For Printers That Use The
Advanced Function Common Control Unit

IPDS Handbook

Document Number: G544-3895-07

Note!

Before using this information and the product it supports, be sure to read the general information in “Notices” on page 11.

Eighth Edition (January 1999)

This edition, G544-3895-07, expands this publication to include new AFCCU printers and models. It obsoletes edition G544-3895-06.

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Preface

This publication is an Intelligent Printer Data Stream (IPDS) reference for printers that contain the Advanced Function Common Control Unit (AFCCU). These printers are:

- IBM 3130 Models 01S/02S/02D/03S
- IBM 3160 Model 001
- IBM 3900 Models D01/D02
- IBM 3900 Models DW1/DW2
- IBM 3900 Model 0W1
- IBM 3900 Model 0W3
- IBM 3935 Model 001
- IBM InfoPrint 60 Model 002
- IBM InfoPrint 60 Finisher
- IBM InfoPrint 62 Models 002/003
- IBM InfoPrint 3000 Model ES1
- IBM InfoPrint 3000 Models ED1/ED2
- IBM InfoPrint 4000 Models DR1/DR2
- IBM InfoPrint 4000 Model IS1
- IBM InfoPrint 4000 Model IS2
- IBM InfoPrint 4000 Models ID1/ID2
- IBM InfoPrint 4000 Models ID3/ID4
- IBM InfoPrint 4000 Models IR1/IR2
- IBM InfoPrint 4000 Models IR3/IR4
- IBM InfoPrint Hi-Lite Color Post-Processor

It is intended for use by systems support personnel who need attachment and data stream information as it pertains to these printers.

Readers are assumed to be familiar with Advanced Function Presentation (AFP) and IPDS.

This book contains the following chapters:

- "Chapter 1. Intelligent Printer Data Stream" on page 21, describes specifically how IPDS relates to the printers covered by this publication.
- "Chapter 2. Exception Reporting and Sense Data" on page 103, provides information about channel commands, channel-related exception recovery, sense data, and acknowledge reply used by IPDS for exception reporting.
- "Chapter 3. AFCCU IPDS Resident Font Sets" on page 147, lists the IPDS fonts resident in the printers.

Terminology

For a definitions of terms, abbreviations, and acronyms used in this book, refer to the *Introduction and Planning Guide* for your printer (see "Related Publications"), and to the *Intelligent Printer Data Stream Reference*, S544-3417.

Related Publications

An extensive listing of available publications is included in the *Introduction and Planning Guide* for each printer.

The following Introduction and Planning Guides are available for use with these printers:

- *3130 Advanced Function Printer Introduction and Planning Guide*, G544-3974
- *InfoPrint 60 and 3160 Advanced Function Printer Introduction and Planning Guide*, G544-5242
- *InfoPrint 62 Introduction and Planning Guide*, G544-5384
- *InfoPrint 4000 and 3900 Advanced Function Printers Introduction and Planning Guide*, G544-5427
- *InfoPrint 3000 Advanced Function Printers Introduction and Planning Guide*, G544-5563
- *3935 Advanced Function Printer Introduction and Planning Guide*, G544-3894
- *InfoPrint Hi-Lite Color Introduction and Planning Guide*, G544-5420

Contact your IBM marketing representative or your IBM system printing specialist for information concerning other publications for any of the printers covered by this publication or associated licensed programs.

The following publications pertain to IPDS and Advanced Function Presentation:

- *Guide to Advanced Function Presentation*, G544-3876
- *Advanced Function Presentation: Printer Summary*, G544-3135
- *Advanced Function Presentation: Printer Information*, G544-3290
- *Intelligent Printer Data Stream Reference*, S544-3417
- *Mixed Object Document Content Architecture Reference*, SC31-6802
- *Presentation Text Object Content Architecture Reference*, SC31-6803
- *Graphics Object Content Architecture Reference*, SC31-6804
- *Image Object Content Architecture Reference*, SC31-6805
- *Bar Code Object Content Architecture Reference*, S544-3766
- *Font Object Content Architecture Reference*, S544-3285

What's New in This Release

This release expands this publication to include:

- IBM InfoPrint 60 finisher
- IBM InfoPrint 3000 Models ES1 and ED1/ED2
- GOCA Boxes and Partial Arcs
- Increased copy group range.

Technical changes are marked with a (|) left margin change character. Editorial changes are not marked.

Chapter 1. Intelligent Printer Data Stream

This section gives an overview of the Intelligent Printer Data Stream (IPDS), lists the IPDS command sets and commands that the following printers accepts, and the IPDS command differences that are unique to each of the following printers:

- 3130 Models 01S/02S/02D/03S
- 3160 Model 001
- 3900 Models D01/D02
- 3900 Models DW1/DW2
- 3900 Model 0W1
- 3900 Model 0W3
- 3935 Model 001
- InfoPrint 60 Model 002
- InfoPrint 60 Finisher
- InfoPrint 62 Models 002/003
- InfoPrint 3000 Model ES1
- InfoPrint 3000 Model ED1/ED2
- InfoPrint 4000 Models DR1/DR2
- InfoPrint 4000 Model IS1
- InfoPrint 4000 Model IS2
- InfoPrint 4000 Models ID1/ID2
- InfoPrint 4000 Models ID3/ID4
- InfoPrint 4000 Models IR1/IR2
- InfoPrint 4000 Models IR3/IR4
- IBM InfoPrint Hi-Lite Color Post-Processing Device that attaches to InfoPrint 4000 and 3900 Advanced Function Printer Models.

This information either differs from or supplements the IPDS command information provided in the *Intelligent Printer Data Stream Reference*, S544-3417.

IPDS is an IBM printer data stream designed to manage and control printer processes. It is distinguished from other data streams for printers because it provides all-points addressability, error recovery and 2-way communications between the printer and Print Service Facility (PSF) licensed programs. Also, IPDS provides data stream compatibility across the IPDS product line independent of speed, physical attachment or rendering technology.

IPDS error recovery assists the customer by providing improved system management and printer operations. For example, the operator is notified by the printer and PSF when human intervention in the print process is required. The notification process provides clear direction of what is needed to correct the printing process, such as font availability notification or paper supply out messages.

PSF provides the customer with transparent resource management by tracking fonts, page segments, and overlays, and sending them to the printer as required.

The 2-way communication at the data stream level provided by IPDS helps synchronize operating system and printer processes, exchanges query-reply information and returns detailed exception information. This function provides the customer with improved printer operations and easier problem identification and resolution. The printers use a subset of the total set of IPDS commands to manage their operations. These commands within the data stream enable the system to control the media-handling capabilities of the printer (request duplexing, select paper sources, and offset printing jobs from each other) and other operations dealing with paper. The commands also provide the means for managing the downloading of fonts and stored objects, such as overlays and page segments, that are required to print an application. The printers support the following data types: text data, font data, IM image data, IOCA image data, graphics data and bar code data. All printers support resident single-byte outline fonts, and host downloadable single-byte outline and raster fonts as supported by the PSF driver. Some printers also support resident and downloaded double-byte raster fonts, while others also support resident and downloaded double-byte outline fonts.

IPDS Command Sets and Commands

All printers covered by this publication support the following IPDS command sets and commands,[1] unless otherwise noted with indicators:

(1) - InfoPrint 4000 Models DR1/DR2, IR1/IR2 or IR3/IR4 only

(2) - Printers with code at version 8.0 or higher

(3) - Printers with code at version 8.3 or higher

(4) - Printers with code at version 9.4 or higher.

- DC1 subset (*) of the Device-Control command set, plus additional commands from this set.

Activate Resource (AR)	X'D62E'
Begin Page (BP) *	X'D6AF'
Deactivate Font (DF) *	X'D64F'
Define User Area (DUA)	X'D6CE'
End (END) *	X'D65D'
End Page (EP) *	X'D6BF'
Include Saved Page (ISP) (1)	X'D67E'
Load Copy Control (LCC) *	X'D69F'
Load Font Equivalence (LFE) *	X'D63F'
Logical Page Descriptor (LPD) *	X'D6CF'
Logical Page Position (LPP) *	X'D66D'
Manage IPDS Dialog (MID) (2)	X'D601'
Apply Finishing Operations (AFO) (4)	X'D602'
No Operation (NOP) *	X'D603'
Sense Type and Model (STM) *	X'D6E4'
Set Home State (SHS) *	X'D697'
Execute Order Anystate (XOA) * (See Note)	X'D633'
Execute Order Homestate (XOH) * (See Note)	X'D68F'

- TX1 subset of the Text command set with PTOCA PT2 data. In addition, printers with code > V8.3 support SEC (Set Extended Text Color) as part of PTOCA PT3 data.

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1. For detailed information on these command sets and commands, see *IBM Intelligent Printer Data Stream Reference*.

Load Equivalence (LE)	X'D61D'
Write Text (WT)	X'D62D'

- IM1 subset of the IM-Image command set with IMD1 data

Write Image Control (WIC)	X'D63D'
Write Image (WI)	X'D64D'

- IO1 subset of the IO-Image command set with FS10 data

Write Image Control 2 (WIC2)	X'D63E'
Write Image 2 (WI2)	X'D64E'

- GR1 subset of the Graphics command set with DR/2V0 data

Write Graphics Control (WGC)	X'D684'
Write Graphics (WG)	X'D685'

- BC1 subset of the Bar Code command set with BCD1 data

Write Bar Code Control (WBCC)	X'D680'
Write Bar Code (WBC)	X'D681'

- OC1 subset of the Object Container command set (3)

Write Object Container Control (WOCC)	X'D63C'
Write Object Container (WOC)	X'D64C'

- OL1 subset of the Overlay command set

Begin Overlay (BO)	X'D6DF'
Deactivate Overlay (DO)	X'D6EF'
Include Overlay (IO)	X'D67D'

- PS1 subset of the Page Segment command set

Begin Page Segment (BPS)	X'D65F'
Deactivate Page Segment (DPS)	X'D66F'
Include Page Segment (IPS)	X'D67F'

- LF1 subset of the Loaded-Font command set

Load Font (LF)	X'D62F'
Load Font Control (LFC)	X'D61F'

Load Font Index (LFI)	X'D60F'

- LF3 subset of the Loaded-Font command set

Load Code Page (LCP)	X'D61B'
Load Code Page Control (LCPC)	X'D61A'
Load Font (LF)	X'D62F'
Load Font Character Set Control (LFCSC)	X'D619'

Note: See “Sense Type and Model (STM) Command — X'D6E4'” on page 48 for supported command orders by printer type and model.

The AFCCU Printers acknowledge replies with:

- Page and copy counters (18-byte counter format)
- 24 bytes of sense data (format 1 is used for data stream positioning exceptions)

Print-Error Markers

If a position exception occurs, and the report-position-check bit is set to B'1' (byte 2, bit 1 of the Execute Order Anystate Exception-Handling Control order), the approximate location of the position exception is shown with a print-error marker (PEM).

PEMs are solid black rectangular marks that are placed along the inside edge of the valid printable area, where the projection of the incorrectly placed data crosses the boundary of the valid printable area. A position exception for a single character, image, or rule may be shown by one or more PEMs.

Due to IPDS mixing rules, PEMs may be completely or partially overlaid by subsequent data and may no longer be visible.

Page Continuation Action (PCA)

There are two types of page continuation actions defined in the IPDS Architecture; skip and continue, page continuation. The AFCCU supports page continuation actions (PCA) since they provide more recovery that skip and continue actions.

PCAs allow the printer to continue processing data after an exception occurs. AFCCU Printers highlight the PCA by drawing a **+** symbol surrounded by a box. The printers also flag print-position errors with a solid rectangle (position check) that may overlap the PCA symbol.

Units of Measurement

AFCCU Printers support any number of L-units per unit base. Current IPDS implementation supports two ratios. Refer to “Expressing Linear Measurements” in *Intelligent Printer Data Stream Reference* if you need more information about units of measure.

Page Counters

The AFCCU Printers contain the following page and copy counters used for error recovery procedures (ERP):

- Received page
- Committed page
- Committed copy
- Operator viewing page
- Operator viewing copy
- Jam recovery page
- Jam recovery copy
- Stacked page
- Stacked copy

Duplex Printing

For those printers that can print duplex, the rasterizer subsystem accepts duplex IPDS data and creates duplex sheets. Duplex affects the following commands:

Load Copy Control
A simplex configuration handles copy subgroups differently than a duplex configuration does.

XOH-Obtain Printer Characteristics
Some of the Self-Defining field attributes change.

Continuous-Forms versus Cut-Sheet

One major way to distinguish printers is paper-type (that is, continuous-forms or cut-sheet). The following list shows the commands that are affected by this division:

XOA-Control Edge Marks
This command only makes sense for a continuous-forms printer.

XOH-Separate Continuous Forms
This command only makes sense for a continuous-forms printer.

XOH-Stack Received Pages
This command only makes sense for a continuous-forms printer.

XOH-Eject to Front Facing
This command requires the hardware to do the eject when using continuous-forms paper; when using cut-sheet this is done by the Rasterizer Subsystem.

Position-Check Highlighting

Support for position-check highlighting is optional in IPDS. All Rasterizer Subsystem configurations support this. Highlighting can be turned on or off by the host. The position-check highlight is a solid rectangle. Position errors are highlighted if either (or both) of the following conditions are true:

- If the “Position-Check Highlight Flag” is on

- If a PCA is being taken (that is, AEA is not enabled and PCA is enabled)

Cut-Sheet Emulation

Some printers provide a 2-UP cut-sheet emulation mode that can be used to print 2-UP on continuous-forms media that, once slit and collated by a post-processing device, emulates cut-sheet output. In this customer-selectable mode, the post-processing device divides the continuous-forms media in half parallel to the carrier strips and controls the placement of pages on either the left side or the right side of the physical media as defined by a printer configuration option.

AFCCU continuous-forms printers provide 4 configuration options for cut-sheet emulation:

Normal Left to Right
: Print data is placed on the left half-sheet first, and then the right half-sheet. The left half-sheet is the one closest to the operator. The physical orientation of the data is based on the lower-left corner of the sheet, from the operator viewpoint.

Normal Right to Left
: Print data is placed on the right half-sheet first, and then the left half-sheet. The right half-sheet is the one furthest from the operator. The physical orientation of the data is based on the lower-left corner of the sheet, from the operator viewpoint.

Inverted Left to Right
: Same as “Normal Left to Right”, except that the physical orientation of the data is based on the upper-right corner of the sheet, from the operator viewpoint—an “upside down” version of Normal Left to Right.

Inverted Right to Left
: Same as “Normal Right to Left”, except that the physical orientation of the data is based on the upper-right corner of the sheet, from the operator viewpoint—an “upside down” version of Normal Right to Left.

If the printer is configured for cut-sheet emulation, the X'C300' in an LCC command enables the function. Absence of the keyword disables this function.

When cut-sheet emulation mode is enabled, the printer partitions the physical media into 2 equal-sized partitions. For the following functions, the printer treats each partition as if it were a separate sheet of cut-sheet media:

- XOA-Alternate Offset Stacker

- XOA-Mark Forms
- XOH-Set Media Origin
- XOH-Select Media Modifications
- Default partition origin is the upper-corner of each partition
- LCC medium overlays
- LCC text suppressions
- LPP
- VPA and UPA checking

Color Processing

Overview

This is a brief outline of how the AFCCU IPDS rasterizer handles colors.

1. When a color is received in a command, preliminary checking is done.
   - The color space must be valid. For most commands, color space is understood to be OCA color. In color triplets and in SEC, it is explicitly specified.
   - The syntax must be valid for that color space.
   - The color value must be valid for that color space. If the color space is OCA, then the OCA color specified must be in the Standard OCA Color Value Table. If an error is recognized, an AEA or PCA is taken if they are available. If this occurs, substitution is done as described in “Substitution and Simulation”). (Note that mapping is attempted on the substituted color.) If the color space is Highlight, then the percents specified must be valid (0 – 100%).
2. If a mapping table is available, mapping is attempted. If a downloaded mapping table is available, it is used. If a downloaded table is not available and a Spot Color Post-processing device is installed and available, then the Internal Default Mapping Table is used. Because error checking was done when the Mapping Table was received, the color produced by the mapping is valid.

   (See “Appendix C. Color Mapping Table” on page 187 for Color Mapping Table details.)
3. The color of ink to be printed is selected based on the resulting color (mapped or original). If the resulting color is valid but not supported, it is simulated as in “Substitution and Simulation”. This might occur with an unsupported OCA color.

Substitution and Simulation

- If an AREA (page, overlay, or object area for BCOCA, IOCA, or GOCA) is being colored, Color of Medium (X'FF08') is used for substitution or simulation.
- If data within a tower (for example, text, barcode, image or graphic) is being colored, substitution and simulation are done with the Default Color (X'FF07', black).

The following sections discuss how the specified color is translated into an ink color.

OCA Color Value Definition

- If the color value is X'0008' or X'FF07', then black is used.
- If the color value is X'FF08', then color of medium is used (only on printers with code at version 8.3 or higher).
- If the color value is X'0000' or X'FF00', then the presentation-process default is used based on the type of object:
  - For GOCA objects, the drawing order default comes from the WGC-GDD command.
  - For other objects, the printer default (black) is used.
- For the remaining valid OCA values:
  - For GOCA area fill, the color is simulated using a shade of gray. Any specified pattern still shows up, and it is in a shade of gray, which is the same as discussed in “Substitution and Simulation” on page 32.
  - For GOCA lines and text, and data within other towers, the default highlight color (black) is used.
  - For area fill (LPD or object areas), color of medium is used.
- An invalid OCA value is any value not present in the “Standard OCA Color Value Table” as described in the *Mixed Object Content Architecture Reference*, SC31-6802. The usual exception handling is performed. If an AEA or PCA is available, substitution is done as explained in “Substitution and Simulation” on page 32, and mapping is performed on the substituted value.

Note: If color-mapping of a GOCA fill pattern succeeded, the OCA color set in GOCA is ignored.

RGB, CMYK, and CIELAB Color Value Definition

Any color in these color spaces is simulated as discussed in “Substitution and Simulation” on page 32.

Highlight Color Space Definition

If a Spot Color Post-processing device is available:

- Highlight color #0 (HL0) is BLACK.
- HL1, HL2 and HL3 are the 3 colors in the Post-processing device.
- All other values are simulated as discussed in “Substitution and Simulation” on page 32.

If a Spot Color Post-processing device is **not** available:

- Highlight color #0 (HL0) is BLACK.
- All other values are simulated as discussed in “Substitution and Simulation” on page 32.

In both cases (with or without a Spot Color attachment):

- For area fill (LPD, object areas, GOCA)
  - Percent Coverage is used
  - Percent Shading is simulated as 0%
- For text, bar code, image, graphics lines
  - Percent Coverage is simulated as 100%
  - Percent Shading is simulated as 0%
- Simulation occurs as the last step before rendering. This means that the actual values specified are used for mapping.

Mixing Rules

The last color placed on the page by the data stream wins. Thus, for example, an application wishing to see a Highlight color rectangle under black text specifies the highlight area first, then the text. (Otherwise, the highlight would erase the text.) The rasterizer creates the desired effect in various ways, realizing that the Spot Color Post-processing device colors are translucent.

IPDS Command Differences and Supported Ranges

The AFCCU Printers use the full range of values from the range column of each command specified in the IPDS architecture, except for the commands described in the tables on the following pages. The information for these commands is specifically for the AFCCU Printers and differs from the *Intelligent Printer Data Stream Reference* manual.

Note: The factory code versions shown in the following table are the latest level of code installed in the printers at the factory. Your printer may not have the latest version of code and its function.

Table 1. AFCCU Printers

Desig-nation	Models	Description	Factory Code Version (in Product Release)
1	3900 Models D01/D02	Duplex and Dual Simplex, continuous-form, 240 pel, 300 IPM	8.528
	3900 Models DW1/DW2	Duplex and Dual Simplex, continuous-form, 240 pel, 300 IPM (464 2-up)	8.528
	3900 Models DW1/DW2 with FC 4253/4	Duplex and Dual Simplex, continuous-form, 240 pel, 458 IPM (708 2-up)	8.528
	3900 Models DW1/DW2 with FC F9930	Duplex and Dual Simplex, continuous-form, 300 pel, 458 IPM (708 2-up)	8.411
	InfoPrint 4000 Models ID1/ID2	Duplex and Dual Simplex, continuous-form, 240, 300, or 240/300 pel, 458 IPM (708 2-up)	9.415
	InfoPrint 4000 Models IR1/IR2	Duplex and Dual Simplex, POD-capable, continuous-form, 480/600 pel, 300 IPM (464 2-up), 240/300/600 pel IPDS and Automatic resolution IPDS (300, 600, and Automatic resolution in 600 mode only)	9.420
	InfoPrint 4000 Models IR3/IR4	Duplex and Dual Simplex, POD-capable, continuous-form, 480/600 pel, 300 IPM (464 2-up), 240/300/600 pel IPDS and Automatic resolution IPDS (300, 600, and Automatic resolution in 600 mode only)	9.420
	InfoPrint 4000 Models ID3/ID4	Duplex and Dual Simplex, continuous-form, 480/600 pel, 648 IPM (1002 2-up), 240/300/600 pel IPDS, and Automatic resolution IPDS (300, 600, and Automatic resolution in 600 mode only)	9.415
	InfoPrint 3000 Model ED1/ED2	Duplex and Dual Simplex, continuous-form, 480, 600 or 480/600 pel, 224 IPM (346 2-up), 240/300/600 pel IPDS, and Automatic resolution IPDS (300, 600, and Automatic resolution in 600 mode only)	9.521

2	3900 Model 0W1	Simplex, continuous-form, 240 pel, 229 IPM (354 2-up)	8.528
	3900 Model 0W1 with FC F9930	Simplex, continuous-form, 300 pel, 229 IPM (354 2-up)	8.411
	3900 Model 0W1 with RPQ 8B3939	Simplex, continuous-form, 240 pel, 229 IPM (no 2-up), narrow paper path	8.528
	3900 Model 0W3	Simplex, continuous-form, 240 pel, 150 IPM (232 2-up), low speed	8.528
	3900 Model 0W1 with FC 4290/1	Simplex, continuous-form, 240 pel, 300 IPM (464 2-up), high speed	8.528
	InfoPrint 3000 Model ES1	Simplex, continuous-form, 480, 600, or 480/600 pel, 112 IPM (173 2-up), 240/300/600 pel IPDS, and Automatic resolution IPDS (300, 600, and Automatic resolution in 600 mode only)	9.521
	InfoPrint 4000 Model IS1	Simplex, continuous-form, 240, 300, or 240/300 pel, 229 IPM (354 2-up)	9.415
	InfoPrint 4000 Model IS2	Simplex, continuous-form, 240 pel, 310 IPM (480 2-up)	9.415
	InfoPrint 4000 Model IS2	Simplex, continuous-form, 240, 300 or 240/300 pel, 324 IPM (501 2-up)	9.415
3	InfoPrint 62 Model 002	Simplex, continuous-form, 240 pel, 62 IPM, AFCCU II	8.525 (3.6.1)
	InfoPrint 62 Model 003	Simplex, continuous-form, 300 pel, 62 IPM, AFCCU II	8.525 (3.6.1)
4	3130 Models 01S/02S	Simplex, cut-sheet, 240/300 pel, 30 IPM	7.1 (2.60)
	3160 Model 001	Duplex, cut-sheet, 240 pel, 60 IPM	7.1 (5.03)
5	3935 Model 001	Duplex, cut-sheet, 300 pel, 35 IPM	6.114 (3.24)

6	3130 Model 03S	Simplex, cut-sheet, 240/300 pel, 30 IPM, AFCCU II	8.123 (10.23.11)
	3130 Model 02D	Duplex, cut-sheet, 240/300 pel, 30 IPM, AFCCU II	8.123 (10.23.11)
7	InfoPrint 60 Model 002	Duplex, cut-sheet, 600 pel, 60 IPM	8.123 (2.43)
8	Reserved		
9	InfoPrint Hi-Lite Color Post-processor for 3900 and InfoPrint 4000 models supporting 240 pel	Simplex, spot color, 3.2 inch coverage or 8.5 inch Coverage	8.528 9.419
10	InfoPrint 4000 Models DR1/DR2	Duplex only, POD only, continuous-form, 600 pel, 300 IPM (464 2-up)	9.108
	InfoPrint 4000 Models IR1/IR2	Duplex and Dual Simplex, POD-capable, continuous-form, 480/600 pel, 300 IPM (464 2-up), 240/300/600 pel IPDS, and Automatic resolution IPDS (300, 600, and Automatic resolution in 600 mode only)	9.420
	InfoPrint 4000 Models IR3/IR4	Duplex and Dual Simplex, POD-capable, continuous-form, 480/600 pel, 458 IPM (708 2-up), 240/300/600 pel IPDS, and Automatic resolution IPDS (300, 600, and Automatic resolution in 600 mode only)	9.420
11	InfoPrint 60 Model 002	Duplex, cut-sheet, 600 pel, 60 IPM, 240/300/600 pel IPDS, and automatic resolution IPDS	9.108 (5.4)
	InfoPrint 60 Model 002	Duplex, cut-sheet, 600 pel, 60 IPM, 240/300/600 pel IPDS, and automatic resolution IPDS, optional finisher	9.415 (7.46)

Acknowledge Reply

Table 2 shows the acknowledge reply responses to commands.

