Advanced Function Presentation Consortium
Data Stream and Object Architectures

Mixed Object Document Content Architecture (MO:DCA) Reference

AFPC-0004-10

AFPConsortium™
Advanced Function Presentation

Note:

Before using this information, read the information in "Notices" on page 655.

AFPC-0004-10
Eleventh Edition (June 2023)

This edition applies to the Mixed Object Document Content Architecture™ (MO:DCA™). It replaces and makes obsolete the previous edition, AFPC-0004-09. This edition remains current until a new edition is published.

Technical changes are indicated in green, with a green vertical bar to the left of the change. Editorial changes that have no technical significance are not noted. For a detailed list of changes, see "Summary of Changes" on page ix.

Internet

Visit our home page at: `www.afpcinc.org`

Preface

This book describes the functions and services associated with the MO:DCA architecture.

This book is a reference, not a tutorial. It complements individual product publications, but does not describe product implementations of the architecture.

Who Should Read This Book

This book is for systems programmers and other developers who need such information to develop or adapt a product or program to interoperate with other presentation products.

AFP Consortium

The Advanced Function Presentation™ (AFP™) architectures began as the strategic, general purpose document and information presentation architecture for the IBM® Corporation. The first specifications and products go back to 1984. Although all of the components of the architecture have grown over the years, the major concepts of object-driven structures, print integrity, resource management, and support for high print speeds were built in from the start.

In the early twenty-first century, IBM saw the need to enable applications to create color output that is independent from the device used for printing and to preserve color consistency, quality, and fidelity of the printed material. This need resulted in the formation, in October 2004, of the AFP Color Consortium™ (AFPCC™). The goal was to extended the AFP architecture with support for full-color devices including support for comprehensive color management. The purpose of doing this via a consortium consisting of the primary AFP architecture users was to build synergism with partners from across the relevant industries, such as hardware manufacturers that produce printers as well as software vendors of composition, work flow, viewer and transform tools. More than 30 members came together in regular meetings and work group sessions to create the AFP Color Management Object Content Architecture™ (CMOCA™), and the extensions required to support CMOCA within the other components of the AFP architecture. A major milestone was reached by the AFP Color Consortium with the release of the specifications of all components of the AFP Color Management Architecture™ (ACMA™) in May 2006.

Due to the success of the AFP Color Consortium, it was decided to broaden the scope of the consortium efforts and in September 2006 IBM announced its plans to open up the complete scope of the AFP architecture to the consortium. In June 2007, IBM's role as founding member of the consortium was transferred to the InfoPrint® Solutions Company, an IBM/Ricoh® joint venture. In February 2009, the consortium was incorporated under a new set of bylaws with tiered membership and shared governance resulting in the creation of a formal open standards body called the AFP Consortium™ (AFPC™). Ownership of and responsibility for the AFP architectures was transferred at that time to the AFP Consortium.

How to Use This Book

This book is divided into eight chapters, six appendixes, and a glossary.

- Chapter 1, "A Presentation Architecture Perspective" introduces the AFP architectures and positions the MO:DCA architecture as a strategic presentation data stream architecture.
- Chapter 2, "Introduction to the MO:DCA Architecture" introduces the concepts that form the basis of the MO:DCA architecture.
- Chapter 3, "MO:DCA Overview" provides an overview of MO:DCA data structures and their use.
- Chapter 4, "MO:DCA Objects" provides the structure definitions for MO:DCA objects.
- Chapter 5, "MO:DCA Structured Fields" provides the syntax and semantics for MO:DCA structured fields.
- Chapter 6, "MO:DCA Triplets" provides the syntax and semantics for MO:DCA triplet data structures.
- Chapter 7, "MO:DCA Interchange Sets" provides complete descriptions of the MO:DCA interchange sets and describes how products can become valid generators and receivers of the MO:DCA architecture.
- Chapter 8, "MO:DCA Function Sets" provides complete descriptions of the MO:DCA function sets and defines the extensions made by each registered function set to specific interchange sets of the MO:DCA architecture.
- Appendix A, "Color Resources" provides information on color resources and on color to grayscale conversion.
- Appendix B, "Resource Access Table (RAT)" defines the Resource Access Table, which is used to locate and process resources such as TrueType and OpenType fonts.
- Appendix C, "MO:DCA Migration Functions" provides the syntax and semantics for MO:DCA migration structured fields, triplets, parameters, and provides the structure definitions for MO:DCA migration objects.
- Appendix D, "MO:DCA Registry" provides a registry for object type identifiers, media type identifiers, and color profile identifiers.
- Appendix E, "Cross-References" provides tables of MO:DCA structured fields and triplets sorted by identifier and by name.
- Appendix F, "Object OID Algorithms" provides the algorithms for generating Object Identifiers (OIDs) such as TrueType/OpenType font OIDs, Color Management Resource (CMR) OIDs, and data object OIDs.
- The Glossary defines some of the terms used within this book.

How to Read the Syntax Diagrams

Throughout this book, syntax is described using the following formats. The syntax of the structured field, the principal MODCA data structure, is shown with a horizontal representation, followed by a table that lists the data elements contained in the structured field. The syntax of the triplet, the secondary MO:DCA data structure, is shown using the table only. Six basic data types are used in the syntax descriptions:

CODE Architected constant
CHAR Character string, which may consist of any code points
BITS Bit string
UBIN Unsigned binary
SBIN Signed binary
UNDF Undefined type

Structured Field Introducer

Structured Field Introducer				
SF Length (2B)	ID = **X'D3TTCC'**	Flags (1B)	Reserved X'0000'	Structured Field Data

The meanings of the elements of the horizontal representation are as follows:

- The Structured Field Introducer, which identifies the length and the function or type of the structured field, is composed of the following parameters:

  Element — **Meaning**

  SF Length — The total length of the structured field including the length of the SF Length element.

  ID = X'D3TTCC' — The structured field identifier—consisting of the structured field class, type, and category codes—that uniquely identifies each MO:DCA structured field.

  Flags — The set of bits or flags that identify if the structured field is segmented of if a structured field extender or padding is to be used.

- The Structured Field Data, which provides the structured field's effect, is contained in the set of parameters described in the table.

For a detailed discussion of the data elements comprising MO:DCA structured fields, see "MO:DCA Structured Field Syntax" on page 20.

Data

The syntax for a MO:DCA data structure is as follows:

Offset	Type	Name	Range	Meaning	M/O	Exc
The field's byte offset.	The field's data type.	Name of field, if applicable.	Range of valid values, if applicable.	Meaning or purpose of the data element.	M or O	Code

Certain fields may be denoted in the Meaning column as *reserved*. A reserved field is a parameter that has no functional definition at the current time, but may have at some time in the future. All bytes in any field that the MO:DCA architecture defines as a reserved field should be given a value of zero by generating applications. Receiving applications should ignore any values contained in a reserved field.

Additional columns appear to the right of the Meaning column. These columns are:

M/O Mandatory or optional

Exc Exception code for the exception conditions that are possible for the data element. See “Exception Conditions” on page 71 for further information concerning exception conditions.

The following is an example of the MO:DCA syntax:

Structured Field Introducer				
SF Length (2B)	ID = **X'D3AFD8'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	OvlyName		Name of the overlay resource	M	X'06'
8–10	SBIN	XolOset	-32,768–32,767	X-axis origin for the page overlay	M	X'06'
			X'FFFFFF'	Retired value		
11–13	SBIN	YolOset	-32,768–32,767	Y-axis origin for the page overlay	M	X'06'
			X'FFFFFF'	Retired value		
14–15	CODE	OvlyOrent	X'0000', X'2D00', X'5A00', X'8700'	The overlay's X-axis rotation from the X axis of the including page coordinate system: **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees	O	X'02'
16–*n*		Triplets		See “IPO Semantics” on page 222 for triplet applicability.	O	X'10'

Related Publications

Following is a list of the AFP Architecture publications.

AFP Architecture Publications

Several other publications can help you understand the architecture concepts described in this book. AFP Consortium publications are available on the AFP Consortium web site at `www.afpcinc.org`.

Table 1. AFPC Architecture Documentation

AFP Architecture Publication	Book Identification
AFP Programming Guide and Line Data Reference	AFPC-0010
Bar Code Object Content Architecture™ Reference	AFPC-0005
Color Management Object Content Architecture Reference	AFPC-0006
Font Object Content Architecture Reference	AFPC-0007
Graphics Object Content Architecture for AFP Reference	AFPC-0008
Image Object Content Architecture Reference	AFPC-0003
Intelligent Printer Data Stream™ Reference	AFPC-0001
Metadata Object Content Architecture Reference	AFPC-0013
Mixed Object Document Content Architecture (MO:DCA) Reference	AFPC-0004
Presentation Text Object Content Architecture Reference	AFPC-0009

Table 2. Additional AFP Consortium Documentation

AFPC Publication	Book Identification
AFP Color Management Architecture (ACMA)	G550–1046 (IBM)
AFPC Company Abbreviation Registry	AFPC-0012
AFPC Font Typeface Registry	AFPC-0016
BCOCA™ Frequently Asked Questions	AFPC-0011
MO:DCA-L: The OS/2® PM Metafile (.met) Format	AFPC-0014
Presentation Object Subsets for AFP	AFPC-0002
Recommended IPDS™ Values for Object Container Versions	AFPC-0017

Table 3. AFP Font-Related Documentation

AFP Font-Related Publication	Book Identification
Character Data Representation Architecture Reference and Registry; For the most current information, please refer to the online version at: `http://www-01.ibm.com/software/globalization/cdra`	SC09-2190 (IBM)
Font Summary for AFP Font Collection	S544-5633 (IBM)
Technical Reference for Code Pages	S544-3802 (IBM)

Table 4. UP^{3}I Architecture Documentation

UP^{3}I Publication	Book Identification
Universal Printer Pre- and Post-Processing Interface (UP^{3}I™) Specification	Available at: `www.afpcinc.org`

Table 5. International Organization for Standardization (ISO) Documentation

ISO Publication	Book Identification
Document management – AFP/Archive	ISO 18565:2015, available at: `www.iso.org`

Summary of Changes

This eleventh edition of the *Mixed Object Document Content Architecture (MO:DCA) Reference* contains the following significant architecture extensions:

- Support for metadata objects has been expanded to allow metadata to be associated with additional AFP objects
- Support for IOCA nColor images and the FS48 function set that includes them
- Support for IOCA function set FS14, an extension of FS11
- Support for QR Code with Image, which allows a variety of data objects to be put on top of AFP QR Code bar codes
- Support for additional Trim finishing
- Support for setup names, which allow print files to specify the printer settings with which they should be printed
- Numerous corrections and clarifications

As stated in the edition notice, the additions are marked in this publication in green, with green revision bars located on the left-hand side of a page.

Contents

Figures

Tables

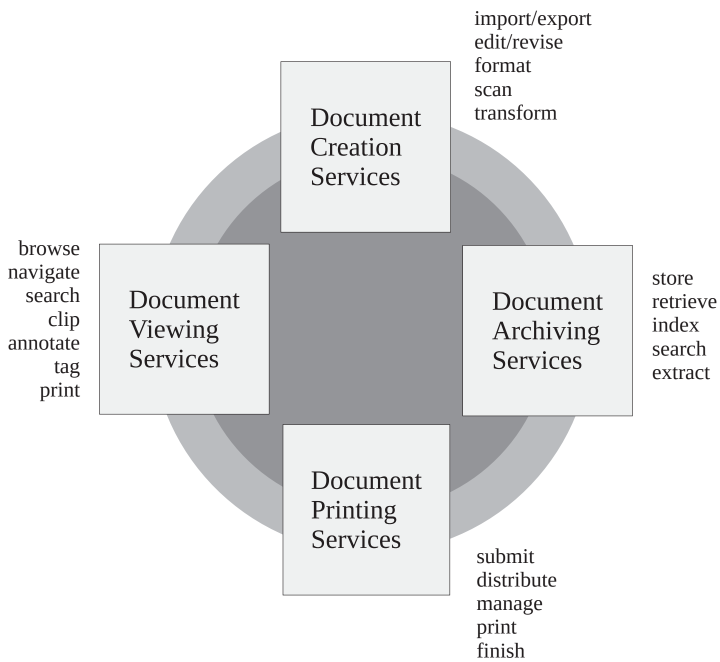
Chapter 1. A Presentation Architecture Perspective

This chapter provides a brief overview of Presentation Architecture.

The Presentation Environment

Figure 1 shows today's presentation environment.

Figure 1. Presentation Environment. The environment is a coordinated set of services architected to meet the presentation needs of today's applications.



The ability to create, store, retrieve, view, and print data in presentation formats friendly to people is a key requirement in almost every application of computers and information processing. This requirement is becoming increasingly difficult to meet because of the number of applications, servers, and devices that must interoperate to satisfy today's presentation needs.

