

Page Printer Formatting Aid
Version 1, Release 1.0

User's Guide



Note

Before using this information and the product it supports, read the information in [“Notices” on page 563.](#)

This edition applies to Page Printer Formatting Aid/370 Version 1 Release 1 Modification 0, Program Number 5688-190, and to all subsequent releases and modifications until otherwise indicated in new editions.

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About this publication

This publication describes how to use the Page Printer Formatting Aid (PPFA) to create and compile page definitions and form definitions for printing or viewing files with Advanced Function Presentation products, such as Print Services Facility.

Notes:

1. All PPFA/370 functions that are described are available on the z/OS[®] operating system. However, because functions on PSF/VM and PSF/VSE and PPFA/370 functions for VM and VSE are not updated, some of the PPFA/370 functions that are described are not available on the VM and VSE operating systems.
2. Not all of the functions that are provided by PPFA are supported in all print server licensed programs. See the information for the print server licensed program that you are using to determine which functions are supported. For more information about a specific environment, see [Appendix A, “System Dependencies for PPFA,”](#) on page 439 for the steps that are required to process page definitions and form definitions.

Who Should Use This Publication?

This publication is for anyone who wants to use PPFA to create form definitions and page definitions (traditional and record format). This publication assumes that you are one of these:

- A first-time user

You are using PPFA for the first time to create form definitions and page definitions. You are familiar with system commands, but you are not familiar with Print Services Facility (PSF) concepts and Page Printer Formatting Aid parameters. You need to read all of the information that is contained in this publication, and then use it as a reference.

For more information about z/OS, VM, or VSE, see the Application Programming Guide for the operating system that you are using.

- An intermediate user

You are familiar with print server concepts and with Page Printer Formatting Aid parameters and you know the difference between a logical page and a physical page. You already know how to create and use form definitions and page definitions. Use this publication as a reference to learn more about PPFA commands and syntax. Refer to the examples for useful information.

- An advanced user

You understand print server concepts and have used PPFA to create form definitions and page definitions. You understand the use of data stream processing. You are using this publication mostly as a reference. [Chapter 5, “Creating Complex Printouts,”](#) on page 99 might be especially helpful.

Abbreviations

AFP

Advanced Function Presentation

BCOCA

Bar Code Object Content Architecture

CMR

Color management resource

IOCA

Image Object Content Architecture

IPDS

Intelligent Printer Data Stream

LCDS

Line Conditioned Data Stream

MO:DCA

Mixed Object Document Content Architecture

MO:DCA-P

Mixed Object Document Content Architecture-Presentation

PCS

Profile Connection Space

PMF

Print Management Facility

PFFA

Page Printer Formatting Aid

PSF

Print Services Facility

Related Publications

You can obtain the publications that are listed in this section from the AFP Consortium web page (<http://www.afpcinc.org>) and the z/OS Internet Library (www.ibm.com/servers/resourcelink/svc00100.nsf/pages/zosInternetLibrary).

Publication	Order Number
<i>Advanced Function Presentation: Programming Guide and Line Data Reference</i>	S544-3884
<i>AFP Conversion and Indexing Facility User's Guide</i>	S550-0436
<i>AFP: Printer Information</i>	G544-3290
<i>Bar Code Object Content Architecture (BCOCA) Reference</i>	AFPC-0005
<i>Color Management Object Content Architecture (CMOCA) Reference</i>	AFPC-0006
<i>Font Object Content Architecture Reference</i>	S544-3285
<i>Graphic Object Content Architecture for AFP Reference</i>	AFPC-0008
<i>IBM AFP Fonts: Font Summary</i>	G544-3810
<i>IBM AFP Fonts: Technical Reference for Code Pages</i>	S544-3802
<i>IBM Infoprint Fonts: Font Summary</i>	G544-5846
<i>Image Object Content Architecture Reference</i>	AFPC-0003
<i>Intelligent Printer Data Stream Reference</i>	AFPC-0001
<i>Mixed Object Document Content Architecture Reference</i>	AFPC-0004
<i>Overlay Generation Language/370 User's Guide and Reference</i>	S544-3702
<i>Presentation Text Object Content Architecture Reference</i>	SC31-6803
<i>Print Services Facility/VM: Application Programming Guide</i>	S544-3677
<i>Print Services Facility/VM: System Programming Guide</i>	S544-3680
<i>Print Services Facility/VSE: Application Programming Guide</i>	S544-3666
<i>Print Services Facility/VSE: System Programming Guide</i>	S544-3665

Publication	Order Number
<i>PSF for z/OS: AFP Download Plus</i>	S550-0433
<i>PSF for z/OS: Customization</i>	S550-0427
<i>PSF for z/OS: Diagnosis</i>	G550-0428
<i>PSF for z/OS: Download for z/OS</i>	S550-0429
<i>PSF for z/OS: Introduction</i>	G550-0430
<i>PSF for z/OS: Messages and Codes</i>	G550-0432
<i>PSF for z/OS: Security Guide</i>	S550-0434
<i>PSF for z/OS: User's Guide</i>	S550-0435
<i>Using OpenType Fonts in an AFP System</i>	G544-5876

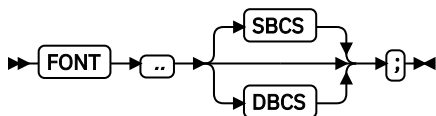
Reading Syntax Diagrams

The syntax for PPSA commands is shown by using graphic notation. To read the diagrams, move from left to right and top to bottom, following the main path line.

Style Rules:

Syntax diagrams use the following style rules to show how to enter commands and parameters:

- A word in uppercase must be spelled exactly as shown, but can be coded in any case. For example, in coding, FORMDEF, FormDef, or formdef are equivalent.
- A word in all italic, lowercase letters shows a parameter that you can replace. For example, *name* shows that you replace *name* with a resource name that is retained in the library.
- A parameter above the line shows the default parameter. For example, SBCS is the default parameter in the syntax diagram for the FONT command:



Symbols:

Syntax diagrams use symbols to help you follow the flow of the information:

- Statements begin with:

▶▶—

- And end with:

—▶◀

- Statements longer than one line continue to a second line with:

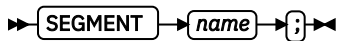
—▶

- Where they resume with:

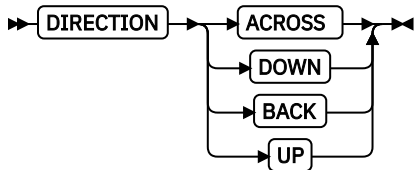
▶—

Required Parameters:

A parameter that you must include is displayed on the main path line. For example, the syntax diagram for the SEGMENT command shows that you must follow SEGMENT with its required parameter:



If you can choose from two or more required parameters, the parameters are shown with the first choice on the main path line and the other choices on branch lines under it. For example, this partial syntax diagram shows the DIRECTION command:

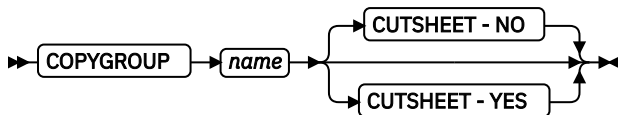


You must type the command in any of the following ways:

- DIRECTION ACROSS
- DIRECTION DOWN
- DIRECTION BACK
- DIRECTION UP

Optional Parameters:

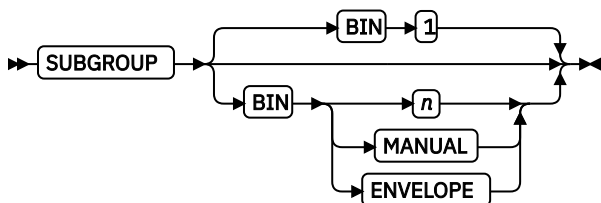
Parameters that you can include with a command are displayed on the branch line below the main path line. For example, this partial syntax diagram shows the COPYGROUP command:



You can type the command in one of these ways:

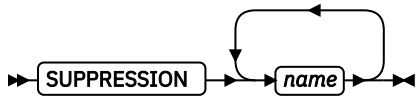
- COPYGROUP *name1* CUTSHEET YES ;
- COPYGROUP *name1* CUTSHEET NO ;
- COPYGROUP *name1*;

Branch lines can include branch lines of their own. For example, this is the partial syntax diagram for the SUBGROUP command with the optional BIN parameter:



Repeating Parameters:

An arrow on a line above a parameter means that you can either repeat the parameter or enter more than one of the listed parameters. An example of this is the partial syntax diagram for the SUPPRESSION subcommand in the SUBGROUP command:



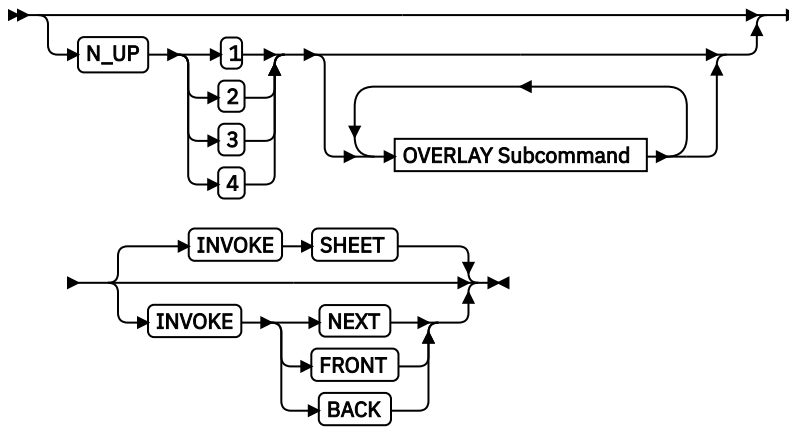
The arrow above *name* means you can include one or more field name parameters with the SUPPRESSION command.

Fragment Elements

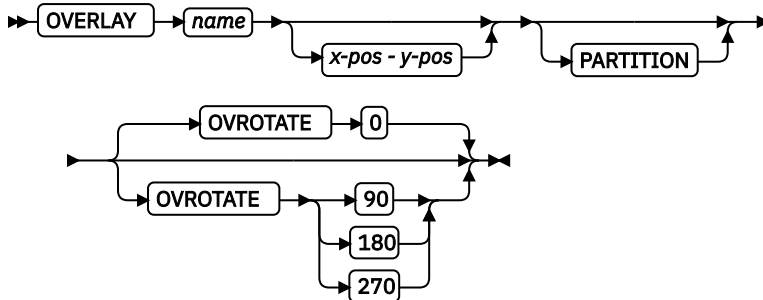
A syntax diagram can contain a section that either has too many items or groups to fit in the diagram or is used more than once. This section can be presented as a *fragment*, and given a label that corresponds to the section within the main diagram. An example of this is the syntax diagram for the FORMDEF subcommand with its fragmented OVERLAY subcommand.

Note: This FORMDEF diagram example also displays examples of some of the parameters that are mentioned in other diagrams.

FORMDEF



OVERLAY Subcommand



Summary of changes

This publication contains additions and changes to information previously presented in *Page Printer Formatting Aid (PPFA) User's Guide*, S544-5284-12. The technical additions and changes are marked with a revision bar (|) in the left margin.

The following information is new or updated:

- The note for the COMMENT subcommand in the FORMDEF command is updated for clarification. See [“COMMENT qstring” on page 231](#).
- Minor text and formatting changes are made to support accessibility and translation.

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Important: If your comment regards a technical problem, see instead [“If you have a technical problem” on page xxviii](#).

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- Send an email from the [Contact z/OS web page \(www.ibm.com/systems/z/os/zos/webqs.html\)](http://www.ibm.com/systems/z/os/zos/webqs.html).

Include the following information:

- Your name and address
- Your email address
- Your phone or fax number
- The publication title and order number:
 Page Printer Formatting Aid: User's Guide
 S544-5284-13

- The topic and page number or URL of the specific information to which your comment relates
- The text of your comment.

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- Contact your IBM service representative.
- Call IBM technical support.

Part 1. What is PPFA?

This section contains [Chapter 1, “Introducing Page Printer Formatting Aid,”](#) on page 3, which describes:

- Form definitions and page definitions
- Basic data types for printing
- PPFA concepts
- PPFA terms and definitions
- Line data controls and structured fields
- Types of duplex printing

Chapter 1. Introducing Page Printer Formatting Aid

Page Printer Formatting Aid is a program that enables users of Advanced Function Presentation (AFP) products to create their own formatting resources, called form definitions and page definitions. The form definitions and page definitions are stored in libraries¹ as AFP resources. Using AFP resources requires IBM Print Services Facility (PSF) or AFP Conversion and Indexing Facility (ACIF), which merges resources with user data files. This merging creates a data stream for printing or viewing.

Using a form definition or a page definition that is created by PPFA requires you to do three steps:

1. Write a set of PPFA commands that define how to position the data or handle the physical sheets.
2. Run PPFA to build the specified page definition or form definition and store the output as resources in a library.
3. Use your print server to submit the print file, specifying the page definition and form definition that are needed to accomplish the results you want.

Notes:

1. All PPFA/370 functions that are described are available on the z/OS operating system. However, because functions on PSF/VM and PSF/VSE and PPFA/370 functions for VM and VSE are not updated, some of the PPFA/370 functions that are described are not available on the VM and VSE operating systems.
2. Not all functions that are provided by PPFA are supported in all printers and printer server licensed programs. Refer to the information for the printer and printer server licensed program that you are using to determine which functions are supported.

Figure 1 on page 4 shows how form definition and page definition relate to PSF. In Figure 1 on page 4, the area inside the broken line represents steps 1 and 2. The area outside of the broken line shows how PSF merges resources with the specified print job to form a single print stream and sends it to a page printer.

¹ The term *library* includes z/OS and VSE libraries, and VM files.

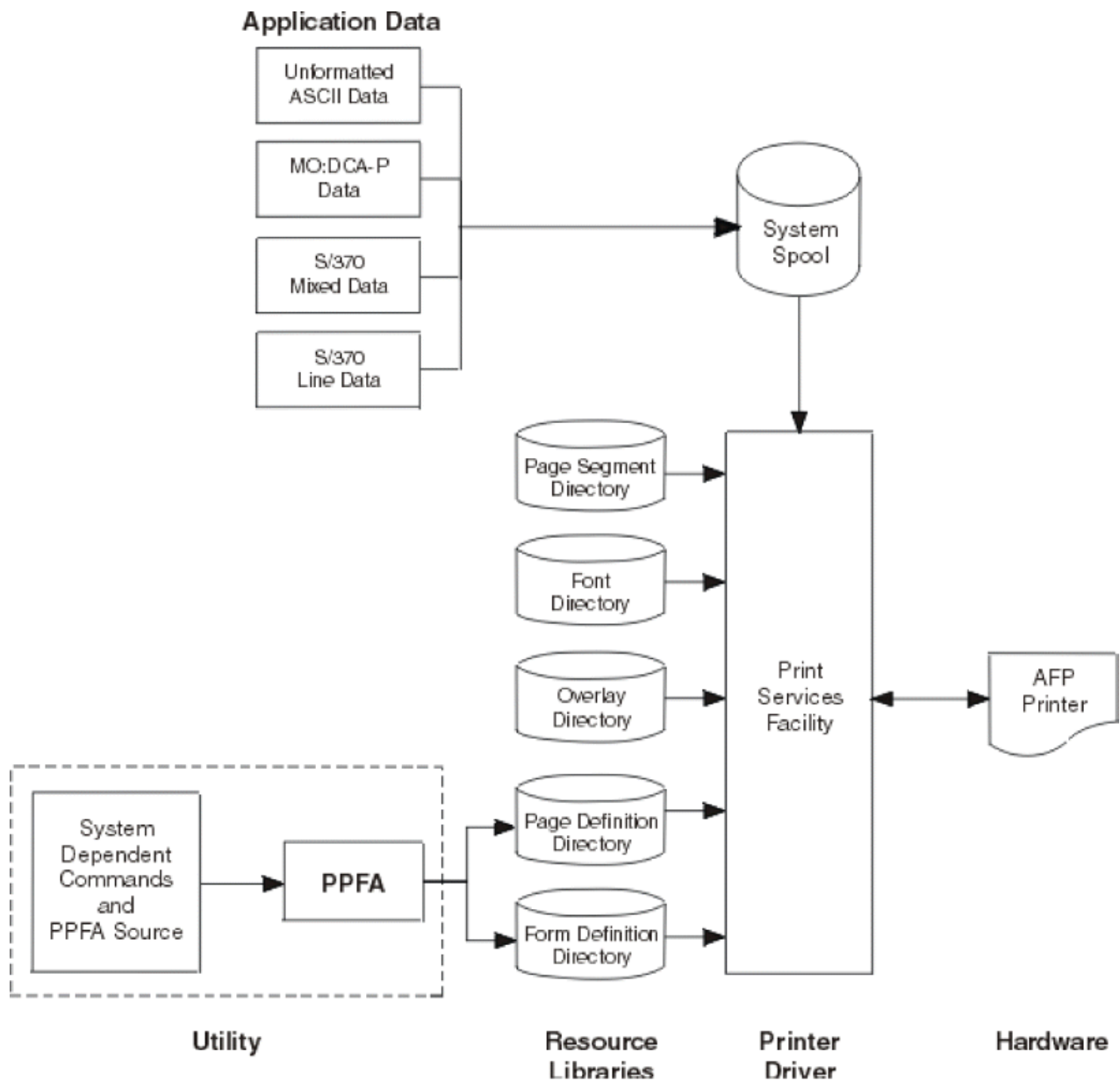


Figure 1: Form Definition and Page Definition Environment

Note: Figure 1 on page 4 is a general representation for operating systems that use PPFA. For PSF users in the z/OS, VSE, and VM environments, substitute the word "Directory" with the system-specific file organization (for example, z/OS library).

Summary of a Form Definition

A PPFA command stream can contain commands for form definitions. A *form definition* specifies how the printer controls the processing of the physical sheets of paper. In a form definition, you can specify modifications that distinguish formatting one print job from another when both are derived from the same data. Form definitions are used for all print server print files regardless of data type.

Form definitions can specify the following functions:

- Position of a logical page on a physical page
- Duplex printing
- Inclusion of overlays, which substitute for preprinted forms

- Flash (the use of a forms flash - only on 3800 printers)
- Selection of the number of copies for any page of data
- Suppression (the exclusion of selected fields of data in one printed version of a page of data but not in another)
- Jog (the offset stacking of cut-sheet output or copy marking on continuous-forms output)
- Selection among paper sources in a cut-sheet printer
- Adjustment of the horizontal position of the print area on the sheet (only on 3800 printers)
- Quality (selection among print quality levels)
- Constant (allows front or back printing of a page without variable data)
- Printing one, two, three, or four logical pages on a single side of a page
- Post-processing controls, such as:
 - Selecting functions
 - Selecting device-dependent functions that are defined by the post-processing device
- Finishing operations:
 - Center Fold In
 - Corner Staple
 - Edge Staple
 - Saddle Stitch (In and Out)
 - Separation Cut
 - Perforation Cut
 - Fold
 - Z-Fold
 - Punch
 - UP3i Finishing

Summary of a Page Definition

A *page definition* specifies how you want data to be positioned on the logical page. A page definition can control the following functions:

- Dimensions of the logical page
- Print direction of the logical page
- Print direction of text lines and fields relative to the logical page
- Conditional processing (different formats on different pages, based on content of data)
- Text line spacing (number of lines per inch)
- Location of individual text lines and fields
- Number of text lines per page
- Page segments for inclusion in printed output
- Overlays for inclusion in printed output (positioned anywhere on the page)
- Page-ejection points
- Fonts and font rotation that are used on a page
- Multiple-up printing (placing more than one subpage on one side of a single sheet)
- Colors to be used (on printers that support this function)
- One and two dimensional bar codes (on printers that support this function)
- External objects for inclusion in printed output (can be positioned anywhere on the page)

- Preloading and preripping of external objects and overlays

Formatting Output of Different Data File Types

The basic types of data that are printed on the print server printers are:

- Line-data files
 - Traditional line data
 - Record format line data
- Mixed-data files
- MO:DCA-P data files
- XML data

Line-data files and mixed-data files require a page definition and a form definition. MO:DCA-P data files require only a form definition.

Line-Data Files

Line data is EBCDIC data that is arranged for printing on line printers. These records can contain line-printer control characters such as carriage control characters (CC or FCFC), table-reference characters (TRC), or only data. To compose pages for the page printer from line data, the print server separates the incoming print records into pages according to specifications in a page definition. A page definition is always required for printing line data with the print server. You can create your own page definition or use a page definition that is provided with the print server. The two types of line data are *traditional* and *record format*.

The line data input to the print server can consist of records that are fully formatted; it can consist of records that contain only the fields of data to be printed; or it can consist of records of both types. You can use the page definition resource to format fields of line data outside of the application program. See [PSF for z/OS: User's Guide](#) for additional information.

The following example shows two types of line data. The first type is data that is arranged as it prints; the second is data that requires field processing.

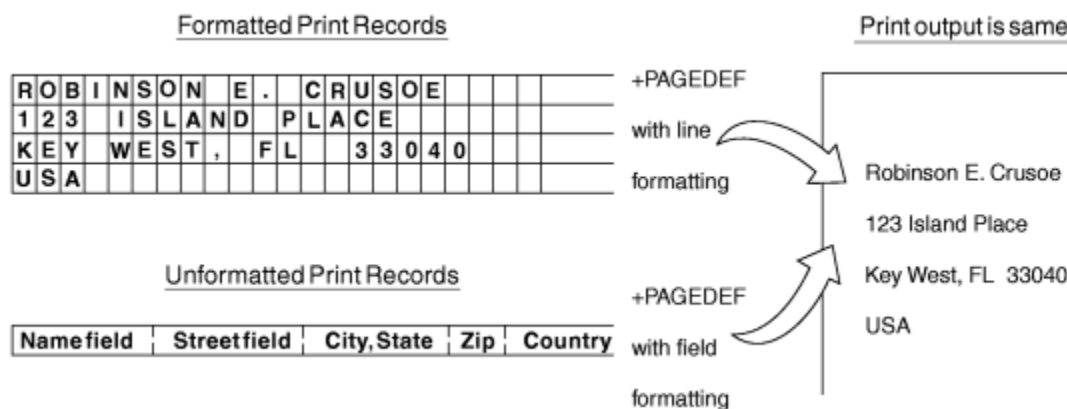


Figure 2: Formatted and Unformatted Print Records

The technique of mapping the unformatted data to locations on the output pages is known as field processing or record processing and is available by using page definition controls. Field processing is explained in detail in [“Processing Fields” on page 40](#).

Traditional Line Data

Traditional line data is data that is formatted for printing on a line printer. Fully formatted line data can be printed on a line printer without a page definition; however, all line data needs a page definition to be printed on a page printer.

A traditional line data record can contain a 1-byte carriage control character and a 1-byte table reference character followed by the data to be printed. (With a line printer, the maximum number of data bytes in a single input record is 208. With a page printer, the maximum number is 32,768 bytes). See [Chapter 3, “Using Page Definition Commands for Traditional Line Data,”](#) on page 31 for additional information about using traditional line data.

Record Format Line Data

The *record formatting function* allows an application to specify a format identifier (record ID) with each set of data fields (data record). The format identifier references a specific layout format in a Page Definition (PAGEDEF). At print time, each layout format (referenced by a record ID in a data record) is retrieved from the PAGEDEF and used to position and format the associated data records or fields on the output page. The PAGEDEF can contain any number of layout formats. The application can use a PAGEDEF layout format to either insert an end of page when a specified last line point is exceeded on the output page or force an end of page. See [Chapter 4, “Using Page Definition Commands for Record Format Line Data and XML Data,”](#) on page 51 for information about using record format line data.

statmid	Justin Case	123 Sligo Lane	Longmont	CO 80501
ckheader				
ckdata	352	01/04/07	\$ 321.50	Blind Squirrel Golf
ckdata	353	01/05/07	\$ 100.00	Janie's Pancake Spot
ckdata	354	01/10/07	\$ 122.30	History Bookstore
ckdata	355	01/11/07	\$ 59.95	Kristina's Pretty Things
ckdata	356	01/15/07	\$ 852.33	Pirie Racing Enterprises
ckdata	357	01/30/07	\$ 500.35	Skippy's Music Center
Ckend				

Figure 3: Example of Record Format Line Data

Mixed-Data Files

Mixed-data files consist of MO:DCA-P data and line data. Such files might specify the beginning and ending of pages and might contain page addresses and data controls for page printing. The line-data portion of such files must be formatted for page printers by page-definition controls.

MO:DCA-P Data Files

MO:DCA-P data files are formed into pages before the print server receives them. These files already contain the embedded controls for printing on page printers. They contain such things as page addresses and data controls for page printing functions.

Note: See *Mixed Object Document Content Architecture Reference* and *Advanced Function Presentation Programming Guide and Line Data Reference* for more information about MO:DCA-P data. User application programs can also generate MO:DCA-P data.

PPFA Concepts

The concepts of physical page, logical page, and subpage are basic to understanding form definition and page definition controls.

Physical Page

A *physical page* is the sheet of paper or other medium (a sheet of labels, for instance) that moves through the printer.

Logical Page

A *logical page* is the area that you define in a PPFA command stream as the space on the physical page where data is printed. The logical page is positioned in relation to the *media origin*. For more information about the media origin of your printer, see your printer documentation. The positioning of the logical page on the sheet of paper is described in [“Positioning a Logical Page on a Sheet”](#) on page 19.

You can use an N_UP command to place one, two, three, or four logical pages on a single sheet. N_UP is in contrast to multiple up, which places subpages on one logical page.

Subpage

A *subpage* is a part of a logical page on which line data can be placed. Subpages are used only with conditional processing. Multiple-up printing can be done with or without defining subpages. In the page definition, multiple subpages can be placed on the physical page based on changes in the print data. An example is the use of *multiple-up* printing, which is printing two or four pages on a single side of a sheet. For more information, see [“Subpage Description and Processing”](#) on page 110.

PPFA Basic Terms

The following terms have meanings that are special to PPFA:

- Printline
- Layout
- Direction
- Rotation
- Presentation
- N_UP partitions
- Modifications

Printline

Printline is a single line of text, and is the traditional command that is synonymous with the record formatting Layout command. In the formatting of line data, a printline is normally the output that is generated by one record in the print file. However, printlines and print records are not the same.

PRINTLINE commands in the PPFA page definition define the number and position of printlines on a page. Each record in the print file is written to a single printline on a page. Usually, one print record is written to each printline. However, control information in the print data can specify that two or more print records be written to the same printline, providing overprinting. Controls also can specify that print records skip printlines. For example, a print record might skip the remaining printlines on a page and instead print on the first printline of a new page.

Layout

Layout specifies a single line of text, and is the record formatting command that is synonymous with the traditional Printline command. In the formatting of line data, a layout is normally the output that is generated by one record in the print file. However, layouts and print records are not the same.

LAYOUT commands in the PPFA page definition define the number and position of layouts on a page. Each record in the print file is written to a single layout on a page. Usually, one print record is written to each layout. However, control information in the print data can specify that two or more print records be written to the same layout, providing overprinting. Controls also can specify that print records skip layouts. For example, a print record might skip the remaining layouts on a page and instead print on the first layout of a new page.

Direction

Text can be printed in four print directions. A print direction is a combination of both inline and baseline directions. For each of the directions, characters can be printed in four rotations.

The line direction is the direction in which successive characters are added to a line of text. The four line directions are:

ACROSS

Text characters are placed in a line from left to right across the page.

DOWN

Text characters are placed in a line from top to bottom down the page.

BACK

Text characters are placed in a line from right to left across the page.

UP

Text characters are placed in a line from bottom to top up the page.

The baseline direction is the direction in which successive lines of text are added to a page. The four character rotations, measured clockwise around each inline direction, for each line direction are:

- 0°
- 90°
- 180°
- 270°

For example, the text in this paragraph is printed ACROSS the page, and its rotation is 0°.

Figure 4 on page 9 shows the four possible directions.

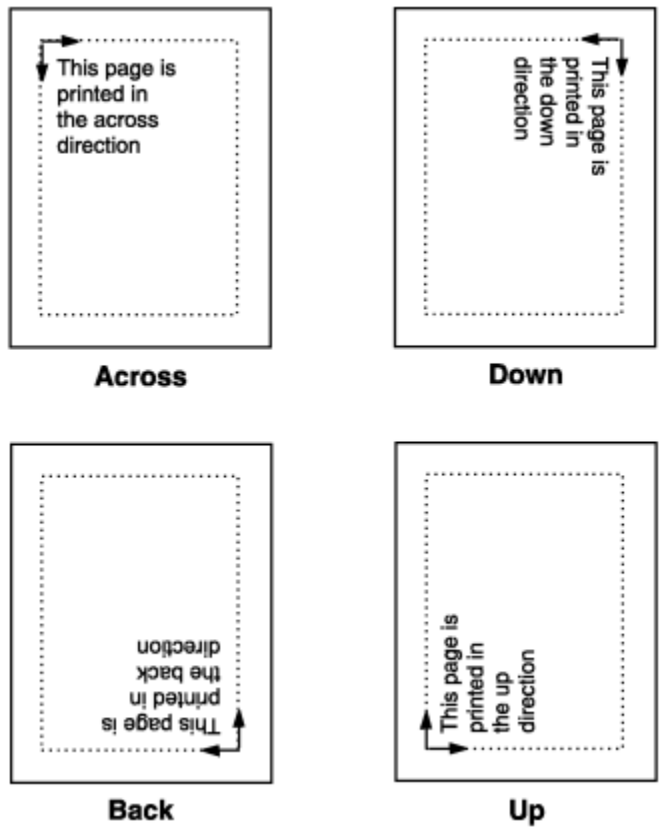


Figure 4: Baseline Direction and Inline Direction

Rotation

Individual characters can be *rotated*. Character rotation can be 0°, 90°, 180°, or 270° relative to the inline direction of the printline or field.

Note: On the 3800 printers only, character rotation differs between *bounded-box fonts* and *unbounded-box fonts*. Bounded-box fonts rotate the fonts; unbounded-box fonts are rotated by selecting the correct font.

Presentation

Presentation describes the shape of the page as it is viewed by the reader. Figure 5 on page 10 shows an example of how text is presented (positioned) on the page. The two page presentations are *portrait* and *landscape*:

Portrait

Designed to be viewed with the short side at the top of the page.

Landscape

Designed to be viewed with the long side at the top of the page.



Document A - Portrait Presentation



Document B - Landscape Presentation

Figure 5: Portrait and Landscape Presentations

N_UP Partitions

Some printers allow the physical sheet of paper to be divided into equal-sized partitions. For two or three partitions, each sheet is divided along one or two lines that are equally spaced along the longer side of the sheet. The printer positions a logical page of print data in each partition, which enables printing multiple logical pages with different formats and modifications on a single sheet of paper.

The size and arrangement of the partitions on the sheet depends on the number of partitions and the shape and size of the paper. For two or three partitions, each sheet is divided at two or three points that are equally spaced along the longer side of the sheet. For four partitions, each sheet is equally divided both vertically and horizontally. See [Chapter 7, "N_UP Printing," on page 129](#) for more information.

Modifications

Modifications are sets of form definition controls that apply to one page of a data file. With these controls, you can:

- Define the type of duplex printing to be done.
- Define one, two, three, or four partitions for N_UP.
- Select an overlay.
- Suppress the appearance of a field.
- Select the forms flash option (only for the 3800 printer).
- Specify the number of copies for a set of modifications.
- Specify post-printing processing options.

You can specify different sets of modifications for the same page of data in one form definition. Therefore, in one print job you can specify a series of SUBGROUP commands. For example, a form definition with two SUBGROUP commands has two sets of modifications. The same page of data is printed for each set of modifications, resulting in a slightly different output for each printing.

Definitions of Command, Subcommand, and Parameter

Commands, subcommands, and parameters are terms that are used throughout this publication to refer to the contents of PPFA control statements. Chapter 10, “Form Definition Command Reference,” on page 189 and Chapter 11, “Page Definition Command Reference,” on page 249 describe these commands with all their applicable subcommands.

Commands

Commands are the major controls that compose form definitions and page definitions.

Subcommands

Subcommands are used to further define commands. The absence of subcommands means that the default values specified with those subcommands are used. Three command terms also appear as subcommand terms: FONT, OVERLAY, and SUPPRESSION. These subcommand terms further define other commands.

Parameters

You can specify *parameters* with subcommands or accept the defaults; valid entries and their defaults are shown in the command reference chapters.

Basic Controls in Traditional Line Data

The following line-printer controls can be included in a line data file and can be used by a page definition to enable AFP functions:

- Carriage control characters
- Table-reference characters
- Record IDs

Carriage Control Characters (CC)

Carriage control characters, which control line skipping, line spacing, and page ejection on line printers, are fields within line-data records. They are compatible with page printers when page definitions format the printed data. In page definitions, you can specify CHANNEL subcommands that correspond to carriage control characters corresponding to channels 1 - 12 in the data. When you do so, the carriage control characters operate just as they do in a line-printer environment.

Note: ASCII ANSI, ANSI, and EBCDIC (machine) handle carriage control characters differently. See the SPACE_THEN_PRINT subcommand listed in “Long Form Subcommands” on page 252 for more information.

Table-Reference Characters (TRC)

Table-reference characters (TRCs) control font selection in line-data output. Page definitions can be used to map table-reference characters to AFP fonts for use with page printers.

For more information about Table-reference characters, see the *Advanced Function Presentation: Programming Guide and Line Data Reference*.

Record ID

Record IDs are only used with the record formatting function.

Basic Controls in Record Format Line Data

Record format line data is a new form of line data that is supported by the print server and formatted by a page definition. With this format, each data record contains a 10-byte record identifier that selects the record descriptor (RCD) in a record format page definition that is used to format the line data. This RCD might contain a carriage control (CC) byte.

- Carriage control characters
- Table-reference characters (not applicable in record format)

Carriage Control Characters (CC)

The CC byte is required when record format data is mixed with MO:DCA-P data, but is ignored. The CC byte is optional for record format line data at all other times; however, if you enter it, you must inform the print server that it is there.

Many functions that are used in the line descriptor (LND) to format traditional line data are used in RCD to format record format line data. Others, such as header and trailer processing, are unique to RCDs.

Traditional line data is similar to record format line data in that neither is formatted into pages. However, traditional line data can be printed on line printers while record format line data cannot. For more information, see Chapter 4, “Using Page Definition Commands for Record Format Line Data and XML Data,” on page 51.

Note: ASCII ANSI, ANSI, and EBCDIC (machine) handle carriage control characters differently. See the SPACE_THEN_PRINT subcommand listed in “Long Form Subcommands” on page 252 for more information.

Table-Reference Characters (TRC)

Table-reference characters (TRCs) cannot be used in record formatted line data.

Record ID

Record IDs are only used with the record formatting function. They are in the first 10 characters of each line data record, and control the layout type that is selected for each specified record. These 10 characters are reserved for record IDs and are not included as part of a defined field or conditional area.

Structured Fields in Line Data

Note: Structured fields are not supported by XML data.

To use the full function of page definitions and form definitions, MO:DCA-P structured fields might be required in the users data. The following MO:DCA-P structured fields can be included in a line-data file to activate AFP functions:

- Invoke Data Map
- Invoke Medium Map
- Include Page Segment
- Include Page Overlay
- Include Object
- Include Presentation Text (PTX)
- No Operation (NOP)

Note: For information about mixed mode, see the *Advanced Function Presentation: Programming Guide and Line Data Reference*.

Invoke Data Map

Add the Invoke Data Map structured field to the line-data file at a point that requires switching from one page format to another. The term *data map* is the name that is used for the term *page format* in PSF publications and PSF terminology.

Invoke Medium Map

Add the Invoke Medium Map structured field to the line-data file at a point that requires switching from one copy group to another. The term *medium map* is the name that is used for the term *copy group* in PSF publications and PSF terminology.

Include Page Segment

Position the Include Page Segment structured field within the line data for placing the page segment on the page.

Include Page Overlay

Position the Include Page Overlay structured field within the line data for placing the overlay anywhere on the page.

Include Object

Position the Include Object structured field for placing an object that contains other object types (for example, IOCA or BCOCA) for placing the object anywhere on the page.

Presentation Text

A presentation text object can be included in line data by using the Presentation Text (PTX) structured field, which is a self-contained object that consists of line spacing, page margin, data position, and font settings. See the *AFP Programming Guide and Line Data Reference* and the *Presentation Text Object Content Architecture Reference* for additional information.

No Operation

A No Operation (NOP) structured field can be placed in the line data stream. It can be used to insert information, such as a comment, into the data stream.

Normal Duplex and Tumble Duplex

Some page printers can print on both sides of a sheet, which is called *duplex* printing. Duplex printing can be done in four ways:

- Normal duplex
- Tumble duplex
- Rotated normal duplex
- Rotated tumble duplex

In normal duplex, both sides have the same orientation, as in most books. In tumble duplex, the back of each page is upside down compared to the front of the page: the top of one side of the sheet is at the same edge as the bottom of the other side. With these two types of duplex, you can specify top binding or side binding of the printed pages.

Duplex also involves the commands RNORMAL (rotated normal) and RTUMBLE (rotated tumble), which are used with landscape-presentation pages to specify the type of duplex printing. See [Figure 14 on page 26](#) and [Figure 15 on page 27](#) for illustrations of duplex printing.

Part 2. Examples of Using PPFA

This section contains information about:

- Using form definition commands
- Using page definition commands
- Creating complex printouts
- Conditional processing
- N_UP printing
- AFP color management

Chapter 2. Using Form Definition Commands

A form definition is a resource that is used by the print server to specify how the printer controls the processing of the sheets of paper. With form definitions, you can do the tasks that are listed in [Table 1 on page 17](#).

Task	Location of Example
Create a form definition.	“Commands Required to Create a Form Definition” on page 18
Position a logical page.	“Positioning a Logical Page on a Sheet” on page 19
Specify landscape presentation.	“OFFSET Subcommand with Rotated Print Direction” on page 20
Specify copies and electronic overlays.	“Specifying Copies and Electronic Overlays” on page 20
Print constant forms.	“Printing Constant Forms” on page 22
Duplex print in two orientation.	“Duplex Printing” on page 23
Print portrait and landscape.	“Duplex Printing in Portrait and Landscape Presentations” on page 25
Specify the page presentation on continuous-forms printers.	“Specifying Page Presentation on Continuous-Forms Printers” on page 27

Copy Groups and Subgroups

A single form definition can contain several subsets of page controls, called *copy groups*. Copy groups define each physical page in the file. When you are printing jobs in duplex, the copy group defines both sides of the physical paper. Copy groups, in turn, can contain up to 127 *subgroups*, each of which creates a different set of modifications for the same page of data.

A series of copy groups can be used where either the data or the printing requirements call for various page control schemes. Part of the file can be printed from one (bin) paper source and part from another. Part can be printed duplex; part can be printed simplex. Duplex commands can be specified for a printer that does not support this function. This command treats the two adjacent pages as duplexed. Various controls can be contained in one form definition that has several copy groups.

You can control the following options within a copy group:

- Position of the logical page on a sheet of paper
- Duplex printing
- Type of cut-sheet paper to be printed on (by choosing between paper input sources in page printers that have more than one paper source)
- Offset stacking or copy marking of parts of a print job in the output stacker
- Printing one, two, three, or four logical pages on a single side of a sheet
- Vendor-attached devices for post-processing functions to be done on the sheet
- Print-quality level

To access a new copy group within a form definition, you can:

- Add to your data file an Invoke Medium Map structured field immediately before the page of data that requires the new copy group.
- Use a page definition that specifies conditional processing. When you access a new copy group, printing begins on the next physical sheet of paper.

For more information on the Invoke Medium Map structured field, see *Mixed Object Document Content Architecture Reference*.

Subgroups allow the same page of data within a file to be printed more than once, using different sets of modifications each time the page is printed. One example is the printing of an invoice and a packing list from the same records in a data file.

The following modifications to the page of data can be specified in a subgroup:

- Selection of suppressed fields for the page
- Selection of overlays that are used with the page
- Selection of forms flash with the page (only on the 3800 printer)
- Selection of the modification for front, back, or both sides of a sheet
- Selection of the number of copies of the subgroup to print
- Selection of the input bin

Commands Required to Create a Form Definition

The following simplified command stream shows the proper nesting of commands and the sequence in which the commands must be entered when you are creating a form definition:

```
SETUNITS ]
FORMDEF
[SUPPRESSION ...]
[COPYGROUP ]
  [OVERLAY ...]
  [SUBGROUP ...]
[COPYGROUP ]
  [OVERLAY ...]
  [SUBGROUP ...]
```

Notes:

1. If the form definition has only one copy group, the COPYGROUP command can be omitted. The OVERLAY command then follows any SUPPRESSION command.
2. Indentations are used to improve readability.
3. Complete definitions of commands are in [Chapter 10, "Form Definition Command Reference,"](#) on page [189](#).

Command Nesting Rules

1. SUPPRESSION commands must be specified immediately after FORMDEF commands.
2. SUBGROUP commands are specified under their associated COPYGROUP command or under the FORMDEF command.
3. OVERLAY commands are specified immediately after COPYGROUP commands.
4. The first COPYGROUP command can be omitted in a form definition if the form definition has only one copy group, and if it contains no OVERLAY commands.
5. A SETUNITS command can be placed anywhere in the PPFA command stream and is in effect until another SETUNITS command is encountered.
6. More than one of each command can appear under one form definition.

7. If an OVERLAY occurs outside of a COPYGROUP (immediately after the FORMDEF), PPFA generates a COPYGROUP with the FORMDEF name and issues a warning message. This copy group becomes the first COPYGROUP and might not be the effect that you want.

Positioning a Logical Page on a Sheet

The example in this section shows how the OFFSET subcommand is used to position the logical page on the physical sheet. A logical page is the area on a sheet of paper where all printing occurs. You establish the *logical page origin*, the point nearest the media origin, with the OFFSET subcommand. The OFFSET subcommand requires two coordinates and might have four. The first x and y coordinate defines the position on the front of the sheet, and the second x and y coordinate defines the position on the back of the sheet. A sample form definition that specifies the logical page position for a simplex sheet is:

```
FORMDEF ABCD  
  OFFSET 1 IN 1 IN ;
```

Note: The 1 IN 1 IN is an abbreviation for 1 INCH 1 INCH. PPFA supports a number of different units of measurement formats. See “Units of Measurement” on page 186 for all the different formats.

The example places the logical page origin 1 inch to the right of and 1 inch down from the media origin.

Figure 6 on page 19 shows the meaning of the x and y coordinates. In writing an OFFSET subcommand, the first parameter specifies x; the second parameter specifies y. If the x and y are repeated for the offset of the back side of the physical page, the same applies. The x defines the horizontal offset; the y defines the vertical offset. In this example, the logical page direction is ACROSS. The arrows within the logical page indicate the inline direction for text on the page. The lines of text are added according to the baseline direction.

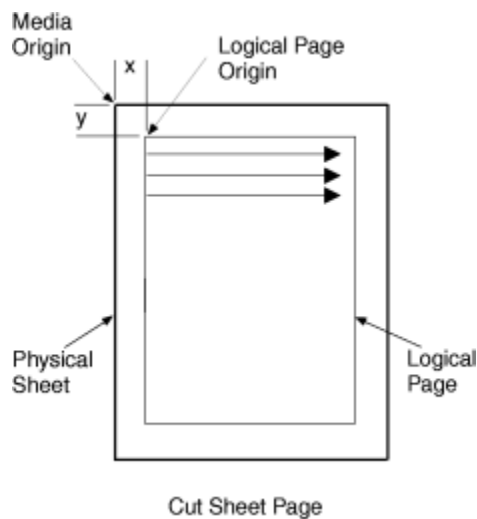


Figure 6: Origin of Logical Page

Figure 7 on page 20 shows the meaning of x and y in a logical page specification for a 3900 sheet. The 3900 sheet does not have an unprintable area, but FORMDEFs supplied with the print server have a 1/6 inch offset.

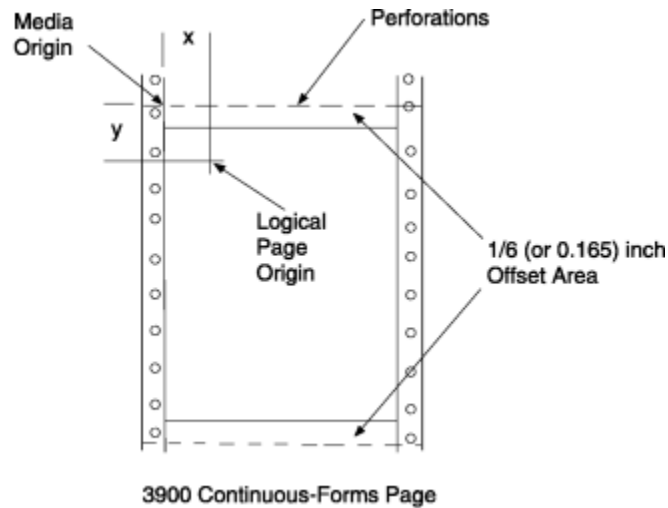


Figure 7: Origin of a Logical Page on a 3900 Sheet

OFFSET Subcommand with Rotated Print Direction

Figure 8 on page 20 shows that the media origins and logical page origins do not change when the print direction of the page changes, although the way you view the page does change. The arrows within the logical page show the DOWN print direction—producing landscape page presentation.

Be careful to coordinate form definitions and page definitions when you change between portrait and landscape presentations.

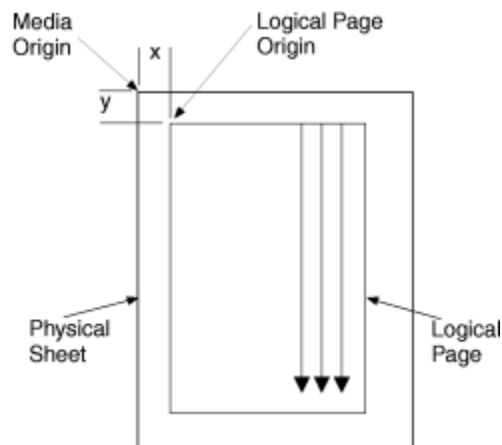


Figure 8: The Meaning of OFFSET Parameters within a Landscape Page

Specifying Copies and Electronic Overlays

This example shows how to specify different electronic overlays in different subgroups. The electronic overlays that you specify are created separately by using a program such as IBM Overlay Generation Language/370, and are stored as resources in the overlay library. No positioning controls are needed in the form definition with an overlay; the overlays are merely named. The overlay contains its own

positioning data relative to the physical sheet. A form definition that contains two overlays might look like this example:

```
FORMDEF SLSCOM ;
COPYGROUP SLSCOM ;
  OVERLAY SLSRPT M1001 ; /*LOCAL NAME AND USER-ACCESS NAME*/
  OVERLAY M1002 ; /*USER-ACCESS NAME ONLY */
  SUBGROUP COPIES 2
    OVERLAY SLSRPT ;
  SUBGROUP COPIES 3
    OVERLAY M1002 ;
```

Figure 9: Form Definition with Two Overlays

The steps to write this form definition are:

1. Create a copy group.
 - a. Write a COPYGROUP command.
 - b. Write an OVERLAY command for each overlay.
2. Create two subgroups by writing two SUBGROUP commands. Each subgroup contains an OVERLAY subcommand that names one of the selected overlays.

Note: The overlays must be named in each copy group.

Overlay Names

To identify overlays by name, you must be aware of the three possible names for an overlay: a local name (SLSRPT) and two system names (M1001, O1M1001). The *local name* is used only within the PPFA command stream and is optional. For example, SLSRPT is the local name in the first OVERLAY command in the [Figure 9 on page 21](#) command stream.

The *system name* identifies an overlay in the library. It has two forms: the *user-access name* (M1001 in [Figure 9 on page 21](#)) and the *library-resource name*. Of these two names, you use only the user-access name. PPFA automatically adds the O1 overlay prefix to the user-access name, which identifies the resource in the library. Therefore, an overlay that is referenced through a form definition that is built with PPFA must begin with the O1 prefix. An example of the result is O1M1001, the library-resource name.

You can make up your own local name for an overlay. However, the local name must be used in the OVERLAY subcommand in the subgroup if it is used in an OVERLAY command for the copy group. If it is not, the subgroup must specify the user-access name, as is done for overlay M1002 in [Figure 9 on page 21](#).

[Figure 9 on page 21](#), which specifies copies and electronic overlays, also specifies the number of copies of each subgroup. More than one copy of printed output can be requested by placing in the SUBGROUP command the COPIES subcommand and the number of copies of the subgroup that you want. The example specifies that two copies of the first subgroup and three copies of the second subgroup are to be printed. See [Figure 10 on page 22](#), which shows the result of printing a job that includes the overlays that are specified in the example.

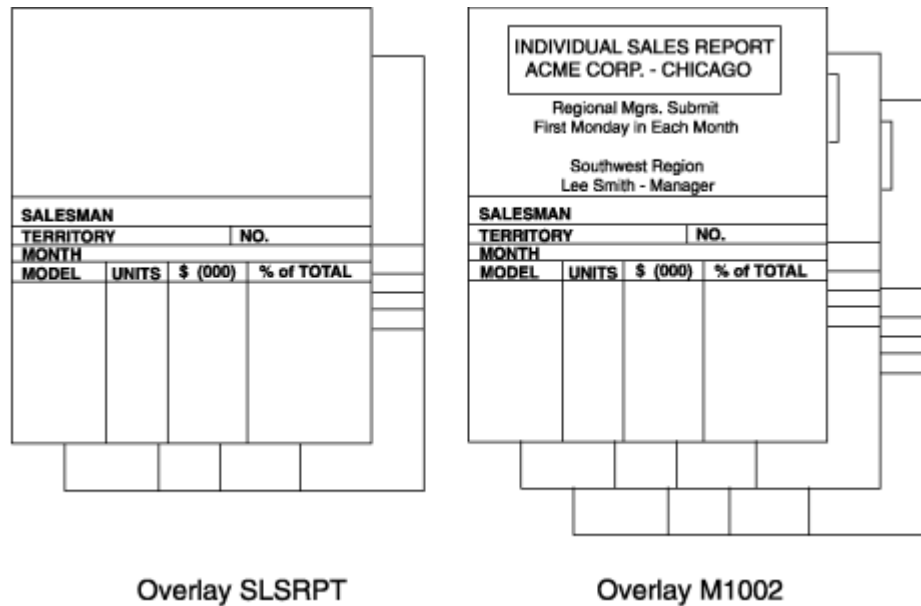


Figure 10: Two Electronic Overlays Incorporated into Two Subgroups

Printing Constant Forms

This example shows how to specify the constant-forms function using the CONSTANT command. The constant-forms function allows you to print overlays or a forms flash on blank pages without adding blank pages to your print job. Instead, the CONSTANT command generates blank pages on which to print the requested overlays and forms flash. These pages are called *constant forms* because no variable data from the print file is printed on the pages.

You specify the CONSTANT command for an entire copy group; you identify the overlays and forms flash in the subgroups of the copy groups.

In the following sample, form definition XMPXXX specifies that overlay XMP be printed on the back of each sheet with no variable data from the print job. The data from the print file is printed only on the front side of each sheet.

```
FORMDEF XMPXXX
    REPLACE YES
    DUPLEX NORMAL ;
COPYGROUP XMPXXY
    CONSTANT BACK ;
    OVERLAY XMP;
    SUBGROUP FRONT ;
    SUBGROUP BACK
        OVERLAY XMP;

PAGEDEF XMPXXX
    REPLACE YES ;
    FONT NORMALFONT GT10 ;
    PAGEFORMAT XMPXXX ;
    PRINTLINE CHANNEL 1 REPEAT 20
        POSITION 1 1 ;
```

The steps to write this form definition are:

1. Create a copy group.
 - a. Specify duplex printing.
 - b. Specify printing of a constant form as the back side of each sheet.
 - c. Write an OVERLAY command.
2. Create two subgroups by writing two SUBGROUP commands. The subgroup for the back side specifies the overlay to be printed.

Note: If you do not specify an overlay in the subgroup for the back, the back side of each sheet is blank.

Duplex Printing

Printing on both sides of a sheet (duplex printing) can be done in two ways: by the use of the FRONT and BACK subcommand combination or by the use of the BOTH subcommand. If FRONT and BACK are chosen, the number of copies that are requested for each must be the same.

To demonstrate some of the functions available for duplex printing, assume that you want to print a six-page data file (a simplified version is shown in [Figure 11 on page 23](#)).

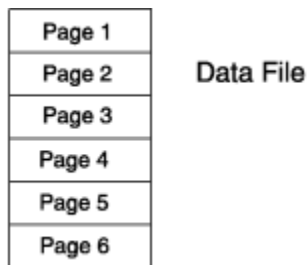


Figure 11: Six-Page Formatted Data File

Assume, too, that the file is already composed and formatted, so only a form definition is needed. The first form definition follows:

```
FORMDEF ABCD
    DUPLEX NORMAL ;
    OVERLAY AB ;
    SUBGROUP FRONT
        OVERLAY AB ;
    SUBGROUP BACK ;
```

In this command stream, form definition ABCD contains two subgroups, one specified with a FRONT subcommand and the other with a BACK subcommand.

By including a pair of FRONT and BACK subcommands within the copy group, you can specify that the front and back of printed sheets are to be controlled by different subgroups. The purpose is to allow modifications (for example, overlays or suppressions) to be separately specified for the front and back of sheets. [Figure 12 on page 24](#) shows the result of using this control where the front sheets have a header (OVERLAY AB) that the backs do not have.

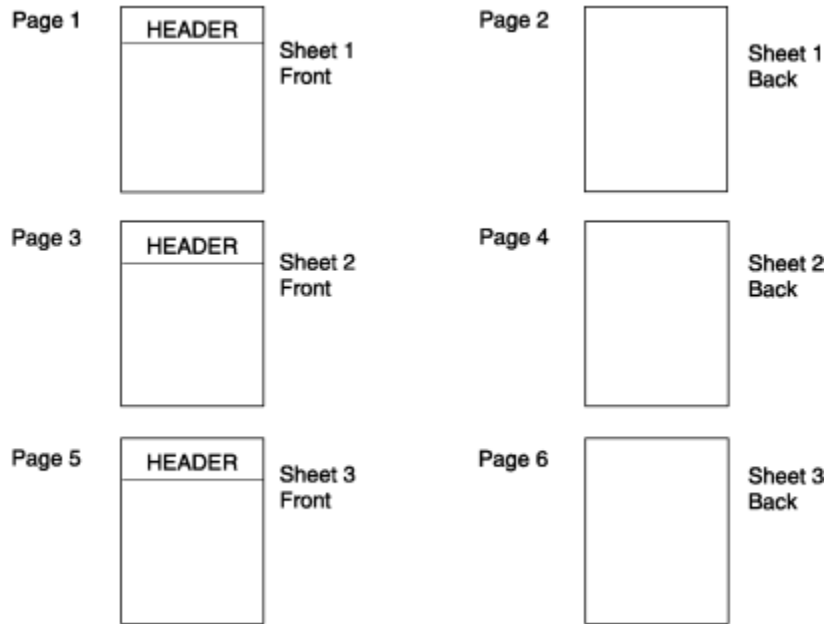


Figure 12: Result of Using a Pair of FRONT and BACK Subgroups

The rules of the FRONT and BACK subcommands are:

- FRONT and BACK subgroups must be specified in pairs.
- Subgroups specifying FRONT must always immediately precede subgroups that specify BACK.
- FRONT and BACK subgroups must agree in the number of copies.

The BOTH subcommand also can be used with a form definition or a copy group that specifies duplex printing. An example of this type of form definition is:

```
FORMDEF EFGH
    DUPLEX NORMAL ;
    SUBGROUP BOTH
        COPIES 2 ;
```

The form definition EFGH contains only one SUBGROUP command.

Notes:

1. The copy group contains the subgroup, but if a form definition contains only one copy group, the copy group need not be specified.
2. With the BOTH subcommand, you specify only one subgroup: both sides of all sheets have the same modifications.
3. The form definition in the example does not put the same data on the front and back of the same sheet. Internally to PPFA, a single BOTH subgroup produces two subgroups. As a result, two pages of data (one for each internal subgroup) are processed before copy number 2 is made. For more information, see [“SUBGROUP Command” on page 243](#).

Figure 13 on page 25 shows a sample print resulting from using the FORMDEF EFGH specifying BOTH to control the printing of the six-page (two copies) data file.

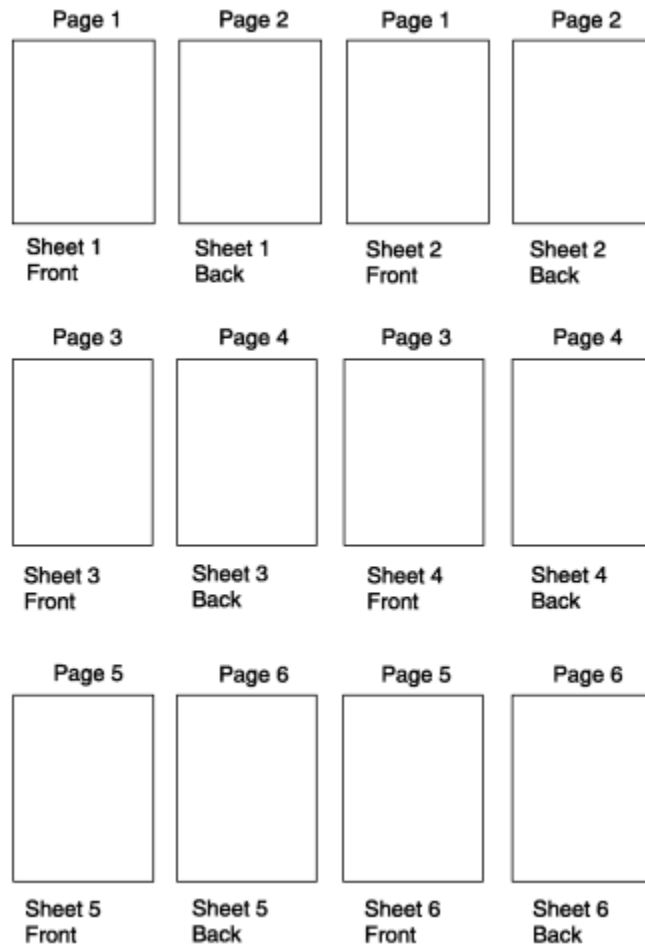


Figure 13: Form Definition EFGH Using DUPLEX with BOTH

Duplex Printing in Portrait and Landscape Presentations

Duplex printing with PPFA and your print server printers offers several other options. This example shows the combination of portrait and landscape presentations with normal and tumble duplex printing.

Note: The terms normal, tumble, portrait, and landscape are used in this example. They are explained in this chapter and in the Glossary.

NORMAL and TUMBLE are parameters of a DUPLEX subcommand. For example, a form definition that specifies DUPLEX NORMAL might be written this way:

```
FORMDEF ABCD ;
COPYGROUP ABCD
        DUPLEX NORMAL ;
SUBGROUP BOTH
        COPIES 1 ;
```

Document A in Chapter 10, “Form Definition Command Reference,” on page 189 shows the result of a DUPLEX NORMAL specification in the portrait presentation. Document D shows the result of the same form definition when a landscape presentation is specified. The printout in landscape presentation is really in a tumble-duplex format, having the tops (of the front side) and the bottoms (of the back side) of the logical pages toward the same edge of the sheet.

Although tumble duplex can be specified in this manner for landscape pages, another parameter, RTUMBLE (rotated tumble), exists to make the form definition look more sensible for use in landscape

print jobs. It also produces the results that are shown in Figure 14 on page 26, depending on whether the form definition called for portrait or landscape presentation. For landscape, the form definition is written as follows:

```
FORMDEF ABCD
PRESENT LANDSCAPE ;
COPYGROUP ABCD
    DUPLEX RTUMBLE ;
SUBGROUP BOTH
    COPIES 1 ;
```

Note: The example is for continuous printers. You must use N_UP for cut-sheet printers. In Chapter 10, “Form Definition Command Reference,” on page 189, see the PRESENT subcommand of COPYGROUP.

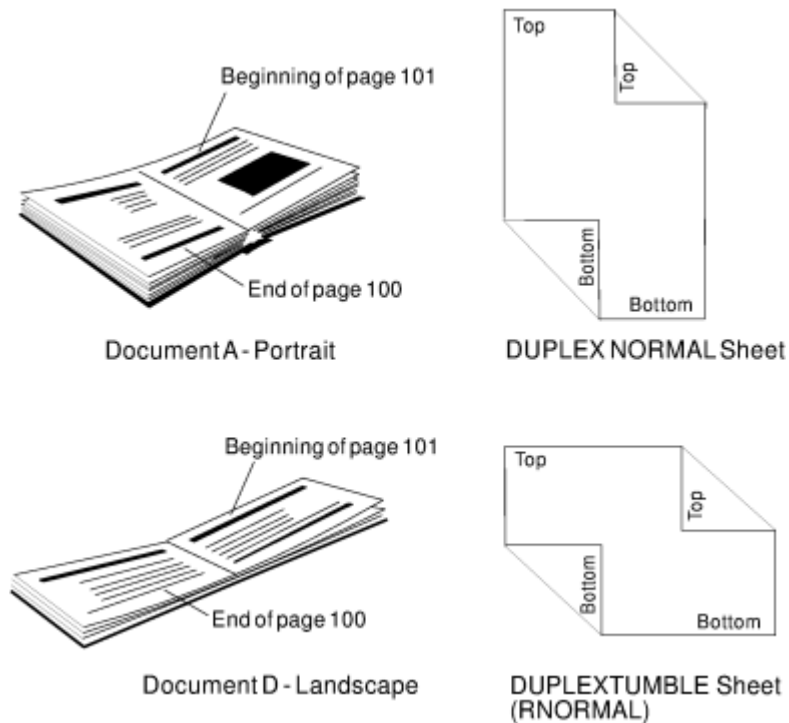


Figure 14: DUPLEX NORMAL: Portrait and Landscape Presentation

The DUPLEX NORMAL and DUPLEX RTUMBLE controls produce the same result on the physical page. RTUMBLE is used to maintain an association between duplex specifications and logical page print direction. The same relationship exists between the RNORMAL and the TUMBLE parameters as exists between the NORMAL and the RTUMBLE parameters; that is, within the two sets the terms are interchangeable.

For example, you can write a form definition with DUPLEX TUMBLE as follows:

```
FORMDEF DEFG ;
COPYGROUP DEFG
    DUPLEX TUMBLE ;
SUBGROUP BOTH
    COPIES 1 ;
```

Documents C and B in Figure 15 on page 27 are the results, depending on how page definition direction is specified to achieve either a portrait page or a landscape page.

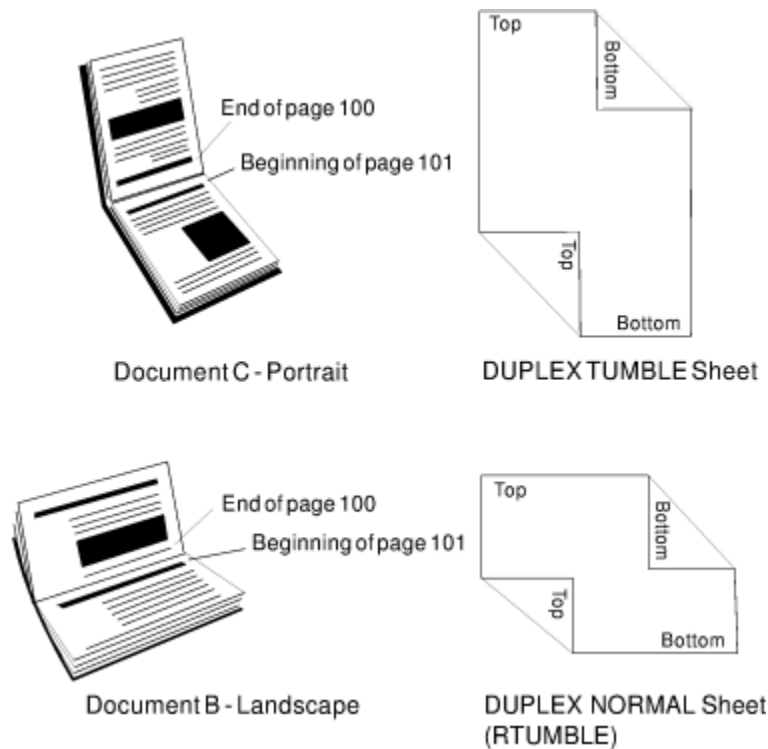


Figure 15: Result when Either TUMBLE or RNORMAL Is Specified

To help you remember, use [Table 2 on page 27](#).

<i>Table 2: Duplex Specifications.</i>		
If the form definition duplex specification is...	And if the page definition direction is...	Then, the duplex printing result is...
DUPLEX NORMAL	ACROSS or BACK	normal duplex - portrait
DUPLEX RTUMBLE	DOWN or UP	tumble duplex - landscape
DUPLEX TUMBLE	ACROSS or BACK	tumble duplex - portrait
DUPLEX RNORMAL	DOWN or UP	normal duplex - landscape
Note: Other control combinations are not recommended.		

Specifying Page Presentation on Continuous-Forms Printers

This example shows how to specify the page presentation (portrait or landscape) on printers that use continuous-forms paper. The page presentation is specified in the form definition with the PRESENT subcommand and the DIRECTION subcommand.

The PRESENT subcommand specifies how your pages are presented when they are printed and has two valid values: PORTRAIT and LANDSCAPE.

The DIRECTION subcommand specifies the inline direction in which your pages are formatted by the page definition (see “FIELD Command” on page 299) or by the program formatting the data. The DIRECTION subcommand has two valid values: ACROSS and DOWN.

The conditions in which you need to use these subcommands and some conditions in which they are not required are described in the following sections. For more information about how these subcommands work with data that is sent to specific printers, see the appropriate printer documentation.

To understand the description that follows, you must be aware of the difference between the two types of continuous forms: *narrow* and *wide*. Narrow forms are forms that have perforations on the shorter edge of the paper and tractor holes on the longer edge. Wide forms are forms that have perforations on the longer edge of the paper and tractor holes on the shorter edge. The two types of forms are illustrated in [Figure 16 on page 28](#).

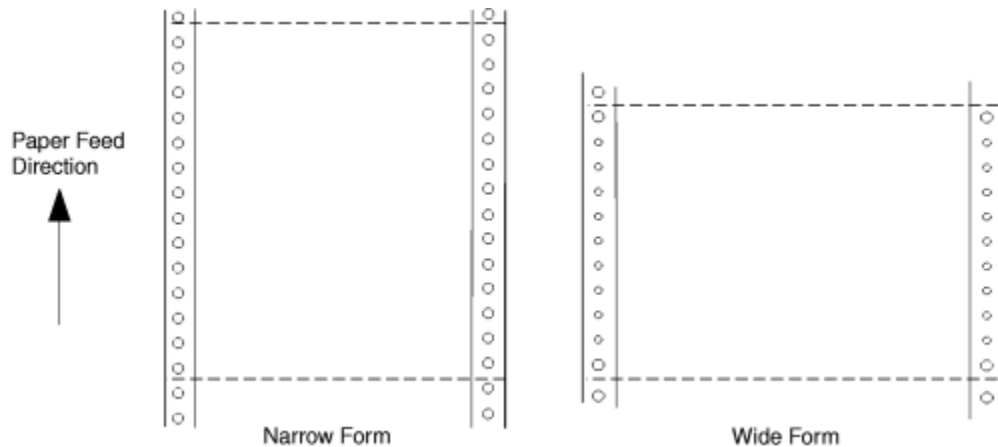


Figure 16: Narrow and Wide Continuous Forms

When to Use the PRESENT and DIRECTION Subcommands

You need to use the PRESENT and DIRECTION subcommands if you are building a form definition that is used in these situations:

- With wide forms on a continuous forms printer when the print data is formatted in the DOWN print direction (see [“The DOWN Direction for Continuous Forms Printers” on page 28](#))
- When you do not know which type of form (narrow or wide) is used on a continuous forms printer (see [“The DOWN Direction for Continuous Forms Printers” on page 28](#))

Note: References to a continuous forms printer point of origin also apply to all continuous-forms printers except the 3800.

When the PRESENT and DIRECTION Subcommands Are Not Required

You do not need to use the PRESENT and DIRECTION subcommands if you are building a form definition that is used in these situations:

- With cut-sheet printers only
- With narrow forms only
- With the 3800 printer only
- With print data that is formatted in the BACK direction by the page definition or the program formatting the data

The DOWN Direction for Continuous Forms Printers

If your data is formatted in the DOWN print direction for landscape page presentation and is to be printed on wide forms on a continuous forms printer, you must specify LANDSCAPE on the PRESENT subcommand to produce readable output.

If PRESENT LANDSCAPE and DIRECTION DOWN are not specified on the FORMDEF command, the data is printed in the landscape presentation; however, the data is upside down, as shown in [Figure 17 on page 29](#). The data is upside down because the media origin for a continuous forms printer is on the same corner of the form, regardless of whether a narrow or wide form is used (see [Figure 17 on page 29](#)).

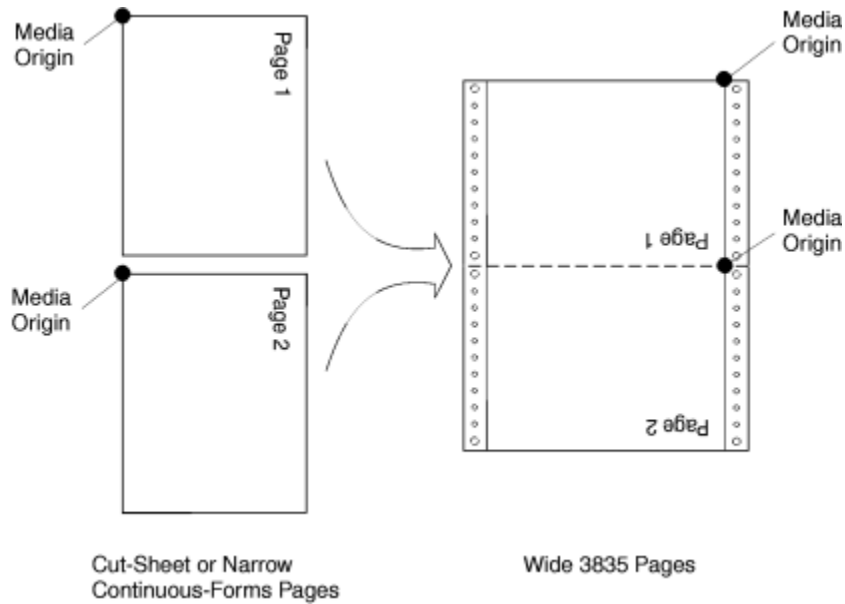


Figure 17: The Results of Not Specifying *PRESENT LANDSCAPE* and *DIRECTION DOWN* on a Continuous Forms Printer

If *PRESENT LANDSCAPE* and *DIRECTION DOWN* are specified on the *FORMDEF* command, the data is printed as shown in [Figure 18 on page 30](#). In this example, line data is formatted by using a page definition.

PRESENT LANDSCAPE and *DIRECTION DOWN* can also be specified for data that is formatted in the *DOWN* print direction and printed on narrow forms. Although *PRESENT LANDSCAPE* and *DIRECTION DOWN* do not need to be specified to produce readable output, specifying them lets you use the same form definition regardless of whether the data is printed on wide forms or narrow forms.

Note: If you are building a form definition that can be used with both wide and narrow forms, the left margin as viewed by the reader becomes the top margin from the printer's perspective (and vice versa). Because many printers have an unprintable area at the margins, you must position the logical page with the *OFFSET* subcommand in the form definition so data is placed in the unprintable area on either wide or narrow forms.

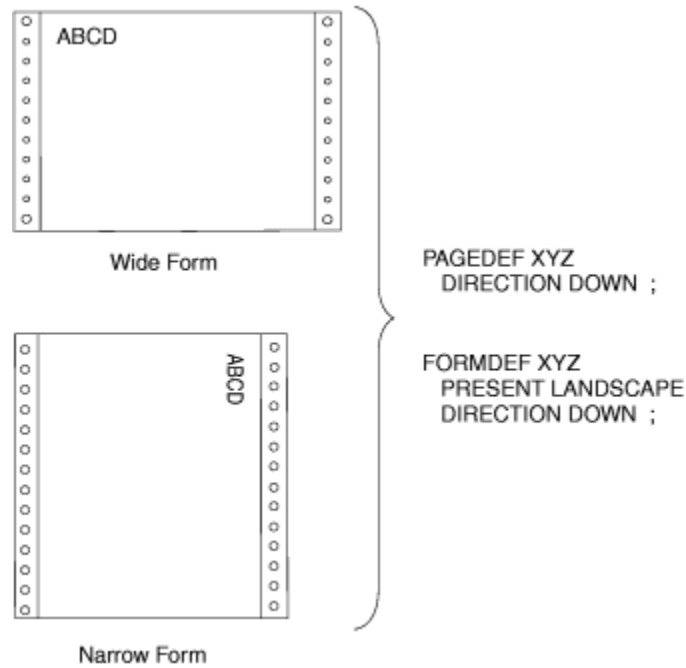


Figure 18: The Results of Specifying PRESENT LANDSCAPE and DIRECTION DOWN on a Continuous Forms Printer

Print Quality Control

If your printer has more than one print-quality selection, you can specify different levels of print quality. For more information, see the publication for your printer.

Chapter 3. Using Page Definition Commands for Traditional Line Data

A *page definition* specifies how you want to position data on the logical page.

A page definition is a resource that is used by print servers to define the rules of transforming line data into composed pages and text controls for printing. With page definitions, you can do the tasks that are listed in [Table 3 on page 31](#).

Task	Location of an Example
Create a page definition.	“Page Definition Command Nesting” on page 32
Define logical page size.	“Defining Logical Page Size” on page 32
Position data on a logical page.	“Positioning the First Line of Data” on page 33
Change the print direction.	“Changing Logical Page Print Direction” on page 35
Print line data.	“Printing Line Data on a Print Server Printer” on page 36
Process fields.	“Processing Fields” on page 40
Change fonts.	“Varying Fonts on a Page” on page 41
Print in different directions.	“Printing Lines in Two Directions on a Page” on page 44
Print fields in two directions.	“Printing Fields in Two Directions on the Same Page” on page 45
Rotate fonts.	“Rotating Fonts” on page 46
Print kanji.	“Using Traditional Kanji Formatting” on page 47
Print multiple up.	“Printing Multiple-Up Pages” on page 48

Page Formats within Page Definitions

Just as form definitions can include more than one copy group, page definitions can include several *page formats*. Page formats use the same subcommands (except REPLACE) as page definitions, and if a subcommand is specified in a page format, it overrides the value that is specified in the page definition for the page format. A single page definition can contain multiple page formats. If pages in a file are to be formatted differently, specify more than one page format in your page definition. Within a page definition, page formats are generated in the order in which they are specified.

Using more than one page format to control different pages requires one of these:

- Adding the Invoke Data Map structured field to the data file each time you want to change page formats
- Using conditional processing.

See *Advanced Function Presentation: Programming Guide and Line Data Reference* for more information about the Invoke Data Map structured field.

Page Definition Command Nesting

The following simplified command stream shows the proper nesting of commands and the order in which they must be entered when you create a page definition:

```
[SETUNITS]
PAGEDEF
  [FONT]
  [OBJECT]
  [PAGEFORMAT]
    [TRCREF]
    [OBJECT]
    [SEGMENT]
    [OVERLAY]
    PRINTLINE
      [FIELD]
      [CONDITION]
    [ENDSUBPAGE]
[SETUNITS]
```

Notes:

1. Brackets enclosing a command mean that the command is optional.
2. A command and its subcommands end with a semicolon.
3. Indentations are used to improve readability.
4. Complete definitions of all commands are included in [Chapter 11, “Page Definition Command Reference,”](#) on page 249.

Command Nesting Rules

1. FONT commands must be specified immediately after PAGEDEF commands.
2. A SETUNITS command can be specified anywhere in the PPFA command stream and is in effect until another SETUNITS command is specified.
3. OBJECT commands can appear after the FONT command, and before any PAGEFORMAT command (global objects) or after a specific PAGEFORMAT command. A global object is defined for all page formats in the page definition. Otherwise, the object is defined for the PAGEFORMAT in which it is specified.
4. TRCREF, SEGMENT, and OVERLAY commands must be specified under their associated PAGEFORMAT command.
5. The first PAGEFORMAT command can be omitted in a page definition, if the page definition has only one page format.
6. At least one PRINTLINE command is required.

Defining Logical Page Size

“[Positioning a Logical Page on a Sheet](#)” on page 19 shows how to establish the origin point of a logical page, relative to the media origin on a sheet of paper, by using the OFFSET subcommand. The following example shows you how to establish the width and height of the logical page relative to this origin point. This example illustrates how the dimensions of a logical page are determined by form definitions and page definitions.

```
FORMDEF ABCD
  OFFSET (1) (2) ;
PAGEDEF ABCD
  WIDTH (3)
  HEIGHT (4) ;
  PRINTLINE ;
```

Note: The parenthetical numbers represent dimensions. [Figure 19 on page 33](#) shows how these dimensions relate to the logical page.

Normally, all parameters consist of a number and a unit of measurement, for example, 6 IN. (See [“Units of Measurement”](#) on [page 186](#) for information on units that are available.) Numbers can be specified with up to three decimal places. The PRINTLINE command is included in the example because at least one is required for all page definitions. See [“PRINTLINE Command”](#) on [page 400](#) for more information.

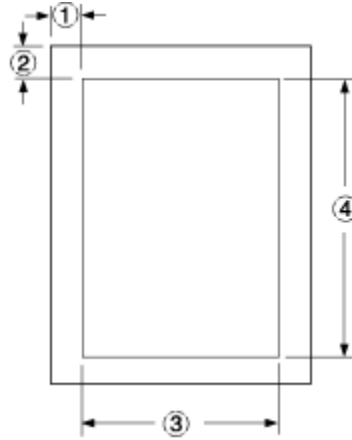


Figure 19: Logical Page Dimensions

The OFFSET subcommand (1) (2) in the sample form definition establishes the corner or origin of the logical page relative to the physical sheet. The WIDTH and HEIGHT subcommands, (3) and (4), specify the dimensions of the logical page relative to the logical page origin.

Note: Be careful not to define a logical page larger than the physical sheet. PPFA does not check the size of the physical sheet.

[“Positioning the First Line of Data”](#) on [page 33](#) shows you two ways to position the first line of data on the page.

Positioning the First Line of Data

[“Defining Logical Page Size”](#) on [page 32](#) shows how to define the size of a logical page. The next two examples show you how to position the first line of data inside the logical page by using the LINEONE subcommand. This subcommand position is relative to the logical page origin, as shown in [Figure 20 on page 33](#). The two coordinates, (1) and (2), of the LINEONE parameter define the starting point for the first line of text.

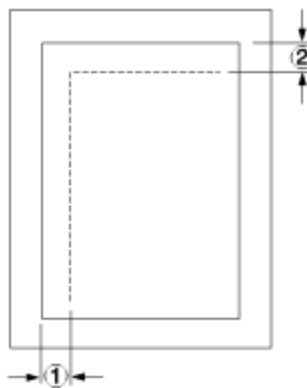


Figure 20: LINEONE Coordinates

This starting point works with the POSITION, MARGIN, and TOP subcommands (of the PRINTLINE command) to position lines of print on a page.

The defaults for LINEONE are:

- $x = 0$
- $y = 80\%$ of one line space from the top of the logical page. For example:
 - 80% of 1/6 inch if lines per inch (lpi) = 6
 - 80% of 1/8 inch if lpi = 8

These defaults leave room for the character ascenders in the first line of text.

Note: PPFA subtracts one logical unit (L-unit) from the y value to compensate for the fact that the printer counts L-units beginning with the number 0. Therefore, if you use the LINEONE subcommand to specify the offsets to the first line in L-units (PELS is the measurement command for L-units), you must remember to subtract one L-unit from the y offset value. This subtraction is necessary to prevent descenders on the last printed line from dropping off the bottom of the logical page.

The following examples illustrate two methods for positioning the first line of text:

1. The position of the first line of data defaults by specifying the SETUNITS command before the PAGEDEF command; for example:

```
SETUNITS 1 IN 1 IN
          LINESP 8 LPI;
FORMDEF  ABCD
          OFFSET 0 .5;
PAGEDEF  ABCD
          WIDTH 7.5
          HEIGHT 10
          DIRECTION ACROSS;
FONT GS12 GS12;
PRINTLINE REPEAT 60
          FONT GS12
          POSITION 0 TOP;
```

Note: The LINESP subcommand (of the SETUNITS command) must precede the PAGEDEF commands.

If the LINESP subcommand follows the PAGEDEF command, PPFA then uses the default LINESP value to calculate the y offset value, which is used to position the first line of print.

The default for the LINESP subcommand of the SETUNITS command is 6 lpi. If LINEONE is allowed to default, based on the LINESP default, the LINEONE value is 31 L-units:

```
LINEONE = ( ( 240 L-units / 6 lpi ) x 80% ) - 1 L-unit = 31 L-units.
```

This value is the vertical (y) position of the printline because TOP is specified in a later POSITION subcommand. However, this value might cause the data to exceed the bottom boundary of the logical page if the LINESP value is changed later.

2. Another way that you can specify the starting position for the first print line is to specify LINEONE explicitly; for example:

```
FORMDEF  ABCD
          OFFSET 0 .5;
PAGEDEF  ABCD
          WIDTH 7.5
          HEIGHT 10
          LINEONE 0 PELS 23 PELS
          DIRECTION ACROSS;
SETUNITS 1 IN 1 IN
          LINESP 8 LPI;
FONT GS12 GS12;
PRINTLINE REPEAT 60
          FONT GS12
          POSITION 0 TOP;
```

In this example, the LINESP subcommand that follows the PAGEDEF command does not cause a data placement problem because the LINEONE command determines explicitly where the first line of text is positioned, and no default LINESP value is used:

```
LINEONE = [ ( 240 L-units / 8 lpi ) x 80% ] - 1 L-unit= 23 L-units
```

If you use the LINEONE command to specify an absolute starting position for the first line, in L-units, you must remember to subtract one L-unit from that value.

Changing Logical Page Print Direction

Logical pages can have four different print directions: ACROSS, DOWN, BACK, and UP. This example shows that all four directions can be specified in relation to one offset specification:

```
FORMDEF ABCD
  OFFSET (1) (2) ;
PAGEDEF DEFG ;
  PAGEFORMAT DEFG1
    WIDTH (3)
    HEIGHT (4)
    DIRECTION ACROSS ;
  PRINTLINE ;
  PAGEFORMAT DEFG2
    WIDTH (3)
    HEIGHT (4)
    DIRECTION DOWN ;
  PRINTLINE ;
  PAGEFORMAT DEFG3
    WIDTH (3)
    HEIGHT (4)
    DIRECTION BACK ;
  PRINTLINE ;
  PAGEFORMAT DEFG4
    WIDTH (3)
    HEIGHT (4)
    DIRECTION UP ;
  PRINTLINE ;
```

One page definition is used to simplify the example, yet four logical pages are specified. The PAGEFORMAT commands create subsets of page definitions for each logical page.

Note: The page formats in this example require an Invoke Data Map structured field at the place in the data file where you want to change page formats. The PRINTLINE commands are required but are not relevant in the example.

The DIRECTION subcommand with one of its four direction parameters (ACROSS, DOWN, UP, or BACK) specifies the print direction of the logical page.

Figure 21 on page 36 shows the format of each of the logical pages that are specified in the page definition with the direction specification of each. The pages with the ACROSS and BACK directions are in portrait presentation. The pages with the DOWN and UP directions are in landscape presentation.

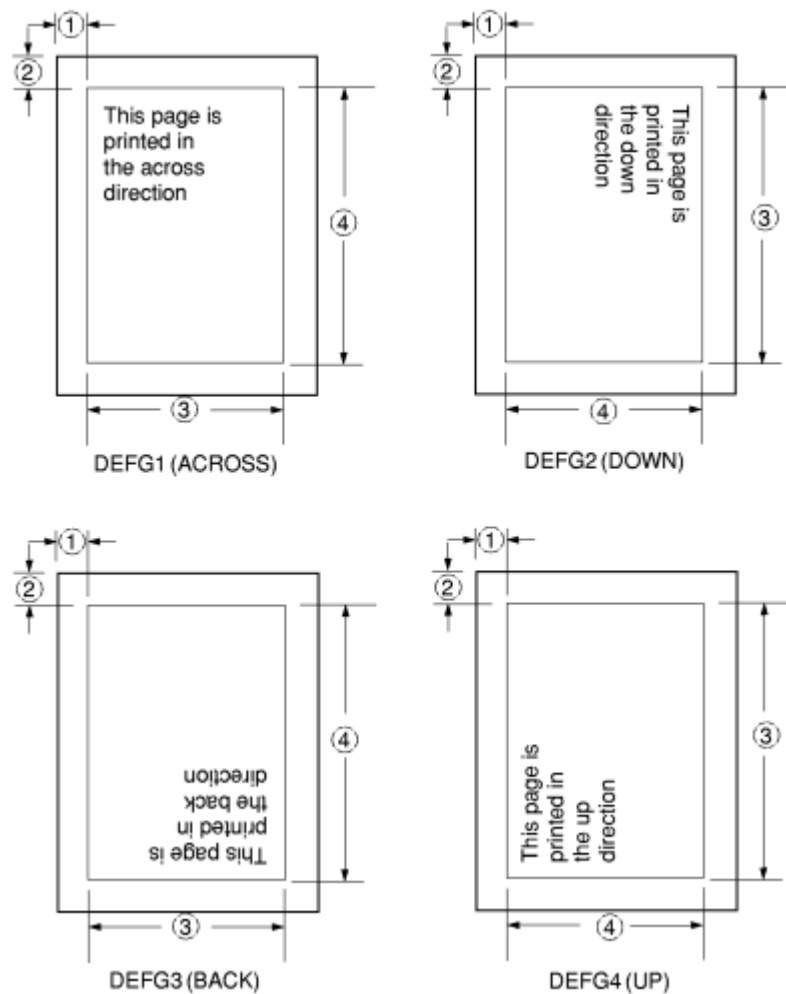


Figure 21: Logical Page Print Directions in Relation to Origin

The media origins and logical page origins do not change with the presentation of the data on the page. The OFFSET subcommand of the form definition need not change. However, the width and height dimensions do change; that is, the WIDTH subcommand always governs the horizontal (inline) dimension as you view the page, and the HEIGHT subcommand always governs the vertical (baseline) dimension whether the page is in portrait or in landscape presentation. Ensure that these specifications do not cause the logical page to cross the edge of the physical page.

However, if the DOWN direction is specified for use with a continuous forms printer, the PRESENT and DIRECTION subcommands might need to be specified in the form definition. See [“Specifying Page Presentation on Continuous-Forms Printers”](#) on page 27 for more information.

Printing Line Data on a Print Server Printer

This example shows how you can print a data file that is developed for a line printer on a page printer without altering the data. The example compares the effects of line printer controls with the corresponding controls in the PPF commands and subcommands. PRINTLINE, LINESP, POSITION, CHANNEL, and REPEAT are page definition controls related to the lines of text in your printout. Line printer controls examined are the forms control buffer (FCB) and carriage control characters.

As shown in [Figure 22](#) on page 37, a file that consists of 13 records is to be printed. Several different printouts of this data are formatted in the following examples. In the first two printouts, records 1 - 6 are printed on page 1, records 7 - 9 on page 2, and records 10 - 13 on page 3.

Carriage-Control Character

1	RECORD 1
	RECORD 2
	RECORD 3
	RECORD 4
	RECORD 5
	RECORD 6
1	RECORD 7
	RECORD 8
	RECORD 9
1	RECORD 10
	RECORD 11
	RECORD 12
	RECORD 13

Data

Figure 22: Line-Data File

Figure 23 on page 37 shows the formatting process that is used when the file is printed on a line printer. For many line printers, an FCB is used to format the output in the z/OS, VM, and VSE environment. The sample FCB represented in Figure 23 on page 37 determines that no printed page contains more than eight lines. A page can have exactly eight lines without using carriage control characters in the data. A page can contain any number of lines fewer than eight by placing fewer than eight records between the carriage control characters in the data. In the data file in Figure 22 on page 37, fewer than eight records are, in all cases, placed between channel 1 carriage control characters. A ninth record, if encountered before a carriage control character, would cause a page eject and a return to the beginning of the FCB. The printout that is shown in Figure 23 on page 37 results from an FCB that formats the data.

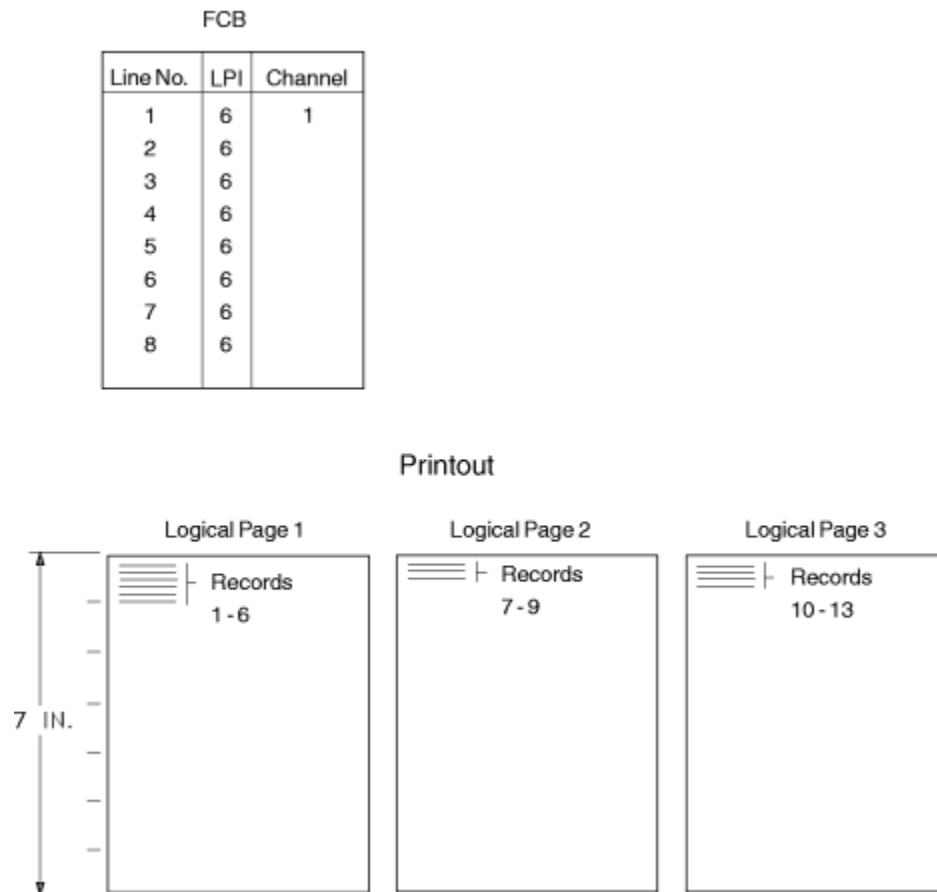


Figure 23: Data File Printed on a Line Printer

A page definition can work the same way. Consider the following example:

```
SETUNITS 1 IN 1 IN
      LINESP 6 LPI ;
PAGEDEF ABCD
      WIDTH 5
      HEIGHT 7
      LINEONE .5 .5 ;
PRINTLINE CHANNEL 1
      POSITION MARGIN TOP
      REPEAT 8 ;
```

This command stream contains one new command (PRINTLINE) and four new subcommands (LINESP, CHANNEL, POSITION, and REPEAT) related to controlling individual lines.

- The subcommand has the same function as the LPI specifications in the FCB or in a Printer File; it defines the line density $iLINESPn$ lines per inch.
- The PRINTLINE command contains the controls for one or more lines.
- The CHANNEL subcommand has the same function as the channel 1 control character in the FCB, causing a page eject at each channel 1 control character that is encountered in the data records.
- The POSITION subcommand establishes the location of the first line relative to the upper-left corner of the logical page. This example uses the MARGIN and TOP parameters; however, numeric parameters similar to the ones that are used with the OFFSET subcommand can also be used. Those values are also relative to the logical page.
- The REPEAT subcommand is a commonly used control in PPFA text formatting. It is the way that you specify the total number of PRINTLINES in a logical page.

Note: The constraints in specifying a REPEAT value and thus, the number of lines per page, are: the lines per inch specification, the height of the logical page, and the font selection. The REPEAT variable 8 is chosen to equal the maximum number of records to be printed per page. As in the line printer version, if a ninth record were encountered before a channel 1 carriage control character, a page eject would occur and the line would be printed as the first line at the top of the next page.

The result of this page definition is represented in [Figure 24 on page 38](#).

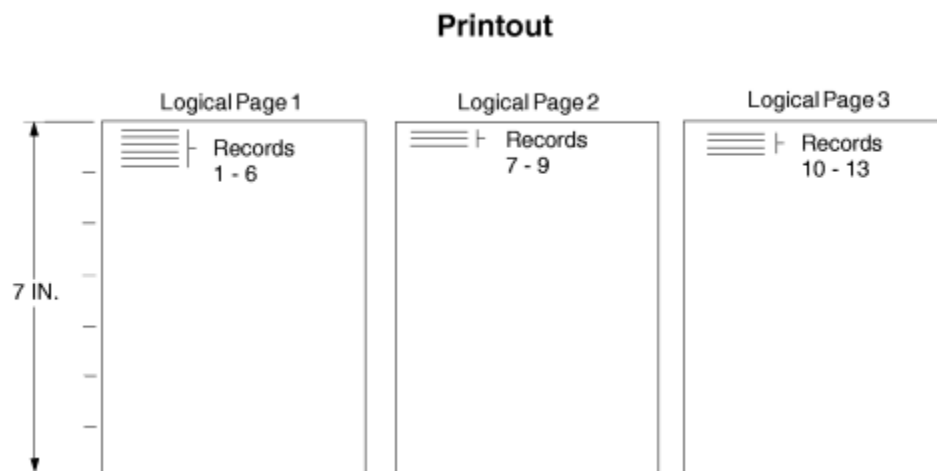


Figure 24: Printout Examples Specifying POSITION MARGIN TOP

Changing line printing specifications for the following example is shown in [Figure 25 on page 39](#).

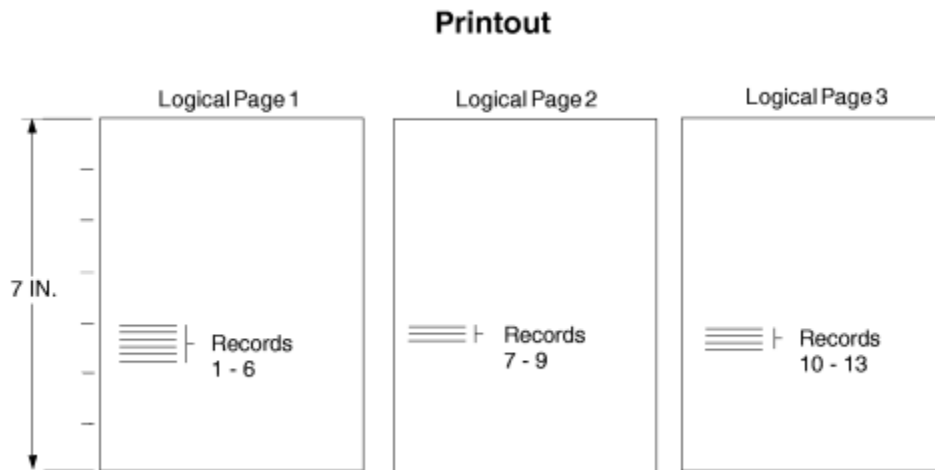


Figure 25: Printout Example Specifying POSITION MARGIN 4.1

```

SETUNITS 1 IN 1 IN
      LINESP 6 LPI ;
PAGEDEF ABCD
      WIDTH 5
      HEIGHT 7
      LINEONE .1 .1 ;
PRINTLINE CHANNEL 1
      POSITION MARGIN 4.1
      REPEAT 8 ;

```

Observe that the second parameter of POSITION is no longer TOP; instead, it is 4.1, which places the first line of text 4.1 inches down the page rather than at the top (Figure 25 on page 39).

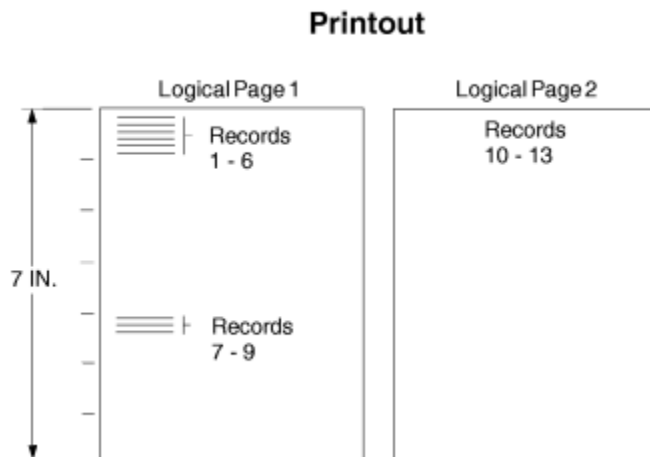


Figure 26: Printout Example Specifying POSITION MARGIN TOP and POSITION MARGIN 4.1

The following example and Figure 26 on page 39 show a third version of the possible formats for the data that is represented in Figure 23 on page 37.

```

SETUNITS 1 IN 1 IN
      LINESP 6 LPI ;
PAGEDEF ABCD
      WIDTH 5
      HEIGHT 7
      LINEONE .1 .1 ;
PRINTLINE CHANNEL 1
      POSITION MARGIN TOP
      REPEAT 8 ;
PRINTLINE CHANNEL 1

```

```

POSITION MARGIN 4.1
REPEAT 8 ;

```

You also can skip over space by using carriage control characters. This example shows how to use a second PRINTLINE command to create a second starting position on the page (as shown in [Figure 26 on page 39](#)). The second starting position is vertically 4.1 inches down from the top of the page; see the second POSITION subcommand. The two CHANNEL 1 subcommands take turns mapping the records that are governed by the successive channel 1 carriage control characters in the data to their specified positions on the page. In this case, the carriage control 1 characters cause printing to alternate between the TOP position (0.1 inches down the page) and 4.1 inches down the page.

Processing Fields

This section describes the mapping of individual fields to the printed sheets. You can use the technique to print unformatted data according to precise specifications, and these specifications can change without affecting the data file.

The rules for field processing of data files are:

- Each record in your file must correspond to a separate PRINTLINE command because each record is mapped separately. When you are processing identical fields, you can define a single printline and use the REPEAT subcommand.
- Each FIELD command must follow its associated PRINTLINE command, and more than one FIELD command can be specified for a single PRINTLINE command.

For this field-processing example, the data file shown in [Figure 28 on page 40](#) is used. [Figure 29 on page 41](#) represents an output format that can be used to place data on a form, such as an invoice or an order. The page definition commands to print [Figure 29 on page 41](#) are in [Figure 27 on page 40](#).

```

PAGEDEF ABCD
WIDTH 7 IN
HEIGHT 8 IN ;
PRINTLINE POSITION 1 IN 1 IN ; /*PROCESSING FOR R1          */
FIELD START 1 LENGTH 4 ;      /*THE PRINTLINE POSITION IS  */
                               /*THE DEFAULT FOR THE FIRST FIELD*/

FIELD START 11 LENGTH 4
POSITION 4 IN 0 IN ;
PRINTLINE POSITION 3 IN 4 IN ; /*PROCESSING FOR R2          */
FIELD START 1 LENGTH 4 ;      /*DEFAULT POSITION            */
FIELD START 6 LENGTH 4
POSITION 0 IN 1 IN ;
FIELD START 13 LENGTH 3
POSITION 2 IN 3 IN ;
PRINTLINE POSITION 1 IN 2 IN ; /*PROCESSING FOR R3          */
FIELD START 1 LENGTH 4 ;      /*DEFAULT POSITION            */
FIELD START 11 LENGTH 4
POSITION 4 IN 0 IN ;

```

Figure 27: Field-processing example for the PRINTLINE command

	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7
R1	A	A	A	A						B	B	B	B			
R2	X	X	X	X	Y	Y	Y	Y		Z	Z	Z	Z			
R3	1	1	1	1						2	2	2	2			

Data File

Figure 28: Unformatted Print Data File

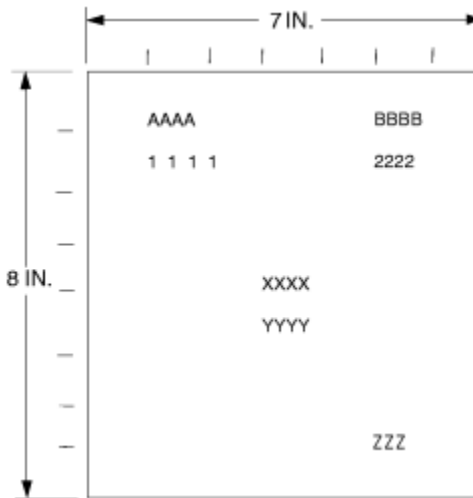


Figure 29: Data Arranged on the Printed Page

POSITION Subcommand in Processing Fields Example

The POSITION subcommand of each PRINTLINE command in [Figure 27 on page 40](#) specifies the printline position relative to the logical page origin. The POSITION subcommands below FIELD commands specify a field position relative to the governing printline position. Following POSITION subcommands come the horizontal (*x*) then the vertical (*y*) offsets from the reference point. They are parallel in structure to the OFFSET subcommand of the form definition.

For example, the final POSITION subcommand places the final field 1 + 4 inches to the right of the left edge of the logical page, combining the *x* value of 1 in the PRINTLINE command, and the *x* value of 4 in the nested FIELD command. The 0 in the FIELD command specifies no change to the *y* value in the PRINTLINE command. Thus, the position of the final field is 5 IN (*x*), 2 IN (*y*).

Note: The first FIELD command within each PRINTLINE has no position specification because the PRINTLINE POSITION value is the default for the first FIELD command nested under it.

Alternative controls for the *x* and *y* values of a POSITION subcommand are available. See the description of the POSITION subcommand in [“FIELD Command” on page 299](#) and [“PRINTLINE Command” on page 400](#).

FIELD Command in Processing Fields Example

In the FIELD command in [Figure 27 on page 40](#), the START and LENGTH parameters specify the location of the field in the record to be processed. START indicates the starting byte position, and LENGTH specifies the number of bytes in the field.

Because a field can be located independently within the data and on the printed page, more than one page definition or page format can be created for the same data file, each specifying different mapping of the data to the output pages.

Varying Fonts on a Page

This example illustrates a simple font variation within a printout. The task is to print a line-data file that has the first line of each page in bold-faced type and the rest in standard type. This task requires controls for two fonts in the page definition.

The commands to select a single font for the page, as shown in [Figure 30 on page 42](#), are as follows:

The FONT command contains two names: the local (STANDARD) name and the user-access (M101) name for the selected font.

```
PAGEDEF ABCD ;
FONT STANDARD M101 ;
PRINTLINE ;
```

Note: Fonts cannot be an FGID. Also, all page definitions require a PRINTLINE command.

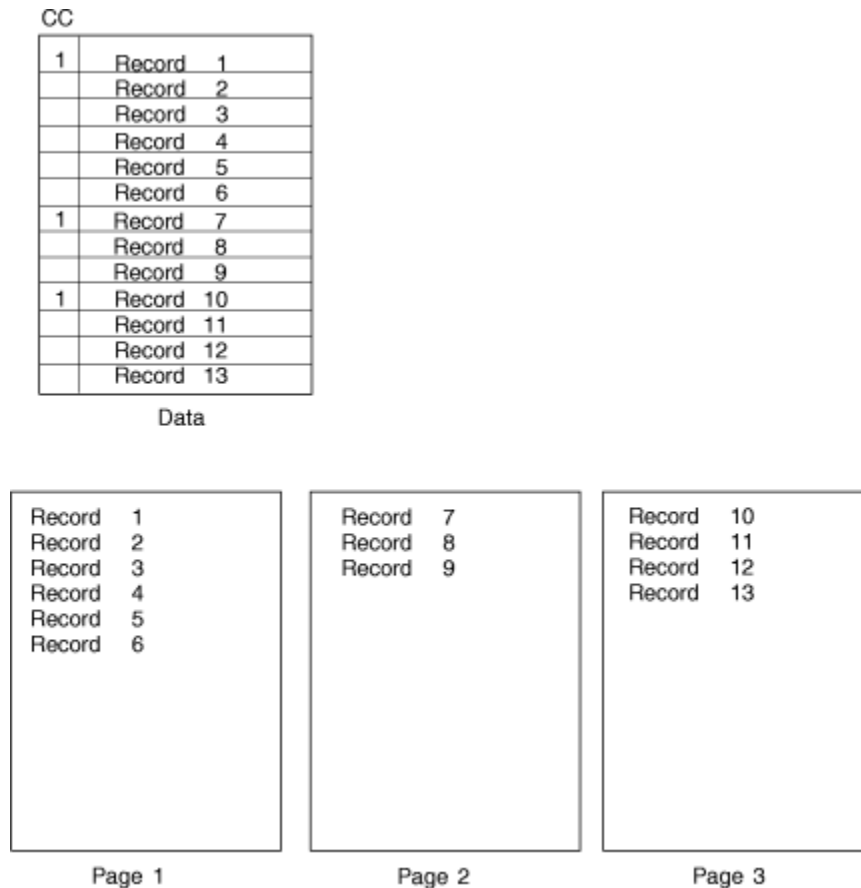


Figure 30: Data File Printed Using a Single Font

The next command stream changes the font by incorporating a TRCREF command. Assume the data file to be formatted incorporates table reference characters (TRCs) as shown in [Figure 31 on page 43](#).

```
PAGEDEF ABCD ;
FONT STANDARD M101 ;      /*CREATING LOCAL FONT NAMES */
FONT BOLDFACE M102 ;
PAGEFORMAT ABCD ;
TRCREF 0                   /*DEFINING THE TRC VALUES */
    FONT STANDARD ;
TRCREF 1
    FONT BOLDFACE ;
PRINTLINE CHANNEL 1
        POSITION 1 IN 1 IN
        REPEAT 8 ;
```

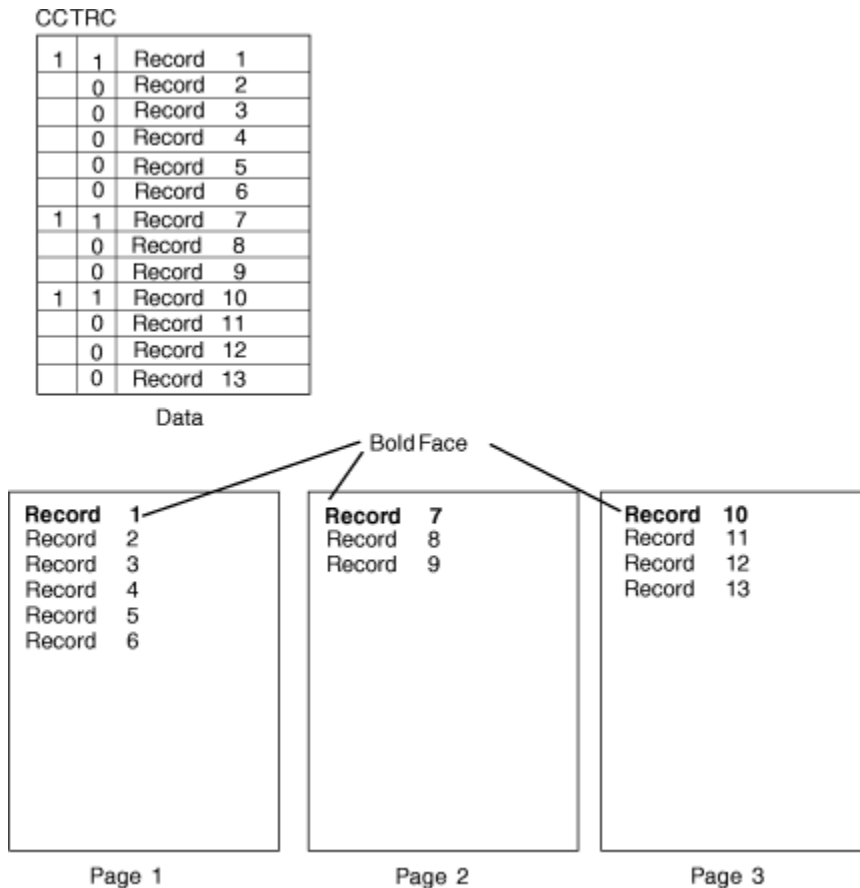


Figure 31: Font Change Using TRCREF Command

The TRCs in the data cause the font switch to be made. The TRCREF command equates a TRC in the data file with the local name of a font that is specified in the FONT command. The FONT command also contains the user-access name for the font. See Table 8 on page 184 for information on local names and user-access names. Because of the relationship among the user-access name, the local name, and the TRC number that is established in the page definition, the TRCs in the data can cause a font switch automatically.

You can specify fonts within a PRINTLINE command when the data file contains no TRCs. For example, assume the data file represented in the sample print in [Figure 32 on page 44](#) is to be formatted by this page definition:

```
PAGEDEF ABCD ;
  FONT M101 ;
  FONT BOLDFACE M102 ;
  PRINTLINE CHANNEL 1          /*BOLDFACE LINE */
    POSITION MARGIN TOP
    FONT BOLDFACE ;
  PRINTLINE POSITION MARGIN NEXT /*STANDARD-TYPE LINE */
    FONT M101
    REPEAT 7 ;
```

This command stream, based on a data file without TRCs, works on the principle that each line of output whose font you want to change from the font in the previous line must be controlled by a separate PRINTLINE command. The FONT subcommand of the PRINTLINE command names the font that is desired for that line. In this example, two PRINTLINE commands are used because one font change and two fonts are intended for the output. The user-access font names appear in the two FONT commands immediately below the PAGEDEF command and optionally, a local name. M101 and M102 in the example are user-access names; BOLDFACE is a local name. Use the local name in the FONT subcommand of PRINTLINE if it is included in the corresponding FONT command, as is done for the first PRINTLINE command.

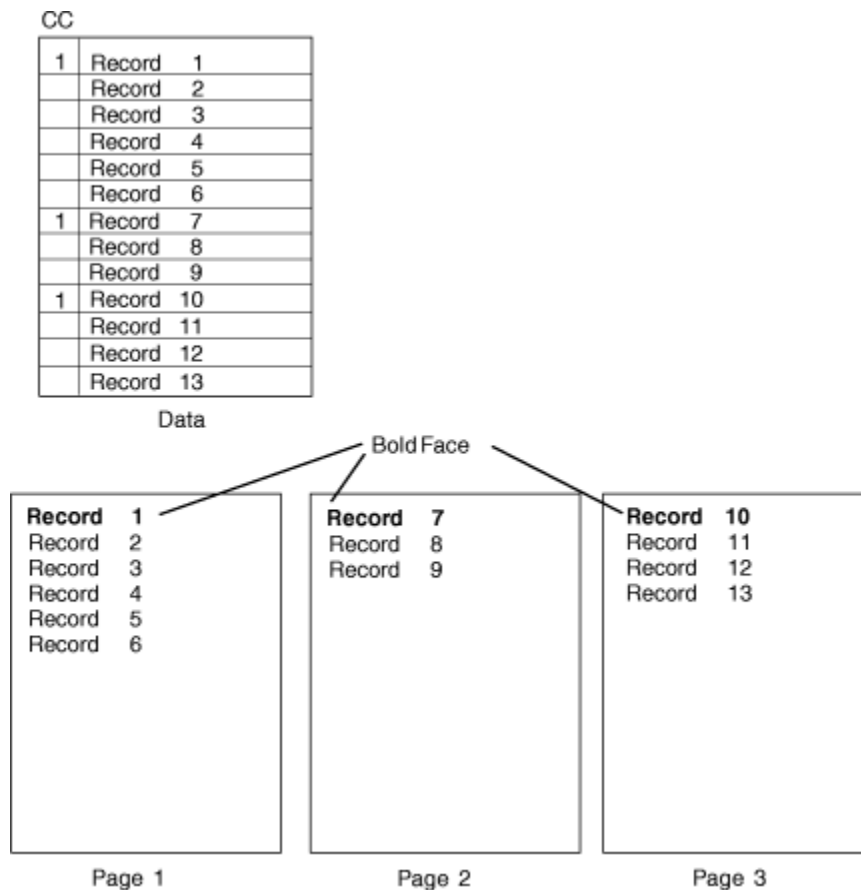


Figure 32: Font Change Using FONT Commands and Subcommands

Changing fonts field by field is similar to changing them in PRINTLINES. You map each field individually with a FIELD command; include a FONT subcommand in the FIELD command. If a font change is wanted for a field, as with the FONT subcommand of a PRINTLINE command, the font must be previously named in a FONT command.

Two possible defaults apply in case you do not specify a font within a field. If the governing PRINTLINE has a FONT subcommand, it contains the font default for the field. If the governing PRINTLINE has no font specification, the print server assigns a font according to its default rules.

Printing Lines in Two Directions on a Page

Lines can be printed in any of four directions, depending on the type of printer that is used.

The four parameters for line direction are ACROSS, DOWN, BACK, and UP. The PPFA commands that are used to format a line-data file with lines that are printed in more than one direction (as shown in Figure 33 on page 45) are stated in the following page definition:

```
PAGEDEF ATOG
  DIRECTION ACROSS ;
PRINTLINE POSITION 1 IN 1 IN      /*LINES A-E */
  REPEAT 5 ;
PRINTLINE POSITION .5 IN 6 IN     /*LINE F */
  DIRECTION UP ;
PRINTLINE POSITION 1 IN 6 IN ;    /*LINE G */
```

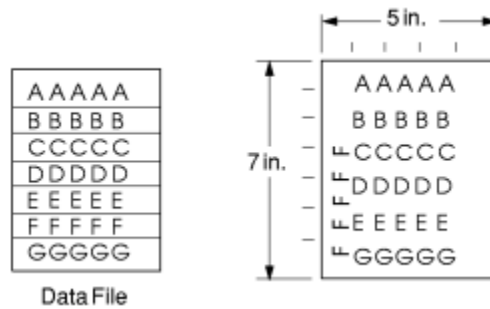



Figure 33: A Printout with More Than One Line Direction

In this page definition, the logical page direction ACROSS is specified. ACROSS is the default, but its inclusion clarifies that no direction control is needed for lines A–E. The default direction of a printline is the direction specification of the logical page of which it is part. The PRINTLINE command for the record F has a DIRECTION subcommand because the direction specification changes from the specification of the previous line. Record G is to be printed in the ACROSS direction again. However, a direction is not specified because the ACROSS direction is the default for all lines in this page definition.

Note: If you are building the page definition for use with the 3800 printer, and if the input data contains table reference characters, you can use the DIRECTION subcommand of the TRCREF command to specify a font that prints UP on the page, as in line F. For more information, see [“TRCREF Command \(Traditional\)”](#) on page 420.

Printing Fields in Two Directions on the Same Page

This example is similar to [“Printing Lines in Two Directions on a Page”](#) on page 44, except that you learn how to control direction field by field. This method creates a field-processing page definition and places direction controls in the FIELD commands. This command stream contains a portion of the page definition controls, showing only the PRINTLINE commands:

```
PRINTLINE POSITION MARGIN TOP ;
  FIELD START 1 LENGTH 4 ;
PRINTLINE POSITION 2 IN 4 IN ;
  FIELD START 7 LENGTH 4
  DIRECTION UP ;
```

As expected in field processing, FIELD commands are nested within PRINTLINE commands. [Figure 34 on page 46](#) shows a simplified portion of an unformatted file and two pages of the printout that is formatted by the page definition, part of which is shown in the command stream. Two PRINTLINES are specified because, as [Figure 34 on page 46](#) shows, the data file contains two input record formats (1 and 3 are alike; 2 and 4 are alike) and because the fields are mapped to two different positions in the output. The assumption of this sample is that the data file is much longer than the portion shown. However, if the records in the file alternate in format as the first four do, the two PRINTLINES of this page definition format as many records as are presented, two to a page, on pages 1 - n.

If more than two mappings are required by the print job, more than two PRINTLINE commands are required in the page definition.

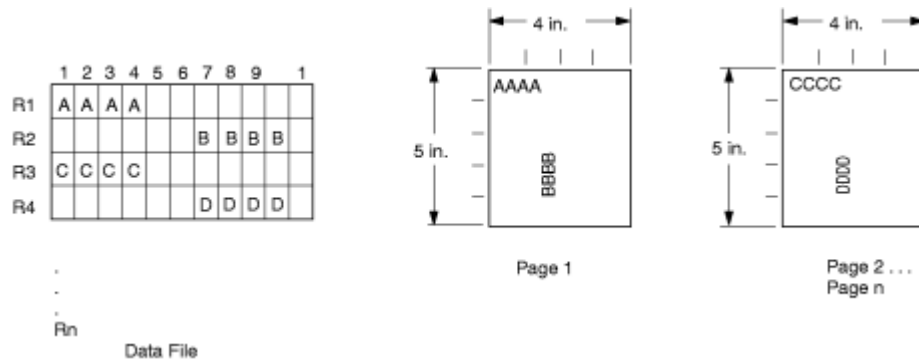


Figure 34: Field Direction

Rotating Fonts

Fonts rotate relative to the inline direction of lines (or fields).

This example focuses on a single letter A from FONTA. With PPFA, a single font that is specified in a page definition can produce letters in any of four rotations. This rotation is accomplished by a FONT command that specifies rotation. In this example, if you want to vary the rotation of a font twice within a page, you use two FONT commands, one for each rotation. You also use two PRINTLINE commands to map the data to the printout by using the two rotations of the font. In a field processing application, FIELD commands can be used in the same way. These PRINTLINE commands name the rotated font in a FONT subcommand.

Figure 35 on page 46 breaks down the elements that are required for the FONT commands and subcommands. Distinct local names and rotation specifications for each font are placed in a FONT command. These specifications identify a font as rotated within a page definition. The rotation of a character is relative to the inline direction of a printline or field. The characters and rotations that are shown here assume an inline direction of ACROSS. See “PPFA Basic Terms” on page 8.

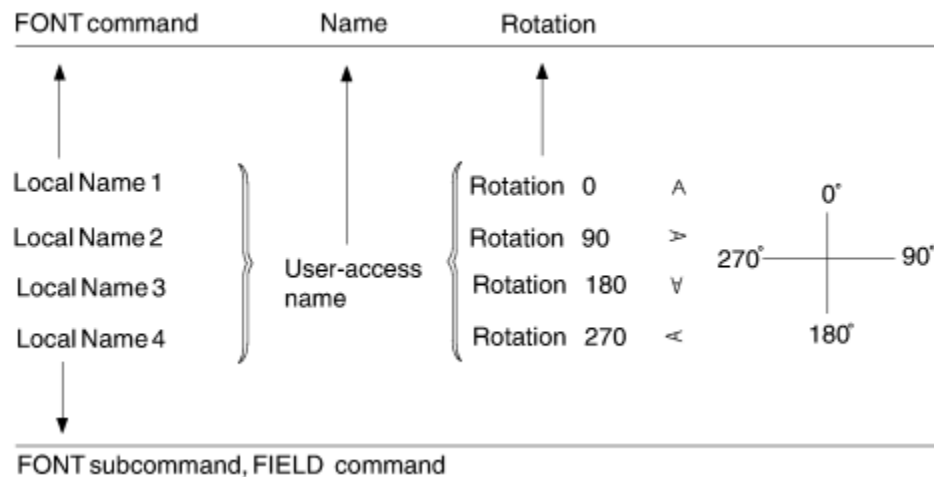


Figure 35: Character Rotation

You can use up to 16 possible combinations of logical page direction and font rotation for page printers other than the 3800.

The FONT subcommands within PRINTLINE or FIELD commands that name the rotated font in that page definition use only the local name. The following command stream shows the proper specification and nesting of FONT commands and subcommands for rotation.

```
PAGEDEF ABCD ;
  FONT FONTA M103 ;           /*NO ROTATION, LOCAL AND      */
                              /*USER-ACCESS NAMES.         */
  FONT FONTARTD180 M103      /*ROTATED FONT, LOCAL, USER-ACCESS*/
    ROTATION 180 ;           /*NAMES PLUS ROTATION SUBCOMMAND */
                              /*AND PARAMETER.             */
  PRINTLINE FONT FONTA       /*LOCAL NAME                  */
    REPEAT 3 ;
  PRINTLINE FONT FONTARTD180 /*LOCAL NAME                  */
    REPEAT 2 ;
```

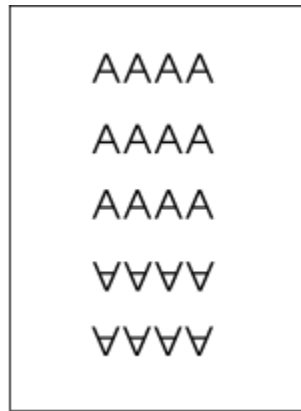


Figure 36: Example of Assumed Data File and Rotation Specifications

FONTA, identified in the first FONT command, requires no rotation parameter because it is printed in the default position (or 0° rotation) for font M103. For the rotated font, the second FONT command identifies FONTARTD180 (the local name) as M103 rotated 180°.

Using Traditional Kanji Formatting

Traditional kanji print presentation, called *tate*, is possible with a printer by using a combination of font rotation and logical page direction. A logical page in the DOWN direction and a 270° font rotation provide the right combination to present kanji in tate format on the printer.

```
FORMDEF TATE
  OFFSET 1 IN 1 IN ;
PAGEDEF TATE
  HEIGHT 5 IN
  WIDTH 6 IN
  DIRECTION DOWN ;
  FONT KANJIRTD M104
    ROTATION 270 ;
  PRINTLINE FONT KANJIRTD
    REPEAT 3 ;
```

Figure 37 on page 48 shows the result of formatting with the page definition in the example. The characters are added to lines down the page. Lines are added right to left.

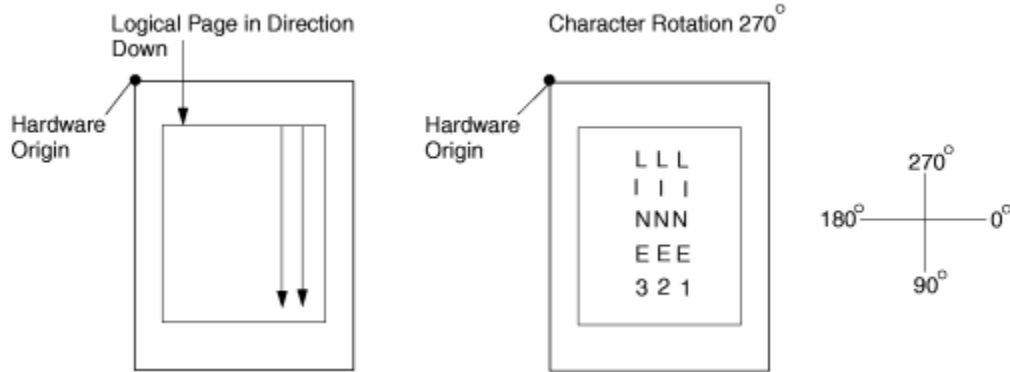


Figure 37: AFP Printer Tate Presentation

Printing Multiple-Up Pages

Multiple up is a printer's term for printing two or more pages of data on one side of a sheet, which is possible with your print server printers and PPFA formatting. The steps that are used in this example are:

1. Change the print direction of the logical page to one of the landscape presentations.
2. Conceptually divide the sheet of paper into parts, one for each multiple-up page (subpage).
3. Create a PRINTLINE position at the top of each multiple-up page.

This example assumes the existence of a line-data file with carriage control 1 characters after records 4, 7, and 11. Each carriage control 1 character begins a new page. Because four pages really exist on the sheet, a skip-to-channel 1 must be used four times. The fifth channel 1 character causes a page eject and the beginning of a new physical sheet. The PPFA commands that follow are for one version of a multiple-up page. This set of commands creates a page layout like the one shown in [Figure 38 on page 49](#) (the physical sheet is not shown).

```

FORMDEF MULTUP
  OFFSET 1 IN .5 IN ;
SETUNITS LINESP 4 LPI ;
PAGEDEF MULTUP1
  WIDTH 10 IN
  HEIGHT 8 IN
  DIRECTION DOWN /*FOR LANDSCAPE PRESENTATION */
PRINTLINE CHANNEL 1 /*PAGE 1 */
  POSITION 1 IN 1.5 IN
  REPEAT 6 ;
  ENDSUBPAGE ;
PRINTLINE CHANNEL 1 /*PAGE 2 */
  POSITION 1 IN 5.5 IN
  REPEAT 6 ;
  ENDSUBPAGE ;
PRINTLINE CHANNEL 1 /*PAGE 3 */
  POSITION 6 IN 1.5 IN
  REPEAT 6 ;
  ENDSUBPAGE ;
PRINTLINE CHANNEL 1 /*PAGE 4 */
  POSITION 6 IN 5.5 IN
  REPEAT 6 ;

```

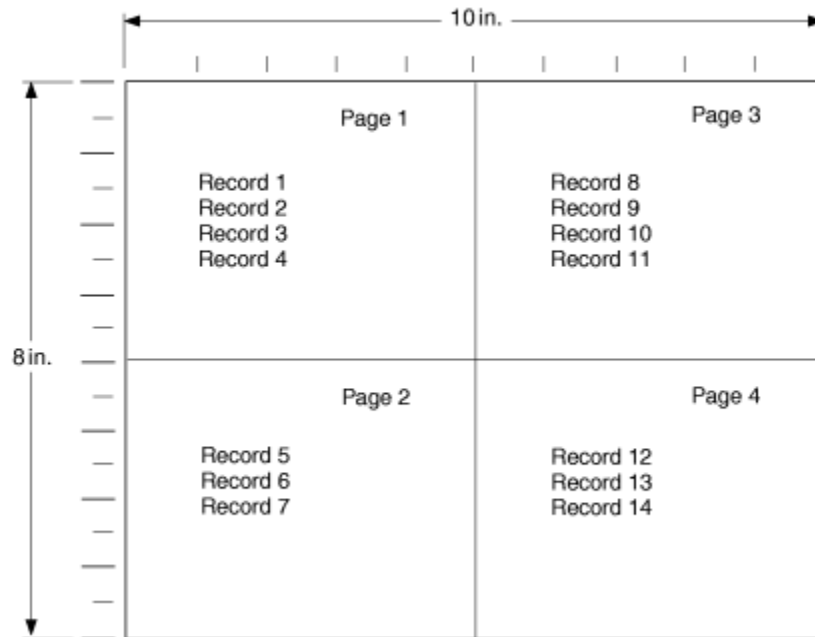


Figure 38: Multiple-Up Page Layout

The DOWN PRINTLINE direction creates a page with a landscape presentation typical of multiple-up printing. Individual PRINTLINES are specified for the initial lines of the four pages. Ensure that the lines of each page fit in the space that is designated by the use of a small font.

Note: In this example, no font is specified for the page definition; therefore, the default font for the page printer is used. If you want a different font, write a FONT command that names it.

The next set of commands alters the sequence of pages.

```
FORMDEF MULTUP
  OFFSET 1 IN .5 IN ;
  SETUNITS LINESP 4 LPI ;
  PAGEDEF MULTUP2
    WIDTH 10 IN
    HEIGHT 8 IN
    DIRECTION DOWN ;
  PRINTLINE CHANNEL 1          /* PAGE 1 */
    POSITION 1 IN 1.5 IN
    REPEAT 4 ;
  ENDSUBPAGE ;
  PRINTLINE CHANNEL 1          /* PAGE 2 */
    POSITION 6 IN 1.5 IN
    REPEAT 4 ;
  ENDSUBPAGE ;
  PRINTLINE CHANNEL 1          /* PAGE 3 */
    POSITION 1 IN 5.5 IN
    REPEAT 4 ;
  ENDSUBPAGE ;
  PRINTLINE CHANNEL 1          /* PAGE 4 */
    POSITION 6 IN 5.5 IN
    REPEAT 4 ;
```

Here, the upper-right and lower-left pages are reversed by reversing the position controls for the second and third printlines.

Figure 39 on page 50 shows the changed printout that results from the page definition command changes. When you set up your basic page definition, changes such as the ones described here become easy.

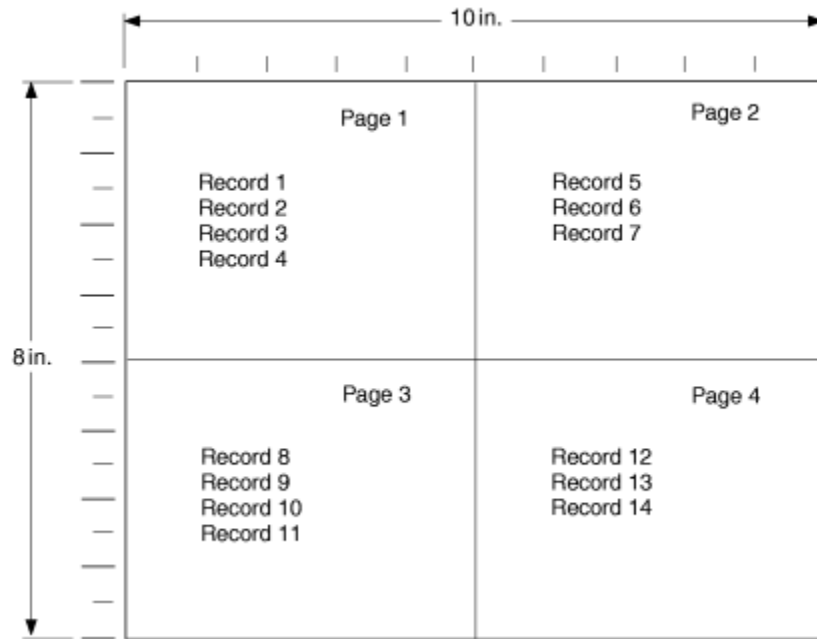


Figure 39: Multiple-Up Page Layout after Page Definition Modification

Note: The ENDSUBPAGE command can be used to mark the boundaries between subpages. Without it, the page definition is no different from any other sequence of PRINTLINEs with POSITION commands. Boundaries do not have to be marked unless conditional processing is being done. The examples that are given here print identically with and without ENDSUBPAGE commands. (See [“Subpage Description and Processing”](#) on page 110 for more information.)

Chapter 4. Using Page Definition Commands for Record Format Line Data and XML Data

This chapter describes the record formatting function and the XML page definition formatting function.

Record Formatting Function

The *record formatting function* allows an application to specify a format identifier (Record ID) with each set of output data fields (Data Record). The format identifier references a specific layout format in a page definition (PAGEDEF). At print time, each layout format (referenced by a Record ID in a Data Record) is retrieved from the PAGEDEF and used to position and format the associated Data Records/fields on the output page.

The purpose of the record formatting capabilities is to move more of the output formatting function into the PAGEDEF and allow for greater flexibility in creating and changing output pages without changing the base application. Rather than the application generating page headers, page trailers, and group headers for each page (and thus fixing the page endings), the page headers, page trailers, and group headers can be generated by a PAGEDEF layout, which allows the page endings to change as font sizes or data layouts change.

To visualize how the record formatting function can be used, review the first six pages of [“Record Formatting Examples”](#) on page 69. These examples show the output of an application before and after it is formatted with PAGEDEF by using the record formatting functions.

These functions are provided by several new PPFA commands (LAYOUT, DEFINE COLOR, DRAWGRAPHIC, and ENDGRAPHIC), and modifications to the PAGEDEF, PAGEFORMAT, FONT, CONDITION, and FIELD commands. This chapter provides an explanation of the record formatting functions with examples of their use. For details on the syntax of these commands, see [Chapter 11, “Page Definition Command Reference,”](#) on page 249.

Some of the functions that can be accomplished in a layout format with the record formatting commands include:

- Selecting different formatting for different types of Data Records/fields based on the Record ID. The output formatting can change mid-page independent of where the output occurs on a page.
- Defining page headers and trailers to be automatically printed on subsequent pages. The headers and trailers can incorporate data from the associated Data Record.
- Numbering the output pages.
- Inserting page ejects can be automatic when text reaches the bottom margin.
- Creating group headings to be printed at the beginning of a group of data. For example, you can create group headings (including column headings) to be repeated each time a different account type is formatted on a banking statement. An active group heading is automatically repeated on subsequent pages until the data group ends.
- Forcing page ejects to occur in the output.
- Creating boxes with or without black and white or color shading. A set of boxes for a table can be started in a group header and automatically ended and restarted on subsequent pages until the table completes.
- Creating graphical objects, such as circles, ellipses, lines, and graphs, in color or black and white output.
- Formatting database records created with field delimiters (rather than fixed-length fields).
- Aligning field output to the left or right.

Record Format Page Definition

A *record format page definition* specifies how you want data to be positioned on the logical page.

A record format page definition is a resource that is used by the print server that defines the rules of transforming line data into composed pages and text controls for printing. With record format page definitions, you can do the tasks that are listed in [Table 4 on page 52](#).

Task	Location of an Example
Create a page definition.	“Page Definition Command Nesting” on page 53
Assign a record ID.	“Record ID Data Format” on page 53
Use the LAYOUT command.	“LAYOUT Command” on page 54
Use the FIELD command.	“FIELD Command” on page 55
Define logical page size.	“Defining Logical Page Size” on page 58
Position data on a logical page.	“Positioning the Data” on page 59
Change the print direction.	“Changing Logical Page Print Direction” on page 59
Process fields.	“Processing Fields” on page 63
Print in different directions.	“Printing Lines in Two Directions on a Page” on page 64
Print fields in two directions.	“Printing Fields in Two Directions on the Same Page” on page 65
Change fonts.	“Varying Fonts on a Page” on page 66
Rotate fonts.	“Rotating Fonts” on page 68
Print kanji.	“Using Traditional Kanji Formatting” on page 69
Use record formatting and commands.	“Record Formatting Examples” on page 69

Page Formats within Page Definitions

Just as form definitions can include more than one copy group, page definitions can include several *page formats*. Page formats use basically the same subcommands as page definitions, and if a subcommand is specified in a page format, it overrides the value that is specified in the page definition for the page format. A single page definition can contain multiple page formats. If pages in a file are to be formatted differently, specify more than one page format in your page definition. Within a page definition, page formats are generated in the order in which they are specified.

Using more than one page format to control different pages requires one of these:

- Adding the Invoke Data Map structured field to the data file each time you want to change page formats.
- Using conditional processing.

See *Advanced Function Presentation: Programming Guide and Line Data Reference* for more information about the Invoke Data Map structured field.

Page Definition Command Nesting

The following simplified command stream shows the proper nesting of commands and the order in which they must be entered when you create a page definition:

```
[SETUNITS]
PAGEDEF
FONT
[OBJECT]
[DEFINE COLOR]
[PAGEFORMAT]
  [SEGMENT]
  [OVERLAY]
  [LAYOUT]
    [CONDITION]
    [FIELD]
    [DRAWGRAPHIC]
    [ENDGRAPHIC]
[PAGEFORMAT]
  [SEGMENT]
  [OVERLAY]
  [LAYOUT]
    [CONDITION]
    [FIELD]
    [DRAWGRAPHIC]
    [ENDGRAPHIC]
```

Notes:

1. Brackets enclosing a command mean that the command is optional.
2. Indentations are used to improve readability.
3. Complete definitions of all commands are included in [Chapter 11, “Page Definition Command Reference,”](#) on page 249.

Rules

1. Record format LAYOUT commands and traditional PRINTLINE commands cannot be used within the same PAGEDEF. At least one LAYOUT command is required per page format for a record formatting page definition.
2. A SETUNITS command can be placed before any other PPFA command. The values that are set are in effect until the next SETUNITS command.
3. SEGMENT and OVERLAY commands must be specified under their associated PAGEFORMAT command.
4. The first PAGEFORMAT command can be omitted in a page definition, if the page definition contains only one page format. If the PAGEFORMAT command is omitted, the PAGEDEF command parameters are used to define the page format.
5. One file can contain multiple sets of page definitions.

Record ID Data Format

In order to allow different formats for different groups (or tables) of data, each of which have an unpredictable number of entries, a Record ID is assigned to each output record to identify the type of record and control layout formatting. An application can group data fields that are to be formatted together as an entity into Data Records with a specific Record ID. For example, in a bank statement, the data fields for a check transaction might be grouped with a Record ID identifying that record as a check transaction. The PAGEDEF would then define a special layout format for a check transaction with a matching Record ID (see [“Record Formatting Examples”](#) on page 69 for detailed examples).

Record formatting in PPFA is achieved by identifying each input record in the data file with a 10-byte ID, similar to an expanded carriage control (CC) (see [“Basic Controls in Record Format Line Data”](#) on page 12 for additional information). Each record in the data file must contain a Record ID if record formatting is used. The Record ID must be the first 10 bytes in every print record in the data file.

Even though the Record ID is specified as a character string, the Record ID is treated as a hexadecimal string, not a character string. This means that there is no translation from ASCII to EBCDIC or vice versa when the Record ID is processed. The Record ID in the input data must match exactly the string that is specified for the LAYOUT Record ID in the page definition in order for correct processing to occur.

When a record is read from the data file at print time, the print server uses the 10-byte Record ID to determine which LAYOUT command in the page definition must be used to format the record.

TRCs (Table Reference Characters) cannot be used with record format data. If you have TRCs in the data and tell the print server that TRCs are present at print time, the print server uses the TRC byte as the first byte of the Record ID, and the Record ID is not recognized as such.

Data files can contain both carriage controls and Record IDs. If your data file is mixed mode (line data plus MO:DCA structured fields), then you must have a CC byte in the data. The CC byte is not counted as part of the 10-byte Record ID. If your file is plain line data, then CCs are allowed but not required. (See [“Basic Controls in Record Format Line Data”](#) on page 12 for additional information.)

LAYOUT Command

When record formatting, the LAYOUT command is used instead of traditional PRINTLINE commands in the page definition. You cannot mix record format LAYOUT and traditional PRINTLINE commands in the page definition. With LAYOUT (see [“LAYOUT Command \(Record Format\)”](#) on page 343), you can identify four types of Data Records:

- Body Records
- Page Headers
- Page Trailers
- Group Headers

Each of the record types is discussed in the following sections. No matter which types of record you are formatting, you can control the positioning, font, color, and direction for the print record.

The POSITION keyword on the LAYOUT command is used to set the initial print position for subsequent text and graphics that are placed with the FIELD and DRAWGRAPHIC commands.

- The *horizontal position* can be specified as LEFTMARGIN, at the same position as the previous layout, or at an absolute or relative location that is given in inches, millimeters, centimeters, points, or pels (see [“PAGEDEF Command”](#) on page 381).
- The *vertical position* can be specified as TOPMARGIN, at the same position as the previous layout, at the next vertical position (with the current LINESP value), or at an absolute or relative location that is given in inches, millimeters, centimeters, points, or pels (see [“PAGEDEF Command”](#) on page 381).

Body Records

The BODY layout type is used for most of the data in the user's input file. That is, any record that is not used for special processing as a page header, page trailer, or group header, contains data to be formatted and placed on the page.

Body records are positioned initially with the LAYOUT command. The default x (horizontal) position for each body record is to be at the same horizontal position as the previous LAYOUT. If it is the first LAYOUT on a logical page, the default horizontal position is 0.

The default y (vertical) position is to place the layout record down one line (as defined in the LINESP subcommand of the last SETUNITS command) from the previous field. If it is the first LAYOUT on a logical page, the default vertical position is one line down from the top margin of the logical page. See [“PAGEDEF Command”](#) on page 381 for details about margins.

You can specify the rotation of data with the DIRECTION keyword on LAYOUT. All of the fields that are defined for this record layout use the same direction unless it is overridden on the FIELD command. On relative LAYOUTs and their fields, the rotation must be ACROSS so that they have the same net rotation as the page format.

You can also specify fonts and color to be used for the text that is formatted with this layout record. Additionally, double-byte fonts can be requested if you have double-byte characters in your data. The color of the text and graphic borders is specified with the COLOR keyword. See [“DEFINE COLOR Command”](#) on page 258 and [“FONT Command”](#) on page 338 for details.

Page segments, overlays, and objects can be included with keywords on the LAYOUT command. This processing is the same as the traditional PRINTLINE command.

Body records can also be identified as belonging to a group. When the GROUP keyword is used on the body LAYOUT, the group header that is in effect at the time is repeated on subsequent pages while the input records use Record ID's that select body LAYOUT and use the GROUP keyword. The group is ended as soon as a Record ID in the input selects a LAYOUT that does not use the GROUP keyword.

Page Headers and Trailers

Page headers and trailers are printed automatically on each new page. Default headers and trailers can be created, which are automatically invoked on each new page without requiring or allowing any input data. No input record data is allowed in a default header or trailer because they are triggered automatically by page ejects and are not associated with any records in the input data file. See [“LAYOUT Command \(Record Format\)”](#) on page 343 for more details.

Rather than using the defaults, you can create headers and trailers that are invoked by a Data Record containing the header or trailer Record ID. These headers and trailers can use input record data in their layout; however, it is not required.

The following example creates a page header and trailer. See [“PAGEDEF Command”](#) on page 381 for more details.

```
LAYOUT C'statmid'  
  SEGMENT ibmlog 1.15 in 1.35 in  
  PAGEHEADER NEWPAGE  
  POSITION SAME ABSOLUTE NEXT;  
  
LAYOUT C'pgenum' PAGETRAILER  
  POSITION SAME ABSOLUTE 10.7 in;
```

Figure 40: Sample Page Header and Trailer

Group Headers

A Group Header layout consists of text, graphics, and other data that is to be printed at the beginning of a group of user records. For example, if you are creating a banking statement, you might define a Group Header for checking and one for savings.

The group header is defined with a special LAYOUT GRPHEADER command, and stays in effect until a BODY layout is encountered that specifies NOGROUP. See [“LAYOUT Command \(Record Format\)”](#) on page 343 for more details on the GRPHEADER subcommand.

If a logical page eject occurs before the group is ended, the header is printed after the top margin on each new page until the group ends.

FIELD Command

The FIELD command is used to identify a field in a Data Record to be formatted and placed on the page. FIELD must follow the LAYOUT command, and parameters that are not specified on FIELD are inherited from the previous LAYOUT. This section describes the new keywords on FIELD that are used with record formatting.

Page numbering can be accomplished by specifying FIELD with the PAGENUM parameter. Most often, you specify FIELD PAGENUM with other formatting information such as position and alignment, which causes the current page number to print at the specified position. The current page number is calculated based on the specification of the PAGECOUNT parameter on the previous PAGEDEF or PAGEFORMAT command. You can override the page number to a specific value with the RESET parameter on the FIELD command. For details, see [“Page Numbering”](#) on page 57.

You can retrieve the value of the Record ID for printing with the RECID keyword on FIELD. RECID also has START and LENGTH subparameters to allow only portions of the Record ID to be printed. Normally, you use the RECID parameter only for debugging your application by tracing which Record IDs are being processed, although it can be used for anything that makes sense for your application.

You can also specify the POSITION, COLOR, DIRECTION, and ALIGN keywords with the PAGENUM or RECID parameters on FIELD. The BARCODE and SUPPRESSION keywords are not allowed with PAGENUM or RECID, but can be used with other text fields from the Data Record.

ALIGN is a keyword that is allowed with the START/LENGTH or TEXT forms of the FIELD command, but only if you are doing record formatting. You use ALIGN to specify whether the field text is LEFT or RIGHT aligned at the given horizontal position.

If your Data Records are stored in a database, the fields might be separated with *field delimiters* instead of just being positional within the record. The DELIMITER keyword on the preceding LAYOUT command is used to specify the 1-byte or 2-byte value that is used to separate fields in the Data Records.

If your data uses field delimiters, you can also specify the FLDNUM parameter on the FIELD command to indicate the number of the field within the record to be extracted, rather than the START position. Fields are numbered from left to right beginning with 1. You can also use the starting position (START) and LENGTH keywords with the FLDNUM to indicate that only part of the field is to be formatted. An example of a typical command is:

```
COMMANDS
.
.
.
LAYOUT 'abc' DELIMITER '*';
FIELD FLDNUM 1 START 2 LENGTH 8 ALIGN RIGHT
  POSITION 5.6 in CURRENT
  FONT varb ; /* Variable text - Amount */
FIELD FLDNUM 2 ALIGN LEFT
  POSITION 1.1 in .9 in
  FONT varb ; /*variable - customer name */

DATA
abc      *Here is some data*more data*

FIELDS used
1st field 'ere is s'
2nd field 'more data'
```

Figure 41: Sample Commands and Data With Delimiters.

Controlling Page Formatting

You use the parameters on the PAGEDEF and PAGEFORMAT commands to specify the margins of the page. The TOPMARGIN and BOTMARGIN keywords are used to reserve space at the top and bottom of the page. The page headers and trailers are normally placed into this reserved space.

Note: No other text or objects need to be written into the margins - only page header and trailer data.

The bottom margin is also used for two other purposes:

- A BODY or GRPHEADER Data Record, which causes the baseline position to move into the bottom margin area, causes a logical page eject.
- Any graphic that is started with the DRAWGRAPHIC command, but not explicitly ended, automatically ends at print time before it extends into the bottom margin area.

You can force a new logical page in the output with the NEWPAGE keyword on a LAYOUT command (see [“LAYOUT Command \(Record Format\)” on page 343](#)). When an input record is encountered whose Record ID matches that LAYOUT name, a page eject is completed before the record data is processed. If it is a header or trailer layout, the page eject is done before the header or trailer becomes active.

The ENDSpace keyword can also be used to control where page ejects are done. If ENDSpace is coded on a LAYOUT, and a Data Record with the matching Record ID is encountered, a page eject is done before

the data is processed - if the remaining space on the page (before the bottom margin) is less than the ENDSPACE value.

The ENDSPACE keyword can be used to ensure that a Table Heading (Group Heading) does not print at the end of a page without allowing space for more Data Records (body records), or to ensure that a table entry does not print at the bottom of a page without allowing space for a totals record.

The following example shows the use of page margins and the NEWPAGE and ENDSPACE keywords:

```
PAGEFORMAT chub1 TOPMARGIN 2 in BOTMARGIN 2 in;
/*****
/** statmid BODY **/
/*****
LAYOUT C'statmid' PAGEHEADER NEWPAGE ENDSPACE .5 in
        POSITION .6 in ABSOLUTE .55 in;
FIELD TEXT C'Big Brother Bank' ALIGN LEFT
FONT comp ; /* default to LAYOUT positioning*/
```

Figure 42: Sample Page Formatting

Page Numbering

Page numbers can be placed with the PAGENUM keywords on the FIELD command. You use PAGENUM to specify whether the page number prints, and whether you want it reset to a specific value rather than using the current value (page count).

The page number prints as an integer (for example, 1, 2, 3, ...) and has a valid range of 1 - 4 billion (four unsigned bytes of data). If the specified or defaulted font that is used for printing the page number is other than an EBCDIC font, you must specify it using the TYPE subcommand on the FONT command.

The page number prints by using the font that is specified on the FIELD command. You can also select a POSITION, COLOR, and DIRECTION for the page number by using existing FIELD keywords.

The ALIGN parameter on FIELD can also be used to specify whether you want the page number LEFT or RIGHT aligned at the given position.

The PAGECOUNT keyword is allowed with the PAGEDEF and PAGEFORMAT commands so that you can specify how page numbering is to be handled when you are switching between page formats. Page numbering can be stopped, reset, resumed for a certain point or continued from a certain point. For a detailed description on how to specify these options, see [“PAGEDEF Command” on page 381](#).

Graphical Objects

When you are creating output with record formatting, you can use the DRAWGRAPHIC commands to create boxes, lines, circles, and ellipses relative to the data printed with the LAYOUT command. DRAWGRAPHIC can be used with DEFINE COLOR to shade an object with a percentage of black or other colors; however, DRAWGRAPHIC is not allowed if you are formatting with the traditional PRINTLINE.

Conditional Processing Considerations

Conditional processing works much the same in record formatting as when you are using the traditional PRINTLINE processing. The only difference is the ability to process based on a field that is defined by delimiters instead of just a fixed start position and length.

Logical Page Eject Processing

A logical page eject can be caused by these:

- Any Record ID that references a layout format with a specification of New Page.
- A relative baseline overflow, which is a Body or Group Header layout format that, when processed against the current input record, causes an overflow of the current print position into the bottom margin. If processing of the input record causes a relative baseline overflow, the page eject is processed before any part of the input record is printed.
- A Data Map change or Medium Map change, or, in Mixed-Mode, a Begin Document or Begin Page structured field.

Page Header, Page Trailer, and Group Header Data Records that are used with page ejects are activated in the following manner:

- If a Data Record specifies the Record ID of a PAGEDEF Page Header layout format, that Data Record is not printed on receipt but is saved as the active page header record (for that PAGEFORMAT). It is saved during the job or until a subsequent Data Record specifies a Page Header (for that PAGEFORMAT).
- If a Data Record specifies the Record ID of a PAGEDEF Page Trailer layout format, that Data Record is not printed on receipt but is saved as the active page trailer record (for that PAGEFORMAT). It is saved during the job or until a subsequent Data Record specifies a Page Trailer (for that PAGEFORMAT).
- If a Data Record specifies the Record ID of a PAGEDEF Group Header layout format, that Data Record is not printed on receipt but is saved as the active group header record. The PAGEDEF Group Header is printed when the next Data Record specifies a Body layout with a GROUP specification and on subsequent page ejects. The Group Header and its associated Data Record are kept active until a subsequent Data Record specifies a Body layout with a NOGROUP specification.

When a logical page eject occurs, the following actions are taken in the following order.

- For the current page:
 1. If it is the start of a line data document (no previous page ejects, group header records or body records are processed with this PAGEDEF), current page items 1 - 3 are skipped.
 2. If an active page header record was in effect before this layout format, that record is presented on the current page by using the matching layout. Otherwise, if the active PAGEFORMAT contains a default Page Header layout, that layout is used to present a page header.
 3. If an active page trailer record was in effect before this layout format, that record is presented on the current page by using the matching layout. Otherwise, if the active PAGEFORMAT contains a default Page Trailer layout, that layout is used to present a page trailer.
- For the new page:
 1. The current print position is moved to the top of the new page and offset from the top of the new page by the top margin. If the PAGEFORMAT is changed, the new Data Map's Margin Definition and layouts are used.
 2. If an active group header record exists for this PAGEFORMAT, that record is presented on the new page by using the matching Record layout. The group header is not printed and causes no action until a Body layout with Group Indicator is processed for the page. If the layout specifies relative positioning, the baseline position of the layout is offset from the top of the page by the top margin plus one line.
 3. If the page eject was caused by a Body layout, the input record that causes the page eject is presented on the new page with the layout that is referenced by the record. If the layout specifies relative positioning and is preceded on the page by a group header, the baseline position is relative to the last printed line of the group header. If the layout specifies relative positioning and is not preceded on the page by a group header, the baseline position of the layout is offset from the top of the page by the top margin plus one line.

Note: The actual locations of 'top of page' and 'top margin' are affected by the text orientation. See ["Using Margins in Record Formatting"](#) on page 61 for more information.

Defining Color Models

Record formatting provides you with the ability to predefine a color with your own name, and then use that name anytime this color is needed. It works in much the same way as a FONT command where you define the FONT with an internal name and then use that name when you place text on the page.

Defining Logical Page Size

["Positioning a Logical Page on a Sheet"](#) on page 19 shows how to establish the origin point of a logical page, relative to the media origin on a sheet of paper, by using the OFFSET subcommand. The following example shows you how to establish the width and height of the logical page relative to this origin point.

This example illustrates how the dimensions of a logical page are determined by form definitions and page definitions.

```

SETUNITS  1 IN 1 IN
FORMDEF   ABCD
          LINESP 8 LPI;
          OFFSET 0 .5;
PAGEDEF   ABCD
          WIDTH 7.5
          HEIGHT 10
          DIRECTION ACROSS;
FONT      GS12 GS12;
LAYOUT    'abc'
          FONT GS12
          POSITION 0 TOP;

```

Normally, all parameters consist of a number and a unit of measurement, for example, 6 IN. (See [“Units of Measurement”](#) on page 186 for information on units that are available.) Numbers can be specified with up to three decimal places. The LAYOUT command is included because at least one is required for all page definitions. See [“LAYOUT Command \(Record Format\)”](#) on page 343 for more information.

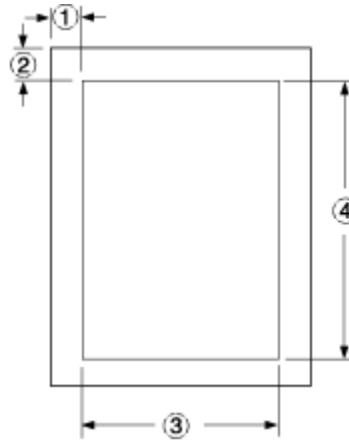


Figure 43: Logical Page Dimensions

The OFFSET subcommand (0) (.5) in the sample form definition establishes the corner or origin of the logical page relative to the physical sheet. The WIDTH and HEIGHT subcommands, (7.5) and (10), specify the dimensions of the logical page relative to the logical page origin.

Note: Be careful not to define a logical page larger than the physical sheet. PPFA does not check the size of the physical sheet.

Positioning the Data

[“Defining Logical Page Size”](#) on page 58 shows you how to define the size of a logical page. [“Changing Logical Page Print Direction”](#) on page 59 and [“Using Margins in Record Formatting”](#) on page 61 show you how to position data inside the logical page.

Changing Logical Page Print Direction

Logical pages can have four different print directions: ACROSS, DOWN, BACK, and UP. This example shows that all four directions can be specified in relation to one offset specification:

```

FORMDEF   ABCD
          OFFSET (1) (2) ;
PAGEDEF   DEFG ;
FONT      GS12 GS12;
PAGEFORMAT DEFG1
          WIDTH (3)
          HEIGHT (4)
          DIRECTION ACROSS ;

```

```
LAYOUT 'abc' ;
PAGEFORMAT DEFG2
    WIDTH (3)
    HEIGHT (4)
    DIRECTION DOWN ;
LAYOUT 'def' ;
PAGEFORMAT DEFG3
    WIDTH (3)
    HEIGHT (4)
    DIRECTION BACK ;
LAYOUT 'ghi' ;
PAGEFORMAT DEFG4
    WIDTH (3)
    HEIGHT (4)
    DIRECTION UP ;
LAYOUT 'jki' ;
```

Note: The parenthetical numbers represent dimensions. [Figure 43 on page 59](#) shows how these dimensions relate to the logical page.

One page definition is used to simplify the example, yet four logical pages are specified. The PAGEFORMAT commands create subsets of page definitions for each logical page.

Note: The page formats in this example require an Invoke Data Map structured field at the place in the data file where you want to change page formats. The LAYOUT commands are required but are not relevant in the example.

The DIRECTION subcommand with one of its four direction parameters ACROSS, DOWN, UP, or BACK specifies the print direction of the logical page.

[Figure 44 on page 61](#) shows the format of each of the logical pages that are specified in the page definition with the direction specification of each. The pages with the ACROSS and BACK directions are in portrait presentation. The pages with the DOWN and UP directions are in landscape presentation.

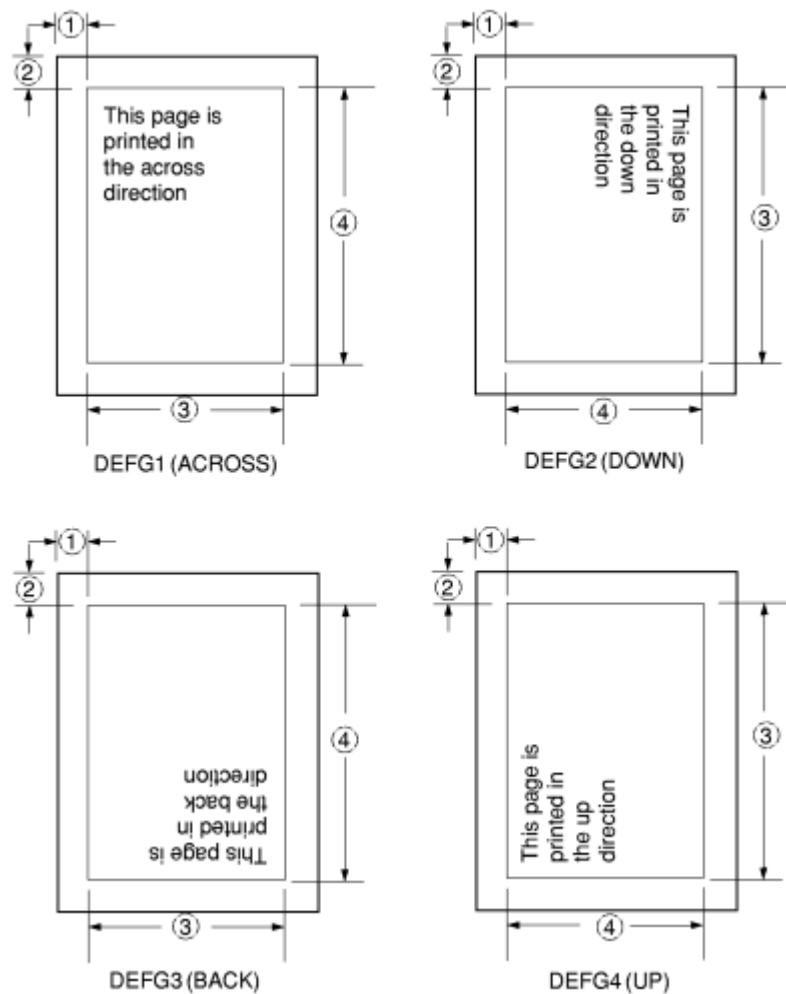


Figure 44: Logical Page Print Directions in Relation to Origin

The media origins and logical page origins do not change with the presentation of the data on the page. The OFFSET subcommand of the form definition need not change. However, the width and height dimensions do change; that is, the WIDTH subcommand always governs the horizontal (inline) dimension as you view the page, and the HEIGHT subcommand always governs the vertical (baseline) dimension whether the page is in portrait or in landscape presentation. Ensure that these specifications do not cause the logical page to cross the edge of the physical page.

However, if the DOWN direction is specified for use with a continuous forms printer, the PRESENT and DIRECTION subcommands might need to be specified in the form definition. See [“Specifying Page Presentation on Continuous-Forms Printers”](#) on page 27 for more information.

Using Margins in Record Formatting

Margins follow the inline direction of the page. For example, if the text orientation is ACROSS, the upper-left diagram in [Figure 45](#) on page 62 shows the left, top, right, and bottom margins. When specified, these margins define a bounding box for the PAGEFORMAT as indicated by the dotted lines.

If the text orientation is changed, the same bounding box applies to the new orientation, but the names of the margins change in the new orientation. For example, if the new text orientation is DOWN, as shown in the upper-right diagram of this same figure, the top margin in the new orientation is now defined on the long side of the page.

Left Margin

Specifies the offset of the left margin along the i axis from the left edge of the page. The left edge of the page is the zero position on the i axis.

Top Margin

Specifies the offset of the top margin along the b axis from the top edge of the page. The top edge of the page is the zero position on the b axis.

Right Margin

Specifies the offset of the right margin along the i axis from the right edge of the page.

Bottom Margin

Specifies the offset of the bottom margin along the b axis from the bottom edge of the page.

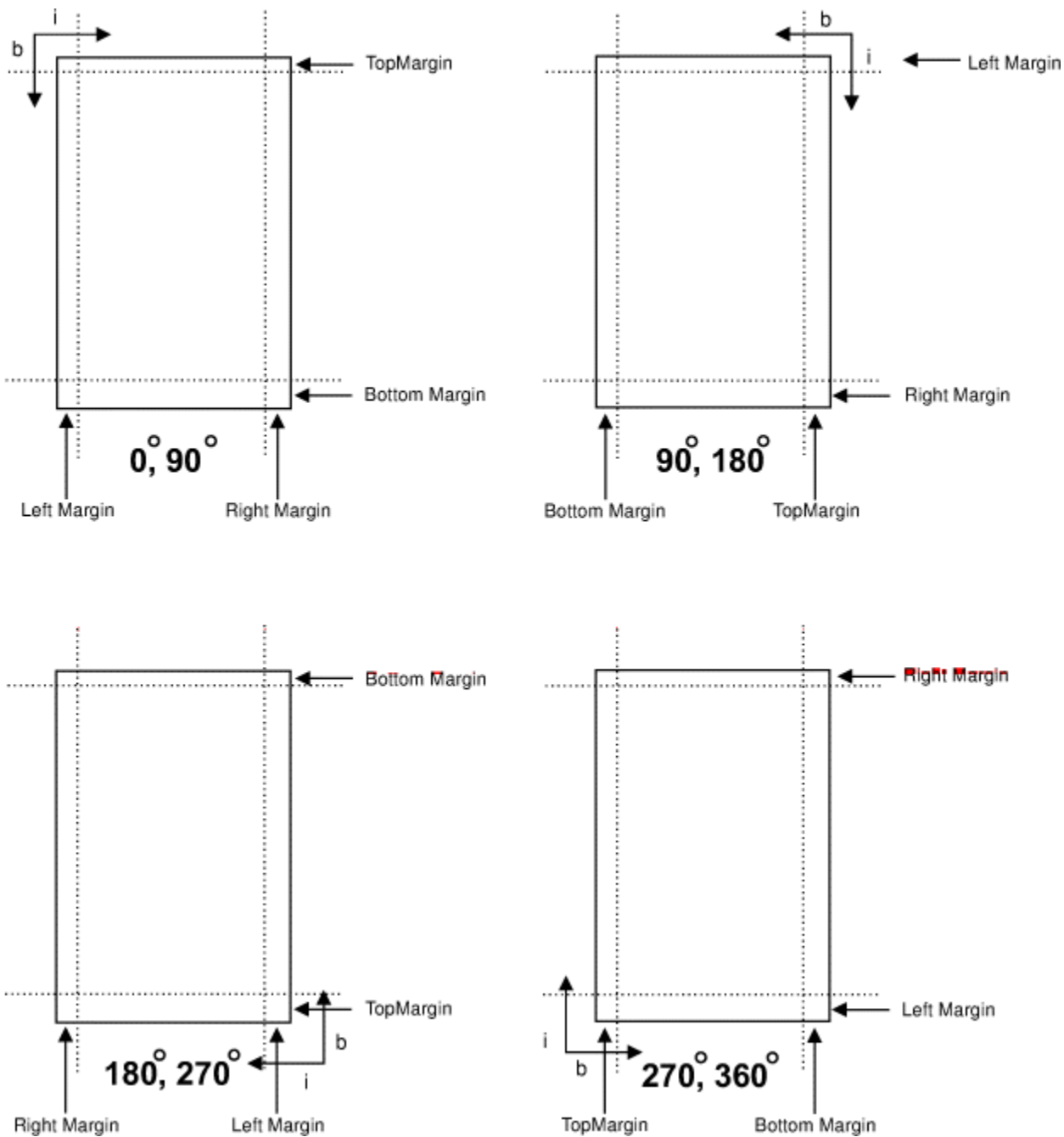


Figure 45: Relationship of Margin Definition to Text Orientation

Processing Fields

This section describes the mapping of individual fields to the printed sheets. You can use this technique to print unformatted data according to precise specifications, and these specifications can change without affecting the data file.

The rule for field processing of data files is: Each FIELD command must follow its associated LAYOUT command, and more than one FIELD command can be specified for a single LAYOUT command.

For this field-processing example, the data file shown in [Figure 47 on page 63](#) is used. [Figure 48 on page 63](#) represents an output format that might be used to place data on a form, such as an invoice or an order. The page definition commands to print [Figure 48 on page 63](#) are in [Figure 46 on page 63](#).

```
PAGEDEF ABCD
  WIDTH 7 IN
  HEIGHT 8 IN ;
FONT GS12 GS12;
LAYOUT 'abc' POSITION 1 IN ABSOLUTE 1 IN ; /*PROCESSING FOR R1 */
  FIELD START 1 LENGTH 4 ; /*THE LAYOUT POSITION IS */
  /*THE DEFAULT FOR THE FIRST FIELD*/

  FIELD START 11 LENGTH 4
  POSITION 4 IN 0 IN ;
LAYOUT 'def' POSITION 3 IN ABSOLUTE 4 IN ; /*PROCESSING FOR R2 */
  FIELD START 1 LENGTH 4 ; /*DEFAULT POSITION */
  FIELD START 6 LENGTH 4
  POSITION 0 IN 1 IN ;
  FIELD START 13 LENGTH 3
  POSITION 2 IN 3 IN ;
LAYOUT 'ghi' POSITION 1 IN ABSOLUTE 2 IN ; /*PROCESSING FOR R3 */
  FIELD START 1 LENGTH 4 ; /*DEFAULT POSITION */
  FIELD START 11 LENGTH 4
  POSITION 4 IN 0 IN ;
```

Figure 46: Field-processing example for the LAYOUT command

	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7
R1	A	A	A	A						B	B	B	B			
R2	X	X	X	X	Y	Y	Y	Y		Z	Z	Z	Z			
R3	1	1	1	1						2	2	2	2			

Data File

Figure 47: Unformatted Print Data File

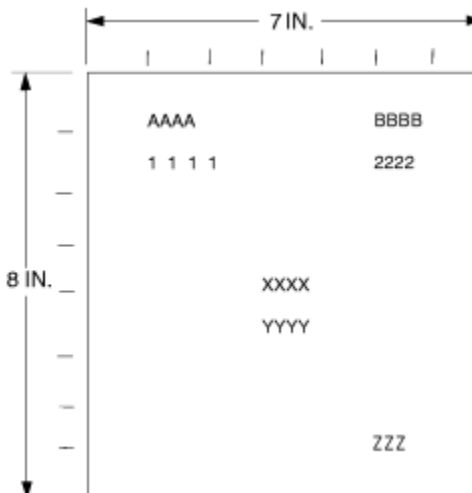


Figure 48: Data Arranged on the Printed Page

POSITION Subcommand in Processing Fields Example

The POSITION subcommand of each LAYOUT command specifies the layout position relative to either the logical page origin or the previous LAYOUT position. The POSITION subcommands below FIELD commands specify a field position relative to the governing LAYOUT position.

This subcommand is for use in positioning text, objects, and graphics. If RELATIVE is specified or POSITION is not specified, the baseline of the Position is relative to the previous LAYOUT position.

1. For PAGEHEADER LAYOUT the baseline position can be anywhere on a logical page.
2. For PAGETRAILER, GROUPHEADER, and BODY LAYOUT the baseline position can be anywhere on a logical page and can be specified as RELATIVE.

Following POSITION subcommands come the horizontal (x) then the vertical (y) offsets from the reference point.

x

Specifies the horizontal offset from the left side of the logical page.

y

Specifies the vertical offset from the top side of the logical page.

They are parallel in structure to the OFFSET subcommand of the form definition.

For example, the final POSITION subcommand on the previous example places the final field 1 + 4 inches to the right of the left edge of the logical page, combining the x value of 1 in the LAYOUT command, and the x value of 4 in the nested FIELD command. The 0 in the FIELD command specifies no change to the y value in the LAYOUT command. Thus, the position of the final field is 5 IN (x), 2 IN (y).

Note: The first FIELD command within each LAYOUT has no position specification because the LAYOUT POSITION value is the default for the first FIELD command nested under it.

Alternative controls for the x and y values of a POSITION subcommand are available. See the description of the POSITION subcommand in FIELD command (Record Format).

FIELD Command in Processing Fields Example

In the FIELD command, the START and LENGTH parameters specify the location of the field in the record to be processed. START indicates the starting byte position, and LENGTH specifies the number of bytes in the field.

```
setunits linesp 6 lpi;
PAGEDEF rel9 replace yes
    direction across width 8.5 in height 11.0 in;
FONT GS12 GS12;
LAYOUT 'abc' position 0 IN 1.0 IN;

/* The fields will be placed at +120 pels, +24 pels (next) */
/* and +48 pels (.20 IN) from lines previously placed on page */

setunits linesp 10 lpi;
LAYOUT 'def' position 0 relative next;
    FIELD START 1 LENGTH 3 position 0 IN .5 IN;
    FIELD START 4 LENGTH 3 position 0 IN next;
    FIELD START 7 LENGTH 3 position current .20 IN;
```

Printing Lines in Two Directions on a Page

Lines can be printed in any of four directions, depending on the type of printer that is used. See your printer's documentation for the print directions that are supported by your printer.

The four parameters for line direction are ACROSS, DOWN, BACK, and UP. The PPFA commands that are used to format a line-data file with lines that are printed in more than one direction (as shown in [Figure 49 on page 65](#)) are stated in the following page definition:

```
PAGEDEF ATOG
    DIRECTION ACROSS ;
    FONT GS12 GS12;
    LAYOUT 'abc' POSITION 1 IN ABSOLUTE 1 IN ; /*LINES A-E */
```

```
LAYOUT 'def' POSITION .5 IN ABSOLUTE 6 IN /*LINE F */
DIRECTION UP ;
LAYOUT 'ghi' POSITION 1 IN ABSOLUTE 6 IN ; /*LINE G */
```

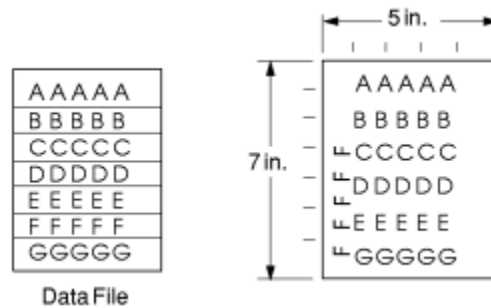


Figure 49: A Printout with More Than One Line Direction

In the page definition, the logical page direction ACROSS is specified. This value is the default, but its inclusion clarifies that no direction control is needed for lines A - E. The default direction of a layout is the direction specification of the logical page of which it is part. The LAYOUT command for the record F has a DIRECTION subcommand because the direction specification changes from the specification of the previous line. Record G is to be printed in the ACROSS direction again. However, a direction is not specified because the ACROSS direction is the default for all lines in the page definition.

Printing Fields in Two Directions on the Same Page

This example is similar to Printing Lines in Two Directions on a Page, except that you learn how to control direction field by field. This method creates a field-processing page definition and places direction controls in the FIELD commands. This command stream contains a portion of the page definition controls, showing only the LAYOUT commands:

```
LAYOUT 'abc' POSITION LEFTMARGIN TOPMARGIN NEWPAGE;
FIELD START 1 LENGTH 4 ;
LAYOUT 'def' POSITION 2 IN ABSOLUTE 4 IN ;
FIELD START 7 LENGTH 4
DIRECTION UP ;
```

As expected in field processing, FIELD commands are nested within LAYOUT commands. [Figure 50 on page 66](#) shows a simplified portion of an unformatted file and two pages of the printout that is formatted by the page definition, part of which is shown in the command stream. Two layouts are specified because the data file contains two input record formats (1 and 3 are alike; 2 and 4 are alike) and because the fields are mapped to two different positions in the output. The assumption of this sample is that the data file is much longer than the portion shown. However, if the records in the file alternate in format as the first four do, the two LAYOUTs of the page definition format as many records as are presented, two to a page, on pages 1 - n.

If more than two mappings are required by the print job, more than two LAYOUT commands are required in the page definition.

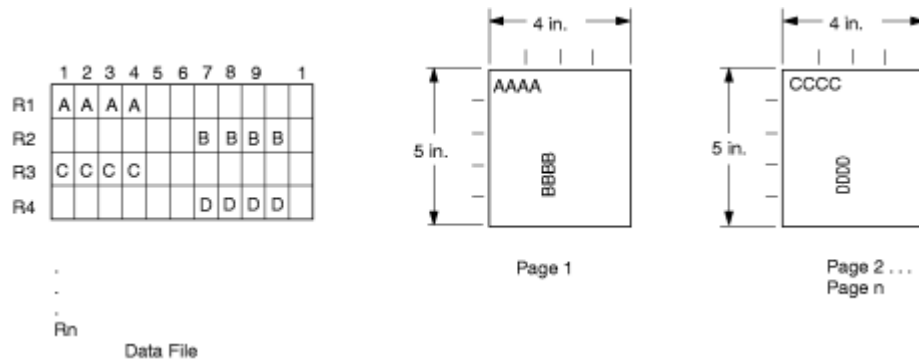


Figure 50: Field Direction

Varying Fonts on a Page

This example illustrates a simple font variation within a printout. The task is to print a line-data file with the first line of each page in bold-faced type and the rest in standard type. This task requires controls for two fonts in the page definition.

The commands to select a single font for the page, as shown in [Figure 52 on page 67](#), are as follows:

The FONT command contains two names: the local (STANDARD) name and the user-access (M101) name for the selected font.

```
PAGEDEF ABCD ;
  FONT STANDARD M101;
  FONT BOLDFACE M102;
  LAYOUT 'abc' FONT BOLDFACE NEWPAGE;
  LAYOUT 'def' FONT STANDARD NEWPAGE;
  LAYOUT 'ghi' FONT STANDARD;
```

Note: Fonts cannot be a Font Typeface Global Identifier (FGID). Also, all page definitions require a LAYOUT command.

The following example shows line data that uses a single font:

```
def      Record 1
ghi      Record 2
ghi      Record 3
ghi      Record 4
ghi      Record 5
ghi      Record 6
def      Record 7
ghi      Record 8
ghi      Record 9
def      Record 10
ghi      Record 11
ghi      Record 12
ghi      Record 13
```

Figure 51: Line Data for Single Font Example

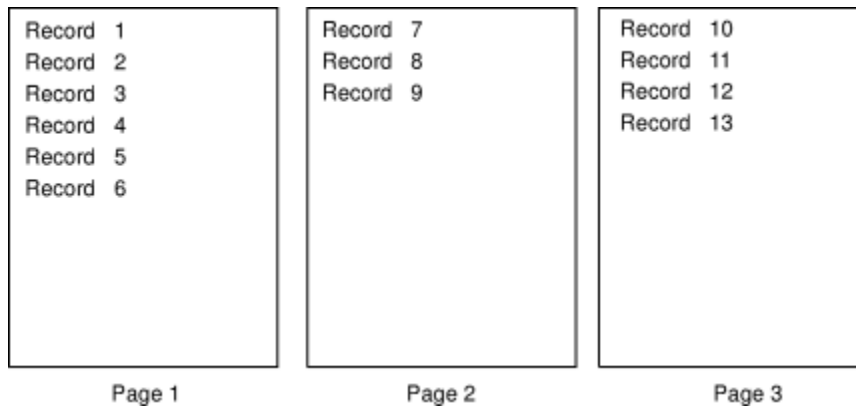


Figure 52: Data File Printed Using a Single Font

This command stream works on the principle that each line of output whose font you want to change from the font in the previous line must be controlled by a separate LAYOUT command. The FONT subcommand of the LAYOUT command names the font that is wanted for that line. In this example, two LAYOUT commands are used because one font change and two fonts are intended for the output. The user-access font names appear in the two FONT commands immediately below the PAGEDEF command and optionally, a local name. M101 and M102 in the example are user-access names; BOLDFACE is a local name. Use the local name in the FONT subcommand of LAYOUT if it is included in the corresponding FONT command, as is done for the first LAYOUT command.

```

abc      Record 1
ghi      Record 2
ghi      Record 3
ghi      Record 4
ghi      Record 5
ghi      Record 6
abc      Record 7
ghi      Record 8
ghi      Record 9
abc      Record 10
ghi      Record 11
ghi      Record 12
ghi      Record 13

```

Figure 53: Line Data for Two Font Example

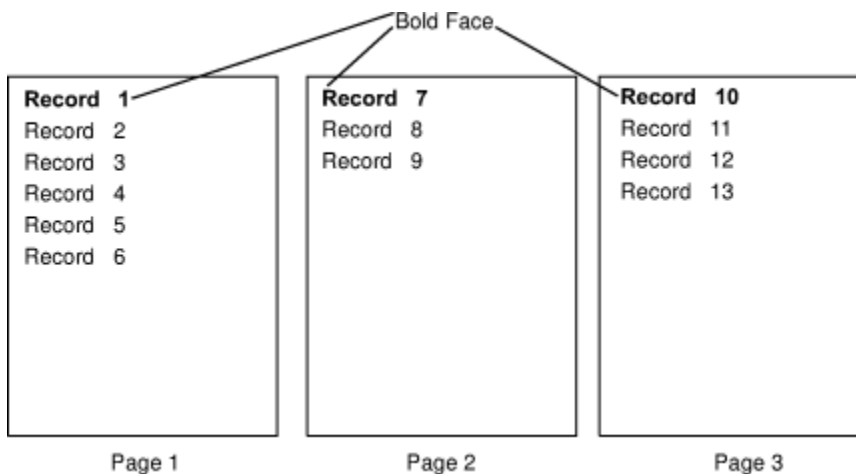


Figure 54: Font Change Using FONT Commands and Subcommands

Changing fonts field by field is similar to changing them in layouts. You map each field individually with a FIELD command; include a FONT subcommand in the FIELD command. If a font change is wanted for a field, as with the FONT subcommand of a LAYOUT command, the font must be previously named in a FONT command.

Rotating Fonts

Fonts rotate relative to the inline direction of lines (or fields).

This example focuses on a single letter A from FONTA. With PPFA, a single font that is specified in a page definition can produce letters in any of four rotations. This formatting is accomplished by a FONT command that specifies rotation. If you want to vary the rotation of a font twice within a page, you use two FONT commands, one for each rotation. You also use two LAYOUT commands to map the data to the printout by using the two rotations of the font. In a field processing application, FIELD commands can be used in the same way. These LAYOUT commands name the rotated font in a FONT subcommand.

Figure 55 on page 68 breaks down the elements that are required for the FONT commands and subcommands. Distinct local names and rotation specifications for each font are placed in a FONT command. These specifications identify a font as rotated within a page definition. The rotation of a character is relative to the inline direction of a field or LAYOUT. The characters and rotations that are shown here assume an inline direction of ACROSS.

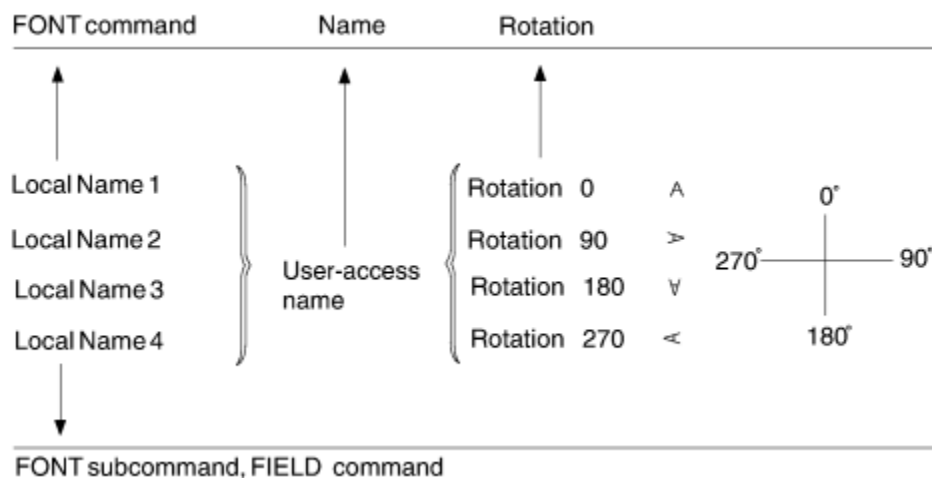


Figure 55: Character Rotation

You can use up to 16 possible combinations of logical page direction and font rotation for page printers other than the 3800.

The FONT subcommands within LAYOUT or FIELD commands that name the rotated font in that page definition use only the local name. The following command stream shows the proper specification and nesting of FONT commands and subcommands for rotation.

```

PAGEDEF ABCD ;
  FONT FONTA M103 ;          /*NO ROTATION, LOCAL AND    */
                             /*USER-ACCESS NAMES.       */
  FONT FONTARD180 M103      /*ROTATED FONT, LOCAL, USER-ACCESS*/
    ROTATION 180 ;          /*NAMES PLUS ROTATION SUBCOMMAND */
                             /*AND PARAMETER.           */
  LAYOUT 'abc' FONT FONTA ; /*LOCAL NAME                */
  LAYOUT 'def' FONT FONTARD180 ; /*LOCAL NAME                */
*/

```




Figure 56: Example of Assumed Data File and Rotation Specifications

FONTA, identified in the first FONT command, requires no rotation parameter because it is printed in the default position (or 0° rotation) for font M103. For the rotated font, the second FONT command identifies FONTARTD180 (the local name) as M103 rotated 180°.

Using Traditional Kanji Formatting

Traditional kanji print presentation, called *tate*, is possible with your print server printers by using a combination of font rotation and logical page direction. A logical page in the DOWN direction and a 270° font rotation provide the right combination to present kanji in tate format on a print server printer.

```
FORMDEF TATE
  OFFSET 1 IN 1 IN ;
PAGEDEF TATE
  HEIGHT 5 IN
  WIDTH 6 IN
  DIRECTION DOWN ;
FONT KANJIRTD M104
  ROTATION 270 ;
LAYOUT 'tate' FONT KANJIRTD;
```

Figure 57 on page 69 shows the result of formatting with the page definition in the example. The characters are added to lines down the page. Lines are added right to left.

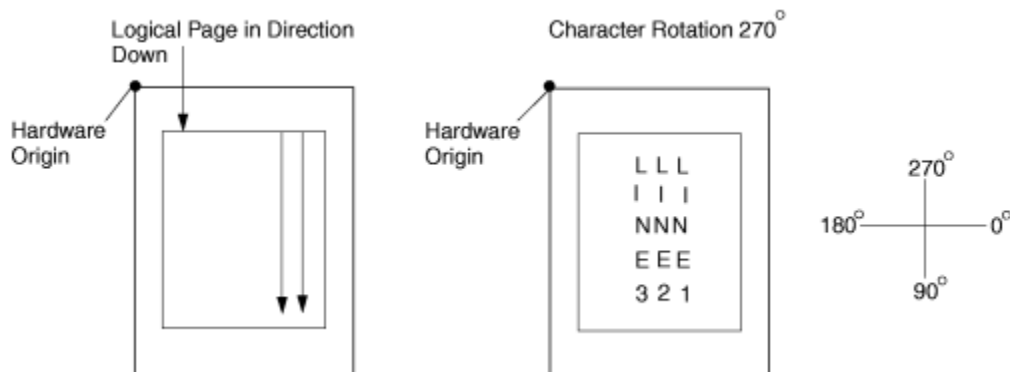


Figure 57: AFP Printer Tate Presentation

Record Formatting Examples

To allow different formats for different groups (or tables) of data, each of which have an unpredictable number of entries, a Record ID is assigned to each output record to identify the type of record and control layout formatting. An application can group data fields that are to be formatted together as an entity into Data Records with a specific Record ID. For example, in a bank statement, the data fields for a check transaction might be grouped with a Record ID identifying that record as a check transaction. The PAGEDEF would then define a special layout format for a check transaction with a matching Record ID.

The same thing might be done for a deposit transaction, customer account information, deposit totals, and check totals. If the customer account information is going to be used in a page header on each page, the PAGEDEF can define a special layout format for a customer information record that automatically generates a page header for each page.

This section shows two complete examples that use the record formatting process. Each is divided into three parts - the output you want (after PAGEDEF processing), the application output (before PAGEDEF processing), and the PPFA commands.