Table 2. Acknowledge Reply

Bytes	Range	Description
0	X'40', X'41', X'44', X'46', X'C0', X'FF'	Acknowledge Reply Type

Notes:

1. The printer sets flag byte bit 1 (correlation ID present) and provide the appropriate correlation ID when the command that caused the ACK contained a correlation ID.
2. The AFCCU Printers do support the Acknowledgement-Continuation function (flag byte bit 2).
3. The Acknowledge Reply Type of X'FF' is used when the host sends an unexpected READ CCW command. The data sent back in response to the READ CCW is X'0006D6FF00FF'.

Device Control Command Set

Activate Resource (AR) Command — X'D62E'

Not all of the data fields in each format are used by the AFCCU printers. Only the date and time from the last Object Data and Time Stamp appended to the AR command is used for the resource's date and time. Only the Cyclic Redundancy Checks, Date Stamps, and Time Stamps (from each subfield) and Grid halves are used from the IBM MVS Host Unalterable Remote Font format. For more information about resource types and ID formats, see Table 70 on page 149.

Define User Area (DUA) Command — X'D6CE'

Following a printer IML, the User Area is reset to the physical printable area.

Include Saved Page (ISP) Command — X'D67F'

This command is a page state command that causes a previously saved page to be presented at the origin of the current page presentation space. If page overlays were also saved for the saved page, the overlays are also presented. Only one ISP command is allowed in a page to be printed; if more than one ISP command is encountered, exception ID X'0255..04' exists.

Nesting of saved pages is not allowed. If an ISP command is specified within a page that is being saved, exception ID X'0255..05' exists.

If any portion of the saved page, including page overlays saved with the page, extends outside of the physical printable area, exception ID X'08C2..00' exists. All data within the saved page and within overlays saved with the page must also stay within the user printable area, if one exists.

If text suppression were specified when the page was saved, a separate copy of the page was saved for each combination of text suppressions. When including a saved page for printing, the appropriate copy of the saved page is used. If the current LCC command specifies a text suppression combination that was not previously saved, exception ID X'0255..06' exists.

Data stream NACKs might have been reported earlier, when the page was saved; these NACKs do not recur when the ISP command is processed.

The format of the data field of this command is as follows:

Offset	Name	Range	Meaning	Required
0—3	Page sequence number	X'00000001' — X'FFFFFFFF'	Page sequence number for the page to be included	X'00000001' — X'FFFFFFFF'
4—n	Triplets		One or more ISP triplets: X'00' Group ID triplet with variable-length group ID X'08'.	

Bytes 0—3

If the requested page had not been previously saved, exception ID X'0255..01' exists. If an invalid value is specified, exception ID X'0255..02' exists.

Bytes 4—n

Printers ignore any triplet that is not supported and no exception is reported. If byte 4 or the first byte after a triplet is X'00' or X'01' (an invalid triplet length), exception ID X'027A..01' exists.

The Group ID triplet with a variable-length group ID is mandatory and identifies the group of saved pages. If more than one Group ID triplet with a variable-length Group ID is present in the ISP command, the last one is used and the others are ignored. If a group of saved pages cannot be found, or if this triplet is absent, exception ID X'0255..03' exists.

Load Copy Control (LCC) Command — X'D69F'

The command can be of any valid IPDS command length for this command. Only 128 copy subgroups are supported on versions < 9.3 or < 8.522. The 512 copy subgroups are supported on versions > 9.3 or > 8.522. Suppression identifications can range from X'01' to X'FF'. N-Up is supported for 1 to 4 partitions per side of a sheet.

Multiple Media Sources are also supported in the copy subgroups. If a media source is not specified and a XOH-SIMS command has not been received, media is selected from a printer designated, available default media source.

Multiple Media Destinations are also supported in the copy groups. If a media destination is not specified, media is directed to a printer designated, available default media destination.

Note: See “Appendix A. Media Source ID to Printer Location Translation” on page 184 and “Appendix B. Media Destination ID to Printer Location Translation” on page 186. If media source ID X'04' (Envelope Feeder) is specified for any model of 3130 printer, a media destination ID X'0001' must be specified else exception ID X'0237..04' exists.

A maximum of 64 medium overlays are allowed in one copy subgroup.

Load Font Equivalence (LFE) Command — X'D63F'

The Load Font Equivalence command can be used to activate coded fonts by specifying a non-zero GRID. Table 3 shows the default values for the GRID when activating a coded font.

Table 3. Load Font Equivalence Command Data

Offset	Field ID	Range of Values	Default Value
5—6	GCSGID	X'0001'—X'FFFE'	X'FFFF' = 1269
7—8	CPGID	X'0001'—X'FFFE'	X'FFFF' = 500
9—10	FGID	X'0001'—X'FFFE'	X'FFFF' = 416
11—12	Font Width	X'0001'—X'7FFE'	X'FFFF' = 144

Logical Page Descriptor (LPD) Command — X'D6CF'

Table 4 shows the logical page descriptor command data.

Table 4. Logical Page Descriptor Command Data

Bytes	Range	Description
15	—	Reserved (not examined)
41—42	X'0000', X'0001', X'0002', X'0003', X'0004', X'0005', X'00 06', X'0008', X'0010', X'FF00', X'FF01', X'FF02', X'FF03', X'FF04', X' FF05', X'FF06', X'FF07', X'FF08', X'FFFF'	Text color
Note: See the X'6201' property pair under the “Device Control” section of Table 7 on page 48 to determine which printers support the following optional triplets.		
43—n	X'4E' X'70'	Color Specification Triplet Presentation Space Reset Mixing Triplet

Following a printer IML, the page descriptor control record is initialized to the following default values. Table 5 on page 44 shows the logical page descriptor command—default control record.

Table 5. Logical Page Descriptor Command–Default Control Record

Bytes	Default Page Descriptor Control Record Field Descriptions	Default Value	Description of the Default Field Values
0	Unit-base	X'00'	The unit base is ten inches.
1	Reserved	X'00'	This field is reserved.
2—3	X_m, X_p, and I units per unit base	X'0960'	2400 L-units per 10 inches
4—5	Y_m, Y_p, and B units per unit base	X'0960'	2400 L-units per 10 inches
6	Reserved	X'00'	This field is reserved.
7—9	X_p extent	X'000708'	The X_p extent of the logical page is 7.5 inches.
10	Reserved	X'00'	This field is reserved.
11—13	Y_p extent	X'000960'	The Y_p extent of the logical page is 10 inches.
14—23	Reserved	X'00..00'	This field is reserved.
24—25	I-axis orientation	X'0000'	The I-axis orientation is left-to-right (+X).
26—27	B-axis orientation	X'2D00'	The B-axis orientation is top-to-bottom (+Y).
28—29	Initial inline coordinate (I_o)	X'0000'	Printing starts (0) L-units to the right of the logical page origin.
30—31	Initial baseline coordinate (B_o)	X'0028'	Printing starts (40) L-units below the logical page origin.
32—33	Margin position value	X'0000'	The initial margin position is at the left edge of the logical page.
34—35	Inter-character adjustment value	X'0000'	The initial inter-character adjustment is zero L-units.
36—37	Reserved	X'0000'	This field is reserved.
38—39	Baseline-sequence increment value	X'0028'	The initial baseline-sequence increment is (40) L-units.
40	Font number	X'FF'	Printing is with the printer default font.
41—42	Text color	X'FF07'	The text color is black.
Note: The resident printer default font is Courier 12.			

Logical Page Position (LPP) Command — X'D66D'

During an IML operation, the printer microcode sets the page position control record equal to the default field values. Table 6 shows the logical page position command-default control record.

Table 6. Logical Page Position Command—Default Control Record

Bytes	Page Position Control Record Field Description	Description of the Default Field Values
0	Reserved	Set to X'00'
1—3	Xm Coordinate	Specifies (in L-units) the Xm coordinate location for the origin of the logical page: set to X'000078’ (decimal 120) L-units
4	Placement	Set to X'00' (default placement)
5—7	Ym Coordinate	Specifies (in L-units) the Ym coordinate location for the origin of the logical page: set to X'000078’ (decimal 120) L-units
8—9	Orientation	Set to X'0000' (0° orientation)

Manage IPDS Dialog (MID) — X'D601'

This command is valid only in home state and causes the printer to either start or stop an IPDS Dialog.

Any IPDS command can start an IPDS Dialog. If an IPDS Dialog has been started and a later MID command with a “Start IPDS Dialog” value is received, the MID command is treated like a NOP command. Also, if an MID command with an “End IPDS Dialog” value is receive as the first command in an IPDS dialog, the MID command is treated like a NOP command.

If the ARQ flag in the MID command is set to B'1', the IPDS Dialog does not end until a positive acknowledge reply has been sent. If a NACK is sent in response to a MID command, the state of the IPDS Dialog is not changed.

When an IPDS Dialog is ended, but the carrying-protocol session remains active, the printer normally maintains unchanged the state machine and all IPDS resources. When a later IPDS command is received, the IPDS Dialog can continue as if it had not been interrupted at all. If the printer does not change any portion of the IPDS state machine or resource information after an IPDS Dialog is ended, the printer must issue an appropriate action code X'1D' NACK or exception ID X'0100..00' (normal printer restart) when the next IPDS command is received.

A printer can request the presentation service program to end the current IPDS Dialog by issuing exception ID X'0180..00'.

The format of the data field for this command is as follows:

Offset	Name	Range	Meaning	Required
0	Type	X'00' X'01'	Start IPDS dialog End IPDS dialog	X'00' X'01'
Note: If an invalid value is specified in the Range field, exception ID X'025B..01' exists.				

Apply Finishing Operations (AFO) — X'D602'

This command is valid only in home state and directs the printer to apply zero or more finishing operations to the current sheet and each copy of that sheet. The current sheet is the sheet on which the first copy of the next received page will be printed. The operations are not applied to sheets after the copies of the current sheet.

An AFO command completely replaces any previously sent AFO command for the current sheet.

Specific finishing operations are specified in Finishing Operation triplets X'85..00'. If no triplets are specified, this command completely replaces any previously sent AFO command for the current sheet and is then treated as if it were a No Operation (NOP) command; this provides a reset function.

The format of the data field for this command is as follows:

Offset	Name	Range	Meaning	Required
0 to end of AFO	Triplets		Zero or more triplets: X'85' Finishing Operation triplet (for operation X'07'- Z-fold)	
Note: If byte zero or the first byte after a triplet is X'00' or X'01' (an invalid triplet length), exception ID X'027A..01' exists.				

Sense Type and Model (STM) Command — X'D6E4'

Table 7 and Table 8 on page 50 define the acknowledge record returned in response to a Sense Type and Model command for printers, as designated in Table 1 on page 36. The byte descriptions are found in the *Intelligent Printer Data Stream (IPDS) Reference*, S544-3417.

Table 7. Sense Type and Model Response Record (Part 1)

Bytes	Value	Description
0	X'FF'	This value must be X'FF'
1—2	X'3130'	Product number for 3130
1—2	X'3160'	Product number for 3160 Product number for InfoPrint 60
1—2	X'3900'	Product number for 3900 Product number for InfoPrint 4000 Models-DR1/DR2
1—2	X'3935'	Product number for 3935
1—2	X'4000'	Product number for InfoPrint 4000 (except Models DR1/DR2)
1—2	X'3300'	Product number for InfoPrint 3000
1—2	X'4370'	Product number for InfoPrint 62 Models 002/003
3	X'01'	Model number for 3935 Model 001
3	X'03'	Model number for 3130 Models 01S/02S/02D/03S Model number for 3160 Model 001
3	X'04'	Model number for InfoPrint 60 Model 002
3	X'B0'	Model number for 3900 Model 0W1 Model number InfoPrint 4000 Models IS1, IS2, and InfoPrint 3000 Model ES1
3	X'B3'	Model number for 3900 Model 0W3

Table 7. Sense Type and Model Response Record (Part 1) (continued)

Bytes	Value	Description
3	X'B1'	Model number for 3900 Models DW1/DW2, InfoPrint 3000 Models ED1/ED2 and InfoPrint 4000 Models ID1/ID2, ID3/ID4, IR1/IR2, and IR3/IR4 in dual-simplex mode
3	X'BB'	Model number for 3900 Models DW1/DW2, InfoPrint 3000 Models ED1/ED2, and InfoPrint 4000 Models DR1/DR2, ID1/ID2, ID3/ID4, IR1/IR2, and IR3/IR4 in duplex mode
3	X'D1'	Model number for 3900 Models D01/D02 in dual-simplex mode
3	X'DD'	Model number for 3900 Models D01/D02 in duplex mode
4—5	X'0000'	Reserved

Table 8. Sense Type and Model Response Record (Part 2)

Bytes	Value	IPDS Command-Set Support	Printers Supporting
6—n	X'00xx'	Length of this command-set vector, including itself (Variable, according to the number of command orders and command set vectors supported by each printer)	All Printers
	X'C4C3'	Device-Control command-set ID	All Printers
	X'FF10'	Device-Control—DC1 subset ID	All Printers
	X'6001'	Multi-copy and copy-subgroup support in LCC Command	All Printers
	X'6002'	Media-source-selection-support in LCC Command	All Printers
	X'6003'	Media-destination-selection-support in LCC Command	All Printers
	X'6101'	Explicit page placement and orientation support in LPP Command	All Printers
	X'6201'	Logical page and object area coloring support	All Printers > V8.3
	X'7001'	Manage IPDS Dialog (MID) Command support	4, All Printers > V8.0
	X'7002'	Apply Finishing Operation (AFO) Command support	Printers with finisher installed and enabled
	X'702E'	Activate Resource (AR) Command support	All Printers
	X'707E'	Include Saved Page (ISP) Command support	10
	X'70CE'	Define User Area (DUA) Command support	All Printers
	X'8008'	XOA Mark Form (MF) Order support	All Printers
	X'800A'	XOA Alternate Offset Stacker (AOS) Order support	All Printers
	X'800C'	XOA Control Edge Marks (CEM) Order support	1, 2, 3, 10
	X'80F2'	XOA Discard Buffered Data (DBD) Order support	All Printers
	X'80F4'	XOA Request Resource List (RRL) Order support	All Printers
	X'80F6'	XOA Exception Handling Control (EHC) Order support	All Printers
	X'9001'	XOH Print Buffered Data (PBD) Order support	All Printers
	X'9002'	XOH Deactivate Saved Page Group (DSPG) Order support	10
	X'9003'	XOH Specify Group Operation (SGO) Order support	10
	X'9004'	XOH Define Group Boundary (DGB) Order support	10
	X'9005'	XOH Erase Residual Print Data (ERPD) Order support	All Printers
	X'9007'	XOH Erase Residual Font Data (ERFD) Order support	All Printers
	X'9009'	XOH Separate Continuous Forms (SCF) Order support	1, 2, 3, 10
	X'900A'	Remove saved page groups (RSPG) Order support	10
	X'900D'	XOH Stack Received Pages (SRP) Order support	All Printers
	X'900E'	XOH Select Medium Modifications (SMM) Order support	1, 2, 3, 10
	X'9013'	XOH Eject to Front Facing (EFF) Order support	All Printers
	X'9015'	XOH Select Input Media Source (SIMS) Order support	All Printers
	X'9016'	XOH Set Media Origin (SMO) Order support	All Printers

6—n	X'000C'	Length of this command-set vector, including itself	All Printers
	X'D7E3'	Text command set—TX1 subset ID	All Printers
	X'FF20'	PTOCA PT2 data—Level ID	All Printers < V8.3
	X'FF30'	PTOCA PT3 data—Level ID	All Printers > V8.3
	X'1001'	Unordered text support	All Printers
	X'4020'	Limited simulated color support	All Printers < V8.3
	X'4022'	Limited simulated color support and color of medium	All Printers > V8.3
	X'50FF'f	Eight text orientations supported	All Printers

6—n	X'000C'	Length of this command-set vector, including itself	All Printers
	X'C9D4'	IM-Image command set—IM1 subset ID	All Printers
	X'FF10'	IMD1 data—Level ID	All Printers
	X'1001'	Unordered-image support	All Printers
	X'4020'	Limited simulated color support	All Printers < V8.3
	X'4022'	Limited simulated color support and color of medium	All Printers > V8.3
	X'A004'	Four image rotations supported	All Printers

6—n			
	X'001E'	Length of this command-set vector, including itself	All Printers
	X'C9D6'	IO-Image command-set—IO1 subset ID	All Printers
	X'FF10'	IOCA FS 10 data—Level ID	All Printers
	X'1001'	Unordered-image support	All Printers
	X'4020'	Limited simulated color support	All Printers < V8.3
	X'4022'	Limited simulated color support and color of medium	All Printers > V8.3
	X'5001'	IBM-MMR compression support	All Printers
	X'5003'	Uncompressed image support	All Printers
	X'5006'	RL4 compression support	All Printers
	X'5008'	ABIC (Bilevel Q-coder) support	All Printers
	X'5081'	G3 MR support	All Printers
	X'5082'	G4 MMR support	All Printers
	X'5101'	Bit ordering supported	All Printers
	X'A004'	Four image rotations supported	All Printers
	X'F300'	Replicate and trim mapping support	All Printers
	X'F301'	Scale-to-Fill mapping support	All Printers > V9.1

6—n			
	X'000C'	Length of this command-set vector, including itself	All Printers < V8.5
	X'000E'	Length of this command-set vector, including itself	All Printers > V8.5, < V9.3
	X'0010'	Length of this command-set vector, including itself	All Printers > V9.3, < V9.6
	X'0012'	Length of this command-set vector, including itself	All Printers > V9.6
	X'E5C7'	Graphics command set—GR1 subset ID	All Printers
	X'FF20'	GOCA DR2/V0 data—Level ID	All Printers
	X'1001'	Unordered-graphics support	All Printers
	X'4020'	Limited simulated color support	All Printers < V8.3
	X'4022'	Limited simulated color support and color of medium	All Printers > V8.3
	X'4100'	Set process color drawing order support	All Printers > V8.5
	X'4101'	Box drawing orders supported	All Printers > V9.3
	X'4102'	Partial Arc drawing orders supported	All Printers > V9.6
	X'A004'	Four graphic rotations supported	All Printers

6—n	X'000C'	Length of this command-set vector, including itself	All Printers
	X'C2C3'	Bar Code command set—BC1 subset ID	All Printers
	X'FF10'	BCOCA BCD1 data—Level ID	All Printers
	X'1001'	Unordered bar code support	All Printers
	X'4020'	Limited simulated color support	All Printers < V8.3
	X'4022'	Limited simulated color and color of medium support	All Printers > V8.3
	X'A004'	Four bar code rotations supported	All Printers
6—n	X'0006'	Length of this command-set vector, including itself	All Printers > V8.3
	X'D6C3'	Object Container command set—OC1 subset ID	All Printers > V8.3
	X'0000'	No levels defined	All Printers > V8.3
6—n	X'0008' or	Length of this command-set vector, including itself	All Printers < V8.2
	X'000A' or	Length of this command-set vector, including itself	All Printers > V8.2
	X'000C'	Length of this command-set vector, including itself	All Printers > V9.2
	X'D6D3'	Overlay command-set ID	All Printers
	X'FF10'	OL1 subset ID	All Printers
	X'1505'	Five-levels of Overlay Nesting	All Printers
	X'1102'	Extended overlay support	All Printers > V8.2
	X'A004'	Page overlay rotation support; all four orientations supported in the IO command	All Printers > V9.2
6—n	X'0006'	Length of this command-set vector, including itself	All Printers < V8.2
	X'0008'		All Printers > V8.2
	X'D7E2'	Page Segment command-set ID	All Printers
	X'FF10'	PS1 subset ID	All Printers
	X'1101'	Extended page segment support	All printers > V8.2

6—n	X'00xx'	Length of this command-set vector, including itself (variable, according to the types of fonts supported)	All Printers
	X'C3C6'	Loaded Font command-set ID	All Printers
	X'FF10'	LF1 subset ID	All Printers
	X'A004'	Four pattern rotations supported	All Printers
	X'B001'	Double-byte fonts supported	All Printers
	X'B002'	Underscore width and position used	All Printers
	X'C005'	Bounded-box raster-font technology	All Printers
	X'C100'	Fixed Metrics support	All Printers
	X'C101'	Relative Metrics support	All Printers

6—n	X'00xx'	Length of this command-set vector, including itself (variable, according to the types of fonts supported	All Printers
	X'C3C6'	Loaded Font command-set ID	All Printers
	X'FF30'	LF3 subset ID	All Printers
	X'A004'	Four pattern rotations supported	All Printers
	X'B001'	Double-byte fonts supported	All Printers > V8.0
	X'B002'	Underscore width and position used	All Printers
	X'B003'	GRID parts required in LFCSC and LCPC	All Printers > V8.0
	X'C01E'	CID-keyed outline font technology	All Printers > V8.0
	X'C01F'	Type 1 PFB outline font technology	All Printers
	X'C101'	Relative Metrics support	All Printers

Execute Order Anystate (XOA) Command — X'D633'

Request Resource List (RLL) Order (X'F400'): The AFCCU Printers do not support multiple-entry queries or queries for the following resource type: X'FF' = All resources, but do support resource type X'20' = Saved Page Group with resource ID format X'08' = Variable-length Group ID Triplet.

The printers do support host-assigned resource-identifier formats for all resource types and IBM Global Resource IDs for all types except Page Segments and Overlays.

The AFCCU Printers support RRL reply continuation. If bytes 3—4 of the XOA-RRL order are non-zero, the printer returns the next set of data to the host. They also support Acknowledgement-Continuation so either method may be used to request the remaining data when the reply is more than 256 bytes.