The solution is a presentation architecture base that is both robust and open ended, and easily adapted to accommodate the growing needs of the open system environment. AFP architectures provide that base by defining interchange formats for data streams and objects that enable applications, services, and devices to communicate with one another to perform presentation functions. These presentation functions might be part of an integrated system solution or they might be totally separated from one another in time and space. AFP architectures provide structures that support object-oriented models and client/server environments.

AFP architectures define interchange formats that are system independent and are independent of any particular format used for physically transmitting or storing data. Where appropriate, AFP architectures use industry and international standards, such as the ITU-TSS (formerly known as CCITT) facsimile standards for compressed image data.

Architecture Components

AFP architectures provide the means for representing documents in a data format that is independent of the methods used to capture or create them. Documents can contain combinations of text, image, graphics, and bar code objects in presentation-system-independent and resolution-independent formats. Documents can contain fonts, overlays, and other resource objects required at presentation time to present the data properly. Finally, documents can contain resource objects, such as a document index and tagging elements supporting the search and navigation of document data, for a variety of application purposes.

The presentation architecture components are divided into two major categories: *data streams* and *objects*.

Data Streams

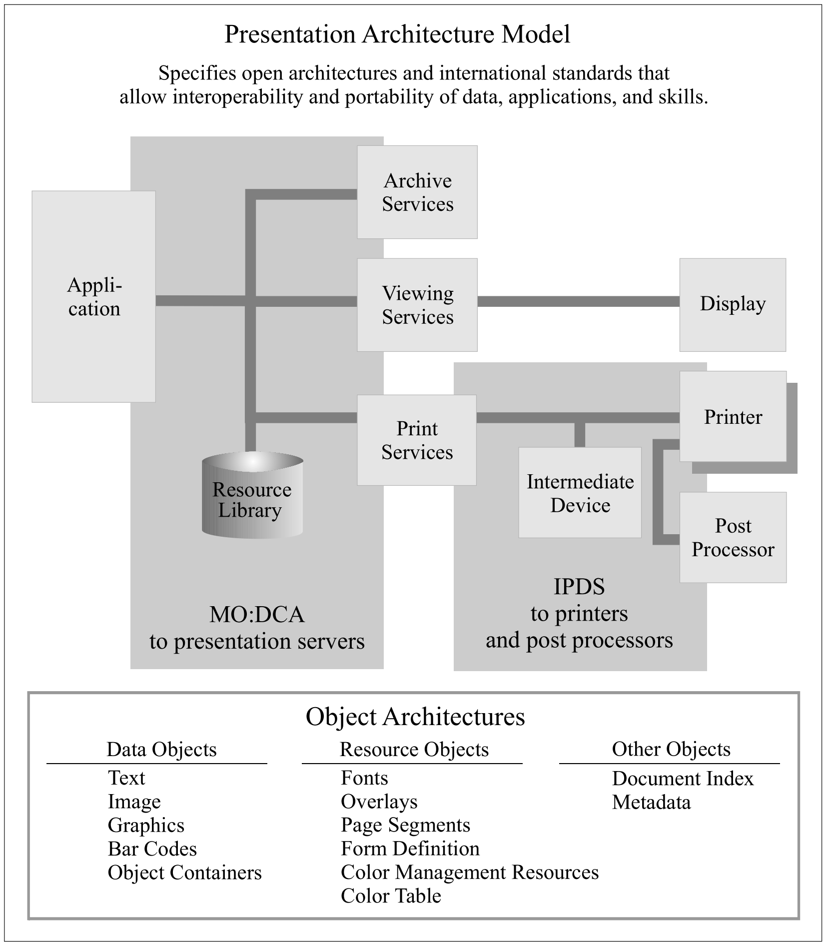
A *data stream* is a continuous ordered stream of data elements and objects conforming to a given format. Application programs can generate data streams destined for a presentation service, archive library, presentation device, or another application program. The strategic presentation data stream architectures are:
- *Mixed Object Document Content Architecture (MO:DCA)*
- *Intelligent Printer Data Stream (IPDS) Architecture*

The MO:DCA architecture defines the data stream used by applications to describe documents and object envelopes for interchange with other applications and application services. The MO:DCA format supports storing and retrieving documents in an archive, viewing, annotation, and printing of documents or parts of documents in local or distributed systems environments. Presentation fidelity is accommodated by including resource objects in the documents that reference them.

The IPDS architecture defines the data stream used by print server programs and device drivers to manage all-points-addressable page printing on a full spectrum of devices from low-end workstation and local area network-attached (LAN-attached) printers to high-speed, high-volume page printers for production jobs, shared printing, and mailroom applications. The same object content architectures carried in a MO:DCA data stream can be carried in an IPDS data stream to be interpreted and presented by microcode executing in printer hardware. The IPDS architecture defines bidirectional command protocols for query, resource management, and error recovery. The IPDS architecture also provides interfaces for document finishing operations provided by pre-processing and post-processing devices attached to IPDS printers.

Figure 2 shows a system model relating MO:DCA and IPDS data streams to the presentation environment previously described. Also shown in the model are the object content architectures that apply to all levels of presentation processing in a system.

Figure 2. Presentation Model. This diagram shows the major components in a presentation system and their use of data stream and object architectures.



Objects

Documents can be made up of different kinds of data, such as text, graphics, image, and bar code. *Object content architectures* describe the structure and content of each type of data format that can exist in a document or appear in a data stream. Objects can be either *data objects* or *resource objects*.

A data object contains a single type of presentation data, that is, presentation text, vector graphics, raster image, or bar codes, and all of the controls required to present the data.

A resource object is a collection of presentation instructions and data. These objects are referenced by name in the presentation data stream and can be stored in system libraries so that multiple applications and the print server can use them.

All object content architectures (OCAs) are totally self-describing and independently defined. When multiple objects are composed on a page, they exist as peer objects that can be individually positioned and manipulated to meet the needs of the presentation application.

The AFPC-defined object content architectures are:

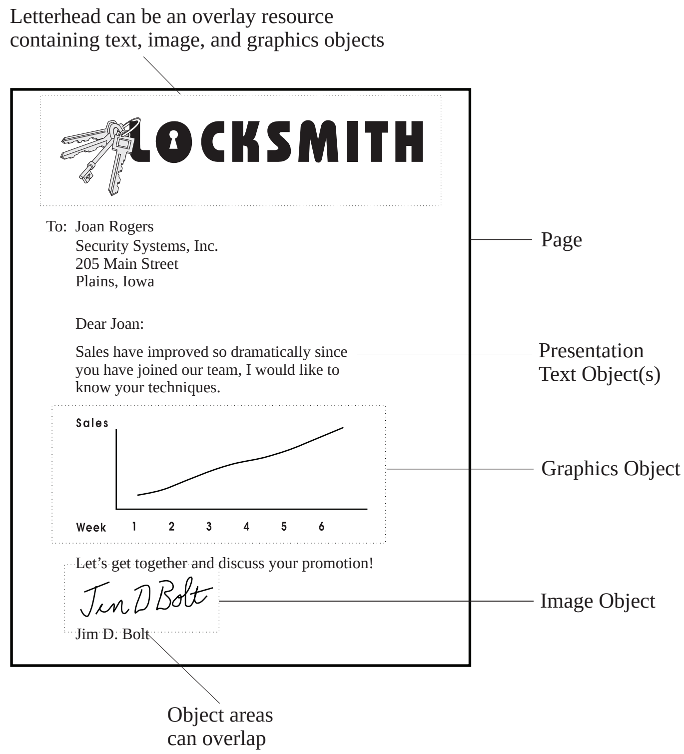
- *Presentation Text Object Content Architecture (PTOCA):* A data architecture for describing text objects that have been formatted for all-points-addressable presentations. Specifications of fonts, text color, and other visual attributes are included in the architecture definition.
- *Image Object Content Architecture (IOCA):* A data architecture for describing resolution-independent image objects captured from a number of different sources. Specifications of recording formats, data compression, color, and grayscale encoding are included in the architecture definition.
- *Graphics Object Content Architecture for Advanced Function Presentation (AFP GOCA):* A version of GOCA that is used in Advanced Function Presentation (AFP) environments. GOCA is a data architecture for describing vector graphics picture objects and line art drawings for a variety of applications. Specification of drawing primitives, such as lines, arcs, areas, and their visual attributes, are included in the architecture definition.
- *Bar Code Object Content Architecture (BCOCA):* A data architecture for describing bar code objects, using a number of different symbologies. Specification of the data to be encoded and the symbology attributes to be used are included in the architecture definition.
- *Font Object Content Architecture (FOCA):* A resource architecture for describing the structure and content of fonts referenced by presentation data objects in the document.
- *Color Management Object Content Architecture (CMOCA):* A resource architecture used to carry the color management information required to render presentation data.
- *Metadata Object Content Architecture (MOCA):* A resource architecture used to carry metadata in an AFP environment.

The MO:DCA and IPDS architectures also support data objects that are not defined by object content architectures. Examples of such objects are Tag Image File Format (TIFF), Encapsulated PostScript® (EPS), and Portable Document Format (PDF). Such objects can be carried in a MO:DCA envelope called an *object container*, or they can be referenced without being enveloped in MO:DCA structures.

In addition to object content architectures, the MO:DCA architecture defines envelope architectures for objects of common value in the presentation environment. Examples of these are *Form Definition* resource objects for managing the production of pages on the physical media, *overlay* resource objects that accommodate electronic storage of forms data, and *index* resource objects that support indexing and tagging of pages in a document.

Figure 3 shows an example of an all-points-addressable page composed of multiple presentation objects.

Figure 3. Presentation Page. This is an example of a mixed-object page that can be composed in a presentation-system-independent MO:DCA format and printed on an IPDS printer.



Chapter 2. Introduction to the MO:DCA Architecture

This chapter:
- Provides a definition of the MO:DCA architecture
- Describes the MO:DCA document component hierarchy

What is the Mixed Object Document Content Architecture?

A mixed object document is the collection of data objects that comprise the document's content, and the resources and formatting specifications that dictate the processing functions to be performed on the content. The term *Mixed* in the MO:DCA architecture refers both to the mixture of data objects and the mixture of document constructs that comprise the document's components. A MO:DCA document can contain a mixture of presentation data objects. Each data object type has unique processing requirements. An Object Content Architecture (OCA) has been established for each data object to define its respective syntax and semantics. MO:DCA documents can contain data and data objects governed by the following OCAs:

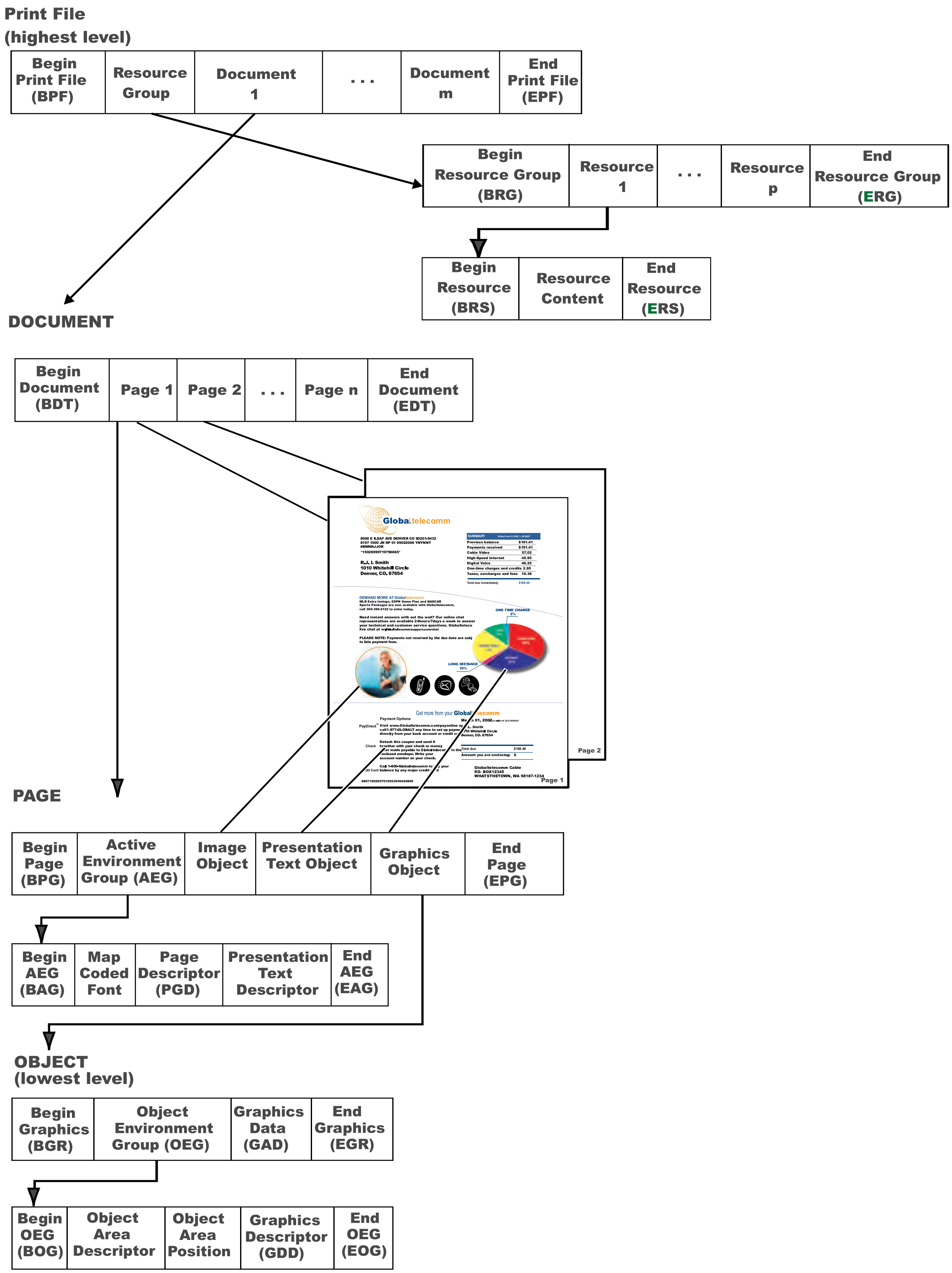
- Bar Code Object Content Architecture (BCOCA), which is used to describe and generate bar code symbols.
- Color Management Object Content Architecture (CMOCA), which is used to define resources used for color management, such as ICC profiles, tone transfer curves, and halftones.
- Font Object Content Architecture (FOCA), which is used to support the digital presentation of character shapes by defining their attributes, such as shape definitions, shape dimensions, and positioning information.
- Graphics Object Content Architecture for Advanced Function Presentation (AFP GOCA), which is used to represent pictures generated by a computer, commonly referred to as computer graphics.
- Image Object Content Architecture (IOCA), which is used to represent image information such as scanned pictures.
- Presentation Text Object Content Architecture (PTOCA), which is used to define text information.
- Metadata Object Content Architecture (MOCA), which is used to define metadata information.