Example 1 - Bank Statement

Figure 58 on page 71 and Figure 59 on page 72 show the printed output for a bank statement after PAGEDEF processing (the second figure is resized). “Application Output (before PAGEDEF Processing)” on page 73 and “PPFA Commands” on page 74 show the user data and the PPFA commands that create the printed output.

Big Brother Bank

"We watch over you"

P.O. Box 1573
Beantown, MA 02116

Justin Case
123 Redlight Lane
TwistNshout, MA 02345

Account Number: 026-257311
Statement Begin Date: JAN 02, 2002
Statement End Date: FEB 01, 2002

Super Checking Account Activity

Beginning Balance	Credits	Debits	Service Charge	Ending Balance
2591.24	1946.93	1956.43	0.00	2581.72

Credits	Description	Date	Amount
	DEPOSIT	01/05/02	26.90
	AUTO DEPOSIT	01/15/02	954.27
	AUTO DEPOSIT	01/30/02	954.27
	INTEREST	01/31/02	11.49
Total Credits			1946.93

Checks	Check No.	Date	Amount	Check No.	Date	Amount
	352	01/04/02	\$ 321.50	353	01/05/02	\$ 100.00
	354	01/10/02	\$ 122.30	355	01/11/02	\$ 59.95
	356	01/15/02	\$ 852.33	357	01/30/02	\$ 500.35
	358	01/15/02	\$ 852.33	359	01/30/02	\$ 500.35
	360	01/15/02	\$ 852.33	361	01/30/02	\$ 500.35
	362	01/15/02	\$ 852.33	363	01/30/02	\$ 500.35
	364	01/15/02	\$ 852.33	365	01/30/02	\$ 500.35
	366	01/15/02	\$ 852.33	367	01/30/02	\$ 500.35
	368	01/15/02	\$ 852.33	369	01/30/02	\$ 500.35
	370	01/15/02	\$ 852.33	371	01/30/02	\$ 500.35
	372	01/15/02	\$ 852.33	373	01/30/02	\$ 500.35
	374	01/15/02	\$ 852.33	375	01/30/02	\$ 500.35
	376	01/15/02	\$ 852.33	377	01/30/02	\$ 500.35
	378	01/15/02	\$ 852.33	379	01/30/02	\$ 500.35
	380	01/15/02	\$ 852.33	381	01/30/02	\$ 500.35
	382	01/15/02	\$ 852.33	383	01/30/02	\$ 500.35
	384	01/15/02	\$ 852.33	385	01/30/02	\$ 500.35
	386	01/15/02	\$ 852.33	387	01/30/02	\$ 500.35
	388	01/15/02	\$ 852.33	389	01/30/02	\$ 500.35
	390	01/15/02	\$ 852.33	391	01/30/02	\$ 500.35
	392	01/15/02	\$ 852.33	393	01/30/02	\$ 500.35
	394	01/15/02	\$ 852.33	395	01/30/02	\$ 500.35

Figure 58: Bank Statement (Page 1 of 2)

Big Brother Bank

"We watch over you"

P.O. Box 1573
Beantown, MA 02116

Account Number: 026-257311
Statement Begin Date: JAN 02, 2002
Statement End Date: FEB 01, 2002

Justin Case
123 Redlight Lane
TwistNshout, MA 02345

Checks	Check No.	Date	Amount	Check No.	Date	Amount
	396	01/15/02	\$ 852.33	397	01/30/02	\$ 500.35
	398	01/15/02	\$ 852.33	399	01/30/02	\$ 500.35
	400	01/15/02	\$ 852.33	401	01/30/02	\$ 500.35
	402	01/15/02	\$ 852.33	403	01/30/02	\$ 500.35
	404	01/15/02	\$ 852.33	405	01/30/02	\$ 500.35
	406	01/15/02	\$ 852.33	407	01/30/02	\$ 500.35
	408	01/15/02	\$ 852.33	409	01/30/02	\$ 500.35
	410	01/15/02	\$ 852.33	411	01/30/02	\$ 500.35
	412	01/15/02	\$ 852.33	413	01/30/02	\$ 500.35
	414	01/15/02	\$ 852.33	415	01/30/02	\$ 500.35
	416	01/15/02	\$ 852.33	417	01/30/02	\$ 500.35
	418	01/15/02	\$ 852.33	419	01/30/02	\$ 500.35
	Total Checks					1956 . 43

Daily Balances	Date	Balance	Date	Balance
	01/04/02	\$2269.74	01/05/02	\$2196.64
	01/10/02	\$2074.34	01/11/02	\$2014.39
	01/15/02	\$2016.33	01/30/02	\$2570.25
	Final Balance			\$2581 . 74

Interest Rate as of 01/04 * * * 5.321%

Figure 59: Bank Statement (Page 2 of 2)

Application Output (before PAGEDEF Processing)

Each layout record contains all information for a specified layout. Because of lack of space, only the first 80 bytes are shown here. The first 10 characters must contain the layout ID.

```
11111111112222222222333333333344444444445555555555666666666677777777778
1234567890123456789012345678901234567890123456789012345678901234567890
statmid 026-257311Justin Case 123 Redlight Lane Twistnshout MA 02345
statsum $2591.24 $1946.93 $1956.43 $0.00 $2581.72
pgenum
crheader
crdata DEPOSIT 01/05/02 $ 26.90
crdata AUTO DEPOSIT 01/15/02 $ 954.27
crdata AUTO DEPOSIT 01/30/02 $ 954.27
crdata INTEREST 01/31/02 $ 11.49
crtotal $1946.93
ckheader
ckdatal 352 01/04/02 $ 321.50
ckdatar 353 01/05/02 $ 100.00
ckdatal 354 01/10/02 $ 122.30
ckdatar 355 01/11/02 $ 59.95
ckdatal 356 01/15/02 $ 852.33
ckdatar 357 01/30/02 $ 500.35
ckdatal 358 01/15/02 $ 852.33
ckdatar 359 01/30/02 $ 500.35
ckdatal 360 01/15/02 $ 852.33
ckdatar 361 01/30/02 $ 500.35
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ckdatar 397 01/30/02 $ 500.35
ckdatal 398 01/15/02 $ 852.33
ckdatar 399 01/30/02 $ 500.35
ckdatal 400 01/15/02 $ 852.33
ckdatar 401 01/30/02 $ 500.35
ckdatal 402 01/15/02 $ 852.33
ckdatar 403 01/30/02 $ 500.35
ckdatal 404 01/15/02 $ 852.33
ckdatar 405 01/30/02 $ 500.35
ckdatal 406 01/15/02 $ 852.33
ckdatar 407 01/30/02 $ 500.35
ckdatal 408 01/15/02 $ 852.33
ckdatar 409 01/30/02 $ 500.35
ckdatal 410 01/15/02 $ 852.33
ckdatar 411 01/30/02 $ 500.35
ckdatal 412 01/15/02 $ 852.33
ckdatar 413 01/30/02 $ 500.35
ckdatal 414 01/15/02 $ 852.33
```

```

ckdatar 415 01/30/02 $ 500.35
ckdatal 416 01/15/02 $ 852.33
ckdatar 417 01/30/02 $ 500.35
ckdatal 418 01/15/02 $ 852.33
ckdatar 419 01/30/02 $ 500.35
ckttotal
balhead
baldatal 01/04/02 $2269.74
baldata 01/05/02 $2196.64
baldatal 01/10/02 $2074.34
baldata 01/11/02 $2014.39
baldatal 01/15/02 $2016.33
baldata 01/30/02 $2570.25
baltotal
statrail

```

PPFA Commands

```

PAGEDEF justin replace yes
      WIDTH 8.5 in
      HEIGHT 11.0 in;
FONT comp a075nc ; /*Big Brother Bank font */
FONT ital a175dc ; /*Italic theme */
FONT addr a075dc ; /*Big Brother address */
FONT varb gt10 ; /*Variable data */
FONT super a075dc ; /*Super Checking Account */
FONT head a055ac; /*Headings */
FONT bhead a075ac; /*Bold Headings */

PAGEFORMAT chub1 TOPMARGIN 2 in BOTMARGIN 2 in;
/*****
/** statmid BODY **/
*****/
LAYOUT C'statmid' PAGEHEADER NEWPAGE
      POSITION .6 in ABSOLUTE .55 in;
      FIELD TEXT C'Big Brother Bank' ALIGN LEFT
      FONT comp ; /* default to LAYOUT positioning*/
      FIELD TEXT C'"We watch over you"' ALIGN LEFT
      POSITION 0 NEXT
      FONT ital ; /*default to next line */
      FIELD TEXT C'P.O. Box 1573' ALIGN LEFT
      POSITION 0 NEXT
      FONT addr ; /*default to next line */
      FIELD TEXT C'Beantown, MA 02116' ALIGN LEFT
      POSITION 0 NEXT
      FONT addr ; /*default to next line */
      FIELD TEXT C'Account Number:' ALIGN LEFT
      POSITION 4.3 in .2 in
      FONT head ; /*New area on right */
      FIELD TEXT C'Statement Begin Date:' ALIGN LEFT
      POSITION 4.3 in NEXT
      FONT head ; /*New area on right */
      FIELD TEXT C'Statement End Date:' ALIGN LEFT
      POSITION 4.3 in NEXT
      FONT head ; /*New area on right */
      FIELD START 1 LENGTH 10 ALIGN RIGHT
      POSITION 7.5 in .2 in
      FONT varb ; /*variable - account number*/
      FIELD START 75 LENGTH 12
      POSITION 7.5 in NEXT
      ALIGN RIGHT /* data is missing from example */
      FONT varb ; /*variable - begin date */
      FIELD START 88 LENGTH 12
      POSITION 7.5 in NEXT
      ALIGN RIGHT /* data is missing from example */
      FONT varb ; /*variable - end date */
      FIELD START 11 LENGTH 19 ALIGN LEFT
      POSITION 1.1 in .9 in
      FONT varb ; /*variable - customer name */
      FIELD START 30 LENGTH 19 ALIGN LEFT
      POSITION 1.1 in NEXT
      FONT varb ; /*variable - customer address */
      FIELD START 49 LENGTH 22 ALIGN LEFT
      POSITION 1.1 in NEXT
      FONT varb ; /*variable - customer city, st. */

/*****
/** statsum BODY **/
*****/
LAYOUT C'statsum' BODY

```

```

        POSITION .6 in .5 in;
FIELD TEXT C'Super Checking Account Activity'
FONT super ; /* Static text - Super Checking */
DRAWGRAPHIC LINE ACROSS 7.5 IN LINEWT BOLD
        POSITION 0 .15 in
        copy down 2 spaced 1 mm;
FIELD TEXT C'Beginning Balance'
        POSITION .3 in .4 in
        FONT head ; /* Static text - first header */
FIELD TEXT C'Credits'
        POSITION 2.4 in CURRENT
        FONT head ; /* Static text - first header */
FIELD TEXT C'Debits'
        POSITION 3.6 in CURRENT
        FONT head ; /* Static text - first header */
FIELD TEXT C'Service Charge'
        POSITION 4.8 in CURRENT
        FONT head ; /* Static text - first header */
FIELD TEXT C'Ending Balance'
        POSITION 6.3 in CURRENT
        FONT head ; /* Static text - first header */
FIELD START 1 LENGTH 8
        POSITION .6 in .6 in
        FONT varb ; /* Variable text - Beg balance */
FIELD START 10 LENGTH 8
        POSITION 2.2 in CURRENT
        FONT varb ; /* Variable text - Credits */
FIELD START 20 LENGTH 8
        POSITION 3.4 in CURRENT
        FONT varb ; /* Variable text - Debits */
FIELD START 30 LENGTH 5
        POSITION 5.0 in CURRENT
        FONT varb ; /* Variable text - Service Chrg */
FIELD START 40 LENGTH 8
        POSITION 6.5 in CURRENT
        FONT varb ; /* Variable text - End Balance */
DRAWGRAPHIC LINE ACROSS 7.5 IN LINEWT BOLD
        POSITION 0 .7 in;

/*****/
/** crheader GROUPHEADER **/
/*****/
LAYOUT C'crheader' GRPHEADER XSPACE .2 in
        POSITION SAME .9 in;
FIELD TEXT C'Credits'
        FONT bhead ; /* Static text - Credits */
FIELD TEXT C'Description'
        POSITION 1.3 in CURRENT
        FONT head ; /* Stat text - Deposit Descr. */
FIELD TEXT C'Date'
        POSITION 3.2 in CURRENT
        FONT head ; /* Static text - Date */
FIELD TEXT C'Amount'
        POSITION 5.0 in CURRENT
        FONT head ; /* Stat text - Amount of deposit*/
DRAWGRAPHIC LINE ACROSS 6.2 IN LINEWT BOLD
        POSITION 1.3 in next;

/*****/
/** crdata BODY **/
/*****/
LAYOUT C'crdata' BODY GROUP;
FIELD START 1 LENGTH 13
        POSITION 1.3 in CURRENT
        FONT varb ; /* Variable text - Description */
FIELD START 14 LENGTH 8
        POSITION 3 in CURRENT
        FONT varb ; /* Variable text - Date */
FIELD START 24 LENGTH 8 ALIGN RIGHT
        POSITION 5.6 in CURRENT
        FONT varb ; /* Variable text - Amount */

/*****/
/** crttotal BODY **/
/*****/
LAYOUT C'crttotal' BODY GROUP;
FIELD TEXT C'Total Credits'
        POSITION 1.5 in .2 in
        FONT bhead ; /* Stat text - Total credits */
FIELD START 24 LENGTH 8 ALIGN RIGHT
        POSITION 7.3 in CURRENT
        FONT varb ; /* Variable text - Amount */

```

```

DRAWGRAPHIC LINE ACROSS 7.5 IN LINEWT BOLD
      POSITION 0 next;

/*****
/** ckheader GROUPHEADER **/
*****/
LAYOUT C'ckheader' GRPHEADER XSPACE .2 in
      POSITION SAME .6 in;
FIELD TEXT C'Checks'
      FONT bhead ; /* Static text - Checks */
FIELD TEXT C'Check No.'
      POSITION 1.4 in CURRENT
      FONT head ; /* Stat text - Check number */
FIELD TEXT C'Date'
      POSITION 2.5 in CURRENT
      FONT head ; /* Stat text - Date of check */
FIELD TEXT C'Amount'
      POSITION 3.5 in CURRENT
      FONT head ; /* Static text - Amount of check*/
FIELD TEXT C'Check No.'
      POSITION 4.6 in CURRENT
      FONT head ; /* Stat text - Check number */
FIELD TEXT C'Date'
      POSITION 5.6 in CURRENT
      FONT head ; /* Stat text - Date of check */
FIELD TEXT C'Amount'
      POSITION 6.8 in CURRENT
      FONT head ; /* Static text - Amount of check*/
DRAWGRAPHIC LINE ACROSS 6.2 IN LINEWT BOLD
      POSITION 1.3 in next;
DRAWGRAPHIC LINE DOWN LINETYPE shortdash
      POSITION 4.5 in CPOS;

/*****
/** ckdatal BODY left side **/
*****/
LAYOUT C'ckdatal' BODY GROUP
      POSITION SAME NEXT;
FIELD START 2 LENGTH 3
      POSITION 1.4 in CURRENT
      FONT varb ; /* Variable text - Check number */
FIELD START 14 LENGTH 8
      POSITION 2.4 in CURRENT
      FONT varb ; /* Variable text - Date */
FIELD START 24 LENGTH 8 ALIGN RIGHT
      POSITION 4.4 in CURRENT
      FONT varb ; /* Variable text - Amount */

/*****
/** ckdatar BODY right side **/
*****/
LAYOUT C'ckdatar' BODY GROUP
      POSITION SAME SAME;
FIELD START 2 LENGTH 3
      POSITION 4.6 in CURRENT
      FONT varb ; /* Variable text - Check number */
FIELD START 14 LENGTH 8
      POSITION 5.6 in CURRENT
      FONT varb ; /* Variable text - Date */
FIELD START 24 LENGTH 8 ALIGN RIGHT
      POSITION 7.5 in CURRENT
      FONT varb ; /* Variable text - Amount */

/*****
/** cktotal BODY **/
*****/
LAYOUT C'cktotal' BODY GROUP;
ENDGRAPHIC LPOS; /*ends dashed line between checks */
FIELD TEXT C'Total Checks'
      POSITION 1.5 in .2 in
      FONT bhead ; /* Stat text - Total checks */
FIELD START 24 LENGTH 8 ALIGN RIGHT
      POSITION 7.3 in CURRENT
      FONT varb ; /* Variable text - Amount */
DRAWGRAPHIC LINE ACROSS 7.5 IN LINEWT BOLD
      POSITION 0 next;

/*****
/** balhead GROUPHEADER **/
*****/
LAYOUT C'balhead' GRPHEADER XSPACE .2 in
      POSITION SAME .6 in;

```



```

FIELD TEXT C'Daily'
      FONT bhead ; /* Static text - Daily Balance */
FIELD TEXT C'Date'
      POSITION 1.3 in CURRENT
      FONT head ;/* Stat text - Date of balance */
FIELD TEXT C'Balance'
      POSITION 2.8 in CURRENT
      FONT head ;/* Static text - Balance */
FIELD TEXT C'Date'
      POSITION 4.3 in CURRENT
      FONT head ; / Stat text - Date of balance */
FIELD TEXT C'Balance'
      POSITION 5.8 in CURRENT
      FONT head ; /*Static text - Balance */
FIELD TEXT C'Balances'
      POSITION 0 NEXT
      FONT bhead ; /*Static text - Daily Balance */
DRAWGRAPHIC LINE ACROSS 6.2 IN LINEWT BOLD
      POSITION 1.3 in CPOS;

/*****/
/** baldata1 BODY left side **/
/*****/
LAYOUT C'baldata1' BODY GROUP
      POSITION SAME NEXT;
FIELD START 14 LENGTH 8
      POSITION 1.3 in CURRENT
      FONT varb ; /* Variable text - Date */
FIELD START 24 LENGTH 8 ALIGN RIGHT
      POSITION 3.6 in CURRENT
      FONT varb ; /* Variable text - Amount */

/*****/
/** baldatar BODY right side **/
/*****/
LAYOUT C'baldatar' BODY GROUP
      POSITION SAME SAME;
FIELD START 14 LENGTH 8
      POSITION 4.3 in CURRENT
      FONT varb ; /* Variable text - Date */
FIELD START 24 LENGTH 8 ALIGN RIGHT
      POSITION 6.6 in CURRENT
      FONT varb ; /* Variable text - Amount */

/*****/
/** baltotal BODY **/
/*****/
LAYOUT C'baltotal' BODY GROUP;
FIELD TEXT C'Final Balance'
      POSITION 1.5 in .2 in
      FONT bhead ; /* Stat text - Final balance */
FIELD START 24 LENGTH 8 ALIGN RIGHT
      POSITION 7.3 IN CURRENT
      FONT varb ; /* Variable text - Amount */

/*****/
/** statrail BODY **/
/*****/
LAYOUT C'strail' BODY
      POSITION SAME .4 in;
DRAWGRAPHIC LINE ACROSS 7.5 IN LINEWT BOLD
      POSITION 0 CPOS;
FIELD TEXT C'Interest Rate '
      POSITION 2.0 in NEXT
      FONT bhead ; /* Static text - Interest rate */
FIELD TEXT C'As of 01/04 * * * 5.321%'
      POSITION CURRENT CURRENT
      FONT varb ; /* Static text */
DRAWGRAPHIC LINE ACROSS 7.5 IN LINEWT BOLD
      POSITION 0 NEXT
      copy down 2 spaced 1 mm;

/*****/
/** pgenum PAGE NUMBER **/
/*****/
LAYOUT C'pgenum' PAGETRAILER
      POSITION SAME ABSOLUTE 10.7 in;
FIELD TEXT C 'Page '
      POSITION 6.5 in CURRENT
      FONT varb; /* placement of page number */
FIELD PAGENUM PRINT RESET 1 /* request page numbering*/

```

```
FONT varb /* placement of page number */
POSITION CURRENT CURRENT;
```

Example 2 - Statement that Uses Repeated and Unended Boxes

Figure 60 on page 78 shows the printed output for a statement that uses the repeated box option, a single circle and some unended boxes during PAGEDEF processing. “Application Output (before PAGEDEF Processing)” on page 78 and “PPFA Commands” on page 78 show the user data and the PPFA commands that create the printed output.

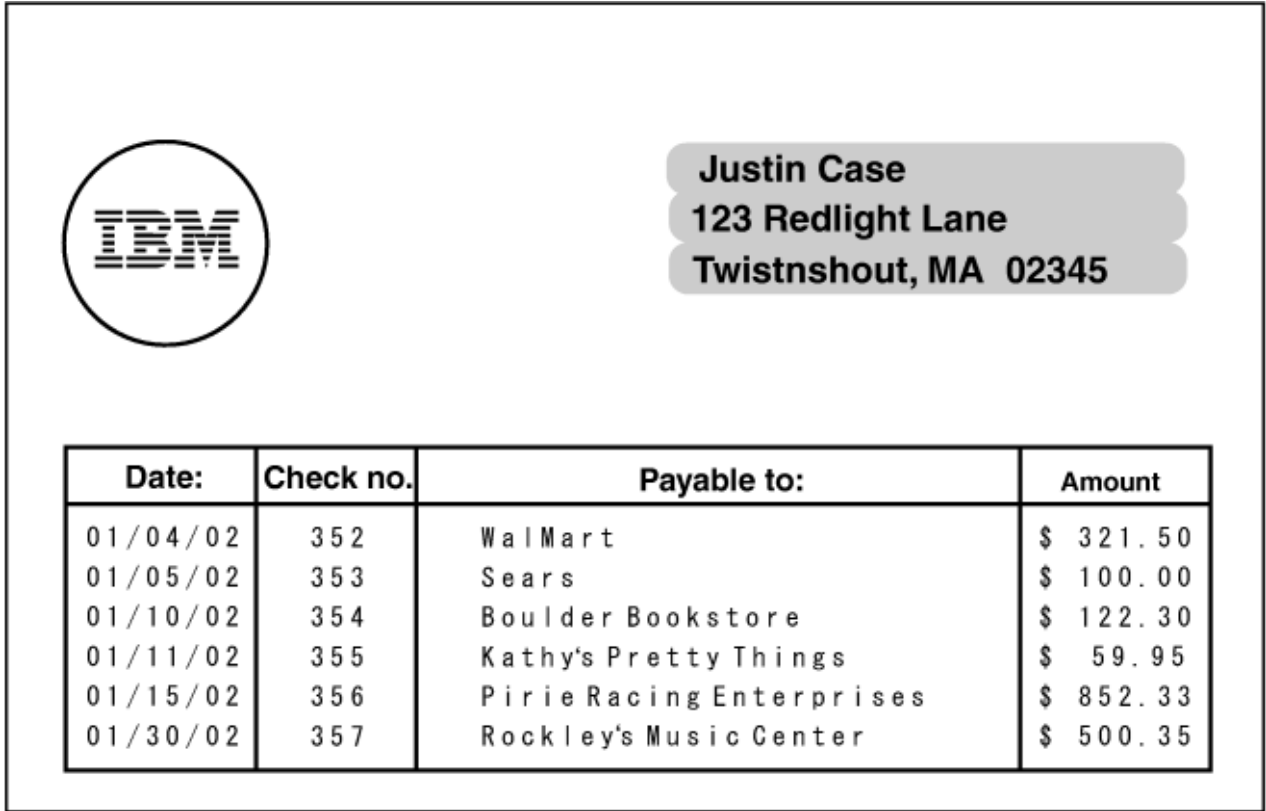


Figure 60: Statement that Uses the Repeating Box Option

Application Output (before PAGEDEF Processing)

```
11111111112222222222333333333344444444445555555555666666666677
1234567890123456789012345678901234567890123456789012345678901
statmid Justin Case 123 Redlight Lane Twistnshout MA 02345
ckheader
ckdata 352 01/04/02 $ 321.50 WalMart
ckdata 353 01/05/02 $ 100.00 Sears
ckdata 354 01/10/02 $ 122.30 Boulder Bookstore
ckdata 355 01/11/02 $ 59.95 Kathy's Pretty Things
ckdata 356 01/15/02 $ 852.33 Pirie Racing Enterprises
ckdata 357 01/30/02 $ 500.35 Rockley's Music Center
ckend
```

PPFA Commands

```
PAGEDEF rept1 replace yes;
FONT addr a075dc ; /*customer address */
FONT varb gt10 ; /*Variable data */
FONT bhead a075ac; /*Bold Headings */
SETUNITS LINESP .25 in ; /* Line spacing */

PAGEFORMAT rept1 BOTMARGIN 2 in;
SEGMENT ibmlog; /*IBM logo */
```

```

/*****/
/** statmid PAGEHEADER **/
/*****/
LAYOUT C'statmid'
  SEGMENT ibmlog 1.15 in 1.35 in
  PAGEHEADER NEWPAGE
  POSITION SAME ABSOLUTE NEXT;
  DRAWGRAPHIC CIRCLE RADIUS .5 in /* 1 inch circle */
  POSITION 1.5 in 1.5 in;
  DRAWGRAPHIC BOX BOXSIZE 2.6 IN .25 IN ROUNDED LARGE
  LINEWT 0 /* invisible border */
  POSITION 4 IN 1 IN
  COPY DOWN 2 SPACED 0
  FILL ALL DOT02;
  FIELD START 2 LENGTH 19 ALIGN LEFT
  POSITION 4.2 in 1.2 in
  FONT addr ; /*variable - customer name */
  FIELD START 21 LENGTH 19 ALIGN LEFT
  POSITION 4.2 in NEXT
  FONT addr ; /*variable - customer address */
  FIELD START 40 LENGTH 22 ALIGN LEFT
  POSITION 4.2 in NEXT
  FONT addr ; /*variable - customer city, st. */
/*****/
/** ckheader GROUPHEADER **/
/*****/
LAYOUT C'ckheader' GRPHEADER XSPACE .25 in
  POSITION 1 in ABSOLUTE 2.5 in; /* set position */
  DRAWGRAPHIC BOX BOXSIZE .95 IN .3 IN
  POSITION 0 0;
  DRAWGRAPHIC BOX BOXSIZE .95 IN /* box started for data */
  POSITION 0 .3 in; /* no vertical size */
  FIELD TEXT C'Date'
  POSITION .3 in .2 in
  FONT bhead ; /* Stat text - Date of check */
  DRAWGRAPHIC BOX BOXSIZE .8 IN .3 IN
  POSITION .95 IN 0;
  DRAWGRAPHIC BOX BOXSIZE .8 IN /* box started for data */
  POSITION .95 in .3 in; /* no vertical size */
  FIELD TEXT C'Check No.'
  POSITION 1 in .2 in
  FONT bhead ; /* Stat text - Check number */
  DRAWGRAPHIC BOX BOXSIZE 3 IN .3 IN
  POSITION 1.75 IN 0;
  DRAWGRAPHIC BOX BOXSIZE 3 IN /* box started for data */
  POSITION 1.75 in .3 in; /* no vertical size */
  FIELD TEXT C'Payable to:'
  POSITION 2.9 in .2 in
  FONT bhead ; /* Static text - Payable to: */
  DRAWGRAPHIC BOX BOXSIZE .95 IN .3 IN
  POSITION 4.75 IN 0 in;
  DRAWGRAPHIC BOX BOXSIZE .95 in /* box started for data */
  POSITION 4.75 in .3 in; /* no vertical size */
  FIELD TEXT C'Amount'
  POSITION 5 in .2 in
  FONT bhead ; /* Stat text - Amount of check */
/*****/
/** ckdata BODY w/ un-ended boxes **/
/*****/
LAYOUT C'ckdata' BODY GROUP;
  FIELD START 2 LENGTH 3 ALIGN LEFT
  POSITION 1.2 in CURRENT
  FONT varb ; /* Variable text - Check number */
  FIELD START 14 LENGTH 8 ALIGN LEFT
  POSITION .1 in CURRENT
  FONT varb ; /* Variable text - Date */
  FIELD START 35 LENGTH 25 ALIGN LEFT
  POSITION 2.0 in CURRENT
  FONT varb ; /* Variable text - Payable to: */
  FIELD START 24 LENGTH 8 ALIGN RIGHT
  POSITION 5.6 in CURRENT
  FONT varb ; /* Variable text - Amount */
/*****/
/** ckend BODY to end boxes **/
/*****/
LAYOUT C'ckend' BODY GROUP; /* If this layout and command are */
  ENDGRAPHIC LPOS; /* not issued, the boxes should be */
/* closed anyway. But if there was */
/* a trailer, they may not end in */
/* the right place. */

```

XML Page Definition Formatting Function

The XML page definition formatting function allows an application to specify formatting instructions for XML data by specifying an XLAYOUT command with specific formatting instructions for the data. The XLAYOUT command addresses an XML data item by specifying a QTAG (qualified tag) for that data. A QTAG is a series of XML start tags that fully identify the XML data item. For example, in [Figure 61 on page 82](#), for your customer's first name, the QTAG would be `Customer`, `name`, and `first`. To define a local name of `first` for easy reference, you can use the following DEFINE command:

```
DEFINE first QTAG 'Customer','name','first';
```

You can then reference it with the following XLAYOUT command by using the defined local name of `first`:

```
XLAYOUT first POSITION ...;
```

Before it prints the data, PSF scans the XML data item and matches it to an XLAYOUT command in the page definition by using its QTAG. The matching XLAYOUT command in the page definition is used to position and format the associated XML data item and its attributes on the printed page.

The XML page definition function has the following new PPFA concepts:

Relative Inline Positioning:

Relative inline positioning places data relative to the current position. If you position a text field and then place the text, the end of the text becomes the new current position. Graphics, bar codes, objects, segments, and overlays do not change the current position after they are originally positioned. For example, if you position a line with a DRAWGRAPHIC LINE command, the new current position is the starting point of that line. The length of the graphic line does not change the current position.

Be aware of several restrictions when you are using relative inline positioning:

1. XLAYOUT commands with relative positioning cannot contain any of these:
 - FIELD commands with inline positioning relative to the XLAYOUT (LPOS)
 - FIELD ATTR (attribute) with inline positioning relative to the XLAYOUT (LPOS)
 - FIELD commands with bar codes
 - DRAWGRAPHIC commands
 - OBJECT subcommands
 - SEGMENT subcommands
 - OVERLAY subcommands
2. You can use the SAME parameter for inline positioning on the XLAYOUT command only when the previously used XLAYOUT command used absolute inline positioning.

Absolute Inline Positioning:

Allows absolute inline positioning on a FIELD command for specific placement of elements.

Attributes are Special FIELDS:

The attribute is identified by name and the data that is printed is from the attribute value or a portion of the attribute value and not from the element content.

Notes:

1. If a FIELD is used for presenting any piece of data on the XLAYOUT command, FIELD commands must be used for all pieces of data that is presented on the XLAYOUT command. Because an attribute is a special field, if you want to print both an attribute value and the element data, you need to code the attribute field for the attribute value and a regular field for the element data.
2. PSF suppresses leading and trailing blanks (X'40' for EBCDIC or X'20' for ASCII) in the data. Multiple embedded blanks are reduced to one blank.

POSITION Subcommand

The POSITION subcommand on each XLAYOUT command specifies the starting layout position in the printout. The POSITION subcommand on the FIELD command specifies a field position relative to the governing XLAYOUT position.

Relative Baseline Position

See the *Advanced Function Presentation: Programming Guide and Line Data Reference* for more detailed information on RCD and XMD processing.

The baseline position corresponds to the y-pos position in PPFA and the inline position corresponds to the x-pos position.

If the baseline position is relative, the offset is measured as follows:

- For Page Header, the offset is relative to the top of the page.
- For Page Trailer, it is relative to the last Record processed; if none exists, it is relative to the top margin.
- For Group Header and Body, the offset is relative to the last Group Header or Body processed; if none exists, it is relative to the top margin.
- For Field, it is relative to the last Field or Body that was processed for print (whether or not data is printed).

The inline position is not changed in the case where no data exists to print.

For example:

```
XLAYOUT text1
      POSITION 6 mm 8 mm;
      FIELD ATTR 'attr1' FONT FONT03;
      FIELD ATTR 'attr2' FONT FONT03 POSITION 20 mm 5 mm;
      FIELD ATTR 'attr3' FONT FONT03;

attr1 = abcdefg
attr2 = W
attr3 = hjkmnp
```

The output is:

```
abcdefg
           Whjkmnp
```

In the output, W is positioned at 6+20 mm across and 8+5 mm down and hjkmnp is positioned next to W. Because no POSITION is specified for FIELD for attr3, its starting point is the current position after attr2 is printed.

If attr2 has no value:

```
attr1 = abcdefg
attr2 =
attr3 = hjkmnp
```

The output is:

```
abcdefg
      hjkmnp
```

In the output, hjkmnp is positioned next to abcdefg but underneath, down 5 mm. Because no POSITION is specified for FIELD for attr3, its starting point is the current position after attr2 is printed. When no data exists for attr2, the x position does not change from where it ended with attr1, but the y position moves down 5 mm.

XML Data Element Example

An application can group XML data elements to be formatted together as an entity by grouping those elements hierarchically under a collection XML data element. The data order normally does not matter in formatting the data elements unless the elements are to be placed relative to each other in the inline direction. Any elements to be placed inline relative to each other must be ordered in inline presentation order. Use the XLAYOUT/FIELD commands to place the data on the presentation device. [Figure 61 on page 82](#) is an example of a bank customer with the name and address fields that are placed together:

```
<Customer>
  <name>
    <title>Dr.</title>
    <first>Kelly</first>
    <last>Green</last>
  </name>
  <address>
    <strno>1911</strno>
    <street>Colt Lane</street>
    <city>Longmont</city>
    <state>CO</state>
    <zip>80501</zip>
  </address>
</Customer>
```

Figure 61: XML Data Elements

The example in [Figure 61 on page 82](#) results in the following printed output:

```
Dr. Kelly Green
1911 Colt Lane
Longmont, CO 80501
```

The page definition that is used to create the output is as follows:

```
PAGEDEF xmp101 UDTYPE ebcdic REPLACE yes;
/*-----*/
/* Font definitions:
/*-----*/
FONT E21H0C TYPE EBCDIC;

/*-----*/
/* Use QTAG definitions to define short alias names */
/* that make coding the XLAYOUTs easier. Do the */
/* messy work here, allowing us to code on the XLAYOUT: */
/* XLAYOUT zip ... */
/* instead of: */
/* XLAYOUT QTAG 'Customer','address','zip' ... */
/*-----*/
Define cust QTAG 'Customer' ;
Define title QTAG 'Customer','name','title';
Define first QTAG 'Customer','name','first';
Define last QTAG 'Customer','name','last';
Define strno QTAG 'Customer','address','strno';
Define street QTAG 'Customer','address','street';
Define city QTAG 'Customer','address','city';
Define state QTAG 'Customer','address','state';
Define zip QTAG 'Customer','address','zip';

/*-----*/
/* Print first line "Dr. Kelly Green" */
/* NOTE:-The "collector" Customer starts a new page */
/* -RELATIVE 0 is not the same as SAME */
/* -RELATIVE 0.167 is equivalent to a 6 CPI space */
/* along with FIELD TEXT, giving us 2 ways to */
/* leave a space. */
/* -Watch out for the POSITION defaults on XLAYOUT */
/* and FIELDS */
/*-----*/
XLAYOUT cust NEWPAGE;
XLAYOUT title POSITION ABSOLUTE 1 in ABSOLUTE 1 in;
XLAYOUT first POSITION RELATIVE 0 in RELATIVE 0;
FIELD TEXT';
FIELD START 1 LENGTH *;
XLAYOUT last POSITION RELATIVE 0.167 in RELATIVE 0;
```

```

/*-----*/
/* Print second line "1911 Colt Lane"          */
/*-----*/
XLAYOUT strno POSITION ABSOLUTE 1 in NEXT;
XLAYOUT street POSITION RELATIVE 0 RELATIVE 0;
FIELD TEXT'';
FIELD START 1 LENGTH *;

/*-----*/
/* Print third line "Longmont, CO 80501"      */
/*-----*/
XLAYOUT city POSITION ABSOLUTE 1 in NEXT;
XLAYOUT state POSITION RELATIVE 0 RELATIVE 0;
FIELD TEXT',';
FIELD START 1 LENGTH 2; /*just the abbreviation*/
XLAYOUT zip POSITION RELATIVE 0 RELATIVE 0;
FIELD TEXT'';
FIELD START 1 LENGTH *;

```

In [Figure 61 on page 82](#), the XML data items `Dr .`, `Kelly`, and `Green` are printed relative to each other by using *relative inline positioning*. This positioning can be done only because the data appears in the following order: the title, `Dr .` is first; the first name, `Kelly` is next; and the last name, `Green` is last. However, if you wanted to use this data, and change the order of the names to print the last name followed by the first name, you must position the names by using *absolute inline positioning* because the data cannot be reordered with *relative inline positioning*.

XML Data Format Example

XML allows the same data to be used for multiple presentation media. In [Figure 62 on page 84](#) - [Figure 66 on page 88](#) XML data file is shown formatted for printing with PPFA's XML support.

```

<?xml version="1.0" ?>
<?xml:stylesheet type="text/xsl" href=bbbank.xsl"?>
<!-- -->
<!-- Data for XML Example -->
<!-- -->
<document>
<bankstatement>
  <customer>
    <acctno>026-257311</acctno>
    <name>Justin Case</name>
    <street>123 Redlight Lane</street>
    <cityst>Twistnshout, MA 02345</cityst>
  </customer>
  <begindate>JAN 02, 2002</begindate>
  <enddate>FEB 01, 2002</enddate>
  <!-- -->
  <!-- Page number generator -->
  <!-- -->
  <pagenumber>
  <!-- -->
  <!-- New account type = Super Checking Account -->
  <!-- -->
  <supercheckingactivity type="superchk">
    <balance>
      <begin>2591.24</begin>
      <credit>1946.93</credit>
      <debit>1956.43</debit>
      <svchg>0.00</svchg>
      <end>0.00</end>
    </balance>
    <!-- -->
    <!-- Credit -->
    <!-- -->
    <credits>
      <transaction>
        <type>DEPOSIT</type>
        <date>01/05/2002</date>
        <amt> 26.90</amt>
      </transaction>
      <transaction>
        <type>AUTO DEPOSIT</type>
        <date>01/05/2002</date>
        <amt> 954.27</amt>
      </transaction>
      <transaction>
        <type>AUTO DEPOSIT</type>
        <date>01/30/2002</date>
        <amt> 954.27</amt>
      </transaction>
    </credits>
  </supercheckingactivity>
</bankstatement>
</document>

```

Figure 62: XML Data File (Part 1 of 5)


```

<transaction>
  <type>INTEREST</type>
  <date>01/31/2002</date>
  <amt> 11.49</amt>
</transaction>
<total>
</credits>
<!-- -->
<!-- Checks -->
<!-- -->
<checks>
  <transaction>
    <chkno>352</chkno>
    <date>01/04/2002</date>
    <amt> 321.50</amt>
  <transaction>
  <transaction>
    <chkno>353</chkno>
    <date>01/05/2002</date>
    <amt> 100.00</amt>
  <transaction>
  <transaction>
    <chkno>354</chkno>
    <date>01/10/2002</date>
    <amt> 122.30</amt>
  <transaction>
  <transaction>
    <chkno>355</chkno>
    <date>01/11/2002</date>
    <amt> 59.95</amt>
  <transaction>
  <transaction>
    <chkno>356</chkno>
    <date>01/15/2002</date>
    <amt> 852.33</amt>
  <transaction>
  <transaction>
    <chkno>357</chkno>
    <date>01/30/2002</date>
    <amt> 500.35</amt>
  <transaction>
</checks>
<!-- -->
<!-- Daily Balances -->
<!-- -->
<balances>
  <baldata>
    <date>01/04/2002</date>
    <bal>2269.74</bal>
  </baldata>
  <baldata>
    <date>01/05/2002</date>
    <bal>2196.64</bal>
  </baldata>
  <baldata>
    <date>01/10/2002</date>
    <bal>2074.34</bal>
  </baldata>
  <baldata>
    <date>01/11/2002</date>
    <bal>2014.39</bal>
  </baldata>

```

Figure 63: XML Data File (Part 2 of 5)

```

<baldata>
  <date>01/15/2002</date>
  <bal> 852.33</bal>
</baldata>
<baldata>
  <date>01/30/2002</date>
  <bal> 500.35</bal>
</baldata>
<total>2581.74</total>
</balances>
<!-- -->
<!-- Statement trailer generator -->
<!-- -->
  <stmtrailer/>
</superbankingactivity>
</bankstatement>
<bankstatement>
  <customer>
    <acctno>887-278342</acctno>
    <name>Anna Merkin</name>
    <street>123 Chantilly Lane</street>
    <cityst>Long Neck Goose, VA 21177</cityst>
  </customer>
  <begindate>JAN 02, 2002</begindate>
  <enddate>FEB 01, 2002</enddate>
  <!-- -->
  <!-- Page number generator -->
  <!-- -->
  <pagenumber>
  <!-- -->
  <!-- New account type = Super Checking Account -->
  <!-- -->
  <supercheckingactivity="suprchk">
    <balance>
      <begin>3722.23</begin>
      <credit>2084.58</credit>
      <debit>1908.94</debit>
      <svchg>0.00</svchg>
      <end>3897.87</end>
    </balance>
  <!-- -->
  <!-- Credits -->
  <!-- -->
  <credits>
    <transaction>
      <type>DEPOSIT</type>
      <date>01/11/2002</date>
      <amt> 17.37</amt>
    </transaction>
    <transaction>
      <type>AUTO DEPOSIT</type>
      <date>01/15/2002</date>
      <amt>1029.81</amt>
    </transaction>
    <transaction>
      <type>AUTO DEPOSIT</type>
      <date>01/30/2002</date>
      <amt>1029.81</amt>
    </transaction>
  </credits>

```

Figure 64: XML Data File (Part 3 of 5)

```

<transaction>
  <type>INTEREST</type>
  <date>01/31/2002</date>
  <amt> 7.59</amt>
</transaction>
<total>2084.58</total>
</credits>
<!-- -->
<!-- Checks -->
<!-- -->
<checks>
  <transaction>
    <chkno>759</chkno>
    <date>01/03/2002</date>
    <amt> 144.00</amt>
  </transaction>
  <transaction>
    <chkno>760</chkno>
    <date>01/04/2002</date>
    <amt> 93.11</amt>
  </transaction>
  <transaction>
    <chkno>761</chkno>
    <date>01/09/2002</date>
    <amt> 322.72</amt>
  </transaction>
  <transaction>
    <chkno>762</chkno>
    <date>01/11/2002</date>
    <amt> 102.43</amt>
  </transaction>
  <transaction>
    <chkno>763</chkno>
    <date>01/17/2002</date>
    <amt> 794.46</amt>
  </transaction>
  <transaction>
    <chkno>764</chkno>
    <date>01/29/2002</date>
    <amt> 452.22</amt>
  </transaction>
</checks>

```

Figure 65: XML Data File (Part 4 of 5)

```

<!-- -->
<!-- Daily Balances -->
<!-- -->
  <balances>
    <baldata>
      <date>01/04/2002</date>
      <bal>3722.23</bal>
    </baldata>
    <baldata>
      <date>01/05/2002</date>
      <bal>3629.12</bal>
    </baldata>
    <baldata>
      <date>01/10/2002</date>
      <bal>3306.40</bal>
    </baldata>
    <baldata>
      <date>01/11/2002</date>
      <bal>3221.34</bal>
    </baldata>
    <baldata>
      <date>01/15/2002</date>
      <bal>4251.15</bal>
    </baldata>
    <baldata>
      <date>01/30/2002</date>
      <bal>3897.87</bal>
    </baldata>
    <total>3897.87</total>
  </balances>
<!-- -->
<!-- Statement trailer generator -->
<!-- -->
  <stmttrailer>
</supercheckingactivity>
</bankstatement>
</document>

```

Figure 66: XML Data File (Part 5 of 5)

Figure 67 on page 89 - Figure 68 on page 90 shows the resulting printed output from the XML data in Figure 62 on page 84 - Figure 66 on page 88.

Big Brother Bank

"We watch over you"

P.O. Box 1573
Beantown, MA 02116

Account Number: 026-257311
Statement Begin Date: JAN 02, 2002
Statement End Date: FEB 01, 2002

Justin Case
123 Redlight Lane
TwistNshout, MA 02345

Super Checking Account Activity

Beginning Balance	Credits	Debits	Service Charge	Ending Balance
2591.24	1946.93	1956.43	0.00	2581.74
Credits	Description	Date	Amount	
	DEPOSIT	01/05/02	26.90	
	AUTO DEPOSIT	01/15/02	954.27	
	AUTO DEPOSIT	01/30/02	954.27	
	INTEREST	01/31/02	11.49	
	Total Credits			1946.93
Checks	Check No.	Date	Amount	
	352	01/04/02	321.50	
	353	01/05/02	100.00	
	354	01/10/02	122.30	
	355	01/11/02	59.95	
	356	01/15/02	852.33	
	357	01/30/02	500.35	
	Total Checks			1956.43
Daily Balances	Date	Balance		
	01/04/02	2269.74		
	01/05/02	2196.64		
	01/10/02	2074.34		
	01/11/02	2014.39		
	01/15/02	852.33		
	01/30/02	500.35		
	Final Balance			2581.74
Interest Rate as of 01/04 * * * 5.321%				

Figure 67: XML Data Printed Output (Part 1 of 2)

Big Brother Bank

"We watch over you"
P.O. Box 1573
Beantown, MA 02116

Account Number: 887-278342
Statement Begin Date: JAN 02, 2002
Statement End Date: FEB 01, 2002

Anna Merkin
123 Chantilly Lane
Long Neck Goose, VA 21177

Super Checking Account Activity

Beginning Balance	Credits	Debits	Service Charge	Ending Balance
3722.23	2084.58	1908.94	0.00	3897.87
Credits	Description	Date	Amount	
	DEPOSIT	01/11/02	17.37	
	AUTO DEPOSIT	01/15/02	1029.81	
	AUTO DEPOSIT	01/30/02	1029.81	
	INTEREST	01/31/02	7.59	
	Total Credits			2084.58
Checks	Check No.	Date	Amount	
	759	01/03/02	144.00	
	760	01/04/02	93.11	
	761	01/09/02	322.72	
	762	01/11/02	102.43	
	763	01/17/02	794.46	
	764	01/29/02	452.22	
	Total Checks			1908.94
Daily Balances	Date	Balance		
	01/04/02	3722.23		
	01/05/02	3629.12		
	01/10/02	3306.40		
	01/11/02	3221.34		
	01/15/02	4251.15		
	01/30/02	3897.87		
	Final Balance			3897.87
Interest Rate as of 01/04 * * * 5.321%				

Figure 68: XML Data Printed Output (Part 2 of 2)

The page definition that is used to create the output in [Figure 67 on page 89](#) - [Figure 68 on page 90](#) is shown in [Figure 69 on page 91](#) - [Figure 75 on page 97](#):

```

PAGEDEF bbbank replace yes
        WIDTH 8.5 in
        HEIGHT 11.0 in
        UDTYPE EBCDIC;
        FONT comp a075nc TYPE EBCDIC; /*Big Brother Bank font */
        FONT ital a175dc TYPE EBCDIC; /*Italic theme */
        FONT addr a075dc TYPE EBCDIC; /*Big Brother address */
        FONT varb gt10 TYPE EBCDIC; /*Variable data */
        FONT super a075dc TYPE EBCDIC; /*Super Checking Account */
        FONT head a055ac TYPE EBCDIC; /*Headings */
        FONT bhead a075ac TYPE EBCDIC; /*Bold Headings */
/*****
/** QTAG declarations **/
/*****
/*---- statmid declarations -----*/
DEFINE statmid QTAG C'document',
                  C'bankstatement',C'customer';
DEFINE acctno QTAG C'document',
                  C'bankstatement',C'customer',C'acctno';
DEFINE name QTAG C'document',
                C'bankstatement',C'customer',C'name';
DEFINE street QTAG C'document',
                  C'bankstatement',C'customer',C'street';
DEFINE cityst QTAG C'document',
                  C'bankstatement',C'customer',C'cityst';
DEFINE begindate QTAG C'document',
                    C'bankstatement',C'begindate';
DEFINE enddate QTAG C'document',
                   C'bankstatement',C'enddate';
/*---- statsum declarations -----*/
DEFINE statsum QTAG C'document',
                  C'bankstatement',C'supercheckingactivity',
                  C'balance';
DEFINE statsumf1 QTAG C'document',
                    C'bankstatement',C'supercheckingactivity',
                    C'balance', c'begin';
DEFINE statsumf2 QTAG C'document',
                    C'bankstatement',C'supercheckingactivity',
                    C'balance', c'credit';
DEFINE statsumf3 QTAG C'document',
                    C'bankstatement',C'supercheckingactivity',
                    C'balance', c'debit';
DEFINE statsumf4 QTAG C'document',
                    C'bankstatement',C'supercheckingactivity',
                    C'balance', c'svchg';
DEFINE statsumf5 QTAG C'document',
                    C'bankstatement',C'supercheckingactivity',
                    C'balance', c'end';
/*---- crdata declarations -----*/
DEFINE crheader QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'credits';
DEFINE crdata1 QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'credits',C'transaction',C'type';
DEFINE crdata2 QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'credits',C'transaction',C'date';

```

Figure 69: Page Definition for XML Output (Part 1 of 7)

```

DEFINE crdata3   QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'credits',C'transaction',C'amt' ;
DEFINE crttotal  QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'credits',C'total';
/*---- ckdata declarations -----*/
DEFINE ckheader  QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'checks' ;
DEFINE ckdata1   QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'checks',C'transaction',C'chkno' ;
DEFINE ckdata2   QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'checks',C'transaction',C'date' ;
DEFINE ckdata3   QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'checks',C'transaction',C'amt' ;
DEFINE ckttotal  QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'checks', C'total';
/*---- baldata declarations -----*/
DEFINE balhead   QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'balances';
DEFINE baldata1  QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'balances',C'baldata',C'date' ;
DEFINE baldata2  QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'balances',C'baldata',C'bal' ;
DEFINE baltotal  QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'balances', C'total';
/*---- misc. declarations -----*/
DEFINE statrail  QTAG C'document',
                   C'bankstatement',C'supercheckingactivity',
                   C'stmtrailer';
DEFINE pgenum    QTAG C'document',
                   C'bankstatement',C'pagenumber';
/*-----*/
/*---- end of QTAG declarations -----*/
/*-----*/
PAGEFORMAT xchub1  TOPMARGIN 2 in BOTMARGIN 1 in;
/*****
** statmid HEADER **
*****/
XLAYOUT statmid  PAGEHEADER NEWPAGE
                POSITION .6 in ABSOLUTE .55 in;
FIELD TEXT C'Big Brother Bank' ALIGN LEFT
                FONT comp ; /* default to LAYOUT positioning */
FIELD TEXT C'"We watch over you"' ALIGN LEFT
                POSITION 0 NEXT
                FONT ital ; /*default to next line */
FIELD TEXT C'P.O. Box 1573' ALIGN LEFT
                POSITION 0 NEXT
                FONT addr ; /*default to next line */

```

Figure 70: Page Definition for XML Output (Part 2 of 7)


```

FIELD TEXT C'Beantown, MA 02116' ALIGN LEFT
      POSITION 0 NEXT
      FONT addr ; /*default to next line */
FIELD TEXT C'Account Number:' ALIGN LEFT
      POSITION 4.3 in .2 in
      FONT head ; /*New area on right */
FIELD TEXT C'Statement Begin Date:' ALIGN LEFT
      POSITION 4.3 in NEXT
      FONT head ; /*New area on right */
FIELD TEXT C'Statement End Date:' ALIGN LEFT
      POSITION 4.3 in NEXT
      FONT head ; /*New area on right */
XLAYOUT acctno PAGEHEADER CONTINUE
      POSITION SAME SAME;
      FIELD START 1 LENGTH 10 ALIGN RIGHT
      POSITION 7.5 in .2 in
      FONT varb ;
XLAYOUT begindate PAGEHEADER CONTINUE
      POSITION SAME SAME;
      FIELD START 1 LENGTH 12
      POSITION 7.5 in .37 in
      ALIGN RIGHT
      FONT varb ;
XLAYOUT enddate PAGEHEADER CONTINUE
      POSITION SAME SAME;
      FIELD START 1 LENGTH 12
      POSITION 7.5 in .53 in
      ALIGN RIGHT
      FONT varb ;
XLAYOUT name PAGEHEADER CONTINUE
      POSITION SAME SAME;
      FIELD START 1 LENGTH 19 ALIGN LEFT
      POSITION 1.1 in .9 in
      FONT varb ;
XLAYOUT street PAGEHEADER CONTINUE
      POSITION SAME SAME;
      FIELD START 1 LENGTH 19 ALIGN LEFT
      POSITION 1.1 in 1.07 in
      FONT varb ;
XLAYOUT cityst PAGEHEADER CONTINUE
      POSITION SAME SAME;
      FIELD START 1 LENGTH 22 ALIGN LEFT
      POSITION 1.1 in 1.23 in
      FONT varb ;
/*****
/** statsum BODY **/
*****/
XLAYOUT statsum BODY
      POSITION .6 in .5 in;
FIELD TEXT C'Super Checking Account Activity'
      FONT super ; /* Static text - Super Checking */
DRAWGRAPHIC LINE ACROSS 7.5 IN LINEWT BOLD
      POSITION 0 .15 in
      copy down 2 spaced 1 mm;
FIELD TEXT C'Beginning Balance'
      POSITION .3 in .4 in
      FONT head ; /* Static text - first header */
FIELD TEXT C'Credits'
      POSITION 2.4 in CURRENT
      FONT head ; /* Static text - first header */

```

Figure 71: Page Definition for XML Output (Part 3 of 7)

```

FIELD TEXT C'Debits'
        POSITION 3.6 in CURRENT
        FONT head ; /* Static text - first header */
FIELD TEXT C'Service Charge'
        POSITION 4.8 in CURRENT
        FONT head ; /* Static text - first header */
FIELD TEXT C'Ending Balance'
        POSITION 6.3 in CURRENT
        FONT head ; /* Static text - first header */
XLAYOUT statsumf1 BODY
        POSITION SAME .6 in;
FIELD START 1 LENGTH 8
        POSITION .6 in CURRENT
        FONT varb ; /* Variable text - Beg balance */
XLAYOUT statsumf2 BODY
        POSITION SAME SAME;
FIELD START 1 LENGTH 8
        POSITION 2.2 in CURRENT
        FONT varb ; /* Variable text - Credits */
XLAYOUT statsumf3 BODY
        POSITION SAME SAME;
FIELD START 1 LENGTH 8
        POSITION 3.4 in CURRENT
        FONT varb ; /* Variable text - Debits */
XLAYOUT statsumf4 BODY
        POSITION SAME SAME;
FIELD START 1 LENGTH 5
        POSITION 5.0 in CURRENT
        FONT varb ; /* Variable text - Service Chrg */
XLAYOUT statsumf5 BODY
        POSITION SAME SAME;
FIELD START 1 LENGTH 8
        POSITION 6.5 in CURRENT
        FONT varb ; /* Variable text - End Balance */
DRAWGRAPHIC LINE ACROSS 7.5 IN LINEWT BOLD
        POSITION 0 .1 in;
/*****
/** crheader GROUPHEADER **/
*****
XLAYOUT crheader GRPHEADER XSPACE .2 in
        POSITION SAME .3 in;
FIELD TEXT C'Credits'
        FONT bhead ; /* Static text - Credits */
FIELD TEXT C'Description'
        POSITION 1.3 in CURRENT
        FONT head ; /* Stat text - Deposit Descr. */
FIELD TEXT C'Date'
        POSITION 3.2 in CURRENT
        FONT head ; /* Static text - Date */
FIELD TEXT C'Amount'
        POSITION 5.0 in CURRENT
        FONT head ; /* Stat text - Amount of deposit*/
DRAWGRAPHIC LINE ACROSS 6.2 IN LINEWT BOLD
        POSITION 1.3 in next;
/*****
/** crdata BODY **/
*****
XLAYOUT crdata1 BODY GROUP;
FIELD START 1 LENGTH 13
        POSITION 1.3 in CURRENT
        FONT varb ; /* Variable text - Description */

```

Figure 72: Page Definition for XML Output (Part 4 of 7)

```

X LAYOUT crdata2 BODY GROUP position same same;
  FIELD START 1 LENGTH 8
    POSITION 3 in CURRENT
    FONT varb ; /* Variable text - Date */
X LAYOUT crdata3 BODY GROUP position same same;
  FIELD START 1 LENGTH 8 ALIGN RIGHT
    POSITION 5.6 in CURRENT
    FONT varb ; /* Variable text - Amount */
/*****/
/** crttotal BODY **/
/*****/
X LAYOUT crttotal BODY GROUP;
  FIELD TEXT C'Total Credits'
    POSITION 1.5 in .2 in
    FONT bhead ; /* Stat text - Total credits */
  FIELD START 1 LENGTH 8 ALIGN RIGHT
    POSITION 7.3 in CURRENT
    FONT varb ; /* Variable text - Amount */
  DRAWGRAPHIC LINE ACROSS 7.5 IN LINEWT BOLD
    POSITION 0 next;
/*****/
/** ckheader GRPHEADER **/
/*****/
X LAYOUT ckheader GRPHEADER XSPACE .2 IN
  POSITION SAME .6 in;
  FIELD TEXT C'Checks'
    FONT bhead ; /* Static text - Checks */
  FIELD TEXT C'Check No.'
    POSITION 1.3 in CURRENT
    FONT head ; /* Stat text - Check number */
  FIELD TEXT C'Date'
    POSITION 3.2 in CURRENT
    FONT head ; /* Stat text - Date of check */
  FIELD TEXT C'Amount'
    POSITION 5.0 in CURRENT
    FONT head ; /* Static text - Amount of check*/
  DRAWGRAPHIC LINE ACROSS 6.2 IN LINEWT BOLD
    POSITION 1.3 in next;
/*****/
/** ckdata BODY **/
/*****/
X LAYOUT ckdata1 BODY GROUP
  POSITION SAME NEXT;
  FIELD START 1 LENGTH 3
    POSITION 1.5 in CURRENT
    FONT varb ; /* Variable text - Check number */
X LAYOUT ckdata2 BODY GROUP position same same;
  FIELD START 1 LENGTH 8
    POSITION 3.0 in CURRENT
    FONT varb ; /* Variable text - Date */
X LAYOUT ckdata3 BODY GROUP position same same;
  FIELD START 1 LENGTH 8 ALIGN RIGHT
    POSITION 5.6 in CURRENT
    FONT varb ; /* Variable text - Amount */
/*****/
/** ckttotal BODY **/
/*****/
X LAYOUT ckttotal BODY GROUP;
  FIELD TEXT C'Total Checks'
    POSITION 1.5 in .2 in
    FONT bhead ; /* Stat text - Total checks */

```

Figure 73: Page Definition for XML Output (Part 5 of 7)

```

FIELD START 1 LENGTH 8 ALIGN RIGHT
      POSITION 7.3 in CURRENT
      FONT varb ; /* Variable text - Amount */
DRAWGRAPHIC LINE ACROSS 7.5 IN LINEWT BOLD
      POSITION 0 next;
/*****/
/** balhead GROUPHEADER **/
/*****/
XLAYOUT balhead GRPHEADER XSPACE .2 in
      POSITION SAME .6 in;
FIELD TEXT C'Daily'
      FONT bhead ; /* Static text - Daily Balance */
FIELD TEXT C'Date'
      POSITION 1.3 in CURRENT
      FONT head ; /* Stat text - Date of balance */
FIELD TEXT C'Balance'
      POSITION 3.15 in CURRENT
      FONT head ; /* Static text - Balance */
FIELD TEXT C'Balances'
      POSITION 0 NEXT
      FONT bhead ; /* Static text - Daily Balance */
DRAWGRAPHIC LINE ACROSS 6.2 IN LINEWT BOLD
      POSITION 1.3 in CPOS;
/*****/
/** baldata BODY **/
/*****/
XLAYOUT baldata1 BODY GROUP
      POSITION SAME NEXT;
FIELD START 01 LENGTH 8
      POSITION 1.3 in CURRENT
      FONT varb ; /* Variable text - Date */
XLAYOUT baldata2 BODY GROUP position same same;
FIELD START 01 LENGTH 8 ALIGN RIGHT
      POSITION 3.8 in CURRENT
      FONT varb ; /* Variable text - Amount */
/*****/
/** baltotal BODY **/
/*****/
XLAYOUT baltotal BODY GROUP;
FIELD TEXT C'Final Balance'
      POSITION 1.5 in .2 in
      FONT bhead ; /* Stat text - Final balance */
FIELD START 1 LENGTH 8 ALIGN RIGHT
      POSITION 7.3 IN CURRENT
      FONT varb ; /* Variable text - Amount */
/*****/
/** statrail BODY **/
/*****/
XLAYOUT statrail BODY
      POSITION SAME .4 in;
DRAWGRAPHIC LINE ACROSS 7.5 IN LINEWT BOLD
      POSITION 0 CPOS;
FIELD TEXT C'Interest Rate '
      POSITION 2.0 in NEXT
      FONT bhead ; /* Static text - Interest rate */
FIELD TEXT C'As of 01/04 * * * 5.321%'
      POSITION CURRENT CURRENT
      FONT varb ; /* Static text */
DRAWGRAPHIC LINE ACROSS 7.5 IN LINEWT BOLD
      POSITION 0 NEXT
copy down 2 spaced 1 mm;

```

Figure 74: Page Definition for XML Output (Part 6 of 7)

```

/*****
/** pgenum PAGE NUMBER **/
*****/
XLAYOUT pgenum PAGETRAILER
        POSITION SAME ABSOLUTE 10.7 in;
FIELD TEXT C 'Page '
        POSITION 6.5 in CURRENT
        FONT varb; /* placement of page number */
FIELD PAGENUM PRINT /* request page numbering */
        FONT varb /* placement of page number */
        POSITION CURRENT CURRENT;

```

Figure 75: Page Definition for XML Output (Part 7 of 7)

Chapter 5. Creating Complex Printouts

You are now ready to learn about some formatting tasks that might apply to more complex printouts. You have learned in other chapters about the basic form definition and page definition elements. This chapter describes how these elements are combined to create complete print jobs.

The advanced techniques that are covered in this section are illustrated in the following examples:

Task	Example location
Combine field processing with an overlay.	“Combining Field Processing and an Electronic Overlay” on page 99
Suppress data.	“Using Suppressions to Vary Data Presentation” on page 101
Include fixed text.	“Incorporating Fixed Text into a Page Definition” on page 102
Combine two reports.	“Combining Two Reports into One Printout” on page 104

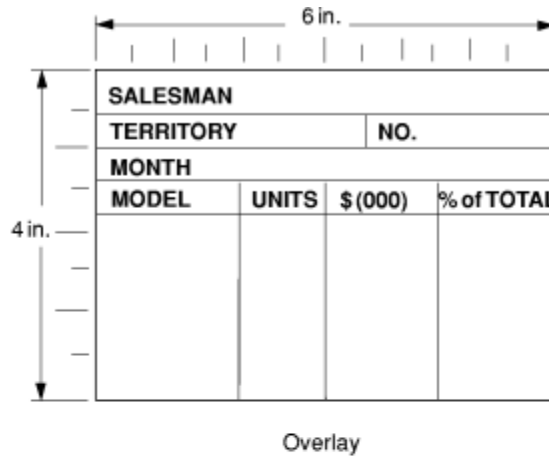
The examples in this chapter build on a single sales application, showing different sales reports being formatted by form definitions and page definitions.

Combining Field Processing and an Electronic Overlay

This example involves printing a monthly individual sales report for a specified distribution. The following items are needed to generate the sales report:

- A pre-designed electronic overlay for the sales report
- An unformatted print data file with periodic sales statistics

An example of the overlay and data file is shown in [Figure 76 on page 100](#).



	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	
R1	J	o	h	n	S	m	i	t	h													
R2	T	e	x	a	s				0	7	7	1	4									
R3	N	o	v	.																		
R4	S	i	e	r	r	a			1	2					5	9				6		
R6	O	t	e	r	o				1	6					7	0				1	0	
R6	A	g	u	a				6	0					1	0	4				1	5	
R7	A	l	l	e	g	r	e		7	1					2	6	5				4	0

Data File

Figure 76: Electronic Overlay and Data File for a Sales Report

The code example that follows contains a form definition and a page definition. The page definition maps the file to the overlay.

In Figure 76 on page 100, the 0,0 point is the upper-left corner of the overlay, which means that the logical page origin must coincide with the overlay origin in this example. POSITION subcommands are relative to the logical page origin. The overlay origin point that positions the overlay is specified in the Overlay Generation Language/370 that creates the overlay, but can be modified in the page definition. In mapping to an overlay, you must check the input to the overlay creation program so you can coordinate its origin with the logical page origin. You can reposition the overlay through the PRINTLINE command.

```

01 FORMDEF SLSRPT OFFSET 0 0 ;
02 OVERLAY SLSRPT ;
03 SUBGROUP OVERLAY SLSRPT ;
04
05 PAGEDEF SLSRPT ;
06 PRINTLINE POSITION 2 IN 1.3 IN ; /* RECORD 1 */
07 FIELD START 1 LENGTH 23 ;
08 PRINTLINE POSITION 2 IN 1.70 IN ; /* RECORD 2 */
09 FIELD START 1 LENGTH 9 ; /* DEFAULT POSITION */
10 FIELD START 10 LENGTH 5
11 POSITION 4.3 IN * ; /* THE ASTERISK MEANS */
12 /* CURRENT LINE */
13 PRINTLINE POSITION 1.5 IN 6 IN ; /* RECORD 3 */
14 FIELD START 1 LENGTH 4 ;
15 SETUNITS LINESP 4 LPI ;
16 PRINTLINE REPEAT 4 /* RECORDS 4-7 */
17 POSITION 1.5 IN 3.6 IN ;
18 FIELD START 1 LENGTH 7 ; /* DEFAULT POSITION */
19 FIELD START 10 LENGTH 3
20 POSITION 1.5 IN * ;
21 FIELD START 16 LENGTH 3
22 POSITION 2.5 IN * ;
23 FIELD START 21 LENGTH 3
24 POSITION 3.5 IN * ;

```

A time-saving device is to use the REPEAT subcommand (line 16), which maps a single printline with its field subsets to records 4 - 7 with all model names and sales statistics. The length values in the repeated

fields are 7, 3, 3, and 3, which are sufficient to accommodate the largest model name, unit value, \$(000), and percentage fields mapped by this FIELD command.

Figure 77 on page 101 shows the report that is formatted by the resources that are generated in the command stream of this example.

6IN.			
SALESMAN		John Smith	
TERRITORY		Texas	NO. 07714
MONTH Nov.			
MODEL	UNITS	\$ (000)	% of TOTAL
Sierra	12	59	6
Otero	16	70	10
Agua	60	104	15
Allegre	71	265	40

Figure 77: Sales Report

Using Suppressions to Vary Data Presentation

You use PPFA and your print server printers to produce variations of the same report in a single job. The essential function for this capability is called *suppression*. Suppression involves the coordinated specification of elements in both the page definition and the form definition. You create a suppression in the page definition and turn it on or off in a subgroup within a form definition.

This example shows how to alter the controls in the previous example ([“Combining Field Processing and an Electronic Overlay”](#) on page 99) to generate a second report along with the one already created.

First, change the page definition by adding a SUPPRESSION subcommand to the third field in the repeated PRINTLINE (the PRINTLINE that mapped the models and sales figures in [“Combining Field Processing and an Electronic Overlay”](#) on page 99). The suppression is, in effect, created by the SUPPRESSION subcommand in the FIELD command. The following example shows the addition at line 23.

```
18 FIELD START 1 LENGTH 7 ;
19 FIELD START 10 LENGTH 3
20 POSITION 1.5 IN * ;
21 FIELD START 16 LENGTH 3
22 POSITION 2.5 IN *
23 SUPPRESSION SALES ; /*ADDED LINE */
24 FIELD START 21 LENGTH 3
25 POSITION 3.5 IN * ;
```

The SUPPRESSION subcommand creates the potential for selective suppression of the data in the \$(000) field of the report.

Then, rewrite the form definition, creating two subgroups within the copy group. Next, write a SUPPRESSION command immediately after the FORMDEF command. Finally, place a SUPPRESSION subcommand in the subgroup in which you want to suppress the data. The subcommand names the suppression. The resulting form definition command stream is as follows:

```
FORMDEF SECRPT ;
SUPPRESSION SALES ; /*NAMING THE SUPPRESSION */
COPYGROUP SECRPT ;
OVERLAY SLSRPT ; /*NAMING THE OVERLAY */
SUBGROUP COPIES 1
OVERLAY SLSRPT ;
SUBGROUP COPIES 1
OVERLAY SLSRPT
SUPPRESSION SALES ; /*TURNING ON THE SUPPRESSION */
```

The result is shown in Figure 78 on page 102. The second subgroup creates the second output page of the same data with a second set of modifications; in this case, *modifications* means a suppression that is not in the first subgroup.

SALESMAN John Smith			
TERRITORY Texas		NO. 07714	
MONTH Nov.			
MODEL	UNITS	\$(000)	% of TOTAL
Sierra	12	59	6
Otero	16	70	10
Agua	60	104	15
Allegre	71	265	40

Subgroup 1

SALESMAN John Smith			
TERRITORY Texas		NO. 07714	
MONTH Nov.			
MODEL	UNITS	\$(000)	% of TOTAL
Sierra	12		6
Otero	16		10
Agua	60		15
Allegre	71		40

Subgroup 2

Suppressed Fields

Figure 78: Selective Suppression

Review the steps in this example. To suppress a field, identify the field as *suppressible* in the page definition under the FIELD command in question. Then, create a subgroup, activating this suppression with a SUPPRESSION subcommand in the form definition.

The first subgroup produces an output identical to the report in [“Combining Field Processing and an Electronic Overlay”](#) on page 99. It contains no suppression.

Note: This example can be printed in simplex only.

Incorporating Fixed Text into a Page Definition

Fixed text can be incorporated into an electronic overlay by using programs, such as Overlay Generation Language/370. By having another place (the page definition) to incorporate fixed text, you can format documents more efficiently.

In [“Combining Field Processing and an Electronic Overlay”](#) on page 99, a territory sales report for salesman John Smith is created. Here, the territory sales report is incorporated into a larger format that goes to ACME's corporate headquarters in Chicago. Therefore, the identification for the region needs to appear on the report form. An overlay is used as a header for the composite report, which means that two overlays appear in the command stream: one carries over from [“Combining Field Processing and an Electronic Overlay”](#) on page 99 and the other is the header.

So, as shown in Figure 79 on page 103, three fixed inputs generate the final report: overlay SLSRPT, overlay HDR, and the fixed regional identification text. (It is the second item that is worked into the page definition in this example.)

SALESMAN			
TERRITORY		NO.	
MONTH			
MODEL	UNITS	\$ (000)	% of TOTAL

Overlay SLSRPT

INDIVIDUAL SALES REPORT ACME CORP. - CHICAGO
Regional Mgrs. Submit First Monday in Each Month

Overlay HDR

Southwest Region Jim Jones - Manager

Fixed Text

Figure 79: Input for the Corporate Version of an Individual Sales Report

The data file used to generate this report is the same as the one shown in [Figure 76 on page 100](#).

```

FORMDEF CORP ;
  OVERLAY SLSRPT ;
  OVERLAY HDR ;
  SUBGROUP OVERLAY SLSRPT HDR ;
PAGEDEF CORP
  WIDTH 6 IN
  HEIGHT 7 IN ;
PRINTLINE POSITION 1.9 IN 2.5 IN ;           /*RECORD 1          */
FIELD TEXT C 'SOUTHWEST REGION' ;          /*DEFAULT FIELD TEXT*/
                                           /*POSITION          */
FIELD POSITION -.2 IN NEXT                   /*NOTE NEGATIVE VALUE*/
TEXT 1 C 'JIM JONES - MANAGER' ;
FIELD START 1 LENGTH 23
POSITION .1 IN .8 IN ;
PRINTLINE POSITION 2 IN 3.7 IN ;           /*RECORD 2          */
FIELD START 1 LENGTH 9 ;                  /*DEFAULT FIELD     */
                                           /*POSITION          */
FIELD START 10 LENGTH 5
POSITION 2.5 IN * ;
PRINTLINE POSITION 1.5 IN 4 IN ;           /*RECORD 3          */
FIELD START 1 LENGTH 4 ;
SETUNITS LINESP 4 LPI ;
PRINTLINE REPEAT 4                         /*RECORDS 4-7      */
POSITION .4 IN 4.7 IN ;
FIELD START 1 LENGTH 7 ;                  /*DEFAULT FIELD     */
                                           /*POSITION          */
FIELD START 10 LENGTH 3
POSITION 1.6 IN * ;
FIELD START 16 LENGTH 3
POSITION 2.9 IN * ;
FIELD START 21 LENGTH 3
POSITION 4.3 IN * ;

```

The same basic commands from “Combining Field Processing and an Electronic Overlay” on page 99 are used in the command stream, although the positions of fields are changed to accommodate the new layout.

New FIELD commands with TEXT subcommands are inserted in the first PRINTLINE command to produce the regional text, which is positioned at the bottom of the header form. The 1 is a duplication parameter that indicates how many times the fixed text is to be repeated. The C can precede single-byte characters, such as those that are used to write English or German. Both 1 and C are the default values for a TEXT subcommand. The text that you want inserted appears between single quotation marks. Observe how the POSITION subcommands change to accommodate both fixed text and record-1 text.

Note: Each PRINTLINE command in your PPFA command stream must have a corresponding record in the input data file. If you specify a fixed-text data field and an input data field under the same PRINTLINE command, they are both associated with the same input data file record. However, if all the FIELD commands under a PRINTLINE command specify fixed text, the corresponding input record is discarded. In that case, you must insert a blank record into the input data file to preserve the correct relationship between records and PRINTLINE commands.

Figure 80 on page 104 shows how the finished output looks.

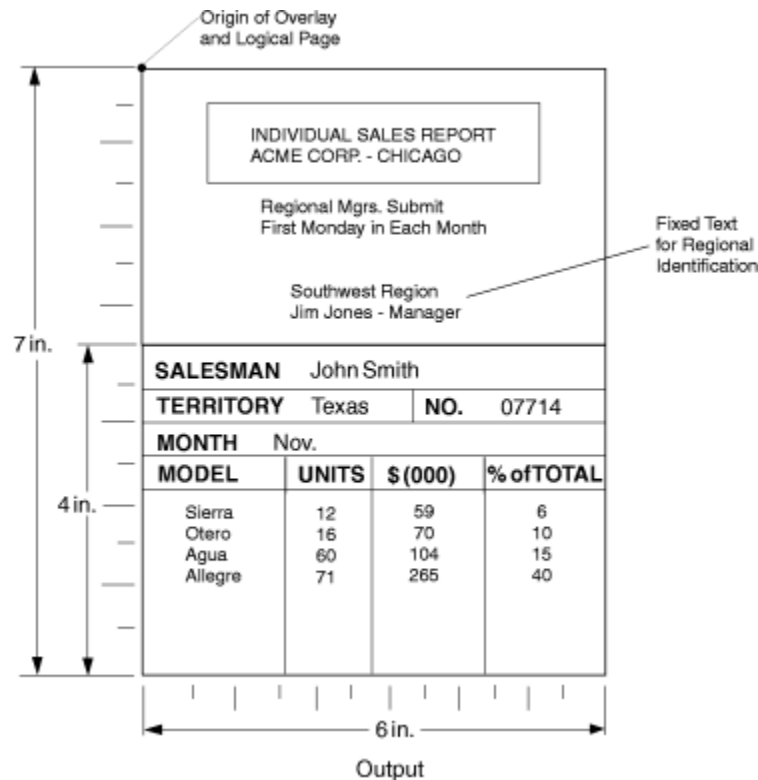
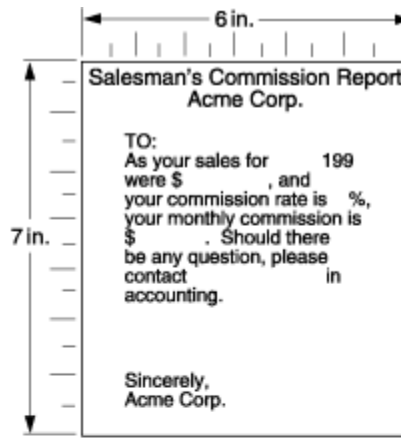


Figure 80: The Corporate Version of the Sales Report with Fixed Text

Combining Two Reports into One Printout

This example combines two data files and two page layouts into one printout, also building on “Combining Field Processing and an Electronic Overlay” on page 99.

Figure 81 on page 105 shows the new data and a new overlay.



Overlay COMRPT

	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3		
R1	J	o	h	n		S	m	i	t	h													
R2	T	e	x	a	s				0	7	7	1	4										
R3	N	o	v	.																			
R4	S	i	e	r	r	a			1	2				5	9						6		
R5	O	t	e	r	e				1	6				7	0						1	0	
R6	A	q	u	a				6	0				1	0	4						1	5	
R7	A	l	l	e	g	r	e		7	1				2	6	5						4	0
	Invoke Medium Map Control Record																						
	Invoke Data Map Control Record																						
R8	J	o	h	n		S	m	i	t	h													
R9	N	o	v	.					5														
R10	4	9	8	.	0	0	0	.	0	0													
R11	2																						
R12	9	9	6	0	.	0	0																
R13	A	l	J	a	n	k	o	w	s	k	1												

Data File

Figure 81: Input for a New Report Produced from the Combined Data Files

This command stream is needed to generate both pages of the preceding report:

```

FORMDEF SLSCOM ;
COPYGROUP SLSRPT ;
  OVERLAY SLSRPT ;
  SUBGROUP OVERLAY SLSRPT ;
COPYGROUP COMRPT ;
  OVERLAY COMRPT ;
  SUBGROUP OVERLAY COMRPT ;
PAGEDEF SLSCOM ;
FONT M104 ;
FONT M105 ;
PAGEFORMAT SLSRPT ; /*SALES REPORT*/
  PRINTLINE FONT M104
    POSITION 2 IN .5 IN ;
    FIELD START 1 LENGTH 23 ;
  PRINTLINE POSITION 2 IN .75 IN ;
    FIELD START 1 LENGTH 9 ; /*DEFAULT FIELD POSITION*/
    FIELD START 10 LENGTH 5
      POSITION 2.3 IN * ;
  PRINTLINE POSITION 1.5 IN 1 IN ;
    FIELD START 1 LENGTH 4 ;
  PRINTLINE REPEAT 4
    POSITION .3 IN 1.8 IN ;
    FIELD START 1 LENGTH 7 ; /*DEFAULT FIELD POSITION */
    FIELD START 11 LENGTH 3
      POSITION 1.5 IN * ;
    FIELD START 16 LENGTH 3
      POSITION 3 IN * ;
    FIELD START 21 LENGTH 3
      POSITION 4.3 IN * ;
PAGEFORMAT COMRPT ; /*COMMISSION REPORT */
PRINTLINE FONT M105 /*RECORD 8 */
  POSITION 1.3 IN 1.7 IN ;

```

```

FIELD START 1 LENGTH 18 ;
PRINTLINE POSITION 3.3 IN 2.2 IN ; /*RECORD 9 */
FIELD START 1 LENGTH 4 ; /*DEFAULT FIELD POSITION */
FIELD START 10 LENGTH 1
POSITION 1.7 IN * ;
PRINTLINE POSITION 1.9 IN 2.6 IN ; /*RECORD 10 */
FIELD START 1 LENGTH 10 ;
PRINTLINE POSITION 4.2 IN 2.9 IN ; /*RECORD 11 */
FIELD START 1 LENGTH 1 ;
PRINTLINE POSITION 1 IN 3.7 IN ; /*RECORD 12 */
FIELD START 1 LENGTH 7 ;
PRINTLINE POSITION 1.7 IN 4.2 IN ; /*RECORD 13 */
FIELD START 1 LENGTH 15 ;

```

Although requiring a complex series of commands, the following commission report is handled much like any other field processing problem: the data must be carefully mapped into the overlay exactly where it is wanted. If you change copy groups and page formats, both the Invoke Medium Map structured field and the Invoke Data Map structured field must be inserted into the data file where you want the changes. Here they occur together.

Figure 82 on page 106 shows both the commission report and the sales report. With page printers and with careful data positioning, such reports look like they were individually prepared with no differences in the presentation of the fixed data.

SALESMAN John Smith			
TERRITORY Texas		NO. 07714	
MONTH Nov.			
MODEL	UNITS	\$(000)	% of TOTAL
Sierra	12	59	6
Otero	16	70	10
Agua	60	104	15
Allegre	71	265	40

Salesman's Commission Report
Acme Corp.

To: John Smith

As your sales for Nov. 1995 were \$498,000.00, and your commission rate is 2 %, your monthly commission is \$9960.00. Should there be any question, please contact Al Jankowski in accounting.

Sincerely,
Acme Corp.

Figure 82: The Sales and the Commission Reports

Chapter 6. Conditional Processing

You use conditional processing to test fields within an input line data record (for example, a customer number). Based on the results of the test, you can specify the action to be taken, such as to change copy groups or page formats. This chapter provides:

- An explanation of how conditional processing works
- A detailed list of rules, restrictions, and considerations
- Examples showing how conditional processing can be used to do some commonly requested functions

General Description

With conditional processing, you can:

- Test the input data by using the `CONDITION` command.
- Choose the copy group and page format to be used when you are printing the data.
- Change to a different copy group or page format after the data is read. You can specify that the new copy group or page format is used:
 - Before the current subpage is printed.
 - Before the current line is printed.
 - After the current line is printed.
 - After the current subpage is printed.

Table 6 on page 107 shows the tasks that you can do with conditional processing.

Task	Location of the Example
Stack offset from previous jobs.	“Jog Output Example” on page 119
Use different print directions for front and back sides of a sheet.	“Duplex Output with Different Front and Back Print Directions” on page 119
Do record reprocessing.	“Record Reprocessing Example” on page 120
Select different paper sources.	“Selecting Paper from an Alternate Bin Example” on page 121
Use multiple <code>CONDITION</code> commands.	“Multiple <code>CONDITION</code> Commands” on page 121
Use repeat <code>PRINTLINE</code> commands.	“Field Processing When <code>PRINTLINE</code>s Are Repeated” on page 123

Using Conditional Processing versus Normal Line Data Processing

Normal line-data processing consists of:

- Setting up the physical page environment by defining a copy group
- Setting up the logical page environment by defining a page format

Input records correspond to `PRINTLINE` commands that determine such things as where the input records are to be printed, which font to use and what print direction to use. Only one copy group and page format can be used for processing each input record.

You can use conditional processing as a preprocessor to test the input data before you decide which copy group and page format to use. Furthermore, you can change these specifications based on changes in the input data. Except for record reprocessing (see [“Record Reprocessing Description and Processing” on page 111](#)), when the copy group and page-format specifications are made, conditional processing operates the same as normal line-data processing.

Note: The copy group and page format can also be changed by placing Advanced Function Presentation data stream (AFP data stream) Invoke Medium Map (IMM) and Invoke Data Map (IDM) structured fields in the input data. Use of these structured fields within the input print file causes results that differ from what is described in this section. See *Mixed Object Document Content Architecture Reference* for information about these structured fields.

Using Conditional Processing to Set Up the Environment

Setting up the environment consists of selecting a copy group and a page format.

Selecting a Copy Group

Conditional processing can be used to *select* a copy group; it does not *process* the copy group.

As described in [Chapter 2, “Using Form Definition Commands,” on page 17](#), a form definition contains the controls that govern the physical page on which the print file is to be printed. A form definition can contain one or more copy groups as shown in the following diagram.

PPFA Commands	Resulting Form Definition
<pre> FORMDEF FDEFX . COPYGROUP CGA . OVERLAY ... SUBGROUP COPYGROUP CGB . OVERLAY ... SUBGROUP COPYGROUP CGC . OVERLAY ... SUBGROUP </pre>	<pre> F1FDEFX ┌───┴───┐ │ CGA │ ├───┬───┤ │ CGB │ ├───┬───┤ │ CGC │ └───┬───┘ </pre>

The first copy group within a form definition is always active when print file processing begins. To select a different copy group, use the `CONDITION` command.

Note: By using the `BEFORE SUBPAGE` and `BEFORE LINE` parameters with conditional processing, you can change to a different active copy group before any lines are formatted.

Using the previous diagram as a reference, assume that copy group `CGB` is active. The copy-group selections that can be made from a `CONDITION` command are:

condname

Starts the named copy group.

CURRENT

Restarts copy group `CGB`.

=

Restarts copy group `CGB` (alternative for `CURRENT`).

NEXT

Starts copy group CGC.

FIRST

Starts copy group CGA.

NULL

Does not change the current copy group processing.

/

Does not change the current copy group processing (alternative for NULL).

See [“Using the CONDITION Command to Select a Copy Group and a Page Format”](#) on page 117 for more information about each option.

Selecting a Page Format

Conditional processing can be used to *select* an active page format. Selecting the page format does not change the basic rules for processing a page format:

- PRINTLINE commands are processed sequentially unless skip-to-channel or spacing commands are used.
- When the end of the page format is reached, processing returns to the first PRINTLINE command in the same page format. Processing does not continue with the next page format (if any) in the page definition.

However, conditional processing does involve some additional considerations:

Subpages

A page format consists of one or more subpages. A subpage is defined by a group of PRINTLINE commands followed by an ENDSUBPAGE command. If an ENDSUBPAGE command is not defined, then the entire page format is one subpage. See [“Subpage Description and Processing”](#) on page 110 for more information.

Record reprocessing

Record reprocessing is used when input records are processed according to one set of copy-group and page-format specifications, and then new specifications are invoked for the same input records. See [“Record Reprocessing Description and Processing”](#) on page 111 for more information.

As described in Chapter 3, [“Using Page Definition Commands for Traditional Line Data,”](#) on page 31, a page definition is a set of controls for formatting line-data files for printing on a logical page. A page definition can contain one or more page formats as shown in the following diagram.

PPFA Commands	Resulting Page Definition
<pre> PAGEDEF PDEFX . PAGEFORMAT PFMTA . PRINTLINE ... PRINTLINE PAGEFORMAT PFMTB . PRINTLINE ... PRINTLINE PAGEFORMAT PFMTC . PRINTLINE ... PRINTLINE </pre>	<pre> P1PDEFX PFMTA PFMTB PFMTC </pre>

The first page format in the page definition is always active when print file processing begins. To invoke a new page format, use the `CONDITION` command.

Note: By using the `BEFORE SUBPAGE` and `BEFORE LINE` parameters, it is possible to change to a different active page format before any lines are formatted.

Using the previous diagram as a reference, assume that page format `PFMTB` is active. The page-format selections that can be made from a `CONDITION` command are:

condname

Starts the named page format.

CURRENT

Restarts page format `PFMTB`.

=

Restarts page format `PFMTB` (alternative for `CURRENT`).

NEXT

Starts page format `PFMTC`.

FIRST

Starts page format `PFMTA`.

NULL

Does not change the current page format processing.

/

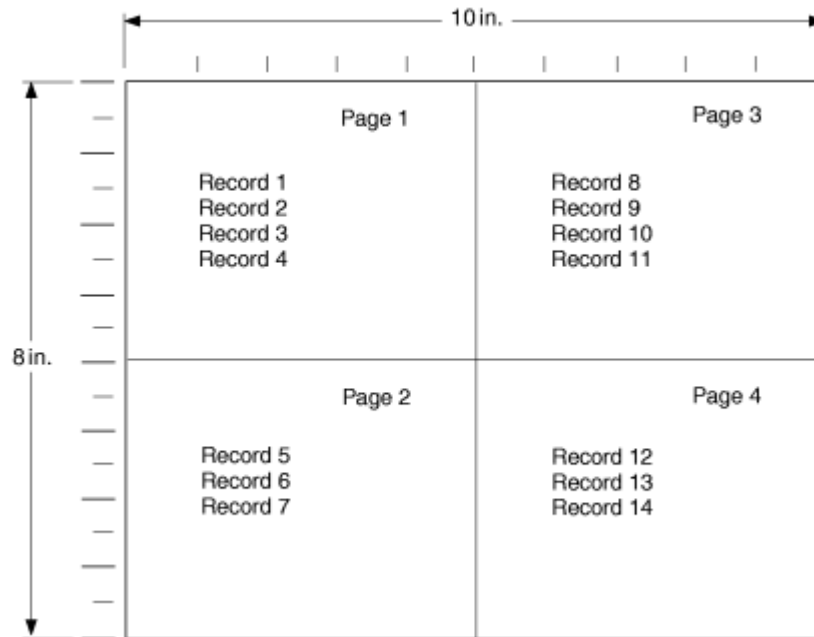
Does not change the current page format processing (alternative for `NULL`).

See [“Using the `CONDITION` Command to Select a Copy Group and a Page Format”](#) on page 117 for more information about each option.

Subpage Description and Processing

A page format consists of one or more subpages. A subpage is defined by a group of `PRINTLINE` commands followed by an `ENDSUBPAGE` command. If an `ENDSUBPAGE` command is not defined, then the entire page format is one subpage. The following considerations apply to subpages:

- Subpages are necessary only with conditional processing. Multiple-up printing can be done with or without defining them as subpages, but to change the page format or copy group at the level of one of the multiple-up pages, the multiple-up pages must be defined as subpages. In the following diagram, pages 1 - 4 can be defined as four separate subpages within one page format, or all defined within one subpage. However, to present the data on page 3 (for example) in a format different from the format that is used for pages 1 and 2, the four pages must be defined as subpages.



- A subpage is processed sequentially starting from the beginning of the page format. Moving from one subpage to the next subpage is done by processing all the PRINTLINE commands for a specified subpage, or by skipping (with the CHANNEL subcommand) or spacing to a PRINTLINE command in a different subpage.

Note: Conditional processing cannot be used to select a subpage except by default. When a page format is started (or the current one is restarted), processing begins with the first PRINTLINE command of the page format. The effect is to select the first subpage in the page format.

Record Reprocessing Description and Processing

Record reprocessing is used when input records are processed according to one set of copy group and page format specifications, and then new specifications are invoked for the same input records. If the new specifications are to be applied with either the BEFORE SUBPAGE or the BEFORE LINE parameter, then the input records must be processed again with the new specifications instead of the original ones.

Note: Input records are not printed twice; record reprocessing just changes the specifications that are used when formatting the records.

The process is shown in the following diagram.

PPFA Commands	Input Records																									
<pre> PAGEFORMAT PFMTA ; PRINTLINE POSITION 1 IN 1 IN DIRECTION ACROSS REPEAT 5 ; CONDITION cond1 START 2 LENGTH 1 WHEN EQ 'B' BEFORE SUBPAGE NULL PAGEFORMAT PFMTB ; PAGEFORMAT PFMTB ; PRINTLINE POSITION 7 IN 1 IN DIRECTION DOWN REPEAT 5 ; CONDITION cond2 START 4 LENGTH 1 WHEN EQ 'Y' BEFORE SUBPAGE NULL PAGEFORMAT PFMTA ; </pre>	<table border="1" data-bbox="1040 359 1292 611"> <tr><td></td><td>A</td><td></td><td></td><td></td></tr> <tr><td></td><td>A</td><td></td><td></td><td></td></tr> <tr><td></td><td>B</td><td></td><td></td><td></td></tr> <tr><td></td><td>A</td><td></td><td></td><td></td></tr> <tr><td></td><td>A</td><td></td><td></td><td></td></tr> </table>		A					A					B					A					A			
	A																									
	A																									
	B																									
	A																									
	A																									

Assume that page format PFMTA is active. Under normal processing, the first input record would print in the ACROSS direction, starting at a horizontal offset of 1 inch and a vertical offset of 1 inch. However, the third record satisfies the CONDITION statement and causes a new page format (PFMTB) to be started. Since CONDITION *cond1* specifies BEFORE SUBPAGE, the first two records must be *reprocessed* by using page format PFMTB. As a result, all of the records are printed in a DOWN direction, starting at a horizontal offset of 7 inches and a vertical offset of 1 inch.

If allowed to operate without restrictions, record reprocessing might force PSF into an infinite loop. For example:

PPFA Commands	Input Records																									
<pre> PAGEFORMAT PFMTA ; PRINTLINE POSITION 1 IN 1 IN DIRECTION ACROSS REPEAT 5 ; CONDITION cond1 START 2 LENGTH 1 WHEN EQ 'B' BEFORE SUBPAGE NULL PAGEFORMAT PFMTB ; PAGEFORMAT PFMTB ; PRINTLINE POSITION 7 IN 1 IN DIRECTION DOWN REPEAT 5 ; CONDITION cond2 START 4 LENGTH 1 WHEN EQ 'Y' BEFORE SUBPAGE NULL PAGEFORMAT PFMTA ; </pre>	<table border="1" data-bbox="1040 1344 1292 1596"> <tr><td></td><td>A</td><td></td><td>X</td><td></td></tr> <tr><td></td><td>A</td><td></td><td>X</td><td></td></tr> <tr><td></td><td>B</td><td></td><td>X</td><td></td></tr> <tr><td></td><td>B</td><td></td><td>X</td><td></td></tr> <tr><td></td><td>B</td><td></td><td>Y</td><td></td></tr> </table>		A		X			A		X			B		X			B		X			B		Y	
	A		X																							
	A		X																							
	B		X																							
	B		X																							
	B		Y																							

As in the previous example, page format PFMTA is initially active, and input record 3 results in the selection of page format PFMTB. However, page format PFMTB has a condition that checks position four for the character 'Y', which is satisfied by input record 5. Therefore, if no restrictions exist, page format PFMTA would again be selected, the input data would be reprocessed (starting with input record 1), leading to an infinite loop.

To prevent this situation, after a BEFORE condition is satisfied, all other BEFORE conditions are ignored until data is formatted. See [“Record Reprocessing” on page 113](#) for detailed information on this restriction.

Conditional Processing Rules, Restrictions, and Considerations

This section describes the rules, restrictions, and considerations for conditional processing in these situations:

- Multiple conditions
- Record reprocessing
- Interaction between a CONDITION command and a REPEAT subcommand
- Interaction between the CONDITION command and the CHANNEL subcommand
- When CHANGE is always false at start of a page format
- CC and TRC fields relationship to the START subcommand
- Using the CONDITION command to select a copy group and a page format
- Variable length records and the CONDITION command
- Truncation of blanks and the CONDITION command

Multiple Conditions

Conditional processing supports:

- Multiple PRINTLINE commands in each subpage
- Multiple CONDITION commands on one PRINTLINE command
- Multiple WHEN statements on one CONDITION command

Rule

For all these situations, the rule is the same; the first true condition is the one processed, and any following true conditions are ignored.

Conditional Processing Considerations

Conditions are evaluated when they are encountered. For example, if a true condition is not detected when an OTHERWISE statement is encountered, the OTHERWISE statement always results in a true condition. (An exception to this consideration is explained in [“Interaction Between the CONDITION Command and the CHANNEL Subcommand” on page 114.](#))

See [“Multiple CONDITION Commands” on page 121](#) for an example of multiple CONDITION commands.

Record Reprocessing

Conditional Processing Restrictions

To prevent an infinite program loop, be aware that the following restrictions apply:

1. When the conditional action is to take place before the current subpage:
 - a. Actions, which are specified as taking place before the current subpage, are shut off until the current subpage end.
 - b. Actions, which are specified as taking place before the current line, are shut off for one line (the first line that is processed in the subpage).
2. When the conditional action is to take place before the current line, actions, which are specified as taking place before the current subpage or before the current line, are shut off for one line.

Considerations

- If a *before subpage* condition is true and causes a switch to a new page format, all *before subpage* conditions in the new page format are ignored.
- If a *before line* condition is true and causes a switch to a new page format, all *before subpage* and *before line* conditions in the new page format are ignored until one line is processed.

The consequence of this is that, after a true condition, at least one line must be processed before the next *before* condition is considered. This consequence can be confusing because a condition that would otherwise yield a true result can be ignored.

See [“Record Reprocessing Example” on page 120](#) for an example of record reprocessing.

Interaction Between a CONDITION Command and a REPEAT Subcommand

See [“Interaction Between the CONDITION Command and the CHANNEL Subcommand” on page 114](#) for what can appear to be an exception to the following rules.

Rule for a CONDITION Command and a REPEAT Subcommand

The REPEAT subcommand is used with the PRINTLINE command to specify the number of printlines (typically greater than one) that are to be constructed with the same specifications (such as font and direction). The CONDITION command is used to invoke conditional processing based on the data in a particular line. When the REPEAT and CONDITION commands are both specified for the same PRINTLINE command, every line that is described by the PRINTLINE command is checked for the specified condition until either the condition is satisfied or no more lines are described by the PRINTLINE command.

Note: This interaction is different from how the CHANNEL and POSITION subcommands interact with the PRINTLINE command. The CHANNEL and POSITION subcommands apply only to the first line described by the PRINTLINE command.

Rule for a CONDITION Command With an OTHERWISE Subcommand

The REPEAT subcommand is used with the PRINTLINE command to specify the number of printlines (typically greater than one) that are to be constructed with the same specifications (such as font and direction). The CONDITION command is used to invoke conditional processing based on the data in a particular line. The CONDITION command includes one or more WHEN subcommands and can include an OTHERWISE subcommand. If an OTHERWISE is coded, and none of the preceding WHEN conditions are true, the OTHERWISE condition is always true. If an OTHERWISE command is not coded, it is treated as a null.

Considerations

For the situation where REPEAT and CONDITION with OTHERWISE are coded for the same PRINTLINE command, the first input line determines the processing to be done. This situation happens because either one of the WHEN conditions or the OTHERWISE condition is always true for the first line.

Interaction Between the CONDITION Command and the CHANNEL Subcommand

Rule

A condition is checked if its associated PRINTLINE command is processed.

Note: ANSI carriage controls and machine (EBCDIC) carriage controls are processed differently. See the SPACE_THEN_PRINT subcommand in [“Long Form Subcommands” on page 252](#) for more information.

ANSI

A skip or space occurs before the line is printed.

Machine

The line is printed and then skipping or spacing is done.

For a CONDITION to be checked, it must be associated with the PRINTLINE command that is used for printing.

ANSI Skipping Consideration

The PRINTLINE command is not processed if a skip-to-channel-n character in the carriage control field causes the specified PRINTLINE command not to be processed.

If a data record contains a character, such as 1, in the carriage control field, and a PRINTLINE command is specified with CHANNEL 1 subcommand, the data record is processed under the new PRINTLINE command (the one that specified CHANNEL 1). Any CONDITION associated with the old PRINTLINE command is ignored (never even checked). See the following diagram for an example.

The character 1 in the carriage-control field of the fifth input record causes a page end before condition *cond1* is ever checked. Thus, the fifth input record is processed by using the first PRINTLINE command of the current page format.

PPFA Commands	Input Records																																										
<pre> PAGEFORMAT PFMTA ; PRINTLINE CHANNEL 1 ; PRINTLINE ; PRINTLINE ; PRINTLINE ; PRINTLINE ; CONDITION cond1 START 6 LENGTH 1 WHEN EQ '5' AFTER SUBPAGE CURRENT NULL; </pre>	<p style="text-align: center;">Carriage Control</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">▼</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6</td> </tr> <tr> <td></td> <td style="text-align: center;">L</td> <td style="text-align: center;">I</td> <td style="text-align: center;">N</td> <td style="text-align: center;">E</td> <td></td> <td style="text-align: center;">1</td> </tr> <tr> <td></td> <td style="text-align: center;">L</td> <td style="text-align: center;">I</td> <td style="text-align: center;">N</td> <td style="text-align: center;">E</td> <td></td> <td style="text-align: center;">2</td> </tr> <tr> <td></td> <td style="text-align: center;">L</td> <td style="text-align: center;">I</td> <td style="text-align: center;">N</td> <td style="text-align: center;">E</td> <td></td> <td style="text-align: center;">3</td> </tr> <tr> <td></td> <td style="text-align: center;">L</td> <td style="text-align: center;">I</td> <td style="text-align: center;">N</td> <td style="text-align: center;">E</td> <td></td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">L</td> <td style="text-align: center;">I</td> <td style="text-align: center;">N</td> <td style="text-align: center;">E</td> <td></td> <td style="text-align: center;">5</td> </tr> </table>	▼	1	2	3	4	5	6		L	I	N	E		1		L	I	N	E		2		L	I	N	E		3		L	I	N	E		4	1	L	I	N	E		5
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	L	I	N	E		3																																					
	L	I	N	E		4																																					
1	L	I	N	E		5																																					

Considerations

The PRINTLINE command is not processed if the PRINTLINE command is spaced over; for example, when multiple line spacing causes certain PRINTLINE commands to be bypassed.

If the input-record carriage-control field specifies a double space before print (for example), and a CONDITION command is specified for the spaced line, the CONDITION is ignored (never checked). Because the OTHERWISE subcommand is part of a CONDITION command, the OTHERWISE subcommand is also ignored.

You might expect an OTHERWISE condition to be true if all other conditions failed. In fact, the OTHERWISE condition can be true if it is associated with a PRINTLINE command that is processed. See the following diagram for an example. This situation assumes that ANSI carriage controls are specified for this print file. ANSI carriage control 0 means space two lines before printing.

The fifth input record contains data (character 5 in the sixth position) that would normally satisfy the condition that is specified on the fifth PRINTLINE command. However, the character 0 in the carriage control field of input record 4 causes the fifth PRINTLINE command to be ignored. The fifth input record is processed by the sixth PRINTLINE command; therefore, the condition is not satisfied.

PPFA Commands	Input Records																																																	
<pre> PAGEFORMAT PFMTA ; PRINTLINE CHANNEL 1 ; PRINTLINE ; PRINTLINE ; PRINTLINE ; PRINTLINE ; CONDITION cond1 START 6 LENGTH 1 WHEN EQ '5' AFTER SUBPAGE CURRENT NULL; PRINTLINE ; </pre>	<p style="text-align: center;">Carriage Control</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 10px;"></th> <th style="width: 15px;">1</th> <th style="width: 15px;">2</th> <th style="width: 15px;">3</th> <th style="width: 15px;">4</th> <th style="width: 15px;">5</th> <th style="width: 15px;">6</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">↓</td> <td>L</td> <td>I</td> <td>N</td> <td>E</td> <td></td> <td>1</td> </tr> <tr> <td></td> <td>L</td> <td>I</td> <td>N</td> <td>E</td> <td></td> <td>2</td> </tr> <tr> <td></td> <td>L</td> <td>I</td> <td>N</td> <td>E</td> <td></td> <td>3</td> </tr> <tr> <td></td> <td>0</td> <td>L</td> <td>I</td> <td>N</td> <td>E</td> <td>4</td> </tr> <tr> <td></td> <td>L</td> <td>I</td> <td>N</td> <td>E</td> <td></td> <td>5</td> </tr> <tr> <td></td> <td>L</td> <td>I</td> <td>N</td> <td>E</td> <td></td> <td>6</td> </tr> </tbody> </table>		1	2	3	4	5	6	↓	L	I	N	E		1		L	I	N	E		2		L	I	N	E		3		0	L	I	N	E	4		L	I	N	E		5		L	I	N	E		6
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WHEN CHANGE is Always False at Start of a Page Format

Rule

The WHEN CHANGE process compares the contents of a specified field with the contents of the same field in the last record that was processed with the current page format and current condition. Whenever a page format is started (either by a condition that *changes* page formats or when processing of the *data file begins*), a WHEN CHANGE condition is always false because the previous record was not processed with the current page format.

Note: The following meanings apply to the terms in the previous paragraph:

changes

Switching to a page format that has a different name.

data file begins

If conditional processing invokes the CURRENT data map, CHANGE information is retained.

Considerations

Ensure that the WHEN CHANGE statement is processed before the switch to a new page format is done. See “WHEN CHANGE is Always False at Start of a Page Format” on page 116 for an example of how a combination of WHEN CHANGE BEFORE SUBPAGE and WHEN CHANGE AFTER SUBPAGE can lead to unexpected results.

Relationship of CC and TRC fields to the START Subcommand

Rule

The position that is specified by the START subcommand of the CONDITION command is about the start of the *data record*. The first 1 or 2 bytes of an input record can contain either both a carriage-control character (CC) or a table-reference character (TRC). However, these characters are not considered part of the data record and are not to be counted when the START subcommand value is determined. In the following example, the field that is checked is the seventh character of the input record, but is the sixth character of the data record.

PPFA Commands	Input Records																																																	
<pre> PAGEFORMAT PFMTA ; PRINTLINE CHANNEL 1 ; PRINTLINE ; PRINTLINE ; PRINTLINE ; PRINTLINE ; CONDITION cond1 START 6 LENGTH 1 WHEN EQ '5' AFTER SUBPAGE CURRENT NULL; PRINTLINE ; </pre>	<p style="text-align: center;">Carriage Control</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">↓</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6</td> </tr> <tr> <td></td> <td style="text-align: center;">L</td> <td style="text-align: center;">I</td> <td style="text-align: center;">N</td> <td style="text-align: center;">E</td> <td></td> <td style="text-align: center;">1</td> </tr> <tr> <td></td> <td style="text-align: center;">L</td> <td style="text-align: center;">I</td> <td style="text-align: center;">N</td> <td style="text-align: center;">E</td> <td></td> <td style="text-align: center;">2</td> </tr> <tr> <td></td> <td style="text-align: center;">L</td> <td style="text-align: center;">I</td> <td style="text-align: center;">N</td> <td style="text-align: center;">E</td> <td></td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">L</td> <td style="text-align: center;">I</td> <td style="text-align: center;">N</td> <td style="text-align: center;">E</td> <td></td> <td style="text-align: center;">4</td> </tr> <tr> <td></td> <td style="text-align: center;">L</td> <td style="text-align: center;">I</td> <td style="text-align: center;">N</td> <td style="text-align: center;">E</td> <td></td> <td style="text-align: center;">5</td> </tr> <tr> <td></td> <td style="text-align: center;">L</td> <td style="text-align: center;">I</td> <td style="text-align: center;">N</td> <td style="text-align: center;">E</td> <td></td> <td style="text-align: center;">6</td> </tr> </table>	↓	1	2	3	4	5	6		L	I	N	E		1		L	I	N	E		2		L	I	N	E		3	0	L	I	N	E		4		L	I	N	E		5		L	I	N	E		6
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Using the CONDITION Command to Select a Copy Group and a Page Format

Rules

1. Within the CONDITION command, a copy group and a page format can be specified by using either a specific name or a parameter (CURRENT or =, FIRST, NEXT), NULL or / can be specified. The use of the NULL or / parameters differs from the use of the others:

Others

When any parameter other than NULL or / is specified, the specifications for the copy group or page format that is selected replace the current specifications. When the current specifications are replaced, the action is referred to as starting or restarting the copy group or page format. In AFP terminology, an Invoke Medium Map (IMM) command is generated for a copy group and an Invoke Data Map (IDM) command is generated for a page format.

NULL or /

When NULL or / is specified, no IMM or IDM is generated and processing continues as if no condition check was present.

2. The COPYGROUP and the PAGEFORMAT parameters are positional. If both parameters are specified, the COPYGROUP parameter must be first. If you want only to specify the copy group, the PAGEFORMAT parameter can be omitted, or specified as NULL or /. However, if you want only to specify the page format, the COPYGROUP parameter must be specified as NULL or /.

Considerations

- Starting or Restarting a Copy Group

When a copy group is started (or restarted), the remaining input data is forced to the start on the next *sheet*. Therefore, if duplex output was expected, but the copy group is restarted while the front side of a sheet is processed, the remaining data starts on the front side of the next sheet rather than on the back side of the current sheet.

See [“Duplex Output with Different Front and Back Print Directions”](#) on page 119 for an example.

Furthermore, observe that any copy group action except NULL restarts the page format (see the following item).

- Starting or Restarting a Page Format

When a page format is started (or restarted), the remaining input data is forced to the start on the next side. Furthermore, that data is processed starting with the first PRINTLINE command in the specified page format. This situation is true even if CURRENT is specified as the page format parameter.

- Not Restarting a Copy Group

If the copy group is not to be restarted, specify NULL or /. Do not specify COPYGROUP NULL or COPYGROUP /. The following example illustrates this point. The command sequence in the Incorrect

Format column invokes a copy group named NULL. The command sequence in the Correct Format column leaves the current copy group active.

Incorrect Format	Correct Format
<pre> CONDITION condname START WHEN ... COPYGROUP NULL . . </pre>	<pre> CONDITION condname START WHEN ... NULL . . </pre>

- Not Restarting a Page Format

If the page format is not to be restarted, specify NULL or / (or omit the specification). Do not specify PAGEFORMAT NULL or PAGEFORMAT /.

The following example illustrates this point. The command sequence in the Incorrect Format column invokes a page format named NULL. The command sequence in the Correct Format column leaves the current page format active.

Incorrect Format	Correct Format
<pre> CONDITION condname START WHEN ... COPYGROUP CGA PAGEFORMAT NULL . . </pre>	<pre> CONDITION condname START WHEN ... COPYGROUP CGA NULL . . </pre>

Variable Length Records and the CONDITION Command

Considerations

The CONDITION command inspects a field that starts at a particular position and extends for a certain length. If the entire field is not available within the input record, the condition is always false. If the input file contains variable-length records, the record might not extend the full length that is specified by the START and LENGTH subcommands. In this way, a condition that seems as if it is satisfied can fail.

Truncation of Blanks and the CONDITION Command

Considerations

Truncation occurs when blank characters are removed from the end of records on the spool. If blank truncation is in effect, the result can be the same as if the input file contained variable-length records.

Blank truncation is a consideration at the time the input records are passed to the print server. In the JES2 environment, blank truncation occurs unless the BLNKTRNC=NO parameter is specified. In the JES3 environment, blank truncation occurs unless the TRUNC=NO parameter is specified as part of either the BUFFER or SYSOUT initialization statements. Blank truncation can affect conditional processing because a field might disappear by being truncated and cause a WHEN/OTHERWISE clause not to run.

Conditional Processing Examples

This section provides conditional processing examples. The examples are grouped into functionally similar applications and are increasingly complex. The examples are:

- Jog output based on a change in the input data
- Duplex output with different front and back print directions
- Record reprocessing
- Select paper from an alternate bin
- Multiple CONDITION commands

Jog Output Example

Figure 83 on page 119 shows how to jog the printed output, based on a change in the input data.

Copy group CGJOG specifies JOG YES. Page format PFJOG contains a CONDITION command that checks for any change in positions 8 - 10. If a change is detected, copy group CGJOG is restarted. Observe that the only result is to start printing on a new sheet and to jog that sheet.

```
FORMDEF TJOG;  
  COPYGROUP CGJOG JOG YES;  
  
PAGEDEF TJOG;  
  PAGEFORMAT PFJOG WIDTH 11 IN HEIGHT 8.5;  
  PRINTLINE REPEAT 50  
    CHANNEL 1;  
  CONDITION NUPAGE START 8 LENGTH 3  
    WHEN CHANGE BEFORE SUBPAGE  
  COPYGROUP CGJOG;
```

Figure 83: Jog Output Example

Duplex Output with Different Front and Back Print Directions

Figure 84 on page 120 shows how to establish one print direction on the front side and a different print direction on the back side of a duplex sheet.

The page definition in this example contains two page formats, each of which has a CONDITION statement that always returns a true value. The value is true because the character in position 1 always has a value greater than or equal to hexadecimal zero. Therefore, every time a page change occurs (front to back, or back to next front) a different page format is started. The different DIRECTION statements in the two page formats change the layout of the text on the page.

Observe that the COPYGROUP parameter is specified as NULL. If a parameter other than NULL or / is specified for COPYGROUP, the copy group restarts every time a page change occurs. Because restarting a copy group forces data to a new sheet, duplex printing does not occur.

```

FORMDEF XMPDUP
    DUPLEX NORMAL;

PAGEDEF XMPDUP WIDTH 8.5 HEIGHT 11.0;
PAGEFORMAT P2FRONT DIRECTION ACROSS;
PRINTLINE CHANNEL 1 POSITION 0.75 TOP;
    CONDITION GOTOBACK START 1 LENGTH 1
    WHEN GE X'00' AFTER SUBPAGE NULL PAGEFORMAT P2BACK;
PRINTLINE REPEAT 59;

PAGEFORMAT P2BACK DIRECTION UP;
PRINTLINE CHANNEL 1 POSITION 0.25 TOP;
    CONDITION GOTOFRTN START 1 LENGTH 1
    WHEN GE X'00' AFTER SUBPAGE NULL PAGEFORMAT P2FRONT;
PRINTLINE REPEAT 59;

```

Figure 84: Duplex Output

Record Reprocessing Example

Figure 85 on page 120 uses the BEFORE SUBPAGE function with record reprocessing because the copy group and page format cannot be determined until input record 3 for each subpage is read.

Notes:

1. This example includes two subpages.
2. The CONDITION command specifies that the action to be done is NEWFORM. Therefore, if the condition is satisfied, the data in the current subpage is forced to start on the next form. If the data is already at the start of a new form, no action is done. In other words, a blank page is not generated.

```

/* Page definition for 2-up printing          */
/* Test field in line 3 of each subpage      */
/* Eject to new sheet if the field changes.   */
PAGEDEF REPROC
    WIDTH 10.6 HEIGHT 8.3 DIRECTION DOWN;

PAGEFORMAT PFREPROC;

/* Definition of first subpage                */
PRINTLINE CHANNEL 1
    REPEAT 2
    POSITION MARGIN TOP;

PRINTLINE REPEAT 1
    POSITION MARGIN NEXT;
CONDITION EJECT
    START 5 LENGTH 5
    WHEN CHANGE BEFORE SUBPAGE
    NEWFORM;

PRINTLINE REPEAT 40
    POSITION MARGIN NEXT;
ENDSUBPAGE;

/* Definition of second subpage               */
PRINTLINE CHANNEL 1
    REPEAT 2
    POSITION 5.3 TOP;

PRINTLINE REPEAT 1
    POSITION 5.3 NEXT;
CONDITION EJECT;

PRINTLINE REPEAT 40
    POSITION 5.3 NEXT;
ENDSUBPAGE;

```

Figure 85: Record Reprocessing Example

Selecting Paper from an Alternate Bin Example

Figure 86 on page 121 selects the first sheet from the alternate bin and all other pages from the primary bin. This function is useful when special paper (such as one having the company logo) is used for the first page of a document.

Note: If the form defined to each bin is the same form number, bin selection is overridden by the printer. Only the primary bin is selected.

```
/* The form definition contains two copy groups -- */
/* ALTBIN - for the first page */
/* PRIBIN - for all other pages */

FORMDEF BINEX
  DUPLEX NO;
  COPYGROUP ALTBIN BIN 2;
  COPYGROUP PRIBIN BIN 1;

PAGEDEF BINEX
  WIDTH 8.3 HEIGHT 10.6;

/* Pageformat for first page - bin 2 */

PAGEFORMAT FIRST;
  PRINTLINE CHANNEL 1
    POSITION MARGIN TOP;
  CONDITION GOTOPRIM START 1 LENGTH 1
    WHEN GE X'00' AFTER SUBPAGE
    COPYGROUP PRIBIN PAGEFORMAT REST;
  PRINTLINE REPEAT 59;

/* Pageformat for all other pages - bin 1 */

PAGEFORMAT REST;
  PRINTLINE CHANNEL 1
    POSITION MARGIN TOP
    REPEAT 60;
```

Figure 86: Alternate bin example

Multiple CONDITION Commands

Two examples are shown here. The first example shows how two CONDITION commands can interact to give unintended results. The second example shows how to use the two CONDITION commands to achieve the correct results.

Example 1 - Incorrect Solution

The example in Figure 87 on page 122 demonstrates how two CONDITION commands can interact to give unintended results. Specifically, one CONDITION command causes a change of page format and then a second CONDITION command inspects a field with a WHEN CHANGE subcommand.

The purpose of condition:

NEWREP

Starts a new report on a new sheet of paper whenever the specified field changes and jogs the output so the report can be easily located.

SHIFTB and SHIFTF

Handles the situation where all four subpages of the front (or back) contain data.

In this situation, the objective is to change the print direction of the text on the page.

In the situation where both conditions seem to be true at the same time, the results might be unexpected.

Note: Condition SHIFTB (or SHIFTF) takes effect after the current subpage; therefore, it precedes the before subpage processing that is defined by condition NEWREP. Because condition SHIFTB starts a new page format, condition NEWREP returns a false value, and the expected new report processing is not done.

```

FORMDEF XMPICO OFFSET 0 0 DUPLEX RTUMBLE JOG YES REPLACE YES;
  COPYGROUP CG1;
  OVERLAY OVLY1;
  OVERLAY OVLY2;
  SUBGROUP      OVERLAY OVLY1 FRONT;
  SUBGROUP      OVERLAY OVLY2 BACK ;

PAGEDEF XMPICO REPLACE YES;
  FONT GT24;
  FONT GT12;

  /* Definition of pageformat for front side */
  PAGEFORMAT PFFRONT WIDTH 11 IN HEIGHT 8.5 IN DIRECTION UP;
SETUNITS 1 PELS 1 PELS LINESP 16 LPI;
  PRINTLINE REPEAT 1 CHANNEL 1 FONT GT24 POSITION 75 188;
  CONDITION NEWREP START 8 LENGTH 3
    WHEN CHANGE BEFORE SUBPAGE COPYGROUP CG1 PAGEFORMAT PFFRONT;
  PRINTLINE REPEAT 40 FONT GT24 POSITION 75 NEXT;
  ENDSUBPAGE;

  PRINTLINE REPEAT 1 CHANNEL 1 FONT GT24 POSITION 1377 188;
  CONDITION NEWREP START 8;
  PRINTLINE REPEAT 40 FONT GT24 POSITION 1377 NEXT;
  ENDSUBPAGE;

  PRINTLINE REPEAT 1 CHANNEL 1 FONT GT24 POSITION 75 1102;
  CONDITION NEWREP START 8;
  PRINTLINE REPEAT 40 FONT GT24 POSITION 75 NEXT;
  ENDSUBPAGE;

  PRINTLINE REPEAT 1 CHANNEL 1 FONT GT24 POSITION 1377 1102;
  CONDITION NEWREP START 8;
  CONDITION SHIFTB START 1 LENGTH 1
    WHEN GE X'00' AFTER SUBPAGE NULL PAGEFORMAT PFBACK;
  PRINTLINE REPEAT 40 FONT GT24 POSITION 1377 NEXT;
  ENDSUBPAGE;

  /* Definition of pageformat for back side */
  PAGEFORMAT PFBACK WIDTH 8.5 IN HEIGHT 11 IN DIRECTION ACROSS;
SETUNITS 1 PELS 1 PELS LINESP 8 LPI;
  PRINTLINE REPEAT 1 CHANNEL 1 FONT GT12 POSITION 75 61;
  CONDITION NEWREP START 8;
  PRINTLINE REPEAT 40 FONT GT12 POSITION 75 NEXT;
  ENDSUBPAGE;

  PRINTLINE REPEAT 1 CHANNEL 1 FONT GT12 POSITION 75 1335;
  CONDITION NEWREP START 8;
  CONDITION SHIFTF START 1 LENGTH 1
    WHEN GE X'00' AFTER SUBPAGE NULL PAGEFORMAT PFFRONT;
  PRINTLINE REPEAT 40 FONT GT12 POSITION 75 NEXT;
  ENDSUBPAGE;

```

Figure 87: INCORRECT Solution Example

Example 2 - Correct Solution

The example in [Figure 88 on page 123](#) demonstrates how two CONDITION commands are used to achieve the correct results. The [Figure 88 on page 123](#) differs from [Figure 87 on page 122](#) in two significant ways:

- Because the page format for the back side is the first one defined in the page definition, it is the one that is initially active.
- Both CONDITION commands (NEWREP and SHIFTF) specify that the action must happen before the current subpage is processed.

When processing begins, condition NEWREP fails because a WHEN CHANGE condition is in place and the page format has started. However, condition SHIFTF returns a true result, and the NEXT page format (PFFRONT) is started. No lines are formatted, so condition SHIFTF moves to the page format for the front side.

```

FORMDEF XMPCOR OFFSET 0 0 DUPLEX RTUMBLE JOG YES REPLACE YES;
COPYGROUP CG1;
OVERLAY OVLY1;
OVERLAY OVLY2;
SUBGROUP OVERLAY OVLY1 FRONT;
SUBGROUP OVERLAY OVLY2 BACK ;

PAGEDEF XMPCOR REPLACE YES;
FONT GT24;
FONT GT12;
/* The pageformat for the back side of the form is */
/* the first pageformat in the PAGEDEF. Therefore, */
/* it will initially be the active pageformat */
PAGEFORMAT PFBACK WIDTH 8.5 IN HEIGHT 11 IN DIRECTION ACROSS;
SETUNITS 1 PELS 1 PELS LINESP 8 LPI;
PRINTLINE REPEAT 1 CHANNEL 1 FONT GT12 POSITION 75 61;
CONDITION NEWREP START 8 LENGTH 3
WHEN CHANGE BEFORE SUBPAGE COPYGROUP CG1 PAGEFORMAT
PFFRONT;
CONDITION SHIFTIT START 1 LENGTH 1
WHEN GE X'00' BEFORE SUBPAGE NULL NEXT;
PRINTLINE REPEAT 40 FONT GT12 POSITION 75 NEXT;
ENDSUBPAGE;

PRINTLINE REPEAT 1 CHANNEL 1 FONT GT12 POSITION 75 1335;
CONDITION NEWREP START 8;
PRINTLINE REPEAT 40 FONT GT12 POSITION 75 NEXT;
ENDSUBPAGE;

/* This is the pageformat for the front side of the form. */
PAGEFORMAT PFFRONT WIDTH 11 IN HEIGHT 8.5 IN DIRECTION UP;
SETUNITS 1 PELS 1 PELS LINESP 16 LPI;
PRINTLINE REPEAT 1 CHANNEL 1 FONT GT23 POSITION 75 188;
CONDITION NEWREP START 8;
CONDITION SHIFTIT START 1;
PRINTLINE REPEAT 40 FONT GT24 POSITION 75 NEXT;
ENDSUBPAGE;

PRINTLINE REPEAT 1 CHANNEL 1 FONT GT24 POSITION 1377 188;
CONDITION NEWREP START 8;
PRINTLINE REPEAT 40 FONT GT24 POSITION 1377 NEXT;
ENDSUBPAGE;

PRINTLINE REPEAT 1 CHANNEL 1 FONT GT24 POSITION 75 1102;
CONDITION NEWREP START 8;
PRINTLINE REPEAT 40 FONT GT24 POSITION 75 NEXT;
ENDSUBPAGE;

PRINTLINE REPEAT 1 CHANNEL 1 FONT GT24 POSITION 1377 1102;
CONDITION NEWREP START 8;
PRINTLINE REPEAT 40 FONT GT24 POSITION 1377 NEXT;
ENDSUBPAGE;

```

Figure 88: CORRECT Solution Example

Field Processing When PRINTLINEs Are Repeated

Figure 89 on page 124 and Figure 90 on page 124 are examples that show the effect of the [LINE | FIELD] parameter on REPEAT *n*.

Figure 89 on page 124 is a PRINTLINE example that uses FIELD type repetition.

```
PAGEDEF rept01 WIDTH 8.0 IN
              HEIGHT 10.5 IN
              LINEONE 0.2 IN 0.2 IN
              DIRECTION ACROSS
              REPLACE YES;

FONT normal CR10 SBCS ROTATION 0;
FONT italic CI10 SBCS ROTATION 0;
FONT bold CB10 SBCS ROTATION 0;
.
.
SETUNITS LINESP 6 LPI;

PRINTLINE POSITION 1.0 IN 1.0 IN
          DIRECTION ACROSS
          FONT bold
          REPEAT 3 FIELD;
FIELD POSITION 0.0 IN 0.0 IN
     DIRECTION ACROSS
     FONT normal
     START * LENGTH 20;
FIELD POSITION 2.5 IN 0.0 IN
     DIRECTION DOWN
     FONT normal
     START * LENGTH 20;
FIELD POSITION 2.5 IN 2.5 IN
     DIRECTION BACK
     FONT normal
     START * LENGTH 20;
FIELD POSITION 0.0 IN 2.5 IN
     DIRECTION UP
     FONT normal
     START * LENGTH 20;
```

Figure 89: REPEAT n type FIELD Example

Figure 90 on page 124 is a PRINTLINE example that shows LINE type repetition.

Note: When LINE type repetition is used, SETUNITS LINESP might need to be set to a higher value to avoid over printing.

```
.
SETUNITS LINESP 3.0 IN;

PRINTLINE POSITION 5.0 IN 1.0 IN
          DIRECTION ACROSS
          FONT bold
          REPEAT 3 LINE;
FIELD POSITION 0.0 IN 0.0 IN
     DIRECTION ACROSS
     FONT normal
     START * LENGTH 20;
FIELD POSITION 2.0 IN 0.0 IN
     DIRECTION DOWN
     FONT normal
     START * LENGTH 20;
FIELD POSITION 2.0 IN 2.0 IN
     DIRECTION BACK
     FONT normal
     START * LENGTH 20;
FIELD POSITION 0.0 IN 2.0 IN
     DIRECTION UP
     FONT normal
     START * LENGTH 20;
```

Figure 90: REPEAT n type LINE Example

Figure 91 on page 125 shows an example of Input Line Data.

```
Field Type Repeat   Field Type Repeat   Field Type Repeat   Field Type Repeat
Field Type Repeat   Field Type Repeat   Field Type Repeat   Field Type Repeat
Field Type Repeat   Field Type Repeat   Field Type Repeat   Field Type Repeat
Line Type Repeat    Line Type Repeat    Line Type Repeat    Line Type Repeat
Line Type Repeat    Line Type Repeat    Line Type Repeat    Line Type Repeat
Line Type Repeat    Line Type Repeat    Line Type Repeat    Line Type Repeat
Field Type Repeat   Notice that the     fields are repeated based on the prior
instance of the same field, and not the printline. This has advantages if
special effects are desired.
Line Type Repeat    is based on the     printline. Good   for sales tickets.
Generally, this type of repeat needs a SETUNITS LINESP command...
...so that lines   won't overlap!     This is           SETUNITS   LINESP 3 IN
```

Figure 91: (Input) Line Data

When [Figure 91 on page 125](#) is processed by the print server, the output in [Figure 92 on page 126](#) and [Figure 93 on page 127](#) is printed.

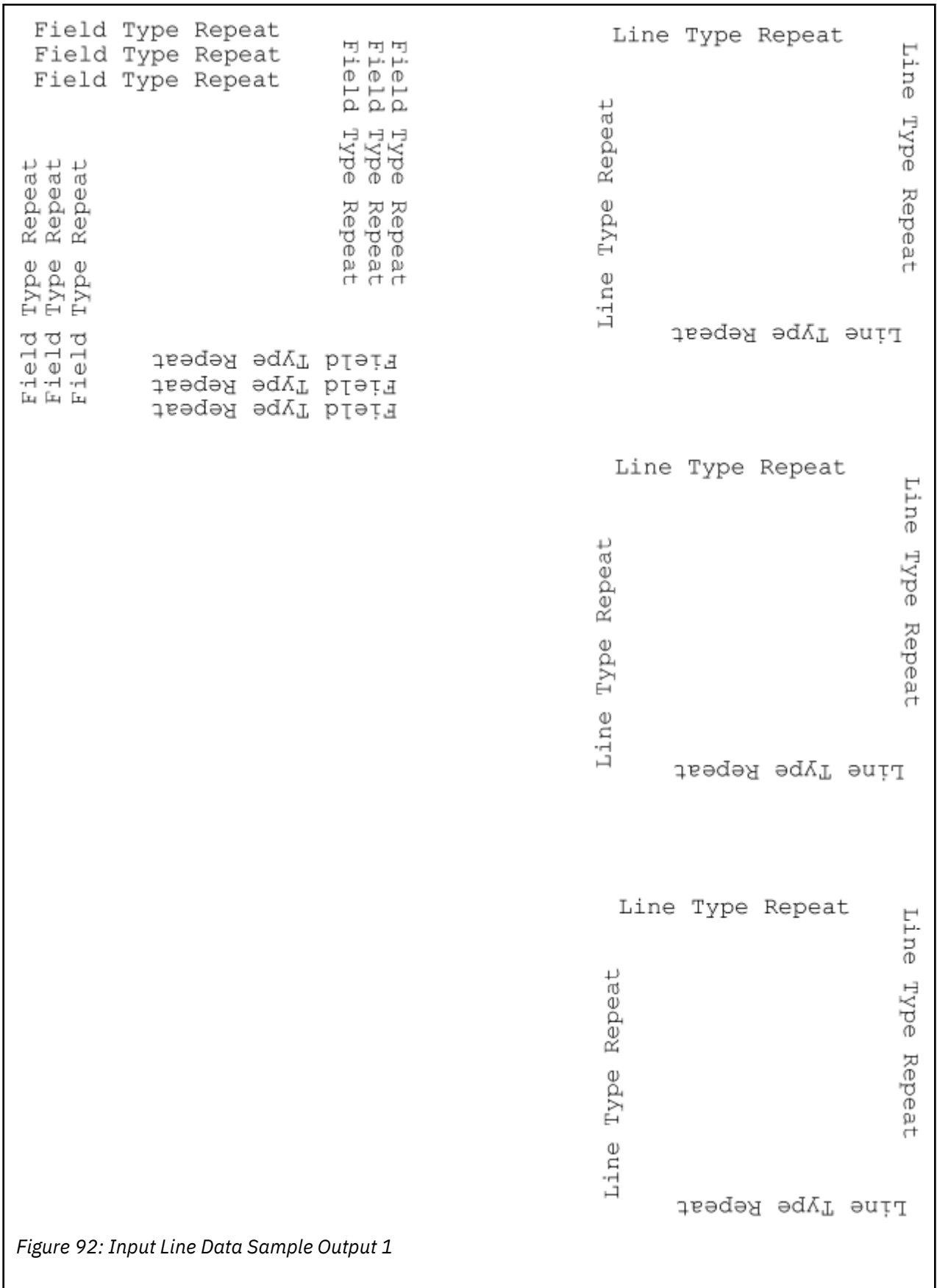


Figure 92: Input Line Data Sample Output 1

```

Field Type Repeat
instance of the same
special effects are

based on the prior
has advantages if

fields are repeated
printline. This

Notice that the
field, and not the
desired.

Line Type Repeat
for sales tickets.

printline. Good
is based on the

Generally, this type
of repeat needs a

command...

SETUNITS LINESP
SETUNITS LINESP 3 IN...so that lines
won't overlap!

This is

```

Figure 93: Input Line Data Sample Output 2

Chapter 7. N_UP Printing

With N_UP printing, which is defined in the form definition, you can print up to four pages on a sheet of paper in simplex mode and up to eight pages in duplex mode. Each page is independent, allowing the use of different page formats and copy groups for each page. This format provides significantly more flexibility and function than the traditional multiple-up capability, which is defined in the page definition. See [“N_UP Compared to Multiple-up” on page 148](#) for more differences between N_UP printing and multiple-up printing.

Two levels of N_UP exist:²

- Basic N_UP supported by older AFP printers: 3825, 3827, 3828, 3829, 3835, and 3900-001.
- Enhanced N_UP supported by printers with the Advanced Function Common Control Unit (AFCCU).

N_UP Partitions and Partition Arrangement

A key concept in N_UP printing is the *partition*. In both basic and enhanced N_UP, each sheet of paper is divided into equal size areas called partitions. Pages are placed in these partitions in sequential order in basic N_UP. Pages are placed in relation to one or more of these partitions in enhanced N_UP. Knowing the partition arrangement is critical to designing applications that use N_UP.

Note: If you are using basic N_UP printing with PSF set to DATAACK=BLOCK, data must fall within the boundary of the partition. Any data that is placed outside the edge of the partition boundary is not printed, and no error message is generated. However, enhanced N_UP printing allows pages to overlap partitions. The only limits are that the pages must not extend beyond the boundaries of the physical sheet, and the pages must not exceed the total number of N_UP partitions that are specified for the sheet.

The number, size, and position of partitions are determined by three things:

- N_UP value (1, 2, 3, or 4)
- Size and shape of the sheet of paper
- Form definition presentation options (PRESENT and DIRECTION)

When printing in duplex mode, the same number of partitions is also defined for the back of the sheet. For normal duplex, back partitions are placed as if the sheet were flipped around its right side or *y-axis*. For tumble duplex, they are placed as if the sheet were flipped around its top edge, or *x-axis*. See [Figure 95 on page 130](#) and [Figure 96 on page 131](#) for illustrations of duplex partitions.

[Figure 94 on page 130](#) through [Figure 105 on page 135](#) show the partition arrangement that results from every combination of N_UP value, paper size, and presentation option. The hex values (X'00', X'01', X'04', X'05', X'02', X'03') indicate how the Medium Orientation Triplet (X'68') specifies the position and orientation of the medium presentation space on the physical medium.

Use these figures to determine how your N_UP application is formatted by the printer. In the figures, each equal-sized partition has a number that indicates its default presentation sequence. The origin for each partition is in the same relative position as the origin point shown for the medium. This point serves as the upper-left corner for a page that is printed in the ACROSS (or 0°) printing direction.

² You must have the correct level of PPFA to generate basic or enhanced N_UP commands and the correct level of PSF for your operating system to drive the printer in the basic or enhanced N_UP mode.

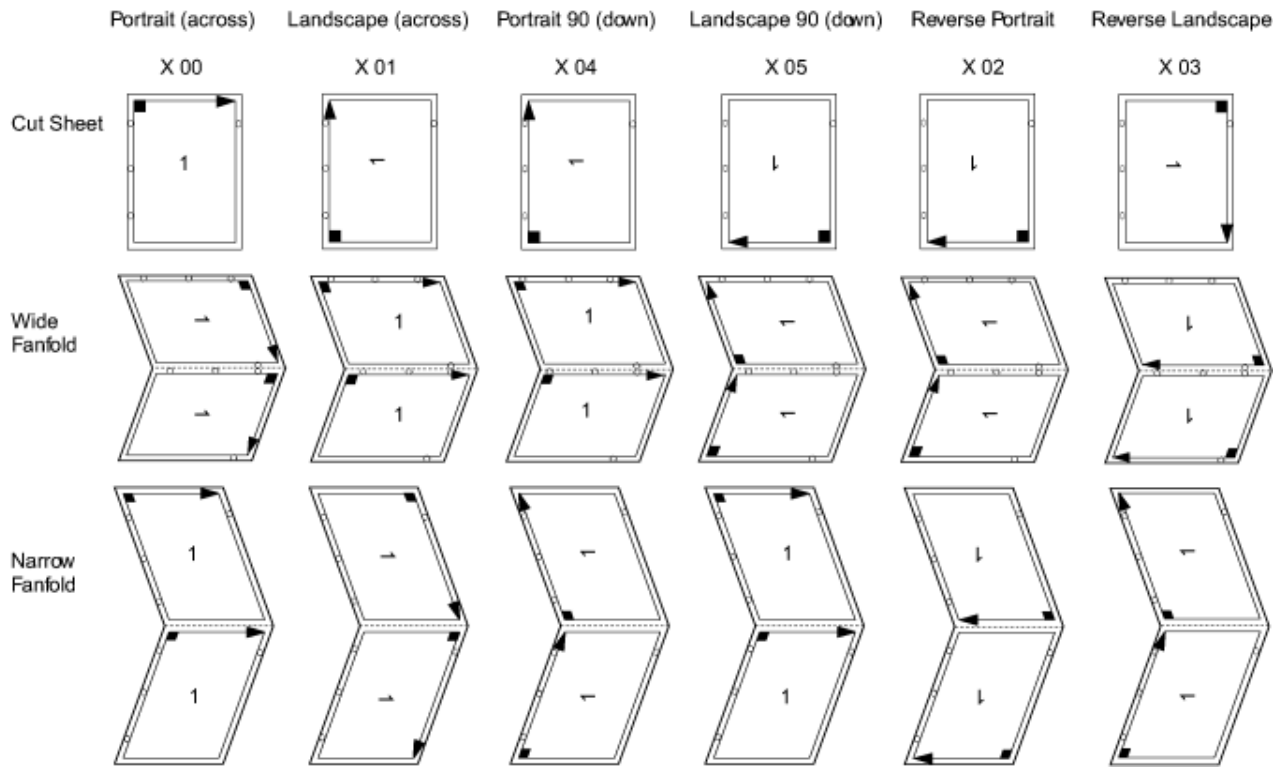


Figure 94: N_UP 1 Partition Numbering, Front Sheet-Side

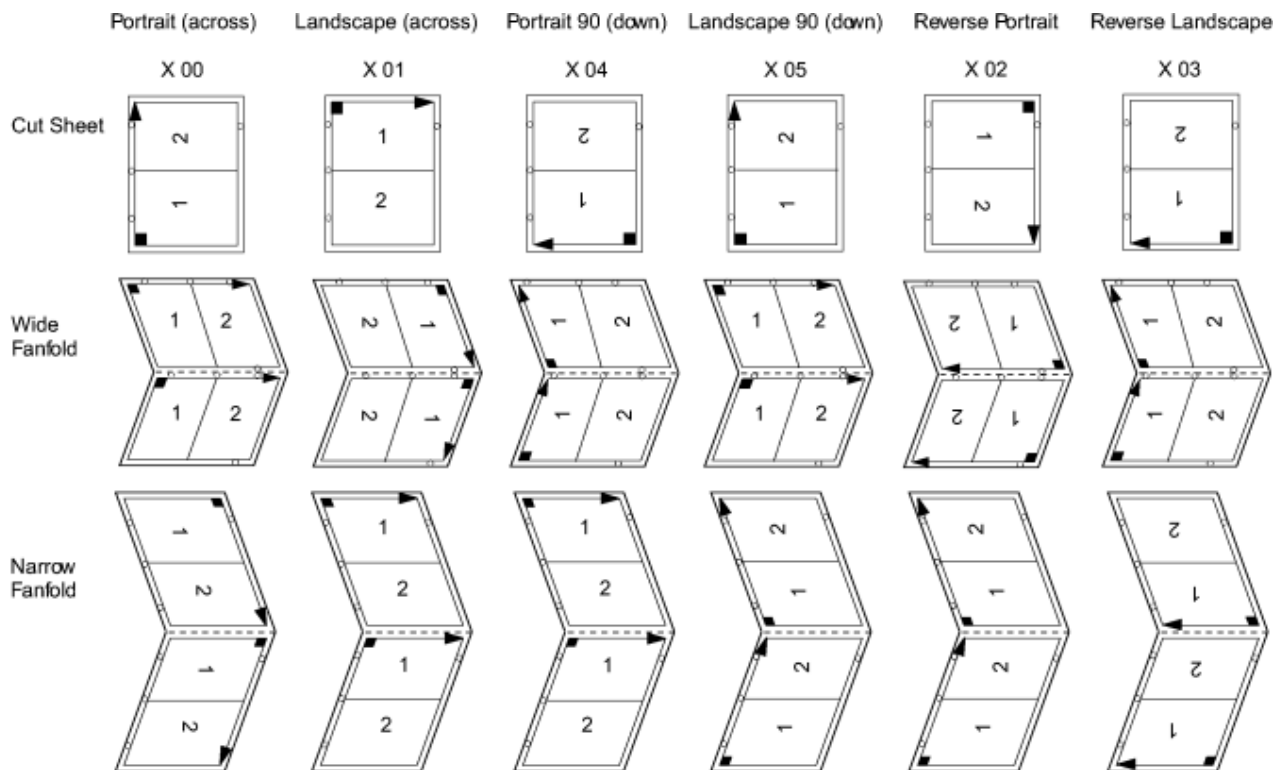


Figure 95: N_UP 2 Partition Numbering, Front Sheet-Side

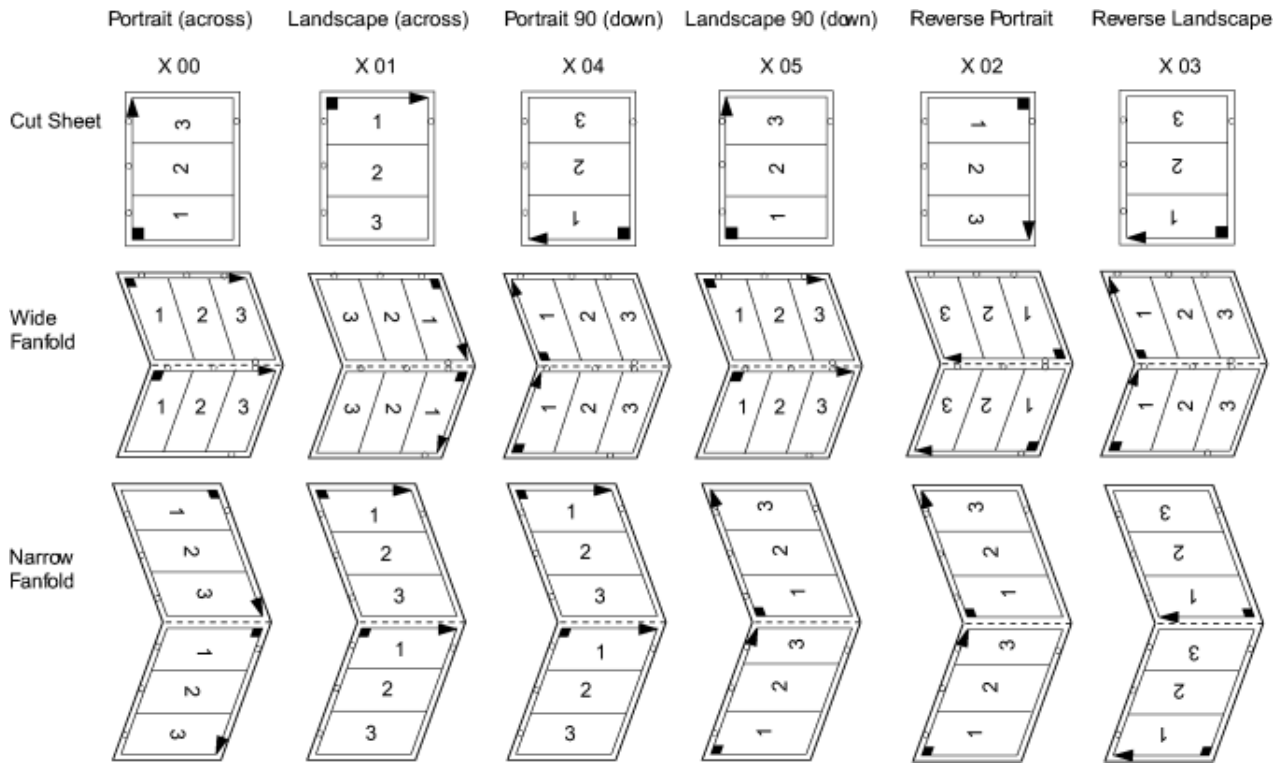


Figure 96: N_UP 3 Partition Numbering, Front Sheet-Side

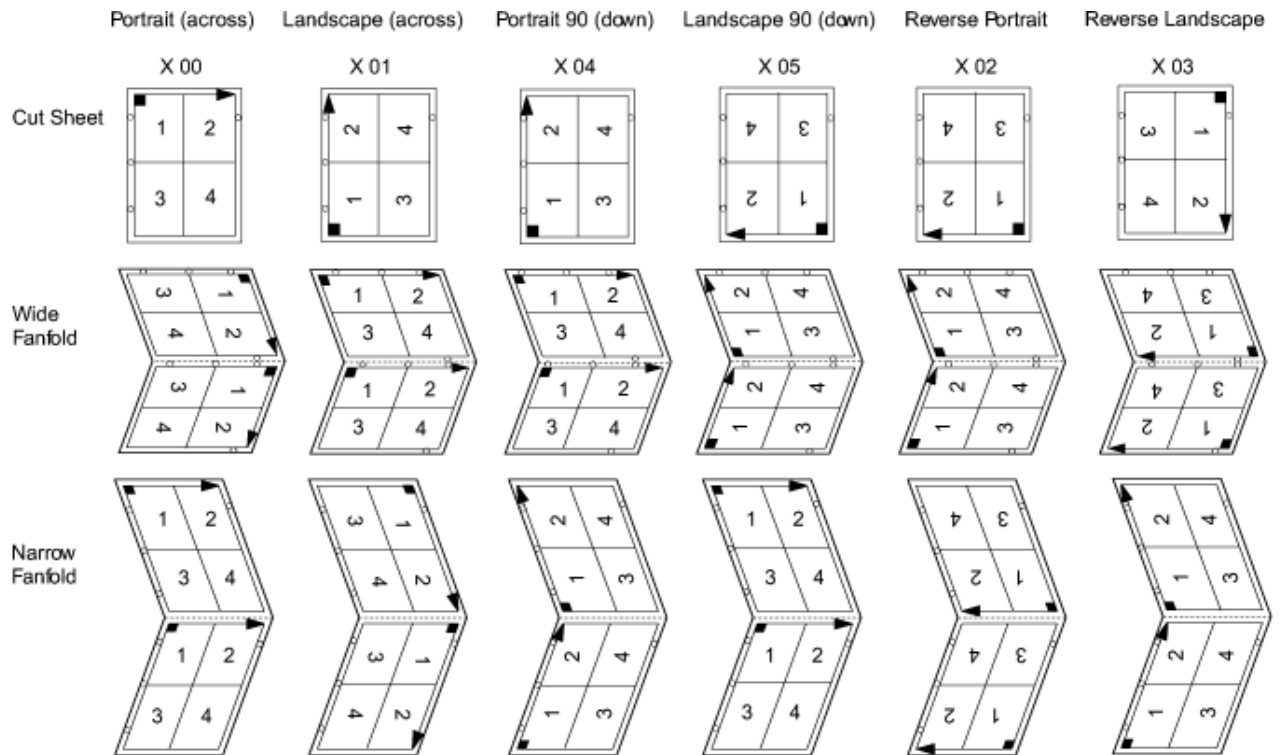


Figure 97: N_UP 4 Partition Numbering, Front Sheet-Side

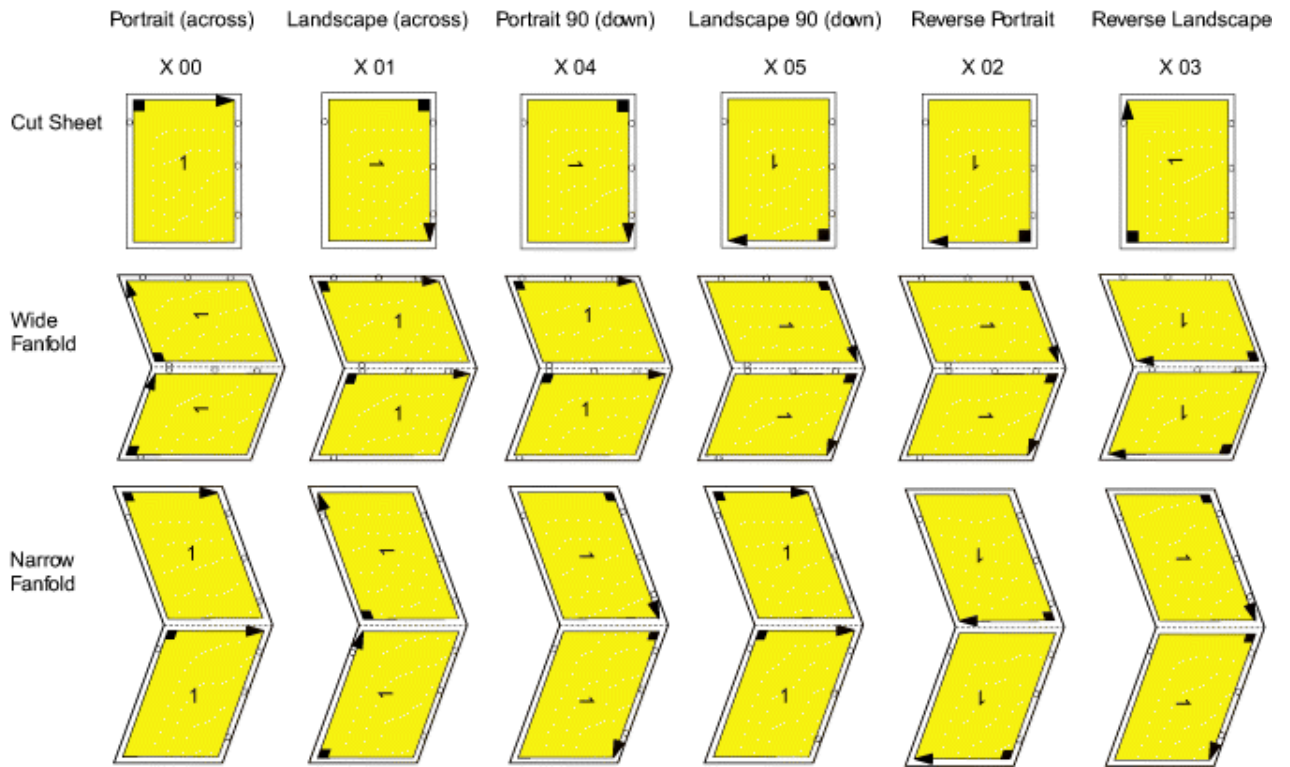


Figure 98: N_UP 1 Partition Numbering, Back Sheet-Side, Normal Duplex

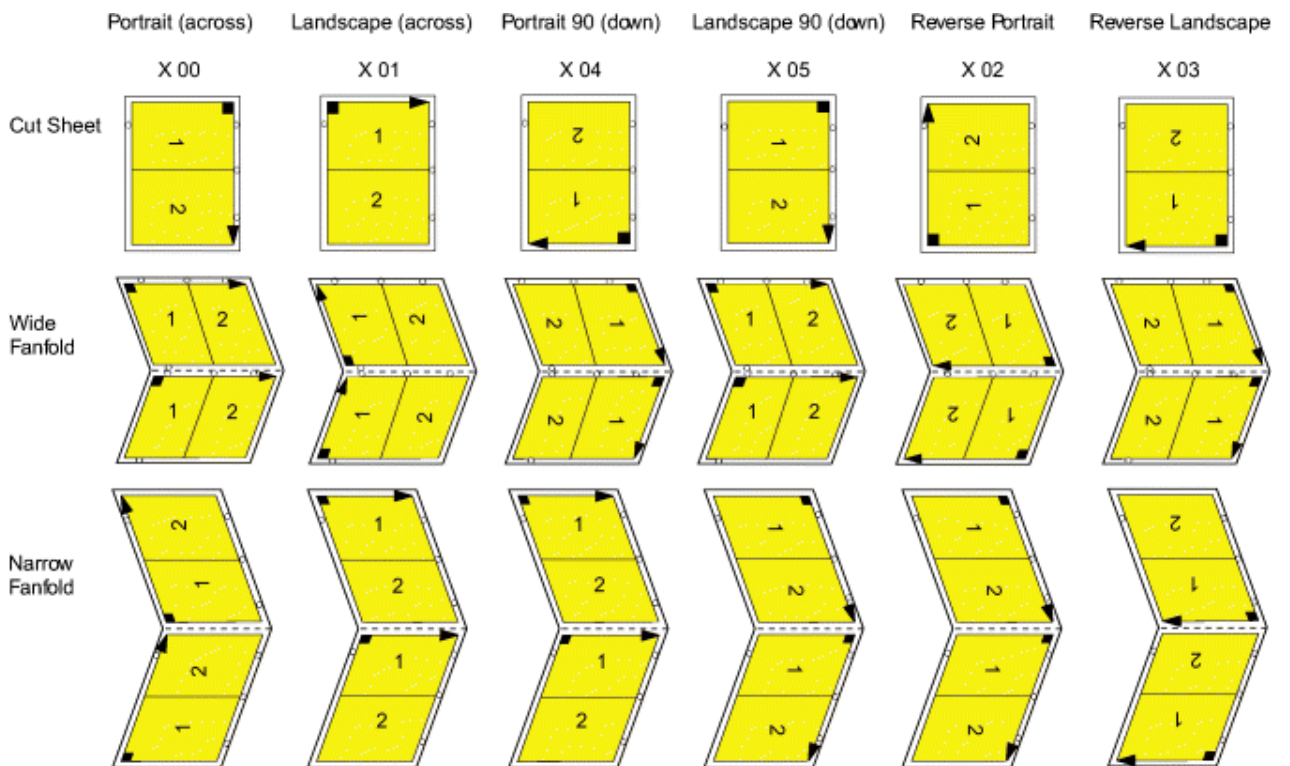


Figure 99: N_UP 2 Partition Numbering, Back Sheet-Side, Normal Duplex

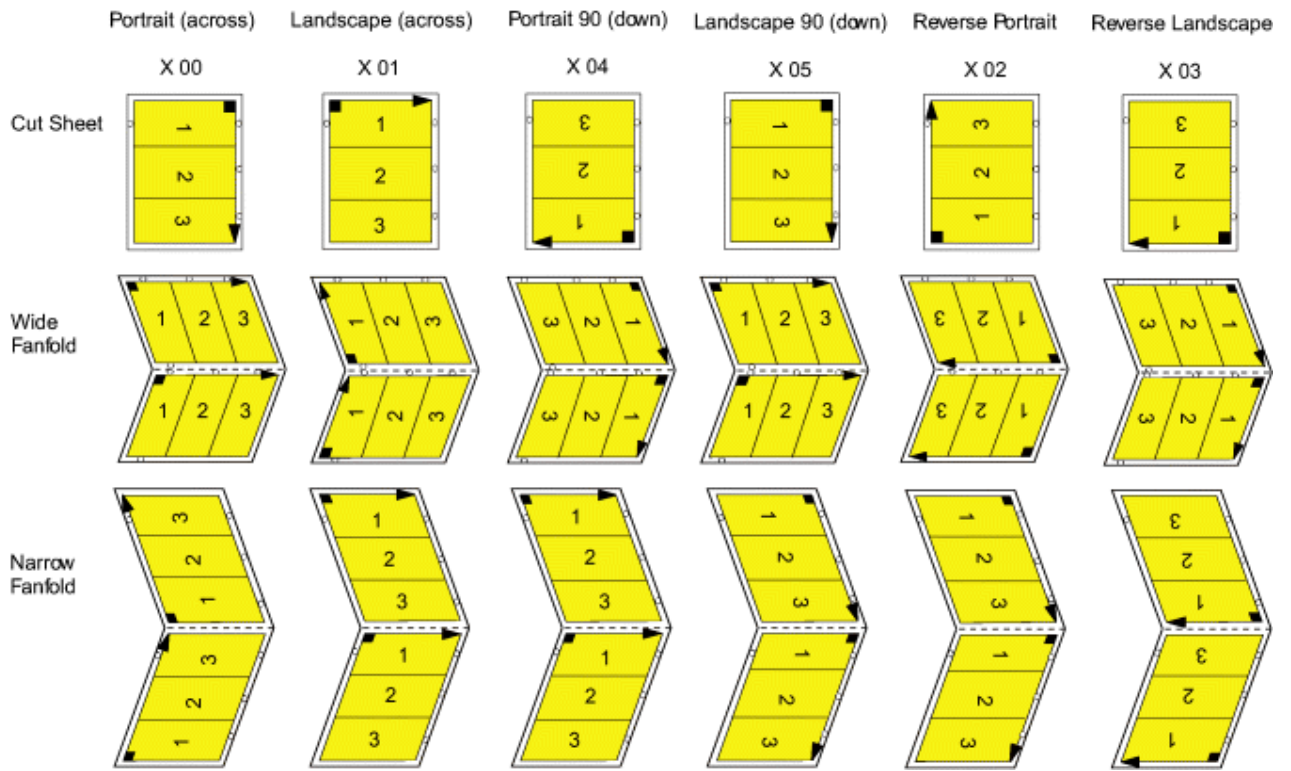


Figure 100: N_UP 3 Partition Numbering, Back Sheet-Side, Normal Duplex

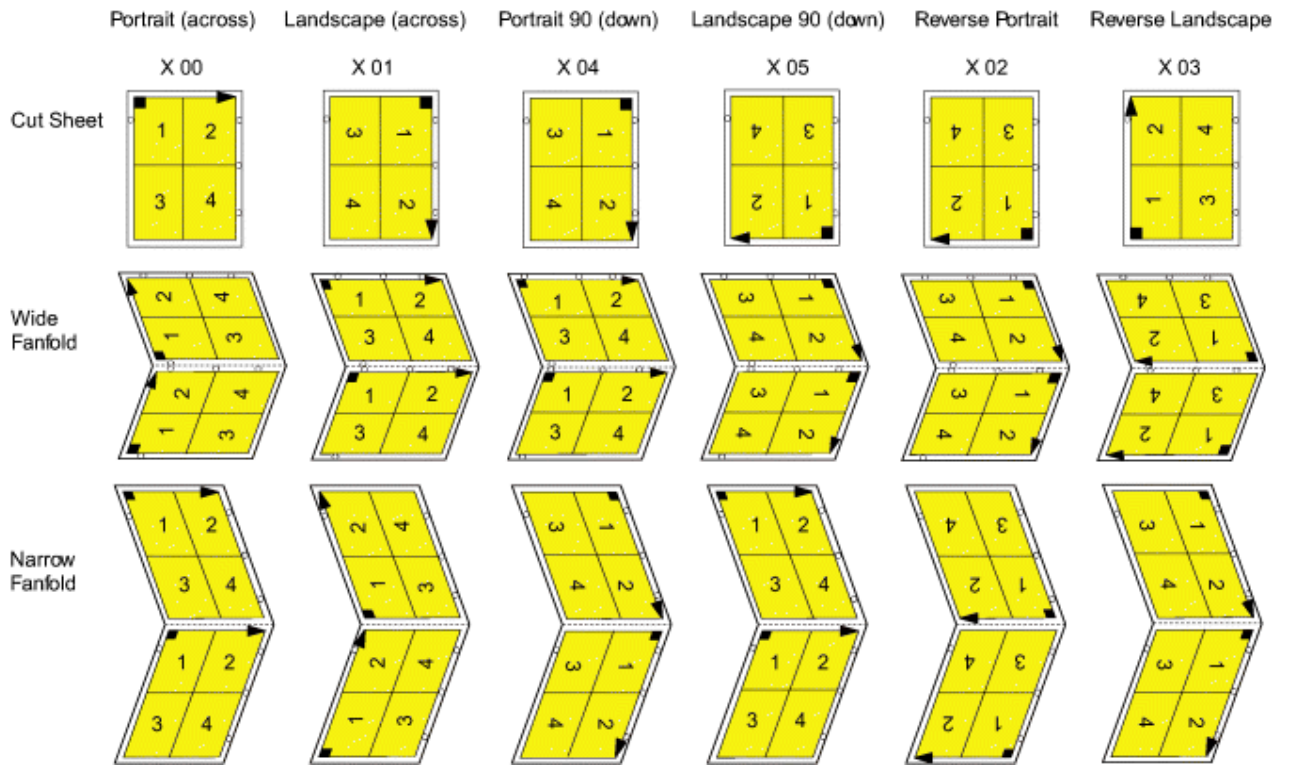


Figure 101: N_UP 4 Partition Numbering, Back Sheet-Side, Normal Duplex

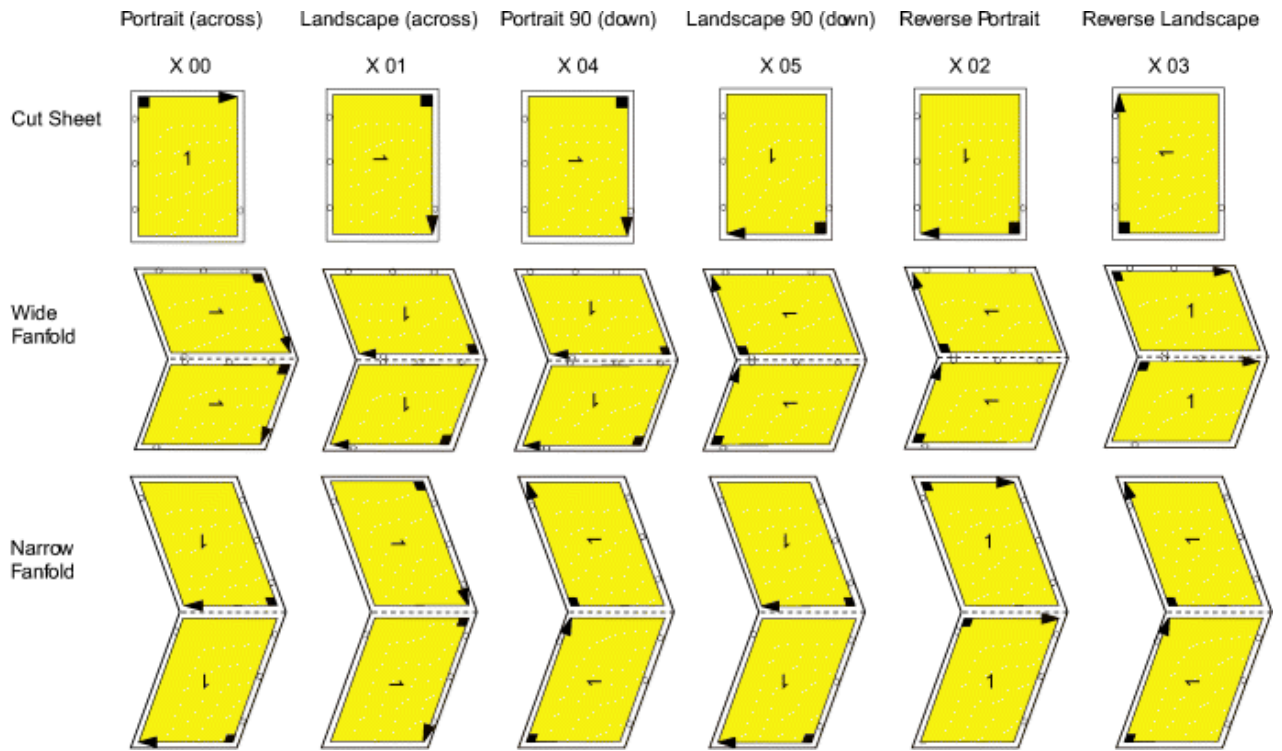


Figure 102: N_UP 1 Partition Numbering, Back Sheet-Side, Tumble Duplex

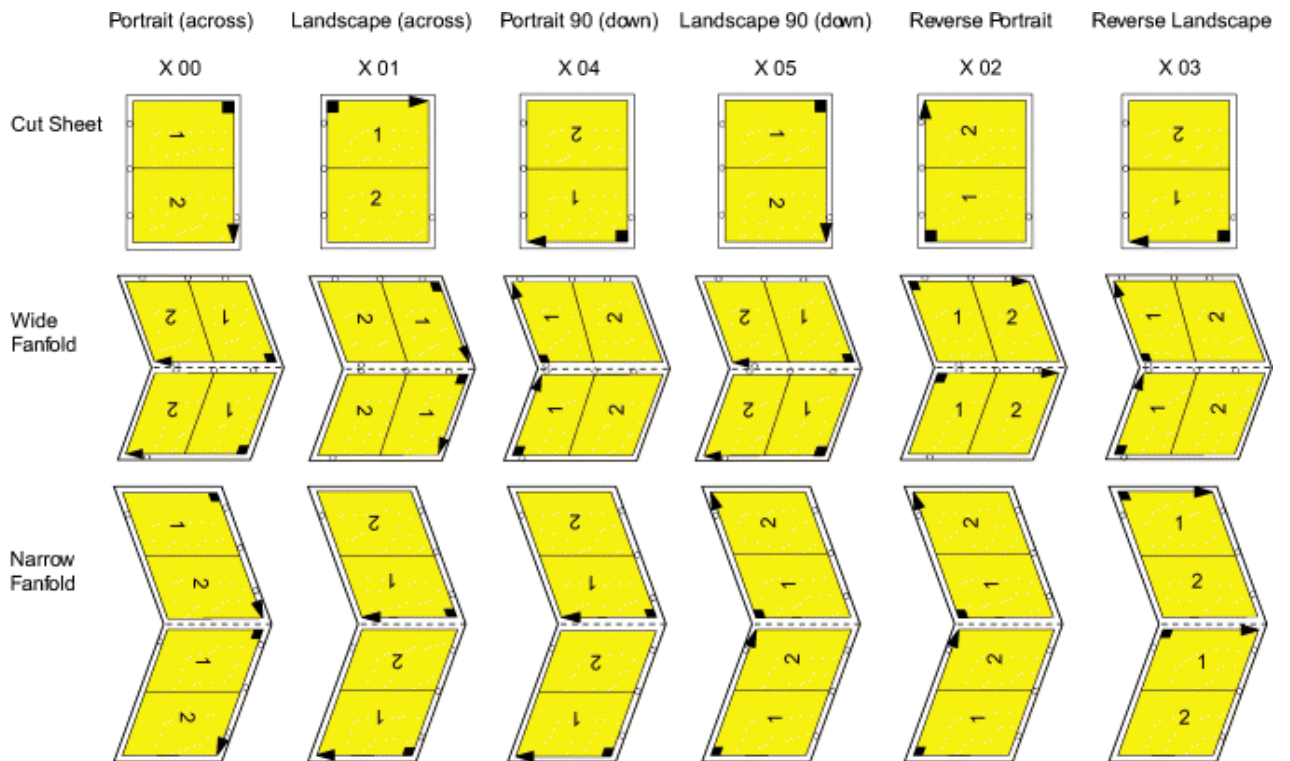


Figure 103: N_UP 2 Partition Numbering, Back Sheet-Side, Tumble Duplex

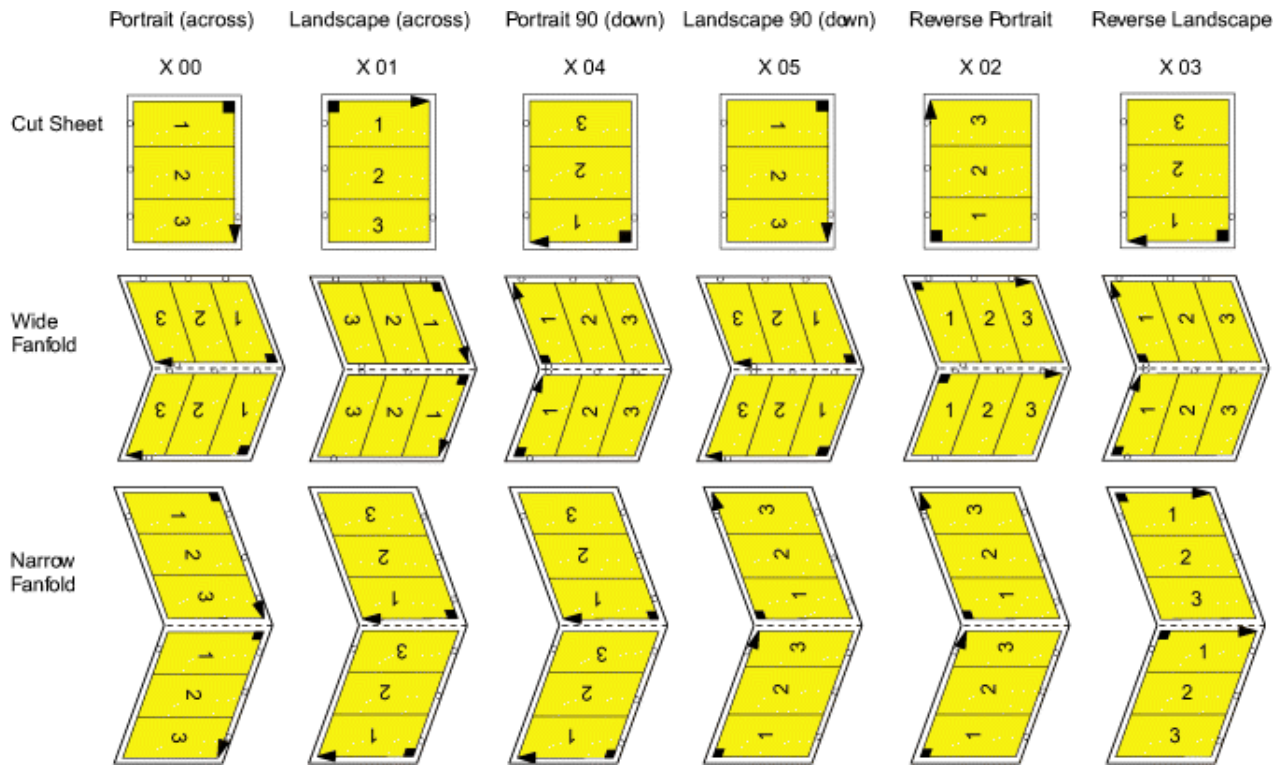


Figure 104: N_UP 3 Partition Numbering, Back Sheet-Side, Tumble Duplex

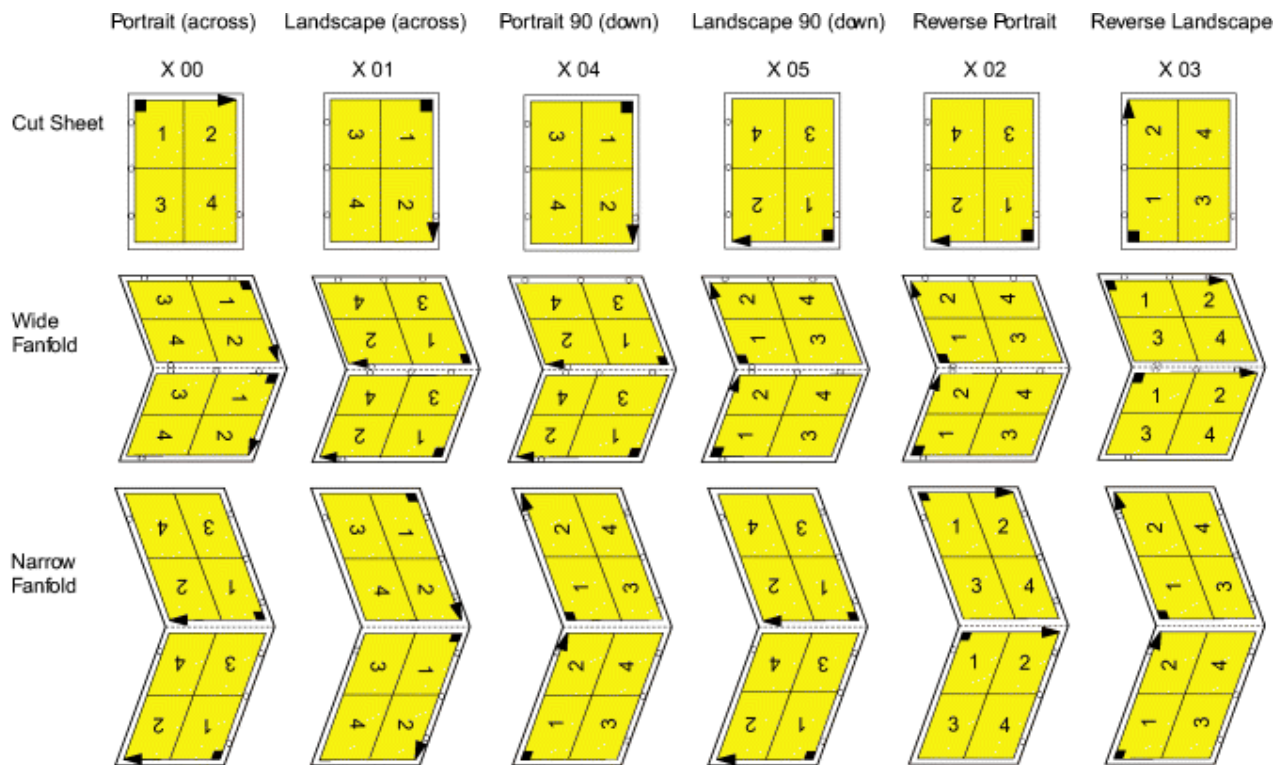
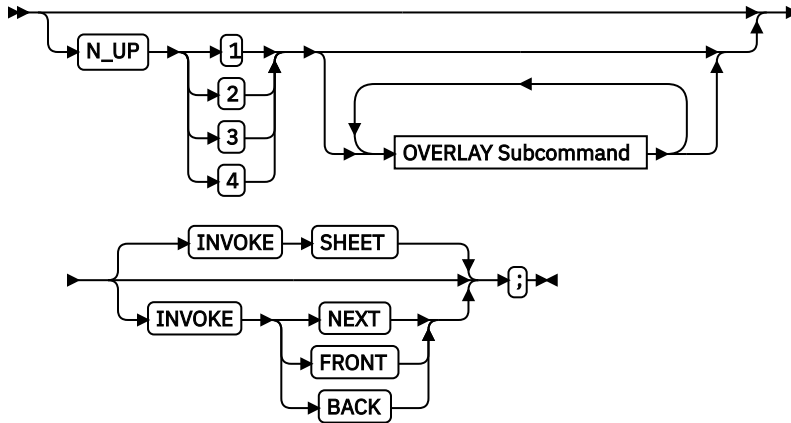


Figure 105: N_UP 4 Partition Numbering, Back Sheet-Side, Tumble Duplex

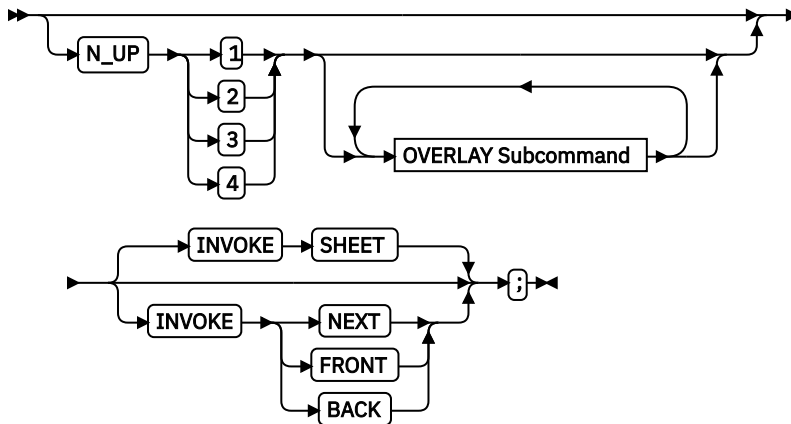
Basic N_UP Printing

You can specify the N_UP subcommand on either the FORMDEF or COPYGROUP commands in the form definition. The following syntax diagrams show the subcommands and parameters that are enabled with basic N_UP printing.

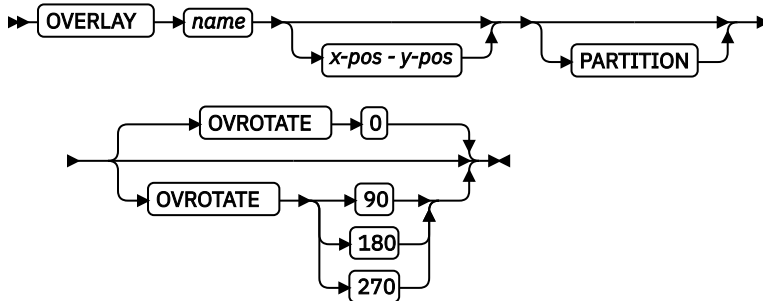
FORMDEF Subcommand



COPYGROUP Subcommand



OVERLAY Subcommand



The N_UP subcommand divides the medium into one, two, three, or four partitions, as described in [“N_UP Partitions and Partition Arrangement”](#) on page 129. The OVERLAY subcommand prints a page overlay in each partition at a specified offset from the page origin or the partition origin. For more information about page overlays, see [“Medium Overlays and Page Overlays”](#) on page 147.

The INVOKE subcommand controls the action that occurs if you invoke a new copy group. You can invoke copy groups by using conditional processing in the page definition or by including an Invoke Medium Map (IMM) structured field in the print data. The default action is to eject to a new sheet. By specifying an

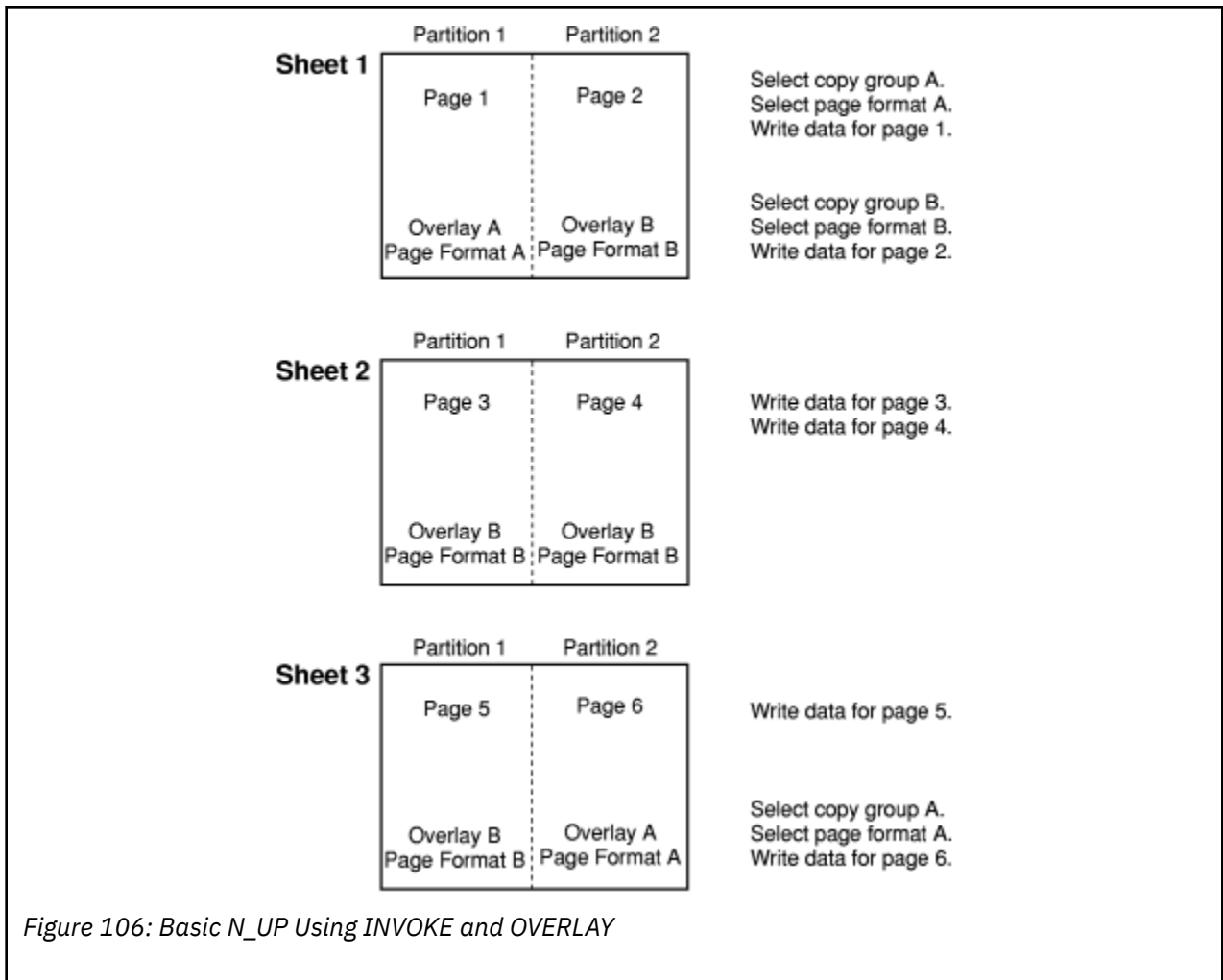
INVOKE subcommand on a COPYGROUP command, you can instead eject to a new N_UP partition, which might be on the same sheet. If printing in duplex mode, you can specify whether to eject to a partition on the front or back side of the sheet.

You must use page overlays instead of medium overlays if you want to change overlays while you are ejecting to a new partition. PSF accepts the NEXT, FRONT, and BACK values of the INVOKE subcommand only if the new copy group has the same medium modifications as the previous copy group. Medium modifications include duplexing, bin, page offset, N_UP values, presentation, direction, and medium overlays. If any of these modifications differ, PSF ejects to a new sheet when the copy group is invoked.

By combining INVOKE with the N_UP OVERLAY subcommand, you can place different page overlays in different partitions when you change copy groups. This format is illustrated in [“Example 1: Basic N_UP Using INVOKE and OVERLAY”](#) on page 137.

The following examples show the use of basic N_UP. Because each example builds on the previous one, read them in sequential order to better understand basic N_UP. All the pages that are used in the examples are formatted in the ACROSS printing direction. Their orientation on the media is the result of using the available PRESENT and DIRECTION combinations in the FORMDEF command.

Example 1: Basic N_UP Using INVOKE and OVERLAY



```

FORMDEF TWOUPS ;

COPYGROUP A
  N_UP 2
  OVERLAY A
  INVOKE NEXT ;

COPYGROUP B
  N_UP 2
  OVERLAY B
  INVOKE NEXT ;

```

Figure 107: Form Definition for Basic N_UP Using INVOKE and OVERLAY

Figure 106 on page 137 shows the INVOKE and OVERLAY functions of basic N_UP printing. Specifying INVOKE NEXT on the COPYGROUP command ensures that when the copy group is invoked by an Invoke Medium Map (IMM) structured field with conditional processing, the next page is placed in the next partition of the N_UP form.

The OVERLAY subcommand specifies a *page overlay*, which can be positioned relative to the page origin or relative to the partition origin. In basic N_UP, the OVERLAY subcommand prints the overlay with the page data in every partition on the sheet. However, as shown in this example, by using INVOKE NEXT, the application can use different overlays in different partitions.