Exception-Handling Control (EHC) Order (X'F600'): The AFCCU Printers use Page Continuation Actions (PCA). Following an IML, the printer default is to report all errors, terminate page processing, print to the point of all errors, highlight position-check errors, but not to take Alternate Exception Action (AEA) (bytes 2, 3, 4 = X'C30101').

Execute Order Homestate (XOH) Command — X'D68F'

Deactivate Saved Page Group (DSPG) Order (X'0200'): This order directs the printer to deactivate one or more previously saved page groups.

Deactivating a saved page group also terminates the DGB group (if it was not already terminated) and terminates all DGB groups with lesser group levels that are nested within the group to be deactivated.

Only saved page groups specified in this order are deactivated; other saved page groups, including those created by DGB nesting, are not automatically deactivated.

The format of the data field of this command is as follows:

Offset	Name	Range	Meaning	Required
0—1	Order code	X'0200'	Deactivate Saved Page Group order code	X'0200'
2—end	Triplets		Zero or more Group ID triplets X'00' Group ID triplet with variable-length group ID X'08'.	

Bytes 0—1
DSPG order code

Bytes 2—n

Zero or more triplets

If no triplets are specified, all open saved page groups are terminated and all saved pages groups are deactivated; this is a deactivate-all function. A deactivate-all command when there are no saved page groups present is effectively a NOP.

The groups to be deactivated are identified by Group ID triplets containing a variable-length Group ID. If the printer does not find the saved page group identified by a Group ID triplet, exception ID X'0255..07' exists.

Exception ID X'0255..08' exists if any of the following occurs in the triplets field:

- Byte 2 or the first byte after a valid triplet was X'00' or X'01' (an invalid triplet length).
- A triplet other than a Group ID triplet (X'00') was specified.
- A Group ID triplet without a variable-length group ID was specified.

Remove Saved Page Group (RSPG) Order (X'0A00'): This order directs the printer to deactivate and remove one or more previously saved page groups.

Removing a saved page group also terminates the DGB group (if it was not already terminated) and terminates all DGB groups with lesser group levels that are nested within the group to be removed.

Only saved page groups specified in the XOH RSPG command are removed; other saved page groups, including those created by DGB nesting, are not automatically removed.

The XOH RSPG command instructs the printer to remove a saved page group, but the removal might not be immediate. If pages from the group were previously included (using an ISP command) in pages to be printed, the saved page group is not removed until all of those pages are printed and stacked.

Offset	Name	Range	Meaning	Required
0—1	Order code	X'0A00'	Remove Saved Page Group order code	X'0A00'
2—end	Triplets		Zero or more Group ID triplets X'00' Group ID triplet with variable-length group ID .	

Bytes 0—1

RSPG order code

Bytes 2—n

Zero or more triplets

If no triplets are specified, all open saved page groups are terminated, all saved pages groups are deactivated, and all saved page groups are removed; this is a remove-all function. A remove-all command when there are no saved page groups present is effectively an NOP.

The groups to be removed are identified by Group ID triplets containing a variable-length Group ID. If the printer does not find the saved page group identified by a Group ID triplet, exception ID X'0255..0A' exists.

Exception ID X'0255..0A' exists if any of the following occurs in the triplets field:

- Byte 2 or the first byte after a valid triplet was X'00' or X'01' (an invalid triplet length).
- A triplet other than a Group ID triplet (X'00') was specified.
- A Group ID triplet without a variable-length group ID was specified.

Specify Group Operations (SGO) Order (X'0300'): Byte 2 (SGO Operation Identifier) —

- Value X'01' Keep group together as a print unit.

  A print unit is atomic. During an IPDS dialog, a printer or intermediate device must preserve the IPDS environment as established by the IPDS presentation services program. If the printer has the capability of accepting and printing data from other data streams or sessions, the printed pages that comprise the print unit must be printed and kept together in the same manner as if the printer had been dedicated to this IPDS

session. If the pages cannot be printed and kept together in this manner, a catastrophic event exists that requires the printer to generate exception ID X'018F..00' (error printer restart).

- Value X'03' Save pages

  This operation directs the printer to process each page of the group normally and report data stream exceptions, but to save each page rather than printing it. The pages of the group are each assigned a sequence number by the printer, and kept together along with the variable-length group ID that is specified in the XOH-DGB order that begins the group.

  If the page is too large to save, exception ID X'0255..09' exists.

  Groups that do not have a variable-length group ID, in the XOH-DGB order that initiates the group, are not saved. If the printer has a previously saved group with the same variable-length group ID, exception ID X'0255..00' exists. The saved pages remain in the printer until either: an XOH-ERPD order is received, the printer deletes the group while it is inactive, or the printer is IMLed.

  Nesting of saved page is not allowed. If an ISP command is specified within a page that is being saved, exception ID X'0255..05' exists.

- Value X'04' Finish

  This operation directs the printer to finish the sheets containing a group of pages that have been collected in a page group. The specific finishing operation paramenters are specified in zero or more Finishing Operation triplets X'85' contained in the XOH DGB command that either initiates or terminates the group. If multiple Finishing Operation triplets are specified, the operations are applied in the order received and duplicate operations are ignored. If no Finishing Operation triplets are specified in either XOH D6B command, no finishing operation is applied.

Define Group Boundary (DGB) Order (X'0400'): To use the “Save Pages” facility within the XOH-SGO command, the following is required in a specified Group ID triplet:

- Byte 1 Triplet Type : X'00' – Group ID
- Byte 2 Format : X'08' – Variable-length group ID format
- Byte 3–end : Variable-length Group ID

To use the Finisher Operations within the XOH-SGO command, the following is required in a specified Finishing Operation triplet:

- Byte 1 Triplet Type :

  X'85' – Finishing Operation
- Byte 2 Operation Type:

  X'01' – Corner staple
  X'02' – Saddle stitch
  X'03' – Edge stitch
- Byte 5 Reference Corner/Edge:

  X'00' – Bottom-right; bottom (Only valid for short-edge fed paper)
  X'01' – Top-right; right (Only valid for long-edge fed paper)
  X'02' – Top-left; top (Only valid for short-edge fed paper)
  X'03' – Bottom-left; left (Only valid for long-edge fed paper)
  X'FF' – Default
- Byte 6– Count of Operations: X'00', X'02', X'03'
- Byte 7-8 Axis offset (in mm): X'FFFF'
- Byte 9-17 : Positions (in mm) Not allowed

Obtain Printer Characteristics (OPC) Order (X'F300'): The following tables, Table 9 through Table 23 on page 75, show the fields returned in response to this order for printers, as designated by Table 1 on page 36.

The fields are returned in the order shown.

Table 9. Printable Area—Media Sources

Bytes	Description	Value : Printers Supporting
0—1	Length of this self-defining field, including itself	X'xxxx' Variable : All Printers (variable, according to Media ID Length)
2—3	Printable Area self-defining field ID	X'0001' : All Printers

Table 9. Printable Area—Media Sources (continued)

Bytes	Description	Value : Printers Supporting
4	Media Source ID — (Printers with more than one Media Source ID return multiple Printable Area records; one record for each supported Media source ID in this byte) **(See "Appendix A. Media Source ID to Printer Location Translation" on page 184 for ID number to printer physical location name translations.)**	X'00' : Printers 1, 2, 3, 10 X'00, 01' : Printer 4 (Model 01S) X'00, 01, 02, 03, 04' : Printer 4 (Model 02S) X'00, 01, 02, 03, 04' : Printer 6 (Model 03S) X'00, 01, 02, 03' : Printer 6 (Model 02D) X'00, 01, 02, 03' : Printers 5, 7, 11
5	Reserved	X'00' : All Printers
6	Unit Base for this self-defining field	X'00' (ten inches) : All printers
7	Reserved	X'00' : All Printers
8—9	L-units per unit-base	X'3840' : All Printers
10—11	Width of the media presentation space in L-units.	Variable : All Printers (according to forms size)
12—13	Length of the media presentation space in L-units.	Variable : All printers (according to forms size)
14—15	Printable Area X-offset in L-units	X'0000' : All Printers
16—17	Printable Area Y-offset in L-units	X'0000' : All Printers
18—19	Printable Area X-extent in L-units	Variable : All Printers (according to forms size)
20—21	Printable Area Y-extent in L-units	Variable : All printers (according to forms size)

Table 9. Printable Area—Media Sources (continued)

Bytes	Description	Value : Printers Supporting
22—23	Media Source Characteristics: Bit 0: Duplex =B'0' Media source not capable of duplexing =B'1' Media source capable of duplexing Bits 1—2: Media Type =B'01' Continuous-forms media =B'10' Cut-sheet media (Note 1) Bit 3: Media Availability =B'0' Media source not available =B'1' Media source available Bit 4: Reserved Bit 5: Envelope Media =B'0' Non-envelope Media =B'1' Envelope Media Bit 6: Media Feed–Manual (B'1'), Auto (B'0') Bits 7—15: Reserved	Applies to all Media Source IDs unless otherwise noted. Printer 1 (dual-simplex mode), 2, 3, 4, 6 (Model 03S) Printers 1, 10 (duplex mode), 6 (Model 02D) 5, 7, 11 Printers 1, 2, 3, 10 Printers 4, 5, 6, 7, 11 All Printers All Printers B'0' All Printers N/A B'0' : All Printers B'000000000' : All Printers
24—25	Media ID length	Variable : All Printers
26	Media ID Type	X'00' : All Printers
27—n	Media ID	Variable : All Printers

Notes:

1. The cut-sheet printers support continuous operation out of the media sources (when multiple trays are installed). Printers are configured for this mode when the media (paper) names are the same (defined by the operator) for both sources. The internal engine software automatically selects the alternate supply when the other supply has been depleted.

Table 10 shows the field data for image and coded font resolution.

Table 10. Image and Coded Font Resolution

Bytes	Description	Value : Printers Supporting
0—1	Length of this self-defining field, including itself	X'000A' : All Printers
2—3	Image and Coded Font Resolution self-defining field ID	X'0003' : All Printers
4	Unit Base = 10 inch increments	X'00' : All Printers
5	Raster patterns resolutions supported: Only resolutions specified in bytes 6–9 All resolutions allowed	X'00': All Printers X'FF': All Printers > V9.1
6—7	X pels per unit base	X'0960' (2400 pels/10 inches) : Printers 1, 2, 3, 4, 6, 11 X'0BB8' (3000 pels/10 inches) : Printers 1, 2, 3, 4, 5, 6, 11 X'1770' (6000 pels/10 inches) : Printers 7, 10, 11
8—9	Y pels per unit base	X'0960' (2400 pels/10 inches) : Printers 1, 2, 3, 4, 6, 11 X'0BB8' (3000 pels/10 inches) : Printers 1, 2, 3, 4, 5, 6, 11 X'1770' (6000 pels/10 inches) : Printers 7, 10, 11

Table 11 on page 63 through Table 14 on page 65 shows the field data for storage pools. The storage pool data is returned in the order shown in these tables.

Table 11. Storage Pools

Bytes	Description	Value : Printers Supporting
0—1	Length of this self-defining field, including itself	X'004B'
2—3	Storage Pools self-defining field ID	X'0004' : All Printers
4—n	Self-defining parameters for each Storage Pool	See Area 1, 2 and 3 Records

Table 12. Storage Pools : Area 1

Bytes	Description	Value : Printers Supporting
0	Length of this Storage Pool (including itself) : Area 1 Record	X'13' : All Printers
1	Record ID	X'01' : All Printers
2	Storage Pool ID	X'01' : All Printers
3—6	Size of storage pool when empty (bytes)	X'00800000' : Printer 1 (unless also 10) X'00300000' : Printers 2, 3, 4, 5, 6, 7, 10, 11
7—10	Reserved	X'00000000' : All Printers
11—18	A repeating group of two-byte self-defining parameters that specify objects housed in this storage pool are defined as follows: Page graphics data Page image data Page text data Page bar code data	 X'0011' : All Printers X'0012' : All Printers X'0013' : All Printers X'0014' : All Printers

Table 13. Storage Pools : Area 2

Bytes	Description	Value : Printers Supporting
0	Length of this Storage Pool (including itself) : Area 2 Record	X'1B' : All Printers
1	Record ID	X'01' : All Printers
2	Storage Pool ID	X'02' : All Printers
3—6	Size of storage pool when empty (bytes)	X'00800000' : Printer 1 (unless also 10) X'00300000' : Printers 2, 3, 4, 5, 6, 7, 10, 11
7—10	Reserved	X'00000000' : All Printers
11—26	A repeating group of two-byte self-defining parameters that specify objects housed in this storage pool are defined as follows: Overlay graphics data Overlay image data Overlay text data Overlay bar code data Page segment graphics data Page segment image data Page segment text data Page segment bar code data	 X'0021' : All Printers X'0022' : All Printers X'0023' : All Printers X'0024' : All Printers X'0031' : All Printers X'0032' : All Printers X'0033' : All Printers X'0034' : All Printers

Table 14. Storage Pools : Area 3 (See Note)

Bytes	Description	Value : Printers Supporting
0	Length of this Storage Pool (including itself) : Area 3 Record	X'19' : All Printers
1	Record ID	X'01' : All Printers
2	Storage Pool ID	X'03' : All Printers
3—6	Size of storage pool when empty (bytes)	X'00000000' : Printers 1, 2, 10 (All Printers < V8.3) X'007A1200' : Printers 6, 7, 11, All Printers > V8.3 and < V9.0 X'00800000' : Printers 4, 5, All Printers > V9.0
7—10	Reserved	X'00000000' : All Printers
11—20	A repeating group of two-byte self-defining parameters that specify objects housed in this storage pool are defined as follows:	
	Single-byte coded-font index tables	X'0040' : All Printers
	Single-byte coded-font patterns	X'0042' : All Printers
	Double-byte coded-font index tables	X'0048' : All Printers
	Double-byte coded-font patterns	X'004A' : All Printers
	Code Pages	X'0050' : All Printers
	Font character sets	X'0060' : All Printers
	Coded fonts	X'0070' : All Printers

Table 15 shows the field data for installed features.

Table 15. Installed Features

Bytes	Description	Value : Printers Supporting
0—1	Length of this self-defining field, including itself	X'xxxx' Variable : All Printers (according to the number of features installed in each printer)
2—3	Installed Features self-defining field ID	X'0006' : All Printers
4—n	A repeating group of two-byte self-defining parameters that specify installed features are defined as follows:	
	Duplex	X'0100' : Printers 1, 10 (duplex mode), 5, 6 (Model 02D), 7, 11
	Manual Two-Channel Switch	X'0200' : Printers 1, 2, 10
	Tightly-Coupled Two-Channel Switch	X'0201' : Printers 1, 2, 10
	Cut-Sheet Output	X'0300' : Printers 4, 5, 6, 7 11
	Offset Stacker	X'0600' : Printers 4, 5, 6, 7, 11
	MICR	X'0800' : Printers 1, 2,
	Burster-Trimmer-Stacker or Cutter-Trimmer-Stacker	X'0900' : Printers 1, 2, 10
	Continuous-Forms Output	X'0B00' : Printers 1, 2, 3, 10
	Continuous-Forms Separation Capability	X'0C00' : Printers 1, 2, 10

Table 16 on page 67 shows the field data for available features.

Table 16. Available Features

Bytes	Description	Value : Printers Supporting
0—1	Length of this self-defining field, including itself	X'xxxx' Variable : All Printers (according to the number of features currently available in each printer)
2—3	Available Features self-defining field ID	X'0007' : All Printers
4—n	A repeating group of two-byte self-defining parameters that specify features currently available are defined as follows:	
	Duplex	X'0100' : Printers 1, 10 (duplex mode), 5, 6 (Model 02D), 7, 11
	Manual Two-Channel Switch	X'0200' : Printers 1, 2, 10
	Tightly-Coupled Two-Channel Switch	X'0201' : Printers 1, 2, 10
	Cut-Sheet Output	X'0300' : Printers 4, 5, 6, 7, 11
	Offset Stacker	X'0600' : Printers 4, 5, 6, 7, 11
	MICR	X'0800' : Printers 1, 2,
	Burster-Trimmer-Stacker or Cutter-Trimmer-Stacker	X'0900' : Printers 1, 2, 10
	Continuous-Forms Output	X'0B00' : Printers 1, 2, 3, 10
	Continuous-Forms Separation Capability	X'0C00' : Printers 1, 2, 10

Table 17 on page 69 shows the field data for XOA RRL RT and RIDF support.

Table 17. XOA RRL RT and RIDF Support

Bytes	Description	Value : Printers Supporting
0—1	Length of this self-defining field, including itself	X'0026'
2—3	XOA RRL RT and RIDF Support self-defining field ID	X'000A' : All Printers
4—n	A repeating group of two-byte self-defining parameters that specify resource types supported are defined as follows:	
	Single-byte coded font with HAID	X'0100' : All Printers
	Single-byte coded font with IBM GRID	X'0103' : All Printers
	Double-byte coded font with HAID	X'0200' : All Printers
	Double-byte coded font section with IBM GRID	X'0203' : All Printers > V8.0
	Double-byte coded font section with HAID	X'0300' : All Printers
	Page segment with HAID	X'0400' : All Printers
	Overlay with HAID	X'0500' : All Printers
	Code Pages with HAID	X'0600' : All Printers
	Code Pages with IBM GRID	X'0603' : All Printers
	Font Character Sets with HAID	X'0700' : All Printers
	Font Character Sets with IBM GRID	X'0703' : All Printers
	Single-byte coded font index with HAID	X'0800' : All Printers
	Double-byte coded font section index with HAID	X'0900' : All Printers
	Single- or Double-byte coded font with HAID	X'1000' : All Printers
	Single- or Double-byte coded font with IBM GRID	X'1003' : All Printers
	Graphic character sets supported in a font character set with IBM GRID	X'1103' : All Printers
	Specific code pages with HAID	X'1200' : All Printers
	Specific code pages with IBM GRID	X'1203' : All Printers
	Saved page groups with variable-length group ID triplet	X'2008' : POD Printers

Parts Format:
HAID = Host-Assigned Resource ID
IBM GRID =Global Resource ID

Table 18 shows the field data for Activate Resource RT and RIDF support.

Table 18. Activate Resource RT and RIDF Support

Bytes	Description	Value : Printers Supporting
0—1	Length of this self-defining field, including itself	X'xxxx' Variable : All Printers (according to the number of two-byte self-defining parameters that specify the Active Resource RT and RDIF support
2—3	Activate Resource RT and RIDF Support self-defining field ID	X'000B' : All Printers
4—n	A repeating group of two-byte self-defining parameters that specify resource types supported are defined as follows:	
	Single-byte coded font with IBM GRID	X'0103' : All Printers
	Single-byte coded font with IBM MVS Host Unalterable	X'0106' : All Printers
	Double-byte coded font section with IBM GRID	X'0303' : All Printers > V8.0
	Double-byte coded font section with IBM MVS Host Unalterable	X'0306' : All Printers except 5
	Code Page with IBM GRID	X'0603' : All Printers
	Font Character Set with IBM GRID	X'0703' : All Printers
	Single-byte coded font index with IBM GRID	X'0803' : All Printers
	Single-byte coded font index with IBM MVS Host Unalterable	X'0806' : All Printers
	Double-byte coded font section index with IBM MVS Host Unalterable	X'0906' : All Printers except 5
	Coded fonts with IBM GRID	X'1003' : All Printers
	Coded fonts with coded font format	X'1007' : All Printers
MVS Host Unalterable = MVS Host Unalterable Remote Font Environment		

Table 19 on page 71 shows the field data for supported Medium Modifications IDs.

Table 19. Medium Modifications Support

Bytes	Description	Value : Printers Supporting
0—1	Length of this self-defining field, including itself	X'00xx' Variable : Printers 1, 2, 10 (According to the number of modification IDs supported by each printer for installed Post-processing devices)
2—3	Medium Modifications support self-defining field ID	X'000D' : Printers 1, 2, 10
4—n	A repeating group of two-byte self-defining medium modifications IDs found in the XOH SMM command as follows:	
	Fixed medium information, the second byte specifies a local ID for the particular fixed medium information selected	One or more IDs between X'A000 — X'A0FE' : Printers 1, 2, 10
	All currently-supported fixed medium information local IDs	X'A0FF' : Printers 1, 2, 10
	Fixed perforation, a perforation is cut into the medium at fixed location	X'A100' : Printers 1, 2, 10
	Fixed separation cut, the medium is cut at a fixed location	X'A200' : Printers 1, 2, 10

Table 20 shows the field data for common bar code type and modifier support.

Table 20. Common Bar Code Type and Modifier Support

Bytes	Description	Value : Printers Supporting
0—1	Length of this self-defining field, including itself	X'000B' : All Printers
2—3	Common Bar Code Type and Modifier Support self-defining field ID	X'000E' : All Printers
4—n	A repeating group of one-byte self-defining parameters that specify the bar code type/modifiers supported are defined as follows:	
	Codabar (Modifier Byte options X'01' and X'02')	X'0D' : All Printers
	Code 128 (Modifier Byte option X'02')	X'11' : All Printers
	POSTNET (Modifier Byte options X'00' through X'03')	X'18' : All Printers
	RM4SCC (Modifier Byte option X'00')	X'1A' : All Printers
	Japan Postal Bar Code (Modifier Byte options X'00' or X'01')	X'1B' : All Printers
	UPC: Two-Digit Supplemental Bar Code (Modifier Bytes X'01' and X'02')	X'86' : All Printers
	UPC: Five-Digit Supplemental Bar Code (Modifier Bytes X'01' and X'02')	X'87' : All Printers
	EAN: Two-Digit Supplemental Bar Code (Modifier Byte X'01')	X'96' : All Printers
	EAN: Five-Digit Supplemental Bar Code (Modifier Byte X'01')	X'97' : All Printers

Table 21 specifies the available media destination IDs that can be selected by a LCC command.

Table 21. Media Destinations Support

Bytes	**Description**	**Value : Printers Supporting**
0—1	Length of this self-defining field, including itself	X'000A' : All Printers (according to the number of ranges reported by each printer)
2—3	Media Destination Support self-defining field ID	X'0010' : All printers
4—5	Default media destination ID	X'00xx' Variable : All Printers (Printer designated, available media destination)
6—n	One or more entries of the following format: +0—1 First number in a range of available, contiguous media destination IDs. +2—3 Last number in a range of available, contiguous media destination IDs **(See “Appendix B. Media Destination ID to Printer Location Translation” on page 186 for ID number to printer physical location name translations.)**	X'0001' : All Printers X'0001' : 1, 2, 3, 10 X'0002' : Printer 5, 7, 11 X'0003' : Printers 4, 6

Table 22 on page 74 shows the field data for supported group operations.

Table 22. Supported Group Operations

Bytes	Description	Value : Printers Supporting
0—1	Length of this self-defining field, including itself	X'0006' : Printer 10 or printers with a finisher installed and enabled
2—3	Supported Group Operations self-defining field ID	X'0012' : Printer 10 or printers with a finisher installed and enabled
4—n	Group operation supported in the XOH-SGO command	X'01' – Keep group together as a print unit : Printer 10 or printers with a finisher installed and enabled X'03' – Save pages : Printer 10 X'04' Finish : Printers with a finisher installed and enabled

Table 23 shows the field data for the product identifier.