MO:DCA documents can also contain or reference non-OCA data object types that are registered in the MO:DCA architecture. Such data object types may be carried in a generic MO:DCA object envelope called an *object container*. Examples of non-OCA data object types that can be included in MO:DCA documents are TIFF (Tag Image File Format), EPS (Encapsulated Postscript), and single-page PDF (Portable Document Format).

The MO:DCA architecture is designed to facilitate document *interchange* as well as document *exchange*. Interchange is the predictable interpretation of shared information in an environment where the characteristics of each process *need not be known* to all other processes. Exchange is the predictable interpretation of shared information by a family of system processes in an environment where the characteristics of each process *must be known* to all other processes.

The MO:DCA architecture is designed to integrate the different data object types into documents that can be interchanged as a single data stream. The MO:DCA architecture provides the data-stream structures needed to carry the data objects. It also provides syntactic and semantic rules governing their use to ensure that different applications process them in a consistent manner. Figure 4 on page 8 illustrates the relationship of MO:DCA data structures to a presentation document composed of pages and data objects.

Figure 4. MO:DCA Presentation Document Components



Two forms of the MO:DCA document format were defined in 1990 and have been documented in the MO:DCA reference since that time:

- the presentation form, called MO:DCA-P, which describes final-form documents in terms of a document structure and the mixtures of presentation objects that define page content within that structure
- the "library" form, called MO:DCA-L, which only describes a mixture of presentation objects without providing document structure

The MO:DCA-L form was used in the IBM OS/2 product to define the Presentation Manager (PM) metafile format. These files were known as ".met" files. This format has been stable for a long time, is functionally capped, and will no longer be documented in the MO:DCA reference. Its definition is provided in the document *MO:DCA-L: The OS/2 Presentation Manager Metafile (.met) Format*, available at `www.afpcinc.org`. The MO:DCA-P format is now simply referred to as the MO:DCA format; these two terms should be considered synonymous.

MO:DCA components are defined with a syntax that consists of self-describing structures. Structured fields are the main MO:DCA structures and are used to encode MO:DCA commands. A structured field starts with an introducer that uniquely identifies the command, provides a total length for the command, and specifies additional control information such as whether padding bytes are present. The introducer is followed by up to 32,759 data bytes. Data may be encoded using fixed parameters, repeating groups, keywords, and triplets. Fixed parameters have a meaning only in the context of the structure that includes them. Repeating groups are used to specify a grouping of parameters that can appear multiple times. Keywords are self-identifying parameters that consist of a one-byte unique keyword identifier followed by a one-byte keyword value. Triplets are self-identifying parameters that contain a one-byte length, a one-byte unique triplet identifier, and up to 252 data bytes. Keywords and triplets have the same semantics wherever they are used. Together, these structures define a syntax for MO:DCA data streams that provides for orderly parsing and flexible extensibility.

Organization of the Architecture

The MO:DCA definition in this document is organized into five parts:
- Definition of the general architecture
- Definition of MO:DCA interchange sets
- Definition of MO:DCA function sets
- Definition of MO:DCA migration functions
- Table definitions and registries

The general architecture is defined in Chapter 1 through Chapter 6. This includes the general architecture definition for structured fields in Chapter 5, the general architecture for triplets in Chapter 6, and the general architecture for MO:DCA object structure in Chapter 4.

MO:DCA interchange sets are defined in Chapter 7. Interchange sets consist of structured field, triplet, and object structure specifications that are formal subsets of the general architecture. The purpose of interchange sets is to provide concise, complete document definitions with clear compliance rules that are agreed on and implemented by MO:DCA generators and receivers. It is strongly recommended that MO:DCA support includes compliance with an interchange set.

MO:DCA function sets are defined in Chapter 8. Function sets consist of structured field, triplet, and object structure definitions that add functionality to an interchange set. A function set is formally defined as an extension to a specific interchange set. Multiple definitions can exist for a given function set, that is, a function set can be defined to extend more than one interchange set. A function set is normally not sufficiently complex to warrant the definition of a new interchange set.

MO:DCA migration objects, structured fields, triplets, parameters, and rules for processing these structures are defined in Appendix C. These constructs may appear in MO:DCA data streams, but they are not considered to be part of the formal architecture definition and may not be supported by all MO:DCA products.

Architected tables, algorithms, and registries are defined in the appendices. The standard OCA color value table is defined in Appendix A. The Color Mapping Table is defined in Appendix A. The Resource Access Table (RAT) is defined in Appendix B. The MO:DCA Registry for object types and media types is defined in Appendix D. The algorithms used to calculate object identifiers (OIDs) are defined in Appendix F.

Compliance with the Architecture

MO:DCA-compliant products do not necessarily support all of the structures and functions defined in this document. MO:DCA compliance may be based on document interchange, in which case a product must support one of the defined interchange sets plus optionally one or more function sets in accordance with the rules specified in "Interchange Set Compliance Requirements" on page 472. MO:DCA compliance may also be based on document exchange, in which case a product must support a subset of the general architecture and must define, in its product documentation, which MO:DCA structures and functions are supported.

MO:DCA Concepts

The print file is the highest level of the MO:DCA data-stream document component hierarchy. Print files can contain multiple documents and a resource group. Documents can be made up of pages, and the pages, which are at the intermediate level, can be made up of objects. Objects are at the lowest level, and can be bar codes, graphics, images, and presentation text. The MO:DCA document component hierarchy for a document containing image, graphics, and presentation text objects is illustrated in Figure 4 on page 8.

At each level of the hierarchy certain sets of MO:DCA data structures, called *structured fields*, are permissible. The document, pages and objects are bounded by structured fields that define their beginnings and their ends. These structured fields, called *begin-end pairs*, provide an *envelope* for the data-stream components. This feature enables a processor of the data stream that is not fully compliant with the architecture to bypass those objects that are beyond its scope, and to process the data stream to the best of its abilities.

Print Files

A MO:DCA print file contains one or more documents to be printed. A print file may also optionally contain an external resource group, also referred to as a print file level resource group, as well as document indexes. A single Form Map is associated with each print file and is used to render that print file.

Documents

A MO:DCA presentation document is one that has been formatted and is intended for presentation, usually on a printer or display device. A data stream containing a presentation document should produce the same document content in the same format on different printers or display devices dependent, however, on the capabilities of each of the printers or display devices. A presentation document can reference resources that are to be included as part of the document to be presented.

Pages

Pages contain the data objects that comprise a presentation document. Figure 4 on page 8 portrays the location of the page within the data-stream hierarchy. Each page has a set of data objects associated with it. Each page within a document is independent from any other page, and each must establish its own environment parameters.

The page is the level in the document component hierarchy that is used for printing or displaying a document's content. The data objects contained in the page envelope in the data stream are presented when the page is presented. Each data object has layout information associated with it that directs the placement and orientation of the data on the page. In addition, each page contains layout information that specifies the measurement units, page width, and page depth.

The presentation of a document by a presentation device is a process that consists of presenting the document's pages on a physical medium in accordance with the document's layout and formatting specifications. Examples of physical media are sides of a sheet of paper and display screens.

Overlays

Overlays are page-like resource objects that contain data objects and that define their own environment parameters. Overlays can be included directly on the medium presentation space using a keyword on the Medium Modification Control (MMC) structured field. Such overlays are positioned at the origin of the medium presentation space and are called *medium overlays*. Overlays may also be included on the logical page presentation space using the Include Page Overlay (IPO) and Page Modification Control (PMC) structured fields. Such overlays are positioned at an offset from the logical page origin that is defined by the IPO and PMC and are called *page overlays*. Page overlays that are included with a PMC are also referred to as *PMC overlays*. Note that the MMC and PMC are specified in a *Medium Map* print control object, whereas the IPO is specified directly in the data stream.

Medium overlays and PMC overlays may be identified as *Preprinted Form Overlays (PFOs).* One Medium PFO (M-PFO) may be included on a sheet-side; additional M-PFOs are ignored. One PMC PFO (PMC-PFO) may be included on each page on a sheet-side; additional PMC-PFOs for that page are ignored. PFOs are always included last on a presentation space, after all other data has been applied for that presentation space, and are merged using special mixing rules; see "Mixing Rules" on page 44. For a given sheet-side, an M-PFO always overrides any PMC-PFOs. That is, if an M-PFO is specified for a sheet-side, any PMC-PFOs specified for pages on that sheet-side are ignored.

Page Segments

Page segments are resource objects that contain data objects but that do not define their own environment parameters. Page segments can be included on the logical page presentation space or on the overlay presentation space using the Include Page Segment (IPS) structured field, and inherit the environment parameters defined by the including page or overlay.

Objects

Objects contain the data that is to be presented. They also may contain environment information needed to establish the proper location and orientation for the data on the presentation surface. Objects in the data stream are bounded by delimiters that identify their type, such as graphics, image, or text. The MO:DCA architecture supports two categories of objects: data objects and resource objects.

Data Objects

In general, data objects consist of data to be presented and the directives required to present it. The content of each type of data object is defined by an object architecture that specifies presentation functions that can be used within its MO:DCA coordinate space. All data objects function as equals in the MO:DCA data-stream environment. Data objects are carried as separate entities with no dependencies on the MO:DCA layout structures or on the containing data-stream environment.

The *object area* is the space on a page that is used to present the data object. An object area is defined by layout information, such as the object area's origin, width, depth, and orientation on the page.

Resource Objects

Resource objects are named objects or named collections of objects that can be referenced from within the document. In general, the referenced resources can reside in a resource group or an external library and can be referenced repeatedly. They may be used in numerous places in a document or in several documents. They are characterized by an unchanging and often complex composition. It is inefficient, and thus undesirable, for applications to generate these objects each time they are required. Instead, the inclusion of these objects in a resource group or a library enables applications to retrieve them repeatedly as they are needed to obtain the desired presentation effect. Examples of resource objects are:

- Fonts that support presentation text and graphics objects
- Referenced data objects
- Page overlays that contain corporate logos, copyright notices, or other such material
- Page segments
- Color Management Resources (CMRs)

Resource objects are also referred to as *hard* objects. That is, they are mapped with a Map structured field in the environment group of a form map, page, or overlay, which causes the server to retrieve the object and send it to the presentation device. The object is then referenced for inclusion at a later time. This is in contrast to *soft* objects, which are not mapped in an environment group and are sent to the presentation device when they are referenced within the page or overlay.