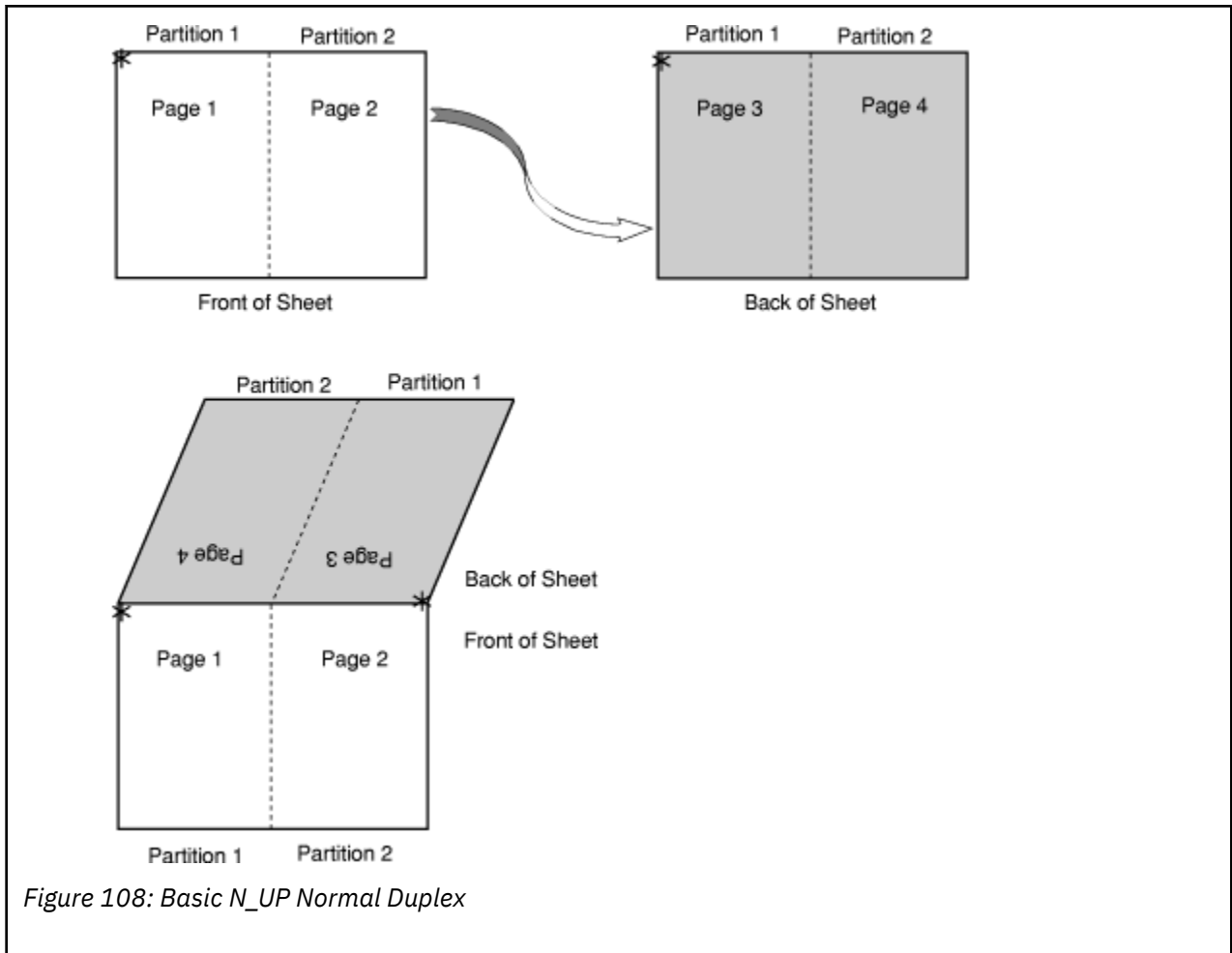
Example 1 is defined as N_UP 2 simplex with the default PORTRAIT ACROSS presentation, which results in the partitions that are illustrated in Figure 106 on page 137. The application uses different page formats on different application pages. With N_UP, changing page formats ejects to the next partition, just as it ejects to a new page in applications without N_UP.

The application also needs different overlays on different pages. Because the overlays are specified on N_UP in the COPYGROUP subcommand, the application can put different overlay on different pages by changing copy groups. Without the INVOKE subcommand, changing the copy group forces an eject to a new physical sheet. However, because INVOKE NEXT is specified, the eject is to the next partition. Changing to copy group B after page 1 is written places page 2 in partition 2 of the same physical sheet. If the change is made after a page is placed in partition 2, the eject to the next partition is to partition 1 of the next sheet. The page is printed with the overlay that is specified in the new copy group.

Notes:

1. The pages in this example are line-format print data, which is formatted with a page definition. The example is the same for MO:DCA data, except that page formats are not used.
2. You can select the copy groups and page formats by including IMM and IDM structured fields in the print data or by using conditional processing in the page formats.
3. Overlays can be defined as *page overlays* in the page definition or in the form definition N_UP or PLACE subcommands. Overlays can also be defined as *medium overlays* in the form definition SUBGROUP command. If you want to change overlays when you are ejecting to a new partition, use page overlays instead of medium overlays. See [“Medium Overlays and Page Overlays”](#) on page 147 for information about page and medium overlays.

Example 2: Basic N_UP Normal Duplex



```

FORMDEF NUPDUP
N_UP 2
PRESENT PORTRAIT
DIRECTION ACROSS
DUPLEX NORMAL ;

```

Figure 109: Form Definition for Basic N_UP Normal Duplex

Figure 108 on page 139 shows the partition order for duplexed pages. This figure also shows the partitions into which the sheet is divided for N_UP 2 with PORTRAIT presentation and ACROSS direction. With normal duplex, the sheet is rotated around its y-axis, which is the right edge of the sheet. The result is that partition 2 for the back side of the sheet is on the back of partition 1 for the front side, and page 4 is on the back of page 1. The tops of pages 3 and 4 are aligned with the tops of pages 1 and 2.

Example 3: Basic N_UP 2 Tumble Duplex

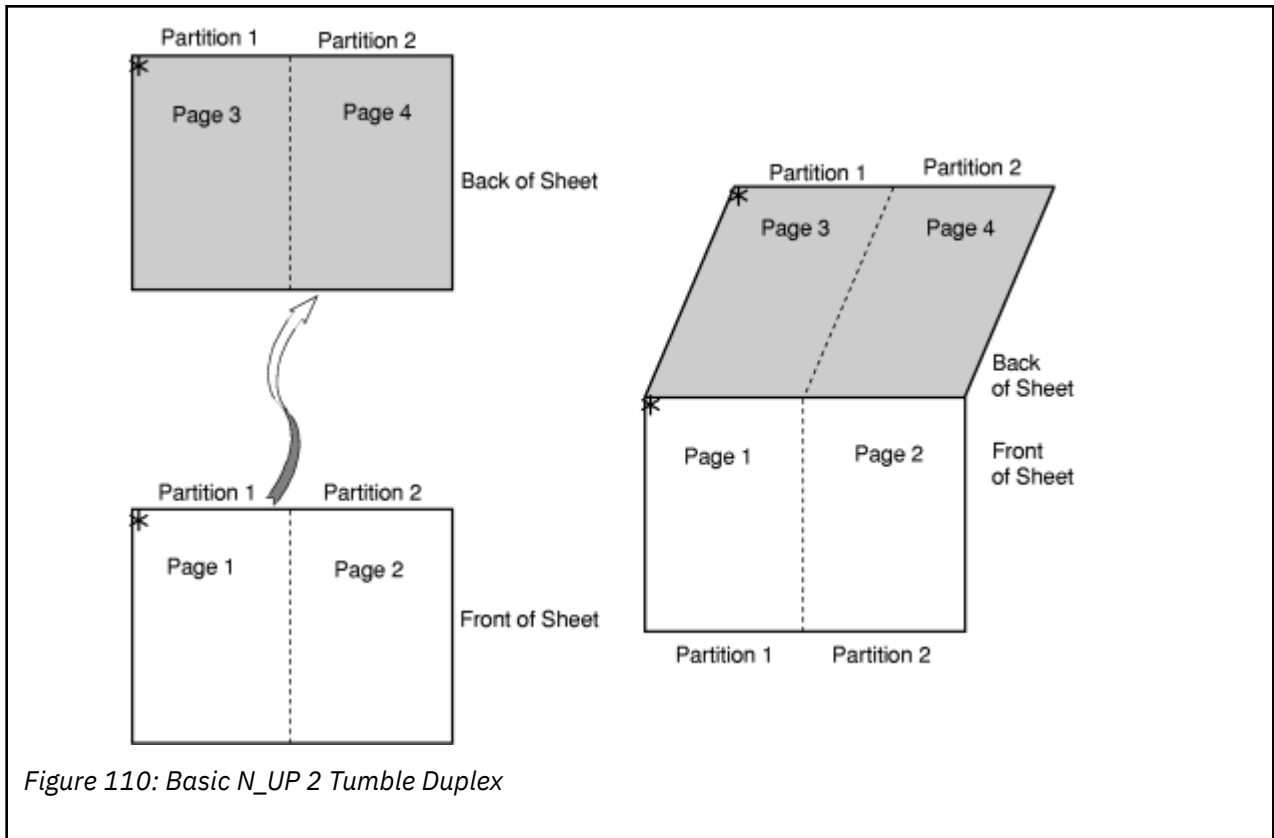


Figure 110: Basic N_UP 2 Tumble Duplex

```
FORMDEF NUPTUM
N_UP 2
PRESENT PORTRAIT
DIRECTION ACROSS
DUPLEX TUMBLE ;
```

Figure 111: Form Definition for Basic N_UP 2 Tumble Duplex

Figure 110 on page 140 shows the partition order for tumble duplex pages. This figure also shows the partitions into which the sheet is divided for N_UP 2 with PORTRAIT presentation and ACROSS direction. With tumble duplex, the sheet is rotated around its x-axis, which is the top of the sheet. The result is that partition 1 of the back of the sheet falls on the back of partition 1 for the front, and page 3 falls on the back of page 1. The tops of pages 3 and 4 are aligned with the bottoms of pages 1 and 2. For more information about normal and tumble duplex printing, see “Normal Duplex and Tumble Duplex” on page 13.

Enhanced N_UP Printing

Enhanced N_UP is supported on AFP continuous forms printers. In addition to all the function of basic N_UP, enhanced N_UP includes the powerful PLACE subcommand.

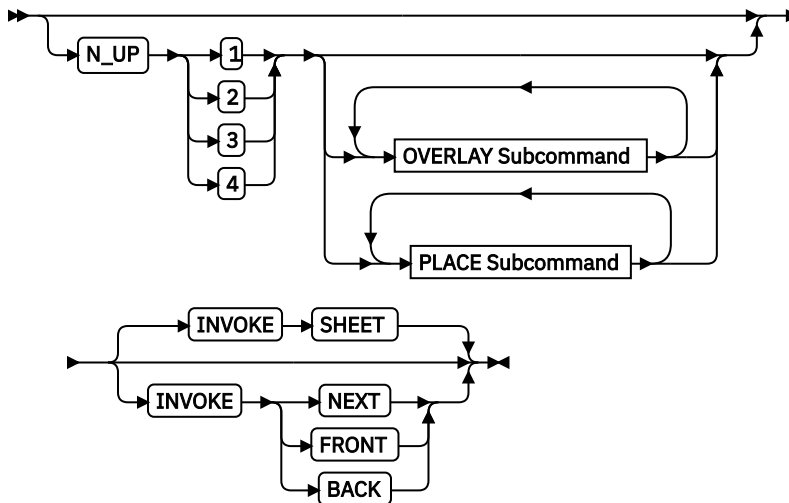
Using the PLACE subcommand, you can place pages in the partitions in any sequence, specify unique overlays for each page, and rotate both the page and the overlays in the partitions. You can place multiple pages in the same partition and no pages in other partitions, and you can extend pages across partition boundaries. In short, you can place pages of any size at any location on the front or back of the sheet, in any orientation. The only limits are that the pages must not extend outside the boundaries of the physical sheet, and the pages must not exceed the total number of N_UP partitions that are specified for the sheet.

You use a single PLACE command to place each page of data on the sheet. You must specify the same number of PLACE commands as the number of N_UP partitions for the sheet. This specification is required for error recovery and restart integrity. If you do not want to place as many pages as partitions, you can

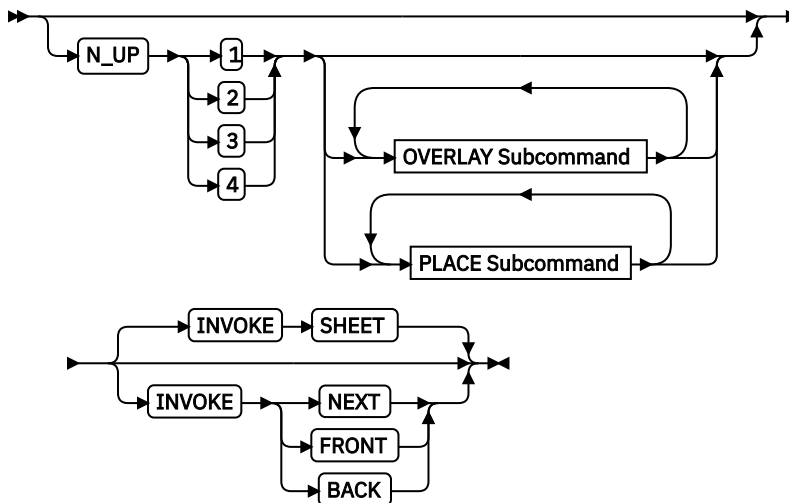
specify **CONSTANT** on a **PLACE** command to indicate that no data is to be placed in the partition. You can specify the **OVERLAY** subcommand with the **CONSTANT** subcommand to place overlays without user's data. The following syntax diagrams show the subcommands and parameters that are enabled with enhanced **N_UP** printing.

For most applications, place constant overlays before you place data on the sheet because the overlay is not placed until the next page of data is placed. If your application changes copy groups or runs out of pages on the sheet before it reaches the constant overlay **PLACE** subcommand, the constant overlay is not printed. However, if you do not want the overlays to print in these cases, place the constant overlay after you place the page data.

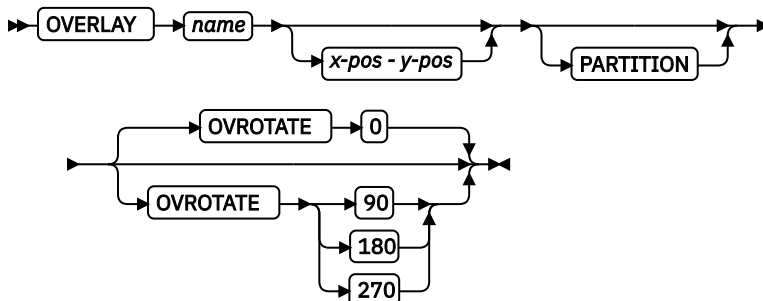
FORMDEF



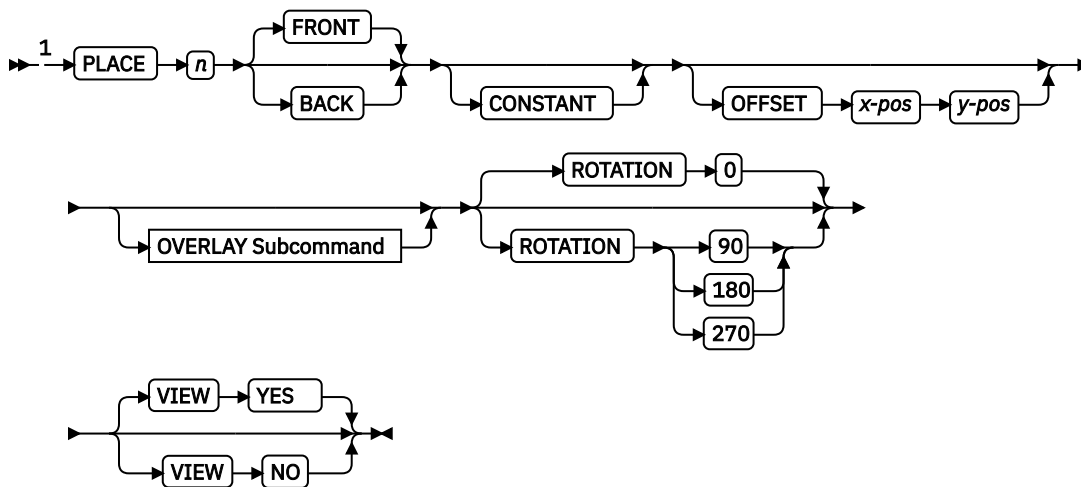
COPYGROUP



OVERLAY Subcommand



PLACE Subcommand



Notes:

¹ The use of the PLACE subcommand indicates enhanced N_UP printing.

The following examples show enhanced N_UP printing. Read these examples in sequence to better understand enhanced N_UP printing.

Example 1: Enhanced N_UP Using PLACE

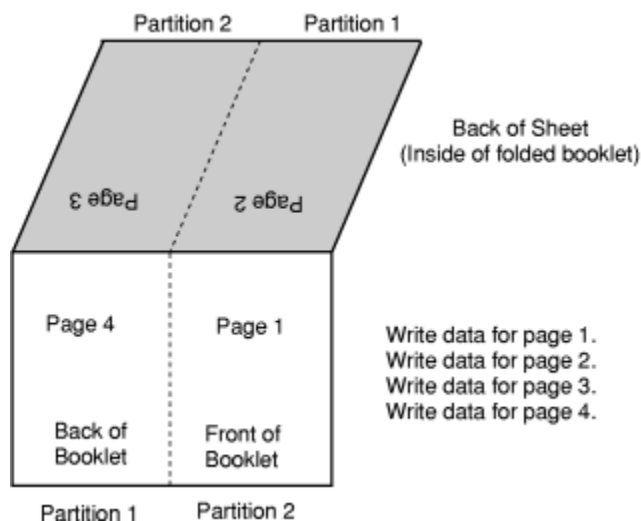


Figure 112: Enhanced N_UP Using PLACE

```

FORMDEF BOOKLT DUPLEX NORMAL
N_UP 2
/* Page 1 */ PLACE 2 FRONT
/* page 2 */ PLACE 1 BACK
/* Page 3 */ PLACE 2 BACK
/* Page 4 */ PLACE 1 FRONT ;

```

Figure 113: Form Definition for Enhanced N_UP Using PLACE

Figure 112 on page 142 shows the function of the PLACE subcommand in specifying the sequence of partitions into which pages are placed. This example is N_UP 2 duplex. The default partition sequence is

from left to right. Notice that when printing in normal duplex, partition 1 on the back of the sheet aligns with partition 2 on the front of the sheet. See “Example 2: Basic N_UP Normal Duplex” on page 138 and “Example 3: Basic N_UP 2 Tumble Duplex” on page 139 for information on N_UP duplex partitions.

For this booklet, you do not want to print pages in the default order: partitions 1 and 2 on the front, followed by partitions 1 and 2 on the back. Instead, print the pages so that when the sheet is folded, you have a booklet, with page 1 on the front outside of the booklet, pages 2 and 3 inside the folded booklet, and page 4 on the back outside of the booklet. The form definition that is shown in Figure 113 on page 142 uses the PLACE subcommand of enhanced N_UP to place pages in the partitions in the order that is needed. The application writes the pages in order, page 1 through page 4, and the N_UP form definition provides the correct sequencing in the partitions.

Example 2: Enhanced N_UP Using CONSTANT and OVERLAY

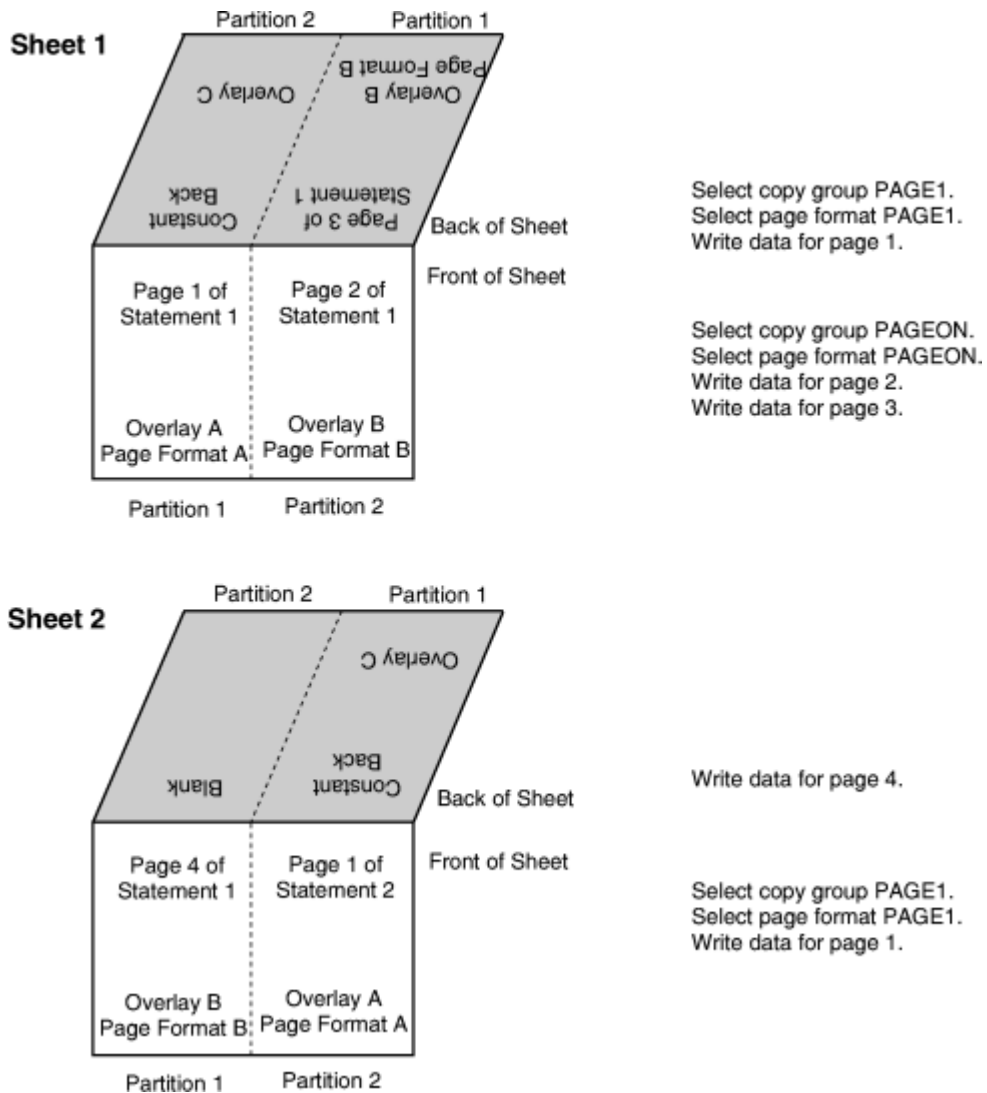


Figure 114: Enhanced N_UP Using CONSTANT and OVERLAY

```

FORMDEF STATMT DUPLEX NORMAL ;

COPYGROUP PAGE1
  INVOKE BACK
  N_UP 2
  PLACE 2 BACK      CONSTANT OVERLAY C
  PLACE 1 FRONT    OVERLAY A
  PLACE 1 BACK      CONSTANT OVERLAY C
  PLACE 2 FRONT    OVERLAY A ;

COPYGROUP PAGON
  INVOKE NEXT
  N_UP 2
  PLACE 1 FRONT    OVERLAY B
  PLACE 2 BACK     OVERLAY B
  PLACE 2 FRONT    OVERLAY B
  PLACE 1 BACK     OVERLAY B ;

```

Figure 115: Form Definition for Enhanced N_UP Using CONSTANT and OVERLAY

Figure 114 on page 143, introduces the CONSTANT subcommand of enhanced N_UP and shows the functions of the PLACE subcommand, which was described in “Example 1: Enhanced N_UP Using PLACE” on page 142 and the INVOKE subcommand, which was described in “Example 1: Basic N_UP Using INVOKE and OVERLAY” on page 137. This figure represents a user application that is printing customer statements with the values N_UP 2 duplex. The PLACE subcommand places the pages in the correct order for post-processing equipment to cut the sheets into individual pages and interleave them to produce sequential pages. The INVOKE subcommand ensures that one customer's statement is never printed on the back side of another customer's statement. The N_UP 2 subcommand, which is combined with the default PORTRAIT ACROSS presentation, divides the sheet into the two partitions that are illustrated in Figure 114 on page 143.

In Figure 114 on page 143, page 1 of each customer's statement is printed with overlay A. The back side of page 1 is a constant overlay, with no user's data. The remaining pages of each customer's statement are printed with overlay B.

The copy groups place the required overlays on both the right and left halves of the sheet so that a new customer statement can begin on either half of the sheet. COPYGROUP PAGON assigns overlay B to all partitions on the sheet. COPYGROUP PAGE1 assigns overlay A to all front partitions and overlay C to all back partitions. The CONSTANT parameter that is used with OVERLAY C means that no user's data is printed in the partition with the overlay. To ensure that the constant overlay prints whenever page 1 is printed, the PLACE subcommand for the constant overlay is specified before the PLACE subcommand for page 1 print data. The INVOKE subcommand specifies BACK to ensure that the overlay is printed on the back of the partition.

In the application that is shown in Figure 114 on page 143, the copy group is changed to PAGON after page 1 is printed. Because the constant overlay and page 1 were printed with the first two PLACE commands of copy group PAGE1, the third PLACE command in new copy group is used for the next page. Page 2 of statement 1 is placed in partition 2 front, as specified in the third PLACE subcommand of copy group PAGON.

After the fourth and last page of statement 1, the copy group is changed back to PAGE1 to print page 1 of statement 2. Page 4 of statement 1 printed in front partition 1 using the first PLACE subcommand of copy group PAGON. N_UP selects the second PLACE subcommand of copy group PAGE1: PLACE 1 FRONT. But the INVOKE subcommand for copy group PAGE1 specifies BACK. N_UP continues sequentially through the PLACE subcommands of copy group PAGE1 until it finds a BACK partition. The third PLACE subcommand is: PLACE 1 BACK CONSTANT OVERLAY C. The constant overlay is placed in partition 1 on the back of the sheet, then page 1 of the new customer's statement is printed by using the next PLACE subcommand: PLACE 2 FRONT on the front side of the constant overlay.

Note: You can use NEXT, FRONT, or BACK on the INVOKE subcommand only when you are switching between copy groups that have identical medium modifications, including identical N_UP values and an

identical number of PLACE subcommands. If the copy groups have different values, the INVOKE command causes an eject to a new physical sheet.

Example 3: Enhanced N_UP Asymmetric Pages

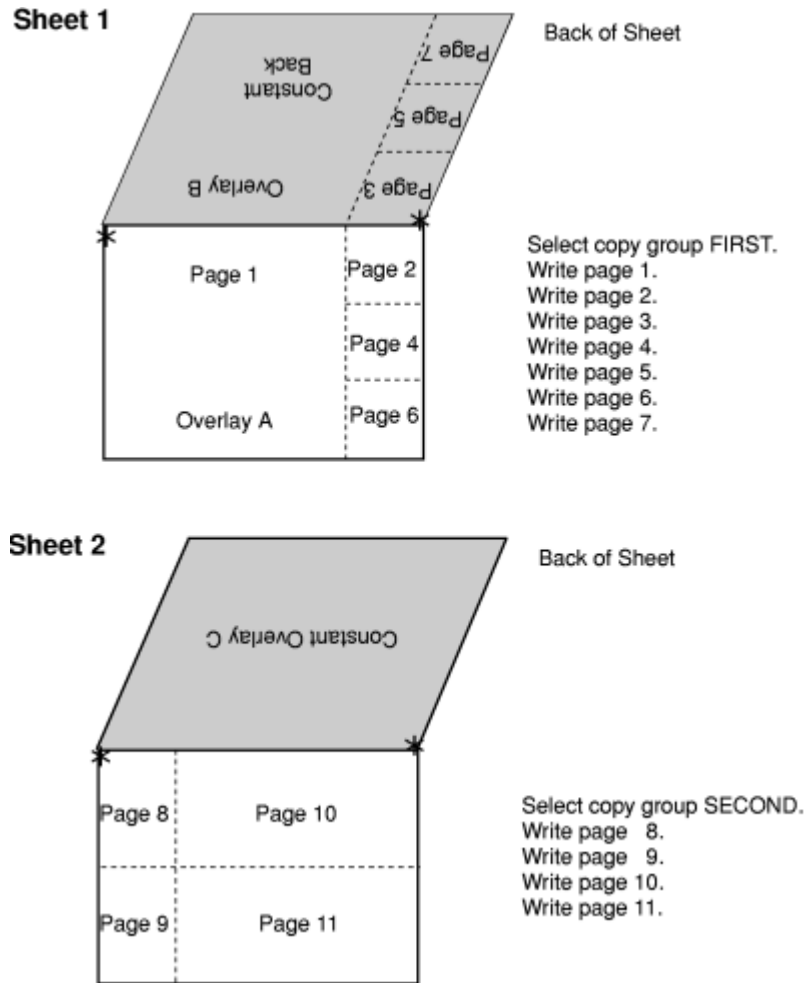


Figure 116: Enhanced N_UP Asymmetric Pages

Figure 116 on page 145 shows the flexibility and power of enhanced N_UP printing. With enhanced N_UP printing, you can place pages relative to any partition on the sheet, front or back, in any sequence. Pages are not limited by partition boundaries. The only limitations are that pages must not print outside the physical form boundaries, and you cannot place more pages on a sheet than the number specified in the N_UP subcommand. For an N_UP 4 duplex page, the limit is eight pages total on front and back sides combined. For N_UP 3 duplex, the limit is six pages on the front and back combined.

Note: In the duplex examples in Figure 116 on page 145 all of the pages can be on one side, with the other side blank.

```

FORMDEF ASYMET DUPLEX NORMAL ;

COPYGROUP FIRST
PRESENT LANDSCAPE DIRECTION ACROSS
N_UP 4
/* Constant*/ PLACE 1 BACK OFFSET 4 0 CONSTANT OVERLAY B
/* Page 1 */ PLACE 1 FRONT OFFSET 0 0 Overlay A
/* Page 2 */ PLACE 1 FRONT OFFSET 12 0
/* Page 3 */ PLACE 1 BACK OFFSET 0 0
/* Page 4 */ PLACE 1 FRONT OFFSET 12 4
/* Page 5 */ PLACE 1 BACK OFFSET 0 4
/* Page 6 */ PLACE 1 FRONT OFFSET 12 8
/* Page 7 */ PLACE 1 BACK OFFSET 0 8 ;

COPYGROUP SECOND
PRESENT PORTRAIT DIRECTION ACROSS
N_UP 3
/* Constant*/ PLACE 1 BACK OFFSET 0 0 CONSTANT OVERLAY C
/* Page 8 */ PLACE 1 FRONT OFFSET 0 0
/* Page 9 */ PLACE 1 FRONT OFFSET 0 4
/* Page 10 */ PLACE 1 FRONT OFFSET 6 0
/* Page 11 */ PLACE 1 FRONT OFFSET 6 4
/* 6th place */ PLACE 1 BACK OFFSET 0 0 CONSTANT ;

```

Figure 117: Form Definition for Enhanced N_UP Asymmetric Pages

To achieve the asymmetrical page placement that is shown in this example, place all the pages relative to the origin of partition 1 on the front or the back side of the sheet. You can place the pages relative to the origin of any of the partitions, but if you use partition 1, it simplifies the calculations for page positions.

With N_UP 4, the default PORTRAIT presentation and ACROSS direction place the origin at the upper right of the partition on wide, continuous-form paper. In this example, specifying LANDSCAPE ACROSS sets the origin at the upper-left corner to achieve the correct page arrangement.

The coding of the form definition is shown in Figure 116 on page 145. Copy group FIRST specifies N_UP 4, which requires eight PLACE subcommands for the duplex page. Observe that the constant overlay B on the back of the sheet represents one of the eight PLACE subcommands. COPYGROUP SECOND used for the second sheet specifies N_UP 3. You must use six PLACE subcommands. Four pages are placed on the front side, and a constant overlay is placed on the back, with five of the six PLACE subcommands. A CONSTANT page is specified without an overlay to fill the sixth PLACE subcommand. Nothing is printed with this PLACE subcommand, but it is required to ensure a correct internal page count for recovery and restart.

Note: In each copy group, the PLACE subcommand for the constant overlay is placed in front of all the PLACE subcommands for page data. This placement ensures that the constant overlay prints if any pages are printed on the sheet. Otherwise, if you change copy groups or run out of pages before the PLACE command for the constant overlay, the overlay does not print.

Additional N_UP Considerations

N_UP can affect the scope of other PPFA commands that operate on a page or a medium.

COPIES

The COPIES subcommand in the SUBGROUP of the form definition operates on the physical medium. When you specify five copies with N_UP 2, you get five sheets of the N_UP 2 data.

SUPPRESSION

The SUPPRESSION subcommand in the SUBGROUP of the form definition operates on the physical medium. The suppression names in the SUBGROUP operate on all N_UP pages on the sheet.

OVERLAY

You can specify an OVERLAY subcommand in multiple places in the form definition and can also specify an overlay in the page definition. The result is either a *page overlay* or a *medium overlay*. See

“Medium Overlays and Page Overlays” on page 147 for a description of the differences between these commands and the uses of these overlays.

PRESENT DIRECTION

You use the PRESENT and DIRECTION subcommands of the form definition with the N_UP subcommand to determine partition arrangement. These commands, which are described in this update guide, now affect all N_UP printers, including cut-sheet printers.

CONDITION

You can use the CONDITION command of the page definition with N_UP just as you use it with non N_UP jobs. However, the NEWSIDE and NEWFORM parameters might operate differently than you expect. NEWSIDE, which is equivalent to invoking a new page format, ejects to the next partition, which might not be on a new side of an N_UP sheet. NEWFORM, which is equivalent to invoking a new copy group, ejects to a new sheet with basic N_UP. The effect with enhanced N_UP depends on the coding of the INVOKE subcommand.

Medium Overlays and Page Overlays

An AFP overlay can be used as a *page overlay* or as a *medium overlay*. Different actions are done on these two different types of overlays. Page overlays apply to the page and are placed relative to the page origin. Medium overlays always apply to the entire medium and are placed at the medium origin. When used with N_UP, the medium overlay still applies to the entire sheet of paper, not to the individual partitions.

The same overlay can be either a page overlay or a medium overlay, depending on the method that is used to invoke it for printing. An overlay that is invoked by a page definition or by an Include Page Overlay (IPO) structured field is always a page overlay. An overlay that is invoked by a form definition without N_UP is

always a medium overlay. When N_UP is specified in the form definition, you can specify commands to invoke a page overlay. The following examples show the ways in which overlays can be invoked.

```
PAGEDEF EXMPL1 ;
PAGEFORMAT P2EXMPL1;
OVERLAY EXMPL1;      /* Allows this page overlay to be */
                    /* invoked by an IPO structured field */
PRINTLINE REPEAT 60; /* coded in the print data */
```

Figure 118: Page Overlay Invoked by an IPO Structured Field

```
PAGEDEF EXMPL2 ;
PAGEFORMAT P2EXMPL2;
OVERLAY EXMPL2;      /* Optional. Stores overlay for reuse */
PRINTLINE REPEAT 1
  POSITION 1 IN 1 IN
  OVERLAY EXMPL2     /* Prints overlay if data prints on printline */
  -1 IN -1 IN ;     /* Positions overlay relative to printline */
PRINTLINE REPEAT 50;
```

Figure 119: Page Overlay Invoked by a PRINTLINE Command

```
FORMDEF EXMPL3 ;
COPYGROUP F2EXMPL3
DUPLEX NORMAL ;
OVERLAY XMPL3F;      /* Allows SUBGROUP to invoke overlay */
OVERLAY XMPL3B;      /* Allows SUBGROUP to invoke overlay */
SUBGROUP FRONT
OVERLAY XMPL3F;      /* Prints overlay on front of every form */
SUBGROUP BACK
OVERLAY XMPL3B;      /* Prints overlay on back of every form */
```

Figure 120: Medium Overlay Invoked by a Form Definition

```
FORMDEF EXMPL4 ;
COPYGROUP F2EXMPL4
N_UP 2
OVERLAY EXMPL4      /* Prints overlay with page in every */
  0 0 ;             /* Partition at the page origin (0,0) */
```

Figure 121: Page Overlay in a Simple N_UP Form Definition

```
FORMDEF EXMPL5 ;
COPYGROUP F2EXMPL5
N_UP 2
  PLACE 1
  OVERLAY XMPL51     /* Prints overlay in Partition 1 */
  0 0 PARTITION     /* Places it relative to Partition */
  PLACE 2
  OVERLAY XMPL52     /* Prints overlay in Partition 2 */
  0 0 PARTITION ;   /* Places it relative to Partition */
```

Figure 122: Page Overlay in an Enhanced N_UP Form Definition

N_UP Compared to Multiple-up

With the addition of the N_UP capability, AFP now provides two methods to format multiple application pages on a single sheet:

- N_UP as defined in a form definition
- Multiple-up as defined in a page definition

The multiple-up function is available for line-format data that is printed on AFP printers. Multiple-up achieves the appearance of multiple pages on a sheet by formatting multiple groups of print lines as a single AFP page. The output is still a single AFP page on a side of a sheet, and the entire output is formatted by a single page format. If the application pages within that sheet require different print layouts, you must design a different page format for all possible arrangements of data. For example, if one

side of a 2-up sheet has 10 different print layouts, you need 100 different page formats to cover all the possible combinations.

In contrast, N_UP is used to place multiple AFP pages on a side of a sheet, which means that each of the N_UP pages can be formatted with a different page format. You can change page formats between each N_UP page without ejecting to a new side of the sheet. For the same example with N_UP, you need only 10 page formats for a 2-up sheet with 10 different print layouts.

N_UP also means that you can place multiple pages of fully composed AFP data (or MO:DCA data) on a single sheet. This was not possible with the multiple-up function that is defined in the page definition because AFP data does not use a page definition.

Chapter 8. AFP Color Management

You can use various ways to print color data with Advanced Function Presentation (AFP). However, to implement an AFP color printing solution with full color management, you must use color management resources (CMRs). Also, for best results, install all of your color images as data objects and associate CMRs with them.

Color management resources

Color management resources (CMRs) are the foundation of color management in AFP print systems. CMRs are AFP resources that provide all the color management information, such as ICC profiles and halftones, that an AFP system needs to process a print job and maintain consistent color from one device to another.

CMRs share some characteristics with other AFP resources, but are different in some important ways.

CMRs are similar to other AFP resources in these ways:

- CMRs can be associated with elements of a print job at various levels of the hierarchy.

Normal hierarchy rules apply, so CMRs specified at lower levels override the ones that are specified at the higher level. For example, a CMR set on a data object overrides a default CMR set on a print file.

- CMRs can be included in a print job in an inline resource group and referenced in a form definition, page environment, object environment, or an include Object (IOB) structured field.

Note: CMRs can vary in size from several hundred bytes to several megabytes. If your print job uses relatively few CMRs, including them in the print file might not have an impact on the performance of your system. However, if your print job uses more than 10 CMRs, the size of the print job can increase so much that file transfer rates and network traffic are affected.

- CMRs can be stored centrally in a resource library, so you do not need to include them in every print job. You can configure all your print servers so they can access the CMRs.
- For the print server to find CMRs, the resource library must be listed in the AFP resource search path on the print server.

CMRs are different from other AFP resources in these ways:

- You cannot copy CMRs into a resource library as you can other AFP resources.

To store CMRs in a central resource library, you must install them using an application such as AFP Resource Installer.

- CMRs and data objects must be stored in resource libraries that have resource access tables (RATs).

AFP Resource Installer creates the RAT when CMRs and data objects are installed. For best results, install CMRs and data objects in separate resource libraries and store resources that do not require RATs (such as form definitions, page definitions, and overlays) in other resource libraries.

- CMRs installed in a resource library can have names longer than 8 characters, and you can use the names in the print data stream. These names are created when you install the CMR with AFP Resource Installer and are UTF-16BE encoded.

Types of CMRs

Different situations call for different types of CMRs. Some CMRs are created by product manufacturers so you can download and use them, while others are created by your printer or other color management software. If you have the appropriate information, you can also create CMRs yourself.

Some CMRs are used to interpret input files (similar to the function done by ICC input profiles), while others are used to prepare the final print job output for a specific printer (similar to the function done by ICC output profiles).

Color conversion CMR

Color conversion CMRs are used to convert colors to and from the ICC Profile Connection Space (PCS), a device-independent color space. You can use them to prepare images for color or grayscale printing.

Color conversion CMRs are an essential element of any AFP color management system because they are ICC profiles encapsulated in AFP structures. The AFP structures add information that your color management system can use, but it leaves the ICC profile unaltered.

You can use color conversion CMRs to produce consistent colors on different devices. In a color system, color conversion CMRs help ensure that the colors on your monitor are as close as possible to the ones that are printed. If you move the print job to a different printer, the colors are adjusted again to match the new printer.

In a grayscale system, color conversion CMRs map colors to appropriate shades of gray to produce high-quality black and white images.

Pass-through CMRs are color conversion CMRs that indicate that no color processing is done if the color space of the presentation device is the same as the color space of the CMR. Pass-through CMRs contain no data.

Link color conversion CMR

Link color conversion CMRs combine the processing information that is required to directly convert an image from the color space of an input device to the color space of the output device. Essentially, link color conversion CMRs replace a pair of color conversion CMRs.

Converting color images to and from the PCS takes a significant amount of processing resources, in part because the process includes two conversions. Link color conversion CMRs combine the two conversions and make them more efficient. The printer can use the link color conversion CMR to convert colors directly from the color space of the input device to the color space of the output device with the same color fidelity they would have if the printer did both of the conversions. As a result, link color conversion CMRs can improve system performance.

The two types of link color conversion CMRs are:

Link CMRs

Link (LK) CMRs are unique. You cannot create a link CMR yourself and you do not include references to link CMRs in your print jobs. The print system creates and uses link CMRs automatically.

If you use AFP Resource Installer, link CMRs are generated automatically when you create or install a color conversion CMR. As a result, your resource library always contains link CMRs for every combination of color conversion CMRs in audit (input) and instruction (output) processing modes. When link CMRs are created, AFP Resource Installer marks them as capturable, so the printer can save them to be used in other print jobs.

If you do not use AFP Resource Installer, your printer might create link CMRs when it processes print jobs. For example, if you send a print job to an InfoPrint 5000, the printer controller looks at the audit color conversion CMRs that are specified. Then, the print controller looks at the link CMRs that it has available to find one that combines the audit color conversion CMR with the appropriate instruction color conversion CMR. If it does not find one, the print controller creates the link CMR and uses it. The print controller might save the link CMRs that it creates, but they can be removed during normal operation; for example, if the printer runs out of storage or is shut down. If the link is removed, the printer must create a new link CMR the next time it is needed.

When a link CMR is created, the print system evaluates the conversion algorithms to and from the PCS. The system then combines the algorithms, so a data object can be converted directly from one color space to the other without being converted to the PCS.

Device link CMRs

Device link (DL) CMRs use an ICC device link profile to convert directly from an input color space to an output color space without reference to an audit-mode or instruction-mode CMR. An ICC device link profile is a special ICC profile that is used to convert the input device color space to the color space of an output or display device. ICC device link profiles are not embedded in images.

You can create, install, and uninstall device link CMRs yourself. Device link CMRs are referenced in the MO:DCA data stream and take precedence over audit color conversion CMRs. A device link CMR specifies its own rendering intent, which is indicated in the header of the ICC device link profile. This rendering intent overrides any other rendering intent that is active.

The biggest advantage of using device link CMRs is that they preserve the black channel (K component) of the input color space when they are converting from CMYK to CMYK.

Halftone CMRs

Halftone CMRs carry the information that a printer uses to convert print jobs into a pattern of dots that it can put on paper. Halftone CMRs can be used with both color and grayscale print jobs.

Halftone CMRs generally specify the line screen frequency, halftone pattern, and rotation of the halftone that they carry. Device-specific halftone CMRs might also include the printer resolution.

A printer that uses AFP color management to print color or grayscale print jobs must use a halftone CMR to convert the print job into a format that the printer can reproduce in ink or toner. If a halftone CMR is not specified in the print job, the printer applies a default halftone CMR.

Note: If you send your color print jobs to an InfoPrint 5000 printer, halftones are applied by the print engine. As a result, the printer ignores halftone CMR requests.

You can associate device-specific halftone CMRs or generic halftone CMRs with print jobs:

- If you know which printer is printing the job, you can associate a device-specific halftone CMR with the print job (or with AFP resources inside the print job). The printer uses the halftone CMR that you specify.
- If you do not know which printer is printing the job, but you want to ensure that it uses a halftone CMR that has certain characteristics, such as a specific line screen frequency, you can associate a generic halftone CMR with the print job.

Because it is difficult to know which halftone CMRs must be used for the current conditions on the current printer, specify halftone CMRs generically and let the printer choose the most appropriate CMR that is available.

Generic halftone CMRs

You can use generic halftone CMRs when you want to choose one or more characteristics of the halftone CMR for a print job, but you do not know exactly which halftone CMRs are available.

When a print job specifies a generic halftone CMR, the print server looks in the resource library for halftone CMRs that match the printer device type and model. If the print server finds an appropriate CMR, it sends the device-specific halftone CMR to the printer with the print job. If the print server does not find an appropriate halftone CMR, it sends the generic halftone CMR to the printer.

If a print job that arrives at the printer is requesting a generic halftone CMR, the printer compares the requested characteristics with the available device-specific halftone CMRs. If a match exists, the printer uses the selected device-specific halftone CMR when it processes the print job. If no match exists, the printer uses the halftone CMR whose line screen frequency value is closest to the one requested.

The Color Management Object Content Architecture (CMOCA) defines a variety of generic halftone CMRs, which cover the most common line screen frequencies and halftone types. A print server that supports CMOCA can interpret generic halftone CMRs if it has device-specific halftone CMRs available to it in a resource library. If you use AFP Resource Installer, the generic halftone CMRs are installed in every resource library that you create and populate by using AFP Resource Installer.

Printers that support CMOCA must be able to interpret those generic CMRs and associate them with device-specific halftone CMRs.

Indexed CMRs

Indexed (IX) CMRs map indexed colors in the data to presentation device colors or colorant combinations.

Indexed CMRs provide rules about how to render indexed colors. Indexed CMRs apply to indexed colors that are specified by using the highlight color space. They do not apply to indexed colors found within

PostScript or other non-IPDS data objects. For Indexed CMRs, both instruction and audit processing modes are valid. However, only indexed CMRs with an instruction processing mode are used; indexed CMRs with an audit processing mode are ignored. The tags in the indexed CMR let the CMR use various color spaces in the descriptions. These color spaces can be grayscale, named colorants, RGB, CMYK, or CIELAB.

Tone transfer curve CMRs

Tone transfer curve CMRs are used to carry tone transfer curve information for an AFP print job, so you can modify the values of a particular color component and adjust the appearance of some of the colors by increasing or decreasing the amount of ink that is used to emphasize or reduce the effects of dot gain on the final output.

Like halftone CMRs, tone transfer curve CMRs are associated with print jobs specifically or generically. If they are specified generically, the print server looks in the resource library for tone transfer curve CMRs that match the printer device type and model. If the print server finds an appropriate CMR, it sends the device-specific tone transfer curve CMR to the printer with the print job. If the print server does not find an appropriate tone transfer curve CMR, it sends the generic tone transfer curve CMR to the printer.

If a print job that arrives at the printer is requesting a generic tone transfer curve CMR, the printer compares the requested characteristics with the device-specific tone transfer curve CMRs that it has available. If a match exists, the print server or printer uses the selected device-specific tone transfer curve CMR when it processes the print job. If the printer cannot find a good match for the generic tone transfer curve CMR, it ignores the request and uses its default tone transfer curve CMR.

The Color Management Object Content Architecture (CMOCA) defines several generic tone transfer curve CMRs with different appearance values. You can use the appearance values to specify how to print your job in regard to the reported dot gain of the printer.

Generic tone transfer curves can be used to select these appearance values:

Dark

The output is adjusted to show a dot gain of 33% for a 50% dot.

Accutone

The output is adjusted to show a dot gain of 22% for a 50% dot.

Highlight Midtone

The output is adjusted to show a dot gain of 14% for a 50% dot. This appearance might be used to emphasize the brightest part of an image.

Standard

The output is adjusted enough to account for the effects of dot gain, effectively counteracting the dot gain.

If you use AFP Resource Installer, it installs the generic tone transfer curve CMRs on your system automatically.

CMR processing modes

CMR processing modes tell the print system how to apply a CMR to the print data it is associated with. You specify a CMR processing mode whenever you specify a CMR, although not all modes are valid for all CMR types.

Audit processing mode

CMRs with the audit processing mode refer to processing that is already applied to a resource. In most cases, audit CMRs describe input data and are similar to ICC input profiles.

The audit processing mode is used primarily with color conversion CMRs. In audit processing mode, those CMRs indicate which ICC profile must be applied to convert the data into the Profile Connection Space (PCS).

For example, to take a photograph with a digital camera and then include the photograph in an AFP print job, you can use AFP Resource Installer to:

1. Create a color conversion CMR by using the ICC profile of your camera.
2. Install your photograph in a resource library.
3. Associate the color conversion CMR with the data object, indicating the audit processing mode.

Then, you create a print job that includes the data object. When the print job is processed, the system uses the color conversion CMR to convert the colors in the image into the PCS. The colors can then be converted into the color space of the printer that is printing it.

Instruction processing mode

CMRs with the instruction processing mode refer to processing that is done to prepare the resource for a specific printer by using a certain paper or another device. Generally, instruction CMRs refer to output data and are similar to ICC output profiles.

The instruction processing mode is used with color conversion, tone transfer curve, and halftone CMRs. In instruction processing mode, these CMRs indicate how the system must convert a resource so it prints correctly on the target printer. The manufacturer of your printer needs to provide ICC profiles or various CMRs that you can use. Those ICC profiles and CMRs might be installed in the printer controller, included with the printer on a CD, or available for download from the manufacturer's website.

If you send a color AFP print job to a printer that supports AFP Color Management, color conversion and tone transfer curve CMRs in instruction processing mode can be associated with the job. When the printer processes the print job, it applies the CMRs in this order:

1. Color conversion CMRs in audit processing mode to convert the resources into the ICC Profile Connection Space (PCS)
2. Color conversion and tone transfer curve CMRs in instruction processing mode to convert the resources into the color space of the printer
3. Halftone CMR in instruction processing mode to convert the job pages from their digital format into the pattern of dots that the printer can produce

In some cases, CMRs that are used as instruction CMRs can be used as audit CMRs. For example, if you send a large print job to a high-speed printer, the images in the print job are converted into the color space of that printer by using a color conversion CMR with the instruction processing mode. However, if you must reprint part of the job on a different printer, the system must convert the print job into the color space of the second printer. In that case, the color conversion CMR of the first printer is used in the audit processing mode to move the images back into the PCS. Then, the system uses a color conversion CMR of the second printer in instruction mode to convert the images into its color space.

Link processing mode

CMRs with the link processing mode are used to link an input color space in the presentation data (sometimes defined by an audit CMR) to the output color space of the presentation device (sometimes defined by an instruction CMR). Only link (LK) and device link (DL) CMRs can be used in link processing mode.

Whenever you install or uninstall audit or instruction color conversion CMRs in your resource library by using AFP Resource Installer or a similar software product, the AFP Resource Installer automatically creates or deletes link (LK) CMRs for every combination of audit and instruction color conversion CMR.

When a print job calls for a specified audit-instruction combination, the print server checks the resource library for a link (LK) CMR for that combination. If the print server finds an appropriate link CMR, it sends the CMR to the printer with the print job. Your printer can use the link (LK) CMRs whenever a print job indicates that it uses a particular combination of audit and instruction CMRs.

If you do not use AFP Resource Installer or a similar program to install your resources, your color printer must either create link (LK) CMRs while it processes your print jobs or convert the colors in your jobs twice, first from the original color space to the PCS and then from the PCS to the color space of the printer.

CMR creation and installation

Device manufacturers and groups that support AFP color standards create CMRs that you can use in your color printing systems. You can also create CMRs yourself, based on your needs.

The AFP Consortium, the group that defined the AFP Color Management Object Content Architecture (CMOCA), identified a set of color conversion CMRs that are most often used in audit processing mode. The set includes color conversion CMRs for common color spaces, such as:

- Adobe RGB (1998)
- sRGB
- SMPTE-C RGB
- SWOP CMYK

The standard CMRs are included with AFP Resource Installer, although they are not installed by default. You can install the standard CMRs that you plan to use. In addition, AFP Resource Installer automatically installs all the generic halftone and tone transfer curve CMRs in any resource library you create.

You can download device-specific CMRs for printers, such as the InfoPrint 5000, from the [Ricoh Production Print Software \(http://rpp.rioh-usa.com/products/software/\)](http://rpp.rioh-usa.com/products/software/).

If you need more CMRs, you can create them using wizards that are provided in AFP Resource Installer. See online help for details about the wizard.

If you use AFP Resource Installer to create a CMR, the software automatically installs the CMR in a resource library. You can also use AFP Resource Installer to install CMRs that you get from your printer manufacturer.

Data objects

Presentation data objects contain a single type of data (such as GIF, JPEG, PNG, and TIFF images) and can be used in your print jobs. These data objects can be placed directly in a page or overlay or can be defined as resources and included in pages or overlays. Using a data object as a resource is more efficient when that object appears more than once in a print job; resources are downloaded to the printer once and referenced as needed.

Data objects can either be included inline with a print job or installed in a resource library by using software such as AFP Resource Installer. If you install your data objects in a resource library, you can associate color conversion CMRs with them.

See [“Resource library management” on page 158](#) for more information about characteristics of resource libraries.

Types of data objects

Image data objects can be stored in a number of different formats, including AFPC JPEG Subset, EPS, GIF, IOCA, PDF, PNG, and TIFF. These image types are device-independent so they can be used by different systems and still be interpreted consistently.

AFPC JPEG Subset (JPEG)

AFPC (AFP Consortium) JPEG Subset files, formerly called JPEG File Interchange Format (JFIF) files, are bitmap image files that are compressed by using Joint Photographic Experts Group (JPEG) compression. As a result, AFPC JPEG Subset files are most commonly referred to as JPEG files. JPEG files most commonly use the file extension .jpg, but can also use .jpeg, .jpe, .jfif, and .jif.

JPEG compression deletes information that it considers unnecessary from images when it converts them. JPEG files vary from having small amounts of compression to having large amounts of compression. The more an image is compressed, the more information is lost. If the image is compressed only once, no noticeable effect typically exists on the image. However, if the image is compressed and decompressed repeatedly, the effects of deleting information become more noticeable.

JPEG compression is commonly used for photographs, especially photographs that are transmitted or displayed on web pages. The compression makes the files small enough to transmit on a network efficiently, but leaves enough information that the image is still visually appealing.

Encapsulated PostScript (EPS)

EPS is a PostScript graphics file format that follows conventions that Adobe Systems defined. EPS files support embedded ICC profiles.

Graphics Interchange Format (GIF)

GIF files are bitmap image files that are limited to a palette of 256 RGB colors. Because of the limited color range that it can contain, GIF is not a good format for reproducing photographs, but it is typically adequate for logos or charts. GIF images are widely used on the internet because they are typically smaller than other image formats. GIF files use the file extension .gif.

Image Object Content Architecture (IOCA)

IOCA is an architecture that provides a consistent way to represent images, including conventions and directions for processing and exchanging image information. The architecture defines image information independently of all data objects and environments in which it might exist and uses self-identifying terms; each field contains a description of itself along with its contents.

Portable Document Format (PDF)

PDF is a standard file format that Adobe Systems developed.

PDF files can be used and stored on various operating systems and contain all the required image and font data. Design attributes in a PDF are kept in a single compressed package.

Note: Single-page and multiple-page PDF files can be used as data objects in AFP print jobs.

Portable Network Graphics (PNG)

PDF is a standard file format that Adobe Systems developed.

PNG files are bitmap image files that support indexed colors, palette-based images with 24-bit RGB or 32-bit RGBA colors, grayscale images, an optional alpha channel, and lossless compression. PNG is used for transferring images on the internet, but not for print graphics. PNG files use the file extension .png.

Tagged Image File Format (TIFF)

TIFF files are bitmap image files that include headers to provide more information about the image.

TIFF files use the file extensions .tif or .tiff. TIFF files support embedded ICC profiles. If an ICC profile is embedded in a file, the characteristics of the input color space are known whenever the file is used; however, the profiles increase the file size. When you save a file in the TIFF format, you can use various compression algorithms.

Note: Single-image and multiple-image TIFF files can be used as data objects in AFP print jobs.

Not all printers support all types of data objects.

The embedded ICC profiles in EPS, JPEG, and TIFF files contain the information that a printer uses to convert colors in the image from an input color space into the Profile Connection Space (PCS). The input color space might be an industry-standard space or it can describe the color reproduction capabilities of a device, such as a scanner, digital camera, monitor, or printer.

Data object creation and installation

You can use a wide variety of software applications to create or manipulate images to include in print jobs. If you want to store them in central resource repositories, you can use AFP Resource Installer to install them.

Data object creation

Most types of data objects are images of some kind. They might be photographs that are taken with a digital camera, charts or diagrams that are generated by a software tool, or digital drawings created with graphics software. Regardless of how images are created, you generally need to manipulate them to include them in print jobs.

The changes include:

- Convert the image into a file type that is appropriate for printing. For example, the file types that many graphics applications (such as Adobe Illustrator, CorelDRAW, and Corel Paint Shop Pro) use to store images while you work on them are not appropriate for printing. To use images that you create by using any of those programs, you can save or export those files as a different file type, such as EPS, JPEG, or TIFF.
- Make sure that your image files are associated with an appropriate color space or input profile. Follow the instructions that are provided with your graphics software to set up color management, including installing and using ICC profiles for digital cameras and monitors, and customizing color management settings. The instructions also explain how to change the color profile that an image uses and how to save an image with an embedded profile.
- Follow the tips and best practices that are provided in [“Tips and best practices” on page 159](#) for creating images and managing them as data object resources.

Data object installation

You can use AFP Resource Installer to install your images in a resource library. AFP Resource Installer includes wizards that can guide you through the process of installing an image as a data object. When you install an EPS, JPEG, or TIFF image with an embedded ICC profile with AFP Resource Installer, you can choose how you want to handle the profile:

- Leave the profile in the file without creating a CMR.
- Leave the profile in the file, but also copy the profile and create a CMR from the copy. Associate the new CMR with the data object.
- Remove the profile from the file (to reduce the file size) and make the profile into a CMR. Associate the new CMR with the data object.

Resource library management

If you store CMRs and data objects in central resource libraries, you must understand some of the characteristics of resource libraries to make sure that your resources are available when and where you need them.

Resource libraries that AFP Resource Installer creates use a resource access table (RAT) as the index of the resource library. The index is stored as a file in the library that it refers to. You must store CMRs in resource libraries that use a RAT. It is also a good idea to store data objects in resource libraries that use a RAT.

When you use AFP Resource Installer to create a resource library, it creates a RAT and stores it in the library. When you install a CMR or data object, AFP Resource Installer updates the RAT with information about the resource. When a print server looks in a resource library for a resource, it first looks in the RAT to see whether the resource is listed.

The print server relies on the RAT; if it is incorrect, the print server cannot find resources in the resource library. As a result, you must always use AFP Resource Installer to manage your resource libraries, including to:

Add CMRs and data objects to a resource library.

Do not copy CMRs or data objects directly into the resource libraries that AFP Resource Installer uses. If you copy CMRs or data objects into these resource libraries, the RAT is not updated so the print server cannot use it to find the CMRs or data objects.

Modify properties of data objects and CMRs listed in the RAT.

Do not directly edit the RAT or any of the files in a resource library. Do not replace an existing version of a CMR or data object with a new version by copying the new version directly into the resource library; use AFP Resource Installer to update the resource.

Install CMRs or data objects in a different resource library or replicate a resource library in a different location.

Do not copy CMRs or data objects from a resource library and store them in another location.

For more information about completing these tasks, see AFP Resource Installer help system.

Tips and best practices

The following general guidelines about creating and managing images and other color resources can improve the performance of your AFP color printing system.

Tips for images

To optimize the performance of your AFP color printing system, follow the following guidelines for creating and including images in print jobs.

When you want to use color images in your print jobs:

- Get the original electronic versions of images instead of scanning existing documents.

Almost unnoticeable specks of color in the background of images that are scanned can greatly increase the size of the image. If you must scan an image, use an image-editing tool to clean up the background as much as possible.

- Save all images in the same standard color space so you need only one input profile for all of them.

Adobe RGB (1998) is the recommended color space for images that are to be printed.

- Flatten multi-layer images (images you create in graphics tools such as Adobe Illustrator and Corel Paint Shop Pro) before you include them in print jobs.

Unflattened images are large and more difficult to work with. Save a copy of the original image for future editing, but flatten the version that you include in your print job.

Tips for resources

To optimize the performance of your AFP color printing system, follow the following guidelines for managing color resources.

You can use AFP Resource Installer to:

- Install all the CMRs for your printer in a resource library.
- Install the data objects that you use frequently in a resource library.
- Mark the CMRs and data objects that are reused regularly as non-private, capturable resources so they can be saved on the printer and used for other print jobs without being downloaded every time.

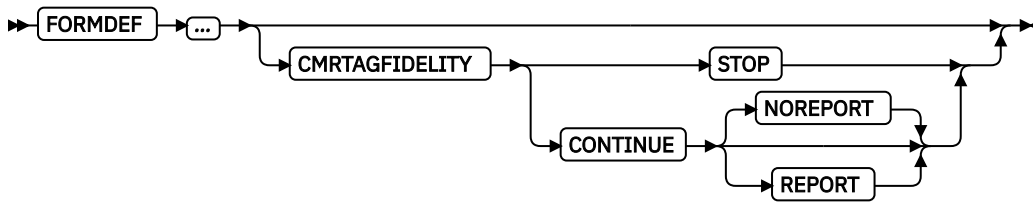
Note: This option is not advisable for secure resources, such as signature files.

- Install CMRs and data objects in resource libraries that the print server can access, so they need only to be stored in one place and can be used by all print servers.
- Associate audit color conversion CMRs with data objects that require color management, so the embedded profiles can be removed from the image files.

CMRTAGFIDELITY Subcommand (FORMDEF)

The following subcommand on the FORMDEF command describes the exception continuation and reporting rules for Color Management Resource (CMR) tag exceptions. A CMR tag exception is detected when an unsupported CMR tag is encountered in a CMR. Having CMR tag fidelity allows more CMR tags to be added in the future without necessarily causing exceptions in printers that do not support the new tags.

CMR Tag Fidelity



FORMDEF

The full form definition command and all its other non-CMR subcommands are described in [“FORMDEF Command” on page 216.](#)

CMRTAGFIDELITY

Specify the exception continuation and reporting rules for Color Management Resource (CMR) tag exceptions.

STOP

CMR Tag exception rule is "Stop presentation at point of first CMR tag exception and report the exception".

CONTINUE

CMR Tag exception rule is "Do not stop presentation because of CMR tag exceptions and do one of the following:"

NOREPORT

Do not report the CMR tag exception to the print server. This is the default if neither NOREPORT or REPORT is coded.

REPORT

Report the CMR tag exception.

Code Example

In the following example, if a CMR tag exception exists, processing continues and the printer reports the exception to the print server.

```
FORMDEF cmrXm1 REPLACE yes CMRTAGFIDELITY continue report;
```

DEFINE CMRNAME Subcommand (FORMDEF and all PAGEDEF types)



DEFINE CMRNAME

This command defines a CMR name. A CMR is identified with a name that is specified in a CMR resource object. The name is 73 characters and is based on an architected naming scheme to ensure uniqueness. This naming scheme includes field components, such as CMR type, manufacturer, device type, and device model number. CMR names are fully described in the *Color Management Object Content Architecture Reference* manual.

Parameters

cmr-lname

CMR local name. Specify a local name with up to 16 characters. This name is used to reference a CMR with a short user specified name. After you define the CMR name with a local name, it can be used on CMR commands and subcommands.

Note: This local name must be unique throughout the entire PPFA source file. That is, the local name cannot be reused in DEFINE CMRNAME commands that appear in different form definitions, page definitions, or both if they are in the same source file.

'cmr-name'

Specify the full 73 character CMR name. The name is entered as single-byte characters and is translated to UTF-16BE. The *cmr-name* must match the name that is specified for this CMR in the Resource Installer. See [“How to copy and paste a name from the AFP Resource Installer” on page 162](#) for more information.

Note: When PPFA does the translation, it uses a fixed table, which means that it translates only from EBCDIC code page 500.

X16'cmr-name'

Specify the full CMR name as UTF-16 hex digits. The name is entered in its UTF-16BE encoding, which takes 4 hex digits per character. No translation is needed.

Code Example

Three defined CMR names are in the following example:

- Local name *bm1* is defined with a 73 character name in single quotation marks and no text type. The name is translated into UTF-16BE. The example shows the name that is split over 3 PPFA source lines, which might be necessary because of source input record length. The character string can be copied-and-pasted from the AFP Resource installer. See [“How to copy and paste a name from the AFP Resource Installer” on page 162](#).
- Local name *jm4* is specified with X16 data type, which means that the name is entered in UTF-16BE hexadecimal digits.
- Local name *gen1dark* is a generic CMR. It is one of the registered generic CMRs and is entered within single quotation marks, which indicates that it is coded with characters and is translated to UTF-16BE.

CMR *bm1* is defined for the entire print file. It is used to render color for all color resources in the print file unless overridden by a CMR with a more restricted scope. COPYGROUP *cg1* uses CMR *bm1* because it inherits from the form definition. COPYGROUP *cg2* uses CMR *jm4* and COPYGROUP *cg3* uses CMR *gen1dark* to render color resources for the groups of pages they control.

```
FORMDEF cmrX12 REPLACE yes;
DEFINE  bm1  CMRNAME
          'BillMay4HT001.200IBM@@4100@@'
          'PD194@whtg190@2@@@rnd@@@141@600@'
          'proc@@@@@';

DEFINE  jm4  CMRNAME
          X16 '004A006F0068006E004D006100790034' /* JohnMay4 */
          '00480054' /* HT */
          '003000300031002E003200300030' /* 001.200 */
          '00490042004D00400040' /* IBM@@ */
          '003400310030003000400040' /* 4100@@ */
          '005000440031' /* PD1 */
          '003900340040' /* 94@ */
          '007700680074' /* wht */
          '0067006C' /* g1 */
          '003900300040' /* 90@ */
          '00320040004000400040' /* 2@@@@ */
          '0072006E0064004000400040' /* rnd@@@ */
          '0031003400310040' /* 141@ */
          '0036003000300040' /* 600@ */
          '00700072006F0063' /* proc */
          '0040004000400040004000400040' /* @@@@@@@@ */
          ;

DEFINE  gen1dark CMRNAME
          '@@@@@@TCgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@'
          'dark@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@';

CMR bm1 PRINTFILE INSTR;

COPYGROUP cg1 ;

COPYGROUP cg2 ;
CMR jm4 INSTR;

COPYGROUP cg3 ;
CMR gen1dark INSTR;
```

How to copy and paste a name from the AFP Resource Installer

The steps that the user must take to copy and paste the CMR name from the AFP Resource Installer are:

1. On your workstation, start the AFP Resource Installer.
2. Use the Select menu item in the Library menu on the menu bar to open the server resource library where the CMR is located. The server resource library appears in the top pane of the AFP Resource Installer.
3. Select the server resource library in the top pane and use the Expand Selected menu item in the Views menu on the menu bar to show the CMRs that in the server resource library.
4. Select the CMR.
5. Use the Properties menu item in the Actions menu on the menu bar to open the Properties notebook for the selected CMR.
6. Copy the CMR Name that is shown in the Properties notebook.
7. Paste the CMR Name into the PPFA source code.

Note: You might need to break up the name if you are using an operating system that restricts the input source line length to less than 73. For example, PPFA on z/OS restricts the input line to 72 bytes. If the name in the PPFA source code is split over two lines with 42 and 31 characters each, you would first copy the first 42 bytes of the name and paste them into line one, and then copy the remaining 31 bytes of the name into the second line.

Registered Generic Halftone CMRs

The following example is the Registered Generic Halftone CMRs. You can copy the appropriate lines from this example into PPFA where you would use DEFINE CMRNAME.

```
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@71@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@85@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@106@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@120@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@141@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@150@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@170@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@190@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@202@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@300@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@600@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@sto@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@dsp@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@erd@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@f-d@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@jnn@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@stu@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@brk@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@sra@@@@@@@@@@@@@@@@@@@@
@@@@@@@HTgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@s-a@@@@@@@@@@@@@@@@@@@@
```

Figure 123: Generic Halftone CMRs

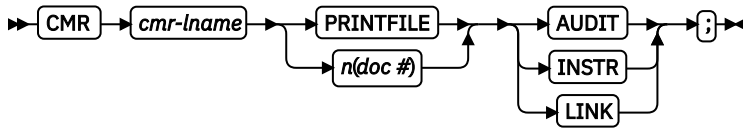
Registered Generic Tone Transfer Curve CMRs

The following example is the Registered Generic Tone Transfer Curve CMRs. You can copy the appropriate lines from this example into PPFA where you would use DEFINE CMRNAME.

```
@@@@@@@TCgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@dark@@@@@@@@@@@@@@@@@@@@
@@@@@@@TCgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@accutn@@@@@@@@@@@@@@@@@@@@
@@@@@@@TCgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@hilmid@@@@@@@@@@@@@@@@@@@@
@@@@@@@TCgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@standd@@@@@@@@@@@@@@@@@@@@
```

Figure 124: Generic Tone Transfer Curve CMRs

CMR Subcommand (FORMDEF)



CMR

Specify a Color Management Resource (CMR), its scope, and its process mode to be associated with the entire print file or a specific document in the print file.

Multiple CMR commands are allowed in the form definition.

Parameters

cmr-lname

The CMR local name. This name must be defined with a DEFINE CMRNAME command.

scope parameter

Specify whether the CMR is for the entire print file or a specific document in the print file. This parameter must immediately follow the CMR local name (*cmr-lname*).

PRINTFILE

The scope of this CMR is the entire print file.

n (document number)

The scope of this CMR is the specified document.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

CMRs with the audit processing mode refer to processing that is already applied to a resource. In most cases, audit CMRs describe input data and are similar to ICC input profiles.

The audit processing mode is used primarily with color conversion CMRs. In audit processing mode, those CMRs indicate which ICC profile must be applied to convert the data into the Profile Connection Space (PCS).

INSTR

CMRs with the instruction processing mode refer to processing that is done to prepare the resource for a specific printer by using a certain paper or another device. Generally, instruction CMRs refer to output data and are similar to ICC output profiles.

The instruction processing mode is used with color conversion, tone transfer curve, and halftone CMRs. In instruction processing mode, these CMRs indicate how the system must convert a resource so it prints correctly on the target printer. The manufacturer of your printer must provide ICC profiles or various CMRs that you can use. Those ICC profiles and CMRs might be installed in the printer controller, included with the printer on a CD, or available for download from the manufacturer's website.

LINK

This CMR defines a direct color conversion from an input color space to a device output color space; process the CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs. The PPFA command RENDER is not used with device link (DL) CMRs as such CMRs specify the intended rendering intent internally. This function requires print server (PSF) and printer support, which is in addition to the original CMR support.

Code Example

In the following example, assume that the DEFINE CMRNAME commands define the CMR names with local names (see the DEFINE CMRNAME command for more details).

Two CMRs are defined:

1. The first CMR with local name Picto550 is an audit CMR for a Picto camera and is to be associated with the entire print file.
2. The second CMR named dark2 is a generic instruction CMR for the fifth document in the print file.

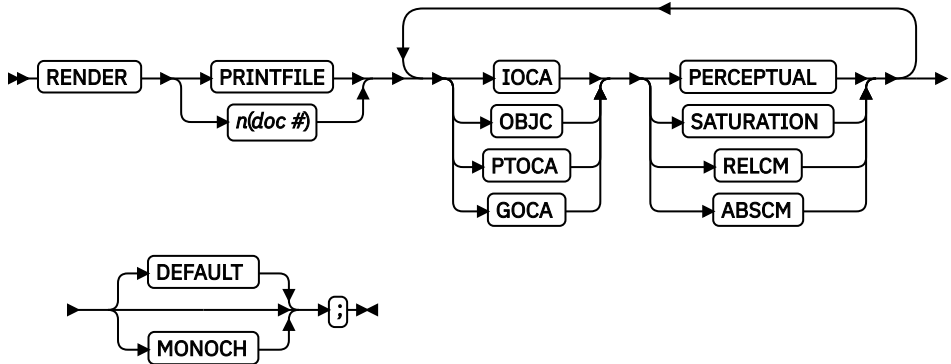
```

DEFINE Picto550 CMRNAME
    'Pict1550CC001.001PictV550@@'
    'ES1@@@@@@@@@@@spac@@@@@@@@@@@RGB@'
    'XYZ@@@@@@@@@@@' ;
DEFINE dark2 CMRNAME
    '@@@@@@@@TCgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@'
    'dark@@@@@@@@@@@@@@@@@@@@@@@@@@@@@' ;

FORMDEF cmrXm2 REPLACE yes;
    CMR Picto550 PRINTFILE audit;
    CMR dark2 5 instr;
COPYGROUP cg1;

```

RENDER Subcommand (FORMDEF)



RENDER

Specify the rendering intent (RI) and device output appearance for a print file or individual document.

RI is used to modify the final appearance of color data and is defined by the International Color Consortium (ICC). For more information about RI, see the current level of the ICC Specification. Multiple RENDER commands are allowed in the form definition when they are for different scopes.

Device output appearance specifies the appearance to be assumed by the presentation device (printer).

Parameters

scope parameter

Specify whether the rendering intent is for the entire print file or a specific document in the print file. This parameter must immediately follow the RENDER keyword.

PRINTFILE

The scope of this RI is the entire print file.

n (document number)

The scope of this RI is the specified document.

object type parameter

Specify the object type to which the following rendering intent parameters apply. Object type and rendering intent parameter pairs can be repeated to define RI for all object types.

IOCA

The following rendering intent applies to all IOCA objects in the print file or specified document.

OBJC

The following rendering intent applies to all non-OCA object containers in the print file or specified document.

PTOCA

The following rendering intent applies to all PTOCA objects in the print file or specified document.

GOCA

The following rendering intent applies to all GOCA objects in the print file or specified document.

rendering intent parameter

Specify the rendering intent for the preceding object type.

PERCEPTUAL

Perceptual rendering intent. It can be abbreviated as PERCP. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to give a pleasing appearance. This intent is typically used to render continuous-tone images.

SATURATION

Saturation rendering intent. It can be abbreviated as SATUR. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to emphasize saturation. This intent results in vivid colors and is typically used for business graphics.

RELCM

Media-relative colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered in regard to the source white point and are adjusted for the media white point. Therefore, colors that are printed on two different media with different white points do not match colorimetrically, but might match visually. This intent is typically used for vector graphics.

ABSCM

ICC-absolute colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered only in regard to the source white point and are not adjusted for the media white point. Therefore, colors that are printed on two different media with different white points must match colorimetrically, but might not match visually. This intent is typically used for logos.

device output appearance parameter

Specify one of a set of architected appearances to be assumed by the presentation device.

DEFAULT

Default appearance. The device assumes its normal appearance. For example, the default appearance of a process-color printer would be to generate full color output.

MONOCH

Monochrome appearance. The device assumes a monochrome appearance such that the device's default color is used for presentation. The device can simulate color values with gray scale by using the default color, or it can simulate color values by substituting the default color, or it can use some combination of the two.

Code Example

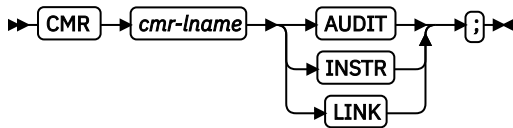
Four RENDER subcommands are defined in the following example. Multiple RENDER subcommands for the same scope are not allowed:

1. The first RENDER is for the entire print file, and defines the RI for IOCA objects as perceptual. It also specifies the device output appearance to be monochromatic.
2. The second RENDER is for the document 5, and defines the RI for non-OCA objects as saturation. It also specifies the device output appearance as the device default, which means full color output for a color printer.
3. The third RENDER is for the document 7, and defines the RI for PTOCA objects as media-relative colorimetric. No device output appearance is specified.

4. The fourth RENDER is for the document 9, and defines the RI for all supported objects. It also specifies the device output appearance to be monochromatic.

```
FORMDEF cmrXm3 REPLACE yes;
RENDER PRINTFILE IOCA perceptual MONOCH ;
RENDER 5          OBJC saturation DEFAULT;
RENDER 7          PTOCA relcm          ;
RENDER 9 OBJC absclm IOCA relcm PTOCA satur GOCA perc MONOCH;
COPYGROUP cg1;
```

CMR Subcommand (COPYGROUP)



CMR

Specify a Color Management Resource (CMR) and its process mode for the collection of pages that are defined by a COPYGROUP. The command is to be placed after the COPYGROUP command for which it is intended.

Multiple CMR commands are allowed in the form definition.

Parameters

cmr-lname

The CMR local name. This name must be defined with a DEFINE CMRNAME command.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

CMRs with the audit processing mode refer to processing that is already applied to a resource. In most cases, audit CMRs describe input data and are similar to ICC input profiles.

The audit processing mode is used primarily with color conversion CMRs. In audit processing mode, those CMRs indicate which ICC profile must be applied to convert the data into the Profile Connection Space (PCS).

INSTR

CMRs with the instruction processing mode refer to processing that is done to prepare the resource for a specific printer by using a certain paper or another device. Generally, instruction CMRs refer to output data and are similar to ICC output profiles.

The instruction processing mode is used with color conversion, tone transfer curve, and halftone CMRs. In instruction processing mode, these CMRs indicate how the system must convert a resource so it prints correctly on the target printer. The manufacturer of your printer must provide ICC profiles or various CMRs that you can use. Those ICC profiles and CMRs might be installed in the printer controller, included with the printer on a CD, or available for download from the manufacturer's website.

LINK

This CMR defines a direct color conversion from an input color space to a device output color space; process the CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs. The PPFA command RENDER is not used with device link (DL) CMRs as such CMRs specify the intended rendering intent internally. This function requires print server (PSF) and printer support, which is in addition to the original CMR support.

Code Example

The following example shows two copy groups with defined CMRs.

- COPYGROUP picto defines a CMR for presenting digital pictures that are taken with a Picto camera (an audit CMR), and a generic instruction CMR, which is replaced with a device-specific CMR or the default printer CMR.
- COPYGROUP snap defines a CMR for presenting digital pictures that are taken with a Snap camera (an audit CMR), and a generic instruction CMR, which are replaced with a device-specific CMR or the default printer CMR.

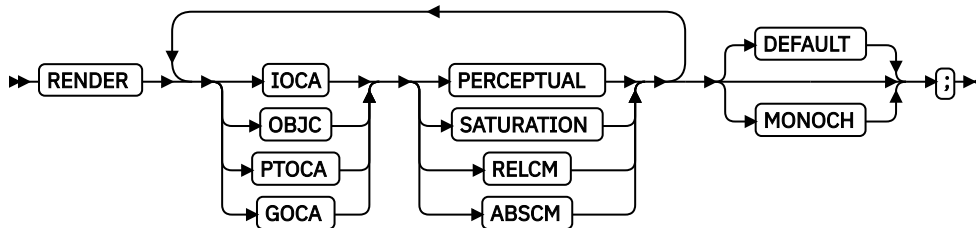
```

FORMDEF cmrX13 REPLACE yes;
DEFINE Picto550 CMRNAME
  'Pict1550CC001.001PictV550@@@'
  'ES1@@@@@@@@@@@spac@@@@@@@@@@@RGB@'
  'XYZ@@@@@@@@@';
DEFINE snap1
  CMRNAME
  'SnapDSC@CC001.001SNAP@DSC-R1'
  'CS@@@@@@@@@@@spac@@@@@@@@@@@RGB@'
  'XYZ@@@@@@@@@';

COPYGROUP picto ;
CMR picto550 AUDIT;
COPYGROUP snap ;
CMR snap1 AUDIT;

```

RENDER Subcommand (COPYGROUP)



RENDER

Specify the Rendering Intent (RI) and device output appearance for the collection of pages presented by a COPYGROUP. The command is to be placed after the COPYGROUP command for which it is intended.

Parameters

object type parameters

Specify the object type to which the following rendering intent parameters apply. Object type and rendering intent parameter pairs can be repeated to define RI for all object types.

IOCA

The following rendering intent applies to all IOCA objects in the pages that are presented by the COPYGROUP.

OBJC

The following rendering intent applies to all non-OCA object in the pages that are presented by the COPYGROUP.

PTOCA

The following rendering intent applies to all PTOCA objects in the pages that are presented by the COPYGROUP.

GOCA

The following rendering intent applies to all GOCA objects in the pages that are presented by the COPYGROUP.

rendering intent parameter

Specify the rendering intent for the preceding object type.

PERCEPTUAL

Perceptual rendering intent. It can be abbreviated as PERCP. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to give a pleasing appearance. This intent is typically used to render continuous-tone images.

SATURATION

Saturation rendering intent. It can be abbreviated as SATUR. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to emphasize saturation. This intent results in vivid colors and is typically used for business graphics.

RELCM

Media-relative colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered in regard to the source white point and are adjusted for the media white point. Therefore, colors that are printed on two different media with different white points do not match colorimetrically, but might match visually. This intent is typically used for vector graphics.

ABSCM

ICC-absolute colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered only in regard to the source white point and are not adjusted for the media white point. Therefore, colors that are printed on two different media with different white points must match colorimetrically, but might not match visually. This intent is typically used for logos.

device output appearance parameter

Specify one of a set of architected appearances to be assumed by the presentation device.

DEFAULT

Default appearance. The device assumes its normal appearance. For example, the default appearance of a process-color printer would be to generate full color output.

MONOCH

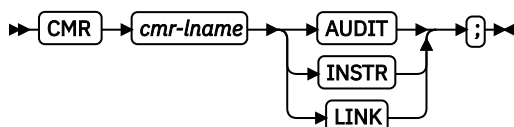
Monochrome appearance. The device assumes a monochrome appearance such that the device's default color is used for presentation. The device can simulate color values with grayscale by using the default color, or it can simulate color values by substituting the default color, or it can use some combination of the two.

Code Example

The following example shows two copy groups, one with IOCA RI defined and monochromatic appearance, and one with RI for all object types and the device default appearance.

```
FORMDEF cmrXm4 REPLACE yes;
COPYGROUP cg1;
  RENDER IOCA percp MONOCH ;
COPYGROUP cg2;
  RENDER DEFAULT OBJC abscm IOCA relcm PTOCA satur
  GOCA percp;
```

CMR Subcommand (PAGEFORMAT)



CMR

Associate a Color Management Resource (CMR) with pages that are presented by a PAGEFORMAT. The command is to follow the PAGEFORMAT command. Multiple CMR commands are allowed in a PAGEFORMAT.

Parameters

cmr-lname

The CMR local name. This name must be defined with a DEFINE CMRNAME command.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

CMRs with the audit processing mode refer to processing that is already applied to a resource. In most cases, audit CMRs describe input data and are similar to ICC input profiles.

The audit processing mode is used primarily with color conversion CMRs. In audit processing mode, those CMRs indicate which ICC profile must be applied to convert the data into the Profile Connection Space (PCS).

INSTR

CMRs with the instruction processing mode refer to processing that is done to prepare the resource for a specific printer by using a certain paper or another device. Generally, instruction CMRs refer to output data and are similar to ICC output profiles.

The instruction processing mode is used with color conversion, tone transfer curve, and halftone CMRs. In instruction processing mode, these CMRs indicate how the system must convert a resource so it prints correctly on the target printer. The manufacturer of your printer must provide ICC profiles or various CMRs that you can use. Those ICC profiles and CMRs might be installed in the printer controller, included with the printer on a CD, or available for download from the manufacturer's website.

Code Example

In the following example, two CMRs are defined for all pages that are presented with PAGEFORMAT pf5:

1. The first CMR named mycmr is an audit CMR for a digital camera.
2. The second CMR named dark1 is a generic instruction CMR.

```
DEFINE mycmr CMRNAME
    'Pict1550CC001.001PictV550@@'
    'ES1@@@@@@@@@spac@@@@@@@@@RGB@'
    'XYZ@@@@@@@@@' ;

DEFINE dark1 CMRNAME
    '@@@@@@TCgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@'
    'dark@@@@@@@@@@@@@@@@@@@@@@@@@@@@@' ;

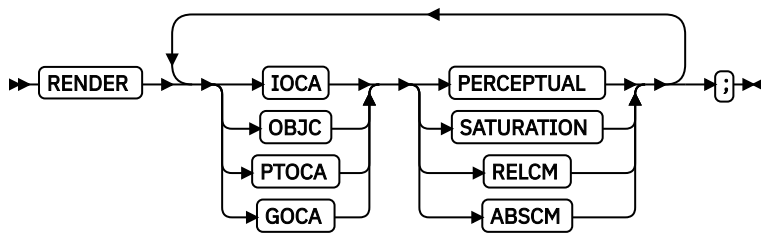
PAGEDEF cmrXm5 REPLACE yes;

PAGEFORMAT pf5;
CMR mycmr          AUDIT;
CMR dark1          INSTR;

PRINTLINE;

PAGEFORMAT pfx;
PRINTLINE;
```

RENDER Subcommand (in a PAGEFORMAT)



RENDER

Specify the page or overlay scope rendering intent (RI) for the pages that are formatted by this PAGEFORMAT. The RENDER command must follow the PAGEFORMAT command but precede the PRINTLINE, LAYOUT, or XLAYOUT commands.

RI is used to modify the final appearance of color data and is defined by the International Color Consortium (ICC). For more information about RI, see the current level of the ICC Specification.

Parameters

object type parameter

Specify the object type to which the following rendering intent parameters apply. Object type and rendering intent parameter pairs can be repeated to define RI for all object types.

IOCA

The following rendering intent applies to an IOCA object in the page or overlay that are presented by the PAGEFORMAT.

OBJC

The following rendering intent applies to a non-OCA object container in the page or overlay that are presented by the PAGEFORMAT.

PTOCA

The following rendering intent applies to a PTOCA object in the page or overlay that are presented by the PAGEFORMAT.

GOCA

The following rendering intent applies to a GOCA object in the page or overlay that are presented by the PAGEFORMAT.

rendering intent parameter

Specify the rendering intent for the preceding object type.

PERCEPTUAL

Perceptual rendering intent. It can be abbreviated as PERCP. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to give a pleasing appearance. This intent is typically used to render continuous-tone images.

SATURATION

Saturation rendering intent. It can be abbreviated as SATUR. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to emphasize saturation. This intent results in vivid colors and is typically used for business graphics.

RELCM

Media-relative colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered in regard to the source white point and are adjusted for the media white point. Therefore, colors that are printed on two different media with different white points do not match colorimetrically, but might match visually. This intent is typically used for vector graphics.

ABSCM

ICC-absolute colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered only in

regard to the source white point and are not adjusted for the media white point. Therefore, colors that are printed on two different media with different white points must match colorimetrically, but might not match visually. This intent is typically used for logos.

Code Example

Four different pages (PAGEFORMATs) with RENDER commands are defined in the following example:

1. The first page RENDER command defines the RI for IOCA objects as perceptual.
2. The second page RENDER command defines the RI for non-OCA objects as saturation.
3. The third page RENDER command defines the RI for PTOCA objects as media-relative colorimetric.
4. The fourth page RENDER command defines the RI for all supported objects.

```
PAGEDEF cmrXm6 REPLACE yes;

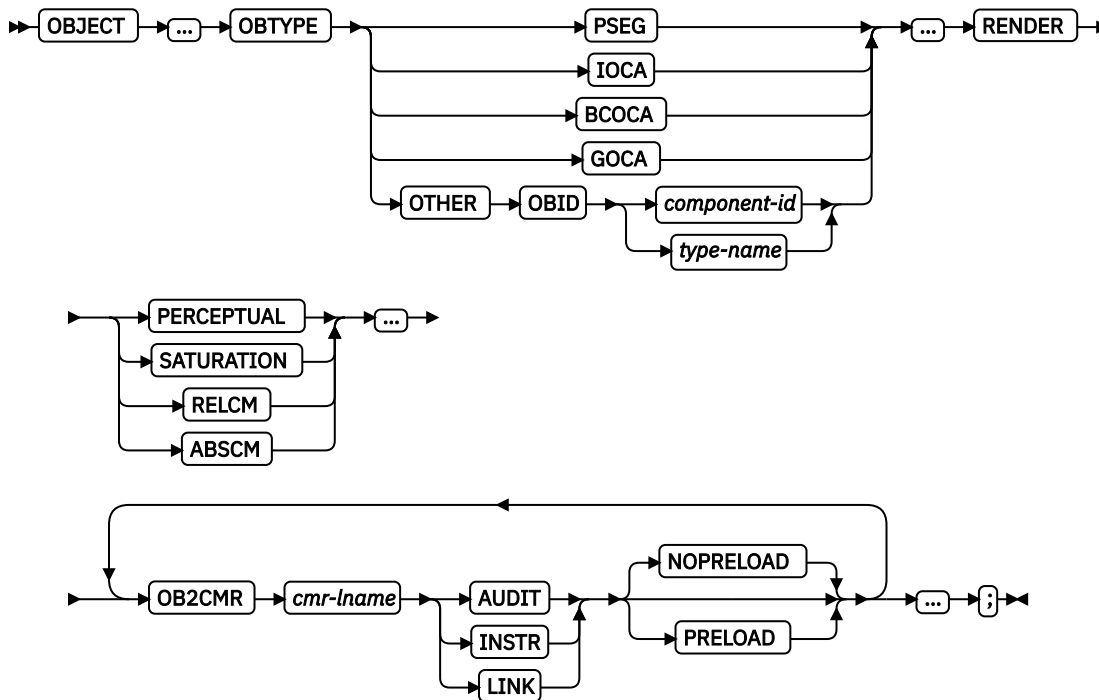
PAGEFORMAT pf6a;
  RENDER IOCA perceptual;
  PRINTLINE;

PAGEFORMAT pf6b;
  RENDER OBJC saturation;
  PRINTLINE;

PAGEFORMAT pf6c;
  RENDER PTOCA relcm;
  PRINTLINE;

PAGEFORMAT pf6d;
  RENDER OBJC abscm IOCA relcm PTOCA satur GOCA percpc;
  PRINTLINE;
```

OBJECT Command (Traditional, Record Format, XML)



OBJECT

The full OBJECT command and all its other non-CMR subcommands are described in [“OBJECT Command”](#) on page 363.

OBTYPE

Specifies the object type.

PSEG

No change, see [“PSEG” on page 366](#).

GOCA

No change, see [“GOCA” on page 366](#).

BCOCA

No change, see [“BCOCA” on page 366](#).

IOCA

No change, see [“IOCA” on page 366](#).

OTHER

No change, see [“OTHER” on page 366](#).

OBID

No change, see [“OBID” on page 366](#).

RENDER

Subcommand on the OBJECT command to specify the rendering intent (RI) for an object within a page definition.

RI is used to modify the final appearance of color data and is defined by the International Color Consortium (ICC). For more information about RI, see the current level of the ICC Specification.

Notes:

1. Rendering intent on a BCOCA object is fixed as media-relative colorimetric (RELCM), so RENDER does not need to be coded for a BCOCA object. But if you do specify something other than RELCM, PPSA flags an error.
2. A page segment (PSEG object type) can contain many object types. If you specify RENDER for a PSEG, PPSA sets that rendering intent type for all object types in the page segment.

rendering intent parameter

Specify the rendering intent for the preceding object type.

PERCEPTUAL

Perceptual rendering intent. It can be abbreviated as PERCP. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to give a pleasing appearance. This intent is typically used to render continuous-tone images.

SATURATION

Saturation rendering intent. It can be abbreviated as SATUR. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to emphasize saturation. This intent results in vivid colors and is typically used for business graphics.

RELCM

Media-relative colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered concerning the source white point and are adjusted for the media white point. Therefore, colors that are printed on two different media with different white points do not match colorimetrically, but might match visually. This intent is typically used for vector graphics.

ABSCM

ICC-absolute colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered concerning only the source white point and are not adjusted for the media white point. Therefore, colors that are printed on two different media with different white points must match colorimetrically, but might not match visually. This intent is typically used for logos.

OB2CMR

Specify a Color Management Resource (CMR) and its process mode for a data object within the page definition. CMRs are secondary objects when used at this level. Multiple OB2CMR subcommands are allowed on the OBJECT command.

cmr-lane

The CMR local name. This name must be defined with a DEFINE CMRNAME command.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

CMRs with the audit processing mode refer to processing that is already applied to a resource. In most cases, audit CMRs describe input data and are similar to ICC input profiles.

The audit processing mode is used primarily with color conversion CMRs. In audit processing mode, those CMRs indicate which ICC profile must be applied to convert the data into the Profile Connection Space (PCS).

INSTR

CMRs with the instruction processing mode refer to processing that is done to prepare the resource for a specific printer by using a certain paper or another device. Generally, instruction CMRs refer to output data and are similar to ICC output profiles.

The instruction processing mode is used with color conversion, tone transfer curve, and halftone CMRs. In instruction processing mode, these CMRs indicate how the system must convert a resource so it prints correctly on the target printer. The manufacturer of your printer must provide ICC profiles or various CMRs that you can use. Those ICC profiles and CMRs might be installed in the printer controller, included with the printer on a CD, or available for download from the manufacturer's website.

LINK

This CMR defines a direct color conversion from an input color space to a device output color space; process the CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs. The PPFA command RENDER is not used with device link (DL) CMRs as such CMRs specify the intended rendering intent internally. This function requires print server (PSF) and printer support, which is in addition to the original CMR support.

NOPRELOAD or PRELOAD

All specified secondary resources are kept. If you want the CMR object to be preloaded before running this job, specify it here.

Code Example

In the following example, an object with CMR is defined. The LAYOUT commands in the example place the object on the page. The CMR name is defined and referenced by the CMR local name. See the DEFINE CMRNAME command for examples and instructions on defining CMR names.

```
PAGEDEF cmr89  replace yes;
  FONT  varb  gt10  ;          /*Variable data          */
  SETUNITS  LINESP .25 in ;   /* Line spacing          */

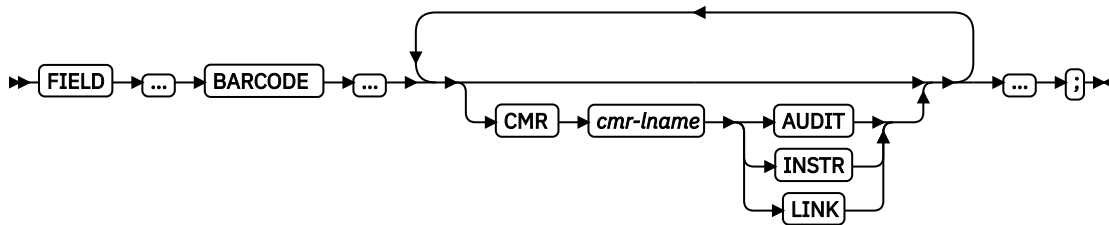
DEFINE srgb CMRNAME
'sRGBicc_CC001.000@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@'
'@@@@@';

Object oc1  obxname 'Flowers_with_sRGB_profile'
  obtype  other  obid 23  OBKEEP
  ob2cmr  srgb  audit

PAGEFORMAT rept1  TOPMARGIN 1 in  BOTMARGIN 2 in;
  LAYOUT 'startpage' BODY  NEWPAGE POSITION 1 in NEXT
  font  varb
  object oc1 0 in 3 in  obsize 6.5 in 8.5 in;
  LAYOUT 'basicline' BODY  POSITION SAME NEXT font  varb;
```

FIELD command (All Page Definition Types)

BARCODE CMR subcommand



FIELD

The full FIELD command and all its other non-CMR subcommands are described in [“FIELD Command”](#) on page 299.

Subcommand

CMR

Specify a Color Management Resource (CMR) and its process mode for the bar code object that is presented.

cmr-lname

The CMR local name. This name must be defined with a DEFINE CMRNAME command.

Note: This parameter must immediately follow the CMR keyword.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

CMRs with the audit processing mode refer to processing that is already applied to a resource. In most cases, audit CMRs describe input data and are similar to ICC input profiles.

The audit processing mode is used primarily with color conversion CMRs. In audit processing mode, those CMRs indicate which ICC profile must be applied to convert the data into the Profile Connection Space (PCS).

INSTR

CMRs with the instruction processing mode refer to processing that is done to prepare the resource for a specific printer by using a certain paper or another device. Generally, instruction CMRs refer to output data and are similar to ICC output profiles.

The instruction processing mode is used with color conversion, tone transfer curve, and halftone CMRs. In instruction processing mode, these CMRs indicate how the system must convert a resource so it prints correctly on the target printer. The manufacturer of your printer must provide ICC profiles or various CMRs that you can use. Those ICC profiles and CMRs might be installed in the printer controller, included with the printer on a CD, or available for download from the manufacturer's website.

LINK

This CMR defines a direct color conversion from an input color space to a device output color space; process the CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs. The PPFA command RENDER is not used with device link (DL) CMRs as such CMRs specify the intended rendering intent internally. This function requires print server (PSF) and printer support, which is in addition to the original CMR support.

Code Example

In the following example, 2 bar codes are defined with CMRs specified. The bar codes are defined for traditional, record format and XML page definitions.

Note: The DEFINE CMRNAMEs for mycmr and dark1 are used in each page definition but defined only once. Page definitions that are in the same source file can define a local CMR name only once because a DEFINE CMRNAME definition is global for all page definitions and form definitions in the same source code file.

```

DEFINE mycmr      CMRNAME
                  'Pict1550CC001.001PictV550@@'
                  'CS@@@@@@@@@@@@@spac@@@@@@@@@@@@@RGB@'
                  'XYZ@@@@@@@@@' ;
DEFINE dark1     CMRNAME
                  '@@@@@@@@@TCgeneric@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@'
                  'dark@@@@@@@@@@@@@@@@@@@@@@@@@@@@@' ;

/* Traditional Pagedef      */
PAGEDEF cmr10P  REPLACE yes;
PRINTLINE;
FIELD Start 1 Length 20
  BARCODE TYPE code39 MOD 1
  CMR myCMR  audit;
FIELD Start 21 Length 40
  BARCODE TYPE code39 MOD 1
  CMR dark1  instr;

/* Record Layout Pagedef   */
PAGEDEF cmr10L  REPLACE yes;
Font f1;
LAYOUT 'l1';
FIELD Start 1 Length 20
  BARCODE TYPE code39 MOD 1
  CMR myCMR  audit;
FIELD Start 21 Length 40
  BARCODE TYPE code39 MOD 1
  CMR dark1  instr;

/* XML Pagedef            */
PAGEDEF cmr10X  REPLACE yes;
Font f1 TYPE ebcdic;
XLAYOUT QTAG 'x1';
FIELD Start 1 Length 20
  BARCODE TYPE code39 MOD 1
  CMR myCMR  audit;
FIELD Start 21 Length 40
  BARCODE TYPE code39 MOD 1
  CMR dark1  instr;

```

EXTREF Command

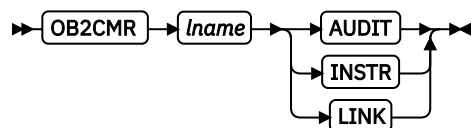
The EXTREF command specifies resources that are to be mapped in the page. It is a way in PPFA to map objects that would not otherwise be mapped. If an object contains another mapped object, the contained object must be mapped, but PPFA does not automatically map that object.

EXTREF

The full EXTREF command and all its other non-CMR subcommands are described in [“EXTREF Command”](#) on page 294.

Subcommands

OB2CMR



Specify a Color Management Resource (CMR) and its process mode for a data object specified within an included object. CMRs are secondary objects when used at this level. An object that is specified here is mapped with "object" scope.

Iname

The CMR local name. This name must be defined with a CMRNAME command.

processing-mode-parameter

Specify the processing mode for the CMR.

AUDIT

CMRs with the audit processing mode refer to processing that is already applied to a resource. In most cases, audit CMRs describe input data and are similar to ICC input profiles.

The audit processing mode is used primarily with color conversion CMRs. In audit processing mode, those CMRs indicate which ICC profile must be applied to convert the data into the Profile Connection Space (PCS).

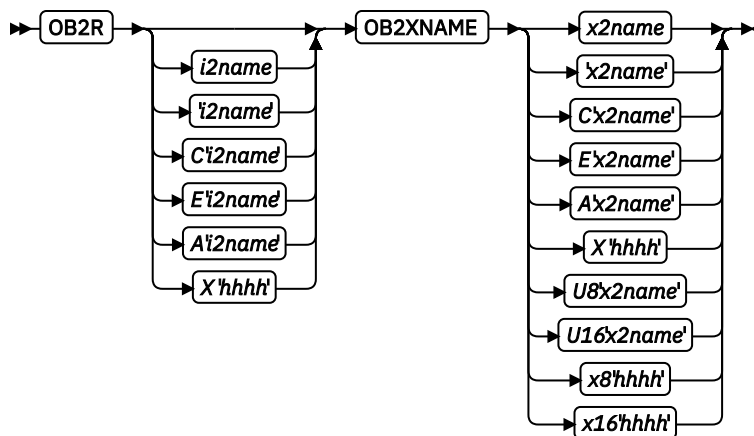
INSTR

CMRs with the instruction processing mode refer to processing that is done to prepare the resource for a specific printer by using a certain paper or another device. Generally, instruction CMRs refer to output data and are similar to ICC output profiles.

The instruction processing mode is used with color conversion, tone transfer curve, and halftone CMRs. In instruction processing mode, these CMRs indicate how the system must convert a resource so it prints correctly on the target printer. The manufacturer of your printer must provide ICC profiles or various CMRs that you can use. Those ICC profiles and CMRs might be installed in the printer controller, included with the printer on a CD, or available for download from the manufacturer's website.

LINK

This CMR defines a direct color conversion from an input color space to a device output color space; process the CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs. The PPFA command RENDER is not used with device link (DL) CMRs as such CMRs specify the intended rendering intent internally. This function requires print server (PSF) and printer support, which is in addition to the original CMR support.

OB2R

Specify a secondary object to be mapped.

If an included object contains a reference to one or more secondary objects, you must identify them here. Specify the internal name for the secondary resource as specified in the included resource. If the internal name contains special characters, such as periods or blanks, then quotation marks must surround the name.

i2name

Unquoted name up to 250 characters long is folded to uppercase and translated into EBCDIC if necessary.

'i2name'

Quoted name up to 250 characters long is accepted as-is with no case folding or translation.

C'i2name'

Quoted name with a C for Character is treated the same as a quoted name of up to 250 characters. No folding or translation is done.

E'i2name'

Quoted name with an E for EBCDIC entered with up to 250 characters is accepted as-is if on an EBCDIC operating system or translated to EBCDIC if on an ASCII operating system. The translation is made with no case folding.

A'i2name'

Quoted name with an A for ASCII entered with up to 250 single-byte characters is accepted as-is if on an ASCII operating system or translated to ASCII if on an EBCDIC operating system. The translation is made with no case folding.

X'hhhh'

Quoted name with an X for Hexadecimal entered with up to 500 hexadecimal characters. The characters are translated to hexadecimal, but no assumptions of data type are made.

OB2XNAME *x2name*

Specifies the external name for a secondary resource object. The name can be up to 250 characters. If the name contains special characters or blanks, then quotation marks must surround the name.

x2name

Unquoted name up to 250 characters long is folded to uppercase and translated into EBCDIC if necessary.

'x2name'

Quoted name up to 250 characters long are accepted as-is with no case folding or translation.

C'x2name'

Quoted name with an C for Character is treated the same as a quoted name up to 250 characters. No folding or translation is done.

E'x2name'

Quoted name with an E for EBCDIC entered with up to 250 single-byte characters is accepted as-is if on an EBCDIC operating system or translated to EBCDIC if on an ASCII operating system. The translation is made with no case folding.

A'x2name'

Quoted name with an A for ASCII entered with up to 250 single-byte characters are accepted as-is on an ASCII operating system or translated to ASCII if on an EBCDIC operating system. The translation is made with no case folding.

X'hhhh'

Quoted name with an X for Hexadecimal entered with up to 500 hexadecimal characters. The characters are translated to hexadecimal, but no assumption of data type is made.

U8'x2name'

Quoted name with a U8 for UTF-8 entered with up to 250 single-byte characters are translated to UTF-8.

X8'hhhh'

Quoted name with an X8 for UTF-8 HEX entered with up to 500 single-byte hexadecimal characters are translated to hexadecimal and assumed to be data type UTF-8. A multiple of 2 hexadecimal characters must be entered.

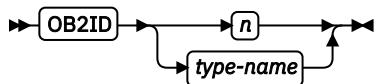
U16'x2name'

Quoted name with a U16 for UTF-16 entered with up to 125 single-byte characters are translated to UTF-16.

X16'hhhh'

Quoted name with an X16 for UTF-16 HEX entered with up to 500 single-byte hexadecimal characters are translated to hexadecimal and assumed to be data type UTF-16. A multiple of 4 hexadecimal characters must be entered.

OB2ID n | type-name



Component type identifier for secondary resource uses an object type number as specified in Object type list adjustments. Use an object type number from the Component - ID column or a type name from the Type-Name of the following table:

Type-Name	Component-ID	Description of OID Type-Name
PDFRO	26	PDF Resource Object (new)
RESCLRPRO	46	Resident Color Profile Resource Object
IOCAFS45RO	47	IOCA FS45 Resource Object Tile (new)

Code Example

In the following example, the CMR `rtvc` is mapped in the Object Environment Group (OEG) of an object that is being included in the page.

Note: If you code `rtvc` with a CMR command (as in the commented out CMR command), it is mapped and is active for the entire page; however, you want it to be active only for the object in whose OEG it is mapped.

```

DEFINE ivtc CMRNAME
'RevVideoTC001.000@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@'
'@@@@@' DNXCMR;

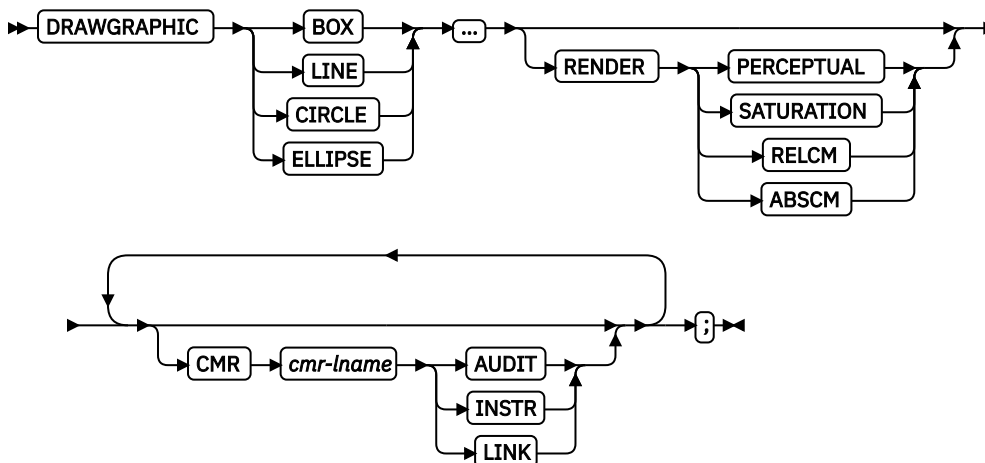
SETUNITS LINESP .25 in ; /* Line spacing */

PAGEFORMAT rept1 TOPMARGIN .25 in;
EXTREF OB2CMR ivtc instr;

```

DRAWGRAPHIC Command (Record Format and XML)

PAGEDEF - CMR and RENDER Subcommands on DRAWGRAPHIC command



DRAWGRAPHIC

The full DRAWGRAPHIC command and all its other non-CMR subcommands are described in:

- [“DRAWGRAPHIC - BOX Command \(Record Format and XML only\)” on page 267](#)
- [“DRAWGRAPHIC - LINE Command \(Record Format and XML only\)” on page 274](#)
- [“DRAWGRAPHIC - CIRCLE Command \(Record Format and XML only\)” on page 280](#)

- [“DRAWGRAPHIC - ELLIPSE Command \(Record Format and XML only\)”](#) on page 287

Subcommands

RENDER

Subcommand on the DRAWGRAPHIC command to specify the rendering intent (RI) for the graphics object being presented.

RI is used to modify the final appearance of color data and is defined by the International Color Consortium (ICC). For more information about RI, see the current level of the ICC Specification.

rendering intent parameter

Specify the rendering intent for the defined graphic (GOCA) object.

PERCEPTUAL

Perceptual rendering intent. It can be abbreviated as PERCP. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to give a pleasing appearance. This intent is typically used to render continuous-tone images.

SATURATION

Saturation rendering intent. It can be abbreviated as SATUR. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to emphasize saturation. This intent results in vivid colors and is typically used for business graphics.

RELCM

Media-relative colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered in regard to the source white point and are adjusted for the media white point. Therefore, colors that are printed on two different media with different white points do not match colorimetrically, but might match visually. This intent is typically used for vector graphics.

ABSCM

ICC-absolute colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered only in regard to the source white point and are not adjusted for the media white point. Therefore, colors that are printed on two different media with different white points must match colorimetrically, but might not match visually. This intent is typically used for logos.

CMR

Specify a Color Management Resource (CMR) and its process mode for a graphics object within the page definition.

cmr-lname

The CMR local name. This name must be defined with a DEFINE CMRNAME command.

Note: This parameter must immediately follow the CMR keyword.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

CMRs with the audit processing mode refer to processing that is already applied to a resource. In most cases, audit CMRs describe input data and are similar to ICC input profiles.

The audit processing mode is used primarily with color conversion CMRs. In audit processing mode, those CMRs indicate which ICC profile must be applied to convert the data into the Profile Connection Space (PCS).

INSTR

CMRs with the instruction processing mode refer to processing that is done to prepare the resource for a specific printer by using a certain paper or another device. Generally, instruction CMRs refer to output data and are similar to ICC output profiles.

The instruction processing mode is used with color conversion, tone transfer curve, and halftone CMRs. In instruction processing mode, these CMRs indicate how the system must convert a resource so it prints correctly on the target printer. The manufacturer of your printer

must provide ICC profiles or various CMRs that you can use. Those ICC profiles and CMRs might be installed in the printer controller, included with the printer on a CD, or available for download from the manufacturer's website.

LINK

This CMR defines a direct color conversion from an input color space to a device output color space; process the CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs. The PPFA command RENDER is not used with device link (DL) CMRs as such CMRs specify the intended rendering intent internally. This function requires print server (PSF) and printer support, which is in addition to the original CMR support.

Code Example

The following examples show how to define CMRs and rendering intent for graphics objects. Rendering intent and a CMR are defined for Record Format and XML page definitions, which are the only two page definitions types for which DRAWGRAPHIC commands are legal.

```
DEFINE mycmr CMRNAME
    'Pict1550CC001.001PictV550@@'
    'CS@@@@@@@@@@@@@spac@@@@@@@@@@@@@RGB@'
    'XYZ@@@@@@@@@' ;

PAGEDEF cmr11L REPLACE yes;
FONT f1;
LAYOUT 'l1';
DRAWGRAPHIC BOX BOXSIZE 1 in 2 in
    RENDER relcm CMR myCMR audit;

PAGEDEF cmr11X REPLACE yes;
FONT f1 TYPE ebcdic;
XLAYOUT QTAG 'x1';
DRAWGRAPHIC BOX BOXSIZE 1 in 2 in
    RENDER relcm CMR myCMR audit;
```

Part 3. PPFA Commands and Syntax

This section contains information about:

- PPFA command syntax
- Form definition commands
- Page definition commands

Chapter 9. PPFA Command Syntax

PPFA controls are made up of four elements: commands, subcommands, parameters, and literals.

- *Commands* are controls that represent the major functions of PPFA and are separated from other commands by semicolons. Each command has its own entry in [Chapter 10, “Form Definition Command Reference,”](#) on page 189 and in [Chapter 11, “Page Definition Command Reference,”](#) on page 249.
- *Subcommands* fall within commands and specify the function of that command.
- *Parameters* specify the values for one subcommand.
- *Literals* consist of fixed text included in a field definition or as constant data for comparison in a conditional processing definition.

Rules for Creating a PPFA Command Stream

When you create a PPFA command stream, follow these rules:

- Before PPFA processes the commands, it converts lowercase characters into uppercase characters, except the ones in literals. Thus, it does not discriminate between uppercase and lowercase characters. For example, `OVERLAY abc` and `overlay ABC` produce the same results because both `overlay` and `abc` are converted to uppercase.
- User names for form definitions and page definitions must not be the same as PPFA command names and subcommand names, which are reserved words. For a list of the reserved words, see [Appendix F, “PPFA Keywords,”](#) on page 525. For example, `REPEAT` or `CHANNEL` must not be form-definition names.
- The subcommands that are governed by a command can be entered in any order; however, the name of a font or form definition, for example, must come immediately after the object that is named. Parameters that are defined in a subcommand must be entered immediately after the subcommand.
- Commands must end with a semicolon.
- A command or subcommand can start in any column and can continue on the next line without a continuation indicator.
- More than one form definition and page definition can be specified in a job stream.
- PPFA does not check or set default values for items that depend on printer hardware.

Token Rules

Tokens are character strings, within a set of PPFA commands, that PPFA recognizes as units. Tokens include:

- Both local names and user-access names for fonts, form definitions, page definitions, overlays, and suppressions
- Commands
- Subcommands
- Parameters
- Literals
- Special characters

The only PPFA element that is not a token is a blank. A token cannot be split between two lines.

To create a token, you must separate a string from the previous token by either a special character or a blank. See the list of special characters in [“Character Set”](#) on page 184. Thus, `A+B` is the same as `A + B` because `+` is a special character. But `AB` is not the same as `A B`. The blank in `A B` creates two tokens.

Character Set

The four types of characters are alphabetic, numeric, blank, and special. Characters of each type are as follows:

PPFA alphabetic characters

```
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z  
a b c d e f g h i j k l m n o p q r s t u v w x y z  
# @ $
```

PPFA numeric characters

```
0 1 2 3 4 5 6 7 8 9
```

Blank character

Character code of X'20' in ASCII (which is the data stream that is used for creating the form definition or page definition).

Note: In EBCDIC data, the blank character has a character code of X'40'.

PPFA special characters

```
. ( + * ) - % ' = ; / &
```

EBCDIC shift-out and shift-in codes

X'0E', the shift-out (SO) code

X'0F', the shift-in (SI) code

Other character codes are also allowed within comments and literals. See [“Comments” on page 185](#) and [“Literals” on page 186](#) for details of what can be included.

Command Delimiters

A command always ends with a semicolon. One command can extend over several lines and does not end until a semicolon appears.

Blanks and Blank Lines

Blanks and blank lines can occur anywhere and have no effect on the processing of PPFA. The ; is the command delimiter.

Names

The maximum number of alphanumeric characters in a PPFA name varies. [Table 8 on page 184](#) shows the number of characters that are allowed in the PPFA names.

Type of Name	Number of Characters Allowed
Form Definition	
COPYGROUP	1 – 8
DEFINE CMRNAME (local name)	1 – 16
DEFINE CMRNAME (user-access name)	73

Table 8: Character Length for PPSA Names. (continued)

Type of Name	Number of Characters Allowed
FORMDEF	1 – 6
OVERLAY (local name)	1 – 16
OVERLAY (user-access name)	1 – 6
SUPPRESSION	1 – 8
Page Definition	
BARCODE	1 – 8
CONDITION	1 – 8
DEFINE COLOR	1 – 10
DEFINE CMRNAME (local name)	1 – 16
DEFINE CMRNAME (user-access name)	73
DEFINE QTAG (local name)	1 – 16
DEFINE QTAG (XML tag names)	1 – 125
DOFONT (local name)	1 – 16
DOFONT (user-access name)	1 – 125
FONT (local name)	1 – 16
FONT (user-access name)	1 – 6
OBJECT (local-name)	1 – 16
OBJECT (external name) (See note)	1 – 250
Secondary OBJECT (internal name) (See note)	1 – 250
Secondary OBJECT (external name) (See note)	1 – 250
OVERLAY	1 – 6
PAGEDEF	1 – 6
PAGEFORMAT	1 – 8
SEGMENT	1 – 6
<p>Note: This name is further restricted to 250 bytes. For data type UTF-16, the maximum is 125 characters or less if surrogate characters are required. Some operating systems have a limit of 8 characters.</p>	

Comments

Programmer comments that are used to document PPSA command streams are allowed anywhere within the command stream. Comments must be enclosed with the delimiters `/*` and `*/`. A comment is allowed anywhere that a blank is allowed and can continue for any number of lines.

The following example shows the available variations in comment formats:

```
FIELD /* comment */ FONT GT10 /* comment,
multiline comment,
more comment */ START * + 10 LENGTH 5 ;
FIELD LENGTH 10 ; FIELD START * + 10 LENGTH 15 ;
```

Notes:

1. A comment must end with the closing delimiter (*,').
2. For VSE, a comment must not start at the beginning of the line. A /* specified as the first 2 bytes of a record in PPFA running under VSE is interpreted as the end of system input.
3. Double-byte character codes in comments must be enclosed within SO (X'0E') and SI (X'0F') on EBCDIC operating systems.

Literals

A literal is any string that is specified in single quotation marks. Literals can be used within a:

- TEXT subcommand to create fixed text for a page definition
- WHEN subcommand to define constant text for comparison

Literals can contain any characters in any position, except the ones that have special syntactic meanings. Single quotation marks can be used within a literal only if they are entered in pairs ('). PPFA translates a pair of single quotation marks into one quotation mark. For example, 'JOAN ' 'S' yields JOAN'S.

A literal can continue for any number of lines. For example:

```
TEXT 'THIS IS ' 'A LITERAL' /* The four separated      */
      'THE TEXT SPANS'      /* text elements will produce*/
      'THREE LINES' ;      /* one sequence of text      */

TEXT X'0101'                /* Hexadecimal literals      */
      X'ABAB'                /* spanning three lines      */
      X'BBBB'                ;

TEXT K'100,200'             /* kanji numbers             */
      K'321,400'             /* specified sequentially     */
```

This example is invalid:

```
TEXT 'THIS IS'
      K'100,200' ;          /* Mixing single-byte and
                           double-byte characters in one
                           field is not allowed */
```

A double-byte literal must be enclosed within apostrophe shift-out (X'7D0E') and shift-in apostrophe (X'0F7D').

Numeric Values

Numeric variables are specified as decimal numbers; up to three decimal places can be specified.

Units of Measurement

Numbers that are used to specify dimensions in form definitions and page definitions can be in any of five units of measurement. They are specified in a command stream as follows:

IN

Inches

MM

Millimeters

CM

Centimeters

POINTS

Points are a common measurement in printing that are used to measure character height, as in 20-point type. A point is approximately 1/72 inch.

PELS

Equates to L-units. The number of pels per inch is a user-specified parameter. The default is 240 pels per inch.

These measurement units can be used in the SETUNITS command:

LPI

Lines per inch

CPI

Characters per inch

The parameters in PPFA that define a measurement can include any of the first five units of measurement that are shown in the previous list. For example:

```
POSITION 1 IN 1 IN ;
POSITION 1or MM 1 MM ;
```

However, PPFA converts all measurements to logical units (L-units) as the common measurement. (Normally, 1 inch equals 240 L-units, but this number can be changed by the user.) If a fraction exists, the first decimal point is truncated. A SETUNITS command defines a unit of measurement that is to be used as the default for any parameter that does not specify a dimension. This default is in effect until another SETUNITS command is encountered. The following example shows part of a PPFA command stream in which a SETUNITS command sets the units of measurement to one inch for a subsequent POSITION (or OFFSET or LINEONE) subcommand.

```
SETUNITS 1 IN 1 IN ;
:
POSITION (or OFFSET or LINEONE) 1 1 ;
```

In the following example, SETUNITS can be used as a multiplier. The SETUNITS command sets two-inch x and y default values. The POSITION subcommand values are multiplied by the default values creating a position four inches horizontally and four inches vertically from a given reference point. See [“SETUNITS Command” on page 242](#) for a more detailed explanation.

```
SETUNITS 2 IN 2 IN ;
:POSITION 2 2 ;
```

Diagram Shorthand

These terms are used in the command definitions:

x-pos

A horizontal position that uses a numeric number followed optionally by a unit. For the available units, see [“Units of Measurement” on page 186](#).

y-pos

A vertical position that uses a numeric number followed optionally by a unit. For the available units, see [“Units of Measurement” on page 186](#).

Chapter 10. Form Definition Command Reference

This section includes:

- Sequence of commands for form definitions
- Form definition commands that are listed alphabetically
- Detailed information about each command
- Descriptions of the applicable subcommands and parameters for each command

Sequence of Commands for Form Definitions

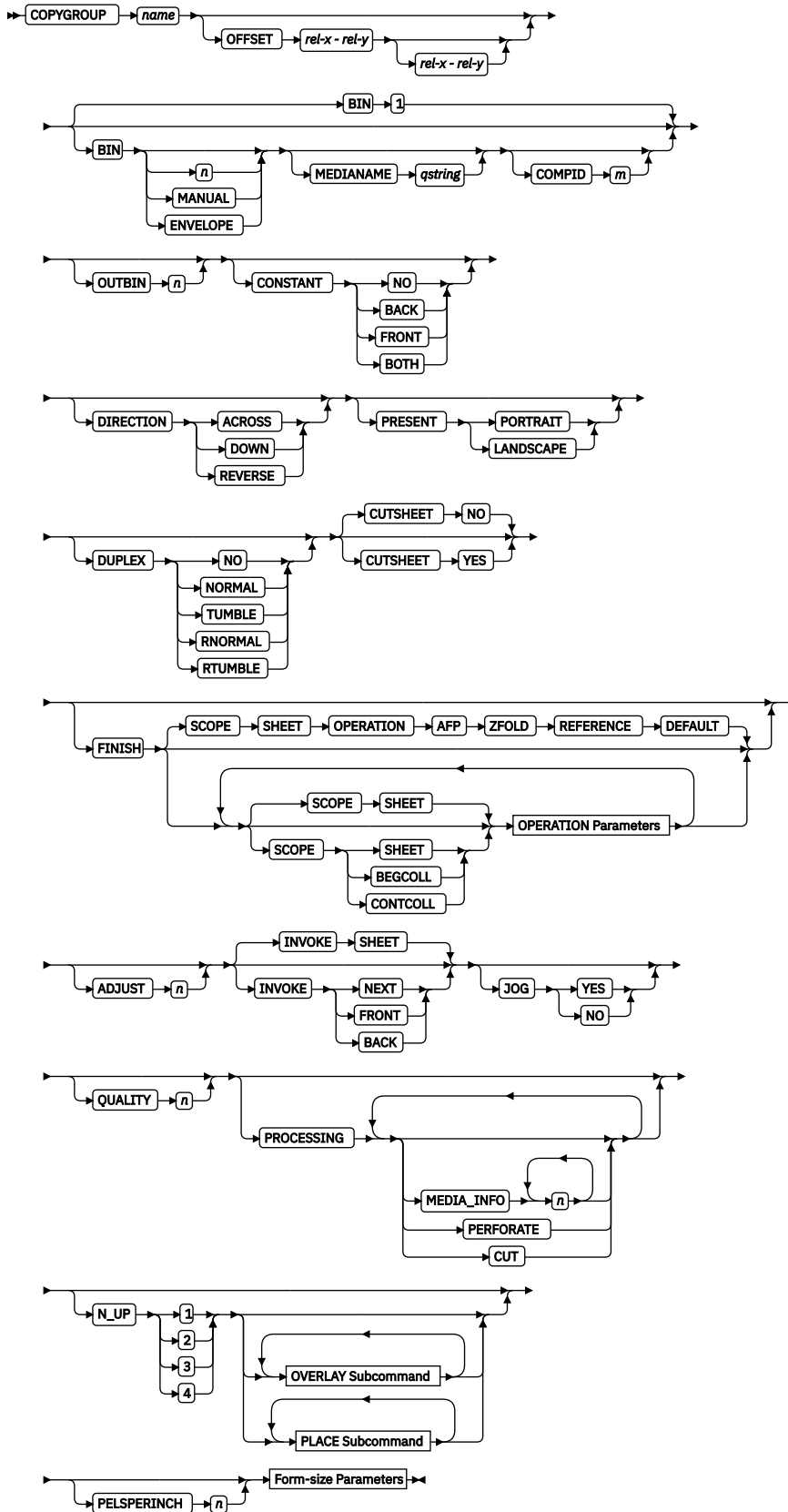
```
[SETUNITS ...]
FORMDEF
[SUPPRESSION ...]
  [DEFINE CMRNAME...]
  [CMR...]
  [CMRTAGFIDELITY...]
  [RENDER...]
[COPYGROUP ]
  [CMR ...]
  [OVERLAY ...]
  [RENDER ...]
  [SUBGROUP ...]
```

Rules:

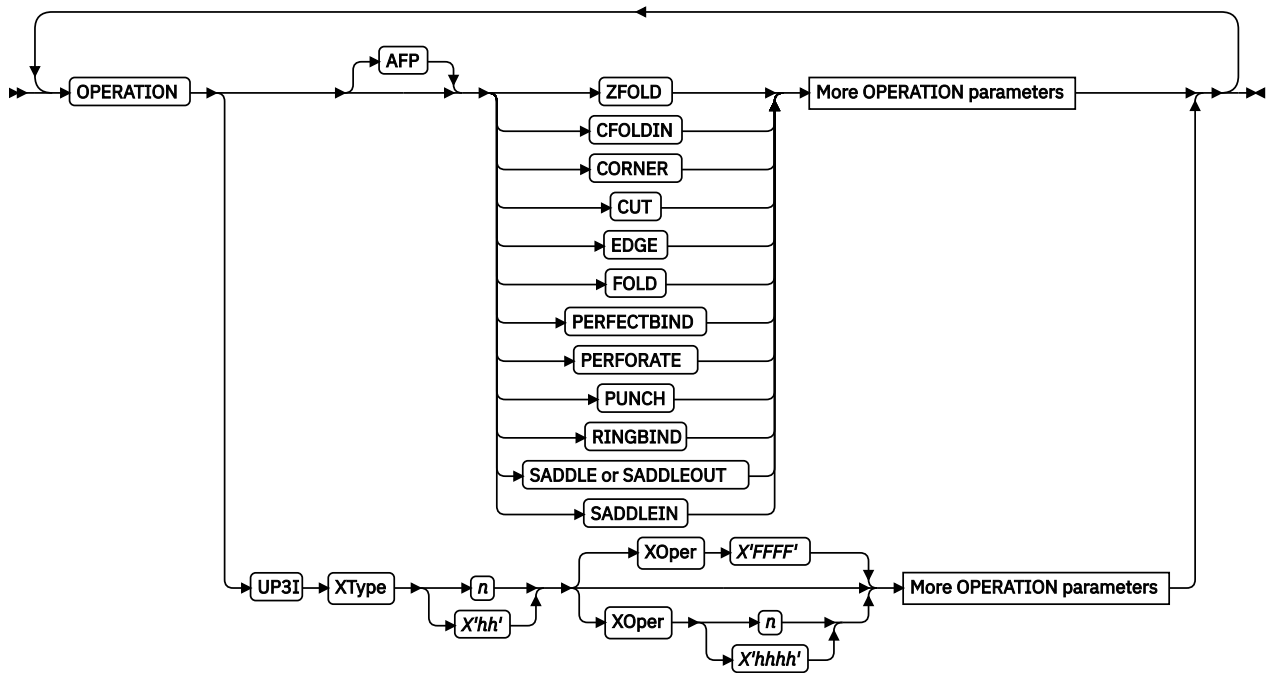
1. SUPPRESSION commands must be specified immediately after FORMDEF commands. The exception is the SETUNITS command (see note “5” on page 189).
2. One file can contain multiple sets of form definitions.
3. OVERLAY and SUBGROUP commands must be specified under their associated COPYGROUP command. The OVERLAY commands must be specified immediately after a COPYGROUP command.
 - The OVERLAY command is required only to designate an overlay that is to be kept in the 3800 printer as raster data, or to specify a local name for referencing an overlay in a SUBGROUP command. If you do not code the OVERLAY command, you can still specify an overlay in a SUBGROUP command by using its user-access name.
 - Overlays also can be specified by using the N_UP subcommand of the FORMDEF or COPYGROUP command, or by using the PRINTLINE command in the page definition. If the overlay is specified in one of these ways, it must not also be coded on the OVERLAY or SUBGROUP commands that are shown here. For more information, see “Medium Overlays and Page Overlays” on page 147.
 - The appearance of a misplaced OVERLAY command before the first COPYGROUP command causes a default COPYGROUP to be generated as the first COPYGROUP.
 - If the form definition has only one copy group, the COPYGROUP command can be omitted. The OVERLAY command then follows any SUPPRESSION command.
4. The first COPYGROUP command can be omitted in a form definition if it contains only one copy group and no OVERLAY commands. If it is omitted, the FORMDEF command parameters are used to define the copy group.
5. A SETUNITS command can be placed before any PPFA command. The values set are in effect until the next SETUNITS command.
6. Each command can appear more than once under one FORMDEF command.
7. To do an INSERT finishing task, select a COPYGROUP that specifies the dedicated INSERT bin number from which the pages are to be inserted and apply (typically dummy) print data to that page. Observe that nothing is printed on the inserted page.

Note: The INSERT bin number is printer-specific. See the documentation for the specific printer that is used.

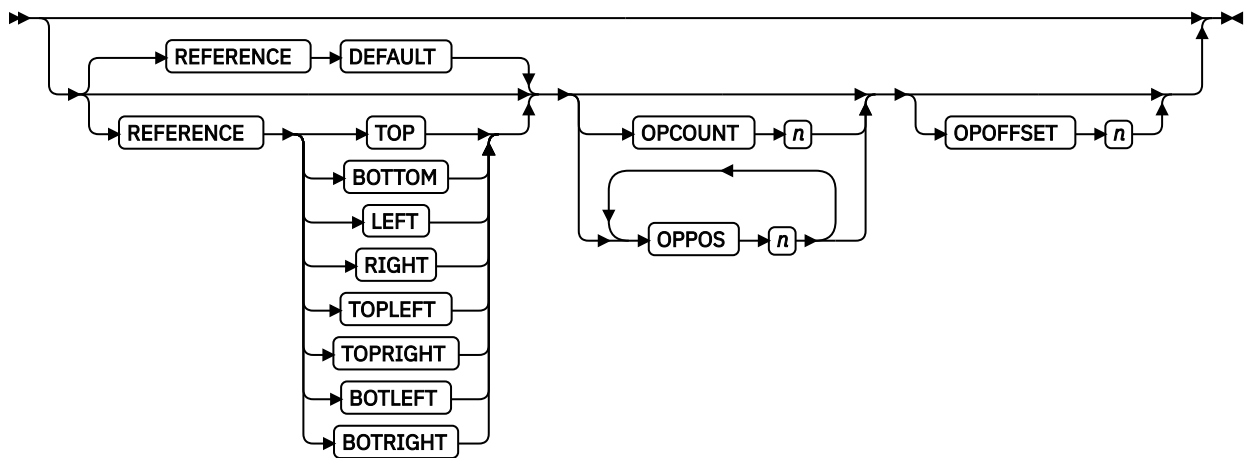
COPYGROUP Command



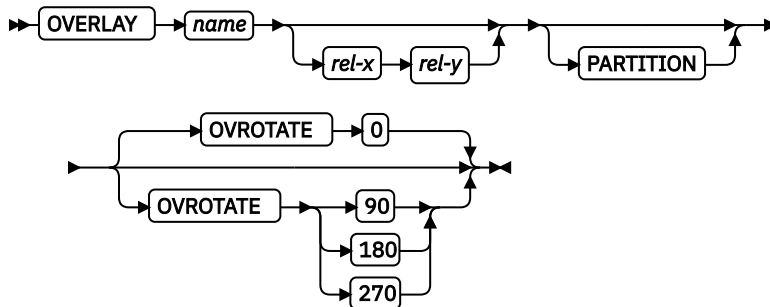
OPERATION Parameters



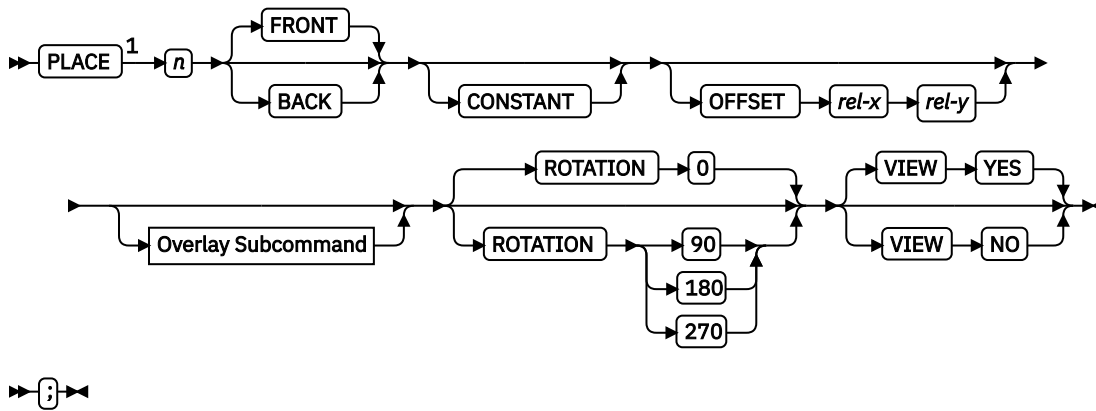
More OPERATION Parameters



OVERLAY Subcommand



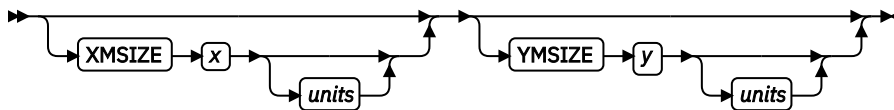
PLACE Subcommand



Notes:

¹ The use of the PLACE subcommand indicates enhanced N_UP printing.

Form-size Parameters



Copy groups are subsets of a form definition. A form definition can contain one or several copy groups. Copy groups are nested within a form definition that follows any SUPPRESSION command. COPYGROUP subcommands have no fixed defaults; if any subcommand is omitted, its value is selected from the corresponding subcommand in the FORMDEF command.

Notes:

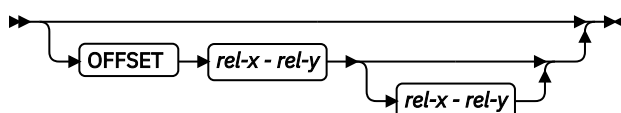
1. Subsets of copy groups are called subgroups.
2. If you specified DUPLEX NO anywhere in the copy group, output is simplex regardless of any other DUPLEX subcommand within the same copy group.
3. If a form definition has only one copy group, the COPYGROUP command can be omitted. If omitted, a name is automatically assigned by PPF to the copy group, by using the form definition resource name, including the F1 prefix. All values for the copy group are given the values from the FORMDEF command and subcommands. You need to know this name if you use conditional processing and need to invoke this copy group by name. Copy groups are placed within the form definition in the order in which they are generated.
4. To change copy groups during formatting, use conditional processing.
5. Another way to change copy groups after the resource is stored is to insert an Invoke Medium Map structured field into your print data file (copy groups are known to the print server as medium maps). If no Invoke Medium Map structured field is found and no conditional processing is being done, the first copy group in the form definition is used for the job.

COPYGROUP name

Defines an alphanumeric name of 1 - 8 characters. This name must be unique in a single form definition. If any names are duplicated, PPF issues an error message and does not create the form definition.

Subcommands

OFFSET



Specifies the relative offset of the logical page for both the front and back pages in regard to the media origin. The media origin is printer-dependent. For more information about media origin, see your printer publications.

If you specify offset values for the back of the page, you must also specify the front offset values.

Notes:

1. The OFFSET subcommand does not affect the position of medium overlays.
2. If OFFSET is not specified, the OFFSET default is 0.1 IN 0.1 IN
3. You can specify this offset as negative to crop the top, left, or both of an image.

rel-x

Specifies the relative horizontal offset of the logical page on the front or back side of the copy group relative to the media origin. The valid options for *rel-x* are described in the SETUNITS command for the horizontal value.

If no unit is specified, a default setting is:

- Taken from the last SETUNITS command
- IN (inch) if no SETUNITS command is issued

rel-y

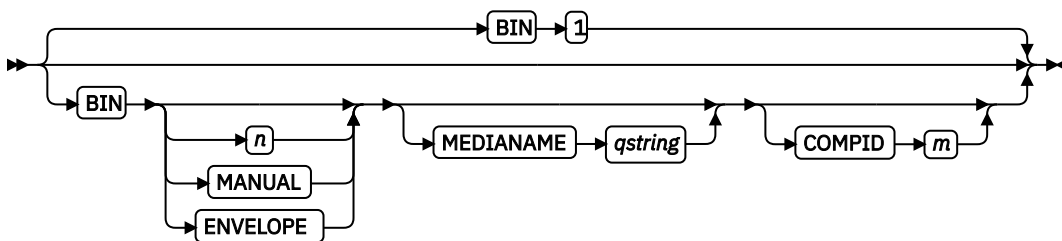
Specifies the relative vertical offset for the logical page for the front or back side of the page. The valid options for *rel-y* are described in the SETUNITS command for the vertical value.

Note: The vertical offset for the 3800 must be 0.5 inches or greater.

If no unit is specified, a default setting is:

- Taken from the last SETUNITS command
- IN (inch) if no SETUNITS command is issued

BIN



Specifies the paper source. This subcommand must be used only for printers that have more than one paper source.

1

Selects the primary paper source.

2 - 255

Selects another paper source. If the specified bin does not exist on your printer, the default paper source for that printer is used. For more information about paper sources on your printer, see your printer publications.

MANUAL

Selects manual feed as a paper source on those printers that support manual feed. For more information, see your printer publications.

ENVELOPE

Selects an envelope paper source on those printers that support this function. For more information, see your printer publications.

MEDIANAME

Selects a media source by specifying an agreed-upon name for the bin.

qstring

Up to 12 characters within single quotation marks, specifying the media source name. On some printers, this name is preset into the printer; on other printers, it can also be entered into the printer by the user. For a current list of the valid media names, see [Appendix G, “PPFA Media Names,”](#) on page 527. See your printer publications for more information.

Notes:

1. BIN selection is overridden by the printer if the form defined to each bin is the same form number. Only the primary bin is selected.
2. The primary source usually contains either letter-size (US) or A4 (ISO) paper. Other paper sources are used for less common paper sizes (such as legal-size) and for special paper (such as colored stock or preprinted letterhead on heavy bond).
3. If duplexing is requested and you select from the front side from one bin and the back side from another bin, a warning message is issued and the printer takes the paper from the bin that is specified on the front side.

COMPID

Selects a bin based on the component ID.

m

For a current list of component IDs, see [Appendix G, “PPFA Media Names,”](#) on page 527. Component IDs 12,288 - 268,435,455 are reserved for the user.

OUTBIN *n*

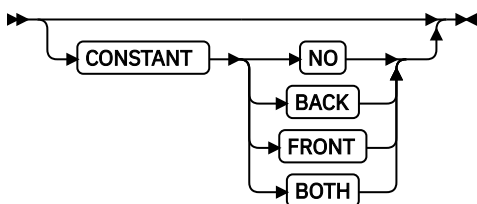


Specifies the destination bin number for any pages that are directed by this COPYGROUP. Subgroups in this form definition that do not specify an output bin number inherit this one.

n

Output bin number

CONSTANT



Specifies whether the constant-forms function is on or off and whether constant form is to be printed on the front or back sides of a sheet.

NO

Specifies that the constant forms function is off.

BACK

Specifies that a constant form is to be printed on the back side without variable data.

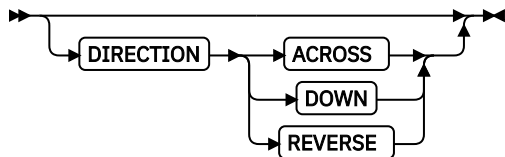
FRONT

Specifies that a constant form is to be printed on the front side without variable data.

BOTH

Specifies that a constant form is to be printed on both sides without variable data.

DIRECTION



Determines, along with the PRESENT subcommand, how data is oriented on printers whose media origin can be changed. See the list of printers in [Chapter 7, “N_UP Printing,”](#) on page 129.

If you are printing line data, you usually specify the same value for the DIRECTION subcommand as is specified for the DIRECTION subcommand in the page definition.

ACROSS

Specifies that the pages are formatted in the ACROSS printing direction.

DOWN

Specifies that the pages are formatted in the DOWN printing direction.

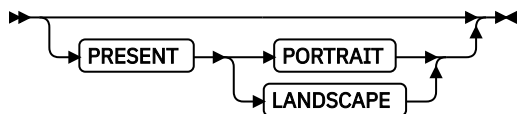
REVERSE

Specifies that the pages are formatted in the REVERSE printing direction.

If the DIRECTION subcommand is specified, you must specify the PRESENT subcommand. The default for DIRECTION is determined by the value that is specified for PRESENT.

The direction default of PORTRAIT is ACROSS; the direction default of LANDSCAPE is DOWN. If PRESENT and DIRECTION are not specified, the default is PRESENT PORTRAIT and DIRECTION ACROSS.

PRESENT



Specifies, along with the DIRECTION subcommand, how the data is oriented on printers whose media origin can be changed.

The PRESENT and DIRECTION subcommands are only supported by cut-sheet printers when you specify the N_UP subcommand or the CUTSHEET subcommand with the YES parameter. See [Figure 94 on page 130](#) - [Figure 97 on page 131](#) to determine the effect of the PRESENT and DIRECTION subcommands when you use them with the N_UP subcommand.

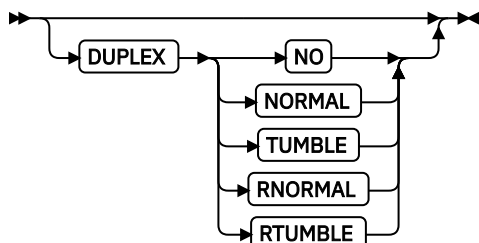
PORTRAIT

Specifies that the pages are printed in the portrait page presentation, with their short edges at the top and bottom and their long edges at the sides.

LANDSCAPE

Specifies that the pages are printed in the landscape page presentation, with their long edges at the top and bottom and their short edges at the sides.

DUPLEX



Specifies whether printing is done on both sides of the sheet. This subcommand must be used only for page printers that have duplex capability.

NO

Duplex printing is not done.

NORMAL

Duplex printing is done, with the tops of both sides printed along the same edge for side binding.

TUMBLE

Duplex printing is done with the top of one side and the bottom of the other printed along the same edge of the sheet for top binding.

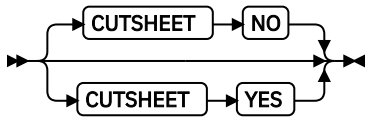
RNORMAL

Rotated normal. Duplex printing is done with the tops of both sides printed along the same edge. Used with landscape pages, N_UP 2, and N_UP 3.

RTUMBLE

Rotated tumble. Duplex printing is done with the top of one side printed along the same edge of the sheet as the bottom of the other. Used with landscape pages, N_UP 2, and N_UP 3.

CUTSHEET



If you are using a cut-sheet printer, this subcommand specifies whether the medium orientation information, which specifies the DIRECTION, PRESENT, or both subcommands, is to be passed to the printer. The default value is NO.

YES

Specifies the rotation data is to be passed.

NO

Specifies the rotation data is not to be passed unless N_UP is coded.

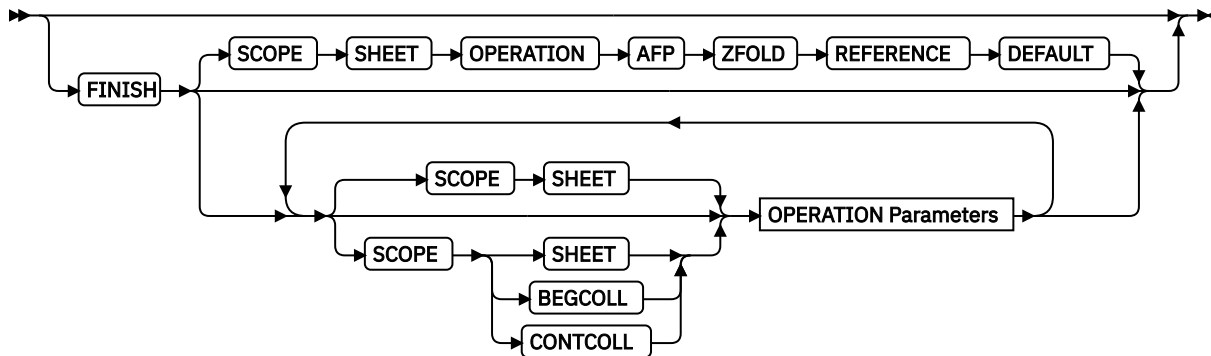
Notes:

1. If you have a continuous form printer, the medium orientation information is passed. If you have a cut-sheet printer and N_UP is coded, the orientation information is passed.
2. If you have a cut-sheet printer and CUTSHEET YES is coded, the orientation information is passed, providing you also have a level of the print server that supports that feature.
3. You must have a printer that allows its media origin to be changed to use this subcommand.

Example: In the following example, the CUTSHEET subcommand is coded on the form definition to give COPYGROUP c1 and c2 CUTSHEET YES behavior and COPYGROUP c3 CUTSHEET NO behavior. The COPYGROUP c1 inherits its behavior from the form definition.

```
FORMDEF cut1 REPLACE YES CUTSHEET YES;  
COPYGROUP c1 ;  
COPYGROUP c2 CUTSHEET YES ;  
COPYGROUP c3 CUTSHEET NO ;
```

FINISH



A finishing operation is to be done on this COPYGROUP. This option is to be used only on a document, set of documents, or an entire print file.

SCOPE

Determines to which sheets the finishing operation is applied.

Note: SCOPE can be repeated within a FINISH subcommand, but only one SCOPE of a particular type is allowed in each COPYGROUP command. For example, only one SCOPE BEGCOLL is allowed in a COPYGROUP command.

single sheet scope

Operations with this SCOPE are applied to a single sheet.

SHEET

Single sheet Medium-map level scope. The specified finishing operation is applied to each sheet individually.

collection scope

Collection/Medium-map level scope. All sheets that are generated by this medium map are collected and the specified finishing operations are applied to this collection.

Note: Some finishing operation combinations are not compatible. Compatible combinations are dependent upon the presentation-device.

BEGCOLL

Begin medium-map level collections, which causes a sheet eject and starts a medium-map-level media collection for the specified operation. If a collection for the same finishing operation is already in progress from a previous medium map, that collection is ended and its specified finishing operation is applied. The media collection started with BEGCOLL continues until:

1. The end of the document is reached.
2. A medium map is invoked that is not CONTINUE COLLECTION for this same operation command.

When a finishing collection is ended for either reason, the specified finishing operation is applied.

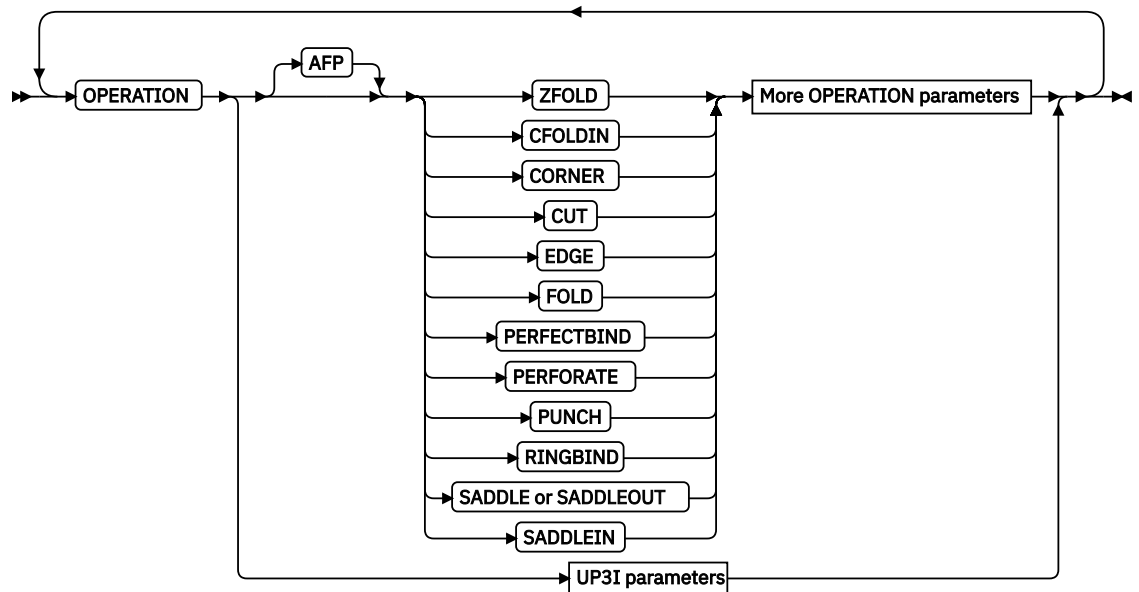
CONTCOLL

Continue medium-map level collection, which continues a medium-level media collection that was started for the same finishing operation by a previous medium map. The media collection started with CONTCOLL continues until:

1. The end of the document is reached.
2. A medium map is invoked that is not CONTINUE COLLECTION for this same operation command.

When a finishing collection is ended for either reason, the specified finishing operation is applied.

OPERATION parameters



OPERATION

Specifies the type of FINISH operation and parameters.

Notes:

1. Compatible operations can be repeated with a specified SCOPE.
2. Your print server might have a limit on the number of collection operations that are allowed at one time.
3. The default for OPERATION is ZFOLD. It is necessary to code OPERATION only if REFERENCE is coded.

AFP

Specifies Advanced Function Presentation (AFP) operations as defined in the *Mixed Object Document Content Architecture Reference* and the *Intelligent Printer Data Stream Reference*.

sheet operations

These operations operate on a single sheet of paper and are valid for SCOPE SHEET.³

CFOLDIN

Center Fold In. Specifies that the media is folded inward along the center line that is parallel to the finishing operation axis. After this operation, the back side of the last sheet of the collection is outside. The OPCOUNT and OPPOS parameters are ignored for this operation. CFOLDIN is applied to collected media, not to individual media.

Note: The data stream pages must already be properly ordered for the CFOLDIN operation.

CUT

Specifies that a separation cut is applied to the media along the axis of the finishing operation. The OPCOUNT and OPPOS parameters are ignored for this operation.

FOLD

Specifies that the media is folded along the axis of the finishing operation. The folding is done along the axis of the finishing operation. The OPCOUNT and OPPOS parameters are ignored for this operation. This operation is applied to collected media, not to individual media.

³ The PAGE scope is obsolete. The SHEET subcommand must be used instead of PAGE subcommand. For compatibility purposes, the PAGE command is accepted as an alias for SHEET.

PERFORATE

Specifies that a perforation cut is applied to the media along the axis of the finishing operation. The OPCOUNT and OPPOS parameters are ignored for this operation.

PUNCH

Specifies that one or more holes are to be punched or drilled into the media along the finishing axis. PUNCH is applied to the collected media, not to individual media.

ZFOLD

Perform a ZFOLD operation along the finishing edge (axis). Z-Folding causes the sheet to first be folded in half inwards (the front side of the sheet is now inside the fold) along a line parallel to the reference edge. The half of the sheet originally furthest from the reference edge is again folded in half outwards along a line parallel to the reference edge. For example, when Z-Folding is applied to an 11 by 17-inch sheet with the reference edge along a short side, the result is an 8.5 by 11 inch fold-out. The OPOFFSET, OPCOUNT, and OPPOS parameters are ignored for this operation. This operation is applied to an individual sheet.

Note: REFERENCE is the only parameter that is allowed for ZFOLD and the only reference edges that are allowed are DEFAULT, TOP, BOTTOM, LEFT, and RIGHT.

afp collection operations

These operations operate on a collection of sheets and are valid with BEGCOLL and CONTCOLL.

CFOLDIN

Center Fold In. Specifies that the media is folded inward along the center line that is parallel to the finishing operation axis. After this operation, the back side of the last sheet of the collection is outside. The OPCOUNT and OPPOS parameters are ignored for this operation. CFOLDIN is applied to collected media, not to individual media.

Note: The data stream pages must already be properly ordered for the CFOLDIN operation.

CORNER

Specifies that one staple is driven into the media at the reference corner (see REFERENCE parameter). For corner staples, the offset and angle of the staple from the selected corner is device-dependent. The OPCOUNT and OPPOS parameters are ignored for this operation. This operation is applied to collected media, not to individual media.

CUT

Specifies that a separation cut is applied to the media along the axis of the finishing operation. The OPCOUNT and OPPOS parameters are ignored for this operation.

EDGE

Specifies that one or more staples are driven into the media along the axis of the finishing operation. This operation is applied to collected media, not to individual media.

FOLD

Specifies that the media is folded along the axis of the finishing operation. The folding is done along the axis of the finishing operation. The OPCOUNT and OPPOS parameters are ignored for this operation. This operation is applied to collected media, not to individual media.

PERFECTBIND

This operation specifies a type of book binding that glues the sheets of the group together at the reference edge (spine). When you specify PERFECTBIND, the OPOFFSET, OPCOUNT, and OPPOS parameters are ignored.

PERFORATE

Specifies that a perforation cut is applied to the media along the axis of the finishing operation. The OPCOUNT and OPPOS parameters are ignored for this operation.

PUNCH

Specifies that one or more holes are to be punched or drilled into the media along the finishing axis. PUNCH is applied to the collected media, not to individual media.

RINGBIND

This operation specifies a type of book binding when the sheets of the group are loosely connected at the reference edge (spine) by first drilling or punching a set of holes along the reference edge and then inserting a wire pattern through the holes. When you specify RINGBIND, the OPOFFSET, OPCOUNT, and OPPOS parameters are ignored.

SADDLE (same as SADDLEOUT)

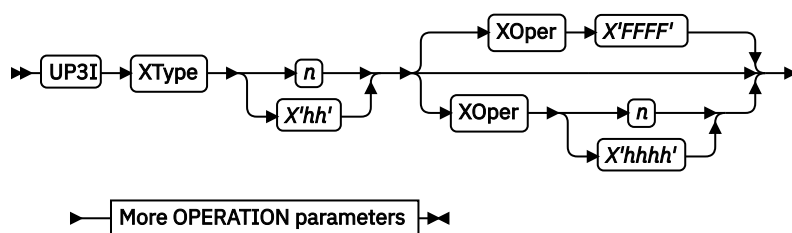
Specifies that one or more staples are driven into the media along the axis of the finishing operation, which is positioned at the center of the media, parallel to the reference edge (see REFERENCE parameter). The OPOFFSET parameter is ignored for this operation. This operation also includes a fold of the media outward along the finishing operation axis so that the front side of the first sheet in the collection is on the outside of the media collection. This operation is applied to collected media, not to individual media.

SADDLEIN

Specifies that one or more staples are driven into the media along the axis of the finishing operation, which is positioned at the center of the media, parallel to the reference edge (see REFERENCE parameter). The OPOFFSET parameter is ignored for this operation. This operation also includes a fold of the media inward along the finishing operation axis so that the front side of the first sheet in the collection is on the inside of the media collection. This operation is applied to collected media, not to individual media.

Note: The datastream pages must already be properly ordered for the SADDLEIN operation.

UP3I parameters



UP3i

Specifies that these operations are passed to the printer by using the Universal Printer Pre- and Post-Processing Interface (UP3i) finishing interface as specified in the "Form Finishing Operation Triplet" in the UP3i specification document. UP3i is an open standard intelligent interface that is intended for printers, pre-processors, post-processors, and other related applications.

Notes:

1. To use this function, you must have printer server support and an attached UP3i device for the specified operation.
2. The complete UP3i specification document, which includes the "Form Finishing Operation Triplet", can be viewed at the [AFP Consortium web page \(http://www.afpcinc.org\)](http://www.afpcinc.org).

UP3i explicit operations

Specifies the explicit values for the "Finishing Operation Type" and the "Finishing Operation Parameter" that go in the UP3i Form Finishing Operation Triplet.

Notes:

1. PPFA does not check that the XType, XOper, or operation parameters are contextually correct. Therefore, new UP3i operations and parameters can be coded without having to install a new PPFA module. However, it also allows contextually incorrect operation and parameter values to be entered.
2. See [Table 9 on page 203](#) for values of XType and XOper.

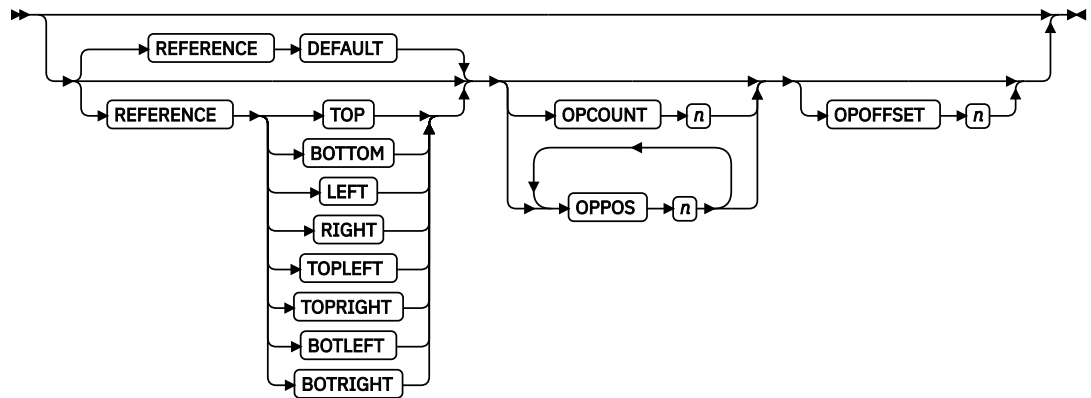
XType

Explicit Operation Type. Specify in hexadecimal or a decimal equivalent number the Finishing Operation Type. A value of 0 specifies a No Operation/Pass through paper operation. When 0 is coded in this field, the XOper field is ignored. Enter 2 hexadecimal digits or a decimal number less than or equal to 255.

XOper

Explicit Operation or Operation Parameter. Specify in hexadecimal or a decimal equivalent number the Finishing Operation Type. A value of X'FFFF' specifies the device default operation for the specified finishing operation for the specified Finishing Operation Type in the XType parameter. Enter 4 hexadecimal digits or a decimal number less than or equal to 65535.

More OPERATION parameters



These operation parameters apply to both AFP and UP3i Operations with the noted exceptions.

REFERENCE

Selects the reference edge or corner for the finishing operation. The REFERENCE subcommand is optional and, when omitted, the DEFAULT attribute is the default.

DEFAULT

Specifies that the device default edge determines the reference edge.

TOPLEFT

Specifies that the reference corner is positioned at the top in the left corner. This REFERENCE parameter can be used only for CORNER operations.

TOPRIGHT

Specifies that the reference corner is positioned at the top in the right corner. This REFERENCE parameter can be used only for CORNER operations.

BOTRIGHT

Specifies that the reference corner is positioned at the bottom in the right corner. This REFERENCE parameter can be used only for CORNER operations.

BOTLEFT

Specifies that the reference corner is positioned at the bottom in the left corner. This REFERENCE parameter can be used only for CORNER operations.

TOP

Specifies that the reference is positioned along the top edge.

BOTTOM

Specifies that the reference edge is positioned along the bottom edge.

RIGHT

Specifies that the reference edge is positioned along the right edge.

LEFT

Specifies that the reference edge is positioned along the left edge.

OPCOUNT *n*

Use OPCOUNT to request a specific number of finishing operations; valid values are 1-122. Do not specify OPPOS values with OPCOUNT. If OPPOS is specified for corner staple, separation cut, perforation cut, or fold, this OPCOUNT value is ignored. The printer determines the positions of the operations. The default is 0 (zero).

OPPOS *n*

Use OPPOS to specify the offset of finishing operations along the finishing operations axis that is measured from the point where the finishing operation axis intersects the bottom edge or left edge of the medium toward the center of the medium. Each consecutive OPPOS parameter is used to position a single finishing operation that is centered on the specified point on the finishing operation axis.

For AFP, the subparameter is an integer value in the range of 0 - 32,767 specified in millimeters.

For UP3i, the subparameter is an integer value in the range of 0 - 999999999 specified in millipoints (1/72000 inch).

Do not specify the unit of measure. Do not specify OPCOUNT when you use OPPOS. If OPPOS is specified for corner staple, fold, separation cut, or perforation cut, the OPCOUNT value is ignored.

OPOFFSET *n*

Specifies the offset of finishing operation axis from the reference edge that is measured from the reference edge toward the center of the medium.

For AFP, the subparameter is an integer value in the range of 0 - 32,767 specified in millimeters.

For UP3i, the subparameter is an integer value in the range of 0 - 999999999 specified in millipoints (1/72000 inch).

Do not specify OPOFFSET for corner staple or saddle stitch; the corner staple or saddle stitch values are ignored when specified with OPOFFSET.

Table 9 on page 203 shows how to specify finishing operations.

XType Finishing Operation	XType Value	XOper Finishing Operation Parameter	XOper Value
No Operation / Pass-through paper	X'00'	Not applicable	
Paper Input / Page Interpose (not used for AFP/IPDS)	X'01'	Interpose from bin xx Stock Number	X'0001' - X'00FE'
		Default Bin/Stock	X'FFFF'

Table 9: XType and XOper values. (continued)

XType Finishing Operation	XType Value	XOper Finishing Operation Parameter	XOper Value
Fold	X'03'	Folding parameters from fold catalog	X'100D'
		No Fold	X'0000'
		Default	X'FFFF'
Staple / Stitch	X'04'	Corner Staple	X'0001'
		Saddle Stitch In	X'0002'
		Saddle Stitch Out	X'0003'
		Edge Stitch	X'0004'
		Default	X'FFFF'
Cut	X'05'	Separation Cut	X'0001'
		Perforation Cut	X'0002'
		Cross Cut	X'0003'
		Default	X'FFFF'
Trim	X'06'	Front Edge	X'0001'
		1 Edge	X'0002'
		3 Edge	X'0003'
		5 Edge	X'0004'
		Default	X'FFFF'
Offset / Group Separator / Job Separator	X'07'	Offset to Left	X'0001'
		Offset to Right	X'0002'
		Device Default	X'FFFF'
Stack	X'08'	Alternate Offset Stack	X'0001'
		Device Default	X'FFFF'
Rotate	X'09'	90° Clockwise	X'0001'
		180° Clockwise	X'0002'
		270° Clockwise	X'0003'
		Device Default	X'FFFF'
Punch	X'0A'	Round Hole	X'0001'
		Rectangular Hole	X'0002'
		Device Default	X'FFFF'
Bind	X'0B'	Device Default	X'FFFF'

XType Finishing Operation	XType Value	XOper Finishing Operation Parameter	XOper Value
Merge	X'0C'	Handle Most Left Page First	X'0001'
		Handle Most Right Page First	X'0002'
		Device Default	X'FFFF'
Banding	X'0D'	Single Band Wrap	X'0001'
		Double Band Wrap	X'0002'
		Crossing Band Wrap	X'0003'
		Device Default	X'FFFF'
Shrink Wrap	X'0E'	Shrink Wrap	X'0001'
		Device Default	X'FFFF'
Special Handling	X'F0'	Specific Parameter (undefined by UP3i)	X'0000' - X'FFFE'
		Not Applicable	X'FFFF'

Notes:

1. Your printer must have the appropriate finishing hardware to do finishing operations.
2. The default OPERATION is ZFOLD, and the default REFERENCE is DEFAULT.
3. Your print server might have a limit on the number of collection operations that can be open at one time.
4. For the finishing operation, changing the orientation of the medium presentation space does not change the finishing position. For instance, the finishing reference edge (corner) is not affected by DIRECTION or PRESENT values.
5. If more than one finishing operation is specified, the operations are applied in the order in which they are specified. Identical finishing operations for the same SCOPE are not supported.

The following are examples of finishing operations:

- ZFOLD pages (for which the xyz COPYGROUP is in effect), specifying the left edge of the document as the reference edge:

```
COPYGROUP xyz
  FINISH OPERATION ZFOLD REFERENCE LEFT
;
```

- ZFOLD pages that specify the default edge of the document:

```
– COPYGROUP xyz FINISH;
```

```
– COPYGROUP xyz FINISH OPERATION ZFOLD;
```

```
– COPYGROUP xyz FINISH OPERATION ZFOLD REFERENCE DEFAULT;
```

- A COPYGROUP finishing command where COPYGROUP 1 begins the finishing collection for corner stapling, folding, and separation cut. COPYGROUP 2 continues the fold, cut, and corner

operations and stops all other operations. COPYGROUP 3 continues any corner stapling, begins a new punch and fold group, and stops all other operations.

```

COPYGROUP 1
  FINISH
  SCOPE BEGCOLL OPERATION corner REFERENCE topleft
                OPERATION fold
                OPERATION cut;

COPYGROUP 2
  FINISH
  SCOPE CONTCOLL OPERATION fold
                OPERATION cut
                OPERATION corner;

COPYGROUP 3
  FINISH
  SCOPE CONTCOLL OPERATION corner REFERENCE topleft
  SCOPE BEGCALL OPERATION punch
                OPERATION fold;

```

- A COPYGROUP finishing command where COPYGROUP 1 begins a finishing collection for a punch, separation cut, and corner stapling (by using the UP3i interface), and stops all other operations in progress. COPYGROUP 2 continues any UP3i corner stapling, but stops all other operations in progress. COPYGROUP 3 continues any UP3i corner stapling, stops all other operations in progress, and begins collecting sheets to punch and cut.

```

FORMDEF FinXmp Replace Yes;

COPYGROUP 1
  FINISH
  SCOPE BEGCOLL OPERATION punch
                OPERATION cut
                OPERATION UP3i XType 4 X0per 1 REFERENCE topleft

COPYGROUP 2
  FINISH
  SCOPE CONTCOLL OPERATION UP3i XType 4 X0per 1 REFERENCE topleft

COPYGROUP 3
  FINISH
  SCOPE CONTCOLL OPERATION UP3i
                UP3i XType X'04' X0per X'0001' REFERENCE topleft
  SCOPE BEGCALL OPERATION AFP punch
                OPERATION cut;

```

- COPYGROUP finishing commands with PRESENT and DIRECTION:

```

FORMEDF MOGD01 replace yes
  PRESENT landscape DIRECTION down ;
COPYGROUP cg00
  PRESENT portrait DIRECTION across ;

COPYGROUP cg01
  PRESENT landscape DIRECTION across ;

COPYGROUP cg02
  PRESENT portrait DIRECTION reverse ;

COPYGROUP cg03
  PRESENT landscape DIRECTION reverse ;

COPYGROUP cg04
  PRESENT portrait DIRECTION down ;

COPYGROUP cg05
  PRESENT landscape DIRECTION down ;

```

Finishing Operation Nesting Rules:

When more than one finishing operation that involves a collection of media is specified for some portion of the print file, a nesting of the operations is defined first by the scope of the operation and second by the order of the operation in the data stream.

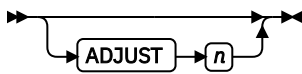
Finishing operations with a broader scope are nested outside of finishing operations with a narrower scope. The following scopes are listed in descending order:

1. Print-file level finishing (SCOPE PRINTFILE)
2. Document-level finishing, each document in the print file (SCOPE ALL)
3. Document-level finishing, a selected document in the PRINTFILE (SCOPE *n*)
4. Medium-map-level finishing, a collection of sheets (SCOPE BEGCOLL)

Finishing Operation Implementation Notes:

1. AFP environments limit the number of finishing operations that can be nested at the medium map (COPYGROUP) level. Check your PSF documentation for these limits.
2. In AFP environments, the nesting of identical finishing operations at the medium-map-level is not supported. Two finishing operations are identical if the OPERATION, REFERENCE, OPCOUNT or OPPOS, and OPOFFSET are the same.
3. For some printers, the JOG function cannot be combined with a finishing operation. In this case, the JOG function is ignored. Check your printer documentation.

ADJUST *n*



Establishes the range of horizontal adjustment for the print area on the sheet.

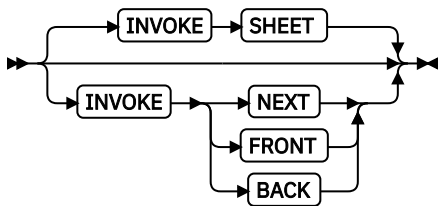
n

The adjustment range can be set 0 - 20 L-units. After a value is set, it is the maximum amount available in both directions, plus and minus.

Notes:

1. If you specify ADJUST, the maximum logical page size (in the horizontal direction) is reduced by the amount you specified here.
2. The ADJUST *n* subcommand is used only on the IBM 3800 printers.

INVOKE



Specifies where the next page of data is placed when this copy group is activated by conditional processing or by an Invoke Medium Map structured field.

INVOKE SHEET, which is the default, places the next page of data on a new sheet. The NEXT, FRONT, and BACK parameters place the next page in a subsequent partition on the same sheet or, if no partitions are available, on the next sheet. If FRONT or BACK is specified, INVOKE selects only partitions on the front or back.

The print server honors the NEXT, FRONT, and BACK values of the INVOKE subcommand only if the new copy group has the same medium modifications as the previous copy group. Some examples of medium modifications are duplexing, input bin, output bin, page offset, N_UP values, presentation, direction, medium (not page) overlays, text suppression, processing functions, print quality, finishing, jogging, and constant forms control. See the Media Eject Control Triplet (X'45') section in the *Mixed Object Document Content Architecture Reference* for a full description of the factors that allow a conditional eject to the next partition instead of the next sheet.

If any of these modifications differ, the print server ejects to a new sheet when the copy group is invoked. If you want to change overlays when you are ejecting to a new partition, use page overlays instead of medium overlays. See [“Medium Overlays and Page Overlays”](#) on page 147 for information about page and medium overlays.

When you use PLACE subcommands, the NEXT, FRONT, and BACK parameters place the next page by using the next sequential PLACE subcommand that matches the requirement (next, front, or back). For example, if you print by using the second PLACE subcommand of copy group A, and then you change to copy group B, you start with the third PLACE subcommand of copy group B.

A CONSTANT parameter on the PLACE subcommand does not alter the selection process. The selection is complete, even though the selected PLACE subcommand does not place the data. N_UP does the constant modification and continues until it finds a PLACE subcommand that does not specify CONSTANT. The data is placed with this subcommand. Observe that this PLACE subcommand need not match the FRONT or BACK specifications of the INVOKE subcommand.

SHEET

Specifies that data is placed in the first selected partition of the sheet.³

NEXT

Specifies that data is placed in the next selected partition.

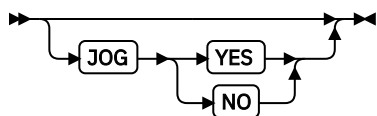
FRONT

Specifies that data is placed in the next selected front partition.

BACK

Specifies that data is placed in the next selected back partition.

JOG



Specifies whether a JOG subcommand is sent to the printer when this COPYGROUP is selected by an IMM structured field, or through conditional processing. When the JOG subcommand is sent, a printer either offsets (jogs) or prints copymarks. For cut-sheet printers, or for continuous-forms printers with burster-trimmer-stacker enabled, the JOG subcommand causes the first sheet that is controlled by this COPYGROUP to be stacked offset from the previous sheets. For continuous forms printers without a burster-trimmer-stacker, the JOG subcommand causes an increment in the copymark that is printed on the carrier strip. JOG subcommands also are sent to the printer at the beginning of each data set or at the beginning of each job, depending on host parameters. For more information about copymarks, see the system programming guide for your host print server.

YES

Specifies that a JOG subcommand be sent to the printer. The first sheet that is printed is offset or the copymark is incremented.

NO

Specifies that no JOG subcommand be sent to the printer. The first sheet that is printed is not offset; the copymark is not incremented.

QUALITY



Specifies the print quality. This subcommand is recognized only on printers that can produce more than one level of print quality. The default is determined by the printer model. (On some printers, the default can be set at the printer itself.) For more information, see your printer publications.

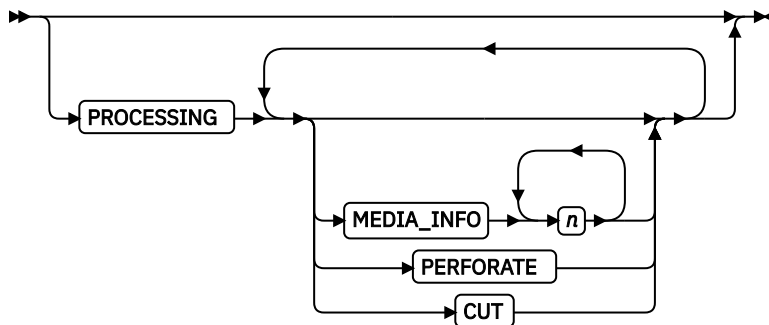
n

You can select a level of print quality by entering any whole number 1 - 10. Higher numbers correspond to higher levels of print quality; lower numbers correspond to lower levels. For more information, see your printer publications.

Print quality is determined by a numerical code in the range of 1 - 254 (hexadecimal X'01' - X'FE'). The codes corresponding to the possible QUALITY parameters are:

- 1 = 15 (X'0F')
- 2 = 40 (X'28')
- 3 = 65 (X'41')
- 4 = 90 (X'5A')
- 5 = 115 (X'73')
- 6 = 140 (X'8C')
- 7 = 165 (X'A5')
- 8 = 190 (X'BE')
- 9 = 215 (X'D7')
- 10 = 240 (X'F0')

PROCESSING



Specifies more post processing capabilities for selected printers and attached equipment. This option can be used only on a single sheet or collection of sheets. This subcommand expects 1 - 3 of the following keywords:

MEDIA_INFO n

This parameter specifies the ID of fixed medium information that a printer or printer-attached device applies to a sheet. Examples include color plates logos, letter heads, and other fixed images.

The numeric values that can be included are:

0 - 254

These numeric values select a particular fixed medium local ID that the printer or printer-attached device applies to a sheet. One or more IDs can be specified within this range.

255

This value selects all the current fixed medium local IDs that the printer or printer-attached devices applies to a sheet.

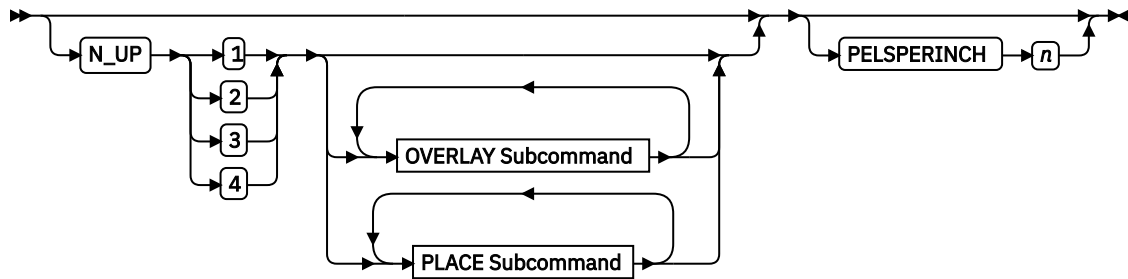
PERFORATE

Specifies a perforation cut at one or more fixed locations on the sheet according to the printer or printer-attached device.

CUT

Specifies a separation cut at one or more fixed locations on the sheet according to the printer or printer-attached device.

N_UP

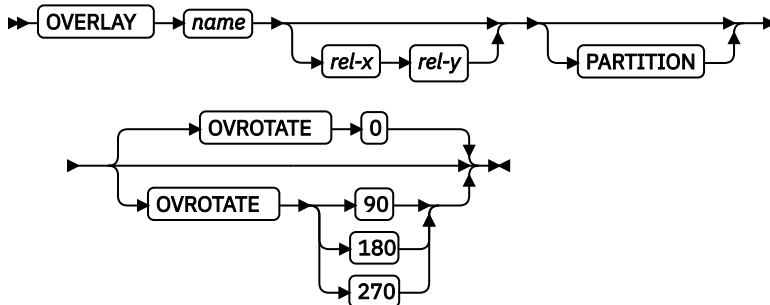


{ 1 | 2 | 3 | 4 }

Specifies the number 1, 2, 3, or 4 of equal-size partitions into which the sheet is divided. See the [list of printers](#) that support the N_UP subcommand.

If you do not specify the N_UP subcommand in the COPYGROUP command, the N_UP subcommand from the FORMDEF command is the default for the COPYGROUP command. You can mix N_UP printing and non-N_UP printing by specifying or not specifying the N_UP subcommand in each copy group and by not specifying N_UP in the FORMDEF command.

OVERLAY Subcommand



name

Specifies the user access name (up to 6 characters) of an overlay to be placed with every page in each of the N_UP partitions. You can specify a maximum of 254 OVERLAY subcommands in a copy group.

Notes:

1. The prefix 'O1' is not part of the six-character user-access name. The overlay name can be an alphanumeric.
2. This name is not related to names as defined on the OVERLAY command.

rel-x rel-y

Specifies the horizontal and vertical adjustment to the position of the overlay. This adjustment is in addition to any offset values built into the overlay. The x and y values can be positive (+) or negative (-). You can specify them in inches (IN), millimeters (MM), centimeters (CM), POINTS, or PELS. If you do not specify a unit value, PPFA uses the unit value that is specified in the last SETUNITS command or uses a default unit value of inches.

Note: This OVERLAY subcommand cannot be specified if the PLACE subcommand is specified.

PARTITION

Specifies that the overlay is to be placed relative to the partition origin.

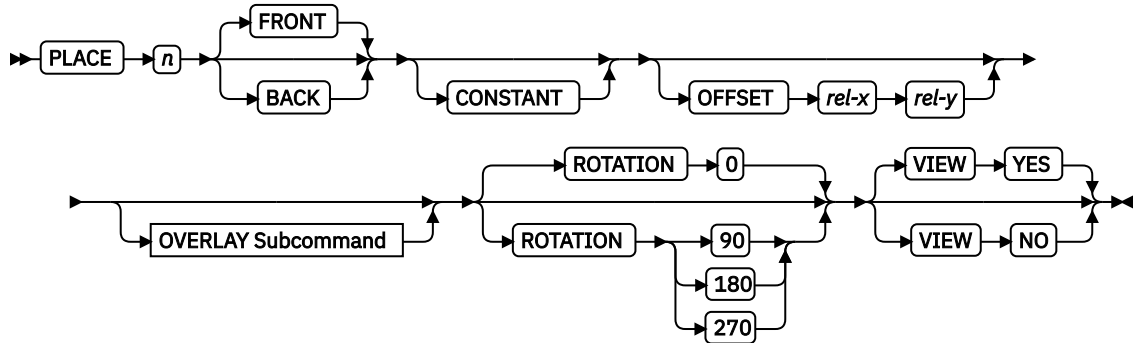
OVROTATE

Specifies the rotation of the placed overlay in regard to the x-axis of the page.

Example: Assuming the overlay has (0,0) placement coordinates, this causes page overlay 01x2 to be placed 1.5 inches to the right and 2.7 inches below the beginning of the page and rotated 90 degrees clockwise in regard to the page.

```
Formdef xmp1
  N_UP 1 PLACE 1 FRONT
  OVERLAY x2 1.5 in 2.7 in
  OVRotate 90;
```

PLACE Subcommand



Places a page of data or a constant modification relative to a partition. Each PLACE subcommand specifies the number *n* of a partition on either the front or back side of the sheet. FRONT is the default, if you do not specify this subcommand. You must specify the same number of PLACE subcommands as the number of partitions on the sheet. The sequence of the PLACE subcommands is the sequence in which incoming pages are placed in the partitions.

Notes:

1. The use of the PLACE subcommand indicates enhanced N_UP printing.
2. The PLACE subcommand is valid only on printers that support enhanced N_UP printing. If PLACE is not specified, pages are placed in partitions in the default partition sequence.

n

Specifies the numbered partition (1 - 4) into which the page of data is placed. See [Figure 94 on page 130](#) through [Figure 97 on page 131](#) for the locale of each numbered partition.

FRONT

Specifies that this partition is placed on the front side of the sheet.

BACK

Specifies that this partition is placed on the back side of the sheet.

CONSTANT

Specifies that no page data is placed by this PLACE subcommand.

Use CONSTANT when you are placing overlays without user's data or are placing fewer data pages on the sheet than the number of partitions that are specified in the N_UP subcommand.

For an example of using the CONSTANT parameter with overlays and to understand how the ordering of the PLACE subcommand affects overlays, see [“Example 3: Enhanced N_UP Asymmetric Pages” on page 145](#).

OFFSET

Specifies a relative offset of the page horizontally (*x*) and vertically (*y*) from the partition origin.

rel-x rel-y

The default value is 0.1 inches for both *x* and *y* offsets. This OFFSET parameter overrides any other OFFSET parameters that are specified on the FORMDEF or COPYGROUP command. You can specify the units in inches (in), millimeters (mm), centimeters (cm), points, or pels. If you do not specify a unit value, PPF uses the unit value that is specified in the last SETUNITS command or uses a default unit value of inches.

Note: You can specify this offset as negative to crop the top, left, or both of an image.

OVERLAY Subcommand

See [OVERLAY Subcommand](#).

ROTATION { 0 | 90 | 180 | 270 }

Specifies the clockwise rotation of the page and associated page overlays placed by this PLACE command.

Rotation turns the page and its associated page overlays around their fixed origin points. If you rotate the page without moving its origin point, you might rotate it off the physical medium. To prevent this situation, always offset the page origin to the place you want it to be for the rotated page, as shown in [Figure 125](#) on page 212.

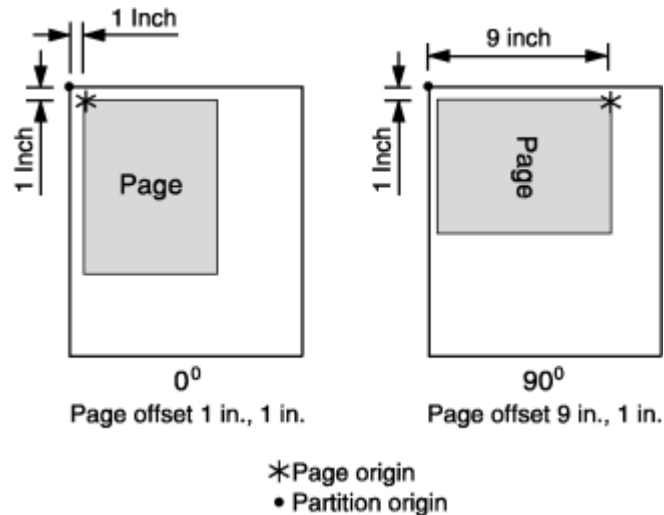


Figure 125: Offsetting the Page Origin for Rotated Pages

VIEW

Determines whether this N_UP PLACE page is viewable. VIEW is relevant only when the page is being presented on a display. VIEW is ignored if the page is being printed. If VIEW is not coded, it is equivalent to specifying VIEW YES.

YES

Specifies that this N_UP page is viewable and is presented.

NO

Specifies that this N_UP page is not to be presented.

OVERLAY Subcommand

See [OVERLAY Subcommand](#) for the syntax. Specifies the user access name (up to 6 characters) of an overlay to be placed with this PLACE subcommand. The overlay is placed relative to the page origin or, if the PARTITION keyword is specified, to the partition origin. You can specify multiple OVERLAY parameters in each PLACE subcommand.

Note: This OVERLAY subcommand cannot be specified if the PLACE subcommand is specified.

rel-x rel-y

Specifies the horizontal and vertical adjustment to the position of the overlay. This adjustment is in addition to any offset values built into the overlay. The x and y values can be positive (+) and negative (-). You can specify them in inches (in), millimeters (mm), centimeters (cm), points, or pels. If you do not specify a unit value, PPFPA uses the unit value that is specified in the last SETUNITS command or uses a default value of inches.

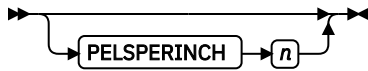
PARTITION

Specifies that the previous offset is from the partition origin. If not present, the offset is from the page origin, which is subject to the OFFSET parameter.

OVROTATE { 0 | 90 | 180 | 270 }

Specifies the rotation of the placed overlay in regard to the x-axis of the page.

PELSPERINCH *n*



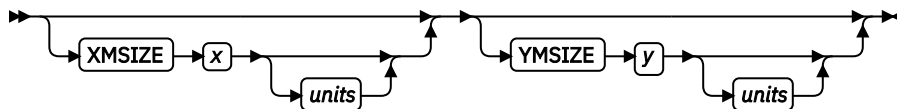
Specifies the Logical Units in pels per inch for this COPYGROUP. Use the PELSPERINCH parameter to tell PPSA the pel resolution of your printer to generate more exact object placements.

n

Specifies an integer number 1 - 3,276, which determines the Logical Units in pels per inch.