Table 23. Product Identifier Self-Defining Field

Bytes	Description	Value : Printers Supporting
0—1	Length of this self-defining field, including itself	X'002C' : All Printers
2—3	Product Identifier self-defining field ID	X'0013' : All Printers
4	Length of this Product-ID parameter, including itself	X'28' : All Printers
5—6	Product identifier parameter ID (Unique Product ID)	X'0001' : All Printers
7—12	Device Type	X'F0F0xxxxxxxx' Variable : All Printers (See “Product Number” in “Sense Type and Model” for values)
13—15	Model Number	X'F0F0xx' Variable : All Printers (See “Model Number” in “Sense Type and Model” for values)
16—18	Manufacturer	X'C9C2D4' : All Printers
19—20	Plant of Manufacture	Variable : All Printers
21—32	Sequence Number	Variable : All Printers
33—34	Tag	X'0000' : All Printers
35—43	Engineering Change level	Variable : All Printers

Table 24 on page 76 shows the field data for the object container type support.

Table 24. Object Container Type Support Self-Defining Field

Bytes	**Description**	**Value : Printers Supporting**
0—1	Length of this self-defining field, including itself	X'0016' : All Printers > V8.3
2—3	Supported Object Container Type Support self-defining field ID	X'0014' : All Printers > V8.3
4	Type record length	X'12' : All Printers > V8.3
5	Type : X'01' (Presentation), X'02' (Non-Presentation)	X'02' : All Printers > V8.3
6—n	MO:DCA registered object ID for the object container supported in the WOC command	X'0607 2B12 0004 0101 1400 0000 0000 0000' Color Mapping Table Setup File : All Printers > V8.3

Table 25 shows the field data for the DF Deactivation types support.

Table 25. DF Deactivation Types Support Self-Defining Field

Bytes	**Description**	**Values : Printers Supporting**
0—1	Length of this self-defining field, including itself	X'0009' : All Printers > V7.0
2—3	DF Deactivation Types Supported self-defining field ID	X'0015' : All Printers > V7.0
4—8	Optional deactivation type	X'22' Font Index for DB coded font section: All Printers > V7.0 X'50' Coded Font : All Printers > V7.0 X'51' Coded Font and components : Printers > V7.0 X'5D' All Resident coded fonts and associated components : All Printers > V7.0 X'5E' All coded fonts : All Printers > V7.0 X'5F' All coded fonts and associated components : All Printers > V7.0

Table 26 on page 78 shows the field data for the printer setup ID support.

Table 26. Printer Set-Up Self-Defining Field

Bytes	Description	Values : Printers Supporting
0—1	Length of this self-defining field, including itself	X'00xx' Variable : Printer 9 (According to the number of setup IDs reported), All Printers > V8.3
2—3	Printer Set-Up self-defining field ID	X'0017' : All Printers > V8.3
4—n	Currently Active Set-Up ID numbers	One or more IDs between X'0000' — X'FFFF' : All Printers > V8.3

Table 27 shows the field data for the finishing operation setup ID support.

Table 27. Finishing Operations Self-Defining Field (Printers With Finisher Installed and Enabled)

Bytes	Description	Values : Printers Supporting
0—1	Length of this self-defining field, including itself	X'0004' to X'0008'
2—3	Finishing Operations self-defining field ID	X'0018'
4—7	Operation type	X'01' : Corner staple X'02' : Saddle stitch X'03' : Edge stitch X'07' : Z-fold

Select Input Media Source (SIMS) Order (X'1500'): See Table 9 on page 59 for the Input-Media Source IDs supported by each printer. If this order is not received and a LCC command does not specify an input-media source, media is selected from a printer designated, available default media source.

Text Command Set

Load Equivalence (LE) Command — X'D61D'

Table 28 shows the field data for the Load Equivalence command.

Table 28. Load Equivalence Command Data

Byte	Range	Description
2 and 3	X'0001'—X'007F'	Internal value
4 and 5	X'0001'—X'007F'	External value

Write Text (WT) Command — X'D62D'

The Write Text command carries PTOCA data, as defined by the PTOCA PT2 or PTOCA PT3 subsets. See the *Presentation Text Object Content Architecture (PTOCA) Reference*, SC31-6803 for information about these subsets. The AFCCU Printers support all control sequences and associated parameter ranges of the PTOCA subset supported.

Notes:

1. If the Sense Type and Model (STM) Command — X'D6E4' response shows X'4020' in the Text Command Set vector on page 51, this printer accepts any valid color and simulate that color as BLACK without logging an error (NACK), but if the response shows X'4022' and a color is specified that can be rendered by the device, the specified color is used and it is not rendered as BLACK.
2. The Begin Suppression and End Suppression control sequences accept suppression IDs in the range X'01'—X'FF'. The coding implementation for these control sequences gives X'00' a special meaning so it cannot be included in the valid range.
3. To be resolution independent, distances are expressed in L-units. When converted to pels, the values may include fractional parts of a pel, particularly a 300–pel or 600–pel printer. The fractional part is maintained in the code. However, when printing on the paper, the values are converted to whole pels. One possible result of this is that a rule with a negative length or width which is designed to fit exactly within the VPA may now overlap by one pel, causing a position error to be generated.

In most cases, the parameter ranges accepted by either PTOCA PT2 or PTOCA PT3 subsets are the full range supported by PTOCA. In a few cases, where the subset supports a range which is smaller than that supported by PTOCA, AFCCU printers support the full PTOCA range, not just the limited subset range. The control sequences which do this are:

- Draw B-axis Rule (DBR)
- Draw I-axis Rule (DIR)
- Set Intercharacter Adjustment (SIA)
- Set Text Color (STC)
- Set variable Space Character Increment (SVI)

IM Image Command Set

Write Image Control (WIC) Command — X'D63D'

If the Sense Type and Model (STM) Command — X'D6E4' response is X'4020' in the IM-Image Command Set vector on page 51, this command accepts any color and simulate that color as BLACK without logging an error (NACK). But if the response is X'4022' and a color is specified that can be rendered by the printer, the specified color is used and it is not rendered as BLACK.

IO Image Command Set

Write Image Control 2 (WIC2) Command — X'D63E'

This command defines the environment that IOCA drawing orders are executed in.

If the Sense Type and Model (STM) Command — X'D6E4' response is X'4020' in the IO-Image Command Set vector on page 52, this command accepts any color and simulate that color as BLACK without logging an error (NACK), but if the response is X'4022' and a color is specified that can be rendered by the printer, the specified color is used and it is not rendered as BLACK. It consists of three self-defining fields:

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

Image Area Position (IAP): Full IPDS architecture for the IAP is supported. Refer to *IBM Intelligent Printer Data Stream Reference* for details.

Image Output Control (IOC): Full IPDS architecture for the IOC is supported. See the X'6201' property pair under the Device Control section of Table 7 on page 48 to determine which printers support the addition of optional color specification and reset mixing triplets. Refer to *IBM Intelligent Printer Data Stream Reference* for details.

Image Data Descriptor (IDD): Full IPDS architecture for the IDD, as it pertains to IOCA Function Set 10, is supported. Refer to *Intelligent Printer Data Stream Reference* for details. The Set Bilevel Image Color Self-defining field can be used to specify a color for the significant image data elements.

Graphics Command Set

Write Graphics Control (WGC) Command — X'D684'

This command defines the environment that graphics drawing orders are executed in.

If the Sense Type and Model (STM) Command — X'D6E4' response is X'4020' in the Graphics Command Set vector on page 52, this command accepts any color and simulate that color as BLACK without logging an error (NACK), but if the response is X'4022' and a color is specified that can be rendered by the printer, the specified color is used and it is not rendered as BLACK.

It consists of three self-defining fields:

- Graphics Area Position (GAP)
- Graphics Output Control (GOC)
- Graphics Data Descriptor (GDD).

Graphics Area Position (GAP): Full IPDS architecture for the GAP is supported. Refer to *IBM Intelligent Printer Data Stream Reference* for details on these three self-defining fields.

Graphics Output Control (GOC): Full IPDS architecture for the GOC is supported. See the X'6201' property pair under the Device Control section of Table 8 on page 50 to determine which printers support the addition of optional color specification and reset mixing triplets. Refer to *IBM Intelligent Printer Data Stream Reference* for details.

Graphics Data Descriptor (GDD): The AFCCU Printers support most of the GDD field values but only a limited set of the mask bytes defined in the *Intelligent Printer Data Stream Reference*.

The following tables, Table 29 through Table 34 on page 86, show the supported mask bytes.

Table 29. Drawing Attributes Set

Mask Bit	Name	Length in Bytes
0	Color	2
1—15	Reserved	—

Table 30 shows the field data for the line attributes set.

Table 30. Line Attributes Set

Mask Bit	Name	Length in Bytes
0	Line type	1
1	Line width	1
2—15	Reserved	—

Table 31 shows the field data for the character attributes set.

Table 31. Character Attributes Set

Mask Bit	Name	Length in Bytes
0	Character angle	4
1	Character cell	4
2	Character direction	1
3	Reserved	—
4	Character set	1
5—15	Reserved	—

Table 32 shows the field data for the marker attributes set.

Table 32. Marker Attributes Set

Mask Bit	Name	Length in Bytes
0—6	Reserved	—
7	Marker symbol	1
8—15	Reserved	—

Table 33 shows the field data for the pattern attributes set.

Table 33. Pattern Attributes Set

Mask Bit	Name	Length in Bytes
0—6	Reserved	—
7	Pattern symbol	1
8—15	Reserved	—

Table 34 shows the field data for the arc parameters set.

Table 34. Arc Parameters Set

Mask Bit	Name	Length in Bytes
0	P value	2
1	Q value	2
2	R value	2
3	S value	2
4—15	Reserved	—

Drawing Attribute Defaults: Table 35 on page 87 shows the attribute defaults when drawing. These defaults may be overridden by explicitly specifying a default in a self-describing instruction.

Table 35. Drawing Attribute Default

Attribute	**Default**
Color	Black
Line type	Solid
Line width	Normal (2 pels)
Character angle	0°
Character cell	Printer-default font maximum box size
Character direction	Left to right
Character set	Printer-default font
Marker symbol	Cross
Pattern symbol	Solid shading
Current position	(Xg, Yg)=0, 0
Arc parameters	P=Q=1, R=S=0
Foreground mix	Over-paint
Background mix	Leave alone
Character precision	Precision 2
Character shear	No shear
Marker precision	Precision 2
Pattern Set	See Table 36 on page 88
Marker Set	See Table 37 on page 89

Table 36 shows the field data for the default pattern set.

Table 36. Default Pattern Set

Value	**Pattern Type**
X'00'	Current default
X'01'—X'08'	Grey density 1 to density 8 (decreasing)
X'09'	Vertical lines
X'0A'	Horizontal lines
X'0B'	Diagonal lines 1 (bottom left to top right)
X'0C'	Diagonal lines 2 (bottom left to top right)
X'0D'	Diagonal lines 1 (top left to bottom right)
X'0E'	Diagonal lines 2 (top left to bottom right)
X'0F'	No shading
X'10'	Solid shading
X'40'	Blank

Table 37 shows the field data for the default marker set.

Table 37. Default Marker Set

Value	**Marker Symbol**
X'00'	Current default
X'01'	Cross
X'02'	Plus
X'03'	Diamond
X'04'	Square
X'05'	Six-point star
X'06'	Eight-point star
X'07'	Filled diamond
X'08'	Filled square
X'09'	Dot
X'0A'	Small circle
X'40'	Blank

Write Graphics (WG) Command — X'D685'

This command transmits graphics data to the printer. The data consists of graphics segments, which contain drawing orders that define a picture. All segments are executed in immediate mode, that is, drawing orders are included in the picture as orders are received by the printer. The printer does not store or retain segments.

If the Sense Type and Model (STM) Command — X'D6E4' response is X'4020' in the Graphics Command Set vector on page 52, this command accepts any color and simulate that color as BLACK without logging an error (NACK), but if the response is X'4022' and a color is specified that can be rendered by the printer, the specified color is used and it is not rendered as BLACK.

Printers using versions of code prior to version 8.4 have limited support for color of medium. In these printers, a graphical object may be drawn in color of medium.

The object is opaque, meaning that it erases underlying graphics objects previously drawn in the same GOCA session. This does not apply to text drawn using GOCA. When the completed GOCA object is placed in the page, the objects that were drawn in the color of medium are treated as transparent. That is, data which was previously drawn into the page shows through the GOCA objects drawn in color of medium.

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.

Table 38 shows a list of supported drawing orders. Refer to the *GOCA Specification*, SC31-6804, for complete descriptions of all GOCA drawing orders.

Table 38. Summary of the Graphics Drawing Orders

Code	Drawing Order	Length
X'68'	Begin Area	2
X'D1'	Begin Image	12
X'91'	Begin Image at Current Position	8
X'80'	Box at Current Position (Printers > V9.3)	8, 10, 12
X'C0'	Box (Printers > V9.3)	12, 14, 16

Table 38. Summary of the Graphics Drawing Orders (continued)

Code	Drawing Order	Length
X'C3'	Character String	6—257
X'83'	Character String at Current Position	2—257
X'01'	Comment	2—257
X'60'	End Area	2—257
X'93'	End Image	2—257
X'3E'	End Prolog	2
X'71'	End Segment (treated like a No Operation command)	2
X'C5'	Fillet	6—254
X'85'	Fillet at Current Position	2—254
X'C7'	Full Arc	8
X'87'	Full Arc at Current Position	4
X'92'	Image Data	2—257
X'C1'	Line	6—254
X'81'	Line at Current Position	2—254
X'C2'	Marker	6—254
X'82'	Marker at Current Position	2—254
X'00'	No Operation	1
X'E3'	Partial Arc (Printers > V9.6)	20
X'A3'	Partial Arc at Current Position (Printers > V9.6)	16
X'E1'	Relative Line	6—256
X'A1'	Relative Line at Current Position	2—256
X'04'	Segment Characteristics (treated like a No Operation command)	2—257

Table 38. Summary of the Graphics Drawing Orders (continued)

Code	Drawing Order	Length
X'22'	Set Arc Parameters	10
X'OD'	Set Background Mix	2
X'34'	Set Character Angle	6
X'33'	Set Character Cell	6 or 10
X'3A'	Set Character Direction	2
X'39'	Set Character Precision	2
X'38'	Set Character Set	2
X'35'	Set Character Shear	6
X'0A'	Set Color	2
X'21'	Set Current Position	6
X'26'	Set Extended Color	4
X'11'	Set Fractional Line Width	4
X'18'	Set Line Type	2
X'19'	Set Line Width	2
X'37'	Set Marker Cell	6
X'3B'	Set Marker Precision	2
X'3C'	Set Marker Set	2
X'29'	Set Marker Symbol	2
X'0C'	Set Mix	2
X'08'	Set Pattern Set	2
X'28'	Set Pattern Symbol	2
X'43'	Set Pick Identifier (treated like a No Operation command)	6

Table 38. Summary of the Graphics Drawing Orders (continued)

Code	Drawing Order	Length
X'B2'	Set Process Color (Printers > V8.3)	12—14

Begin Segment Introducer (BSI): The Begin Segment Introducer is part of the Write Graphics command. It precedes all drawing orders that are grouped together in a graphics segment. Refer to the description of the Begin Segment command in the *GOCA Specification*, SC31-6804, for a complete description of this command.

Table 39. Summary of the Begin Segment Introducer

Byte	BSI Field Description	Supported Field Values
0	ID	X'70'
1	BSI Length	X'0C'
2—5	Segment ID	(This field is ignored.)
6	Reserved	(This field is ignored.)
7	Flags	Bit 0 Chaining Flag: B'0' = Chained B'1' = Unchained Bits 1—2: Reserved Bit 3 Prolog Flag: B'0' = No prolog B'1' = Prolog Bit 4: Reserved Bits 5—6 Segment Flag: B'00' = New segment (reinitialize graphics defaults) B'11' = Append this segment to the previous segment (do not reinitialize graphics defaults) Bit 7: Reserved
8—9	Segment Length	Number of drawing order bytes in this segment.
10—13	Reserved	(This field is ignored.)
14—n	Orders	Drawing orders (the number of bytes in this field must equal the value in bytes 8 and 9).

Flags Byte (Byte 7) Description:

Bit 0 Chaining flag—The printer only processes chained segments. If this bit specifies an unchained segment, the segment data is ignored. No error is reported.

Bits 1 and 2
Reserved—Must be B'00'.

Table 40 shows the valid prolog drawing orders.

Table 40. Prolog Drawing Orders

Code	Drawing Order
X'00'	No Operation
X'01'	Comment
X'04'	Segment Characteristics
X'08'	Set Pattern Set
X'0A'	Set Color (graphics)
X'0C'	Set Mix
X'0D'	Set Background Mix
X'11'	Set Fractional Line Width
X'18'	Set Line Type
X'19'	Set Line Width
X'21'	Set Current Position
X'22'	Set Arc Parameters
X'26'	Set Extended Color
X'28'	Set Pattern Symbol
X'29'	Set Marker Symbol
X'33'	Set Character Cell
X'34'	Set Character Angle
X'38'	Set Character Set
X'39'	Set Character Precision
X'3A'	Set Character Direction
X'3B'	Set Marker Precision
X'3C'	Set Marker Set
X'43'	Set Pick Identifier
X'B2'	Set Process Color (Printers > V8.3)

Bar Code Command Set

Write Bar Code Control (WBCC) Command — X'D680'

Bar Code Area Position (BCAP): The BCOCA receiver supports the full IPDS architecture for BCAP. Refer to the *Intelligent Printer Data Stream Reference*.

Bar Code Output Control (BCOC): The BCOCA receiver supports the full IPDS architecture for BCOC. See the X'6201' property pair under the Device Control section of Table 8 on page 50 to determine which printers support the addition of optional color specification and reset mixing triplets. Refer to the *Intelligent Printer Data Stream Reference*.

Bar Code Data Descriptor (BCDD): Table 41 shows the bar code symbol descriptors that vary from the BCOCA architecture. Refer to the *Bar Code Object Content Architecture Reference*, S544-3766.

If the Sense Type and Model (STM) Command — X'D6E4' response is X'4020' in the Bar Code Command Set vector on page 53, this command accepts any color and simulate that color as BLACK without logging an error (NACK), but if the response is X'4022' and a color is specified that can be rendered by the printer, the specified color is used and it is not rendered as BLACK.

Table 41. Bar Code Symbol Descriptor

Offset	Field ID	Range of Values	Default Value
16	Type	X'01'—X'03', X'05'—X'0D', X'11', X'16'—X'18'	Required field
18	LID	X'00'—X'FE', X'FF'	X'FF', See Table 42 on page 98.
19—20	Color	IPDS Color Support	X'FFFF' = Presentation Device Default Color
21	Module Width	X'01'—X'FE', X'FF'	X'FF', see Table 42 on page 98.
22	Element Height	X'0001'—X'7FFF', X'FFFF'	X'FFFF', see Table 42 on page 98.
25—26	Wide Narrow ratio (WE:NE)	X'0000'—X'7FFF', X'FFFF'	X'FFFF', see Table 42 on page 98.

Although the maximum height of a bar code is dependent on the resolution of a specific printer, the minimum bar code height is dependent on the bar code type. UPC/EAN bar codes contain imbedded HRI text fields; the minimum height must include the height of the OCR-B HRI. When a supplemental bar code is created in the same WBCC as its main UPC/EAN bar code, the minimum height must include the imbedded HRI of the main symbol and the HRI above the supplement. All other bar code types, excluding POSTNET but including supplemental bar codes created independently, do not have imbedded HRI; the minimum height is one printer pel. The module widths and the element heights for are fixed by the symbology. POSTNET has no human-readable interpretation.

Table 42 shows the BCDD default values for different types of bar codes.

Table 42. BCDD Default Values and Ranges Specific to Bar Code Types

Bar Code Type	HRI Style	Module Width (Supported Range)	Element Height (Supported Range)	WE:NE
X'01': Code 39	OCR-A	13 mils (7 to 254 mils)	Larger of 250 mils or 15% of length (1 pel minimum)	2.5
X'02': MSI	OCR-A	13 mils (7 to 254 mils)	Larger of 300 mils or 15% of length (1 pel minimum)	2.0
X'03': UPC-A	OCR-B	13 mils (9 to 36 mils)	1020 mils (135 mils minimum)	N/A
X'05': UPC-E	OCR-B	13 mils (9 to 36 mils)	1020 mils (135 mils minimum)	N/A
X'06': UPC-2 Digit Supplemental	OCR-B	13 mils (9 to 36 mils)	770 mils (modifier 0: 1 pel minimum, modifier 1 or 2: 260 mils minimum)	N/A
X'07': UPC-5 Digit Supplemental	OCR-B	13 mils (9 to 36 mils)	770 mils (modifier 0: 1 pel minimum, modifier 1 or 2: 260 mils minimum)	N/A
X'08': EAN-8	OCR-B	13 mils (9 to 36 mils)	1020 mils (135 mils minimum)	N/A
X'09': EAN-13	OCR-B	13 mils (9 to 36 mils)	1020 mils (135 mils minimum)	N/A
X'0A': Industrial 2-of-5	OCR-A	13 mils (7 to 254 mils)	Larger of 250 mils or 15% of length (1 pel minimum)	2.5
X'0B': Matrix 2-of-5	OCR-A	13 mils (7 to 254 mils)	Larger of 250 mils or 15% of length (1 pel minimum)	2.5
X'0C': Interleaved 2-of-5	OCR-A	13 mils (7 to 254 mils)	Larger of 250 mils or 15% of length (1 pel minimum)	2.5

Table 42. BCDD Default Values and Ranges Specific to Bar Code Types (continued)

Bar Code Type	HRI Style	Module Width (Supported Range)	Element Height (Supported Range)	WE:NE
X'0D': Codabar	OCR-A	13 mils (7 to 254 mils)	Larger of 250 mils or 15% of length (1 pel minimum)	2.5
X'11': Code 128	OCR-B	13 mils (7 to 254 mils)	Larger of 250 mils or 15% of length (1 pel minimum)	N/A
X'16': EAN 2 Digit Supplemental	OCR-B	13 mils (9 to 36 mils)	840 mils (modifier 0: 1 pel minimum, modifier 1: 260 mils minimum)	N/A
X'17': EAN 5 Digit Supplemental	OCR-B	13 mils (9 to 36 mils)	840 mils (modifier 0: 1 pel minimum, modifier 1: 260 mils minimum)	N/A
X'18': POSTNET	N/A	Fixed	Fixed	N/A
X'1A': RM4SCC Printers > V9.2	N/A	Fixed	Fixed	N/A
X'1B': Japan Postal Bar Code Printers > V9.6	N/A	24 mils (14 to 31 mils) **Note:** The recommended range is 19 to 27 mils	The Long Bar, Timing Bar, Ascender, and Decender are all calculated from the width	N/A
Note: 1 mil = 0.001 inch				

Write Bar Code (WBC) Command — X'D681'

Table 43 on page 100 shows the default values for the WBC command of the IPDS architecture. Refer to *Intelligent Printer Data Stream Reference*.

Table 43. Bar Code Symbol Data

Offset	Field ID	Range of Values	Default Value
0, bits 1—2	POS	B'00' B'01' B'10'	Default- HRI below HRI below HRI above

Object Container Command Set

Write Object Container Control (WOCC) Command — X'D63C'

Object Container Position (OCAP): Currently, AFCCU Printers support for the Object Container is limited to non-presentation objects. Therefore, the OCAP is ignored by AFCCU Printers.