Secondary Resource Objects

A data object that is processed as a resource may itself require additional resources for presentation. Such resources are called *secondary resources*. Examples of data objects and their secondary resources are:

- An IOCA FS45 image object that references a tile resource
- A PDF object that requires a custom font
- An EPS object that is to be rendered with a SWOP or Euroscale color profile
- An SVG file that requires a raster image
- A PDF object that requires a CMR
- A QR Code with Image bar code (BCOCA) object that requires a presentation data image

A secondary resource may be referenced explicitly from a data object, such as a IOCA tile resource; or it may be tied implicitly to the data object, such as a color profile. A secondary resource must be mapped with an MDR that carries the *external* identifier of the resource in an FQN triplet, whose FQN type varies:

- FQN type X'DE' if the secondary resource is a non-presentation object
- FQN type X'84' if the secondary resource is an IOCA object
- FQN type X'CE' if the secondary resource is a non-OCA presentation object

The external identifier is used to identify the secondary resource in the data stream and in the presentation system. If there is also an explicit reference to the secondary resource from within the data object, the *internal* identifier is specified in an FQN type X'BE' triplet. The FQN type X'DE', X'84', or X'CE' triplet is paired with the FQN type X'BE' triplet at object include time (when the Include Object structured field that includes the data object is processed) to match up the internal and external identifiers.

See "Data Objects and Supported Secondary Resources" on page 626 for more information on data objects and their secondary resources.

Tertiary Resource Objects

In the case of a QR Code with Image bar code, a data object that is processed as a secondary image resource may itself require additional resources for presentation. Such additional resources are called *tertiary resources*. Tertiary resources are always non-presentation data objects. Examples of a secondary image resource calling out for a tertiary resource in a QR Code with Image bar code are:

- An IOCA FS45 image object that references a tile resource
- A PDF object that requires a custom font
- An SVG file that requires a raster image
- A PDF object that requires a CMR

Tertiary resources may be referenced explicitly from a secondary image resource, such as a tertiary IOCA tile resource being referenced from within an IOCA image object. A tertiary resource must be mapped with an MDR that carries the *external* identifier of the resource in an FQN triplet, whose FQN type varies:

- FQN type X'EE' if the tertiary resource is a CMR
- FQN type X'DE' if the tertiary resource is any other non-presentation object

The external identifier is used to identify the tertiary resource in the data stream and in the presentation system.

All resource types that are supported as secondary resources are also supported as tertiary resources, except for resident color profiles; if a secondary resource to a QR Code with Image bar code references a resident color profile, that tertiary reference is ignored.

For tertiary resources other than CMRs, there is an explicit reference to the tertiary resource from within the secondary image resource; this *internal* identifier is specified in an FQN type X'BE' triplet. The FQN type X'DE' triplet is paired with the FQN type X'BE' triplet at object include time (when the Include Object structured field that includes the QR Code with Image bar code is processed) to match up the internal and external identifiers.

For tertiary CMR resources, the *internal* identifier of the secondary image resource from within the bar code is specified in an FQN type X'BE' triplet. The FQN type X'EE' triplet for the tertiary CMR is paired with the FQN type X'BE' triplet for the secondary image resource at object include time (when the Include Object structured field that includes the QR Code with Image bar code is processed) to match up the CMR with the secondary image resource with which it is associated.

Multi-page Resource Objects

A resource object may be a file that contains multiple pages or paginated objects for presentation. Such an object is appropriately characterized in the Object Registry. That is, it is registered with an encoded object-type OID that identifies it as a file that may contain multiple pages or paginated objects. When a multi-page file is referenced in the data stream with a structured field like an Include Object (IOB), it must be indexed to select only a single paginated object for presentation. Similarly, when a multi-page file is carried in a container that is specified directly within a page or overlay, the Container Data Descriptor (CDD) structured field must select a single paginated object for presentation. Examples of multi-page resource objects are PDF files that contain multiple pages and TIFF files that contain multiple paginated image objects.

Architecture Note: When a page, such as a PDF page, or a paginated object is included on a MO:DCA page, it becomes a data object on that MO:DCA page and is no longer considered a “page”. That is, it is not subject to MO:DCA page level functions such as page level indexing.

Implementation Note: When a resource-collection application processes multi-page resource objects, it may choose to collect the complete file, not just the pages in the file that are actually selected for presentation.

Resource Object Mapping

The MO:DCA architecture defines Map structured fields for objects that are to be processed as resource objects. Examples are the Map Page Overlay (MPO), Map Page Segment (MPS), Map Coded Font (MCF), and Map Data Resource (MDR) structured fields. Map structured fields are specified in environment groups and indicate to the presentation server that the referenced object is to be processed as a resource object and will be required for presentation. They may also provide additional information, such as a mapping of the resource reference to a local identifier for the resource. The scope of the environment determines the scope of the mapping. For example, if a resource is mapped in the Active Environment Group (AEG) for a page, the scope of the mapping is the page. Any object that is to be treated as a resource must be mapped. For some objects like page segments, IOCA objects, and non-OCA data objects, treating the object as a resource is optional. Therefore for these objects, the mapping is optional. If a mapping is specified, the object is sent to the presentation device and may be used multiple times via an include command. In that case, the object is sometimes called a *hard* object. If a mapping is not specified, the object is sent to the presentation device as part of the page or overlay, and is sometimes called a *soft* object.

Note: To optimize print performance, it is strongly recommended that the same encoding scheme be used for a resource reference wherever in a print file that resource reference is specified. That is, the encoding scheme used for the resource include, the resource map, and the resource wrapper should be the same.

Preloading and Preprocessing Resource Objects

The Resource Environment Group (REG) allows *preloading* of complex resources before printing for the first page is started. This can avoid device underruns that might occur if the resource downloading takes place between pages.

Resource *preprocessing* is an extension of the resource preload concept. It can be used with objects that have a long rasterization time, and causes this rasterization to be done after the resource is preloaded, but before printing of the first page is started. This can avoid device underruns that might occur if such rasterization takes place between pages. Examples of resource objects that might benefit from resource preprocessing are:

- Large IOCA FS45 image objects that need to be rotated, scaled, or trimmed
- Complex EPS and PDF objects

The penalty for underrunning a device is dependent on the device characteristics. For example, on a cut-sheet printer the penalty is normally a larger time delay between page printing, which may be acceptable. On a continuous-forms printer that can backhitch and recover from an underrun, the penalty is normally a loss of throughput and possibly increased printer maintenance. On a continuous-forms printer that cannot backhitch, the penalty is most severe in that unwanted blank sheets are generated during the underrun. These blank sheets must be accounted for and discarded by the post-processing system.

Resource preloading and preprocessing does come at a cost. The undesirable effect of resource preloading and preprocessing is that the time to first print is increased. To achieve optimum throughput, an application should be tuned to preload and preprocess only those resources whose downloading and processing between pages would cause an unacceptable device underrun.

Object Containers

An *object container* is an envelope for object data. The object data may or may not be defined by an AFP architecture. The container consists of a mandatory Begin/End structured field pair, an optional Object Environment Group (OEG), and mandatory Object Container Data (OCD) structured fields. The Begin structured field specifies information about the object data such as object-type identifier, class, type, level, and structure, so that a MO:DCA receiver can determine whether it is an object that can be processed given its capabilities. The OCD structured fields are used to carry the object data.

If the object is to be carried in MO:DCA resource groups and interchanged, it must at a minimum be enveloped by a Begin/End pair, the Object Classification (X'10') triplet on the Begin structured field must specify the registered object-type identifier (encoded object-type OID) for the object data format, and all object data must be partitioned into OCDs. If the object container is to appear directly in a page or overlay, the container must be structured in accordance with the MO:DCA syntax for data objects supported directly in pages and overlays, such as IOCA, GOCA, and BCOCA objects. For a definition of this structure, see "Object Containers" on page 114. Object containers can be included indirectly by name in a document using the Include Object (IOB) structured field.

If the object data is traditional time-invariant presentation data, it must be paginated, that is the presentation space within which the object data is presented must be restricted to a single page. However, the object data within the container is not constrained to be traditional presentation object data. Examples of presentation object data that can be carried in an object container are image objects in TIFF (Tag Image File Format), PCX (Paintbrush Picture Format), and DIB (Device Independent Bitmap) format. Examples of non-presentation object data that can be carried in an object container are COM Set-up Files, Color Mapping Tables, TrueType and OpenType fonts, and Color Management Resources (CMRs).

Environment Groups

An *environment group* in the data stream is used to carry layout information and to identify mappings to resources for resource management. Environment groups can be specified at the object, page, or document level. An environment group consists of a set of MO:DCA structured fields enveloped in a begin-end pair.

Document Environment Groups

A *Document Environment Group* may be associated with a Form Map print control object. The document environment group contains presentation specifications such as resource mappings and medium information that apply to all Medium Maps in the Form Map. The scope of a document environment group is the scope of its containing Form Map.

Resource Environment Groups

A *Resource Environment Group* (REG) is associated with a document or a group of pages in a document. It is contained in the document's begin-end envelope in the data stream. The REG is used to identify complex resources, such as high-resolution color images, that need to be downloaded to the presentation device before the pages that follow are processed. The scope of a REG is the pages that follow, up to the next REG (which is a complete replacement for the current REG) or the end of the document, whichever occurs first. Specification of a REG is optional. Identifying a resource in a REG does not remove the need to map that resource in the environment groups for the pages and objects that use the resource.

Active Environment Groups

An *Active Environment Group* (AEG) is associated with each page, and is contained in the page's begin-end envelope in the data stream. Figure 4 on page 8 depicts the relationship of the active environment group to the page. The active environment group contains layout and formatting information that defines the measurement units and size of the page, and may contain resource information. Any objects that are required for page presentation and that are to be treated as resource objects must be mapped with a map structured field in the AEG. The scope of an active environment group is the scope of its containing page or overlay. In many cases the information contained in an active environment group can be inherited by objects contained in the page. See "Default Values" on page 29 for a discussion of defaults and inheritance.

Object Environment Groups

An *Object Environment Group* (OEG) may be associated with an object and is contained within the object's begin-end envelope. Figure 4 on page 8 depicts the relationship of the object environment group to its corresponding object. The object environment group defines the object's origin and orientation on the page, and can contain resource information.

Any objects that are required for object presentation and that are to be treated as resource objects must be mapped using a map structured field in the OEG.

Application Note: For print server resource management, any mapping specified in the OEG for an object must also be specified in the AEG for the page or overlay that includes the object. This is sometimes referred to as *factoring* the resource mapping from OEG to AEG.

The scope of an object environment group is the scope of its containing object. An application that creates a data-stream document may omit some of the parameters normally contained in the object environment group, or it may specify that one or more default values are to be used. The values to be used may be:
- Inherited from the active environment group on the current page
- Supplied by default values defined by the MO:DCA architecture
- Supplied by default values defined by the application

See "Default Values" on page 29 for a discussion of defaults and inheritance.

Resource Groups

A *resource group* is used in the data stream to contain resources during transmission. The resources can be referenced or included at other locations within the data stream.

Resource groups can exist at the print file level. The retired IS/2 interchange set also allows resource groups to exist at the page level. A resource group has the same scope as its container. That is, the contents of the resource group are available for referencing until the containing component is ended. For example, when a resource group is contained within a print file, the contents of the resource group are available for referencing only within that print file. Once the end of the print file is encountered, the resources contained within that resource group are no longer available.

Although the MO:DCA architecture has several ways of referencing a resource object, ultimately they all result in matching a referenced identifier with the identifier used for the resource object. If the resource object is within a resource group in the data stream, the resource object's identifier is specified on the Begin Resource structured field. If the resource is in an external library, the resource object's identifier is the library name associated with the object. The MO:DCA architecture does not require that the library name be the same as the identifier specified on the Begin structured field.

In addition to matching the identifier, the resource object type must also match the reference. Thus, if a reference is made to a page overlay named ABCDEF and a color attribute table named ABCDEF is encountered in the resource group, it is not considered a valid match because the Begin structured field is of the wrong type.

Although the MO:DCA architecture permits objects of different resource types to have the same identifier, it requires that objects of the same resource type *within the same resource group* have unique identifiers. However, there is no restriction on having multiple objects of the same resource type and identifier in multiple resource groups.

The MO:DCA architecture defines the order in which resource groups must be searched when attempting to locate a specific resource. When searching for a resource, the first resource located that satisfies the search criteria ends the search. Thus, although two different versions of the same resource type with the same name may exist in different resource groups, the MO:DCA resource scope and search rules remove any uncertainty as to which of the resources will be selected.

The MO:DCA search order for resources referenced within a print file is as follows:
1. The current page level resource group, if one exists (only supported in the retired MO:DCA IS/2 interchange set, see “Retired Interchange Set” on page 575)
2. The print file level resource group, if one exists

If no resource groups exist or if the referenced resource object is not found in any of the resource groups searched, the search is extended to an external library. The search convention does not include library access methods, since these are dependent upon the implementing system. For the formal definition of resource groups in MO:DCA data streams, see “Resource Groups” on page 87.