Note: If the L-Units are not specified on the copy group, they are inherited from the form definition. See [Figure 126 on page 232](#) for more information.

Form-size Parameters



Specifies the medium presentation space (also known as the medium size or form length and form width).

Notes:

1. This function requires both printer server and printer support. See your print server and printer documentation.
2. The printer does not adjust the size of your media-presentation space to be larger than the paper size (or what is defined in the printer as the paper size).
3. Some printers (such as the InfoPrint 1145 and the InfoPrint 4100) do not support the IPDS Set Media Size (SMS) command. The form size cannot be set with the form definition. Do not use the XMSIZE and YMSIZE subcommands for the printers that do not support the SMS commands.
4. Other printers (such as the 6400, 4247, and 4230) do not support the Set Media Origin (SMO) command. The media origin does not change. For the 6400, 4247, and 4230 printers form length is always YMSIZE and form width is always XMSIZE.
5. For all other printers, use the settings that are shown in [Table 10 on page 214](#) and [Table 11 on page 214](#). For these other printers, whether the XMSIZE or YMSIZE is form length or form width depends on the medium presentation space orientation, type of form, and NUP setting. The following examples are from [Table 10 on page 214](#) and [Table 11 on page 214](#). See the table for other media combinations.
 - Wide fanfold paper, PRESENT=Landscape, DIRECTION=ACROSS, and no-NUP - The form length is YMSIZE.
 - Narrow fanfold paper, PRESENT=Landscape, DIRECTION=ACROSS, and no-NUP - The form length is XMSIZE.
 - Cutsheet paper, PRESENT=Landscape, DIRECTION=ACROSS, and no-NUP - The form length is XMSIZE.
6. Only two choices exist. If you try one that does not work, try the other. For example, if you try XMSIZE for the form length and it does not create a longer form, use YMSIZE.

XMSIZE

Specifies the medium presentation space along the X-axis (also known as the medium's size in the X-direction). If this subcommand is specified on the FORMDEF command, it becomes the default for all copy groups that do not specify XMSIZE on the COPYGROUP command. If this subcommand is not specified on the FORMDEF command, the printer's current default X-axis becomes the default for all copy groups that do not specify XMSIZE on the COPYGROUP command.

x

Enter a number with 0 - 3 decimal places and optional units.

YMSIZE

Specifies the medium presentation space along the Y-axis (also known as the medium's size in the Y-direction). If this subcommand is specified on the FORMDEF command, it becomes the default for all copy groups that do not specify YMSIZE on the COPYGROUP command. If this subcommand is not specified on the FORMDEF command, the printer's current default Y-axis becomes the default for all copy groups that do not specify YMSIZE on the COPYGROUP command.

y

Enter a number with 0 - 3 decimal places and optional units.

units

Enter IN for inches, CM for centimeters, MM for millimeters, or PELS for pels. If *units* is not specified, the default is to the most recent setting of the SETUNITS command or inches if no SETUNITS command is coded.

Table 10: Form Length (LEN) and Form Width (WID) for Cutsheet and Narrow Fanfold Paper.

DIRECTION	ACROSS				DOWN				REVERSE			
PRESENT	Portrait		Landscape		Portrait		Landscape		Portrait		Landscape	
	LEN	WID	LEN	WID	LEN	WID	LEN	WID	LEN	WID	LEN	WID
No NUP	Ym	Xm	Xm	Ym	Xm	Ym	Ym	Xm	Ym	Xm	Xm	Ym
1-UP	Ym	Xm	Xm	Ym	Xm	Ym	Ym	Xm	Ym	Xm	Xm	Ym
2-UP	Xm	Ym	Ym	Xm	Ym	Xm	Xm	Ym	Xm	Ym	Ym	Xm
3-UP	Xm	Ym	Ym	Xm	Ym	Xm	Xm	Ym	Xm	Ym	Ym	Xm
4-UP	Ym	Xm	Xm	Ym	Xm	Ym	Ym	Xm	Ym	Xm	Xm	Ym

Table 11: Form Length (LEN) and Form Width (WID) for Wide Fanfold Paper.

DIRECTION	ACROSS				DOWN				REVERSE			
PRESENT	Portrait		Landscape		Portrait		Landscape		Portrait		Landscape	
	LEN	WID	LEN	WID	LEN	WID	LEN	WID	LEN	WID	LEN	WID
No NUP	Xm	Ym	Ym	Xm	Ym	Xm	Xm	Ym	Xm	Ym	Ym	Xm
1-UP	Xm	Ym	Ym	Xm	Ym	Xm	Xm	Ym	Xm	Ym	Ym	Xm
2-UP	Ym	Xm	Xm	Ym	Xm	Ym	Ym	Xm	Ym	Xm	Xm	Ym
3-UP	Ym	Xm	Xm	Ym	Xm	Ym	Ym	Xm	Ym	Xm	Xm	Ym
4-UP	Xm	Ym	Ym	Xm	Ym	Xm	Xm	Ym	Xm	Ym	Ym	Xm

Examples:

```

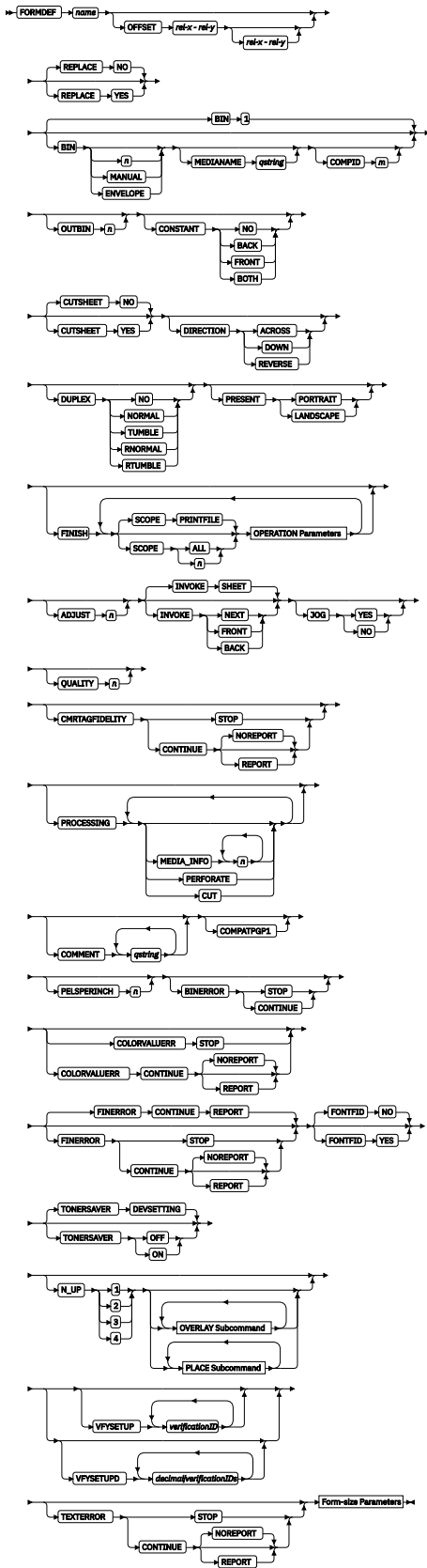
FORMDEF FMSZX1  Replace Yes
PRESENT Landscape Direction Across
XMSIZE 8.5 in YMSIZE 11.0 in;
COPYGROUP cp1;
COPYGROUP cp2;

FORMDEF FMSZX2  Replace Yes YMSIZE 17.0 in;
COPYGROUP cp3;
COPYGROUP cp4;

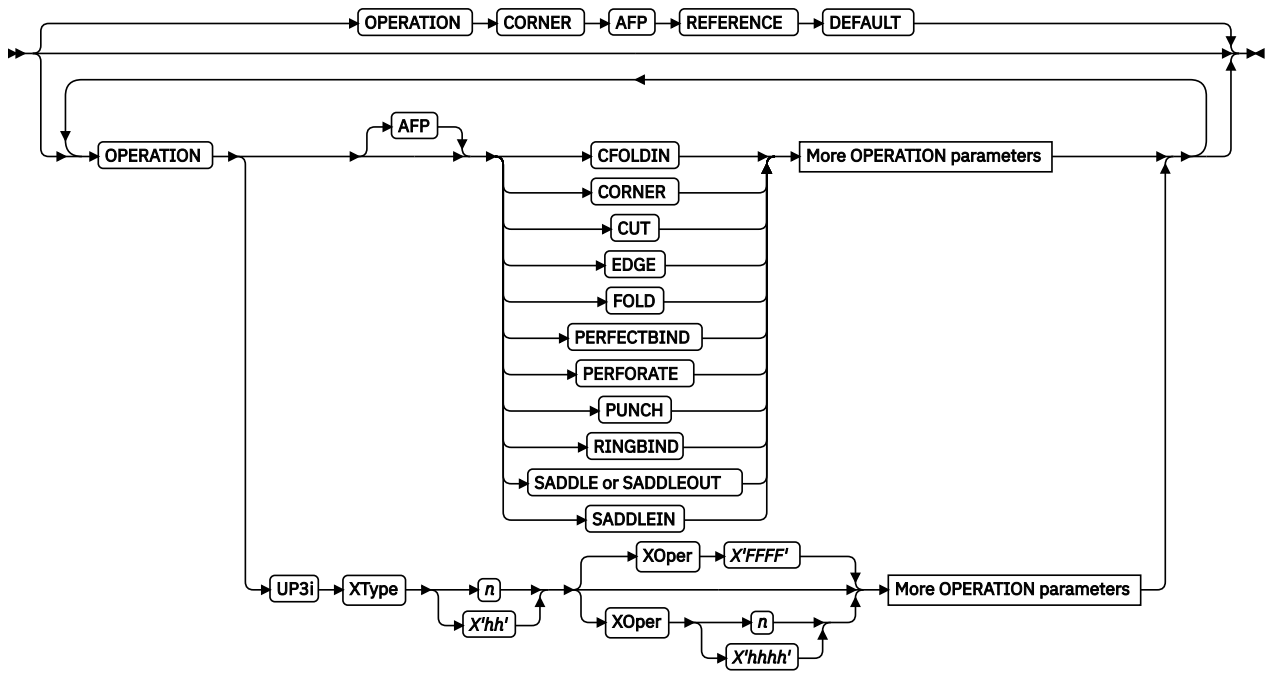
```

- In the first example, the printer is a 4400 thermal printer, which supports both SMS and SMO IPDS commands. The form definition that is named FMSZX1 defines a form length of 8.5 inches and form width of 11.0 inches. COPYGROUP cp1 and cp2 inherit those sizes from the form definition.
- In the second example, the printer is a 6400 printer and you want to define the form length. The form definition that is named FMSZX2 defines form length as 17 inches and leaves the form width as the printer default. COPYGROUP cp3 and cp4 inherit those sizes from the form definition.
- If this example is run on z/OS with FORMLEN defined in the JCL, the JCL definition is used.

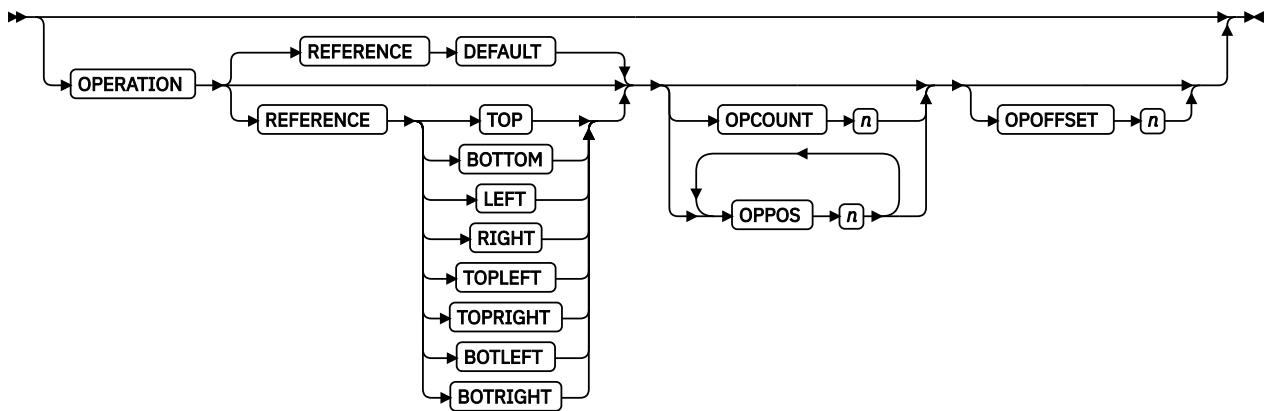
FORMDEF Command



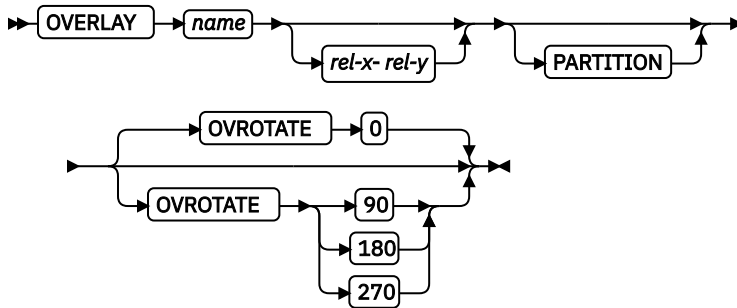
OPERATION Parameters



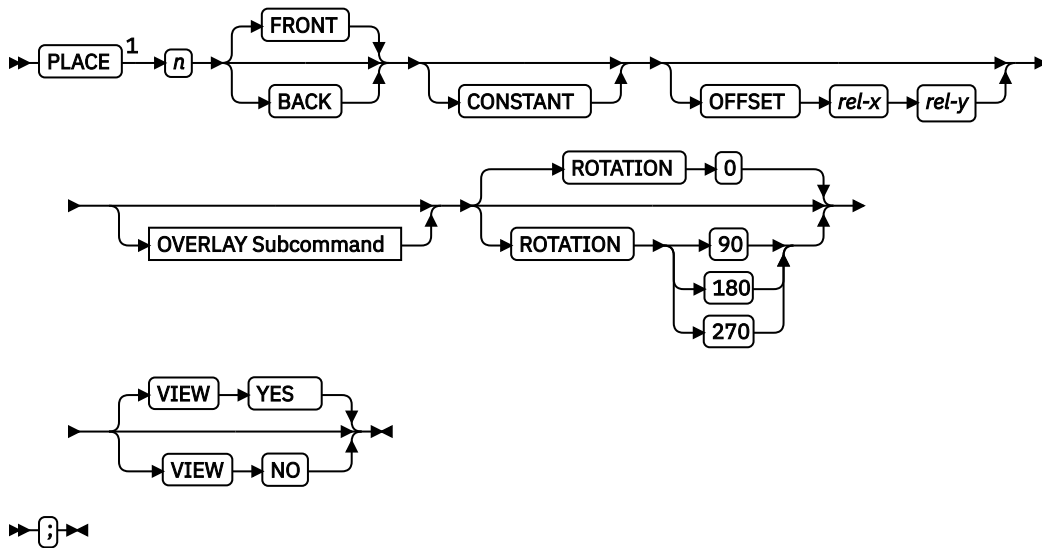
More OPERATION Parameters



OVERLAY Subcommand



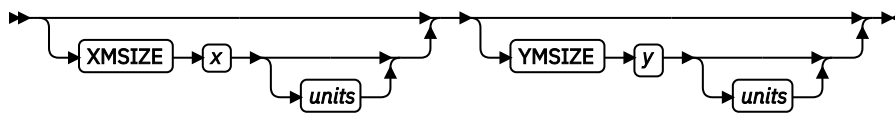
PLACE Subcommand



Notes:

¹ The use of the PLACE subcommand indicates enhanced N_UP printing.

Form-size Parameters



A form definition is a resource that contains all the controls that relate to the physical sheet. A FORMDEF command must be specified when you define a new form definition. When subcommands (except for the REPLACE, PRESENT, and DIRECTION subcommands) are specified, they become the defaults for all COPYGROUP commands nested within this form definition.

FORMDEF

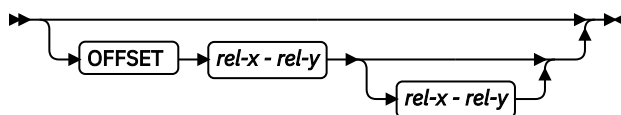
Identifies the form definition to be used with the print job.

name

Defines an alphanumeric name of 1 - 8 characters for the form definition. When you create a form definition, PPFA assigns a prefix of F1 to the name you specify. F1nnnnn is the external resource name in the form-definition library.

Subcommands

OFFSET



Specifies the offset of the logical page for both the front and back pages in regard to the media origin. The media origin is printer-dependent. For more information about media origin, see your printer publications or *Advanced Function Presentation: Printer Information*.

If you specify offset values for the back of the page, you must also specify the front offset values.

Notes:

1. The OFFSET subcommand does not affect the position of medium overlays.
2. You can specify this offset as negative to crop the top, left, or both of an image.

rel-x

Specifies the relative horizontal offset (negative or positive) of the logical page on the front or back side of the copy group relative to the media origin. The valid options for *rel-x* are described in the SETUNITS command for the horizontal value.

The default unit is:

- Taken from the last SETUNITS command
- IN (inch) if no SETUNITS command is issued
- 0.1 IN

rel-y

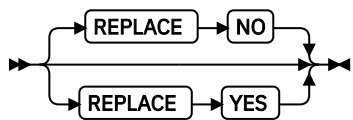
Specifies the relative vertical offset (negative or positive) for the logical page for the front or back side of the page. The valid options for *rel-y* are described in the SETUNITS command for the vertical value.

The default unit is:

- Taken from the last SETUNITS command
- IN (inch) if no SETUNITS command is issued
- 0.1 IN

Note: The vertical offset for the 3800 must be 0.5 inches or greater.

REPLACE



Specifies whether this form definition is to replace an existing one with the same resource name in the library.

YES

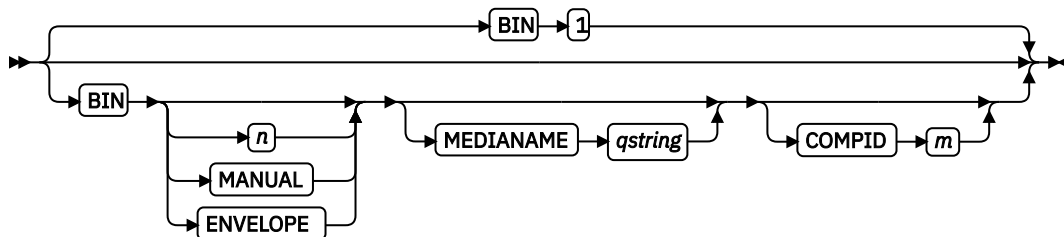
Replace an existing form definition of the same name in the library if there is one. If a form definition with the same name does not exist in the library, then store this form definition.

NO

Do not replace an existing form definition of the same name. If a form definition with the same name does not exist in the library, then store this form definition.

This is the default.

BIN



Specifies which paper source is to be used on printers with more than one paper source. The value range is 1 - 255. (This subcommand must be used only for printers that have more than one paper source.)

Note: If you specify the BIN subcommand, you must also specify at least one of the legal parameters.

n

An integer number 1 - 255 that is the Media Source ID (also known as the bin number).

1

Selects the primary paper source.

2 - 255

Selects another paper source. If the specified bin does not exist on your printer, the default paper source for that printer is used. For more information about paper sources on your printer, see your printer publications. Using a value of 100 is the same as specifying MANUAL.

MANUAL

Selects manual feed as a paper source on those printers that support manual feed. For more information, see your printer publications.

ENVELOPE

Selects an envelope paper source on those printers that support this function. For more information, see your printer documentation.

MEDIANAME

Selects a media source by specifying an agreed upon name for the bin. For a list of the valid media names, see [Appendix G, "PPFA Media Names,"](#) on page 527.

qstring

Up to 12 characters within single quotation marks that specify the media source name. On some printers, this name is preset in the printer; on others, it also can be entered in the printer by the user. See your printer documentation for further information.

COMPID *m*

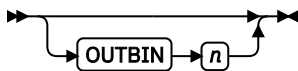
Selects a bin based on the component ID.

Note: For a current list of component IDs, see [Appendix G, "PPFA Media Names,"](#) on page 527. Component IDs 12,288 - 268,435,455 are reserved for the user.

Notes:

1. BIN selection is overridden by the printer if the form defined to each bin is the same form number. Only the primary bin is selected.
2. The primary source usually contains either letter-size (US) or A4 (I.S.O.) paper. Other paper sources are used for less common paper sizes (such as legal-size) and for special paper (such as colored stock or preprinted letterhead on heavy bond).
3. If duplexing is requested and you select from the front side from one bin and the back side from another bin, a warning message is issued and the printer takes the paper from the bin that is specified on the front side.

OUTBIN *n*

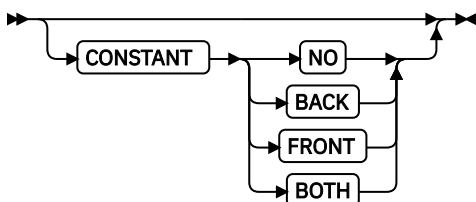


Specifies the destination bin number for any pages that are directed by this form definition. Copy groups and subgroups in this form definition that do not specify an output bin number inherit this bin number.

n

Specifies the output bin number.

CONSTANT



Specifies whether the constant-forms function is on or off and whether constant form is to be printed on the front or back sides of a sheet.

NO

Specifies that the constant forms function is off.

BACK

Specifies that a constant form is to be printed on the back side without variable data.

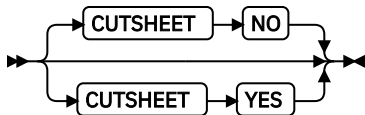
FRONT

Specifies that a constant form is to be printed on the front side without variable data.

BOTH

Specifies that a constant form is to be printed on both sides without variable data.

CUTSHEET



If you are using a cut-sheet printer, this subcommand specifies whether the medium orientation information, which is coded by using the DIRECTION, PRESENT, or both subcommands, is to be passed to that printer. Not coding the CUTSHEET subcommand is equivalent to coding CUTSHEET NO.

NO

Specifies that the rotation data is not to be passed unless N_UP is coded.

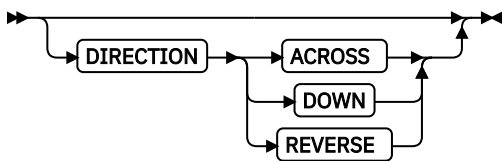
YES

Specifies that the rotation data is to be passed.

Notes:

1. As always: If you have a continuous form printer, the medium orientation information is passed. If you have a cut-sheet printer and N_UP is coded, the orientation information is passed. The default for a COPYGROUP for which no CUTSHEET subcommand is coded is to inherit the behavior of the FORMDEF.
2. New: If you have a cut-sheet printer and CUTSHEET YES is coded, the orientation information is passed if you also have a level of print server that supports the CUTSHEET feature.
3. In all cases: Before you use this command, you must have a printer that allows its media origin to be changed.

DIRECTION



Determines, along with the PRESENT subcommand, how data is oriented on printers whose media origin can be changed. See the list of printers under the PRESENT subcommand.

If you are printing line data, you usually specify the same value for the DIRECTION subcommand as is specified for the DIRECTION subcommand in the page definition.

ACROSS

Specifies that the pages are formatted in the ACROSS printing direction.

DOWN

Specifies that the pages are formatted in the DOWN printing direction.

REVERSE

Specifies that the pages are formatted in the REVERSE printing direction.

If the DIRECTION subcommand is specified, you must specify the PRESENT subcommand. The default for DIRECTION is determined by the value that is specified for PRESENT.

The direction default of PORTRAIT is ACROSS; the direction default of LANDSCAPE is DOWN. If PRESENT or DIRECTION is not specified, the default is PRESENT PORTRAIT and DIRECTION ACROSS.

Examples of FORMDEF finishing commands with PRESENT and DIRECTION:

```
FORMDEF fd00
  PRESENT portrait    DIRECTION across ;

FORMDEF fd01
  PRESENT landscape   DIRECTION across ;

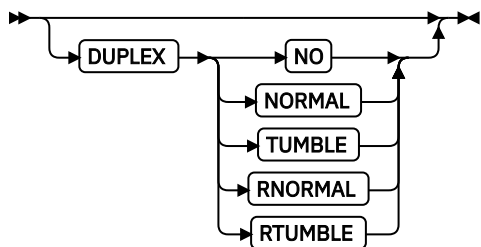
FORMDEF fd02
  PRESENT portrait    DIRECTION reverse ;

FORMDEF fd03
  PRESENT landscape   DIRECTION reverse ;

FORMDEF fd04
  PRESENT portrait    DIRECTION down ;

FORMDEF fd05
  PRESENT landscape   DIRECTION down ;
```

DUPLEX



Specifies whether printing is done on both sides of the sheet. This subcommand must be used only for page printers that have duplex capability.

NO

Duplex printing is not done.

NORMAL

Duplex printing is done, with the tops of both sides printed along the same edge for side binding.

TUMBLE

Duplex printing is done with the top of one side and the bottom of the other printed along the same edge of the sheet for top binding.

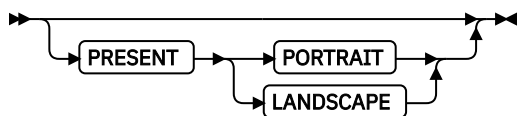
RNORMAL

Rotated normal. Duplex printing is done with the top of one side printed along the same edge of the sheet as the bottom of the other. Used with landscape pages, N_UP 2, and N_UP 3.

RTUMBLE

Rotated tumble. Duplex printing is done with the tops of both sides printed along the same edge. Used with landscape pages, N_UP 2, and N_UP 3.

PRESENT



Specifies, along with the DIRECTION subcommand, how the data is oriented on printers whose media origin can be changed.

The PRESENT and DIRECTION subcommands are only supported by cut-sheet printers when you specify the N_UP subcommand or the CUTSHEET subcommand with the YES parameter. See [Figure 94 on page 130](#) - [Figure 97 on page 131](#) to determine the effect of the PRESENT and DIRECTION subcommands when you use them with the N_UP subcommand.

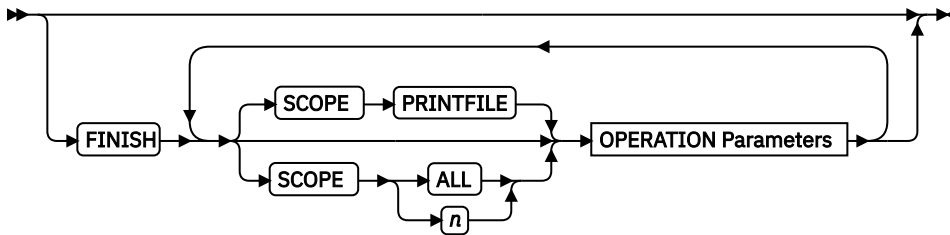
PORTRAIT

Specifies that the pages are printed in the portrait page presentation, with their short edges at the top and bottom and their long edges at the sides.

LANDSCAPE

Specifies that the pages are printed in the landscape page presentation, with their long edges at the top and bottom and their short edges at the sides.

FINISH



Specifies where the media is to be stapled, folded, cut, or perforated.

This option can be used only on a document, set of documents, or an entire print file. Finishing operations are device-dependent; check your printer documentation before you use the FINISH subcommand.

Notes:

1. The FINISH operation is used for printers with finisher attachments.
2. The finishing operation must be specified at least once, and can occur more than once. It specifies finishing operations to be applied to the collected media.
3. If more than one finishing operation is specified, the operations are applied in the order in which they are specified. Identical finishing operations for the same SCOPE are not supported.
4. FINISH positions are not affected by DIRECTION or PRESENT values.
5. Changing the orientation of the medium presentation space does not change the finishing corners or edges.
6. For continuous forms media, the carrier strips are not considered to be part of the physical media.
7. For saddle stitch operation, the staples are placed along the center of the media, parallel to the reference edge. Any offset value is ignored. If no OPCOUNT or OPPOS values are specified, the device default count is used.
8. User-specified OPCOUNT and OPPOS values are ignored for FOLD, CUT, or PERFORATE operations.

SCOPE

Determines how the finishing operation is applied.

Note: SCOPE can be repeated within a FINISH subcommand, but only one SCOPE of a particular type is allowed for each FORMDEF command. For example, only one SCOPE ALL is allowed for each FORMDEF FINISH command.

PRINTFILE

Determines that the specified finishing operations for the OPERATION subcommand are applied to the complete print file, excluding header pages, trailer pages, and message pages.

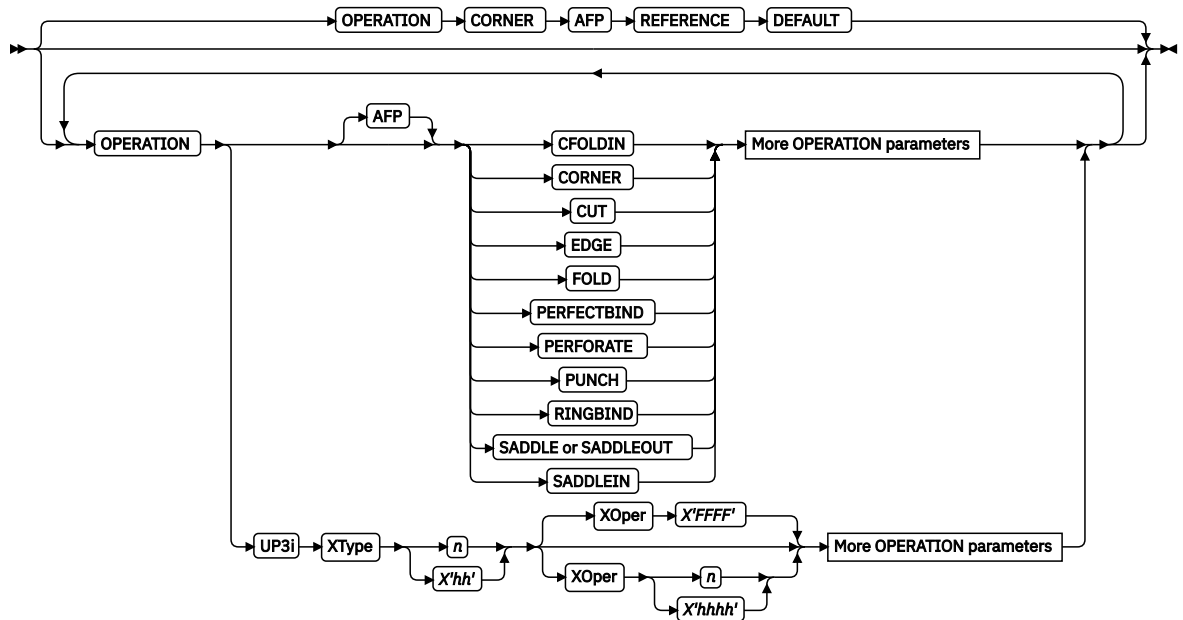
ALL

Determines that the specified finishing operations for the OPERATION subcommand are applied individually to all documents in the print file.

n

Use the *n* to apply the finishing operation to a specific document. Use a value of 1 to apply the finishing operation to the first document in a print file. Use the value 2 to apply the finishing operation to the second document in a print file, and so on. The range of values includes 1 - 32,767.

OPERATION Parameters



OPERATION

Specifies the type of finishing operation and parameters for that operation.

Notes:

1. Compatible Operations can be repeated within a specified SCOPE.
2. Your print server can have a limit on the number of collection operations that are allowed to be active at one time.

AFP

Specifies Advanced Function Presentation (AFP) operations as defined in the *Mixed Object Document Content Architecture Reference* and the *Intelligent Printer Data Stream Reference*.

CFOLDIN

Center Fold In. Specifies that the media is folded inward along the center line that is parallel to the finishing operation axis. After this operation, the back side of the last sheet of the collection is on the outside. The OPCOUNT and OPPOS parameters are ignored for this operation. CFOLDIN is applied to collected media, not to individual media.

Note: Pages of the datastream must already be properly ordered for this operation.

CORNER

Specifies that one staple is driven into the media at the reference corner (see REFERENCE parameter). For corner staples, the offset and angle of the staple from the selected corner is device-dependent. The OPOFFSET, OPCOUNT, and OPPOS parameters are ignored for this operation. This operation is applied to collected media, not to individual media.

CUT

Specifies that a separation cut is applied to the media along the axis of the finishing operation. The OPCOUNT and OPPOS parameters are ignored for this operation.

EDGE

Specifies that one or more staples are driven into the media along the axis of the finishing operation. This operation is applied to collected media, not to individual media.

FOLD

Specifies that the media is folded inward on the front sheet side of the first sheet of the collection. The folding is done along the axis of the finishing operation. The OPOFFSET and OPPOS parameters are ignored for this operation. This operation is applied to collected media, not to individual media.

PERFECTBIND

This operation specifies a type of book binding that glues the sheets of the group together at the reference edge (spine). When you specify PERFECTBIND, the OPOFFSET, OPCOUNT, and OPPOS parameters are ignored.

PERFORATE

Specifies that a perforation cut is applied to the media along the axis of the finishing operation. The OPOFFSET and OPPOS parameters are ignored for this operation.

PUNCH

Specifies that one or more holes are to be punched or drilled into the media along the finishing axis. PUNCH is applied to the collected media, not to individual media.

RINGBIND

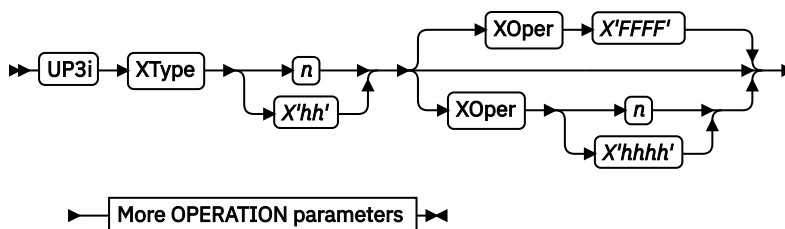
This operation specifies a type of book binding when the sheets of the group are loosely connected at the reference edge (spine) by first drilling or punching a set of holes along the reference edge and then inserting a wire pattern through the holes. When you specify RINGBIND, the OPOFFSET, OPCOUNT, and OPPOS parameters are ignored.

SADDLE (same as SADDLEOUT)

Specifies that one or more staples are driven into the media along the axis of the finishing operation, which is positioned at the center of the media, parallel to the reference edge (see REFERENCE parameter). The OPOFFSET parameter is ignored for this operation. This operation also includes a fold of the media outward along the finishing operation axis so that the front side of the first sheet in the collection is on the outside of the media collection. This operation is applied to collected media, not to individual media.

SADDLEIN

Specifies that one or more staples are driven into the media along the axis of the finishing operation, which is positioned at the center of the media, parallel to the reference edge (see REFERENCE parameter). The OPOFFSET parameter is ignored for this operation. This operation also includes a fold of the media inward along the finishing operation axis so that the front side of the first sheet in the collection is on the outside of the media collection. This operation is applied to collected media, not to individual media.

UP3i Parameters**UP3i**

Specifies that these operations are passed to the printer by using the Universal Printer Pre- and Post-Processing Interface (UP3i) finishing interface as specified in the "Form Finishing Operation Triplet" in the UP3i specification document. UP3i is an open standard intelligent interface that is intended for printers, pre-processors, post-processors, and other related applications. The complete UP3i specification document, which includes the "Form Finishing Operation Triplet" can be viewed at the [AFP Consortium web page \(http://www.afpcinc.org\)](http://www.afpcinc.org).

UP3i explicit operations

Specifies the explicit values for the "Finishing Operation Type" and the "Finishing Operation Parameter" that go in the UP3i Form Finishing Operation Triplet.

Note: See Table 9 on page 203 for values of XType and XOper as defined in the UP3i Specification.

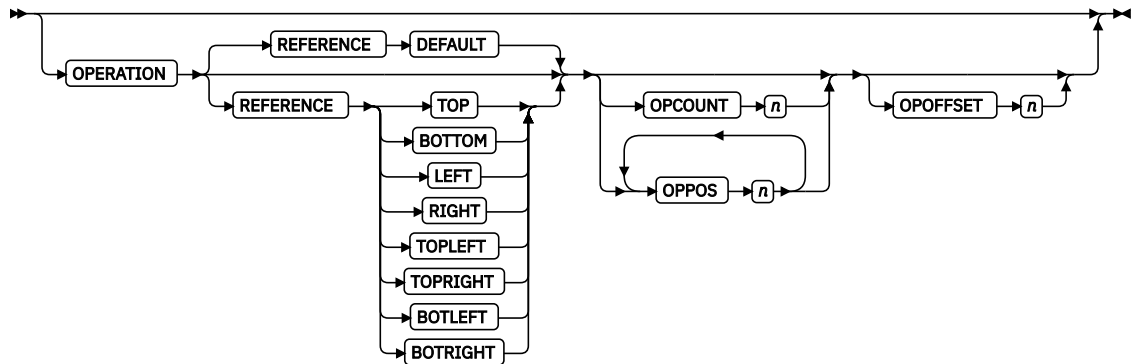
XType

Explicit Operation Type. Specify in hexadecimal or a decimal equivalent number the Finishing Operation Type. A value of 0 specifies a No Operation/Pass through paper operation. When 0 is coded in this field, the XOper field is ignored. Enter 2 hexadecimal digits or a decimal number less than or equal to 255.

XOper

Explicit Operation or Operation Parameter. Specify in hexadecimal or a decimal equivalent number the Finishing Operation Type. A value of X'FFFF' specifies the device default operation for the specified finishing operation for the specified Finishing Operation Type in the XType parameter. Enter 4 hexadecimal digits or a decimal number less than or equal to 65535.

More OPERATION Parameters



REFERENCE

Determines the reference corner or edge of the finishing operation.

DEFAULT

Specifies that the device default determines the reference corner or edge.

TOPLEFT

Specifies that, for the finishing operation, the reference corner is positioned at the top in the left corner. This REFERENCE parameter can be used only for CORNER operations.

TOPRIGHT

Specifies that, for the finishing operation, the reference corner is positioned at the top in the right corner. This REFERENCE parameter can be used only for CORNER operations.

BOTRIGHT

Specifies that, for the finishing operation, the reference corner is positioned at the bottom in the right corner. This REFERENCE parameter can be used only for CORNER operations.

BOTLEFT

Specifies that, for the finishing operation, the reference corner is positioned at the bottom in the left corner. This REFERENCE parameter can be used only for CORNER operations.

TOP

Specifies that, for the finishing operation, the reference edge is positioned at the top.⁴

⁴ This REFERENCE parameter can be used only for edge type operations (for example, SADDLE, EDGE, FOLD, CFOLDIN, PUNCH, SADDLEIN, CUT, PERFORATE).

BOTTOM

Specifies that, for the finishing operation, the reference edge is positioned at the bottom.⁵

LEFT

Specifies that, for the finishing operation, the reference edge is positioned at the left.⁵

RIGHT

Specifies that, for the finishing operation, the reference edge is positioned at the right.⁵

OPCOUNT *n*

Use OPCOUNT to request a specific number of finishing operations; valid values are 1 - 122. Do not specify OPPOS values with OPCOUNT. If OPPOS is specified for corner staple, separation cut, perforation cut or fold, this OPCOUNT value is ignored. The printer determines the positions of the operations. The default is 0 (zero).

OPPOS *n*

Use OPPOS to specify the offset of finishing operation along the finishing operation axis that is measured from the point where the finishing operation axis intersects the bottom edge or left edge of the medium toward the center of the medium. Each consecutive OPPOS parameter is used to position a single finishing operation that is centered on the specified point on the finishing operation.

For AFP, the subparameter is an integer value in the range of 0 - 32,767, specified in millimeters.

For UP3i, the subparameter is an integer value in the range of 0 - 999999999, specified in millipoints (1/72000 inch).

Do not specify the unit of measure. Do not specify OPCOUNT when you use OPPOS. If OPPOS is specified for corner staple, fold, separation cut, or perforation cut, the OPCOUNT value is ignored.

OPOFFSET *n*

Specifies the offset of finishing operation axis from the reference edge, which is measured from the reference edge toward the center of the medium.

For AFP, the subparameter is an integer value in the range of 0 - 32,767, specified in millimeters.

For UP3i, the subparameter is an integer value in the range of 0 - 999999999, specified in millipoints (1/72000 inch).

Do not specify OPOFFSET for corner staple or saddle stitch; the corner staple or saddle stitch values are ignored when specified with OPOFFSET.

The following examples show how to specify finishing operations.

- To request scope as the entire print job with one corner staple in the top-left corner, specify:

```
FINISH SCOPE PRINTFILE OPERATION CORNER REFERENCE TOPLEFT;
```

- Sometimes a user wants to request multiple finishing operations. To request that the fifth document in the job stream is finished with top-left corner staple and the ninth document is edge stitched only at the print default location, specify:

```
FINISH SCOPE 5
      OPERATION CORNER
      REFERENCE TOPLEFT
SCOPE 9
      OPERATION EDGE;
```

- The following example requests that SCOPE 5 (the fifth document in the job stream):

⁵ This REFERENCE parameter can be used only for edge type operations.

1. Use the UP3i interface, is punched at the device default reference edge, and is offset with the device default number and type of holes.
2. Use the normal AFP interface to staple the top-left corner.

The following example also requests that SCOPE 9 (the ninth document in the job stream):

1. Use the UP3i interface to trim on the front.
2. Use the normal AFP interface to edge stitch at the printer default location and offset with the device default number and type of staples.

```
FORMDEF FinSm2 Replace Yes
FINISH
  SCOPE 5 OPERATION UP3i XType X'0A'
          OPERATION      CORNER REFERENCE TOPLEFT
  SCOPE 9 OPERATION UP3i XType 6 XOper 1
          OPERATION AFP EDGE;
```

Finishing Operation Nesting Rules:

When more than one finishing operation that involves a collection of media is specified for some portion of the print file, a nesting of the operations is defined first by the scope of the operation and second by the order of the operation in the data stream.

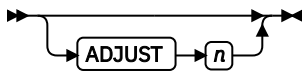
Finishing operations with a broader scope are nested outside of finishing operations with a narrower scope. The following scopes are listed in descending order:

1. Print-file level finishing (SCOPE PRINTFILE)
2. Document-level finishing, each document in the print file (SCOPE ALL)
3. Document-level finishing, a selected document in the PRINTFILE (SCOPE *n*)
4. Medium-map-level finishing, a collection of sheets (SCOPE BEGCOLL)

Finishing Operation Implementation Notes:

For some printers, the JOG function cannot be combined with a finishing operation. In this case, the JOG function is ignored. Check your printer documentation.

ADJUST *n*

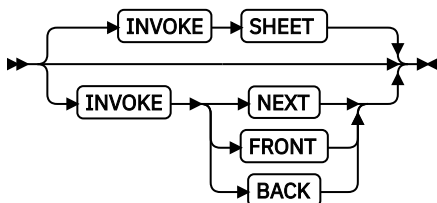


Establishes the range of horizontal adjustment for the printed area on the sheet. The default is 0. The adjustment range can be set 0 - 20 L-units. After a value is set, it is the maximum amount available in both directions, plus and minus.

Notes:

1. If you specify ADJUST, the maximum logical page size (in the horizontal direction) is reduced by the amount you specified here.
2. The ADJUST *n* subcommand is used only on the IBM 3800 printers.

INVOKE



Specifies where the next page of data is placed when this copy group is activated by conditional processing or by an Invoke Medium Map structured field.

INVOKE SHEET, which is the default, places the next page of data on a new sheet. The NEXT, FRONT, and BACK parameters place the next page in a subsequent partition on the same sheet or, if no partitions are available, on the next sheet. If FRONT or BACK is specified, INVOKE selects only partitions on the front or back.

Print servers accept the NEXT, FRONT, and BACK values of the INVOKE subcommand only if the new copy group has the same medium modifications as the previous copy group. Some examples of medium modifications are duplexing, input bin, output bin, page offset, N_UP values, presentation, direction, medium (not page) overlays, text suppression, processing functions, print quality, finishing, jogging, and constant forms control. See the Media Eject Control Triplet (X'45') section in the *Mixed Object Document Content Architecture Reference* for a full description of the factors that allow a conditional eject to the next partition instead of the next sheet.

If any of these modifications differ, the print server ejects to a new sheet when the copy group is invoked. If you want to change overlays when you are ejecting to a new partition, use page overlays instead of medium overlays. See [“Medium Overlays and Page Overlays”](#) on page 147 for information about page and medium overlays.

When you use PLACE subcommands, the NEXT, FRONT, and BACK parameters place the next page by using the next sequential PLACE subcommand that matches the requirement (next, front, or back). For example, if you print by using the second PLACE subcommand of copy group A, and then you change to copy group B, you start with the third PLACE subcommand of copy group B.

A CONSTANT parameter on the PLACE subcommand does not alter the selection process. The selection is complete, even though the selected PLACE subcommand does not place the data. N_UP does the constant modification and continues until it finds a PLACE subcommand that does not specify CONSTANT. The data is placed with this subcommand. Observe that this PLACE subcommand need not match the FRONT or BACK specifications of the INVOKE subcommand.

SHEET

Specifies that data is placed in the first selected partition of the sheet.³

NEXT

Specifies that data is placed in the next selected partition.

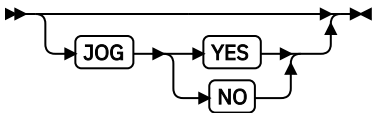
FRONT

Specifies that data is placed in the next selected front partition.

BACK

Specifies that data is placed in the next selected back partition.

JOG



Specifies whether a JOG subcommand is sent to the printer when this FORMDEF is selected by an IMM structured field, or through conditional processing. When the JOG subcommand is sent, a printer either offsets (jogs) or prints copymarks. For cut-sheet printers, or for continuous-forms printers with burster-trimmer-stacker enabled, the JOG subcommand causes the first sheet that is controlled by this FORMDEF to be stacked offset from the previous sheets. For continuous forms printers without a burster-trimmer-stacker, the JOG subcommand causes an increment in the copymark that is printed on the carrier strip. JOG subcommands also are sent to the printer at the beginning of each data set or at the beginning of each job, depending on host parameters. For more information about copymarks, see the system programming guide for your host print server.

YES

Specifies that a JOG subcommand be sent to the printer. The first sheet that is printed is offset or the copymark is incremented.

NO

Specifies that no JOG subcommand be sent to the printer. The first sheet that is printed is not offset; the copymark is not incremented.

QUALITY *n*

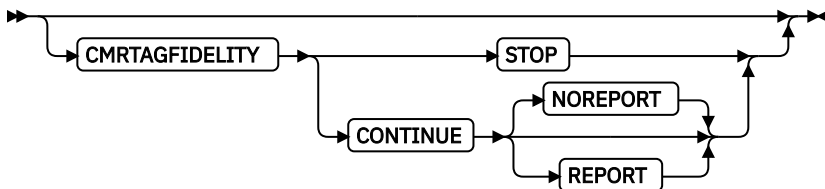
Specifies the print quality. This subcommand is recognized only on printers that can produce more than one level of print quality. The default is determined by the printer model. (On some printers, the default can be set at the printer itself.) For more information, see your printer publications.

n

You can select a level of print quality by entering any whole number 1 - 10. Higher numbers correspond to higher levels of print quality; lower numbers correspond to lower levels. For more information, see your printer publications.

Print quality is determined by a numerical code in the range of 1 to 254 (hexadecimal X'01' - X'FE'). The codes corresponding to the possible QUALITY parameters are:

- 1 = 15 (X'0F')
- 2 = 40 (X'28')
- 3 = 65 (X'41')
- 4 = 90 (X'5A')
- 5 = 115 (X'73')
- 6 = 140 (X'8C')
- 7 = 165 (X'A5')
- 8 = 190 (X'BE')
- 9 = 215 (X'D7')
- 10 = 240 (X'F0')

CMRTAGFIDELITY

Specify the exception continuation and reporting rules for Color management resource (CMR) tag exceptions.

Note: See Chapter 8, “AFP Color Management,” on page 151 for more information about using the CMRTAGFIDELITY subcommand.

STOP

CMR Tag exception rule is "Stop presentation at point of first CMR tag exception and report the exception".

CONTINUE

CMR Tag exception rule is "Do not stop presentation because of CMR tag exceptions and do one of the following:"

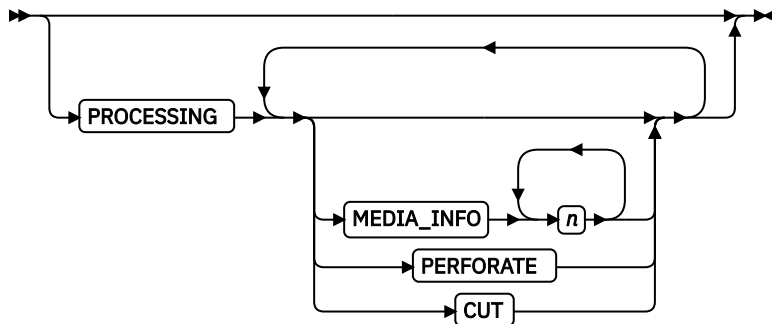
NOREPORT

Do not report the CMR tag exception to the print server. This is the default if NOREPORT or REPORT is not coded.

REPORT

Report the CMR tag exception.

PROCESSING



Specifies more post-processing capabilities for selected printers and attached equipment. This option can be used only on a single page or a set of pages. The subcommand expects one to three of the following keywords:

MEDIA_INFO *n*

This parameter specifies the ID of fixed medium information that a printer or printer-attached device applies to a page. Examples such as color plates logos, letter heads, and other fixed images.

The numeric values that can be included are:

0 - 254

These numeric values select a particular fixed medium local ID that the printer or printer-attached device applies to a sheet. One or more IDs can be specified within this range.

255

This value selects all the current fixed medium local IDs that the printer or printer-attached devices applies to a sheet.

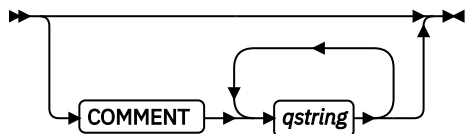
PERFORATE

Specifies a perforation cut at one or more fixed locations on the sheet according to the printer or printer-attached device.

CUT

Specifies a separation cut at one or more fixed locations on the sheet according to the printer or printer-attached device.

COMMENT *qstring*



Specifies a string comment. Use COMMENT to mark a form definition with a user comment. The string is placed in the NOP structured field of the form definition.

qstring

Specifies a quoted set of strings up to a total of 255 characters.

Note: In PPFA, a keyword or parameter (token) cannot extend across a line. Therefore, you must break the string into several strings to have a comment string that is longer than what fits on one line. Each string must be a complete token with beginning and ending quotation marks. Be sure to add a blank before the ending quotation mark if you want the comment lines separated. For example:

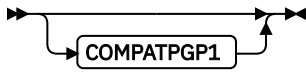
```
FORMDEF replace yes
COMMENT 'first line of comment '
      'second line of comment';
```

PPFA composes the comment to be:

```
first line of comment second line of comment
```

and places it in a separate NOP structured field in the form definition.

COMPATPGP1



Specifies that a Page Position structured field of type Format-1 (PGP-1) is generated when a PGP of type Format-2 (PGP-2) is not required. A PGP-1 is generated when all of the following conditions exist:

- The keyword COMPATPGP1 is coded on the form definition
- The form definition is simplex
- The form definition is not enhanced NUP (with the PLACE subcommand)
- The form definition is not simple NUP (with the PARTITION subcommand.)

Note: If it does not matter which internal structures PPFA uses, you do not need to use this function.

PELSPERINCH *n*



Specifies the Logical Units in pels per inch for this form definition. Use the PELSPERINCH parameter to tell PPFA the pel resolution of your printer to generate more exact object placements.

n

Specifies an integer number 1 - 3,276, which determines the Logical Units in pels per inch.

Note: If the L-Units are not specified on this form definition, they are defaulted to 240 pels per inch.

In [Figure 126 on page 232](#), the form definition xmp01 specified L-Units as 300 pels per inch. Because the COPYGROUP C1 does not specify L-Units, it inherits 300 pels per inch. COPYGROUP C2 does specify L-Units as 1200 pels per inch.

```
FORMDEF xmp01 replace yes
PELSPERINCH 300 ;

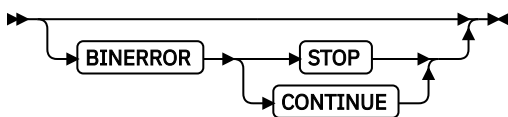
COPYGROUP C1
offset 2 in 3 in;

COPYGROUP C2
offset 2 in 3 in
PELSPERINCH 1200;
```

Figure 126: PELSPERINCH example

The code in COPYGROUP C1 (offset 2 in 3 in) produces internal and structured field values for *x* and *y* of 600 and 900, whereas in COPYGROUP C2 the same code produces values of 2400 and 3600 because of the difference in L-Units.

BINERROR



Tells the printer whether you want to stop printing if the wrong media is loaded on the printer or the bin number is not found.

This subcommand is displayed only on the FORMDEF command, not the COPYGROUP or the SUBGROUP commands, since the scope of the subcommand is throughout the FORMDEF. Printing control is based on the status of the media that is loaded as it pertains to the BIN subcommand in effect at the time.

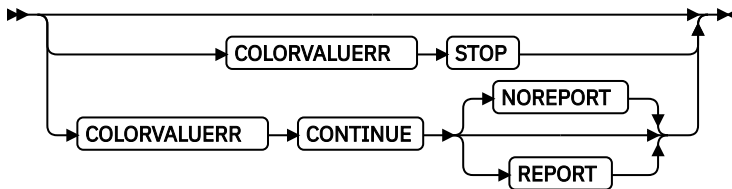
STOP

If the specified input bin is in error, stop the print job and hold it in a state from which it can be resubmitted.

CONTINUE

If the specified input bin is in error, continue printing by using the printer default input bin.

COLORVALUERR



When the form definition contains color values that the printer cannot render exactly as specified, you can request that the printer substitute colors and continue job processing, or you can request the printer to stop. If you request STOP, the printer issues an error and stops processing. If you request CONTINUE, you can ask for an error report.

STOP

Specifies that an error is issued by the printer and the job is ended if the printer reports a color exception. A color exception is reported if the color specification in the data stream cannot be rendered as specified. Also, a color exception is reported if the host print server supports color fidelity and the target printer does not.

CONTINUE

Specifies that an exception condition is ignored. Also, the printer substitutes colors for any that it cannot render, and the job continues.

REPORT

Specifies that the error is reported by the printer.

NOREPORT

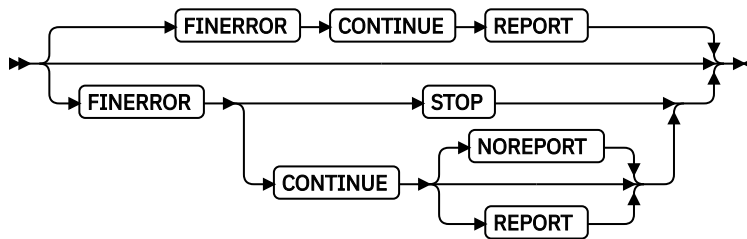
Specifies that the error is not to be reported by the printer. NOREPORT is the default if COLORVALUERR CONTINUE is coded and REPORT or NOREPORT is not coded.

Note: When the printer reports a color value exception, the following actions are taken:

- If the print server and the printer both support Color Fidelity and the COLORVALUERR subcommand is coded, printing occurs as previously described.
- If the print server and the printer both support Color Fidelity and the COLORVALUERR subcommand is not coded, the print server instructs the printer to reset to defaults at the beginning of the job.
- Whenever the print server supports Color Fidelity but the printer does not, the following rules apply:
 1. If no COLORVALUERR subcommand is issued, printing continues. However, color exception errors are reported and ignored.
 2. If the COLORVALUERR subcommand is issued, you might receive print server errors or the command might be ignored, depending on the level of PSF you installed and your operating system (for example, z/OS, VM, or VSE). Therefore, you must not use the COLORVALUERR subcommand if you do not have a host print server that supports it.
- Whenever the printer supports Color Fidelity but the print server does not, the following rules apply:
 1. If no COLORVALUERR subcommand is issued, printing continues. However, color exception errors are reported and ignored.

2. If either COLORVALUERR STOP or COLORVALUERR CONTINUE NOREPORT is coded, the print server issues an error and stops printing, even if a color exception error does not exist.
3. If COLORVALUERR CONTINUE REPORT is coded, the print server continues printing. However, color exception errors are reported and ignored.

FINERROR



If both the host PSF and target printer support finishing fidelity, you can control job continuation and error reporting with the FINERROR subcommand on the FORMDEF command. If a form definition requests a finishing operation that is not available with the printer, you can request that the job continue processing or cause it to stop printing.

FINERROR covers only operations that the printer cannot process. For example, a stapling operation is specified on a device that is not equipped with a stapler. It does not cover temporary exceptions that require operator intervention, such as an empty stapler.

STOP

Use STOP to specify that the job is ended when a finishing exception is detected by the printer. A finishing exception that stops presentation is reported and the print file is put on hold to be resubmitted when the finishing operation can be done.

CONTINUE

Use CONTINUE to specify that the exception condition is ignored and the job continues without applying the unavailable finishing operation.

NOREPORT

Use NOREPORT to specify that the error is not reported by the printer. NOREPORT is the default if FINERROR CONTINUE is specified without specify REPORT or NOREPORT.

REPORT

Use REPORT to specify that the error is reported to the printer.

Notes:

1. If finishing fidelity is requested with the FINERROR subcommand and it is supported by the printer and the print server, the job is processed as specified with the STOP, CONTINUE, REPORT, and NOREPORT parameters.
2. If finishing fidelity is requested and supported by the print server, but is not supported by the printer, the request is processed by the print server as follows:
 - If you specify FINERROR STOP, the print server issues an error message and stops processing.
 - If you specify FINERROR CONTINUE, the print server prints the job and either issues a message if REPORT is specified or does not issue a message if NOREPORT is specified.
3. If finishing fidelity is not requested with the FINERROR subcommand or the print server does not support finishing fidelity, the job is printed and the finishing operations that cannot be done are not applied. Finishing exceptions are reported.

Examples:

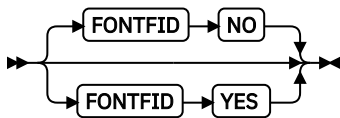
```

FORMDEF xmp01 FINERROR STOP
        REPLACE YES;
Copygroup X
...
FORMDEF xmp02 FINERROR Continue NoReport;
  
```

If both the print server and the printer support finishing fidelity:

- In the first example, FORMDEF xmp01 specifies a STOP parameter if a finishing error is encountered. If the specified finishing operation is not available, the printer reports an error, does not print the job, and places the job on hold to be resubmitted when the finishing operation can be done.
- In the second example, FORMDEF xmp02 specifies a CONTINUE parameter if a finishing error is encountered and a REPORT is made. If a specified finishing operation is not available, the printer continues processing the print job without applying the unavailable finishing operation or reporting the error.

FONTFID



Indicates to the print server whether the form definition accepts the fidelity of the specified fonts when a raster font of a specified resolution and metric-technology cannot be found on the printer. To get the print server to accept this command you also must specify font resolution on either the FONT command or externally (for example, on the JCL). Not coding FONTFID is equivalent to coding FONTFID NO.

YES

Specifies that no substitution is allowed and the print server issues an error message if it cannot find the font that matches the specified resolution and metric.

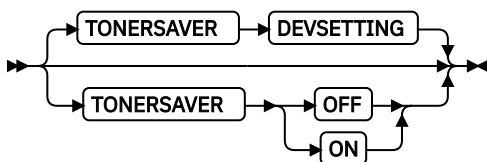
NO

Specifies that the print server does not enforce font fidelity. The print server does not check for a match of the specified resolution and metric with the font found on the system.

Notes:

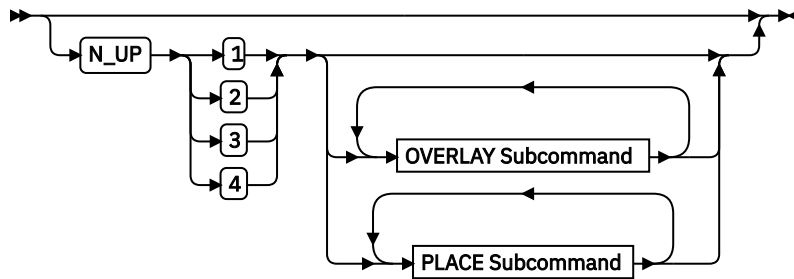
1. The FONTFID subcommand is used in concert with the RESOLUTION and METRICTECHNOLOGY subcommands on the FONT command, which are used to rigorously specify the font characteristics.
2. This subcommand assists the user who created a form definition and page definition for printing with a raster font on a printer of one resolution (for example, a 240 pel printer), and moved that application to a printer of another resolution (for example, a 300 pel printer). When the print server cannot match the raster font, it substitutes an outline font, which often causes the placed text to overflow or underflow the intended space on the page. If this happens, the user can specify the actual metric and resolution of the font that is used to print the text, and also specify FONTFID YES so that the print server does not substitute another font.

TONERSAVER



Specifies whether the printer's toner saver mode is activated. When activated, it might degrade print quality, and might also impact performance. If DEVSETTING is specified, the specific device's setting is used. If TONERSAVER ON or OFF is specified, it overrides any QUALITY parameters. This function is device-specific. Make sure that your printers support this feature by checking the printer's documentation.

N_UP

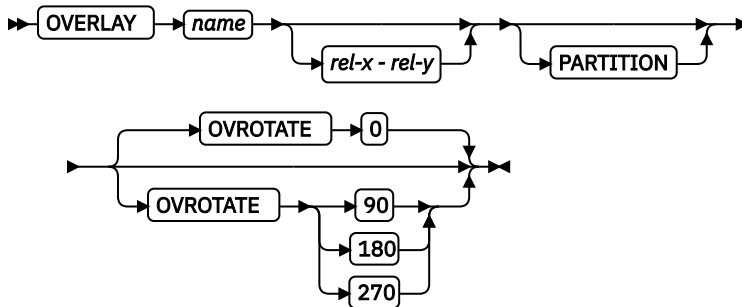


{ 1 | 2 | 3 | 4 }

Specifies the number (1, 2, 3, or 4) of equal-size partitions into which the sheet is divided. See the [list of printers](#) that support the N_UP subcommand.

If you do not specify the N_UP subcommand in the COPYGROUP command, the N_UP subcommand from the FORMDEF command is the default for the COPYGROUP command. You can mix N_UP printing and non-N_UP printing by specifying or not specifying the N_UP subcommand in each copy group and by not specifying N_UP in the FORMDEF command.

OVERLAY Subcommand



Specifies the name of an overlay to be placed with every page in each of the N_UP partitions. The overlay is placed relative to the page origin, or if the PARTITION parameter is specified, relative to the partition origin. You can specify a maximum of 254 OVERLAY subcommands in a copy group.

rel-x rel-y

Specifies the horizontal and vertical adjustment to the position of the overlay. This adjustment is in addition to any offset values built into the overlay. The x and y values can be positive (+) and negative (-). You can specify them in inches (IN), millimeters (MM), centimeters (CM), points, or pels. If you do not specify a unit value, PPFA uses the unit value that is specified in the last SETUNITS command or uses a default unit value of inches.

Note: This OVERLAY subcommand cannot be specified if the PLACE subcommand is specified. Use the OVERLAY parameter of the PLACE subcommand instead.

PARTITION

Specifies that the overlay is to be placed relative to the partition origin.

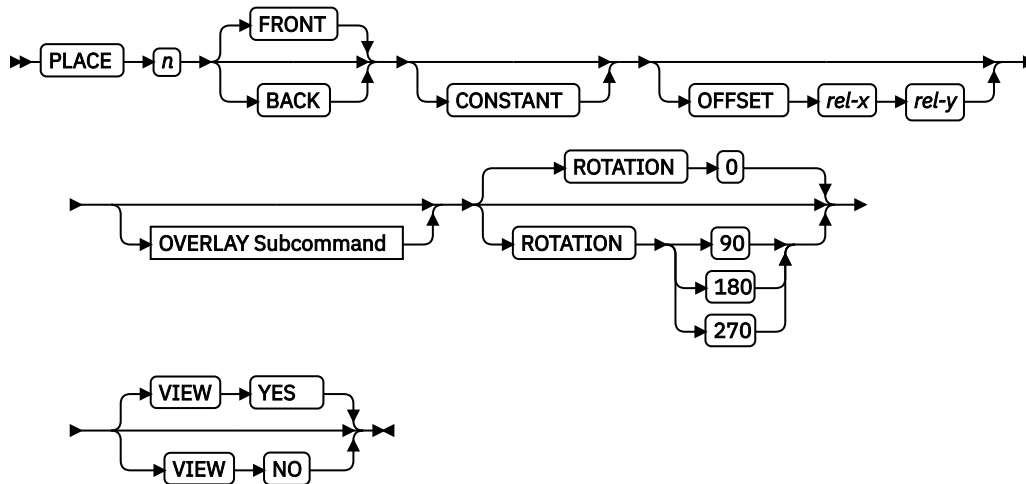
OVROTATE { 0 | 90 | 180 | 270 }

Specifies the rotation of the placed overlay in regard to the x-axis of the page.

Example: Assuming the overlay has (0,0) placement coordinates, this causes page overlay x2 to be placed 1.5 inches to the right and 2.7 inches below the beginning of the page and rotated 90 degrees clockwise in regard to the page.

```
Formdef f1
  N_UP 1  PLACE 1 FRONT
          OVERLAY x2 1.5 in 2.7 in
          OVROTATE 90;
```


PLACE Subcommand



Places a page of data or a constant modification relative to a partition. Each PLACE subcommand specifies the number n of a partition on either the front or back side of the sheet. FRONT is the default, if you do not specify this subcommand. You must specify the same number of PLACE subcommands as the number of partitions on the sheet. The sequence of the PLACE subcommands is the sequence in which incoming pages are placed in the partitions.

Notes:

1. The use of the PLACE subcommand indicates enhanced N_UP printing.
2. The PLACE subcommand is valid only on printers that support enhanced N_UP printing. If PLACE is not specified, pages are placed in partitions in the default partition sequence.

n

Specifies the numbered partition (1 - 4) into which the page of data is placed.

FRONT

Specifies that this partition is placed on the front side of the sheet.

BACK

Specifies that this partition is placed on the back side of the sheet.

CONSTANT

Specifies that no page data is placed by this PLACE subcommand.

Use CONSTANT when you are placing overlays without user's data or are placing fewer data pages on the sheet than the number of partitions that are specified in the N_UP subcommand.

For an example of using the CONSTANT parameter with overlays and to understand how the ordering of the PLACE subcommand affects overlays, see [“Example 3: Enhanced N_UP Asymmetric Pages”](#) on page 145.

OFFSET $rel-x$ $rel-y$

Specifies a relative offset of the page horizontally (x) and vertically (y) from the partition origin. If OFFSET is not coded, PPFA uses the value of 0.1 inches for both the x and y offsets. This OFFSET parameter overrides any other OFFSET parameters that are specified on the FORMDEF or COPYGROUP command. You can specify the units in inches (in), millimeters (mm), centimeters (cm), points, or pels. If you do not specify a unit value, PPFA uses the unit value that is specified in the last SETUNITS command or uses a default unit value of inches.

Note: You can specify this offset as negative to crop the top, left, or both of an image.

OVERLAY Subcommand

See [OVERLAY Subcommand](#) for the syntax.

name

Specifies the name of an overlay to be placed with this PLACE subcommand. The overlay is placed relative to the page origin or, if the PARTITION keyword is specified, to the partition origin. You can specify multiple OVERLAY parameters in each PLACE subcommand.

rel-x rel-y

Specifies the horizontal and vertical adjustment to the position of the overlay. This adjustment is in addition to any offset values built into the overlay. The x and y values can be positive (+) and negative (-). You can specify them in inches (IN), millimeters (MM), centimeters (CM), points, or pels. If you do not specify a unit value, PPFA uses the unit value that is specified in the last SETUNITS command or uses a default value of inches.

PARTITION

Specifies that the previous offset is from the partition origin. If not present, the offset is from the page origin, which is subject to the OFFSET parameter.

OVROTATE { 0 | 90 | 180 | 270 }

Specifies the rotation of the placed overlay in regard to the x-axis of the page.

ROTATION { 0 | 90 | 180 | 270 }

Specifies the clockwise rotation of the page and associated page overlays placed by this PLACE command.

Rotation turns the page and its associated page overlays around their fixed origin points. If you rotate the page without moving its origin point, you might rotate it off the physical medium. To prevent this rotation, always offset the page origin to the place you want it to be for the rotated page, as shown in [Figure 127](#) on page 238.

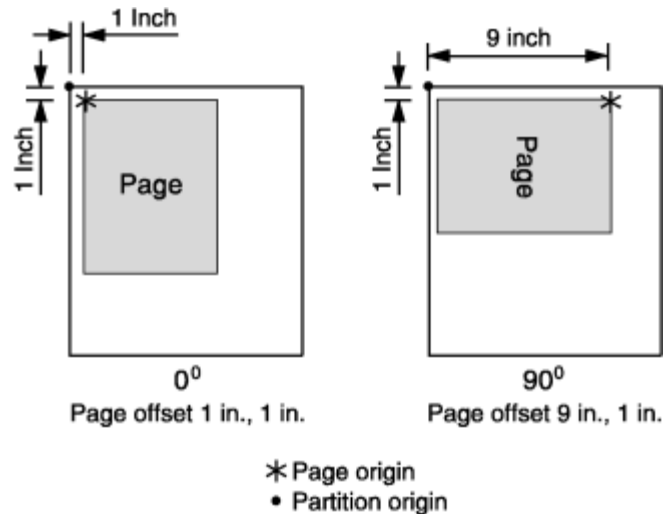


Figure 127: Offsetting the Page Origin for Rotated Pages

VIEW

Determines whether this N_UP PLACE page is viewable. VIEW is relevant only when the page is being presented on a display. VIEW is ignored if the page is being printed. If VIEW is not coded, it is equivalent to specifying VIEW YES.

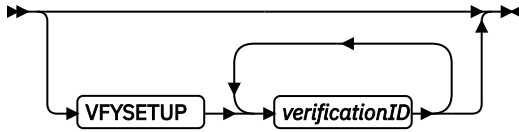
YES

Specifies that this N_UP page is viewable and is presented.

NO

Specifies that this N_UP page is not to be presented.

VFYSETUP *verificationID* ...



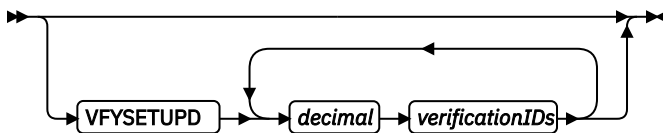
Use to propagate the setup IDs to all medium maps (copy groups) in the form definition. Do not specify VFYSETUP on the COPYGROUP command. Before you use the VFYSETUP subcommand, verify that your version of print server supports FORMDEF setup verification.

To use VFYSETUP, specify one or more 2-character (4-digit hexadecimal) identifier sets that match the Setup Verification IDs defined at the printer operator's console for the specific print job. For example, if the Setup Verification IDs defined at the printer were X'012F', X'0521', and X'938A', specify these:

```
FORMDEF vfy7 REPLACE YES VFYSETUP 012F 0521 938A;
```

When the print server processes the print job, it compares the setup verification IDs in the form definition to the IDs that are active in the printer. If the active IDs in the printer do not match the IDs required by the form definition, or if the printer does not support FORMDEF setup verification IDs, the job is held.

VFYSETUPD *decimal/verificationID* ...



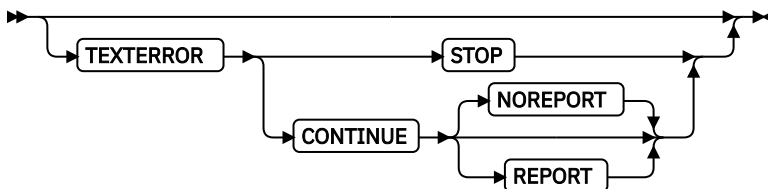
Use to propagate the setup IDs to all medium maps (copy groups) in the form definition. Do not specify VFYSETUPD on the COPYGROUP command. Before you use the VFYSETUPD subcommand, verify that your version of print server supports FORMDEF setup verification.

To use VFYSETUPD, specify one or more decimal numbers that match the Setup Verification IDs defined at the printer operator's console for the specific print job. For example, if the Setup Verification IDs defined at the printer were 303, 1313, and 37770, specify these:

```
FORMDEF vfy7 REPLACE YES VFYSETUPD 303 1313 37770;
```

When the print server processes the print job, it compares the setup verification IDs in the form definition to the IDs that are active in the printer. If the active IDs in the printer do not match the IDs required by the form definition, or if the printer does not support FORMDEF setup verification IDs, the job is held.

TEXTERROR



You use the Text Fidelity subcommand to specify what happens when the printer reports a text exception. A text exception is reported if the printer encounters a text control sequence it doesn't recognize.

Note: If the printer and print server both support Text Fidelity, the following occurs.

STOP

When a text exception occurs, this parameter specifies that the job is ended and the text exception is reported.

Note: When presentation is ended, the print file is put into a state where it can be resubmitted when the text can be rendered without exceptions.

CONTINUE

When a text exception occurs, this parameter instructs the printer to skip the text control sequence it did not recognize and continue processing the print job.

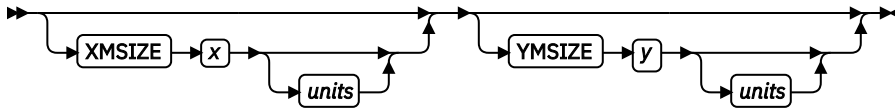
REPORT

Specifies that the error is reported by the printer.

NOREPORT

Specifies that the error is not reported by the printer. This is the default if TEXTERROR CONTINUE is coded.

Form-size Parameters



Specifies the medium presentation space. This is also known as the medium size or form length and form width.

Notes:

1. This function requires both Printer Server and Printer support.
2. The printer does not adjust your media presentation space size to be larger than the paper size (or what the printer thinks is the paper size).
3. Some printers (such as the InfoPrint 1145 and the InfoPrint 4100) do not support the IPDS Set Media Size (SMS) command. The form size cannot be set with the form definition. Do not use the XMSIZE and YMSIZE subcommands for those printers that do not support the SMS commands.
4. Other printers (such as the 6400, 4247, and 4230) do not support the Set Media Origin (SMO) command. The media origin does not change. For the 6500, 6400, 4247, and 4230 printers form length is always YMSIZE and form width is always XMSIZE.
5. For all other printers, use the settings that are shown in [Table 10 on page 214](#). For these other printers, whether the XMSIZE or YMSIZE is form length or form width depends on the medium presentation space orientation, type of form, and NUP setting. The following examples are from [Table 10 on page 214](#). See the table for other media combinations.
 - Wide fanfold paper, PRESENT=Landscape, DIRECTION=ACROSS, and no-NUP - The form length is YMSIZE.
 - Narrow fanfold paper, PRESENT=Landscape, DIRECTION=ACROSS, and no-NUP - The form length is XMSIZE.
 - Cutsheet paper, PRESENT=Landscape, DIRECTION=ACROSS, and no-NUP - The form length is XMSIZE.
6. Only two choices exist. If you try one that doesn't work, try the other. For example, if you try XMSIZE for the form length and it doesn't create a longer form, use YMSIZE.

XMSIZE

Specifies the medium presentation space along the X-axis (also known as the medium's size in the X-direction). If this subcommand is specified on the FORMDEF command, it becomes the default for all copy groups that do not specify XMSIZE on the COPYGROUP command. If this subcommand is not specified on the FORMDEF command, the printer's current default X-axis becomes the default for all copy groups that do not specify XMSIZE on the COPYGROUP command.

x

Enter a number with 0 - 3 decimal places and optional units.

YMSIZE

Specifies the medium presentation space along the Y-axis (also known as the medium's size in the Y-direction). If this subcommand is specified on the FORMDEF command, it becomes the default for all copy groups that do not specify YMSIZE on the COPYGROUP command. If this subcommand is not specified on the FORMDEF command, the printer's current default Y-axis becomes the default for all copy groups that do not specify YMSIZE on the COPYGROUP command.

y

Enter a number with 0 - 3 decimal places and optional units.

units

Enter IN for inches, CM for centimeters, MM for millimeters, or PELS for pels. If *units* is not specified, the default is the most recent setting of the SETUNITS command, or inches if no SETUNITS command is coded.

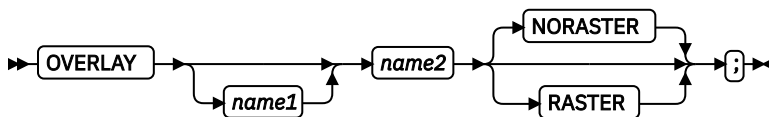
Examples:

```
FORMDEF FMSZX1  Replace Yes
PRESENT Landscape Direction Across
XMSIZE 8.5 in YMSIZE 11.0 in;
COPYGROUP cp1;
COPYGROUP cp2;

FORMDEF FMSZX2  Replace Yes YMSIZE 17.0 in;
COPYGROUP cp3;
COPYGROUP cp4;
```

- In the first example, the printer is a 4400 thermal printer, which supports both SMS and SMO IPDS commands. The form definition that is named FMSZX1 defines a form length of 8.5 inches and form width of 11.0 inches. COPYGROUP cp1 and cp2 inherit those sizes from the form definition.
- In the second example, the printer is a 6400 printer and you want to define the form length. The form definition that is named FMSZX2 defines form length as 17 inches and leaves the form width as the printer default. COPYGROUP cp3 and cp4 inherit those sizes from the form definition.
- If this example is run on z/OS with FORMLEN defined in the JCL, the JCL definition is used.

OVERLAY Command



This OVERLAY command identifies an electronic *medium overlay* to be used in one or more subgroups of a copy group. See [“Medium Overlays and Page Overlays” on page 147](#) for more information. When you are using the OVERLAY command, follow these guidelines:

- An OVERLAY command comes after the COPYGROUP command.
- A separate OVERLAY command must be specified for each electronic overlay that is used in a subgroup.
- A maximum of 254 OVERLAY commands can be specified for coded overlays per copy group.
- The overlay that is named here must be referenced in a SUBGROUP command to be printed (see [SUBGROUP OVERLAY Subcommand](#)).

Notes:

1. Overlays contain their own positioning controls.
2. This does not define *page overlays* that are placed with the N_UP subcommand. See [“Medium Overlays and Page Overlays” on page 147](#) for more information.

OVERLAY [*name1*] *name2*

Identifies an electronic overlay to be used in one or more subgroups of a copy group.

name1

Specifies an alphanumeric name of 1 - 16 characters (local name) for the overlay. It must conform to the token rules and must be unique within a copy group.

Note: If *name1* is omitted, *name2* is used as the local name and is the name that is used in the subgroup command.

name2

Specifies an alphanumeric name of 1 - 6 characters (user-access name) for this overlay. A prefix of O1 is added by PPFA to identify the overlay resource.

Subcommands

RASTER or NORASTER

Specifies overlays as raster or not raster data.

RASTER

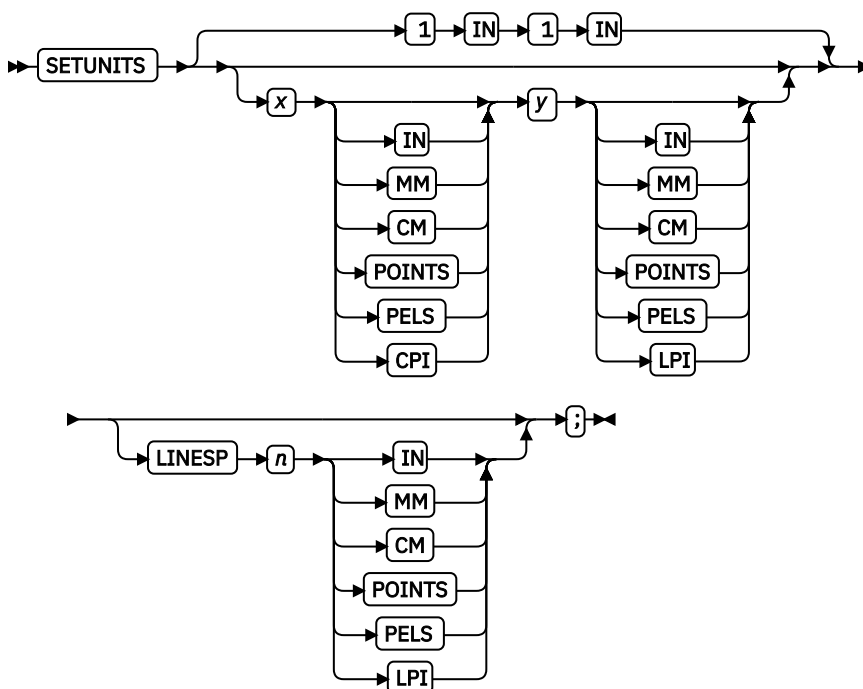
Specifies that this overlay is to be kept in the printer as raster data. If this overlay is to be used several times, the printer does not need to recompile it each time.

NORASTER

Specifies that this is a coded overlay. A maximum of 254 coded overlays can be specified per copy group.

Note: The RASTER or NORASTER subcommands are used only on the IBM 3800 printers.

SETUNITS Command



The SETUNITS command specifies the value and the unit of measurement that is the default for any subsequent measurement parameter in all of the commands and subcommands. These values remain the default values until another SETUNITS command is specified. The SETUNITS command must be specified as the first command in a form definition. If this command or a measurement parameter is not specified, the defaults that are identified within the following description are used.

SETUNITS

Specifies the value and the unit of measurement that is the default for any subsequent measurement parameter in all of the commands and subcommands.

x

Specifies the number that is used for horizontal measurement. A number with up to three decimal places can be used. The default is 1. The unit choices are IN, MM, CM, POINTS, PELS, or CPI.

Note: This value affects subsequent OFFSET subcommands.

y

Specifies the number that is used for vertical measurement. A number with up to three decimal places can be used. The default is 1. The unit choices are IN, MM, CM, POINTS, PELS, or LPI.

Note: This value affects subsequent OFFSET subcommands.

Using CPI and LPI Units of Measurement: The CPI and LPI units of measurement make it possible to write the following command:

```
SETUNITS 10 CPI 6 LPI ;
```

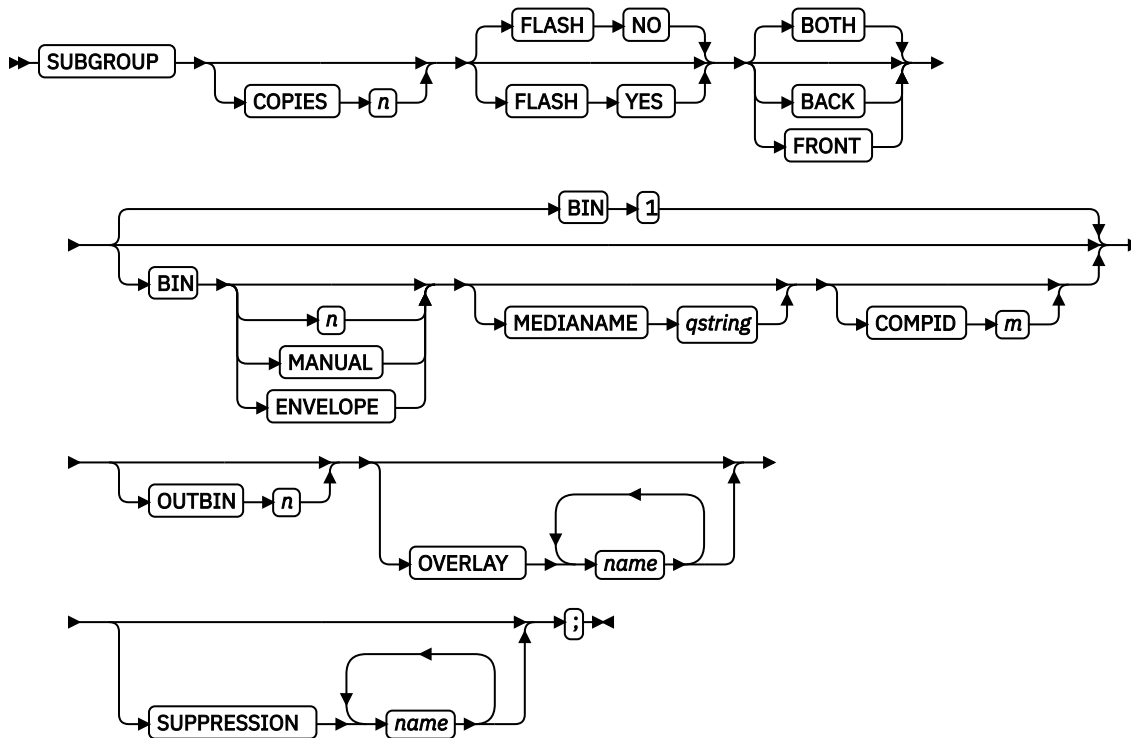
This command sets the units of measurement for horizontal and vertical spacing in terms of characters per inch and lines per inch. You can then use the OFFSET subcommand specifications to increment the spacing one character or one line at a time. The distance that is specified by *n* characters over and by *n* lines down is defined in the governing SETUNITS command. In this example, 10 characters per inch (CPI) and 6 lines per inch (LPI) exist.

Subcommand

LINESP *n*

This subcommand is to be used within a page definition to set up default line spacing; it serves no purpose when used within a form definition.

SUBGROUP Command



The SUBGROUP command specifies the number of copies of a single page that are to be printed and any modifications (consisting of overlays, suppressions, type of duplexing, and forms flash) to be made to the copies. A SUBGROUP command follows a COPYGROUP command; a maximum of 127 SUBGROUP commands can be specified within each copy group.

Notes:

1. The BOTH subcommand causes two subgroups to be generated. Thus, a maximum of 63 subgroups can be specified when the BOTH subcommand is used.
2. When you specify the DUPLEX subcommand (with a parameter other than NO) in the COPYGROUP command, you must include one SUBGROUP command for each side of a sheet, or you can specify the BOTH subcommand in a single SUBGROUP command.

Subcommands

COPIES *n*

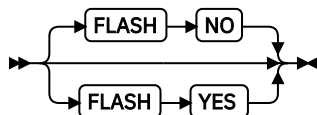


Specifies how many copies of each page are to be printed.

n

Defines the number of copies (the maximum number is 255). When BACK is specified within a SUBGROUP command, the system counts the front pages printed (the actual number of sheets) not copies made (front and back). The default is 1.

FLASH



Specifies whether to use forms flash.

NO

Specifies that forms flash does not occur.

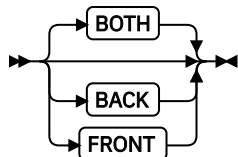
YES

Specifies that forms flash occurs.

Notes:

1. When forms flash is used, its name must be specified in the job control language for the print job. The operator must place the correct negative into the 3800 when the job is ready to print.
2. The FLASH subcommand is used only on the IBM 3800 printers.

side subcommands



These optional subcommands specify whether the subgroup is for both sides of a sheet or for only the front or the back side.

Rules:

1. Subgroups must specify FRONT and BACK if an overlay, suppression, or forms flash appears on one side but not on the other.
2. The FRONT and BACK subgroups must have the same number of copies.
If the number of copies differs, the COPIES parameter of the BACK subgroup is ignored, and a warning message is issued.
3. The FRONT and BACK subcommands must occur in pairs.

- If the FRONT and BACK subcommands are specified with DUPLEX NO (in the FORMDEF or COPYGROUP commands), PPFA issues an error message and does not create the form definition.

BACK

Specifies this SUBGROUP command is for the back sides of the sheets.

A subgroup with a BACK subcommand must have a FRONT subcommand in the preceding subgroup.

FRONT

Specifies this subgroup is for the front sides of the sheets.

If a DUPLEX subcommand in a FORMDEF or COPYGROUP command is specified with a parameter other than NO and the FRONT subcommand is specified in a SUBGROUP command, the next SUBGROUP command must have a BACK subcommand.

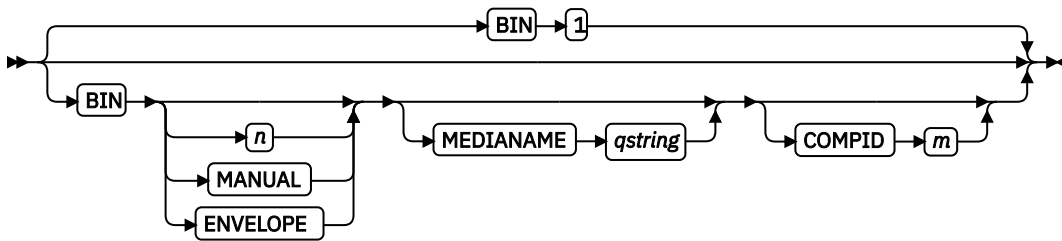
BOTH

Specifies this subgroup is used for both sides of the sheet.

This is the default when DUPLEX is specified in the copy group.

If BOTH is specified with DUPLEX NO (in a FORMDEF or COPYGROUP command), PPFA issues a warning message and ignores the BOTH subcommand.

BIN



Specifies the paper source. This subcommand is used only for printers that have more than one paper source.

Note: If you specify the BIN subcommand, you must also specify at least one of the legal parameters.

n

An integer number 1 - 255 that is the Media Source ID (also known as the bin number).

1

Selects the primary paper source.

2 – 255

Selects another paper source. If the specified bin does not exist on your printer, the default paper source for that printer is used. For more information about paper sources on your printer, see your printer publications. Using a value of 100 is the same as specifying MANUAL.

MANUAL

Selects manual feed as a paper source on those printers that support manual feed. For more information, see your printer publications.

ENVELOPE

Selects an envelope paper source on those printers that support this function. For more information, see your printer documentation.

Notes:

- BIN selection is overridden by the printer if the form defined to each bin is the same form number. Only the primary bin is selected.
- The primary source usually contains either letter-size (US) or A4 (I.S.O.) paper. Other paper sources are used for less common paper sizes (such as legal-size) and for special paper (such as colored stock or pre-printed letterhead on heavy bond).

- If duplexing is requested and you select from the front side from one bin and the back side from another bin, a warning message is issued and the printer takes the paper from the bin that is specified on the front side.

MEDIANAME

Selects a media source by specifying an agreed upon name for the bin. For a current list of the valid media names, see [Appendix G, "PPFA Media Names," on page 527](#).

qstring

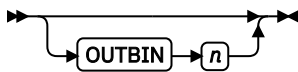
Up to 12 characters within single quotation marks that specify the media source name. On some printers, this name is pre-set into the printer; on others, it also can be entered into the printer by the user. See your printer documentation for more information.

COMPID *m*

Selects a bin based on the component ID.

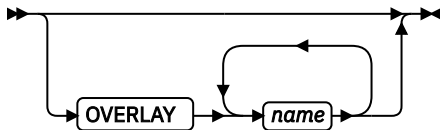
Note: For a current list of component IDs, see [Appendix G, "PPFA Media Names," on page 527](#). Component IDs 12,288 - 268,435,455 are reserved for the user.

OUTBIN *n*



Specifies the destination bin number for any pages that are directed by this form definition. Copy groups and subgroups in this form definition that do not specify an output bin number inherit this bin number.

OVERLAY



Specifies the electronic overlay that is to be used with this subgroup.

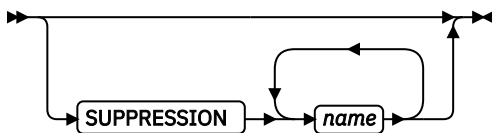
name

Specifies either the local or user-access name. A maximum of eight names can be specified within a subgroup.

Notes:

- If the local name is used, it must be defined in an OVERLAY command before it can be referenced.
- PPFA does not check for duplicate user-access names.

SUPPRESSION



Specifies that the named field is suppressed.

name

Specifies an alphanumeric name of 1 - 8 characters (local name) of the text field to be suppressed. A maximum of eight names can be specified within a subgroup.

The suppression field that is named here must be defined in a SUPPRESSION command that follows the FORMDEF command before it can be referenced. See ["SUPPRESSION Command" on page 247](#).

Note: This subcommand is for text only fields.

SUPPRESSION Command

» SUPPRESSION » *name* » ; »

A SUPPRESSION command, if used, must immediately follow the FORMDEF command. It names the suppression that is specified in the FIELD command of a page definition that is associating the form definition and the page definition.

name

Identifies an alphanumeric name of 1 to 8 characters (local name). The name must conform to the token rules.

You must specify the area to be suppressed in a FIELD command or a SUBGROUP command by using one of the names that are specified within this series of SUPPRESSION commands for the suppression to be effective.

Notes:

1. The SUPPRESSION command is for text only fields. It does not work for bar codes or other non-text fields.
2. A maximum of eight suppressions can be specified for one SUBGROUP command, and a maximum of 127 suppressions can be specified within one form definition.

Chapter 11. Page Definition Command Reference

This section includes:

- Sequence of commands for page definitions
- Page definition commands that are listed alphabetically
- Detailed information about each command
- Descriptions of the applicable subcommands and parameters for each command

Sequence of Traditional Commands for Page Definitions with PRINTLINE

```
[ SETUNITS ... ]
PAGEDEF
[ DEFINE CMRNAME ...]
[ FONT ...]
[ DOFONT ... ]
[ OBJECT ... ]
[DEFINE COLOR ... ]
[ PAGEFORMAT ]
[ TRCREf ...]
[ SEGMENT ...]
[ RENDER ...]
[ OVERLAY ...]
[ EXTREF ... ]
[ CMR ...]
PRINTLINE [ FIELD | CONDITION ...]
[ ENDSUBPAGE ] |
[ PRINTLINE [ FIELD | CONDITION ...] ...]
[ PAGEFORMAT ]
[ TRCREf ...]
[ SEGMENT ...]
[ OVERLAY ...]
PRINTLINE [ FIELD | CONDITION ...]
[ ENDSUBPAGE ] |
[ PRINTLINE [ FIELD | CONDITION ...] ...]
```

Rules:

1. FONT and DOFONT commands must be specified immediately after a PAGEDEF command. The exception is the SETUNITS command.
2. OBJECT commands must be specified immediately after any FONT commands and before any PAGEFORMAT or other commands, except the SETUNITS command.
3. A SETUNITS command can be placed before any other PPFA command. The values set are in effect until the next SETUNITS command.
4. TRCREf, SEGMENT, and OVERLAY commands must be specified under their associated PAGEFORMAT command.
5. The first PAGEFORMAT command can be omitted in a page definition, if the page definition contains only one page format. If the PAGEFORMAT command is omitted, the PAGEDEF command parameters are used to define the page format.
6. At least one PRINTLINE command is required per page format for Traditional Line Data Page definition. PRINTLINE and LAYOUT commands cannot be used within the same page definition.
7. An ENDSUBPAGE command can occur anywhere in a page definition that a PRINTLINE command can occur, except it cannot occur between a PRINTLINE command and its associated FIELD and CONDITION commands.
8. One file can contain multiple sets of page definitions.

Sequence of Record Formatting Commands for Page Definitions with LAYOUT

```
[ SETUNITS ...]
PAGEDEF
FONT
[ DOFONT ... ]
[ OBJECT ... ]
[ DEFINE COLOR... ]
[ PAGEFORMAT ]
  [ SEGMENT ...]
  [ OVERLAY ...]
  [ RENDER ...]
  [ EXTREF ... ]
  [ CMR ...]
  [ LAYOUT ...]
  [ CONDITION ...]
  [ FIELD ...]
  [ DRAWGRAPHIC ...]
  [ ENDGRAPHIC ...]
[ PAGEFORMAT ]
  [ SEGMENT ...]
  [ OVERLAY ...]
  [ LAYOUT ...]
  [ CONDITION ...]
  [ FIELD ...]
  [ DRAWGRAPHIC ...]
  [ ENDGRAPHIC ...]
```

Rules:

1. LAYOUT, XLAYOUT, and PRINTLINE commands cannot be mixed within the same PAGEDEF. At least one LAYOUT command is required per page format for a record formatting page definition.
2. FONT and DOFONT commands must be specified immediately after a PAGEDEF command.
3. A SETUNITS command can be placed before any other PPF command. The values set are in effect until the next SETUNITS command.
4. SEGMENT, OVERLAY, and EXTREF commands must be specified under their associated PAGEFORMAT command.
5. The first PAGEFORMAT command can be omitted in a page definition, if the page definition contains only one page format. If the PAGEFORMAT command is omitted, the PAGEDEF command parameters are used to define the page format.
6. One file can contain multiple sets of page definitions.
7. At least one FONT or DOFONT command is required for each PAGEDEF command.

Sequence of Commands for XML Page Definitions with XLAYOUT

```
[ SETUNITS ...]
PAGEDEF
FONT
[ DOFONT ... ]
[ OBJECT ... ]
[ DEFINE COLOR... ]
[ DEFINE QTAG ...]
[ PAGEFORMAT ]
  [ SEGMENT ...]
  [ OVERLAY ...]
  [ RENDER ...]
  [ EXTREF ... ]
  [ CMR ...]
  [ XLAYOUT ...]
  [ CONDITION ...]
  [ FIELD ...]
  [ DRAWGRAPHIC ...]
  [ ENDGRAPHIC ...]
[ PAGEFORMAT ]
  [ SEGMENT ...]
```

```

[ OVERLAY ...]
[ XLAYOUT ...]
[ CONDITION ...]
[ FIELD ...]
[ DRAWGRAPHIC ...]
[ ENDGRAPHIC ...]

```

Rules:

1. LAYOUT, XLAYOUT, and PRINTLINE commands cannot be mixed within the same PAGEDEF. At least one XLAYOUT command is required per page format for an XML page definition. At least one FONT or DOFONT command is required for each PAGEDEF command.
2. FONT and DOFONT commands must be specified immediately after a PAGEDEF command.
3. A SETUNITS command can be placed before any other PPF command. The values set are in effect until the next SETUNITS command.
4. SEGMENT, OVERLAY, and EXTREF commands must be specified under their associated PAGEFORMAT command.
5. The first PAGEFORMAT command can be omitted in a page definition, if the page definition contains only one page format. If the PAGEFORMAT command is omitted, the PAGEDEF command parameters are used to define the page format.
6. One file can contain multiple sets of page definitions.
7. DOFONT commands must be after the PAGEDEF command and before the first PAGEFORMAT command.
8. EXTREF must be after a PAGEFORMAT (the scope if for that page format) and before the first PRINTLINE, LAYOUT, or XLAYOUT.

Diagram Shorthand

These terms are used in the command definitions:

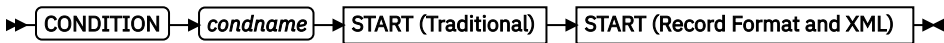
x-pos

A vertical position that uses a numeric number followed optionally by a unit. For the available units, see [“Units of Measurement”](#) on page 186.

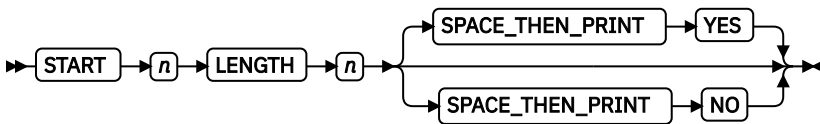
y-pos

A horizontal position that uses a numeric number followed optionally by a unit. For the available units, see [“Units of Measurement”](#) on page 186.

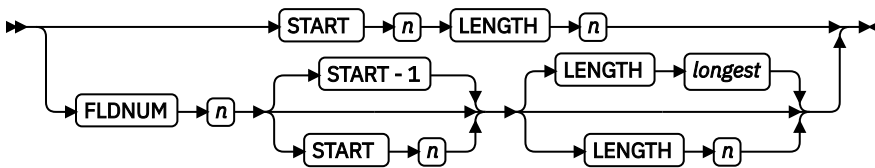
CONDITION Command



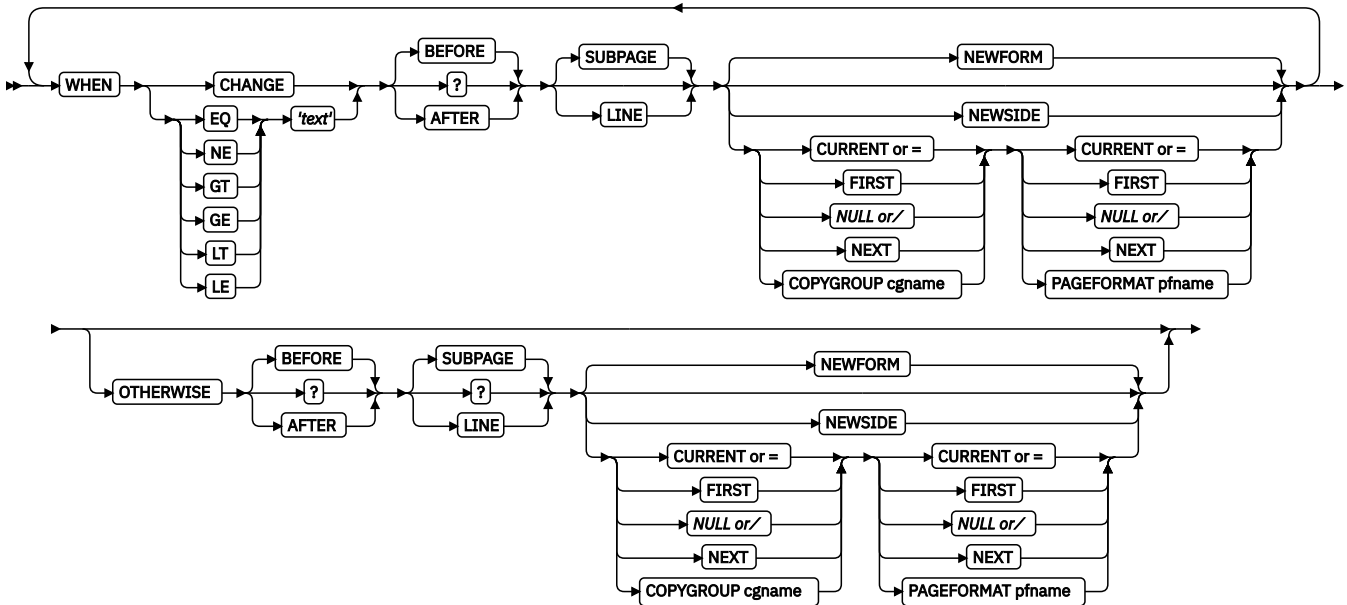
START (Traditional)



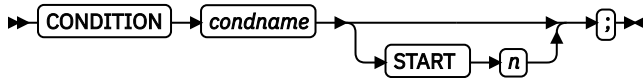
START (Record Format and XML)



Long Form



Short Form



CONDITION

The **CONDITION** command examines data in an input record and specifies actions to be taken based on the result of the examination.

- The *condname* parameter must come before any subcommands.
- No **WHEN** subcommand can follow an **OTHERWISE** subcommand in the same **CONDITION** command.

condname

Names the condition. The name must contain 1 - 8 alphanumeric characters.

PPFA allows cross-referencing to the *condname*. The cross-reference is done by using the short form of the **CONDITION** command (second format in the syntax table). By specifying a previously defined *condname*, PPFA uses the specifications from that command. When the condition is reused, the point where you want the comparison to begin might be at a different point in the record. By specifying the optional **START** subcommand, you can change the starting point of the comparison but not the field length. If the **START** subcommand is not specified, the starting point is the same as defined in the original **CONDITION** command.

Note: When you are comparing text in fields that contain delimiters, the comparison text must not contain the delimiter. The delimiter is not part of the data.

Long Form Subcommands

START *n*



Specifies the starting byte of the comparison field within the data record where the comparison is to be done.

n

Specifies the number of bytes from the first data byte in the record as the starting point of the comparison field. The first data byte position of an input record is 1.

Note: The carriage-control character and the table-reference character are not considered data.

LENGTH *n*



Specifies the length of the comparison field.

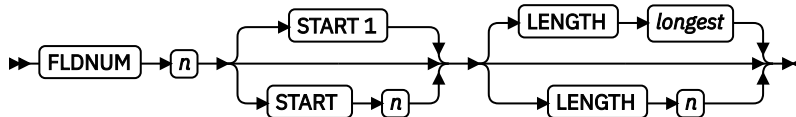
n

Specifies the number of bytes in the data record to be compared, beginning with the position specified in START. Valid values are numbers 1 - 8000. The length of the constant text must be the same as defined in this parameter or the results are invalid.

Comparisons are done on a byte-by-byte basis. Because the comparison field and the constant text must have the same lengths, padding is not necessary.

Note: If any part of the comparison field that is specified by the combination of START and LENGTH is outside the boundaries of the data record, no conditional processing is done. No WHEN is started. If an OTHERWISE is present, it is not started either.

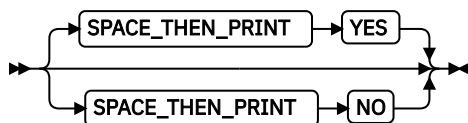
FLDNUM (Record Format and XML only)



Field number to be used in comparison. This keyword is used only if the DELIMITER field was used in the LAYOUT command. Fields cannot be counted without specifying delimiters in the database. When fields are counted, the first field after the record ID is to be considered FLDNUM 1.

To identify a part of a field that is numbered, you can specify the starting position (from the delimiter) and the length of the field to be used in the WHEN condition (the default of the longest parameter is the length of the longest condition or when no specific condition is specified, it is from the starting position to the end of the field.)

SPACE_THEN_PRINT (Traditional only)



Specifies whether ANSI carriage controls for spacing are enabled for the first record on the new logical page that follows the execution of the CONDITION command. The abbreviation of this command is SPACE.

YES

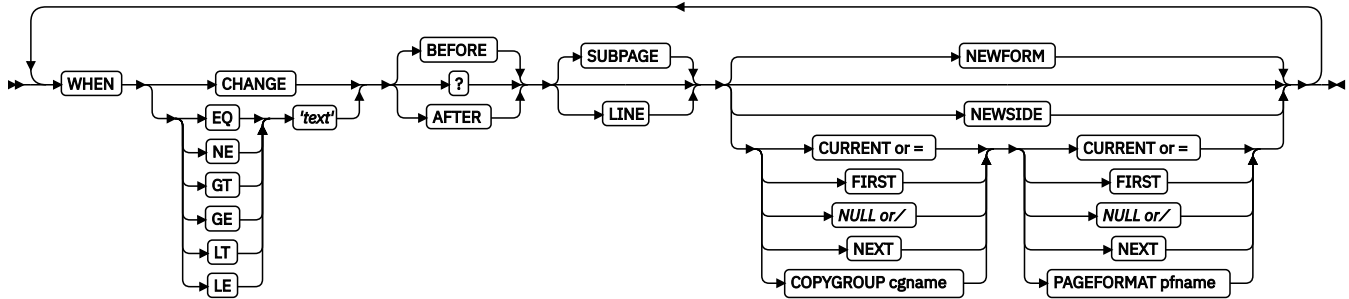
Specifies that the ANSI carriage-control character in the first print record of the new page is enabled for spacing. The spacing action that is specified in the carriage control is done after the eject to the new page. For example, if the carriage-control byte in the first record of the new page is a blank (skip one line before printing), then the first record skips the first line of the new page and prints at the second printline position.

NO

Specifies the ANSI carriage-control character spacing action is suppressed for the first print record of the new page. If this record contains a carriage-control spacing value, such as blank, 0, or -, the spacing is ignored and the record prints at the first printline position on the new page. Channel code values are not ignored. If the first print record contains a valid channel code value of 1 - 9, or A - C, then the first record on the new page prints at the printline defined with that channel code.

Note: This subcommand is effective for print files that contain ANSI carriage controls. It is not used for data files that contain machine carriage controls, or a mixture of ANSI and machine carriage controls.

WHEN



Marks the start of the conditional comparison parameters. At least one WHEN subcommand is required.

comparison type

Specifies the type of comparison that is to be done between the data in the comparison field (the portion of the record that is specified by START and LENGTH) and the constant text that is defined in the *text* parameter.

The values are:

EQ

Equal to

NE

Not equal to

GT

Greater than

GE

Greater than or equal to

LT

Less than

LE

Less than or equal to

text

Specifies constant text for comparison with the comparison field text. The constant text length must be the same as the value on the LENGTH subcommand, with a maximum length of 8000 bytes. Examples of valid text are:

```
2C(3) 'AB'
K'321,400'
X'41FE7799' 2 'CHARS'
```

Any values or parameters that are valid for the TEXT subcommand within the FIELD command can be used as text.

CHANGE

Specifies that the contents of the comparison field in this record are to be compared with the field in the record last processed by the same CONDITION command.

This parameter is an alternative to the *comparison type* and *text* parameter combination but can be specified only once in a CONDITION command.

The result of the comparison is either TRUE or FALSE.

TRUE

When the contents of the comparison field change from one record to the next.

FALSE

When the print server processes the data, if the comparison field lies outside the boundary of the current record, which might occur with variable-length records or with truncated trailing blanks, the current record is not used in future comparisons.

CHANGE is always false if used with the first WHEN subcommand of a series (no previous record to compare against). Whenever a new data map (one with a different name) is invoked, all the CHANGE comparisons are reset. Field values in the previous data map are not retained.

BEFORE

Specifies that the conditional action takes place before the current line or subpage is processed. This is the default.

AFTER

Specifies that the conditional action takes place after the current line or subpage is processed.

LINE

Specifies that the conditional action takes place either before or after the current line.

SUBPAGE (Traditional only)

Specifies that the conditional action takes place either before or after the current subpage. Between LINE and SUBPAGE, SUBPAGE is the default.

For a description of subpages, see [“Logical Page” on page 7](#).

PAGE (Record Format and XML only)

Specifies that the conditional action takes place either before or after the current page. This is the default. Between LINE and PAGE, PAGE is the default.

Note: For CONDITION commands in a Record Format or XML page definition, the keyword SUBPAGE is acceptable but obsolete. Record Format and XML page definitions do not have subpages.

NEWFORM

Specifies that the only action to be taken is skipping to the front of a new form (sheet) and restarting the page format.

Note: This parameter is an alternative to using the COPYGROUP and PAGEFORMAT parameters, and is equivalent to specifying CURRENT for the COPYGROUP parameter and NULL for the PAGEFORMAT parameter. CURRENT NULL are the respective defaults for COPYGROUP and PAGEFORMAT parameters; therefore, NEWFORM is the default action.

NEWSIDE

Specifies that the only action to be taken is skipping to a new side (either the back of the current sheet or the front of a new sheet) and restarting the page format.

Notes:

1. This parameter is an alternative to using the COPYGROUP and PAGEFORMAT parameters, and is equivalent to specifying NULL for the COPYGROUP parameter and CURRENT for the PAGEFORMAT parameter.
2. Conditional processing does not result in unnecessary blank pages.

If the line currently being processed is the first line on a side, then:

- A COPYGROUP or NEWFORM action that takes effect BEFORE LINE does not force an additional new form.
- A PAGEFORMAT or NEWSIDE action that takes effect BEFORE LINE does not force an additional new side.

Similarly, additional sides or forms are not forced by BEFORE SUBPAGE if the line currently being processed is in the first subpage on a side or a form.

copygroup options

Specifies a copy group to be invoked if the condition is true.

Note: Any copy group action (except NULL) restarts the page format.

{ CURRENT or = }

Invoke the current copy group again. This results in ending printing on the current sheet and resuming on the front side of a new sheet. This is the default.

The page format is restarted, which means that the first input record to go on the new page is printed with the first PRINTLINE command of the current page format. For example, data that is to be printed as subpage 4 on the sheet might be printed on subpage 1 on the new sheet.

Note: The character = can be used for CURRENT.

FIRST

Invokes the first copy group in the current form definition.

{ NULL or/ }

Retains the current copy group, taking no action. The character / can be used for NULL.

NEXT

Invokes the next copy group in the current form definition.

Note: If NEXT is specified from the last copy group in the form definition, the first copy group in the form definition is used.

COPYGROUP *cgname*

Uses the named copy group that is defined in the current form definition. The name must contain 1 - 8 alphanumeric characters.

pageformat options

Specifies a page format to be invoked if the condition is true.

{ CURRENT or = }

Invokes the current page format again. This results in ending printing on the current sheet and resuming on the front side of a new sheet.

The page format is restarted, which means that the first input record to go on the new page is printed with the first PRINTLINE command of the current page format.

The character = can be used for CURRENT.

FIRST

Invokes the first page format in the current page definition.

{ NULL or/ }

Retains the current page format, taking no action. The character / can be used for NULL. This is the default.

NEXT

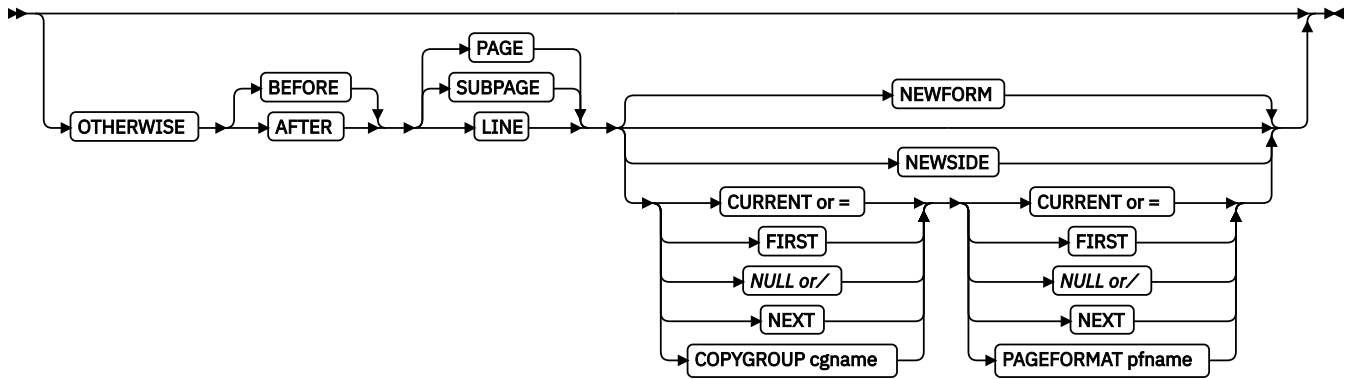
Invokes the next page format in the current page definition.

Note: If NEXT is specified from the last page format in the page definition, the first page format in the page definition is used.

PAGEFORMAT *pfname*

Uses the named page format that is defined in the current page definition. The name must contain 1 - 8 alphanumeric characters.

OTHERWISE



Marks the start of a conditional action that is taken if all preceding WHEN comparisons have proved false. The syntax is the same as the WHEN subcommand, except that the comparison parameters (*comparisontype text* or CHANGE) are not used. See the WHEN parameters that start with “BEFORE” on page 255 for a description of the parameters.

If the OTHERWISE subcommand is not used within the sequence, no action is taken. This action is the same as if an OTHERWISE NULL NULL is entered.

Note: OTHERWISE is not started if any part of the comparison field that is specified by the combination of START and LENGTH is outside the boundaries of the data record.

Short Form Subcommands

Notes:

1. These parameters (START or FLDNUM) have the same meaning as described on the long form of the CONDITION command except that when the parameters are coded here they override the value that is coded on the long form. When not coded here, their values are inherited from the associated long form of the CONDITION command. Long form and short form CONDITION commands are associated by the use of the same *condname* parameter.
2. No other parameters can be specified on the short form of the CONDITION command. They are inherited from the associated long form.

START *n*

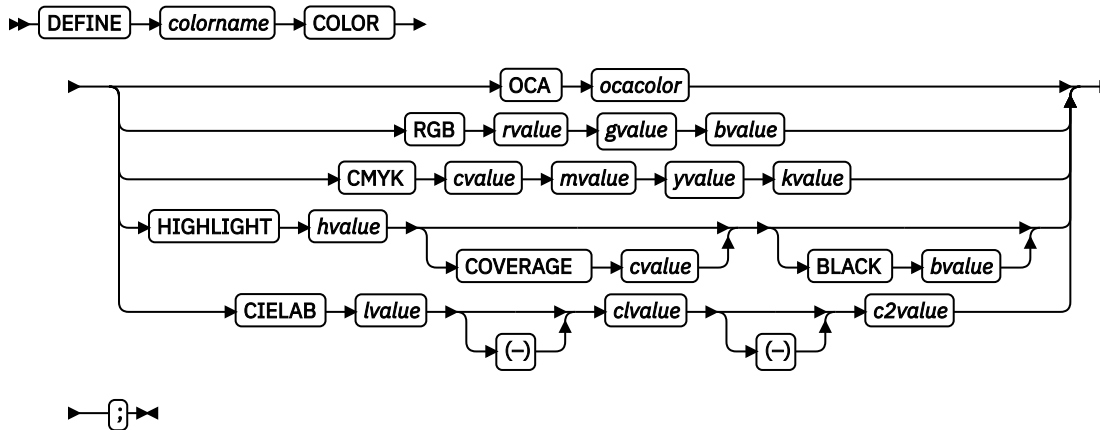
Use this parameter to specify a new starting position for the text to be tested. If this parameter is not coded, the starting position is the same as specified or defaulted in the long form of this CONDITION.

FLDNUM *n*

Use this parameter to specify a new field number for the text to be tested. FLDNUM can be specified only if the LAYOUT or XLAYOUT is coded with a delimiter.

If this parameter is not coded, the starting position is the same as specified or defaulted in the long form of this CONDITION.

DEFINE COLOR Command



Defines a color name of a particular color model such as OCA, RGB, CMYK, HIGHLIGHT, or CIELAB. This name can be used anywhere color of that model is allowed. For example, a defined color of any color model can be used as text color in the FIELD or PRINTLINE commands, but only a color that is defined as an OCA color can be used as an object placement area color. See the OBCOLOR subcommand in “PRINTLINE Command” on page 400.

colorname

Select a 1 - 10 character name. Use this name on the command to identify this color. For example:

```
DEFINE oldblue COLOR OCA brown;
PRINTLINE COLOR oldblue;
```

Subcommands

COLOR

Specifies the color of print for this field that is supported in MO:DCA for the OCA, the Red/Green/Blue color model (RGB), the highlight color space, the Cyan/Magenta/Yellow/Black color model (CMYK), and the CIELAB color model.

OCA *ocacolor*

Choose one of the standard OCA colors or synonyms:

- BLUE
- RED
- MAGENTA (or PINK)
- GREEN
- CYAN (or TURQ)
- YELLOW
- BLACK
- BROWN
- MUSTARD
- DARKBLUE (or DBLUE)
- DARKGREEN (or DGREEN)
- DARKTURQ (DTURQ, or DCYAN, or DARKCYAN)
- ORANGE
- PURPLE
- GRAY

- NONE
- DEFAULT

Note: In some printer publications, the color turquoise (TURQ) is called *cyan*, and the color pink (PINK) is called *magenta*.

RGB *rvalue gvalue bvalue*

Three RGB integer values are used. The first (*rvalue*) represents a value for red, the second (*gvalue*) represents a value for green, and the third (*bvalue*) represents a value for blue. Each of the three integer values can be specified as a percentage 0 - 100.

Note: An RGB specification of 0/0/0 is black. An RGB specification of 100/100/100 is white. Any other value is a color somewhere between black and white, depending on the output device.

HIGHLIGHT *hvalue COVERAGE cvalue BLACK bvalue*

Indicates the highlight color model. Highlight colors are device-dependent.

You can use an integer within the range of 0 - 65,535 for the *hvalue*.

Note: An *hvalue* of 0 indicates that no default value is defined; therefore, the default color of the presentation device is used.

COVERAGE indicates the amount of coverage of the highlight color to be used. You can use an integer within the range of 0 - 100 for the *cvalue*. If less than 100 percent is specified, the remaining coverage is achieved with the color of the medium.

Note: Fractional values are ignored. If COVERAGE is not specified, a value of 100 is used as a default.

BLACK indicates the percentage of black to be added to the highlight color. You can use an integer within the range of 0 - 100 for the *bvalue*. The amount of black shading that is applied depends on the COVERAGE percentage, which is applied first. If less than 100 percent is specified, the remaining coverage is achieved with black.

Note: If BLACK is not specified, a value of 0 is used as a default.

CMYK *cvalue mvalue yvalue kvalue*

Defines the cyan/magenta/yellow/black color model. *cvalue* specifies the cyan value. *mvalue* specifies the magenta value. *yvalue* specifies the yellow value. *kvalue* specifies the black value. You can use an integer percentage within the range of 0 - 100 for any of the CMYK values.

CIELAB *Lvalue (-)c1value (-)c2value*

Defines the CIELAB model. Use a range of 0.00 - 100.00 with *Lvalue* to specify the luminance value. Use signed integers from -127 to 127 with *c1value* and *c2value* to specify the chrominance differences.

Lvalue, *c1value*, *c2value* must be specified in this order. No defaults exist for the subvalues.

Note: Do not specify both an OCA color with the COLOR subparameter and an extended color model on the same FIELD or PRINTLINE command. The output is device-dependent and might not be what you expect.

DEFINE QTAG Command (XML only)



DEFINE QTAG

Defines a local identifier for a qualified tag that can be used later in the page definition on an XLAYOUT command. A QTAG is a sequence of one or more start-tag names, which taken together identify an XML data element. This identifier is the logical equivalent of the *record ID* on the LAYOUT command

for a record formatting page definition. But, instead of identifying an entire record as the LAYOUT command does, the QTAG identifies a single XML data element.

When used, the local identifier makes the coding of an XLAYOUT command easier by allowing the use of a locally defined name instead of the fully qualified set of start tags. It also makes the XLAYOUT command syntax similar to the LAYOUT command.

qtagname

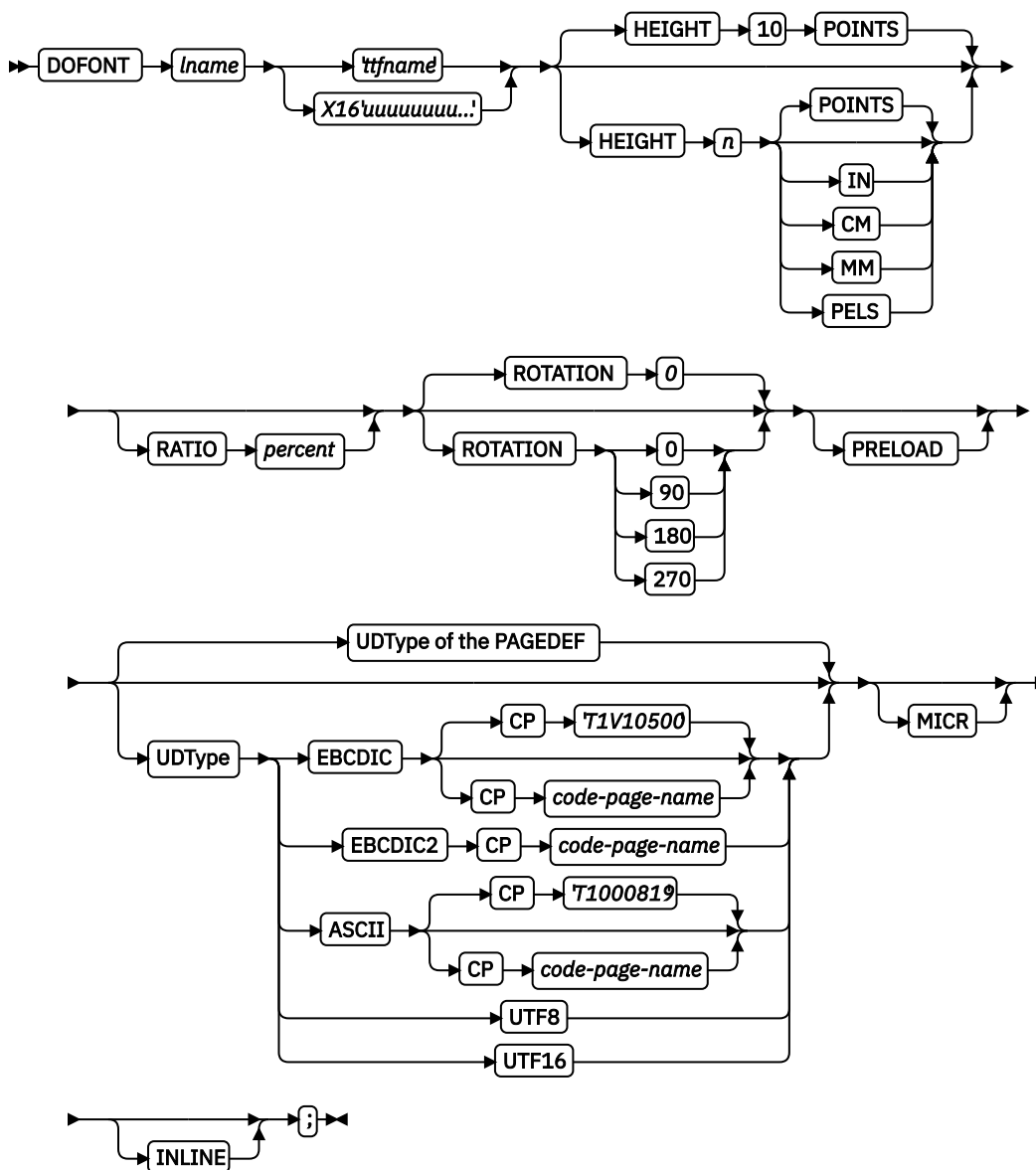
The internal name that is assigned to the fully qualified QTAG. This name can be used on the XLAYOUT command to identify the XML data item. This name is not case-sensitive. It can be up to 16 characters in length.

starttag

An XML element name. This name must match exactly to the element name in the XML data. To preserve the case for the name, put it in quotation marks. Otherwise, the name is folded to uppercase. If necessary, the name is translated to the data type specified or defaulted by the UDTYPE subcommand on the PAGEDEF command. For example, if the page definition is coded on an EBCDIC operating system, but the UDTYPE specifies UTF8, PPFA converts the start tags from EBCDIC code page 500 to UTF-8.

See the [“XLAYOUT Command \(XML\)”](#) on page 422 for an example of using a defined QTAG with an XLAYOUT command.

DOFONT Command



The DOFONT command defines a Data Object font and specifies its attributes. Data Object fonts include TrueType and OpenType fonts. A font installer is used to install Data Object fonts and a Resource Access Table (RAT). The RAT contains a table which, when accessed with the full font name that is provided by the user, gives the file access name for the font. All names in the RAT are encoded in UTF-16. For more information, see *Using OpenType Fonts in an AFP System*.

To use Data Object fonts, do these:

- Non-PPFA requirements:
 - You need a printer and a print server (PSF or IPM) that supports Data Object fonts.
 - You must install a Resource Access Table (RAT) and the Data Object fonts that are used. For more information, see *Using OpenType Fonts in an AFP System*.
- PPFA requirements:
 - Define the font by using a DOFONT command.
 - Reference the font in one of the following two ways:
 - Reference the font with the PRINTLINE, LAYOUT, XLAYOUT, FIELD, or FIELD BARCODE commands by using the local name.

- Use the EXTREF command in the appropriate PAGEFORMAT to create an external reference to any font that must be mapped but is not referenced in the first manner. For example, a BCOCA object can be presented in the page definition and that object can use a font that is not referenced by the page definition. The EXTREF command would allow the font to be mapped.

DOFONT

Defines a Data Object Font.

Iname

Local name for the font. Specifies an unquoted alphanumeric name of 1 - 16 characters. The name must be unique within the page definition. *Iname* is the name that is used in the EXTREF, PRINTLINE, LAYOUT, XLAYOUT, FIELD, or FIELD BARCODE commands by using FONT or DOFONT commands that reference the font.

full font name

The full font name of the Data Object font; for example, Times New Roman Bold.

'*ttfname*'

Specifies a quoted, case-sensitive name of the Data Object font to be used in the page definition. *Names* entered in this form are translated to UTF-16 for matching in the RAT. The name is 1 - 125 characters long and can contain blanks. It is entered in the operating system encoding (for example, ASCII or EBCDIC). The full font name is case-sensitive and must match exactly the full font name in the Data Object font, including blanks. Long font names must be entered as follows:

```
DOFONT Font1 'A very long named Helvetica Font whose name'
              ' will not fit on one line, and maybe '
              'not even on two lines'
              Height 12 points;
```

Be sure that the blanks are not left out and the case (Upper or Lower) of the characters are correct.

X'16'*uuuuuuuu...*

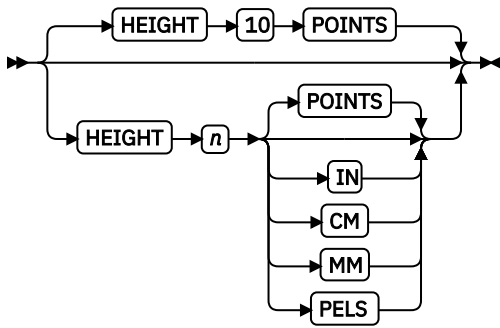
The full font name of the Data Object font in Unicode UTF-16BE (Big Endian) encoding. Enter the full Unicode font name in hex digits. Four hex digits represent one Unicode code point if it isn't a surrogate. It takes eight if it is a surrogate. PPF only checks that the entered digits are a multiple of four. The total number of hex digits that are entered is restricted to 500. This allows a font name of up to 125 characters (if no surrogates exist). No translation is done on the name when entered in this format. The Unicode UTF-16BE is case-sensitive and must match exactly the full font name in the Data Object font, including blanks. Long font names must be entered as follows:

```
DOFONT Font1 X16'0041002000760065007200790020006C006F006E0067'
                '00200066006F006E00740020006E0061006D00650064'
                '002000480065006C007600650074006900630061'
                Height 12 points;
```

Be sure that the blanks are included and the case (Upper or Lower) of the characters are correctly encoded.

Subcommands

HEIGHT



Specifies the height of a Data Object font.

n

A number that specifies the height of the Data Object font. This number can be up to three decimal places.

Note: If HEIGHT is not specified, the default is 10 points.

units

One of the following standard units:

POINTS

Each point is equivalent to 1/72 of an inch (default).

IN

Inches

CM

Centimeters

MM

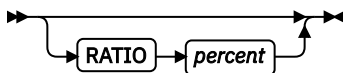
Millimeters

PELS

Pels in the current Logical Units per inch. For example, in 240ths of an inch.

The default units are POINTS.

RATIO

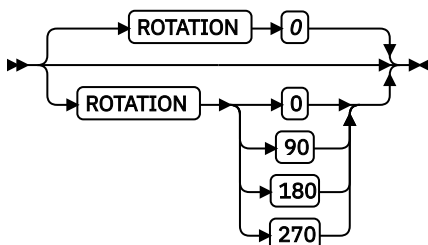


Specifies the ratio of scaling the width relative to the height in a font.

percent

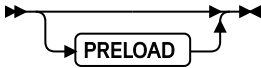
Represents the percent of the normal width of the character that is printed. For example, RATIO 50 yields a font with characters half as wide as normal.

ROTATION



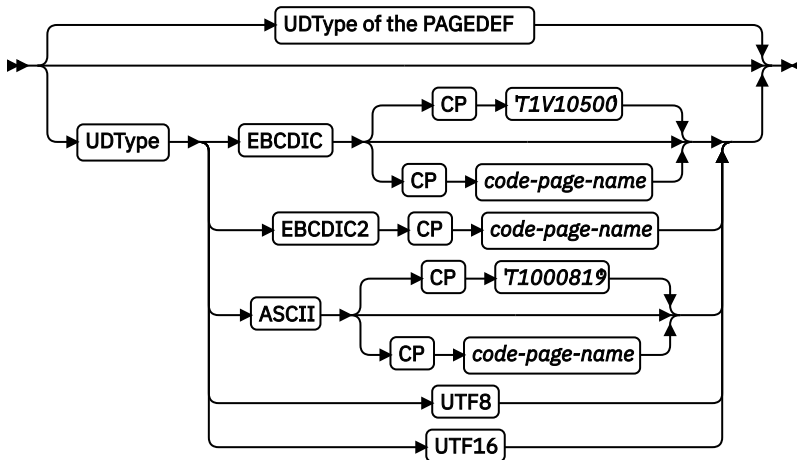
Specifies the rotation of characters in degrees. The specified value is relative to the inline direction of the line to be printed. Valid rotations are 0, 90, 180, and 270. Zero is the default.

PRELOAD



If you want the font to be preloaded before starting the print job, specify it here. Preloaded fonts enhance print performance. The printer must support this function.

UDType



The UDType subcommand specifies the user's data type and optionally, the code page name for mapping the font.

If UDType is not coded on the DOFONT command, it defaults to the coded or default UDType of the page definition.

Notes:

1. Using a code page with a UDType specifies the code page that is used by the application to create the data.
2. To use multiple font mappings for a line in ASCII, UTF8, or UTF16 you must use the FIELD command, since automatic font switching for single and double byte text is only done for EBCDIC data.

EBCDIC

Single-byte EBCDIC.

CP

Code page name. This parameter is optional here and, if not coded, the default is single-byte EBCDIC code page T1V10500.

code-page-name

Enter a quoted or unquoted string for the code page name. If the string is unquoted, it can be up to 6 characters. The string is folded to uppercase and the two character prefix T1 is added. If the string is quoted, it can be up to 8 characters, retain the case, and no prefix is added.

EBCDIC2

Double byte EBCDIC.

CP

Code page name. This parameter is mandatory.

code-page-name

Enter a quoted or unquoted string for the code page name. If the string is unquoted, it can be up to 6 characters. The string is folded to uppercase and the two character prefix T1 is added. If the string is quoted it can be up to 8 characters, retain the case, and no prefix is added.

ASCII

Single-byte ASCII.

CP

Code page name. This parameter is optional here and, if not coded, the default is single-byte ASCII code page T1000819.

code-page-name

Enter a quoted or unquoted string for the code page name. If the string is unquoted, it can be up to 6 characters. The string is folded to uppercase and the two character prefix T1 is added. If the string is quoted, it can be up to 8 characters, retain the case, and no prefix is added.

UTF8

Unicode encoding form UTF-8.

UTF16

Unicode encoding form UTF-16.

MICR

Specifies that this font is to be used for MICR print. MICR print defines that the font is to be used for Magnetic Ink Character Recognition (MICR) printing. When MICR printing is requested, the font needs to be designed for use in MICR applications. MICR text is normally printed with a toner that is mixed with a magnetic material.

INLINE

Specifies that this font resource is to be found in an inline resource group when the line data is processed and no additional resource libraries are searched. Its use is intended to correspond to a data object font resource used with complex text that is contained in a PTOCA text object. This PTOCA text object is included by using the OBJECT command in PFFA.

Complex text languages provide different layouts for the presentation of text and its storage. Bidirectional (BIDI) languages present text normally from right to left; however, some text such as numbers and embedded Latin, Cyrillic, and Greek scripts, are written from left to right. These languages include Arabic, Urdu, Farsi, and Hebrew.

It is recommended that you place all TrueType/OpenType fonts that are used for complex text rendering in the print file resource group (inline). To ensure that only a font from the print file resource group is used by the presentation system, it is recommended that the INLINE parameter is used for such fonts. The user is responsible for including the font in an inline printfile resource group.

Data Object Font Examples

The following page definition shows these examples of font coding:

- Two AFP fonts are defined, `myfont` and `font1`.
- Four Data Object fonts are defined, `fontU`, `font2`, `font3`, and `font4`.
 - `fontU` is not referenced in the page definition, but is specified as referenced externally, because it is used in the GOCA object `AmFlag`.

- Fonts myfont, font1, font2, font3, and font4 are referenced normally on a PRINTLINE command.
- font2 uses the UDTYPE subcommand with a named code page.
- font3 specifies a height and is preloaded.
- font4 specifies its name in Unicode UTF-16BE (Traditional only).
- font4 specifies its name in Unicode UTF-16 (Record Format and XML only).

```

Pagedef ttxmp1 replace yes;
FONT myfont 'XZM32F';
FONT font1 M32F;

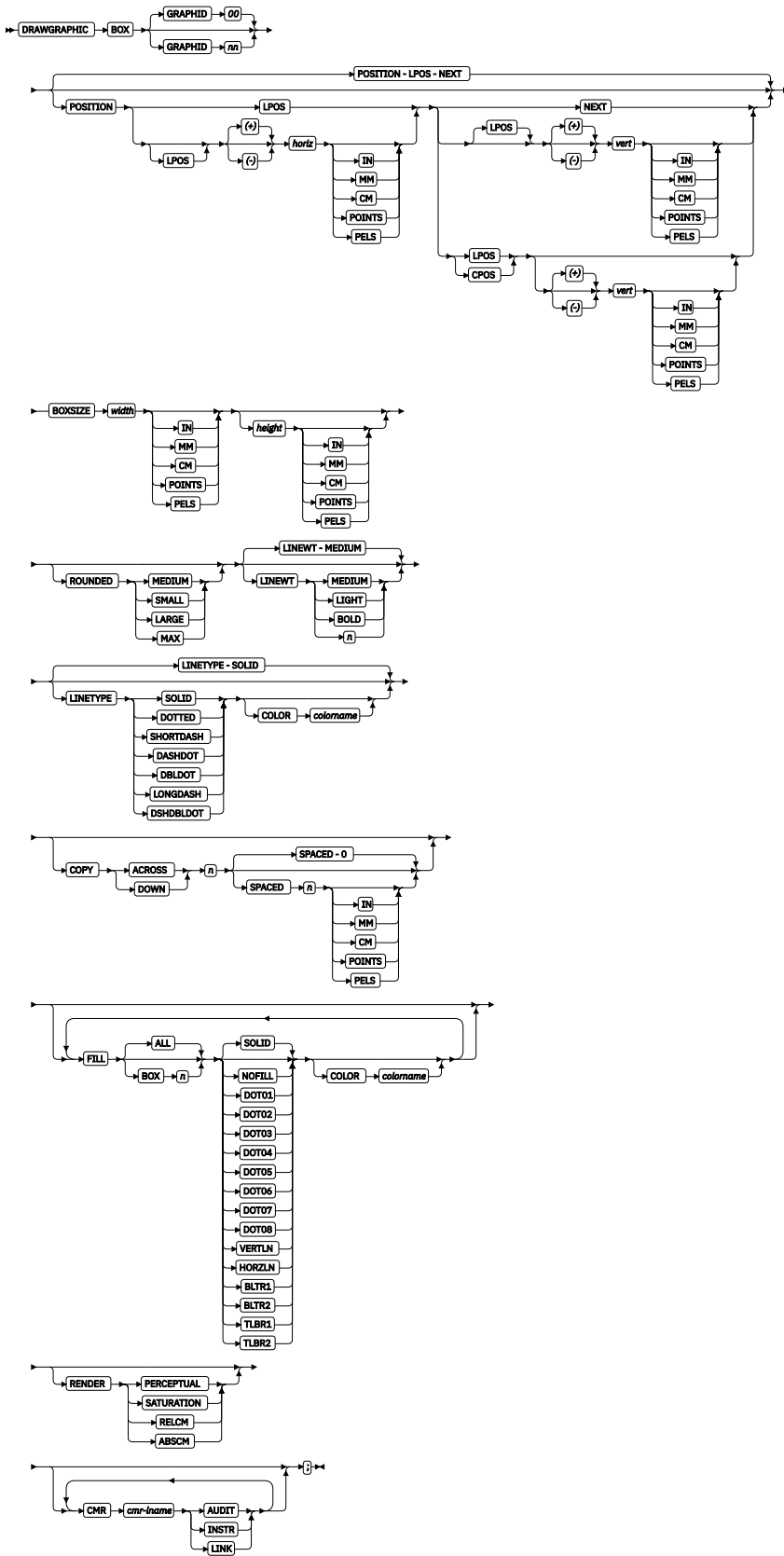
DOFONT fontU 'Unreferenced Font, Used in OBJECT AmFlag';
DOFONT font2 'Times New Roman' UDTYPE EBCDIC CP 'T1V10037';
DOFONT font3 'New Gothic Condensed' PRELOAD Height 12;
DOFONT font4 X16'00480065006C00760065' /*Helve */
              '0074006900630061'; /* tica */
DOFONT micr1 'Times New Roman' HEIGHT 12 MICR;
OBJECT amflg OBXNAME 'AmFlag' OBTYP goca OBKEEP;

PAGEFORMAT PF1;
EXTREF fontU;
Printline Font myfont;
Printline Font font1 ;
Printline Font font2 ;
Printline Font font3 ;
Printline Font font4 OBJECT amflg;
Printline;
FIELD Start 21 Length 16 FONT micr1;

DOFONT tnreb 'Times New Roman WT J' Height 12 UDTYPE EBCDIC
CP 'T1V10500';
DOFONT tnreb 'Times New Roman WT J' Height 12 UDTYPE EBCDIC2
CP 'T10300';
DOFONT tnras 'Times New Roman WT J' Height 12 UDTYPE ASCII;
DOFONT tnru8 'Times New Roman WT J' Height 12 UDTYPE UTF8;
DOFONT tnru16 'Times New Toman WT J' Height 12 UDTYPE UTF16;

```

DRAWGRAPHIC - BOX Command (Record Format and XML only)



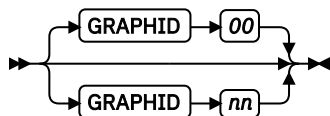
You use the DRAWGRAPHIC - BOX command to draw boxes on the page with GOCA (Graphics Object Content Architecture) objects.

Note: GOCA boxes require specific microcode in your printer.

You can draw a box of varying attributes and colors at either the current line position or a specified position. DRAWGRAPHIC can be used with the COLOR parameter and DEFINE COLOR to shade a box with a percentage of black or other colors.

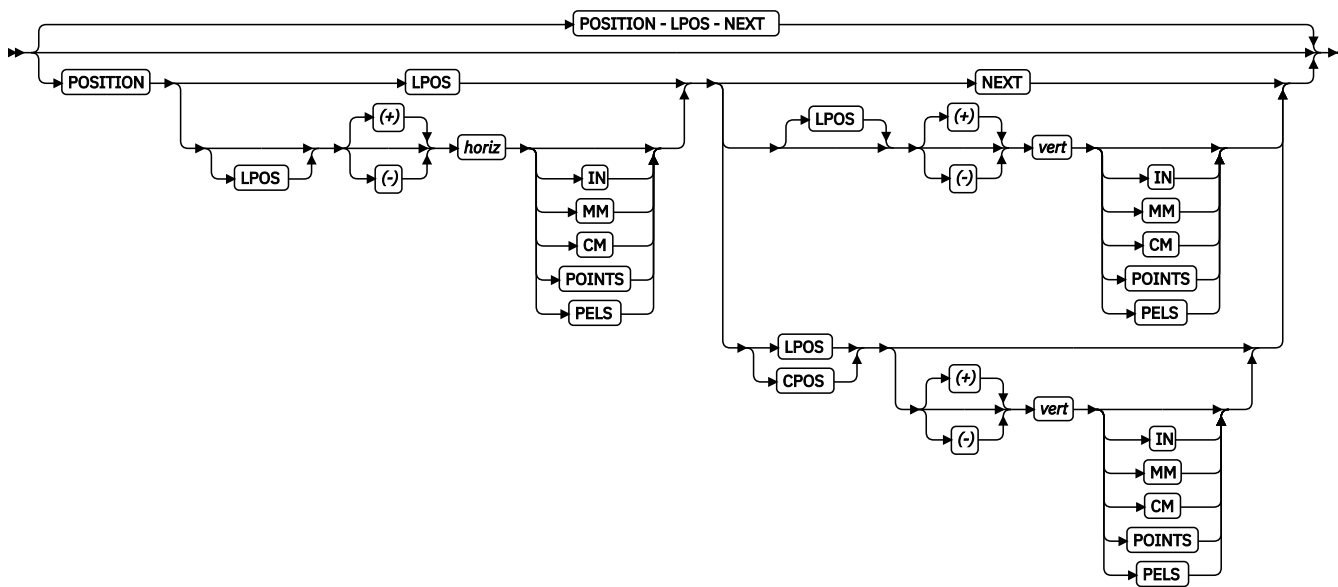
Subcommands

GRAPHID



Specified number is used to later identify as the box or set of boxes to be closed by the ENDGRAPHIC. The default is 00.

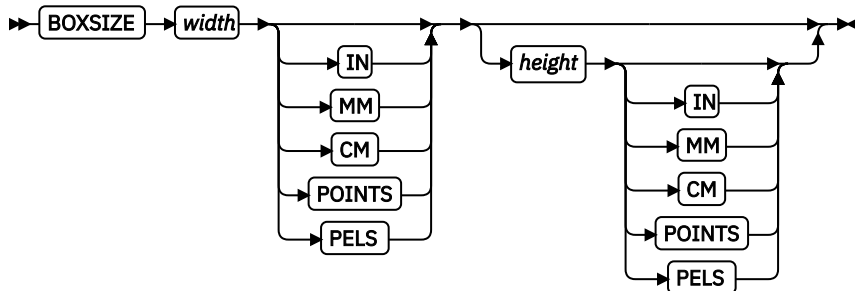
POSITION



Horizontal and vertical position for first box. This position is relative to the LAYOUT command's position statement or the current position.

LPOS and CPOS refer to Layout Position and Current Position. If LPOS is used alone, the position is used exactly at the same position as is specified on the LAYOUT command. If it is used with a + or - value, the position moves that amount from the LAYOUT position. The same is true for Current position except that the position is taken from the previous FIELD or DRAWGRAPHIC command.

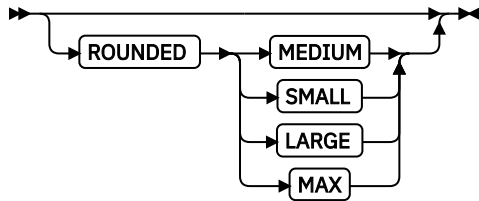
BOXSIZE



Specify the horizontal and optionally, vertical dimensions of the box. The first parameter is required and specifies the horizontal width of the box, which is a fixed size. The second parameter is optional

and if given, specifies the fixed vertical depth of the box. If the second parameter is omitted, the box is a variable size or floating box. For a floating box, the depth of the box is determined when the box is closed with an ENDGRAPHIC command.

ROUNDED



Size of the rounded corner length is determined by the following parameters:

MEDIUM

Medium corner length - equates to a radius of 20 pels at 240 pels/inch or 120 pels at 1440 pels/inch.

SMALL

Small corner length - equates to a radius of 10 pels at 240 pels/inch or 60 pels at 1440 pels/inch.

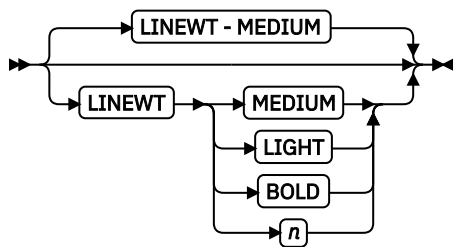
LARGE

Large corner length - equates to a radius of 30 pels at 240 pels/inch or 180 pels at 1440 pels/inch.

MAX

Maximum corner length gives an arc with a radius that extends half the length of the shortest box side. If boxes are rounded MAX, they cannot be open-ended.

LINEWT



Specify either one of the following keywords or the number of lineweights to be used (1 lineweight = 0.01 inches). Specify 0 if you want invisible borders (type and color are then ignored).

LIGHT

The same as LINEWT 0.01 inches.

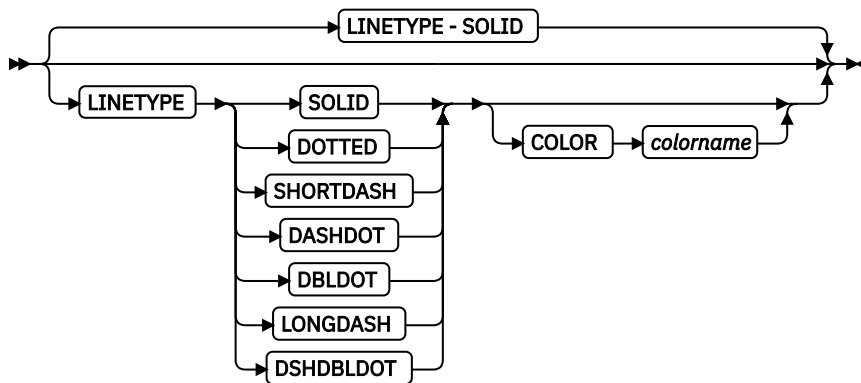
MEDIUM

The same as LINEWT 0.02 inches.

BOLD

The same as LINEWT 0.03 inches.

LINETYPE



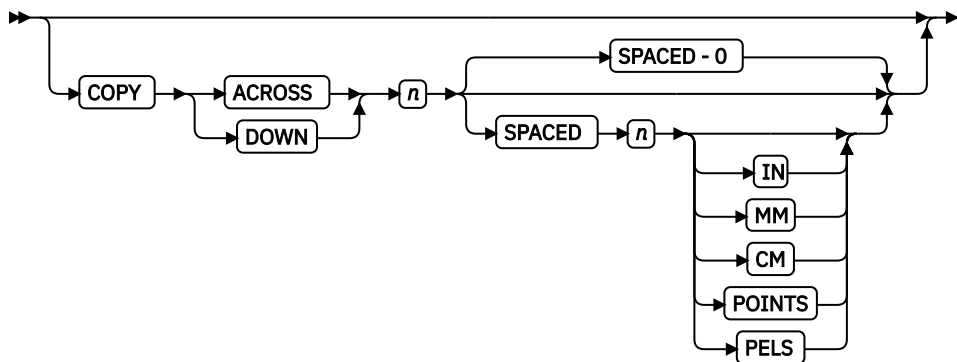
Specify one of the following keywords for the border type:

- SOLID
- DOTTED
- SHORTDASH
- DASHDOT
- DBL DOT (double dot)
- LONGDASH
- DSHDBL DOT (dash double dot)

COLOR

Color to be used for the box border. The color name must be either one of the pre-defined OCA keywords or the color name from the DEFINE COLOR command.

COPY



Repeat the same box at regular intervals either across or down the page. Total number of boxes is one more than the value specified on this parameter.

Restriction: If boxes are repeated in the DOWN direction, they cannot be open-ended.

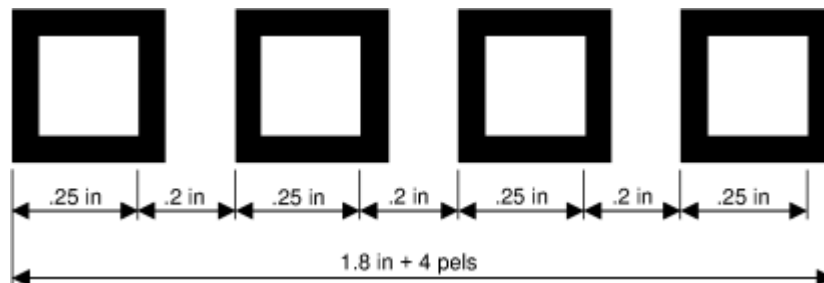


Figure 128: Spaced Boxes (not to scale).

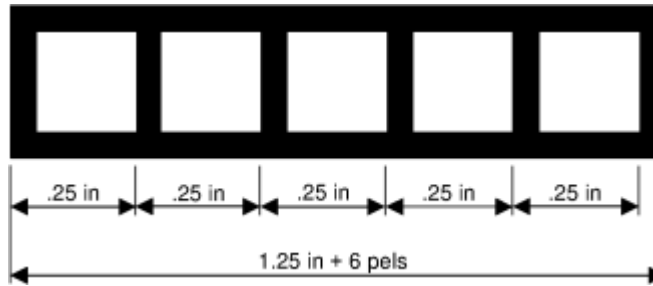
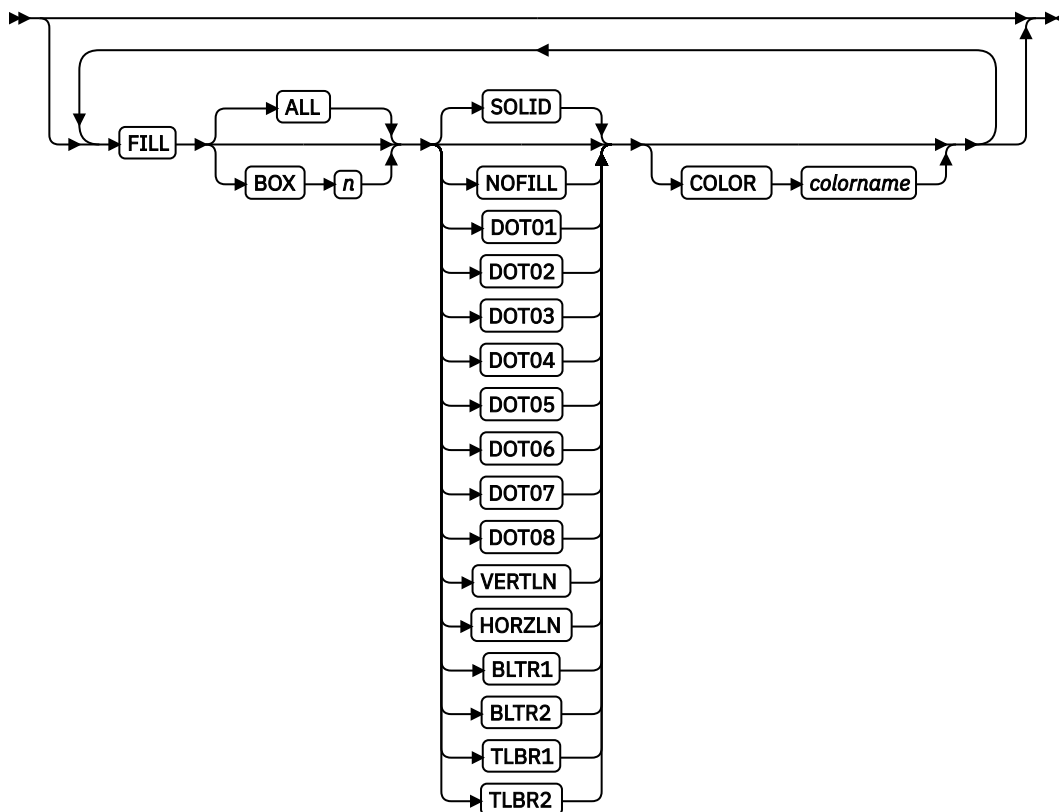


Figure 129: Boxes Spaced 0 (not to scale).

SPACED

Spacing between the boxes can be specified directly. The default is to have no space between the boxes. If spaces do not exist between the boxes, the common border is shared and not duplicated.

FILL



Allows the option of filling a box with a pre-defined GOCA pattern and optionally specifying a color. The numbering of the boxes is done in the order they are defined within this one command, such as 1, 2, 3. Filling follows the last fill wins rule.

The NOFILL keyword fills ALL boxes with one fill pattern. Specify NOFILL on one box to remove that box's pattern.

For an example of the various GOCA-supported fill patterns, see [Figure 167 on page 529](#).

The NOFILL keyword can be used when a series of boxes are specified as filled and one or more of them are to be left empty. In the example, boxes 1, 2, 4, and 5 are filled with solid blue and box 3 is empty:

```
LAYOUT ...
  Drawgraphic BOX boxsize 1 in .2 in copy down 4
  Linetype solid color green
```

```
FILL ALL SOLID Color Blue
FILL Box 3 NOFILL;
```

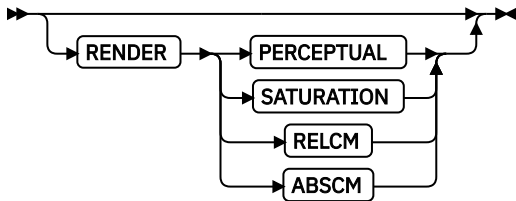
ALL

All boxes are filled.

BOX

n boxes are numbered starting at 1 for the initial box in this command, and increasing by using the COPY parameter.

RENDER



Subcommand on the DRAWGRAPHIC command that is used to specify the rendering intent (RI) for an object within a page definition. RI is used to modify the final appearance of color data and is defined by the International Color Consortium (ICC). For more information about RI, see the current level of the ICC Specification.

Note: See [Chapter 8, “AFP Color Management,” on page 151](#) for more information about using the RENDER subcommand.

rendering intent parameter

Specify the rendering intent for the defined graphic (GOCA) object.

PERCEPTUAL

Perceptual rendering intent. It can be abbreviated as PERCP. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to give a pleasing appearance. This intent is typically used to render continuous-tone images.

SATURATION

Saturation rendering intent. It can be abbreviated as SATUR. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to emphasize saturation. This intent results in vivid colors and is typically used for business graphics.

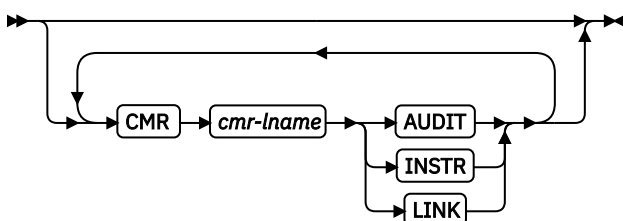
RELCM

Media-relative colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered in regard to the source white point and are adjusted for the media white point. Therefore, colors that are printed on two different media with different white points do not match colorimetrically, but might match visually. This intent is typically used for vector graphics.

ABSCM

ICC-absolute colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered only in regard to the source white point and are not adjusted for the media white point. Therefore, colors that are printed on two different media with different white points must match colorimetrically, but might not match visually. This intent is typically used for logos.

CMR



Specify a Color management resource (CMR) and its process mode for a graphics object within the page definition.

Note: See [Chapter 8, “AFP Color Management,” on page 151](#) for more information about using the CMR subcommand.

cmr-lname

The CMR local name. This name must be defined with a DEFINE CMRNAME command.

Note: This parameter must immediately follow the CMR keyword.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

Process this CMR as an audit CMR.

INSTR

Process this CMR as an instruction CMR.

LINK

Process this CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs.

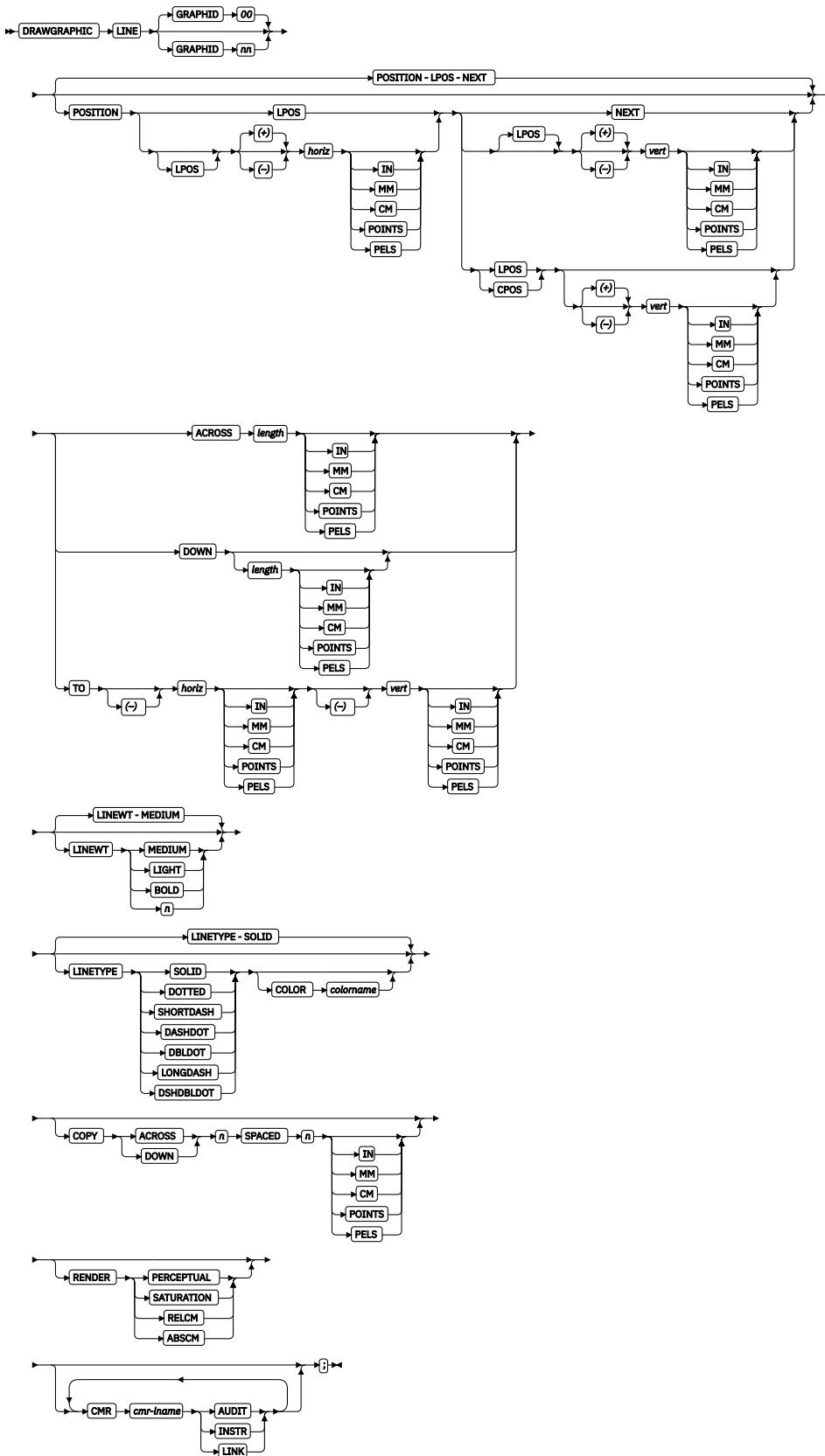
Examples: The following code examples show how to define CMRs and rendering intent for graphics objects. Rendering intent and a CMR are defined for Record Format and XML page definitions, which are the only two page definition types for which DRAWGRAPHIC commands are legal.

```
DEFINE mycmr CMRNAME ... ;

PAGEDEF cmr11L REPLACE yes;
FONT f1;
LAYOUT '11';
DRAWGRAPHIC BOX BOXSIZE 1 in 2 in
RENDER relcm CMR myCMR audit;

PAGEDEF cmr11X REPLACE yes;
FONT f1 TYPE ebcdic;
XLAYOUT QTAG 'x1';
DRAWGRAPHIC BOX BOXSIZE 1 in 2 in
RENDER relcm CMR myCMR audit;
```

DRAWGRAPHIC - LINE Command (Record Format and XML only)



You use the DRAWGRAPHIC - LINE command to:

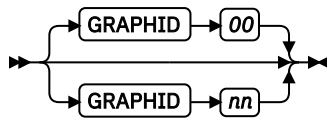
- Draw lines on the page with GOCA (Graphic Character Global Identifier) objects.

Note: GOCA lines require specific microcode in your printer.

- Create either one straight line or a series of straight lines from either the current line position or a specified position.

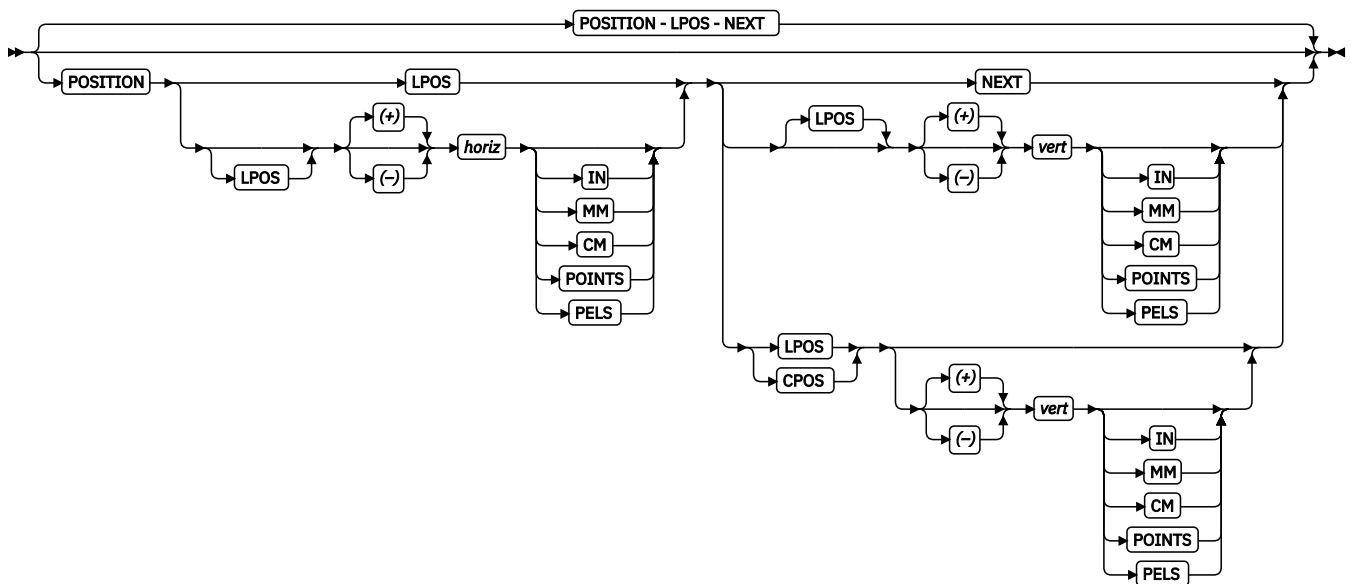
Subcommands

GRAPHID



Specifies a number that is used to later identify the graphic line to be closed by the ENDGRAPHIC. The default is 00.

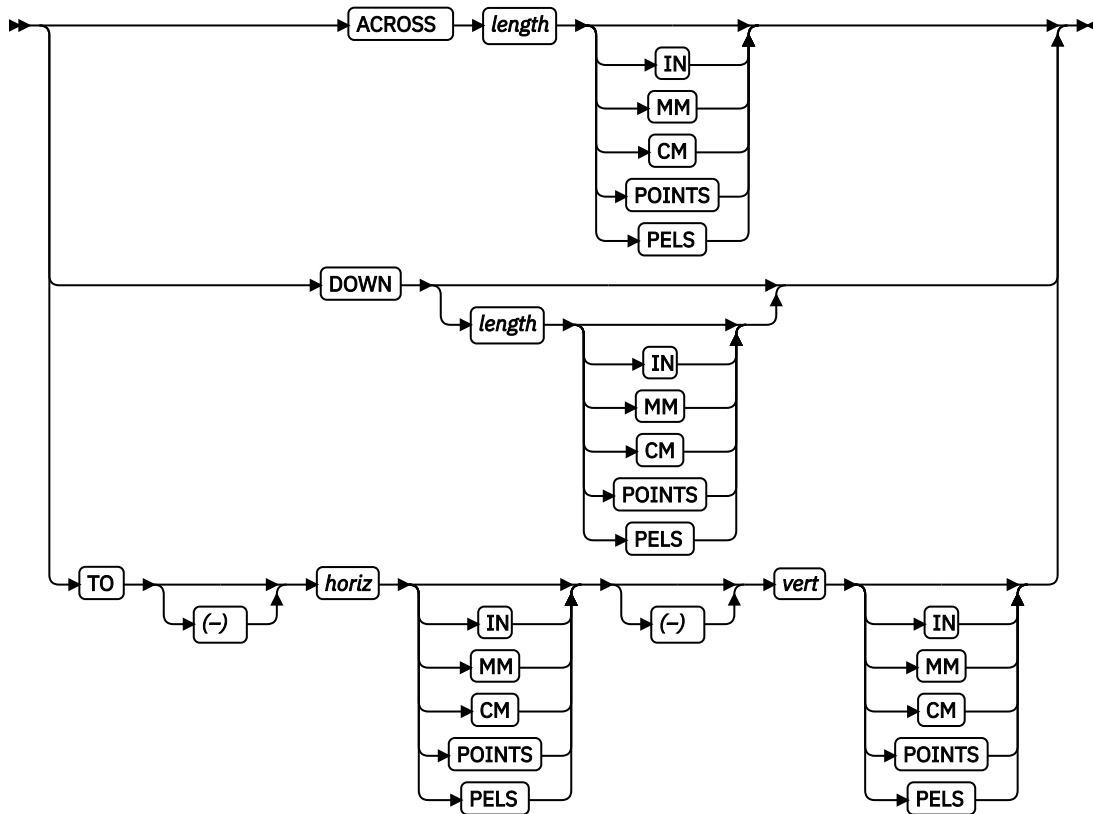
POSITION



Horizontal and vertical position for the start of the first line. This position is relative to either the Layout Position parameter or the current position.

LPOS and CPOS refer to Layout Position and Current Position. If LPOS is used alone, the position is used exactly at the same position as is specified on the LAYOUT command. If it is used with a + or - value, the position moves that amount from the Layout position. The same is true for Current position except that the position is taken from the previous FIELD or DRAWGRAPHIC command.

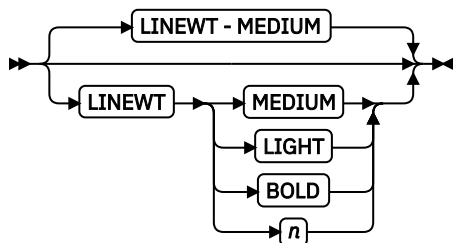
ACROSS, DOWN, TO



Specify the line length in either the ACROSS or DOWN directions. If ACROSS is specified, the line length must also be specified. If DOWN is specified and the *n units* value is not entered, the line continues until either a logical page eject is started or an ENDGRAPHIC is found.

Specify the horizontal and vertical ending positions for the line with TO. Used for lines that are point-to-point. The TO position is specified relative to the POSITION parameter values in this command.

LINEWT



Specify either one of the following keywords or the number of lineweights to be used (1 lineweight= 0.01 inches).

LIGHT

The same as LINEWT 0.01 inches.

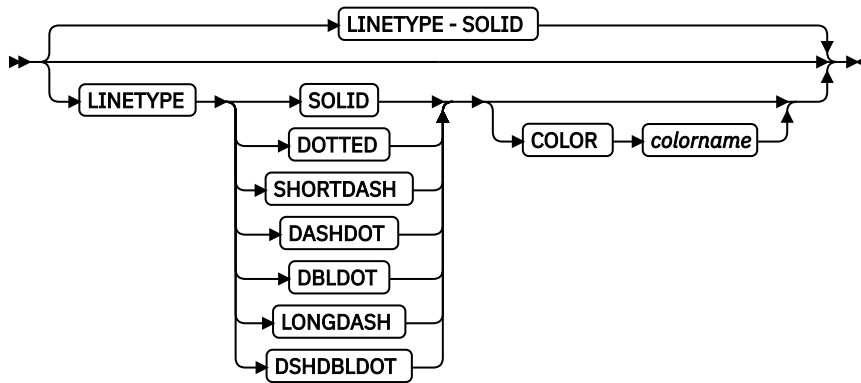
MEDIUM

The same as LINEWT 0.02 inches.

BOLD

The same as LINEWT 0.03 inches.

LINETYPE



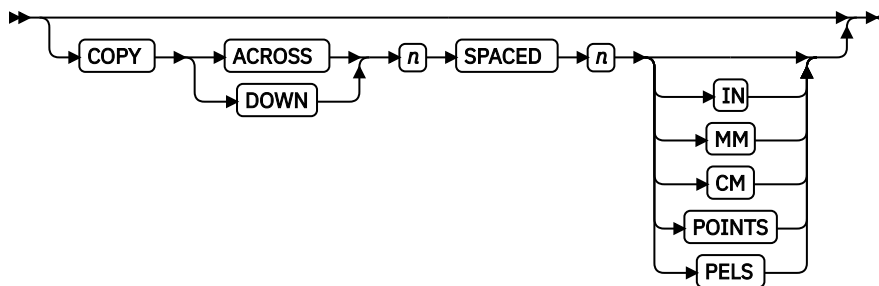
Specify one of the following keywords for the line type:

- SOLID
- DOTTED
- SHORTDASH
- DASHDOT
- DBLDOT (double dot)
- LONGDASH
- DSHDBLDOT (dash double dot)

COLOR

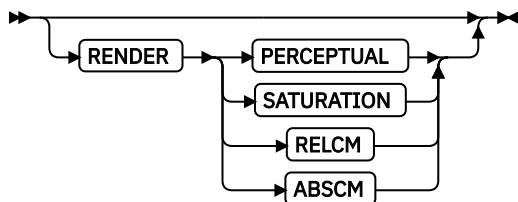
Color to be used for the line. The color name must be either one of the pre-defined OCA keywords or the color name from the DEFINE COLOR command.

COPY



Repeat the same line at regular intervals either across or down the page. Total number of lines is one more than the value specified on this parameter.

RENDER



Subcommand on the DRAWGRAPHIC command that is used to specify the rendering intent (RI) for an object within a page definition. RI is used to modify the final appearance of color data and is defined by the International Color Consortium (ICC). For more information about RI, see the current level of the ICC Specification.

Note: See Chapter 8, “AFP Color Management,” on page 151 for more information about using the RENDER subcommand.

rendering intent parameter

Specify the rendering intent for the defined graphic (GOCA) object.

PERCEPTUAL

Perceptual rendering intent. It can be abbreviated as PERCP. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to give a pleasing appearance. This intent is typically used to render continuous-tone images.

SATURATION

Saturation rendering intent. It can be abbreviated as SATUR. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to emphasize saturation. This intent results in vivid colors and is typically used for business graphics.

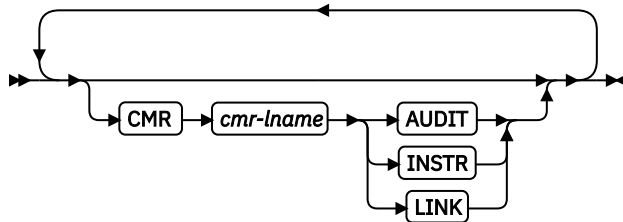
RELCM

Media-relative colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered in regard to the source white point and are adjusted for the media white point. Therefore, colors that are printed on two different media with different white points do not match colorimetrically, but might match visually. This intent is typically used for vector graphics.

ABSCM

ICC-absolute colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered only in regard to the source white point and are not adjusted for the media white point. Therefore, colors that are printed on two different media with different white points must match colorimetrically, but might not match visually. This intent is typically used for logos.

CMR



Specify a Color management resource (CMR) and its process mode for a graphics object within the page definition.

Note: See [Chapter 8, “AFP Color Management,”](#) on page 151 for more information about using the CMR subcommand.

cmr-lname

The CMR local name. This name must be defined with a DEFINE CMRNAME command.

Note: This parameter must immediately follow the CMR keyword.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

Process this CMR as an audit CMR.

INSTR

Process this CMR as an instruction CMR.

LINK

Process this CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs.

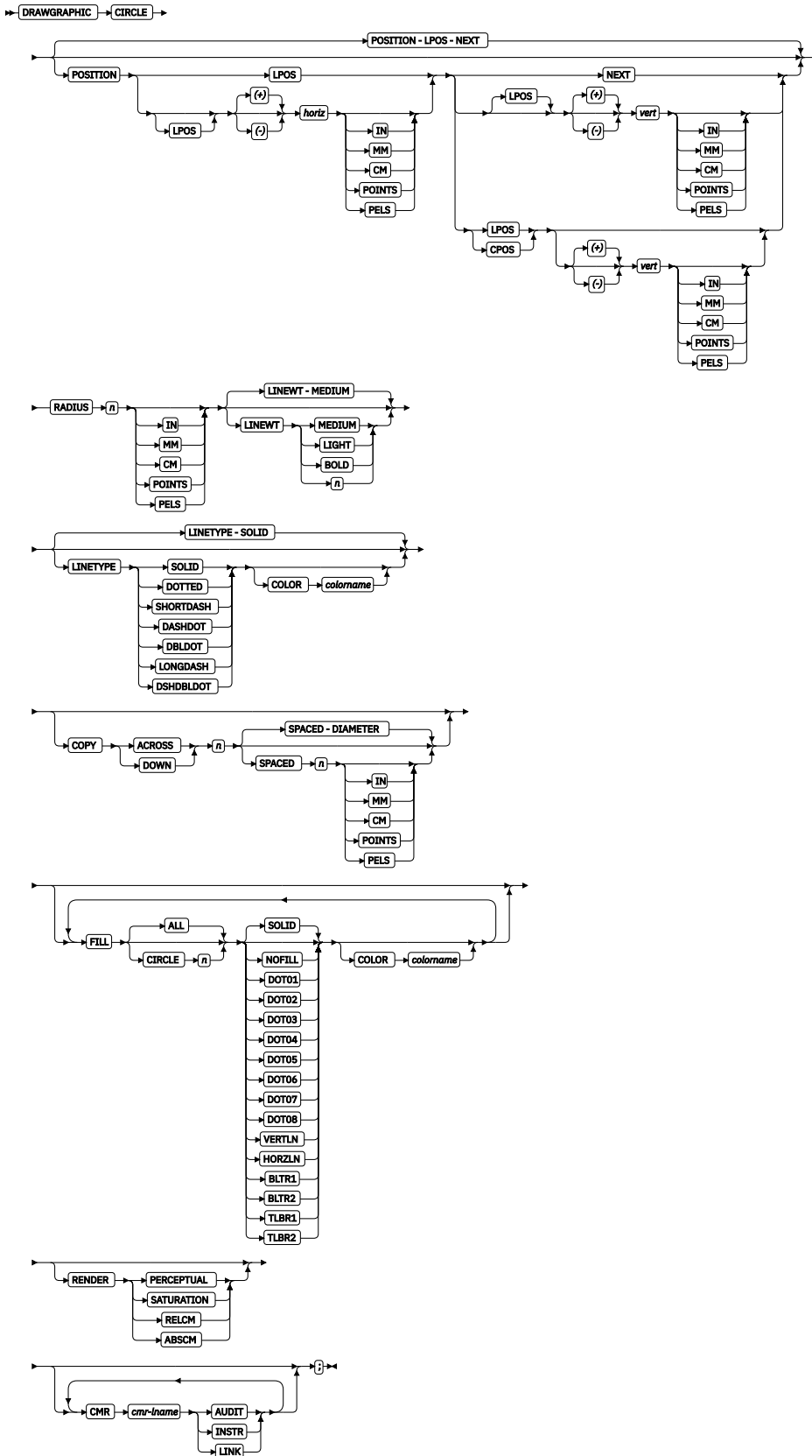
Examples: The following code examples show how to define CMRs and rendering intent for graphics objects. Rendering intent and a CMR are defined for Record Format and XML page definitions, which are the only two page definition types for which DRAWGRAPHIC commands are legal.

```
DEFINE mycmr CMRNAME ... ;  
PAGEDEF cmr11L REPLACE yes;
```

```
FONT f1;
LAYOUT 'l1';
  DRAWGRAPHIC BOX BOXSIZE 1 in 2 in
  RENDER relcm CMR myCMR audit;

PAGEDEF cmr11X REPLACE yes;
FONT f1 TYPE ebcdic;
XLAYOUT QTAG 'x1';
  DRAWGRAPHIC BOX BOXSIZE 1 in 2 in
  RENDER relcm CMR myCMR audit;
```

DRAWGRAPHIC - CIRCLE Command (Record Format and XML only)



You use the DRAWGRAPHIC - CIRCLE command to:

- Draw circles on the page with GOCA (Graphics Object Content Architecture) objects.

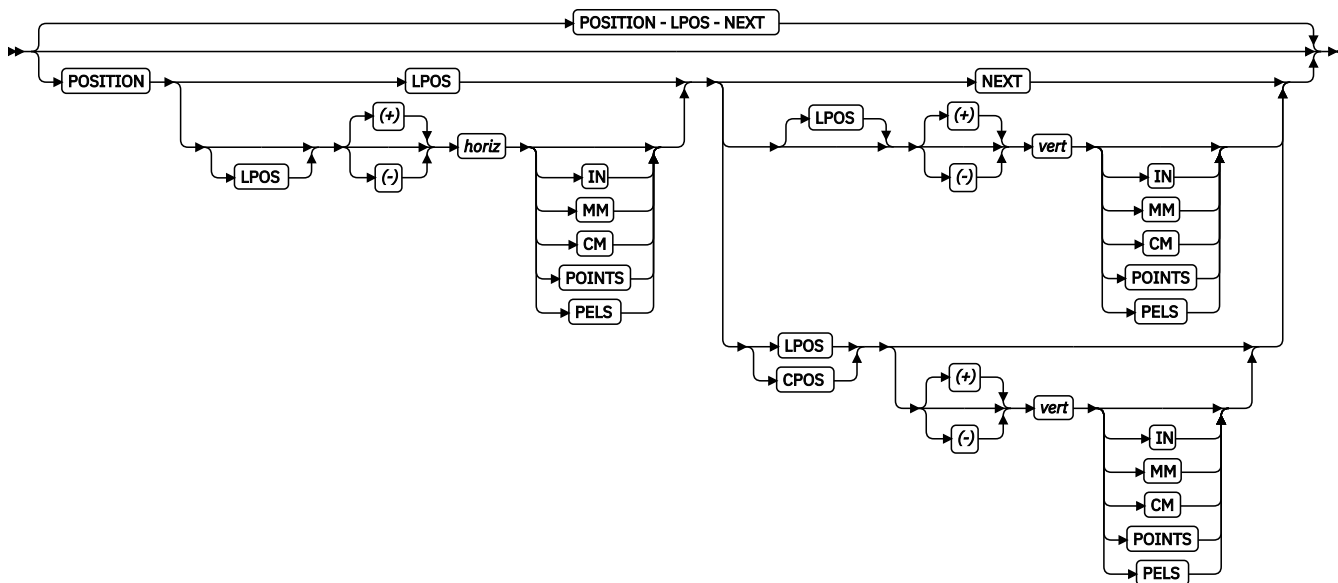
Note: GOCA circles require specific microcode in your printer.

- Create a circle at either a specified radial distance from the last line that is printed or a specified position.

DRAWGRAPHIC can be used with the COLOR parameter and DEFINE COLOR to shade a circle with a percentage of black or other colors.

Subcommands

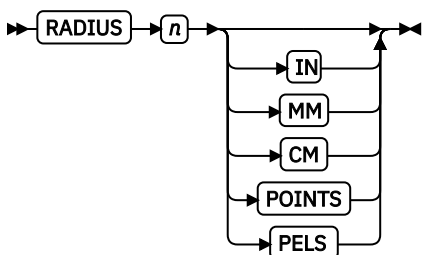
POSITION



Horizontal and vertical position of the center of the first circle. This position value is relative to either the Layout Position parameter or the current position.

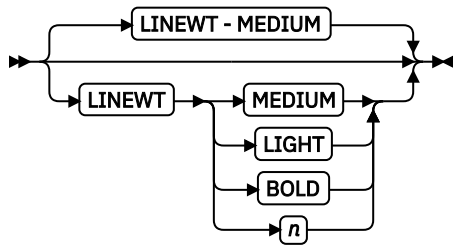
LPOS and CPOS refer to Layout Position and Current Position. If LPOS is used alone, the position is used exactly at the same position as is specified on the LAYOUT command. If it is used with a + or - value, the position moves that amount from the Layout position. The same is true for Current position except that the position is taken from the previous FIELD or DRAWGRAPHIC command.

RADIUS



Specify the circle radius. (The radius is measured from the center of the circle to the middle of the line width.)

LINEWT



Specify either one of the following keywords or the number of lineweights to be used (1 lineweight = 0.01 inches). Specify 0 if you want invisible borders (type and color are then ignored).

LIGHT

The same as LINEWT 0.01 inches.