Object Container Output Control (OCOC): Currently, AFCCU Printers support for the Object Container is limited to non-presentation objects. Therefore, the OCOC is ignored by AFCCU Printers.

Object Container Data Descriptor (OCDD): Currently, AFCCU printers support for the Object Container is limited to non-presentation objects. Therefore, the Object Container receiver supports the full IPDS architecture for OCDD, except for X'92', the Presentation Space Size triplet.

Overlay Command Set

Include Overlay (IO) Command — X'D67D'

Overlays can be nested up to five levels. When an overlay definition contains an Include Overlay command, the overlay that is included is nested in the overlay that the host program is defining.

When the host program sends the Include Overlay command as part of an overlay definition, the printer stores the Include Overlay command as part of the overlay definition. The nested overlay is not merged with the print data for the nested overlay until the printer merges the overlays with the print data for a page.

If the overlay nesting limit of the printer is exceeded, the printer sets its sense bytes to identify exception ID X'0297..01'. The printer has no alternate exception action.

AFCCU printers > V8.2 support up to 32 511 overlays at a time (extended overlay support).

Page Segment Command Set

Include Page Segment (IPS) Command — X'D6F7'

AFCCU printers > V8.2 support up to 32 511 page segments at a time (extended page segment support).

Loaded-Font Command Set

Load Font Control (LFC) Command — X'D61F'

Table 44 shows the Load Font Control command data for printers at code version < V8.0. Printers > V8.0 support the full range of IPDS values in these bytes.

Table 44. Load Font Control Command Data for Printers < V8.0

Byte	Range	Description
26	X'00', X'01'	Pel-units Unit-base
28—29	X'0960'	Pel units per unit-base in X direction (when unit-base = X'00', 240 pel device)
28—29	X'03B1'	Pel units per unit-base in X direction (when unit-base = X'01', 240 pel device)
30—31	X'0960'	Pel units per unit-base in Y direction (when unit-base = X'00', 240 pel device)
30—31	X'03B1'	Pel units per unit-base in Y direction (when unit-base = X'01', 240 pel device)
28—29	X'0BB8'	Pel units per unit-base in X direction (when unit-base = X'00', 300 pel device)
28—29	X'049D'	Pel units per unit-base in X direction (when unit-base = X'01', 300 pel device)
30—31	X'0BB8'	Pel units per unit-base in Y direction (when unit-base = X'00', 300 pel device)
30—31	X'049D'	Pel units per unit-base in Y direction (when unit-base = X'01', 300 pel device)

Note: Printers < V8.5 only support fixed metric fonts in 240 pel resolution, except 3900 Model 0W1 with FC F9930.

Chapter 2. Exception Reporting and Sense Data

This chapter gives the exception reporting and sense data used by the AFCCU Printers.

Printer-Sensed Presentation Exception Reporting

The printers use 24 bytes of sense information to report printer sensed presentation exceptions, and to direct the host program to the appropriate exception recovery actions. The printer can queue up to 30 synchronous exceptions and an unlimited number (in practice) of asynchronous exceptions.

Note: For a detailed description of exception reporting, see “Exception Reporting” in the *Intelligent Printer Data Stream Reference* manual.

Channel Sense Data

Reported by any printer attaching to a host system via a System/370 Parallel Channel or an ESCON Channel.

Command Reject

Table 45 lists the command reject exceptions.

Table 45. Command Reject Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
8005..00	Invalid Channel Command	04	3
8005..00	Invalid Channel Command Sequence	1C	3
8005..00	Invalid Channel Command	04	5
8005..00	Invalid Channel Command Sequence	1C	5
8006..00	Printer Not Assigned	24	5

Equipment-Check with Intervention-Required

Conditions may occur in the printer that are caused by hardware failure or by hardware limitations that require operator intervention before command processing can continue. The following exception codes are used to notify presentation software of these conditions.

Table 46 lists the equipment-check with intervention-required exceptions.

Table 46. Equipment-Check with Intervention-Required Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
5010..00	Print Engine Failure	02	2

Intervention-Required

Table 47 lists the intervention-required exceptions. A continuous-forms printer can report all of the listed exceptions. A cut-sheet printer will report only a subset of the listed exceptions, pertinent to the individual printer.

Table 47. Intervention-Required Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
4000..00	Printer Not Ready	03	4
4001..00	Out of Paper	03	4
4002..00	Stacker Full	03	4
4004..00	Toner Out	03	4
4011..00	Suppressed Jam Recovery	02	4
4031..00	Paper Length Wrong	03	4
4033..00	Paper Width Wrong	03	4
4050..00	Fuser Oil Out	02	4
4051..00	Developer Mix needs changing	02	2
4052..00	Oiler Belt needs changing	02	2
4053..00	Toner Collector full	02	2
4054..00	Fine Filter needs changing	02	2
407C..00	Out of Staples	22	2
407C..01	Staple Jam	0A or 22	2
407C..02	Too many sheets for a finishing operation	0A or 22	2
407D..00	Post processor has discarded pages	0A or 22	2
407D..01	Finishing mechanism exception	0A or 22	2
40E2..00	Transport Requires Corrective Action	03	4

Table 47. Intervention-Required Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
40E3..00	Fuser Requires Corrective Action	03	4
40E5..00	Jam Recovery Needed	0A	2
40E6..00	Door Open	03	4
40E7..00	Paper Specification Wrong	03	4
40E9..00	Post Processor Not Ready	22	2

Bus-Out Parity Check Exceptions

Table 48. Bus-Out Parity Check Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
2001..01	Link Adapter A Device Level Error	04	5
2001..02	Link Adapter B Device Level Error	04	5
2002..01	Link Adapter A Link Level Error	04	5
2002..02	Link Adapter B Link Level Error	04	5
2011..00	Channel Command Parity Error	04	3
2012..00	Channel Data Parity Error	04	3

Equipment-Check Exceptions

Table 49 lists the equipment-check exceptions.

Table 49. Equipment-Check Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
10E0..00	Channel Adapter Error	04	3
10E2..01	Link Adapter A Check	04	5
10E2..02	Link Adapter B Check	04	5
10F1..00	Log Only Condition	18	2

Channel and Link Adaptor Exceptions

Table 50 lists the channel and link adaptor exceptions.

Table 50. Channel and Link Adaptor Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0401..00	Channel Overrun	04	3
0401..01	Link Adapter A Overrun	04	5
0401..02	Link Adapter B Overrun	04	5

Conditions Requiring Host Notification

Table 51. Conditions Requiring Host Notification

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
01A0..00	Printer Assigned Elsewhere	25	5
01A1..00	Sense Reset Due to Reset Allegiance	04	5
01A2..00	Operation Terminated Due to Reset Allegiance	04	5
01A3..00	Resetting Event	4D	5

SNA Exceptions Reported

Note

This section applies only to the 3130, 3160, and 3935 printers attaching to a host system via an SNA Token Ring or an SNA SDLC.

Table 52 on page 111 lists the SNA errors reported. The bytes and categories are defined as follows:

Bytes
Meaning

0 Category

1 Modifier

2—3
Sense-Code Specific information

The Byte 0 categories are defined as follows:

Value
Category

X'08'
Request Reject

X'10'
Request Error

X'20'
State Error

X'40'
Request Header (RH) Usage Error

X'80'

Path Error

Table 52. SNA Exceptions

Bytes 0—3 (in hex)	Description	Internal AFCCU Error Code
08050008	No session can be activated because the number of sessions of the requested type has been exceeded.	162
08640000	The conversation was terminated by the abnormal ending of a system service.	130
08890000	Program error purging.	118
08890001	Program error truncate.	120
08890100	A service transaction program error occurred. The program data was not truncated.	135
08890101	A service transaction program error occurred and purged the program data.	134
10086021	An invalid TP name was specified.	127
10086031	Remote program initialization parameter (PIP) data is not supported.	114
10086034	The specified conversation type is not supported by the program.	101
10086041	Synchronization level is not supported by the program.	115
10086042	Reconnect is not supported by the program.	116
10101002	An invalid GDS identifier was found in the data.	143
80080000	The PU is not active.	175

IPDS Exceptions Reported

The following sections list the exception codes and action codes used by all of the printers covered by this document unless otherwise noted.

These exception codes are reported by all printers regardless of the type of host system attachment.

Notes:

1. For a detailed description of these exception codes, see “Tables of Printer Exceptions” in the *Intelligent Printer Data Stream Reference.*
2. For a list of which action codes are attachment-type-specific, see “Action Codes” on page 136.
3. Errors which occur within an overlay or page segment will be identified when the Include Overlay (IO) or Include Page Segment (IPS) command is processed. (Only minimal format checking is done during the receipt of the data following a Begin Overlay or Begin Page Segment command).

Command Reject

Table 53 lists the command reject exceptions.

Table 53. Command Reject Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
8001..00	Invalid IPDS Command Code	01	0
8002..00	Invalid IPDS Command Sequence	01	0
8004..00	Data Received after ARQ	01	0

Equipment-Check with Intervention-Required

Conditions may occur in the printer that are caused by hardware failure or by hardware limitations that require operator intervention before command processing can continue. The following exception codes are used to notify presentation software of these conditions.

Table 54 lists the equipment-check with intervention-required exceptions.

Table 54. Equipment-Check with Intervention-Required Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
5010..00	Print Engine Failure	16 or 22	2
50F2..00	Print Overrun	09 or 22	2
50F6..00	Offset Stacker Exception	17	2
50F7..00	Duplex Media Path Exception	17	2
50F8..nn	Input Media-Source Exception (tray number nn)	17	2
50F9..00	MICR Printing Exception	17	2

Intervention-Required

Table 55 lists the intervention-required exceptions. A continuous forms printer can report all of the listed exceptions. A cut-sheet printer will report only a subset of the listed exceptions, pertinent to the individual printer.

Table 55. Intervention-Required Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
4000..00	Printer Not Ready	22 or 1A	2
4001..00	Out of Paper	22 or 1A	2
4002..00	Stacker Full	22	2
4004..00	Toner Out	22	2
4011..00	Suppressed Jam Recovery	22	2
4031..00	Paper Length Wrong	22	2
4033..00	Paper Width Wrong	22	2
4050..00	Fuser Oil Out	22	2

Table 55. Intervention-Required Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
4051..00	Developer Mix needs changing	22	2
4052..00	Oiler Belt needs changing	22	2
4053..00	Toner Collector full	22	2
4054..00	Fine Filter needs changing	22	2
407C..00	Out of Staples	22	2
407C..01	Staple Jam	0A or 22	2
407C..02	Too Many Sheets for a Finishing Operation	0A or 22	2
407D..00	Postprocessor Has Discarded Pages	0A or 22	2
407D..01	Finishing Mechanism Exception	0A or 22	2
40C0..00	Continuous Forms Separator Jam	8	2
40E2..00	Transport Requires Corrective Action	22	2
40E3..00	Fuser Requires Corrective Action	22	2
40E5..00	Paper Jam Recovery Needed	8 or 22	2
40E6..00	Door Open	22	2
40E7..00	Paper Specification Wrong	22	2
40E8..nn	Supported but not installed Media Source ID specified	1A	2
40E9..00	Postprocessor Not Ready	22	2

Data-Check

Table 56 lists the data-check exceptions.

Table 56. Data-Check Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0821..00	Undefined character	01 or 1F	0
0829..00	Double-byte coded font section is not loaded or is invalid	01 or 1F	0
0860..00	Numeric representation precision check	01 or 1F	0
08C1..00	Asynchronous Position check (see note)	01 or 1F	1
08C2..00	Included page position check (for Models DR1/DR2, IR1/IR2, and IR3/IR4)	01	1
08C3..00	Saved page position check (for Models DR1/DR2, IR1/IR2, and IR3/IR4)	01 or 1F	1

Note: When data to be printed outside the VPA is blank (no toned pels), printers either generate or suppress this exception ID as follows:

Un-printable Character
Suppress

Suppresses Text
Suppress

Color-of-Medium
Generate

All other data
Generate

IO-Image Exceptions

Table 57 lists the IO-Image exceptions.

Table 57. IO-Image Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0500..01	Invalid or unsupported IO-Image self-defining field code	01 or 1F	0
0500..03	Invalid or unsupported IO-Image self-defining field length	01 or 1F	0
0500..04	Invalid IO-Image self-defining field value	01 or 1F	0
0570..0F	IO-Image Begin Segment out of sequence	01 or 1F	0
0571..0F	IO-Image End Segment out of sequence	01 or 1F	0
0591..0F	IO-Image Begin Image Content out of sequence	01 or 1F	0
0592..0F	IO-Image self-defining field out of sequence	01 or 1F	0
0593..0F	IO-Image End Image Content out of sequence	01 or 1F	0
0594..01	Inconsistent Image Size Parameter value and Image Data	01 or 1F	0
0594..0F	IO-Image Image Size Parameter missing or out of sequence	01 or 1F	0
0594..10	IO-Image Image Size Parameter value unsupported	01 or 1F	0
0594..11	IO-Image Image Size cannot be determined	01 or 1F	0
0595..0F	IO-Image Image Encoding Parameter out of sequence	01 or 1F	0
0595..10	IO-Image Image Encoding Parameter value unsupported	01 or 1F	0
0595..11	IO-Image decompression error	01 or 1F	0
0596..0F	IO-Image Image Data Element Size Parameter out of sequence	01 or 1F	0

Table 57. IO-Image Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0596..10	IO-Image Image Data Element Size Parameter value unsupported	01 or 1F	0
0597..0F	IO-Image Image Look Up Table ID Parameter out of sequence	01 or 1F	0
0597..10	IO-Image Image Look Up Table ID Parameter value unsupported	01 or 1F	0
05A9..02	IO-Image data outside the Image Presentation Space	01 or 1F	0

Bar Code Exceptions

Table 58 lists the bar code exceptions.

Table 58. Bar Code Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0403..00	Invalid or unsupported bar code type	01 or 1F	0
0404..00	Unsupported font local ID or font not available	01 or 1F	0
0405..00	Invalid or unsupported bar code color	01 or 1F	0
0406..00	Invalid or unsupported module width	01 or 1F	0
0407..00	Invalid or unsupported element height	01 or 1F	0
0408..00	Invalid or unsupported height multiplier	01 or 1F	0
0409..00	Invalid or unsupported wide-to-narrow ratio	01 or 1F	0
040A..00	Invalid or unsupported symbol origin	01 or 1F	0
040B..00	Invalid or unsupported bar code modifier	01 or 1F	0
040C..00	Invalid or unsupported bar code data length	01 or 1F	0
040E..00	Check-digit calculation exception	01 or 1F	0
0410..00	Invalid or unsupported operator-readable interpretation location	01 or 1F	0
0411..00	Attempt to print portion of symbol outside block or VPA	01 or 1F	1

Graphics Data Exceptions

Table 59 lists the graphics data exceptions.

Table 59. Graphics Data Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0300..01	Unallocated or unsupported graphics order or command code	01 or 1F	0
0300..02	Reserved byte exception or invalid attribute set	01 or 1F	0
0300..03	Incorrect drawing order length	01 or 1F	0
0300..04	Invalid attribute value	01 or 1F	0
0300..08	Truncated order exception	01 or 1F	0
0300..0C	Segment prolog exception	01 or 1F	0
0300..0D	Virtual graphics presentation space overflow	01 or 1F	0
0300..0E	Unsupported attribute value	01 or 1F	0
0300..21	Invalid or unsupported default	01 or 1F	0
0304..00	Invalid segment characteristics drawing order	01 or 1F	0
0334..00	Character angle value not supported	01 or 1F	0
033E..00	Invalid End Prolog	01 or 1F	0
0360..00	Area bracket exception	01 or 1F	0
0368..00	Begin Area received incorrectly	01 or 1F	0
0368..01	Area truncated exception	01 or 1F	0
0368..02	Supported order invalid in area	01 or 1F	0
0368..03	Pattern Set not supported	01 or 1F	0
0368..04	Undefined pattern symbol	01 or 1F	0

Table 59. Graphics Data Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0368..05	Temporary-storage overflow while drawing an area	01 or 1F	0
0370..01	Unsupported Begin Segment Introducer segment flag	01 or 1F	0
0370..82	Invalid Begin Segment Introducer segment flag	01 or 1F	0
0370..C1	Invalid Begin Segment Introducer length	01 or 1F	0
0370..C5	Insufficient segment data	01 or 1F	0
0392..00	Graphics Image order sequence exception	01 or 1F	0
0392..01	Image data discrepancy	01 or 1F	0
0393..00	Graphics image bracket exception	01 or 1F	0
0393..01	Incorrect number of Image Data drawing orders	01 or 1F	0
03C0..00	Box corner too large (Printers > V9.2)	01 or 1F	0
03C0..01	Box corner parameter outside range (Printers > V9.2)	01 or 1F	0
03C2..00	Marker Set not supported	01 or 1F	0
03C2..01	Undefined marker code	01 or 1F	0
03C3..00	Font not available	01 or 1F	0
03C3..01	Undefined graphics character	01 or 1F	0
03C6..01	Arc drawing check	01 or 1F	0
03D1..00	Truncated graphics image exception	01 or 1F	0
03D1..01	Invalid order in graphics image	01 or 1F	0
03D1..02	Graphics image format not supported	01 or 1F	0
03E1..00	Relative line outside coordinate space	01 or 1F	0

Table 59. Graphics Data Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
03E3..00	Partial Arc ends outside graphics presentation space (Printers > V9.6)	01 or 1F	0
03E3..02	Negative sweep angle (Printers > V9.6)	01 or 1F	0
03E3..03	Negative start angle (Printers > V9.6)	01 or 1F	0

Specification Check–General

Table 60 lists the specification checks.

Table 60. Specification-Check Exceptions

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0200..01	Embedded control-sequence code exception	01 or 1F	0
0202..01	End Suppression (ESU) control-sequence exception	01 or 1F	0
0202..02	Invalid or unsupported IPDS command length	01	0
0202..05	Invalid data self-defining field length	01 or 1F	0
0203..02	IPDS command header length too small	01	0
0203..05	Invalid or unsupported block orientation	01 or 1F	0
0204..01	EP command encountered before End Suppression	01 or 1F	0
0204..02	Invalid use of Acknowledgment Continuation Bit	01 or 1F	0
0204..05	Invalid or unsupported value for area-position reference system	01 or 1F	0
0205..01	Invalid spanning sequence	01 or 1F	0
0205..05	Invalid or unsupported self-defining field unit base	01 or 1F	0
0206..01	invalid Begin Suppression (BSU)	01 or 1F	0
0206..05	Invalid or unsupported self-defining field L-units	01 or 1F	0
0207..05	Invalid or unsupported self-defining field extents	01 or 1F	0
0208..05	Invalid or unsupported mapping option	01 or 1F	0
0209..05	Invalid or unsupported axis offsets	01 or 1F	0
020B..05	Invalid self-defining field identifier	01 or 1F	0
020C..01	Invalid or unsupported font local ID	01 or 1F	0

Table 60. Specification-Check Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
020D..01	Invalid or unsupported object container data (Printers > V8.3)	01 or 1F	0
020D..02	Unsupported value for registered object ID (Printers > V8.3)	01 or 1F	02
020D..03	Invalid triplet length (Printers > V8.3)	01 or 1F	02
020E..01	Invalid area coloring triplet length (Printers > V8.3)	01 or 1F	0
020E..02	Invalid or unsupported color space (Printers > V8.3)	01 or 1F	0
020E..03	Invalid or unsupported color value (Printers > V8.3)	01 or 1F	0
020E..04	Invalid percent value (Printers > V8.3)	01 or 1F	0
020E..05	Invalid or unsupported number of bits for a color component (Printers > V8.3)	01 or 1F	0
020F..01	Invalid or unsupported Set Text Orientation (STO)	01 or 1F	0
0210..01	Invalid or unsupported Set Inline Margin (SIM)	01 or 1F	0
0211..01	Invalid or unsupported Set Baseline Increment (SBI)	01 or 1F	0
0212..01	Invalid or unsupported inter-character adjustment	01 or 1F	0
0213..01	Invalid or unsupported Absolute Move Baseline (AMB)	01 or 1F	0
0214..01	Invalid or unsupported Absolute Move Inline (AMI)	01 or 1F	0
0214..02	The font, font section, or font index to be deleted is not found	01	0
0215..02	Invalid or unsupported DF command font or font section ID	01	0
0217..01	Invalid or unsupported Set Variable-Space Increment (SVI)	01 or 1F	0
0217..02	Invalid or unsupported value for DF command deletion type	01	0

Table 60. Specification-Check Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0218..02	Invalid, unsupported, or unavailable font ID. No AEA or PCA supported.	01 or 1F	0
0219..01	Invalid or unsupported value for Repeat String (RPS) repeat length	01 or 1F	0
0219..02	Multiple occurrences of the same LFE font-equivalence number	01 or 1F	0
021A..01	Repeat String (RPS) or Transparent Data (TRN) exception	01 or 1F	0
021B..01	Repeat String (RPS) target-string length exception	01 or 1F	0
021B..02	Invalid or unsupported unit base for L-units value in Load Font Control	01	0
021C..01	Invalid escape sequence	01 or 1F	0
021C..02	Invalid LFC command byte-count value	01	0
021D..02	Invalid or unsupported value for the Load Font Equivalence GRID	01 or 1F	0
021E..01	Invalid WT control-sequence length	01 or 1F	0
021F..01	Repeat String (RPS) length exception	01 or 1F	0
021F..02	Mismatch of LFE command font Host-Assigned IDs	01 or 1F	0
0220..01	Double-byte MICR font section mismatch	01	0
0220..02	Invalid LFC font staging byte	01	0
0221..02	Invalid or unsupported value for Load Font Control font-index format	01	0
0222..02	Invalid or unsupported LFC data pattern format	01	0
0223..02	Invalid or unsupported value for LFC font-type bits	01	0

Table 60. Specification-Check Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0226..02	Invalid or unsupported LFC X-box size	01	0
0227..02	Invalid or unsupported LFC Y-box size	01	0
022A..02	Invalid or unsupported value for LFC L-units per unit base in the X direction	01	0
022B..02	Invalid or unsupported value for LFC L-units per unit base in the Y direction	01	0
022D..02	Invalid or unsupported value for LFC character-data alignment	01	0
022E..02	Insufficient font data received	01	0
0231..01	Invalid or unsupported value for LCC number of copies	01	0
0232..01	Invalid or unsupported LCC Keyword in copy-group entry	01	0
0232..02	Excess font data received	01	0
0234..01	Invalid or unsupported value for LCC entry-byte count	01	0
0236..01	Invalid or unsupported LCC simplex/duplex parameter	01	0
0237..01	Invalid or unsupported LCC simple-up parameter	01	0
0237..03	Unsupported Load Copy Control media-destination parameter	01	0
0237..04	Incompatible media source and media destination	09	0
0237..05	Mixture of media-source IDs or media-destination IDs in a duplex copy-subgroup	01	0
0238..01	Maximum supported number of overlays per LCC copy group exceeded	01	0
0238..03	Missing medium overlay HAID keyword	01	0