Page Groups

A *page group* is used in the data stream to define a named, logical grouping of sequential pages. Page groups are delimited by begin-end structured fields that carry the name of the page group. Page groups are defined so that the pages that comprise the group can be referenced or processed as a single entity. Examples of page group processing are:
- Assigning a set of common indexing attributes to the page group
- Retrieving the page group from an archive system for viewing

Print Control Objects

Print control objects are resource objects that contain formatting, layout, and resource-mapping information used to present the document's pages on physical media. Print control objects may be selected at the time of the print request, or they may be invoked directly from the document. There are two types of print control objects, *form maps*, also known as *form definitions* or *formdefs*, and *medium maps*. A form map print control object contains one or more medium map print control objects. Note that a medium map is also sometimes referred to as a *copygroup*.

Process Elements

Process elements are document structures that facilitate particular forms of document processing. A process element is defined by a structured field and does not contain any presentation specifications, that is, it does not affect the appearance of a document when the document is presented. An example of a process element is a Tag Logical Element (TLE), which specifies object attribute information that can be used to support attribute-based document indexing and attribute-based document navigation. Another example is a Link Logical Element (LLE), which specifies a linkage from a source document component to a target document component.

Chapter 3. MO:DCA Overview

This chapter:
- Describes the general syntax and semantics for MO:DCA structured fields
- Describes state, as defined by the MO:DCA architecture
- Describes the types and categories of MO:DCA parameters
- Describes conventions used in the MO:DCA architecture for coordinate systems, measurement units, and rotation units
- Describes MO:DCA mixing rules
- Describes MO:DCA color management
- Describes MO:DCA metadata objects
- Describes font technologies used in MO:DCA documents
- Describes MO:DCA document indexing
- Describes other aspects of MO:DCA document presentation
- Describes and defines the MO:DCA exception conditions

MO:DCA Data Structures

Each component of a mixed object document is explicitly defined and delimited in the data stream that transmits it. This is accomplished through the use of MO:DCA data structures, called *structured fields*, that reside in the data stream. Structured fields are used to envelop document components and to provide commands and information to applications using the data stream. Structured fields may contain one or more parameters. Each parameter provides one value from a set of values defined by the architecture.

Notation Conventions

In addition to the information provided in "How to Read the Syntax Diagrams" on page v, the following notation conventions apply throughout this document:

- Bytes are numbered from left to right beginning with byte zero, which is considered the high order (most significant) byte position. This is referred to as *big-endian* byte order. For example, a three-byte field would consist of byte zero, byte one, and byte two.
- Each byte is composed of eight bits.
- Bits in a single byte are numbered from left to right beginning with bit zero, the most significant bit, and continuing through bit seven, the least significant bit. This is referred to as big-endian bit order.
- When bits from multiple consecutive bytes are considered together, the first byte always contains bits zero to seven and the bits of the additional bytes are numbered eight to *n*, where *n* is equal to one less than the total number of bytes multiplied by eight. For example, a two-byte field would consist of bits zero to fifteen and a four-byte field would consist of bits zero to thirty-one.
- Negative numbers are expressed in two's-complement form. See "Number" on page 32 for details.
- Field values are expressed in hexadecimal or binary notation:

```
B'01111110' = X'7E' = +126
X'7FFF' = +32,767
X'8000'  = -32,768 (when signed binary is used)
X'8000'  = +32,768   (when unsigned binary is used)
```

MO:DCA Structured Field Syntax

MO:DCA structured fields consist of two parts: an introducer that identifies the length and type of the structured field, and data that provides the structured field's effect. The data is contained in a set of parameters, which can consist of other data structures and data elements. The maximum length of a structured field is 32,767 bytes. The general format for a structured field is as follows:

Structured Field Introducer						
Length (2B)	Identifier (3B)	Flags (1B)	Reserved; X'0000'	Extension	Data	Padding

Structured Field Introducer

The MO:DCA Structured Field Introducer (SFI) introduces a structured field, and identifies its type and its length. SFIs have the following format:

SFI Syntax

Table 6. Structured Field Introducer (SFI)

Offset	Type	Name	Range	Meaning	M/O	Exc
0–1	UBIN	SFLength	8–32,767	Total length of the structured field including the length of the introducer	M	X'82'
2–4	CODE	SFTypeID		A three-byte code that uniquely identifies the structured field. See “SFI Semantics” on page 21 for a description.	M	X'78'
5	BITS	FlagByte		Used to indicate whether an extension, segmentation, or padding is in use	M	X'82'
Bit 0		ExtFlag	B'0', B'1'	**B'0'** No SFI extension exists **B'1'** SFI extension is present		
Bit 1				Reserved; should be zero		
Bit 2		SegFlag	B'0', B'1'	**B'0'** Data is not segmented **B'1'** Data is segmented		
Bit 3				Reserved; should be zero		
Bit 4		PadFlag	B'0', B'1'	**B'0'** No padding data exists **B'1'** Padding data is present		
Bits 5–7				Reserved; should be zero		
6–7				Reserved; should be zero	M	X'82'
The following optional extension appears only if bit 0 of FlagByte is B'1':						

Table 6 Structured Field Introducer (SFI) (cont'd.)

Offset	Type	Name	Range	Meaning	M/O	Exc
8	UBIN	ExtLength	1–255	Length of the extension including the length of ExtLength itself	O	X'82'
9		ExtData		Reserved	O	X'00'

SFI Semantics

SFLength Defines the length of the structured field, including itself.

Application Note: Some platforms include structured fields in a larger platform-specific record by surrounding the structured field with additional bytes (such as the X'5A' prefix). This can result in a record length greater than X'7FFF' if the structured field length is X'7FFF'. Such a record length can be misinterpreted as a negative number if the length is treated as SBIN. To ensure portability of MO:DCA print files, it is strongly recommended that the maximum structured field length be limited to X'7FF0' = 32,752, which avoids such record length issues on the known platforms. Note that MO:DCA interchange sets have traditionally limited the maximum structured field length. MO:DCA IS/3 limits the length to X'7FF0' = 32,752, MO:DCA IS/1 and IS/2 limit the length to X'2000' = 8,192.

SFTypeID A three-byte field that uniquely identifies the structured field. It has the form *D3TTCC*, where:

Code **Description**

D3 The structured field *class* code that has been assigned to the MO:DCA architecture.

TT The structured field *type* code. The type code identifies the function of the structured field, such as begin, end, descriptor, or data. See “Type Codes” on page 22 for a description of type codes.

CC The structured field *category* code. It identifies the lowest level component that can be constructed using the structured field, such as document, active environment group, page, or object. The same category code point assigned to a component's begin structured field also is assigned to that component's end structured field. These code points identify and delimit an entire component within a data stream or an encompassing component. See “Category Codes” on page 23 for a description of category codes.

FlagByte Specifies the value of the optional indicators. Indicator bits are defined as follows:

Bit **Indicator name and meaning**

0 ExtFlag is the SFI extension flag. See “Structured Field Introducer Extension” on page 24 for details.

B'0' No SFI extension exists.
B'1' This structured field has an SFI extension.

2 SegFlag is the segmentation flag. See “Structured Field Segmentation” on page 24 for details.

B'0' No segmentation in effect.
B'1' The data for this structured field has been segmented.

4 PadFlag is the padding flag. See “Structured Field Padding” on page 24 for details.

B'0' No padding data appended.
B'1' Padding data has been appended to the end of this structured field.

All others Reserved; should be binary zero

Bytes 6–7 Reserved; should be zero

Application Note: In AFP environments, some applications use bytes 6–7 of the Structured Field Introducer to specify a sequence number for the structured field. This is an unarchitected use of these bytes and should be avoided.

ExtLength Specifies the length of the SFI extension, including the length of ExtLength itself. For ExtLength to be valid, bit 0 of FlagByte must be B'1'.

ExtData Contains up to 254 bytes of application-defined SFI extension data. For ExtData to be valid, bit 0 of FlagByte must be B'1'.

Type Codes

The following type codes have been defined. All other type codes are reserved.

Table 7. Type Codes

Type Code	Function	Description
X'A0'	Attribute	An *attribute* structured field defines an attribute with parameters such as name and value.
X'A2'	Copy Count	A *copy count* structured field specifies groups of sheet copies, called *copy subgroups*, that are to be generated, and identifies modification control structured fields that specify modifications to be applied to each group.
X'A6'	Descriptor	A *descriptor* structured field defines the initial characteristics and, optionally, the formatting directives for all objects, object areas, and pages. Depending on the specific descriptor structured field type, it may contain some set of parameters that identify: • The size of the page or object • Measurement units • Initial presentation conditions
X'A7'	Control	A *control* structured field specifies the type of modifications that are to be applied to a group of sheet copies, or a copy subgroup.
X'A8'	Begin	A *begin* structured field introduces and identifies a document component. In general, a begin structured field may contain a parameter that identifies the name of the component.
X'A9'	End	An *end* structured field identifies the end of a document component. In general, an end structured field may contain a parameter that identifies the name of the component.
X'AB'	Map	A *map* structured field provides the following functions in the MO:DCA architecture: • All occurrences of a variable embedded in structured field parameter data can be given a new value by changing only one reference in the mapping, rather than having to physically change each occurrence. Thus all references to font X may cause a Times Roman font to be used in one instance and a Helvetica font in another instance merely by specifying the proper *map coded font* structured field. • The presence of the map structured field in a MO:DCA environment group indicates use of the named resource within the scope of the environment group.
X'AC'	Position	A *position* structured field specifies the coordinate offset value and orientation for presentation spaces.

Table 7 Type Codes (cont'd.)

Type Code	Function	Description
X'AD'	Process	A *process* structured field specifies processing to be performed on an object.
X'AF'	Include	An *include* structured field selects a named resource which is to be embedded in the including data stream as if it appeared *inline*. External resource object names on the *begin* structured field may or may not coincide with the library name of that object, as library name resolution is outside the scope of the MO:DCA architecture.
X'B0'	Reserved	See *MO:DCA-L: The OS/2 PM Metafile (.met) Format*, available at: `www.afpcinc.org`.
X'B1'	Migration	A *migration* structured field is used to distinguish the MO:DCA structured field from a structured field with the same acronym from an earlier data-stream architecture. The earlier version is called *Format 1*. The MO:DCA version is called *Format 2*.
X'B2'	Variable	A *variable* structured field defines or contains variable information.
X'B4'	Link	A *link* structured field defines a logical connection, or linkage, between two document components.
X'EE'	Data	A *data* structured field consists of data whose meaning and interpretation is governed by the object architecture for the particular data object type.

Category Codes

The following category codes have been defined. All other category codes are reserved.

Category Code	Description
X'5F'	Page Segment
X'6B'	Object Area
X'77'	Reserved. See *MO:DCA-L: The OS/2 PM Metafile (.met) Format*, available at: `www.afpcinc.org`.
X'7B'	IM Image
X'88'	Medium
X'8A'	Coded Font
X'90'	Process Element
X'92'	Object Container
X'9B'	Presentation Text
X'A5'	Print File
X'A7'	Index
X'A8'	Document
X'AD'	Page Group
X'AF'	Page
X'BB'	Graphics
X'C3'	Data Resource
X'C4'	Document Environment Group (DEG)
X'C6'	Resource Group
X'C7'	Object Environment Group (OEG)
X'C9'	Active Environment Group (AEG)
X'CC'	Medium Map
X'CD'	Form Map
X'CE'	Name Resource

X'D8'	Page Overlay
X'D9'	Resource Environment Group (REG)
X'DC'	Preprinted Form Overlay
X'DF'	Overlay
X'EA'	Data Suppression
X'EB'	Bar Code
X'EE'	No Operation
X'FB'	Image

Structured Field Data

The structured field's data is contained in a parameter set that immediately follows the structured field's introducer. The syntax and semantics for each MO:DCA structured field parameter set is given in Chapter 5, “MO:DCA Structured Fields”, on page 119. Depending on the structured field and its purpose, the parameter set may contain zero or more parameters. If parameters are present, they contain specific information appropriate for the structured field. The data occupies as many bytes as needed, up to a maximum of 32,759 bytes.

Structured Field Introducer Extension

A structured field introducer may be extended by up to 255 bytes. The presence of an SFI extension is indicated by a value of B'1' in bit 0 of the SFI flag byte. If an extension is present, the introducer is at least 8 bytes, but not more than 263 bytes, in length. The first byte of the extension specifies its length. If an extension to the structured field introducer is present, the structured field's data can occupy up to 32,759 bytes, less the length of the extension.

Structured Field Segmentation

When the total length of the introducer and the data portion of a structured field exceeds 32,767 bytes, the data must be split into two or more fragments and specified on multiple consecutive structured fields. This is known as *segmenting* a structured field. Segmenting normally only occurs for those structured fields that contain OCA data.