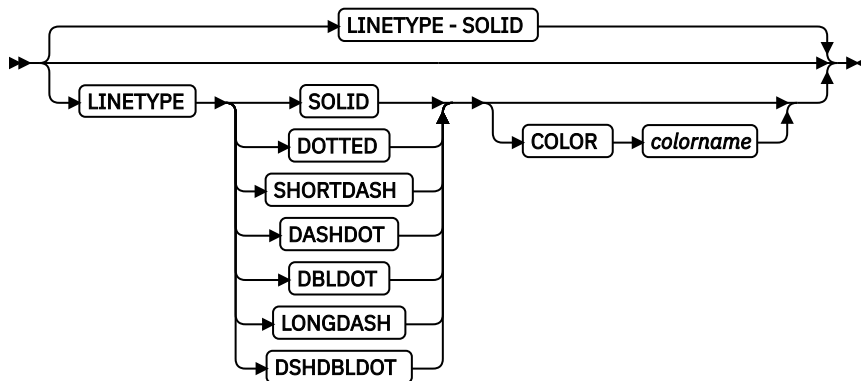
MEDIUM

The same as LINEWT 0.02 inches.

BOLD

The same as LINEWT 0.03 inches.

LINETYPE



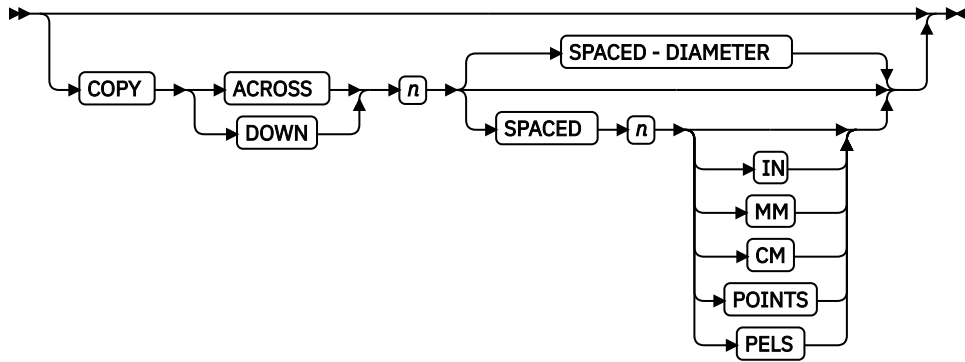
Specify one of the following keywords for the line type:

- SOLID
- DOTTED
- SHORTDASH
- DASHDOT
- DBLDOT (double dot)
- LONGDASH
- DSHDBLDOT (dash double dot)

COLOR

Color to be used for the circle border. The color name must be one of the pre-defined OCA keywords or the color name from the DEFINE COLOR command.

COPY



Repeat the same circle at regular intervals either across or down the page. Repeating ACROSS or DOWN with the DIAMETER indication means that the circles are placed to join at one point with the center positions of each being one diameter width apart. See following figures for a pictorial view of repeating circles.

Total number of circles is one more than the value specified on this parameter.

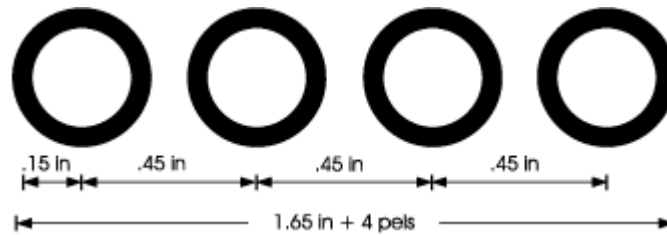


Figure 130: Repeating circles with 0.45 inches spacing (not to scale).

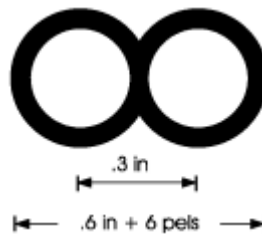
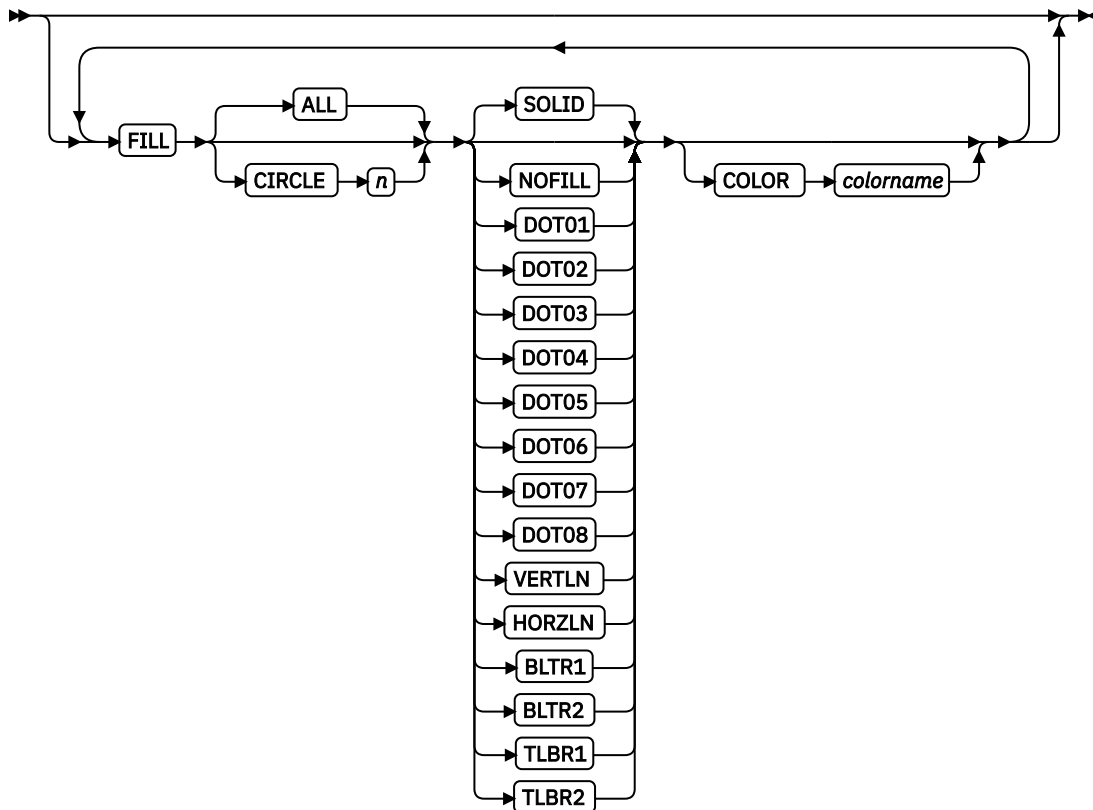


Figure 131: Repeating circles with DIAMETER spacing (not to scale).

FILL

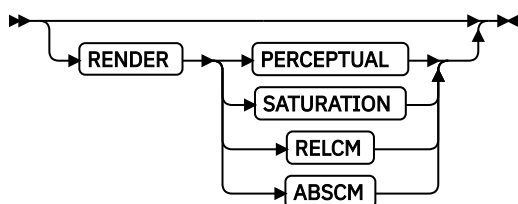


Allows the option of filling a circle with a pre-defined GOCA pattern and optionally specifying a color. Circles are numbered in the order they are defined within this command, such as 1, 2, 3. Filling follows the rule that the last fill wins.

Using the NOFILL keyword fills ALL circles with one fill pattern. Specify NOFILL on one circle to remove that circle's pattern.

For an example of the various GOCA-supported fill patterns, see [Figure 167](#) on page 529.

RENDER



Subcommand on the DRAWGRAPHIC command to specify the rendering intent (RI) for an object within a page definition. RI is used to modify the final appearance of color data and is defined by the International Color Consortium (ICC). For more information about RI, see the current level of the ICC Specification.

Note: See [Chapter 8, “AFP Color Management,”](#) on page 151 for more information about using the RENDER subcommand.

rendering intent parameter

Specify the rendering intent for the defined graphic (GOCA) object.

PERCEPTUAL

Perceptual rendering intent. It can be abbreviated as PERCP. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to give a pleasing appearance. This intent is typically used to render continuous-tone images.

SATURATION

Saturation rendering intent. It can be abbreviated as SATUR. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to emphasize saturation. This intent results in vivid colors and is typically used for business graphics.

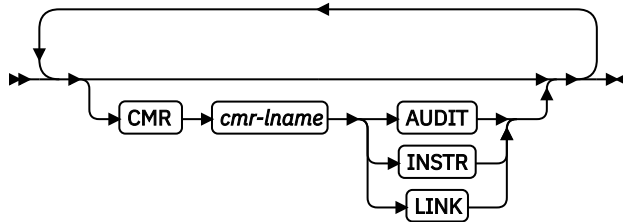
RELCM

Media-relative colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered in regard to the source white point and are adjusted for the media white point. Therefore, colors that are printed on two different media with different white points do not match colorimetrically, but might match visually. This intent is typically used for vector graphics.

ABSCM

ICC-absolute colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered only in regard to the source white point and are not adjusted for the media white point. Therefore, colors that are printed on two different media with different white points must match colorimetrically, but might not match visually. This intent is typically used for logos.

CMR



Specify a Color management resource (CMR) and its process mode for a graphics object within the page definition.

Note: See [Chapter 8, “AFP Color Management,”](#) on page 151 for more information about using the CMR subcommand.

cmr-lname

The CMR local name. This name must be defined with a DEFINE CMRNAME command.

Note: This parameter must immediately follow the CMR keyword.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

Process this CMR as an audit CMR.

INSTR

Process this CMR as an instruction CMR.

LINK

Process this CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs.

Examples: The following code examples show how to define CMRs and rendering intent for graphics objects. Rendering intent and a CMR are defined for Record Format and XML page definitions, which are the only two page definition types for which DRAWGRAPHIC commands are legal.

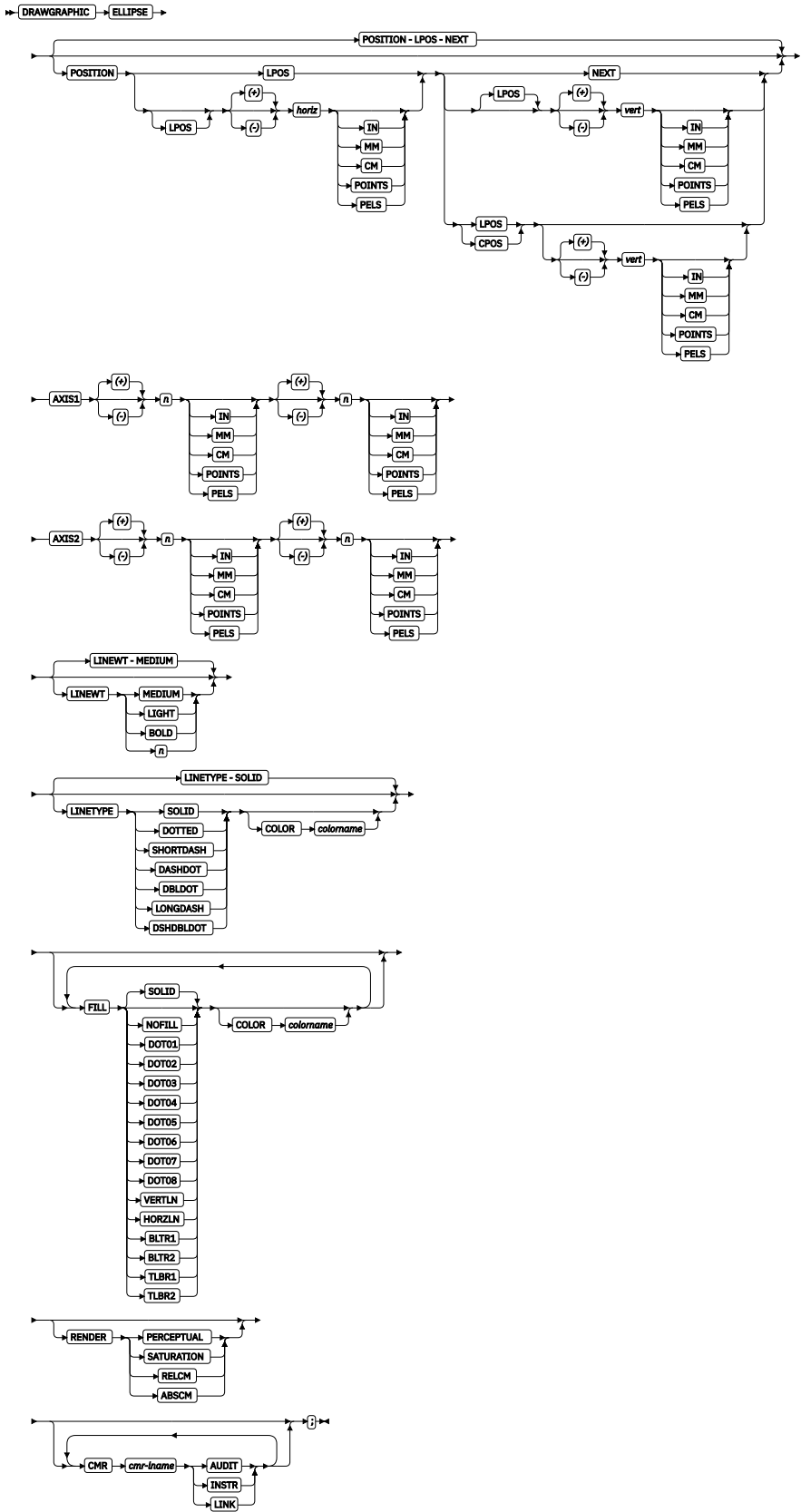
```
DEFINE mycmr CMRNAME ... ;

PAGEDEF cmr11L REPLACE yes;
  FONT f1;
  LAYOUT '11';
  DRAWGRAPHIC BOX BOXSIZE 1 in 2 in
    RENDER relcm CMR myCMR audit;

PAGEDEF cmr11X REPLACE yes;
  FONT f1 TYPE ebcdic;
  XLAYOUT QTAG 'x1';
```

```
DRAWGRAPHIC BOX BOXSIZE 1 in 2 in  
RENDER relcm CMR myCMR audit;
```

DRAWGRAPHIC - ELLIPSE Command (Record Format and XML only)



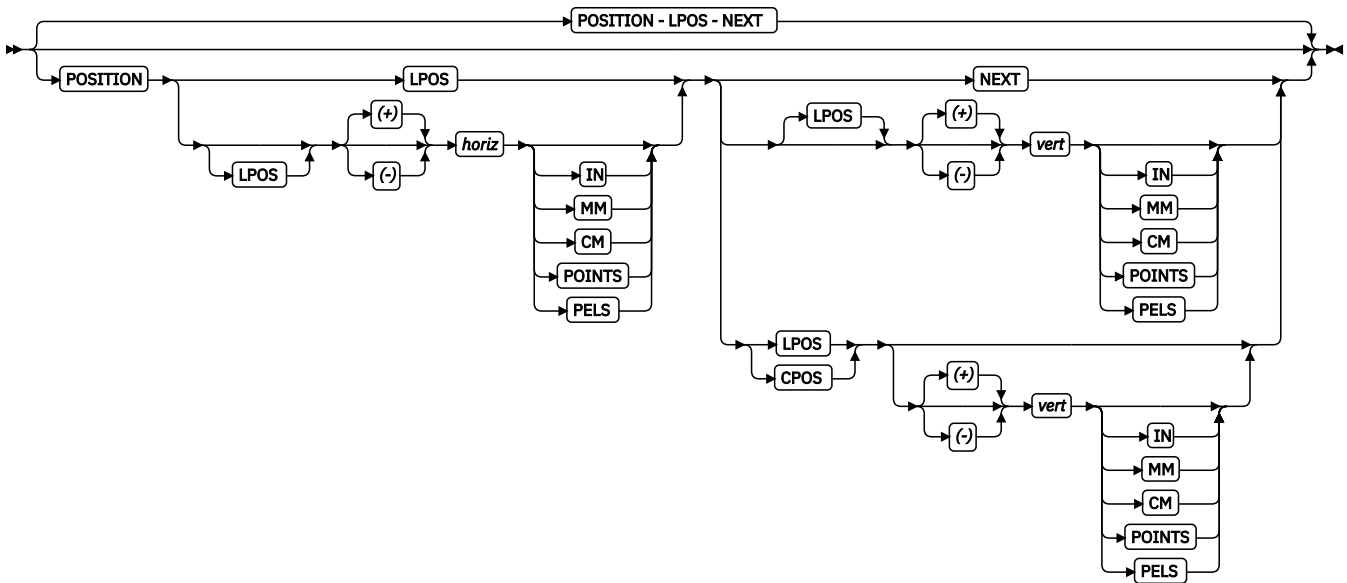
You use the DRAWGRAPHIC - ELLIPSE command to to:

- Draw ellipses on the page by generating GOCA (Graphics Object Content Architecture) structure fields.
- Note:** GOCA lines require specific microcode in your printer.
- Create an ellipse with a number of positions that show the major and minor axes at a specified distance from the last line printed.

The DRAWGRAPHIC can be used with the COLOR parameter and DEFINE COLOR to shade an ellipse with a percentage of black or other colors.

Subcommands

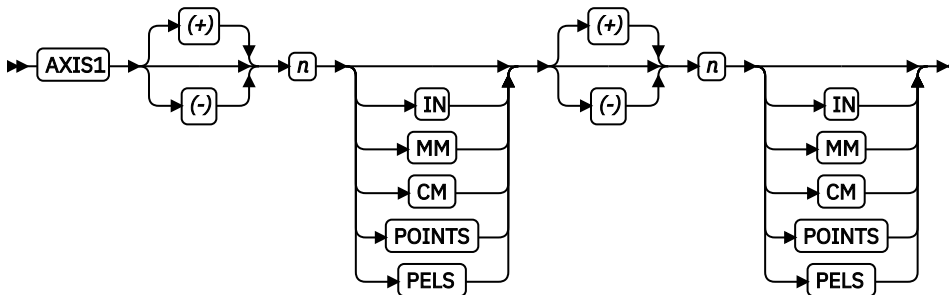
POSITION



Horizontal and vertical position of the ellipse.

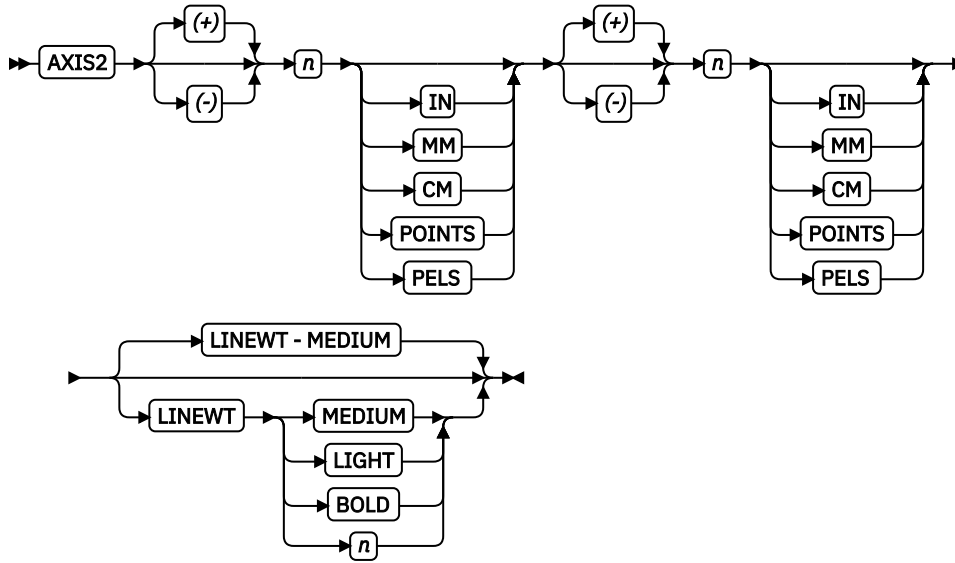
LPOS and CPOS refer to Layout Position and Current Position. If LPOS is used alone, the position is used exactly at the same position as is specified on the LAYOUT command. If it is used with a + or - value, the position moves that amount from the Layout position. The same is true for Current position except that the position is taken from the previous FIELD or DRAWGRAPHIC command.

AXIS1



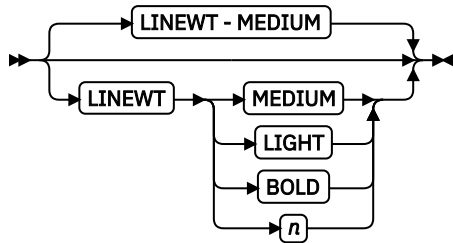
The first pair of n units specifies the location of one point on the ellipse that is specified in relation to the POSITION parameter on this command. This location is specified as if the POSITION parameter is now at (0,0) on a coordinate system. The x and y movements are either in the positive or negative direction from the center point at (0,0). For a picture of how AXIS1 is used, see point R,Q in [Figure 132](#) on page 291.

AXIS2



The second pair of *n units* specifies the location of second point on the ellipse that is specified in relation to the POSITION parameter on this command. This location is specified as if the POSITION parameter is now at (0,0) on a coordinate system. The x and y movements are either in the positive or negative direction from the center point at (0,0). For a picture of how **AXIS2** is used, see point P,S in [Figure 132 on page 291](#).

LINEWT



Specify either a keyword or the number of lineweights to be used (1 lineweight = 0.01 inches). Specify 0 if you want invisible borders (type and color are then ignored).

LIGHT

The same as **LINEWT** 0.01 inches.

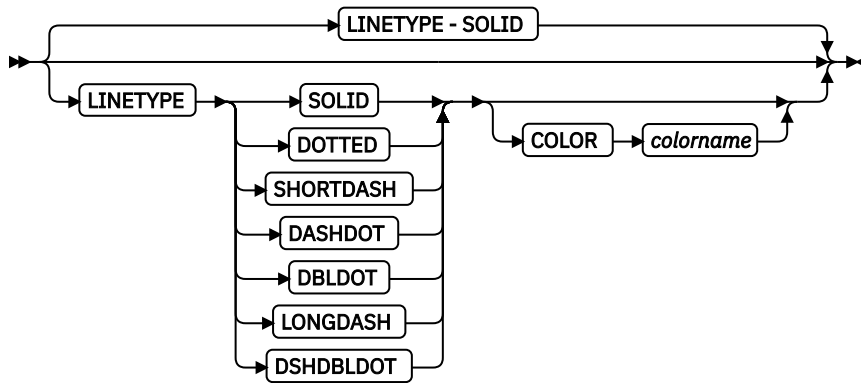
MEDIUM

The same as **LINEWT** 0.02 inches.

BOLD

The same as **LINEWT** 0.03 inches.

LINETYPE



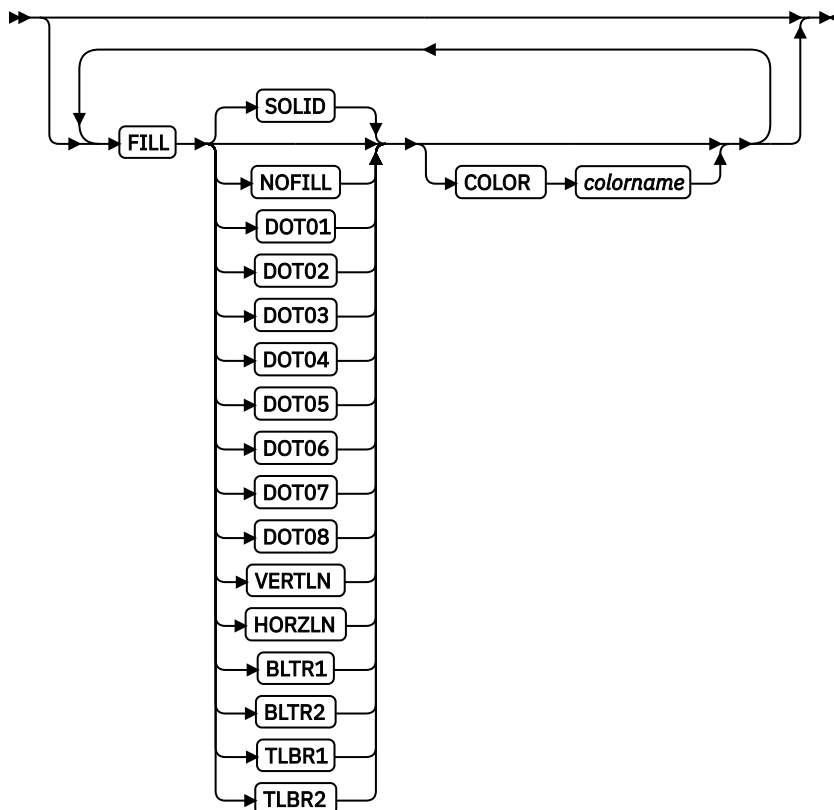
Specify one of the following keywords for the line type:

- SOLID
- DOTTED
- SHORTDASH
- DASHDOT
- DBL DOT (double dot)
- LONGDASH
- DSHDBL DOT (dash double dot)

COLOR

Color to be used for the ellipse border. Specify either one of the pre-defined OCA keywords or the color name from the DEFINE COLOR command.

FILL



Allows the option of filling an ellipse with a pre-defined GOCA pattern and optionally specifying a filling color. For an example of the various GOCA-supported fill patterns, see [Figure 167 on page 529](#).

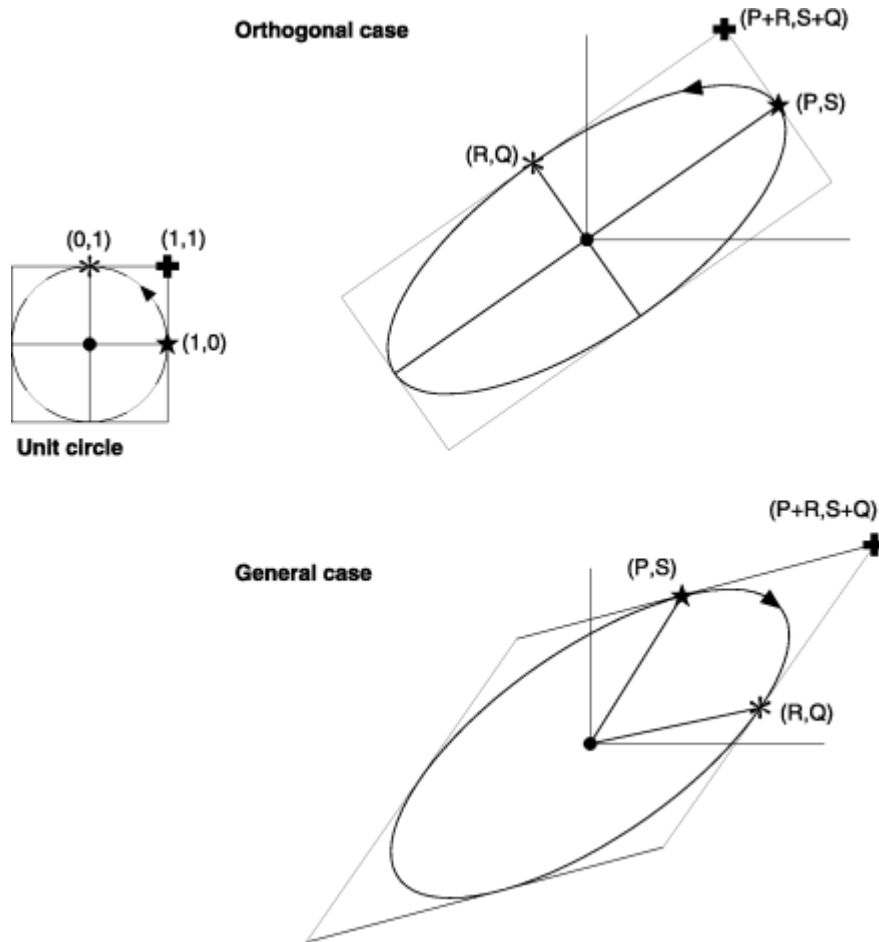
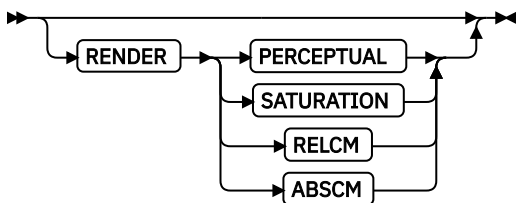


Figure 132: Ellipse parameters

The dot in the center of the ellipse shows the POSITION parameter. The asterisk shows the major axis position and star shows the minor axis position.

RENDER



Subcommand on the DRAWGRAPHIC command that is used to specify the rendering intent (RI) for an object within a page definition. RI is used to modify the final appearance of color data and is defined by the International Color Consortium (ICC). For more information about RI, see the current level of the ICC Specification.

Note: See [Chapter 8, “AFP Color Management,” on page 151](#) for more information about using the RENDER subcommand.

rendering intent parameter

Specify the rendering intent for the defined graphic (GOCA) object.

PERCEPTUAL

Perceptual rendering intent. It can be abbreviated as PERCP. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to give a pleasing appearance. This intent is typically used to render continuous-tone images.

SATURATION

Saturation rendering intent. It can be abbreviated as SATUR. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to emphasize saturation. This intent results in vivid colors and is typically used for business graphics.

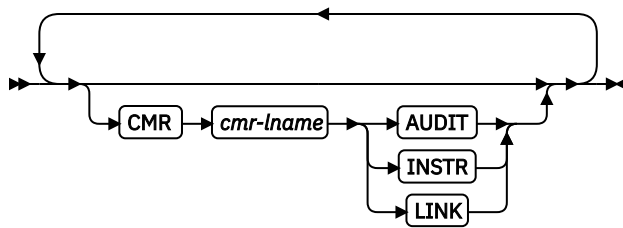
RELCM

Media-relative colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered in regard to the source white point and are adjusted for the media white point. Therefore, colors that are printed on two different media with different white points do not match colorimetrically, but might match visually. This intent is typically used for vector graphics.

ABSCM

ICC-absolute colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered only in regard to the source white point and are not adjusted for the media white point. Therefore, colors that are printed on two different media with different white points must match colorimetrically, but might not match visually. This intent is typically used for logos.

CMR



Specify a Color management resource (CMR) and its process mode for a graphics object within the page definition.

Note: See Chapter 8, “AFP Color Management,” on page 151 for more information about using the CMR subcommand.

cmr-lname

The CMR local name. This name must be defined with a DEFINE CMRNAME command.

Note: This parameter must immediately follow the CMR keyword.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

Process this CMR as an audit CMR.

INSTR

Process this CMR as an instruction CMR.

LINK

Process this CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs.

Examples: The following code examples show how to define CMRs and rendering intent for graphics objects. Rendering intent and a CMR are defined for Record Format and XML page definitions, which are the only two page definition types for which DRAWGRAPHIC commands are legal.

```
DEFINE mycmr CMRNAME ... ;
PAGEDEF cmr11L REPLACE yes;
FONT f1;
LAYOUT '11';
DRAWGRAPHIC BOX BOXSIZE 1 in 2 in
```



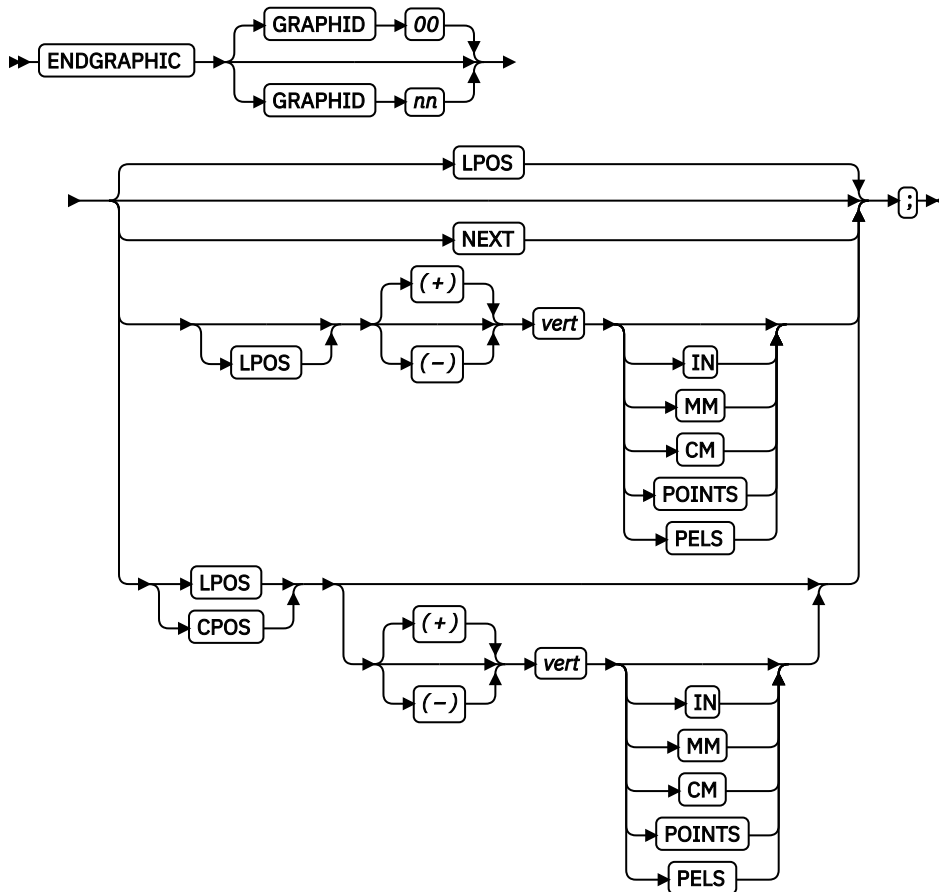
```

    RENDER rclcm CMR myCMR audit;

PAGEDEF cmr11X REPLACE yes;
FONT f1 TYPE ebcdic;
XLAYOUT QTAG 'x1';
DRAWGRAPHIC BOX BOXSIZE 1 in 2 in
    RENDER rclcm CMR myCMR audit;

```

ENDGRAPHIC Command (Record Format and XML only)



You use the ENDGRAPHIC command to end all active graphics with a matching graphic ID. An active graphic is one that is started but not ended; for example, a vertical line or a box with no vertical size.

Subcommands

GRAPHID

ID must match one previously defined in a DRAWGRAPHIC command. If no GRAPHID is specified, all DRAWGRAPHIC commands that have no GRAPHID are closed (for example, GRAPHID 00).

NEXT

Specifies the layout is to be positioned down (on the logical page) one line (as defined in the LINESP subcommand of the last SETUNITS command) from the previous field. The LINESP subcommand of the SETUNITS command establishes the distance from one line to the next.

LPOS CPOS

LPOS and CPOS refer to Layout Position and Current Position. If LPOS is used alone, the position is used exactly at the same position as is specified on the LAYOUT command. If it is used with a + or - value, the position moves that amount from the Layout position. The same is true for Current position except that the position is taken from the previous FIELD or DRAWGRAPHIC command.

vert

This value is relative to the Layout position. If not specified, the graphics are closed one line spacing from the Layout position.

ENDSUBPAGE Command (Traditional Only)

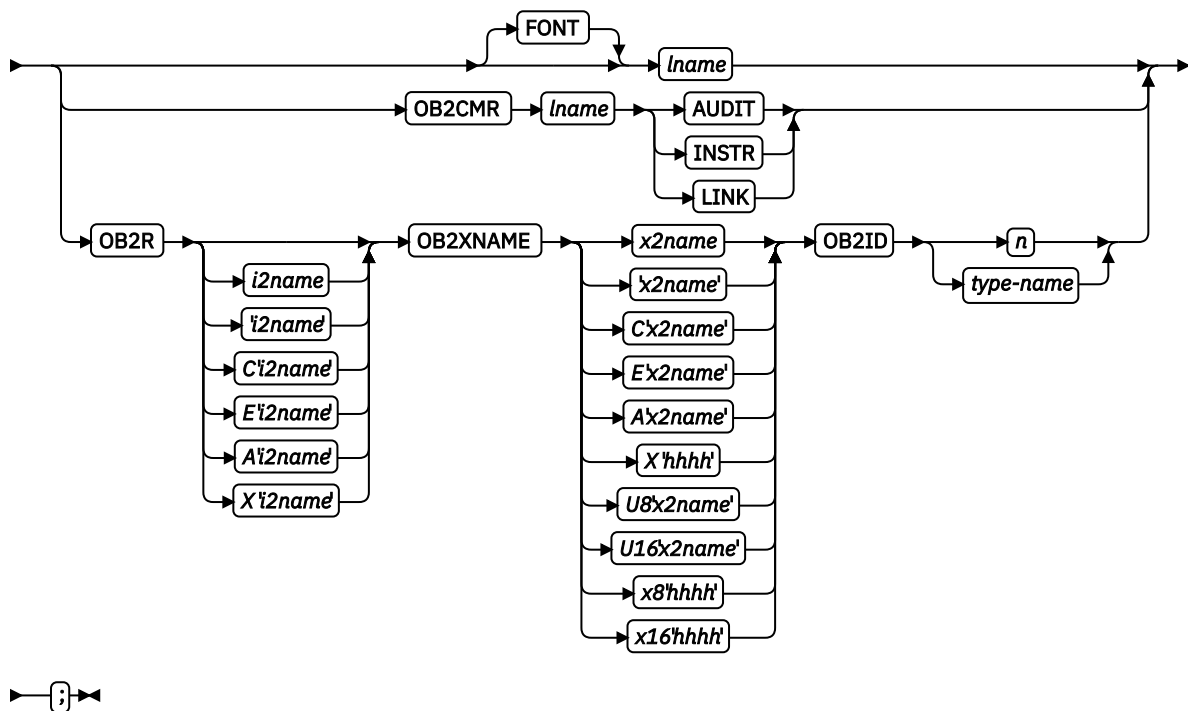


The ENDSUBPAGE command is used to identify the end of a subpage for conditional processing.

You can specify the ENDSUBPAGE command at any point in a page definition command stream where a PRINTLINE or LAYOUT command can occur. However, you must not enter the ENDSUBPAGE command between a PRINTLINE or LAYOUT command and its associated FIELD or CONDITION command.

If an ENDSUBPAGE command is not specified, the entire page format is treated as one subpage.

EXTREF Command



The EXTREF command specifies resources that are to be mapped in the page. It is a way in PPFA to map objects that wouldn't otherwise be mapped. If an object contains another mapped object, the contained object must be mapped, but PPFA does not automatically map that object.

For example, if you presented a GOCA object that contained a mapped font, a CMR, another object, or a combination, those resources are not mapped in the page. The EXTREF command can be used to map this required resource.

Note: Even though a font is mapped automatically by PPFA when it is used internally in the page definition on a PRINTLINE, LAYOUT, XLAYOUT, or FIELD command, a font that is used in an included object, such as a GOCA object, is not known to PPFA and consequently not mapped. In that case, the user must define that font with either a FONT or DOFONT command and map it with the EXTREF command.

You use the EXTREF command to map resources that are used in included objects that are not known to PPFA and therefore not mapped.

Subcommands

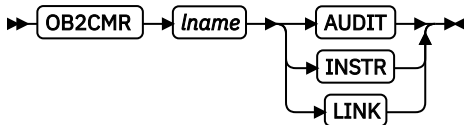
FONT

Specify a font to be mapped. This parameter is the default if FONT, OB2CMR, or OB2R are not specified.

Iname

Local name for a font. Specifies an unquoted alphanumeric name of 1 - 16 characters that is used in the page definition. The name must be unique within the page definition. *Iname* is the name that is used in the FONT or DOFONT commands that define the font.

OB2CMR



Specify a Color management resource (CMR) and its process mode for a data object specified within an included object. CMRs are secondary objects when used at this level. An object that is specified here is mapped with *object* scope.

Note: See Chapter 8, “AFP Color Management,” on page 151 for more information about using the CMR subcommand.

Iname

The CMR local name. This name must be defined with a DEFINE CMR command.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

CMRs with the audit processing mode refer to processing that is already applied to a resource. In most cases, audit CMRs describe input data and are similar to ICC input profiles.

The audit processing mode is used primarily with color conversion CMRs. In audit processing mode, those CMRs indicate which ICC profile must be applied to convert the data into the Profile Connection Space (PCS).

INSTR

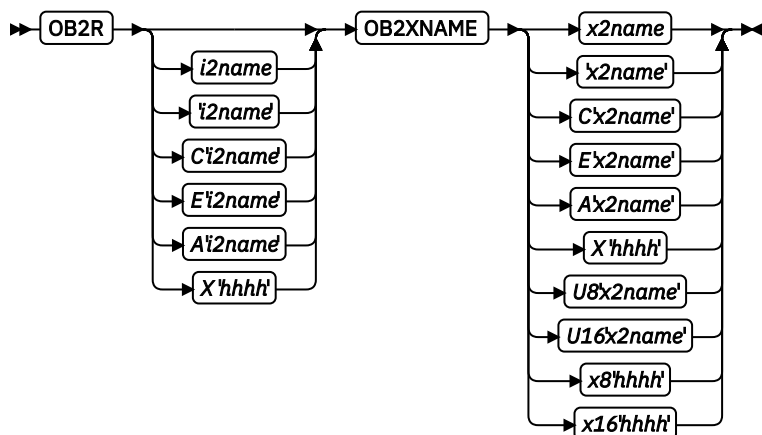
CMRs with the instruction processing mode refer to processing that is done to prepare the resource for a specific printer that uses a certain paper or another device. Generally, instruction CMRs refer to output data and are similar to ICC output profiles.

The instruction processing mode is used with color conversion, tone transfer curve, and halftone CMRs. In instruction processing mode, these CMRs indicate how the system must convert a resource so it prints correctly on the target printer. The manufacturer of your printer must provide ICC profiles or various CMRs that you can use. Those ICC profiles and CMRs might be installed in the printer controller, included with the printer on a CD, or available for download from the manufacturer's website.

LINK

This CMR defines a direct color conversion from an input color space to a device output color space; process the CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs. The PPFA command RENDER is not used with device link (DL) CMRs as such CMRs specify the intended rendering intent internally. This function requires print server (PSF) and printer support, which is in addition to the original CMR support.

OB2R



Specify a secondary object to be mapped.

If an included object contains a reference to one or more secondary objects, you must identify them. Specify the internal name for the secondary resource as specified in the included resource. If the internal name contains special characters such as periods or blanks, then quotation marks must surround the name.

i2name

Unquoted name up to 250 characters long is folded to uppercase and translated into EBCDIC if necessary.

'i2name'

Quoted name up to 250 characters long is accepted as-is with no case folding or translation.

C'i2name'

Quoted name with a C for Character is treated the same as a quoted name of up to 250 characters. No folding or translation is done.

E'i2name'

Quoted name with an E for EBCDIC entered with up to 250 characters is accepted as-is if on an EBCDIC operating system or translated to EBCDIC if on an ASCII operating system. The translation is made with no case folding.

A'i2name'

Quoted name with an A for ASCII entered with up to 250 single-byte characters is accepted as-is if on an ASCII operating system or translated to ASCII if on an EBCDIC operating system. The translation is made with no case folding.

X'hhhh'

Quoted name with an X for Hexadecimal entered with up to 500 hexadecimal characters. The characters are translated to hexadecimal, but no assumptions of data type are made.

OB2XNAME *x2name*

Specifies the external name for a secondary resource object. The name can be up to 250 characters. If the name contains special characters or blanks, then quotation marks must surround the name.

x2name

Unquoted name up to 250 characters long is folded to uppercase and translated into EBCDIC if necessary.

'x2name'

Quoted name up to 250 characters long is accepted as-is with no case folding or translation.

C'x2name'

Quoted name with an C for Character is treated the same as a quoted name up to 250 characters. No folding or translation is done.

E'x2name'

Quoted name with an E for EBCDIC entered with up to 250 single-byte characters is accepted as-is if on an EBCDIC operating system or translated to EBCDIC if on an ASCII operating system. The translation is made with no case folding.

A'x2name'

Quoted name with an A for ASCII entered with up to 250 single-byte characters is accepted as-is on an ASCII operating system or translated to ASCII if on an EBCDIC operating system. The translation is made with no case folding.

X'hhhh'

Quoted name with an X for Hexadecimal entered with up to 500 hexadecimal characters. The characters are translated to hexadecimal, but no assumption of data type is made.

U8'x2name'

Quoted name with a U8 for UTF-8 entered with up to 250 single-byte characters is translated to UTF-8.

X8'hhhh'

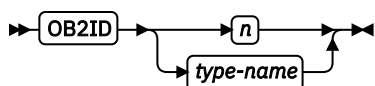
Quoted name with an X8 for UTF-8 HEX entered with up to 500 single-byte hexadecimal characters is translated to hexadecimal and assumed to be data type UTF-8. A multiple of two hexadecimal characters must be entered.

U16'x2name'

Quoted name with a U16 for UTF-16 entered with up to 125 single-byte characters is translated to UTF-16.

X16'hhhh'

Quoted name with an X16 for UTF-16 HEX entered with up to 500 single-byte hexadecimal characters is translated to hexadecimal and assumed to be data type UTF-16. A multiple of four hexadecimal characters entered.

OB2ID n | type-name

Component type identifier for secondary resource that uses an object type number as specified in Object type list adjustments. Use an object type number from the Component - ID column or a type name from the Type name of the following table:

Type-Name	Component-ID	Description of OID Type-Name
PDFRO	26	PDF Resource Object (new)
RESCLRPRO	46	Resident Color Profile Resource Object
IOCAFS45RO	47	IOCA FS45 Resource Object Tile (new)

Example: In the following example, the fonts ocaf, fontA, and fontABI and the CMR ıtvç are mapped in the Object Environment Group (OEG) of an object that is being included in the page.

Without the EXTREF commands, only the font varb would be mapped because only it is being called out in the PPGA source code. Also, without the EXTREF command, the CMR ıtvç is not mapped.

Notes:

1. The fonts that are coded in the EXTREF commands must also be defined in a FONT command.

2. If you code `rvtc` with a CMR command (as in the commented out CMR command), it is mapped but is active for the entire page; however, you want it to be active only for the object in whose OEG it is mapped.

```
PAGEDEF cmr42  replace yes;
FONT  varb  gt10  ;          /*Variable data          */
FONT  ocaf  CS N40090 CP 000395; /* mapped in OEG  */
DOFONT fontA 'Arial' Height 12;
DOFONT fontABI 'Arial Bold Italic'
      UDTYPE EBCDIC CP 'T1V10500';

DEFINE rvtc CMRNAME
'RevVideoTC001.000@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@'
'@@@@@'

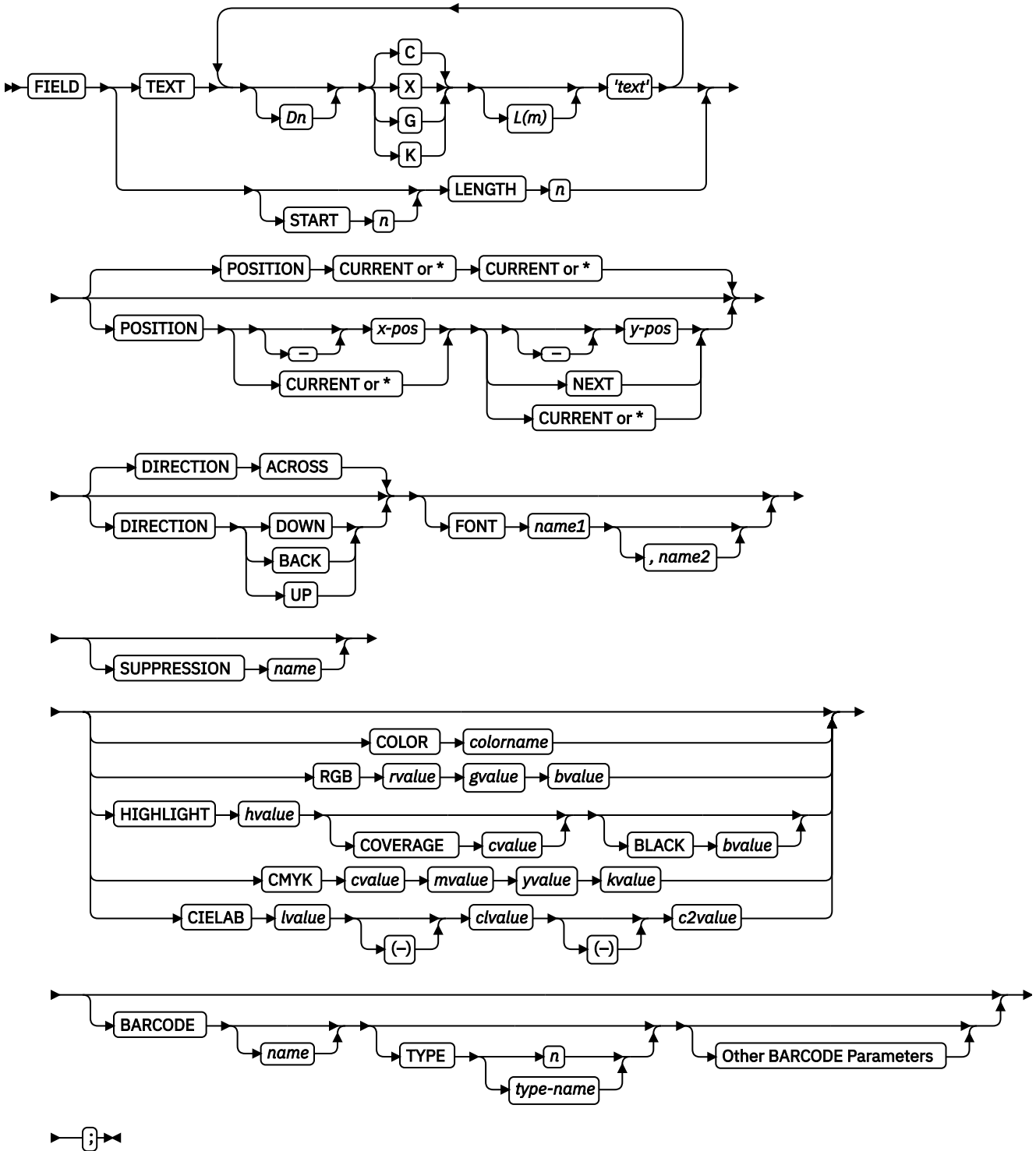
SETUNITS  LINESP .25 in ;      /* Line spacing          */

PAGEFORMAT rept1  TOPMARGIN .25 in;
EXTREF ocaf;
EXTREF fontA;
EXTREF fontABI;
EXTREF OB2CMR rvtc instr;

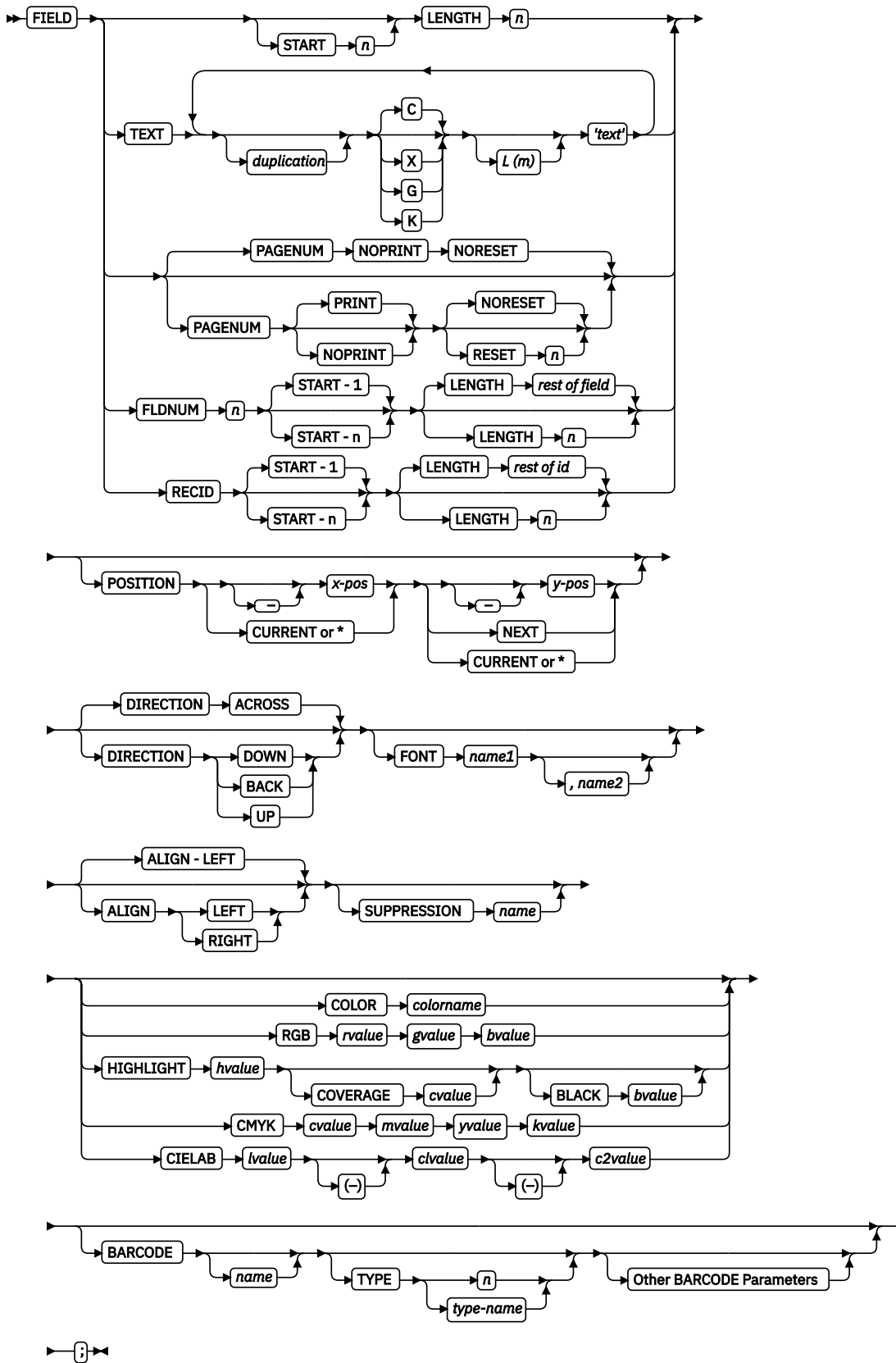
/* CMR rvtc instr;          **/
LAYOUT 'startline' BODY  newpage POSITION .5 in SAME FONT varb;
LAYOUT 'plaindata' BODY  POSITION .5 in NEXT FONT varb;
```

FIELD Command

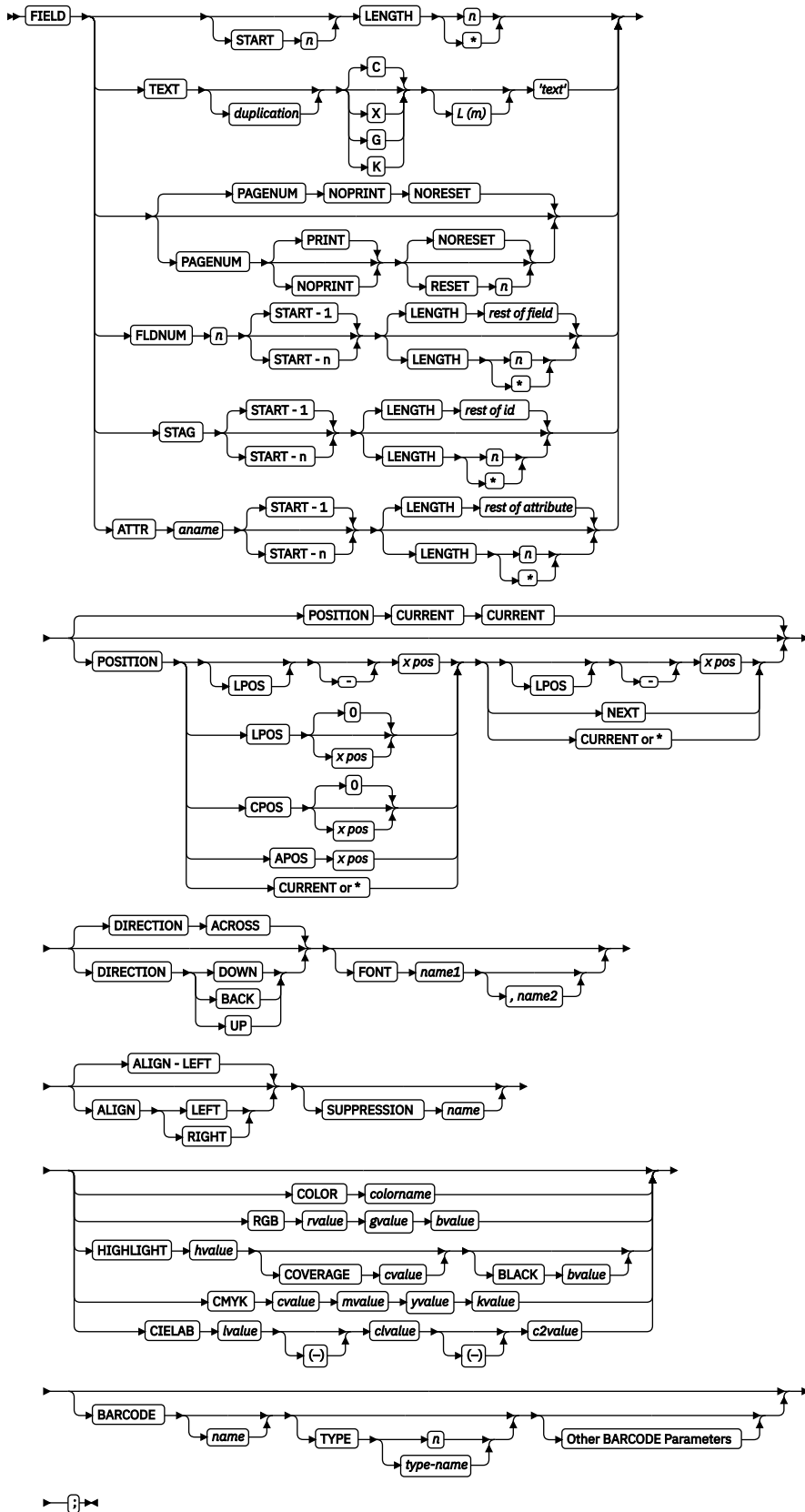
FIELD Command (Traditional only)



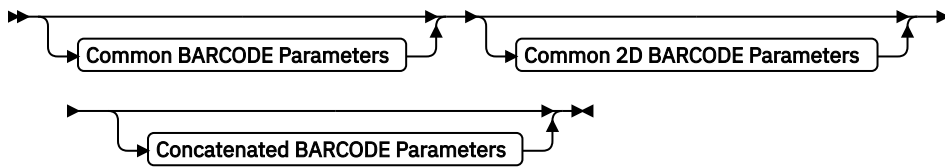
FIELD Command (Record Format)



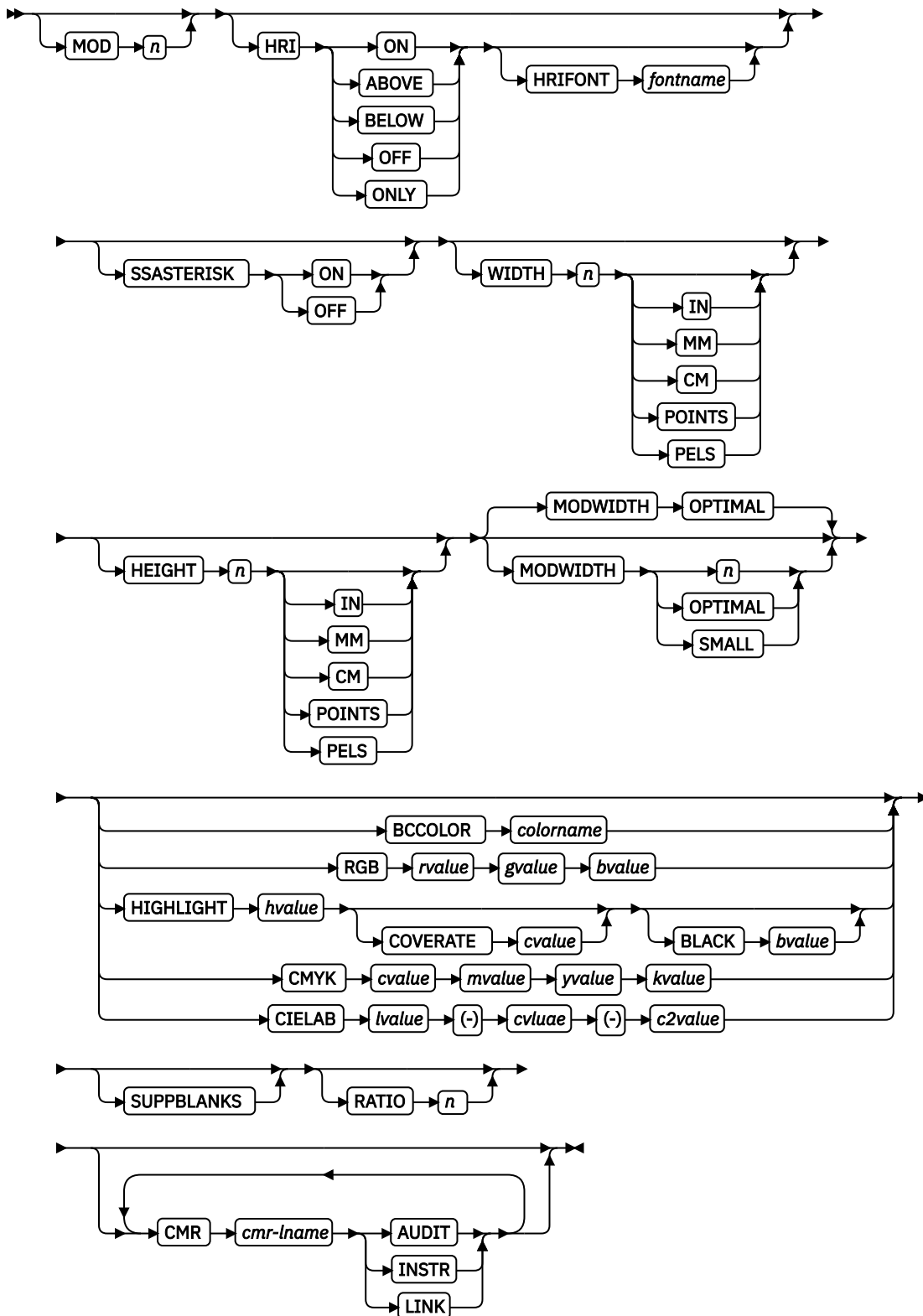
FIELD Command (XML)



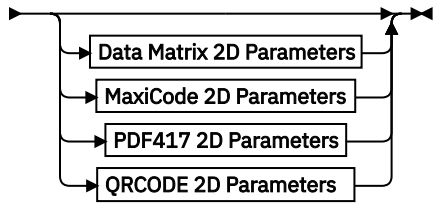
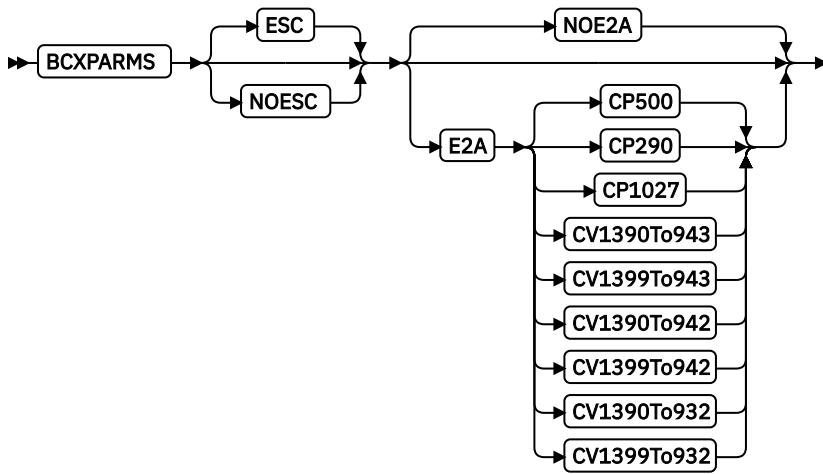
Other BARCODE Parameters



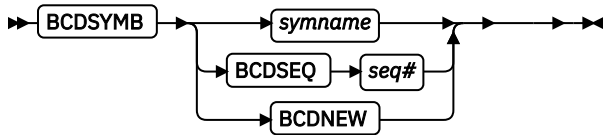
Common BARCODE Parameters



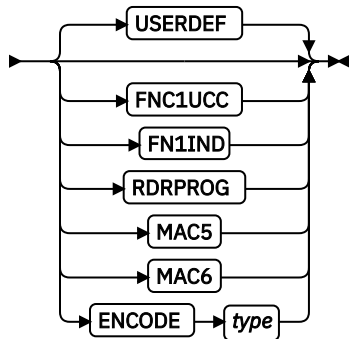
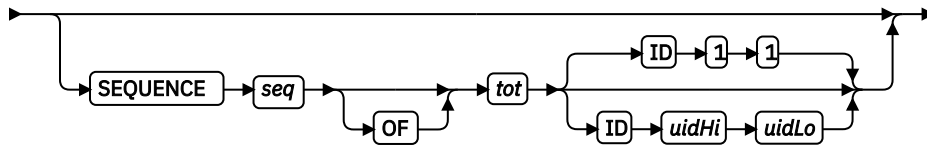
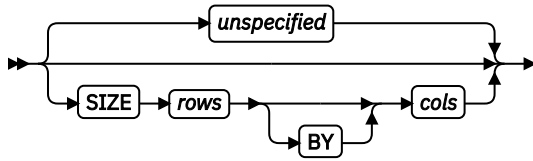
Common 2D BARCODE Parameters



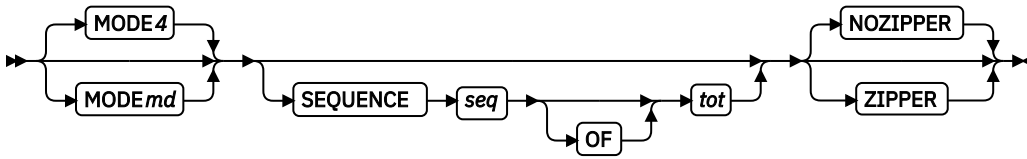
Concatenated BARCODE Parameters



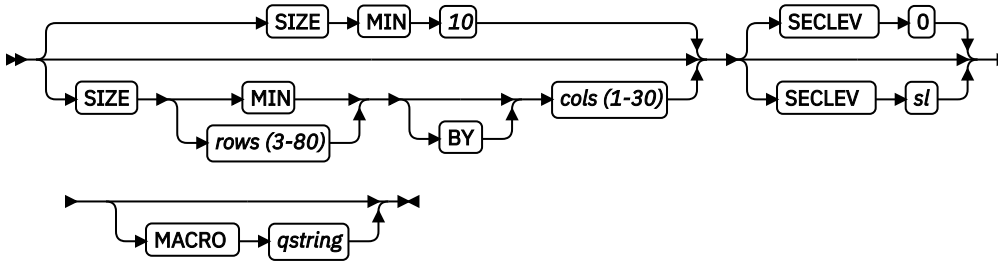
Data Matrix 2D Parameters



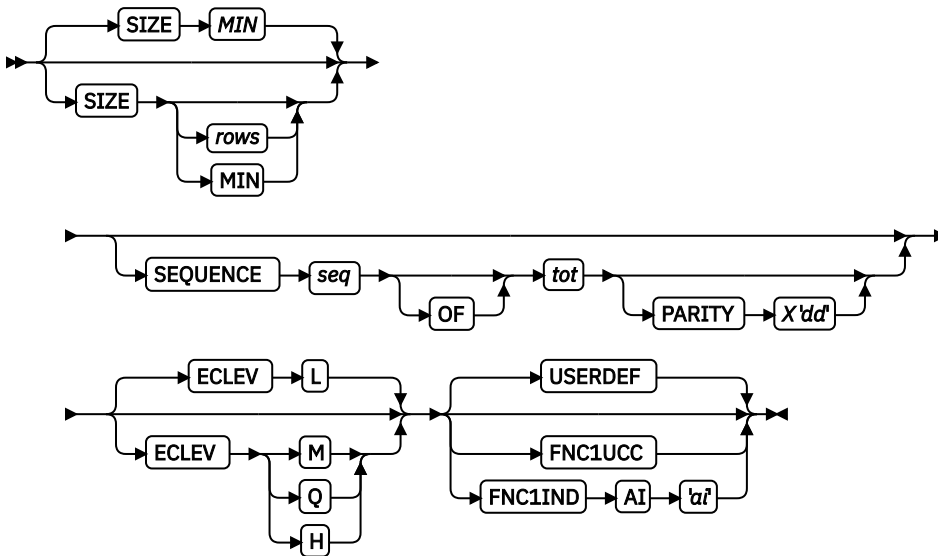
MaxiCode 2D Parameters



PDF417 2D Parameters



QR CODE 2D Parameters



The FIELD command identifies a field in a data record or supplies a field of constant text, and positions where the field is on the page. More than one position on the page can be specified.

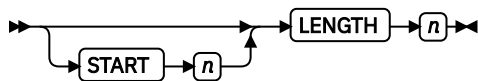
FIELD commands:

- Are subordinate to a PRINTLINE command (Traditional), LAYOUT command (Record Format), or LAYOUT subcommand (XML)
- Must follow a PRINTLINE command (Traditional) or a LAYOUT command (Record Format)
- Must contain either a LENGTH subcommand or a TEXT subcommand (Traditional only)

The FONT, DIRECTION, and COLOR subcommands do not have fixed defaults. If any of the subcommands are omitted, the value for the omitted subcommand is obtained from corresponding subcommand in the PRINTLINE command (Traditional), LAYOUT command (Record Format), or LAYOUT subcommand (XML).

Subcommands

START



Specifies the starting byte in the data record for the field you want.

n

Specifies the number of bytes from the first data byte in the record to be used as the starting point of the field. The first data byte position of an input record is 1.

Note: The carriage-control character, table-reference character, and record ID are not considered data.

Denotes the next byte after the field identified in the previous FIELD command, excluding FIELD commands with constant TEXT.

+ *n*

Adds the value of *n* to the * byte position.

- *n*

Subtracts the value of *n* from the * byte position.

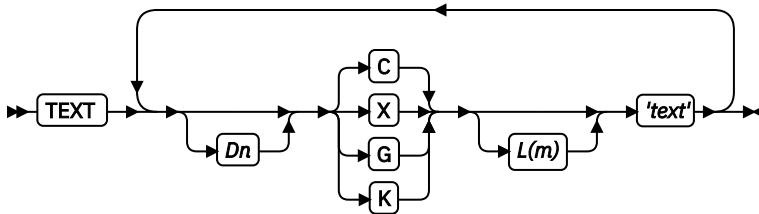
If START is omitted and LENGTH is specified, then START * is assumed.

LENGTH *n*

Specifies the number (*n*) of bytes to process from the data record, beginning with the position specified in START.

Record Format: When the maximum length of the field is determined, the print server truncates all of the fields not containing data.

TEXT



Specifies the constant text that is to be printed in the output. A maximum of 65,535 bytes of text can be provided in one page format.

Note: This text is considered constant in that the same text is printed each time. In regard to the CONSTANT command within a form definition, this text is considered variable because the text prints only where variable data is allowed to print.

Dn

Specifies the number of times the text is to be duplicated (use a decimal number). The maximum times the text is repeated varies depending on the size of the text. The default is 1.

text type

Specifies the type of text.

C

Indicates that the text contains single-byte code characters, which include all Roman alphabetic characters (for example, the ones used for English). Any valid character code can be specified, including blanks. This is the default.

X

Indicates that the text contains hexadecimal codes (in groups of two hexadecimal codes) that specify values from X'00' - X'FE'.

G

Indicates that the text contains double-byte code characters (for example, kanji characters).

Characters in type G text must start with shift-out (SO X'0E') and end with shift-in (SI X'0F') characters within opening and closing apostrophes (X'7D' for EBCDIC operating systems and X'27 ' for ASCII operating systems).

K

Indicates that the text contains kanji numbers that are enclosed in apostrophes. Kanji numbers are separated by commas:

```
K '321,400'
```

Valid double-byte character set (DBCS) codes are from X'41' - X'FE' for each byte. Code X'4040' (blank) is the only exception.

Valid

```
X'4040', X'4141', X'41FE' X'FE41', X'FEFE'
```

Invalid

```
X'2040', X'413E', X'4100' X'7F00', X'FE3E'
```

L(m)

Specifies the length of text (use a decimal number in parentheses). When the actual length of the text is different from *m*, the *m* specification is accepted. That is, the text is either padded with blanks to the right or truncated.

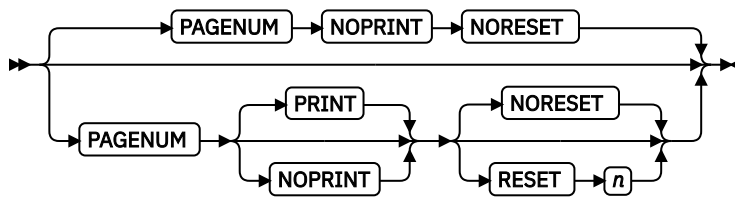
'text'

Specifies the text.

Examples:

- When TEXT 2C(3)'AB' is specified, 'AB AB ' is generated. The blanks are generated because of the (3) specification.
- TEXT 2C(1)'AB' generates 'AA', truncating the Bs.

PAGENUM n (Record Format and XML)



Although parameters are specified as optional, at least one must be specified.

Page numbers can be set to start with the value specified as *n*; otherwise, they follow the specification that is made in the PAGEDEF or PAGEFORMAT command.

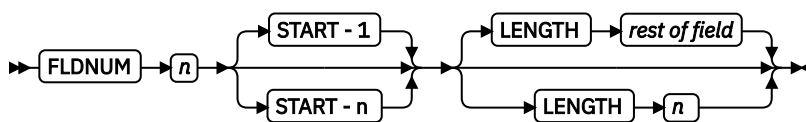
The POSITION parameters that are specified with the PAGENUM parameter reflect the position of the page number only.

If you do not want a page number to be printed, either do not use this parameter or specify NOPRINT.

The RESET parameter is only used when you want to reset the page number that is to be used with this page.

Note: You must define a font that specifies the font type to be used for printing page numbers.

FLDNUM (Record Format and XML)

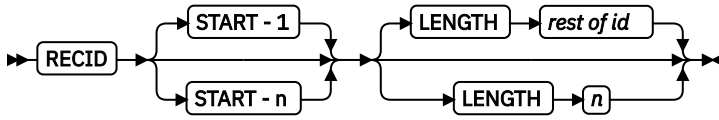


This keyword must only be used if the DELIMITER field was used in the LAYOUT command. Fields cannot be counted without specifying delimiters in the database.

To allow for the identification of a part of a field that is field delimited, you can specify the starting position (from the delimiter), and optionally the length of the part of the field you want to use. The

LENGTH default is to use the entire remainder of the field from the start position to the ending delimiter.

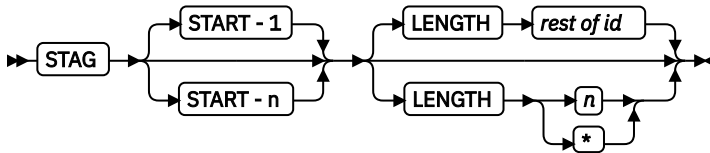
RECID (Record Format only)



You use this keyword to access characters in the first n characters of a record. This area is reserved for the record identifier, and all other field starts and lengths are calculated after this area. These starts and lengths reference only the area within the record ID.

If no record length is specified, the remaining bytes of the n -byte field are assumed.

STAG (XML only)

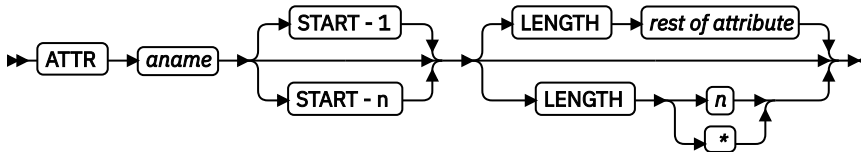


You use this keyword to access characters in the START tag. It also includes the < and > delimiters; position 1 is always the < delimiter.

If no record length is specified, the remaining bytes of the START tag are assumed. If no START is specified, 1 is assumed.

LENGTH * means that the remainder of the field is used for the length.

ATTR (XML only)



You use this keyword to access attribute values from the data. Multiple attribute fields can access the same attribute, which allows subsets of the value to be printed.

If no record length is specified, the remaining bytes of the attribute are assumed. If not START is specified, 1 is assumed.

aname

The attribute name. To preserve the case, enter the name in quotation marks. The name is converted to the data type you specify, by using UDTYPE on the page definition, or it is defaulted.

START n

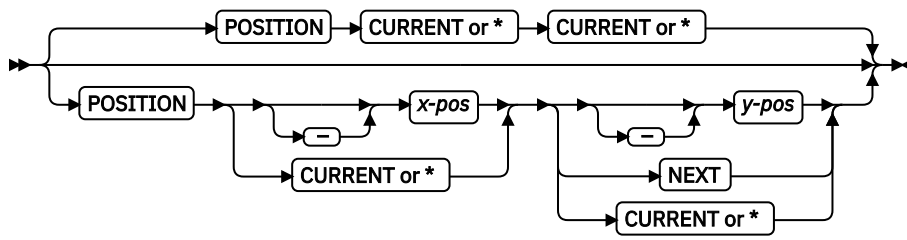
The starting position of the attribute to extract the data. If this parameter is omitted, position 1 is assumed.

LENGTH n

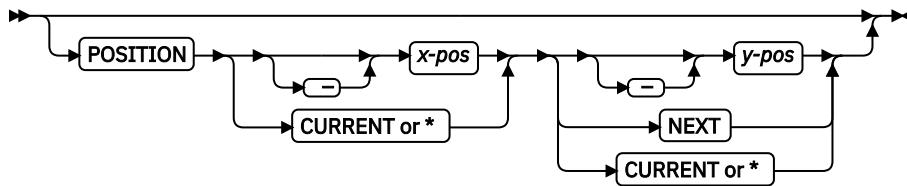
The length of the attribute to be placed. If this parameter is omitted or LENGTH * is coded, the rest of the field is assumed for the length.

POSITION

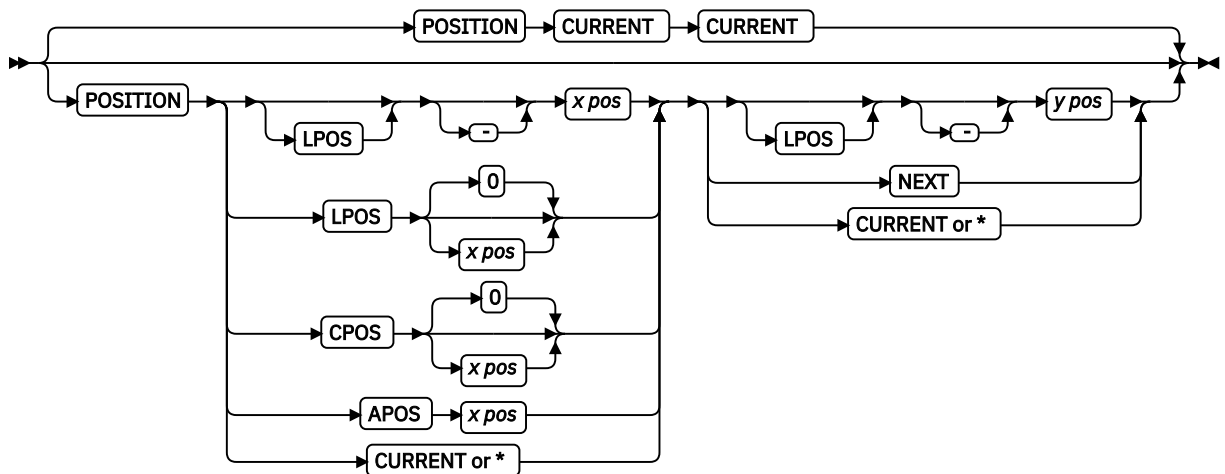
Traditional



Record Format



XML



Specifies the starting position of the field in the printout.

x-pos

Do not mix *x-pos* specifications with CURRENT or * except in ACROSS fields.

-

Specifies that the *x* value is negative.

x

Specifies the horizontal offset for the starting print position that is relative to the *printline starting position*. The choices are IN, MM, CM, POINTS, or PELS.

The default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

The PELS measurement equals one L-unit or 1/240 of an inch, depending on whether the PELSPERINCH parameter is specified previously.

APOS

Specifies that the *x pos* parameter that follows is absolute. The *x pos* parameter is mandatory and must be positive.

CPOS

Specifies that the *x pos* parameter that follows is relative to the current position. This parameter can be negative.

LPOS

Specifies that the *x pos* parameter that follows is relative to the XLAYOUT position. This parameter can be negative.

CURRENT

Specifies that the inline offset (relative to the field's direction) is the end of the previous field. For the first field, use the PRINTLINE offset. This is the default.

Note: The meaning of CURRENT differs from the meaning of the PRINTLINE command parameter (Traditional) or a LAYOUT command parameter (Record Format) SAME.

Alternative for CURRENT.

y-pos

Do not mix *y-pos* specifications with CURRENT or * except in ACROSS fields.

-

Specifies that the y value is negative.

y

Specifies the vertical offset for the starting print position that is relative to the *printline starting position*. The choices are IN, MM, CM, POINTS, or PELS.

The default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

NEXT

Specifies a field that is positioned down one line in the baseline direction (as defined in the SETUNITS command LINESP subcommand) from the previous field.

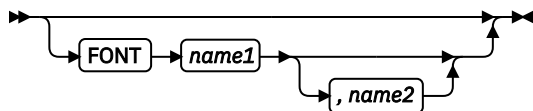
Use NEXT only in ACROSS fields.

CURRENT

Specifies that the baseline offset (relative to the field's direction) is the same as the previous field. That is, the baseline position does not change. For the first field, use the PRINTLINE (Traditional) or a LAYOUT (Record Format) offset. This is the default.

Alternative for CURRENT.

FONT



Defines the font to be used for the field.

name1

Specifies the local name of a font that is used to print the data. This font must be defined in a previous FONT or DOFONT command in this page definition.

If Shift-Out, Shift-In (SOSI) processing is used, *name1* must be the single-byte font.

name2

Specify only when you are using Shift-Out, Shift-In (SOSI) processing to dynamically switch between a single-byte font and a double-byte font within the field. *name2* must be the double-byte font.

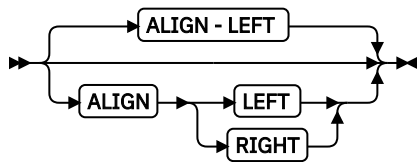
Note: *name2* is only valid with EBCDIC data.

Notes:

1. If this subcommand is not specified, the font that is specified in the preceding PRINTLINE command (Traditional) or a LAYOUT command (Record Format) is used. If neither is specified, the print server assigns a font.]

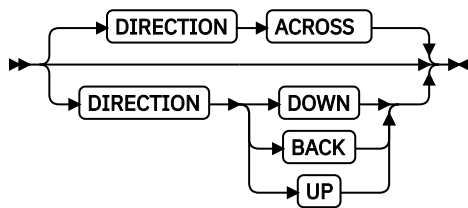
- Record Format only: For ASCII, UTF8, or UTF16, the entire PRINTLINE command must be one font. To use multiple font mappings for a line in ASCII, UTF8, or UTF16, you must use the FIELD command.

ALIGN LEFT | RIGHT (Record Format and XML only)



The data in this field is left or right-aligned to the x position that is specified in the horizontal POSITION parameter.

DIRECTION



Specifies the print direction of the field, relative to the upper-left corner as you view the logical page. If this subcommand is omitted, the direction that is specified in the governing PRINTLINE command is used.

ACROSS

The page is printed with the characters added from left to right on the page, and the lines are added from the top to the bottom.

DOWN

The page is printed with the characters added from top to bottom on the page, and the lines are added from the right to the left.

BACK

The page is printed with the characters added from right to left on the page, and the lines are added from the bottom to the top.

UP

The page is printed with the characters added from bottom to top on the page, and the lines are added from the left to the right.

If DIRECTION is not zero, then the position is relative to the rotated origin of the page.

Note: Not all printers can print in all directions. See your printer documentation for more information.

SUPPRESSION



Specifies that this text field can be suppressed (not valid for bar codes).

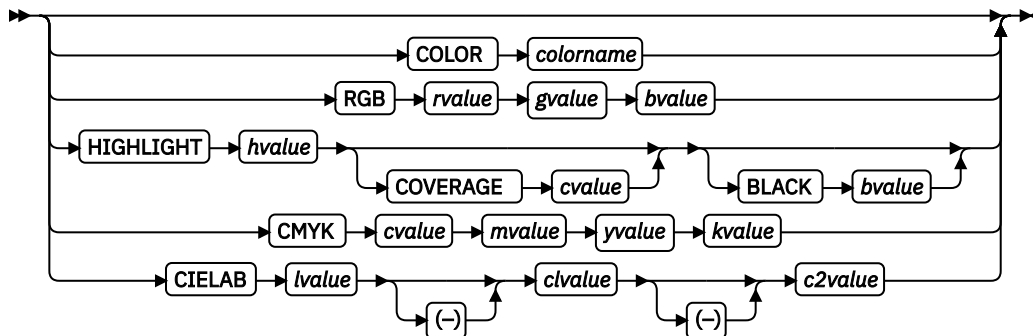
name

Specifies the name of a field to be suppressed.

Printing of this field is suppressed if this name is identified by a SUPPRESSION command within the form definition.

The same name can be used in one or more fields to suppress these fields as a group.

COLOR



Specifies an OCA or defined color for the text of this field. This subcommand is recognized only by printers that support multiple-color printing. See your printer publication for more information.

colorname

Values for *colorname* can be a defined color (see “[DEFINE COLOR Command](#)” on page 258), or an OCA *colorname*. Values for OCA *colornames* are:

- BLUE
- RED
- MAGENTA (or PINK)
- GREEN
- CYAN (or TURQ)
- YELLOW
- BLACK
- BROWN
- MUSTARD
- DARKBLUE (or DBLUE)
- DARKGREEN (or DGREEN)
- DARKTURQ (DTURQ, or DCYAN, or DARKCYAN)
- ORANGE
- PURPLE
- GRAY
- NONE
- DEFAULT

The color choices depend on the printer.

Note: In some printer publications, the color turquoise (TURQ) is called *cyan*, and the color pink (PINK) is called *magenta*.

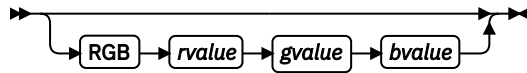
color model

Specifies the color of print for this field that is supported in MO:DCA for the Red/Green/Blue color model (RGB), the highlight color space, the Cyan/Magenta/Yellow/Black color model (CMYK), and the CIELAB color model. This example shows the color model with the FIELD command:

```

FIELD START 1 LENGTH 5
COLOR BLUE ;
FIELD START 1 LENGTH 1
RGB 10 75 30 ;
FIELD START 1 LENGTH 1
cmk 80 10 10 10 ;
FIELD START 1 LENGTH 2
CIELAB 80 100 20 ;
FIELD START 1 LENGTH 2
highlight 5 ;
FIELD START 1 LENGTH 2
highlight 300 COVERAGE 50 BLACK 30 ;
  
```

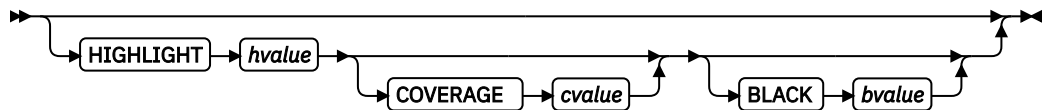
RGB *rvalue gvalue bvalue*



Three RGB integer values are used. The first (*rvalue*) represents a value for red, the second (*gvalue*) represents a value for green, and the third (*bvalue*) represents a value for blue. Each of the three integer values can be specified as a percentage 0 - 100.

Note: An RGB specification of 0/0/0 is black. An RGB specification of 100/100/100 is white. Any other value is a color somewhere between black and white, depending on the output device.

HIGHLIGHT *hvalue COVERAGE cvalue BLACK bvalue*



Indicates the highlight color model. Highlight colors are device-dependent.

You can use an integer within the range of 0 - 65535 for the *hvalue*.

Note: An *hvalue* of 0 indicates that no default value is defined; therefore, the default color of the presentation device is used.

COVERAGE indicates the amount of coverage of the highlight color to be used. You can use an integer within the range of 0 - 100 for the *cvalue*. If less than 100 percent is specified, the remaining coverage is achieved with the color of the medium.

Note: Fractional values are ignored. If COVERAGE is not specified, a value of 100 is used as a default.

BLACK indicates the percentage of black to be added to the highlight color. You can use an integer within the range of 0 - 100 for the *bvalue*. The amount of black shading that is applied depends on the COVERAGE percentage, which is applied first. If less than 100 percent is specified, the remaining coverage is achieved with black.

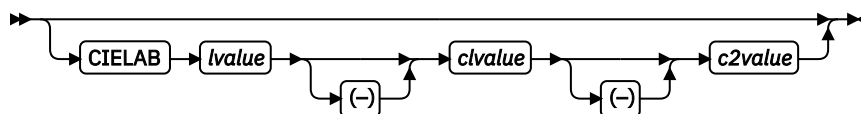
Note: If BLACK is not specified, a value of 0 is used as a default.

CMYK *cvalue mvalue yvalue kvalue*



Defines the cyan/magenta/yellow/black color model. *Cvalue* specifies the cyan value. *Mvalue* specifies the magenta value. *Yvalue* specifies the yellow value. *Kvalue* specifies the black value. You can use an integer percentage within the range of 0 to 100 for any of the CMYK values.

CIELAB *Lvalue (-)c1value (-)c2value*

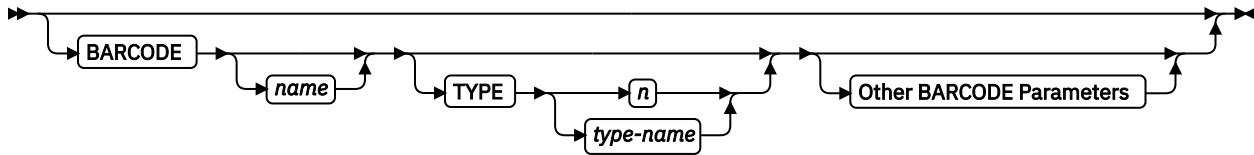


Defines the CIELAB model. Use a range of 0.00 - 100.00 with *Lvalue* to specify the luminance value. Use signed integers from -127 to 127 with *c1value* and *c2value* to specify the chrominance differences.

Lvalue, *c1value*, *c2value* must be specified in this order. No defaults exist for the subvalues.

Note: Do not specify both an OCA color with the COLOR subparameter and an extended color model on the same FIELD or PRINTLINE command. The output is device-dependent and might not be what you expect.

BARCODE



Specifies a bar code in a page definition. The following are valid bar code type-names:

- CODE39 (same as 1)
- MSI (same as 2)
- UPCA (same as 3)
- UPCE (same as 5)
- UPC2SUPP (same as 6)
- UPC5SUPP (same as 7)
- EAN8 (same as 8)
- EAN13 (same as 9)
- IND2OF5 (same as 10)
- MAT2OF5 (same as 11)
- ITL2OF5 (same as 12)
- CDB2OF7 (same as 13)
- CODE128 (same as 17)
- EAN2SUP (same as 22)
- EAN5SUP (same as 23)
- POSTNET (same as 24)
- RM4SCC (same as 26)
- JPOSTAL (same as 27)
- 2DMATRIX (same as 28)
- 2DMAXI (same as 29)
- 2DPDF417 (same as 30)
- APOSTAL (same as 31)
- 2DQRCODE (same as 32)
- CODE93 (same as 33)
- US4STATE (same as 34)
- REDTAG (same as 35)
- DATABAR (same as 36)

The bar code name can be 1 - 8 characters long. See your printer documentation for more information about bar code support. Ensure that the bar code fits on the page or you errors occur at print time.

Read your printer hardware documentation before you use bar codes. The documentation indicates which bar code types, modifiers, MODWIDTH, element heights, and ratio values are valid for the printer.

PPFA does minimal verification of the bar code values. If you use the MOD, HEIGHT, MODWIDTH, and RATIO parameters, ensure that the values you specify are valid for your printer.

For printer optimization, specify *BARCODE name options* in the first instance of a specific type of bar code. If this type is used again, position it as usual with *START*, *LENGTH*, and *POSITION*, but specify the bar code information by using only *BARCODE same-name-as-previously*. The *BARCODE* subcommand is recognized only by printers that support *BCOCA* bar code printing; see your printer documentation for more information.

Bar code concatenation

The concatenated bar code function allows the user to collect bar code data from different fields, records, or both to be concatenated in generating a bar code object.

For example, the hyphen in a nine-digit ZIP code, *aaaaa-bbbb*, is not a valid character in a *POSTNET* bar code. The concatenated bar code function allows a user to specify a *FIELD* for the *aaaaa* and a *FIELD* for the *bbb* and concatenate them together into one bar code. For 2D bar codes, which can contain many bytes of data, multiple records of data can be concatenated together into one bar code.

The defining bar code fully defines a bar code, specifying any necessary placement or descriptive parameters. A defining bar code can start the collection of bar code data if it specifies a *BARCODE* name and the *BCDSYMB* keyword with a symbol name.

The continuation bar code defines bar code data that is to be added to a bar code data collection started with a defining bar code with *BCDSYMB* coded. This bar code uses the defining *BARCODE* name and *BCDSYMB* name but does not specify the *TYPE* or *BARCODE* parameters because it uses the information from the defining bar code.

Example 1

POSTNET 9-digit bar code split in two fields *aaaaa-bbbb*:

```
PAGEDEF BC1P REPLACE YES;
FONT afont GT10;
PAGEFORMAT example1;
PRINTLINE POSITION 4 in 1.5 in;
FIELD START 1 LENGTH 15 POSITION 0 IN 0 IN;
FIELD START 16 LENGTH 20 POSITION 0 IN NEXT;
FIELD START 36 LENGTH 15 POSITION 0 IN NEXT;

FIELD START 51 LENGTH 5 POSITION 0 IN 0.70 IN
  BARCODE zip54 TYPE POSTNET MOD 1 BCDSYMB datacoll;
FIELD START 57 LENGTH 4 BARCODE zip54 BCDSYMB datacoll;
```

Example 2

2D bar code with data bytes across multiple records:

```
PAGEDEF BC2P REPLACE YES;
FONT afont GT10;
PAGEFORMAT example2;
PRINTLINE POSITION 1 in 1 in;
FIELD START 1 LENGTH 200
  POSITION 1.0 IN 1.0 IN DIRECTION ACROSS
  BARCODE max1l TYPE 2DMATRIX MOD 0 BCXPARMS ESC E2A
  BCDSYMB bcd2 BCDSEQ 5;

PRINTLINE REPEAT 4;
FIELD START 1 LENGTH 200 DIRECTION ACROSS
  BARCODE max1l BCDSYMB bcd2 BCDSEQ 1;
```

Notes:

1. A bar code cannot be positioned on or outside of the logical page.

For example, the following page definition results in a position of 0 0, which is on the logical page boundary. The following example results in a printer error:

```
PAGEDEF XMPL1 REPLACE YES;
SETUNITS 1 IN 1 IN LINESP 6 LPI;
FONT FNT1 CR10;
FONT FNT2 CR10;
PAGEFORMAT IBMSSN WIDTH 9.5 HEIGHT 4.0 /* PORTRAIT */
DIRECTION ACROSS;
PRINTLINE
  FONT FNT1 REPEAT 1 CHANNEL 1 POSITION 0 0;
```

```
FIELD START 671 LENGTH 13 POSITION 0 0
  BARCODE 30F9
  TYPE 1 MODWIDTH 17
  SSASTERISK ON;
```

2. If you want to suppress blanks, use the SUPPBLANKS parameter.
3. SUPPBLANKS for bar code data cause the entire field to be ignored if it is all blanks.
4. Bar code Symbol Size

The height of the bar code symbol is controlled by the bar code symbology definition and by various BCOCA parameters. The width of the symbol is typically dependent on the amount of data to be encoded and by choices that are made in various BCOCA parameters.

Linear Symbologies

The element-height and height-multiplier parameters specify the height of the symbol. For some bar code types, these parameters also include the height of the human-readable interpretation (HRI). See the description of the element-height parameter in the *Bar Code Object Content Architecture Reference* for a description of the height for specific linear symbols. Some bar code symbologies (Australia Post Bar Code, Japan Postal Bar Code, POSTNET, RM4SCC, and REDTAG) explicitly specify the bar code symbol height; in this case, the element-height and height-multiplier parameters are ignored.

Two-Dimensional Matrix Symbologies

The MaxiCode symbology specifies a fixed physical size, nominally 28.14 mm wide by 26.91 mm high; the module-width, element-height, and height-multiplier parameters are ignored for MaxiCode values.

Data Matrix symbols are rectangular and are made up of a pattern of light and dark squares (called modules). The size of each module is specified in the module-width parameter and the number of rows and columns of these modules is controlled by the desired-number-of-rows and desired-row-size parameters and the amount of data to be encoded. The element-height and height-multiplier parameters are ignored for Data Matrix symbols.

QR Code symbols are square and are made up of a pattern of light and dark squares (called modules). The size of each module is specified in the module-width parameter; the number of rows and columns of these modules is controlled by the version parameter, the error correction level that is selected, and the amount of data to be encoded. The element-height and height-multiplier parameters are ignored for QR Code symbols.

Two-Dimensional Stacked Symbologies

PDF417 symbols are rectangular and are made up of a pattern of light and dark rectangles (called modules). The size of each module is specified in the module-width, element-height, and height-multiplier parameters and the number of rows and columns of these modules is controlled by the data-symbols and rows parameters and the amount of data to be encoded. A PDF417 symbol must contain at least three rows.

For more information about bar codes, see [Appendix D, "More About Bar Code Parameters," on page 449](#) and *Bar Code Object Content Architecture Reference*.

name

Specifies a specific bar code name to be included in a page definition. The name is required if BARCODE is used to reference or continue the bar code later, as is done for bar code concatenation.

TYPE { *n* | *type-name* }

Specifies the type of bar code symbol to be generated.

Note: If a type indicates "(same as *n*)", you can substitute the specified number for the character name.

The following bar code types are supported:

type-name

Specifies a specific bar code type name to be included in a page definition.

CODE39 (same as 1)

Specifies a bar code type of Code 39 (3-of-9 code), Automatic Identification Manufacturers Uniform Symbol Specification 39.

MSI (same as 2)

Specifies a bar code type of modified Plessey code.

UPCA (same as 3)

Specifies a bar code type of Universal Product Code (United States) and the Canadian Grocery Product Code, Version A.

UPCE (same as 5)

Specifies a bar code type of Universal Product Code (United States) and the Canadian Grocery Product Code, Version E.

UPC2SUPP (same as 6)

Specifies a bar code type of Universal Product Code (United States) two-digit Supplemental (periodicals).

UPC5SUPP (same as 7)

Specifies a bar code type of Universal Product Code (United States) five-digit Supplemental (paperbacks).

EAN8 (same as 8)

Specifies a bar code type of European Article Numbering 8 (includes Japanese Article Numbering-short).

EAN13 (same as 9)

Specifies a bar code type of European Article Numbering 13 (includes Japanese Article Numbering-standard).

IND2OF5 (same as 10)

Specifies a bar code type of Industrial 2-of-5.

MAT2OF5 (same as 11)

Specifies a bar code type of Matrix 2-of-5.

ITL2OF5 (same as 12)

Specifies a bar code type of Interleaved 2-of-5, Automatic Identification Manufacturers Uniform Symbol Specification-I 2/5.

CDB2OF7 (same as 13)

Specifies a bar code type of Codabar, 2-of-7, Automatic Identification Manufacturers Uniform Symbol Specification-Codabar.

CODE128 (same as 17)

Specifies a bar code type of Code 128, Automatic Identification Manufacturers Uniform Symbol Specification-128.

Note: A subset of CODE128 exists that is called EAN128. These EAN128 bar codes can be produced with PPFA by specifying CODE128 for the bar code type in the PAGEDEF and including the extra parts of the bar code in the data. The UCC-128 bar code format is:

```
startcode FNC1 ai nnnnnnnnnnnnnnnnn m c stopchar
```

The string of *ns* represents the bar code data. The start code, stop character, and 'c' value are generated by the printer microcode for BCOCA bar codes. The FNC1 is a hexadecimal 8F character. The *ai* is an application identifier and needs to be defined for use by each EAN128 application. The *m* is a modulo 10 check digit that must be calculated by the application and included in the bar code data.

Not all printers generate the EAN128 bar codes; thus, you might need to verify that the bar code that is produced in this manner is readable by your bar code scanner.

For more information about the EAN128 bar codes, see the [AFP Consortium web page](http://www.afpcinc.org) (<http://www.afpcinc.org>).

EAN2SUP (same as 22)

Specifies a bar code type of European Article Numbering, Two-digit Supplemental.

EAN5SUB (same as 23)

Specifies a bar code type of European Article Numbering, Five-digit Supplemental.

POSTNET (same as 24)

Specifies a bar code type of POSTal Numeric Encoding Technique (United States Postal Service), and defines specific values for the BSD module width, element height, height multiplier, and wide-to-narrow ratio fields.

Note: POSTNET MOD 4 is normally called PLANET bar code. POSTNET MOD 4 is supported by PPFA and some AFP printers.

RM4SCC (same as 26)

Specifies a 4-state customer code that is defined by the Royal Mail Postal Service of England for bar coding postal code information.

JPOSTAL (same as 27)

A complete Japan Postal Bar Code symbol consists of a set of distinct bars and spaces for each character followed by a modulo 19 checksum character and enclosed by a unique start character, stop character and quiet zones.

2DMATRIX (same as 28)

Specifies a Data Matrix two-dimensional bar code. Two-dimensional matrix symbologies (sometimes called area symbologies) allow large amounts of information to be encoded in a two-dimensional matrix. These symbologies are typically rectangular and require a quiet zone around all four sides; for example, the Data Matrix symbology requires a quiet zone at least one module wide around the symbol. Two-dimensional matrix symbologies use extensive data compaction and error correction codes, allowing large amounts of character or binary data to be encoded.

2DMAXI (same as 29)

Specifies a MaxiCode two-dimensional stacked bar code. Two-dimensional stacked symbologies allow large amounts of information to be encoded by effectively stacking short one-dimensional symbols in a row/column arrangement. This arrangement reduces the amount of space that is typically used by conventional linear bar code symbols and allows for a large variety of rectangular bar code shapes.

2DPDF417 (same as 30)

Specifies a PDF417 two-dimensional stacked bar code. Two-dimensional stacked symbologies allow large amounts of information to be encoded by effectively stacking short one-dimensional symbols in a row/column arrangement. This arrangement reduces the amount of space that is typically used by conventional linear bar code symbols and allows for a large variety of rectangular bar code shapes.

APOSTAL (same as 31)

Specifies the bar code type as defined by the Australian Postal Service.

2DQR CODE (same as 32)

Specifies a QR Code two-dimensional bar code. QR Code consists of a matrix of dark and light squares (modules). The matrix is also square and 40 sizes exist that range from a matrix of 21 by 21 modules and increase by steps of 4 up to a matrix of 177 by 177 modules. Thus, up to 7089 numeric characters, 4296 alphabetic characters, 2953 8-bit characters, or 1817 Kanji characters can be contained on a single symbol, and up to 16 symbols can be logically linked together.

Since squares (modules) are square, the size of a module is determined by the MODWIDTH parameter only. The HEIGHT and RATIO parameters are not used.

CODE93 (same as 33)

Specifies a bar code type as defined by the AIM Uniform Symbology Specification - Code 93. This linear bar code is similar to Code 39, but more complex.

US4STATE (same as 34 or US4ST)

Specifies a United States Postal Service (USPS) Four-State bar code. This parameter can be abbreviated as US4ST. This bar code is also known as the Intelligent Mail Bar Code.

The USPS Four-State bar code symbol has a fixed size; therefore, the HEIGHT and RATIO parameters are not applicable and ignored. This bar code symbol allows a MODWIDTH parameter with two sizes SMALL and OPTIMAL. If you specify any other MODWIDTH, PPFA issues a warning message (RC=4), defaults to OPTIMAL, and continues generating the page definition. MODWIDTH SMALL prints a symbol approximately 2.575 inches wide and MODWIDTH OPTIMAL prints a symbol approximately 2.9 inches wide.

The input data is all numeric and consists of five data fields. The first four are fixed length; the fifth is variable length. The five fields are:

1. Application ID (2 digits) - the second digit must be 0 - 4 so that the valid values are 00 - 04, 01 - 14, and so on, through 90 - 94.
2. Special Services (3 digits) - assigned by the USPS. Valid values are 000 - 999.
3. Customer Identifier (6 digits) - assigned by the USPS. Valid values are 000000 - 999999.
4. Sequence Number (9 digits) - assigned by the mailer. Valid values are 000000000 - 999999999.
5. Delivery Point ZIP Code (0, 5, 9, or 11 digits) - see the following MOD parameter for valid values.

USPS Four-State modifiers (MOD) are defined as follows:

X'00'

Present a USPS Four-State bar code symbol with no Delivery Point ZIP Code. The input data for this bar code symbol must be 20 numeric digits.

X'01'

Present a USPS Four-State bar code symbol with a 5-digit Delivery Point ZIP Code. The input data for this bar code symbol must be 25 numeric digits. The valid values for the Delivery Point ZIP code are 00000 - 99999.

X'02'

Present a USPS Four-State bar code symbol with a 9-digit Delivery Point ZIP Code. The input data for this bar code symbol must be 29 numeric digits. The valid values for the Delivery Point ZIP code are 000000000 - 999999999.

X'03'

Present a USPS Four-State bar code symbol with an 11-digit Delivery Point ZIP Code. The input data for this bar code symbol must be 31 numeric digits. The valid values for the Delivery Point ZIP code are 00000000000 - 99999999999.

Note: You can print HRI with this symbol but it is not currently (Oct 2004) defined by the USPS. Therefore, PPFA defaults the HRI parameter to HRI OFF for this symbol. The USPS says that they plan to define HRI for some Special Services. "Track and Confirm" is an example of a Special Service that USPS does not currently define HRI but might in the future.

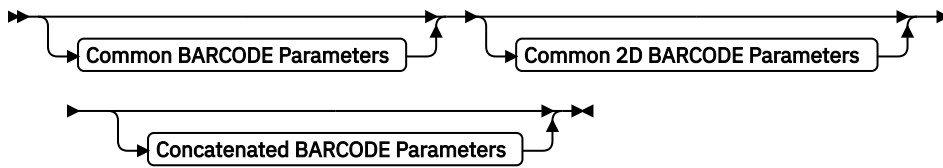
REDTAG (same as 35)

Specifies a 4-state bar code type that is defined by the Royal Mail Postal Service of England as RED TAG.

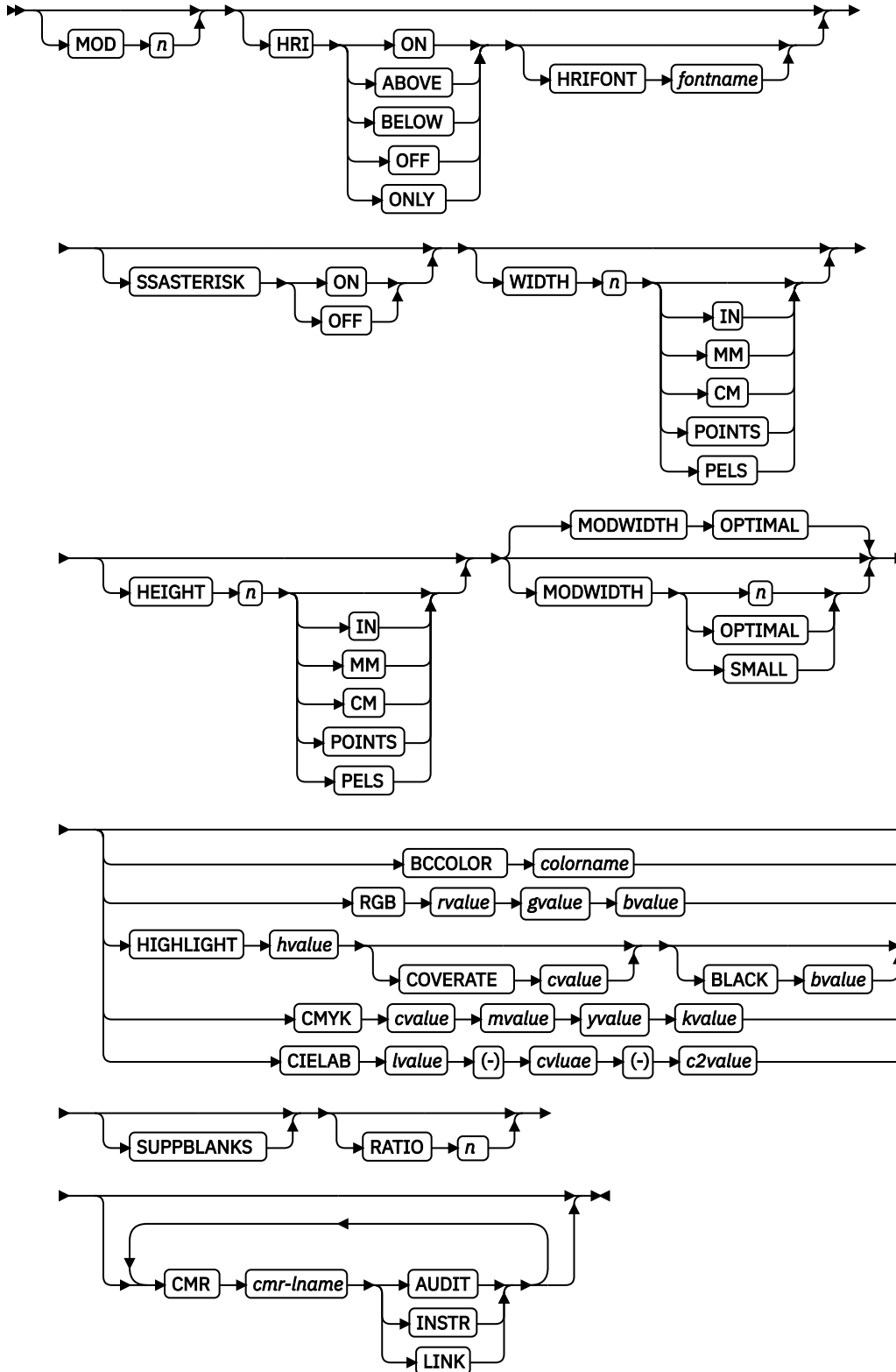
DATABAR (same as 36)

Specifies a bar code type of GS1 DataBar.

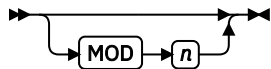
Other BARCODE Parameters



Common BARCODE Parameters



MOD



Specifies more processing information about the bar code symbol to be generated (for example, MOD specifies whether a check-digit ⁶ must be generated for the bar code symbol).

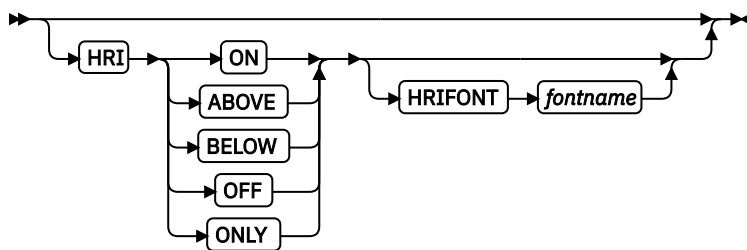
n

The meaning of *n* differs between the types. For more information, see [Table 24 on page 457](#).

If MOD is not specified, the MOD value defaults as follows, depending on the bar code type specified:

TYPE	MOD	TYPE	MOD
1	1	22	0
2	1	23	0
3	0	24	0
5	0	26	0
6	0	27	0
7	0	28	0
8	0	29	0
9	0	30	0
10	1	31	1
11	1	32	2
12	1	33	0
13	1	35	1
17	2	36	0

HRI



Specifies the human-readable interpretation (text characters) to be generated and placed above or below the bar code symbol, as directed.

ON

Specifies that HRI must be generated at the default location for the bar code type.

ABOVE

Specifies that HRI must be placed above the bar code symbol.

BELOW

Specifies that HRI must be placed below the bar code symbol.

⁶ Check digits are a method of verifying data integrity during the bar code reading process.

OFF

Specifies that HRI must not be generated.

ONLY

Specifies that only the HRI is to be printed. No bar code symbol is to be generated. The POSITION parameters on the FIELD command specify the placement position for the first character of the HRI.

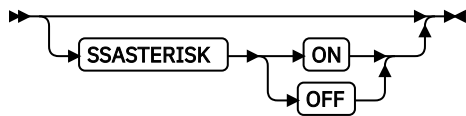
Note: Not all bar code printers accept the request to suppress printing the bar code symbol.

Notes:

1. If HRI is requested, and HRI font isn't, the printer default font is used to render the HRI, instead of the font specified on the FIELD FONT subcommand.
2. HRI is not supported by any of the 2D bar codes.

HRIFONT *fontname*

Specifies the local name of a font that is used in printing the HRI for the bar code. This font must first be defined in a previous font command in the page definition.

SSASTERISK

Specifies whether an asterisk is to be generated as the HRI for CODE39 bar code start and stop characters.

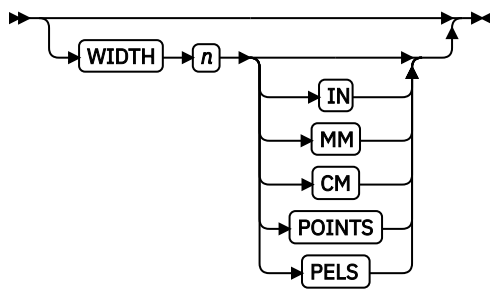
Note: SSASTERISK is ignored by all bar code types except CODE39.

ON

Specifies that start and stop characters must be generated in the HRI.

OFF

Specifies that start and stop characters must not be generated in the HRI.

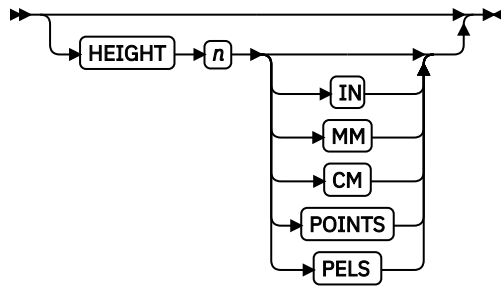
WIDTH

Specifies the width of the whole bar code symbol.

n

Specifies the width value of the whole bar code symbol. The *n* value can be up to three decimal places.

HEIGHT



Specifies the height of bar code element. For UPC and EAN bar codes, the total height includes the bar code and the HRI characters.

If HEIGHT is not specified, the printer default height is used.

Note: HEIGHT is ignored by bar code types that explicitly specify the element heights (for example, POSTNET or RM4SCC).

n

Specifies the height of the bar code. The *n* value can be up to three decimal places.

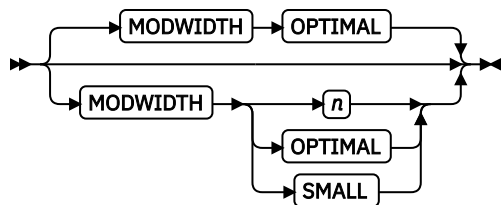
unit

Specifies a unit of measurement for the HEIGHT parameter. The choices are IN, MM, CM, POINTS, or PELS.

Notes:

1. If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.
2. Height for the 2D bar code. PDF417 specifies the height of a bar or row (not the total height of the symbol).

MODWIDTH



Specifies the width of the smallest defined bar code element by using mils (thousandths of an inch). The range of values is 1 - 254. If MODWIDTH is not specified, the printer default MODWIDTH is used; the printer default yields the optimum scannable symbol.

n

Specifies the width of each module by using thousandths of an inch (1/1000) as the unit of measurement.

OPTIMAL

Specifies that the printer chooses the optimal module width. This value is recommended. It is the default value when MODWIDTH is not coded.

SMALL

Specifies that the PPFA chooses a module width that produces the smallest symbol that meets the symbology tolerances.

Note: Because this symbol is at the lower boundary of the symbology-defined tolerance range, external conditions, such as printer contrast setting, toner consistency, and paper absorbency, might cause this symbol to scan improperly.

Example:

```
PAGEDEF 4SXM1  REPLACE YES;
FONT FN1;

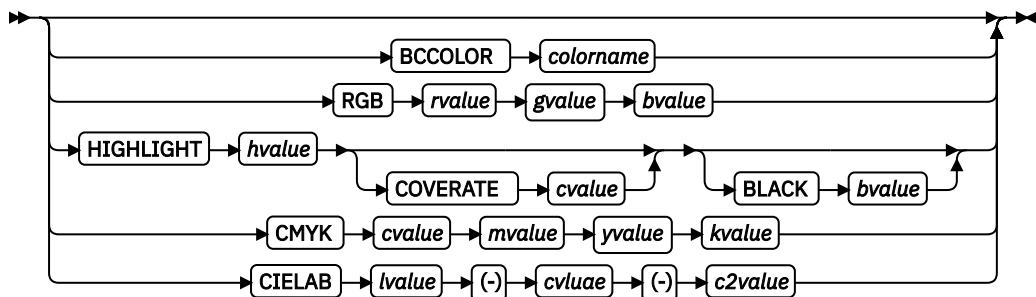
PRINTLINE ;
FIELD START 1  LENGTH 20 BARCODE BC1 TYPE US4ST;

PRINTLINE ;
FIELD START 01 LENGTH 20 BARCODE bc2 TYPE US4STATE MOD 0
MODWIDTH OPTIMAL;
PRINTLINE ;
FIELD START 41 LENGTH 25 BARCODE bc3 TYPE US4STATE MOD 1
MODWIDTH SMALL ;
PRINTLINE ;
FIELD START 66 LENGTH 29 BARCODE bc4 TYPE US4STATE MOD 2
MODWIDTH SMALL ;
PRINTLINE ;
FIELD START 66 LENGTH 31 BARCODE bc5 TYPE US4STATE MOD 3
MODWIDTH SMALL ;
PRINTLINE ;
FIELD START 66 LENGTH 31 BARCODE bc6 TYPE US4STATE MOD 3
MODWIDTH 15 ;
```

In the example:

- FIELD BARCODE commands exist for the new "Four State" bar code with default Modifier, and explicit Modifiers each with the proper field length.
- FIELD BARCODE commands exist that use the new MODWIDTH parameters SMALL and OPTIMAL.
- One example BARCODE command exists that uses an explicit MODWIDTH parameter that results in an informational message and a MODWIDTH of OPTIMAL.

BCOLOR



Specifies an OCA color or a defined color to be used in printing the bar code and its HRI. Defined colors are specified with the DEFINE COLOR command.

colorname

Values for color names are:

- A defined color (defined by the DEFINE COLOR command)
- NONE
- DEFAULT
- BLACK
- BLUE
- BROWN
- GREEN
- PINK
- RED
- TURQ (turquoise)
- YELLOW

- ORANGE
- PURPLE
- MUSTARD
- GRAY
- DARKBLUE
- DARKGREEN
- DARKTURQ (dark turquoise)

The color choices depend on the printer. NONE is the color of the medium. DEFAULT is the printer default color.

color model

Specifies the color of print for this field that is supported in MODCA for the Red/Green/Blue color model (RGB), the highlight color space, the Cyan/Magenta/Yellow/Black color model (CMYK), and the CIELAB color model.

Example: In the following code example, four bar codes are defined that use color.

1. The first uses a predefined non-OCA color.
2. The second uses an OCA color that is not predefined.
3. The third uses a predefined OCA color.
4. The fourth uses a CMYK color model directly.

```

/*-----*/
/* CMRX13 - Full Color on Bar Code */
/* */
/* */
/*-----*/
/* Traditional pagedef */
/*-----*/
Pagedef cmx14P replace yes;

DEFINE ocablue COLOR OCA blue ;
DEFINE cymkyel COLOR CMYK 50 30 30 30 ;

FONT fte egt12 TYPE ebcdic;

PAGEFORMAT pf1;
PRINTLINE;
FIELD START 50 LENGTH 8 RGB 30 25 25
BARCODE AUST1 TYPE APOSTAL MOD 2
BCCOLOR cymkyel /* PRE-DEFINED NON-OCA COLOR */
HEIGHT .5 IN;
FIELD START 5 LENGTH 5 BARCODE BCC0 TYPE POSTNET
BCCOLOR RED /* OCA COLOR */
HEIGHT .5 IN;
FIELD START 5 LENGTH 5 BARCODE BCC01 TYPE POSTNET
BCCOLOR ocablue /* Defined OCA COLOR */
HEIGHT .5 IN;
FIELD START 5 LENGTH 5 BARCODE BCC02 TYPE POSTNET
CMYK 50 30 30 30 /* direct cmyk color */
HEIGHT .5 IN;

/*-----*/
/* Record Fmt pagedef */
/*-----*/
Pagedef cmx14L replace yes;

DEFINE ocablue COLOR OCA blue ;
Define rgbred COLOR RGB 30 25 25 ;
DEFINE cymkyel COLOR CMYK 50 30 30 30 ;
DEFINE HIgreen COLOR HIGHLIGHT 100 coverage 50;
DEFINE cieblue COLOR cielab 40 90 95 ;

FONT fte egt12 TYPE ebcdic; /* type ebcdic */

PAGEFORMAT pf1;
LAYOUT '11';
FIELD START 50 LENGTH 8 RGB 30 25 25
BARCODE AUST1 TYPE APOSTAL MOD 2
BCCOLOR cymkyel /* PRE-DEFINED NON-OCA COLOR */

```



```

FIELD START 5 LENGTH 8 BARCODE AUST2 TYPE APOSTAL MOD 2
BCCOLOR RED /* NON PRE-DEFINED OCA COLOR */
HEIGHT .5 IN;
FIELD START 5 LENGTH 5 BARCODE BCCO TYPE POSTNET
BCCOLOR OCABLUE /* PRE-DEFINED OCA COLOR */
HEIGHT .5 IN;
FIELD START 5 LENGTH 5 BARCODE BCCO2 TYPE POSTNET
CMYK 50 30 30 30 /* direct cmyk color */
HEIGHT .5 IN;

/*-----*/
/* XML pagedef */
/*-----*/
Pagedef cmx14X replace yes;

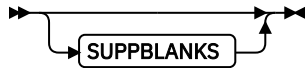
DEFINE ocablue COLOR OCA blue ;
Define rgbred COLOR RGB 30 25 25 ;
DEFINE cymkyel COLOR CMYK 50 30 30 30 ;
DEFINE HIGreen COLOR HIGHLIGHT 100 coverage 50;
DEFINE cieblue COLOR cielab 40 90 95 ;

DEFINE cn QTAG 'cust','name' ;
FONT fte egt12 TYPE ebcdic; /* type ebcdic */

PAGEFORMAT pf1;
XLAYOUT cn;
FIELD START 50 LENGTH 8 RGB 30 25 25
BARCODE AUST1 TYPE APOSTAL MOD 2
BCCOLOR cymkyel /* PRE-DEFINED NON-OCA COLOR */
HEIGHT .5 IN;
FIELD START 5 LENGTH 8 BARCODE AUST2 TYPE APOSTAL MOD 2
BCCOLOR RED /* NON PRE-DEFINED OCA COLOR */
HEIGHT .5 IN;
FIELD START 5 LENGTH 5 BARCODE BCCO TYPE POSTNET
BCCOLOR OCABLUE /* PRE-DEFINED OCA COLOR */
HEIGHT .5 IN;
FIELD START 5 LENGTH 5 BARCODE BCCO2 TYPE POSTNET
CMYK 50 30 30 30 /* direct cmyk color */
HEIGHT .5 IN;

```

SUPPBLANKS

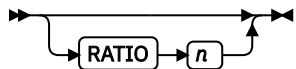


Suppress the trailing blanks in the data field that is used to generate the bar code.

When the page definition selects any of the EAN, UPC or POSTNET bar code types and modifiers and also requests that trailing blanks be truncated for the bar code field, the print server examines the resulting data length and choose the correct bar code type and modifier for the bar code object created.

Note: If the data length does not match any of the bar code type and modifier combinations, the print server uses the original bar code type and modifier that is requested to build the bar code object.

RATIO



Specifies the ratio between the width of the wide and the narrow bar code elements. The range of values is 100 - 500, but you must specify a value appropriate for your printer and bar code type or you errors occur at print time.

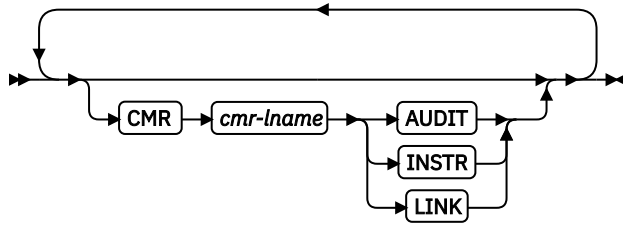
If RATIO is not specified, the printer default ratio is used.

n

The RATIO is specified as a percent value. For example, form *nnn*. For example, 200 represents a ratio of 2 to 1; 250 represents a ratio of 2.5 to 1. For most bar code symbols, the RATIO value is 200 - 300. For bar code types that explicitly specify the module width

(for example, POSTNET and RM4SCC, this field is ignored. If RATIO is not specified, the default ratio for the bar code symbol is used.

CMR



Specify a Color management resource (CMR) and its process mode for a bar code object within the page definition.

Note: See Chapter 8, “AFP Color Management,” on page 151 for more information about using the CMR subcommand.

cmr-lname

The CMR local name. This name must be defined with a DEFINE CMRNAME command.

Note: This parameter must immediately follow the CMR keyword.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

Process this CMR as an audit CMR.

INSTR

Process this CMR as an instruction CMR.

LINK

Process this CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs.

Example: In the following code example, 2 bar codes are defined with CMRs specified. The bar codes are defined for traditional, record format and XML page definitions.

Note: The DEFINE CMRNAMEs for mycmr and dark1 are used in each page definition but defined only once. Page definitions that are compiled together can define a local CMR name only once. This requirement is because a DEFINE CMRNAME definition is global for all page definitions and form definitions in the same set of source code.

```

DEFINE mycmr  CMRNAME ... ;
DEFINE dark1  CMRNAME ... ;

/* Traditional Pagedef          */
PAGEDEF cmr10P  REPLACE yes;
PRINTLINE;
  FIELD Start 1 Length 20
  BARCODE TYPE code39 MOD 1
  CMR myCMR  audit;
  FIELD Start 21 Length 40
  BARCODE TYPE code39 MOD 1
  CMR dark1  instr;

/* Record Layout Pagedef      */
PAGEDEF cmr10L  REPLACE yes;
Font f1;
LAYOUT '11';
  FIELD Start 1 Length 20
  BARCODE TYPE code39 MOD 1
  CMR myCMR  audit;
  FIELD Start 21 Length 40
  BARCODE TYPE code39 MOD 1
  CMR dark1  instr;

/* XML Pagedef                */

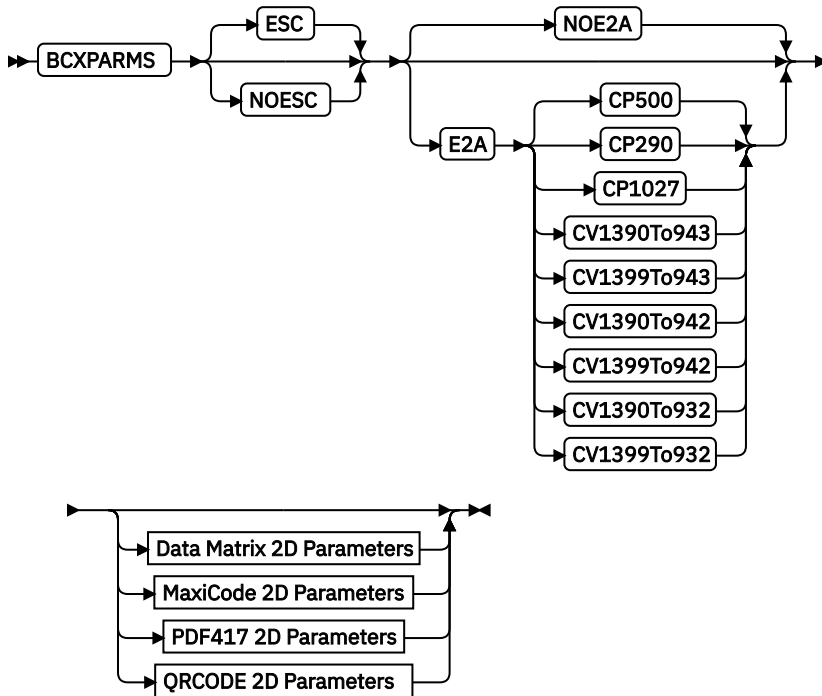
```

```

PAGEDEF cmr10X REPLACE yes;
Font f1 TYPE ebcdic;
XLAYOUT QTAG 'x1';
FIELD Start 1 Length 20
  BARCODE TYPE code39 MOD 1
  CMR myCMR audit;
FIELD Start 21 Length 40
  BARCODE TYPE code39 MOD 1
  CMR dark1 instr;

```

Common 2D BARCODE Parameters



Bar code parameters are common for all for two-dimensional bar code types.

Note: See the *Bar Code Object Content Architecture (BCOCA) Reference* and [Appendix D, “More About Bar Code Parameters,”](#) on page 449 for more details on these extra parameters.

escape sequence processing

Specifies whether to process escape sequences in the data.

Note: If the EBCDIC to ASCII flag is set (E2A), all characters are converted ASCII first so that the EBCDIC backslash characters (X'E0') are converted to ASCII (X'5C') before the escape sequence handling is applied.

ESC

Escape Sequence Handling. This is the default if neither is coded. When this parameter is coded or defaulted, each backslash character within the bar code data is treated as an escape character according to the particular bar code symbology specification.

NOESC

Ignore Escape Sequences. When this parameter is coded, each backslash character within the bar code data is treated as a normal data character.

Note: In this case, no code page switching can occur within the data.

EBCDIC to ASCII translation

Determines whether to translate the data.

Note: Only QR CODE uses the E2A code page parameters.

E2A

EBCDIC to ASCII translation for all two-dimensional bar codes.

- For Data Matrix and MaxiCode, the printer converts each byte of the data from EBCDIC code page 500 to ASCII code page 819.
- For PDF417, the printer converts each byte of the bar code data and each byte of the Macro PDF417 control block data from a subset of EBCDIC code page 500 into ASCII. This translation covers 181 code points, which includes alphanumerics and many symbols. The code points that are not covered by the translation do not occur in EBCDIC and are mapped, by the printer, to the X'7F' (127) code point. Do not use the following EBCDIC code points for PDF417:

X'04'	X'06'	X'08'	X'09'	X'0A'	X'14'	X'15'	X'17'
X'1A'	X'1B'	X'20'	X'21'	X'22'	X'23'	X'24'	X'28'
X'29'	X'2A'	X'2B'	X'2C'	X'30'	X'31'	X'33'	X'34'
X'35'	X'36'	X'38'	X'39'	X'3A'	X'3B'	X'3E'	X'46'
X'62'	X'64'	X'65'	X'66'	X'6A'	X'6B'	X'6C'	X'6D'
X'6E'	X'6F'	X'70'	X'72'	X'73'	X'74'	X'75'	X'76'
X'77'	X'78'	X'80'	X'8C'	X'8D'	X'8E'	X'9D'	X'9F'
X'AC'	X'AD'	X'AE'	X'AF'	X'B4'	X'B5'	X'B6'	X'B9'
X'BC'	X'BD'	X'BE'	X'BF'	X'CA'	X'CF'	X'DA'	X'EB'
X'ED'	X'EE'	X'EF'	X'FA'	X'FB'	X'FD'	X'FE'	X'FF'

- QR CODE - The default coding for QR CODE is ECI 000020, which is equivalent to the IBM ASCII code page 897. When translation is required, you must enter the code page to use for translation. Three choices exist. Each choice causes the printer to translate from the code page into ASCII code page 897 before the data is used to build the bar code symbol:
 - EBCDIC code page 500 (International #5). Only 128 bytes of this code page can be translated into ECI 000020. These code points are specified in [“QR Code Special-Function Parameters” on page 497](#).
 - EBCDIC code page 290 (Japanese Katakana Extended).
 - EBCDIC code page 1027 (Japanese Latin Extended).

The first three values are used when the input data is encoded with a single-byte EBCDIC code page. The parameter identifies the EBCDIC code page that encodes single-byte EBCDIC bar code data:

CP500

Code page 500 (International #5) Only 128 of the characters within ECI 000020 can be specified in code page 500. The code page 500 characters that can be translated are shown in the *Bar Code Object Content Architecture Reference*.

CP290

Code page 290 (Japanese Katakana Extended)

CP1027

Code page 1027 (Japanese Latin Extended)

The following parameters are used when the input data is SOSI. Each parameter identifies a specific conversion from EBCDIC SOSI input data to a specific mixed-byte ASCII encoding:

CV1390To943

Translates EBCDIC data CCSID 1390 code points to ASCII Shift-JIS CCSID 943 code points.

CV1399To943

Translates EBCDIC data CCSID 1399 code points to ASCII Shift-JIS CCSID 943 code points.

CV1390To932

Translates EBCDIC data CCSID 1390 code points to ASCII Shift-JIS CCSID 932 code points.

CV1399To932

Translates EBCDIC data CCSID 1399 code points to ASCII Shift-JIS CCSID 932 code points.

CV1390To942

Translates EBCDIC data CCSID 1390 code points to ASCII Shift-JIS CCSID 942 code points.

CV1399To942

Translates EBCDIC data CCSID 1399 code points to ASCII Shift-JIS CCSID 942 code points.

Note: CCSID definitions:

CCSID 932

Japanese PC Data Mixed including 1880 UDC.

CCSID 942

Japanese PC Data Mixed including 1880 UDC, Extended SBCS.

CCSID 943

Japanese PC Data Mixed for Open environment (Multi-vendor code): 6878 JIS X 0208-1990 chars, 386 IBM selected DBCS chars, 1880 UDC (X'F040' to X'F9FC')

CCSID 1390

Extended Japanese Katakana-Kanji Host Mixed for JIS X0213 including 6205 UDC, Extended SBCS (includes SBCS and DBCS euro)

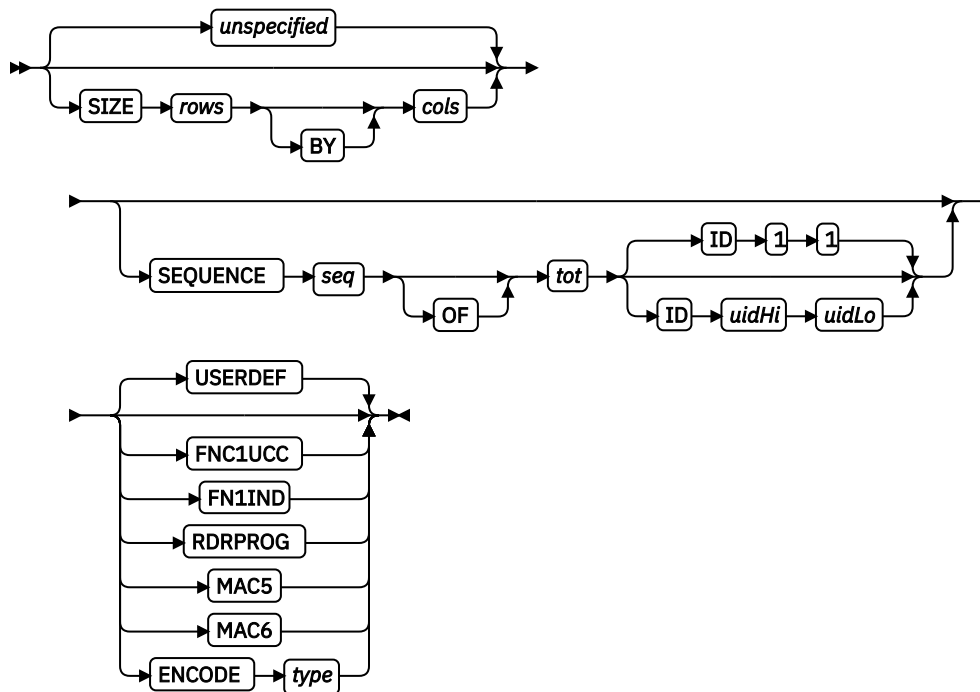
CCSID 1399

Extended Japanese Latin-Kanji Host Mixed for JIS X0213 including 6205 UDC, Extended SBCS (includes SBCS and DBCS euro)

NOE2A

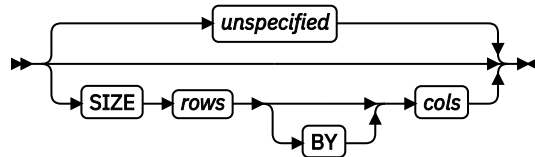
No translation. This is the default if neither is coded. This parameter is used for all two-dimensional bar codes. No translation is done by the printer or PPFA. The bar code data is assumed to be the default coding as defined in the AIM Uniform Symbology Specification.

Data Matrix 2D parameters



These parameters are for Data Matrix 2D bar codes:

SIZE



The size of the two-dimensional bar code. The number of rows and columns (row size) in the symbol. The allowable values for rows and columns are specified in Table 28 on page 486. If size is not coded, the size is marked as unspecified and the appropriate number of rows and columns are used based on the amount of data.

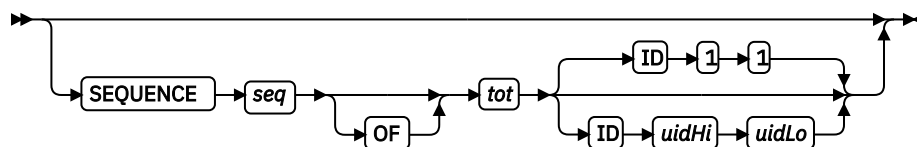
unspecified

Unspecified size. The SIZE parameter isn't coded. The appropriate number of rows and columns are used based on the amount of data that is presented.

rows BY cols

The number of rows that are wanted including the finder pattern, and the number of columns (or modules) in each row that are wanted including the finder pattern. The keyword BY is optional. The rows and columns must be one of the allowed combinations in Table 28 on page 486.

SEQUENCE



Structured append sequence indicator. Some two-dimensional bar codes can be logically linked together to encode large amounts of data. The logically linked symbols can be presented on the same or different media and are logically recombined after they are scanned. PPFPA checks the numbers for obvious errors and the proper number range. For example, SEQUENCE 5 OF 3 is wrong.

sqn

Structured-append sequence indicator. This parameter is an integer whose acceptable range of values depends on the bar code type. The range for this parameter is 1 - 16.

OF

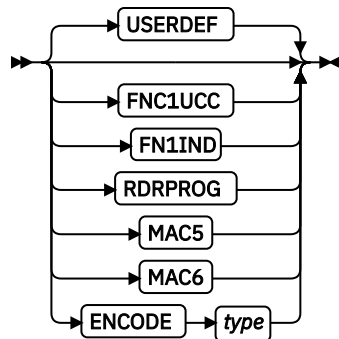
Optional parameter for readability.

tot

Total number of structured-append symbols. This parameter is an integer whose acceptable range of values depends on the bar code type. The range of this parameter is 2 - 16.

ID uidHi uidLo

The high and low-order bytes of a unique file identification for a set of structured-append symbols. Each is a unique number 1 - 254 and identifies this set of symbols. The actual File ID is computed by 256 times *uidHi* plus *uidLo*.

data matrix special functions

Special functions that can be used only with a Data Matrix symbol. If not coded, the default is USERDEF (user-defined symbol).

FNC1UCC

UCC/EAN FNC1 alternate data type identifier. An FNC1 is added in the first data position (or fifth position of a structured append symbol) to indicate that this bar code symbol conforms to the UCC/EAN application identifier standard format.

FNC1IND

Industry FNC1 alternate data type identifier. An FNC1 is added in the second data position (or sixth data position of a structured append symbol) to indicate that this bar code symbol conforms to a particular industry standard format.

RDRPROG

Used when the symbol contains a message that is used to program the bar code reader. In this case, the bar code symbol cannot be a part of a structured append sequence.

MAC5

This provides instructions to the bar code reader to insert an industry-specific header and trailer around the symbol data. The bar code symbol contains a 05 Macro codeword. The bar code symbol cannot be a part of a structured append sequence.

MAC6

Same as MAC5 except the bar code symbol contains a 06 Macro codeword. The bar code symbol cannot be a part of a structured append sequence.

ENCODE

Data Matrix bar code encodation scheme.

type

Specifies the Data Matrix bar code encodation scheme. These encodation schemes are supported:

DEFAULT

Uses a device-specific method of selecting and switching among encodation schemes. If you are unsure of which encodation scheme to use, device default is a good choice.

ASCII

Encodation scheme that produces 4 bits per data character for double digit numerics, 8 bits per data character for ASCII values 0 - 127, and 16 bits per data character for Extended ASCII values 128 - 255.

C40

Encodation scheme that is used when the input data is primarily uppercase alphanumeric.

Text

Encodation scheme that is used when the input data is primarily lowercase alphanumeric.

X12

Encodation scheme that is used when the input data is defined with the ANSI X12 EDI data set.

EDIFACT

Encodation scheme that is used when the input data is ASCII values 32 - 94.

BASE256

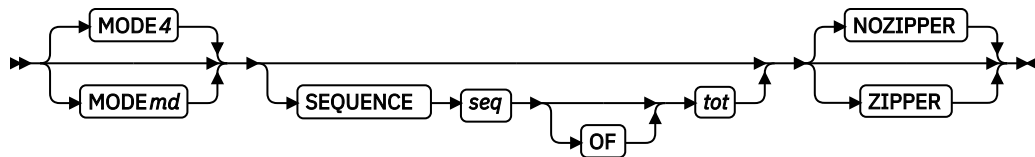
Encodation scheme that is used when the data is binary (for example image or non-text data).

AUTO

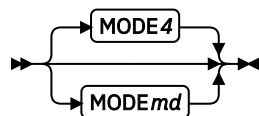
Starts with ASCII encodation and switches between encodation schemes as needed to produce the minimum symbol data characters.

USERDEF

None of the supported schemes. This is a user-defined data symbol with no Header or Trailer instructions to the reader.

MaxiCode 2D Parameters

These parameters are for MaxiCode 2D bar codes:

MODE

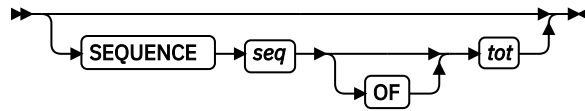
Symbol mode (used for MaxiCode two-dimensional bar code only). If not coded, the default is Standard Symbol Mode 4.

- 2** Structured Carrier Message - numeric postal code.
- 3** Structured Carrier Message - alphanumeric postal code.
- 4** Standard symbol (default).
- 5** Not supported.

6

The bar code data is used to program the bar code reader system.

SEQUENCE



Structured append sequence indicator. Some two-dimensional bar codes can be logically linked together to encode large amounts of data. The logically linked symbols can be presented on the same or different media and are logically recombined after they are scanned. PPFA checks the numbers for obvious errors and the proper number range. For example, SEQUENCE 5 OF 3 is wrong.

sqn

Structured-append sequence indicator. This parameter is an integer whose acceptable range of values depends on the bar code type. The range of this parameter is 1 - 8.

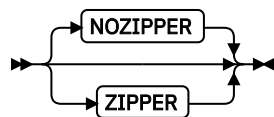
OF

Optional parameter for readability.

tot

Total number of structured-append symbols. This parameter is an integer whose acceptable range of values depends on the bar code type. The range for this parameter is 2 - 8.

zipper pattern



Print a zipper pattern and contrast block (use for MaxiCode two-dimensional bar code only).

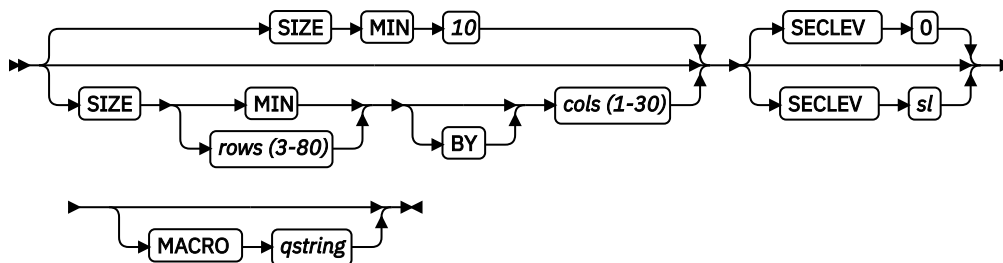
NOZIPPER

Does not print a zipper pattern.

ZIPPER

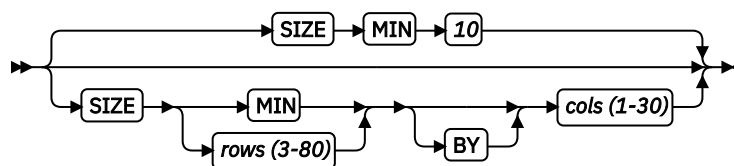
Prints a zipper pattern.

PDF417 2D Parameters



These parameters are for PDF417 2D bar codes:

SIZE



The size of the two-dimensional bar code. The number of rows and number of columns (number of data symbol characters per row). These numbers do not include the start patterns or left and right row indicators. The allowable values for *rows* are 3 - 90, the allowable values for *cols* are 1 - 30, but their product cannot exceed 928. If size is not coded, the default is MIN number of *rows* and 10 *cols* (characters per row).

rows

The number of rows that are wanted.

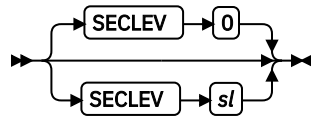
MIN

Instructs the printer to use the minimum number of rows necessary to print the symbol.

cols

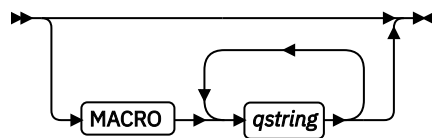
The number of data symbol characters in a row that are wanted.

SECLEV



This parameter specifies the security level that is wanted for the symbol as a value 0 - 8. Each higher security level causes more error correction codewords to be added to the symbol (used for PDF417 two-dimensional bar code only). If not coded, the default is Security level 0.

MACRO



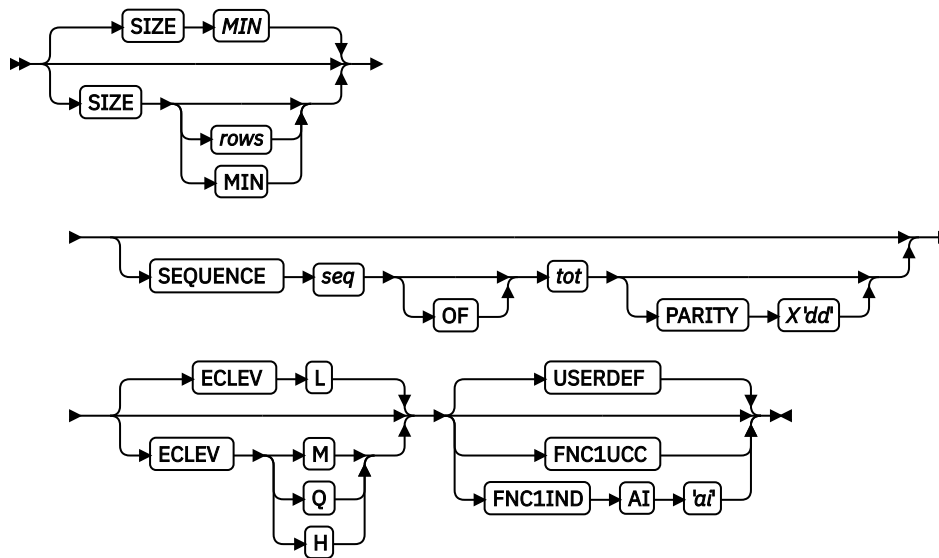
PDF417 Macro data. The total length of macro text is limited to 28,000 bytes.⁷

qstring

A quoted string. The string does not extend across records, but you can code multiple quoted strings. Code the MACRO keyword only once.

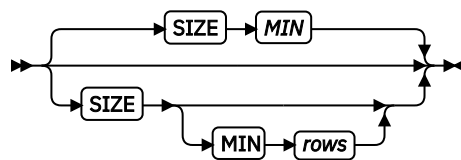
⁷ This limit is imposed by the data stream architecture. The total number of bytes allowed in a structured field is 32,000. Macro data must be shared with triplets, bar code data (which can be up to 2710 bytes), and other overhead.

QRCODE 2D Parameters



These parameters are for QRCODE 2D bar codes:

SIZE



The size (in rows and columns) that is wanted for of the QRCODE bar code. This symbol is square so both rows and columns are the same. The allowable values for rows and columns are 21 - 177 in increments of 4. These are also specified in [Table 30 on page 501](#). The size in *rows* by *cols* is 21 - 177 in increments of 4.

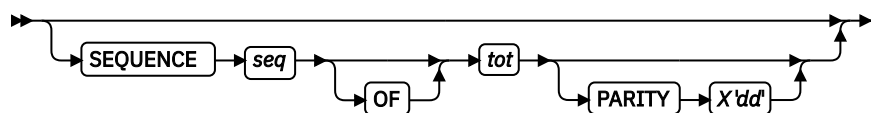
rows

The number of rows and columns that is wanted.

MIN

Instructs the printer to use the minimum number of rows necessary to print the symbol.

SEQUENCE



QR bar codes can be logically linked together to encode large amounts of data. The logically linked symbols can be presented on the same or different media and are logically recombined after they are scanned. PPFA checks the numbers for obvious errors and the proper number range. For example, SEQUENCE 5 OF 3 is wrong.

seq

Structured-append sequence indicator. This parameter is an integer whose acceptable range of values is 1 - 16.

OF

Optional parameter for readability.

tot

Total number of structured-append sequences indicator. This parameter is an integer whose acceptable range of values is 2 - 16.

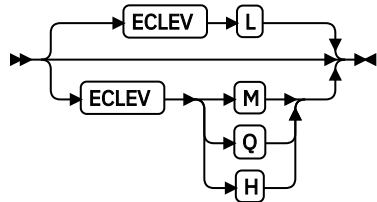
PARITY X'dd'

Structured append parity data. This parameter is used for the QR Code 2D bar code only when it has linked structured-append symbols. The parameter specifies the parity byte for the entire collection of linked structured-append symbols. The parity byte is the same for each symbol in the collection and is obtained by doing an "exclusive or" function on all of the bytes of the ASCII data in all symbols of the collection. If this symbol is not structured-append symbol, the parity parameter is ignored.

X'dd'

The parity data byte. It must be entered as two hexadecimal digits (X'0' - X'F'). As for all hexadecimal digits in PPFA, the digits must be uppercase if they are X'A' - X'F'.

ECLEV



Error Correction Level. It specifies the level of error correction to be used for the symbol. Each higher level of error correction causes more error correction code words to be added to the symbol; therefore, fewer code words are left for the data. See the particular bar code symbology specification for more information. Four different levels of Reed-Solomon error correction can be selected:

L

Level L allows recovery of 7% of symbol code words.

M

Level M allows recovery of 15% of symbol code words.

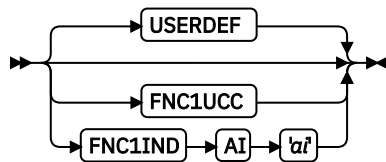
Q

Level Q allows recovery of 25% of symbol code words.

H

Level H allows recovery of 30% of symbol code words.

special functions



Special functions that can be used with QR Code 2D symbols. If not coded, the default is USERDEF (user-defined symbol).

FNC1UCC

UCC/EAN FNC1 alternate data type identifier. The symbol indicates that this QR Code symbol conforms to the UCC/EAN application identifiers standard.

FNC1IND

Industry FNC1 alternate data type identifier. The symbol indicates that this QR Code symbol conforms to the specific industry or application specifications previously agreed with AIM International. When this standard is selected, an application indicator must be specified.

AI 'ai'

Application indicator for Industry FNC1. This value is coded as a single uppercase or lowercase alphabetic character, or a 2-digit number. It must be

enclosed in single quotation marks. This parameter is required for QR Code bar codes when FNC1IND is coded.

USERDEF

None of the special functions. This value is a user-defined symbol with either no significance or "user-defined" significance that is assigned to all FNC1 characters that appear in the symbol.

QR CODE Barcode Example:

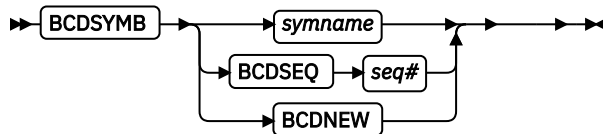
```
PAGEDEF QNXmp Replace Yes;

PRINTLINE;
  FIELD START 1 LENGTH 4400 BARCODE bc3p      TYPE 2DQR CODE
    BCXPARMS E2A CP500
      noesc
      SIZE 025
      ECLEV M
      SEQUENCE 1 of 7
      PARITY x'7A'
      FNC1IND AI 'a'
    ;
```

In the example:

- A QR CODE 2D bar code is placed. The data is encoded in EBCDIC with code page 500. The bar code is 25 by 25 squares and the error correction level is M, which allows recovery of 15% of symbol code words.
- This is the first of seven symbols that are to be linked together by the bar code reader application program. The parity-data value for all symbols is a hexadecimal X'7A'. Parity must be the same for all the linked symbols and is obtained by doing an "exclusive or" function on all of the bytes of the ASCII value of all the original input data.
- The QR CODE symbol conforms to industry specifications for application indicator a.

Concatenated BARCODE Parameters



BCDSYMB *symname*

Specifies bar code data collection symbol and names a bar code data collection. All bar code data that is described with FIELD command and bar codes with this name is collected for printing the bar code.

Defines an alpha-numeric name up to 16 characters long. This name must be unique within a page format.

BCDSEQ *seq#*

Specifies bar code data sequence number. Allows for sequencing bar code data. Bar code data that is collected with unique sequence numbers is collected in ascending order of its sequence number. Data with the same sequence number is collected in the order its FIELD commands are processed.

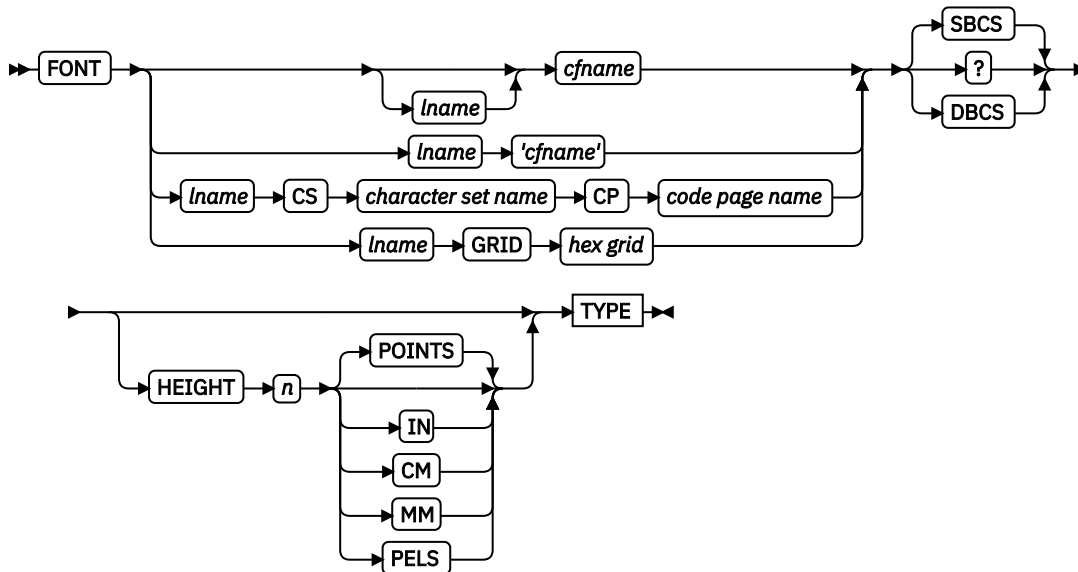
Note: BCDSEQ is optional but if it coded, all bar codes with the same BCDSYMB symbol name must code BCDSEQ.

BCDNEW

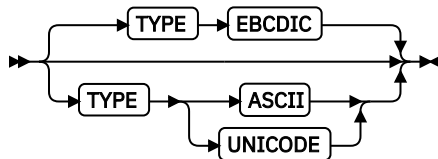
Specifies to start a new bar code symbol for collected bar code data when this record is reused. If BCDSEQ is used to sequence the collection data, BCDNEW is placed on the FIELD command for the first record that is encountered in the data. This record might not be the first sequentially. In general, BCDNEW is placed on the record for the first piece of data that is encountered in the bar code data collection. If BCDSYMB is not specified, BCDNEW is ignored.

Note: This parameter has no effect on a PRINTLINE FIELD BARCODE command as the BCDNEW function does not apply to traditional line data.

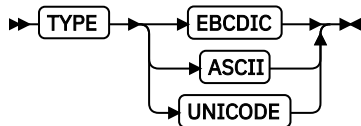
FONT Command



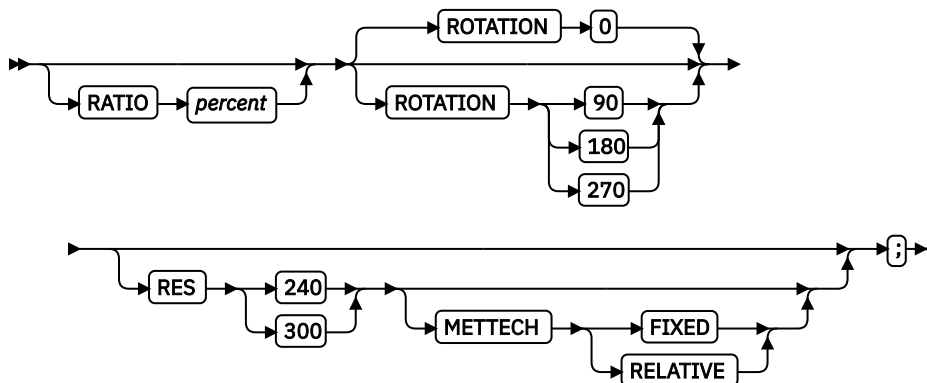
TYPE (Traditional and Record Format)



TYPE (XML)



Traditional and Record Format



The FONT command is used to identify the fonts that are to be specified with the following commands:

Traditional

PRINTLINE, FIELD, and TRCREf commands.

Record Layout

LAYOUT and FIELD commands.

XML

XLAYOUT and FIELD commands.

A maximum of 127 font names for each page definition can be identified.

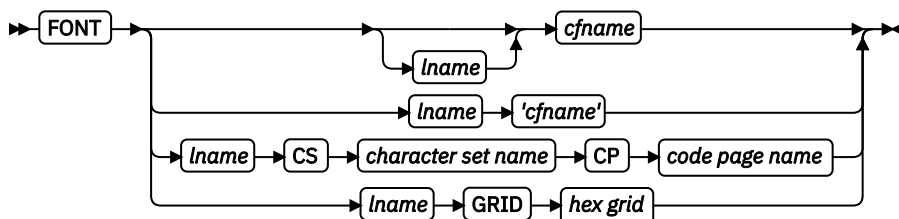
Note: Naming a font with the FONT command does not, by itself, affect your output. You must specify the font in one of the listed commands for the font to become effective. You must name at least one font in a Record Format or XML page definition.

FONT commands immediately follow the PAGEDEF command. A separate FONT command is required:

- For each font used within a page definition
- For each rotation of the same font

Note: For Traditional, see the [“TRCREF Command \(Traditional\)”](#) on page 420 for the exception.

FONT



Identifies the fonts to be specified in the preceding commands.

Inname

Local name for the font. Specifies an unquoted alphanumeric name of 1 - 16 characters (local name) of the font to be used in the page definition. The name must conform to the token rules and must be unique within the page definition.

Inname is used with the following commands:

Traditional

PRINTLINE, FIELD, and TRCREF commands.

Record Layout

LAYOUT and FIELD commands.

XML

XLAYOUT and FIELD commands.

Inname is optional if *cfname* is specified.

cfname

Coded font name. Specifies an alphanumeric name of 1 - 6 characters (user-access name) of the coded font to be used in the page definition. Specify this name without the *Xn* prefix.

'cfname'

Quoted full user-access name. Specifies a quoted alphanumeric name of 1 - 8 characters of the coded font to be used in the page definition. The name can contain blanks and special characters. No uppercase folding or prefix is added to the name. The '*cfname*' variable is intended for outline fonts and allows them to be selected without overriding the HEIGHT specified in the CFI structured field in the coded font. Enter the full outline font name as a quoted name and do not enter the HEIGHT parameter. For example, if you enter the following command, the outline font XZM32F is used with no overriding HEIGHT parameters:

```
FONT myfont 'XZM32F'
```

Notes:

1. The quoted name of the font name is primarily intended for outline fonts. If you use a quoted name for a raster font, you must be sure that you have the name corresponding to the correct rotation of the font.

2. If you use the quoted name of the font name, you must also enter an *lname* (local name); sometimes called an *alias name*.
3. You can still specify the HEIGHT command if you want and override the coded font height.

character set name

Specifies an alphanumeric name of 1 - 6 characters of the character set to be used in the page definition. Specify this name without the *Cn* prefix.

code page name

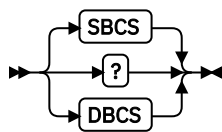
Specifies an alphanumeric name of 1 - 6 characters of the code page without the T1 prefix to be used in the page definition.

hex grid

Specifies the 16-character hexadecimal GRID.

Subcommands

SBCS or DBCS



Specifies single-byte or double-byte fonts.

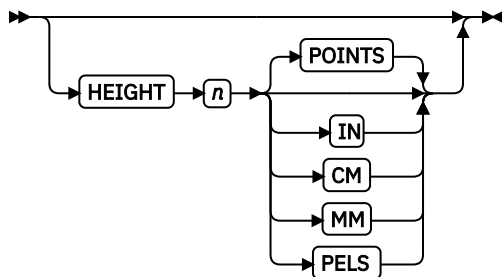
SBCS

Specifies that the font is a single-byte character set. This value is the default.

DBCS

Specifies that the font is a double-byte character set.

HEIGHT *n*



Specifies the height of the outline font.

POINTS

Each point is equal to 1/72 of an inch.

IN

Inches

CM

Centimeters

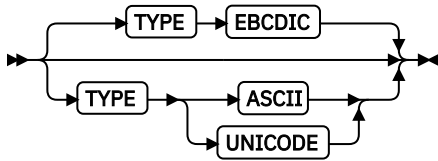
MM

Millimeters

PELS

Pels in the current Logical Units per inch. For example, in 240ths of an inch.

TYPE (Traditional and Record Format)



The TYPE subcommand indicates the type of font that is used.

EBCDIC

This parameter is normally used for fonts on OS390–based systems. This value is the default.

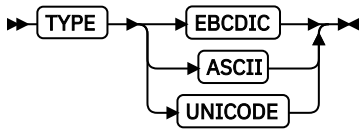
ASCII

This parameter is normally used for fonts on workstation–based systems.

UNICODE

This parameter is used with Unicode type fonts.

TYPE (XML only)



The TYPE subcommand indicates the type of font that is used. This parameter is required for fonts in an XML page definition.

EBCDIC

This parameter is normally used for fonts on OS390–based systems.

ASCII

This parameter is normally used for fonts on workstation–based systems.

UNICODE

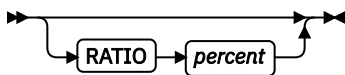
This parameter is used with Unicode type fonts (fixed 2-byte UNICODE without surrogates).

Note: TYPE indicates what type of font is being used, OS390 or workstation, for the printing of PRINTLINE, LAYOUT or XLAYOUT commands. UDTYPE (on the PAGEDEF) is the user’s data type (EBCDIC, ASCII, UTF8, UTF16) that is being placed with the font. The font TYPE and user data UDTYPE must match but certain combinations of TYPE and UDTYPE are permitted.

- Data is UTF-8 and Font is ASCII or UNICODE
- Data is UTF-16 and Font is UNICODE

Otherwise, message AKQ271E results.

RATIO

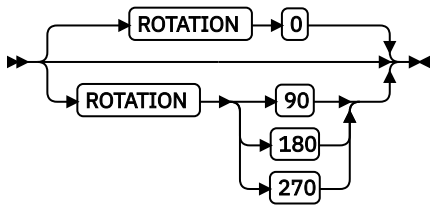


Specifies the ratio of scaling the width relative to the height in an outline font.

percent

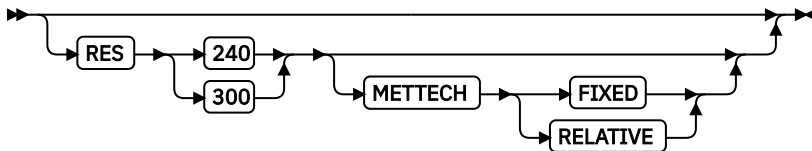
Represents the percent of the normal width of the character that is printed. For example, specifying RATIO 50 yields a font with characters half as wide as normal, and specifying RATIO 200 yields a font with characters twice as wide (200% as wide) as normal. If RATIO is specified, you must also specify the HEIGHT.

ROTATION



Specifies the rotation of characters in degrees. The specified value is relative to the inline direction of a printline or field. Valid rotations are 0°, 90°, 180°, or 270°; 0° is the default.

RESOLUTION



Specifies the resolution and metric technology on a font. Examples of resolution command inputs are:

RES or RESOLUTION

The raster-pattern resolution units in pels per inch:

240	240 pels per inch
300	300 pels per inch

METTECH or METRICTECHNOLOGY

The metric technology that is used for this raster font:

FIXED	Fixed-metric technology
RELATIVE	Relative-metric technology

Notes:

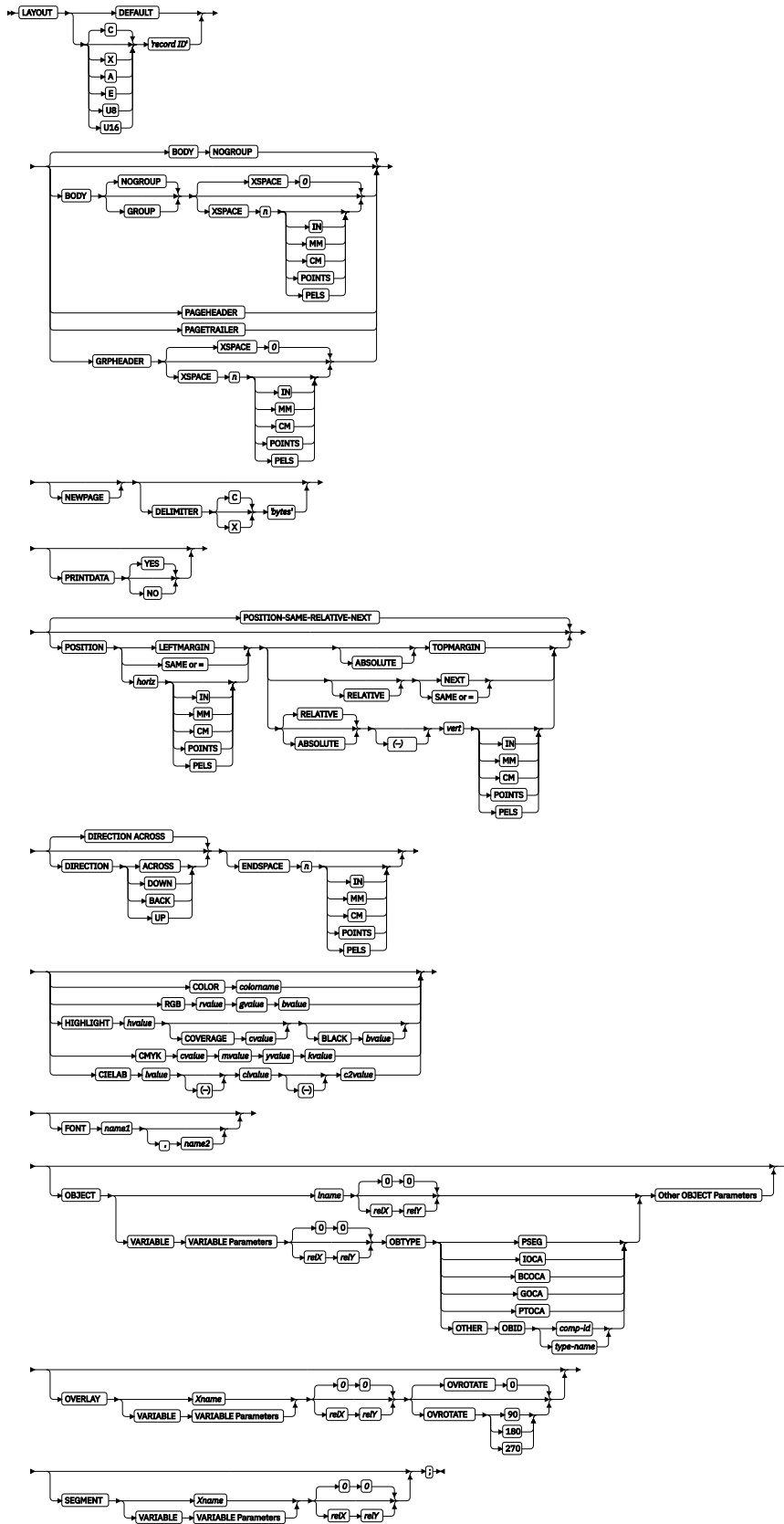
1. The resolution and metric technology subcommands allow rigorous font specifications for use with font fidelity. See the font fidelity subcommand FONTFID on the FORMDEF command.
2. For a description of metric technologies, see:
 - *Intelligent Printer Data Stream Reference*
 - *Font Object Content Architecture Reference*
3. RESOLUTION can be abbreviated as RES; METRICTECHNOLOGY can be abbreviated as METTECH.

In the following example, the form definition xmp01 specifies font fidelity and the page definition specifies a font that has 240 pels per inch resolution and fixed-metric technology. If a font with exactly those characteristics is not accessible by the printer, an error occurs and processing stops.

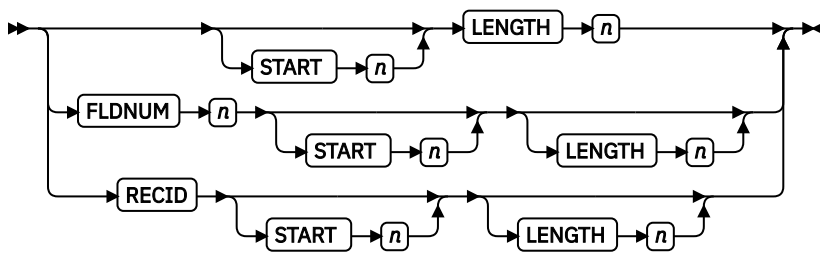
```
FORMDEF xmp01
  FONTFID YES ;

PAGEDEF xmp01  replace yes ;
  FONT xx2 res 240 mettech fixed ;
  PRINTLINE font xx2 ;
```

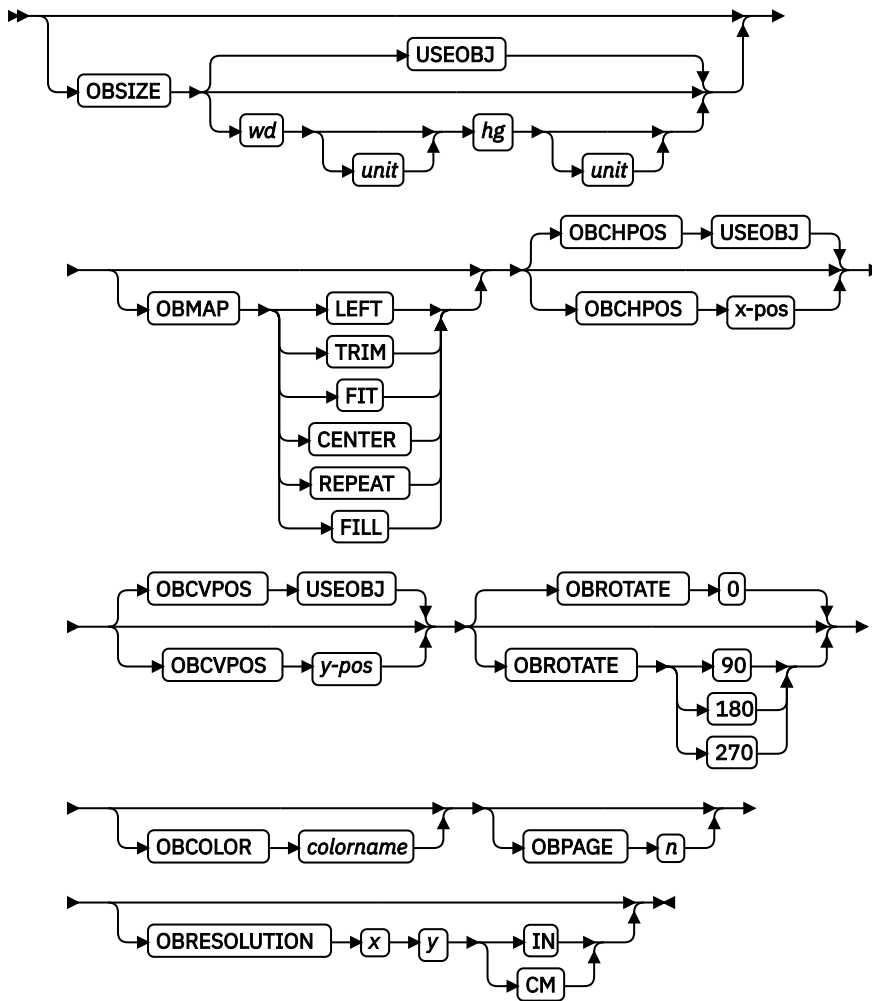
LAYOUT Command (Record Format)



VARIABLE Parameters



Other OBJECT Parameters



The LAYOUT command is used to format a data record. The LAYOUT command is associated with the line of data record by using a *record ID* that appears both on the LAYOUT command and in the first *n* bytes of the data record (normally *n* is 10 bytes, but can be specified as 1 - 250 bytes). The '*record ID*' is entered in quotation marks and must match the '*record ID*' within the data exactly, byte for byte. The ID is padded with blanks if the field is entered with less than *n* bytes.

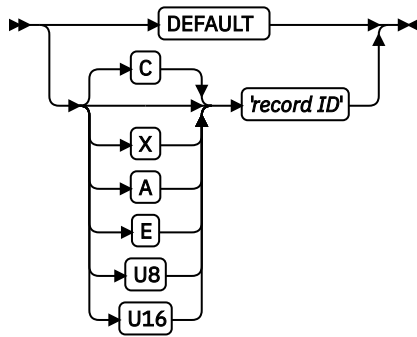
The LAYOUT command is used in a different type of page definition, a Record Format page definition. The LAYOUT command is analogous to the PRINTLINE and XLAYOUT commands in Traditional page definitions and XML page definitions.

Notes:

1. The LAYOUT command defines a Record Format page definition and cannot be mixed with PRINTLINE commands, which define Traditional page definitions, or XLAYOUT commands, which define XML page definitions.
2. Typically the *record ID* is 10 bytes long; however, it can be specified as 1 - 250 bytes by using the RECIDLLEN subcommand on either the PAGEDEF or PAGEFORMAT commands

Subcommands

DEFAULT



This *'record ID'* is used only when the layout type is either PAGEHEADER or PAGETRAILER and no name is needed.

'record ID'

The *'record ID'* is a quoted name up to 250 characters long that is accepted as is with no case folding or translation.

C'record ID'

The *C'record ID'* is a quoted name with a C for Character that is treated the same as a quoted name up to 250 characters. No folding or translation is done.

A'record ID'

The *A'record ID'* is a quoted name with an A for ASCII entered with up to 250 single-byte characters that are accepted as-is if on an ASCII operating system or translated to ASCII if on an EBCDIC operating system. The translation is made with no case folding.

E'record ID'

The *E'record ID'* is a quoted name with an E for EBCDIC entered with up to 250 single-byte characters that are accepted as-is if on an EBCDIC operating system or translated to EBCDIC if on an ASCII operating system. The translation is made with no case folding.

X'hhhh'

The *X'hhhh'* is a quoted name with an X for Hexadecimal entered with up to 500 hexadecimal characters. The characters are translated to hexadecimal, but no assumption of data type is made.

Note: All *X'00'* and *X'FF'* values are considered reserved and must not be used to specify the hexadecimal name value.

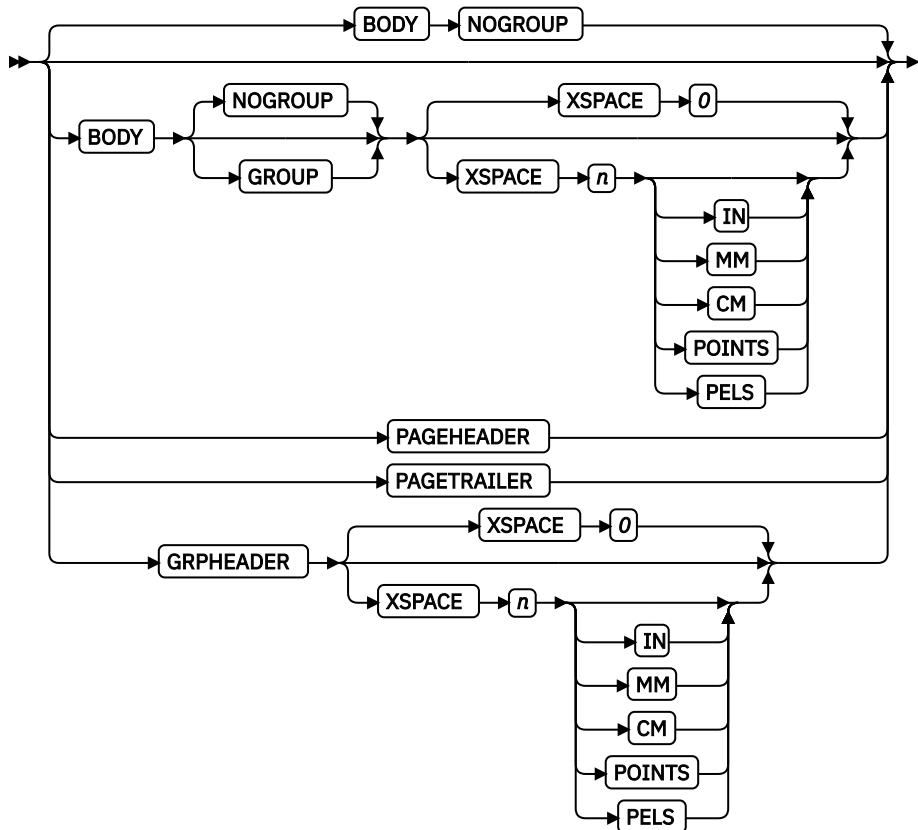
U8'record ID'

The *U8'record ID'* is a quoted name with a U8 for UTF-8 entered with up to 250 single-byte characters that are translated to UTF-8.

U16'record ID'

The *U16'record ID'* is a quoted name with a U16 for UTF-16 entered with up to 125 single-byte characters that are translated to UTF-16.

BODY



The BODY layout type is used for most of data in the user's database, normally printed line by line. This is the default.

GROUP

The GROUP parameter indicates that the existing group header must be saved and used for subsequent pages. If this parameter is not set when processing starts on a BODY layout, the active group header record is discarded and not reprinted on subsequent pages.

PAGEHEADER

This layout type specifies a header that is to be printed on each new page. The baseline position of this layout is normally in the top margin, but can be anywhere on a logical page. If RELATIVE is specified, the position is considered to be relative to the page origin. Usually contains customer's name, address, account number, and so forth. Only one default PAGEHEADER layout can be specified in a PAGEFORMAT and no input record data can be specified in a default layout.

GRPHEADER

This layout type specifies a header that is to be printed at the beginning of a group of data. If a logical page eject occurs before the group of data ends, the header is printed after the top margin on each new page until the group ends. The baseline position of this layout can be specified as RELATIVE. It can include column headings.

XSPACE

XSPACE indicates the amount of extra space from the position of the layout to the bottom of the group header area. This allows the user to identify the amount of extra space in excess of one text line that is used by the header so that the baseline moves down and the following group data is not placed on top of the header area. This space is not calculated by PPFA and must be explicitly defined by the user. See [Figure 133 on page 347](#) (shaded space shows group header area):

Checks	Check No.	Date	Amount
	352	01/04/90	⌘ 321.50
	353	01/05/90	⌘ 100.00
	354	01/10/90	⌘ 122.30

Figure 133: Example Showing the Use of XSPACE.

When a Group Header record is processed and is still active when it leaves the PAGEFORMAT, the group header record is saved by the presentation services program. Whenever the same PAGEFORMAT is reinvoked, the saved group header record is presented again if the first body record after reinvoking the PAGEFORMAT selects a Body record that has the Group Indicator on.

PAGETRAILER

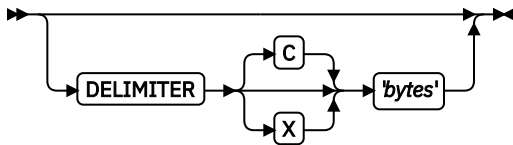
This layout type specifies a trailer that is to be printed on each new page. The baseline position of this layout is normally in the bottom margin, but can be located anywhere on a logical page and can be specified as RELATIVE. Only one default PAGETRAILER layout can be specified in a PAGEFORMAT and no input record data is processed with a default layout. It can contain the name of the form or a footnote.

NEWPAGE



This parameter indicates that a new page must be started with this layout name. If it is a header or trailer layout, the print position is moved to the start of a new page before this header or trailer becomes the active header or trailer.

DELIMITER

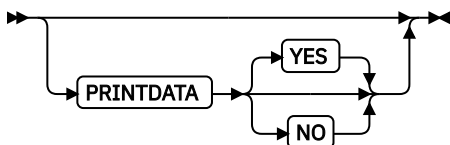


The delimiter is a one or two-byte code that is specified in either character or hex indicates a delimiting character within the customer's database and is used to separate fields. PPFA translates the character data to the data type specified by the UDType subcommand on the PAGEDEF command. Hex characters must be entered in uppercase within the quotation marks and are not translated.

Notes:

1. Delimiters that are specified after the Record ID are ignored.
2. You cannot mix delimited and non-delimited fields on the same LAYOUT command.
3. A single-byte delimiter character is ignored when EBCDIC double byte text (SOSI) is processed.