Table 60. Specification-Check Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0239..01	Maximum supported number of suppressions per LCC copy group exceeded	01	0
0239..02	Load Font Control font Host-Assigned ID already assigned	01	0
023A..02	Maximum number of fonts exceeded	01	0
023B..01	Inconsistent command length	01	0
023B..02	Invalid double-byte character flags	01	0
023C..02	Invalid or unsupported value within an LFI command	01	0
023E..02	Invalid LFC character-pattern address	01	0
023F..02	STO-SCFL-LFE command mismatch	01 or 1F	0
0240..02	Invalid or unsupported value for font inline sequence	01	0
0242..01	WIC Pel count is less than the minimum required	01 or 1F	0
0243..01	WIC command Pel count is greater than the maximum supported value	01 or 1F	0
0243..02	Invalid double-byte coded font section identifier	01	0
0244..01	WIC command scan count is less than the minimum required	01 or 1F	0
0244..02	Non-matching double-byte coded font sections	01	0
0245..01	WIC command scan count is greater than the maximum supported value	01 or 1F	0
0246..01	Invalid WIC source image format	01 or 1F	0
0246..02	Invalid parameter in an LFI command	01	0
0247..01	Invalid or unsupported value for WIC magnification factor	01 or 1F	0

Table 60. Specification-Check Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0247..02	Invalid or unsupported value for LFE font-inline sequence	01 or 1F	0
0248..01	Invalid or unsupported value for WIC scan-line direction	01 or 1F	0
0249..01	Invalid scan-line-sequence direction in a WIC command	01 or 1F	0
024A..01	Invalid or unsupported value for WIC image block location	01 or 1F	0
0253..01	Invalid or unsupported value for WIC image color	01 or 1F	0
0255..00	Page group already saved (POD Printers)	01	0
0255..01	Included page not previously saved (POD Printers)	01	0
0255..02	Invalid page sequence number in ISP command (POD Printers)	01	0
0255..03	Saved page group not found (POD Printers)	01	0
0255..04	Multiple ISP commands encountered (POD Printers)	01	0
0255..05	Nested ISP commands encountered (POD Printers)	01	0
0255..06	Included page not previously saved with the specified text suppressions (POD Printers)	01	0
0255..07	Saved page group to be deactivated was not found (POD Printers)	01	0
0255..08	Invalid triplet information in a XOH-DSPG command (POD Printers)	01	0
0255..09	Page too large to save (POD Printers)	01	0
0255..0A	Invalid triplet information in an XOH RSPG command (POD Printers)	01	0
0258..03	Invalid or unsupported value for text color	01 or 1F	0

Table 60. Specification-Check Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
025B..01	Invalid type value in MID command (3130 All models and printers > V8.0)	01	0
025C..02	Invalid or unsupported parameter in a DUA	01	0
0260..02	Invalid or unsupported value for LPD	01	0
0261..02	Invalid or unsupported value for LPD L-units per unit base	01	0
0262..02	Invalid or unsupported value for LPD X-extent	01	0
0263..02	Invalid or unsupported value for LPD Y-extent	01	0
0264..02	Invalid or unsupported value for LPD unit base	01	0
0268..02	Invalid or unsupported value for LPD inline-sequence direction	01	0
0269..02	Invalid baseline-sequence direction in the LPD command	01	0
026A..01	Insufficient source image data	01 or 1F	0
026A..02	Invalid or unsupported value for LPD initial I print coordinate	01	0
026B..01	Excess source image data received	01 or 1F	0
026B..02	Invalid or unsupported value for LPD initial B print coordinate	01	0
026E..01	Invalid or unsupported value in an XOH-SMM command	01	0
026F..02	Invalid Media Origin parameter specified in an XOH-SMO command	01	0
0277..01	Group termination exception	01	0
0278..01	Invalid or unsupported order type	01	0
027A..01	Invalid triplet length value in a group triplet	01	0

Table 60. Specification-Check Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
027B..01	Incorrect number of triplet data bytes in a group triplet	01	0
027C..01	Incompatible finishing operations	01 or 06	0
027C..02	Too many sheets for a finishing operation	06 or 09	0
027C..03	Invalid or unsupported finishing operation type	01 or 06	0
027C..04	Invalid or unsupported finishing operation reference corner and edge	01 or 06	0
027C..05	Unsupported finishing operation count	01	0
027C..06	Invalid or unsupported finishing operation axis offset	01	0
027C..07	Invalid or unsupported number of finishing positions	01	0
027C..09	Finishing operation incompatible with physical media or media destination	06	0
027C..0B	Media to be finished cannot be sent to the selected media destination	09	0
027C..0C	Invalidly mixed paper sizes while finishing	09	0
0280..02	Invalid or unsupported rule width	01 or 1F	0
0282..02	Invalid or unsupported rule length	01 or 1F	0
0285..01	Invalid or unsupported value for DO command overlay ID or overlay HAID	01	0
0287..02	Invalid or unsupported value for LFC unit base for Pel-units	01	0
0288..02	Invalid or unsupported value for LFC unit base in the X direction	01	0
0289..02	Invalid or unsupported value for LFC unit base in the Y direction	01	0

Table 60. Specification-Check Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
028A..01	Invalid or unsupported value for DPS command page segment HAID	01	0
028A..02	Invalid or unsupported value for LFC Relative-Metric Multiplying Factor	01	0
028F..01	Invalid or unsupported AR parameter value	01	0
028F..02	AR command activation failed	01	0
028F..03	Invalid resource ID triplet length (Printers > V8.0)	01	0
028F..04	Invalid resolution or metric technology value (Printers > V9.1)	01	0
028F..10	Invalid or unsupported value in a Metric Adjustment triplet (Printers > V9.3)	01	0
028F..11	Baseline adjustment value too large or too small (Printers > V9.3)	01	0
0290..01	Invalid or unsupported overlay ID or overlay HAID	01 or 1F	0
0291..01	BO overlay ID or overlay HAID already loaded	01	0
0291..02	Invalid or unsupported value XOA-RRL entry	01	0
0292..01	Overlay ID or overlay HAID not loaded	01 or 1F	0
0293..01	Recursive overlay invocation	01 or 1F	0
0293..02	Invalid orientation value in an IO command (Printers > V9.2)	01 or 1F	0
0294..01	Invalid or unsupported value for page segment HAID	01 or 1F	0
0295..01	Page segment HAID already loaded	01	0

Table 60. Specification-Check Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0295..02	Invalid or unsupported value for XOH-PCC page-counter update	01	0
0296..01	Page segment HAID not loaded	01 or 1F	0
0297..01	Overlay nesting limit exceeded	01 or 1F	0
0298..01	Invalid or unsupported suppression number	01 or 1F	0
0298..03	Invalid or unsupported increment or direction for TBM. Note that precision errors for TBM are not checked.	01 or 1F	0
0299..02	Invalid Edge Mark Parameter	01	0
029A..01	OVS overstrike character is not valid.	01 or 1F	0
02A4..01	Page boundary in the X-direction cannot be represented in the printer	01 or 1F	0
02A4..02	User printable area boundary in the X-direction cannot be represented in the printer	01	0
02A5..01	Page boundary in the Y-direction cannot be represented in the printer	01	0
02A5..02	User printable area boundary in the Y-direction cannot be represented in the printer	01	0
02AD..01	Invalid or unsupported offset value in LPP command	01	0
02AD..02	Invalid or unsupported page-placement value in LPP command	01	0
02AD..03	Invalid or unsupported orientation value in LPP command	01	0
02AE..01	Invalid or unsupported parameter in IO command	01 or 1F	0
02AF..01	Insufficient storage to print the sheet	0C	0

Table 60. Specification-Check Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
02B0..00	Code-page Host-Assigned ID already assigned	01	0
02B0..01	Invalid code-page Host-Assigned ID in an LCPC command	01	0
02B0..02	Invalid or unsupported encoding-scheme value in an LCPC command	01	0
02B0..03	Invalid GCSGID or CPGID in a code page (Printers > V8.0)	01 or 1F	0
02B0..04	Too much or too little code-page data	01	0
02B0..05	Invalid or unsupported byte-count value in an LCPC command	01	0
02B0..07	Code points out of order in an LCP command	01	0
02B0..0A	Host-Assigned ID already assigned in an LFCSC command	01	0
02B0..0B	Invalid Host-Assigned ID in an LFCSC command	01	0
02B0..0C	Invalid or unsupported pattern-technology ID in an LFCSC command	01	0
02B0..0D	Invalid GCSGID or FGID in a font character set	01	0
02B0..0E	Invalid or unsupported Load-Font count value in an LFCSC command	01	0
02B0..0F	Invalid or unsupported map-size value in an LFCSC command	01	0
02B1..01	Invalid or unsupported character ID format in an LF command	01	0
02B1..02	Invalid technology-specific ID offset in an LF command	01	0
02B1..03	Invalid technology-specific ID length in an LF command	01	0

Table 60. Specification-Check Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
02B1..04	GCGIDs out of order in a font character set (Printers > V8.0)	01 or 1F	0
02B1..08	Invalid technology-specific object length in an LF command	01	0
02B1..09	Checksum mismatch in an LF command	01	0
02B1..0A	Invalid technology-specific-object-name length in an LF command	01	0
02B1..0B	Invalid data within a LF3-type technology-specific object (Printers > V8.0)	01 or 1F	0
02B2..01	Parent font character set not activated (Printers > V8.0)	01	0
02B2..02	Font character set extension not valid with pattern technology (Printers > V8.0)	01	0
02B2..03	Mismatched character-ID format in a LF command (Printers > V8.0)	01	0
02B2..04	Mismatched MICR printing flag in a LFCSC command (Printers > V8.0)	01	0
02C0..01	Mixture of X-axis duplex and Y-axis duplex copy groups	01	0
02C0..02	Mixture of simple-up copy groups in an LCC command	01	0
02C0..03	More than one simple-up keyword specified in a copy group	01	0
02C0..05	N-up partitioning not supported with envelope media (Printers > V8.0)	01	0
02C1..01	Maximum number of simplex or duplex keywords in an LCC command	01	0
02C1..02	Internal value not unique in an LE command	01	0

Table 60. Specification-Check Exceptions (continued)

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
02C2..01	Odd number of duplex copy groups in LCC command	01	0
02C2..02	More than one media-source or media-destination keyword specified in a copy subgroup	01	0
02C3..01	Mixture of simplex and duplex parameters in an LCC command	01	0
02C4..01	Unequal copy counts in an LCC command	01	0
02C5..01	Unable to delete resource	01	0
02C6..01	Unable to deactivate a component of an activated coded font	01	0
02C6..02	Invalid mapping type in an LE command	01	0
02C8..01	An unsupported Input Media Source was specified	01	0
02C8..02	Invalid or unsupported internal value or external value in an LE command	01	0
02FF..02	Exceptions detected but not queued	01	0

Conditions Requiring Host Notification

Table 61. Conditions Requiring Host Notification

Sense Bytes 0, 1, 19 (in hex)	Description	Sense Byte 2 Action Code (in hex)	Sense Format
0100..00	Normal printer restart	0D	2
0101..00	Physical media size or input media source ID changed	1D	2
0102..00	MICR printing status changed	1D	2
0103..00	BTS/CTS status changed	1D	2
0104..00	Medium Modification Availability has Changed	1D	2
0105..00	Media-destination status changed	1D	2
0106..00	Printer resolution has changed (Printers > V8.0)	1D	2 (> V8.0)
0108..00	Printer setup has changed (Printers > V8.3)	1D	2 (> V8.3)
0109..00	Supported finishing operations changed	1D	2
0110..00	Print position adjustment	1A	2
0180..00	Request to end IPDS Dialog (3130 Model 2 printer only)	05	2
018F..00	Error Printer Restart	0D	2
01E4..00	Cancel key pressed	15	2
01E8..00	Pre/Post Processor Device Overrun	1A	2

Action Codes

Action codes classify the exception to assist the host in recovery. Table 62 lists the action codes that are returned by all printers covered by this document, unless noted by indicator (1) - 3130, 3900, InfoPrint 4000Models DR1/DR2, IR1/IR2.

Table 62. Action Codes

Action Code	Description
X'01'	Data-Stream exception. A syntax error has been found.
X'02'	Operator intervention with OBR record. (Parallel or ESCON Channel attached only)
X'03'	Operator intervention without OBR record. (Parallel or ESCON Channel attached only)
X'04'	Channel Error (Parallel or ESCON Channel attached only)
X'05'	End IPDS Dialog (All Printers > V8.0)
X'08'	Paper jam. The printer has detected a jam.
X'09'	Data-related print exception.
X'0A'	Postprocessor exception.
X'0C'	Resource storage exception.
X'0D'	Printer restart.
X'15'	Cancel.
X'16'	Hardware-related print error.
X'17'	Printer mechanism unusable.
X'18'	Log only condition. (Parallel or ESCON Channel attached only)
X'1A'	Re-drive buffered pages.
X'1C'	Invalid Channel Command Sequence (Parallel or ESCON Channel attached only)
X'1D'	Printer characteristics changed.

Table 62. Action Codes (continued)

Action Code	Description
X'1F'	Data stream exception in secure overlay.
X'22'	Printer inoperative (See Note).
X'24'	Printer not assigned. (ESCON Channel attached only)
X'25'	The printer is assigned to another host. (ESCON Channel attached only)
X'4D'	Resetting Event. (ESCON Channel attached only)
Note: Action code X'22' is used in SNA to replace another action code, the counters are adjusted as if the other action code was sent. For example, error X'40E5..00' has its counters set to the jam recovery counter values.	

Sense Byte Information

All AFCCU printers respond with 24 sense bytes. The following describes the information in each byte.

Table 63. Sense Bytes

Bytes	Description
0	The first byte of the three-byte exception ID, that defines the exception class for the specific exception.
1	The second byte of the three-byte exception ID, that together with sense bytes 0 and 19, defines the specific exception within an exception class.
2	Contains the host exception-recovery action code that specifies the suggested recovery action for the exception.
3	For most action codes this byte defines whether the printer is in the ready or not ready state at the time of the exception, not at the time the exception is reported to the host. For action codes X'01', X'0C', X'0D', X'15', and X'18' the printer state is defined at the time the exception is reported to the host.
5	Specifies the format of sense bytes 4—18 and 20—23. as X'00', X'01', X'02', X'03', X'04', or X'05'. See “Formats 0, 1, 2, 3, 4, and 5, for Sense Bytes 4—23” on page 139 for details.
4, 6—18	Describes the specific cause of the exception
19	The third byte of the three-byte exception ID
20—23	If not saving a page, contains the page identifier (from the Begin Page command) for the page that has the exception; if saving a page, contains the sequence number of the page within the group.

Formats 0, 1, 2, 3, 4, and 5, for Sense Bytes 4—23

The following sections describe the formats of sense bytes 4—23.

Sense Format 0

Format 0 provides detailed information for all data stream exceptions, excluding data-check-positioning exceptions. This format applies to all data-check, specification-check, and command-reject exceptions, excluding exceptions X'08C1..00', X'08C2..00', X'08C3..00' and X'0411..00'.

Table 64 defines the sense bytes in format 0.

Table 64. Sense Format 0

Sense Byte	Description
4	Data exception X'DE'
5	Format identifier X'00'
6—7	Quantity of exception occurrences
8—9	Overlay ID that has the exception
10—11	Page-segment ID that has the exception
12—13	Command in process when the exception was found
14—15	ID of other object (for example, font ID from LFC command)
16—17	ID of other object subsection (for example, double-byte font section)
18	Type of page identifier X'00' = Page identifier from Begin Page command X'01' = Page sequence number associated with a saved page
19	Byte 3 of the exception ID

Table 64. Sense Format 0 (continued)

Sense Byte	Description
20—23	Page identifier • If printing and not saving a page, and the exception is associated with a particular page, this is the page ID from the Begin Page command. If the exception is not associated with a particular page, this field will contain X'00000000'. • If saving a page and the exception is associated with a particular page, this is the page sequence number that is associated with the page to be saved. If the exception is not associated with a particular page, this field will contain X'00000000'.
Note: For exception ID X'0237..04', bytes 12—13 contain the command code for a LCC command, byte 14 is reserved and should contain X'00', byte 15 contains a media-source ID, and bytes 16—17 contain the media-destination ID that is inconsistent with the media-source ID.	

Sense Format 1

Format 1 provides detailed information for data stream positioning exceptions X'08C1..00', X'08C2..00', X'08C3..00' and X'0411..00'.

Table 65 defines the sense bytes in format 1.

Table 65. Sense Format 1

Sense Byte	Description
4	Data exception X'DE'
5	Format identifier X'01'
6—7	Quantity of exception occurrences
8—9	Overlay ID that has the exception
10—11	Page-segment ID that has the exception
12—13	Command in process when the exception was found
14	Text position exception count (maximum 255, no wrap)
15	Image position exception count (maximum 255, no wrap)
16	Rule position exception count (maximum 255, no wrap)
17	Graphic position exception count (maximum 255, no wrap)
18	Type of page identifier X'00' = Page identifier from Begin Page command X'01' = Page sequence number associated with a saved page
19	Byte 3 of the exception ID

Table 65. Sense Format 1 (continued)

Sense Byte	Description
20—23	Page identifier • If printing and not saving a page, and the exception is associated with a particular page, this is the page ID from the Begin Page command. If the exception is not associated with a particular page, this field will contain X'00000000'. • If saving a page and the exception is associated with a particular page, this is the page sequence number that is associated with the page to be saved. If the exception is not associated with a particular page, this field will contain X'00000000'.

Sense Format 2

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

Table 66 defines the sense bytes in format 2.

Table 66. Sense Format 2

Sense Byte	Description
4	Device sense-format identifier for bytes 8Created by ActiveSystems 11/14/96 Entity not defined.18
5	Format identifier X'02'
6—7	System Reference Code (device specific)
8—18	Device specific sense detail
19	Byte 3 of the error code
20—23	Usage count in sides of paper.

Sense Format 3

Format 3 provides detailed information for all Parallel Channel and ESCON Channel errors.

Table 67 defines the sense bytes in format 3.

Table 67. Sense Format 3

Sense Byte	Description
4	Reserved
5	Format identifier, X'03'
6—7	Reserved
8—9	Reserved

Table 67. Sense Format 3 (continued)

Sense Byte	Description
10	Channel Adapter Error Log Register
11	Reserved
12	Data Transfer Protocol
13	Data Streaming Rate
14	Channel Command Register
15	Channel (Host) Status Register
16	Channel Adapter (Request) Wait Register
17	Command Table
18–19	Reserved
20	Storage Control Block Number
21	Data Transfer Byte Count
22—23	Reserved

Sense Format 4

Format 4 provides detailed information for all Operator Interventions without OBR records (Parallel Channel ESCON Channel attached only)

Table 68 defines the sense bytes in format 4.

Table 68. Sense Data Format 4

Byte	Description
4	Zero
5	Format identifier, X'04'
6—23	Zero

Sense Format 5

Format 5 provides detailed information for all ESCON Channel errors.

Table 69 defines the sense bytes in format 5.

Table 69. Sense Data Format 5

Byte	Description
4	Reserved
5	Format identifier, X'05'
6	Physical Interface Identifier
7—8	Link Adapter A Basic Status Register
9	Link Adapter A Error Log Reg Byte 1
10—12	Link Adapter A Link Error Log
13—14	Link Adapter B Basic Status Register
15	Link Adapter B Error Log Reg Byte 1

Table 69. Sense Data Format 5 (continued)

Byte	Description
16—18	Link Adapter B Link Error Log
19	Link Adaptor Indicator
20	Reserved
21	VCU ID (0–15 Link A, 16–31 Link B)
22–23	Virtual Error Log for VCU ID

Chapter 3. AFCCU IPDS Resident Font Sets

This chapter describes the resident AFCCU font support, including:

- The contents of the resident SBCS IBM Strategic Font Set:
  - “IBM Core Interchange Resident Scalable Font Set” on page 151
  - “4028 Compatibility Resident Font Set” on page 162
  - “IBM Coordinated Resident Scalable Font Set” on page 167.
- The contents of the DBCS Resident Raster Font Set: See “DBCS Resident Raster Font Set” on page 170.
- The contents of the DBCS Resident Scalable Outline Font Set: See “DBCS Resident Scalable Outline Font Set” on page 174.
- A description of the printer default font, as well as other fonts that can be selected as the default font. See “Default Font” on page 178.
- Printer support of the AS/400 “bolding” function. See “Native AS/400 or OfficeVision Bolding Function” on page 181.

Introduction to IPDS Fonts

The IBM Strategic font set, which is comprised of the IBM Core Interchange set and the IBM Coordinated font set, are supported as scalable Type 1 outline fonts, depending on the Print Services Facility (PSF) support, for all AFCCU printers. That font set also provides typeface support for the 4028 Compatibility Resident font set for the specific pitch and point sizes listed below.

All resident font sets are contained on the AFCCU’s hard disk with the default font of Courier Roman Medium 12 pitch (10 point).

All AFCCU printers also accept downloaded AFP single-byte and double-byte raster fonts and AFP FOCA format scalable single-byte and double-byte outline fonts as supported by the PSF driver except:

- 3130 Models 01S/02S, 3160 Model 001, and 3935 Model 001 do not support double-byte outline fonts.
- 3935 Model 001 does not support double-byte raster fonts.
- Printers at code version < V8.5 allow only fixed metric fonts in 240 pel resolution, except 3900 Model 0W1 with FC 9930.
- Printers at code version < V9.1 and printers not set to automatic resolution do not allow relative metric raster fonts if the font resolution does not match the reported resolution in the Image and Coded Font Resolution self-defining field for the XOH-OPC response.
- Printers on version 8 below V8.528, and printers on version 9 below V9.415 are not shipped with Euro currency character sets or code pages, except the 3130–035 and 02D will have resident Euro support on product version > 10.24.1, and the 3935 will have resident Euro support on product Version 3.25.

Resident Font Activation Methods

Fonts resident within the printers may be activated by any of the following IPDS commands.

Load Font Equivalence

The Load Font Equivalence (LFE) command maps font local identifiers, specified within text, graphics, or bar code data, to font Host Assigned IDs (HAIDs) and Global Resource IDs (GRIDs). If the GRID specified in the LFE command matches a GRID contained in the printer, the font is activated.

Activate Resource (Load Resource Equivalence)

The Activate Resource (AR) command (previously known as Load Resource Equivalence) maps Host Assigned IDs to global names of another format. The format for the global name is identified by a resource type and resource ID combination. If the printer has a resource that matches the global name in the AR command, that resource is activated.

Table 70 shows the combinations of Resource Type and Resource ID Format that are supported.

Table 70. Resource Type and Resource ID Formats

Resource Type	RT Hex	Resource ID Format	RIDF Hex
Single-Byte Coded Raster Font	X'01'	IBM GRID	X'03'
Single-Byte Coded Raster Font	X'01'	MVS Host Unalterable	X'06'
Double-Byte Coded Font Section (Printers > V8.0)	X'03'	IBM GRID	X'03'
Double-Byte Coded Font Section	X'03'	MVS Host Unalterable	X'06'
Code Page	X'06'	IBM GRID	X'03'
Font Character Set	X'07'	IBM GRID	X'03'
Single-Byte Coded Font Index	X'08'	IBM GRID	X'03'

Table 70. Resource Type and Resource ID Formats (continued)

Resource Type	RT Hex	Resource ID Format	RIDF Hex
Single-Byte Coded Font Index	X'08'	MVS Host Unalterable	X'06'
Double-Byte Coded Font Index	X'09'	MVS Host Unalterable	X'06'
Coded Font	X'10'	IBM GRID	X'03'
Coded Font	X'10'	Coded Font Format	X'07'

GRID: Global Resource ID

IBM Core Interchange Resident Scalable Font Set

Table 71 lists the type faces in the IBM Core Interchange Resident Scalable Font Set, the resident typefaces, as well as the valid Font Global ID (FGID) and Graphic Character Set Global ID (GCSGID) for each typeface.