When a structured field is segmented, the OCA may require that the data be split on specific data element boundaries. The MO:DCA architecture permits other structured fields to be interspersed between the segmented structured fields. However, for those cases where it is undesirable to split the data at a specific boundary or to permit other structured fields to appear between the segmented structured fields, the MO:DCA architecture provides a segmentation flag. This flag indicates that the segmented structured fields are all part of a single, uninterrupted parameter string. When bit 2 of the SFI flag byte is set to B'1', the parameter data may be split at any byte boundary and *no* other structured fields are permitted to appear between the segmented structured fields. The segmentation flag value for the last structured field in a sequence of structured fields containing a segmented parameter string must be B'0'.

Structured Field Padding

Padding bytes may be used by an application to extend the physical length of a structured field beyond what is required by its introducer and parameter set. This could be done, for example, to make all structured fields the same length or to make each structured field's length a multiple of some number. The use of padding is indicated by a value of B'1' in bit 4 of the SFI flag byte.

If padding is indicated, the length of the padding is specified in the following manner:

- For 1 or 2 bytes of padding, the length is specified in the last padding byte.
- For 256 to 32,759 bytes of padding, the length is specified in the last three bytes of the padding data. The last byte must be X'00' and the two preceding bytes specify the padding length.

- For 3 to 255 bytes of padding, the length can be specified by either method.

When padding is indicated:
- The structured field length value specifies the total length of the structured field, including the padding data.
- The padding length value specifies the total length of the padding data, including the padding length byte(s).

Structured Field Formats

The MO:DCA architecture has evolved from several previous IBM data streams, namely the Composed Page Data Stream (CPDS), the Composite Document Presentation Data Stream (CDPDS), and the Advanced Function Print Data Stream (AFPDS). Because of this, the MO:DCA architecture uses many of the same structured fields originally defined for these architectures. However, in some cases new structured fields have been defined that have the same name, acronym, and usage as these older structured fields. This has only been done for those cases where it became necessary to expand the function of the structured field, but the definition of the original structured field did not lend itself to expansion.

These new structured fields are always assigned a structured field identifier closely resembling the old one. Although the structured field identifiers clearly differentiate between the two versions of the same structured field, when referring to them by name or by acronym, the older version is known as *Format 1* and the newer MO:DCA version is known as *Format 2*. Two such structured fields are the Map Coded Font structured field and the Presentation Text Data Descriptor structured field.

Data Stream Format

The MO:DCA architecture does not dictate the physical format of the data stream or how it is transported. The data stream may be carried within a communication protocol or it may be stored on a tape or disk. It may be one continuous string of bytes or it may be broken up into multiple records. When broken into multiple records, the records may be fixed length or variable length. Each record may contain an individual structured field, a portion of a structured field, or any number of contiguous structured fields. The receiver must be capable of receiving the data stream and parsing or processing it sequentially from start to finish. While receivers may impose reasonable limits on blocking factors for buffer management purposes, they should not be designed to process only one type of data stream format.

MO:DCA Data Stream States

The MO:DCA architecture defines a *state* to be a domain within the data stream, bounded by a begin-end structured field pair, within which certain structured fields are permitted. This is also called a MO:DCA Object (see Chapter 4, “MO:DCA Objects”, on page 75, for more information). The processor of a MO:DCA data stream is required to check the validity of the structured field sequence received. A valid structured field sequence is one in which each structured field that is processed belongs to the set of permissible structured fields for the begin-end envelope in which it is found. If a structured field other than one belonging to the set of permissible structured fields is detected, a violation of the state has occurred, and the processor is required to raise an exception condition.

See “MO:DCA Interchange Set 1” on page 473 and “MO:DCA Interchange Set 3 (IS/3)” on page 489 for details of the structured fields that may be encountered in each state in MO:DCA, MO:DCA IS/1, and MO:DCA IS/3 data streams respectively.

Environment Hierarchies

The Active Environment Group and Object Environment Group are also hierarchically related. Parameters specified in the OEG *override* like parameters specified in the AEG, while like parameters specified within the same environment—whenever this is allowed—*replace* the previous specification. To illustrate this point, consider the following example. Note that the same LID mapping rules apply when a resource object is mapped with a Map Data Resource (MDR) structured field.

- A page contains an AEG with the following two Map Coded Font structured fields:
  - An MCF that maps LID 1 to font A and LID 2 to font B
  - An MCF that maps LID 3 to font D
- A graphics data object on that same page contains an OEG with the following two Map Coded Font structured fields:
  - An MCF that maps LID 3 to font E and LID 4 to font F
  - An MCF that maps LID 5 to font H

For objects on that page that do not specify their own MCFs within their own OEGs, the LIDs and their associated fonts would be:

- LID 1 = font A, from AEG MCF #1
- LID 2 = font B, from AEG MCF #2
- LID 3 = font D, from AEG MCF #2

The LIDs and their associated fonts available within the graphics object would be:

- LID 1 = font A, from AEG MCF #1
- LID 2 = font B, from AEG MCF #2
- LID 3 = font E, from OEG MCF #1
- LID 4 = font F, from OEG MCF #1
- LID 5 = font H, from OEG MCF #2

In this case, fonts A and B were made available from the MCFs contained in the AEG which was higher in the environment hierarchy. However, font D was overridden when the first MCF in the OEG mapped LID 3 to font E.

Similarly, if a Presentation Space Reset Mixing triplet were specified on both the Page Descriptor structured field and one or more Object Area Descriptor structured fields within a particular overlay within a resource group, the PGD would control the presentation space mixing for the entire overlay presentation space and the OBDs would control the presentation space mixing for their individual object area presentation spaces.

Resource Environment Groups (REGs) are optional and do not affect AEGs and OEGs. Identifying a resource in a REG does not remove the need to map that resource in the environment groups of the pages and objects that use the resource.

Processing Order

Unless otherwise specified in a structured field's definition, all structured fields are processed in the order in which they appear in the data stream. For example, if a presentation data stream contains a page with a text object, an Include Page Overlay, a graphic object, a second Include Page Overlay, and an image object, in that order, the objects are presented (imaged) on the page in that same order. That is, the text object is presented first, the first overlay is presented second, the graphic object is presented third, the second overlay is presented fourth, and the image object is presented last.

Likewise, unless otherwise specified in the structured field or triplet definition, structured field and triplet parameters are also processed in the order in which they appear in the structured field or triplet.

Resource Search Order

Resources used by a MO:DCA document may be located in resource groups that are internal to the document (such resource groups are only supported in the retired MO:DCA IS/2 interchange set, see "Retired Interchange Set" on page 575), in resource groups that are external to the document (print file level resource groups), or in resource libraries.

The general search order for MO:DCA resources is as follows:

1. Internal (page level) resource groups (such resource groups are only supported in the retired MO:DCA IS/2 interchange set, see "Retired Interchange Set" on page 575)
2. External (print file level) resource groups
3. External resource libraries

For the formal definition of resource groups in MO:DCA data streams, see "Resource Groups" on page 87.

Structured Field Parameters

A structured field is composed of a set of parameters that provides data and control information to processors of the data stream. The MO:DCA architecture has established a length, a set of permissible values and a functional definition for each structured field parameter.

Mandatory and Optional Parameters

A parameter can be mandatory or optional. Chapter 5 provides a description of each structured field's parameters. The description indicates whether each parameter is mandatory or optional.

Mandatory Parameters

A *mandatory parameter* appears in a structured field because the function of the parameter is required and a value is essential for proper interpretation of the data stream. A value must be specified for a mandatory parameter. The value specified either must be within the range of permissible parameter values, or it must designate that an existing default value is to be used. A mandatory parameter requires that a suitable value for the parameter must appear somewhere in the hierarchy of structured fields in the data stream.

Optional Parameters

An *optional parameter* can be omitted from a structured field if the function of that parameter is not required, or if, although the function is required, a default value is acceptable. An optional parameter cannot be omitted if the function is required and the default value is not acceptable.

Parameter Categories

A parameter's category refers to its structure. A parameter can consist of a single data element or it can be a data structure composed of several data elements. Parameters that are data structures can have either a fixed length or a variable length. In the MO:DCA architecture two types of parameters are used: *fixed* and *self-identifying*.

Fixed Parameters

A parameter consisting of a single data element is called a *fixed parameter*. A fixed parameter has a constant size in terms of bits and bytes and it always appears at the same location within its structured field. Fixed parameters also are called *positional parameters*.

Self-identifying Parameters

Self-identifying parameters are data structures that consist of three or more data elements, one of which is used to identify the purpose of the parameter. The self-identifying parameter in the MO:DCA architecture is known as a *triplet*.

A triplet can have a variable length of up to 254 bytes. A triplet must consist of at least three data elements: a length data element, an identifier data element, and one or more data elements for its contents. It can occupy any location after any fixed parameters that occur in the structured field.

Repeating Groups

The MO:DCA architecture also supports another category of parameters known as a *repeating group*. A repeating group consists of specific fixed or self-identifying parameters that have been combined into a defined group. This group then becomes a data structure that may be specified multiple times.

When the repeating group contains self-identifying parameters, the first parameter in the repeating group is a length parameter that indicates how many bytes comprise that repeating group. This length parameter is called the RGLength parameter and the value specified always includes the length of the RGLength parameter itself, which is usually two bytes.

When the repeating group contains only fixed parameters, the MO:DCA architecture may or may not specify that the repeating group contains a RGLength parameter. When it does, the value specified for the RGLength parameter always includes the length of the RGLength parameter itself.

Note: Frequently, a structured field may contain both positional and self-identifying parameters. When this occurs, the positional parameters always occur before any self-identifying parameters. At times, some or all of the positional parameters may be defined as optional. Optional parameters may only occur at the end, *after* all mandatory parameters. When optional self-identifying parameters such as triplets are added to a structured field that has optional positional parameters defined, all of the positional parameters are considered *mandatory* and must appear before the first self-identifying parameter. See "Include Page Overlay (IPO)" on page 222 for an example of this type of structured field.

Parameter Values

A parameter's value can be specified directly, or it can be obtained indirectly through the use of defaults.

Specified Values

The values to be given to a parameter must be consistent with its length and data type. Additional constraints on values may eliminate one or more values that otherwise could be assigned to a parameter.

Default Values

The use of defaults enables the sender of data-stream documents to omit the values for defaulted parameters, permitting the receiving application to use predetermined values. A default value can be given to a parameter by omitting any value for it, or by entering a value, defined by the architecture, requesting use of the default. The source of the default value used for a parameter may be an environment group higher in the document component hierarchy, or it may be an architected default established by the MO:DCA architecture.

Hierarchical Defaults

Parameter values established by an environment group at a higher level in the document component hierarchy will be the default for a subordinate level unless a value is specified at the subordinate level. The scope of a parameter is the same as the scope of the structured field that contains it. Thus the parameters established in an active environment group for the current page will be in effect for the duration of the page, and will be the default parameters for all objects contained in the page. If an object in the page has an associated object environment group that specifies new values, the new parameter values will be in effect for the duration of the object. If the parameters for a subsequent object in the page are unspecified, or if they specify that the default value is to be used, the values from the current page's active environment group will be used. The placement of parameter values at a higher level in the document hierarchy, for the purpose of enabling lower levels to *inherit* these values as defaults, is known as *factoring*.

Architected Defaults

Certain parameters may be given default values by the MO:DCA architecture. Parameters that have been given defaults are identified in the structured field descriptions in Chapter 5, "MO:DCA Structured Fields", on page 119. If a default is not listed for a parameter, no architected default exists.

Default Indicator

One of the values that usually can be given to a parameter is the *default indicator*. Use of the default indicator for a parameter's value specifies that the current default value for the parameter is to be used. In the MO:DCA architecture the default indicator has the value X'F…F'. The default indicator specifies that either a hierarchical default value or an architected default value is to be used for the parameter. A default indicator is implied when a fixed parameter has been omitted at the end of a structured field. A fixed parameter cannot be omitted if any subsequent, optional, positional parameter is present, or if any triplet is present.

Any parameter for which the default indicator is valid must have a default value assigned. This value, which must be valid for the parameter, is used when the default indicator is specified or implied. A structured field whose parameter values are all default indicators has no effect and can be omitted from the data stream.

Parameter Occurrence

Parameters may be *single-occurrence* or *multiple-occurrence*. The syntax tables in Chapter 5, “MO:DCA Structured Fields”, on page 119 identify which parameters are single-occurrence and which are multiple-occurrence.

Single-Occurrence Parameters

Single-occurrence parameters can occur only once in a structured field. Single-occurrence parameters can be fixed parameters or triplets. If a value is specified for a single-occurrence parameter, it will be in effect for the scope of its structured field. If the value of a single-occurrence parameter is omitted or if the default indicator is specified, then normal default value inheritance will apply.