PRINTDATA



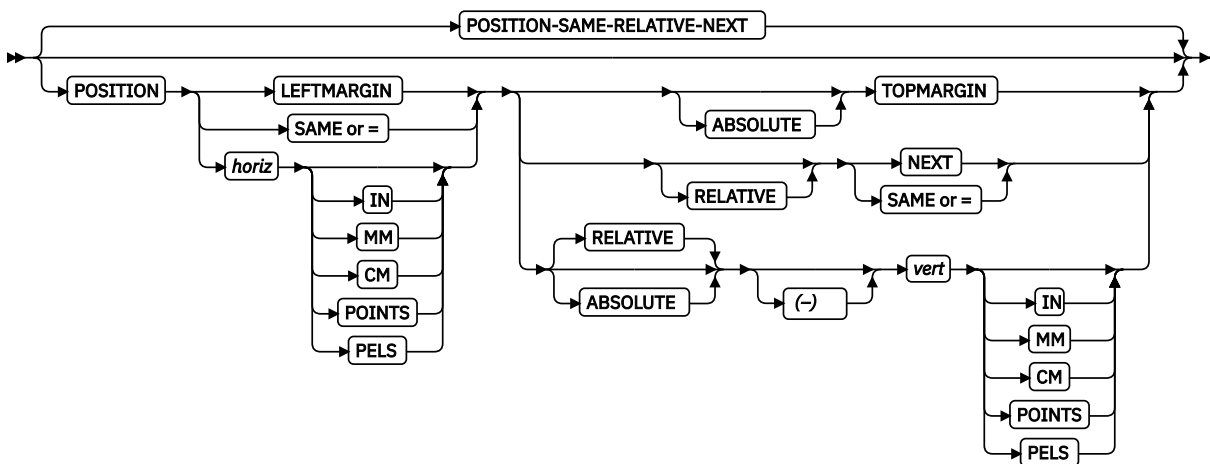
Specifies whether the line of data that is associated with the current LAYOUT must be printed. The PRINTDATA subcommand is useful when the data stream is interspersed with lines of comments, blank lines, or lines without data that is not meant to be printed.

YES

Specifies that the data for the current LAYOUT is printed. YES is the default.

NO

Specifies that the data for the current LAYOUT is not printed.

POSITION

Used in positioning FIELD, DRAWGRAPHIC, and ENDGRAPHIC text and graphics. If RELATIVE is specified or POSITION is not specified, the baseline of the POSITION is relative to the previous LAYOUT position.

1. For PAGEHEADER RCD: The baseline position can be anywhere on a logical page, but cannot be specified as Relative.
2. For PAGETRAILER, GROUPHEADER and BODY RCDs: The baseline position can be anywhere on a logical page and can be specified as RELATIVE.

Specifies the starting position of the layout in the printout.

horizontal position**x-pos**

Specifies the horizontal offset from the left side of the logical page. The value is a number with up to three decimal places. The valid options for *x-pos* are described in the SETUNITS command for the horizontal value.

LEFTMARGIN

Specifies that this line starts at the position that is specified as the horizontal (x) value in the previous LEFTMARGIN subcommand within the page definition.

SAME

Specifies this line starts at the same horizontal offset position as the previously coded LAYOUT. If applied to the first LAYOUT of a logical page, the horizontal position is 0, which is the default.

=

Alternative for SAME.

RELATIVE

Specifies that the following vertical position value is to be processed as a relative value. The LAYOUT is positioned relative to the last LAYOUT placed on the page.

Notes:

1. If both TOP and RELATIVE are requested for the *y-pos* value, the RELATIVE request is ignored.
2. When PPSA uses RELATIVE positioning, it does not flag off-the-page conditions for the position of a LAYOUT or for any overlays, segments, or objects placed relative to that LAYOUT. LAYOUTS that fall outside the bounds of the logical page are flagged by the print server at run time.

3. When you are specifying RELATIVE, use the minus sign to indicate any negative values for the LAYOUT vertical position; you can use the plus sign to indicate positive values. If no sign is used, a positive value is assumed.
4. The DIRECTION for a relative LAYOUT must be ACROSS. Fields that are associated with a relative LAYOUT must have the same DIRECTION as the LAYOUT and must match the PAGEFORMAT DIRECTION.
5. If RELATIVE is specified with SAME or = as the *y-pos* value, the relative value in the LAYOUT is +0.
6. RELATIVE positioning is allowed on a LAYOUT command only if the LAYOUT and all its associated FIELD commands are formatted to print in the same direction as the PAGEFORMAT. That is, the DIRECTION parameter in the LAYOUT and any associated FIELD commands must specify (or default to) ACROSS. The DIRECTION in the PAGEFORMAT or PAGEDEF command is any allowable value: ACROSS, DOWN, BACK, or UP.

vertical position

y-pos

Specifies the vertical offset from the top side of the logical page. The value options for *y-pos* are described in the SETUNITS command for the vertical value.

TOPMARGIN

Specifies that the LAYOUT is placed in the position that is specified as the vertical (*y*) value in the TOPMARGIN subcommand within the page definition.

NEXT

Specifies the layout is to be positioned down (on the logical page) one line (as defined in the LINESP subcommand of the last SETUNITS command) from the previous LAYOUT. The LINESP subcommand of the SETUNITS command establishes the distance from one line to the next.

When NEXT is specified for the first LAYOUT of a logical page, the starting position of the line is one line down from the top of the logical page, as defined by the TOPMARGIN subcommand.

Note: The down direction is determined by the direction of the logical page (as specified in the page format), not the LAYOUT direction. Therefore, NEXT is mainly useful in ACROSS LAYOUTS.

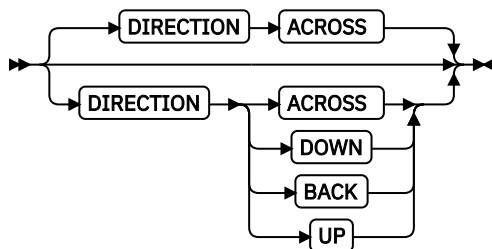
SAME

Specifies this LAYOUT starts at the same vertical position as the previous LAYOUT.

=

Alternative for SAME.

DIRECTION



Specifies the print direction of the line relative to the upper-left corner as you view the logical page. Not all printers can print in all print directions. For more information about your printer, see your printer documentation.

If DIRECTION is not specified, the direction that is specified in the PAGEFORMAT command is used. Observe that this direction is additive to the direction specified in the PAGEFORMAT command. See ["PAGEFORMAT Command"](#) on page 392.

ACROSS

The layout direction is rotated 0 degrees relative to the direction specified in the PAGEFORMAT (the layouts are oriented in the same direction as the page).

DOWN

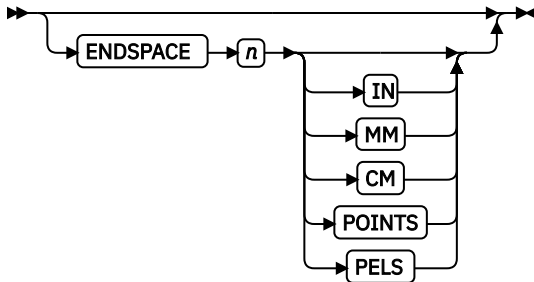
The layout direction is rotated 90 degrees relative to the direction specified in the PAGEFORMAT.

BACK

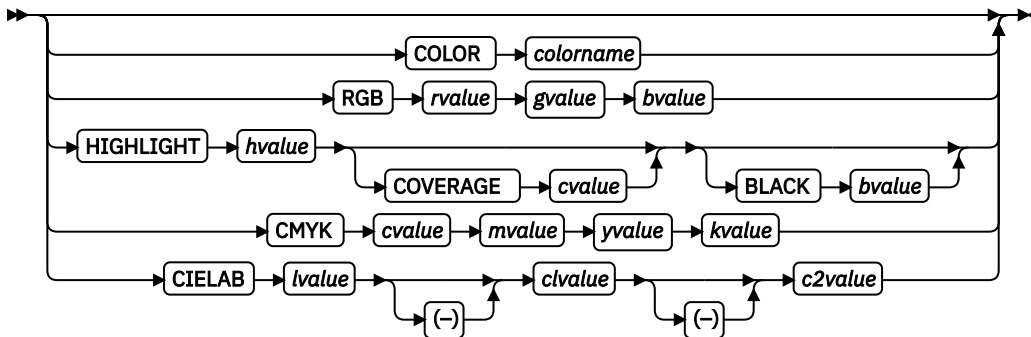
The layout direction is rotated 180 degrees relative to the direction specified in the PAGEFORMAT.

UP

The layout direction is rotated 270 degrees relative to the direction specified in the PAGEFORMAT.

ENDSPACE

If the remaining body space is less than the value specified, ENDSpace causes a logical page eject to be done. This can be used, for example, on a GRPHEADER layout to ensure that a group header does not print at the end of a page without the first data record of the group. ENDSpace does not include the space within the bottom margin (specified on the PAGEDEF or PAGEFORMAT command). This indicator is ignored on a PAGEHEADER or PAGETRAILER layout.

COLOR

Specifies an OCA or defined color for the text of this field. This subcommand is recognized only by printers that support multiple-color printing. See your printer publication for information about the colors that can be printed.

colorname

Values for *colorname* can be a defined color (see [“DEFINE COLOR Command”](#) on page 258), or an OCA *colorname*. Values for OCA *colornames* are:

- NONE
- DEFAULT
- BLACK
- BLUE
- BROWN
- GREEN
- RED
- PINK (or MAGENTA)
- TURQ (or CYAN)
- YELLOW
- DARKBLUE (or DBLUE)

ORANGE
PURPLE
MUSTARD
GRAY
DARKGREEN (or DGREEN)
DARKTURQ (DTURQ, or DCYAN, or DARKCYAN)

The color choices depend on the printer.

If you do not enter one of these colors, the default color for that printer is used. NONE is the color of the medium; DEFAULT is the printer default color.

Note: In some printer manuals, the color turquoise (TURQ) is called *cyan*, and the color pink (PINK) is called *magenta*.

PPFA supports the following synonyms:

- CYAN for TURQ
- DARKCYAN for DARKTURQ
- DBLUE for DARKBLUE
- DCYAN for DARKTURQ
- DGREEN for DARKGREEN
- DTURQ for DARKTURQ
- MAGENTA for PINK

color models

Specifies the color of print for this field that is supported in MO:DCA for the Red/Green/Blue color model (RGB), the highlight color space, the Cyan/Magenta/Yellow/Black color model (CMYK), and the CIELAB color model.

RGB *rvalue gvalue bvalue*

Three RGB integer values are used. The first (*rvalue*) represents a value for red, the second (*gvalue*) represents a value for green, and the third (*bvalue*) represents a value for blue. Each of the three integer values can be specified as a percentage 0 - 100.

Note: An RGB specification of 0/0/0 is black. An RGB specification of 100/100/100 is white. Any other value is a color somewhere between black and white, depending on the output device.

HIGHLIGHT *hvalue* COVERAGE *cvalue* BLACK *bvalue*

Indicates the highlight color model. Highlight colors are device-dependent.

You can use an integer within the range of 0 - 65535 for the *hvalue*.

Note: An *hvalue* of 0 indicates that no default value is defined; therefore, the default color of the presentation device is used.

COVERAGE indicates the amount of coverage of the highlight color to be used. You can use an integer within the range of 0 - 100 for the *cvalue*. If less than 100 percent is specified, the remaining coverage is achieved with the color of the medium.

Note: Fractional values are ignored. If COVERAGE is not specified, a value of 100 is used as a default.

BLACK indicates the percentage of black to be added to the highlight color. You can use an integer within the range of 0 - 100 for the *bvalue*. The amount of black shading that is applied depends on the COVERAGE percentage, which is applied first. If less than 100 percent is specified, the remaining coverage is achieved with black.

Note: If BLACK is not specified, a value of 0 is used as a default.

CMYK *cvalue mvalue yvalue kvalue*

Defines the cyan/magenta/yellow/black color model. *cvalue* specifies the cyan value. *mvalue* specifies the magenta value. *yvalue* specifies the yellow value. *kvalue* specifies the black value. You can use an integer percentage within the range of 0 - 100 for any of the CMYK values.

CIELAB *Lvalue (-)c1value (-)c2value*

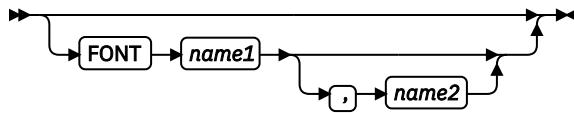
Defines the CIELAB model. Use a range of 0.00 to 100.00 with *Lvalue* to specify the luminance value. Use signed integers from -127 to 127 with *c1value* and *c2value* to specify the chrominance differences.

Lvalue, *c1value*, *c2value* must be specified in this order. No defaults exist for the subvalues.

Notes:

1. Do not specify both an OCA color with the COLOR subparameter and an extended color model on the same FIELD or PRINTLINE command. The output is device-dependent and might not be what you expect.
2. Do not specify two extended COLOR subcommands on the same FIELD or PRINTLINE command.

FONT



Defines the font to be used for the layout.

name1

Specifies the name of a font that is used to print the data. This font must be defined in a previous FONT command in the page definition.

If Shift-Out, Shift-In (SOSI) processing is used, *name1* must be the single-byte font.

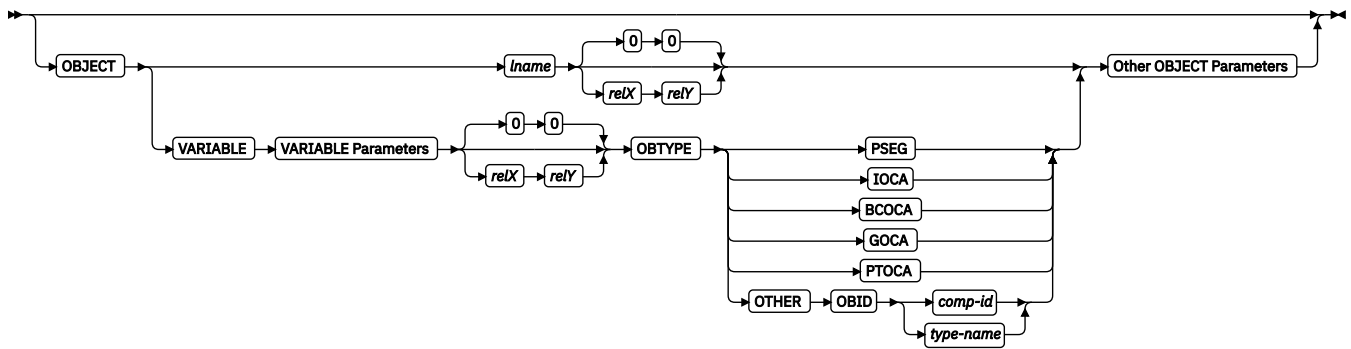
name2

Specify only when you are using Shift-Out, Shift-In (SOSI) processing to dynamically switch between a single-byte font and a double-byte font within the layout. *name2* must be the double-byte font.

Notes:

1. If this subcommand is not specified in the print data, the print server uses the font indicated. Otherwise, the print server selects a default font.
2. *name2* is only valid with EBCDIC data.

OBJECT



Specifies the name of an object that is to be positioned and oriented relative to the location specified in the LAYOUT command in which the OBJECT subcommand was named. The OBJECT, as identified by the *Iname* parameter, must be defined by an OBJECT command.

Note: Multiple page/image objects that are used without specifying a page with OBPAGE default to using the first page in the object.

You can place multiple objects on the same LAYOUT command and you can place the same object multiple times. Each placement must have its own set of placement parameters, as follows:

Iname

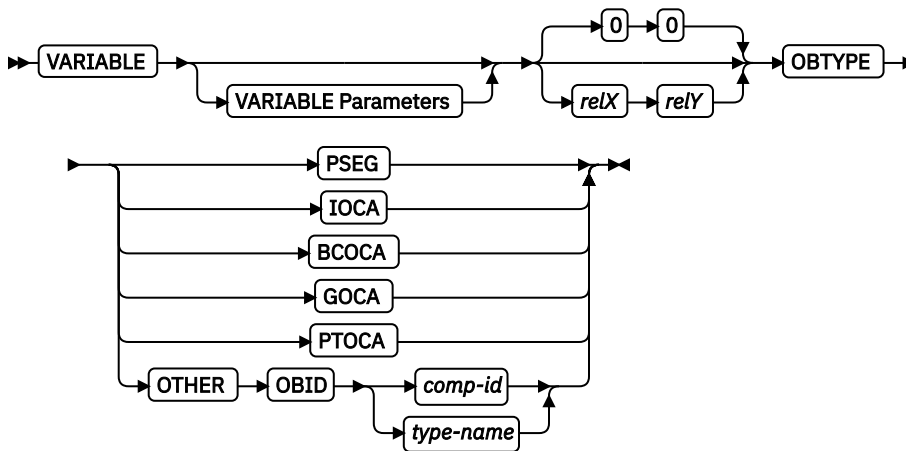
Specifies the local name of an object that is up to 16 alphanumeric characters in length. The *Iname* is used to match the LAYOUT OBJECT subcommand to its definition from the OBJECT command. An object must be defined with this local name by the OBJECT command.

relX relY

Specifies the number of units (such as inches or mm) that are added to the position of the current LAYOUT to position the top-left corner of the object. The values for the horizontal and vertical positioning are limited by the type of printer that is used and the L-units that are specified with the PELSPERINCH parameter on the PAGEDEF or PAGEFORMAT command.

Each position specification can be a positive or negative number with up to three decimal places. The units that are specified can be one of these: IN, MM, CM, POINTS, or PELS.

VARIABLE

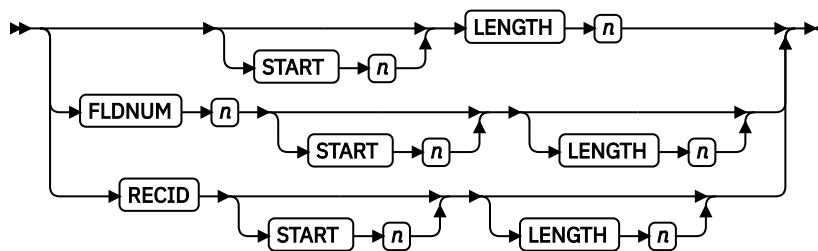


Indicates that the actual name of the object is read from the data record. The Variable-Name-Locator field specifies where in the data to get the name.

Notes:

1. Any object that is to be included in this manner must be defined in the PAGEDEF by using the OBJECT command. Defining objects enhances performance.
2. If you specify VARIABLE for the OBJECT name and don't want to print the name, then you must have at least one field command, or code PRINTDATA NO on the LAYOUT command.

VARIABLE Parameters



START n

The starting position in the data record to get the overlay name. The first data byte position of the input record is 1. If START is not coded, 1 is assumed.

LENGTH *n*

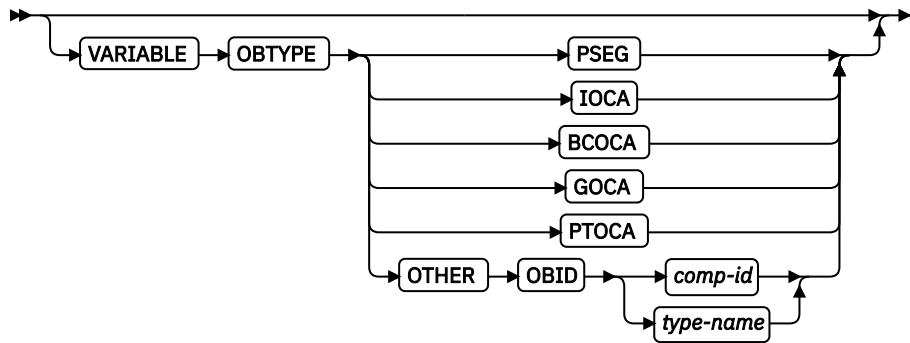
Length of field. Specifies the number (*n*) of bytes to process from the data record, beginning with the position specified in START. The maximum length is 8.

FLDNUM *n* START *n* LENGTH *n*

The field number. This is the same as in the FIELD command. The overlay name is taken from the *n* field of the input data record. START *n* and LENGTH *n* describe which portion of the *n* field is used. If omitted, the entire field is used to form the overlay name.

RECID

Gets the name from the record ID. This is the same as in the FIELD command. Use START *n* and LENGTH *n* to use only a portion of the record ID, or leave them out to use the entire record field.

OBTYPE

Used to specify the type of the object. Observe that each of the object types restricts the type of mapping option that is allowed in the placement of the object (OBMAP on the OBJECT subcommand on the PRINTLINE command).

PSEG

Specifies a page segment object, as described in the *Mixed Object Document Content Architecture Reference*. All mapping types (OBMAP) are allowed by PPGA; however, the print server issues an error if any of the objects that are contained in the page segment are not compatible with the coded OBMAP parameter.

GOCA

Specifies a graphic object, as described in the *Graphics Object Content Architecture Reference*. You use GOCA to specify TRIM, FIT, CENTER, REPEAT, and FILL parameters on the OBMAP subcommand.

BCOCA

Specifies a bar code object, as described in the *Bar Code Object Content Architecture Reference*. You use BCOCA to specify only the LEFT parameter on the OBMAP subcommand.

IOCA

Specifies an image object, as described in the *Image Object Content Architecture Reference*. You use IOCA to specify TRIM, FIT, CENTER, REPEAT, and FILL parameters on the OBMAP subcommand.

PTOCA

Specifies a presentation text object with Object Environment Group (OEG) as described in the *Presentation Text Object Content Architecture Reference* and the *Mixed Object Document Content Architecture Reference*. You use the PTOCA object type to specify the LEFT parameter in the OBMAP subcommand.

OTHER

Specifies other object data. The object data to be included is a paginated presentation object with a format that might or might not be defined by an AFP architecture. When you specify OTHER, you must also specify the OBID parameter. You use OTHER to specify TRIM, FIT, CENTER, REPEAT, and FILL parameters on the OBMAP subcommand.

OBID

Specifies either a component identifier or a type name from [Table 13](#) on page 355. The OBID is translated into an Encoded OID and matched to the OID inside the object; they must match.

comp-id

Specifies the component identifier.

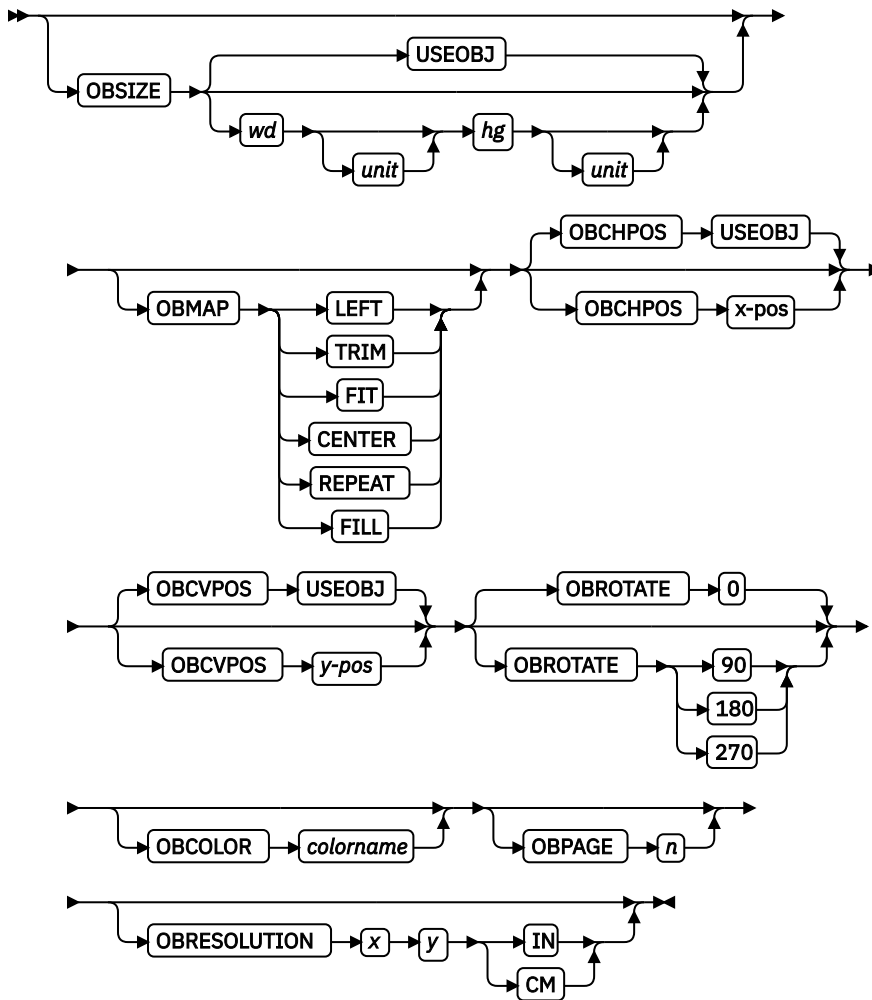
type-name

The name that is chosen by PPFA as an alternative to coding a component identifier.

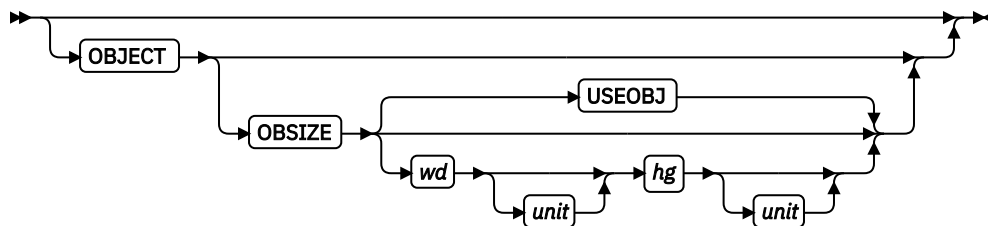
Type-Name	Component-ID	Description of OBID Object Type
EPS	13	Encapsulated PostScript
TIFF or TIF	14	Tag Image File Format
WINDIB	17	Device Dependent Bit Map [DIB], Windows Version
OS2DIB	18	Device Dependent Bit Map [DIB], PM Version
PCX	19	Paint Brush Picture File Format
GIF	22	Graphics Interchange Format
JFIF, JPEG, or JPG	23	AFPC (AFP Consortium) JPEG Subset
PDFSPO	25	PDF Single Page Object
PCLPO	34	PCL Page Object
EPSTR	48	EPS with Transparency
PDFSPOTR	49	PDF Single Page Object with Transparency
MTIFF	61	TIFF Multiple Image File
MTIFFNT	62	TIFF Multiple Image without Transparency File
MPDF	63	PDF Multiple Page File
MPDFT	64	PDF Multiple Page with Transparency File
PNG	65	PNG File Format
AFPCTIFF	66	AFPC TIFF Subset

Type-Name	Component-ID	Description of OID Type-Name
PDFRO	26	PDF Resource Object (new)
RESCLPRO	46	Resident Color Profile Resource Object
IOCAFS45RO	47	IOCA FS45 Resource Object Tile (new)

Other OBJECT parameters



OBSIZE



Specifies the size of the object placement area. When no OBSIZE is specified, the default is the size that is specified in the object. If no size is specified in the object, the size of the page is used. The page width is as specified on the PAGEDEF or PAGEFORMAT commands, or it defaults to 8.3 inches by 10.8 inches.

wd

Specifies the width of an object placement area as a number with up to three decimal places. The allowable width might vary with the type of printer that is used and the L-units that are specified with the PELSPERINCH parameter on the PAGEDEF or PAGEFORMAT command.

hg

Specifies the height of the object placement area as a number with up to three decimal places. The allowable height might vary with the type of printer that is used and the L-units

that are specified with the PELSPERINCH parameter on the PAGEDEF or PAGEFORMAT command.

unit

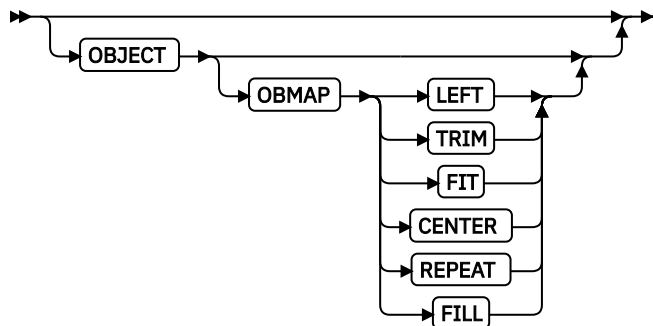
Specifies a unit of measurement for the width parameter. The choices are: IN, MM, CM, POINTS, or PELS.

Note: If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

USEOBJ

Specifies that the size measurements that are specified in the object are to be used. If no size is specified in the object, the size of the page is used, which is the length and width as specified on the PAGEDEF or PAGEFORMAT commands, or it defaults to 8.3 inches by 10.8 inches.

OBJMAP



Specifies mapping options. The OBJMAP parameter defines the mapping of the object to the object placement area. If OBJMAP is not coded, the mapping option within the object is used. If the object does not contain a mapping option, then the print server sets it to the created default for the container type.

Each object type (OBJTYPE on the OBJECT command) dictates the allowable mapping options for that type. When it can, PPFA issues a message when these rules are violated. However, for an object type of page segment (OBJTYPE=PSEG), PPFA does not know what types of objects are contained in it; therefore, PPFA cannot enforce the restrictions. See [“OBJECT Command” on page 363](#) for a description of the restrictions.

LEFT

Specifies that the object is positioned at the upper, left corner of the object placement area, as defined or defaulted by the *relative-xpos*, *relative-ypos*, OBCHPOS, and OBCVPOS parameters. Any portion of the object that falls outside the object placement area as defined by the OBSIZE parameter is not trimmed and might cause an exception condition by the presentation system.

TRIM

Specifies position and trim. The object is positioned at the upper, left corner of the object placement area, as defined or defaulted by the *relative-xpos*, *relative-ypos*, OBCHPOS, and OBCVPOS parameters. Any portion of the object that falls outside the object placement area as defined by the OBSIZE parameter is trimmed.

FIT

Specifies scale to fit; this value is the default if the OBJMAP parameter is not coded. The object is to be scaled to fit within the object placement area, as defined by the OBSIZE parameter. The center of the object is placed in the center of the object placement area and the object is scaled up or down to fit the block. Scaling in the horizontal and vertical directions is symmetrical. The FIT parameter ensures that all of the data in the object is presented in the object placement area at the largest possible size. The object is not trimmed.

CENTER

Specifies that the center of the object is positioned at the center of the object placement area. Any portion of the object that falls outside the object placement area is trimmed.

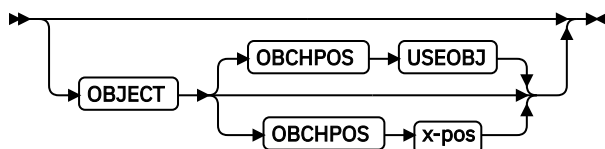
REPEAT

Specifies that the origin of the data object is positioned with the origin of the object placement area. The object is then replicated in the X and Y directions. If the last replicated data does not fit in the object area, it is trimmed to fit.

FILL

Specifies that the center of the data object is positioned coincident with the center of the object placement area. The data object is then scaled so that it totally fills the object placement area in both the X and Y directions. This might require that the object is asymmetrically scaled by different scale factors in the X and Y directions.

OBCHPOS



Specifies the horizontal offset of the object contents within the object placement area as a number.

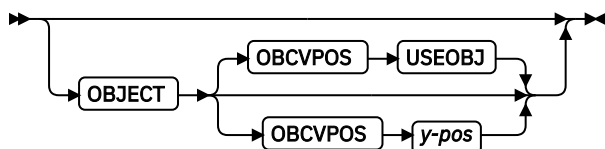
x-pos

Specifies a positive or negative number. The valid options for *x-pos* are described in the SETUNITS command for the horizontal value.

USEOBJ

Specifies that the offset value from the object is to be used. If no value is set in the object, the value defaults to 0.

OBCVPOS



Specifies the vertical offset of the object contents within the object placement area, as defined by the OBSIZE parameter. If OBCVPOS is not specified, it defaults to USEOBJ and uses the value set in the object. If no value is set in the object, the value defaults to 0. The OBCHPOS parameter is used only in LEFT and TRIM mapping of the object into the object placement area.

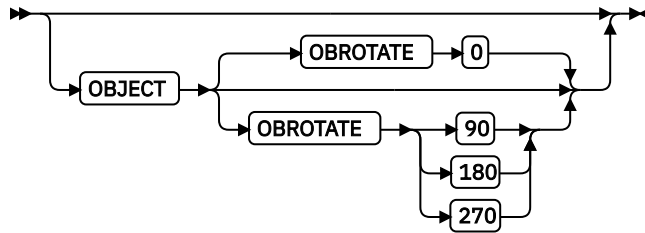
y-pos

Specifies a positive or negative number. The valid options for *y-pos* are described in the SETUNITS command for the vertical value.

USEOBJ

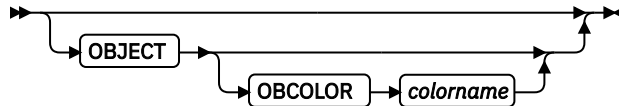
Specifies that the offset value from the object is to be used. If no value is set in the object, the value defaults to 0.

OBROTATE {0|90|180|270}



Specifies the object rotation in regard to the current LND's coordinate system.

OBCOLOR



Specifies the color to be used as the default color or initial color for the object placement area. The OBCOLOR parameter is used only for objects of the PSEG, GOCA, BCOCA, and IOCA type. If the object type is OTHER, this parameter is ignored.

colorname

Values for *colorname* can be a defined color (see [“DEFINE COLOR Command”](#) on page 258) or one of these OCA color spaces:

- NONE
- DEFAULT
- BLACK
- BLUE
- BROWN
- GREEN
- RED
- PINK (or MAGENTA)
- TURQ (or CYAN)
- YELLOW
- DARKBLUE (or DBLUE)
- ORANGE
- PURPLE
- MUSTARD
- GRAY
- DARKGREEN (or DGREEN)
- DARKTURQ (DTURQ, or DCYAN, or DARKCYAN)

In the following example, the page definition `pd1` defines an object with an external name of `PSEGxyz`, of object type `PSEG`. The object has an internal name of `xyzintname`. The internal name identifies the object for the `LAYOUT OBJECT` subcommand when the object is placed. Observe that case is not significant on either the internal nor the external names.

```
PAGEDEF pd1 Replace Yes
COMMENT 'this is my program';
FONT XF1 ;

OBJECT xyzIntName
  OBXNAME PSEGxyz
  OBTYP E PSEG ;

PAGEFORMAT pf1;
LAYOUT 'abc' POSITION 2 in 1 in;
OBJECT xyzintname 1.1 in 2.1 in
```

```
OBSIZE 3 in 5 in
OBMAP FILL
OBCOLOR BLUE ;
```

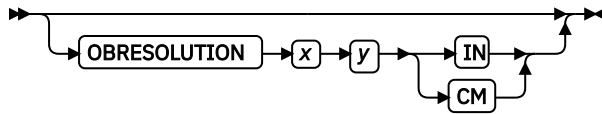
The LAYOUT in PAGEFORMAT pf1 places the object on the page 1.1 inches to the left and 2.1 inches below the current LAYOUT position. It also maps the object into the object area with the FILL parameter, which centers the object in the object area and totally fills the area, possibly with different scaling factors in the X and Y directions. It has an area size of 3 by 5 inches, and overrides the default presentation space color to BLUE.

OBPAGE



Specifies the page number of a multipage object or file to be presented. *n* is the page number. A number 1 - 999999999 (9 digits) is valid.

OBRESOLUTION



Specifies the resolution and unit of measurement of an image. If the resolution is already specified inside the image, this information is ignored by the printer. Use this subcommand for images that do not or might not contain their resolution. Specify resolution of an image so that the printer can print the image correctly.

To specify object resolution, you must have a printer and a print server (PSF or IPM) that support this capability.

If not specified, the default is to assume that the image resolution is the same as the printer. If the image does not print at the size you expect, use OBRESOLUTION to identify the image's resolution. With the resolution information, the printer is then able to print the image at the expected size.

x

Specifies the number to be used for the horizontal resolution of an image. Specify an integer value in the range of 1 - 3276.

y

Specifies the number to be used for the vertical resolution of an image. Specify an integer value in the range of 1 - 3276.

unit

Specifies a unit of measurement. The choices are:

IN

Inch

CM

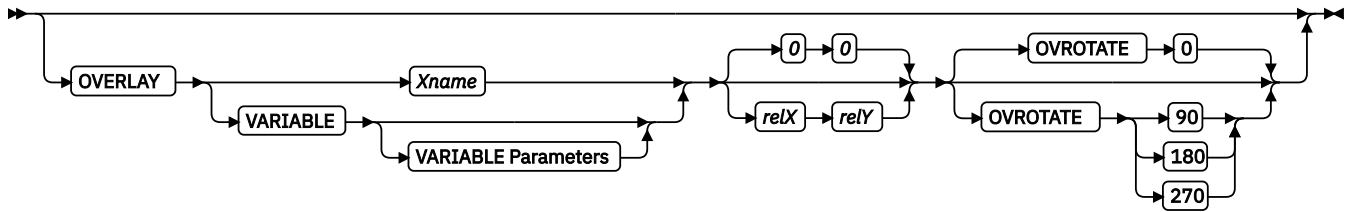
Centimeter

Example: In the following code example, the OBJECT subcommand is used to define a JFIF object (which can be specified as JPG). This object has a resolution of 300 pels per inch in both the *x* and *y* directions.

```
Pagedef obres2 replace yes;

PRINTLINE OBJECT VAR .4 .5 start 2 length 6
          OBTYPE OTHER OBID JPG
          OBRESOLUTION 300 300 IN;
```

OVERLAY



Specifies the name of an overlay that is to be positioned relative to the location specified in the LAYOUT command in which the OVERLAY subcommand was named. The PAGEFORMAT OVERLAY command can contain the named overlays. The maximum number of overlays that are specified for a PAGEFORMAT including the LAYOUT OVERLAY subcommand is 254.

Specifies the electronic overlay that is to be used with this subgroup.

Xname

Specifies the user-access name as defined in the OVERLAY command.

Notes:

1. PPFA checks for duplication of local names. If a duplication exists, the page definition is generated, but a warning message is issued.
2. PPFA does not check for duplicate user-access names.

relX relY

Specifies the number of units (such as inches or mm) that are added to the position of the layout to position the top-left corner of the overlay. The values for horizontal and vertical can be (+) or (-). The maximum value is + or - 32760 L-units. For example:

- OVERLAY NAME1 2 in 1 in
- OVERLAY NAME2 5 mm 1 mm

Note: Any offset coded in the overlay itself is added to this offset.

VARIABLE

Indicates that the actual name of the overlay, including the O1 prefix, is read from the data record. The Variable-Name-Locator field specifies where in the data to get the name.

Notes:

1. Any overlay that is to be included in this manner must be defined in the PAGEFORMAT by using the OVERLAY command. Any overlay that is included but not defined causes a runtime print error for a missing MPO structured field, for example APS263I.
2. If you specify VARIABLE for the OVERLAY name and don't want to print the name, then you must have at least one field command, or code PRINTDATA NO on the LAYOUT command.

VARIABLE Parameters

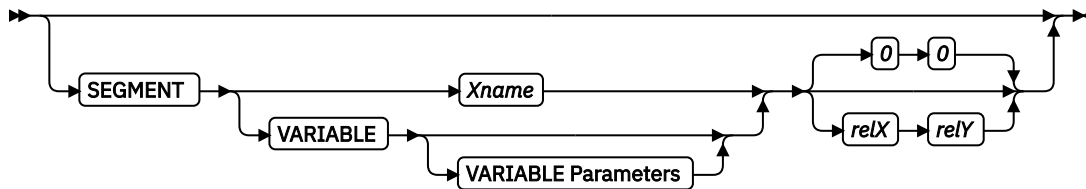
See “[VARIABLE Parameters](#)” on page 353 for the syntax. The field number and record ID are only used for Record Layout and XML Page definitions.

OVROTATE {0|90|180|270}

Specifies the rotation of the placed overlay in regard to the x-axis of the page.

See “[FORMDEF Command](#)” on page 216 for an OVROTATE example, which is presented in the FORMDEF description.

SEGMENT



Specifies the name of a segment that is to be positioned relative to the location specified in the LAYOUT command in which the SEGMENT subcommand was named. The PAGEFORMAT SEGMENT command can contain the named segments. The maximum number of segments that are specified for a PAGEFORMAT including the LAYOUT SEGMENT subcommand is 127.

Specifies the page segment that is to be used with this subgroup.

Xname

Specifies the user-access name as defined in the SEGMENT command.

Notes:

1. PPFA checks for duplication of local names. If a duplication exists, the page definition is generated, but a warning message is issued.
2. PPFA does not check for duplicate user-access names.

relX relY

Specifies the number of units (such as inches or mm) that are added to the position of the layout to position the top-left corner of the page segment. The values for horizontal and vertical can be (+) or (-). The maximum value is + or - 32760 L-units. For example:

- SEGMENT MYSEG1 2 in 1 in
- SEGMENT MYSEG1 5 mm 1 mm

VARIABLE

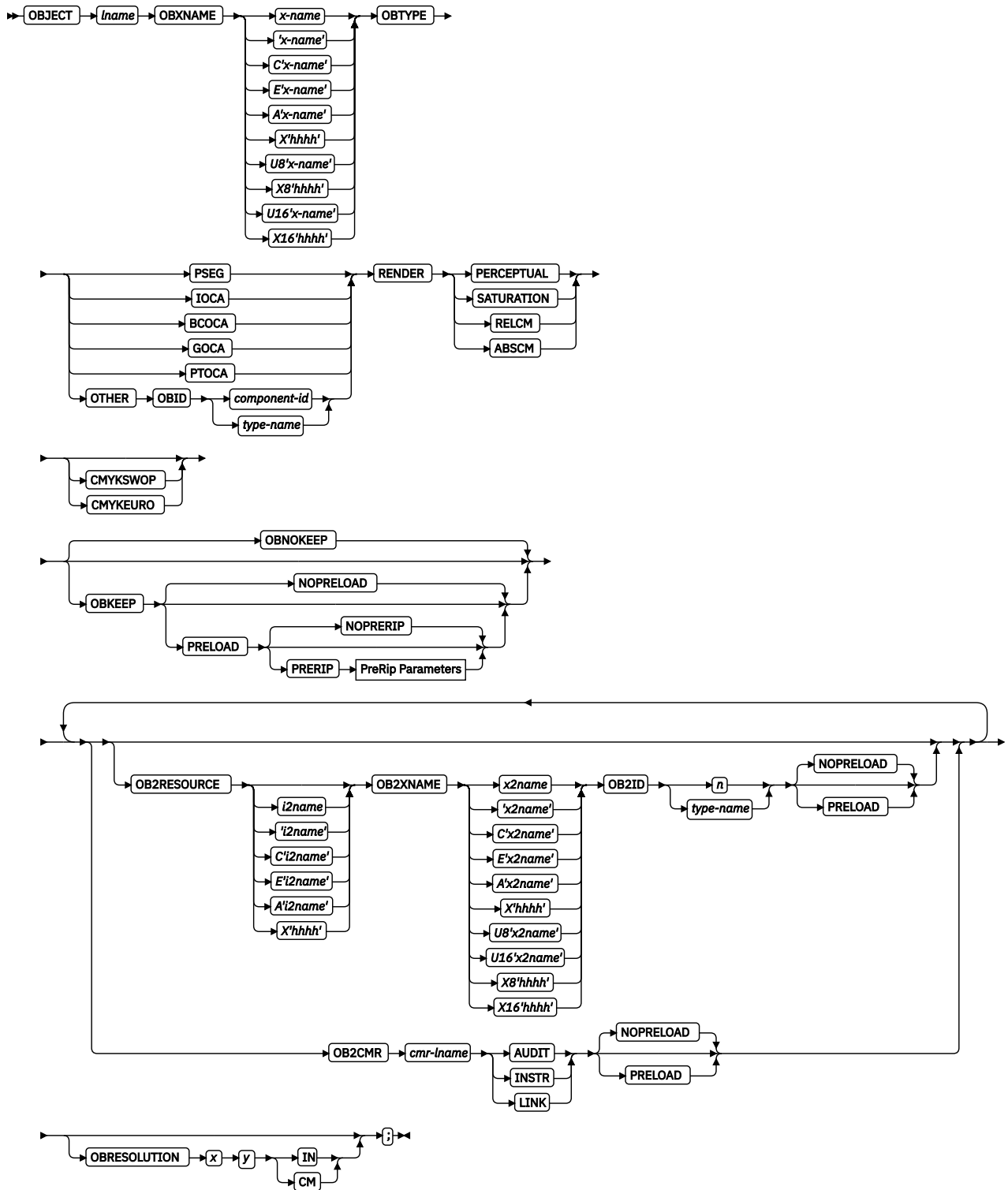
Indicates that the actual name of the segment, including the S1 prefix, is read from the data record. The Variable-Name-Locator field specifies where in the data to get the name.

Note: If you specify VARIABLE for the SEGMENT name and don't want to print the name, then you must have at least one field command, or code PRINTDATA NO on the LAYOUT command.

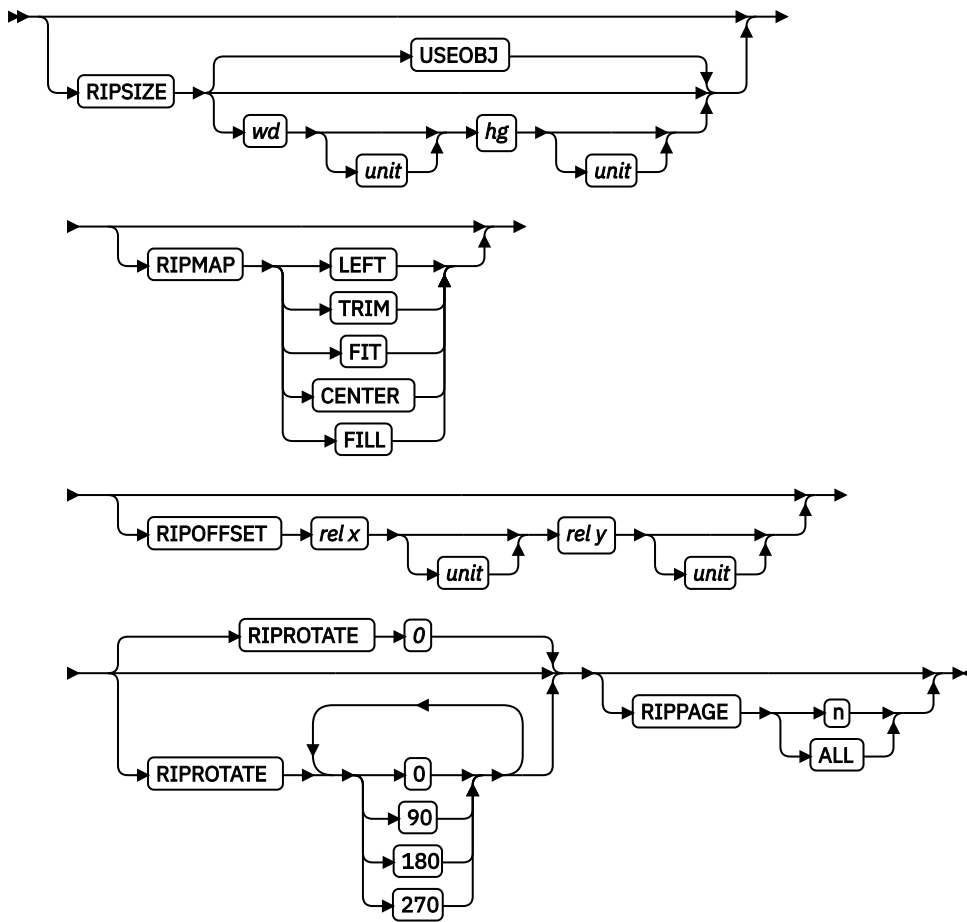
VARIABLE Parameters

See [“VARIABLE Parameters” on page 353](#) for the syntax. The field number and record ID are only used for Record Layout and XML Page definitions.

OBJECT Command



PreRip Parameters



You use the OBJECT command to define an external object to PPFA. Then, you can use the PRINTLINE command (Traditional) or the LAYOUT command (Record Format and XML) with the OBJECT subcommand to place the defined object on a page.

You can use one PRINTLINE command (Traditional), LAYOUT command (Record Format), or XLAYOUT command (XML) to place one or many defined objects multiple times with different placement parameters on each placement. On the PRINTLINE OBJECT subcommand, enter information about the positioning, rotation, color, object size, page number, and mapping instructions. All positioning is relative to the print line coordinate system. The *lname* appears on both the OBJECT command and on the PRINTLINE OBJECT subcommand (Traditional), the LAYOUT OBJECT command (Record Format), and the XLAYOUT OBJECT command (XML), and is used similar to the way overlays and page segments are defined and placed (or printed).

Notes:

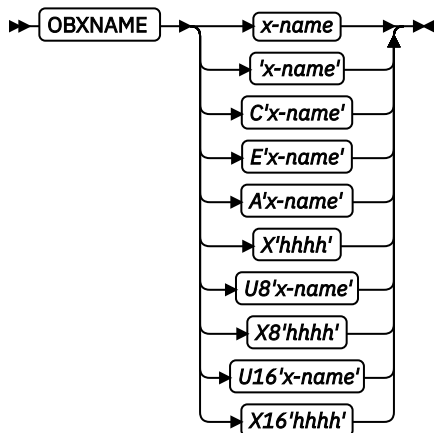
1. The *lname* is case insensitive but the *lname* of the OBJECT command and of the PRINTLINE OBJECT subcommand (Traditional), the LAYOUT OBJECT command (Record Format), and the XLAYOUT OBJECT command (XML) must match exactly.
2. This function requires both the print server and printer support. Check your print server and printer documentation.
3. Fonts that are used by the OBJECT must be mapped. You can use the EXTREF command to map a font.
4. CMRs used by the OBJECT must be mapped. You can use the EXTREF OB2CMR command to map a CMR.

OBJECT *lname*

Identifies the object and also is used to match a PRINTLINE OBJECT subcommand (Traditional), the LAYOUT OBJECT command (Record Format), and the XLAYOUT OBJECT command (XML). The *lname* can be no more than 16 alphanumeric characters.

Subcommands

OBXNAME



Specifies the external user access name of the resource object. The name indicates where on the file system the object is located.

Notes:

1. As a file system name, it must adhere to the rules of the operating system where the object is located. For example, the *x-name* in z/OS is the member name of the object in the object library, so it must be 8 characters or less and in uppercase EBCDIC code page 500.
2. All the translations assume code page International #5 (code page 500) for EBCDIC and LATIN1 ISO/ANSI 8-bit (code page 819) for ASCII.

x-name

Unquoted name up to 250 characters long is folded to uppercase and translated into EBCDIC if necessary.

'*x-name*'

Quoted name up to 250 characters long is accepted as-is with no case folding or translation.

'C'*x-name*

Quoted name with a "C" for Character is treated the same as a quoted name up to 250 characters. No folding or translation is done.

'A'*x-name*

Quoted name with an "A" for ASCII entered with up to 250 single-byte characters is accepted as-is if on an ASCII operating system or converted to ASCII if on an EBCDIC operating system. The conversion is made with no case folding.

'E'*x-name*

Quoted name with an E for EBCDIC entered with up to 250 single-byte characters is accepted as-is if on an EBCDIC operating system or converted to EBCDIC if on an ASCII operating system. The conversion is made with no case folding.

'X'*hhh*

Quoted name with an X for hexadecimal is entered with up to 500 hexadecimal characters. The characters are converted to hexadecimal, but no assumption of data type is made.

'U8'*x-name*

Quoted name with an U8 for UTF-8 entered with up to 250 single-byte characters is translated to UTF-8.

'X8'*hhh*

Quoted name with an X8 for UTF-8 HEX entered with up to 500 single-byte hexadecimal characters is translated to hexadecimal and assumed to be data type UTF-8. A multiple of two hexadecimal characters must be entered.

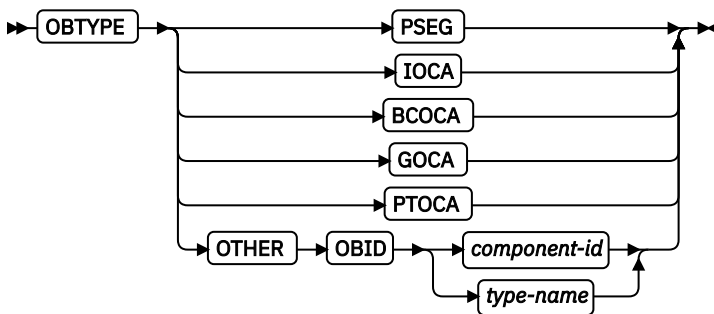
U16'x-name'

Quoted name with a U16 for UTF-16 entered with up to 125 single-byte characters is translated to UTF-16.

X16'hhhh'

Quoted name with an X16 for UTF-16 HEX is entered with up to 500 single-byte hexadecimal characters. The characters are translated to hexadecimal and assumed to be data type UTF-16. A multiple of four hexadecimal characters must be entered.

To have portability across older versions of print servers in multiple system environments, it is recommended that resource object names use EBCDIC encoding with code page 500.

OBTYPE

Used to specify the type of the object. Observe that each of the object types restricts the type of mapping option that is allowed in the placement of the object (OBMAP on the OBJECT subcommand on the PRINTLINE command (Traditional) or the LAYOUT command (Record Format and XML)).

PSEG

Specifies a page segment object, as described in the *Mixed Object Document Content Architecture Reference*. All mapping types (OBMAP) are allowed by PPFA; however, the print server issues an error if any of the objects that are contained in the page segment is not compatible with the coded OBMAP parameter.

GOCA

Specifies a graphics object, as described in the *Graphics Object Content Architecture Reference*. You use GOCA to specify TRIM, FIT, CENTER, REPEAT, and FILL parameters on the OBMAP subcommand.

BCOCA

Specifies a bar code object, as described in the *Bar Code Object Content Architecture Reference*. You use BCOCA to specify only the LEFT parameter on the OBMAP subcommand.

IOCA

Specifies an image object, as described in the *Image Object Content Architecture Reference*. You use the IOCA object type to specify TRIM, FIT, CENTER, REPEAT, and FILL parameters on the OBMAP subcommand.

PTOCA

Specifies a presentation text object with Object Environment Group (OEG) as described in the *Presentation Text Object Content Architecture Reference* and the *Mixed Object Document Content Architecture Reference*. You use the PTOCA object type to specify the LEFT parameter in the OBMAP subcommand.

OTHER

Specifies other object data. The object data that is included is a paginated presentation object with a format that might be defined by an AFP presentation architecture. When you specify OTHER, you must also specify the OBID parameter. You use the OTHER object type to specify TRIM, FIT, CENTER, REPEAT, and FILL parameters on the OBMAP subcommand.

OBID

Specifies either a component identifier or a type name from Table 15 on page 367. The OBID is translated into an Encoded OID and matched to the OID inside the object; they must match.

component-id

Specifies the component identifier.

type-name

Type-name is a name that is chosen by PPFA as an alternative to coding a component identifier.

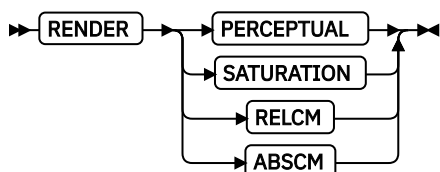
Table 15: Non-OCA Objects supported by IOB.

Type-Name	Component-ID	Description of OBID Object Type
EPS	13	Encapsulated PostScript
TIFF or TIF	14	Tag Image File Format
WINDIB	17	Device Dependent Bit Map [DIB], Windows Version
OS2DIB	18	Device Dependent Bit Map [DIB], PM Version
PCX	19	Paintbrush Picture File Format
GIF	22	Graphics Interchange Format
JFIF, JPEG, or JPG	23	AFPC (AFP Consortium) JPEG Subset
PDFSPO	25	PDF Single Page Object
PCLPO	34	PCL Page Object
EPSTR	48	EPS with Transparency
PDFSPOTR	49	PDF Single Page Object with Transparency
MTIFF	61	TIFF Multiple Image File
MTIFFNT	62	TIFF Multiple Image without Transparency File
MPDF	63	PDF Multiple Page File
MPDFT	64	PDF Multiple Page with Transparency File
PNG	65	PNG File Format
AFPCTIFF	66	AFPC TIFF subset

Table 16: Object Types that can be referenced as Secondary Resources

Type-Name	Component-ID	Description of OID Type-Name
PDFRO	26	PDF Resource Object (new)
RESCLRPRO	46	Resident Color Profile Resource Object
IOCAFS45RO	47	IOCA FS45 Resource Object Tile (new)

RENDER



Subcommand on the OBJECT command to specify the rendering intent (RI) for an object within a page definition.

RI is used to modify the final appearance of color data and is defined by the International Color Consortium (ICC). For more information about RI, see the current level of the ICC Specification.

Not all object types have rendering intent; in that case, rendering intent is ignored. The following list shows object types that can be specified as parameters on the OBTYPE subcommand, and the resulting rendering intent object type:

- PSEG - rendering intent that is specified on a PSEG is used for all object types
- IOCA - supported
- BCOCA - not supported. Rendering intent for BCOCA objects is fixed as media-relative colorimetric (RELCM).
- GOCA - supported
- PTOCA - supported
- OTHER - supported

rendering intent parameter

Specify the rendering intent for the preceding object type.

PERCEPTUAL

Perceptual rendering intent. It can be abbreviated as PERCP. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to give a pleasing appearance. This intent is typically used to render continuous-tone images.

SATURATION

Saturation rendering intent. It can be abbreviated as SATUR. With this rendering intent, gamut mapping is vendor-specific, and colors are adjusted to emphasize saturation. This intent results in vivid colors and is typically used for business graphics.

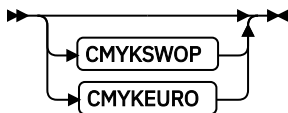
RELCM

Media-relative colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered in regard to the source white point and are adjusted for the media white point. Therefore, colors that are printed on two different media with different white points do not match colorimetrically, but might match visually. This intent is typically used for vector graphics.

ABSCM

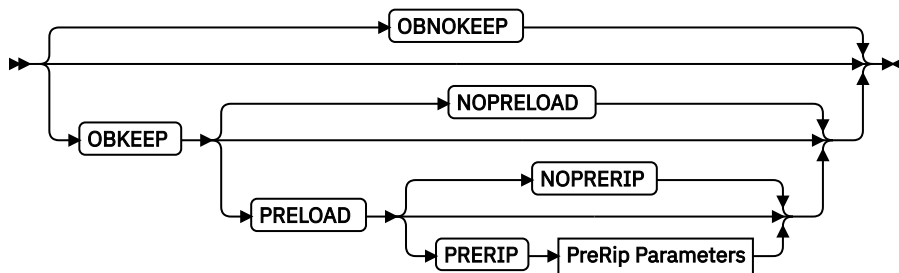
ICC-absolute colorimetric rendering intent. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered only in regard to the source white point and are not adjusted for the media white point. Therefore, colors that are printed on two different media with different white points must match colorimetrically, but might not match visually. This intent is typically used for logos.

CMYKSWOP | CMYKEURO



Indicates the color profile if it is required by the object.

OBNOKEEP



This object name is not included in a Map Data Resource structured field so that the object is loadable each time the object is placed on the page.

OBKEEP

This object is included in a Map Data Resource at the beginning of the PAGEDEF making a hard object at the beginning of the page and then available throughout without reloading.

Note: Only objects with OBTYPE IOCA and OTHER can be kept; otherwise, OBKEEP is ignored.

NOPRELOAD

Do not preload this object.

PRELOAD

Preload this object before processing the print job.

NOPRERIP

Do not PreRip this object.

PRERIP

Prepare an object for printing by rasterizing it with its presentation parameters — object area size, object mapping option, object content offset, and object rotation in regard to the media leading edge.

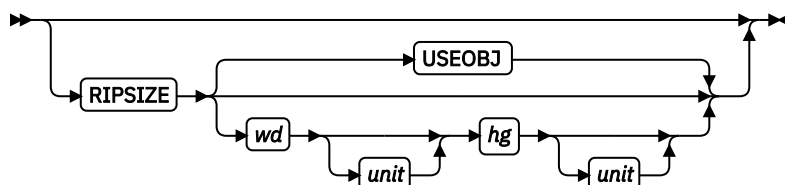
PreRip Parameters

These parameters are used to specify the exact rasterization of the object, its size, offset, mapping, and rotations.

Notes:

1. To specify multiple pages, rip sizes, mappings, and offsets for the same object, code multiple object commands.
2. Mapping an object (also known as KEEPing) enhances throughput by allowing the printer to download an object once and use it on subsequent pages of the same print job or possibly on subsequent print jobs. Secondary objects are always mapped.
3. Preloading an object consists of loading the object into the printer memory before the print job is started. This enhances throughput because it removes the downloading time from print-time to page build time.
4. Preripping further enhances throughput because it allows the object and its secondary objects to be rasterized (RIPped) at the proper size and rotation when they are preloaded. When a primary object is preripped, all its secondary objects are also preloaded and preripped.

RIPSIZE



Specifies the size of the object placement area. When no RIPSIZ is specified, the default is the size that is specified in the object. If no size is specified in the object, the size of the page is used. The page width is specified on the PAGEDEF or PAGEFORMAT commands, or it defaults to 8.3 inches by 10.8 inches.

USEOBJ

Specifies that the size measurements that are specified in the object are to be used. If no size is specified in the object, the size of the page is used, which is the length and width as specified on the PAGEDEF or PAGEFORMAT commands, or it defaults to 8.3 inches by 10.8 inches.

wd

Specifies the width of an object placement area as a number with up to three decimal places. The allowable width can vary with the type of printer that is used and the L-units that are specified with the PELSPERINCH parameter on the PAGEDEF or PAGEFORMAT command.

hg

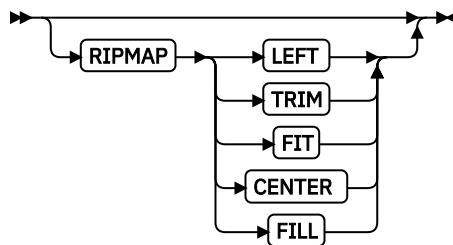
Specifies the height of an object placement area as a number with up to three decimal places. The allowable height can vary with the type of printer that is used and the L-units that are specified with the PELSPERINCH parameter on the PAGEDEF or PAGEFORMAT command.

unit

Specifies a unit of measurement for the width parameter. The choices are: IN, MM, CM, POINTS, or PELS.

Note: If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

RIPMAP



Specifies mapping options. The RIPMAP parameter defines the mapping of the object to the object placement area. If RIPMAP is not coded, the mapping option within the object is used. If the object does not contain mapping option, then the print server sets it to the created default for container type. Each object type (OBTYP on the OBJECT command) specifies the allowable mapping options for that type. See the OBJECT OBTYP parameter for a description of the restrictions.

FIT

Specifies scale to fit. This is the default value of the RIPMAP parameter is not coded. The object is to be scaled to fit within the object placement area, as defined by the RIPSIZ parameter. The center of the object is placed in the center of the object placement area and the object is scaled up or down to fit the block. Scaling in the horizontal and vertical directions is symmetrical. The FIT parameter ensures that all of the data in the object is presented in the object placement area at the largest possible size. The object is not trimmed.

FILL

Specifies that the center of the data object is positioned coincident with the center of the object placement area. The data object is then scaled so that it totally fills the object placement area in both the X and Y directions. This might require that the object is asymmetrically scaled by different scale factors in the X and Y directions.

LEFT

Specifies that the object is positioned at the upper, left corner of the object placement area, as defined or defaulted by the *relative-xpos*, *relative-ypos*, and RIPOFFSET parameters. Any portion of the object that falls outside the object placement area as defined by the RIPSIZ parameter is not trimmed and might cause an exception condition by the presentation system. This mapping type is invalid with an IOCA object.

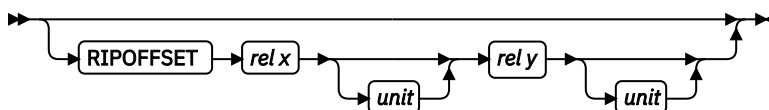
TRIM

Specifies position and trim. The object is positioned at the upper, left corner of the object placement area, as defined or defaulted by the *relative-xpos*, *relative-ypos*, and RIPOFFSET parameters. Any portion of the object that falls outside the object placement area as defined by the RIPSIZ parameter is trimmed.

CENTER

Specifies that the center of the object is positioned at the center of the object placement area. Any portion of the object that falls outside the object placement area is trimmed.

RIPOFFSET



Object Content Offset - Specifies the horizontal and vertical offset of the object contents within the object placement area, as defined by the RIPSIZ parameter. If RIPOFFSET is not specified, the object is preprocessed and cached at its full size. The content offset specified at Include time is then used to place and possibly trim the object to the object area, with an associated performance penalty.

The RIPOFFSET parameter is used only in LEFT and TRIM mapping of the object into the object placement area.

rel x

Specifies the offset along the X-axis of the object area coordinates system. This can be a positive or negative number.

rel y

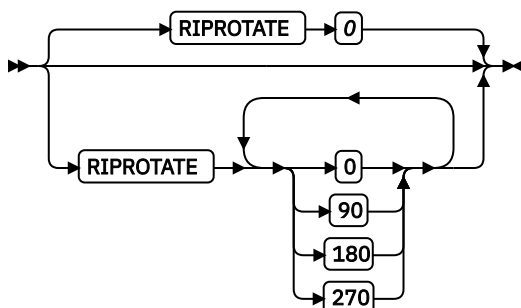
Specifies the offset along the Y-axis of the object area coordinates system. This can be a positive or negative number.

unit

Specifies a unit of measurement for the width parameter. The choices are: IN, MM, CM, POINTS, or PELS.

Note: If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

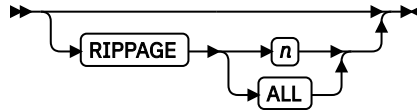
RIPROTATE { 0 | 90 | 180 | 270 }



Specifies the object rotation in regard to the leading edge of the media. Up to four rotations can be specified.

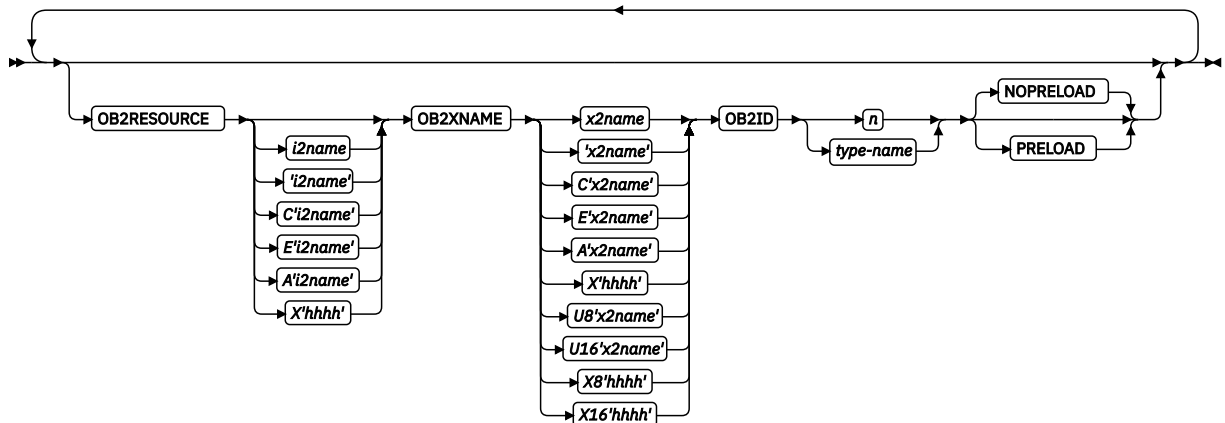
Note: Many factors, such as media selection, media side, media loading media orientation, page orientation, and object area rotation affect the orientation of an object in regard to the media leading edge. Therefore, proper specification of this parameter might require visual inspection of physical output.

RIPPAGE



Specifies the page number of a multipage object or file to be pre-RIPped. *n* is the page number. A number 1 - 999999999 (9 digits) is valid. ALL specifies to pre-RIP all objects in a multipage object.

OB2RESOURCE



If the primary object contains a reference to one or more secondary objects, you must identify them. Specify the internal name for the secondary resource as specified in the primary resource. If the internal name contains special characters such as periods or blanks, then quotation marks must surround the name.

i2name

Unquoted name up to 250 characters long is folded to uppercase and translated into EBCDIC if necessary.

'i2name'

Quoted name up to 250 characters long is accepted as-is with no case folding or translation.

C'i2name'

Quoted name with a "C" for Character is treated the same as a quoted name of up to 250 characters. No folding or translation is done.

A'i2name'

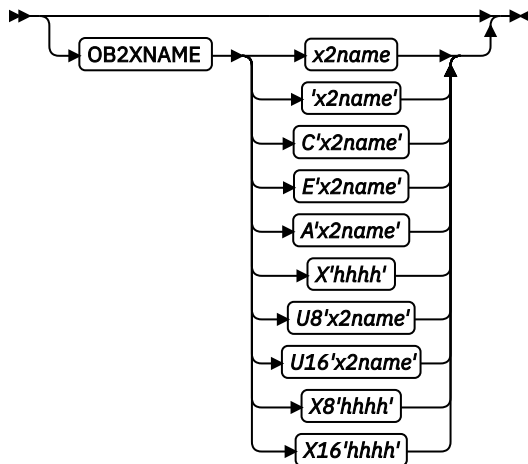
Quoted name with an "A" for ASCII entered with up to 250 single-byte characters is accepted as-is if on an ASCII operating system or translated to ASCII if on an EBCDIC operating system. The translation is made with not case folding.

E'i2name'

Quoted name with an "E" for EBCDIC entered with up to 250 single-byte characters is accepted as-is if on an EBCDIC operating system or translated to EBCDIC if on an ASCII operating system. The translation is made with not case folding.

X'hhhh'

Quoted name with an X for Hexadecimal entered with up to 500 hexadecimal characters. The characters are translated to hexadecimal, but no assumption of data type is made.

OB2XNAME

Specifies the external name for a secondary resource object. The name can be up to 250 characters. If the name contains special characters or blanks, it must be enclosed in blanks.

Note: A file system name must adhere to the rules of the operating system where the object is located. This might further restrict the following sizes.

x2name

Unquoted name up to 250 characters long is folded to uppercase and translated into EBCDIC if necessary.

'x2name'

Unquoted name up to 250 characters long is accepted as-is with no case folding or translation.

C'x2name'

Quoted name with a C for Character is treated the same as a quoted name up to 250 characters. No folding or translation is done.

A'x2name'

Quoted name with an A for ASCII entered with up to 250 single-byte characters is accepted as-is if on an ASCII operating system or translated to ASCII if on an EBCDIC operating system. The translation is made with no case folding.

E'x2name'

Quoted name with an E for EBCDIC entered with up to 250 single-byte characters is accepted as-is if on an EBCDIC operating system or translated to EBCDIC if on an ASCII operating system. The translation is made with no case folding.

X'hhhh'

Quoted name with an X for Hexadecimal entered with up to 500 hexadecimal characters. The characters is translated to hexadecimal, but no assumption of data type is made.

U8'x2name'

Quoted name with an U8 for UTF-8 entered with up to 250 single-byte characters is translated to UTF-8.

X8'hhhh'

Quoted name with an X8 for UTF-8 HEX entered with up to 500 single-byte hexadecimal characters is translated to hexadecimal and assumed to be data type UTF-8. A multiple of two hexadecimal characters must be entered.

U16'x2name'

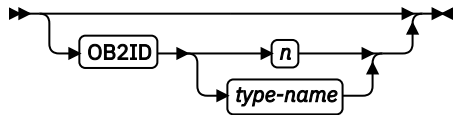
Quoted name with an U16 for UTF-16 entered with up to 125 single-byte characters is translated to UTF-16.

X16'hhhh'

Quoted name with an X16 for UTF-16 HEX entered with up to 500 single-byte hexadecimal characters is translated to hexadecimal and assumed to be data type UTF-16. A multiple of four hexadecimal characters must be entered.

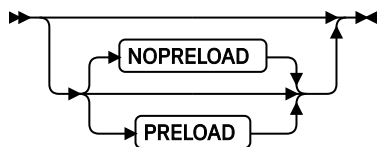
All specified secondary resources are kept. See OBKEEP for more information.

OB2ID *n* | *type-name*



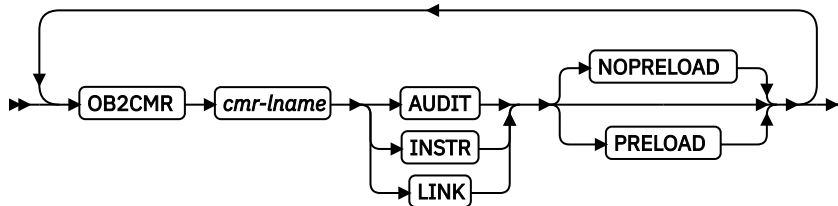
Component type identifier for secondary resource. Use an object type number as specified in Object type list adjustments. Use an object type number from the Component - ID column or a type name from the Type-Name column of [Table 16 on page 367](#).

NOPRELOAD | PRELOAD



All specified secondary resources are kept. If you want the secondary object to be preloaded before the running of this job, specify it here.

OB2CMR



Specify a Color management resource (CMR) and its process mode for a data object within the PAGEDEF. CMRs are secondary objects when used at this level. Multiple OB2CMR subcommands are allowed on the OBJECT command.

Note: See [Chapter 8, “AFP Color Management,” on page 151](#) for more information about using the CMR subcommand.

cmr-lname

The CMR local name. This name must be defined with a DEFINE CMRNAME command.

processing mode parameter

Specify the processing mode for the CMR.

AUDIT

CMRs with the audit processing mode refer to processing that is already applied to a resource. In most cases, audit CMRs describe input data and are similar to ICC input profiles.

The audit processing mode is used primarily with color conversion CMRs. In audit processing mode, those CMRs indicate which ICC profile must be applied to convert the data into the Profile Connection Space (PCS).

INSTR

CMRs with the instruction processing mode refer to processing that is done to prepare the resource for a specific printer by using a certain paper or another device. Generally, instruction CMRs refer to output data and are similar to ICC output profiles.

The instruction processing mode is used with color conversion, tone transfer curve, and halftone CMRs. In instruction processing mode, these CMRs indicate how the system must convert a resource so it prints correctly on the target printer. The manufacturer of your printer must provide ICC profiles or various CMRs that you can use. Those ICC profiles and CMRs might be installed in the printer controller, included with the printer on a CD, or available for download from the manufacturer's website.

LINK

This CMR defines a direct color conversion from an input color space to a device output color space; process the CMR as a link CMR. This processing mode is only valid for device link (DL) CMRs. The PPFA command RENDER is not used with device link (DL) CMRs as such CMRs specify the intended rendering intent internally. This function requires print server (PSF) and printer support, which is in addition to the original CMR support.

NOPRELOAD|PRELOAD

All specified secondary resources are kept. If you want the CMR object to be preloaded before the running of this job, specify it here.

Example: In the following code example, an object with CMR is defined. The following LAYOUT commands place the object on the page. The CMR name is defined and referenced by the CMR local name. See the DEFINE CMRNAME command for examples and instructions on defining CMR names.

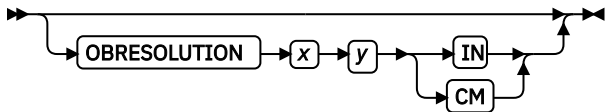
```
PAGEDEF cmr89  replace yes;
  FONT  varb  gt10  ;          /*Variable data      */
  SETUNITS  LINESP .25 in ;   /* Line spacing      */

DEFINE srgb CMRNAME
'sRGBicc_CC001.0000@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@'
'@@@@@';

Object oc1 obxname 'Flowers_with_sRGB_profile'
  obtype other obid 23 OBKEEP
  ob2cmr srgb audit

PAGEFORMAT rept1  TOPMARGIN 1 in BOTMARGIN 2 in;
  LAYOUT 'startpage' BODY  NEWPAGE POSITION 1 in NEXT
  font varb
  object oc1 0 in 3 in obsize 6.5 in 8.5 in;
  LAYOUT 'basicline' BODY  POSITION SAME NEXT font varb;
```

OBRESOLUTION



Specifies the resolution and unit of measurement of an image. If the resolution is already specified inside the image, this information is ignored by the printer. Use this subcommand for images that do not or might not contain their resolution. Specify resolution of an image so that the printer can print the image correctly.

To specify object resolution, you must have a printer and a print server (PSF or IPM) that support this capability.

If not specified, the default is to assume that the image resolution is the same as the printer. If the image does not print at the size you expect, use OBRESOLUTION to identify the image's resolution. With the resolution information, the printer is then able print the image at the expected size.

x
Specifies the number to be used for the horizontal resolution of an image. Specify an integer value in the range of 1 - 3276.

y
Specifies the number to be used for the vertical resolution of an image. Specify an integer value in the range of 1 - 3276.

unit

Specifies a unit of measurement. The choices are:

IN

Inch

CM

Centimeter

In the following code example, the OBJECT command is used to define two JFIF objects. One is pre-ripped and the other is not. One has a resolution of 300 pels per inch in both the x and y directions. The other has a resolution of 600 pels per inch in both the x and y directions.

```
SETUNITS 2 in 2 in;
Pagedef obxres

OBJECT obres1 OBXNAME xpseg23 OBTYPE other OBID JFIF
      OBRESOLUTION 300 300 IN;
OBJECT obres2 OBXNAME xpseg24 OBTYPE other OBID JFIF
      OBRESOLUTION 600 600 IN;

PRINTLINE OBJECT obres1
  23 PELS 01 PELS  OMap TRIM  OBSIZE  1.2 in 1.3 in ;
PRINTLINE OBJECT obres2
  34 PELS 01 PELS  OMap TRIM  OBSIZE  1.2 in 1.3 in ;
```

Examples

Example 1

In the following page definition, several examples of long names are shown, which is for illustration only.

- OBU8 — The primary object name is specified in U8 format, which means that it is specified as a character string and translated to UTF-8 encoding.

The secondary object that is defined on object OBU8 is referenced in the primary object with an identifier that is the equivalent of hexadecimal X'ABF8'. The external name for that object is specified in C format, which means that the name is accepted as it with no translation or folding of case.

- OBU16 — This object name is specified in U16 format, which means that it is specified as a character string and translated to UTF-16 encoding.
- OBX16 — This object name is specified in X16 format, which means that it is specified as a hexadecimal string that represents the UTF-16 encoding. It is not translated. The only check that PPFa makes is that its length is a multiple of 4.

```
PAGEDEF LNNG2P  REPLACE YES;
FONT FN1 GT10;
OBJECT obU8 OBXNAME u8'A Long Object Name in UFT8'
  ' Which is continued on a second line'
  ' And could also be continued on a subsequent line'
      OBTYPE IOCA  OBKEEP PRELOAD
OB2RESOURCE X'ABF8' OB2XNAME C'A plain old Character '
  ' type Secondary Object name which will be used as typed'
  ' in the code page of the User'  OB2ID PDFRO PRELOAD;

OBJECT OBU16 OBXNAME U16'abcdef4'
      OBTYPE IOCA  OBKEEP PRELOAD;

OBJECT obx16 OBXNAME X16'006100620063'
      '0064006500660034'
      OBTYPE IOCA  OBKEEP PRELOAD;

printline object obU8 FONT fn1;
printline object obU16;
printline object obX16;
```

Example 2

In the following page definition, an IOCA object is defined and placed. The object is to be mapped, preloaded, and preripped in 3 orientations (0, 90, 270). Object area size and offset mapping are

specified. TRIM mapping specifies that the object is to be placed in the upper-left corner of the object area, as defined by the PRINTLINE position and RIPOFFSET parameters, and, if necessary, trimmed to the object area size, as defined by RIPSIZ.

```
PAGEDEF RipXml Replace Yes;
  OBJECT ripit OBXNAME FS45pic OBTYPE IOCA
    OBKEEP PRELOAD
    PRERIP
      RIPSIZ 3.0 in 4.0 in
      RIPMAP trim
      RIPOFFSET 1.0 in 1.5 in
      RIPROTATE 0,90,270
    ;
  PRINTLINE OBJECT ripit;
```

Example 3

In the following page definition, multiple page objects are defined and placed. To specify the page number, see the descriptions of the parameters RIPPAGE and OBPAGE.

```
/*-----*/
/* MULTIEX2 multipage objects - Printline */
/* Examples */
/* */
/*-----*/
setunits 1 in 1 in linesp 6 lpi;
pagedef multx2 replace yes pelsperinch 600
  width 8.5 height 11.0;

font f1 gt10;
/*-----*/
/* Define objects */
/*-----*/

/*-----*/
/* Multipage objects OBID type name */
/*-----*/
object npt02 obxname TIFFONT1 obtype other obid MTIFFONT;

/*-----*/
/* PRERIP ALL Multipage objects OBID component id */
/*-----*/
object pac03 obxname MPDF6 obtype other obid 63
  OBKEEP PRELOAD PRERIP RIPPAGE ALL;

/*-----*/
/* PRERIP page Multipage objects OBID type name */
/*-----*/
object ppt04 obxname MPDFT7 obtype other obid MPDFT
  OBKEEP PRELOAD PRERIP RIPPAGE 6;

/*-----*/
/* pgfmt01: */
/*-----*/
pageformat pfmt01 ;

/*-----*/
/* Layout for placing objects */
/*-----*/
/* type name no prerip, pages 1, 2, 3 */
/*-----*/
printline
  object npt02 obpage 1
  object npt02 obpage 2
  object npt02 obpage 3;

/*-----*/
/* pgfmt02: PRERIP ALL */
/*-----*/
pageformat pfmt02 ;

/*-----*/
/* Layout for placing objects PRERIP */
/*-----*/

/*-----*/
/* component id rip all, pages 4, 5, 6 */
/*-----*/
printline
  object pac03 obpage 4
```

```

object pac03 obpage 5
object pac03 obpage 6;

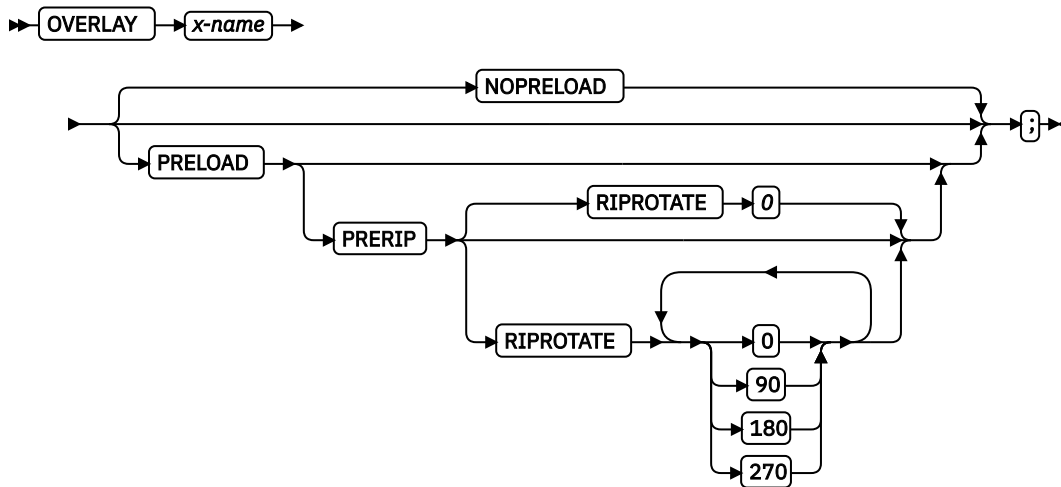
/*-----*/
/* pgfmt03: PRERIP page 6 */
/*-----*/
pageformat pfmt03 ;

/*-----*/
/* Layout for placing objects PRERIP */
/*-----*/

/*-----*/
/* type name rip 6, page 6 */
/*-----*/
printline
    object ppt04 obpage 6;

```

OVERLAY Command



The OVERLAY command is used to identify an electronic overlay to be included in the print file. This function is similar to the SEGMENT command. A separate OVERLAY command is required for each overlay, including all overlay names that can be used with the OVERLAY VARIABLE keyword on PRINTLINE, LAYOUT, or XLAYOUT. A maximum of 254 OVERLAY commands (each of the 254 names must be unique) can be specified for each page format.

The OVERLAY commands are nested within the PAGEFORMAT command. For Traditional:

```

PAGEFORMAT
  [ TRCREF ]
  [ SEGMENT ]
  [ OVERLAY ]
  ...
  [ OVERLAY ]

```

For Record Format and XML:

```

PAGEFORMAT
  [ SEGMENT ]
  [ OVERLAY ]
  ...
  [ OVERLAY ]

```

An overlay can be requested in the following two ways:

- Place the overlay by using the OVERLAY subcommand on the PRINTLINE command (Traditional), the LAYOUT command (Record Format), or the XLAYOUT command (XML).

- Enter an Include Page Overlay (IPO) structured field in the line data. The name of the overlay on the IPO structured field must match exactly the overlay that is identified by this command. The IPO must specify a value of 'X'FFFFFF' for the X and Y offset parameters if the overlay is to be placed relative to the current line position.

To include page overlays without using the IPO structured field, see the [“PRINTLINE Command ”](#) on page 400.

OVERLAY

Identifies the overlay that is positioned on the page.

x-name

The user access name (external name) for the overlay. *x-name* can be unquoted or enclosed in quotation marks.

unquoted-name

An unquoted overlay name can be up to 6 characters. It is folded to uppercase, has an O1 prefix added to it, and is translated to EBCDIC code page 500 if necessary.

'*quoted-name*'

A quoted overlay name can be up to 8 characters. No translation or case folding is done.

Subcommands

These subcommands are used to specify whether to preload overlays, PreRip overlays, or both.

Notes:

1. The printer must support the preloading and preripping functions.
2. Mapping an overlay enhances throughput by allowing the printer to download an object once and use it on subsequent pages of the same print job or possibly on subsequent print jobs. Overlays are always mapped so it is not necessary for you to request mapping. Mapping an overlay provides sufficient performance for most applications.
3. Preloading an overlay consists of loading the object into printer memory before the print job is started. Preloading enhances throughput by removing downloading time from real time to the page build time.
4. Preripping enhances throughput by allowing the resources to be rasterized (RIPped) at the proper size and rotation when they are preloaded.

NOPRELOAD

Do not preload the overlay.

PRELOAD

Preload the overlay before the print job is processed.

NOPRERIP

Do not PreRip the overlay.

PRERIP

Prepare the overlay for printing by rasterizing it with its presentation rotation in regard to the media leading edge.

RIPROTATE { 0 | 90 | 180 | 270 }

Specifies the overlay rotation in regard to the leading edge of the media. Up to four rotations can be specified.

Note: Many factors, such as media selection, media side media loading, media orientation, page rotation, and overlay area rotation affect the orientation of the overlay in regard to the media leading edge. Therefore, proper specification of this parameter might require visual inspection of physical output.

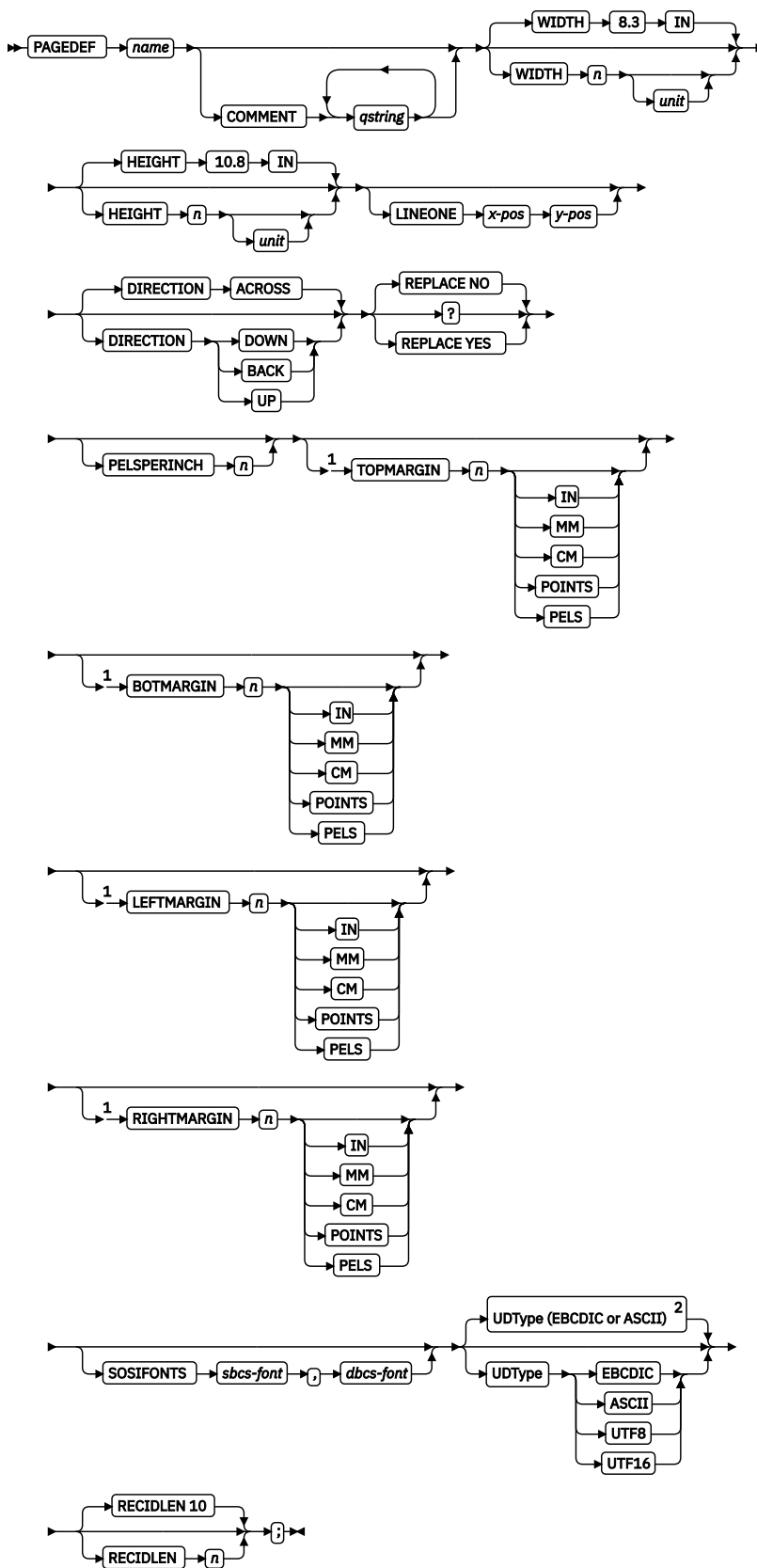
Note: The prefix O1 is not part of the six-character user-access name. The overlay name can be alphanumeric.

Example

In the following example, an overlay is defined and placed. The overlay is preripped in two orientations, 180 and 0.

```
PAGEDEF RipXm2 Replace Yes;  
PAGEFORMAT pf1;  
OVERLAY ripit PRELOAD PRERIP OVBROTATE 180,0 ;  
  
PRINTLINE OVERLAY ripit;
```


PAGEDEF Command



Notes:

¹ Record Format and XML only.

² If UDType is not specified for Traditional and Record Format page definitions, the User Data Type is unspecified if not coded. This means that no data type information is added to the page definition. If UDType is not specified for XML page definitions, the User Data Type defaults to the type for the operating system when UDType is not coded. That is, it defaults to EBCDIC when on a z/OS operating system.

A page definition is a resource that defines how data is formatted on a logical page. When generated by PPFA, a page definition is stored as a resource in the page-definition library. You can use the page definition with the Record Format line data by using the PAGEDEF subcommands.

This command must be specified when you define a page definition. All of the PAGEDEF subcommands are optional; defaults are assumed.

For Traditional only: Values that are assigned within the subcommands or the default values become the values for any PAGEFORMAT subcommand not specified. REPLACE is not a PAGEFORMAT subcommand, so its default is not carried forward.

PAGEDEF

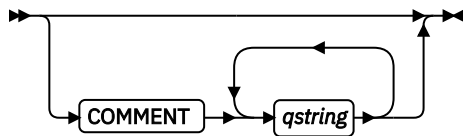
Identifies the page definition to be used with the print job.

name

Defines an alphanumeric name of 1 to 6 characters for the page definition. When page definitions are generated, PPFA assigns the prefix P1 to this name as the external resource name.

Subcommands

COMMENT

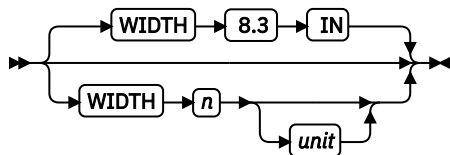


Specifies a user comment. This string comment is placed in the NOP structured field of the page definition.

qstring

Specifies a quoted set of strings 1 - 255 characters in total length.

WIDTH



Defines the width of the logical page.

n

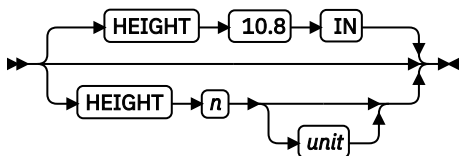
A number with up to three decimal places is used. The width might vary according to the type of printer that is used. For more information, see your printer documentation. The default is 8.3 IN.

unit

Specifies a unit of measurement for the WIDTH subcommand. The choices are IN, MM, CM, POINTS, or PELS.

Note: If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

HEIGHT



Defines the height of the logical page.

n

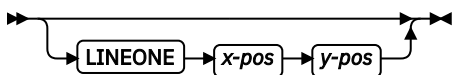
A number with up to three decimal places is used. The height might vary according to the type of printer that is used. For more information, see your printer documentation. The default is 10.8 IN.

unit

Specifies a unit of measurement for the HEIGHT subcommand. The choices are IN, MM, CM, POINTS, and PELS.

Note: If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

LINEONE (Traditional only)



Specifies the values for the MARGIN and TOP parameters that are used in the POSITION subcommand of the PRINTLINE command.

x-pos

Specifies the offset from the left edge of the logical page (margin position). The valid options for *x-pos* are described in the SETUNITS command for the horizontal value.

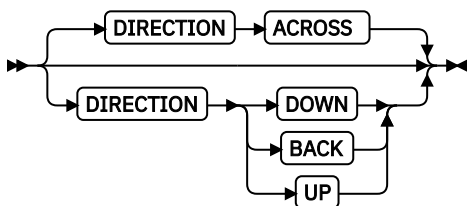
Note: If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

y-pos

Specifies the vertical offset from the top of the logical page (top line position). The valid options for *y-pos* are described in the SETUNITS command for the vertical value.

Note: If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

DIRECTION



Specifies the print direction of the logical page. Not all printers can print in all print directions. For more information, see your printer documentation.

Note: Some printers have a different media origin and require different direction settings than most page printers. For printing in the landscape page presentation when you are using wide forms, the PRESENT subcommand must be specified on the FORMDEF command to produce readable output. Alternatively, if you have existing page definitions, the UP direction can be used in the page definition without changes to the form definition to produce the same result.

ACROSS

The page is printed with the characters added left to right in each line, and the lines added from the top to the bottom.

DOWN

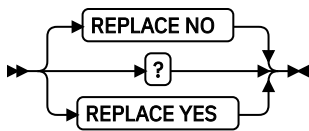
The page is printed with the characters added to the page from top to bottom, and the lines added from the right to the left.

BACK

The page is printed with the characters added to the page from right to left, and the lines added from the bottom to the top.

UP

The page is printed with the characters added to the page from bottom to top, and the lines added from the left to the right.

REPLACE

Specifies whether the page definition replaces an existing page definition with the same resource name in the library.

NO

The page definition does not replace a page definition with the same resource name in the library.

If a page definition with the same resource name does not exist in the library, the page definition is stored.

YES

If a page definition with the same resource name exists in the library, the page definition replaces it.

If a page definition with the same resource name does not exist in the library, the page definition is stored.

PELSPERINCH *n*

Specifies the Logical Units in pels per inch for the page definition. Use the PELSPERINCH parameter to tell PPFA the pel resolution of your printer to generate more exact object placements.

n

Specifies an integer number 1 - 3,276, which determines the Logical Units in pels per inch.

Note: If the L-Units are not specified on the page definition, they are defaulted to 240 pels per inch.

In [Figure 134 on page 385](#), the page definition xmp01 specifies L-Units as 300 pels per inch. Because the PAGEFORMAT P1 does not specify L-Units, it inherits 300 pels per inch. PAGEFORMAT P2 does specify L-Units as 1200 pels per inch. The width and height in PAGEFORMAT P1 (7 in, 3 in) produces

internal and structured field values of 2100 and 900, whereas in PAGEFORMAT P2 the same code produces values of 8400 and 3600 because of the difference in L-Units.

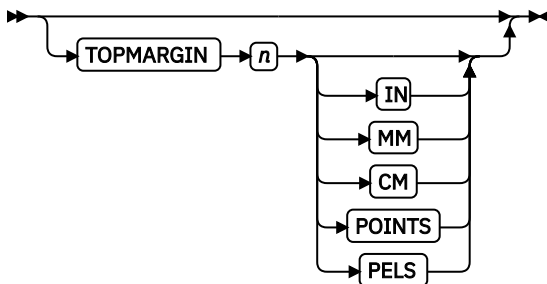
```
PAGEDEF xmp01 replace yes
PELSPERINCH 300 ;

PAGEFORMAT P1
width 7 in
height 3 in;
PRINTLINE;

PAGEFORMAT P2
width 7 in
height 3 in
PELSPERINCH 1200;
PRINTLINE;
```

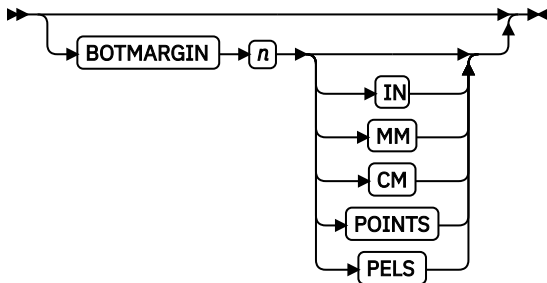
Figure 134: PELSPERINCH example

TOPMARGIN (Record Format and XML)



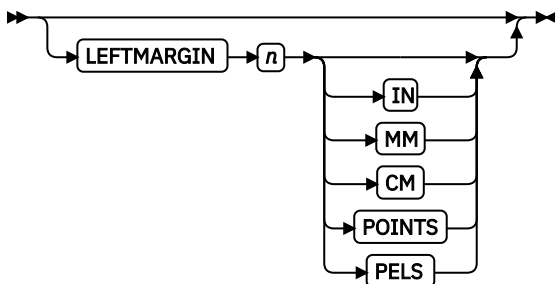
This keyword with parameters specifies the amount of space to be reserved at the top of the page. The default is 80% of the current line spacing.

BOTMARGIN (Record Format and XML)



This keyword with parameters specifies the amount of space to be reserved at the bottom of the page. Only PAGETRAILER data can be written into this area. If a graphic is not ended at the time information is being placed in the bottom margin, the graphic is ended before the bottom margin. The default is 0.

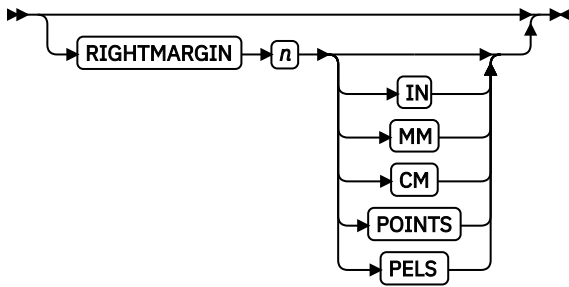
LEFTMARGIN (Record Format and XML)



This keyword with parameters specifies the amount of space to be reserved at the left of the page. This keyword is to be used only with the DRAWGRAPHIC commands. Although PPFa collects the left

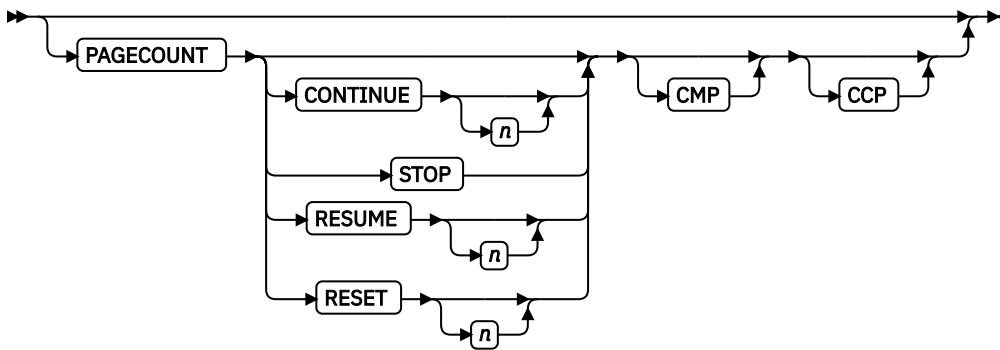
margin information, it uses the value only within PPFA to define an area. The value itself is not passed in the data stream. The default is 0.

RIGHTMARGIN (Record Format and XML)



This keyword with parameters specifies the amount of space to be reserved at the right of the page. This keyword is only to be used with the DRAWGRAPHIC commands. Although PPFA collects the right margin information, it uses the value only within PPFA to define an area. The value itself is not passed in the datastream. The default is 0.

PAGECOUNT (Record Format and XML)



This keyword specifies how the page counting is handled when you are switching between PAGEFORMATs.

CONTINUE

Page counting continues from the previous PAGEFORMAT - this is the default. The *n* value is only used on the first PAGEFORMAT in the job; otherwise, it is ignored. If this is the first PAGEFORMAT and no *n* value is specified, it defaults to one.

STOP

Page counting stops. Page count is captured from the previous PAGEFORMAT, but does not continue to count.

RESUME

Page counting continues from wherever it was the last time this PAGEFORMAT was called. The *n* value sets the value only the first time the PAGEFORMAT is invoked.

RESET

Page counting is reset to the value within the *n* value. If no *n* value is entered, then the page numbers are reset to one.

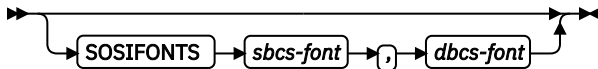
CMP

Count MO:DCA Pages option. Tells the print server to count any embedded MO:DCA pages in the page count.

CCP

Count Constant Pages options. Tells the print server to count any pages that have no variable data on them.

SOSIFONTS



The SOSIFONTS subcommand causes a Single-Byte Character Set (SBCS) font and a Double-Byte Character Set (DBCS) font to be mapped in a manner that allows the proper font switching when Shift-in and Shift-out control sequences are encountered in printed text.

sbcs-font

A Single-Byte Character Set font. This font is selected by the print server when a Shift-In (SI) control byte is encountered in text that is presented.

dbcs-font

A Double-Byte Character Set font. This font is selected by the print server when a Shift-Out (SO) control byte is encountered in text that is presented.

Use one of these methods to use SOSI fonts in a page definition:

- In the PAGEDEF, use the FONT placement subcommand to specify both the SBCS and DBCS fonts to be used. To use this method, define both a single-byte and double-byte font with the FONT or DOFONT commands. Then, reference both fonts, separated by a comma, on the FONT subcommand on the FIELD, PRINTLINE, XLAYOUT, or LAYOUT commands. The single-byte font goes first.

Examples:

1. In a traditional page definition:

```
Pagedef sosiP1 replace yes;
FONT sb1 GT10 SBCS;
FONT db1 M40F DBCS;
PAGEFORMAT PF1;
PRINTLINE POSITION 1 in 1.2 in FONT sb1,db1;
```

2. In a Record Format or XML page definition:

```
Pagedef sosiP1 replace yes;
FONT sb1 GT10 SBCS;
FONT db1 M40F DBCS;
PAGEFORMAT PF1;
LAYOUT 'l1' POSITION 1 in 1.2 in FONT sb1,db1;
```

- In the PAGEDEF, use the PAGEFORMAT subcommand SOSIFONTS to ensure that a single-byte font is mapped first and a double-byte font is mapped second in the PAGEFORMAT. To use this method, code both a single-byte and double-byte font with the FONT command. Then, use the SOSIFONTS subcommand on the PAGEFORMAT command with the SBCS font coded first and the DBCS font coded next.

Examples:

1. In a traditional page definition:

```
Pagedef sosiL1 replace yes;
FONT sb1 GT10 SBCS;
FONT db1 M40F DBCS;
PAGEFORMAT PF1 SOSIFONTS sb1,db1;

PRINTLINE POSITION 1 in 1.2 in;
```

2. In a Record Format or XML page definition:

```
Pagedef sosiP1 replace yes;
FONT sb1 GT10 SBCS;
FONT db1 M40F DBCS;
PAGEFORMAT PF1 SOSIFONTS sb1,db1;

LAYOUT 'l1' POSITION 1 in 1.2;
```

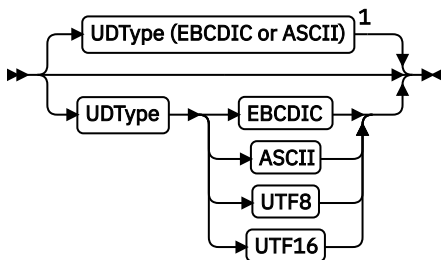
Note: The SOSIFONTS subcommand can also be coded on the PAGEFORMAT command. Any PAGEFORMATs that do not code a SOSIFONTS subcommand inherit from the PAGEDEF.

- Specify fonts by using the CHARS JCL parameter and either no fonts in the PAGEDEF or the default PAGEDEF. Using this method, the first font that is defined in CHARS is a SBCS font and the second is a DBCS font.
- Traditional only: Use the TRCREF command to define the SBCS font as 0 and the DBCS font as 1. Do not specify a FONT subcommand on PRINTLINE, FIELD, and other commands when you are using this method. This method is used only with a Traditional page definition. For example:

```
Pagedef sosil1 replace yes;  
FONT sb1 GT10 SBCS;  
FONT db1 M40F DBCS;  
PAGEFORMAT PF1;  
TRCREF 0 FONT sb1;  
TRCREF 1 FONT db1;  
PRINTLINE;
```

Note: You cannot mix Data Object fonts (defined with the DOFONT command) with FOCA fonts (defined with the FONT command) in the page definition in any but the first method of specifying SOSI fonts.

UDType



Notes:

¹ If UDType is not specified for Traditional and Record Format page definitions, the User Data Type is unspecified if not coded. This means that no data type information is added to the page definition. If UDType is not specified for XML page definitions, the User Data Type defaults to the type for the operating system when UDType is not coded. That is, it defaults to EBCDIC when on a z/OS operating system or ASCII when on an AIX[®] or Windows operating system.

This subcommand identifies the encoding of your data. If UDType is not coded on the PAGEDEF, it defaults to either ASCII or EBCDIC to match the operating system. For example, if PPFA is run on a z/OS operating system and UDType is not coded it defaults to EBCDIC.

UDType on the PAGEDEF command is used for several things:

1. Allow PPFA to translate fixed text to the specified UDType from either ASCII or EBCDIC according to the operating system on which the PPFA compile is done.
2. Set the default for all DOFONT (Data Object Font) commands so you do not need to code UDType on each DOFONT command.
3. Pass encoding information to the printer for converting non-UTF16 user data to UTF16 when you are using a DOFONT command. (TrueType is an example of a DOFONT).
4. Allows PSF or ACIF to know to look for a Byte Order Mark (BOM) when your data type is UTF8 or UTF16 and contains a BOM.

If the data does not match the operating system data type, PPFA translates the following constant page definition data to the encoding specified by UDType:

- FIELD command text (all page definitions)
- CONDITION text (all page definitions)
- LAYOUT command 'record ID' (Record Format page definition only)
- LAYOUT command delimiter (Record Format page definition only)

- XLAYOUT command start tags (XML page definition only)
- XLAYOUT command delimiter (XML page definition only)
- DEFINE QTAG command start tags (XML page definition only)
- FIELD attribute names (XML page definition only)

Notes:

1. For data with a Byte Order Mark (BOM), you must specify UDType, and the BOM must be the first 2 bytes (UTF16) or 3 bytes (UTF8) in the first line data record following any CC or TRC bytes. A BOM in the data is required if the data is UTF16 Little Endian.
2. If the UDType parameter is specified, all of the user data that is processed by the page definition must be of that data type. Having data that is not of the specified encoding type might lead to improper translation of that data. For example, the text in a CONDITION statement is not matched to the data.
3. If UDType is not coded on the PAGEDEF, the UDType on the DOFONT command or TYPE on the FONT command determines the translation, but only for the data placed by that font.
4. If you have multiple data type encodings in a data file, you must not code UDType on the page definition. Instead, for Data Objects Fonts, code UDType on the DOFONT command for the fonts that place the individual fields or records. For regular FOCA fonts, you use fonts of the type that match the data for the individual fields or records.
5. If you use ACIF to generate your print document and the NEWLINE ENCODING value does not agree with the UDType subcommand on the PAGEDEF command, ACIF issues a warning message but continues processing the file.
6. The UDType coded on the PAGEDEF is inherited by the DOFONT if NONE is coded on the DOFONT command. And, if no UDType is coded on either the PAGEDEF or the DOFONT, the DOFONT defaults to the operating system encoding.
7. The UDType coded or not coded on the PAGEDEF does not affect the FONT command inheritance of data type, or in any way except to provide translation for fixed text that is placed by the FONT command.
8. If UDType is not the same as the UDType coded on the DOFONT command, PPFA issues an error message and no page definition is generated.
9. To use multiple font mappings for a line in ASCII, UTF8, or UTF16 you must use the FIELD command, since automatic font switching for single and double byte text is only done for EBCDIC data.
10. SBCS, DBCS, TYPE, and UDTYPE are different parameters that can affect fonts. TYPE indicates that an ASCII or EBCDIC font is defined for printing. UDTYPE, which is not on the FONT command, indicates that the type of the user's data is ASCII or EBCDIC. SBCS and DBCS indicate what type of character set the defined font uses, either single byte (SBCS) or double byte (DBCS).
11. If UDTYPE is coded on the PAGEDEF and an ID name or text is explicitly defined with another type, an error results and the page definition is not generated. In the next example:

```
PAGEDEF cmr1is replace yes UDTYPE ASCII;
FONT varb gt10;
SETUNITS LINESP .25 in;
PAGEFORMAT rept1 TOPMARGIN .25 in BOTMARGIN .25 in;
LAYOUT E'startpage' BODY NEWPAGE POSITION .25 in NEXT font varb;
```

PAGEDEF with UDTYPE ASCII and LAYOUT with E 'startpage', the ASCII type does not match the 'E'EBCDIC type.

EBCDIC

Single-byte EBCDIC code page 500

ASCII

Single-byte ASCII code page 819

UTF8

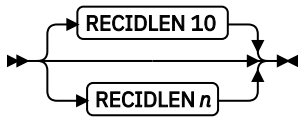
Unicode encoding form UTF-8 toleration mode (surrogates allowed)

UTF16

Unicode encoding form UTF-16

Note: The PAGEDEF is created in UTF-16BE (Big Endian). If the data is in UTF16LE, PSF translates it to UTF-16BE before processing.

RECIDLEN



Specifies the length of the Record Descriptor ID in bytes. This is also known as the *LAYOUT name*. If the RECIDLEN parameter is not coded on a PAGEFORMAT command, it inherits the value from the specified or default value on the page definition. If the RECIDLEN parameter is not coded on a PAGEDEF command, the default length is 10 bytes.

Notes:

1. Use the RECIDLEN keyword on Record Format page definition only.
2. This parameter can be used only in a Record Format page definition.

n

Specifies that the 'record ID' on the LAYOUT command is to be *n* bytes long. The allowable value of *n* is 1 - 250. UTF-16 data characters are 2 bytes long allowing up to 125 UTF-16 characters. Any 'record ID' on a LAYOUT command that is less than this length is padded to the specified length with blanks of the type that is specified or defaulted in the UDType subcommand on the PAGEDEF command. A 'record ID' that is longer than *n* is flagged as an error by PPF and no page definition is generated.

Note: If the User Data Type (UDType) is UTF16 and this number is odd, it is rounded up to the next even number.

Code Example

In the following example, User Data Type UTF16 and RECIDLEN 24 are specified on the PAGEDEF command and the RECIDLEN 26 is specified on the second PAGEFORMAT command (pf2).

For the two page formats pf1 and pf2:

1. pf1 inherits a RECIDLEN of 24 bytes from the page definition, and the User Data Type for the entire page definition is UTF-16.
 - a. The LAYOUT name 'Long Name 1' is translated to UTF-16 and padded to 24 bytes with UTF-16.
 - b. The delimiter '/' on the LAYOUT is translated to UTF-16.
 - c. The FIELD command text 'abcd' is translated to UTF-16.
2. pf2 specifies a RECIDLEN of 26 bytes and gets UDType UTF-16 from the page definition.
 - a. The LAYOUT name 'Long Name 2' is translated to UTF-16 and padded to 26 bytes with UTF-16.
 - b. The CONDITION command text 'ABCDEFGH' is translated to UTF-16.

Note: The field length of the 8-character string is 16 bytes because each character is 2 bytes long.

```
PAGEDEF xmp1 UDType UTF16 RECIDLEN 24 REPLACE yes;

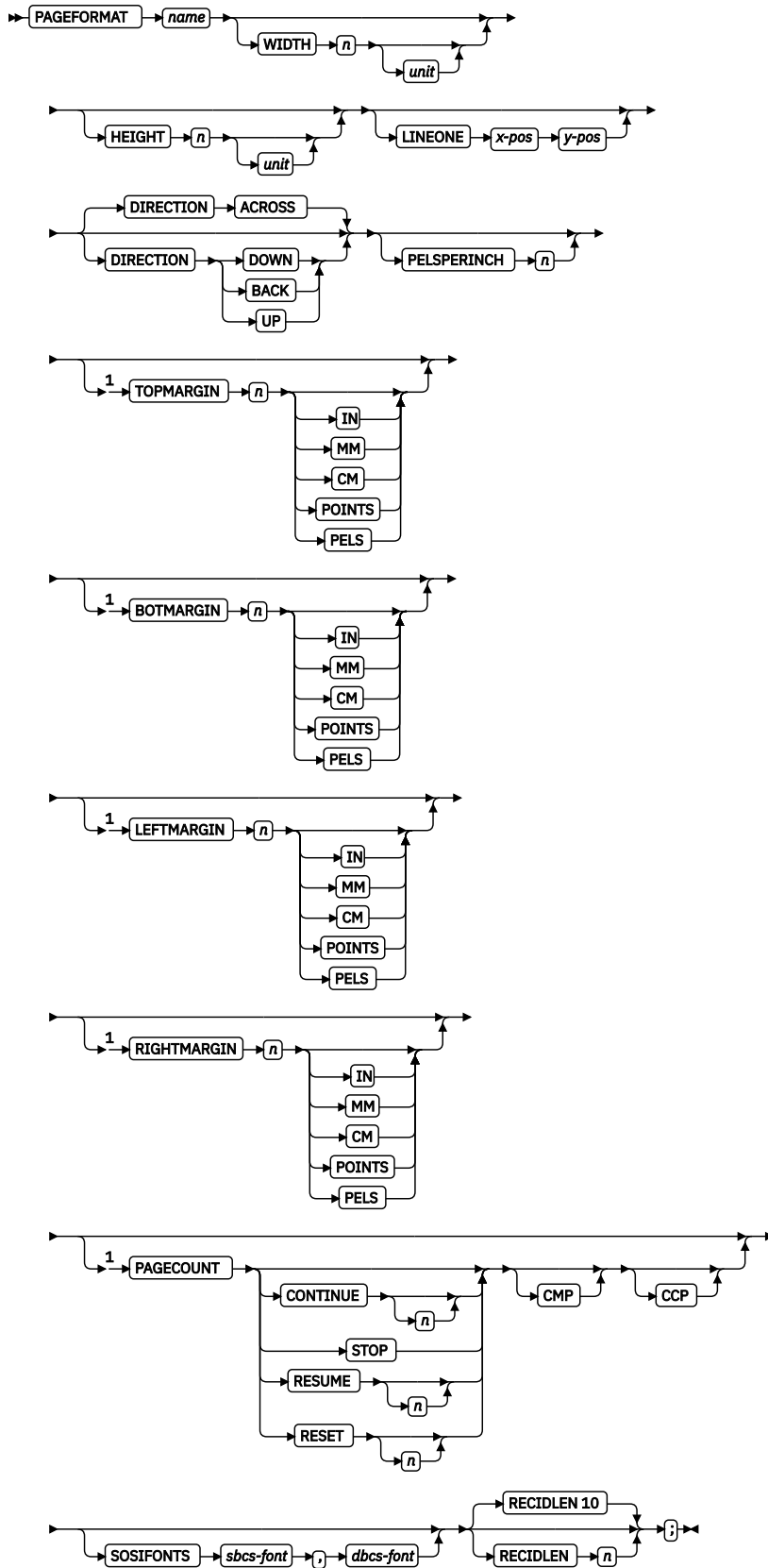
FONT comp a075nc TYPE UNICODE
FONT comp2 a075bg TYPE UNICODE

PAGEFORMAT pf1;
  LAYOUT 'Long Name 1' DELIMITER '/' Position 2 1 FONT comp;
  FIELD TEXT 'abcd' Position 2.5 1.5,

PAGEFORMAT pf2 RECIDLEN 26;
  LAYOUT 'Long Name 2' POSITION 2 1 FONT comp2;
```

```
CONDITION cn1 START 13 Length 16  
WHEN EQ 'ABCDEFGH' NULL Pageformat pf1;
```

PAGEFORMAT Command



Notes:

¹ Record Format and XML only.

Page formats are subsets of page definitions. If you want to use more than one set of specifications to format a page within a single print job, you must use more than one page format. To change page formats, use conditional processing or insert an Invoke Data Map structured field in your print file. (Page formats are known to the print server as data maps.) If you do not use conditional processing or if you do not insert an Invoke Data Map structured field, the print server uses only the first page format in the page definition. Page formats are placed in the page definition in the order in which they are generated.

PAGEFORMAT subcommands have no fixed defaults. The entire PAGEFORMAT command and all of its subcommands can assume defaults. If any PAGEFORMAT subcommand is omitted, its value is selected from the corresponding subcommand in the governing PAGEDEF command.

This command can be omitted for the first page format in a page definition if only one page format is used. If omitted, PPFA assigns a page format name by using the page-definition name, including the P1 prefix.

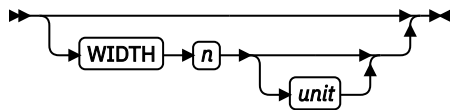
PAGEFORMAT *name*

Specifies an alphanumeric name of 1 - 8 characters. This name must be unique within the page definition.

The following subcommands are used for each page format. They can be issued in the same way as in a page definition. Values that are specified in the PAGEDEF subcommands are used if any of the following subcommands are not defined within a page format.

Subcommands

WIDTH



Defines the width of the logical page.

n

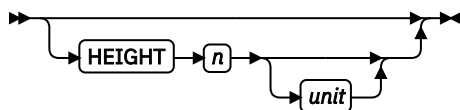
A number with up to three decimal places is used. The width might vary according to the type of printer that is used. For more information, see your printer documentation.

unit

Specifies a unit of measurement for the WIDTH subcommand. The choices are IN, MM, CM, POINTS, or PELS.

Note: If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

HEIGHT



Defines the height of the logical page.

n

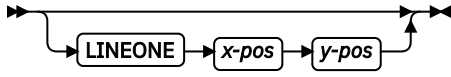
A number with up to three decimal places is used. The height might vary according to the type of printer that is used. For more information, see your printer documentation.

unit

Specifies a unit of measurement for the HEIGHT parameter. The choices are IN, MM, CM, POINTS, or PELS.

Note: If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

LINEONE (Traditional)



Specifies the values for the MARGIN and TOP parameters that are used in the POSITION subcommand of the PRINTLINE command.

x-pos

Specifies the offset from the left edge of the logical page (margin position). The valid options for *x-pos* are described in the SETUNITS command for the horizontal value.

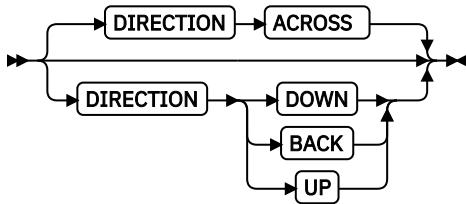
Note: If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

y-pos

Specifies the offset from the top of the logical page (top line position). The valid options for *y-pos* are described in the SETUNITS command for the vertical value.

Note: If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

DIRECTION



Specifies the print direction of the logical page. Not all printers can print in all print directions. For more information, see your printer documentation.

Note: Some printers have a different form origin and require different direction settings than most page printers. For printing in the landscape page presentation when you are using wide forms, the PRESENT subcommand must be specified on the FORMDEF command to produce readable output. Alternatively, if you have existing page definitions, the UP direction can be used in the page definition without changes to the form definition to produce the same result.

ACROSS

The page is printed with the characters added to the page from left to right, and the lines added from the top to the bottom.

DOWN

The page is printed with the characters added to the page from top to bottom, and the lines added from the right to the left.

BACK

The page is printed with the characters added to the page from right to left, and the lines added from the bottom to the top.

UP

The page is printed with the characters added to the page from bottom to top, and the lines added from the left to the right.

For Record Format and XML DIRECTION effects the meaning of the following new margin parameters.

- If the DIRECTION is ACROSS, then TOPMARGIN refers to the margin in the short end of the physical page where the tops of the characters point toward that same short end.
- If the DIRECTION is DOWN, then TOPMARGIN refers to the margin in the long end of the physical page where the tops of the characters point toward that same long end.

PELSPERINCH *n*



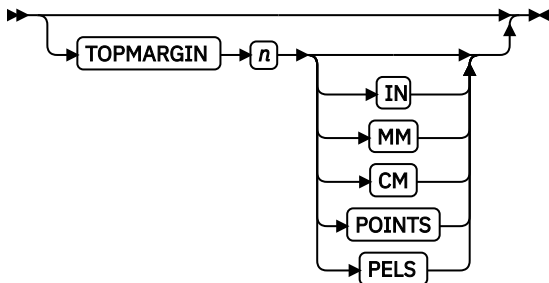
Specifies the Logical Units in pels per inch for the page format. Use the PELSPERINCH parameter to tell PPFA the pel resolution of your printer to generate more exact object placements.

n

Specifies an integer number 1 - 3,276, which determines the Logical Units in pels per inch.

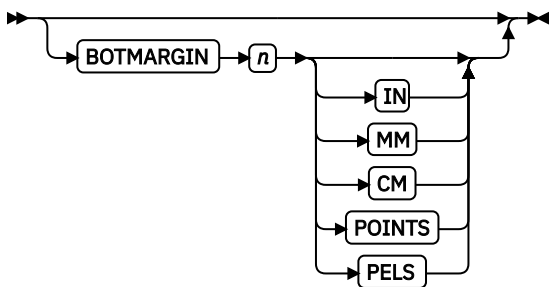
Note: If the L-Units are not specified on the page format, they are inherited from the page definition that contains the page format. See [Figure 134 on page 385](#).

TOPMARGIN (Record Format and XML)



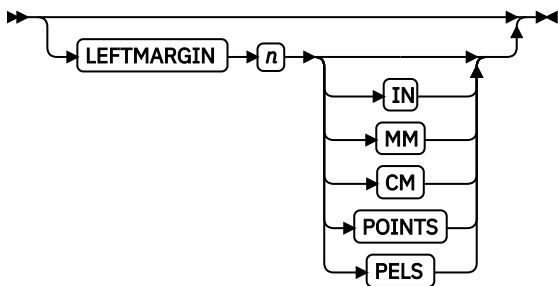
This keyword with parameters specifies the amount of space to be reserved at the top of the page. The default is 80% of the current line spacing.

BOTMARGIN (Record Format and XML)



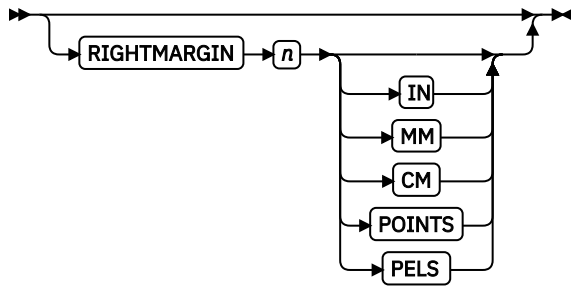
This keyword with parameters specifies the amount of space to be reserved at the bottom of the page. The default is 0.

LEFTMARGIN (Record Format and XML)



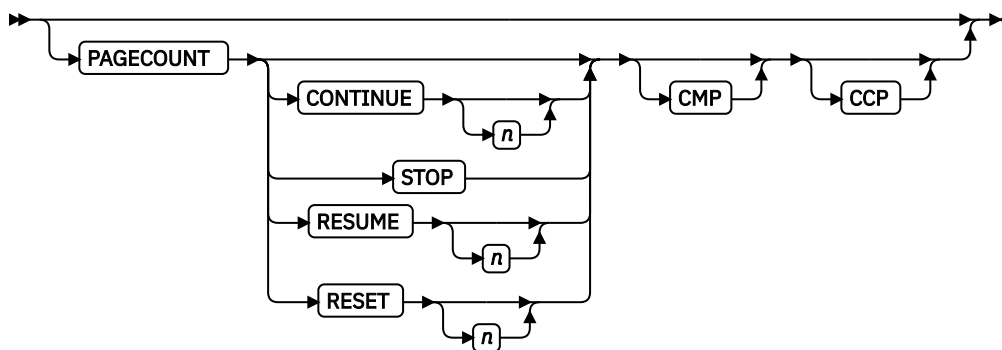
This keyword with parameters specifies the amount of space to be reserved at the left of the page. This is only used with the DRAWGRAPHIC commands. Although PPFA collects the left margin information, the value is used only within PPFA to define an area. The value itself is not passed in the datastream. The default is 0.

RIGHTMARGIN (Record Format and XML)



This keyword with parameters specifies the amount of space to be reserved at the right of the page. This is only to be used with the DRAWGRAPHIC commands. Although PPFA collects the right margin information, it uses the value only within PPFA to define an area. This value itself is not passed in the datastream. The default is 0.

PAGECOUNT (Record Format and XML)



This keyword specifies how the page counting is handled when you are switching between page formats.

CONTINUE

Page counting continues from the previous page format - this is the default. The *n* value is used only on the first PAGEFORMAT in the job; otherwise, it is ignored. If this is the first PAGEFORMAT and no *n* value is specified, it defaults to one.

STOP

Page counting stops. Page count is captured from the previous page format, but does not continue to count.

RESUME

Page counting continues from wherever it was the last time the page format was called. The *n* value sets the value only the first time page format is invoked.

RESET

Page counting is reset to the value within the *n* value. If no *n* value is entered, then the page numbers are reset to one.

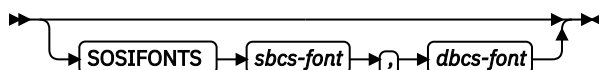
CMP

Count MO:DCA Pages option. Tells the print server to count any embedded MO:DCA pages in the page count.

CCP

Count Constant Pages options. Tells the print server to count any pages that have no variable data on them.

SOSIFONTS



The SOSIFONTS subcommand causes a Single-Byte Character Set (SBCS) font and a Double-Byte Character Set (DBCS) font to be mapped in a manner that allows the proper font switching when Shift-in and Shift-out control sequences are encountered in printed text.

***sbc*-font**

A Single-Byte Character Set font. This font is selected by the print server when a Shift-In (SI) control byte is encountered in text that is presented.

***dbcs*-font**

A Double-Byte Character Set font. This font is selected by the print server when a Shift-Out (SO) control byte is encountered in text that is presented.

Use one of these methods to use SOSI fonts in a page definition:

- In the PAGEDEF, use the FONT placement subcommand to specify both the SBCS and DBCS fonts to be used. To use this method, define both a single-byte and double-byte font with the FONT or DOFONT commands. Then, reference both fonts, separated by a comma, on the FONT subcommand on the FIELD, PRINTLINE, or LAYOUT commands. The single-byte font goes first.

Examples:

1. In a traditional page definition:

```
Pagedef sosiP1 replace yes;
FONT sb1 GT10 SBCS;
FONT db1 M40F DBCS;
PAGEFORMAT PF1;
PRINTLINE POSITION 1 in 1.2 in FONT sb1,db1;
```

2. In a Record Format or XML page definition:

```
Pagedef sosiP1 replace yes;
FONT sb1 GT10 SBCS;
FONT db1 M40F DBCS;
PAGEFORMAT PF1;
LAYOUT 'l1' POSITION 1 in 1.2 in FONT sb1,db1;
```

- In the PAGEDEF, use the PAGEFORMAT subcommand SOSIFONTS to ensure that a single-byte font is mapped first and a double-byte font is mapped second in the PAGEFORMAT. To use this method, code both a single-byte and double-byte font with the FONT command. Then, use the SOSIFONTS subcommand on the PAGEFORMAT command with the SBCS font coded first and the DBCS font coded next.

Examples:

1. In a traditional page definition:

```
Pagedef sosiL1 replace yes;
FONT sb1 GT10 SBCS;
FONT db1 M40F DBCS;
PAGEFORMAT PF1 SOSIFONTS sb1,db1;

PRINTLINE POSITION 1 in 1.2 in;
```

2. In a Record Format or XML page definition:

```
Pagedef sosiL1 replace yes;
FONT sb1 GT10 SBCS;
FONT db1 M40F DBCS;
PAGEFORMAT PF1 SOSIFONTS sb1,db1;

LAYOUT 'l1' POSITION 1 in 1.2;
```

Note: The SOSIFONTS subcommand can also be coded on the PAGEFORMAT command. It is inherited on any PAGEFORMATs that do not code a SOSIFONTS subcommand.

- Define fonts by using the CHARS JCL parameter and either no fonts in the PAGEDEF or the default PAGEDEF. Using this method, the first font that is defined in the CHARS is an SBCS font and the second is a DBCS font.

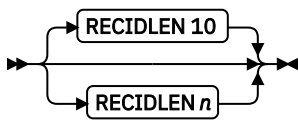
- Traditional only: Use the TRCREF command to define the SBCS font as 0 and the DBCS font as 1. Do not specify a FONT subcommand on PRINTLINE, FIELD, and other commands when you are using this method. This method is used only with a Traditional page definition. For example:

```
Pagedef sosis11 replace yes;
  FONT sb1 GT10 SBCS;
  FONT db1 M40F DBCS;
  PAGEFORMAT PF1;
  TRCREF 0 FONT sb1;
  TRCREF 1 FONT db1;
  PRINTLINE;
```

Note: You cannot mix Data Object fonts (defined with the DOFONT command) with FOCA fonts (defined with the FONT command) in the page definition in any but the first method of specifying SOSI fonts.

For additional information about using SOSI characters, see the *AFP Programming Guide and Line Data Reference*.

RECIDLEN



Specifies the length of the Record Descriptor ID in bytes. This is also known as the *LAYOUT name*. If the RECIDLEN parameter is not coded on a PAGEFORMAT command, it inherits the value from the specified or default value on the page definition. If the RECIDLEN parameter is not coded on a PAGEDEF command, the default length is 10 bytes.

Notes:

1. Use the RECIDLEN keyword on Record Format page definition only.
2. This parameter can be used only in a Record Format page definition.

n

Specifies that the 'record ID' on the LAYOUT command is to be *n* bytes long. The allowable value of *n* is 1 - 250. UTF-16 data characters are 2 bytes long allowing up to 125 UTF-16 characters. Any 'record ID' on a LAYOUT command that is less than this length is padded to the specified length with blanks of the type that is specified or defaulted in the UDType subcommand on the PAGEDEF command. A 'record ID' that is longer than *n* is flagged as an error by PPFPA and no page definition is generated.

Note: If the User Data Type (UDType) is UTF16 and this number is odd, it is rounded up to the next even number.

Code Example

In the following example, User Data Type UTF16 and RECIDLEN 24 are specified on the PAGEDEF command and the RECIDLEN 26 is specified on the second PAGEFORMAT command (pf2).

For the two page formats pf1 and pf2:

1. pf1 inherits a RECIDLEN of 24 bytes from the page definition, and the User Data Type for the entire page definition is UTF-16.
 - a. The LAYOUT name 'Long Name 1' is translated to UTF-16 and padded to 24 bytes with UTF-16.
 - b. The delimiter '/' on the LAYOUT is translated to UTF-16.
 - c. The FIELD command text 'abcd' is translated to UTF-16.
2. pf2 specifies a RECIDLEN of 26 bytes and gets UDType UTF-16 from the page definition.
 - a. The LAYOUT name 'Long Name 2' is translated to UTF-16 and padded to 26 bytes with UTF-16.
 - b. The CONDITION command text 'ABCDEFGH' is translated to UTF-16.

Note: The field length of the 8-character string is 16 bytes because each character is 2 bytes long.

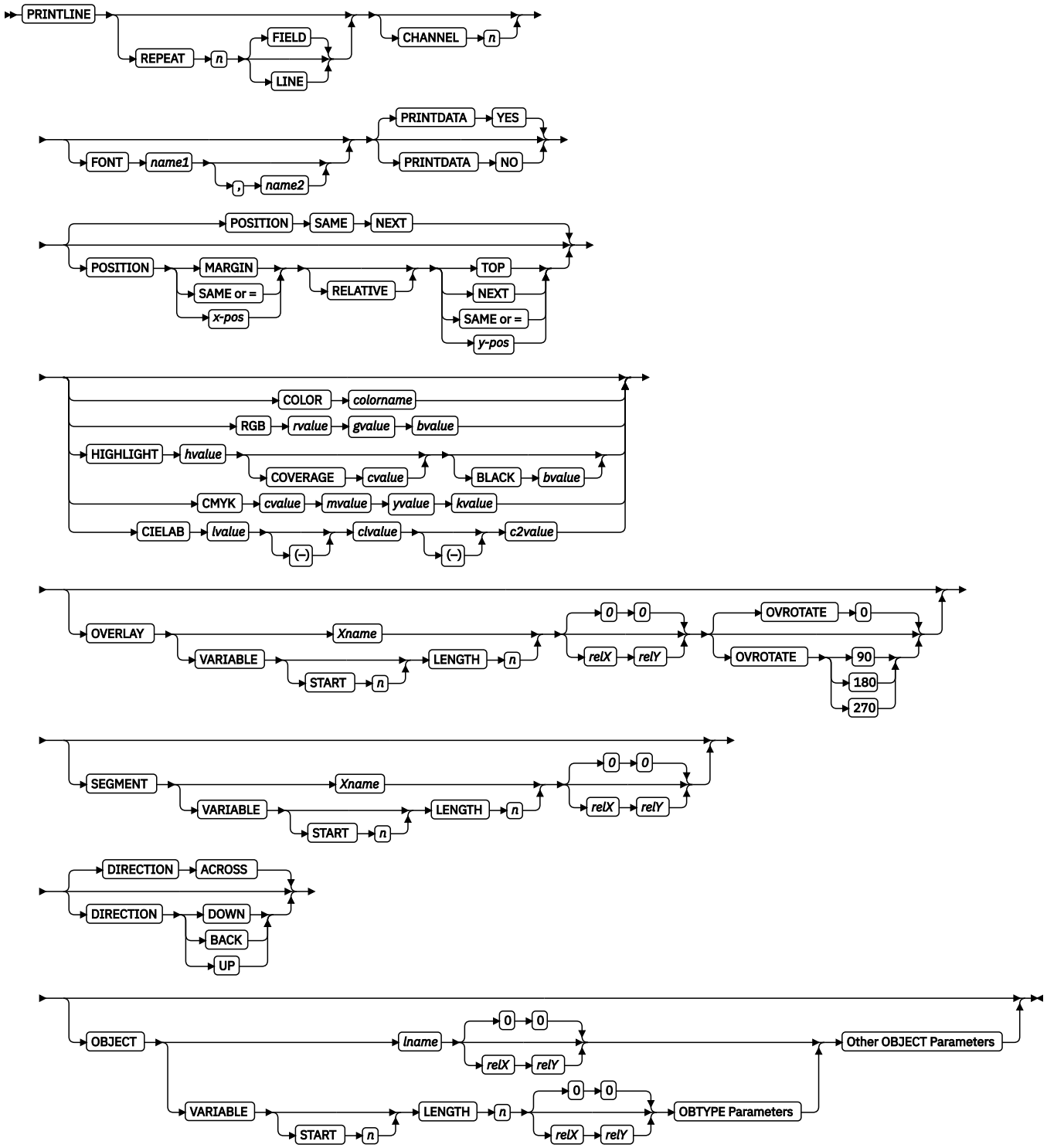
```
PAGEDEF xmp1 UDTpe UTF16 RECIDLEN 24 REPLACE yes;

FONT comp a075nc TYPE UNICODE
FONT comp2 a075bg TYPE UNICODE

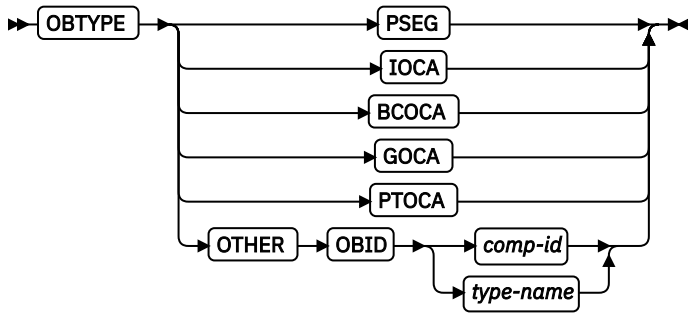
PAGEFORMAT pf1;
  LAYOUT 'Long Name 1' DELIMITER '/' Position 2 1 FONT comp;
  FIELD TEXT 'abcd' Position 2.5 1.5,

PAGEFORMAT pf2 RECIDLEN 26;
  LAYOUT 'Long Name 2' POSITION 2 1 FONT comp2;
  CONDITION cn1 START 13 Length 16
  WHEN EQ 'ABCDEFGH' NULL Pageformat pf1;
```

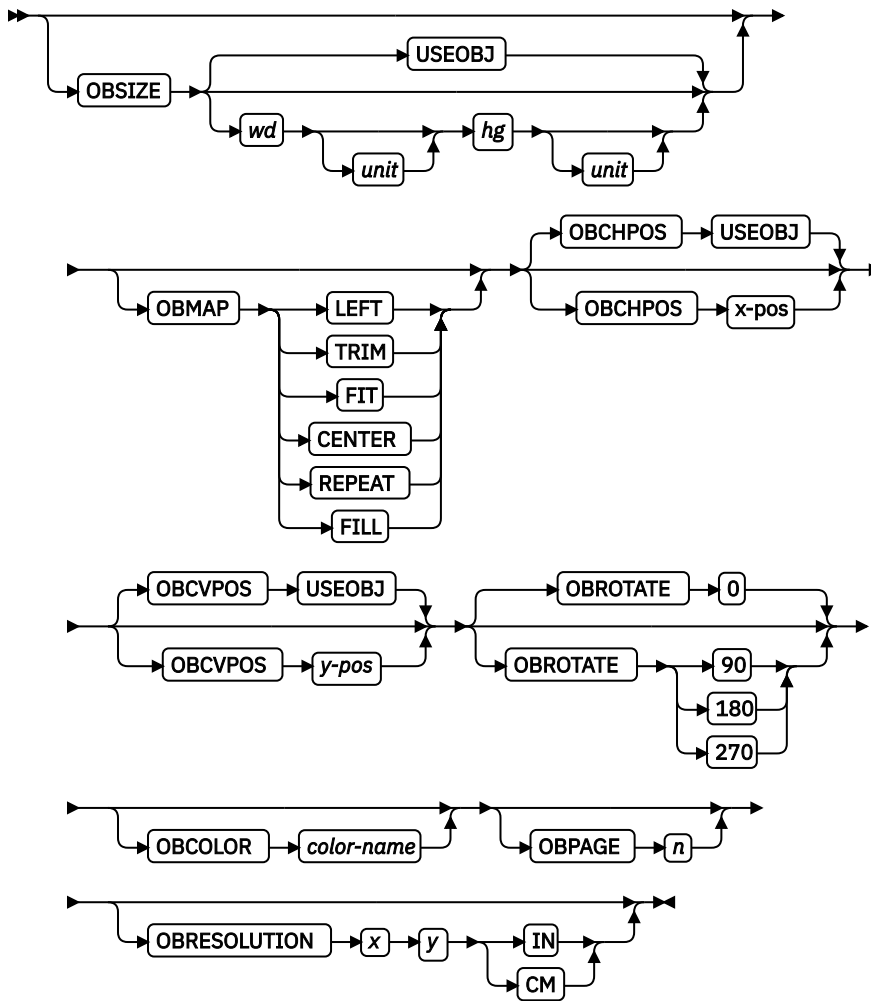
PRINTLINE Command



OBTYPE Parameters



Other OBJECT Parameters



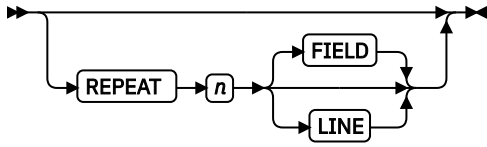
PRINTLINE

The PRINTLINE command specifies the printing of one data record on a line. If a *formatted* printline is to be printed, one or more FIELD commands must follow the governing PRINTLINE command; at least one is required. If one FIELD command is not used, field processing is not done and the unformatted data is printed.

Note: The PRINTLINE command defines a traditional page definition and cannot be mixed with LAYOUT commands that define Record Formatting page definitions or XLAYOUT commands that define XML page definitions.

Subcommands

REPEAT



Specifies the number of printlines that are to be printed on a logical page. The direction and font that is specified within this printline applies to all lines printed. By using this command, you do not have to write specifications for each line.

Note: If the REPEAT subcommand is omitted, only one line is printed for this PRINTLINE command.

n

This value specifies the number of printlines for a logical page; the maximum value is 65,535.

REPEAT 0

Not valid.

REPEAT 1

Only one line is printed.

If the CHANNEL or POSITION subcommands are specified within this PRINTLINE command, they apply only to the first line.

If this PRINTLINE is followed by several FIELD commands, the related field controls are also repeated.

FIELD

Specifies that fields that are associated with repetitions of this PRINTLINE are to be positioned based on the first instance of the same field.

This parameter has no effect in fields with the same direction as the PRINTLINE of which they are a part.

This parameter specifies that the direction of repetition for a field is the direction of the first instance of the field plus 90°. Therefore, every field of an ACROSS PRINTLINE is repeated down the page, regardless of the direction of the FIELD.

LINE

Specifies that fields that are associated with repetitions of this printline are to be positioned based on the repetition of the PRINTLINE itself.

This parameter has no effect in fields with the same direction as the PRINTLINE of which they are a part.

This parameter specifies that the direction of repetition for a field is the direction of the associated PRINTLINE plus 90°. Therefore, every field of an ACROSS PRINTLINE is repeated down the page, regardless of the direction of the FIELD.

CHANNEL *n*

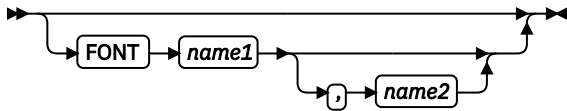


Used to specify line spacing, skipping within a logical page, or page ejection (skipping to a new page). This subcommand is equivalent to the Forms Control Buffer (FCB) channel.

n

The range of channels is 1 - 12. The channels correspond to carriage-control characters in the data. No default exists.

FONT



Defines the font to be used for the printline.

name1

Specifies the name of a font that is used to print the data. This font must be defined in a previous FONT command in the page definition.

If Shift-Out, Shift-In (SOSI) processing is used, *name1* must be the single-byte font.

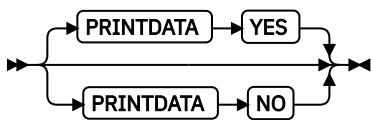
name2

Specify only when you are using Shift-Out, Shift-In (SOSI) processing to dynamically switch between a single-byte font and a double-byte font within the printline. *name2* must be the double-byte font.

Notes:

1. If this subcommand is not specified and TRC (Table Reference Character) bytes are specified in the print data, the print server uses the font indicated by the TRC byte. Otherwise, the print server selects a default font.
2. For ASCII, UTF8, or UTF16 the entire PRINTLINE command must be one font. To use multiple font mappings for a line in ASCII, UTF8, or UTF16, you must use the FIELD command.

PRINTDATA



Specifies whether the line of data that is associated with the current PRINTLINE must be printed. The PRINTDATA subcommand is useful when the data stream is interspersed with lines of comments, blank lines, or lines without data that are not meant to be printed.

YES

Specifies that the data for the current PRINTLINE is printed. YES is the default.

NO

Specifies that the data for the current PRINTLINE is not printed.

Note: Any FIELD command that is associated with a PRINTLINE that specifies PRINTDATA NO is ignored and an error message is issued.

The default position for a YES command that specifies PRINTDATA NO is position same. The following example is for PRINTLINE NO.

```
PAGEDEF xmp01 ;
SETUNITS LINESP 1 LPI ;

PRINTLINE ;
PRINTLINE PrintData NO ;
PRINTLINE PrintData yes ;
PRINTLINE ;
PRINTLINE Segment X PrintData NO Overlay Y Position Same Next ;
PRINTLINE PrintData yes ;
```

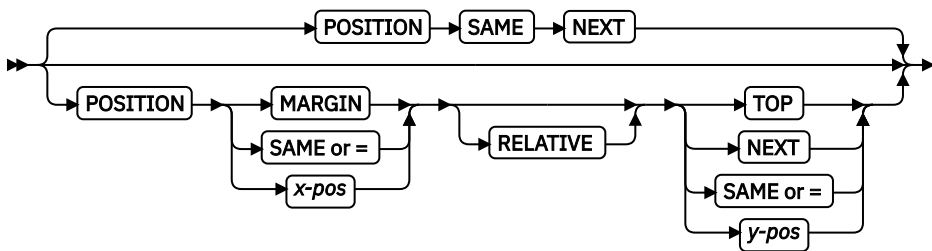
The LINESP parameter specifies that one line per inch is to be printed.

1. The first line of data is read and printed.
2. The second line of data is read, but not printed.
3. The third line of data is read and printed 1 inch down from the first line.

4. The fourth line of data is read and printed 1 inch down from the third line.
5. The fifth line of data is read, but not printed.
 - The segment X is printed.
 - The overlay Y is printed.
6. The sixth line of data is read and printed 2 inches down from the fourth line.

Note: The data line 2 was not printed and did not affect the positioning of the lines that followed. Line 3 was positioned as though line 2 did not exist.

POSITION



Specifies the starting position of the printline in the printout.

x-pos

Specifies the horizontal offset from the left side of the logical page. The value is a number with up to three decimal places. The valid options for *x-pos* are described in the SETUNITS command for the horizontal value.

MARGIN

Specifies that the line starts at the position that is specified as the horizontal (x) value in the previous LINEONE subcommand within the page definition.

SAME

Specifies this line starts at the same horizontal offset position as the previous printline. If applied to the first printline of a logical page, the horizontal position is 0, which is the default.

=

Alternative for SAME.

RELATIVE

Specifies that the following vertical position value is to be processed as a relative value. The printline is positioned relative to the last printline placed on the page.

If a set of printlines were skipped over in the page definition because of a skip-to-channel carriage control, and the new active printline contains a relative vertical position, the output line is positioned relative to the location of the last line that is printed on the page.

Notes:

1. If both TOP and RELATIVE are requested for the Y position value, the RELATIVE request is ignored.
2. When you are using RELATIVE positioning, PPFA does not flag off-the-page conditions for the position of a printline or for any overlays, segments, or objects placed relative to that printline. Printlines that fall outside the bounds of the logical page are flagged by the print server at run time.
3. When you are specifying RELATIVE, use the minus sign to indicate any negative values for the PRINTLINE vertical position; you can use the plus sign to indicate positive values. If no sign is used, a positive value is assumed.
4. The DIRECTION for a relative printline must be ACROSS. Fields that are associated with a relative printline must have the same DIRECTION as the printline and must match the PAGEFORMAT DIRECTION.
5. If RELATIVE is specified with SAME or = as the y value, the relative value in the printline is +0.

6. Relative positioning is allowed on a PRINTLINE command only if the PRINTLINE and all its associated FIELD commands are formatted to print in the same direction as the PAGEFORMAT. That is, the DIRECTION parameter in the PRINTLINE and any associated FIELD commands must specify (or default to) ACROSS. The DIRECTION in the PAGEFORMAT or PAGEDEF command can be any allowable value: ACROSS, DOWN, BACK, or UP.
7. The PRINTLINE command in which relative positioning is used can specify a CHANNEL parameter. The *n* value that is specified for the CHANNEL parameter cannot be used for any other PRINTLINE in the same PAGEFORMAT.

```

setunits linesp 6 lpi;
PAGEDEF rel9 replace yes
  direction across width 8.5 in height 11.0 in;
PRINTLINE channel 1 repeat 7 position 0 IN 1.0 IN;

/* The fields will be placed at +120 pels, +24 pels (next) */
/* and +48 pels (.20 IN) from lines previously placed on page */

setunits linesp 10 lpi;
PRINTLINE channel 2 repeat 2 position 0 relative next;
  FIELD START 1 LENGTH 3 position 0 IN .5 IN;
  FIELD START 4 LENGTH 3 position 0 IN next;
  FIELD START 7 LENGTH 3 position current .20 IN;

```

y-pos

Specifies the vertical offset from the top side of the logical page. The value options for *y-pos* are described in the SETUNITS command for the vertical value.

TOP

Specifies that the printline is placed in the position that is specified as the vertical (*y*) value in the previous LINEONE subcommand within the page definition.

NEXT

Specifies the PRINTLINE is to be positioned down (on the logical page) one line (as defined in the LINESP subcommand of the last SETUNITS command) from the previous PRINTLINE. The LINESP subcommand of the SETUNITS command establishes the distance from one line to the next.

When NEXT is specified for the first PRINTLINE of a logical page, the starting position of the line is one line down from the top of the logical page, which is the default.

Note: The down direction is determined by the direction of the logical page (as specified in the page format), not the printline direction. Therefore, NEXT is useful in ACROSS printlines.

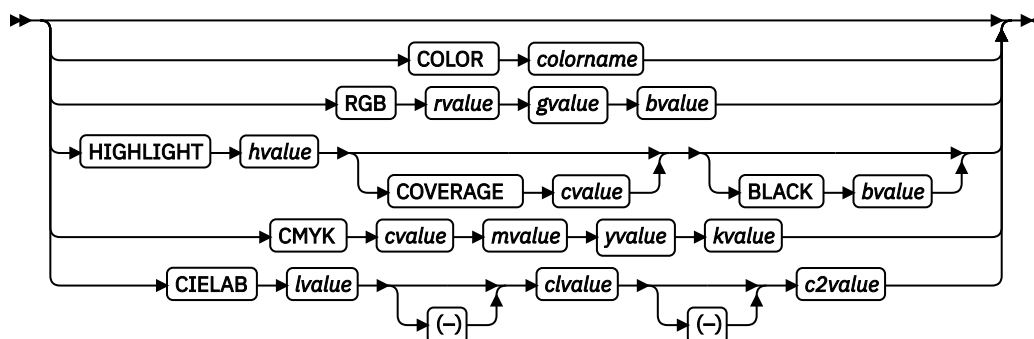
SAME

Specifies this printline starts at the same vertical position as the previous printline. If applied to the first printline of a logical page, the horizontal position is 0, which is the default.

=

Alternative for SAME.

COLOR



Specifies an OCA or defined color for the text of this field. This subcommand is recognized only by printers that support multiple-color printing. See your printer publication for information about the

colors that can be printed. See [Chapter 8, “AFP Color Management,” on page 151](#) for more information about using color.

colorname

Values for *colorname* can be a defined color (see [“DEFINE COLOR Command” on page 258](#)), or an OCA *colorname*. Values for OCA *colornames* are:

NONE
DEFAULT
BLACK
BLUE
BROWN
GREEN
RED
PINK (or MAGENTA)
TURQ (or CYAN)
YELLOW
DARKBLUE (or DBLUE)
ORANGE
PURPLE
MUSTARD
GRAY
DARKGREEN (or DGREEN)
DARKTURQ (DTURQ, or DCYAN, or DARKCYAN)

The color choices depend on the printer.

If you do not enter one of these colors, the default color for that printer is used. NONE is the color of the medium. DEFAULT is the printer default color.

Note: In some printer manuals, the color turquoise (TURQ) is called *cyan*, and the color pink (PINK) is called *magenta*.

PPFA supports the following synonyms:

- CYAN for TURQ
- DARKCYANN for DARKTURQ
- DBLUE for DARKBLUE
- DCYAN for DARKTURQ
- DGREEN for DARKGREEN
- DTURQ for DARKTURQ
- MAGENTA for PINK

color models

Specifies the color of print for this field that is supported in MO:DCA for the Red/Green/Blue color model (RGB), the highlight color space, the Cyan/Magenta/Yellow/Black color model (CMYK), and the CIELAB color model.

RGB rvalue gvalue bvalue

Three RGB integer values are used. The first (*rvalue*) represents a value for red, the second (*gvalue*) represents a value for green, and the third (*bvalue*) represents a value for blue. Each of the three integer values can be specified as a percentage 0 - 100.

Note: An RGB specification of 0/0/0 is black. An RGB specification of 100/100/100 is white. Any other value is a color somewhere between black and white, depending on the output device.

HIGHLIGHT hvalue COVERAGE cvalue BLACK bvalue

Indicates the highlight color model. Highlight colors are device-dependent.

You can use an integer within the range of 0 - 65535 for the *hvalue*.

Note: An *hvalue* of 0 indicates that no default value is defined; therefore, the default color of the presentation device is used.

COVERAGE indicates the amount of coverage of the highlight color to be used. You can use an integer within the range of 0 - 100 for the *cvalue*. If less than 100 percent is specified, the remaining coverage is achieved with the color of the medium.

Note: Fractional values are ignored. If COVERAGE is not specified, a value of 100 is used as a default.

BLACK indicates the percentage of black to be added to the highlight color. You can use an integer within the range of 0 - 100 for the *bvalue*. The amount of black shading that is applied depends on the COVERAGE percentage, which is applied first. If less than 100 percent is specified, the remaining coverage is achieved with black.

Note: If BLACK is not specified, a value of 0 is used as a default.

CMYK *cvalue mvalue yvalue kvalue*

Defines the cyan/magenta/yellow/black color model. *cvalue* specifies the cyan value. *mvalue* specifies the magenta value. *yvalue* specifies the yellow value. *kvalue* specifies the black value. You can use an integer percentage within the range of 0 - 100 for any of the CMYK values.

CIELAB *Lvalue (-)c1value (-)c2value*

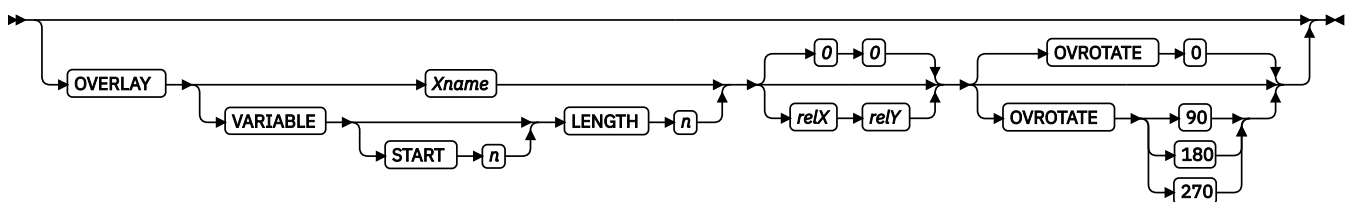
Defines the CIELAB model. Use a range of 0.00 - 100.00 with *Lvalue* to specify the luminance value. Use signed integers from -127 to 127 with *c1value* and *c2value* to specify the chrominance differences.

Lvalue, *c1value*, *c2value* must be specified in this order. No defaults exist for the subvalues.

Notes:

1. Do not specify both an OCA color with the COLOR subparameter and an extended color model on the same FIELD or PRINTLINE command. The output is device-dependent and might not be what you expect.
2. Do not specify two extended COLOR subcommands on the same FIELD or PRINTLINE command.

OVERLAY



Specifies the name of an overlay that is to be positioned relative to the location specified in the PRINTLINE command in which the OVERLAY subcommand was named. The PAGEFORMAT OVERLAY command can contain the named overlays. The maximum number of overlays that are specified for a PAGEFORMAT including the PRINTLINE OVERLAY subcommand is 254.

The OVERLAY can be identified by specifying a name (*xname*) or by getting the name from the input data record (use VARIABLE command).

Xname

The user access name (external name). It can be unquoted or quoted with descriptor tags, indicating the data type (for example, ASCII) of the data in the field.

unquoted-name

An unquoted external name can be up to 6 characters. It is folded to uppercase, has an O1 prefix added to it, and is translated to EBCDIC code page 500 if necessary.

quoted-name with no data tag

A quoted external name can be up to 8 characters. No translation is done. It is the data type (EBCDIC or ASCII) as dictated by the operating system. If not 8 bytes long, it is padded on the right with EBCDIC or ASCII blanks.

C'quoted-name'

This quoted external name can be up to 8 characters. No translation is done. It is the data type (EBCDIC or ASCII) as dictated by the operating system. If not 8 bytes long, it is padded on the right with EBCDIC or ASCII blanks.

E'quoted-name'

This quoted external name can be up to 8 characters. It is translated, if necessary, to EBCDIC and padded with EBCDIC blanks if it isn't 8 bytes long.

A'quoted-name'

This quoted external name can be up to 8 characters. It is translated, if necessary, to ASCII and padded with ASCII blanks if it isn't 8 bytes long.

X'hex-digit-pairs'

This quoted external name can be up to 8 characters (16 hexadecimal digits). No translation is done. If fewer than 8 characters are coded, the name is padded on the right with blanks of the operating system type where the page definition is generated (ASCII on AIX and Windows; otherwise, EBCDIC). The user can avoid the padding by coding all 16 hexadecimal digits.

VARIABLE

Indicates that the actual name of the overlay, including the O1 prefix, is read from the data record. The Variable-Name-Locator field specifies where in the data to get the name.

Notes:

1. Any overlay that is to be included in this manner must be defined in the PAGEFORMAT by using the OVERLAY command. Any overlay that is included but not defined causes a runtime print error for a missing MPO structured field, for example APS263I.
2. If you specify VARIABLE for the OVERLAY name and don't want to print the name, then you must have at least one field command, or code PRINTDATA NO on the PRINTLINE command.

START n

The starting position in the data record to get the overlay name. The first data byte position of the input record is 1. If START is not coded, 1 is assumed.

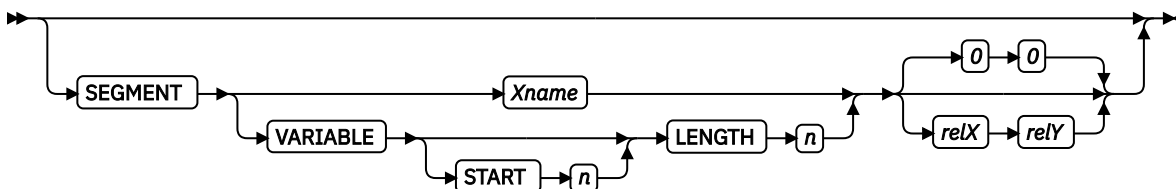
LENGTH n

Length of field. Specifies the number (n) of bytes to process from the data record, beginning with the position specified in START. The maximum length is 8.

OVRotate {0|90|180|270}

Specifies the rotation of the placed overlay in regard to the x-axis of the page. See "FORMDEF Command" on page 216 for an OVRotate example, which is presented in the FORMDEF description.

SEGMENT



Specifies the placement of a segment relative to the location specified in the PRINTLINE command in which the SEGMENT subcommand was named. The PAGEFORMAT SEGMENT command can contain the named segments. The maximum number of segments that are specified for a PAGEFORMAT including the PRINTLINE SEGMENT subcommand is 127.

The SEGMENT can be identified by specifying a name (*Xname*) or by getting the name from the input data record by using VARIABLE Variable-Name-Locator.

Xname

Specifies the user-access name as defined in the SEGMENT command. It can be unquoted or quoted with descriptor tags within indicate the data type of the data in the field.

unquoted-name

An unquoted external name can be up to 6 characters. It is folded to uppercase, have an O1 prefix added to it, and be translated to EBCDIC code page 500 if necessary.

quoted-name with no data tag

A quoted external name can be up to 8 characters. No translation is done. It is the data type (EBCDIC or ASCII) as dictated by the operating system. If not 8 bytes long, it is padded on the right with EBCDIC or ASCII blanks.

C'quoted-name'

A quoted external name can be up to 8 characters. No translation is done. It is the data type (EBCDIC or ASCII) as dictated by the operating system. If not 8 bytes long, it is padded on the right with EBCDIC or ASCII blanks.

E'quoted-name'

This quoted external name can be up to 8 characters. It is translated, if necessary, to EBCDIC and padded with EBCDIC blanks if it isn't 8 bytes long.

A'quoted-name'

This quoted external name can be up to 8 characters. It is translated, if necessary, to ASCII and padded with ASCII blanks if it isn't 8 bytes long.

X'hex-digit-pairs'

This quoted external name can be up to 8 characters (16 hexadecimal characters). No translation is done. If fewer than 8 characters are coded, the name is padded on the right with blanks of the operating system type where the page definition was generated (ASCII on AIX and Windows; otherwise, EBCDIC). You can avoid the padding by coding all 16 hexadecimal digits.

VARIABLE

Indicates that the actual name of the segment, including the S1 prefix, is read from the data record. The Variable-Name-Locator field specifies where in the data to get the name.

Notes:

1. Any page segment that is to be included in this manner must be defined in the PAGEFORMAT by using the SEGMENT command. Defining page segments enhances print performance.
2. If you specify VARIABLE for the SEGMENT name and don't want to print the name, then you must have at least one field command, or code PRINTDATA NO on the PRINTLINE command.

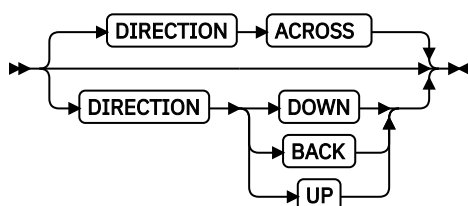
START *n*

The starting position in the data record to get the overlay name. The first data byte position of the input record is 1. If START is not coded, 1 is assumed.

LENGTH *n*

Length of field. Specifies the number (*n*) of bytes to process from the data record, beginning with the position specified in START. The maximum length is 8.

DIRECTION



- If you specify VARIABLE for the OBJECT name and don't want to print the name, then you must have at least one field command, or code PRINTDATA NO on the PRINTLINE command.

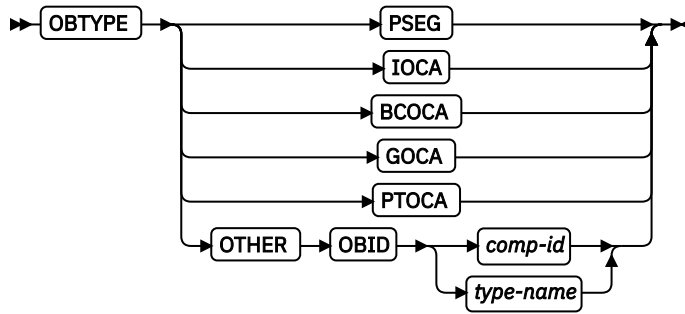
START *n*

The starting position in the data record to get the object name. The first data byte position of the input record is 1. If START is not coded, 1 is assumed.

LENGTH *n*

Length of field. Specifies the number (*n*) of bytes to process from the data record, beginning with the position specified in START. The maximum length is 8.

OBTYPE Parameters



Used to specify the type of the object. Observe that each of the object types restricts the type of mapping option that is allowed in the placement of the object (OBMAP on the OBJECT subcommand on the PRINTLINE command).

PSEG

Specifies a page segment object, as described in the *Mixed Object Document Content Architecture Reference*. All mapping types (OBMAP) are allowed by PPFA; however, the print server issues an error if any of the objects that are contained in the page segment are not compatible with the coded OBMAP parameter.

GOCA

Specifies a graphic object, as described in the *Graphics Object Content Architecture Reference*. You use GOCA to specify TRIM, FIT, CENTER, REPEAT, and FILL parameters on the OBMAP subcommand.

BCOCA

Specifies a bar code object, as described in the *Bar Code Object Content Architecture Reference*. You use BCOCA to specify only the LEFT parameter on the OBMAP subcommand.

IOCA

Specifies an image object, as described in the *Image Object Content Architecture Reference*. You use IOCA to specify TRIM, FIT, CENTER, REPEAT, and FILL parameters on the OBMAP subcommand.

PTOCA

Specifies a presentation text object with Object Environment Group (OEG) as described in the *Presentation Text Object Content Architecture Reference* and the *Mixed Object Document Content Architecture Reference*. You use the PTOCA object type to specify the LEFT parameter in the OBMAP subcommand.

OTHER

Specifies other object data. The object data that is included is a paginated presentation object with a format that might be defined by an AFP presentation architecture. When you specify OTHER, you must also specify the OBID parameter. You use OTHER to specify TRIM, FIT, CENTER, REPEAT, and FILL parameters on the OBMAP subcommand.

OBID

Specifies either a component identifier or a type name from [Table 17 on page 412](#). The OBID is translated into an Encoded OID and matched to the OID inside the object; they must match.

comp-id

Specifies the component identifier.

type-name

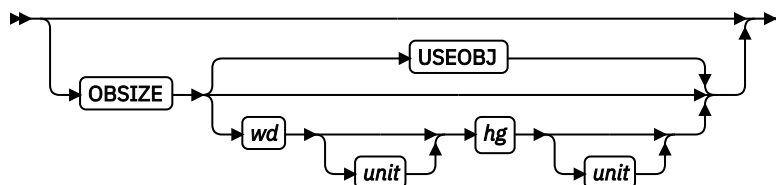
The name that is chosen by PPFA as an alternative to coding a component identifier.

Table 17: Non-OCA Objects supported by IOB

Type-Name	Component-ID	Description of OBID Object Type
EPS	13	Encapsulated PostScript
TIFF or TIF	14	Tag Image File Format
WINDIB	17	Device Dependent Bit Map [DIB], Windows Version
OS2DIB	18	Device Dependent Bit Map [DIB], PM Version
PCX	19	Paint Brush Picture File Format
GIF	22	Graphics Interchange Format
JFIF, JPEG, or JPG	23	AFPC (AFP Consortium) JPEG Subset
PDFSPO	25	PDF Single Page Object
PCLPO	34	PCL Page Object
EPSTR	48	EPS with Transparency
PDFSPOTR	49	PDF Single Page Object with Transparency
MTIFF	61	TIFF Multiple Image File
MTIFFNT	62	TIFF Multiple Image without Transparency File
MPDF	63	PDF Multiple Page File
MPDFT	64	PDF Multiple Page with Transparency File
PNG	65	PNG File Format
AFPCTIFF	66	AFPC TIFF Subset

Table 18: Object Types that can be referenced as Secondary Resources

Type-Name	Component-ID	Description of OID Type-Name
PDFRO	26	PDF Resource Object (new)
RESCLRPRO	46	Resident Color Profile Resource Object
IOCAFS45RO	47	IOCA FS45 Resource Object Tile (new)

Other OBJECT parameters**OBSIZE**

Specifies the size of the object placement area. When no OBSIZE is specified, the default is the size that is specified in the object. If no size is specified in the object, the size of the page is used. The page width is as specified on the PAGEDEF or PAGEFORMAT commands, or it defaults to 8.3 inches by 10.8 inches.

wd

Specifies the width of an object placement area as a number with up to three decimal places. The allowable width might vary with the type of printer that is used and the L-units that are specified with the PELSPERINCH parameter on the PAGEDEF or PAGEFORMAT command.

hg

Specifies the height of the object placement area as a number with up to three decimal places. The allowable height might vary with the type of printer that is used and the L-units that are specified with the PELSPERINCH parameter on the PAGEDEF or PAGEFORMAT command.

unit

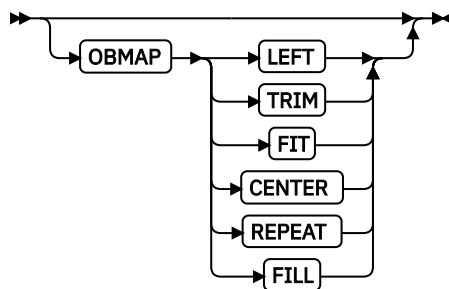
Specifies a unit of measurement for the width parameter. The choices are: IN, MM, CM, POINTS, or PELS.

Note: If no unit is specified, the default is the most recent SETUNITS command value or IN (inch) if a SETUNITS command is not issued.

USEOBJ

Specifies that the size measurements that are specified in the object are to be used. If no size is specified in the object, the size of the page is used, which is the length and width as specified on the PAGEDEF or PAGEFORMAT commands, or it defaults to 8.3 inches by 10.8 inches.

OBJMAP



Specifies mapping options. The OBJMAP parameter defines the mapping of the object to the object placement area. If OBJMAP is not coded, the mapping option within the object is used. If the object does not contain a mapping option, then the print server sets it to the created default for the container type.

Each object type (OBJTYPE on the OBJECT command) specifies the allowable mapping options for that type. When it can, PPFA issues a message when these rules are violated. However, for an object type of page segment (OBJTYPE=PSEG), PPFA does not know what types of objects are contained in it; therefore, PPFA cannot enforce the restrictions. See [“OBJECT Command” on page 363](#) for a description of the restrictions.

LEFT

Specifies that the object is positioned at the upper, left corner of the object placement area, as defined or defaulted by the *relative-xpos*, *relative-ypos*, OBCHPOS, and OBCVPOS parameters. Any portion of the object that falls outside the object placement area as defined by the OBSIZE parameter is not trimmed and might cause an exception condition by the presentation system.

TRIM

Specifies position and trim. The object is positioned at the upper, left corner of the object placement area, as defined or defaulted by the *relative-xpos*, *relative-ypos*, OBCHPOS, and

OBCVPOS parameters. Any portion of the object that falls outside the object placement area as defined by the OBSIZE parameter is trimmed.

FIT

Specifies scale to fit. This is the default value if the OBMAP parameter is not coded. The object is to be scaled to fit within the object placement area, as defined by the OBSIZE parameter. The center of the object is placed in the center of the object placement area and the object is scaled up or down to fit the block. Scaling in the horizontal and vertical directions is symmetrical. The FIT parameter ensures that all of the data in the object is presented in the object placement area at the largest possible size. The object is not trimmed.

CENTER

Specifies that the center of the object is positioned at the center of the object placement area. Any portion of the object that falls outside the object placement area is trimmed.

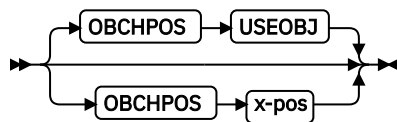
REPEAT

Specifies that the origin of the data object is positioned with the origin of the object placement area. The object is then replicated in the X and Y directions. If the last replicated data does not fit in the object area, it is trimmed to fit.

FILL

Specifies that the center of the data object is positioned coincident with the center of the object placement area. The data object is then scaled so that it totally fills the object placement area in both the X and Y directions. This might require that the object is asymmetrically scaled by different scale factors in the X and Y directions.

OBCHPOS



Specifies the horizontal offset of the object contents within the object placement area.

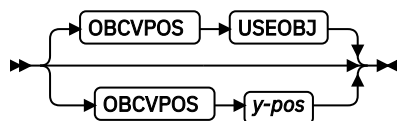
x-pos

The valid options for *x-pos* are described in the SETUNITS command for the horizontal value.

USEOBJ

Specifies that the offset value from the object is to be used. If no value is set in the object, the value defaults to 0.

OBCVPOS



Specifies the vertical offset of the object contents within the object placement area, as defined by the OBSIZE parameter. If OBCVPOS is not specified, it defaults to USEOBJ and uses the value set in the object. If no value is set in the object, the value defaults to 0. The OBCHPOS parameter is used only in LEFT and TRIM mapping of the object into the object placement area.

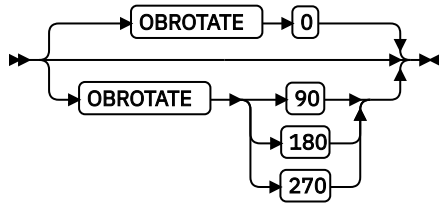
y-pos

Specifies a positive or negative number. The valid options for *y-pos* are described in the SETUNITS command for the vertical value.

USEOBJ

Specifies that the offset value from the object is to be used. If no value is set in the object, the value defaults to 0.

OBROTATE {0|90|180|270}

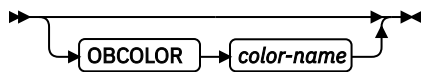


Specifies the object rotation in regard to the current LND's coordinate system.

Notes:

1. An included object is positioned and oriented in the following manner:
 - All measurements are from the LND position that is established by the PRINTLINE position. Reference these measurements by using the inline direction of the printline.
 - Measure the *x-pos* and *y-pos* units from the PRINTLINE current position to determine the object area origin.
 - Apply any rotation from OBROTATE to modify the PRINTLINE axis, and to create the new object area coordinate system.
 - Use the OBSIZE parameter to determine the object area size within the object area coordinate system, and to define the object placement area.
 - To determine the object content origin, apply the Object Content Offset from parameters OBCHPOS (Object Content Horizontal Position) and OBCVPOS (Object Content Vertical Position) to the object area origin.
2. The object content offset is used only for position (LEFT) and position and trim (TRIM) mapping options.

OBCOLOR



Specifies the color to be used as the default color or initial color for the object placement area. The OBCOLOR parameter is used only for objects of the PSEG, GOCA, BCOCA, and IOCA type. If the object type is OTHER, this parameter is ignored.

colorname

Values for *colorname* can be a defined color (see [“DEFINE COLOR Command”](#) on page 258) or one of these OCA color spaces:

NONE
DEFAULT
BLACK
BLUE
BROWN
GREEN
RED
PINK (or MAGENTA)
TURQ (or CYAN)
YELLOW
DARKBLUE (or DBLUE)
ORANGE
PURPLE
MUSTARD
GRAY

DARKGREEN (or DGREEN)
DARKTURQ (or DTURQ)
DARKCYAN (or DCYAN)

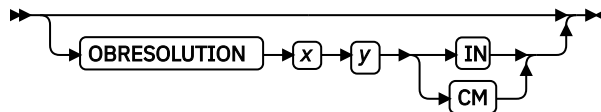
Note: This function requires both the print server and printer support. Check your print server and printer documentation.

OBPAGE



Specifies the page number of a multipage object or file to be presented. *n* is the page number. A number 1 - 999999999 (9 digits) is valid.

OBRESOLUTION



Specifies the resolution and unit of measurement of an image. If the resolution is already specified inside the image, this information is ignored by the printer. Use this subcommand for images that do not or might not contain their resolution. Specify resolution of an image so that the printer can print the image correctly.

To specify object resolution, you must have a printer and a print server that support this capability.

If not specified, the default is to assume that the image resolution is the same as the printer. If the image does not print at the size you expect, use OBRESOLUTION to identify the image's resolution. With the resolution information, the printer is then able print the image at the expected size.

x

Specifies the number to be used for the horizontal resolution of an image. Specify an integer value in the range of 1 - 3276.

y

Specifies the number to be used for the vertical resolution of an image. Specify an integer value in the range of 1 - 3276.

unit

Specifies a unit of measurement. The choices are:

IN

Inch

CM

Centimeter

In the following code example, the OBJECT subcommand is used to define a JFIF object (which can be specified as JPG). This object has a resolution of 300 pels per inch in both the x and y directions.

```
Pagedef obres2 replace yes;  
  
PRINTLINE OBJECT VAR .4 .5 start 2 length 6  
          OBTYPE OTHER OBID JPG  
          OBRESOLUTION 300 300 IN;
```

Example

In the following example, the page definition pd1 defines an object with an external name of PSEGxyz, of object type PSEG. The object has an internal name of xyzintname. The internal name identifies the object for the PRINTLINE OBJECT subcommand when the object is placed.

```
PAGEDEF pd1 Replace Yes
  COMMENT 'this is my program';

  OBJECT xzZIIntName
    OBXNAME PSEGxyz
    OBTYP E PSEG ;

PAGEFORMAT pf1;
PRINTLINE
  OBJECT xyzintname -1.1 in 2.1 in
    OBSIZE 3 in 5 in
    OBMAP FILL
    OBCOLOR BLUE ;
```

The PRINTLINE in PAGEFORMAT pf1 places the object on the page 1.1 inches to the left and 2.1 inches below the current printline position. It also maps the object into the object area with the FILL parameter, which centers the object in the object area and totally fills the area, possibly with different scaling factors in the X and Y directions. It has an area size of 3 by 5 inches, and overrides the default presentation space color to BLUE.

SEGMENT Command

→ **SEGMENT** → *name* → ; →

Use the SEGMENT command only if you want page segments to be loaded to the printer before the page begins printing. If segments are used repeatedly and need to be available in the printer, this command eliminates the need to load them each time. However, they do take up raster-pattern storage.

A separate SEGMENT command is required for each page segment with a maximum of 127 SEGMENT commands within a single page format. A SEGMENT command is nested within the page format and follows the PAGEFORMAT command.

For Traditional

```
PAGEFORMAT
TRCREF
SEGMENT
...
SEGMENT
```

Note: To include a page segment on a page without using an Include Page Segment structured field within the user data, see the [“PRINTLINE Command”](#) on page 400.

For Record Format and XML

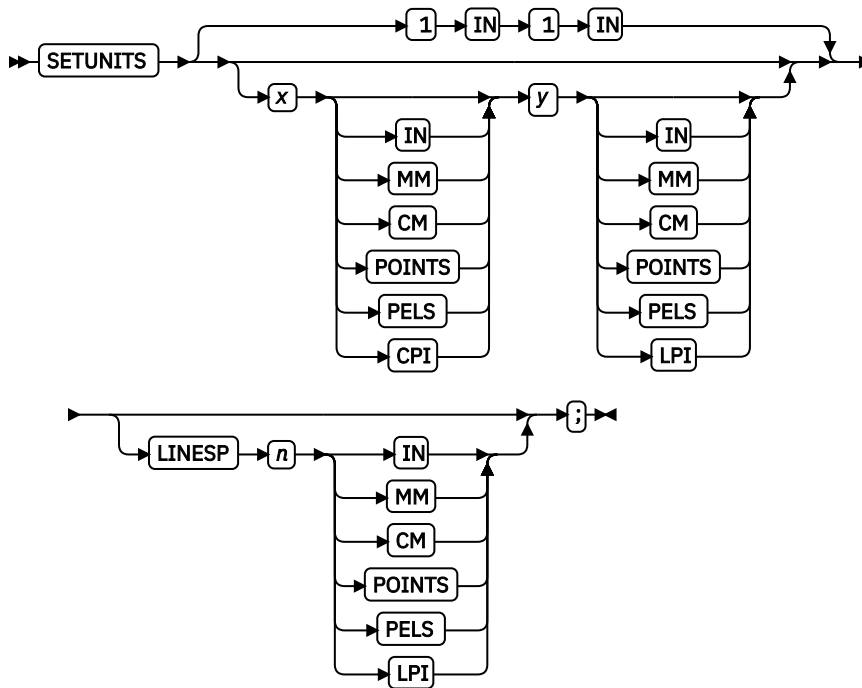
```
PAGEFORMAT
SEGMENT
...
SEGMENT
```

SEGMENT *name*

Specifies the alphanumeric name of 1 - 6 characters (user-access name) of the page segment. Each name must be unique within a single page format.

Note: The prefix S1 is not part of the six-character user-access name.

SETUNITS Command



The SETUNITS command specifies the value and the unit of measurement that are the defaults for any subsequent measurement parameter in all of the commands and subcommands. These values remain the default values until another SETUNITS command is specified. The SETUNITS command must be specified as the first command in a page definition. If this command or a measurement parameter is not specified, the defaults that are identified within the following description are used.

SETUNITS

Specifies the value and the unit of measurement that are the defaults for any subsequent measurement parameter in all of the commands and subcommands.

x

Specifies the number that is used for horizontal measurement. A number with up to three decimal places is used. The default is 1. The choices are IN, MM, CM, POINTS, PELS, or LPI. The default is IN.

Note: This value affects subsequent OFFSET subcommands.

y

Specifies the number that is used for vertical measurement. A number with up to three decimal places is used. The default is 1. The choices are IN, MM, CM, POINTS, PELS, or LPI. The default is IN.

Note: This value affects subsequent OFFSET subcommands.

Using CPI and LPI Units of Measurement: The CPI and LPI units of measurement make it possible to write the following command:

```
SETUNITS 10 CPI 6 LPI ;
```

This command sets the units of measurement for horizontal and vertical spacing in terms of characters per inch and lines per inch. You can then use the OFFSET subcommand specifications to increment the spacing one character or one line at a time. The distance that is specified by *n* characters over and by *n* lines down is defined in the governing SETUNITS command. This example shows 10 characters per inch (CPI) and 6 lines per inch (LPI).

Subcommand

LINESP

Determines the line density or *leading* of the text. Any unit of measurement can be used.

For Traditional

This subcommand value affects:

- The following PRINTLINE NEXT subcommand
- The vertical (*y*) position of the first line on a logical page when the LINEONE subcommand is not specified and the default is assumed

The default is 6 LPI. If LINESP is allowed to default to 6 LPI, the LINEONE default is one L-unit less than 80% of 1/6 inch.

For Record Format and XML

This subcommand value affects the LAYOUT NEXT subcommand:

n

The meaning is determined by the type of unit-of-measurement that is specified in the unit parameter.

LPI

The number of lines per inch

All others

The distance between lines

unit

Specifies a unit of measurement. The choices are:

IN

Inch

LPI

Lines-per-inch

MM

Millimeter

CM

Centimeter

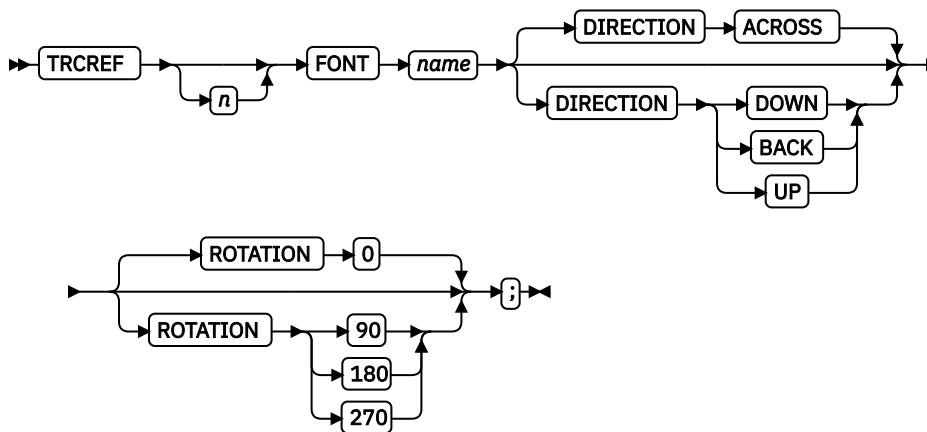
PELS

L-units per inch (The number of L-units per inch can be defined by the user or can default to 240 L-units in an inch)

POINTS

Points per inch (72 points in an inch)

TRCREF Command (Traditional)



The TRCREF command specifies the relationship between a font and a table-reference character (TRC) in the data. When specified, the TRCREF command must immediately follow a PAGEFORMAT command.

```
PAGEFORMAT
TRCREF
SEGMENT
OVERLAY
```

Depending on the value that is specified for *n*, the TRC is interpreted by the print server as being either S/370 1403 line-mode compatible or S/370 1403 line-mode incompatible: Notice that, if compatibility TRCs are to be used, no fonts are specified in any PRINTLINE or FIELD commands within the same PAGEFORMAT.

0 - 3

Indicate a compatible TRC for a S/370 1403 line-mode data stream.