Notes:

1. Table 72 on page 155 lists the valid GCSGID subsets for each GCSGID listed in Table 71.
2. Table 73 on page 156 lists the Code Pages that correspond to each typeface.

Table 71. IBM Core Interchange Resident Scalable Font Set

Typeface	FGID	GCSGID
Latin 1/2/3/4/5		
Times New Roman Medium	2308	1269
Times New Roman Bold	2309	1269
Times New Roman Italic Medium	2310	1269
Times New Roman Italic Bold	2311	1269
Helvetica Roman Medium	2304	1269
Helvetica Roman Bold	2305	1269
Helvetica Italic Medium	2306	1269
Helvetica Italic Bold	2307	1269
Courier Roman Medium	416	1269
Courier Roman Bold	420	1269
Courier Italic Medium	424	1269
Courier Italic Bold	428	1269
Latin 1/2/3/4/5 with Euro		
Times New Roman Medium	2308	1355

Table 71. IBM Core Interchange Resident Scalable Font Set (continued)

Typeface	FGID	GCSGID
Times New Roman Bold	2309	1355
Times New Roman Italic Medium	2310	1355
Times New Roman Italic Bold	2311	1355
Helvetica Roman Medium	2304	1355
Helvetica Roman Bold	2305	1355
Helvetica Italic Medium	2306	1355
Helvetica Italic Bold	2307	1355
Courier Roman Medium	416	1355
Courier Roman Bold	420	1355
Courier Italic Medium	424	1355
Courier Italic Bold	428	1355
Symbols		
Times New Roman Medium	2308	1275
Times New Roman Bold	2309	1275
Helvetica Roman Medium	2304	1275
Helvetica Roman Bold	2305	1275
Courier Roman Medium	416	1275
Courier Roman Bold	420	1275
Cyrillic Greek		
Times New Roman Medium	2308	1300
Times New Roman Bold	2309	1300
Times New Roman Italic Medium	2310	1300

Table 71. IBM Core Interchange Resident Scalable Font Set (continued)

Typeface	FGID	GCSGID
Times New Roman Italic Bold	2311	1300
Helvetica Roman Medium	2304	1300
Helvetica Roman Bold	2305	1300
Helvetica Italic Medium	2306	1300
Helvetica Italic Bold	2307	1300
Courier Roman Medium	416	1300
Courier Roman Bold	420	1300
Courier Italic Medium	424	1300
Courier Italic Bold	428	1300
Arabic		
ITC Boutros Setting Medium	2308	1264
ITC Boutros Setting Bold	2309	1264
ITC Boutros Setting Italic Medium	2310	1264
ITC Boutros Setting Italic Bold	2311	1264
ITC Boutros Modern Rokaa Medium	2304	1264
ITC Boutros Modern Rokaa Bold	2305	1264
ITC Boutros Modern Rokaa Italic Medium	2306	1264
ITC Boutros Modern Rokaa Italic Bold	2307	1264
Boutros Typing Medium	416	1264
Boutros Typing Bold	420	1264
Boutros Typing Italic Medium	424	1264
Boutros Typing Italic Bold	428	1264

Table 71. IBM Core Interchange Resident Scalable Font Set (continued)

Typeface	FGID	GCSGID
Hebrew		
Narkissim Medium	2308	1265
Narkissim Bold	2309	1265
Narkissim Italic Medium	2310	1265
Narkissim Italic Bold	2311	1265
Narkiss Tam Medium	2304	1265
Narkiss Tam Bold	2305	1265
Narkiss Tam Italic Medium	2306	1265
Narkiss Tam Italic Bold	2307	1265
Shalom Medium	416	1265
Shalom Bold	420	1265
Shalom Italic Medium	424	1265
Shalom Italic Bold	428	1265

GCSGID Subsets for IBM Core Interchange Fonts

Table 72 lists the valid GCSGID subsets for each GCSGID listed in Table 71 on page 151.

Table 72. GCSGID Subsets for IBM Core Interchange Fonts

GCSGID	Valid GCSGID Subsets
1269	0101, 0103, 0119, 0251, 0265, 0269, 0273, 0277, 0281, 0285, 0288, 0289, 0293, 0297, 0301, 0305, 0309, 0313, 0317, 0321, 0325, 0329, 0337, 0341, 0611, 0697, 0919, 0959, 0965, 0980, 0982, 0983, 0987, 0990, 0991, 0993, 0995, 1111, 1132, 1133, 1145, 1146, 1149, 1152, 1166, 1167, 1174, 1188, 1189, 1198, 1220, 1232, 1233, 1237, 1256, 1258, 1259, 1260, 1261, 1268, 1286, 1301, 1302, 2039
1275	0340, 0630, 0909, 1191, 1257
1355 (Euro)	1269, 2041
2041 (Euro)	695, 988, 1243, 1353, 1412, 2039
1264	0235, 0994, 1154, 1162, 1177, 1244
1265	0941, 0687, 0986, 0992, 1147, 1199, 1217, 1218
1300	0218, 0925, 0960, 0981, 0985, 0996, 0998, 1150, 1190, 1231, 1235, 1249, 1251, 1276, 1401

IBM Core Interchange Resident Code Page Set

Table 73 lists the code pages used with the IBM Core Interchange Resident Fonts.

Table 73. IBM Core Interchange Resident Code Page Set

CPGID	GCSGID	Language Supported
Latin 1 Country Extended Code Pages		
037	697	US English, Canadian English, Canadian French, Dutch, Brazilian Portuguese, Portuguese
273	697	German
274	697	Belgian
275	697	Brazilian
277	697	Danish, Norwegian
278	697	Finnish, Swedish
280	697	Italian
281	697	Japanese
282	697	Portuguese
284	697	Castillian Spanish, Latin American Spanish
285	697	UK English
297	697	French, Catalan
500	697	Multinational, Belgian French, Belgian Dutch, Swiss French, Swiss German, Swiss Italian
871	697	Icelandic
1140	695	US English, Canadian English, Canadian French, Dutch, Brazilian Portuguese, Portuguese
1141	695	German

Table 73. IBM Core Interchange Resident Code Page Set (continued)

CPGID	GCSGID	Language Supported
1142	695	Danish, German
1143	695	Finnish, Swedish
1144	695	Italian
1145	695	Castillian Spanish, Latin American Spanish
1146	695	UK English
1147	695	French, Catalan
1148	695	Multinational, Belgian French, Belgian Dutch, Swiss French, Swiss German, Swiss Italian
1149	695	Icelandic
Latin 1 EBCDIC Publishing Code Pages		
361	1145	Multinational, Belgian French, Belgian Dutch, Swiss French, Swiss German, Swiss Italian
382	1145	German
383	1145	Belgian
384	1145	Brazilian Portuguese
385	1145	Canadian French
386	1145	Danish, Norwegian
387	1145	Finnish, Swedish
388	1145	French, Catalan
389	1145	Italian
390	1145	Japanese
391	1145	Portuguese

Table 73. IBM Core Interchange Resident Code Page Set (continued)

CPGID	GCSGID	Language Supported
392	1145	Castillian Spanish
393	1145	Latin American Spanish
394	1145	UK English
395	1145	US English, Canadian English
	Latin 1 ASCII Code Pages	
437	919	Multinational, US English, UK English, Dutch, German, Finnish, French, Italian, Spanish, Swedish
850	980	Multinational PC
858	988	PC Multilingual with Euro
860	990	Portuguese (Primary = 850)
861	991	Icelandic (Primary = 850)
863	993	Canadian French (Primary = 850)
865	995	Nordic (Primary = 850)
1004	1146	IBM PC Desktop Publishing
1252	1412	Windows, Latin 1
819	697	ISO Latin 1
	Latin 2/3/4/5 EBCDIC and ASCII Code Pages	
852	982	Croatian, Czech, East German, Hungarian, Polish, Romanian, Slovak, Slovenian
870	959	Latin 2 Multilingual
912	959	Latin 2 ISO/ ANSI 8 Bit
853	983	Latin 3 Multilingual PC

Table 73. IBM Core Interchange Resident Code Page Set (continued)

CPGID	GCSGID	Language Supported
905	1286	Latin 3 Multilingual
1069	1256	Latin 4 EBCDIC
914	1256	Latin 4 ISO/ASCII
857	987	Latin 5 PC
920	1152	Latin 5 ISO/ANSI 8 Bit
1026	1152	Latin 5
Latin 9 EBCDIC and ASCII Code Pages		
923 (Euro)	1353	Latin 9
924 (Euro)	1353	Latin 9 EBCDIC
Latin EBCDIC DCF Code Pages		
1002	1132	DCF Release 2 Compatibility
1003	1133	US Text Subset
1068	1259	Text with Numeric Spacing
1039	1258	GML List Symbols
Cyrillic and Greek EBCDIC and ASCII Code Pages		
880	960	Cyrillic Multilingual (Primary = 1025)
915	1150	Cyrillic ISO/ASCII 8 Bit
855	985	Cyrillic PC
866	996	Cyrillic #2 PC
1025	1150	Cyrillic Multilingual
423	218	Greek 183 (Primary = 875)
813	925	Greek ISO/ASCII 8 Bit

Table 73. IBM Core Interchange Resident Code Page Set (continued)

CPGID	GCSGID	Language Supported
851	981	Greek PC (Primary = 869)
869	998	Greek PC
875	925	Greek
1039	1258	GML List Symbols
	Arabic EBCDIC and ASCII Code Pages	
420	235	Arabic Bilingual
864	994	Arabic PC
1008	1162	Arabic ISO/ASCII 8 Bit
1029	1154	Arabic Extended ISO/ASCII 8 Bit
1046	1177	Arabic Extended ISO/ASCII 8 Bit
1039	1258	GML List Symbols
	Hebrew EBCDIC and ASCII Code Pages	
916	941	Hebrew ISO/ASCII 8 Bit
1028	1199	Hebrew Publishing
424	941	Hebrew
803	1147	Hebrew Character Set A (Primary = 424)
856	986	Hebrew PC (Primary = 862)
862	992	Hebrew PC
1039	1258	GML List Symbols
	Symbols	
259	340	Symbols, Set 7
899	340	Symbols, Set 7 ASCII

Table 73. IBM Core Interchange Resident Code Page Set (continued)

CPGID	GCSGID	Language Supported
1087	1257	Symbols, Adobe
1038	1257	Symbols, Adobe ASCII
1091	1191	Symbols, Modified Set 7
1092	1191	Symbols, Modified Set 7 ASCII
363	630	Symbols, Set 8
829	909	Math Symbols

4028 Compatibility Resident Font Set

Table 74 describes the 4028 Compatibility Resident Font Set.

Notes:

1. The AFCCU Printers substitutes Times New Roman (from the IBM Core Interchange Set) for the Times Roman fonts listed in Table 74.
2. Table 75 on page 165 describes the code pages that correspond to the **Code Page** column in Table 74.
3. Prestige Fonts with a Code Page ID (CPGID) of 259 are mapped to the Courier Roman Medium Symbols font (FGID 85) and character set (GCSGID 1275).
4. To achieve maximum compatibility with the 4028 and derived printers, the box-drawing mode should be turned on at the printer console.

Table 74. 4028 Compatibility Resident Font Set

Typeface	FGID	Alt FGID	Pitch	Point Size	Font width	Code Pages
APL	76		12	10	120	310
Boldface	159		Proportional	12	120	A, B
Courier	11		10	12	144	259, A, B
Courier	85		12	10	120	259, A, B
Courier	223		15	8	96	A, B
Courier.17ss	254		17.1	7	84	A, B
Courier.17	252 ([1])		17.1	11	84	A, B
Courier Bold	46		10	12	144	A, B
Courier Bold	108 ([1])		12	10	120	A, B
Courier Italic	18		10	12	144	A, B
Courier Italic	92		12	10	120	A, B

Table 74. 4028 Compatibility Resident Font Set (continued)

Typeface	FGID	Alt FGID	Pitch	Point Size	Font width	Code Pages
Letter Gothic	281		20	6.3	72	A, B
OCR A	19		10	12	144	892
OCR B	03		10	12	144	893
Prestige	86		12	10	120	259, A, B
Prestige	221		15	7.76	96	A, B
Prestige	256		17.1	7	84	A, B
Prestige Pica	12		10	12	144	259, A, B
Prestige Pica Bold	60 ([1])		10	12	144	A, B
Prestige Elite Bold	111		12	10	120	A, B
Prestige Elite Italic	112		12	10	120	A, B
Prestige PSM Roman Medium	164 ([1])		Proportional	12	120	A, B
Prestige PSM Roman Bold	701		Proportional	12	120	A, B
Times Roman	5687	760	Typo	6	40	A, B
Times Roman	5687	751	Typo	8	53	A, B
Times Roman	5687	1051	Typo	10	67	A, B
Times Roman	5687	1351	Typo	12	80	A, B
Times Roman Bold	5707	1053	Typo	10	67	A, B
Times Roman Bold	5707	761	Typo	12	80	A, B
Times Roman Bold	5707	762	Typo	14	93	A, B
Times Roman Bold	5707	1803	Typo	18	120	A, B
Times Roman Bold	5707	2103	Typo	24	160	A, B
Times Roman Italic	5815	1056	Typo	10	67	A, B

Table 74. 4028 Compatibility Resident Font Set (continued)

Typeface	FGID	Alt FGID	Pitch	Point Size	Font width	Code Pages
Times Roman Italic	5815	763	Typo	12	80	A, B
Times Roman Bold Italic	5835	764	Typo	10	67	A, B
Times Roman Bold Italic	5835	765	Typo	12	80	A, B

Note (1): This font is not available for printers at code version < V8.0.

4028 Compatibility Resident Code Page Set

Table 75 provides an explanation of the groups as used in the Code Pages column of Table 74 on page 162.

Table 75. 4028 Compatibility Resident Code Page Set

CPGID	GCSGID
Group A	
037, 273, 274, 277, 278, 280, 281, 284, 285, 297, 500, 871	697
038, 367	103
260	341
276	277
286	317
287	321
288	325
1002	1132
1140, 1141, 1142, 1143, 1143, 1145, 1146, 1147, 1148, 1149	695
Group B	
256 (Replaced by 500)	337
289 (Replaced by 500, but missing obsolete ″Peseta″ character)	329
Miscellaneous	
310	963
259	340
892	968

Table 75. 4028 Compatibility Resident Code Page Set (continued)

CPGID	GCSGID
893	969

IBM Coordinated Resident Scalable Font Set

Table 76 lists the IBM Coordinated font set typefaces resident in the printers and includes the valid Font Global ID and code pages for each font. All of the listed fonts are scalable.

Where the IBM Core Interchange code pages are referenced in Table 73 on page 156, only the Latin 1 Country Extended, Latin 1 EBCDIC Publishing, Latin 1 ASCII and Latin EBCDIC DCF code pages are supported.

Table 76. Resident IBM Coordinated Font Set

Typeface	FGID	GCSGID	Code Pages
APL	307	1304	293, 310, 910
APL Bold	322	1304	293, 310, 910
Boldface	20224	2039	See Table 73 on page 156
Boldface (Euro)	20224	2041	See Table 73 on page 156
Gothic Text	304	2039	See Table 73 on page 156
Gothic Text (Euro)	304	2041	See Table 73 on page 156
Letter Gothic	400	2039	See Table 73 on page 156
Letter Gothic (Euro)	400	2041	See Table 73 on page 156
Letter Gothic Bold	404	2039	See Table 73 on page 156
Letter Gothic Bold (Euro)	404	2041	See Table 73 on page 156
OCR A	305	968	876, 892
OCR B	306	969	877, 893
Prestige	432	2039	See Table 73 on page 156
Prestige (Euro)	432	2041	See Table 73 on page 156
Prestige Bold	318	2039	See Table 73 on page 156

Table 76. Resident IBM Coordinated Font Set (continued)

Typeface	FGID	GCSGID	Code Pages
Prestige Bold (Euro)	318	2041	See Table 73 on page 156
Prestige Italic	319	2039	See Table 73 on page 156
Prestige Italic (Euro)	319	2041	See Table 73 on page 156
Katakana Gothic	304	1306	290, 897, 1027, 1041

GCSGID Subsets for IBM Coordinated Fonts

Table 77 maps the valid subsets of the GCSGIDs listed for the IBM Coordinated Font Set.

Table 77. GCSGID IBM Coordinated Font Set

GCSGID	Valid GCSGID Subsets
1304	0380, 0963, 1113
2039	0101, 0103, 0119, 0251, 0265, 0269, 0273, 0277, 0281, 0285, 0288, 0289, 0293, 0297, 0301, 0305, 0309, 0313, 0317, 0321, 0325, 0329, 0337, 0341, 0611, 0697, 0919, 0980, 0990, 0991, 0993, 0995, 1132, 1133, 1145, 1146, 1149, 1198, 1220, 1258, 1259, 1260
1306	0332, 1164, 1172, 1187
2041 (Euro)	0695, 0988, 1243, 1353, 1412, 2039

IBM Coordinated Resident Code Page Set

Table 78. provides the GCSGIDs and CPGIDs for the individual code pages listed in the Code Pages column of Table 76 on page 167.

Table 78. IBM Coordinated Resident Code Page Set

CPGID	GCSGID
293	380
310	963
910	1113
876, 892	968
877, 893	969
290, 1027	1172
897	1164
1041	1187

DBCS Resident Raster Font Set

The following tables list the DBCS resident raster fonts that are available standard on the 3160 Model-001 printer only, or available as part of a separately orderable feature for the 3130 printer only (see also “DBCS Resident Scalable Outline Font Set” on page 174). These fonts provide 240 pel capability for Japanese (Katakana), Korean, Simplified Chinese, Traditional Chinese and Thai character sets.

Notes:

1. These fonts are available on all printers > V7.0 that support 240 pel IPDS resolution (see note 5).
2. These fonts are standard on all printers > V8.0 that support 240 pel IPDS resolution, except 3130 Models 03S and 02D and InfoPrint 60.
3. These fonts are only available in raster form at 240 pel.
4. The 5 Japanese/Kanji DBCS fonts supported by 3820 ROM Font RPQ #8A5014 are included in the Japanese font set.
5. All 3130 printers may not have all of these fonts resident, depending on the date of the AFCCU microcode and the installation of the DBCS font feature. Refer to the *3130 Advanced Function Printer User’s Guide*, S544-5337, or the *3130 Advanced Function Printer System Administration Guide*, S544-5328, to determine which fonts are resident for any installed 3130 printer.

Table 79. Japanese Font Set

Typeface	Box Size	Point Size	Font Width	GCSGID	CPGID	FGID
Mincho (M16F)	16x16	4.8	96	370	300	53559
Mincho (M24F)	24x24	7.0	140	370	300	53559
Mincho (Z24F)	24x24	7.2	144	370	300	53559
Mincho (M26F)	26x26	7.8	156	370	300	53559
Mincho (M32F)	32x32	10.0	180	370	300	53559
Mincho (M36F)	36x36	10.8	216	370	300	53559
Mincho (M40F)	40x40	12.0	240	370	300	53559

Table 79. Japanese Font Set (continued)

Typeface	Box Size	Point Size	Font Width	GCSGID	CPGID	FGID
Mincho (M44F)	44x44	13.2	264	370	300	53559
Mincho (M48F)	48x48	14.4	288	370	300	53559
Mincho (M52F)	52x52	15.6	312	370	300	53559
Mincho (M64F)	64x64	19.2	384	370	300	53559
Gothic (G16F)	16x16	5.0	100	370	300	53815
Gothic (G20F)	20x24	7.2	144	370	300	53813
Gothic (G24F)	24x30	7.0	140	370	300	53813
Gothic (G32F)	32x32	9.6	192	370	300	53815
Gothic (G36F)	36x36	10.8	216	370	300	53815
Gothic (G40F)	40x40	12.0	240	370	300	53815
Gothic (G48F)	48x48	14.4	288	370	300	53815
Gothic (G64F)	64x64	19.2	384	370	300	53815
R-Gothic (R36F)	36x36	10.8	216	370	300	54071
R-Gothic (R40F)	40x40	12	240	370	300	54071
R-Gothic (R48F)	48x48	14.4	288	370	300	54071
R-Gothic (R64F)	64x64	19.2	384	370	300	54071

Table 80. Korean Font Set

Typeface	Box Size	Point Size	Font Width	GCSGID	CPGID	FGID
Mincho (M24K)	24x24	7.2	144	934	834	53559
Mincho (M32K)	32x32	9.6	192	934	834	53559
Mincho (M36K)	36x36	10.8	216	934	834	53559

Table 80. Korean Font Set (continued)

Typeface	Box Size	Point Size	Font Width	GCSGID	CPGID	FGID
Mincho (M40K)	40x40	12.0	240	934	834	53559
Mincho (M48K)	48x48	14.4	288	934	834	53559
Mincho (M64K)	64x64	19.2	384	934	834	53559
Gothic (G16K)	16x16	4.8	96	934	834	53815
Gothic (G24K)	24x30	9.0	180	934	834	53813

Table 81. Traditional Chinese Font Set

Typeface	Box Size	Point Size	Font Width	GCSGID	CPGID	FGID
Ming (M24T)	24x24	7.2	144	935	835	54583
Ming (M32T)	32x32	9.6	192	935	835	54583
Ming (M40T)	40x40	12.0	240	935	835	54583
Gothic (G16T)	16x16	4.8	96	935	835	53815

Table 82. Simplified Chinese Font Set

Typeface	Box Size	Point Size	Font Width	GCSGID	CPGID	FGID
Song (S26P)	26x26	7.8	144	937	837	54327
Song (S32P)	32x32	9.6	192	937	837	54327
Song (S40P)	40x40	12.0	240	937	837	54327
Gothic (G16P)	16x16	4.8	96	937	837	53815

Table 83. Thai Font Set

Typeface	Box Size	Point Size	Font Width	GCSGID	CPGID	FGID
Official (O40F)	24x40	12.0	240	939	839	57655

Table 83. Thai Font Set (continued)

Typeface	Box Size	Point Size	Font Width	GCSGID	CPGID	FGID
Official (O60F)	24x60	18.0	360	939	839	57655
Italics (I60F)	24x60	18.0	360	939	839	58039

DBCS Resident Scalable Outline Font Set

Table 84 lists the type faces in the DBCS Resident Scalable Outline Font Set, which is available as a part of a separately orderable feature on the 3130 Models 03S and 02D and InfoPrint 60 printers only (see also “DBCS Resident Raster Font Set” on page 170). These fonts are standard on all other printers > V8.0. This table also lists the valid Font Global ID (FGID) and Graphic Character Set Global ID (GCSGID) for each typeface.