Multiple-Occurrence Parameters

Multiple-occurrence parameters are parameters that can appear more than once in a structured field. Multiple-occurrence parameters can be triplets or repeating groups. A repeating group may consist of fixed parameters, triplets, or a combination of fixed parameters and triplets. The following rules apply to multiple-occurrence parameters:

- Triplets will not inherit values from higher levels of the document component hierarchy.
  - If some triplets are omitted from a structured field at a lower level, default values will not be used. The result will be that no values will exist for the omitted parameters for the scope of the structured field.
  - If all triplets are omitted from a structured field, architected default values will be used for those parameters that have them. The result will be that only those parameters having architected defaults will have effect for the scope of the structured field.
- Fixed parameters will inherit values from higher levels of the document component hierarchy. If repeating groups of fixed parameters are specified at more than one level within the document component hierarchy and semantic conflicts occur, then the conflicts are resolved in favor of the lowest level for the scope of the structured field.

Parameter Types

The term *parameter type* refers to a parameter's function rather than to the data type of the parameter's data. For a listing of the six basic data types used by the MO:DCA architecture, see “How to Read the Syntax Diagrams” on page v. A parameter's function may be closely related to a data type, for example, in the case of a bit string parameter and the BITS data type. A MO:DCA parameter may be a bit string, character string, code, global identifier, local identifier, name, number, or an undefined type.

One of the most important functions for certain types of parameters is their use in referencing other document components. A *reference* is the use of an identifier to refer to a component, structured field, or repeating parameter group. References are usually found in structured fields that map component identifiers to local identifiers, and that *invoke* or *include* components at specific data-stream locations. The effect is the same as if the component appeared at the location in the data stream that contains the structured field that invokes or includes it. Components that are referenced by *include* structured fields provide resource definitions or object definitions. Components that are referenced by *invoke* structured fields provide format information, such as that contained in environment groups.

Bit String

A *bit string* is a string of binary elements and corresponds to the BITS data type. Each bit of a bit string has a value of either B'1' or B'0', which represents *on* or *off* respectively. Each bit usually is independent of the others. Some combinations of bits may be invalid depending on what has been defined for the data element by the MO:DCA architecture. The convention used for addressing bits within a bit string is that the leftmost bit is bit 0.

Character String

A *character string* corresponds closely to the CHAR data type. It is used for identifiers composed of a string of one or more graphic characters. Character strings are compared on the basis of the identifiers of the graphic characters that are presented for the corresponding code points. In the MO:DCA data stream, this is governed by the Coded Graphic Character Set Global Identifier (CGCSGID).

Code

A *code* is a value assigned by the MO:DCA architecture that relates to a particular meaning. The code parameter type relates to the CODE data type. In general, parameters having a code type are given hexadecimal values or value ranges to distinguish them from parameters with a number type.

Global Identifier

A *global identifier* (GID) is a string of bytes that is from 1 to 250 bytes in length. It is usually a coded graphic character string with a data type of CHAR, but it can also be a number or a code. A global identifier has either an alphanumeric character value that is a global name, such as the name of a document, or a numeric value that is unique in the interchange environment. If an identifier is to be used where uniqueness is required, for example to reference a component by name, the same name or value cannot be used more than once within the scope of its reference. For example, the same name must not be given to two different resource definitions of the same type in the same resource group.

Local Identifier

A *local identifier* (LID) is used within the data stream to reference a resource, such as a font, from within a structured field or an OCA. The application creating the data stream is responsible for establishing the cross references or mapping between the resources and their LIDs. The use of LIDs and mapping enables an application to make one change in the mapping to effect multiple changes for the scope of an LID, rather than having to make a change at each location where the LID appears.

Once established, an LID has meaning only within the context of the data stream that contains it. An LID has a data type of CODE and its meaning is independent of where the data stream is created, filed, transmitted, or presented.

Whenever a local identifier parameter type is used to relate structured fields present in the data stream, the scope of reference for the LID is the begin-end pair enveloping the referenced resource. Thus both the *referenced* resource and the *referencing* structured field must reside in the same begin-end envelope.

Structured fields, known as map structured fields, that specify a global to local mapping follow the normal MO:DCA environment hierarchy rules.

Name

A *name* is an identifier composed of alphanumeric characters, and is closely related to the CHAR data type. A name parameter type can relate either to a global or a local identifier. Names are compared on the basis of the identifiers of the graphic characters that are presented for the corresponding code points. When comparing names of unequal length, the shorter name is padded with space characters until it is the same length as the longer name.

Generally, names of begin structured fields within a MO:DCA data stream are required to be unique only if their names will be referenced and they reside in the same containing envelope with another begin structured field of the same type.

Name parameters for end structured fields, if used, must match the name parameter for corresponding begin structured fields. However if the first two bytes of the name parameter for an end structured field have the value X'FFFF', it will, by default, match any name on the corresponding begin structured field.

Architecture Note: The semantic that stated “A value of X'0…0' for any positional parameter having a name type indicates that a Fully Qualified Name (FQN) triplet exists in the structured field. The Fully Qualified Name triplet contains a name that is used to replace the positional name parameter value” is outdated and has been removed from the architecture. Each structured field that specifies a positional name parameter (a “token name”) and that supports an override of this parameter using an FQN triplet, already clearly states that such an FQN triplet (normally FQN type X'01') overrides and replaces the positional name parameter. In fact, the FQN type X'01' triplet is defined as “Replace First GID name”, and, by definition, replaces the token name regardless of whether the token name specifies a value of X'0…0' or not.

The scope of any name reference is limited to the scope of the document component where the name is specified. Thus a name appearing in an Active Environment Group has a scope that is limited to the page or page overlay containing the Active Environment Group, and a name appearing in an Object Environment Group has a scope that is limited to the object containing the Object Environment Group.

Number

A *number* or arithmetic value implies count or magnitude. All numbers used within the MO:DCA architecture are either signed or unsigned integers as indicated in the syntax tables by the SBIN and UBIN data types respectively.

In an unsigned number, all bits are used to express the absolute value of the number. For signed numbers, the leftmost, or high order bit represents the sign, which is followed by the integer field.

Positive numbers are represented in true binary notation with the sign bit set to zero. Negative numbers are represented in two's-complement binary notation with the sign bit set to one. Specifically, a negative number is represented by the two's complement of the positive number. The two's-complement of a number is obtained by inverting each bit of the number and adding a one to the low-order bit position.

Since the MO:DCA architecture defines X'F…F' as a default indicator, the arithmetic value -1 generally is not permitted. However, in the case where a parameter cannot be defaulted, the value which normally is the default indicator is interpreted as -1. Chapter 5, “MO:DCA Structured Fields”, on page 119 and Chapter 6, “MO:DCA Triplets”, on page 345 identify parameters that cannot be defaulted. The maximum absolute values for numbers that can be assigned to data elements that also can be assigned the default indicator are listed in Table 8 on page 33.

Table 8. Maximum Absolute Values of Numbers in the MO:DCA Architecture

Number of Bytes	Data Type	Absolute Values	
		Hexadecimal	Decimal
1	SBIN	X'7F'	127
1	UBIN	X'FE'	254
2	SBIN	X'7FFF'	32,767
2	UBIN	X'FFFE'	65,534
3	SBIN	X'7FFFFF'	8,388,607
3	UBIN	X'FFFFFE'	16,777,214
4	SBIN	X'7FFFFFFF'	2,147,483,647
4	UBIN	X'FFFFFFFE'	4,294,967,294

Unique syntax is used for the expression of values that pertain to units of measurement and to rotation. See "Measurement Units" on page 35 and "Rotation Units" on page 40 for details of this syntax.

Coordinate Systems

The MO:DCA architecture defines a multi-level coordinate system hierarchy that allows a large degree of flexibility in presenting data on a physical medium. A MO:DCA coordinate system is an orthogonal coordinate system based on the fourth quadrant of a standard Cartesian coordinate system. Both the X axis and the Y axis specify positive values, which is a difference from the Cartesian system where the Y axis in the fourth quadrant specifies negative values.

Wherever negative offsets are supported, such as in the positioning of a page presentation space on the medium presentation space, the negative X axis is generated by extending the X axis left of the origin, and the negative Y axis is generated by extending the Y axis above the origin. Negative numbers are expressed in two's complement notation.

Each individual coordinate system is associated with a specific presentation space. The MO:DCA architecture defines the following presentation spaces:

Medium Presentation Space
The presentation space for the physical medium. This is the base presentation space onto which all other presentation spaces are merged.

Page Presentation Space
The presentation space for the page, also called a *logical page*.

Overlay Presentation Space
The presentation space for an overlay.

Object Area Presentation Space
The presentation space for an object area.

Data Object Presentation Space
The presentation space for a data object. This presentation space is defined by the corresponding data object architecture. For details on data object presentation spaces, refer to the reference manual for each specific data object architecture.

The coordinate systems that correspond to the MO:DCA presentation spaces are listed in Table 9 on page 34. Each coordinate system defines its own coordinate axes, measurement units, and extents.

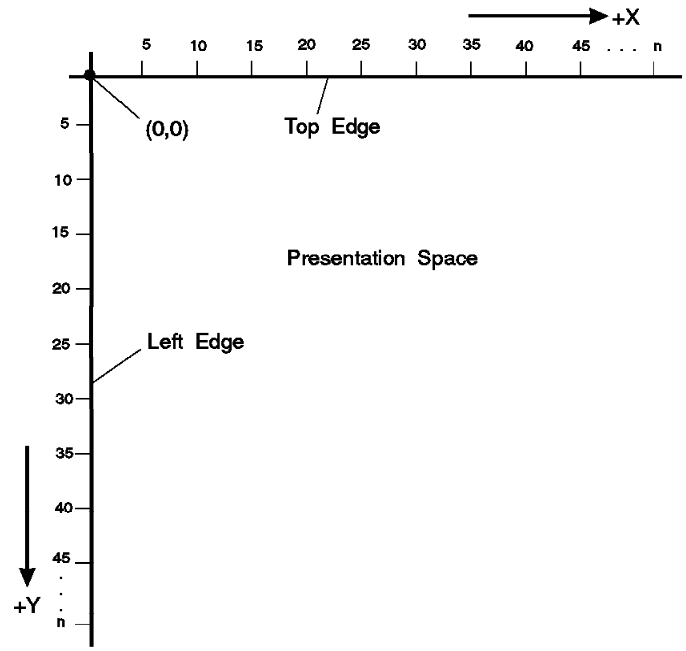
Table 9. MO:DCA Coordinate Systems

Coordinate System	Notation for Axes	
	x direction	y direction
Medium	X_m	Y_m
Page	X_{pg}	Y_{pg}
Overlay	X_{ol}	Y_{ol}
Object Area	X_{oa}	Y_{oa}

The origin of all MO:DCA coordinate systems is the point (0,0) where X equals zero and Y equals zero. The X and Y axes form the top and left edges, respectively, of the presentation space, as shown in Figure 5 on page 35.

The presentation space associated with the MO:DCA page can be specified to exist on either side of a sheet, and multiple page presentation spaces can exist on the same side of a sheet.

Figure 5. A MO:DCA Presentation Space Coordinate System



Measurement and Rotation

Measurement and rotation conventions are essential to the specification and interpretation of layout information for data-stream documents. MO:DCA's conventions for measurement include data element formats and definitions for units, extent, and position. Its conventions for rotation include data element formats and definitions for units.

Measurement

The distance of a point from an origin is known as its absolute position. The distance of a point from another point is known as its relative position. Distances are measured in *addressable positions*, and can mean X_m,Y_m units, X_{pg},Y_{pg} units, X_{ol},Y_{ol} units, or X_{oa},Y_{oa} units, depending on the extent or offset being measured.

Measurement Units

Measurement units are used throughout the MO:DCA architecture to identify the units of measure to be used for such things as extents and offsets along the X and Y axes of a coordinate system.

Each individual measurement unit is specified as two separate values:

Unit base
: This value represents the length of the measurement base. It is specified as a one-byte coded value. The valid codes and their associated meanings are as follows:
  X'00' Ten inches
  X'01' Ten centimeters

Units per unit base
: This value represents the number of units in the measurement base. It is specified as a two-byte numeric value between 1 and 32,767.

The term *units of measure* is defined as the measurement base value divided by the units per unit base value.

For example, if the measurement base is 10 inches and the units per unit base is 5000, then the units of measure is 10 inches / 5000 or one five-hundredth of an inch.

The base measurement units for each axis is specified as part of the definition of a presentation space. Each MO:DCA coordinate system may specify base measurement units independent from other coordinate systems appearing on the same medium. Although the overall architecture design permits each axis to have a different unit base, current implementations require that both unit bases be identical.

Measurement Unit Formats

The format used to resolve addressable positions into a unit of measure is a set of four parameters that specify the X and Y units of length used for measurements in the X and Y direction, respectively.