4 - 126

Indicate an incompatible TRC for a S/370 1403 line-mode data stream.

Also, notice that any TRC number outside the range of 0 - 3 results in non-compatibility TRCs for the entire page definition. If compatibility TRCs are used, do not specify fonts on PRINTLINE or FIELD commands within the same PAGEFORMAT.

TRCREF

Specifies the TRC numbers that can appear in print data.

n

The allowable values are 0 - 126; each TRCREF command must contain a unique number within a page format.

If *n* is omitted, PPFA automatically adds one to the *n* value of the previous TRCREF command in the sequence and assigns that value.

The default for the first TRCREF command is 0.

Notes:

1. You can have multiple TRCs pointing to the same font.
2. If four or fewer fonts are specified, they are treated as compatibility TRCs and the leftmost 4 bits of the TRC are ignored. For example, in this case X'F0' and X'00' are both valid for TRC0.

Subcommands

FONT

Specifies the font that is associated with the TRC number.

name

Specifies the local name of a font; the font must be one that is named in a FONT command.

If you used both the user-access name and the local name in the FONT command, use the local name here. If you used only the user-access name, use it here.

DIRECTION

Specifies the print direction of the line relative to the upper-left corner as you view the logical page. Not all printers can print in all print directions. For more information about your printer, see your printer documentation.

The DIRECTION on the TRCREF command must match the DIRECTION of the PRINTLINE command with which the TRC is to be used. If TRCREF DIRECTION subcommand is not specified, DIRECTION ACROSS is assumed. Observe that this direction is additive to the direction specified in the PAGEFORMAT command.

ACROSS

The page is printed with the characters added to the page from left to right, and the lines added from the top to the bottom.

DOWN

The page is printed with the characters added to the page from top to bottom, and the lines added from the right to the left.

BACK

The page is printed with the characters added to the page from right to left, and the lines added from the bottom to the top.

UP

The page is printed with the characters added to the page from bottom to top, and the lines added from the left to the right.

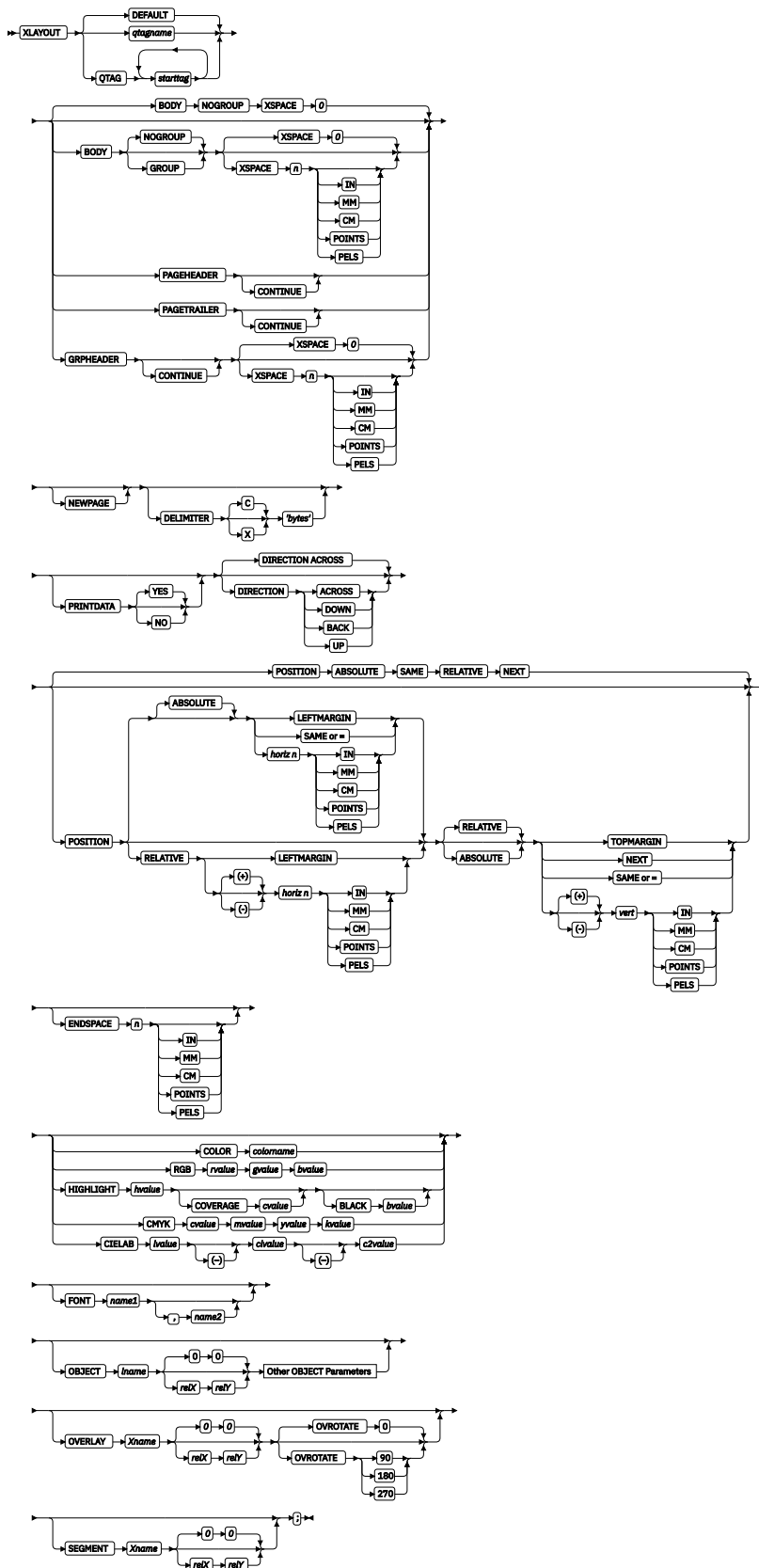
ROTATION

Specifies the rotation of characters in degrees. The specified value is relative to the inline direction of the printline.

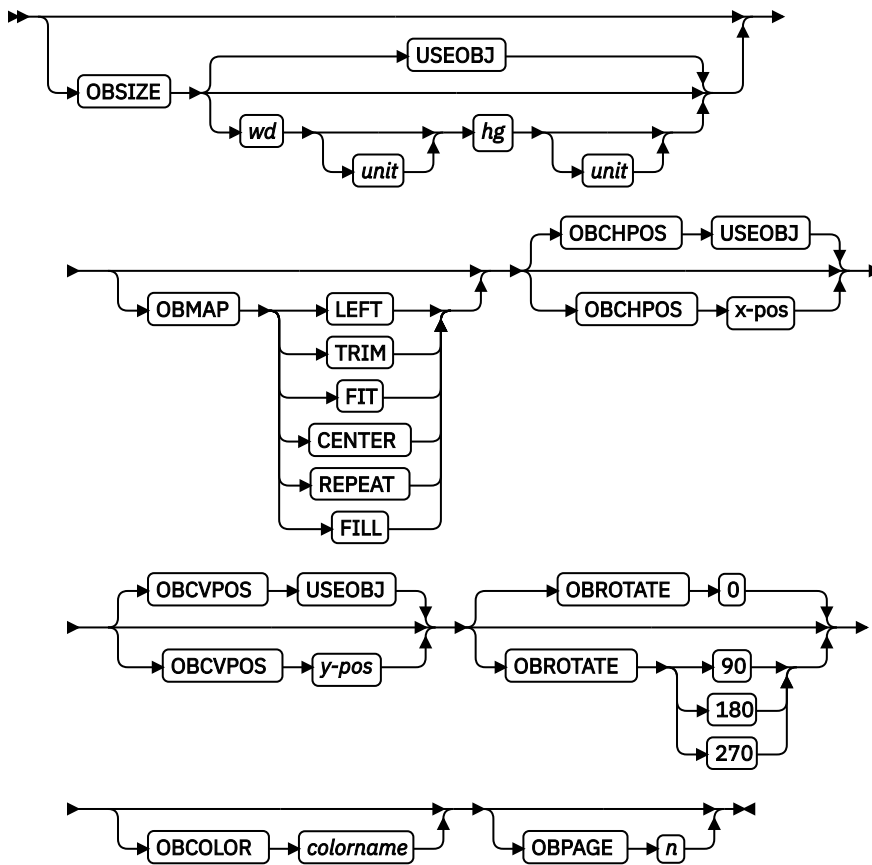
Valid rotations are 0°, 90°, 180°, or 270°; 0 is the default.

If the TRCREF ROTATION subcommand is not specified, the default is the rotation value that is specified on the FONT command.

XLAYOUT Command (XML)



Other OBJECT Parameters



The XLAYOUT command addresses an XML data item by specifying a QTAG (qualified tag) for that data. A QTAG is a series of XML start tags that fully identify the XML data item.

Before PSF prints the data, it scans the XML data item and matches it to an XLAYOUT command in the page definition by using its QTAG. The matching XLAYOUT command in the page definition is used to position and format the associated XML data item and its attributes on the printed page.

The XML page definition function has the following new PPFA concepts:

Relative Inline Positioning:

Relative inline positioning places data relative to the current position. If you position a text field and then place the text, the end of the text becomes the new current position. Graphics, bar codes, objects, segments, and overlays do not change the current position after they are originally positioned. For example, if you position a line with a DRAWGRAPHIC LINE command, the new current position is the starting point of that line. The length of the graphic line does not change the current position.

These restrictions must be observed when you are using relative inline positioning:

1. XLAYOUT commands with relative positioning cannot contain any of these:
 - FIELD commands with inline positioning relative to the XLAYOUT (LPOS)
 - FIELD ATTR (attribute) with inline positioning relative to the XLAYOUT (LPOS)
 - FIELD commands with bar codes
 - DRAWGRAPHIC commands
 - OBJECT subcommands
 - SEGMENT subcommands
 - OVERLAY subcommands
2. You can use the SAME parameter only for inline positioning on the XLAYOUT command when the previously used XLAYOUT command used absolute inline positioning.

Absolute Inline Positioning:

Allows absolute inline positioning on a FIELD command for specific placement of elements.

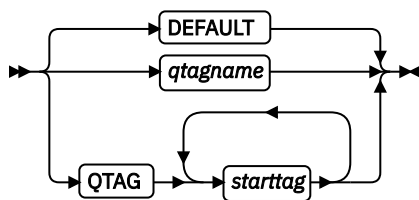
Attributes are Special FIELDS:

The attribute is identified by name and the data that is printed is from the attribute value or a portion of the attribute value and not from the element content.

Notes:

1. If a FIELD is used for presenting any piece of data on the XLAYOUT command, FIELD commands must be used for all pieces of data that is presented on the XLAYOUT command. Because an attribute is a special field, if you want to print both an attribute value and the element data, you need to code the attribute field for the attribute value and a regular field for the element data.
2. PSF suppresses leading and trailing blanks (X'40' for EBCDIC or X'20' for ASCII) in the data. Multiple embedded blanks are reduced to one blank.
3. The XLAYOUT command defines an XML page definition and cannot be mixed with PRINTLINE commands, which define traditional page definitions, or LAYOUT commands, which define Record Formatting page definitions.

Subcommands



DEFAULT

This keyword is used only when the layout type is either PAGEHEADER or PAGETRAILER, and no name is needed. Only one default PAGEHEADER or PAGETRAILER can be specified in a PAGEFORMAT.

qtagname

The *qtagname* is a defined Qualified Tag. It is defined by the DEFINE *qtagname* QTAG command at the beginning of the page definition.

QTAG starttag

An explicit Qualified Tag. It is defined by coding a series of start tags that are separated by commas. A start tag is an XML data element name. Put the start tag in quotation marks if you want to preserve its case. Otherwise, it is folded to uppercase.

In Figure 135 on page 425, *person*, *name*, and *first* are start tags. The qualifying tag for the data item *Case* is 'person', 'name', 'last'. In the example page definition, both of the *x* and *y* XLAYOUT commands address the same XML data item *Case*.

```

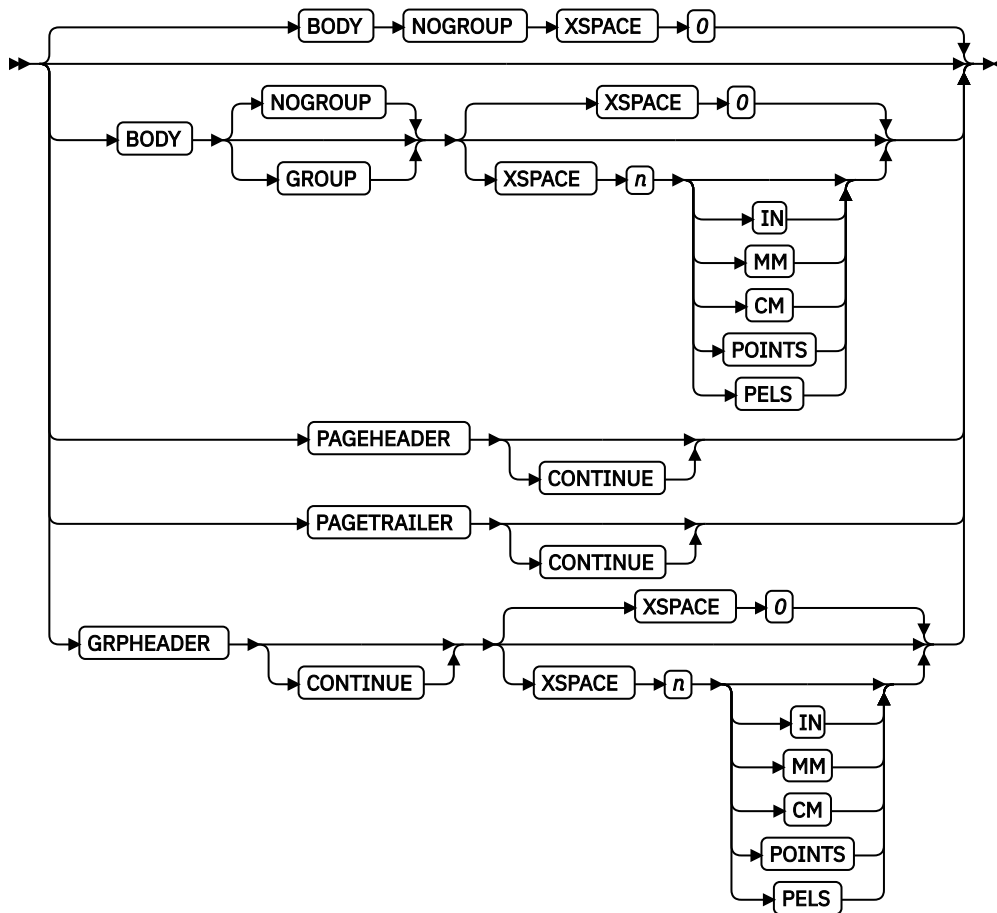
<person>
  <name>
    <first>Justin</first>
    <last>Case</last>
  </name>
</person>

PAGEDEF xxx...;
  DEFINE lname QTAG 'person','name','last';
  ...
  Pageformat x ...
    XLAYOUT lname POSITION...
  ...
  Pageformat y ...
    XLAYOUT QTAG 'person','name','last' POSITION ...
  ...

```

Figure 135: Example of XML data with the associated page definition

Body



The BODY layout type is used for most of data in your database. This is the default.

GROUP

The GROUP parameter indicates that the existing group header must be saved and used for subsequent pages. If this parameter is not set when processing starts on a BODY layout, the active group header record is discarded and not reprinted on subsequent pages.

XSPACE

XSPACE indicates the amount of extra space from the position of the layout to the bottom of the group header area. The user can identify the amount of extra space in excess of one text line that

is used by the header so that the baseline moves down and the following group data is not placed on top of the header area. This space is not calculated by PPFA and must be explicitly defined by the user. See [Figure 136 on page 426](#) (shaded space shows group header area):

Checks	Check No.	Date	Amount	XSPACE
	352	01/04/90	\$ 321.50	
	353	01/05/90	\$ 100.00	
	354	01/10/90	\$ 122.30	

Figure 136: Example Showing the Use of XSPACE.

When a Group Header record is processed and is still active when the PAGEFORMAT is left, the group header record is saved by the presentation services program. Whenever the same PAGEFORMAT is reinvoked, this saved group header record is presented again if the first body record after reinvoking the PAGEFORMAT selects a Body record that has the Group Indicator on.

PAGEHEADER

This layout type specifies a header that is to be printed on each new page. The baseline position of this layout is normally in the top margin, but can be anywhere on a logical page. If RELATIVE is specified, the position is considered to be relative to the page origin. Usually contains customer's name, address, account number, and so forth. Only one default PAGEHEADER layout can be specified in a PAGEFORMAT and no input record data can be specified in a default layout.

CONTINUE

The CONTINUE parameter indicates that this XLAYOUT command is a continuation of the Page Header definition. The formation of the Page Header might require the data from more than one data element, which is done by specifying the CONTINUE parameter.

PAGETRAILER

This layout type specifies a trailer that is to be printed on each new page. The baseline position of this layout is normally in the bottom margin, but can be located anywhere on a logical page and can be specified as RELATIVE. Only one default PAGETRAILER layout can be specified in a PAGEFORMAT and no input record data is processed with a default layout. It can contain the name of the form or a footnote.

CONTINUE

The CONTINUE parameter indicates that this XLAYOUT command is a continuation of the Page Trailer definition. The formation of the Page Trailer might require the data from more than one data element, which is done by specifying the CONTINUE parameter.

GRPHEADER

This layout type specifies a header that is to be printed at the beginning of a group of data. If a logical page eject occurs before the group of data ends, the header is printed after the top margin on each new page until the group ends. The baseline position of this layout can be specified as RELATIVE. It can include column headings.

CONTINUE

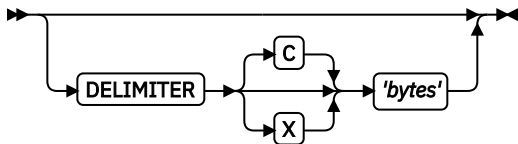
The CONTINUE parameter indicates that this XLAYOUT command is a continuation of the Group Header definition. The formation of the Group Header might require the data from more than one data element, which is done by specifying the CONTINUE parameter.

NEWPAGE



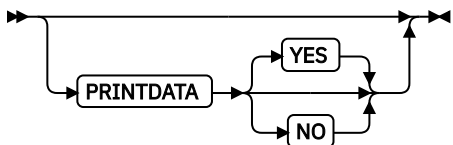
This parameter indicates that a new page must be started with this layout name. If it is a header or trailer layout, the print position is moved to the start of a new page before this header or trailer becomes the active header or trailer.

DELIMITER



The delimiter is a one or two-byte code that is specified in either character or hex indicates a delimiting character within the customer's database and is used to separate fields. PPFA does not translate these characters. Hex characters must be entered in uppercase within the quotation marks.

PRINTDATA



Specifies whether the line of data that is associated with the current LAYOUT must be printed. The PRINTDATA subcommand is useful when the data stream is interspersed with lines of comments, blank lines, or lines without data that are not meant to be printed.

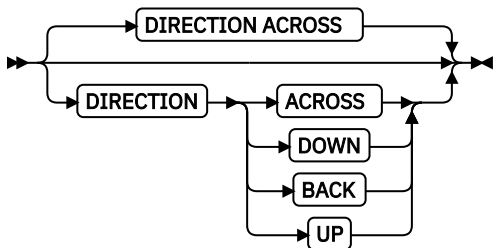
YES

Specifies that the data for the current XLAYOUT is printed. YES is the default.

NO

Specifies that the data for the current XLAYOUT is not printed.

DIRECTION



Specifies the print direction of the line relative to the upper-left corner as you view the logical page. Not all printers can print in all print directions. For more information about your printer, see your printer documentation.

If DIRECTION is not specified, the direction that is specified in the PAGEFORMAT command is used. Observe that this direction is additive to the direction specified in the PAGEFORMAT command. See ["PAGEFORMAT Command"](#) on page 392.

ACROSS

The layout direction is rotated 0 degrees relative to the direction specified in the PAGEFORMAT (the layouts are oriented in the same direction as the page).

DOWN

The layout direction is rotated 90 degrees relative to the direction specified in the PAGEFORMAT.

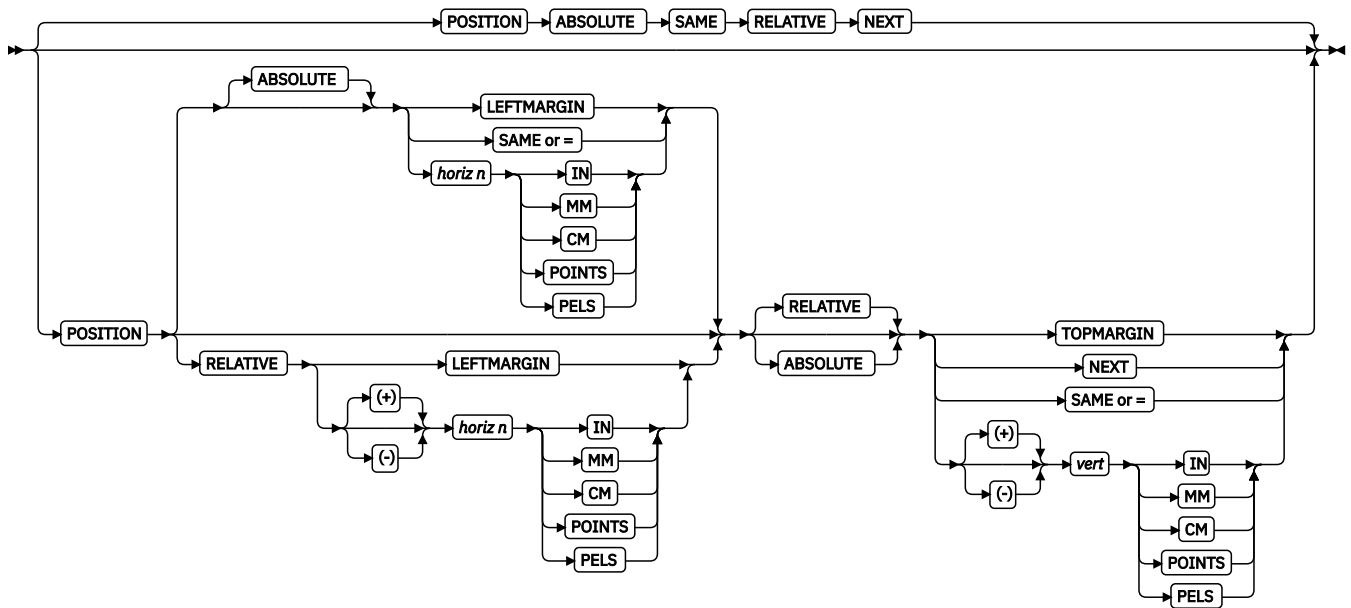
BACK

The layout direction is rotated 180 degrees relative to the direction specified in the PAGEFORMAT.

UP

The layout direction is rotated 270 degrees relative to the direction specified in the PAGEFORMAT.

POSITION



Positions FIELD, DRAWGRAPHIC, and ENDGRAPHIC text and graphics. If Relative is specified or POSITION is not specified, the baseline of the Position is relative to the previous LAYOUT position.

1. For PAGEHEADER RCD: The baseline position can be anywhere on a logical page, but cannot be specified as Relative.
2. For PAGETRAILER, GROUPHEADER, and BODY RCDs: The baseline position can be anywhere on a logical page and can be specified as RELATIVE.

Specifies the starting position of the layout in the printout.

RELATIVE

Specifies the *horizontal position* and *vertical position* values that are relative to the current inline position.

horizontal position

Specifies that the following *horizontal position* value is to be processed as a value relative to the current inline position.

x-pos

Specifies the horizontal offset from the left side of the logical page. The value is a number with up to three decimal places. The valid options for *x-pos* are described in the SETUNITS command for the horizontal value.

LEFTMARGIN

Specifies this line starts at the position that is specified as the horizontal (x) value in the previous LEFTMARGIN subcommand within the page definition.

SAME

Specifies this line starts at the same horizontal offset position as the previously coded XLAYOUT. If applied to the first XLAYOUT of a logical page, the horizontal position is 0, which is the default.

Note: This parameter is not valid with RELATIVE *horizontal*.

=

Alternative for SAME.

vertical position

Specifies that the following *vertical position* value is to be processed as a relative value. The XLAYOUT is positioned relative to the last XLAYOUT placed on the page.

y-pos

Specifies the vertical offset from the top side of the logical page. The value options for *y-pos* are described in the SETUNITS command for the vertical value.

TOPMARGIN

Specifies that the XLAYOUT is placed in the position that is specified as the vertical (*y*) value in the TOPMARGIN subcommand within the page definition.

NEXT

Specifies the layout is to be positioned down (on the logical page) one line (as defined in the LINESP subcommand of the last SETUNITS command) from the previous field. The LINESP subcommand of the SETUNITS command establishes the distance from one line to the next.

When NEXT is specified for the first XLAYOUT of a logical page, the starting position of the line is one line down from the top of the logical page, as defined by the TOPMARGIN subcommand.

Note: The down direction is determined by the direction of the logical page (as specified in the page format), not the XLAYOUT direction. Therefore, NEXT is useful in ACROSS XLAYOUTs.

SAME

Specifies this XLAYOUT starts at the same vertical position as the previous XLAYOUT.

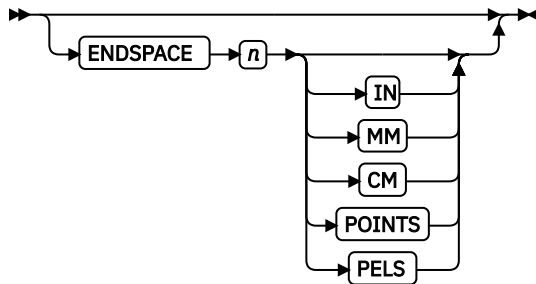
=

Alternative for SAME.

Notes:

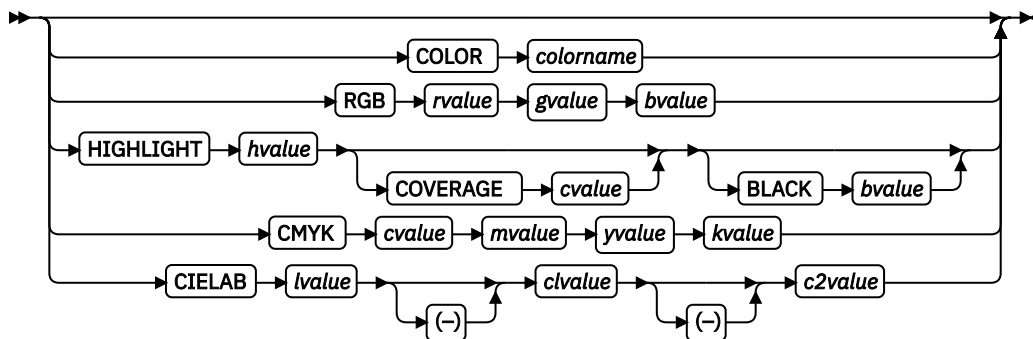
1. If both TOP and RELATIVE are requested for the *y-pos* value, the RELATIVE request is ignored.
2. When you are using RELATIVE positioning, PPFA does not flag off-the-page conditions for the position of an XLAYOUT or for any overlays, segments, or objects placed relative to that XLAYOUT. XLAYOUTs that fall outside the bounds of the logical page are flagged by the print server at run time.
3. When you are specifying RELATIVE, use the minus sign to indicate any negative values for the XLAYOUT vertical position; you can use the plus sign to indicate positive values. If no sign is used, a positive value is assumed.
4. The DIRECTION for a relative XLAYOUT must be ACROSS. Fields that are associated with a relative XLAYOUT must have the same DIRECTION as the XLAYOUT and must match the PAGEFORMAT DIRECTION.
5. If RELATIVE is specified with SAME or = as the *y* value, the relative value in the XLAYOUT is +0.
6. RELATIVE positioning is allowed on an XLAYOUT command only if the XLAYOUT and all its associated FIELD commands are formatted to print in the same direction as the PAGEFORMAT. That is, the DIRECTION parameter in the XLAYOUT and any associated FIELD commands must specify (or default to) ACROSS. The DIRECTION in the PAGEFORMAT or PAGEDEF command can be any allowable value: ACROSS, DOWN, BACK, or UP.

ENDSPACE



If the remaining body space is less than the value specified, ENDSPACE causes a logical page eject to be done. For example, ENDSPACE can be used on a GRPHEADER layout to ensure that a group header does not print at the end of a page without the first data record of the group. ENDSPACE does not include the space within the bottom margin (specified on the PAGEDEF or PAGEFORMAT command). This indicator is ignored on a PAGEHEADER or PAGETRAILER layout.

COLOR



Specifies an OCA or defined color for the text of this field. This subcommand is recognized only by printers that support multiple-color printing. See your printer publication for information about the colors that can be printed.

colorname

Values for *colorname* can be a defined color (see “DEFINE COLOR Command” on page 258), or an OCA *colorname*. Values for OCA *colornames* are:

- NONE
- DEFAULT
- BLACK
- BLUE
- BROWN
- GREEN
- RED
- PINK (or MAGENTA)
- TURQ (or CYAN)
- YELLOW
- DARKBLUE (or DBLUE)
- ORANGE
- PURPLE
- MUSTARD
- GRAY
- DARKGREEN (or DGREEN)
- DARKTURQ (DTURQ, or DCYAN, or DARKCYAN)

The color choices depend on the printer.

If you do not enter one of these colors, the default color for that printer is used. NONE is the color of the medium. DEFAULT is the printer default color.

Note: In some printer manuals, the color turquoise (TURQ) is called *cyan*, and the color pink (PINK) is called *magenta*.

PPFA supports the following synonyms:

- CYAN for TURQ
- DARKCYANN for DARKTURQ
- DBLUE for DARKBLUE
- DCYAN for DARKTURQ
- DGREEN for DARKGREEN
- DTURQ for DARKTURQ
- MAGENTA for PINK

color models

Specifies the color of print for this field that is supported in MO:DCA for the Red/Green/Blue color model (RGB), the highlight color space, the Cyan/Magenta/Yellow/Black color model (CMYK), and the CIELAB color model.

RGB *rvalue gvalue bvalue*

Three RGB integer values are used. The first (*rvalue*) represents a value for red, the second (*gvalue*) represents a value for green, and the third (*bvalue*) represents a value for blue. Each of the three integer values can be specified as a percentage 0 - 100.

Note: An RGB specification of 0/0/0 is black. An RGB specification of 100/100/100 is white. Any other value is a color somewhere between black and white, depending on the output device.

HIGHLIGHT *hvalue COVERAGE cvalue BLACK bvalue*

Indicates the highlight color model. Highlight colors are device-dependent.

You can use an integer within the range of 0 - 65535 for the *hvalue*.

Note: An *hvalue* of 0 indicates that no default value is defined; therefore, the default color of the presentation device is used.

COVERAGE indicates the amount of coverage of the highlight color to be used. You can use an integer within the range of 0 - 100 for the *cvalue*. If less than 100 percent is specified, the remaining coverage is achieved with the color of the medium.

Note: Fractional values are ignored. If COVERAGE is not specified, a value of 100 is used as a default.

BLACK indicates the percentage of black to be added to the highlight color. You can use an integer within the range of 0 - 100 for the *bvalue*. The amount of black shading that is applied depends on the COVERAGE percentage, which is applied first. If less than 100 percent is specified, the remaining coverage is achieved with black.

Note: If BLACK is not specified, a value of 0 is used as a default.

CMYK *cvalue mvalue yvalue kvalue*

Defines the cyan/magenta/yellow/black color model. *cvalue* specifies the cyan value. *mvalue* specifies the magenta value. *yvalue* specifies the yellow value. *kvalue* specifies the black value. You can use an integer percentage within the range of 0 - 100 for any of the CMYK values.

CIELAB *Lvalue (-)c1value (-)c2value*

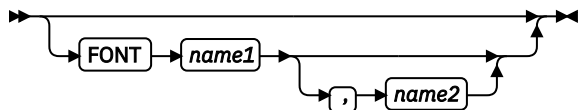
Defines the CIELAB model. Use a range of 0.00 - 100.00 with *Lvalue* to specify the luminance value. Use signed integers from -127 to 127 with *c1value* and *c2value* to specify the chrominance differences.

Lvalue, *c1value*, *c2value* must be specified in this order. No defaults exist for the subvalues.

Notes:

1. Do not specify both an OCA color with the COLOR subparameter and an extended color model on the same FIELD or PRINTLINE command. The output is device-dependent and might not be what you expect.
2. Do not specify two extended COLOR subcommands on the same FIELD or PRINTLINE command.

FONT



Defines the font to be used for the layout.

name1

Specifies the name of a font that is used to print the data. This font must be defined in a previous FONT command in the page definition.

If Shift-Out, Shift-In (SOSI) processing is used, *name1* must be the single-byte font.

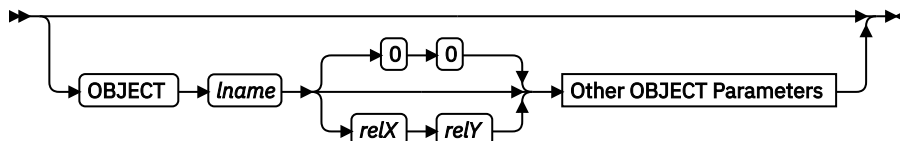
name2

Specify when are only using Shift-Out, Shift-In (SOSI) processing to dynamically switch between a single-byte font and a double-byte font within the layout. *name2* must be the double-byte font.

Notes:

1. If this subcommand is not specified in the print data, the print server uses the font indicated. Otherwise, the print server selects a default font.
2. *name2* is only valid with EBCDIC data.

OBJECT



Specifies the local name of an object that is to be positioned and oriented relative to the location specified in the XLAYOUT command in which the OBJECT subcommand was named. The OBJECT, as identified by the *lname* parameter, must be defined by an OBJECT command.

Note: Multiple page/image objects that are used without specifying a page with OBPAGE default to using the first page in the object.

You can place multiple objects on the same XLAYOUT command and you can place the same object multiple times. Each placement must have its own set of placement parameters, as follows:

lname

Specifies the local name of an object that is up to 16 alphanumeric characters in length. The *lname* parameter is used to match the XLAYOUT OBJECT subcommand to its definition from the OBJECT command. An object must be defined with this internal name by the OBJECT command.

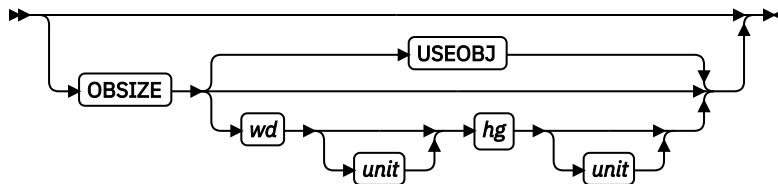
relX relY

Specifies the number of units (such as inches or mm) that are added to the position of the current XLAYOUT to position the top-left corner of the object. The values for the horizontal and vertical positioning are limited by the type of printer that is used and the L-units that are specified with the PELSPERINCH parameter on the PAGEDEF or PAGEFORMAT command.

Each position specification can be a positive or negative number with up to three decimal places. The units that are specified can be one of these: IN, MM, CM, POINTS, or PELS.

Other OBJECT Parameters

OBSIZE



Specifies the size of the object placement area. When no **OBSIZE** is specified, the default is the size that is specified in the object. If no size is specified in the object, the size of the page is used. The page width is as specified on the **PAGEDEF** or **PAGEFORMAT** commands, or it defaults to 8.3 inches by 10.8 inches.

wd

Specifies the width of an object placement area as a number with up to three decimal places. The allowable width might vary with the type of printer that is used and the L-units that are specified with the **PELSPERINCH** parameter on the **PAGEDEF** or **PAGEFORMAT** command.

hg

Specifies the height of the object placement area as a number with up to three decimal places. The allowable height might vary with the type of printer that is used and the L-units that are specified with the **PELSPERINCH** parameter on the **PAGEDEF** or **PAGEFORMAT** command.

unit

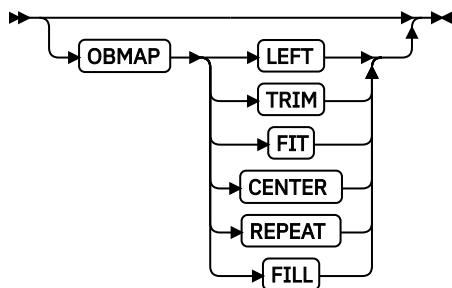
Specifies a unit of measurement for the width parameter. The choices are: **IN**, **MM**, **CM**, **POINTS**, or **PELS**.

Note: If no unit is specified, the default is the most recent **SETUNITS** command value or **IN** (inch) if a **SETUNITS** command is not issued.

USEOBJ

Specifies that the size measurements that are specified in the object are to be used. If no size is specified in the object, the size of the page is used, which is the length and width as specified on the **PAGEDEF** or **PAGEFORMAT** commands, or it defaults to 8.3 inches by 10.8 inches.

OBMAP



Specifies mapping options. The **OBMAP** parameter defines the mapping of the object to the object placement area. If **OBMAP** is not coded, the mapping option within the object is used. If the object does not contain a mapping option, then the print server sets it to the created default for the container type.

Each object type (**OBTYPE** on the **OBJECT** command) dictates the allowable mapping options for that type. When it can, **PPFA** issues a message when these rules are violated. However, for an object type of page segment (**OBTYPE=PSEG**), **PPFA** does not know what types of objects are contained in it; therefore, **PPFA** cannot enforce the restrictions. See [“OBJECT Command”](#) on page 363 for a description of the restrictions.

LEFT

Specifies that the object is positioned at the upper, left corner of the object placement area, as defined or defaulted by the *relative-xpos*, *relative-ypos*, OBCHPOS, and OBCVPOS parameters. Any portion of the object that falls outside the object placement area as defined by the OBSIZE parameter is not trimmed and might cause an exception condition by the presentation system.

TRIM

Specifies position and trim. The object is positioned at the upper, left corner of the object placement area, as defined or defaulted by the *relative-xpos*, *relative-ypos*, OBCHPOS, and OBCVPOS parameters. Any portion of the object that falls outside the object placement area as defined by the OBSIZE parameter is trimmed.

FIT

Specifies scale to fit. This is the default value if the OBMAP parameter is not coded. The object is to be scaled to fit within the object placement area, as defined by the OBSIZE parameter. The center of the object is placed in the center of the object placement area and the object is scaled up or down to fit the block. Scaling in the horizontal and vertical directions is symmetrical. The FIT parameter ensures that all of the data in the object is presented in the object placement area at the largest possible size. The object is not trimmed.

CENTER

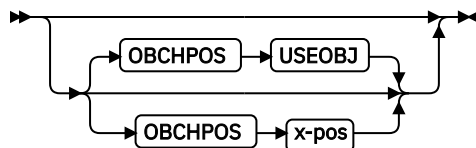
Specifies that the center of the object is positioned at the center of the object placement area. Any portion of the object that falls outside the object placement area is trimmed.

REPEAT

Specifies that the origin of the data object is positioned with the origin of the object placement area. The object is then replicated in the X and Y directions. If the last replicated data does not fit in the object area, it is trimmed to fit.

FILL

Specifies that the center of the data object is positioned coincident with the center of the object placement area. The data object is then scaled so that it totally fills the object placement area in both the X and Y directions. This might require that the object is asymmetrically scaled by different scale factors in the X and Y directions.

OBCHPOS

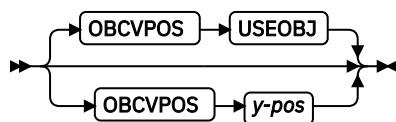
Specifies the horizontal offset of the object contents within the object placement area as a number.

x-pos

Specifies a positive or negative number. The valid options for *x-pos* are described in the SETUNITS command for the horizontal value.

USEOBJ

Specifies that the offset value from the object is to be used. If no value is set in the object, the value defaults to 0.

OBCVPOS

Specifies the vertical offset of the object contents within the object placement area, as defined by the OBSIZE parameter. If OBCVPOS is not specified, it defaults to USEOBJ and uses the

value set in the object. If no value is set in the object, the value defaults to 0. The OBCHPOS parameter is used only in LEFT and TRIM mapping of the object into the object placement area.

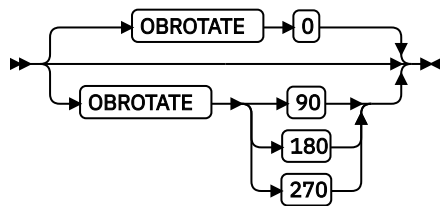
y-pos

Specifies a positive or negative number. The valid options for *y-pos* are described in the SETUNITS command for the vertical value.

USEOBJ

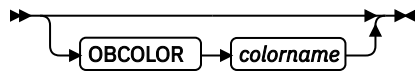
Specifies that the offset value from the object is to be used. If no value is set in the object, the value defaults to 0.

OBROTATE {0|90|180|270}



Specifies the object rotation in regard to the current LND's coordinate system.

OBCOLOR



Specifies the color to be used as the default color or initial color for the object placement area. The OBCOLOR parameter is used only for objects of the PSEG, GOCA, BCOCA, and IOCA type. If the object type is OTHER, this parameter is ignored.

colorname

Values for *colorname* can be a defined color (see [“DEFINE COLOR Command”](#) on page 258) or one of these OCA color spaces:

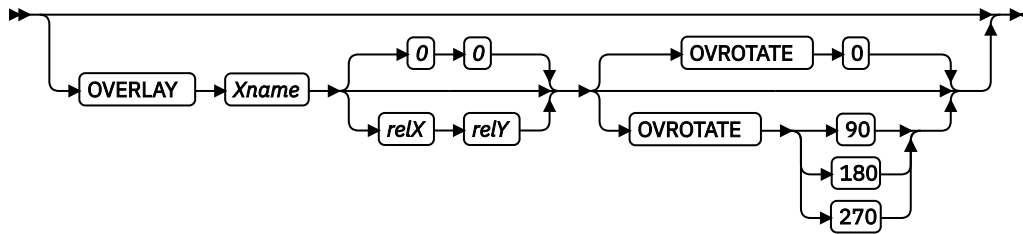
- NONE
- DEFAULT
- BLACK
- BLUE
- BROWN
- GREEN
- RED
- PINK (or MAGENTA)
- TURQ (or CYAN)
- YELLOW
- DARKBLUE (or DBLUE)
- ORANGE
- PURPLE
- MUSTARD
- GRAY
- DARKGREEN (or DGREEN)
- DARKTURQ (DTURQ, or DCYAN, or DARKCYAN)

OBPAGE



Specifies the page number of a multipage object or file to be presented. *n* is the page number. A number 1 - 999999999 (9 digits) is valid.

OVERLAY



Specifies the name of an overlay that is to be positioned relative to the location specified in the XLAYOUT command in which the OVERLAY subcommand was named. The PAGEFORMAT OVERLAY command can contain the named overlays. The maximum number of overlays that are specified for a PAGEFORMAT including the XLAYOUT OVERLAY subcommand is 254.

Specifies the electronic overlay that is to be used with this subgroup.

Xname

Specifies the user-access name as defined in the OVERLAY command.

Notes:

1. PPFA checks for duplication of local names. If a duplication exists, the page definition is generated, but a warning message is issued.
2. PPFA does not check for duplicate user-access names.

relX relY

Specifies the number of units (such as inches or mm) that are added to the position of the layout to position the top-left corner of the overlay. The values for horizontal and vertical can be (+) or (-). The maximum value is + or - 32760 L-units. For example:

- OVERLAY NAME1 2 in 1 in
- OVERLAY NAME2 5 mm 1 mm

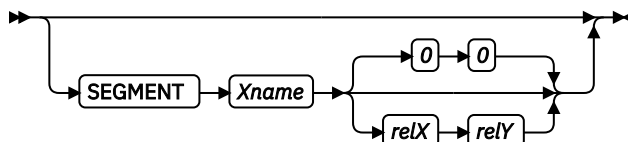
Note: Any offset coded in the overlay itself is added to this offset.

OVROTATE {0|90|180|270}

Specifies the rotation of the placed overlay in regard to the x-axis of the page.

See “FORMDEF Command” on page 216 for an OVROTATE example, which is presented in the FORMDEF description.

SEGMENT



Specifies the name of a segment that is to be positioned relative to the location specified in the XLAYOUT command in which the SEGMENT subcommand was named. The PAGEFORMAT SEGMENT command can contain the named segments. The maximum number of segments that are specified for a PAGEFORMAT including the XLAYOUT SEGMENT subcommand is 127.

Specifies the page segment that is to be used with this subgroup.

Xname

Specifies the user-access name as defined in the SEGMENT command.

Notes:

1. PPFA checks for duplication of local names. If a duplication exists, the page definition is generated, but a warning message is issued.
2. PPFA does not check for duplicate user-access names.

relX relY

Specifies the number of units (such as inches or mm) that are added to the position of the layout to position the top-left corner of the page segment. The values for horizontal and vertical can be (+) or (-). The maximum value is + or - 32760 L-units. For example:

- SEGMENT MYSEG1 2 in 1 in
- SEGMENT MYSEG1 5 mm 1 mm

Example of printing XML data with a page definition

This example shows the XML data in [Figure 137 on page 437](#) that is printed with the page definition in [Figure 138 on page 438](#) to get these results:

Home customer: Justin Case	123 Redlight Lane Twistnshout, MA 01050
Work customer: Anna Merkin	1911 Colt Lane Longmont, CO 80501

XML Data

```
<customer type='Home'>
  <name>
    <first>Justin</first>
    <last>Case</last>
  </name>
  <address>
    <strno>123</strno>
    <street>Redlight Lane</street>
    <city>Twistnshout</city>
    <state>MAMassachusetts</state>
    <zip>01050</zip>
  </address>
</customer>

<customer type='Work'>
  <name>
    <first>Anna</first>
    <last>Merkin</last>
  </name>
  <address>
    <strno>1911</strno>
    <street>Colt Lane</street>
    <city>Longmont</city>
    <state>COColorado</state>
    <zip>80501</zip>
  </address>
</customer>
```

Figure 137: XML data for printing

Page Definition

```
SETUNITS 1 IN 1 IN LINESP 6 LPI;
Pagedef XMLxml replace yes UDType EBCDIC;
FONT E21H0C TYPE EBCDIC;
DEFINE cust QTAG 'customer';
DEFINE name QTAG 'customer','name';
DEFINE fname QTAG 'customer','name','first';
DEFINE lname QTAG 'customer','name','last';
DEFINE addr QTAG 'customer','address';
DEFINE strno QTAG 'customer','address','strno';
DEFINE street QTAG 'customer','address','street';
DEFINE city QTAG 'customer','address','city';
DEFINE state QTAG 'customer','address','state';
DEFINE zip QTAG 'customer','address','zip';

XLAYOUT cust POSITION ABSOLUTE 0
  FIELD ATTR 'type' ;
  FIELD TEXT 'customer:' ;
XLAYOUT fname POSITION ABSOLUTE 2.5 SAME;
XLAYOUT lname POSITION RELATIVE 0.167 SAME;
XLAYOUT strno POSITION ABSOLUTE 5.5 SAME;
XLAYOUT street POSITION RELATIVE 0 SAME;
  FIELD TEXT ' ' ;
  FIELD START 1 LENGTH *;
XLAYOUT city POSITION ABSOLUTE 5.5 NEXT;
  FIELD START 1 LENGTH *;
  FIELD TEXT ',' ;
XLAYOUT state POSITION RELATIVE 0 SAME;
  FIELD START 1 LENGTH 2;
  FIELD TEXT ' ';
XLAYOUT zip POSITION RELATIVE 0 SAME;
```

Figure 138: Page definition used to print XML data

Appendix A. System Dependencies for PPFA

PPFA is a cross system product that operates on:

- Virtual Machine (VM)
- Virtual Storage Extended (VSE)
- z/OS

For the level of the operating system on which PPFA can run, See the *PPFA/370: Licensed Program Specification*, G544-3696.

PPFA creates page definitions and form definitions that are used for printing by PSF for z/OS and PSF/VM. Page definitions and form definitions that are created on one system can be used for printing on another system. However, not all versions of print servers support all functions that are provided by PPFA. Use the Programming Guide or User's Guide for your print server system to determine which functions are supported by your system.

While page definitions and form definitions created on one system can be used on any of the systems, the method of creating these resources is different.

Each system is presented to show how PPFA creates page definitions and form definitions. In the examples, the prefixes F1 and P1 are automatically added by PPFA to the user name designated for form definitions and page definitions.

Note: All PPFA/370 functions that are described in this document are available on the z/OS operating system. However, because functions on PSF/VM and PSF/VSE and PPFA/370 functions for VM and VSE are not updated, some of the PPFA/370 functions that are described in this document are not available on the VM and VSE operating systems.

VSE Environment

PPFA can operate in any partition of VSE. It operates in batch mode but is able to operate in a partition that is occupied by an interactive processor.

Storing PPFA Resources

Form definitions and page definitions are stored by name in a library. In VSE, sublibraries are created for form-definition and page-definition storage within the system library.

Form definitions and page definitions are stored by name in a library.

PPFA for z/OS is run as a batch program with Job Control Language (JCL). The JCL statements are an example of PPFA execution under z/OS:

```
//JOBPPFA      JOB TOKYO
//STEP         EXEC PGM=AKQPPFA
//STEPLIB     DD DSN=ppfa.program,DISP=SHR
//SYSPRINT    DD SYSOUT=A
//FORMLIB     DD DSN=ppfa.formlib,DISP=SHR
//PAGELIB     DD DSN=ppfa.pagelib,DISP=SHR
//SYSIN       DD *

    PPFA control statements
    .
    .
    .
/*
```

The SYSIN file contains the commands that are used to build form definitions and page definitions. The records can be fixed length or variable length, and they can be blocked. The maximum length for fixed-length records is 100 bytes; the maximum length for variable-length records is 104 bytes. For fixed 80-byte records, the last 8 bytes are treated as comments.

The record format for the page-definition and form-definition data sets must be variable blocked (VBM). The block size and record length must be 8209 and 8205. PPFA uses all of the available storage in the program.

Note: When concatenating multiple data sets in the SYSIN data definition, you must ensure that the data set with the largest block size is first in the concatenation order. Otherwise, the output might not be what you expect.

VM Environment

To create a page definition and form definition that runs PPFA under VM, use the following command syntax:

Note: The defaults require only file name (*fn*) and file type (*ft*) for your PPFA source file.

```
PPFA fn ft [ fm ] [ ( [PAGEDEF ( ft [ fm | A1 ] )
                      [FORMDEF ( ft [ fm | A1 ] )
                      [LISTING ( ft [ fm | A1 ] )
                      [SIZE nnnn{K|M} ] ) ] ) ]
```

PPFA is the command to run PPFA on VM. The file name (*fn*) is the name of your file that contains the PPFA control statements. The file name (*fn*) and file type (*ft*) are required parameters. When you specify only the *fn* and *ft*, the file mode goes to your default disk.

The record format of the PPFA input source file is either V or F. The variable record length is a maximum of 100 bytes. For a fixed 80-byte record, the last 8 bytes are treated as comments.

The PPFA command can include any of four optional parameters: PAGEDEF, FORMDEF, LISTING, and SIZE.

- Each keyword parameter can be abbreviated as two letters.
- All parameters in the command can be omitted. However, any optional parameter that follows an open parenthesis must be specified.
- Operands must be enclosed in parentheses when more than one operand is specified for one parameter. Parentheses can be omitted when only one operand is specified for one parameter. Also, the final closing parenthesis can be omitted.
- Any operand string longer than 8 characters is truncated to the first 8 characters.

- Any parameter or operand can be separated from others by parentheses or blanks. The only exceptions are the K and the M operands of a size parameter. For example, in size 256K you cannot separate the 256 from the K.
- The same parameter must not be specified more than once in a command. If duplicate parameters or operands appear, PPFA issues an error message and ends the program.
- For errors associated with a VM execution command, PPFA issues an error message with a return code 20, and does not generate any files (object or listing).
- No optional parameters can follow the open parenthesis that occurs after the input source file ID.
- The size parameter varies according to the size of the command stream. Most command streams do not need a size value because the default specifies enough space for processing. The minimum size is 4K and the maximum size is 16M.

PAGEDEF Parameter

PAGEDEF (which can be abbreviated as PA) is the keyword that is used to specify the name of a page-definition resource. (The file type is required; the file mode is optional. If you do not specify a file mode, A1 is assumed.) The page-definition file name is obtained from your input file, and P1 is prefixed to that name.

An example is this command:

```
PPFA PCOM DATA A1 ( PAGEDEF ( PAGEOBJ B1 ) )
```

In the example, the input file, PCOM DATA A1, contains the following control statements:

```
PAGEDEF PAGE1;
PRINTLINE;
FORMDEF FORM1;
```

The result is a page-definition resource file with the file name P1PAGE1, the file type PAGEOBJ, and the file mode B1.

If the page definition parameter is not used, a page-definition resource with the default name P1 (the page definition name from input file) PDEF38PP A1 is created.

The record format of the object file is VM and VA (5A records). 5A records contain the character X'5A' in the first byte of each record. The record size is up to 8205 bytes.

FORMDEF Parameter

FORMDEF (which can be abbreviated as FO) is the keyword that is used to specify the name of a form-definition resource. (The file type is required; the file mode is optional.) The file name is obtained from your input file, and F1 is prefixed to that name.

An example is this command:

```
PPFA PCOM DATA A1 ( FORMDEF ( FORMOBJ B1 ) )
```

In the example, the input file, PCOM DATA A1, contains the following control statements:

```
PAGEDEF PAGE1;
PRINTLINE;
FORMDEF FORM1;
```

The result is a form-definition resource file with the file name F1FORM1, the file type FORMOBJ, and the file mode B1.

If the form-definition parameter is not used, a form-definition resource with the default name F1 (form-definition name from input file) FDEF38PP A1 is created.

The record format of the object file is VM and VA (5A records). The record size is up to 8205 bytes.

LISTING Parameter

LISTING (which can be abbreviated as LI) is the keyword that is used to specify the name of an output listing file. You can specify the file type and file mode of the resource; the file type is required. If you do not specify a file mode, A1 is assumed. The file name is the same as the PPFA input file name.

For this command example, the result is an output listing file with the name PCOM LISTOUT B1:

```
PPFA PCOM DATA A1 ( LISTING ( LISTOUT B1 )
```

If the LISTING parameter is not used, an output listing file with the default name (PPFA input file name) LISTING A1 is created.

The record format of an output listing file is VA. The record length is 121 bytes (120 bytes + 1 byte (channel control number)). CC numbers are 0 - 12 in the first column of the line data file.

RUN and OPTIONS file

Figure 139 on page 443 and Figure 140 on page 443 are examples of the VM files that print your data file with the form definition and page definition that you specify.

```
*****  
/*THE ENVIRONMENT IS NOW SET UP TO PRINT */  
'CP SP PRT TO NET NOHOLD CLASS A FORM PRT035 COPY 1';  
'CP TAG DEV PRT WASVM SYSTEM';  
'PSF EXAMP1 PRCDATA A1 ( OPTIONS (EXAMP1) )';  
/*RESTORE THE ENVIRONMENT TO PRINT SOMETHING OTHER THAN THIS EXAMPLE*/  
*****
```

Figure 139: VM EXEC Example

```
*****  
FORMDEF ( F1EXAMP1 FDEF38PP ) SEND  
*****  
PAGEDEF ( P1EXAMP1 PDEF38PP ) SYSDISK  
*****  
OVERLAY ( * OVLY38PP ) SYSDISK  
*****  
* COMMON OPTIONS  
*****  
CC  
NOTRC  
BIN 1  
CKPTPAGE 0  
DATAK UNBLOCK  
NODUMP  
FILE SEND  
FONT ( * FONT3820 ) SYSDISK  
MESSAGES NO  
NOOPT  
PAGESEG ( * PSEG38PP ) SYSDISK  
TRACE OFF  
*****
```

Figure 140: VM OPTIONS Example

Appendix B. More about Direction

In PPFA, directions that are specified with the PRINTLINE and TRCREF commands are relative to the direction specified in the PAGEFORMAT command. If no PAGEFORMAT command is specified, the direction that is specified in the PAGEDEF command is used. If no direction is specified in either of these commands, the default direction for the page format is ACROSS.

The PRINTLINE and TRCREF commands add their DIRECTION values to the DIRECTION value specified with the PAGEFORMAT command. Thus, you can select a PAGEFORMAT direction and code PRINTLINES and TRCREFs relative to the PAGEFORMAT direction. For more information about the PRINTLINE and TRCREF commands, see [Chapter 3, “Using Page Definition Commands for Traditional Line Data,”](#) on page 31.

For instance, if a page is to be printed in the landscape page presentation on a printer that requires the DOWN or UP print direction to generate landscape output, the PAGEFORMAT command can specify DOWN as its DIRECTION. When this direction is established, you can view the page as a landscape page and specify the PRINTLINE and the TRCREF commands with the ACROSS direction. Output that is specified in this way prints ACROSS relative to the landscape page, as shown in [Figure 141 on page 445](#).

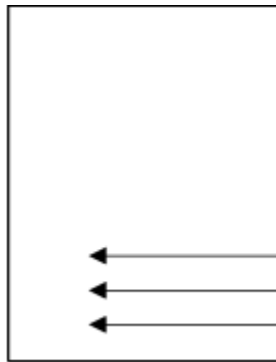


Figure 141: Printing Across a Landscape Page

If you specify the DOWN direction for the PRINTLINE or the TRCREF command in this case, the output looks like [Figure 142 on page 445](#) because the direction of the page format is also DOWN.

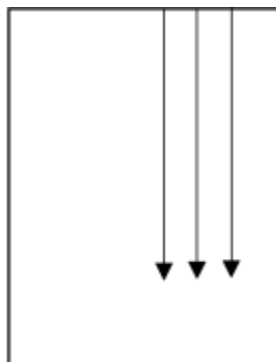


Figure 142: Printing Down a Portrait Page

Table 19 on page 446 shows the final result when all of the possible combinations of DIRECTION are specified. The final direction that PPFA computes from the PAGEFORMAT, PRINTLINE, and TRCREF commands determines the prefix that is assigned to the font names specified in the page definition. The final direction is important when printing on the 3800 printer because its unbounded-box font

architecture requires a separate font for each combination of print direction and character rotation. This information is encoded in the prefix of the font name (X1, X3, XA, and XF, for example).

Table 19: The Effect of Additive DIRECTIONS on Formatting and Font Prefixes.

Page Format	PRINTLINE or TRCREF	Final Result	3800 Font Prefix			
			0°	90°	180°	270°
Across	Across	Across	X1	X5	X9	XD
Across	Down	Down	X2	X6	XA	XE
Across	Back	Back	X3	X7	XB	XF
Across	Up	Up	X4	X8	XC	XG
Down	Across	Down	X2	X6	XA	XE
Down	Down	Back	X3	X7	XB	XF
Down	Back	Up	X4	X8	XC	XG
Down	Up	Across	X1	X5	X9	XD
Back	Across	Back	X3	X7	XB	XF
Back	Down	Up	X4	X8	XC	XG
Back	Back	Across	X1	X5	X9	XD
Back	Up	Down	X2	X6	XA	XE
Up	Across	Up	X4	X8	XC	XG
Up	Down	Across	X1	X5	X9	XD
Up	Back	Down	X2	X6	XA	XE
Up	Up	Back	X3	X7	XB	XF

The entries in the Final Result column can be computed by using a simple algorithm. If you assume that ACROSS is 0, DOWN is 1, BACK is 2, and UP is 3, you can add the direction specifications in the two commands, subtracting 4 when the result is 4 or greater, to compute the final direction.

Appendix C. Differences in Measurements and REPEATs with AFP Utilities

When you repeat a DRAWRULE (OGL), PRINTLINE (PPFA), DRAWGRAPHIC (PPFA), or Line (PMF), differences exist in the measurements of the repeated lines. For OGL, REPEAT indicates the number of repetitions in addition to the first. For DRAWGRAPHIC (PPFA), REPEAT is the same as OGL. Therefore, REPEAT yields 2 DRAWRULEs. For PPFA, REPEAT indicates the total number of PRINTLINEs. Therefore, REPEAT yields 2 PRINTLINEs.

Another difference occurs when the line spacing (set by SETUNITS in OGL and PPFA, and by a screen item in PMF) results in the distance from one line to the next not being a whole number of pels. Each product handles the fractional pel differently. Because the printer cannot print parts of a pel, fractional pels cannot be represented at the printer. When line spacing calculations result in a fractional pel per line space, these occur:

OGL

Carries the fractions until they add up to a whole pel, then adds it in. The result is that the final spot of a repeat is within a pel of where it is expected. Therefore, not all of the spaces between rules are even; they can vary by 1 pel.

PPFA

Truncates the fractional pel before the repeat. Therefore, the spaces between the lines are even, but the total might be shorter than expected.

PMF

Rounds the fractional pel before the repeat. Therefore, the spaces between the lines are even, but the total might be shorter or longer than expected. If the fractional pel is less than 0.5, it is handled the same as PPFA and the line space is shorter. If the fractional pel is greater than or equal to 0.5, the line space is longer.

Use line spacing in all products that result in a whole number of pels. To resolve existing problems, select the resource that you don't want to change, and code the remaining resource without using REPEAT because of the way the other products handle the fractional pels.

The following example shows what occurs if you want to print at 9 lines per inch, and repeat it for 20 lines. Starting at zero, and adding 9 lines per inch (converted to pels it is $240/9 = 26.6670$), you see the results that are illustrated in [Table 20 on page 447](#).

Table 20: Differences in Measurements and REPEATs with AFP Utilities.

Repetition	Mathematics		OGL		PPFA		PMF	
	Position	FromLast	Position	FromLast	Position	FromLast	Position	FromLast
	0.000	-.---	0	---	0	---	0	---
1	26.667	26.667	26	26	26	26	27	27
2	53.333	26.667	53	27	52	26	54	27
3	80.000	26.667	80	27	78	26	81	27
4	106.667	26.667	106	26	104	26	108	27
5	133.333	26.667	133	27	130	26	135	27
6	160.000	26.667	160	27	156	26	162	27
7	186.667	26.667	186	26	182	26	189	27
8	213.333	26.667	213	27	208	26	216	27

Table 20: Differences in Measurements and REPEATs with AFP Utilities. (continued)

Repetition	Mathematics		OGL		PPFA		PMF	
	Position	FromLast	Position	FromLast	Position	FromLast	Position	FromLast
9	240.000	26.667	240	27	234	26	243	27
10	266.667	26.667	266	26	260	26	270	27
11	293.333	26.667	293	27	286	26	297	27
12	320.000	26.667	320	27	312	26	324	27
13	346.667	26.667	346	26	338	26	351	27
14	373.333	26.667	373	27	364	26	378	27
15	400.000	26.667	400	27	390	26	405	27
16	426.667	26.667	426	26	416	26	432	27
17	453.333	26.667	453	27	442	26	459	27
18	480.000	26.667	480	27	468	26	486	27
19	506.667	26.667	506	26	494	26	513	27
20	533.333	26.667	533	27	520	26	540	27

To resolve differences in how OGL, PPFA, and PMF handle repeated values, one of these approaches can be taken:

- Do not use REPEAT.
- Code units as PELs.

Note: In all of these products (except PPFA), a PEL is 1/240 of an inch. For PPFA, the PEL size can be set by the user, but defaults to 1/240 of an inch.

Appendix D. More About Bar Code Parameters

This section contains supplemental information about Bar Code Object Content Architecture (BCOCA) specified by the BARCODE subcommand of the FIELD command, and includes the following topics:

- Bar code data
- MOD parameter

For more complete information, see *Bar Code Object Content Architecture Reference*.

Bar Code Data

The data is specified as a series of single-byte code points from a specific code page. Some symbologies limit the valid code points to just the 10 numerals (0 - 9), other symbologies allow a richer set of code points. The bar code symbol is produced from these code points; the code points are also used, along with a particular type style, when HRI is produced.

Table 21 on page 449 lists, for each symbology, the valid code page from which characters are chosen and the type style that is used when HRI is printed in terms of a registered CPGID and FGID. More information about these values can be found in *IBM AFP Fonts: Font Summary* and in *IBM AFP Fonts: Technical Reference for Code Pages*.

Type	Bar Code Symbology	EBCDIC-Based CPGID	FGID
1	Code 39 (3-of-9 Code), AIM USS-39	500	Device specific
2	MSI (modified Plessey code)	500	Device specific
3	UPC/CGPC — Version A	893	3 (OCR-B)
5	UPC/CGPC — Version E	893	3 (OCR-B)
6	UPC — Two-digit Supplemental (Periodicals)	893	3 (OCR-B)
7	UPC — Five-digit Supplemental (Paperbacks)	893	3 (OCR-B)
8	EAN-8 (includes JAN-short)	893	3 (OCR-B)
9	EAN-13 (includes JAN-standard)	893	3 (OCR-B)
10	Industrial 2-of-5	500	Device specific
11	Matrix 2-of-5	500	Device specific
12	Interleaved 2-of-5, AIM USS-I 2/5	500	Device specific
13	Codabar, 2-of-7, AIM USS-Codabar	500	Device specific
17	Code 128, AIM USS-128	1303	Device specific
22	EAN Two-digit Supplemental	893	3 (OCR-B)
23	EAN Five-digit Supplemental	893	3 (OCR-B)
24	POSTNET	500	None
26	RM4SCC	500	None

Table 21: Valid Code Pages and Type Styles (continued)

Type	Bar Code Symbology	EBCDIC-Based CPGID	FGID
27	Japan Postal Bar Code	500	None
28	Data Matrix (2D bar code)	Code page is selectable within the symbol by using ECI protocol	None
29	MaxiCode (2D bar code)	Code page is selectable within the symbol by using ECI protocol	None
30	PDF417 (2D bar code)	Code page is selectable within the symbol by using ECI protocol	None
31	Australia Post Bar Code	Code page is selectable within the symbol by using ECI protocol	Device Specific
32	QR Code	Code page is selectable within the symbol by using ECI protocol	None
33	Code 93	500	Device Specific
34	USPS Four-State	500	Device Specific

As shown in Table 21 on page 449, the font that is used to print HRI depends on the symbology. Some symbologies use OCR-B; others use a device-specific font (typically OCR-A).

Table 22 on page 450 lists the valid characters for each symbology and specifies how many characters are allowed for a bar code symbol.

Table 22: Valid Characters and Data Lengths.

Code	Bar Code Type	Valid Characters	Valid Data Length
1	Code 39 (3-of-9 Code), AIM USS-39	0123456789 ABCDEFGHIJKLM NOPQRSTUVWXYZ -.\$/+% and the space character A total of 43 valid input characters.	Symbology: unlimited BCOCA range: 0 - 50 characters (see note "1" on page 453)
2	MSI (modified Plessey code)	0123456789	3 - 15 characters for Modifier X'01' 2 - 14 characters for Modifier X'02' 1 - 13 characters for all other modifiers
3	UPC/CGPC - Version A	0123456789	11 characters
5	UPC/CGPC - Version E	0123456789	10 characters
6	UPC - Two-digit Supplemental (Periodicals)	0123456789	2 characters for Modifier X'00' 13 characters for Modifier X'01' 12 characters for Modifier X'02'

Table 22: Valid Characters and Data Lengths. (continued)

Code	Bar Code Type	Valid Characters	Valid Data Length
7	UPC - Five-digit Supplemental (Paperbacks)	0123456789	5 characters for Modifier X'00' 16 characters for Modifier X'01' 15 characters for Modifier X'02'
8	EAN-8 (includes JAN-short)	0123456789	7 characters
9	EAN-13 (includes JAN-standard)	0123456789	12 characters
10	Industrial 2-of-5	0123456789	Symbology: unlimited BCOCA range: 0 - 50 characters (see note "1" on page 453)
11	Matrix 2-of-5	0123456789	Symbology: unlimited BCOCA range: 0 - 50 characters (see note "1" on page 453)
12	Interleaved 2-of-5, AIM USS-I 2/5	0123456789	Symbology: unlimited BCOCA range: 0 - 50 characters (see note "1" on page 453)
13	Codabar, 2-of-7, AIM USS-Codabar	0123456789 -\$/+.ABCD 16 characters plus 4 start/stop characters (ABCD) (Note "2" on page 453)	Symbology: unlimited BCOCA range: 0 - 50 characters (see note "1" on page 453)
17	Code 128, AIM USS-128 (modifier X'02')	All characters that are defined in the Code 128 code page	Symbology: unlimited BCOCA range: 0 - 50 characters (see note "1" on page 453)
	UCC/EAN 128 (modifiers X'03' and X'04')	0123456789 ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz FNC1	Symbology: unlimited BCOCA range: 0 - 50 characters (see note "1" on page 453)
22	EAN Two-digit Supplemental	0123456789	2 characters for Modifier X'00' 14 characters for Modifier X'01'
23	EAN Five-digit Supplemental	0123456789	5 characters for Modifier X'00' 17 characters for Modifier X'01'
24	POSTNET	0123456789	5 characters for Modifier X'00' 9 characters for Modifier X'01' 11 characters for Modifier X'02' 11 characters for Modifier X'04' BCOCA range for Modifier X'03': 0 - 50 characters (see note "1" on page 453)
26	Royal Mail (RM4SCC, modifier X'00')	0123456789 ABCDEFGHIJKLM NOPQRSTUVWXYZ	Symbology: unlimited BCOCA range: 0 - 50 characters (see note "1" on page 453)
	Royal Mail (Dutch KIX variation, modifier X'01')	0123456789 ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz	Symbology: unlimited BCOCA range: 0 - 50 characters (see note "1" on page 453)
27	Japan Postal Bar Code (Modifier X'00')	0123456789 ABCDEFGHIJKLM NOPQRSTUVWXYZ - (hyphen)	Symbology: 7 or more BCOCA range: 7 - 50 characters (see note "1" on page 453)
	Japan Postal Bar Code (Modifier X'01')	0123456789 CC1,CC2,CC3,CC4, CC5,CC6,CC7,CC8 - (hyphen) start, stop	No length checking done; refer to the modifier X'01' description.

Table 22: Valid Characters and Data Lengths. (continued)

Code	Bar Code Type	Valid Characters	Valid Data Length
28	Data Matrix	Any 1-byte character or binary data	Symbology: up to 3116 depending on whether the data is character or numeric; refer to the symbology specification. BCOCA range: 0 - 3116 characters (see note "1" on page 453)
29	MaxiCode	Any 1-byte character that is allowed by the symbol mode	Symbology: up to 93 alphanumeric characters per symbol depending on encoding overhead or up to 138 numeric characters per symbol; refer to the symbology specification. BCOCA range: 0 - 138 characters
30	PDF417	Any 1-byte character or binary data	Symbology: up to 1850 text characters, 2710 ASCII numeric digits, or 1108 bytes of binary data per symbol depending on the security level; refer to the symbology specification. BCOCA range: 0 - 2710 characters
31	Australia Post Bar Code – Refer to the modifier (byte 13) description to see which characters are valid in specific parts of the symbol.		
	Modifier X'01' – Standard Customer Barcode	0123456789	Symbology: 8 digits BCOCA range: 8 digits
	Modifier X'02' – Customer Barcode 2 using Table N	0123456789	Symbology: 8 - 16 digits BCOCA range: 8 - 16 digits
	Modifier X'03' – Customer Barcode 2 using Table C	0123456789 ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz (space) # (number sign)	Symbology: 8 - 13 characters BCOCA range: 8 - 13 characters
	Modifier X'04' – Customer Barcode 2 using proprietary encoding	0123456789 for sorting code 0 - 3 for customer information	Symbology: 8 - 24 digits BCOCA range: 8 - 24 digits
	Modifier X'05' – Customer Barcode 3 using Table N	0123456789	Symbology: 8 - 23 digits BCOCA range: 8 - 23 digits
	Modifier X'06' – Customer Barcode 3 using Table C	0123456789 ABCDEFGHIJKLM NOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz (space) # (number sign)	Symbology: 8 - 18 characters BCOCA range: 8 - 18 characters
	Modifier X'07' – Customer Barcode 3 using proprietary encoding	0123456789 for sorting code 0 - 3 for customer information	Symbology: 8 - 39 digits BCOCA range: 8 - 39 digits
	Modifier X'08' – Reply Paid Barcode	0123456789	Symbology: 8 digits BCOCA range: 8 digits
32	QR Code	Any 1-byte character or binary data	Symbology: Up to 7,089 characters depending on the size and type of the data; refer to the symbology specification. BCOCA range: 0 - 7,089 characters

Table 22: Valid Characters and Data Lengths. (continued)

Code	Bar Code Type	Valid Characters	Valid Data Length
33	Code 93	0123456789 ABCDEFGHIJKLM NOPQRSTUVWXYZ -.\$/+% space character a - representing Shift 1 b - representing Shift 2 c - representing Shift 3 d - representing Shift 4 A total of 47 valid input characters.	Symbology: unlimited BCOCA range: 0 - 50 characters (see note "1" on page 453)
34	USPS Four-State	0123456789	20 digits for Modifier X'00' 25 digits for Modifier X'01' 29 digits for Modifier X'02' 31 digits for Modifier X'03'

Notes:

1. All BCOCA receivers must support at least the BCOCA range. Some receivers support a larger data length.
2. Some descriptions of Codabar show the characters T, N, *, E as stop characters (representing the stop characters A, B, C, D), but the Codabar symbology allows only A, B, C, D as start and stop characters. This alternative representation (T, N, *, E) is used only to distinguish between the start and stop characters when a Codabar symbol is described; when a BCOCA Codabar symbol is coded, start and stop characters must be represented with A, B, C, or D.
3. The data for the UPC and EAN symbologies is numeric and of a fixed length, but not all numbers of the appropriate length are valid. This is because the coding scheme is designed to uniquely identify both a product and its manufacturer. The first part of the symbol represents the manufacturer and is defined in the symbology specification (not all numbers are valid in this part of the symbol). The second part of the symbol represents a unique product identifier code that is assigned by the manufacturer. See the appropriate symbology specification for more details.

Table 23: Characters and Code Points used in the BCOCA Symbologies; Excluding Code 128

Character	EBCDIC Code Point
0	X'F0'
1	X'F1'
2	X'F2'
3	X'F3'
4	X'F4'
5	X'F5'
6	X'F6'
7	X'F7'
8	X'F8'
9	X'F9'
A	X'C1'
B	X'C2'
C	X'C3'
D	X'C4'
E	X'C5'
F	X'C6'
G	X'C7'

Table 23: Characters and Code Points used in the BCOCA Symbologies; Excluding Code 128 (continued)

Character	EBCDIC Code Point
H	X'C8'
I	X'C9'
J	X'D1'
K	X'D2'
L	X'D3'
M	X'D4'
N	X'D5'
O	X'D6'
P	X'D7'
Q	X'D8'
R	X'D9'
S	X'E2'
T	X'E3'
U	X'E4'
V	X'E5'
W	X'E6'
X	X'E7'
Y	X'E8'
Z	X'E9'
a	X'81'
b	X'82'
c	X'83'
d	X'84'
e	X'85'
f	X'86'
g	X'87'
h	X'88'
i	X'89'
j	X'91'
k	X'92'
l	X'93'
m	X'94'
n	X'95'
o	X'96'

Table 23: Characters and Code Points used in the BCOCA Symbologies; Excluding Code 128 (continued)

Character	EBCDIC Code Point
p	X'97'
q	X'98'
r	X'99'
s	X'A2'
t	X'A3'
u	X'A4'
v	X'A5'
w	X'A6'
x	X'A7'
y	X'A8'
z	X'A9'
- (hyphen)	X'60'
# (number sign)	X'7B'
. (period)	X'4B'
\$	X'5B'
/	X'61'
+	X'4E'
%	X'6C'
:	X'7A'
Space	X'40'
FNC1	X'8F'

The Code 128 code page (CPGID = 1303) is defined as shown in [Figure 143](#) on page 456.

Hex DIGITS 1st → 2nd ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	NUL SE010000	DLE SE170000			(SP) SP010000	& SM050000	- SP100000					^ SD180000	{ SM110000	} SM140000	\ SM070000	0 ND100000
-1	SOH SE020000	DC1 SE180000					/ SP120000		a LA010000	j LJ010000	- SD190000		A LA020000	J LJ020000		1 ND010000
-2	STX SE030000	DC2 SE190000	FS SE350000	SYN SE230000					b LB010000	k LK010000	s LS010000		B LB020000	K LK020000	S LS020000	2 ND020000
-3	ETX SE040000	DC3 SE200000							c LC010000	l LL010000	t LT010000		C LC020000	L LL020000	T LT020000	3 ND030000
-4									d LD010000	m LM010000	u LU010000		D LD020000	M LM020000	U LU020000	4 ND040000
-5	HT SE100000		LF SE110000						e LE010000	n LN010000	v LV010000		E LE020000	N LN020000	V LV020000	5 ND050000
-6		BS SE090000	ETB SE240000						f LF010000	o LO010000	w LW010000		F LF020000	O LO020000	W LW020000	6 ND060000
-7			ESC SE280000	EOT SE050000					g LG010000	p LP010000	x LX010000		G LG020000	P LP020000	X LX020000	7 ND070000
-8		CAN SE250000							h LH010000	q LQ010000	y LY010000		H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9		EM SE260000						` SD130000	i LI010000	r LR010000	z LZ010000		I LI020000	R LR020000	Z LZ020000	9 ND090000
-A						! SP020000	:SP150000					[SM080000			FN2 SE400000	FN3 SE410000
-B	VT SE120000				. SP110000	\$ SC030000	, SP060000	# SM010000				] SM080000				
-C	FF SE190000			DC4 SE210000	< SA030000	* SM040000	% SM020000	@ SM050000								
-D	CR SE140000	GS SE360000	ENQ SE060000	NAK SE320000	(SP060000	) SP070000	_ SP090000	' SP050000								
-E	SO SE150000	RS SE370000	ACK SE070000		+ SA010000	; SP140000	> SA050000	= SA040000					FN4 SE420000			
-F	SI SE160000	US SE380000	BEL SE080000	SUB SE270000	| SO130000		? SP150000	" SP040000	FN1 SE390000							DEL SE380000

Figure 143: Code 128 Code Page (CPGID = 1303)

Note: All START, STOP, SHIFT, and CODE characters are generated by the printer to produce the shortest bar code possible from the specified data; these characters are not specified in the Bar Code Symbol Data. All code points not listed in the table are undefined. The code points that do not have graphic character shapes, such as X'00' (NUL) and X'8F' (FN1), are control codes that are defined within the Code 128 symbology; in the HRI, control codes print in a device-dependent manner. The FN1, FN2, FN3, and FN4 characters are also called FNC1, FNC2, FNC3, and FNC4 in the Code 128 Symbology Specification.

MOD Parameter

The modifier field gives more processing information about the bar code symbol to be generated. For example, it indicates whether a check-digit is to be generated for the bar code symbol.

Table 24 on page 457 shows the modifier values for each bar code type.

Table 24: Modifier Values by Bar Code Type

Bar Code Type	MOD Value
1 – Code 39 (3-of-9 Code), AIM USS-39	X'01' and X'02'
2 – MSI (modified Plessey code)	X'01' - X'09'
3 – UPC/CGPC Version A	X'00'
5 – UPC/CGPC Version E	X'00'
6 – UPC - Two-digit Supplemental	X'00' - X'02'
7 – UPC - Five-digit Supplemental	X'00' - X'02'
8 – EAN 8 (includes JAN-short)	X'00'
9 – EAN 13 (includes JAN-standard)	X'00'
10 – Industrial 2-of-5	X'01' and X'02'
11 – Matrix 2-of-5	X'01' and X'02'
12 – Interleaved 2-of-5, AIM USS-I 2/5	X'01' - X'04'
13 – Codabar, 2-of-7, AIM USS-Codabar	X'01' and X'02'
17 – Code 128, AIM USS-128	X'02' - X'05'
22 – EAN Two-digit Supplemental	X'00' and X'01'
23 – EAN Five-digit Supplemental	X'00' and X'01'
24 – POSTNET	X'00' - X'04'
26 – RM4SCC	X'00' and X'01'
27 – Japan Postal Bar Code	X'00' and X'01'
28 – DataMatrix two-dimensional Bar Code	X'00'
29 – MaxiCode two-dimensional Bar Code	X'00'
30 – PDF417 two-dimensional Bar Code	X'00' and X'01'
31 – Australia Postal Bar Code	X'01' - X'08'
32 – QR CODE two-dimensional Bar Code	X'02'
33 – CODE 93	X'00'
34 – USPS Four-State	X'00' - X'03'
35 – Red Tag	X'00'
36 – GS1 DataBar	X'00' - X'04' and X'11' - X'1B'

The modifier values, by bar code type, are as follows:

Code 39 (3-of-9 Code), AIM USS-39



Code 39 (3-of-9 Code)
 (encoding 39OR93 with check character
 yielding a 2.32 inch wide symbol)

X'01'

Present the bar code without a generated check digit.

X'02'

Generate a check digit and present it with the bar code.

Note: The Code 39 character set contains 43 characters that include numbers, uppercase alphabetic, and some special characters. The Code 39 Specification also provides a method of encoding all 128 ASCII characters by using 2 bar code characters for those ASCII characters that are not in the standard Code 39 character set. This is sometimes referred to as *Extended Code 39* and is supported by all BCOCA receivers. In this case, the 2 bar code characters that are used to specify the *extended character* are shown in the Human-Readable Interpretation and the bar code scanner interprets the 2-character combination bar/space pattern.

MSI (modified Plessey code)**X'01'**

Present the bar code without check digits that are generated by the printer. Specify 3 - 15 digits of input data.

X'02'

Present the bar code with a generated IBM modulo-10 check digit. This check digit is the second check digit; the first check digit is the last character of the data as defined in the associated FIELD START and LENGTH subcommands. Specify 2 - 14 digits of input data.

X'03'

Present the bar code with two check digits. Both check digits are generated by using the IBM modulo-10 algorithm. Specify 1 - 13 digits of input data.

X'04'

Present the bar code with two check digits. The first check digit is generated by using the NCR modulo-11 algorithm; the second using the IBM modulo-10 algorithm. The first check digit equals the remainder; exception condition EC-0E00 exists if the first check-digit calculation results in a value of 10. Specify 1 - 13 digits of input data.

X'05'

Present the bar code with two check digits. The first check digit is generated by using the IBM modulo-11 algorithm; the second using the IBM modulo-10 algorithm. The first check digit equals the remainder; exception condition EC-0E00 exists if the first check-digit calculation results in a value of 10. Specify 1 - 13 digits of input data.

X'06'

Present the bar code with two check digits. The first check digit is generated by using the NCR modulo-11 algorithm; the second using the IBM modulo-10 algorithm. The first check digit equals 11 minus the remainder; a first check digit value of 10 is assigned the value zero. Specify 1 - 13 digits of input data.

X'07'

Present the bar code with two check digits. The first check digit is generated by using the IBM modulo-11 algorithm; the second using the IBM modulo-10 algorithm. The first check digit equals 11 minus the remainder; a first check digit value of 10 is assigned the value zero. Specify 1 - 13 digits of input data.

X'08'

Present the bar code with two check digits. The first check digit is generated by using the NCR modulo-11 algorithm; the second using the IBM modulo-10 algorithm. The first check digit equals 11 minus the remainder; exception condition EC-0E00 exists if the first check-digit calculation results in a value of 10. Specify 1 - 13 digits of input data.

X'09'

Present the bar code with two check digits. The first check digit is generated by using the IBM modulo-11 algorithm; the second using the IBM modulo-10 algorithm. The first check digit equals 11 minus the remainder; exception condition EC-0E00 exists if the first check-digit calculation results in a value of 10. Specify 1 - 13 digits of input data.

UPC/CGPC—Version A

UPC Version A
(encoding 01234567890)

X'00'

Present the standard UPC-A bar code with a generated check digit. The data to be encoded consists of 11 digits. The first digit is the number-system digit; the next 10 digits are the article number.

Specify 11 digits of input data. The first digit is the number system character; the remaining digits are information characters.

UPC/CGPC—Version E

UPC Version E
(encoding 078349)

X'00'

Present a UPC-E bar code symbol. Of the 10 input digits, 6 digits are encoded. The check digit is generated by using all 10 input data digits. The check digit is not encoded; it is only used to assign odd or even parity to the six encoded digits.

Specify 10 digits of input data. Version E suppresses some zeros that can occur in the information characters to produce a shorter symbol. All 10 digits are information characters; the number system character must not be specified (it is assumed to be 0).

UPC—Two-Digit Supplemental



UPC A + Two-digit Supplemental
(encoding 00633895260, supplemental = 24)

X'00'

Present a UPC two-digit supplemental bar code symbol. This option assumes that the base UPC Version A or E symbol is presented as a separate bar code object. The bar and space patterns that are used for the two supplemental digits are left-odd or left-even parity, with the parity determined by the digit combination.

Specify 2 digits of input data.

X'01'

The two-digit UPC supplemental bar code symbol is preceded by a UPC Version A, Number System 0, bar code symbol. The bar code object contains both the UPC Version A symbol and the two-digit supplemental symbol. The input data consists of the number system digit, the 10-digit article number, and the two supplement digits, in that order. A check digit is generated for the UPC Version A symbol. The two-digit supplemental bar code is presented after the UPC Version A symbol by using left odd and even parity as determined by the two supplemental digits.

Specify 13 digits of input data.

X'02'

The two-digit UPC supplemental bar code symbol is preceded by a UPC Version E symbol. The bar code object contains both the UPC Version E symbol and the two-digit supplemental symbol. The input data consists of the 10-digit article number and the two supplemental digits. The bar code object processor generates the six-digit UPC Version E symbol and a check digit. The check digit is used to determine the parity pattern of the six-digit Version E symbol. The two-digit supplemental bar code symbol is presented after the Version E symbol by using left odd and even parity as determined by the two digits.

Specify 12 digits of input data.

UPC—Five-Digit Supplemental



UPC A + Five-digit Supplemental
(encoding 09827721123, supplemental = 21826)

X'00'

Present the UPC five-digit supplemental bar code symbol. This option assumes that the base UPC Version A or E symbol is presented as a separate bar code object. A check digit is generated from the five supplemental digits and is used to assign the left-odd and left-even parity of the five-digit supplemental bar code. The supplemental check digit is not encoded or interpreted.

Specify 5 digits of input data.

X'01'

The five-digit UPC supplemental bar code symbol is preceded by a UPC Version A, Number System 0, bar code symbol. The bar code object contains both the UPC Version A symbol and the five-digit supplemental symbol. The input data consists of the number system digit, the 10-digit article

number, and the five supplement digits, in that order. A check digit is generated for the UPC Version A symbol. A second check digit is generated from the five supplement digits. It is used to assign the left odd and even parity of the five-digit supplemental bar code symbol. The supplement check digit is not encoded or interpreted.

Specify 16 digits of input data.

X'02'

The five-digit UPC supplemental bar code symbol is preceded by a UPC Version E symbol. The bar code object contains both the UPC Version E symbol and the five-digit supplemental symbol. The input data consists of the 10-digit article number and the five-digit supplemental data. The bar code object processor generates the six-digit UPC Version E symbol and check digit. The check digit is used to determine the parity pattern of the Version E symbol. The five-digit supplemental bar code symbol is presented after the Version E symbol. A second check digit is calculated for the five-digit supplemental data and is used to assign the left odd and even parity. The supplement check digit is not encoded or interpreted.

Specify 15 digits of input data.

EAN-8 (includes JAN-short)



EAN 8
(encoding 2468123)

X'00'

Present an EAN-8 bar code symbol. The input data consists of 7 digits: two flag digits and five article number digits. All 7 digits are encoded along with a generated check digit.

EAN-13 (includes JAN-standard)

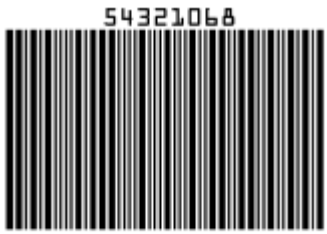


EAN 13
(encoding 041234567890)

X'00'

Present an EAN-13 bar code symbol. The input data consists of 12 digits: two flag digits and 10 article number digits, in that order. The first flag digit is not encoded. The second flag digit, the article number digits, and generated check digit are encoded. The first flag digit is presented in HRI form at the bottom of the left *quiet zone*. The first flag digit governs the A and B number-set pattern of the bar and space coding of the 6 digits to the left of the symbol center pattern.

Industrial 2-of-5



Industrial 2-of-5
(encoding 54321068)

X'01'

Present the bar code without a generated check digit.

X'02'

Generate a check digit and present it with the bar code.

Matrix 2-of-5



Matrix 2-of-5
(encoding 54321068)

X'01'

Present the bar code symbol without a generated check digit.

X'02'

Generate a check digit and present it with the bar code.

Interleaved 2-of-5, AIM USS-I 2/5



Interleaved 2-of-5
(encoding 54321068)

The Interleaved 2-of-5 symbology requires an even number of digits. The printer adds a leading zero if necessary to meet this requirement.

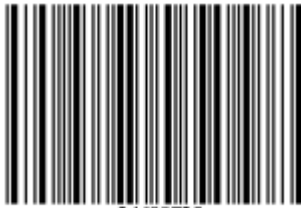
X'01'

Present the bar code symbol without a check digit.

X'02'

Generate a check digit and present it with the bar code.

Codabar, 2-of-7, AIM USS-Codabar



34698735
Codabar

(encoding A34698735B)

X'01'

Present the bar code without a generated check digit. The input data consists of a start character, digits to be encoded, and a stop character, in that order. Start and stop characters can be A, B, C, or D, and can be used only at the beginning and end of the symbol.

X'02'

Generate a check digit and present it with the bar code. The input data consists of a start character, digits to be encoded, and a stop character, in that order. Start and stop characters can be A, B, C, or D, and can be used only at the beginning and end of the symbol.

Code 128, AIM USS-128 (modifier values X'02' through X'04')

The 1986 symbology definition for Code 128 defined an algorithm for generating a start character and then changed that algorithm in 1993 to accommodate the UCC/EAN 128 variation of this bar code. Many BCOCA printers implemented the 1986 version (with modifier X'02'), some BCOCA printers changed to use the 1993 algorithm (with modifier X'02'), and some BCOCA printers support both algorithms. When UCC/EAN 128 bar codes are produced for printers that explicitly support UCC/EAN 128, modifier X'03' or modifier X'04' must be specified. For printers that do not explicitly support UCC/EAN 128, specifying modifier X'02' might produce a valid UCC/EAN 128 bar code (see notes in the modifier descriptions).

The data for UCC/EAN 128 bar codes is in the form:

```
"FNC1, ai, data, m, FNC1, ai, data, m, FNC1, ..., ai, data, m"
```

FNC1 is the FNC1 function character (X'8F'), ai is an application identifier, data is defined for each registered application identifier, and m is a modulo 10 check digit (calculated with the same check digit algorithm that is used for UPC version A bar codes). Not all application identifiers require a modulo 10 check digit (m). Also, all except the first FNC1 are field separator characters that appear only when the preceding ai data is of variable length. See *UCC/EAN-128 APPLICATION IDENTIFIER STANDARD* from the Uniform Code Council, Inc. for a description of application identifiers and the use of FNC1. To build the bar code symbol, the printer must:

- Produce a start character based on the 1993 algorithm.
- Bar encode the data, including the FNC1, ai, data, and m check digit.
- Produce a modulo 103 check digit.
- Produce a stop character.

Modifier X'02' – Code 128 symbol, with original (1986) start-character algorithm



ABC123abc@456

Code 128

(encoding ABC123abc@456)

Generate a Code 128 symbol with subset A, B, or C to produce the shortest possible bar code from the specified data, by using the start-character algorithm that was published in the original (1986) edition of the Code 128 Symbology Specification. The Code 128 code page (CPGID = 1303, GCSGID = 1454) is used to interpret the bar code symbol data. Generate a check digit and present it with the bar code.

Notes:

1. Some IPDS printers use the modifier X'03' start-character algorithm even when modifier X'02' is specified. This produces a valid UCC/EAN 128 symbol when valid UCC/EAN 128 data is provided. However, in general, modifier X'02' must not be used to produce UCC/EAN 128 symbols because this value causes other IPDS printers to use the original Code 128 start-symbol algorithm, which generates a Start (Code B) instead of the Start (Code C) that UCC/EAN 128 requires. Some bar code scanners can handle either start character for a UCC/EAN 128 symbol, but others require the Start (Code C) character.
2. These printers use the UCC/EAN 128 start-character algorithm when modifier X'02' is specified: 4312, 4317, 4324, InfoPrint 20, InfoPrint 21, InfoPrint 32, InfoPrint 40, InfoPrint 45, InfoPrint 70, InfoPrint 2070, InfoPrint 2085, and InfoPrint 2105. Other IPDS printers use the original start-character algorithm when modifier X'02' is specified.

Modifier X'03' – UCC/EAN 128 symbol, without parenthesis in the HRI



SCC-14 and Sell-By Date Concatenated in a UCC/EAN-128 Symbol

(encoding $\frac{F}{C}$ 019061414100768715001230)

Generate a Code 128 symbol with subset A, B, or C to produce the shortest possible bar code from the specified data, by using the version of the start-character algorithm that was modified for producing UCC/EAN 128 symbols. If the first data character is FNC1 (as is required for a UCC/EAN 128 symbol) and is followed by valid UCC/EAN 128 data, the printer generates a Start (Code C) character. The Code 128 code page (CPGID = 1303, GCSGID = 1454) is used to interpret the bar code symbol data. Generate a check digit and present it with the bar code.

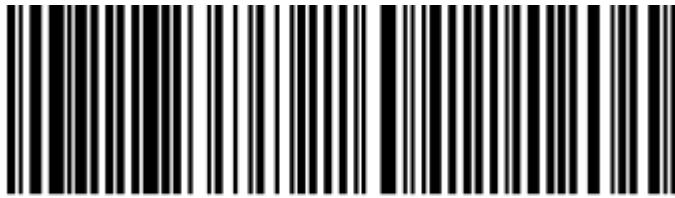
The UCC/EAN 128 data is checked for validity and exception condition EC-1200 exists if one or more of the following conditions are encountered:

- FNC1 is not the first data character.
- Invalid application identifier (ai) value encountered.
- Data for an ai doesn't match the ai definition.
- Insufficient (or no) data that follows an ai.
- Too much data for an ai.
- Invalid use of FNC1 character.

Notes:

1. UCC/EAN 128 is a variation of Code 128 that begins with an FNC1 character, followed by an Application Identifier and the data to be bar encoded. All of these characters (including the FNC1 character) must be supplied within the Bar Code Symbol Data (BSA). UCC/EAN 128 also requires that the symbol begin in subset C.
2. For UCC/EAN 128 symbols, the start character, the FNC1 characters, the modulo 103 check digit, and the stop character are not shown in the human readable format.

Modifier X'04' – UCC/EAN 128 symbol, with parenthesis in the HRI



(01)90614141007687(15)001230

SCC-14 and Sell-By Date Concatenated in a UCC/EAN-128 Symbol
(encoding 019061414100768715001230)

Generate a Code 128 symbol in the same manner as for modifier X'03', but use parenthesis in the HRI to distinguish each application identifier (ai). The printer inserts the parenthesis in the printed HRI when modifier X'04' is specified; these parentheses are not part of the input data.

EAN Two-Digit Supplemental



EAN + 2 Digit Supplemental
(encoding 041234567890, supplemental = 99)

X'00'

Present the EAN two-digit supplemental bar code symbol. This option assumes that the base EAN-13 symbol is presented as a separate bar code object. The value of the two digit supplemental data determines their bar and space patterns that are chosen from number sets A and B.

Specify 2 digits of input data.

X'01'

The two-digit supplemental bar code symbol is preceded by a normal EAN-13 bar code symbol. The bar code object contains both the EAN-13 symbol and the two-digit supplemental symbol. The two-digit supplemental bar code is presented after the EAN-13 symbol by using left odd and even parity as determined by the two supplemental digits that are chosen from number sets A and B.

Specify 14 digits of input data.

Note: Used for both books and paperbacks.

EAN Five-Digit Supplemental



EAN + 5 Digit Supplemental
(encoding 041234567890, supplemental = 54321)

X'00'

Present the EAN five-digit supplemental bar code. This option assumes that the base EAN-13 symbol is presented as a separate bar code object. A check digit is calculated from the five supplemental digits. The check digit is also used to assign the bar and space patterns from number sets A and B for the five supplemental digits. The check digit is not encoded or interpreted.

Specify 5 digits of input data.

X'01'

The five-digit supplemental bar code symbol is preceded by a normal EAN-13 bar code symbol. The bar code object contains both the EAN-13 symbol and the five-digit supplemental symbol. A check digit is generated from the five-digit supplemental data. The check digit is used to assign the bar and space patterns from number sets A and B. The check digit is not encoded or interpreted.

Specify 17 digits of input data.

Note: Used for books and paperbacks.

POSTNET and PLANET

US POSTNET
Zip+4
(encoding 12345+6789)



PLANET Code
(encoding 00123456789)

For all POSTNET modifiers that follow, the BSA HRI flag field and the BSD module width, element height, height multiplier, and wide-to-narrow ratio fields are not applicable to the POSTNET bar code symbology. These fields are ignored because the POSTNET symbology defines specific values for these parameters.

X'00'

Present a POSTNET ZIP Code bar code symbol. The ZIP Code to be encoded is defined as a five-digit, numeric (0 - 9), data variable to the BSA data structure. The POSTNET ZIP Code bar code consists of a leading frame bar, the encoded ZIP Code data, a correction digit, and a trailing frame bar.

X'01'

Present a POSTNET ZIP+4 bar code symbol. The ZIP+4 code to be encoded is defined as a nine-digit, numeric (0 - 9), data variable to the BSA data structure. The POSTNET ZIP+4 bar code consists of a leading frame bar, the encoded ZIP+4 data, a correction digit, and a trailing frame bar.

X'02'

Present a POSTNET Advanced Bar Code (ABC) bar code symbol. The ABC code to be encoded is defined as an 11-digit, numeric (0 - 9), data variable to the BSA data structure. The POSTNET ABC bar code consists of a leading frame bar, the encoded ABC data, a correction digit, and a trailing frame bar.

Note: An 11-digit POSTNET bar code is called a *Delivery Point bar code*.

X'03'

Present a POSTNET variable-length bar code symbol. The data to be encoded is defined as an n-digit, numeric (0 - 9), data variable to the BSA data structure. The bar code symbol is generated without length checking; the symbol is not guaranteed to be scannable or interpretable. The POSTNET variable-length bar code consists of a leading frame bar, the encoded data, a correction digit, and a trailing frame bar.

X'04'

Present a PLANET Code symbol. The PLANET Code is a reverse topology variation of POSTNET that encodes 11 digits of data; the first 2 digits represent a service code (such as 21 = Origin Confirm and 22 = Destination Confirm) and the next 9 digits identify the mailpiece. A 12th digit is

generated by the printer as a check digit. The PLANET Code symbol consists of a leading frame bar, the encoded data, a check digit, and a trailing frame bar.

Royal Mail (RM4SCC and Dutch KIX)



Royal Mail (RM4SCC)

UK and Singapore version
(encoding SN34RD1A)



Royal Mail (RM4SCC)

Dutch KIX version
(encoding SN34RD1A)

A 4-state customer code that is defined by the Royal Mail Postal service of England for use in bar coding postal code information. This symbology is also called the *Royal Mail bar code* or the *4-State customer code*. The symbology (as defined for modifier X'00') is used in the United Kingdom and in Singapore. A variation that is called KIX (KlantenIndeX = customer index, as defined for modifier X'01') is used in the Netherlands.

X'00'

Present a RM4SCC bar code symbol with a generated start bit, checksum character, and stop bit. The start and stop bits identify the beginning and end of the bar code symbol and also the orientation of the symbol.

X'01'

Present a RM4SCC bar code symbol with no start bar, no checksum character, and no stop bar.

Note: Modifier X'01' is also known as *Dutch Kix Postal Bar Code*. In addition to the characters allowed in Modifier X'00', it allows lowercase alphabetical characters, which are folded to uppercase by the printer.

Japan Postal Bar Code (JPOSTAL)



Japan Postal Bar Code

Modifier X'00'
(encoding 15400233-16-4)

A complete Japan Postal Bar Code symbol that consists of a set of distinct bars and spaces for each character, followed by a modulo 19 checksum character and enclosed by a unique start character, stop character, and quiet zones.

X'00'

Present a Japan Postal Bar Code symbol with a generated start character, checksum character, and stop character.

The generated bar code symbol consists of a start code, a 7-digit new postal code, a 13-digit address indication number, a check digit, and a stop code. The variable data to be encoded (BSA bytes 5-n) is used as follows:

1. The first few digits represent the new postal code in either the form nnn-nnnn or the form nnnnnnn; the hyphen, if present, is ignored and the other 7 digits must be numeric. The 7 digits are placed in the new postal code field of the bar code symbol.
2. If the next digit is a hyphen, it is ignored and is not used in generating the bar code symbol.
3. The remainder of the BSA data is the address indication number, which can contain numbers, hyphens, and alphabetic characters (A-Z). Each number and each hyphen represents one digit in the bar code symbol; each alphabetic character is represented by a combination of a control code (CC1, CC2, or CC3) and a numerical code, and handled as two digits in the bar code symbol. Thirteen digits of this address indication number data are placed in the address indication number field of the bar code symbol.
 - If fewer than 13 more digits are present, the shortage is filled in with the bar code corresponding to control code CC4 up to the thirteenth digit.

- If more than 13 more digits are present, the first 13 are used and the remainder are ignored, with no exception condition reported. However, if the thirteenth digit is the control code for an alphabetic (A-Z) character, only the control code is included and the numeric part is omitted.

X'01'

Present a Japan Postal Bar Code symbol directly from the bar code data. Each valid character in the BSA data field is converted into a bar/space pattern, with no validity or length checking. The printer does not generate start, stop, or check digits.

To produce a valid bar code symbol, the bar code data must contain a start code, a 7-digit new postal code, a 13-digit address indication number, a valid check digit, and a stop code. The new postal code must consist of 7 numeric digits. The address indication number must consist of 13 characters, which can be numeric, hyphen, or control characters (CC1 through CC8). The following table lists the valid code points for modifier X'01':

Bar Code Character	Code Point	Numerical Checking Value	Bar Code Character	Code Point	Numerical Checking Value
start	X'4C'		0	X'F0'	0
stop	X'6E'		1	X'F1'	1
hyphen	X'60'	10	2	X'F2'	2
CC1	X'5A'	11	3	X'F3'	3
CC2	X'7F'	12	4	X'F4'	4
CC3	X'7B'	13	5	X'F5'	5
CC4	X'E0'	14	6	X'F6'	6
CC5	X'6C'	15	7	X'F7'	7
CC6	X'50'	16	8	X'F8'	8
CC7	X'7D'	17	9	X'F9'	9
CC8	X'4D'	18			

Notes:

1. Do not attempt to use the Start and Stop characters in calculating the check digit. You can use the remaining characters to generate check digits; they are the only characters that are valid for check digits. Use the Numeric Checking Values to calculate the check digits.
2. You supply data generation for mod 1. The check digit is the sum of the digits module 19, which is a remainder of X. The check digit is 19 minus X, converted to hex. If this is done incorrectly, the print server displays message APS830I.

The hyphen has a hex value of X'60' and a checking digit numerical of 10.

The following example is a generation of the customer bar code where 154-0023 is the new postal code and 3 - 1 6 - 4 is the address indication number:

```
address
 154
 3-16-4, Wakabayshi, Setagaya-ku

New postal code + address indication number:
154-0023-3-16-4
```


Delete hyphens between the third and fourth digits of the new postal code and between the new postal code and address indication number, as follows:

15400233-16-4

If the address indication number is shorter than 13 digits, use CC4s to fill the remaining spaces, as in the following example.

15400233-16-4 CC4 CC4 CC4 CC4 CC4 CC4 CC4

The first 7 digits are ignored as the postal code and the remaining digits are the address indication number. Remember to count hyphens as digits. In the previous example, the postal code is 1540023 and the address indication number is 3 - 1 6 - 4 plus seven CC4 characters.

Calculate the check digit (CD), based on the table of correspondence between characters for bar code and checking numerals. See [Table 25 on page 468](#) for more information about check digits.

$$1+5+4+0+0+2+3+3+10+1+6+10+4+14+14+14+14+14+14+14+14+14+14+CD = 147 + CD = \text{integral multiple of } 19$$

Using the integral multiple of 19, $152 - 147 = 5$ for the check digit, based on the table of correspondence between characters for bar code and checking numerals. Five corresponds to checking numerical five.

For the previous postal code and address indication number, calculate the hex value of the check digit. The following table shows how to convert the data to hex values. Add the check digit (CD), start code (STC), and stop code (SPC), as follows:

Table 26: Table Shows How to Convert Data to Hex Values.

Start Code (STC)	HEX
1	F1
5	F5
4	F4
0	F0
0	F0
2	F2
3	F3
3	F3
-	60
1	F1
6	F6
-	60
4	F4
CC4	E0
CC4	E0
CC4	E0
CC4	E0

Table 26: Table Shows How to Convert Data to Hex Values. (continued)

Start Code (STC)	HEX
CC4	E0
CC4	E0
CC4	E0
CD(5)	F5
SPC	6E

Notice that the check digit (CD) equals 5 and is converted to the hex value of F5.

The following are examples of various Japanese postal bar codes.

```
PAGEDEF SLSRPT;
PRINTLINE POSITION 2 IN 2 IN;
FIELD START 1 LENGTH 23
POSITION CURRENT NEXT
DIRECTION ACROSS
BARCODE JAPAN TYPE JPOSTAL MOD 1;
```

This bar code used numeric postal codes only. The 7-digit field contains the start, stop, and checksum characters. The printer does not generate start, stop, or checksum characters.

```
PAGEDEF SLSRPT;
PRINTLINE POSITION 2 IN 2 IN;
FIELD START 1 LENGTH 23
POSITION CURRENT NEXT
DIRECTION ACROSS
BARCODE JAPAN TYPE JPOSTAL MOD 1;
```

This bar code used alphanumeric postal codes only. The 13-digit field contains start, stop, checksum, and command codes. The printer does not generate start, stop, or checksum characters.

```
PAGEDEF SLSRPT;
PRINTLINE POSITION 2 IN 2 IN;
FIELD START 1 LENGTH 7
POSITION CURRENT NEXT
DIRECTION ACROSS
BARCODE JAPAN TYPE JPOSTAL MOD 0;
```

This bar code used numeric postal codes only. This is a 7-digit character field.

```
PAGEDEF SLSRPT;
PRINTLINE POSITION 2 IN 2 IN;
FIELD START 1 LENGTH 13
POSITION CURRENT NEXT
DIRECTION ACROSS
BARCODE JAPAN TYPE JPOSTAL MOD 0;
```

This bar code used alphanumeric postal codes only. This is a 13-digit character field.

Data Matrix (2DMATRIX)



Data Matrix 2D Symbol

(encoding A1B2C3D4E5F6G7H8I9J0K1L2)

A two-dimensional matrix bar code symbology that is defined as an AIM International Symbology Specification.

X'00'

Present a Data Matrix Bar Code symbol by using Error Checking and Correcting (ECC) algorithm 200.

The bar code data is assumed to start with the default character encodation (ECI 000003 = ISO 8859-1). This is an international Latin 1 code page that is equivalent to the ASCII code page 819. To change to a different character encodation within the data, the ECI protocol as defined in the *AIM International Symbology Specification - Data Matrix*, must be used. This means that whenever a byte value of X'5C' (an escape code) is encountered in the bar code data, the next six characters must be decimal digits (byte values X'30' - X'39') or the next character must be another X'5C'. When the X'5C' character is followed by six decimal digits, the six decimal digits are interpreted as the ECI number, which changes the interpretation of the characters that follow the decimal digits. When the X'5C' character is followed by another X'5C' character, this is interpreted as one X'5C' character (which is a backslash in the default character encodation); alternatively, the escape-sequence handling flag can be used to treat X'5C' as a normal character.

Since the default character encodation for this bar code is ASCII, the EBCDIC-to-ASCII translation flag can be used when all of the data for the bar code is EBCDIC. If the bar code data contains more than one-character encodation or if the data needs to be encoded within the bar code symbol in a form other than the default character encodation (such as, in EBCDIC), the bar code data must begin in the default encodation, the EBCDIC-to-ASCII translation flag must be set to B'0', and the ECI protocol must be used to switch into the other encodation.

Note: For more information about 2DMATRIX two-dimensional matrix bar codes, see [“Data Matrix Special-Function Parameters”](#) on page 484.

MaxiCode (2DMAXI)



MaxiCode 2D Symbol

A two-dimensional matrix bar code symbology that is defined as an AIM International Symbology Specification.

X'00'

Present a MaxiCode bar code symbol.

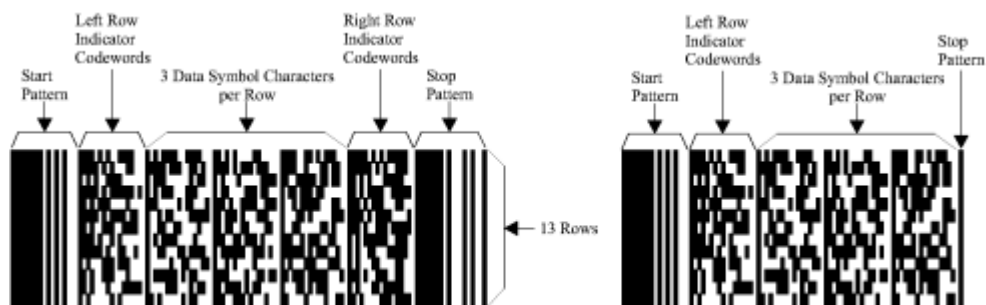
The bar code data is assumed to start with the default character encodation (ECI 000003 = ISO 8859-1). This is an international Latin 1 code page that is equivalent to the ASCII code page 819. To change to a different character encodation within the data, the ECI protocol as defined in section 4.15.2 of the *AIM International Symbology Specification - MaxiCode*, must be used. This means that whenever a byte value of X'5C' (an escape code) is encountered in the bar code data, the next six

characters must be decimal digits (byte values X'30' - X'39') or the next character must be another X'5C'. When the X'5C' character is followed by six decimal digits, the six decimal digits are interpreted as the ECI number, which changes the interpretation of the characters that follow the decimal digits. When the X'5C' character is followed by another X'5C' character, this is interpreted as one X'5C' character (which is a backslash in the default character encoding); alternatively, the escape-sequence handling flag can be used to treat X'5C' as a normal character. The X'5C' character is allowed anywhere in the bar code data except for Modes 2 and 3 where it is not allowed in the Primary Message portion of the data.

Since the default character encoding for this bar code is ASCII, the EBCDIC-to-ASCII translation flag can be used when all of the data for the bar code is EBCDIC. If the bar code data contains more than one-character encoding or if the data needs to be encoded within the bar code symbol in a form other than the default character encoding (such as, in EBCDIC), the bar code data must begin in the default encoding, the EBCDIC-to-ASCII translation flag must be set to B'0', and the ECI protocol must be used to switch into the other encoding.

Note: For more information about 2DMAZI two-dimensional matrix bar codes.

2DPDF417



PDF417

Truncated PDF417

A two-dimensional matrix bar code symbology that is defined as an *AIM International Symbology Specification – PDF417*.

X'00'

Present a full PDF417 bar code symbol.

X'01'

Present a truncated PDF417 bar code symbol for use in an environment in which damage to the symbol is unlikely. This version omits the right row indicator and simplifies the stop pattern into a single module width bar.

The bar code data is assumed to start with the default character encoding (GLI 0) as defined in Table 5 of the Uniform Symbology Specification PDF417. To change to another character encoding, the GLI (Global Label Identifier) protocol, as defined in the Uniform Symbology Specification PDF417, must be used. This means that whenever a byte value of X'5C' (an escape code) is encountered in the bar code data, the next three characters must be decimal digits (byte values X'30' - X'39') or the next character must be another X'5C' character. When the X'5C' character is followed by three decimal digits, this is called an escape sequence. When the X'5C' character is followed by another X'5C' character, this is interpreted as one X'5C' character (which is a backslash in the default character encoding); alternatively, the escape-sequence handling flag can be used to treat X'5C' as a normal character.

To identify a new GLI, two or three escape sequences in a row must exist. The first escape sequence must be “\925”, “\926”, or “\927” (as defined by GLI 0). If the first escape sequence is “\925” or “\927”, one other escape sequence must follow that contains a value from “\000” to “\899”. If the first escape sequence is “\926”, two more escape sequences must follow and each escape sequence must contain a value from “\000” to “\899”. For example, to switch to GLI 1 (ISO 8859-1, which is equivalent to ASCII code page 819), the bar code data would contain the character sequence “\927\001”. The “\927” escape sequence is used for GLI values 0 - 899. The “\926” escape sequence is used for GLI values 900 - 810,899. The “\925” escape sequence is used for GLI values

810,900 - 811,799. For more information about how these values are calculated, see section 2.2.6 of the *Uniform Symbology Specification PDF417*.

In addition to transmitting GLI numbers, the escape sequence is used to transmit other codewords for more purposes. The special codewords are given in Table 8 in Section 2.7 of the *Uniform Symbology Specification PDF417*. The special codewords “\903” to “\912” and “\914” to “\920” are reserved for future use. The BCOCA receiver accepts these special escape sequences and adds them to the bar code symbol, resuming normal encoding with the character that follows the escape sequence.

The special codeword “\921” instructs the bar code reader to interpret the data that is contained within the symbol for reader initialization or programming. This escape sequence is only allowed at the beginning of the bar code data.

The special codewords “\922”, “\923”, and “\928” are used for coding a Macro PDF417 Control Block as defined in section G.2 of the *Uniform Symbology Specification PDF417*. These codewords must not be used within the BCOCA data; instead, a Macro PDF417 Control Block can be specified in the special-function parameters. Exception condition EC-2100 exists if one of these escape sequences is found in the bar code data.

Because the default character encodation for this bar code is GLI 0 (an ASCII code page that is similar to IBM code page 437), the EBCDIC-to-ASCII translation flag can be used when all of the data for the bar code is EBCDIC. If the bar code data contains more than one-character encodation, or if the data needs to be encoded within the bar code symbol in a form other than the default character encodation (such as in EBCDIC), the bar code data must begin in the default encodation, the EBCDIC-to-ASCII translation flag must be set to B'0', and the GLI protocol must be used to switch into the other encodation.

Note: For more information about 2DPDF417 two-dimensional matrix bar codes, see [“PDF417 Special-Function Parameters” on page 493](#).

Australia Post Bar Code (APOSTAL)



Australia Post Bar Code
Customer Barcode 2 using Table C
(encoding 56439111ABA 9)

A bar code symbology that is defined by Australia Post for use in Australian postal systems. Several formats of this bar code exist, which are identified by the modifier byte as follows:

Modifier	Type of bar code	Valid bar code data
X'01'	Standard Customer Barcode (format code = 11)	An 8-digit number that represents the Sorting Code.
X'02'	Customer Barcode 2 using Table N (format code = 59)	An 8-digit number that represents the Sorting Code followed by up to 8 numeric digits that represent the Customer Information.
X'03'	Customer Barcode 2 using Table C (format code = 59)	An 8-digit number that represents the Sorting Code followed by up to 5 characters (A - Z, a - z, 0 - 9, space, #) that represent the Customer Information.
X'04'	Customer Barcode 2 using proprietary encoding (format code = 59)	An 8-digit number that represents the Sorting Code followed by up to 16 numeric digits (0 - 3) that represent the Customer Information. Each of the 16 digits specifies one of the 4 types of bar.
X'05'	Customer Barcode 3 using Table N (format code = 62)	An 8-digit number that represents the Sorting Code followed by up to 15 numeric digits that represent the Customer Information.

Modifier	Type of bar code	Valid bar code data
X'06'	Customer Barcode 3 using Table C (format code = 62)	An 8-digit number that represents the Sorting Code followed by up to 10 characters (A - Z, a - z, 0 - 9, space, #) that represent the Customer Information.
X'07'	Customer Barcode 3 using proprietary encoding (format code = 62)	An 8-digit number that represents the Sorting Code followed by up to 31 numeric digits (0 - 3) that represent the Customer Information. Each of the 31 digits specify one of the 4 types of bar.
X'08'	Reply Paid Barcode (format code = 45)	An 8-digit number that represents the Sorting Code.

The proprietary encoding allows the customer to specify the types of bars to be printed directly by using 0 for a full bar, 1 for an ascending bar, 2 for a descending bar and 3 for a timing bar. If the customer does not specify enough Customer Information to fill the field, the printer uses a filler bar to extend pad the field out to the correct number of bars.

The printer encodes the data by using the proper tables, generate the start and stop bars, generate any needed filler bars, and generate the Reed Solomon ECC bars.

Human-readable interpretation (HRI) can be selected with this bar code type. The format control code, Delivery Point Identifier, and customer information field (if any) appear in the HRI, but the ECC does not.

The proprietary encoding allows the customer to specify the types of bars to be printed directly by using 0 for a full bar, 1 for an ascending bar, 2 for a descending bar, and 3 for a timing bar. If the customer does not specify enough Customer Information to fill the field, the printer uses a filler bar to extend pad the field out to the correct number of bars.

The printer encodes the data by using the proper tables, generate the start and stop bars, generate any needed filler bars, and generate the Reed Solomon ECC bars.

Human readable interpretation (HRI) can be selected with this bar code type. The format control code, Delivery Point Identifier, and customer information field (if any) appear in the HRI, but the ECC does not.

QR Code



QR Code 2D Symbol

A two-dimensional matrix bar code symbology that is defined as an AIM International Technical Standard.

X'02'

Present a Model 2 QR Code Bar Code symbol as defined in *AIM International Symbology Specification – QR Code*.

The bar code data is assumed to start with the default character encodation (ECI 000020). This is a single-byte code page that represents the JIS8 and Shift JIS character sets; it is equivalent to the ASCII code page 897. To change to a different character encodation within the data, the ECI protocol as defined in the *AIM International "Extended Channel Interpretation (ECI) Assignments"*, must be used.

Since the default character encodation for this bar code is ASCII, the EBCDIC-to-ASCII translation flag can be used in the following manner:

- When all of the input data for the bar code is single-byte EBCDIC that uses one of the supported code pages (500, 290, or 1027), set the EBCDIC-to-ASCII translation flag to B'1' and select the correct code page in the conversion parameter.
- When all of the input data for the bar code is mixed-byte EBCDIC AFP Line Data that uses SO and SI controls (SOSI data), set the EBCDIC-to-ASCII translation flag to B'1' and select the conversion value you want in the conversion parameter.

If the bar code data contains more than one-character encodation or if the data needs to be encoded within the bar code symbol in a form other than the ones that are previously mentioned (such as in an EBCDIC code page that is not supported by the EBCDIC-to-ASCII translation flag), the bar code data must begin in the default encodation, the EBCDIC-to-ASCII translation flag must be set to B'0', and the ECI protocol must be used to switch to the other encodings.

A quiet zone must exist around the symbol that is at least four modules wide on each of the four sides of the symbol.

Note: For more information about QR CODE two-dimensional bar code see [“QR Code Special-Function Parameters”](#) on page 497.

Code 93



Code 93
(encoding 39OR93
yielding a 1.82 inch wide symbol)

A linear bar code symbology similar to Code 39, but more compact than Code 39. Code 93 bar code symbols are made up of a series of characters each of which is represented by 9 modules that are arranged into 3 bars with their adjacent spaces. The bars and spaces vary between 1 module wide and 4 modules wide.

X'00'

Present a Code 93 bar code symbol as defined in *AIM International Symbology Specification – Code 93*.

The Code 93 character set contains 47 characters, including numeric digits, uppercase alphabets, four shift characters (a, b, c, and d), and seven special characters. The Code 93 Specification also provides a method of encoding all 128 ASCII characters by using two bar code characters for those ASCII characters that are not in the standard Code 93 character set. This is sometimes referred to as *Extended Code 93*. In this case, the two bar code characters that are used to specify the *extended character* are shown in the Human-Readable Interpretation (as a • followed by the second character) and the bar code scanner interprets the two-character combination bar/space pattern.

The Human-Readable Interpretation of the Start and Stop characters is represented as an open box (□) and the shift characters (a, b, c, and d) are represented as a filled box (•).

A quiet zone must precede and follow the symbol that is at least 10 modules wide.

USPS Four-State



USPS Four-State Bar Code
Modifier X'03'
(encoding 01 234 567094 987654321 01234567891)

The USPS Four-State bar code symbology⁸ limits the symbol size; therefore, BSD element height, height multiplier, and wide-to-narrow ratio fields are not applicable to this symbology and are ignored by BCOCA receivers. The module width field allows for two symbol sizes (small and optimal); the small symbol is approximately 2.575 inches wide and the optimal symbol is approximately 2.9 inches wide.

⁸ The United States Postal Service (USPS) developed this symbology for use in the USPS mailstream and named it the OneCode^{SOLUTION} Barcode. The bar code is also known as the *4-state Customer Barcode* and is abbreviated in several ways: OneCode (4CB), OneCode (4-CB), 4CB, or 4-CB.

The input data is all numeric and consists of 5 data fields. The first four fields are fixed length and the 5th field can have one of four lengths; the bar code modifier is used to specify the length of the 5th field. The total length of the input data can be 20, 25, 29, or 31 digits and is defined as follows:

- Bar code ID (2 digits) - assigned by USPS, the 2nd digit must be 0 - 4. Thus, the valid values are: 00 - 04, 10 - 14, 20 - 24, 30 - 34, 40 - 44, 50 - 54, 60 - 64, 70 - 74, 80 - 84, and 90 - 94.
- Service Code (3 digits) - assigned by USPS; valid values are 000 - 999.
- Subscriber ID (6 digits) - assigned by USPS; valid values are 000000 - 999999.
- Unique ID (9 digits) - assigned by the mailer; valid values are 000000000 - 999999999.
- Routing ZIP Code (0, 5, 9, or 11 digits) - refer to the modifier for valid values.

USPS Four-State modifier values are defined as follows:

X'00'

Present a USPS Four-State bar code symbol with no Delivery Point ZIP Code. The input data for this bar code symbol must be 20 number digits.

X'01'

Present a USPS Four-State bar code symbol with a 5-digit Delivery Point ZIP Code. The input data for this bar code symbol must be 25 number digits; the valid values for the Delivery Point ZIP Code are 00000 - 99999.

X'02'

Present a USPS Four-State bar code symbol with a 9-digit Delivery Point ZIP Code. The input data for this bar code symbol must be 29 number digits; the valid values for the Delivery Point ZIP Code are 000000000 - 999999999.

X'03'

Present a USPS Four-State bar code symbol with an 11-digit Delivery Point ZIP Code. The input data for this bar code symbol must be 31 number digits; the valid values for the Delivery Point ZIP Code are 00000000000 - 99999999999.

Human-Readable Interpretation (HRI) can be printed with a USPS Four-State symbol, but HRI is not used with all types of special services. See *Introducing 4-state Customer Barcode* for a description of when HRI is appropriate.

A quiet zone must surround the symbol (all four sides) that is at least 0.04 inches above and below and at least 0.125 inches on both sides of the symbol.

Check Digit Calculation Method

Some bar code types and modifiers call for the calculation and presentation of check digits. Check digits are a method of verifying data integrity during the bar coding reading process. Except for UPC Version E, the check digit is always presented in the bar code bar and space patterns, but is not always presented in the HRI. The following table shows the check digit calculation methods for each bar code type and the presence or absence of the check digit in the HRI.

Bar Code Type	Modifier	In HRI?	Check Digit Calculation
1 – Code 39 (3-of-9 Code), AIM USS-39	X'02'	Yes	Modulo 43 of the sum of the data characters' numerical values as described in a Code 39 specification. The start and stop codes are not included in the calculation.

Table 27: Check Digit Calculation Methods For Each Bar Code. (continued)

Bar Code Type	Modifier	In HRI?	Check Digit Calculation
2 – MSI (modified Plessey code)	X'02' - X'09'	No	<p>IBM Modulus 10 check digit:</p> <ol style="list-style-type: none"> 1. Multiply each digit of the original number by a weighting factor of 1 or 2 as follows: multiply the units digit by 2, the tens digit by 1, the hundreds digit by 2, the thousands digit by 1, and so forth. 2. Sum the digits of the products from step 1. This is not the same as summing the values of the products. 3. The check digit is described by the following equation where sum is the resulting value of step 2: $(10 - (\text{sum modulo } 10)) \text{ modulo } 10$
			<p>IBM Modulus 11 check digit:</p> <ol style="list-style-type: none"> 1. Multiply each digit of the original number by a repeating weighting factor pattern of 2, 3, 4, 5, 6, 7 as follows: multiply the units digit by 2, the tens digit by 3, the hundreds digit by 4, the thousands digit by 5, and so forth. 2. Sum the products from step 1. 3. The check digit depends on the bar code modifier. The check digit as the remainder is described by the following equation where sum is the resulting value of step 2: $(\text{sum modulo } 11)$ <p>The check digit as 11 minus the remainder is described by the following equation: $(11 - (\text{sum modulo } 11)) \text{ modulo } 11$</p>
			<p>NCR Modulus 11 check digit:</p> <ol style="list-style-type: none"> 1. Multiply each digit of the original number by a repeating weighting factor pattern of 2, 3, 4, 5, 6, 7, 8, 9 as follows: multiply the units digit by 2, the tens digit by 3, the hundreds digit by 4, the thousands digit by 5, and so forth. 2. Sum the products from step 1. 3. The check digit depends on the bar code modifier. The check digit as the remainder is described by the following equation where sum is the resulting value of step 2: $(\text{sum modulo } 11)$ <p>The check digit as 11 minus the remainder is described by the following equation: $(11 - (\text{sum modulo } 11)) \text{ modulo } 11$</p>

Table 27: Check Digit Calculation Methods For Each Bar Code. (continued)

Bar Code Type	Modifier	In HRI?	Check Digit Calculation
3 – UPC/CGPC Version A	X'00'	Yes	<p>UPC/EAN check digit calculation:</p> <ol style="list-style-type: none"> 1. Multiply each digit of the original number by a weighting factor of 1 or 3 as follows: multiply the units digit by 3, the tens digit by 1, the hundreds digit by 3, the thousands digit by 1, and so forth. 2. Sum the products from step 1. 3. The check digit is described by the following equation where sum is the resulting value of step 2: $(10 - (\text{sum modulo } 10)) \text{ modulo } 10$
5 – UPC/CGPC Version E	X'00'	Yes	See UPC/CGPC Version A
8 – EAN 8 (includes JAN-short)	X'00'	Yes	See UPC/CGPC Version A
9 – EAN 13 (includes JAN-standard)	X'00'	Yes	See UPC/CGPC Version A
10 – Industrial 2-of-5	X'02'	Yes	See UPC/CGPC Version A
11 – Matrix 2-of-5	X'02'	Yes	See UPC/CGPC Version A
12 – Interleaved 2-of-5	X'02'	Yes	See UPC/CGPC Version A
13 – Codabar, 2-of-7, AIM USS-Codabar	X'02'	No	<p>Codabar check digit calculation:</p> <ol style="list-style-type: none"> 1. Sum of the data characters' numerical values as described in a Codabar specification. All data characters are used, including the start and stop characters. 2. The check digit is described by the following equation where sum is the resulting value of step 1: $(16 - (\text{sum modulo } 16)) \text{ modulo } 16$
17 – Code 128, AIM USS-128	X'02'	No	<p>Code 128 check digit calculation:</p> <ol style="list-style-type: none"> 1. Going left to right starting at the start character, sum the value of the start character and the weighted values of data and special characters. The weights are 1 for the first data or special character, 2 for the second, 3 for the third, and so forth. The stop character is not included in the calculation. 2. The check digit is modulo 103 of the resulting value of step 1.
24 – POSTNET	X'00' - X'04'	NA	The POSTNET check digit is $(10 - (\text{sum modulo } 10)) \text{ modulo } 10$, where sum is the sum of the ZIP code data.

Table 27: Check Digit Calculation Methods For Each Bar Code. (continued)

Bar Code Type	Modifier	In HRI?	Check Digit Calculation
26 – RM4SCC	X'00'	NA	The RM4SCC checksum digit is calculated by using an algorithm that weights each of the 4 bars within a character in relation to its position within the character.
	X'01'	NA	None.
27 – Japan Postal Bar Code JPOSTAL	X'00'	N/A	<p>The Japan Postal Bar Code check digit calculation:</p> <p>Convert each character in the bar code data into decimal numbers. Numeric characters are converted to decimal. Each hyphen character is converted to the number 10. Each alphabetic character is converted to two numbers according to the symbology definition.</p> <p>For example, A becomes 11 and 0, B becomes 11 and 1,..., J becomes 11 and 9, K becomes 12 and 0, L becomes 12 and 1, ..., T becomes 12 and 9, U becomes 13 and 0, V becomes 13 and 1, ..., and Z becomes 13 and 5.</p> <p>Sum the resulting decimal numbers and calculate the remainder modulo 19.</p> <p>The check digit is 19 minus the remainder.</p>
	X'01'	N/A	None
28 – DataMatrix (2DMATRIX)	X'00'	N/A	The DataMatrix symbology uses a Reed-Solomon error checking and correcting algorithm.
29 – MaxiCode 2DMAXI	X'00'	N/A	The MaxiCode symbology uses a Reed-Solomon error checking and correcting algorithm.
30 – PDF417	X'00' - X'01'	N/A	The PDF417 symbology uses a Reed-Solomon error checking and correcting algorithm.
31 – Australia Post Bar Code APOSTAL	X'01' - X'08'	No	The Australian Post Bar Code uses a Reed Solomon error correction code based on Galois Field 64.
32 – QR Code	X'02'	NA	The QR Code symbology uses a Reed-Solomon Error Checking and Correcting (ECC) algorithm.
33 – Code 93	X'00'	No	Both check digits (C and K) are calculated as Modulo 47 of the sum of the products of the data-character numerical values as described in the Code 93 specification and a weighting sequence. The start and stop codes are not included in the calculation.

Table 27: Check Digit Calculation Methods For Each Bar Code. (continued)

Bar Code Type	Modifier	In HRI?	Check Digit Calculation
34 — USPS Four-State	X'00' - X'03'	No	No check digit exists, but error detection and correction is added as part of the encoding process. See <i>Specifications for the Four-State Barcode</i> .

Bar code Exception Conditions

This section lists the BCOCA exception conditions that require detection by the bar code object processor when the bar code data structures are processed. It also specifies the standard actions that are taken.

Specification-Check Exceptions

A specification-check exception indicates that the bar code object processor received a bar code request with invalid or unsupported data parameters or values.

Exception Description

EC-0300

The bar code type that is specified in the BSD data structure is invalid or unsupported.

Standard Action: Stop bar code object processing.

EC-0400

A font local ID specified in the BSD data structure is unsupported or not available.

For those symbologies that require a specific type style or code page for HRI, the BCOCA receiver cannot determine the type style or code page of the specified font.

Standard Action: If the requested font is not available, a font substitution can be made preserving as many characteristics as possible of the originally requested font while still preserving the original code page. Otherwise, stop bar code object processing.

Some bar code symbologies specify a set of type styles to be used for HRI data. Font substitution for HRI data must follow the bar code symbology specification that is used.

EC-0500

The color that is specified in the BSD data structure is invalid or unsupported.

Standard Action: The device default color is used.

EC-0505

The unit base that is specified in the BSD data structure is invalid or unsupported.

Standard Action: Stop bar code object processing.

EC-0600

The module width that is specified in the BSD data structure is invalid or unsupported.

Standard Action: The bar code object processor uses the closest smaller width. If the smaller value is less than the smallest supported width or zero, the bar code object processor uses the smallest supported value.

EC-0605

The units per unit base that is specified in the BSD data structure is invalid or unsupported.

Standard Action: Stop bar code object processing.

EC-0700

The element height that is specified in the BSD data structure is invalid or unsupported.

Standard Action: The bar code object processor uses the closest smaller height. If the smaller value is less than the smallest supported element height or zero, the bar code object processor uses the smallest supported value.

EC-0705

The presentation space extents that are specified in the BSD data structure are invalid or unsupported.

Standard Action: Stop bar code object processing.

EC-0800

The height multiplier that is specified in the BSD data structure is invalid.

Standard Action: The bar code object processor uses X'01'.

EC-0900

The wide-to-narrow ratio that is specified in the BSD data structure is invalid or unsupported.

Standard Action: The bar code object processor uses the default wide-to-narrow ratio. The default ratio is in the range of 2.25 - 3.00 to 1. The MSI bar code, however, uses a default wide-to-narrow ratio of 2.00 to 1.

EC-0A00

The bar code origin (Xoffset value or Yoffset value) given in the BSA data structure is invalid or unsupported.

Standard Action: Stop bar code object processing.

EC-0B00

The bar code modifier in the BSD data structure is invalid or unsupported for the bar code type that is specified in the same BSD.

Standard Action: Stop bar code object processing.

EC-0C00

The length of the variable data that is specified in the BSA data structure plus any bar code object processor generated check digits is invalid or unsupported.

Standard Action: Stop bar code object processing.

EC-0E00

The first check-digit calculation resulted in a value of 10; this is defined as an exception condition in some of the modifier options for MSI bar codes in the BSD data structure.

Standard Action: Stop bar code object processing.

EC-0F00

Either the matrix row size value or the number of rows value that is specified in the BSA data structure is unsupported. Both of these values must be within the range of supported sizes for the symbology.

Standard Action: Use X'0000' for the unsupported value so that an appropriate size is used based on the amount of symbol data.

EC-0F01

An invalid structured append sequence indicator was specified in the BSA data structure. For a Data Matrix symbol, the sequence indicator must be 1 - 16. For a MaxiCode symbol, the sequence indicator must be 1 - 8.

Standard Action: Present the bar code symbol without structured append information.

EC-0F02

A structured append sequence indicator that is specified in the BSA data structure is larger than the total number of structured append symbols.

Standard Action: Present the bar code symbol without structured append information.

EC-0F03

Mismatched structured append information was specified in the BSA data structure. One of the sequence-indicator and total-number-of-symbols parameters was X'00', but the other was not X'.

Standard Action: Present the bar code symbol without structured append information.

EC-0F04

An invalid number of structured append symbols was specified in the BSA data structure. For a Data Matrix symbol, the total number of symbols must be 2 - 16. For a MaxiCode symbol, the total number of symbols must be 2 - 8.

Standard Action: Present the bar code symbol without structured append information.

EC-0F05

For a MaxiCode symbol, the symbol mode value that is specified in the BSA data structure is invalid.

Standard Action: Stop bar code object processing.

EC-0F06

For a PDF417 symbol, the number of data symbol characters per row value that is specified in the BSA data structure is invalid.

Standard Action: Stop bar code object processing.

EC-0F07

For a PDF417 symbol, the desired number of rows value that is specified in the BSA data structure is invalid.

This exception condition can also occur when the number of rows times the number of data symbol characters per row is greater than 928.

Standard Action: Proceed as if X'FF' was specified.

EC-0F08

For a PDF417 symbol, too much data is specified in the BSA data structure.

Standard Action: Stop bar code object processing.

EC-0F09

For a PDF417 symbol, the security level value that is specified in the BSA data structure is invalid.

Standard Action: Proceed as if security level 8 was specified.

EC-0F0A

An incompatible combination of Data Matrix parameters was specified in the BSA data structure. The following conditions can cause this exception condition:

- A structured append was specified (byte 10 not X'00'), but either the reader programming flag was set to B'1' or a hdr/trl macro was specified.
- The UCC/EAN FNC1 flag was set to B'1', but either the industry FNC1 flag was set to B'1', the reader programming flag was set to B'1', or a hdr/trl macro was specified.
- The industry FNC1 flag was set to B'1', but either the UCC/EAN FNC1 flag was set to B'1', the reader programming flag was set to B'1', or a hdr/trl macro was specified.
- The reader programming flag was set to B'1', but either a structured append was specified, one of the FNC1 flags was set to B'1', or a hdr/trl macro was specified.
- A hdr/trl macro was specified, but either a structured append was specified, one of the FNC1 flags was set to B'1', or the reader programming flag was set to B'1'.

Standard Action: Stop bar code object processing.

EC-0F0B

An invalid structured append file identification value was specified in the BSA data structure. Each byte of the 2-byte file identification value must be in the range X'01' - X'FE'.

Standard Action: Present the bar code symbol without structured append information.

EC-0F0C

A Macro PDF417 Control Block length value that is specified in the BSA data structure is invalid.

Standard Action: Stop bar code object processing.

EC-0F0D

Data within a Macro PDF417 Control Block that is specified in the BSA data structure is invalid.

Standard Action: Present the bar code symbol without a Macro PDF417 Control Block.

EC-0F0E

For a QR Code symbol, an invalid EBCDIC-code page value was specified in the BSA data structure.

Standard Action: Stop the bar code object processing.

EC-0F0F

For a QR Code symbol, an invalid version value was specified in the BSA data structure.

Standard Action: Proceed as if X'00' is specified.

EC-0F10

For a QR Code symbol, an invalid error-correction level value was specified in the BSA data structure.

Standard Action: Proceed as if X'03' is specified.

EC-0F11

For a QR Code symbol, an invalid combination of special-function flags was specified in the BSA data structure. Only one of the FNC1 flags can be B'1'.

Standard Action: Stop the bar code object processing.

EC-0F12

For a QR Code symbol, an invalid application-indicator value was specified in the BSA data structure.

Standard Action: Present the bar code symbol without structured append information.

EC-1000

The human-readable interpretation location that is specified in the BSA data structure is invalid.

Standard Action: Stop bar code object processing.

EC-1100

A portion of the bar code, including the bar and space patterns and the HRI, extends outside of either:

- The bar code presentation space
- The intersection of the mapped bar code presentation space and the controlling environment object area
- The maximum presentation area.

Standard Action: Stop bar code object processing.

All bar code symbols must be presented in their entirety. Whenever a partial bar code pattern is presented, for whatever reason, it is obscured to make it unscannable.

EC-1200

Invalid data is encountered in a UCC/EAN 128 symbol; one or more of the following conditions was encountered:

- FNC1 is not the first data character.
- Invalid application identifier (ai) value is encountered.
- Data for an ai does not match the ai definition.
- Insufficient (or no) data follows an ai.
- Too much data for an ai.
- Invalid use of FNC1 character.

Standard Action: Stop bar code object processing.

Data-Check Exceptions

A data-check exception indicates that the bar code object processor detected an undefined character.

Exception Description

EC-2100

An invalid or undefined character, according to the rules of the symbology specification, is detected in the bar code data.

Standard Action: End bar code object processing.

Data Matrix Special-Function Parameters

Offset	Type	Name	Range	Meaning	BCD1 Range
5	BITS			Control flags	
	bit 0	EBCDIC	B'0' B'1'	EBCDIC-to-ASCII translation: Do not translate Convert data from EBCDIC to ASCII	Not supported in BCD1
	bit 1	Escape sequence handling	B'0' B'1'	Escape-sequence handling: Process escape sequences Ignore all escape sequences	Not supported in BCD1
	bits 2 - 7		B'000000'	Reserved	
6 - 7	UBIN	Desired row size	X'0000' X'0001' - X'FFFE'	No size is specified. Matrix row size as allowed by symbology; see field description.	Not supported in BCD1
8 - 9	UBIN	Desired number of rows	X'0000' X'0001' - X'FFFE'	No size is specified. Number of rows as allowed by symbology; see field description.	Not supported in BCD1
10	UBIN	Sequence indicator	X'00' - X'10'	Structured append sequence indicator	Not supported in BCD1
11	UBIN	Total symbols	X'00' or X'02' - X'10'	Total number of structured-append symbols	Not supported in BCD1
12	UBIN	File ID 1st byte	X'01' - X'FE'	High-order byte of a 2-byte unique file identification for a set of structured-append symbols	Not supported in BCD1
13	UBIN	File ID 2nd byte	X'01' - X'FE'	Low-order byte of a 2-byte unique file identification for a set of structured-append symbols	Not supported in BCD1

Offset	Type	Name	Range	Meaning	BCD1 Range
14	BITS			Special-function flags	
	bit 0	UCC/EAN FNC1	B'0' B'1'	Alternate data type identifier: User-defined symbol Symbol conforms to UCC/EAN standards	Not supported in BCD1
	bit 1	Industry FNC1	B'0' B'1'	Alternate data type identifier: User-defined symbol Symbol conforms to industry standards	Not supported in BCD1
	bit 2	Reader programming	B'0' B'1'	Reader programming symbol: Symbol encodes a data symbol. Symbol encodes a message that is used to program the reader system.	Not supported in BCD1
	bit 3 - 4	Hdr/Trl Macro	B'00' B'01' B'10' B'11'	Header and trailer instructions to the bar code reader: No header or trailer Use the 05 Macro header/trailer Use the 06 Macro header/trailer No header or trailer	Not supported in BCD1
	bit 5 - 7		B'000'	Reserved	

A desired symbol size can be specified in bytes 6 - 9, but the actual size of the symbol depends on the amount of data to be encoded. If not enough data is supplied, the symbol is padded with null data to reach the requested symbol size. If too much data is supplied for the requested symbol size, the symbol is bigger than requested, but the aspect ratio is maintained as closely as possible.

Byte 5

Control flags.

These flags control how the bar code data (bytes n+1 to end) is processed by the BCOCA receiver.

Bit 0

EBCDIC-to-ASCII translation.

If this flag is B'0', the data is assumed to begin in the default character encodation and no translation is done.

If this flag is B'1', the BCOCA receiver converts each byte of the bar code data from EBCDIC code page 500 into ASCII code page 819 before this data is used to build the bar code symbol.

Bit 1

Escape-sequence handling.

If this flag is B'0', each X'5C' (backslash) within the bar code data is treated as an escape character according to the Data Matrix symbology specification.

If this flag is B'1', each X'5C' within the bar code data is treated as a normal data character and therefore all escape sequences are ignored. In this case, no ECI code page switching can occur within the data.

Note: If the EBCDIC-to-ASCII translation flag is also set to B'1', all EBCDIC backslash characters (X'E0') are first converted into X'5C' before the escape-sequence handling flag is applied.

Bits 2 - 7

Reserved.

Bytes 6 - 7

Desired row size.

For a Data Matrix symbol, this parameter specifies the desired number of modules in each row, including the finder pattern. An even number of modules per row and an even number of rows must exist. Square symbols exist with sizes from 10x10 to 144x144, and rectangular symbols exist with sizes from 8x18 to 16x48 not including quiet zones. The following table lists the complete set of supported sizes. Exception condition EC-0F00 exists EC-0F00 if an unsupported size value is specified.

If X'0000' is specified for this parameter, an appropriate row size is used based on the amount of symbol data.

<i>Table 28: Supported Sizes for a Data Matrix symbol.</i>							
Square Symbols				Rectangular Symbols			
Symbol Size		Data Region		Symbol Size		Data Region	
Number of rows	Row size	Size	Number	Number of rows	Row size	Size	Number
10	10	8x8	1	8	18	6x6	1
12	12	10x10	1	8	32	6x14	2
14	14	12x12	1	12	26	10x24	1
16	16	14x14	1	12	36	10x16	2
18	18	16x16	1	16	36	14x16	2
20	20	18x18	1	16	48	14x22	2
22	22	20x20	1				
24	24	22x22	1				
26	26	24x24	1				
32	32	14x14	4				
36	36	16x16	4				
40	40	18x18	4				
44	44	20x20	4				
48	48	22x22	4				
52	52	24x24	4				
64	64	14x14	16				
72	72	16x16	16				
80	80	18x18	16				
88	88	20x20	16				
96	96	22x22	16				
104	104	24x24	16				
120	120	18x18	36				
132	132	20x20	36				

<i>Table 28: Supported Sizes for a Data Matrix symbol. (continued)</i>							
Square Symbols				Rectangular Symbols			
Symbol Size		Data Region		Symbol Size		Data Region	
Number of rows	Row size	Size	Number	Number of rows	Row size	Size	Number
144	144	24x24	36				

Bytes 8 - 9

Desired number of rows.

For a Data Matrix symbol, this parameter specifies the desired number of rows, including the finder pattern. Exception condition EC-0F00 exists if an unsupported size value is specified.

If X'0000' is specified for this parameter, an appropriate number of rows are used based on the amount of symbol data.

Byte 10

Structured append sequence indicator.

Multiple data matrix bar code symbols (called structured appends) can be logically linked together to encode large amounts of data. The logically linked symbols can be presented on the same or on different physical media, and are logically recombined after they are scanned. 2 - 16 Data Matrix symbols can be linked. This parameter specifies where this symbol is logically linked (1 - 16) in a sequence of symbols.

If X'00' is specified for this parameter, this symbol is not part of a structured append. Exception condition EC-0F01 exists if an invalid sequence indicator value is specified. Exception condition EC-0F02 exists if the sequence indicator is larger than the total number of symbols (byte 11).

If this field is not X'00', the reader programming flag must be B'0' and the hdr/trl macro flags must be either B'00' or B'11'. Exception condition EC-0F0A exists if an incompatible combination of these parameters is specified.

Byte 11

Total symbols in a structured append.

This parameter specifies the total number of symbols (2 - 16) that is logically linked in a sequence of symbols.

If X'00' is specified for this parameter, this symbol is not part of a structured append. If this symbol is not part of a structured append, both bytes 10 and 11 must be 00 or exception condition EC-0F03 exists.

Exception condition EC-0F04 exists if an invalid number of symbols is specified.

Byte 12

High-order byte of structured append file identification.

This parameter specifies the high-order byte of a 2-byte unique file identification for a set of structured-append symbols, which helps ensure that the symbols from two different structured appends are not linked together. The low-order byte of the 2-byte field is specified in byte 13. Each of the 2 bytes can contain a value in the range X'01' - X'FE'.

This parameter is ignored if this symbol is not part of a structured append.

If this symbol is part of a structured append, but byte 12 contains an invalid value (X'00' or X'FF'), exception condition EC-0F0B exists.

Byte 13

Low-order byte of structured append file identification.

This parameter specifies the low-order byte of a 2-byte unique file identification for a set of structured-append symbols. The high-order byte of the 2-byte field is specified in byte 12. Each of the 2 bytes can contain a value in the range X'01' - X'FE'.

This parameter is ignored if this symbol is not part of a structured append.

If this symbol is part of a structured append, but byte 13 contains an invalid value (X'00' or X'FF'), exception condition EC-0F0B exists.

Byte 14

Special-function flags.

These flags specify special functions that can be used with a Data Matrix symbol.

Bit 0

UCC/EAN FNC1 alternate data type identifier.

If this flag is B'1', an FNC1 is added in the first data position (or fifth position of a structured append symbol) to indicate that this symbol conforms to the UCC/EAN application identifier standard format. In this case, the industry FNC1 flag must be B'0', the reader programming flag must be B'0', and the hdr/trl macro must be B'00' or B'11'. Exception condition EC-0F0A exists if an incompatible combination of these parameters is specified.

Bit 1

Industry FNC1 alternate data type identifier.

If this flag is B'1', an FNC1 is added in the second data position (or sixth position of a structured append symbol) to indicate that this symbol conforms to a particular industry standard format. In this case, the UCC/EAN FNC1 flag must be B'0', the reader programming flag must be B'0', and the hdr/trl macro must be B'00' or B'11'. Exception condition EC-0F0A exists if an incompatible combination of these parameters is specified.

Bit 2

Reader programming.

If this flag is B'1', this symbol encodes a message that is used to program the reader system. In this case, the structured append sequence indicator must be X'00', the UCC/EAN FNC1 and industry FNC1 flags must both be B'0', and the hdr/trl macro flags must be either B'00' or B'11'. Exception condition EC-0F0A exists if an incompatible combination of these parameters is specified.

Bits 3 - 4

Header and trailer instructions to the bar code reader.

This field provides a means of instructing the bar code reader to insert an industry-specific header and trailer around the symbol data.

If this field is B'00' or B'11', no header or trailer is inserted. If this field is B'01', the bar code symbol contains a 05 Macro codeword. If this field is B'10', the bar code symbol contains a 06 Macro codeword.

If these flags are B'01' or B'10', the structured append sequence indicator must be X'00', the UCC/EAN FNC1 and industry FNC1 flags must both be B'0', and the reader programming flag must be B'0'. Exception condition EC-0F0A exists if an incompatible combination of these parameters is specified.

Bits 5 - 7

Reserved.

MaxiCode Special-Function Parameters

Offset	Type	Name	Range	Meaning	BCD1 Range
5	BITS			Control flags	
	bit 0	EBCDIC	B'0' B'1'	EBCDIC-to-ASCII translation: Do not translate Convert data from EBCDIC to ASCII	Not supported in BCD1
	bit 1	Escape sequence handling	B'0' B'1'	Escape-sequence handling: Process escape sequences Ignore all escape sequences	Not supported in BCD1
	bits 2 - 7		B'000000'	Reserved	
6	CODE	Symbol Mode	X'02' X'03' X'04' X'05' X'06'	Mode 2 Mode 3 Mode 4 Mode 5 Mode 6	Not supported in BCD1
7	UBIN	Sequence indicator	X'00' - X'08'	Structured append sequence indicator	Not supported in BCD1
8	UBIN	Total symbols	X'00' or X'02' - X'08'	Total number of structured-append symbols	Not supported in BCD1
9	BITS			Special-function flags	
	bit 0	Zipper	B'0' B'1'	No zipper pattern Vertical zipper pattern on right	Not supported in BCD1
	bit 1 - 7		B'0000000'	Reserved	

Byte 5

Control flags.

These flags control how the bar code data (bytes n+1 to end) is processed by the BCOCA receiver.

Bit 0

EBCDIC-to-ASCII translation.

If this flag is B'0', the data is assumed to begin in the default character encoding and no translation is done.

If this flag is B'1', the BCOCA receiver converts each byte of the bar code data from EBCDIC code page 500 into ASCII code page 819 before this data is used to build the bar code symbol.

Bit 1

Escape-sequence handling.

If this flag is B'0', each X'5C' (backslash) within the bar code data is treated as an escape character according to the MaxiCode symbology specification.

If this flag is B'1', each X'5C' within the bar code data is treated as a normal data character and therefore all escape sequences are ignored. In this case, no ECI code page switching can occur within the data.

Note: If the EBCDIC-to-ASCII translation flag is also set to B'1', all EBCDIC backslash characters (X'E0') are first converted into X'5C' before the escape-sequence handling flag is applied.

Bits 2 - 7

Reserved.

Byte 6

Symbol mode.

Mode 2

Structured Carrier Message - numeric postal code.

This mode is designed for use in the transport industry, encoding the postal code, country code, and service class with the postal code that is numeric. The bar code data must be structured as described in B.2.1 and B.3.1 of the *AIM International Symbology Specification - MaxiCode*. The postal code, country code, and service class are placed in the primary message portion of the MaxiCode symbol and the rest of the bar code data is placed in the secondary message portion of the MaxiCode symbol. The first part of the bar code data includes in order the postal code, country code, and service class, which are separated by the [GS] character (X'1D'). This information can be preceded by the character sequence "[>RS01GSyy]", where RS and GS are single characters and yy are two decimal digits that represent a year. This character sequence is represented in hex bytes X'5B293E1E30311Dxxxx', where each xx is a value X'30' - X'39'. This sequence indicates that the message conforms to particular open system standards. This first portion of the bar code data must be encoded by using the MaxiCode default character set (ECI 000003 = ISO 8859-1). This first portion of the bar code data must not contain the backslash escape character to change the ECI character set. The postal code must be 1 - 9 decimal digits with each digit that is represented by the byte values from X'30' - X'39'. The country code must be 1 - 3 decimal digits with each digit a byte value X'30' - X'39'. The service code must also be 1 - 3 decimal digits, again with each digit a byte value X'30' - X'39'. The primary message portion of the MaxiCode symbol uses Enhanced Error Correction (EEC) and the secondary message portion of the MaxiCode symbol uses Standard Error Correction (SEC).

When the postal code portion of the Structured Carrier Message is numeric, mode 2 must be used.

Mode 3

Structured Carrier Message - alphanumeric postal code.

This mode is designed for use in the transport industry, encoding the postal code, country code, and service class with the postal code that is alphanumeric. The bar code data must be structured as described in B.2.1 and B.3.1 of the *AIM International Symbology Specification - MaxiCode*. The postal code, country code, and service class are placed in the primary message portion of the MaxiCode symbol and the rest of the bar code data is placed in the secondary message portion of the MaxiCode symbol. The first part of the bar code data includes in order the postal code, country code, and service class, which are separated by the [GS] character (X'1D'). This information can be preceded by the character sequence "[>RS01GSyy]", where RS and GS are single characters and yy are two decimal digits that represent a year. This character sequence is represented in hex bytes X'5B293E1E30311Dxxxx', where each xx is a value from X'30' - X'39'. This sequence indicates that the message conforms to particular open system standards. This first portion of the bar code data must be encoded by using the MaxiCode default character set (ECI 000003 = ISO 8859-1). This first portion of the bar code data must not contain the backslash escape character to change the ECI character set. The postal code must be 1 - 6 alphanumeric characters with each character one of the printable characters in MaxiCode Code Set A. Postal codes fewer than 6 characters are padded with trailing spaces; postal codes longer than 6 characters are truncated. These characters include the letters A to Z (X'41' - X'5A'), the space character (X'20'), the special characters (X'22' - X'2F'), the decimal digits (X'30' - X'39'), and the colon (X'3A'). The country code must be 1 - 3 decimal digits with each digit a byte value X'30' - X'39'. The service code must also be 1 - 3 decimal digits, again with each digit a byte value X'30' - X'39'. The primary message

portion of the MaxiCode symbol uses Enhanced Error Correction (EEC) and the secondary message portion of the MaxiCode symbol uses Standard Error Correction (SEC).

When the postal code portion of the Structured Carrier Message is alphanumeric, mode 3 must be used.

Mode 4

Standard Symbol.

The symbol employs EEC for the Primary Message and SEC for the Secondary Message. The first nine codewords are placed in the Primary Message and the rest of the codewords are placed in the Secondary Message. This mode provides for a total of 93 codewords for data. If the bar code data consists of only characters from MaxiCode Code Set A, the number of codewords matches the number of bar code data characters. However, if the bar code data contains other characters, the number of codewords is greater than the number of bar code data characters due to the overhead of switching to and from the different code sets. The Code Set A consists of the byte values X'0D', X'1C' to X'1E', X'20', X'22' to X'3A', and X'41' to X'5A'.

Mode 5

Full ECC Symbol.

The symbol employs EEC for the Primary Message and EEC for the Secondary Message. The first nine codewords are placed in the Primary Message and the rest of the codewords are placed in the Secondary Message. This mode provides for a total of 77 codewords for data. If the bar code data consists of only characters from MaxiCode Code Set A, the number of codewords matches the number of bar code data characters. However, if the bar code data contains other characters, the number of codewords is greater than the number of bar code data characters due to the overhead of switching to and from the different code sets. The Code Set A consists of the byte values X'0D', X'1C' to X'1E', X'20', X'22' to X'3A', and X'41' to X'5A'.

Mode 6

Reader Program, SEC.

The symbol employs EEC for the Primary Message and SEC for the Secondary Message. The data in the symbol is used to program the bar code reader system. The first nine codewords are placed in the Primary Message and the rest of the codewords are placed in the Secondary Message. This mode provides for a total of 93 codewords for data. If the bar code data consists of only characters from MaxiCode Code Set A, the number of codewords matches the number of bar code data characters. However, if the bar code data contains other characters, the number of codewords is greater than the number of bar code data characters due to the overhead of switching to and from the different code sets. The Code Set A consists of the byte values X'0D', X'1C' to X'1E', X'20', X'22' to X'3A', and X'41' to X'5A'.

Exception condition EC-0F05 exists if an invalid symbol-mode value is specified.

Byte 7

Structured append sequence indicator.

Multiple MaxiCode bar code symbols (called structured appends) can be logically linked together to encode large amounts of data. The logically linked symbols can be presented on the same or on different physical media, and are logically recombined after they are scanned. MaxiCode symbols 2 - 8 can be linked. This parameter specifies where this particular symbol is logically linked (1&-8) in a sequence of symbols.

If X'00' is specified for this parameter, this symbol is not part of a structured append. Exception condition EC-0F01 exists if an invalid sequence indicator value is specified. Exception condition EC-0F02 exists if the sequence indicator is larger than the total number of symbols (byte 8).

Byte 8

Total symbols in a structured append.

This parameter specifies the total number of symbols (2 - 8) that is logically linked in a sequence of symbols.

If X'00' is specified for this parameter, this symbol is not part of a structured append. If this symbol is not part of a structured append, both bytes 6 and 7 must be X'00', or exception condition EC-0F03 exists.

Exception condition EC-0F04 exists if an invalid number of symbols is specified.

Byte 9

Special-function flags.

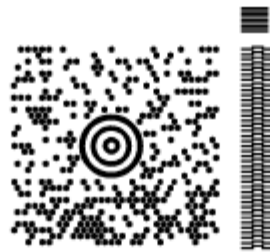
These flags specify special functions that can be used with a MaxiCode symbol.

Bit 0

Zipper pattern.

If this flag is B'1', a vertical zipper-like test pattern and a contrast block are printed to the right of the symbol. The zipper provides a quick visual check for printing distortions. If the symbol presentation space is rotated, the zipper and contrast block are rotated along with the symbol.

To maintain consistency among printers, the zipper pattern and contrast block must approximate the guideline dimensions that are shown in Figure 144 on page 492. The zipper pattern and contrast block is made up of several filled rectangles that must be created such that each rectangle is as close to the specified dimensions as possible for the particular printer pel resolution, then the pattern is repeated to yield an evenly spaced zipper pattern and contrast block.



Guideline Dimensions for the Zipper and Contrast Block

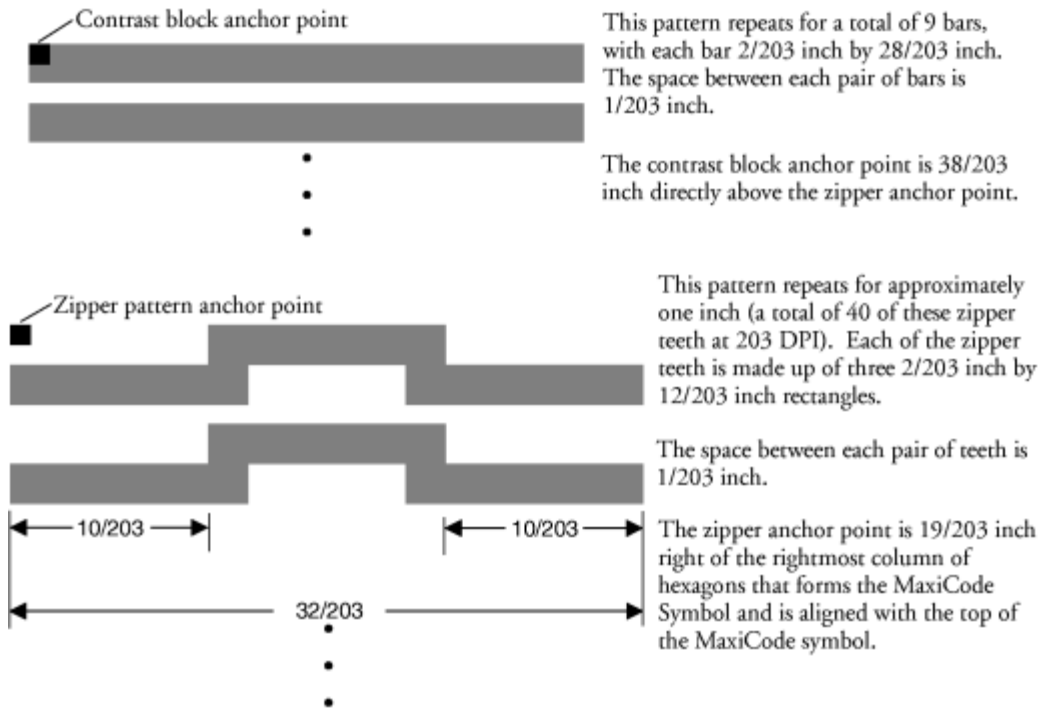


Figure 144: Example of a MaxiCode Bar Code Symbol with Zipper and Contrast Block

Bits 1 - 7
Reserved.

PDF417 Special-Function Parameters

Offset	Type	Name	Range	Meaning	BCD1 Range
5	BITS			Control flags	
	bit 0	EBCDIC	B'0' B'1'	EBCDIC-to-ASCII translation: Do not translate Convert data from EBCDIC to ASCII	Not supported in BCD1
	bit 1	Escape sequence handling	B'0' B'1'	Escape-sequence handling: Process escape sequences Ignore all escape sequences	Not supported in BCD1
	bits 2 - 7		B'000000'	Reserved	
6	UBIN	Data symbols	X'01' - X'1E'	Number of data symbol characters per row	Not supported in BCD1
7	UBIN	Rows	X'03' - X'5A' X'FF'	Desired number of rows Minimum necessary rows	Not supported in BCD1
8	UBIN	Security	X'00' - X'08'	Security level	Not supported in BCD1
9 - 10	UBIN	Macro length	X'0000' - X'7FED'	Length of Macro PDF417 Control Block that follows	Not supported in BCD1
11 - <i>n</i>	UBIN	Macro data	Any value	Data for Macro PDF417 Control Block	Not supported in BCD1

Byte 5

Control flags.

These flags control how the bar code data is processed by the BCOCA receiver.

Bit 0

EBCDIC-to-ASCII translation (for bytes 11 to end).

If this flag is B'0', the data is assumed to begin in the default character encoding and no translation is done.

If this flag is B'1', the BCOCA receiver converts each byte of the bar code data (bytes *n*+1 to end) and each byte of the Macro PDF417 Control Block data (bytes 11 - *n*) from a subset of EBCDIC code page 500 into the default character encoding (GLI 0) before this data is used to build the bar code symbol. This translation covers 181 code points, which include alphanumerics and many

symbols; the 75 code points that are not covered by the translation do not occur in EBCDIC and are mapped to X'7F' (127). See Figure 145 on page 494 for a picture that shows the 181 EBCDIC code points that can be translated.

The EBCDIC-to-ASCII translation flag must not be used if any of the 75 code points that have no EBCDIC equivalent are needed for the bar code data or for the Macro PDF417 Control Block data.

Table 5 in the *Uniform Symbology Specification – PDF417* shows the full set of GLI 0 code points; from this set, the 75 code points that have no EBCDIC equivalent are as follows: 158, 159, 169, 176–224, 226–229, 231–240, 242–245, 247, 249, 251–252, and 254.

The 75 EBCDIC code points that are not covered by the translation and are thus mapped into X'7F' are as follows:

X'04', X'06', X'08' - X'0A', X'14' - X'15', X'17',
 X'1A' - X'1B', X'20' - X'24', X'28' - X'2C', X'30' - X'31',
 X'33' - X'36', X'38' - X'3B', X'3E' X'46', X'62'
 X'64' - X'66', X'6A', X'70', X'72' - X'78', X'80',
 X'8C' - X'8E', X'9D' X'9F', X'AC' - X'AF', X'B4' - X'B6',
 X'B9', X'BC' - X'BF', X'CA', X'CF', X'DA', X'EB',
 X'ED' - X'EF', X'FA' - X'FB', X'FD' - X'FF'

Hex Digits 1st → 2nd ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	NUL SE010000	DLE SE170000			(SP) SP010000	& SM030000	_ SP100000			° SM190000	μ SM170000	¢ SC040000	{ SM110000	} SM140000	\ SM070000	0 ND100000
-1	SOH SE020000	DC1 SE180000			(RSP) SP300000	é LE110000	/ SP120000	É LE120000	a LA010000	j LJ010000	~ SD190000	£ SC020000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	STX SE030000	DC2 SE190000		SYN SE230000	â LA150000	ê LE150000			b LB010000	k Lk010000	s LS010000	¥ SC050000	B LB020000	K Lk020000	S LS020000	2 ND030000
-3	ETX SE040000	DC3 SE200000			ã LA170000	ë LE170000	Ä LA180000		c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4					à LA130000	è LE130000			d LD010000	m LM010000	u LU010000		D LD020000	M LM020000	U LU020000	4 ND040000
-5	HT SE100000		LF SE110000		á LA110000	í LI110000			e LE010000	n LN010000	v LV010000		E LE020000	N LN020000	V LV020000	5 ND050000
-6		BS SE090000	ETB SE240000			î LI150000			f LF010000	o LO010000	w LW010000		F LF020000	O LO020000	W LW020000	6 ND060000
-7	DEL SE330000		ESC SE280000	EOT SE050000	â LA270000	ï LI170000	Å LA280000		g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8		CAN SE250000			ç LC410000	i LI130000	Ç LC420000		h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9		EM SE260000			ñ LN190000	ß LS610000	Ñ LN200000	´ SD130000	i LI010000	r LR010000	z LZ010000		I LI020000	R LR020000	Z LZ020000	9 ND090000
-A					[SM060000	] SM080000		: SP130000	« SP170000	‡ SM210000	¡ SP030000	¬ SM660000			² ND021000	
-B	VT SE120000				· SP110000	Š SC030000	, SP080000	# SM010000	» SP180000	² SM200000	¿ SP160000	| SM130000	ô LO150000	ù LU150000		
-C	FF SE130000	FS SE350000		DC4 SE210000	< SA030000	* SM040000	% SM020000	@ SM050000		æ LA510000			ö LO170000	ü LU170000	Ö LO180000	Û LU180000
-D	CR SE140000	GS SE360000	ENQ SE060000	NAK SE220000	(SP060000	) SP070000	_ SP090000	' SP050000					ò LO130000	ù LU130000		
-E	SO SE150000	RS SE370000	ACK SE070000		+ SA010000	; SP140000	> SA050000	= SA040000		Æ LA520000			ó LO110000	ú LU110000		
-F	SI SE160000	US SE380000	BEL SE080000	SUB SE270000	! SP020000	^ SD150000	? SP150000	" SP040000	± SA020000					ÿ LY170000		

Figure 145: Subset of EBCDIC code page 500 that can be translated to GLI 0

Bit 1

Escape-sequence handling (for bytes n+1 to end).

If this flag is B'0', each X'5C' (backslash) within the bar code data is treated as an escape character according to the PDF417 symbology specification.

If this flag is B'1', each X'5C' within the bar code data is treated as a normal data character and therefore all escape sequences are ignored. In this case, no GLI code page switching and no reader programming can occur within the data.

Note: If the EBCDIC-to-ASCII translation flag is also set to B'1', all EBCDIC backslash characters (X'E0') are first converted into X'5C' before the escape-sequence handling flag is applied.

Bits 2 - 7

Reserved.

Byte 6

Data symbol characters per row.

This parameter specifies the number of data symbol characters per row. Each row consists of a start pattern, a left row indicator codeword, 1 - 30 data symbol characters, a right row indicator codeword (omitted in a truncated symbol), and a stop pattern. The aspect ratio of the bar code symbol is determined by the number of data symbol characters and the number of rows.

Exception condition EC-0F06 exists if an invalid number of data symbol characters per row is specified.

Because of the Error Checking and Correction (ECC) algorithm and the data compaction method that is used by the printer when the symbol is built, the number of data symbol characters is not necessarily the same as the number of characters in the bar code data.

Byte 7

Desired number of rows.

This parameter specifies the desired number of rows in the bar code symbol. From 3 - 90 rows can be specified or X'FF' can be specified to instruct the printer to generate the minimum number of rows necessary. The number of rows times the number of data symbol characters per row cannot exceed 928. Exception condition EC-0F07 exists if an invalid number of rows is specified.

The actual number of rows that are generated depends on the amount of data to be encoded and on the security level selected. If more rows than necessary are specified, the symbol is padded to fill the requested number of rows. If not enough rows are specified, enough extra rows are inserted by the printer to produce the symbol.

If too much data is specified to fit in the bar code symbol, exception condition EC-0F08 exists.

Byte 8

Security level.

This parameter specifies the desired security level for the symbol as a value 0 - 8. Each higher security level causes more error correction codewords to be added to the symbol. At a particular security level, a number of codewords can be missing or erased and the symbol can still be recovered. Also, PDF417 can recover from mis-decodes of codewords. The formula is: Maximum Limit \geq Erasures + 2*Misdecodes. The relation of security level to error correction capability is as follows:

Security level	Maximum Limit \geq Erasures + 2*Misdecodes
0	0
1	2
2	6
3	14
4	30

Security level	Maximum Limit \geq Erasures + 2*Misdecodes
5	62
6	126
7	254
8	510

For example, at security level 6, a total of 126 codewords can be either missing or destroyed and the entire symbol can still be completely recovered. The following table provides a recommended security level for various amounts of data:

<i>Table 29: Caption. Description</i>	
Number of Data Codewords	Recommended Security Level
1 - 40	2
41 - 160	3
161 - 320	4
321 - 863	5

Exception condition EC-0F09 exists if an invalid security level value is specified.

Bytes 9 - 10

Length of Macro PDF417 Control Block that follows.

This field specifies the length of a Macro PDF417 Control Block that follows in bytes 11 - *n*; this length does not contain the length field itself.

If X'0000' is specified, no Macro PDF417 Control Block is specified as a special function and this is the last field of the special-function parameters; what follows is the bar code data itself.

If a value between X'0001' and X'7FED' is specified, the BCOCA receiver builds a Macro PDF417 Control Block at the end of the bar code symbol by using the data in bytes 11 - *n*.

If an invalid length value is specified, exception condition EC-0F0C exists.

Bytes 11 - *n*

Macro PDF417 Control Block data.

The special codewords \922, \923, and \928 are used for coding a Macro PDF417 Control Block as defined in section G.2 of the *Uniform Symbology Specification PDF417*, but these codewords must not be used within the bar code data. Exception condition EC-2100 exists if one of these escape sequences is found in the bar code data. If a Macro PDF417 Control Block is needed, it is specified in bytes 11 - *n*.

The data for this Macro PDF417 Control Block must adhere to the following format; exception condition EC-0F0D exists if this format is not followed:

- For the symbol in a Macro PDF417 that represents the last segment of the Macro PDF417, the data must contain \922. For all symbols in a Macro PDF417, except the one representing the last segment:
 - A Macro PDF417 Control Block starts with a \928 escape sequence.
 - Followed by 1 to 5 numeric digits (bytes values X'30' - X'39'), representing a segment index value 1 - 99,999.
 - Followed by a variable number of escape sequences that contain values \000 - \899, representing the file ID.
 - Followed by zero or more optional fields, with the following layout:
 - \923 escape sequence, signaling an optional field

- Escape sequence that contains the field designator with a value \000 - \006
- Followed by a variable number of text characters (for field designators \000, \003, and \004) or a variable number of numeric digits (for field designators \001, \002, \005, and \006). The field designators are defined in Table G1 of the Uniform Symbology Specification. For text characters, the byte values must be X'09', X'0A', X'0D', or from X'20' through X'7E'. These values represent the uppercase letters A - Z, the lowercase letters a - z, and the digits 0- 9, plus some punctuation and special characters (for GLI 0). For the numeric digits, the byte values must be X'30' - X'39'.
 - For field designator \001, the 1 - 5 numeric digits that follow represent the segment count. This value must be greater than or equal to the segment index value.
 - For field designator \002, the 1 - 11 numeric digits that follow represent the time stamp on the source file that is expressed as the elapsed time in seconds since January 1, 1970 00:00 GMT.
 - For field designator \005, one or more numeric digits must follow.
 - For field designator \006, the 1 - 5 numeric digits that follow represent the decimal value of the 16-bit CRC checksum over the entire source file. This checksum value must be a decimal value from 0 through 65,535.

The file name, segment count, time stamp, sender, addressee, file size, and checksum are provided in the optional fields of the Macro PDF417 Control Block and the BCOCA receiver makes no attempt to calculate or verify these values (other than the previously stated restrictions). If the Macro PDF417 Control Block data does not follow these rules, exception condition EC-0F0D exists. The Uniform Symbology Specification PDF417 has the following additional claims. The BCOCA receiver does not check for these claims nor does it report any exceptions conditions if these claims are violated:

- If the optional Segment Count is given in the Macro PDF417 Control Block of one of the segments (symbols) of the macro, then it must be used in all of the segments (symbols) of the macro.
- All optional fields, other than the Segment Count, need to appear only in one of the segments (symbols) of the macro.
- If an optional field with the same field designator appears in more than one segment (symbol) of the same macro, then it must appear identically in every segment (symbol).

QR Code Special-Function Parameters

Offset	Type	Name	Range	Meaning	BCD1 Range
5	BITS			Control flags	
	bit 0	EBCDIC	B'0' B'1'	EBCDIC-to-ASCII translation: Do not translate Convert data from EBCDIC to ASCII	Not supported in BCD1
	bit 1	Escape sequence handling	B'0' B'1'	Escape-sequence handling: Process escape sequences Ignore all escape sequences	Not supported in BCD1
	bits 2 - 7		B'000000'	Reserved	

Offset	Type	Name	Range	Meaning	BCD1 Range
6	CODE	EBCDIC code page	X'00' X'01' X'02' X'03'	EBCDIC code page that is used to encode data: No code page specified Code page 500 (International #5) Code page 290 (Japanese Katakana Ext.) Code page 1027 (Japanese Latin Extended)	Not supported in BCD1
7	CODE	Version	X'00' X'01' - X'28'	Version of symbol: Smallest symbol Version number (1 - 40)	Not supported in BCD1
8	CODE	Error correction level	X'00' X'01' X'02' X'03'	Level of error correction: Level L (7% recovery) Level M (15% recovery) Level Q (25% recovery) Level H (30% recovery)	Not supported in BCD1
9	UBIN	Sequence indicator	X'00' - X'10'	Structured append sequence indicator	Not supported in BCD1
10	UBIN	Total symbols	X'00' or X'02' - X'10'	Total number of structured-append symbols	Not supported in BCD1
11	UBIN	Parity Data	X'00' - X'FF'	Structured append parity data	X'00' - X'FF'
12	BITS			Special-function flags	
	bit 0	UCC/EAN FNC1	B'0' B'1'	Alternate data type identifier: User-defined symbol Symbol conforms to UCC/EAN standards	Not supported in BCD1
	bit 1	Industry FNC1	B'0' B'1'	Alternate data type identifier: User-defined symbol Symbol conforms to industry standards	Not supported in BCD1
	bits 2 - 7		B'000000'	Reserved	
13	CODE	Application indicator	See field description	Application indicator for Industry FNC1	Not supported in BCD1

A desired symbol size is specified by the version parameter (byte 7), but the actual size of the symbol depends on the amount of data to be encoded. If not enough data is supplied, the symbol is padded with null data to reach the requested symbol size. If too much data is supplied for the requested symbol size, the symbol is bigger than requested and is the smallest symbol that can accommodate that amount of data.

Byte 5

Control flags.

These flags control how the bar code data (bytes $n+1$ to end) is processed by the BCOCA receiver; the receiver can be an IPDS printer or any other product that processes BCOCA objects.

Bit 0

EBCDIC-to-ASCII translation.

If this flag is B'0', the data is assumed to begin in the default character encodation (ECI 000020) and no translation is done.

If this flag is B'1' and an EBCDIC code page is selected in byte 6, the BCOCA receiver converts each byte of the bar code data from the EBCDIC code page that is specified in byte 6 into ASCII code page 897 before this data is used to build the bar code symbol. The following EBCDIC code pages can be used to encode the bar code data:

- Code page 500 (International #5) — specify X'01' in byte 6.

Only 128 of the characters within ECI 000020 can be specified in code page 500. The code page 500 characters that can be translated are shown in

- Code page 290 (Japanese Katakana Extended) — specify X'02' in byte 6.
- Code page 1027 (Japanese Latin Extended) — specify X'03' in byte 6.

EBCDIC characters that are not defined within ECI 000020 are mapped to X'7F' (DEL).

Bit 1

Escape-sequence handling.

If this flag is B'0', each X'5C' within the bar code data is treated as an escape character according to the QR Code symbology specification.

If this flag is B'1', each X'5C' within the bar code data is treated as a normal data character and therefore all escape sequences are ignored. In this case, no ECI code page switching can occur within the data.

Note: If the EBCDIC-to-ASCII translation flag is also set to B'1', all EBCDIC characters are first converted into X'5C' before the escape-sequence handling flag is applied.

Byte 6

Conversion.

When the EBCDIC-to-ASCII translation flag is B'1', this parameter specifies the method that is used to convert EBCDIC input data into the default character encodation. When the EBCDIC-to-ASCII translation flag is B'0', this parameter is not used and must be set to X'00'.

For the first three values (used when the input data is encoded with a single-byte EBCDIC code page), this parameter identifies the EBCDIC code page that encodes single-byte EBCDIC bar code data. The following EBCDIC code pages are supported:

X'01'

Code page 500 (International #5).

Only 128 of the characters within ECI 000020 can be specified in code page 500. The code page 500 characters that can be translated are shown in [Figure 146 on page 501](#).

X'02'

Code page 290 (Japanese Katakana Extended).

X'03'

Code page 1027 (Japanese Latin Extended).

For the remaining values (used when the input data is SOSI), this parameter identifies the desired conversion from EBCDIC SOSI input data to a specific mixed-byte ASCII encoding.

Note: The values X'04' - X'09' are defined for the Additional Bar Code Parameters (X'7B') triplet that is used with AFP Line Data; these values are not valid within a BCOCA object that is built for a non-line-data environment, such as MO:DCA and IPDS. See *Advanced Function Presentation: Programming Guide and Line Data Reference* for a description of the Additional Bar Code Parameters (X'7B') triplet.

The following choices are supported:

X'04'

CCSID 1390 - CCSID 943

Convert from:

CCSID 1390 – Extended Japanese Katakana-Kanji Host Mixed for JIS X0213 including 6205 UDC, Extended SBCS (includes SBCS & DBCS euro).

Convert to:

CCSID 943 – Japanese PC Data Mixed for Open environment (Multi-vendor code): 6878 JIS X 0208-1990 chars, 386 IBM selected DBCS chars, 1880 UDC (X'F040' - X'F9FC').

X'05'

CCSID 1399 - CCSID 943

Convert from:

CCSID 1399 – Extended Japanese Latin-Kanji Host Mixed for JIS X0213 including 6205 UDC, Extended SBCS (includes SBCS & DBCS euro).

Convert to:

CCSID 943 – Japanese PC Data Mixed for Open environment (Multi-vendor code): 6878 JIS X 0208-1990 chars, 386 IBM selected DBCS chars, 1880 UDC (X'F040' - X'F9FC').

X'06'

CCSID 1390 - CCSID 932

Convert from:

CCSID 1390 – Extended Japanese Katakana-Kanji Host Mixed for JIS X0213 including 6205 UDC, Extended SBCS (includes SBCS & DBCS euro).

Convert to:

CCSID 932 – Japanese PC Data Mixed including 1880 UDC.

X'07'

CCSID 1399 - CCSID 932

Convert from:

CCSID 1399 – Extended Japanese Latin-Kanji Host Mixed for JIS X0213 including 6205 UDC, Extended SBCS (includes SBCS & DBCS euro).

Convert to:

CCSID 932 – Japanese PC Data Mixed including 1880 UDC.

X'08'

CCSID 1390 - CCSID 942

Convert from:

CCSID 1390 – Extended Japanese Katakana-Kanji Host Mixed for JIS X0213 including 6205 UDC, Extended SBCS (includes SBCS & DBCS euro).

Convert to:

CCSID 942 – Japanese PC Data Mixed including 1880 UDC, Extended SBCS.

X'09'

CCSID 1399 - CCSID 942

Convert from:

CCSID 1399 – Extended Japanese Latin-Kanji Host Mixed for JIS X0213 including 6205 UDC, Extended SBCS (includes SBCS & DBCS euro).

Convert to:

CCSID 942 – Japanese PC Data Mixed including 1880 UDC, Extended SBCS.

EBCDIC characters that are not defined within ECI 000020 are mapped to the substitute character, X'7F' or X'FCFC'; exception condition EC-2100 exists when an undefined character is encountered.

Exception condition EC-0FOE exists if an invalid or unsupported conversion value is specified.

Hex Digits 1st → 2nd ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	NUL SE010000	DLE SE170000			(SP) SP010000	& SM030000	_ SP100000						{ SM110000	} SM140000		0 ND010000
-1	SOH SE020000	DC1 SE180000					/ SP120000		a LA010000	j LJ010000			A LA020000	J LJ020000		1 ND010000
-2	STX SE030000	DC2 SE190000		SYN SE230000					b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ETX SE040000	DC3 SE200000							c LC010000	l LL010000	t LT010000		C LC020000	L LL020000	T LT020000	3 ND030000
-4									d LD010000	m LM010000	u LU010000		D LD020000	M LM020000	U LU020000	4 ND040000
-5	HT SE100000		LF SE110000						e LE010000	n LN010000	v LV010000		E LE020000	N LN020000	V LV020000	5 ND050000
-6		BS SE090000	ETB SE240000						f LF010000	o LO010000	w LW010000		F LF020000	O LO020000	W LW020000	6 ND060000
-7	DEL SE330000		ESC SE280000	EOT SE050000					g LG010000	p LP010000	x LX010000		G LG020000	P LP020000	X LX020000	7 ND070000
-8		CAN SE250000							h LH010000	q LQ010000	y LY010000		H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9		EM SE260000					' SD130000		i LI010000	r LR010000	z LZ010000		I LI020000	R LR020000	Z LZ020000	9 ND090000
-A					[SM040000	] SM080000		: SP130000								
-B	VT SE120000				. SP110000	S SC030000	, SP080000	# SM010000				| SM130000				
-C	FF SE130000	FS SE350000		DC4 SE210000	< SA030000	* SM040000	% SM020000	@ SM050000				- SM150000				
-D	CR SE140000	GS SE360000	ENQ SE060000	NAK SE220000	(SP060000	) SP070000	_ SP090000	' SP050000								
-E	SO SE150000	RS SE370000	ACK SE070000		+ SA010000	; SP140000	> SA050000	= SA040000								
-F	SI SE160000	US SE380000	BEL SE080000	SUB SE270000	! SP020000	^ SD150000	? SP150000	" SP040000								

Figure 146: Subset of EBCDIC Code Page 500 that can be translated to ECI 000020

Byte 7

Version of symbol.

This parameter specifies the desired size of the symbol; each version specifies a particular number of modules per row and column. The size of each square module is specified by the module width parameter (byte 17 in the BSD). The following table lists the complete set of supported versions. Exception condition EC-0F0F exists if an invalid version value is specified.

Version	Symbol Size	Version	Symbol Size
0 (X'00')	smallest	21 (X'15')	101x01
1 (X'01')	21x21	22 (X'16')	105x105
2 (X'02')	25x25	23 (X'17')	109x109
3 (X'03')	29x29	24 (X'18')	113x113

<i>Table 30: Supported Version for a QR Code symbol (continued)</i>			
Version	Symbol Size	Version	Symbol Size
4 (X'04')	33x33	25 (X'19')	117x117
5 (X'05')	37x37	26 (X'1A')	121x121
6 (X'06')	41x41	27 (X'1B')	125x125
7 (X'07')	45x45	28 (X'1C')	129x129
8 (X'08')	49x49	29 (X'1D')	133x133
9 (X'09')	53x53	30 (X'1E')	137x137
10 (X'0A')	57x57	31 (X'1F')	141x141
11 (X'0B')	61x61	32 (X'20')	145x145
12 (X'0C')	65x65	33 (X'21')	149x149
13 (X'0D')	69x69	34 (X'22')	153x153
14 (X'0E')	73x73	35 (X'23')	157x157
15 (X'0F')	77x77	36 (X'24')	161x161
16 (X'10')	81x81	37 (X'25')	165x165
17 (X'11')	85x85	38 (X'26')	169x169
18 (X'12')	89x89	39 (X'27')	173x173
19 (X'13')	93x93	40 (X'28')	177x177
20 (X'14')	97x97		

If X'00' is specified for this parameter, an appropriate row/column size is used based on the amount of symbol data; the smallest symbol that can accommodate the amount of data is produced.