Notes:

1. Table 86 on page 177 provides a mapping of the valid subsets of the GCSGIDs listed in Table 84.

Table 84. DBCS Resident Scalable Font Set

Typeface	FGID	Code Page	Character Set GCSGID
Japanese			
Heisei Mincho	53248	300	1067
Heisei Kaku Gothic	53249	300	1067
Traditional Chinese			
Sung	54563	835	2070
Kai	54568	835	2070
Simplified Chinese			
Fang Song	54566	837	1082
Hei	54565	837	1082
Kai	54568	837	1082
Song	54567	837	1082
Korean			
Myengjo	53560	834	1091

Table 84. DBCS Resident Scalable Font Set (continued)

Typeface	FGID	Code Page	Character Set GCSGID
Gothic	53816	834	1091

DBCS Resident Scalable Outline Code Page Set

Table 85. DBCS Resident Scalable Code Page Set

CPGID	GCSGID	Language and Width Supported
		Japanese Code Pages
300	1000	Japanese Full Width
300	1001	Japanese Full Width with (UDC) support
290	1172	Japanese Half Width
1002	1132	Japanese Half Width
1027	1172	Japanese Half Width
1041	1187	Japanese Half Width
		Traditional Chinese Code Pages
835	935	Chinese Full Width with (UDC) support
835	1030	Chinese Full Width
37	1175	Chinese Half Width
1043	1189	Chinese Half Width
1114	1238	Chinese Half Width
		Simplified Chinese Code Pages
837	937	Chinese Full Width with (UDC) support
837	1020	Chinese Full Width
836	1174	Chinese Half Width
1115	1240	Chinese Half Width
		Korean Code Pages
834	934	Korean Full Width with (UDC) support
834	1010	Korean Full Width
833	1173	Korean Half Width
1088	1327	Korean Half Width

GCSGID Subsets for the DBCS Resident Scalable Outline Font Set

Table 86 lists the valid GCSGID subsets for each GCSGID listed in Table 84 on page 174 and valid subsets (denoted with *) for GCSGIDs intended for user-defined font sets.

Table 86. GCSGID Subsets for the DBCS Resident Scalable Font Set

GCSGID	Valid GCSGID Subsets
1067	1000, 1132, 1172, 1187
1068 *	1001, 1067
1082	1020, 1174, 1240
1083 *	937, 1082
1091	1010, 1173, 1327
1092 *	934, 1091
2070	1030, 1175, 1189, 1238
2071 *	935, 2070

Default Font

The default font for all of the printers is Courier Roman Medium 12 pitch (10 point) using code page 500, version 1.

On the 3130, 3160, 3935, InfoPrint 60, and InfoPrint 62 printers only, the operator can change the default font and code page, by selecting from the code pages listed below.

Table 87. Selectable Default Fonts

Code Page	Description	Typeface/Size (CPI)
500	Belgium, Switzerland/International	See Note
037	US, Canada, Netherlands, Portugal	See Note
038	US English ASCII	See Note
260	Canadian French	See Note
273	Austrian/German	See Note
274	Belgium	See Note
277	Danish/Norwegian	See Note
278	Finnish/Swedish	See Note
280	Italian	See Note
281	Japanese	See Note
284	Spanish	See Note
285	UK English	See Note
286	Austrian/German (Alternate	See Note
287	Danish/Norwegian (Alternate)	See Note
288	Finnish/Swedish (Alternate)	See Note
290	Japanese/Katakana	Katakana Gothic Medium/10 and 12

Table 87. Selectable Default Fonts (continued)

Code Page	Description	Typeface/Size (CPI)
297	French	See Note
420	Arabic	Boutros Typing Medium/10 and 12 Boutros Typing Bold/10 and 12 Boutros Typing Italic Medium/10 and 12 Boutros Typing Italic Bold/10 and 12
423	Greek	See Note
424	Hebrew	Shalom Medium/10 and 12 Shalom Bold/10 and 12 Shalom Italic Medium/10 and 12 Shalom Italic Bold/10 and 12
870	Latin 2 Multilingual	See Note
871	Icelandic	See Note
875	Greek	See Note
880	Cyrillic	See Note
892	OCR - A	Medium/10
893	OCR - B	Medium/10
905	Turkish	See Note
924	Latin 9 EBCDIC Euro	See Note
1026	Turkish	See Note
1140	US, Canada, Netherlands, Portugal (Euro)	See Note
1141	Austrian/German (Euro)	See Note
1142	Danish/Norwegian (Euro)	See Note

Table 87. Selectable Default Fonts (continued)

Code Page	Description	Typeface/Size (CPI)
1143	Finnish/Swedish (Euro)	See Note
1144	Italian (Euro)	See Note
1145	Spanish (Euro)	See Note
1146	UK English (Euro)	See Note
1147	French (Euro)	See Note
1148	Belgium, Switzerland/International (Euro)	See Note
1149	Icelandic (Euro)	See Note

Note:

- Courier Medium/10 and 12
- Courier Bold/10 and 12
- Courier Italic/10 and 12
- Courier Italic Bold/10 and 12

Native AS/400 or OfficeVision Bolding Function

The following tables show the typeface substitutions that occurs on the printers when an application running in native AS/400 or OfficeVision use the “bolding” function. The tables list the original typeface, the typeface that the printer substitutes, and the FGIDs of both.

Notes:

1. This support is available for resident fonts only.
2. The bold font may have different metrics than the original font; this can affect line endings.
3. The following tables do not list bold fonts, which do not get bolded since they are already bold.

Table 88. IBM Core Interchange Resident Scalable Font Set

Requested Font	FGID	Result	FGID
Latin 1/2/3/4/5			
Times New Roman Medium	2308	Times New Roman Bold	2309
Times New Roman Italic Medium	2310	Times New Roman Italic Bold	2311
Helvetica Roman Medium	2304	Helvetica Roman Bold	2305
Helvetica Italic Medium	2306	Helvetica Italic Bold	2307
Courier Roman Medium	416	Courier Roman Bold	420
Courier Italic Medium	424	Courier Italic Bold	428
Symbols			
Times New Roman Medium	2308	Times New Roman Bold	2309
Helvetica Roman Medium	2304	Helvetica Roman Bold	2305
Courier Roman Medium	416	Courier Roman Bold	420
Cyrillic Greek			
Times New Roman Medium	2308	Times New Roman Bold	2309
Times New Roman Italic Medium	2310	Times New Roman Italic Bold	2311

Table 88. IBM Core Interchange Resident Scalable Font Set (continued)

Requested Font	FGID	Result	FGID
Helvetica Roman Medium	2304	Helvetica Roman Bold	2305
Helvetica Italic Medium	2306	Helvetica Italic Bold	2307
Courier Roman Medium	416	Courier Roman Bold	420
Courier Italic Medium	424	Courier Italic Bold	428
Arabic			
ITC Boutros Setting Medium	2308	ITC Boutros Setting Bold	2309
ITC Boutros Setting Italic Medium	2310	ITC Boutros Setting Italic Bold	2311
ITC Boutros Modern Rokaa Medium	2304	ITC Boutros Modern Rokaa Bold	2305
Boutros Typing Medium	416	Boutros Typing Bold	420
Boutros Typing Italic Medium	424	Boutros Typing Italic Bold	428
Hebrew			
Narkissim Medium	2308	Narkissim Bold	2309
Narkissim Italic Medium	2310	Narkissim Italic Bold	2311
Narkiss Tam Medium	2304	Narkiss Tam Bold	2305
Narkiss Tam Italic Medium	2306	Narkiss Tam Italic Bold	2307
Shalom Medium	416	Shalom Bold	420
Shalom Italic Medium	424	Shalom Italic Bold	428

Table 89. 4028 Compatibility Resident Font Set

Requested Font	FGID	Result	FGID
Courier	11	Courier Roman Bold	46
Courier	85	Courier Roman Bold	108
Courier	223	Courier Roman Bold	46

Table 89. 4028 Compatibility Resident Font Set (continued)

Requested Font	FGID	Result	FGID
Courier	254	Courier Roman Bold	46
Courier Italic	18	Courier Italic Bold	428
Courier Italic	92	Courier Italic Bold	428
Letter Gothic	281	Letter Gothic Bold	404
Prestige	86	Prestige Bold	111
Prestige	221	Prestige Bold	111
Prestige	256	Prestige Bold	111
Prestige Pica	12	Prestige Bold	60
Prestige PSM	164	Prestige PSM Bold	701
Times Roman	5687/760	Times New Roman Bold	2309
Times Roman	5687/751	Times New Roman Bold	2309
Times Roman	5687/1051	Times New Roman Bold	1053
Times Roman	5687/1351	Times New Roman Bold	761
Times Roman Italic	5815/1056	Times New Roman Italic Bold	764
Times Roman Italic	5815/763	Times New Roman Italic Bold	765

Table 90. IBM Coordinated Font Set

Requested Font	FGID	Result	FGID
APL	307	APL Bold	322
Letter Gothic	400	Letter Gothic Bold	404
Prestige	432	Prestige Bold	318

Appendix A. Media Source ID to Printer Location Translation

Table 91. Media Source ID to Printer Physical Location Name/Capacity Translation

XOH-OPC Media Source ID	Printer Type/Model Physical Location Name/Capacity							
	3130-01S (*)	**3130-02S (*)**	**3130-03S**	**3130-02D**	**3160-001**	**InfoPrint 60-002**	**3935-001**	**3900 InfoPrint 62 InfoPrint 4000 All Models**
X'00'	NA	Main Tray 2000 Sheets	Main Tray 2000 Sheets	Main Tray 2000 Sheets	Main Tray 2000 Sheets	Main Tray 2000 Sheets	Tray 1 2000 Sheets	Forms Input Area
X'01'	NA	Lower Sub Tray 250 Sheets	Lower Sub Tray 250 Sheets	Lower Sub Tray 250 Sheets	Lower Sub Tray 500 Sheets	Lower Sub Tray 500 Sheets	Tray 2 550 Sheets	NU
X'02'	NA	Upper Sub Tray 250 Sheets	Upper Sub Tray 250 Sheets	Upper Sub Tray 250 Sheets	Upper Sub Tray 500 Sheets	Upper Sub Tray 500 Sheets	Tray 3 250 Sheets	NU
X'03'	Side Tray 500 Sheets	Side Tray (O) 500 Sheets	Side Tray (O) 500 Sheets	Side Tray (O) 500 Sheets	Side Tray (O) 2000 Sheets	Side Tray 2000 Sheets	Tray 4 550 Sheets	NU
X'04'	Envelope Feeder (O) 100 Each	Envelope Feeder (O) 100 Each	Envelope Feeder (O) 100 Each	Envelope Feeder (O) 100 Each	NU	NU	NU	NU
X'05'	Top Front Tray 250 Sheets	Top Front Tray 250 Sheets	NA	NA	NU	NU	NU	NU

Table 91. Media Source ID to Printer Physical Location Name/Capacity Translation (continued)

XOH-OPC Media Source ID	Printer Type/Model Physical Location Name/Capacity							
	3130-01S (*)	3130-02S (*)	3130-03S	3130-02D	3160-001	InfoPrint 60-002	3935-001	3900 InfoPrint 62 InfoPrint 4000 All Models
Notes: 1. NA = Not Available on this model 2. NU = Not Used on this model 3. (O) = Optional Feature on this model 4. (*) = This model no longer offered – replaced by Model-03S.								

Appendix B. Media Destination ID to Printer Location Translation

Table 92. Media Destination ID to Printer Physical Location Name/Capacity Translation

XOH-OPC Media Destination ID	Printer Type/Model Physical Location Name/Capacity							
	3130-01S (*)	**3130-02S (*)**	**3130-03S**	**3130-02D**	**3160-001**	**InfoPrint 60-002**	**3935-001**	**3900 InfoPrint 4000 All Models**
X'0001'	Top - Base Stacker 500 Sheets	Top - Base Stacker 500 Sheets	Top - Base Stacker 500 Sheets	Top - Base Stacker 500 Sheets	Top Stacker 500 Sheets	Top Stacker 500 Sheets	Top Stacker 250 Sheets	Output Stacker
X'0002'	Top - Upper Stacker (O) 500 Sheets	Top - Upper Stacker (O) 500 Sheets	Top - Upper Stacker 500 Sheets	Top - Upper Stacker 500 Sheets	Side Stacker 1500 Sheets (S) 3000 Sheets (O)	Side Stacker 1500 Sheets (S) 3000 Sheets (O)	Side Stacker 2000 Sheets (S) (O)	NU
X'0003'	Side Stacker (O) 1500 Sheets	Side Stacker (O) 1500 Sheets	Side Stacker (O) 1500 Sheets	Side Stacker (O) 1500 Sheets	NU	NU	NU	NU

Notes:

1. NU = Not Used on this model
2. (O) = Optional Feature on this model
3. (S) = A 1500 sheet stacker is standard on this model – an optional feature 3000 sheet stacker replaces the standard 1500 sheet stacker in the same physical location
4. (*) = This model no longer offered – replaced by Model-03S.

Appendix C. Color Mapping Table

Overview

The AFCCU IPDS Rasterizer accepts a color mapping table which is downloaded in a WOC command. The syntax of the table is described in *Mixed Object Content Architecture Reference*, SC31-6802. The color mapping table is NOT part of IPDS so its implementation is described here.

AFCCU IPDS Rasterizer accepts both of the possible table types: color mapping table, and Reset color mapping table.

How Color Mapping Occurs

The Color Mapping is applied to data in a resource object, such as an overlay, when that object is included in a logical page. An exception to the above rule occurs when pages are processed and then saved in the database for sheet composition by the SideBuilder. In this case, the color mapping table that is active when the page is created (before it is stored in the database) is used to map colors in the page.

When a mapping table is active, an attempt is made to map all colors. In some cases, the color received as part of the input stream was invalid and another color was substituted as part of the AEA or PCA. The color which was substituted is the one that will be mapped, not the original color. In other cases, an input value may be valid but not supported. In these cases, the input value will be mapped. If it does not map, then simulation by another color value will occur. Simulation occurs for unsupported OCA colors and Highlight percents.

There may be multiple source repeating groups that could be used to map data. When attempting to map a color, all applicable tables will be searched in the order received and the first match that is found will be used. For example, for PTOCA text, any source group with Source_Object_Type_Selector being X'9B' (PTOCA), X'FE' (All Towers), or X'FF' (All Data) will be searched. Similarly, when coloring overlay presentation spaces, any source group with Source_Object_Type_Selector being X'DF' (Overlay), or X'FF' (All Data) will be searched.

Mapping GOCA Colors

If the GOCA color is specified using a Set Color (GSCOL, GPSCOL) order, a one-byte color value (X'00' –X'08') is specified. This value is converted to a two-byte value by preceding the value with X'FF'. For instance, if the GSCOL order specifies the value X'05', it becomes X'HH05'. This may be mapped to another color using the color mapping table by specifying X'FF05' as the source value. It will not be mapped by a source value of X'0005' in the color mapping table.

If the color value is set by a Set Extended color (GSECOL, CPSECOL) order, color mapping works as it would normally.

Mapping GOCA Patterns

When tables are downloaded, they may map GOCA patterns to percent coverage of a highlight color. When this happens:

- If the pattern mapped, then the area is filled with percent coverage of the target highlight color.
- If the pattern did not map, then the current color is checked.
  - If the current color mapped, then the area is filled with the pattern, in the percent coverage of target color.
  - If the color did not map, then the area is filled with the pattern, in the color that results from the rules specified in “OCA Color Value Definition” on page 33.

Color Mapping Table Parsing

- Reset color mapping table:
  - All data in table after Table_type will be consumed but ignored.
- color mapping table
  1. Source Repeating Groups are read.
     - They are read in the order received and the ID is noted.

- If an ID is smaller than the ID of the previous group, the rest of the group is consumed but not used. Processing continues.
- If a target repeating group is encountered, processing of target groups begins.

2. Target Repeating Groups are read.
   - They are read in the order received and the ID is noted.
   - If an ID is smaller than the ID of the previous group, the rest of the group is consumed but not used. Processing continues.
   - If a source repeating group is encountered, it is consumed and ignored.
3. Error Checking:

   If an error is found, X'020D..01' error is flagged and all data in this color mapping table is consumed but ignored. Whatever color mapping table was active before this WOC command was received will remain active. Checking is done for the following errors:
   - There is not at least one source and one target group.
   - A source id does not have a matching target ID.
   - Within a repeating group:
     - Type is invalid (not X'01': source or X'02': target)
     - Color Space is invalid – valid values are:
       - Source: Highlight, OCA, GOCA
       - Target: RGB, CMYK, Highlight, CIELAB
     - Source Object Type Selector is invalid.
     - Color Size is invalid.
     - Color Value is invalid:
       - Valid OCA values are listed in MO:DCA.
       - Valid Highlight percents are 0–100% (plus X'FF' for a source repeating group).
       - No other values need to be checked.

Default Internal Mapping Table for Spot Color

When a Spot Color Post-processing device is installed and available, a special Default Internal Mapping Table may be active. It maps only three OCA colors:

- OCA color X'0001' maps to Highlight color #1 (HL1)
- OCA color X'0002' maps to Highlight color #2 (HL2)
- OCA color X'0003' maps to Highlight color #3 (HL3)

This table becomes active when the printer reports a printer restart exception and Spot Color is available. It also becomes active if Spot Color becomes available and no color mapping tables (regular or reset) have been received. It is no longer active after a downloaded color mapping table or color reset mapping table has been received.

If a Spot Color Post-processing device is installed and available but cannot be used on a particular side of the form, mapping still occurs on that side. The highlight colors (X'0001', X'0002', and X'0003') are rendered as solid black rather than a solid color. Note that this looks the same as output from a printer with no color post-processing device *except* for GOCA fill areas, which are solid black instead of simulated as a pattern representing the color.

Life Cycle

When the printer reports a printer restart exception, the color mapping table goes to a default state.

- If a Spot Color Post-processing device is not available, then no mapping table is in effect.
- If a Spot Color Post-processing device is installed and available, then the Spot Color Internal Mapping Table is in effect.

  Note: If a Spot Color Post-processing device is not available on a particular side of the form, HL1, HL2, and HL3 are simulated as BLACK so mapping occurs but does not affect the output, except as discussed above.

When the rasterizer receives the reset color mapping table, then no color mapping table is active and no mapping occurs.

A color mapping table remains active until another color mapping table or the reset color mapping table is invoked or until a printer restart exception is reported. If no color mapping table is active, no color mapping occurs.

Acronyms and Glossary

A

ACK. A positive Acknowledge Reply. A response that contains counters and sense or special data.

ARQ. Acknowledge Required Flag. A flag in an IPDS command header that requests an Acknowledge Reply.

area position. A field in object area control commands that specifies the position and orientation of the object area.

B

BCAP. Bar Code Area Position. See *area position*.

BCDD. Bar Code data Descriptor. See *data descriptor*.

BCOC. Bar Code Output Control. See *output control*.

BCOCA. Bar Code Object Content Architecture. An architected collection of constructs used to interchange and present bar code data. See document *Bar Code Object Content Architecture*, S544-3766.

C

CID. Correlation ID. An optional field in an IPDS command header.

code page. A resource object containing descriptive information, graphic character identifiers, and code points corresponding to a coded graphic character set.

CPGID. Code page Global Identifier. A unique code page identifier that can be expressed as either a two-byte binary or a five-digit decimal value.

cut-sheet emulation. A continuous-forms printer emulates a cut-sheet printer by dividing each sheet in half and treating each half-sheet as if it were a single sheet.

D

data descriptor. A field in object area control commands that specifies the size and resolution of the presentation space.

DBCS. Double-byte character set

E

EUR. Offical abbreviation for the Euro.

Euro. A monetary unit of measure for a common currency recently introduced among cooperating countries in Europe. The symbol for a Euro looks like the letter C with two horizontal lines through the middle.

F

FGID. Font Typeface Global Identifier. A unique font identifier that can be expressed as either a two-byte binary or a five-digit decimal value, and is used to identify a type style and the characteristics of: posture, weight, and width.

FOCA. Font Object Content Architecture. An architected collection of constructs used to describe fonts and to interchange those font descriptions. See document *Font Object Content Architecture, S544-3285.*

G

GAP. Graphics Area Position. See *area position.*

GCSGID. Graphic Character Set Global Identifier. A unique graphic character set identifier that can be expressed as either a two-byte binary or a five-digit decimal value.

GDD. Graphics Data Descriptor. See *data descriptor.*

GOC. Graphics Output Control. See *output control.*

GOCA. Graphics Object Content Architecture. An architected collection of constructs used to interchange and present graphics data. See document *Graphics Object Content Architecture*, SC311-6804.

GRID. Global Resource Identifier. An eight-byte identifier that identifies a coded raster font. Contains Graphic Character Set Global ID, Code Page Global ID, Font Global ID, and font width.

GRN. Global Resource Name. A unique name used to identify resources. Can be one of a number of multi-byte resource naming schemes.

H

HAID. Host Assigned ID. A two-byte ID assigned by the host to a font, overlay, or page segment.

HARID. Host Assigned Resource ID. The combination of a HAID with a section identifier, a font inline sequence, or both.

I

IAP. Image Area Position. See *area position.*

IDD. Image Data Descriptor. See *data descriptor.*

IOC. Image Output Control. See *output control.*

IOCA. Image Object Content Architecture. An architected collection of constructs used to interchange and present images. See document *Image Object Content Architecture*, SC311-6805.

IPDS. Intelligent Printer Data Stream. An architected host-to-printer data stream that contains both data and controls defining how the data is to be presented. See *Intelligent Printer Data Stream Reference*, S544-3417.

L

logical page. A presentation space. One or more object areas can be mapped to a logical page. A logical page has specifiable characteristics, such as size, shape, orientation, and offset. The shape of a logical page is that of a rectangle. Orientation and offset are specified relative to a medium coordinate system. See also *UPA (User Printable Area)* and *VPA (Valid Printable Area)*.

L-unit. Logical Unit. A unit of linear measurement used in IPDS. The size of a logical-unit is determined by number of logical-units per unit base.

M

MO:DCA. Mixed Object Document Content Architecture. An architected, device-independent data stream for interchanging documents.

N

NACK. Negative Acknowledge Reply. Like a positive Acknowledge Reply but used to indicate an error.

O

output control. A field in object area control commands that specifies the mapping for the presentation space.

overlay. A predefined page or part of a page that is stored as a resource. Overlays are often used as electronic forms.

P

page segment. A portion of a page containing data objects and stored as a resource. It can be included in a page or an overlay.

Pel. The smallest printable or displayable unit on a physical medium. Pels per inch is often used as measurement of presentation granularity. Synonymous with *picture element* and *pixel*.

printer restart exception. An exception that has an action code of X'0D' (printer restart).

PTOCA. Presentation Text Object Content Architecture. An architected collection of constructs used to interchange and present presentation text data. See document *Presentation Text Object Content Architecture*, SC31-6803.

R

resource. An object that is referenced by a data stream or by another object to data or information. In IPDS, resources can be downloaded to and stored in printers. Examples of resources are fonts, code pages, overlays and page segments.

RT. Resource Type. A field in some IPDS commands that identifies the type of resource.

RIDF. Resource ID Format. A field in some IPDS commands that identifies the format of the resource ID.

S

SDF. Self-Defining Field. A field in the response the printer sends to the host following an XOH-OPC command. The field contains a length, an ID, and some data fields.

sense data. Data returned to the host in a Negative Acknowledge Reply or directly on a channel. It contains information that the host needs in order to recover from the error.

special data area. The area in a Negative Acknowledge Reply following the counters and the sense data that contains responses to host queries. It is used in the STM, XOA-RRL, and XOH-OPC command responses.

U

unit base. The base for the logical-units.

UPA. User Printable Area. The portion of the of the physical printable area to which user-generated data is restricted. See also *logical page* and *VPA (Valid Printable Area)*.

V

VPA. Valid Printable Area. The intersection of a logical page with the area of the medium presentation space in which printing is allowed. See also *logical page* and *UPA (User Printable Area)*.

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Readers' Comments — We'd Like to Hear from You

File Number: S370/4300/9370-15

Printed in U.S.A.

G544-3895-07