Byte 8

Level of error correction.

This parameter specifies the level of error correction to be used for the symbol. Each higher level of error correction causes more error correction codewords to be added to the symbol and therefore leaves fewer codewords for symbol data. See the QR Code symbology specification for more information about how many codewords are available for symbol data for each version and error-correction level combination.

Four different levels of Reed-Solomon error correction can be selected:

Level L (X'00') allows recovery of 7% of symbol codewords.

Level M (X'01') allows recovery of 15% symbol codewords.

Level Q (X'02') allows recovery of 25% symbol codewords.

Level H (X'03') allows recovery of 30% symbol codewords.

Exception condition EC-0F10 exists if an invalid level-of-error-correction value is specified.

Byte 9

Structured append sequence indicator.

Multiple QR Code bar code symbols (called structured appends) can be logically linked together to encode large amounts of data. The logically linked symbols can be presented on the same or on different physical media, and are logically recombined after they are scanned. From 2 - 16 QR Code symbols can be linked. This parameter specifies where this symbol is logically linked (1 - 16) in a sequence of symbols.

If X'00' is specified for this parameter, this symbol is not part of a structured append. Exception condition EX-0F01 exists if an invalid sequence indicator value is specified. Exception condition EC-0F02 exists if the sequence indicator is larger than the total number of symbols (byte 10).

Byte 10

Total number of structured-append symbols.

This parameter specifies the total number of symbols (2 - 16) that is logically linked in a sequence of symbols.

If X'00' is specified for this parameter, this symbol is not part of a structured append. If this symbol is not part of a structured append, both bytes 9 and 10 must be X'00', or exception condition EC-0F03 exists.

Exception condition EC-0F04 exists if an invalid number of symbols is specified.

Byte 11

Structured append parity data.

This parameter specified parity data for a structured append symbol. The parity-data value must be calculated from the entire message that is broken into structured-append symbols; the parity-data value must be the same in each of the structured-append symbols.

The parity-data value is obtained by XORing byte by byte the ASCII/JIS values of all the original input data before division into structured-append symbols.

If this symbol is not a structured append, this parameter is ignored and must be set to X'00'.

Byte 12

Special-function flags.

These flags specify special functions that can be used with a QR Code symbol.

Bit 0

UCC/EAN FNC1 alternate data type identifier.

If this flag is B'1', this QR Code symbol indicates that it conforms to the UCC/EAN application identifiers standard. In this case, the industry FNC1 flag must be B'0'. Exception condition EC-0F11 exists if an incompatible combination of these bits is specified.

Bit 1

Industry FNC1 alternate data type identifier.

If this flag is B'1', this QR Code symbol indicates that it conforms to the specific industry or application specifications previously agreed with AIM International. In this case, the UCC/EAN FNC1 flag must be B'0'. Exception condition EC-0F11 exists if an incompatible combination of these bits is specified.

When this flag is B'1', an application indicator is specified in byte 13.

Bits 2 - 7

Reserved.

Byte 13

Application indicator for Industry FNC1.

When the Industry FNC1 flag is B'1', this parameter specifies an application indicator. The application indicator is a 1-byte value that is specified either as an alphabetic value (from the ASCII set a-z, A-Z) plus 100 or as a two-digit number (00 - 99 represented as a hexadecimal value). For example:

For application indicator a (ASCII value X'61'), specify X'C5'.

For application indicator Z (ASCII value X'5A'), specify X'BE'.

For application indicator 01, specify X'01'.

For application indicator 99, specify X'63'.

When the Industry FNC1 flag is B'0', this parameter is ignored and must be set to X'00'.

Exception condition EC0F12 exists if an invalid application-indicator value is specified.

Appendix E. Set Media Origin (SMO)

This appendix explains how to generate the correct Set Media Origin (SMO) information in a form definition.

Background

IBM 3800-3

The first AFP printer was the IBM 3800-3 delivered in 1983. It had a single, fixed media origin or *top, left corner* as shown in Figure 147 on page 505. Print data could be placed to print across, down, or up the page. Across and down are shown. Page definitions (*pagedefs*) were used to place the line data on the page. IBM provided page definitions for common line spacings for both portrait and landscape orientation. The two most common paper sizes used were 12" x 8.5" (shown on left) and 9.5" x 11" (shown on right). As shown in the following figure, different page definitions are required to print the same output on the two different sizes of paper. For example, an *across* page definition is used to print landscape output on 12" x 8.5" paper and a *down* page definition is used for landscape output on 9.5" x 11" paper. Forms, like 12" x 8.5", that have a width greater than their length are referred to as *wide continuous forms* and forms, like 9.5" x 11", that have a length greater than their width are called *narrow continuous forms*.

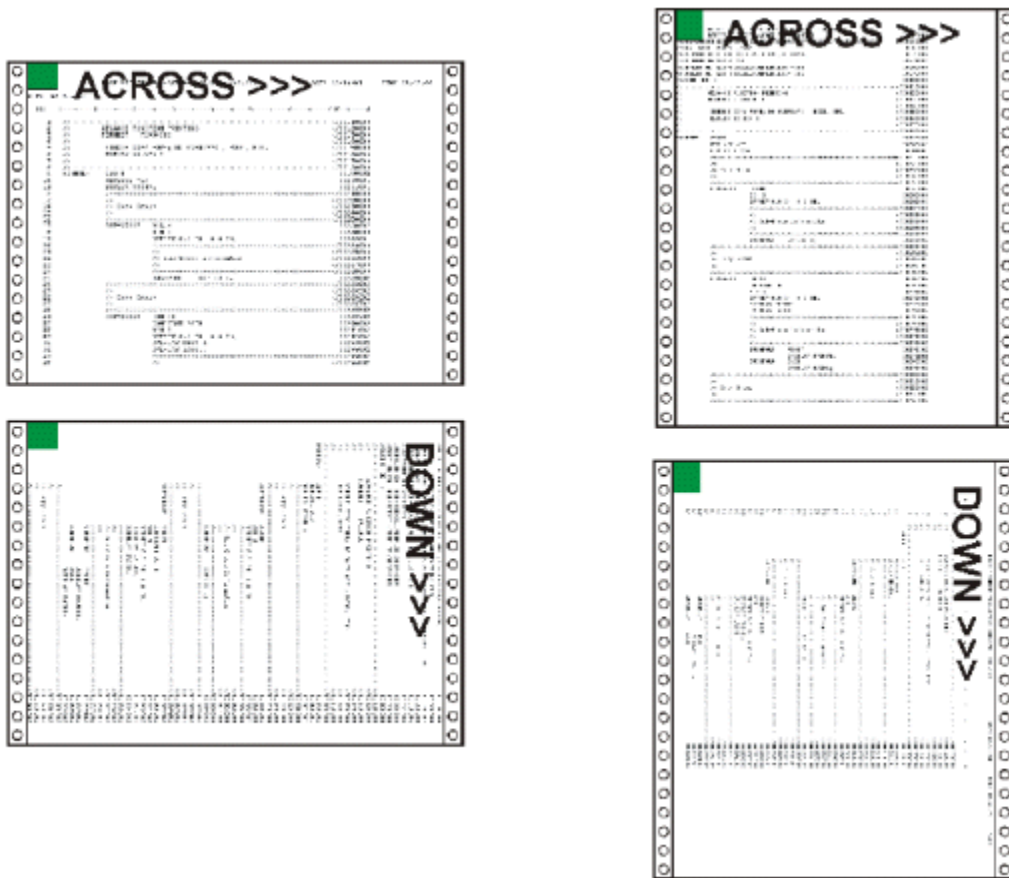


Figure 147: Fixed Media Origins for the IBM 3800-3 Printer

IBM 3820

In 1985 the IBM 3820 was introduced. It was the first IBM AFP cut-sheet printer. Like the 3800-3, it also had a single, fixed media origin as shown. The 3820 could print in the same directions as the 3800-3 plus one new direction, *back*. As shown in Figure 148 on page 506, it had similar print direction characteristics as a 3800-3 using 9.5" x 11" paper.



Figure 148: Fixed Media Origins for the IBM 3820 Printer

The Problem

Many customers had both 3800-3s and 3820s. The 3800-3 was the fastest printer of its time at 215 impressions per minute. To achieve that speed, it had to use the 12" x 8.5" paper. This paper had the additional benefit of reducing maintenance charges because the 3800s usage charge was based on the number of linear feet printed. The use of the shorter, 12" x 8.5" paper cost less per page than the longer, 9.5" x 11" paper. Unfortunately, when the 12" x 8.5" paper is used on the 3800-3 it causes an incompatibility with the 3820. As shown in Figure 149 on page 506, the 3800-3 with 12" x 8.5" paper has a different media orientation than the 3820.

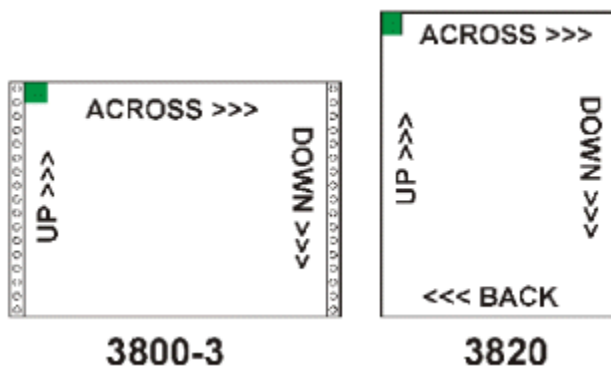


Figure 149: Differences in Media Origin Between the IBM 3800-3 and IBM 3820 Printers

The 3800-3's media origin is at the left end of the long edge and the 3820's is at the left end of the short edge. Because of this, different page definitions would be needed to print the same output on both printers. For example, to print landscape output, an *across* page definition would be used on the 3800-3 and a "down" page definition for the 3820. This would require different page definitions to be specified for each printer.

Another Problem

AFP also provides the ability to print image data. The print direction that is coded in the page definition controls how the text data is oriented on the page. Unfortunately it has no effect on data that is contained within an image. In Figure 150 on page 507, an image that contains the word, LOGO is placed on the 3800-3 and 3820 pages. It is oriented as desired on the 3820 but appears to be rotated 90 degrees counterclockwise on the 3800-3. In reality, the image is not rotated, the paper is. To compensate for this, a special, rotated version of the image was built for use on the 3800-3 and care was taken to use the proper version on both printers.

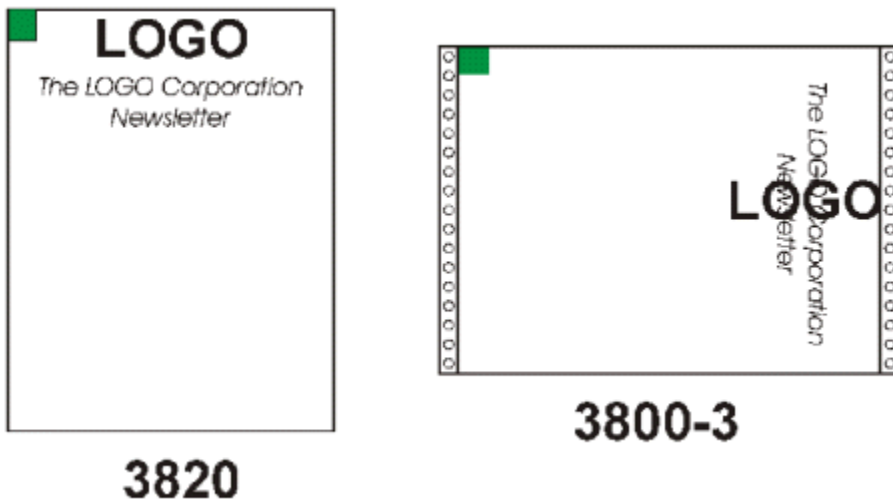


Figure 150: Rotated Text and Image Data

When IBM was developing its second, continuous forms AFP printer, the 3835, it was decided to develop a solution for the problem of different media origins between cut-sheet and continuous forms printers. The AFP architecture was enhanced to allow the media origin to be moved to any of the four corners of the paper. This function is called Set Media Origin and is controlled by a value in the form definition (*formdef*). This value is called the Medium Origin and is set by using the Page Printer Formatting Aid (PPFA) PRESENT and DIRECTION parameters on the FORMDEF and COPYGROUP commands.

FORMDEF PRESENT and DIRECTION Parameters

The use of PRESENT and DIRECTION parameters on the FORMDEF is confusing. The examples in “The SMO Reference Pages” on page 508 show a sheet of paper and the placement of the Medium Origin for a particular PRESENT and DIRECTION combination. Notice that for a particular Medium Origin combination, the results for cut-sheet paper, wide continuous forms paper, narrow continuous forms paper, and Cut Sheet Emulation are different. This was done to guarantee that the application pages would be oriented in the same manner on all printer and media types. Cut Sheet Emulation (CSE) divides a continuous forms printer's paper web into two equal sheetlets.

The PRESENT parameter has two possible values of PORTRAIT and LANDSCAPE. The DIRECTION has values of ACROSS and DOWN. An additional optional parameter is CUTSHEET. It specifies whether the SMO command is sent to cut-sheet printers.⁹ This is invoked by coding a value of YES. If NO is coded or allowed to default the media origin on cut-sheet printers is not changed and is at the default location, which is equivalent to a form definition with PRESENT PORTRAIT and DIRECTION ACROSS. Coding the N_UP parameter (1-up, 2-up, 3-up, 4-up) has the same effect as coding CUTSHEET. The CUTSHEET parameter was created to allow form definitions that do not have N-UP coded to enable SMO on cut-sheet printers.

⁹ Some older printers do not support the SMO function.

When Print Services Facility (PSF) converts an output file to Intelligent Printer Data Stream (IPDS) to send to the printer, it includes an SMO value if SMO is supported by the printer. This value is calculated by examining the Medium Origin of the form definition and then checking to see whether the printer is cut-sheet, wide continuous, or narrow continuous. CSE on the printer reports back wide or narrow continuous. PSF/IPM then specifies the proper SMO. The resulting SMO values are included in the figures for completeness.

The SMO Reference Pages

The following pages show how the four possible SMO combinations behave on the following four different printer types:

- Cut-sheet
- Continuous forms with wide paper
- Continuous forms with narrow paper
- Continuous forms with Cut Sheet Emulation enabled.

Four summary pages show the media origin and print directions for the listed printer types. These summary pages are followed by detail pages. The top of each detail page shows the:

- Printer type.
- Values for Presentation and Direction that are coded on the form definition that is used.
- Medium Origin value that this combination produces.

Each detail page shows six images of a single paper sheet. The media origin is also called the *top, left corner*. Three sheets show how data is oriented for:

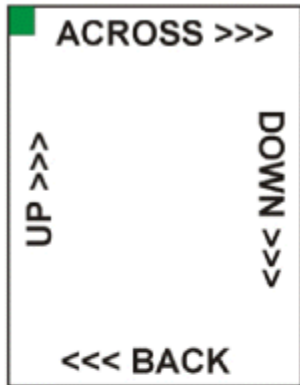
- Simplex sheet or front of a duplex sheet
- Back of a normal duplex sheet
- Back of a tumble duplex sheet

Simulated hole punches and rotation axis lines are provided to help visualize how the back of a duplex sheet relates to the front. An image that is made from a photograph is included on these sheets to help understand the orientation. The top, left corner of the image is in the same corner as the media origin.

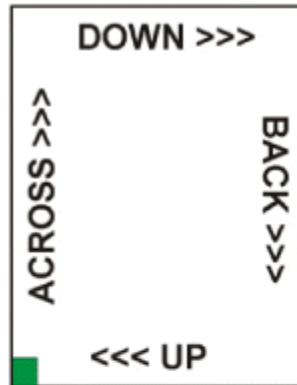
One sheet shows the four print directions and how they relate to the media origin; one sheet shows sample line data that is formatted by using a page definition that is coded with an *across* print direction; and one sheet shows data that is formatted with a page definition that is coded with a *down* print direction. The page definition name, its direction, total lines, and lines-per-inch spacing are given for each page definition page.

Cut-Sheet Printer

Portrait Across



Landscape Across

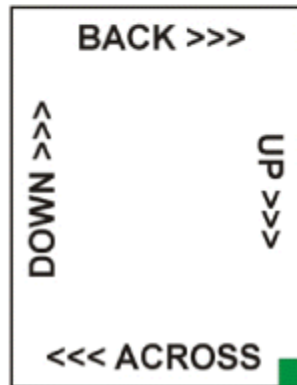


 = MEDIUM ORIGIN

Portrait Down



Landscape Down



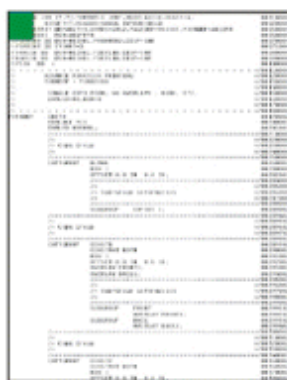
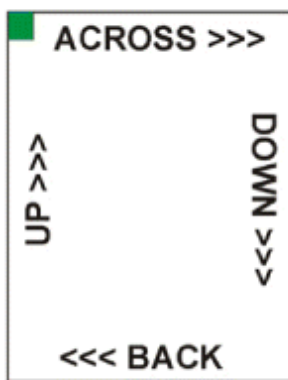
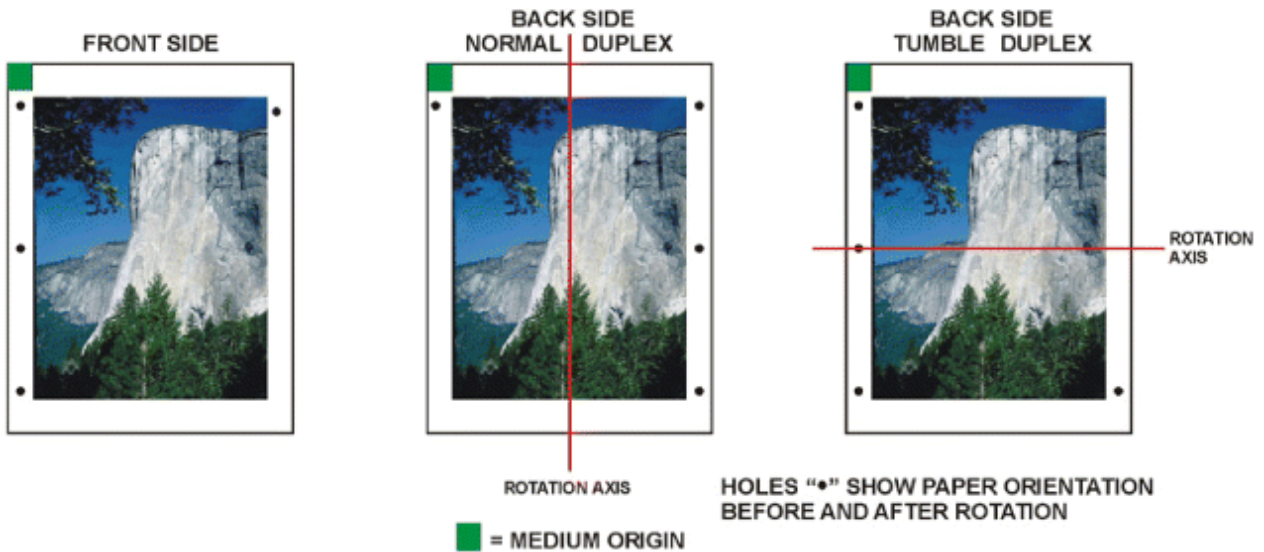
1061p3007

Figure 151: Cut-Sheet Printer Summary of Set Medium Origin

Presentation: **Portrait** Direction: **Across**

Medium Origin: X'00'

Cut Sheet Printer, Portrait Across Formdef,
MO:DCA Medium Origin = X'00', IPDS SMO = X'00'



PAGEDEF: P1A06462
DIRECTION: ACROSS
64 LINES, 6 LPI



PAGEDEF: P1V04863
DIRECTION: DOWN
48 LINES, 6.1 LPI

ib6p3011

Figure 152: Cut-Sheet Printer with a Medium Origin of X'00'

Presentation: **Landscape** Direction: **Across**

Medium Origin: X'01'

Cut Sheet Printer, Landscape Across Formdef,
MO:DCA Medium Origin = X'01', IPDS SMO = X'03'

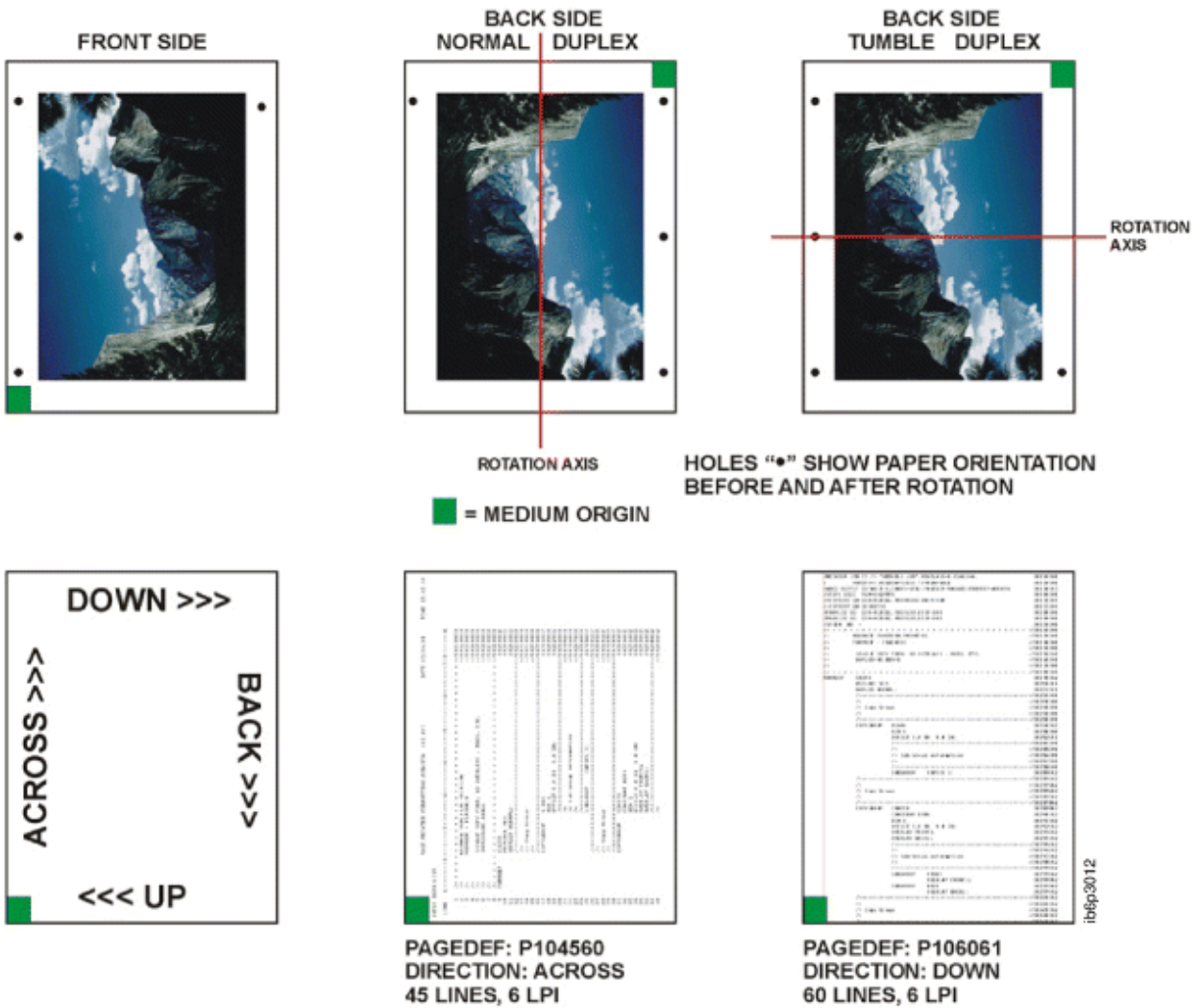


Figure 153: Cut-Sheet Printer with a Medium Origin of X'01'

Presentation: **Portrait** Direction: **Down**

Medium Origin: X'04'

Cut Sheet Printer, Portrait Down Formdef,
MO:DCA Medium Origin = X'04', IPDS SMO = X'03'

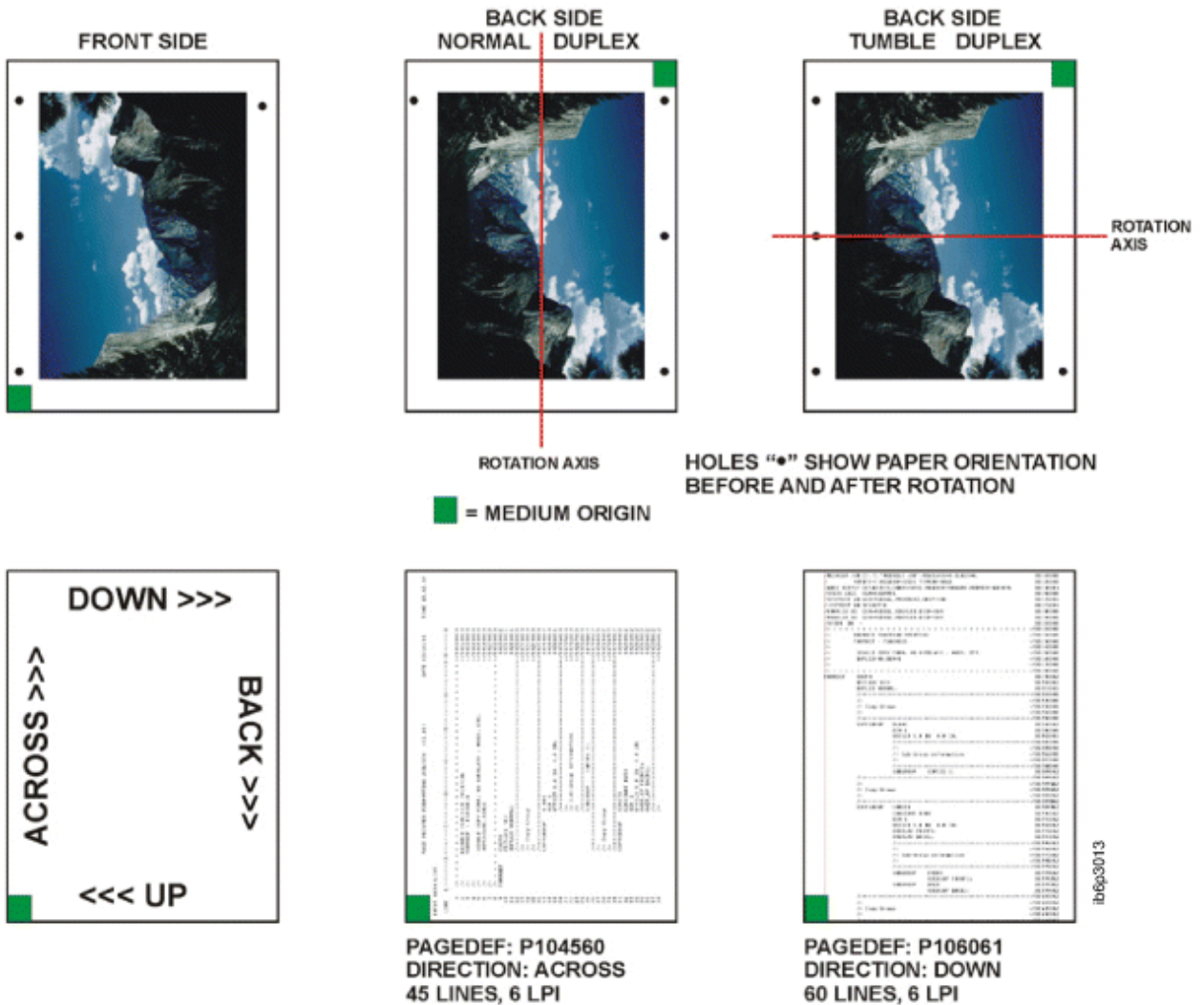


Figure 154: Cut-Sheet Printer with a Medium Origin of X'04'

Presentation: **Landscape** Direction: **Down**

Medium Origin: X'05'

Cut Sheet Printer, Landscape Down Formdef,
MO:DCA Medium Origin = X'05', IPDS SMO = X'02'

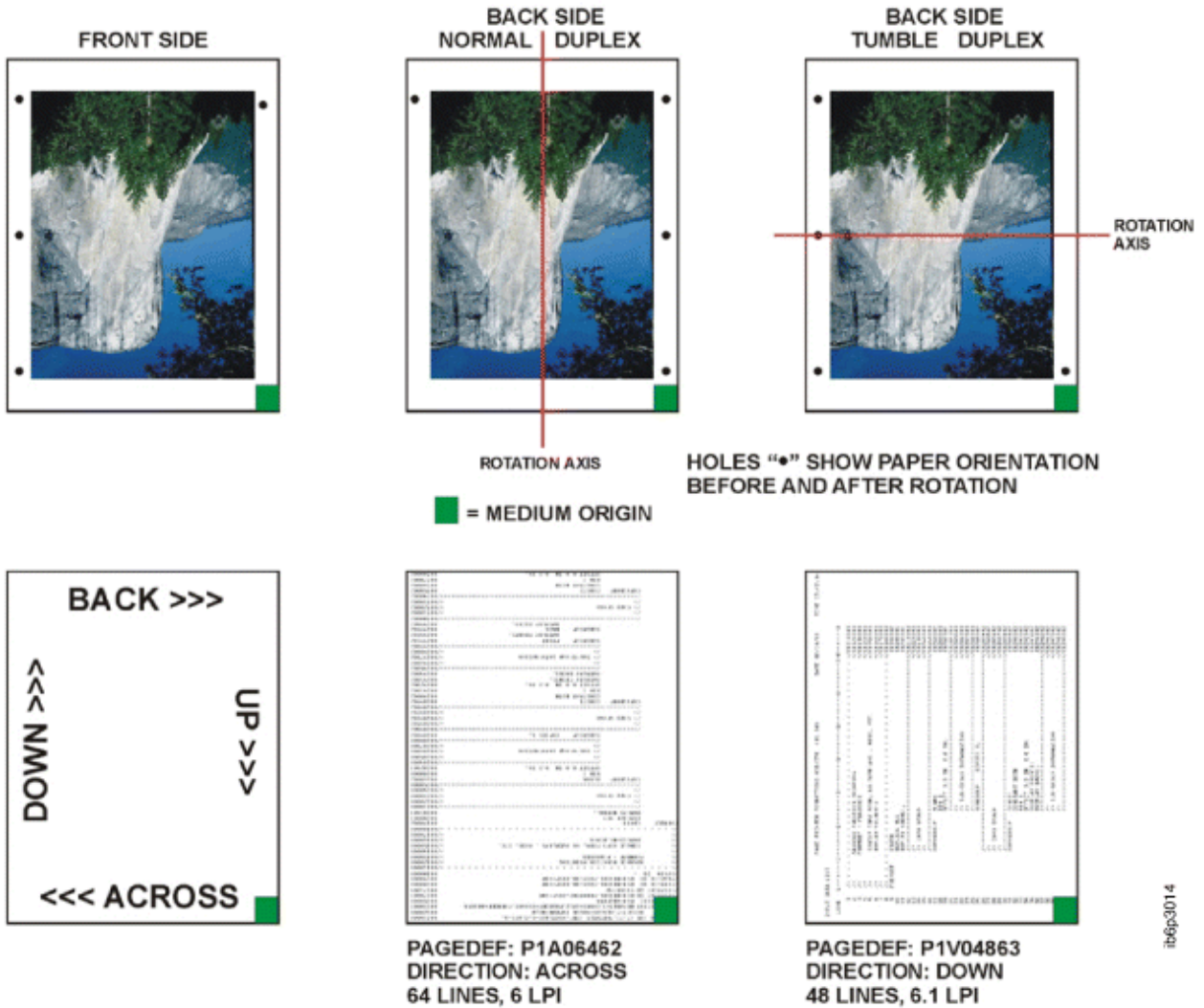
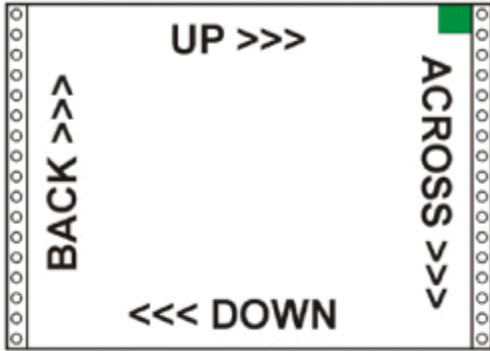


Figure 155: Cut-Sheet Printer with a Medium Origin of X'05'

Wide Continuous Forms Paper

Portrait Across



Landscape Across

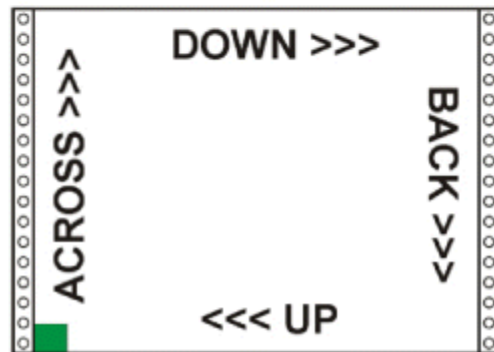


 = MEDIUM ORIGIN

Portrait Down



Landscape Down



8000c9p01

Figure 156: Wide Continuous Forms Printer Paper Summary of Set Media Origin

Presentation: **Portrait** Direction: **Across**

Medium Origin: X'00'

Continuous Forms Printer, Wide Paper,
Portrait Across Formdef,
MO:DCA Medium Origin = X'00', IPDS SMO = X'00'

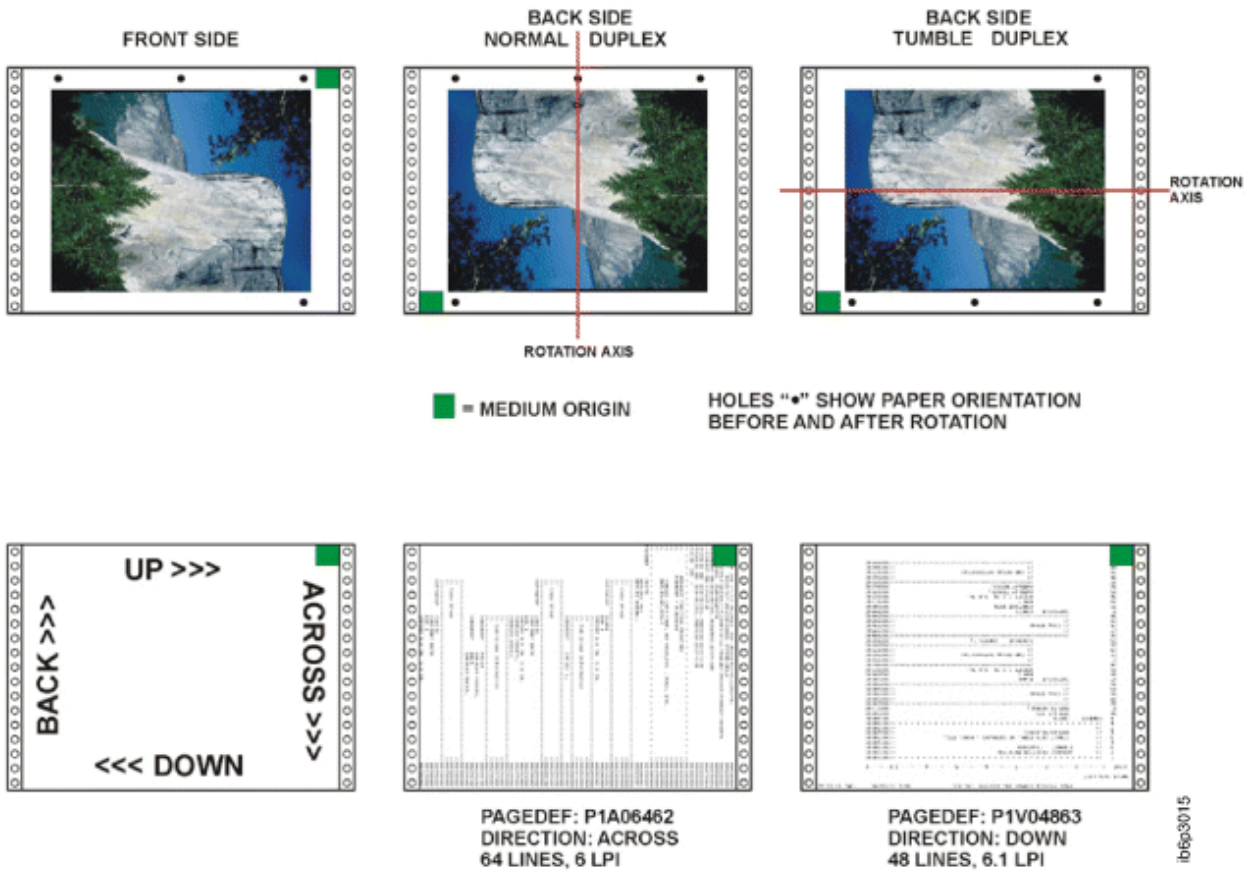


Figure 157: Wide Continuous Forms Printer Paper with a Medium Origin of X'00'

Presentation: **Landscape** Direction: **Across**

Medium Origin: X'01'

Continuous Forms Printer, Wide Paper,
Landscape Across Formdef,
MO:DCA Medium Origin = X'01', IPDS SMO = X'03'

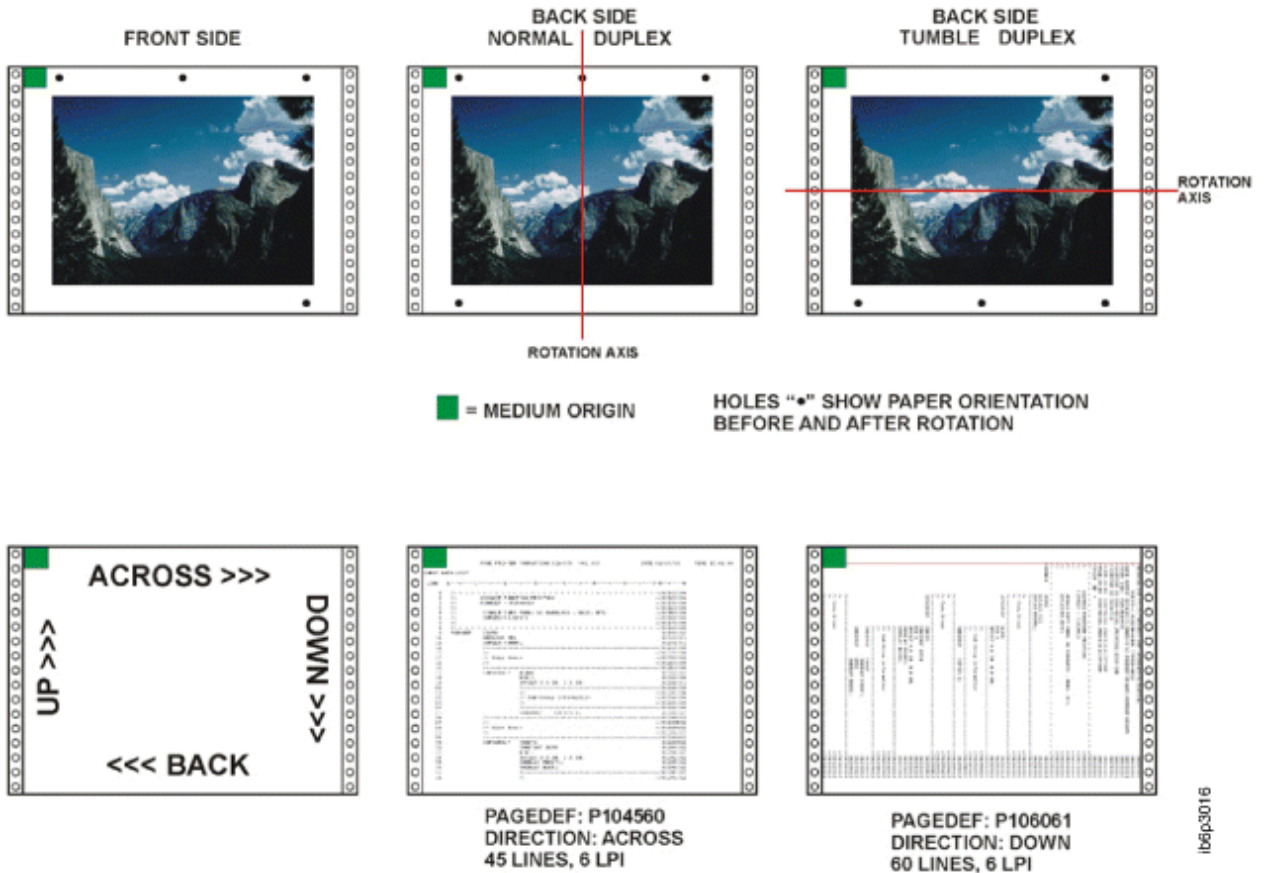


Figure 158: Wide Continuous Forms Printer Paper with a Medium Origin of X'01'

Presentation: **Portrait** Direction: **Down**

Medium Origin: X'04'

Continuous Forms Printer, Wide Paper,
Portrait Down Formdef,
MO:DCA Medium Origin = X'04', IPDS SMO = X'03'

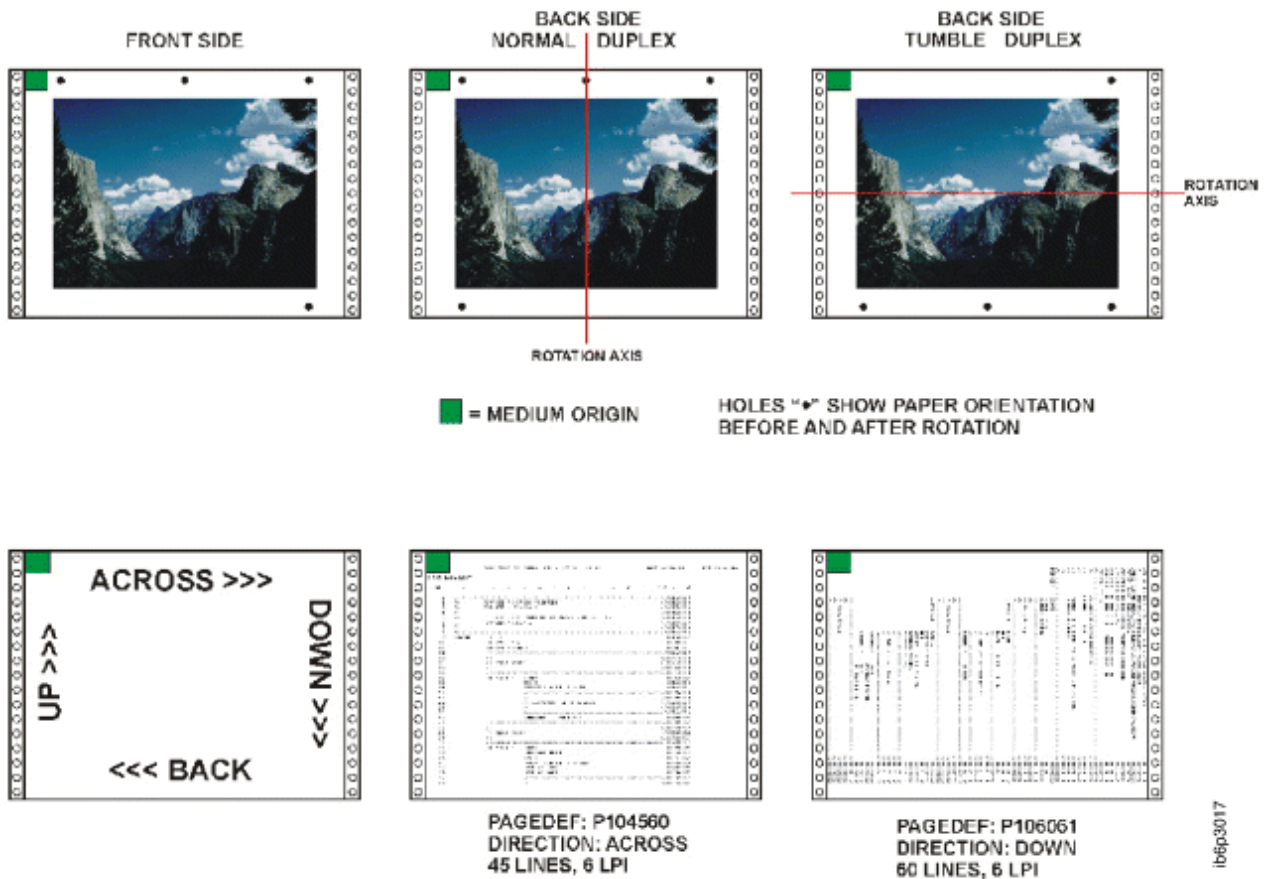


Figure 159: Wide Continuous Forms Printer Paper with a Medium Origin of X'04'

Presentation: **Landscape** Direction: **Down**

Medium Origin: X'05'

Continuous Forms Printer, Wide Paper,
Landscape Down Formdef,
MO:DCA Medium Origin = X'05', IPDS SMO = X'02'

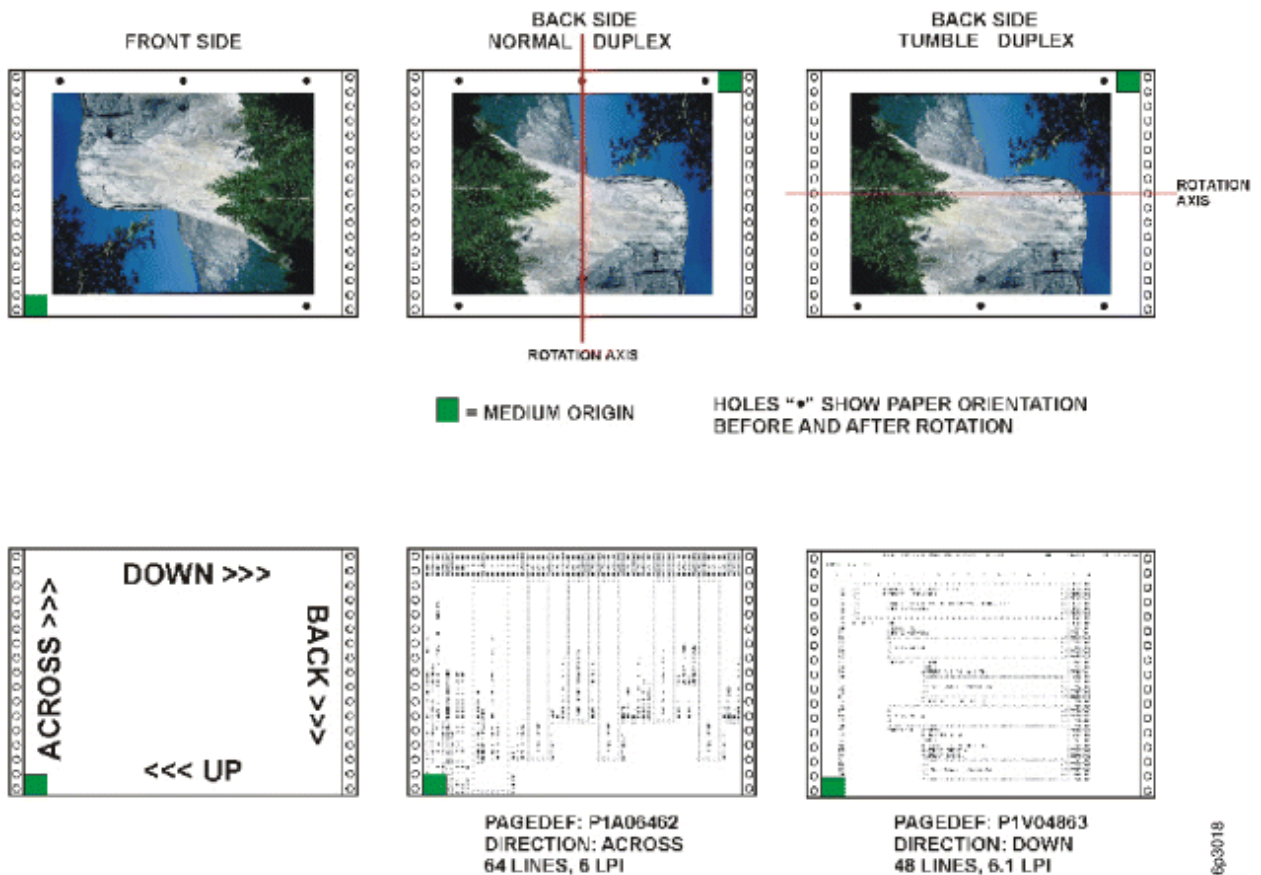
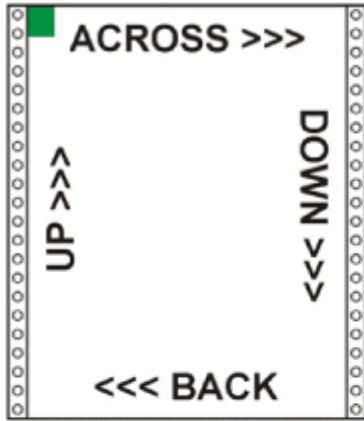


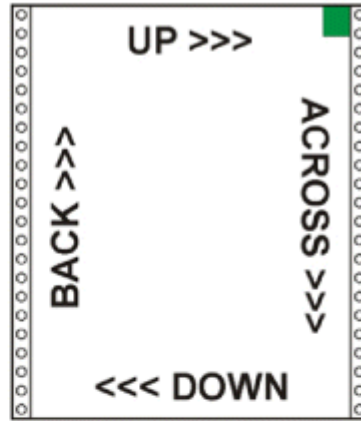
Figure 160: Wide Continuous Forms Printer Paper with a Medium Origin of X'05'

Narrow Continuous Forms Paper

Portrait Across

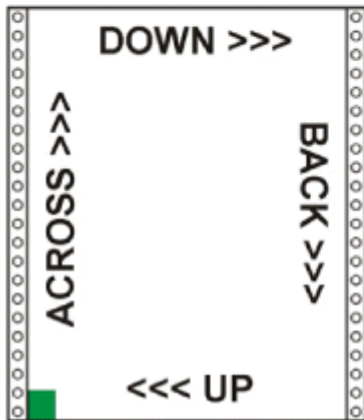


Landscape Across



 = MEDIUM ORIGIN

Portrait Down



Landscape Down

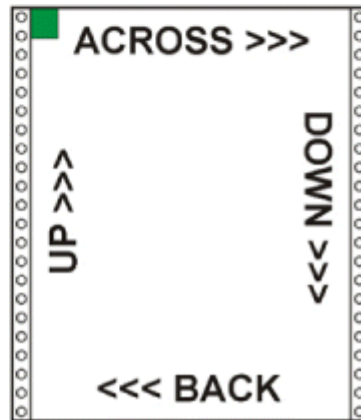


Figure 161: Narrow Continuous Forms Printer Paper Summary of Set Media Origin

Presentation: Portrait Direction: Across

Medium Origin: X'00'

Continuous Forms Printer, Narrow Paper,
Portrait Across Formdef,
MO:DCA Medium Origin = X'00', IPDS SMO = X'00'

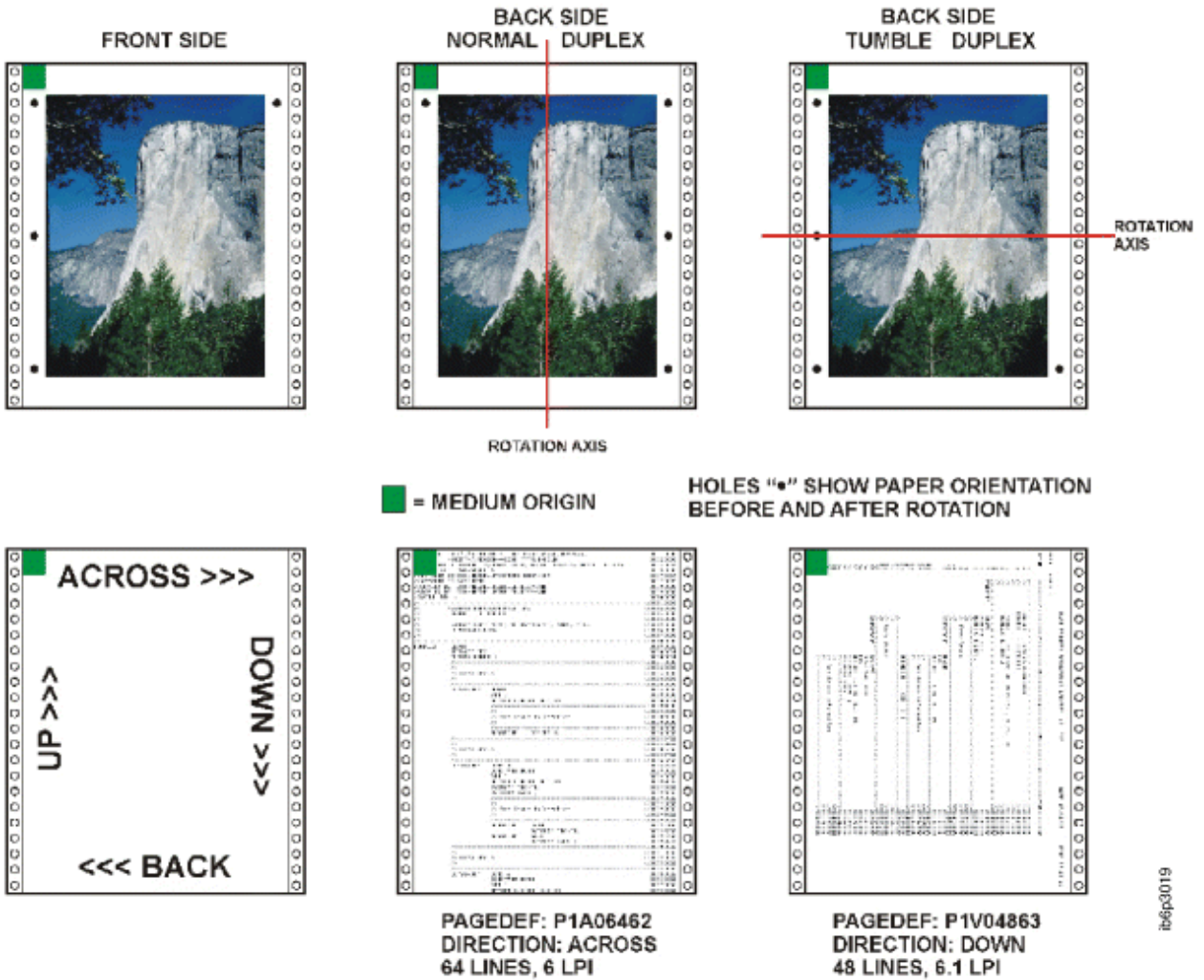


Figure 162: Narrow Continuous Forms Printer Paper with a Medium Origin of X'00'

Presentation: **Landscape** Direction: **Across**

Medium Origin: X'01'

Continuous Forms Printer, Narrow Paper,
Landscape Across Formdef,
MO:DCA Medium Origin = X'01', IPDS SMO = X'01'

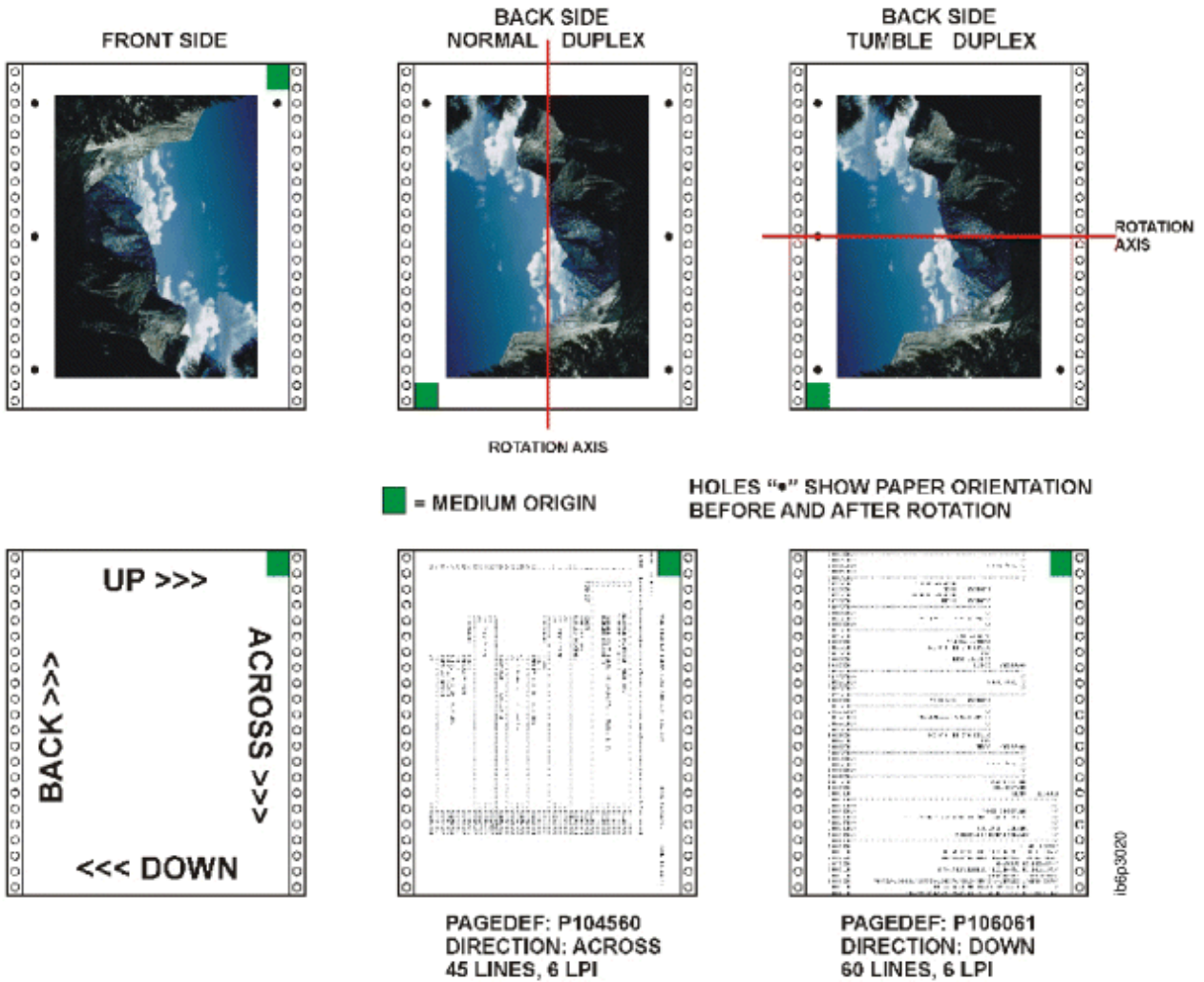


Figure 163: Narrow Continuous Forms Printer Paper with a Medium Origin of X'01'

Presentation: **Portrait** Direction: **Down**

Medium Origin: X'04'

Continuous Forms Printer, Narrow Paper,
Portrait Down Formdef,
MO:DCA Medium Origin = X'04', IPDS SMO = X'03'

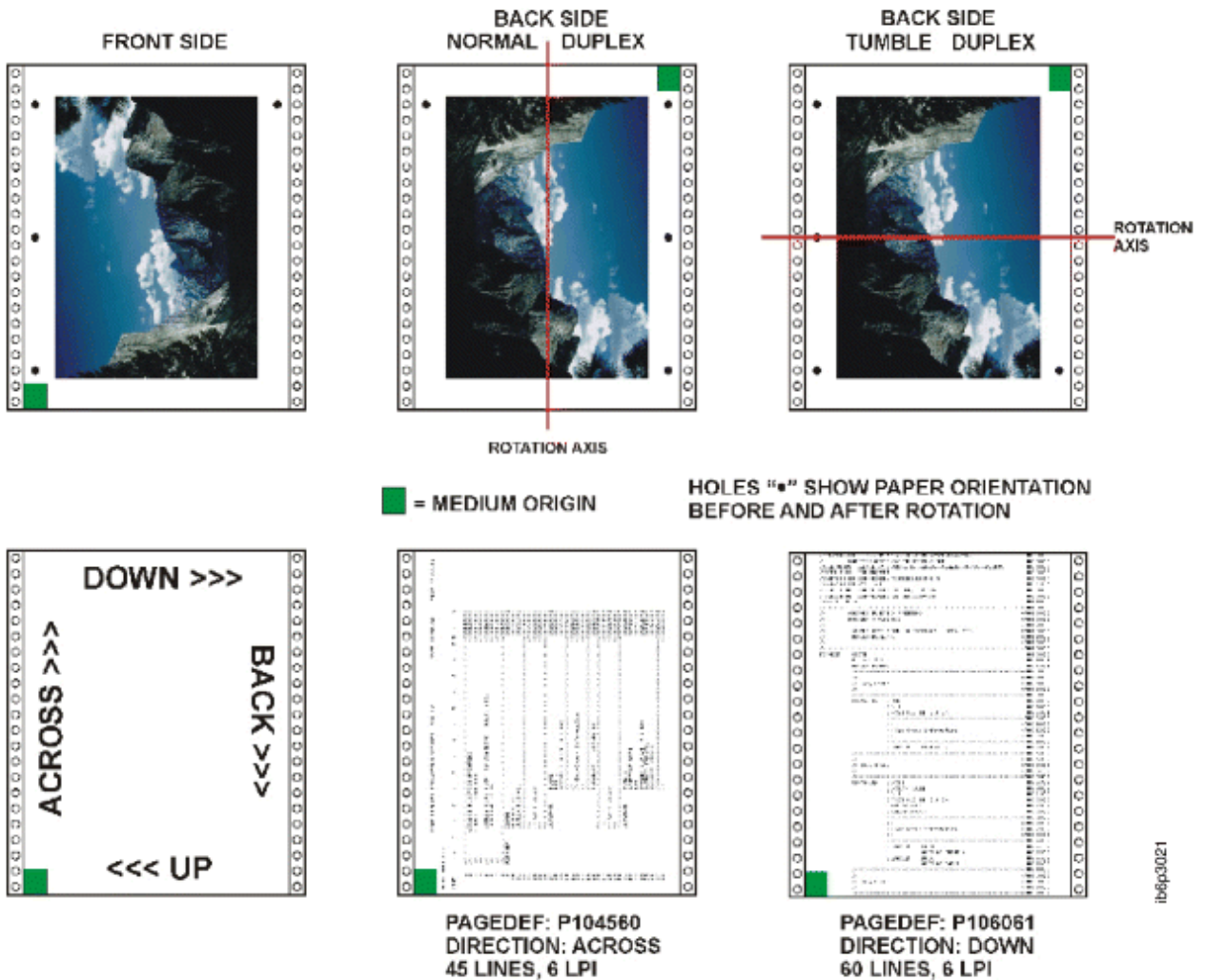


Figure 164: Narrow Continuous Forms Printer Paper with a Medium Origin of X'04'

Presentation: **Landscape** Direction: **Down**

Medium Origin: X'05'

Continuous Forms Printer, Narrow Paper,
Landscape Down Formdef,
MO:DCA Medium Origin = X'05', IPDS SMO = X'00'

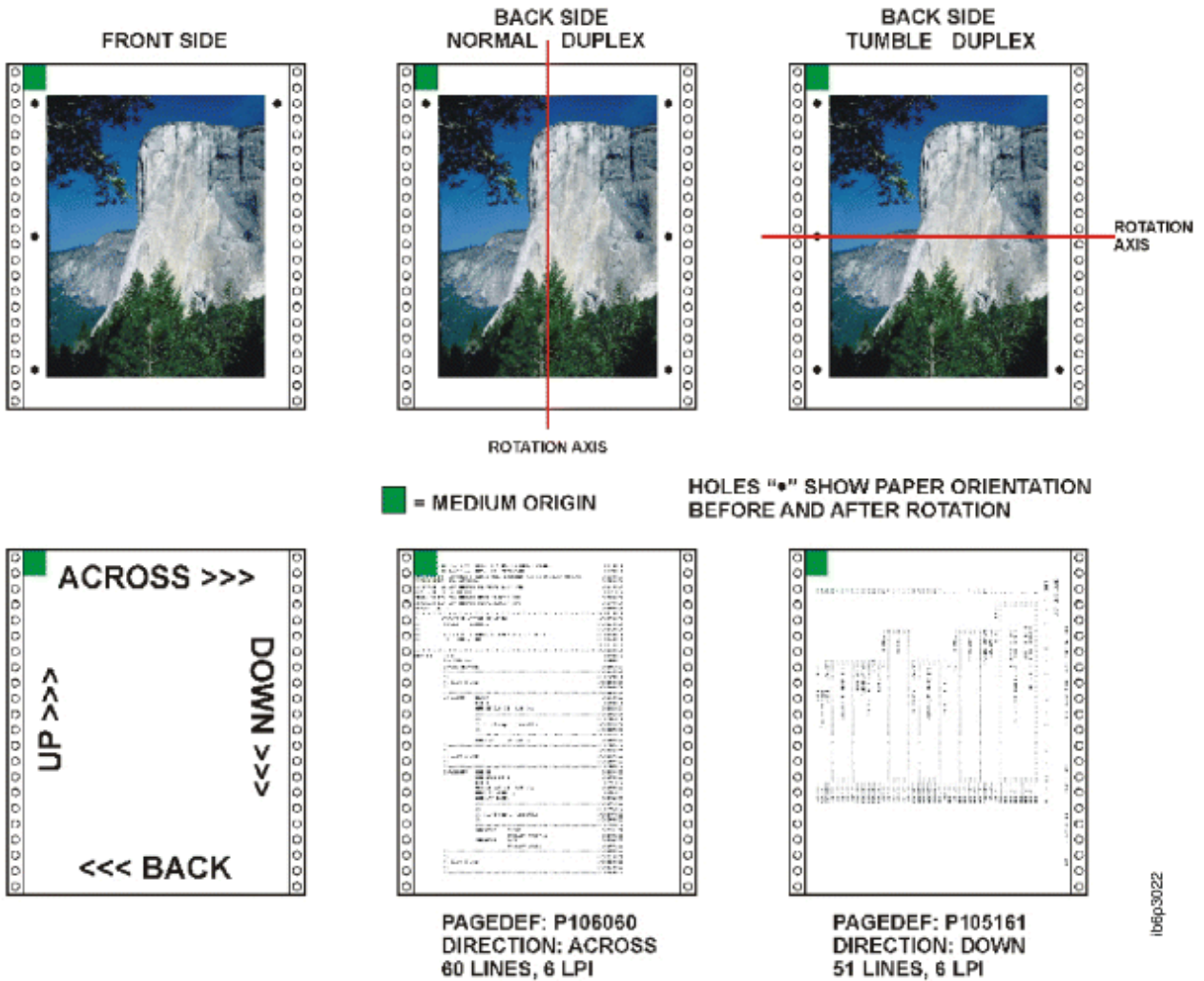


Figure 165: Narrow Continuous Forms Printer Paper with a Medium Origin of X'05'

Cut-Sheet Emulation

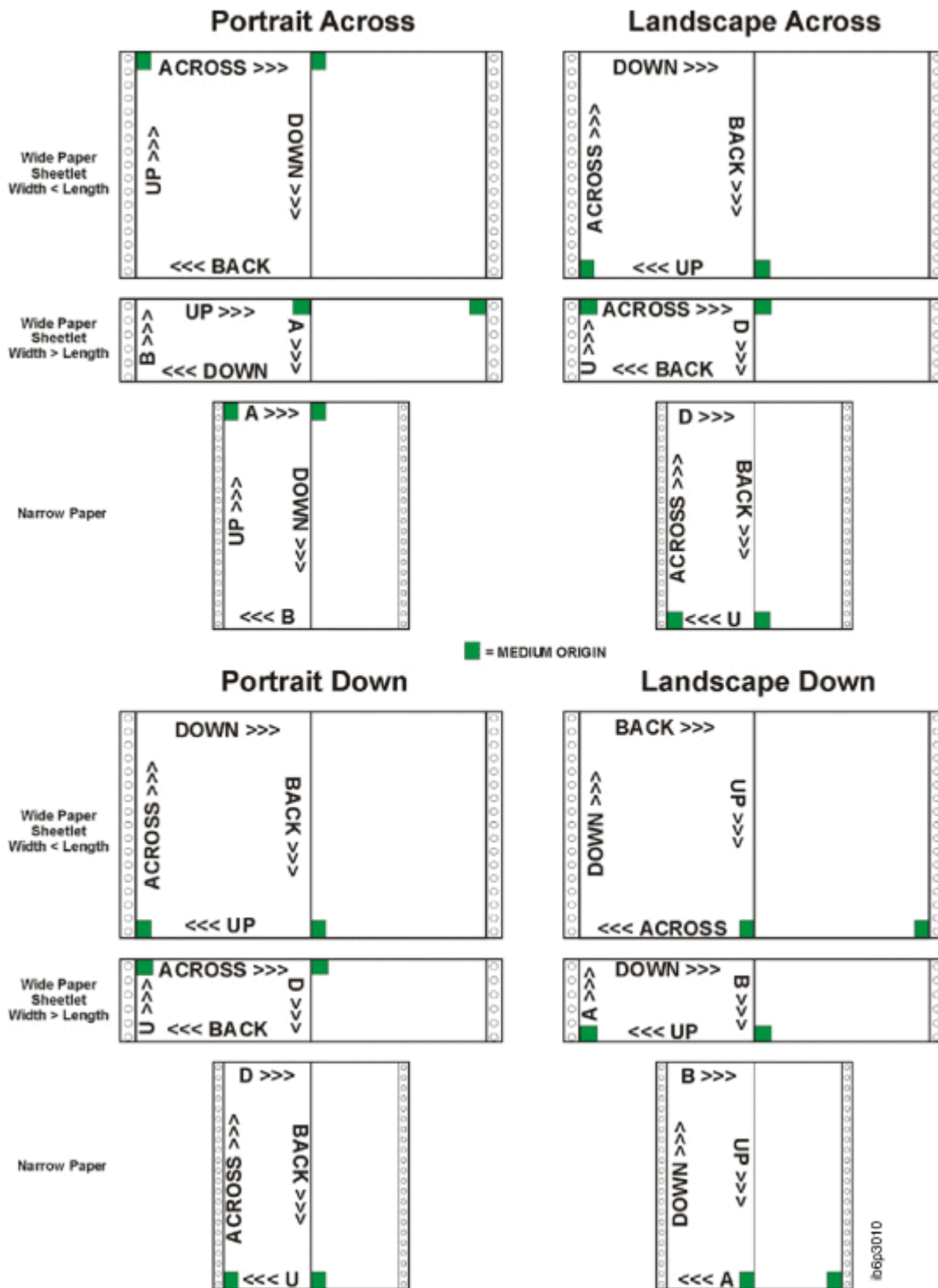


Figure 166: Cut-Sheet Emulation for Continuous Forms Printer Wide and Narrow Paper Set Media Origin

Appendix F. PPFA Keywords

A keyword is a word in PPFA that must be entered exactly as shown. Keywords cannot be used as second names for commands (like FONT and OVERLAY), which can have two positional parameters as names. This is less restrictive than prior versions of PPFA.

Note: When keywords are longer than 5 characters, they can be abbreviated to the first 5 characters. The shorthand form of the keyword must also be avoided as a name. For example, since PAGEH and CONDI are 5 character forms for PAGEHEADER and CONDITION, they cannot be used as second names.

PPFA reserved keywords are shown in the following list:

ABSOLUTE	COPYGROUP	HILITE	OFFSET	RESOLUTION
ACROSS	HRI	HRIFONT	OPCOUNT	RGB
ADJUST	CP	INVOKE	OPERATION	ROTATION
AFIELD	CS	JOG	OPOFFSET	SBCS
ALIGN	CUTSHEET	LAYOUT	OPPOS	SCOPE
AXIS1	CVERROR	LENGTH	OTHERWISE	SEGMENT
AXIS2	DBCS	LINE	OUTBIN	SETUNITS
BACK	DEFINE	LINEONE	OVERLAY	SOSIFONT
BARCODE	DEFINE CMRNAME	LINESP	OVROTATE	SPACE_THEN_PRINT
BCCOLOR	DELIMITER	LINETYPE	PAGECOUNT	SSASTERISK
BCXPARGS	DIRECTION	LINEWT	PAGEDEF	START
BIN	DOWN	MEDIUM	PAGEFORMAT	SUBGROUP
BINERROR	DOFONT	METRICTECHNOLOGY	PAGEHEADER	SUPPBLANKS
BODY	DRAWGRAPHIC	METTECH	PAGENUM	SUPPRESSION
BOTH	DUPLEX	MOD	PAGETRAILER	TEXT
BOX	ELLIPSE	MODWIDTH	PARTITION	TEXTERROR
BOXSIZE	ENDGRAPHIC	N	PLACE	TO
CHANNEL	ENDSPACE	N_UP	POSITION	TONERSAVER
CIELAB	ENDSUBPAGE	NEWPAGE	PRELOAD	TRCREF
CIRCLE	EXTREF	NOGROUP	PRESENT	TYPE
CLRTRAP	FIELD	NOPRELOAD	PRINTDATA	UDTYPE
CMR	FILL	NORASTER	PRINTLINE	WHEN
CMRNAME	FINISH	OBID	PROCESSING	WIDTH
CMRTAGFIDELITY	FLASH	OBJECT	QUALITY	XATTR
CMYK	FLDNUM	OBKEEP	RADIUS	XLAYOUT
COLOR	FONT	OBNOKEEP	RASTER	XMSIZE
COLORVALUERR	FONTFID	OBTYPE	RATIO	XSPACE
COMMENT	FORMDEF	OBXNAME	RECID	YMSIZE
COMPATPGP1	FRONT	OB2CMR	REFERENCE	
CONDITION	GRAPHID	OB2ID	RELATIVE	
CONSTANT	GRID	OB2RESOURCE	RENDER	
COPIES	GROUP	OB2TYPE	REPEAT	
COPY	GRPHEADER	OB2XNAME	REPLACE	
	HEIGHT	OCA	RES	

Appendix G. PPFA Media Names

Table 31 on page 527 lists the PPFA media names, media types, and component identifiers.

Note: The range of component IDs 12,288 - 268,435,455 is reserved for user-defined media types.

Table 31: Registered Media Types Sorted By Media Name

Media Name	Media Type	Component ID
BSNS ENV	North American business envelope	143
COM 10 ENV	Com10 envelope (9.5 x 4.125 in)	75
C5 ENV	C5 envelope (229 x 110 mm)	79
DL ENV	DL envelope (220 x 110 mm)	77
EXEC	North American executive (7.25 x 10.5 in)	65
INDEX CD	Index Card	150
ISO A3	ISO A3 white (297 x 420 mm)	10
ISO A3 CO	ISO A3 colored	11
ISO A4	ISO A4 white (210 x 297 mm)	0
ISO A4 CO	ISO A4 colored	1
ISO A4 TAB	ISO A4 tab (225 x 297 mm)	7
ISO A4 THD	ISO 1/3 A4	5
ISO A4 TR	ISO A4 transparent	2
ISO A5	ISO A5 white (148.5 x 210 mm)	20
ISO A5 CO	ISO A5 colored	21
ISO A6 PC	ISO A6 Postcard	152
ISO B4	ISO B4 white (257 x 364 mm)	30
ISO B4 CO	ISO B4 colored	31
ISO B4 ENV	ISO B4 envelope	83
ISO B5	ISO B5 white (176 x 250 mm)	40
ISO B5 CO	ISO B5 colored	41
ISO B5 ENV	ISO B5 envelope	73
ISO C4 ENV	ISO C4 envelope	93
ISO C5 ENV	ISO C5 envelope	103
ISO LNG ENV	ISO long envelope	113
JIS B4	JIS B4 (257 x 364 mm)	42
JIS B5	JIS B5 (182 x 257 mm)	43
JP PC	Japan postcard (Hagaki) (100 x 148 mm)	81

Table 31: Registered Media Types Sorted By Media Name (continued)

Media Name	Media Type	Component ID
JP PC ENV	Japan postcard envelope (200 x 150 mm)	80
LEDGER	North American ledger (11 x 17 in)	67
LEGAL	North American legal white (8.5 x 14 in)	60
LEGAL CO	North American legal colored	61
LEGAL TAB	Legal tab (9 x 14 in)	146
LEGAL 13	North American legal 13 (Folio) (8.5 x 14 in)	63
LETTER	North American letter white (8.5 x 11 in)	50
LETTER CO	North American letter colored	51
LETTER TAB	Letter tab (9 x 11 in)	145
LETTER TR	North American letter transparent	52
MON ENV	Monarch envelope (7.5 x 3.875 in)	76
RA3	Oversize A3 (16.923 x 12.007 in)	153
RA4	Oversize A4 (8.465 x 12.007 in)	162
STATEMNT	North American statement (5.5 x 8.5 in)	69
US PC	US Postcard	151
9x12 ENV	North American 9 x 12 envelope	133
10x13 ENV	North American 10 x 13 envelope	123
9x12 MAN	Manual (9 x 12 in)	147
8x10 MED	Media (8 x 10 in)	160
8x10.5 MED	Media (8 x 10.5 in)	148
8.5x10 MED	Media (8.5 x 10 in)	157
9x14 MED	Media (9 x 14 in)	149
12x18 MED	Media (12 x 18 in)	155
14x17 MED	Media (14 x 17 in)	154
14x18 MED	Media (14 x 18 in)	156

Appendix H. Fill Patterns for DRAWGRAPHIC Commands

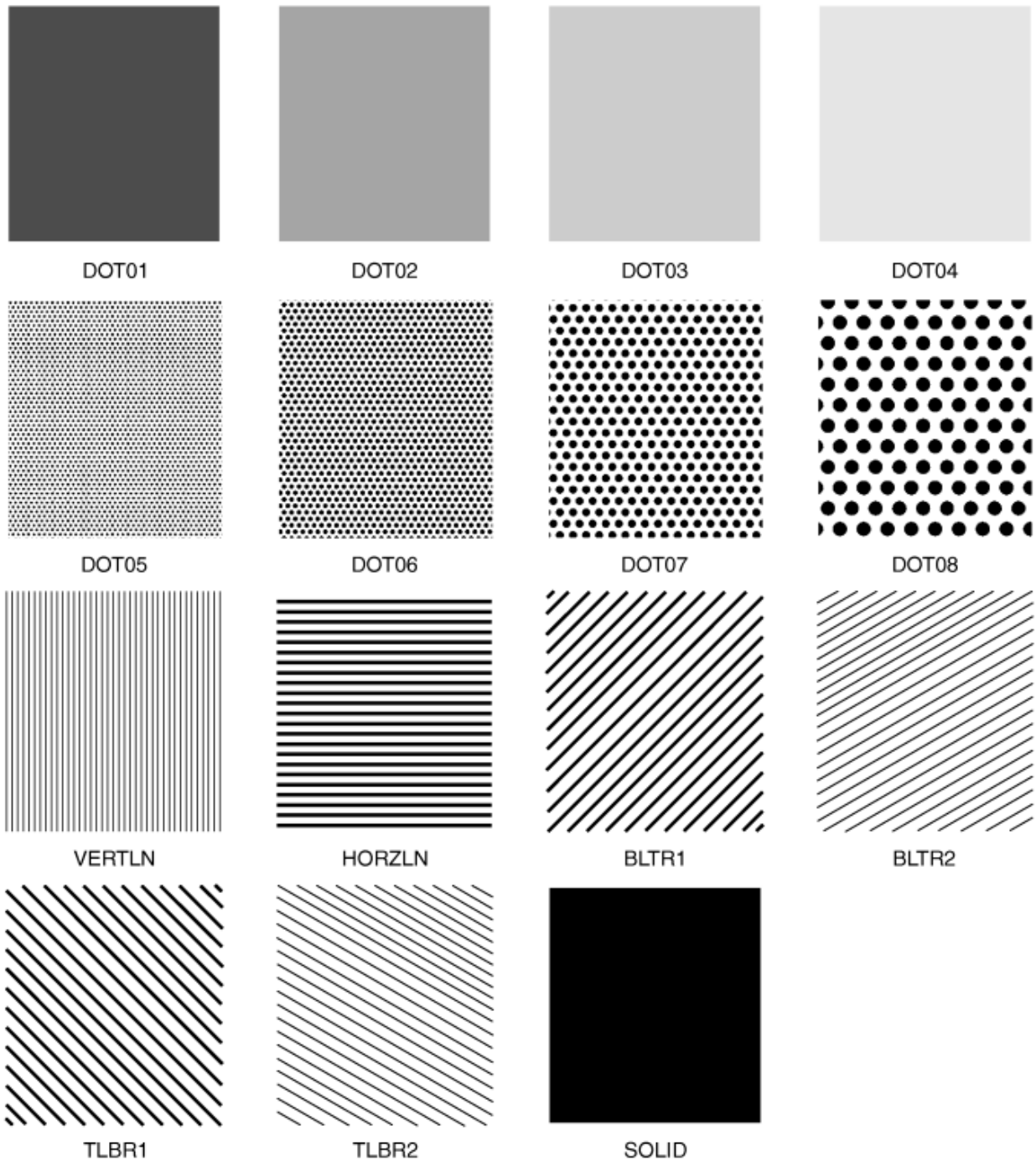


Figure 167: Fill Patterns for DRAWGRAPHIC Commands

Appendix I. PPFA Messages and Codes

At the end of processing for each command, the maximum error level that is encountered during processing is printed on the system printer, providing the error was not caused by the system printer itself. The meaning of the return codes is shown in [Table 32 on page 531](#).

Return Code	Severity	Description
Return Code 0	I = Information; the command is processed.	PPFA did not encounter any problems. No warning, error, severe-error, or termination-error message was issued.
Return Code 4	W = Warning; the command is processed.	PPFA encountered at least one non-terminating error, which was solved by an assumption. At least one warning message was issued. No error, severe-error, or terminating-error message was issued. The requested function was most likely correctly done. The program ran to completion.
Return Code 8	E = Error; the command is partially processed.	PPFA encountered at least one error, but no severe or terminating error. A requested function might be partially incomplete.
Return Code 12	S = Severe error; the command is not processed.	PPFA encountered a severe error. The program ran to completion, but some of the functions requested were not done.
Return Code 16	T = Termination error; the job is ended.	PPFA encountered a terminating error. The program ended prematurely.

PPFA Messages and Their Meanings

The general format of the error message is as follows:

All messages consist of a standard seven-character prefix, followed by the message text:

AKQnnns THIS IS THE MESSAGE TEXT . . .

- AKQ is the three-character identifier of Page Printer Formatting Aid (PPFA).
- *nnn* is the message number.
- *s* is the message-severity indicator. The severity indicators are defined in [Table 32 on page 531](#).

Notes:

1. You cannot use the `ps fmsg` command to view PPFA messages.
2. PPFA errors are written to a listing file.
3. PPFA issues a maximum of 269 user errors that are generated within a source file, and one additional message that is used for the message queue to indicate an out-of-storage condition.

AKQ001E END OF COMMENT (*) IS NOT SPECIFIED.

System action

The page definition or form definition is not generated. The syntax check might be ended.

Explanation

The end mark of a comment (*) is not specified.

Operator response

Specify the end mark of a comment.

AKQ002E DBCS STRING DOES NOT END WITH SHIFT-IN.

Explanation

DBCS strings in comments must end with shift-in.

System action

The form definition or page definition is not generated. The syntax check continues, assuming shift-in.

Operator response

Specify a valid DBCS string that is enclosed by SO and SI.

AKQ003E LITERAL DOES NOT END WITH APOSTROPHE.

Explanation

A literal must end with an apostrophe.

System action

The page definition is not generated. The syntax check continues, assuming an apostrophe.

Operator response

Specify a valid literal that is enclosed by apostrophes. An apostrophe in a literal is specified by consecutive double apostrophes.

AKQ004E DBCS LITERAL DOES NOT END WITH SHIFT-IN AND APOSTROPHE.

Explanation

A DBCS literal must end with shift-in and apostrophe.

System action

The page definition is not generated. The syntax check continues, assuming the end of the DBCS literal at the end of a record.

Operator response

Specify a valid literal that is ended by shift-in and apostrophe.

AKQ101E COMMAND SEQUENCE IS INVALID.

Explanation

The command sequence is invalid.

System action

A page definition or form definition is not generated. The syntax check continues from a valid command.

Operator response

Specify commands in a valid sequence.

AKQ102E INVALID COMMAND (*erroneous entry*) IS SPECIFIED.

Explanation

An invalid command is specified in the input data.

System action

A page definition or form definition is not generated. The syntax check continues from a valid command.

Operator response

Specify a valid command.

AKQ103E INVALID SUBCOMMAND (*value*) IS SPECIFIED.

Explanation

An invalid subcommand was specified in the input data. This message is often issued when a semicolon (;) is missing

System action

A page definition or form definition is not generated. The syntax check continues from the next keyword.

Operator response

Specify a valid subcommand.

AKQ104E (*command or parameter name*) NAME IS NOT SPECIFIED.

Explanation

The required name is not specified.

System action

A page definition or form definition is not generated. The syntax check continues, assuming blanks or default as the name.

Operator response

Specify the required name.

AKQ105E **REQUIRED PARAMETER IN
(*subcommand name*) IS NOT
SPECIFIED.**

Explanation

The subcommand that is indicated in the message requires a correct PPFA format.

System action

A page definition or form definition is not generated. The syntax check continues, assuming the default values.

Operator response

See the command reference section of this publication for help in specifying a valid subcommand parameter.

AKQ106E **(*command or parameter name*)
NAME IS SPECIFIED WITH
INVALID SYNTAX.**

Explanation

The required name is specified with invalid syntax. See Table 8 on page 184 for the correct length of names.

System action

A page definition or form definition is not generated. The syntax check continues.

Operator response

Specify a valid name.

AKQ107E **PARAMETER IN (*subcommand
name*) IS INVALID.**

Explanation

The parameter in the subcommand is invalid (invalid format or out of range).

System action

A page definition or form definition is not generated. The syntax check continues, assuming the default values as the parameter.

Operator response

Specify a valid parameter value.

AKQ108E **(*subcommand name*)
SUBCOMMAND IS DUPLICATED IN
ONE COMMAND.**

Explanation

The subcommand that is indicated in the message was specified more than once in the same command. Only one such subcommand is allowed within this command.

System action

A page definition or form definition is not generated. The syntax check continues, ignoring the duplicate subcommand.

Operator response

Delete one subcommand.

AKQ109E **(*subcommand name*)
SUBCOMMAND CONFLICTS WITH
(*subcommand name*)
SUBCOMMAND.**

Explanation

One subcommand conflicts with another (FONT, PRINTLINE, FIELD, OPCOUNT, OPPOS)

System action

A page definition or form definition is not generated. The syntax check continues, ignoring the latter subcommand.

User response

Delete one of the subcommands.

AKQ110E **THE VALUE OF THE (*command
name*) SUBCOMMAND IS TOO
LARGE OR TOO SMALL.**

Explanation

The parameter in the subcommand is out of range.

IN
136.5

MM
3467.1

CM
346.7

POINTS
9828.0

PELS (L-units)
32760

These values are specified in:

```
FORMDEF N_UP OVERLAY relative_xpos
relative_ypos
PAGEDEF PRINTLINE OVERLAY / SEGMENT
relative_xpos relative_ypos
```

Note: The values that are specified for the CPI and LPI are set in the SETUNITS subcommand.

System action

No form definition or page definition is generated. PPFA continues syntax checking.

Operator response

Specify a valid parameter value.

AKQ111E	SUBCOMMAND SEQUENCE IS INVALID: (<i>subcommand name</i>) OCCURS AFTER (<i>subcommand name</i>)
----------------	---

Explanation

For example, a WHEN subcommand occurs after an OTHERWISE subcommand in a CONDITION command.

System action

A page definition or form definition is not generated. The syntax check continues, ignoring the subcommand.

Operator response

Reorder or rewrite the conditions.

AKQ112E	CONDITION COMMAND DOES NOT ALLOW '*' IN ITS START SUBCOMMAND.
----------------	--

Explanation

A relative position ('*', '* + *n*', or '* - *n*') was specified in a START subcommand of a CONDITION command.

System action

A page definition or form definition is not generated. The syntax check continues from the valid subcommand.

Operator response

Specify an absolute starting position.

AKQ113E	MORE THAN ONE 'WHEN' SUBCOMMAND SPECIFIED THE CHANGE PARAMETER.
----------------	--

Explanation

More than one WHEN subcommand specified CHANGE for its field comparison.

System action

A page definition or form definition is not generated. The syntax check continues from the valid subcommand.

Operator response

Remove the extra subcommands that specify the CHANGE parameter.

AKQ114E	NUMBER OF PARAMETERS EXCEED LIMIT FOR (<i>subcommand name</i>) SUBCOMMAND OR KEYWORD.
----------------	--

Explanation

The named subcommand or keyword in the message limits the number of parameters that can be coded with a single subcommand or keyword. The number of parameters that can be coded with the named subcommand or keyword is defined in [Chapter 10, "Form Definition Command Reference,"](#) on page 189 and [Chapter 11, "Page Definition Command Reference,"](#) on page 249.

System action

The form definition is not generated. The syntax check continues from the valid subcommand.

Operator response

Remove the extra parameters.

AKQ115E	REQUIRED PARAMETER(S) (PARAM1, PARAM2, ...) IN (COMMAND OR SUBCOMMAND) IS (ARE) NOT SPECIFIED.
----------------	---

Explanation

This generic message indicates that one or more parameters are missing on a subcommand or command. For example, a DRAWGRAPHIC BOX must have a BOXSIZE subcommand coded.

System action

A page or form definition is not generated.

Operator response

Provide the correct parameters on the command or subcommand.

**AKQ116E PARAMETER (PARM1) IN
(COMMAND OR SUBCOMMAND) IS
INVALID.**

Explanation

This generic message indicates that a parameter in a subcommand or command is invalid.

System action

A page or form definition is not generated.

Operator response

Provide the correct parameter on the command or subcommand.

**AKQ117E PARAMETER (PARM1) IN
(COMMAND OR SUBCOMMAND) IS
DUPLICATED.**

Explanation

This generic message indicates that a parameter in a subcommand or command is coded more than once. For example, ...LINEWT LIGHT BOLD... shows two different line weights in the same subcommand.

System action

A page or form definition is not generated.

Operator response

Remove one of the parameters.

**AKQ118E MUTUALLY EXCLUSIVE
PARAMETERS ON THE (INSERT1)
COMMAND OR SUBCOMMAND ARE
DUPLICATED.**

Explanation

A command or subcommand contains more than one mutually exclusive parameter. For example, the PAGECOUNT subcommand on the PAGEDEF command cannot have both STOP and CONTINUE coded.

System action

A page or form definition is not generated.

Operator response

Remove one of the parameters.

**AKQ119E GRAPHICS-TYPE (BOX, LINE,
CIRCLE, ELLIPSE) MUST
IMMEDIATELY FOLLOW
DRAWGRAPHIC.**

Explanation

The DRAWGRAPHIC command must have the graphics type (BOX, LINE, CIRCLE, ELLIPSE) immediately following the command.

System action

A page or form definition is not generated.

Operator response

Code one of the graphics types.

**AKQ120I UNKNOWN COMPONENT ID. PPFA
WILL ASSUME IT IS SUPPORTED.**

Explanation

PPFA allows the use of numeric component IDs when the object type is OTHER so that new OTHER object types can be supported without a new release of PPFA. The unknown component ID is one of them.

System action

A PAGEDEF is generated.

Operator response

Ensure that the object type component ID is supported by your printer and PSF service level.

**AKQ121W COMMAND SEQUENCE IS
INVALID. A (insert-1) OCCURS
BEFORE A (insert-2).**

Explanation

For example, an overlay occurs outside a copy group.

System action

A dummy copy group is created that is the first copy group. The FORMDEF is generated.

Operator response

Reorder the command statements.

**AKQ122W THE (insert-1) IS TOO LONG. IT IS
TRUNCATED TO (insert-2) BYTES.**

Explanation

The input length of a parameter is exceeded. For example, the maximum length of a bar code Macro is 4096 bytes.

System action

Only the first (*insert-2*) bytes of a parameter are used. Processing continues. A PAGEDEF is generated.

Operator response

Use a shorter text parameter.

AKQ201E *(subcommand name)*
**SUBCOMMAND IS NOT
SPECIFIED.**

Explanation

The required subcommand is not specified.

System action

A page definition or form definition is not generated. The syntax check continues, assuming the default.

Operator response

Specify the required subcommand.

AKQ202E **SPECIFIED (*command name*)
NAME IS NOT DEFINED.**

Explanation

A resource name (OVERLAY, SUPPRESSION, FONT, OBJECT, QTAG, or COLOR) is not defined.

System action

A page definition or form definition is not generated. The syntax check continues.

Operator response

Correct the name.

AKQ203W *(command name)* **NAME IS
DUPLICATED.**

Explanation

The required name must be unique for OVERLAY, COPYGROUP, FONT, PAGEFORMAT, OBJECT, or SUPPRESSION.

System action

A page definition or form definition is generated.

Operator response

Specify a unique name.

AKQ204E *(object)* **NAME IS DUPLICATED.**

Explanation

The name must be unique (OVERLAY, COPYGROUP, FONT, PAGEFORMAT, SEGMENT).

System action

A page definition or form definition is not generated. The syntax check continues.

Operator response

Specify a unique name.

AKQ205E **PAGEFORMAT (*pageformat name*)
WAS NOT FOUND IN THIS PAGE
DEFINITION.**

Explanation

A WHEN or OTHERWISE subcommand of CONDITION specifies a PAGEFORMAT name that is not found in the page definition that is processed.

System action

A page definition or form definition is not generated. The syntax check continues.

Operator response

Specify a *pageformat name* that is in the page definition.

AKQ206E **CONDITION (*condition name*) HAS
ALREADY BEEN DEFINED.**

Explanation

A CONDITION command specifies LENGTH, WHEN, or OTHERWISE, and the condition with this condition name is already defined by an earlier CONDITION command.

System action

A page definition is not generated. The syntax check continues.

Operator response

Define the condition only the first time it occurs.

AKQ210E **THE RELATIVE POSITION VALUE
EXCEEDS THE ALLOWED RANGE**

System action

The value that is specified for the *relative x* position or *relative y* position on the N_UP subcommand (for an OVERLAY) or PRINTLINE command (for an OVERLAY or SEGMENT) exceeds the range of +32760 to -32760 L-

units. For example, assuming the default of 240 pels per inch is being used, the values must be equal to, or less than these units:

IN

136.5

MM

3467.1

CM

346.7

POINTS

9828.0

PELS (L-units)

32760 (+ or -)

CPI

*

LPI

*

The value that is specified for CPI or LPI in the SETUNITS command determines whether the value exceeds 32760 L-units.

System action

The page definition or form definition is not generated. The syntax check continues.

Operator response

Correct the *relative x* and *y* position values within the allowed range.

AKQ211E FRONT/BACK SIDE IS NOT SPECIFIED FOR DUPLEX.

Explanation

The SUBGROUP specified with BACK does not exist after the SUBGROUP specified with FRONT, or the SUBGROUP specified with FRONT does not exist before the SUBGROUP specified with BACK.

System action

A form definition is not generated. The syntax check continues.

Operator response

Specify subgroups for both sides.

AKQ212W PAPER SIDE IS SPECIFIED FOR SIMPLEX.

Explanation

A subgroup that is specified with BOTH, FRONT, or BACK is invalid with single-sided printing.

System action

A form definition is generated, which ignores the subcommand that specifies the paper side.

User response

Either delete the subcommand that specified the paper side or specify DUPLEX.

AKQ213E LOGICAL PAGE POSITION EXCEEDS THE LIMIT.

Explanation

The logical page position that is specified by the OFFSET subcommand in the FORMDEF or COPYGROUP command exceeds the limits.

System action

A form definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ214E MORE THAN 127 SUPPRESSIONS ARE SPECIFIED IN ONE FORMDEF.

Explanation

More than 127 suppressions are specified in one FORMDEF.

System action

A form definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ215E MORE THAN 127 OVERLAYS ARE SPECIFIED IN ONE COPYGROUP.

Explanation

More than 127 OVERLAYS are specified in one copy group. PPFA can issue this message for an N_UP subcommand that specifies more than 127 overlays.

System action

No form definition is generated. The syntax check continues.

User response

Correct the error.

AKQ216E MORE THAN ONE RASTER OVERLAY IS SPECIFIED IN ONE COPYGROUP.**Explanation**

More than one raster OVERLAY is specified in one copy group.

System action

A form definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ217W LOGICAL PAGE POSITION FOR BACK SIDE OF PAGE SPECIFIED IN SIMPLEX PROCESSING**Explanation**

The logical-page position that is specified by the OFFSET subcommand in a FORMDEF or COPYGROUP command for the back side of a page was specified, but simplex was specified in a COPYGROUP command.

System action

A form definition is generated, with the back side logical page position included, as if duplex is specified. The syntax check continues.

Operator response

Correct the error by specifying duplex in the COPYGROUP command or remove the second set of coordinates in the OFFSET subcommand.

AKQ218E MORE THAN 255 COPIES ARE SPECIFIED IN ONE COPYGROUP.**Explanation**

More than 255 copies are specified in a COPYGROUP.

System action

A form definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ219E MORE THAN 127 SUBGROUPS ARE SPECIFIED IN ONE COPYGROUP.**Explanation**

More than 127 subgroups are specified in a COPYGROUP.

System action

A form definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ220E MORE THAN 8 OVERLAYS ARE SPECIFIED IN ONE SUBGROUP.**Explanation**

More than eight overlays are specified in one SUBGROUP.

System action

A form definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ221E MORE THAN 8 SUPPRESSIONS ARE SPECIFIED IN ONE SUBGROUP.**Explanation**

More than eight suppressions are specified in one SUBGROUP.

System action

A form definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ222W DIFFERENT NUMBERS OF COPIES ARE SPECIFIED FOR EACH SIDE OF DUPLEX.**Explanation**

The number of copies for BACK side is not equal to the ones for FRONT side.

System action

A form definition is generated, which assumes the number of copies that are specified for front side.

Operator response

Check the number of copies.

AKQ223E **LOGICAL PAGE POSITION FOR
(page side) SIDE OF PAGE
EXCEEDS THE LIMIT.**

Explanation

The logical-page position that is specified by the OFFSET subcommand in a FORMDEF or COPYGROUP command exceeds the limit for the current side of the page.

System action

A form definition is not generated. The syntax check continues.

Operator response

Correct the positioning OFFSET parameter.

AKQ224E **MORE THAN 254 OVERLAYS ARE
SPECIFIED IN A PAGEFORMAT.**

Explanation

The maximum number of OVERLAY commands is 254. PPFA can issue this message for the OVERLAY subcommand of the PRINTLINE command.

System action

A page definition is not generated. The syntax check continues.

User response

Specify a valid number of OVERLAY commands.

AKQ225E **CONSTANT SUBCOMMAND
PARAMETER (*parameter*)
SPECIFIED IN SIMPLEX
PROCESSING**

Explanation

The BACK or BOTH parameter is specified for the CONSTANT subcommand within simplex processing.

System action

A form definition is not generated. The syntax check continues.

Operator response

Correct this CONSTANT subcommand or indicate DUPLEX.

AKQ226E **DIRECTION SUBCOMMAND ONLY
ALLOWED WITH PRESENT
SUBCOMMAND.**

Explanation

The DIRECTION subcommand is specified, but the PRESENT subcommand is not.

System action

A form definition is not generated. The syntax check continues.

Operator response

Either add the PRESENT subcommand or remove the DIRECTION subcommand.

AKQ227E **THE ORIGIN OF THE RESOURCE
(name) NAMED IN THE PRINTLINE
COMMAND IS OFF THE LOGICAL
PAGE.**

Explanation

The relative position of the PRINTLINE overlay or segment that is named is off the logical page. The origin of the overlay or segment that is specified for the resource that is named in the N_UP subcommand is off the medium.

System action

The page definition that has the overlay or segment in question is not generated. PPFA continues the syntax check, ignoring the problem.

Operator response

Correct the x-position and y-position for the OVERLAY or SEGMENT subcommand.

AKQ228E **THE ORIGIN OF THE OVERLAY
(*overlay name*) NAMED IN THE
(*command*) COMMAND IS OFF THE
MEDIUM**

Explanation

The resource position values position the resource such that at least part of the resource is off the medium (physical page).

System action

The form definition that has the overlay in question is not generated. PPFA continues the syntax check, ignoring the problem.

User response

Correct the relative x-position and relative y-position values for the OVERLAY named in the N_UP subcommand.

AKQ229W **SUBGROUPS FOR FRONT AND BACK OF SAME SHEET USED DIFFERENT BINS.**

Explanation

In your subgroup command, you specified FRONT and BACK parameters. However, your COPYGROUP has different bins that are specified.

System action

A form definition is generated that specifies the bin that is used for the front side.

Operator response

Check the number of copies and correct the bin setting.

AKQ231E **PRINTLINE OR LAYOUT IS NOT SPECIFIED.**

Explanation

No PRINTLINE or LAYOUT command exists in the page format.

System action

A page definition is not generated. The syntax check continues.

Operator response

Specify either a PRINTLINE or LAYOUT command.

AKQ232E **REQUIRED SUBCOMMAND TEXT OR LENGTH IS NOT SPECIFIED.**

Explanation

A FIELD subcommand must have a TEXT or LENGTH subcommand.

System action

A page definition is not generated. The syntax check continues.

Operator response

Specify either a TEXT subcommand or a LENGTH subcommand.

AKQ233E **THE LOGICAL PAGE SIZE IS TOO LARGE OR TOO SMALL.**

Explanation

The specified page size is too large or too small. The page size must be 1 - 32767 pels. The HEIGHT and WIDTH subcommands must be 1 - 32767 pels or the same measurements expressed in other units.

System action

A page definition is not generated. The syntax check continues, assuming the defaults.

Operator response

Correct the error.

AKQ234E **POSITION OF LINEONE EXCEEDS THE LOGICAL PAGE BOUNDARY.**

Explanation

The TOP or MARGIN position that is specified by the LINEONE subcommand exceeds the logical page boundary. This error message is issued only if TOP or MARGIN is specified.

System action

A page definition is not generated. The syntax check continues.

Operator response

Specify a valid position value.

AKQ235E **MORE THAN 127 SEGMENTS ARE SPECIFIED IN ONE PAGEFORMAT.**

Explanation

More than 127 segments are specified in a single PAGEFORMAT command. PPFA can issue this message for the SEGMENT subcommand of the PRINTLINE command.

System action

No page definition is generated. The syntax check continues.

User response

Correct the error.

AKQ238E **MORE THAN 127 FONTS ARE SPECIFIED IN ONE PAGEFORMAT.**

Explanation

More than 127 fonts are specified in one PAGEFORMAT or the specified TRC number exceeds 126. PPFA counts each use of a font in more than one direction or rotation as a separate font.

System action

A page definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ239E PRINT POSITION EXCEEDS THE LOGICAL PAGE BOUNDARY.

Explanation

The print position that is specified by POSITION subcommand exceeds the logical page boundary.

System action

A page definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ240E NUMBER OF PRINTLINES, FIELDS, AND CONDITIONS EXCEEDS 65,535 IN ONE PAGEFORMAT.

Explanation

The total number of PRINTLINES, FIELDS, and CONDITIONS exceeds 65,535 in one page format.

System action

A page definition is not generated. The syntax check continues.

Operator response

Reduce the number of PRINTLINES, FIELDS, or CONDITIONS in the page format.

AKQ241E TOTAL LENGTH OF TEXT DATA EXCEEDS 65,534 BYTES.

Explanation

The total length of text can be up to 65,534 bytes.

System action

A page definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ242E THE VALUE OF THE STARTING POSITION OF A RECORD IS TOO LARGE OR TOO SMALL.

Explanation

The START position of a record exceeds the maximum (65,535) or minimum (1) value.

System action

A page definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ243E DBCS LENGTH IS NOT A MULTIPLE OF 2.

Explanation

The number of bytes of DBCS must be a multiple of two. Therefore, the value of the LENGTH parameter must be a multiple of two.

System action

A page definition is not generated. The syntax check continues.

Operator response

Specify a valid length or a valid DBCS.

AKQ244E INVALID CODE IS SPECIFIED IN THE TEXT.

Explanation

SBCS text must be within code range X'00' to X'FE'.

Valid double-byte character set (DBCS) codes are between X'41' and X'FE' for each byte. PPFA checks this range. Code X'4040' (blank) is the only exception. For example, the following are valid DBCS codes: X'4040', X'4141', X'41FE', X'FE41', X'FEFE'.

System action

A page definition is not generated. The syntax check continues.

Operator response

Specify a valid code.

AKQ245E HEXADECIMAL TEXT IS INVALID.

Explanation

Hexadecimal text is specified in an invalid format. Hexadecimal text must have an even length parameter and be in hexadecimal notation ('0' to 'F').

System action

A page definition is not generated. The syntax check continues.

Operator response

Specify valid hexadecimal text.

AKQ246E NULL LITERAL IS SPECIFIED.

Explanation

The literal has no string.

System action

A page definition is not generated. The syntax check continues.

Operator response

Specify a valid literal.

AKQ247E KANJI NUMBER TEXT IS INVALID.

Explanation

A Kanji number is specified in invalid format. Kanji number text must be a string of Kanji numbers that are delimited by commas. Each Kanji number must be a decimal number equal to a valid DBCS code, minus X'4000'.

System action

A page definition is not generated. The syntax check continues.

Operator response

Specify valid kanji numbers in a valid format.

AKQ248E TEXT ATTRIBUTE CONFLICTS WITH FONT.

Explanation

SBCS font is specified for DBCS text (type G, K), or DBCS font is specified for SBCS text (type C).

System action

A page definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ249E TEXT ATTRIBUTE CONFLICTS WITH TEXT TYPE.

Explanation

The literal type conflicts with text type. SBCS literal is specified as type G or X, and DBCS literal is specified as type C, X, or K.

System action

A page definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ250E TRC NUMBER IS DUPLICATED.

Explanation

The specified TRC number is duplicated in one page format.

System action

A page definition is not generated. The syntax check continues.

Operator response

Correct the error.

AKQ251W SPECIFIED LENGTH IS SHORTER THAN THE TEXT AND WAS TRUNCATED.

Explanation

The LENGTH parameter of the TEXT subcommand is shorter than the length of the specified literal, which is truncated to a specified length.

System action

The operation continues, truncating the literal.

Operator response

Check the truncation.

AKQ252E **TEXT IS NOT THE LENGTH
SPECIFIED BY THE LENGTH
SUBCOMMAND.**

Explanation

The length of the comparison text in a WHEN or OTHERWISE subcommand of a CONDITION command is not equal to the length specified by the LENGTH subcommand of that CONDITION command.

System action

A page definition is not generated. The syntax check continues.

Operator response

Change the comparison text or the LENGTH parameter so that they match.

AKQ253E **TEXT IN THE 'WHEN'
SUBCOMMAND IS TOO LONG.**

Explanation

Constant text in a WHEN subcommand of a CONDITION command is too long to fit into an 8150-byte CCP structured field.

System action

A page definition or form definition is not generated. The syntax check continues.

Operator response

Shorten the field to 8000 bytes or fewer, and shorten the comparison text accordingly.

AKQ254E **(text type) LITERAL WAS
EXPECTED BUT (text type) WAS
FOUND.**

Explanation

An SBCS literal occurs where a DBCS one was expected, or vice versa.

System action

A page definition or form definition is not generated. The syntax check continues.

Operator response

In a FIELD command, do not use a DBCS literal without specifying a DBCS font. In a CONDITION command, do not mix SBCS and DBCS literals in the comparison text of a single WHEN subcommand.

AKQ255E **INVOKE SPECIFIES A SIDE FOR
WHICH NO PLACE
SUBCOMMANDS PUT DATA.**

Explanation

The N_UP PLACE subcommand contains an error that makes it incompatible with the value that is specified in the INVOKE subcommand. Either INVOKE BACK was specified, but PLACE *n* BACK was not specified, or INVOKE FRONT was specified, but PLACE *n* FRONT was not specified.

System action

No form definition is generated. Processing continues.

User response

Specify the same value (FRONT or BACK) for both the INVOKE and PLACE subcommands.

AKQ256E **INCORRECT NUMBER OF PLACE
SUBCOMMANDS.**

Explanation

The required number of PLACE subcommands must be specified.

System action

No form definition is generated. Processing continues.

User response

When you are using N_UP PLACE subcommands with single-sided printing, the number of PLACE subcommands must equal the value that is specified on N_UP. When you are using duplex printing, the number of PLACE subcommands must equal two times the value that is specified on N_UP.

AKQ257W **CONSTANT (*parameter*) FOUND
WITH PLACE SUBCOMMAND.**

Explanation

The CONSTANT (*parameter*) subcommand cannot be specified when N_UP PLACE subcommands are specified.

System action

A form definition is generated without constant forms control. The syntax check continues.

User response

Delete the CONSTANT (*parameter*) from the FORMDEF or COPYGROUP command.

AKQ258W **MORE THAN 122 OPERATION POSITIONS SPECIFIED FOR A FINISH OPERATION.**

Explanation

More than 122 finishing operation positions are specified.

System action

A form definition is generated with 122 finishing positions. All others are ignored.

User response

Move extraneous operator position values.

AKQ259W **OPCOUNT AND OPPOS VALUES SPECIFIED. OPCOUNT IGNORED.**

Explanation

Both OPCOUNT and OPPOS are specified.

System action

A form definition is not generated.

Operator response

If OPCOUNT is specified, OPPOS is ignored. When you are using OPPOS for controlling the position of each operation on the operation axis, OPCOUNT is ignored.

AKQ260E **(insert-1) not allowed with/on a (insert-2).**

Explanation

This generic message indicates a contextually incorrect combination of PPFA commands or subcommands. If this message indicates that an action is not allowed with or on a CMR of this type, the processing mode is not valid for that type of CMR. LINK is valid only for device link (DL) CMRs and device link (DL) CMRs can have only processing mode LINK. Any other use of LINK processing mode results in error message AKQ260E.

System action

A page definition or form definition is not generated.

Operator response

Correct the incorrect parameter and rerun the job.

AKQ261E **(insert-1) requires (insert-2).**

Explanation

This generic message indicates that a PPFA command or subcommand is missing.

System action

A page definition is not generated.

Operator response

Add the required parameter and rerun the job.

AKQ262E **(insert-1) specifies a (insert-2) which is not a (insert-3).**

Explanation

This generic message indicates a contextually incorrect combination of PPFA commands or subcommands. For example, an ENDGRAPHIC command is specified or defaulted to a GRAPHID that does not match a floating DRAWGRAPHIC BOX or DRAWGRAPHIC LINE.

System action

A page definition is not generated.

Operator response

Correct the indicated problem.

AKQ263E **(insert-1) exceeds (insert-2).**

Explanation

This generic message indicates an out of bound condition for some parameters. For example, a DRAWGRAPHIC CIRCLE is positioned off the logical page.

System action

A page definition is not generated.

Operator response

Correct the indicated problem.

AKQ264W **(insert-1) is ignored (insert-2).**

Explanation

This generic message indicates that a contextually incorrect combination of PPFA commands or subcommands is clearly incorrect and is ignored. For example, if a LINEONE subcommand was coded on a Record Format PAGEDEF (for example, one using LAYOUT), the LINEONE subcommand is ignored.

System action

A page definition is generated.

Operator response

No action necessary unless the result is not what you wanted.

AKQ265W *(insert-1)* exceeds *(insert-2)*.

Explanation

This generic message indicates an out of bounds condition for some parameters, which is not necessarily critical. For example, a DRAWGRAPHIC CIRCLE is positioned outside the margin boundary but is still on the logical page.

System action

A page definition is generated.

Operator response

No action necessary unless the result is not what you wanted.

AKQ266E **PAGEDEF CONTAINS BOTH
LAYOUT AND PRINTLINE
COMMANDS.**

Explanation

Lines are placed in a record format page definition by using LAYOUT commands or in an XML page definition by using XLAYOUT command; otherwise, lines are placed with PRINTLINE commands. The commands cannot be mixed in the same page definition.

System action

A page definition is not generated.

Operator response

Remove either the LAYOUT, XLAYOUT, or PRINTLINE commands.

AKQ267E **MORE THAN ONE DEFAULT
PAGEHEADER OR PAGETRAILER
IN A PAGEFORMAT.**

Explanation

Only one LAYOUT DEFAULT PAGEHEADER or PAGETRAILER can be coded in a PAGEFORMAT.

System action

A page definition is not generated.

Operator response

Remove one of the duplicates.

AKQ268E **SPECIFIED MARGINS FOR THIS
PAGEFORMAT OVERLAP.**

Explanation

Either the left margin is defined on or right of the right margin or the top margin is defined on or below the bottom margin.

System action

A page definition is not generated.

Operator response

Redefine the margins so that they do not overlap.

AKQ269E **A RECORD FORMAT PAGEDEF
REQUIRES AT LEAST ONE FONT
DEFINITION.**

Explanation

At least one font must be defined whether one is referenced.

System action

A page definition is not generated.

Operator response

Define a font.

AKQ270E **PDF417 MACRO DATA BYTE
(insert-1), CODEPOINT *(insert-2)*
CANNOT BE TRANSLATED TO GLI
O ENCODATION**

Explanation

All code points in an ASCII bar code must ultimately end up as ASCII. The printer translates EBCDIC code points if you tell it, but it translates both the macro data and the regular data.

When EBCDIC to ASCII translation is requested for a PDF417 bar code and the PAGEDEF is being compiled on an ASCII operating system, macro data that exists is in ASCII. You now have mixed data, which cannot be translated. Therefore, PPF must translate the ASCII macro data to EBCDIC so that both are the same. The printer can now translate the data and print the bar code. However, not all EBCDIC code points translate to GLIO, as the message indicates.

System action

The PAGEDEF is not generated.

Operator response

Make sure that all the PDF417 macro text translates to EBCDIC code points.

AKQ271E **THE FONT TYPE AND USER DATA TYPE (UDTYPE) SPECIFIED CAUSES A DATA TRANSFORMATION THAT IS NOT SUPPORTED**

Explanation

When the User's Data Type (UDType) and font encoding are different, the printer must translate your data to the encoding type of the font. For example, if the UDType is UTF8 and the font is an ASCII font, then the printer must translate your data from UTF8 to ASCII. Therefore, combinations are restricted to these:

UDType of UTF8

Fonts can be only ASCII or UNICODE.

UDType of UTF16

Fonts can be only UNICODE.

System action

PAGEDEF is not generated.

User response

Chooses an appropriately encoded font.

AKQ275I *(insert-1)*

Explanation

This generic informational message contains variable text inserts. Two examples are:

1. EXTERNAL OBJECT NAME IS DUPLICATED.
2. KEYWORD USED AS A NAME. CHECK NAME NOT OMITTED. PROCESSING CONTINUES.

System action

Compilation continues. This definition is generated and stored or replaced.

Operator response

Make sure that the situation warned against is what you want. For example, make sure that the keyword that is used as a name is not a missing name, or that the duplicated object name is intended.

AKQ2MMS **NUMBER OF MESSAGES EXCEEDS THE 270 ALLOWED LIMIT. PROGRAM TERMINATES.**

Explanation

PPFA allows only 270 messages, including this message. When this limit is reached, the messages are printed and the program ends.

System action

The program ends.

Operator response

Correct the PPFA code for the messages that are issued and redo.

AKQ301I **PAGE PRINTER FORMATTING AID ENDED, MAX RETURN CODE = *(max return code)*.**

Explanation

This message accompanies the output listings of all form definitions and page definitions with the maximum return code for that particular object. The object is generated only when the return code is less than 8.

System action

None.

Operator response

None.

AKQ302I **NO ERRORS FOUND IN *(resource name)* DEFINITION.**

Explanation

One definition is processed. No statements were flagged in this definition.

System action

This definition is generated, and stored or replaced.

Operator response

None.

AKQ303S **NO CONTROL STATEMENT(S) ARE SPECIFIED IN INPUT DATA.**

Explanation

No control statements exist in the input data.

System action

The operation ends.

Operator response

Specify a valid PPFA command.

AKQ304S DEFINITION STATEMENT IS NOT SPECIFIED.

Explanation

No FORMDEF or PAGEDEF command exists in the system input command stream.

System action

The operation ends.

Operator response

Specify valid definition commands.

AKQ305S THIS DEFINITION IS NOT STORED BECAUSE MEMBER ALREADY EXISTS.

Explanation

This form definition or page definition is not saved because a file with the same name exists in the directory (REPLACE option is NO).

System action

A page definition or form definition is not generated. The syntax check continues to next definition.

Operator response

Check the specified form definition or page definition name, and specify REPLACE subcommand YES. Specify another form definition or page definition name.

AKQ311I FORMDEF (*form definition name*) IS GENERATED AND STORED. MAX RETURN CODE = (max return code).

Explanation

The form definition is generated and stored.

System action

A form definition is generated.

Operator response

None.

AKQ312I FORMDEF (*command name*) IS GENERATED AND REPLACED. MAX RETURN CODE = (*max return code*).

Explanation

The form definition is generated and is replaced. The maximum return code is listed.

System action

A form definition is generated.

Operator response

None.

AKQ313E FORMDEF (*form definition name*) IS NOT GENERATED. MAX RETURN CODE = (*max return code*).

Explanation

The form definition is not generated because of an error. The error is indicated by another message.

System action

A form definition is not generated.

Operator response

Correct the error.

AKQ321I PAGEDEF (*page definition name*) IS GENERATED AND FILED. MAX RETURN CODE = (*max return code*).

Explanation

The page definition is generated and stored.

System action

A page definition is generated.

Operator response

None.

AKQ322I PAGEDEF (*page definition name*) IS GENERATED AND REPLACED. MAX RETURN CODE = (*max return code*).

Explanation

The page definition is generated and is replaced.

System action

A page definition is generated.

Operator response

None.

AKQ323E **PAGEDEF (page-definition name)
IS NOT GENERATED. MAX RETURN
CODE = (max return code).**

Explanation

The page definition is not generated because of an error. The error is indicated by another message.

System action

A page definition is not generated.

Operator response

Correct the error.

AKQ350T **AN UNRECOVERABLE PROGRAM
ERROR OCCURRED.**

Explanation

An error exists in PPFA logic.

System action

The operation ends.

Operator response

Use local problem-reporting procedures to report this message.

AKQ360E **FONT COMMAND DOES NOT
CONTAIN SUFFICIENT
INFORMATION.**

Explanation

The FONT command does not contain enough information to generate a valid MCF. This error is caused by having a CS parameter without a CP parameter, or vice versa.

System action

A page definition is not generated.

Operator response

Correct the referenced FONT command.

AKQ361E **FONT COMMAND SPECIFIES
CONFLICTING PARAMETERS.**

Explanation

A FONT is specified in more than one way; however, only one of these parameters is allowed:

Coded Font
Character Set, Code Page pair (CS and CP parameters)
GRID

System action

A page definition is not generated.

Operator response

Correct the referenced FONT command.

AKQ362E **FONT RATIO SPECIFIED WITHOUT
FONT HEIGHT.**

Explanation

To scale a font, both the HEIGHT and RATIO must be specified. If a RATIO subcommand is found without a HEIGHT subcommand, the scaling information cannot be calculated by PPFA.

System action

A page definition is not generated.

Operator response

Correct the referenced FONT command.

AKQ363W **HEIGHT SPECIFIED, WIDTH IN
GRID IGNORED.**

Explanation

You specified both a HEIGHT and GRID in the FONT command.

System action

None.

Operator response

Correct the referenced FONT command.

AKQ364E **INVALID DIRECTION WITH
RELATIVE PRINTLINE**

Explanation

You specified an incorrect direction with the relative printline in your page definition source. The field direction must match the direction of the printline. The printline direction must be ACROSS.

System action

A page definition is not generated.

Operator response

Correct the referenced DIRECTION subcommand.

**AKQ365W COLOR AND EXTENDED COLOR
 SPECIFIED**

Explanation

Both COLOR and one of the extended color keywords (RGB, CMYK, HIGHLIGHT, CIELAB) was specified.

System action

Both requests are placed into the output resource. Output depends on printer function.

Operator response

If output does not print as expected, remove one of the specifications.

**AKQ370E BARCODE NAME WAS NOT
 PREVIOUSLY DEFINED.**

Explanation

You attempted to reference a bar code name that was not defined.

System action

A page definition is not generated.

Operator response

Correct the referenced BARCODE subcommand of the FIELD command.

**AKQ371E BARCODE NAME WAS
 PREVIOUSLY DEFINED.**

Explanation

You attempted to define a bar code name that was previously defined.

System action

A page definition is not generated.

Operator response

Correct the referenced BARCODE subcommand of the FIELD command.

**AKQ372W BARCODE MODIFICATION
 UNDEFINED FOR TYPE GIVEN.**

Explanation

You specified a modification for a bar code that is not defined for the type specified.

See Appendix D, "More About Bar Code Parameters," on page 449 for more information.

System action

A page definition is generated as specified so that, as new bar code types and modifications are introduced, you can create page definitions for them. However, you received this warning because the specification might also be an error.

Operator response

Correct the referenced BARCODE subcommand of the FIELD command, if appropriate.

AKQ373W BARCODE TYPE IS UNDEFINED.

Explanation

You specified a bar code type that is not defined.

System action

A page definition is generated as specified so that, as new bar code types and modifications are introduced, you can create page definitions for them. However, you received this warning because this specification might also be an error.

Operator response

Correct the referenced BARCODE subcommand of the FIELD command, if appropriate.

**AKQ374W INVALID DATA LENGTH FOR
 SELECTED BARCODE TYPE AND
 MODIFICATION.**

Explanation

You specified a data length for a defined bar code type and modification that is invalid for that combination of type and modification. When extra control characters are used (for example, in QRCode SOSI data), the data after translation might not exceed the limit.

See Appendix D, "More About Bar Code Parameters," on page 449 for more information.

System action

A page definition is generated as specified so that, as new bar code types and modifications are introduced, you can create page definitions for them. However, you received this warning because this specification might also be an error.

Operator response

Correct the referenced BARCODE subcommand of the FIELD command, if appropriate.

AKQ401E EXEC PARAMETER IS INVALID.

Explanation

The program parameter specification is invalid.

System action

A page definition or form definition is not generated. The syntax check continues.

Operator response

Specify a valid program parameter.

AKQ402T ERROR OCCURRED DURING ATTEMPT TO OBTAIN STORAGE

Explanation

These conditions generate this message:

1. Available size to hold the compiled data for the page definition and form definition is exceeded.
2. Insufficient available disk space on the file system to write the output of the compiler.
3. Limit of 269 user errors generated within a PPFA source file is exceeded.

System action

The operation ends.

Operator response

1. Increase the region or VM program size.
2. Increase the size of the file system or specify a directory on another file system that has more disk space.
3. Fix the errors reported to this point and rerun PPFA.

AKQ403T ERROR OCCURRED DURING ATTEMPT TO FREE STORAGE.

Explanation

A system error occurred while PPFA attempted to free disk space at the end of an execution.

System action

The operation ends.

Operator response

Use local problem-reporting procedures to report this message.

AKQ404T SYSIPT OPEN FAILURE.

Explanation

SYSIPT cannot be opened.

System action

The operation ends.

Operator response

Assign a valid input data file.

AKQ405T INSUFFICIENT STORAGE TO EXECUTE PPFA.

Explanation

The region size is too small to run PPFA.

System action

The operation ends.

Operator response

Increase the region size available to the job.

AKQ410T (Librarian error message).

Explanation

The message describes a librarian error.

System action

The operation ends.

Operator response

Contact a system programmer.

AKQ411T FORMDEF LIBRARY OPEN FAILURE.

Explanation

The FORMDEF library cannot be opened.

System action

The operation ends.

Operator response

Assign a valid FORMDEF library.

AKQ412T FORMDEF LIBRARY I/O ERROR.

Explanation

An I/O error occurred during attempted access of a form definition directory.

System action

The operation ends.

Operator response

Check the permissions of the directory. If you do not have access, contact the owner of the directory. If this action does not resolve the problem, contact a system programmer.

AKQ413T FORMDEF DIRECTORY CANNOT BE UPDATED.

Explanation

The FORMDEF member cannot be registered on the directory.

System action

The operation ends.

Operator response

Contact a system programmer.

AKQ414T FORMDEF LIBRARY CLOSE FAILURE.

Explanation

A form definition directory cannot be closed.

System action

The operation ends.

Operator response

Use local problem-reporting procedures to report this message.

AKQ415T PAGEDEF LIBRARY OPEN FAILURE.

Explanation

The PAGEDEF library cannot be opened.

System action

The operation ends.

Operator response

Assign a valid PAGEDEF library.

AKQ416T PAGEDEF LIBRARY I/O ERROR.

Explanation

I/O error occurs during attempted access of a page definition directory.

System action

The operation ends.

Operator response

Check the permissions of the directory. If you do not have access, contact the owner of the directory. If this action does not resolve the problem, contact a system programmer.

AKQ417T PAGEDEF DIRECTORY CANNOT BE UPDATED.

Explanation

A page definition file cannot be registered on the directory.

System action

The operation ends.

Operator response

Contact a system programmer.

AKQ418T PAGEDEF LIBRARY CLOSE FAILURE.

Explanation

A page definition directory cannot be closed.

System action

The operation ends.

Operator response

Use local problem-reporting procedures to report this message.

AKQ420T SYSTEM ERROR. ABEND CODE = (ABEND code).

Explanation

System forces PPFA to end abnormally.

System action

The operation ends.

Operator response

Contact a system programmer. See the documentation for your operating system.

AKQ421T FORMDEF LIBRARY IS FULL.**Explanation**

The file system into which PPFA attempted to save the form definition is full.

System action

The operation ends.

Operator response

Increase the size of the file system or specify a directory on a file system that has more disk space.

AKQ422T PAGEDEF LIBRARY IS FULL.**Explanation**

The file system into which PPFA attempted to save the page definition is full.

System action

The operation ends.

Operator response

Increase the size of the file system or specify a directory on a file system that has more disk space.

AKQ501T SYSIN OPEN FAILURE.**Explanation**

The PPFA input source file cannot be opened.

System action

The operation ends.

Operator response

Specify a valid input source file.

AKQ502T SPANNED RECORD OF SYSIN IS NOT SUPPORTED.**Explanation**

The spanned record of the PPFA input source file is not supported.

System action

The operation ends.

Operator response

Specify a valid input record format.

AKQ503T UNDEFINED LENGTH RECORD OF SYSIN IS NOT SUPPORTED.**Explanation**

An undefined length record of PPFA input source file is not supported.

System action

The operation ends.

Operator response

Specify a valid input record format.

AKQ504T LOGICAL RECORD LENGTH OF SYSIN EXCEEDS LIMIT.**Explanation**

The logical record length of the PPFA input source file exceeds the limit of 100 bytes or the z/OS variable length of 104.

System action

The operation ends.

Operator response

Correct the logical record length of the file.

AKQ510T FORMDEF/PAGEDEF LIBRARY OPEN FAILURE.**Explanation**

The FORMDEF or PAGEDEF directory cannot be opened.

System action

The operation ends.

Operator response

Specify a valid FORMDEF or PAGEDEF or check to make sure that the directory is correct.

AKQ511T I/O ERROR OCCURRED DURING (FORMDEF/PAGEDEF) DIRECTORY SEARCH. RETURN CODE = (return

code) REASON CODE = (*reason code*)

Explanation

I/O error occurred during the FIND function.

System action

The operation ends.

Operator response

Contact a system programmer.

AKQ512T LOGICAL RECORD LENGTH OF FORMDEF/PAGEDEF EXCEEDS LIMIT.

Explanation

The logical record length exceeds maximum or minimum value.

System action

The operation ends.

Operator response

Specify a file name that has a valid record length.

AKQ513T BLOCK SIZE OF FORMDEF/PAGEDEF EXCEEDS LIMIT.

Explanation

The block size exceeds maximum or minimum value.

System action

The operation ends.

Operator response

Assign a file name that has a valid block size.

AKQ514T UNDEFINED LENGTH RECORD IS NOT SUPPORTED IN FORMDEF/PAGEDEF LIBRARY.

Explanation

An undefined length record is not supported in FORMDEF/PAGEDEF directory.

System action

The operation ends.

Operator response

Assign a valid record format.

AKQ515T FIXED LENGTH RECORD IS NOT SUPPORTED IN FORMDEF/PAGEDEF LIBRARY.

Explanation

The fixed-length record is not supported in the FORMDEF or PAGEDEF library.

System action

The operation ends.

Operator response

Assign a valid record format.

AKQ516T NO CONTROL CHARACTER RECORD IS SUPPORTED IN FORMDEF/PAGEDEF LIBRARY.

Explanation

No control character record is supported in FORMDEF/PAGEDEF directory.

System action

The operation ends.

Operator response

Assign a valid record format.

AKQ517T NO SPACE IN FORMDEF/PAGEDEF DIRECTORY.

Explanation

No space was available in the FORMDEF directory or the PAGEDEF directory to add or replace the resource.

System action

The operation ends.

Operator response

Increase the directory space or specify a directory on another file system that has more disk space.

AKQ518T I/O ERROR OCCURRED WHILE UPDATING FORMDEF/PAGEDEF DIRECTORY. RETURN CODE = (*return code*). REASON CODE = (*reason code*).

Explanation

A permanent I/O error was detected, the specified data control block is not opened, or insufficient disk space exists to do the write function.

System action

The operation ends.

Operator response

Contact a system programmer.

AKQ519T I/O ERROR OCCURRED DURING WRITE.

Explanation

The error message is displayed.

System action

The operation ends.

Operator response

Contact a system programmer.

AKQ520T SPANNED RECORD IS NOT SUPPORTED IN FORMDEF/PAGEDEF LIBRARY.

Explanation

The spanned record is not supported in the FORMDEF or PAGEDEF library.

System action

The operation ends.

Operator response

Remove the SPAN attribute and assign a valid data set.

AKQ522T BLOCK SIZE IS NOT SPECIFIED FOR FORMDEF/PAGEDEF DATA SET.

Explanation

A block size is not specified for FORMDEF/PAGEDEF data set.

System action

The operation ends.

Operator response

Specify a BLKSIZE in the DD statement.

AKQ540T SYSTEM ABEND (code) OCCURRED IN PPFA PROCESS.

Explanation

A system ABEND (*code*) occurred in PPFA. The ESTAE macro instruction ended processing.

System action

The operation ends.

Operator response

Contact a system programmer. See System Messages for your operating system.

AKQ541T USER ABEND (code) OCCURRED IN PPFA/OS/390 PROCESS.

Explanation

A user ABEND (*code*) occurred in PPFA. The ESTAE macro instruction ended processing.

System action

The operation ends.

Operator response

Use local problem-reporting procedures to report this message.

AKQ600T INPUT FILENAME NOT SPECIFIED.

Explanation

You did not specify an input file name.

System action

The operation ends.

Operator response

Enter the input file name.

AKQ601T INPUT FILETYPE NOT SPECIFIED.

Explanation

You did not specify an input file type.

System action

The operation ends.

Operator response

Enter the input file type.

AKQ602T COMMAND SYNTAX IS NOT VALID.

Explanation

The command syntax that you entered was not accepted.

System action

The operation ends.

Operator response

Enter a valid command.

**AKQ603T FILEMODE FOR (FORMDEF/
PAGEDEF/LISTING) IS INVALID.**

Explanation

You entered an invalid file mode for FORMDEF, PAGEDEF, or LISTING.

System action

The operation ends.

Operator response

Enter a valid file extension.

**AKQ604T INVALID PARAMETER IS
SPECIFIED IN (FORMDEF/
PAGEDEF/LISTING/SIZE) OPTION.**

Explanation

You entered an invalid parameter for FORMDEF, PAGEDEF, LISTING, or SIZE.

System action

The operation ends.

Operator response

Enter a valid option parameter.

**AKQ605T (FORMDEF/PAGEDEF/LISTING/
SIZE) KEYWORD IS DUPLICATED.**

Explanation

You entered a duplicate keyword for FORMDEF, PAGEDEF, LISTING, or SIZE.

System action

The operation ends.

Operator response

Enter a unique keyword.

**AKQ606T FILETYPE FOR (FORMDEF/
PAGEDEF/LISTING) NOT
SPECIFIED.**

Explanation

The file type for FORMDEF, PAGEDEF, or LISTING was not entered.

System action

The operation ends.

Operator response

Enter an appropriate file type.

AKQ607T INVALID KEYWORD SPECIFIED.

Explanation

The keyword that you entered was not accepted.

System action

The operation ends.

Operator response

Enter a valid keyword.

**AKQ608T INVALID SIZE PARAMETER
SPECIFIED.**

Explanation

The size parameter that is specified is not valid.

System action

The operation ends.

Operator response

Enter a valid size parameter.

**AKQ610T SIZE PARAMETER VALUE
EXCEEDS THE ALLOWABLE
MAXIMUM.**

Explanation

The size that is entered exceeds the maximum allowable.

System action

The operation ends.

Operator response

Enter a valid size value.

AKQ611T SIZE PARAMETER VALUE IS TOO SMALL.

Explanation

The size that is entered is too small for running in PPFA/VM.

System action

The operation ends.

Operator response

Enter a valid size value.

AKQ612T INVALID FILE IDENTIFIER '*' SPECIFIED FOR INPUT FILE.

Explanation

'*' is specified for input file name or file type.

System action

The operation ends.

Operator response

Enter a valid file name or file type.

AKQ613T SIZE PARAMETER VALUE IS MISSING.

Explanation

You did not specify a size parameter

System action

The operation ends.

Operator response

Specify a valid size parameter.

AKQ620T INPUT FILE WAS NOT FOUND.

Explanation

The input file name entered was not found.

System action

The operation ends.

Operator response

Correct the input file name.

AKQ621T NO READ/WRITE (file mode) DISK ACCESSED FOR (INPUT/LISTING/FORMDEF/PAGEDEF /OUTPUT).

Explanation

The disk on which the file is saved cannot be read from or written to because it either was not accessed or was accessed with an invalid access mode.

System action

The operation ends.

Operator response

Access the file system by using a valid access mode.

AKQ622T INPUT FILE EXCEEDS THE ALLOWABLE LOGICAL RECORD LENGTH MAXIMUM.

Explanation

The logical record length of the input file exceeds the limit of 100 bytes or the z/OS variable record length of 104.

System action

The operation ends.

Operator response

Correct the logical record length of the file.

AKQ624T I/O ERROR OCCURRED IN (AKQINIO/AKQLBIO/AKQPRIO) MODULE. RC = (return code from FWRITE/FGETS macro instruction).

Explanation

An I/O error occurred during either FGETS or FWRITE processing of module AKQINIO, AKQLBIO, or AKQPRIO.

System action

The operation ends.

Operator response

Contact your system programmer.

AKQ625T DISK (file mode) IS FULL.

Explanation

Not enough space is available on the specified file system to write the file.

System action

The operation ends.

Operator response

Erase some files from the specified file disk and rerun.

AKQ639T **ABEND EXIT ROUTINE FAILED TO EXECUTE. RC = (return code from ABNEXIT macro)**

Explanation

ABEND exit routine cannot be established.

System action

The operation ends.

Operator response

Contact your system programmer.

AKQ640T **SYSTEM ABEND (code) OCCURRED IN PPFA/VM PROCESS.**

Explanation

A system ABEND occurred during processing. The ABEND exit routine ended processing.

System action

The operation ends.

Operator response

Use local problem-reporting procedures to report this message.

AKQ641T **USER ABEND (code) OCCURRED IN PPFA/VM PROCESS.**

Explanation

A user-initiated ABEND occurred during processing. The ABEND exit routine ended the processing.

System action

The operation ends.

Operator response

Use local problem-reporting procedures to report this message.

AKQ700I **SIZE PARAMETER IS NO LONGER NECESSARY IN PPFA/370.**

Explanation

The storage that is required to contain the messages and control blocks is not automatically set at 32K and 128K. If the control block storage is used up, an additional 128K is obtained and chained to the previous storage. All storage necessary to do the compile is obtained during processing.

System action

The compile process continues.

Operator response

None.

Appendix J. Accessibility

Accessible publications for this product are offered through [IBM Knowledge Center \(www.ibm.com/support/knowledgecenter/SSLTBW/welcome\)](http://www.ibm.com/support/knowledgecenter/SSLTBW/welcome).

If you experience difficulty with the accessibility of any z/OS information, send a detailed message to the [Contact z/OS web page \(www.ibm.com/systems/z/os/zos/webqs.html\)](http://www.ibm.com/systems/z/os/zos/webqs.html) or use the following mailing address.

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Poughkeepsie, NY 12601-5400
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Accessibility features

Accessibility features help users who have physical disabilities such as restricted mobility or limited vision use software products successfully. The accessibility features in z/OS can help users do the following tasks:

- Run assistive technology such as screen readers and screen magnifier software.
- Operate specific or equivalent features by using the keyboard.
- Customize display attributes such as color, contrast, and font size.

Consult assistive technologies

Assistive technology products such as screen readers function with the user interfaces found in z/OS. Consult the product information for the specific assistive technology product that is used to access z/OS interfaces.

Keyboard navigation of the user interface

You can access z/OS user interfaces with TSO/E or ISPF. The following information describes how to use TSO/E and ISPF, including the use of keyboard shortcuts and function keys (PF keys). Each guide includes the default settings for the PF keys.

- [*z/OS TSO/E Primer*](#)
- [*z/OS TSO/E User's Guide*](#)
- [*z/OS V2R2 ISPF User's Guide Vol I*](#)

Dotted decimal syntax diagrams

Syntax diagrams are provided in dotted decimal format for users who access IBM Knowledge Center with a screen reader. In dotted decimal format, each syntax element is written on a separate line. If two or more syntax elements are always present together (or always absent together), they can appear on the same line because they are considered a single compound syntax element.

Each line starts with a dotted decimal number; for example, 3 or 3.1 or 3.1.1. To hear these numbers correctly, make sure that the screen reader is set to read out punctuation. All the syntax elements that have the same dotted decimal number (for example, all the syntax elements that have the number 3.1) are mutually exclusive alternatives. If you hear the lines 3.1 USERID and 3.1 SYSTEMID, your syntax can include either USERID or SYSTEMID, but not both.

The dotted decimal numbering level denotes the level of nesting. For example, if a syntax element with dotted decimal number 3 is followed by a series of syntax elements with dotted decimal number 3.1, all the syntax elements numbered 3.1 are subordinate to the syntax element numbered 3.

Certain words and symbols are used next to the dotted decimal numbers to add information about the syntax elements. Occasionally, these words and symbols might occur at the beginning of the element itself. For ease of identification, if the word or symbol is a part of the syntax element, it is preceded by the backslash (\) character. The * symbol is placed next to a dotted decimal number to indicate that the syntax element repeats. For example, syntax element *FILE with dotted decimal number 3 is given the format 3 * FILE. Format 3* FILE indicates that syntax element FILE repeats. Format 3* * FILE indicates that syntax element * FILE repeats.

Characters such as commas, which are used to separate a string of syntax elements, are shown in the syntax just before the items they separate. These characters can appear on the same line as each item, or on a separate line with the same dotted decimal number as the relevant items. The line can also show another symbol to provide information about the syntax elements. For example, the lines 5.1*, 5.1 LASTRUN, and 5.1 DELETE mean that if you use more than one of the LASTRUN and DELETE syntax elements, the elements must be separated by a comma. If no separator is given, assume that you use a blank to separate each syntax element.

If a syntax element is preceded by the % symbol, it indicates a reference that is defined elsewhere. The string that follows the % symbol is the name of a syntax fragment rather than a literal. For example, the line 2.1 %OP1 means that you must refer to separate syntax fragment OP1.

The following symbols are used next to the dotted decimal numbers.

? indicates an optional syntax element

The question mark (?) symbol indicates an optional syntax element. A dotted decimal number followed by the question mark symbol (?) indicates that all the syntax elements with a corresponding dotted decimal number, and any subordinate syntax elements, are optional. If there is only one syntax element with a dotted decimal number, the ? symbol is displayed on the same line as the syntax element, (for example 5? NOTIFY). If there is more than one syntax element with a dotted decimal number, the ? symbol is displayed on a line by itself, followed by the syntax elements that are optional. For example, if you hear the lines 5 ?, 5 NOTIFY, and 5 UPDATE, you know that the syntax elements NOTIFY and UPDATE are optional. That is, you can choose one or none of them. The ? symbol is equivalent to a bypass line in a railroad diagram.

! indicates a default syntax element

The exclamation mark (!) symbol indicates a default syntax element. A dotted decimal number followed by the ! symbol and a syntax element indicate that the syntax element is the default option for all syntax elements that share the same dotted decimal number. Only one of the syntax elements that share the dotted decimal number can specify the ! symbol. For example, if you hear the lines 2? FILE, 2.1! (KEEP), and 2.1 (DELETE), you know that (KEEP) is the default option for the FILE keyword. In the example, if you include the FILE keyword, but do not specify an option, the default option KEEP is applied. A default option also applies to the next higher dotted decimal number. In this example, if the FILE keyword is omitted, the default FILE(KEEP) is used. However, if you hear the lines 2? FILE, 2.1, 2.1.1! (KEEP), and 2.1.1 (DELETE), the default option KEEP applies only to the next higher dotted decimal number, 2.1 (which does not have an associated keyword), and does not apply to 2? FILE. Nothing is used if the keyword FILE is omitted.

*** indicates an optional syntax element that is repeatable**

The asterisk or glyph (*) symbol indicates a syntax element that can be repeated zero or more times. A dotted decimal number followed by the * symbol indicates that this syntax element can be used zero or more times; that is, it is optional and can be repeated. For example, if you hear the line 5.1* data area, you know that you can include one data area, more than one data area, or no data area. If you

hear the lines 3* , 3 HOST, 3 STATE, you know that you can include HOST, STATE, both together, or nothing.

Notes:

1. If a dotted decimal number has an asterisk (*) next to it and there is only one item with that dotted decimal number, you can repeat that same item more than once.
2. If a dotted decimal number has an asterisk next to it and several items have that dotted decimal number, you can use more than one item from the list, but you cannot use the items more than once each. In the previous example, you can write HOST STATE, but you cannot write HOST HOST.
3. The * symbol is equivalent to a loopback line in a railroad syntax diagram.

+ indicates a syntax element that must be included

The plus (+) symbol indicates a syntax element that must be included at least once. A dotted decimal number followed by the + symbol indicates that the syntax element must be included one or more times. That is, it must be included at least once and can be repeated. For example, if you hear the line 6.1+ data area, you must include at least one data area. If you hear the lines 2+, 2 HOST, and 2 STATE, you know that you must include HOST, STATE, or both. Similar to the * symbol, the + symbol can repeat a particular item if it is the only item with that dotted decimal number. The + symbol, like the * symbol, is equivalent to a loopback line in a railroad syntax diagram.

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Various z/OS elements, such as DFSMS, HCD, JES2, JES3, and MVS™, contain code that supports specific hardware servers or devices. In some cases, this device-related element support remains in the product even after the hardware devices pass their announced End of Service date. z/OS may continue to service element code; however, it will not provide service related to unsupported hardware devices. Software problems related to these devices will not be accepted for service, and current service activity will cease if a problem is determined to be associated with out-of-support devices. In such cases, fixes will not be issued.

Minimum supported hardware

The minimum supported hardware for z/OS releases identified in z/OS announcements can subsequently change when service for particular servers or devices is withdrawn. Likewise, the levels of other software products supported on a particular release of z/OS are subject to the service support lifecycle of those products. Therefore, z/OS and its product publications (for example, panels, samples, messages, and product documentation) can include references to hardware and software that is no longer supported.

- For information about software support lifecycle, see: [IBM Lifecycle Support for z/OS \(www.ibm.com/software/support/systemsz/lifecycle\)](http://www.ibm.com/software/support/systemsz/lifecycle)
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Glossary

This glossary defines technical terms and abbreviations that are used in PSF for z/OS documentation. If you do not find the term that you are looking for, see [IBM Glossary of Computing Terms \(www.ibm.com/software/globalization/terminology\)](http://www.ibm.com/software/globalization/terminology).

These cross-references are used in this glossary:

Contrast with.

Refers to a term that has an opposed or substantively different meaning.

See.

Refers to preferred synonyms or to defined terms for acronyms and abbreviations.

See also.

Refers to related terms that have similar, but not synonymous, meanings, or to contrasted terms that have opposite or substantively different meanings.

Synonym for.

Indicates that the term has the same meaning as a preferred term, which is defined in its proper place in the glossary.

Synonymous with.

Indicates a backward reference from a defined term to all other terms that have the same meaning.

A

ACIF

See [AFP conversion and indexing facility](#).

Advanced Function Presentation

A set of licensed programs, together with user applications, that use the all-points-addressable concept to print data on a wide variety of printers or to display data on various display devices. AFP includes creating, formatting, archiving, retrieving, viewing, distributing, and printing information.

AFP

See [Advanced Function Presentation](#).

AFP Conversion and Indexing Facility (ACIF)

A print server utility program that converts a print file into AFP, MO:DCA-P, creates an index file for input data, and collects resources that are used by an AFP document into a separate file.

all-points addressability (APA)

The capability to address, reference, and position data elements at any addressable position in a presentation space or on a physical medium. An example of all points addressability is the positioning of text, graphics, and images at any addressable point on the physical medium. See also [picture element](#).

all-points-addressable mode

Synonym for [page mode](#).

alphanumeric string

A sequence of characters that consist solely of the letters a - z and the numerals 0 - 9.

American National Standards Institute (ANSI)

An organization that consists of producers, consumers, and general interest groups. ANSI establishes the procedures by which accredited organizations create and maintain voluntary industry standards in the United States. It is the United States constituent body of the [International Organization for Standardization \(ISO\)](#).

ANSI

See [American National Standards Institute](#).

APA

See [all-points addressability](#).

application

The use to which an information system is put.

A collection of software components that are used to do specific types of work on a computer.

application program

A program that is written for or by a user that applies to the user's work.

ascender

The parts of certain lowercase letters, such as b, d, or f, which at zero-degree character rotation rise above the top edge of other lowercase letters such as a, c, and e. Contrast with descender.

aspect ratio

The ratio of the length (or height) of a bar to the length (or width) of the linear bar code symbol.

attribute

A property or characteristic of one or more constructs. For example, *character attribute*, *color attribute*, *current drawing attributes*, *default drawing attributes*, *line attributes*, *marker attributes*, and *pattern attributes*.

B**bar**

In bar codes, the darker element of a printed bar code symbol.

bar code

An array of parallel rectangular bars and spaces that together represent data elements or characters of a particular type. The bars and spaces are arranged in a predetermined pattern that follows unambiguous rules that are defined by the symbology.

bar code command set

In the IPDS architecture, a collection of commands used to present bar code symbols in a page, page segment, or overlay.

bar code density

The number of characters per inch (cpi) in a bar code symbology. In most cases, the range is 3-10 cpi.

bar code object area

The rectangular area on a logical page in which a bar code presentation space is mapped.

Bar Code Object Content Architecture (BCOCA)

An architected collection of constructs that are used to interchange and present bar code data.

bar code symbol

A combination of characters that form a complete, scannable entity, including start and stop characters, quiet zones, data characters, and check characters that are required by a particular bar code type.

bar code symbology

A bar code language. Bar code symbologies are defined and controlled by various industry groups and standards organizations. Bar code symbologies are described in public domain bar code specification documents. Synonymous with symbology. Examples of bar code symbology include: *Canadian Grocery Product Code (CGPC)*, *European Article Numbering (EAN)*, *Japanese Article Numbering (JAN)*, and *Universal Product Code (UPC)*.

bar height

In bar codes, the bar dimension perpendicular to the bar width. Synonymous with bar length and height.

bar length

In bar codes, the bar dimension perpendicular to the bar width. Synonymous with bar height and height.

bar width

In bar codes, the thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar.

baseline

A conceptual line in regard to which successive characters are aligned.

baseline direction

The direction in which successive lines of text appear on a logical page.

bearer bars

A bar across the top and bottom edge of a linear bar code. Partial scans of bar code symbologies, such as Interleaved 2 of 5, can produce valid, but incorrect, reads by self-discriminating scanners. Bearer bars help prevent such errors and increase reliability.

Note: A self-discriminating scanner is one that automatically determines which bar code symbology it is reading.

BCOCA

See [Bar Code Object Content Architecture](#).

bin

The standard-size paper source on cut-sheet page printers that have more than one paper source. Each printer is set up with either A4 or letter-size paper as the standard size. Contrast with [cassette](#).

BITS

A data type for architecture syntax, indicating one or more bytes to be interpreted as bit string information.

body

On a printed page, the area between the top and bottom margins that can contain data.

In a book, the portion between the front matter and the back matter.

boldface

A heavy-faced type.

Printing in heavy-faced type.

C**carriage control character**

If present, the first character of an output record (line) that is to be printed or spaced; it determines how many lines are skipped before the line. See also [control character](#).

cassette

A removable storage device that is the source for alternative sizes of paper on page printers that have more than one paper source. Contrast with [bin](#).

CDB2OF7

A parameter that specifies a bar code type of Codabar, 2-of-7, Automatic Identification Manufacturers Uniform Symbol Specification-Codabar.

CGPC

Canadian Grocery Product Code.

CHAR

A data type for architecture syntax, indicating one or more bytes to be interpreted as character information.

character

A member of a set of elements that are used for the organization, control, or representation of data. A character can be either a graphic character or a control character. See also [control character](#) and [graphic character](#).

In bar codes, a single group of bars and spaces that represent an individual number, letter, punctuation mark, or other symbol.

character ascender

See [ascender](#).

character attribute

A characteristic that controls the appearance of a character or character string.

character baseline

A conceptual reference line that is coincident with the X axis of the character coordinate system.

character code

An element of a code page or a cell in a code table to which a character can be assigned. The element is associated with a binary value. The assignment of a character to an element of a code page determines the binary value that is used to represent each occurrence of the character in a character string.

character descender

See [descender](#).

character identifier

The unique name for a graphic character. See also [graphic character identifier](#).

character rotation

The alignment of a character in regard to its character baseline, which is measured in degrees in a clockwise direction. Examples are 0°, 90°, 180°, and 270°. Zero-degree character rotation exists when a character is in its customary alignment with the baseline. Character rotation and font inline sequence are related in that character rotation is a clockwise rotation; font inline sequence is a counterclockwise rotation. See also [orientation](#) and [rotation](#).

character set

A finite set of different graphic or control characters that is complete for a specified purpose. For example, the character set in ISO Standard 646, 7-bit Coded Character Set for Information Processing Interchange. See also [control character](#) and [font character set](#).

character set attribute

An attribute that is used to specify a coded font.

check character

The result of some mathematical combination of the characters in the field that is bar coded. Used as a check of the accuracy of both the input of the data field and the scanning of the bar code. A bar code can have 0, 1, 2, or sometimes more check characters.

check digit

Same as a check character, but limited to decimal digits only.

Codabar

A bar code symbology that is characterized by a discrete, self-checking, numeric code with each character represented by a stand-alone group or four bars and three spaces between them.

Code128

A bar code symbology that is characterized by a variable-length, alphanumeric code with 128 characters.

Code39

A bar code symbology that is characterized by a variable-length, bidirectional, discrete, self-checking, alphanumeric code. Three of the nine elements are wide and six are narrow. It is the standard for LOGMARS (the Department of Defense) and the AIAG.

coded font

A resource that contains elements of a code page and a font character set, and is used for presenting text, graphics character strings, and bar code HRI. See also [code page](#) and [font character set](#).

In FOCA, a resource that contains the resource names of a valid pair of font character set and code page resources. The graphic character set of the font character set must match the graphic character set of the code page for the coded font resource pair to be valid.

In the IPDS architecture, a raster font resource that contains code points that are directly paired to font metrics and the raster representation of character shapes, for a specific graphic character set.

In the IPDS architecture, a font resource that contains descriptive information, a code page, font metrics, and a digital-technology representation of character shapes for a specific graphic character set.

coded graphic character set global identifier (CGCSGID)

A four-byte binary or a ten-digit decimal identifier that consists of the concatenation of a GCSGID and a CPGID. The CGCSGID identifies the code point assignments in the code page for a specific graphic character set, from among all the graphic characters that are assigned in the code page.

code page

A resource object that contains descriptive information, graphic character identifiers, and code points corresponding to a coded graphic character set. Graphic characters can be added over time; therefore, to specifically identify a code page, both a GCSGID and a CPGID is used.

A set of assignments, each of which assigns a code point to a character. Each code page has a unique name or identifier. Within a specific code page, a code point is assigned to one character. More than one character set can be assigned code points from the same code page. See also [coded font](#).

code page global identifier (CPGID)

A unique 5-digit decimal or 2-byte binary identifier that is assigned to a code page. The range of values is 00001 - 65534 (X'0001' - X'FFFE').

code point

A unique bit pattern that can serve as an element of a code page or a site in a code table, to which a character can be assigned. The element is associated with a binary value. The assignment of a character to an element of a code page determines the binary value that is used to represent each occurrence of the character in a character string. Code points are one or more bytes long.

color attribute

An attribute that affects the color values that are provided in a graphics primitive, a text control sequence, or an IPDS command. Examples of color attributes are foreground color and background color.

color model

The method by which a color is specified. For example, the RGB color space specifies color in terms of three intensities for red (R), green (G), and blue (B).

command

A request from a terminal or automated operator for the performance of an operation or service, or a request in a batch-processing job or print file for the operation or execution of a particular program. In Page Printer Formatting Aid, commands are control statements for major formatting functions. For example, FORMDEF and COPYGROUP are commands. Commands are further specified by subcommands and parameters.

command stream

The sequence of Page Printer Formatting Aid commands that is submitted with the job control statements in a Page Printer Formatting Aid execution. The commands and subcommands are the control statements that define the object or objects to be generated.

compatibility mode

The use of table reference characters (TRCs) that are acceptable to line printers and page printers and that access page definitions with little or no change to the user's data or to the job command stream. Contrast with [page mode](#).

composed-text data file

A file that contains text data and text control information that dictates the format, placement, and appearance of the data to be printed.

conditional processing

A page definition function that allows input data records to partially control their own formatting.

construct

An architected set of data such as a structured field or a triplet.

continuous code

A linear bar code in which each character starts immediately after the preceding character. No space or gap exists between characters. Interleaved 2 of 5 is an example of a continuous bar code.

control character

A character that denotes the start, modification, or end of a control function. A control character can be recorded for use in a subsequent action, and it can have a graphic representation. See also [character](#).

A control function the coded representation of which consists of a single code point.

copy group

A subset of a form definition that contains a set of controls for the physical pages of a printout. Such functions as the selection of either of two paper sources on the page printer, the use of duplex printing, or the positioning of the reference point for all printing on the sheet are available in the copy group.

cm

Centimeters.

CMS

Conversational Monitor System.

cpi

Characters per inch.

cut-sheet media

Unconnected sheets.

D**data map**

An internal object whose structured fields control the formatting of data on a logical page of a printout. Created by a PAGEDEF command or a PAGEFORMAT command.

data stream

A continuous stream of data that is a defined format. An example of a defined format is a structured field.

DBCS

Double-byte character set.

default

Pertaining to an attribute, value, or option that is assumed when none is explicitly specified and one is needed to continue processing.

density

A measure of the number of characters per inch or per millimeter represented by the bar code. A high-density bar code represents more characters per inch than a low-density bar code.

The bar code symbology helps determine the density. Within a specific symbology, factors that affect the density of a bar code are: the x-dimension (width of the narrow bar) and the wide-to-narrow ratio (width of a wide bar relative to the narrow bar).

descender

In a font, the distance from the baseline to the bottom of the character box. This value might differ for different characters in a specific font. Contrast with [ascender](#).

direction

The print position of data in a logical page, line, or field. In Page Printer Formatting Aid, the ultimate reference point for all direction controls on a page is the hardware origin. Secondary and tertiary reference points are possible as well, allowing more than one print direction on a page.

discrete code

A linear bar code that is constructed with groups of bars and spaces that represent individual characters and having a space or intercharacter gap between each group. This gap is used solely to separate characters and contains no data. Code 3 of 9 is a discrete bar code.

document

A machine-readable collection of one or more objects that represents a composition, a work, or a collection of data.

A publication or other written material.

double-byte character set (DBCS)

A character set, such as a set of Japanese ideographs, requiring 2 bytes to identify each character.

duplex printing

Printing on both sides of a sheet.

y-coordinate

The vertical or baseline position that defines a page origin or the starting point of a line or field.

E**EAN**

See [European Article Numbering](#).

EAN2SUP

A parameter that specifies a bar code type of European Article Numbering, Two-digit Supplemental.

EAN5SUB

A parameter that specifies a bar code type of European Article Numbering, Five-digit Supplemental.

EAN8

A parameter that specifies a bar code type of European Article Numbering 8 (includes Japanese Article Numbering-short).

EAN13

A parameter that specifies a bar code type of European Article Numbering 13 (includes Japanese Article Numbering-standard).

EBCDIC

See [Extended Binary Coded Decimal Interchange Code](#).

electronic overlay

In IBM Print Server Facility, a collection of constant data that is electronically composed in the host processor and can be merged with variable data on a sheet during printing. Contrast with [page segment](#). See also [overlay](#) and [preprinted form](#).

European Article Numbering (EAN)

The bar code symbology that is used to code grocery items in Europe.

Extended Binary Coded Decimal Interchange Code (EBCDIC)

A coded character set that consists of 8-bit coded characters.

external library resource (member)

Objects that can be used by other licensed programs while printing jobs; for example, coded fonts, code pages, font character sets, form definitions, page definitions, and page segments. Synonym for [resource object](#).

external object

Synonym for [resource object](#).

F**FCB**

Forms control buffer.

field

In a record, a specified area that is used for a particular class of data; for example, a group of character positions that are used to enter or display wage rates on a screen.

In Page Printer Formatting Aid, any area of a record singled out for particular formatting treatment.

field processing

Mapping individual fields to a page of output with special formatting controls.

file

A named set of records that are stored or processed as a unit.

first read rate

The percentage of the bar code scans that read correctly on the first scan of the bar code. A 99% or higher first read is desirable. Anything below 85% is normally not acceptable.

fixed medium information

Information that can be applied to a sheet by a printer or printer-attached device that is independent of data that is provided through the data stream. Fixed medium information does not mix with the data that is provided by the data stream and is presented on a sheet either before or after the text,

image, graphics, or bar code data provided within the data stream. Fixed medium information can be used to create preprinted forms, or other types of printing, such as colored logos or letterheads, that cannot be created conveniently within the data stream.

FOCA

See [Font Object Content Architecture](#).

font

A family or assortment of characters of a specific size and style; for example, 9-point Bodoni Modern.

font character set

A FOCA resource that contains descriptive information, font metrics, and the digital representation of character shapes for a specified graphic character set.

Font Object Content Architecture (FOCA)

An architected collection of constructs that are used to describe fonts and to interchange those font descriptions.

font typeface global identifier (FGID)

See [global resource identifier \(GRID\)](#).

form

A physical piece of paper or other medium on which output data is printed. For cut-sheet printers, a form is one sheet of paper or other medium. For continuous-forms printers, the form is the area of paper (or other medium) defined to the printer as a single physical page, which for fan-fold paper is normally the area between perforations. See also [medium](#), [page](#), and [sheet](#).

format

The arrangement or layout of data on a physical medium or in a presentation space.

formatted data

In FD:OCA, data whose implied syntax and semantics are represented by architected controls that accompany the data.

formatted data object (FDO)

An object that contains formatted data. See also [object](#).

Formatted Data Object Content Architecture (FD:OCA)

An architected collection of constructs that are used to interchange formatted data.

formatter

A process that is used to prepare a document for presentation.

formdef

See [form definition](#).

form definition

In IBM Print Server Facility, a resource object that defines the characteristics of the form, which include: overlays to be used, text suppression, position of page data on the form, and modifications and number of copies of a page.

forms control buffer (FCB)

A line printer control. In the 3800 Printing Subsystem, a buffer for controlling the vertical format of printed output.

forms flash

In the 3800 Printing Subsystem, the function of the printer that allows user-prepared images to be printed with variable page data. An operator must insert the image holder when forms overlay printing is wanted.

The photographic negative of a predefined design to be exposed to the photoconductor by a flash of light. The forms overlay can be merged with variable data during printing. See also [electronic overlay](#).

G**GCGID**

See [graphic character global identifier](#).

GCSGID

See [graphic character set global identifier](#).

GID

See [global identifier](#).

global identifier (GID)

Any of these identifiers:

- Coded character set identifier (CCSID).
- Coded graphic character set global identifier (CGCSGID)
- Code page global identifier (CPGID)
- Font typeface global identifier (FGID)
- Global resource identifier (GRID)
- Graphic character global identifier (GCGID)
- Graphic character set global identifier (GCSGID)
- Object identifier (OID)
- In MO:DCA, an encoded graphic character string that provides a reference name for a document element.

global resource identifier (GRID)

An 8-byte identifier that identifies a coded font resource. A GRID contains the following fields in the order shown:

1. GCSGID of a minimum set of graphic characters that are required for presentation. It can be a character set that is associated with the code page, or with the font character set, or with both.
2. CPGID of the associated code page
3. FGID of the associated font character set
4. Font width in 1440ths of an inch.

GOCA

See [Graphics Object Content Architecture](#).

graphic character

A member of a set of symbols that represent data. Graphic characters can be letters, digits, punctuation marks, or other symbols. Synonymous with *glyph*. See also [character](#).

graphic character global identifier (GCGID)

An alphanumeric character string that is used to identify a specific graphic character. A GCGID can be 4 - 8 bytes long.

graphic character identifier

The unique name for a graphic character in a font or in a graphic character set. See also [character identifier](#).

graphic character set global identifier (GCSGID)

A unique graphic character set identifier that can be expressed as either a 2-byte binary or a five-digit decimal value.

graphics command set

In the IPDS architecture, a collection of commands that are used to present GOCA data in a page, page segment, or overlay.

graphics object

An object that contains graphics data. See also [object](#).

graphics object area

A rectangular area on a logical page into which a graphics presentation space window is mapped.

Graphics Object Content Architecture (GOCA)

An architected collection of constructs that are used to interchange and present graphics data.

GRID

See [global resource identifier](#).

guard bars

The bars at both ends and the center of an EAN, JAN, or [UPC](#) symbol, that provide reference points for scanning.

H**height**

In Page Printer Formatting Aid, refers to the vertical dimension of a logical page and is controlled by the HEIGHT subcommand.

In bar codes, the bar dimension perpendicular to the bar width. Synonymous with [bar height](#) and [bar length](#).

hexadecimal

A number system with a base of sixteen. The decimal digits 0 - 9 and characters A through F are used to represent hexadecimal digits. The hexadecimal digits A- F correspond to the decimal numbers 10 - 15. An example of a hexadecimal number is X'1B', which is equal to the decimal number 27.

highlighting

The emphasis of displayed or printed information. Examples are increased intensity of selected characters on a display screen and exception highlighting on an IPDS printer.

host

In the [IPDS](#) architecture, a computer that drives a printer.

In [IOCA](#), the host is the controlling environment.

HRI

See [human-readable interpretation](#).

human-readable interpretation (HRI)

The printed translation of [bar code characters](#) into equivalent Latin alphabetic characters, Arabic numeral decimal digits, and common special characters that are typically used for printed human communication.

I**image**

An electronic representation of a picture that is produced by using sensing light, sound, electron radiation, or other emanations that come from the picture or reflected by the picture. An image can also be generated directly by software without reference to an existing picture.

image content

[Image](#) data and its associated image data parameters.

Image Object Content Architecture (IOCA)

An architected collection of [constructs](#) used to interchange and present [images](#).

in

Inches.

IND2OF5

A parameter that specifies a bar code type of Industrial 2-of-5.

inline

In printing, the direction of successive characters in a line of text. Synonymous with [inline direction](#).

inline direction

Synonym for [inline](#).

Intelligent Printer Data Stream (IPDS)

An architected [host-to-printer](#) data stream that contains both data and controls that define how the data is to be presented.

intercharacter gap

The space between characters in a discrete bar code symbology.

International Organization for Standardization (ISO)

An organization of national standards bodies from various countries that are established to promote development of standards to facilitate international exchange of goods and services, and develop cooperation in intellectual, scientific, technological, and economic activity.

Invoke Data Map

A control record that is placed in the user's data to begin a new page format.

Invoke Medium Map

A control record that is placed in the user's data to begin a new copy group.

IOCA

See [Image Object Content Architecture](#).

IPDS

See [Intelligent Printer Data Stream](#).

ISO

See [International Organization for Standardization](#).

italics

A typeface with characters that slant upward to the right. In FOCA, italics is the common name for the defined inclined typeface posture attribute or parameter.

ITL2OF5

A parameter that specifies a bar code type of Interleaved 2-of-5, Automatic Identification Manufacturers Uniform Symbol Specification-I 2/5.

J**JAN**

See [Japanese Article Numbering](#).

Japanese Article Numbering (JAN)

The bar code symbology that is used to code grocery items in Japan.

jog

Offset stacking of individual sheets or sets of sheets in the output hopper of a page printer or copy mark in a continuous forms printer.

K**kanji**

A graphic character set consisting of symbols that are used in Japanese ideographic alphabets. Each character is represented by 2 bytes.

keyword

A two-part self-defining parameter that consists of a 1-byte identifier and a 1-byte value.

L**ladder orientation**

Linear bar code orientation where the bars are parallel to the base of the document (like the rungs of a ladder). Sometimes called vertical orientation (because that is the direction of the scan).

landscape presentation

The position of a printed sheet that has its long edges at the top and bottom and its short edges at the sides. Contrast with [portrait presentation](#).

language

A set of symbols, conventions, and rules that is used for conveying information.

leading

A printer's term for the distance between lines of type that is measured in points. It refers to the lead slug placed between lines of type in traditional typesetting.

library

System storage for generated form definitions and page definitions.

library resource (member)

A named collection of records or statements in a library.

library resource name

A name by which an object can be called from a library by IBM Print Server Facility as part of a print job. Includes the two-character prefix for the type of object, such as P1 for page definitions, F1 for form definitions, or O1 for overlays (also known as *resource name*).

line attributes

Those attributes that pertain to straight and curved lines. Examples of line attributes are line type and line width.

line data files

Files that are formatted for printing on line printers.

line printer

A device that prints a line of characters as a unit. Synonymous with *line-at-a-time printer*. Contrast with page printer.

line type

A line attribute that controls the appearance of a line. Examples of line types are dashed, dotted, and solid. Contrast with line width.

line width

A line attribute that controls the appearance of a line. Examples of line width are light, medium, and bold. Contrast with line type.

lines per inch (lpi)

On a printer, a measurement of the number of lines per vertical inch of paper.

A unit of measure for specifying the baseline increment.

local name

A name for a suppression, an overlay, or a font that is used only within the Page Printer Formatting Aid command stream. Contrast with user-access name.

location

A site within a data stream. A location is specified in terms of an offset in the number of structured fields from the beginning of a data stream, or in the number of bytes from another location within the data stream.

logical page

The area on a surface of a form that is formatted for printing.

A collection of data that can be printed on one side of a sheet of paper. See also form and page.

logical page origin

The user-defined point that acts as a reference for all positioning of printed material on the page.

The point nearest the hardware origin where printing can occur.

logical unit (L-unit)

A unit of linear measurement that is expressed with a unit base and units per unit-base value. For example, in Page Printer Formatting Aid, 1 logical unit = 1/240 inch (unit base = 10 inches, units per unit base = 2400).

lpi

Lines per inch.

lowercase

Pertaining to small letters as distinguished from capital letters. Examples of small letters are *a*, *b*, and *g*. Contrast with uppercase.

L-unit

A unit of linear measurement that is expressed with a unit base and units per unit-base value. In other words, the number of units in a linear inch. Synonymous with logical unit.

M

MAT2OF5

A parameter that specifies a bar code type of Matrix 2-of-5.

media origin

The first hardware addressable point on the physical page. The point from which the logical page origin is positioned by the medium map.

medium

The physical material (for example, paper) on which data is printed. See also [form](#).

medium map

An internal object whose structured fields control the physical sheets of a printout, including the choice of duplex printing, the beginning print position, and the paper source to use. Controlled by a COPYGROUP command in a Page Printer Formatting Aid command stream.

medium overlay

Synonym for [overlay](#).

mixed data files

Files consisting of composed and uncomposed portions.

mm

Millimeters.

MOD

A parameter that specifies more processing information about the bar code symbol to be generated. See *Bar Code Object Content Architecture Reference* for more information.

Mixed Object Document Content Architecture (MO:DCA)

An architected, device-independent data stream for interchanging documents.

Print data that is composed into pages. Text formatting programs can produce composed text data that consists entirely of structured fields.

MO:DCA

See [Mixed Object Document Content Architecture](#).

MO:DCA-P

Mixed Object Document Content Architecture for Presentation.

module

In a bar code symbology, the nominal width of the smallest element of a [bar](#) or space. Actual bar code symbology bars and spaces can be a single module wide or some multiple of the module width. The multiple need not be an integer.

MODWIDTH

A parameter that specifies the width of the smallest defined bar code element by using mils (thousandths of an inch).

MSI

A parameter that specifies a bar code type of modified Plessey code.

multiple up

The printing of more than one page on a single side of a sheet of paper.

N

name

A table heading for architecture syntax. The entries under this heading are short names that give a general indication of the contents of the construct.

noncompatibility mode

The use of table reference character (TRC) numbers not compatible with a line printer.

normal duplex printing

Duplex printing for sheets that are to be bound on the long edge of the paper, regardless of whether the printing is portrait or landscape. Contrast with [tumble duplex printing](#).

N_UP

The printing of more than one logical page on a single side of a medium.

O

object

A collection of data that is referred to by a single name. Form definitions and page definitions that are stored in a library are resources.

offset

A table heading for architecture syntax. The entries under this heading indicate the numeric displacement into a construct. The offset is measured in bytes and starts with byte zero. Individual bits can be expressed as displacements within bytes.

order

In GOCA, a graphic construct that the controlling environment builds to instruct a drawing processor about what to draw and how to draw it.

orientation

The angular distance a presentation space or object area is rotated in a specified coordinate system, expressed in degrees and minutes. For example, the orientation of printing on a physical medium, relative to the X_m axis of the X_m, Y_m coordinate system.

origin

A picture element (pel).

outline font

A shape technology in which the graphic character shapes are represented in digital form by a series of mathematical expressions that define the outer edges of the strokes. The resultant graphic character shapes can be either solid or hollow.

overlay

A collection of predefined data such as lines, shading, text, boxes, bar codes, or logos, that can be merged with variable data on a page during printing. See [electronic overlay](#).

Overlay Generation Language (OGL)

A programming language that is used to produce electronic overlays.

P

page

A collection of data that can be printed on one side of a sheet of paper or a form.

The boundary for determining the limits of printing. See also [logical page](#) and [physical page](#).

page definition

A resource that contains a set of Page Printer Formatting Aid formatting controls for printing pages of data. Includes controls for number of lines per printed sheet, font selection, print direction, and mapping of individual fields in the data to positions on the printed sheets.

page ejection

The point at which the printer finishes printing on one sheet and moves to the beginning of the next sheet.

page format

A subset of a page definition, containing all the same controls for formatting printed output as a page definition. Includes controls for number of lines per printed sheet, font selection, print direction, and mapping of individual fields in the data to positions on the printed sheets.

page mode

The mode of operation in which an AFP printer can accept a page of data from a host processor to be printed on an all-points-addressable output medium. Printed data can consist of pages that are composed of text, images, overlays, and page segments. Contrast with [compatibility mode](#).

page printer

A device that prints a page at a time. Contrast with [line printer](#).

Page Printer Formatting Aid (PPFA)

An IBM licensed program that creates and stores form definitions and page definitions, which are resource objects for print-job management. By writing a command stream that specifies form definitions, page definitions, or both, for running Page Printer Formatting Aid, you can store the objects that are specified in the library. These objects can then be used to format printed output.

page segment

An object that can contain text and images and be included at any addressable point on a page or electronic overlay. It assumes the environment of an object it is included in.

A library resource that contains the definition of a page segment. Contrast with [electronic overlay](#).

parameter

A variable that is given a constant value for a specified application and that can denote the application.

In Page Printer Formatting Aid, the values specified for a subcommand.

partition

Dividing the medium presentation space into a specified number of equal-sized areas in a manner that is determined by the current physical media.

In FD:OCA, a conceptual subdivision of a string of data fields. A partition can be further divided into subpartitions.

pel

Picture element. The smallest printable or displayable unit on a physical medium. In computer graphics, the smallest element of a physical medium that can be independently assigned color and intensity. Synonymous with [picture element](#) and [pixel](#).

PELS

In Page Printer Formatting Aid, a unit of measure under the SETUNITS command. See also [logical unit](#).

physical page

A single surface (front or back) of a sheet. See also [form](#) and [page](#).

picket fence orientation

Linear bar code orientation where the bars are perpendicular to the base of the document (like the pickets in a picket fence). Sometimes called horizontal orientation (because that is the direction of the scan).

picture element

In computer graphics, the smallest element of a display space that can be independently assigned color and intensity.

The smallest area that can be individually toned by the printer.

pixel

The smallest printable or displayable unit on a physical medium. Synonymous with [pel](#) and [picture element](#).

PMF

Print Management Facility.

point

In printing, a unit of about 1/72 of an inch used in measuring typographical material; for example, 10-point Helvetica. 12 points equal a pica.

portrait presentation

The position of a printed sheet that has its short edges at the top and bottom and its long edges at the sides. Contrast with [landscape presentation](#).

position

The location specified for a line or field on the output page.

POSTNET

A parameter that specifies a bar code type of POSTal Numeric Encoding Technique (United States Postal Service), and defines specific values for the BSD module width, element height, height multiplier, and wide-to-narrow ratio fields.

PPFA

Page Printer Formatting Aid.

preprinted form

A sheet of paper that contains a preprinted design of constant data. Variable data can be merged with the constant data on such a form. See also [electronic overlay](#) and [forms flash](#).

print line

A single line of text. In the formatting of line data, it refers to the output generated by one data record. Governed by the PRINTLINE command.

Print Management Facility (PMF)

A program that can create fonts, segments, page definitions, and form definitions.

Print Server Facility (PSF)

A program that produces printer commands from the data sent to it.

printer-attached device

Either a preprocessor or postprocessor that is attached to the printer.

PSF

Print Server Facility.

Q**quiet zone**

A blank area before and following a bar code. This required space enables the scanner to differentiate the start and stop of a bar code. The size of the quiet zone is usually 10 times the x-dimension or 1/4 inch, whichever is larger.

R**range**

A table heading for architecture syntax. The entries under this heading give numeric ranges applicable to a construct. The ranges can be expressed in binary, decimal, or hexadecimal. The range can consist of a single value.

raster

In computer graphics, a predetermined pattern of lines that provides uniform coverage of a display space.

In AFP printers, an on-or-off pattern of electrostatic images produced by the laser print head.

RASTER / NORASTER subcommand

A subcommand that specifies whether an overlay is to be kept in the printer (3800 only) as raster data.

RATIO

A parameter that specifies the ratio of the wide-element dimension to the narrow-element dimension whenever two different size elements exist.

ratio

The relationship in quantity, amount, or size between two or more things.

record

In programming languages, an aggregate that consists of data objects, possibly with different attributes, with identifiers typically attached to them. In some programming languages, records are called structures.

A set of data that is treated as a unit.

A set of one or more related data items that are grouped for processing.

RM4SCC

A parameter that specifies a 4-state customer code that is defined by the Royal Mail Postal Service of England for bar coding postal code information. See [Royal Mail 4 State Customer Code](#).

resource

A collection of printing instructions, and sometimes data to be printed, that consists entirely of structured fields. A resource object is stored as a member of a library and can be called for by IBM Print Server Facility when needed. The different resource objects are page segments, overlays, form definitions, and page definitions.

resource object

In AFP, a collection of printing instructions, and sometimes data to be printed, that consists entirely of structured fields. A resource object is stored as a member (or file) of a library and can be called for by PSF when needed. The different resource objects include coded font, font character set, code page, page segment, overlay, form definition, and page definition.

RNORMAL

Rotated normal. A Page Printer Formatting Aid parameter that specifies the type of duplex printing. The tops of both sides of a duplex-printed sheet are toward the same physical edge of the sheet, for side binding of the document. Used with landscape-presentation pages.

rotation

The orientation of the characters of a font in regard to the baseline.

Royal Mail 4 State Customer Code (RM4SCC)

A two-dimensional bar code symbology that is developed by the United Kingdom's Royal Mail postal service for use in automated mail-sorting processes.

RTUMBLE

Rotated tumble. A Page Printer Formatting Aid parameter that specifies a type of duplex printing. It means the top of one side of a duplex-printed sheet and the bottom of the other are toward one physical edge of the sheet, for top binding of the document. Used with landscape-presentation pages.

rule

A solid line of any line width.

x-dimension

The width (usually in thousandths of an inch) of the narrow bar or space of the bar code symbology.

S**SBCS**

Single-byte character set.

scanner

In bar codes, an electronic device that converts optical information into electrical signals. Sometimes called a *reader* or *decoder*.

segment

A collection of composed text and images, which are prepared before formatting and included in a document when it is printed. See [page segment](#).

The resource that contains the structured-field definition of a page segment.

sheet

A single piece of paper. For cut-sheet printers, a synonym for [form](#).

shift-in and shift-out characters (SOSI)

Characters that are used to delimit literals in Page Printer Formatting Aid command streams: X'OE' and X'OF'.

simplex printing

A method that is used to print data on one side of a sheet; the other side is left blank. Contrast with [duplex printing](#).

single-byte character set

A character set whose codes require a single byte of data. The character set used for English is an example.

skip-to-channel control

A line printer control that appears in line data. Allows space to be left between print lines. Compatible with page printers when the data is formatted by page definitions.

space

In bar codes, the lighter element of a printed bar code symbol, which is typically formed by the background between bars.

space width

In bar codes, the thickness of a bar code symbol space measured from the edge closest to the symbol start character to the trailing edge of the same space.

SSASTERISK

A parameter that specifies whether an asterisk is to be generated as the HRI for CODE39 bar code start and stop characters.

start-stop character or pattern

In bar codes, a special bar code character that provides the scanner with start and stop reading instructions and a scanning direction indicator. The start character is normally at the left end and the stop character at the right end of a horizontally oriented bar code symbol.

structured field

A self-identifying string of bytes and its data or parameters.

subcommand

In Page Printer Formatting Aid, the next level of control under commands.

A request for an operation that is within the scope of work that is requested by a previously issued command.

subgroup

A subset of a form definition that is used to reprint the same page of data more than once. Subgroups provide for variations in the same page of data within one print job. Modifications that distinguish one subgroup from another are number of copies, type of duplex printing, inclusion of overlays, inclusion of suppressions, and (only for the 3800 printer) forms flash. A set of modifications within a copy group that applies to a certain number of copies of a form. A copy group can contain more than one subgroup.

subpage

A part of a logical page on which line data can be placed. In the page definition, multiple subpages can be placed on a physical page based on changes in the print data.

suppression

The electronic equivalent of a spot carbon, preventing selected data from being printed on certain copies.

symbology

A bar code language. Bar code symbologies are defined and controlled by various industry groups and standards organizations. Bar code symbologies are described in public domain bar code specification documents. Synonymous with bar code symbology. See also [European Article Numbering \(EAN\)](#), [Japanese Article Numbering \(JAN\)](#), and [Universal Product Code \(UPC\)](#).

syntax

The rules that govern the structure of a construct.

T**table reference character (TRC)**

Usually, the second byte on a line in the user's data. This byte contains a value (0 - 126) that is used to select a font to be used to print that line.

tate

The Japanese word for top-to-bottom, as applied to the formatting of writing and printing. The traditional arrangement of Japanese kanji characters on the page. Pronounced "ta-tay".

text

A graphic representation of information on an output medium. Text can consist of alphanumeric characters and symbols that are arranged in paragraphs, tables, columns, and other shapes.

TRC

Table reference character.

truncation

Planned or unplanned end of a presentation space or data presentation.

tumble duplex printing

Duplex printing for sheets that are to be bound on the top, as is often done for legal documents. The top of one side of each sheet is at the same edge as the bottom of the other side. Contrast with normal duplex printing.

triplet

A three-part self-defining variable-length parameter that consists of a length byte, an identifier byte, and one or more parameter-value bytes.

type

A table heading for architecture syntax. The entries under this heading indicate the types of data present in a construct. Examples include: BITS, CHARCODE, SBIN, UBIN, UNDF.

TYPE

A parameter that specifies the kind of bar code symbol to be generated. For example, CODE39, MSI, UPCA, and UPCE.

type font

See font.

type weight

A parameter that indicates the degree of boldness of a typeface. A character's stroke thickness determines its type weight. Examples are light, medium, and bold.

type width

A parameter that indicates a relative change from the font's normal width-to-height ratio. Examples are normal, condensed, and expanded.

U**unformatted print data**

Data that is not formatted for printing. A page definition can contain controls that map unformatted print data to its output format.

Uniform Symbol Specification (USS)

A series of bar code symbology specifications that are published by AIM. The specifications that are currently included are USS-Interleaved 2 of 5, USS-39, USS-93, USS-Codabar, and USS-128.

Universal Character Set (USC)

A printer feature that permits the use of various character arrays. Synonymous with font.

Universal Product Code (UPC)

A standard bar code symbology, commonly used to mark the price of items in stores, that can be read and interpreted by a computer.

unprintable area

The area of a sheet of paper on which no printing can be done because of printer and hardware limitations.

UPC

See Universal Product Code.

UPCA

A parameter that specifies a bar code type of Universal Product Code (United States) and the Canadian Grocery Product Code, Version A.

UPCE

A parameter that specifies a bar code type of Universal Product Code (United States) and the Canadian Grocery Product Code, Version E.

UPC2SUPP

A parameter that specifies a bar code type of Universal Product Code (United States) two-digit Supplemental (periodicals).

UPC5SUPP

A parameter that specifies a bar code type of Universal Product Code (United States) five-digit Supplemental (paperbacks).

uppercase

Pertaining to capital letters. Examples of capital letters are A, B, and C. Contrast with [lowercase](#).

user-access name

The library resource name of a font or an overlay, less its two-character prefix. Contrast with [local name](#).

USS

See [Uniform Symbol Specification](#).

W**wide-to-narrow ratio**

The ratio of the width of the wide bar or space to the narrow bar (x-dimension) or space in a two-width symbology. This ratio is usually in the range of 2:1 to 3:1.

width

In Page Printer Formatting Aid, refers to the horizontal dimension of a logical page, is specified in the page definition, and is controlled by the WIDTH subcommand.

X**x-coordinate**

The horizontal or inline position that defines a page origin or the starting point of a line or field.

x-dimension

The width (usually in thousandths of an inch) of the narrow bar or space of the bar code symbology.

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