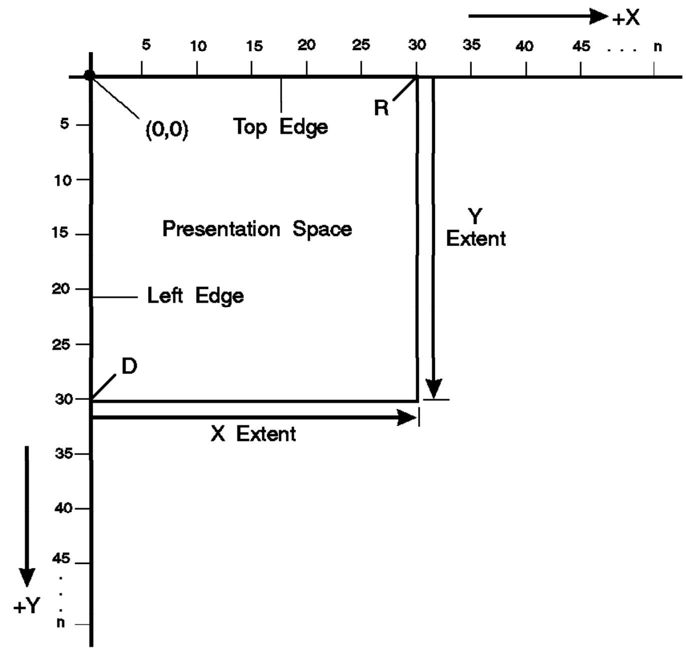
Parameter	Description
X unit base	A one-byte code
Y unit base	A one-byte code
X units per unit base	A two-byte binary number from 1 through 32,767 in units of the X unit base
Y units per unit base	A two-byte binary number from 1 through 32,767 in units of the Y unit base.

Since presentation devices can be built to support different units of measure along different axes, the units of measure to which the presentation spaces have been designed can be specified in the data stream. The target presentation device may determine if it can accept the specified length unit, if it can convert from the specified addressable positions to one of its own, or if it recognizes a problem and possibly rejects that portion of the data stream. The origins of coordinate systems can be established at any addressable position that exists within a presentation space.

Extent

Each presentation space has two *extents*: the X extent, which parallels the X axis as it currently is oriented, and the Y extent, which parallels the Y axis as it currently is oriented. Extents start at the origin of a presentation space and end at a point determined by summing the extent value and the origin value. Negative extent values are not permitted since the area enclosed by a MO:DCA coordinate system always starts at the origin and proceeds in positive X and Y directions within its current orientation. In Figure 6 on page 37 the X extent of the presentation area is represented by line segment *0R* and the Y extent by line segment *0D*.

Figure 6. Presentation Space Extents



The bottom edge of a presentation space is a line parallel to the X axis of the presentation space that intercepts the Y axis at the end point of the Y extent. The right edge of a presentation space is a line parallel to the Y axis of the presentation space that intercepts the X axis at the end point of the X extent.

The two extents specify the size of the presentation space. Using the example of a measurement base of 10 inches and a units per unit base of 5000, if the X extent were specified as 4250 and the Y extent as 5500, the presentation space size would be 8.5 by 11 inches.

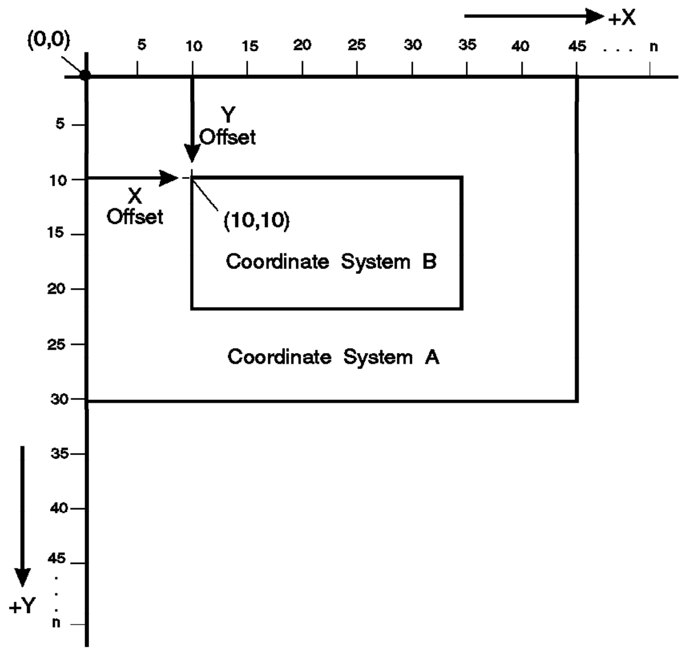
Offset

The origin of any MO:DCA coordinate system is expressed as an *offset* from the origin of another coordinate system. The offset values for the X and Y axes can be positive or negative. Negative offset values are expressed in two's complement notation. Any MO:DCA coordinate system that is offset from a reference coordinate system need not be contained within that reference coordinate's extents.

The medium coordinate system is the base coordinate system from which all the other coordinate systems are directly or indirectly offset. A coordinate system for a document component that is placed within a superior document component *references* the coordinate system of the superior document component. For example, the coordinate system of an object or a page overlay that is placed on a page references the page's coordinate system. Since each MO:DCA coordinate system can be expressed in different base measurement units, the offset of the origin of a subordinate coordinate system, relative to the origin of the reference coordinate system, is always measured in the reference system's base measurement units. This permits the reference system to influence the placement of the contained system.

The offset coordinate system inherits the orientation of the reference coordinate system. In Figure 7 on page 38, the origin for coordinate system B is offset ten X units and ten Y units from the reference coordinate system A. Coordinate system B's origin is specified as the intersection of the lines drawn perpendicular to the X and Y axes at the specified X and Y offset values from coordinate system A.

Figure 7. Offset of a Coordinate System



Any portion of a coordinate system may be overlapped by one or more peer coordinate systems. For example, two different object areas could be defined with the same origin so that one completely overlapped the other, or their origins could be specified such that only a portion of the object areas overlapped.

Rotation

Rotation is used to change the presentation orientation of a document component with respect to that of the superior document component that contains it.

Orientation refers to the rotation of a document component and its coordinate system with respect to the coordinate system that contains it. After a MO:DCA coordinate system's origin and X and Y extents have been established, the orientation value of the coordinate definition may cause the defined space to rotate in a clockwise direction around its origin. Orientation is expressed in degrees and minutes, with the Y axis orientation value being 90 degrees greater than the X axis orientation value.

Figure 8 on page 39 shows the effect of rotating one coordinate system, shown as a series of rectangles, within a containing coordinate system. Note how the X and Y extents, and thus the rectangle formed by these extents, rotate around the contained coordinate system's origin point of 3 and 4 units from the origin of the containing coordinate system.

Figure 8. Examples of Coordinate System Orientation

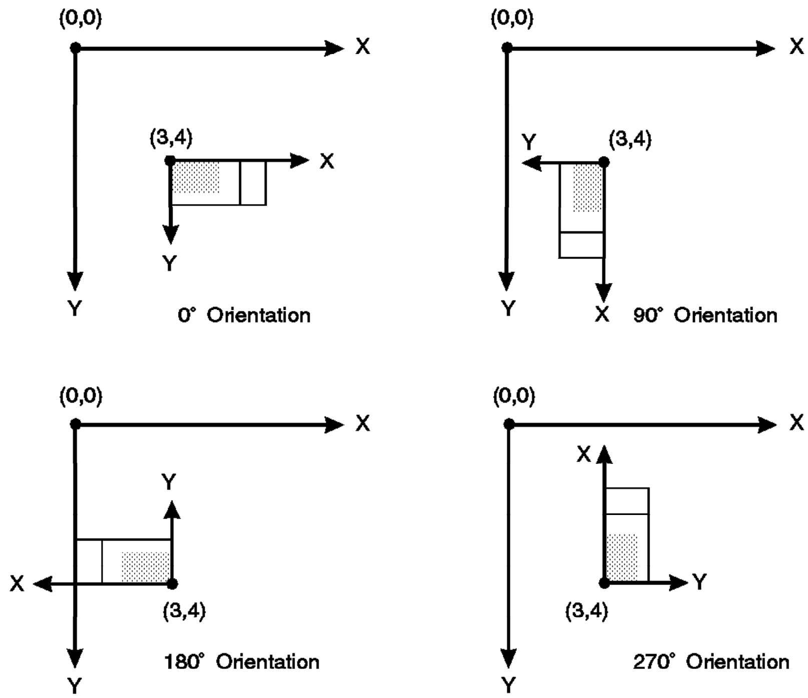
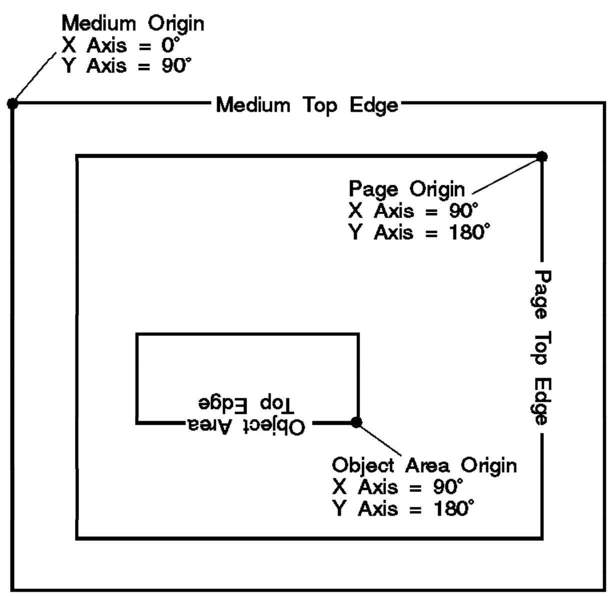


Figure 9. Inheritance of Coordinate System Orientation



The orientation characteristics possessed by a MO:DCA coordinate system do not have to be the same as those of its reference coordinate system. Any MO:DCA coordinate system may possess orientation characteristics that are the same as, or different from, their reference coordinate system or any other MO:DCA coordinate system. Figure 9 on page 39 shows the effect of offsetting a page from a medium, then rotating it 90 degrees and then offsetting an object area from the page and rotating it 90 degrees. The object area inherited the 90 degree page rotation which, when added to its 90 degrees rotation, produced a cumulative orientation value of 180 degrees.

Rotation Units

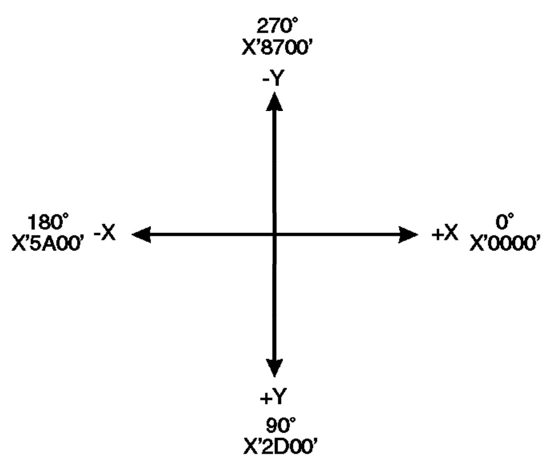
The rotation of the X and Y axes of an object area are specified in terms of rotation units. Rotation unit values are expressed in degrees and minutes using two-byte, three-part binary numbers as shown in Table 10 on page 40.

Table 10. Format for Numbers Expressed in Rotation Units

Bit Position	Name	Meaning
Bit 0–Bit 8	Degrees	Used to represent 0 through 359 degrees. Values from 360 through 511 are invalid.
Bit 9–Bit 14	Minutes	Used to represent 0 through 59 minutes. Values from 60 through 63 are invalid.
Bit 15	Reserved	Value must be zero.

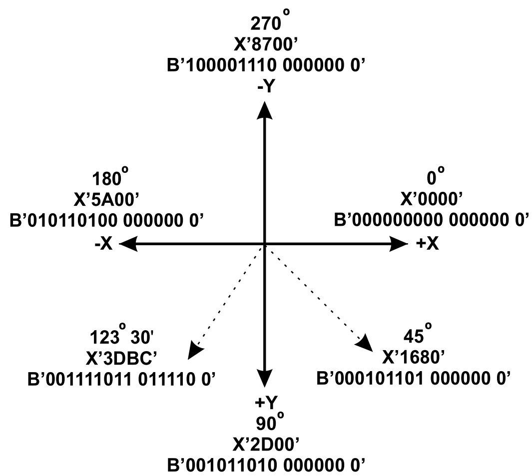
A rotation value of zero specifies no rotation with respect to the X axis of the presentation space in which the origin of the page, page overlay, object area, or object is located. Increasing values indicate increasing clockwise rotation. The four major orientations, plus-X, plus-Y, minus-X, and minus-Y, have values of 0 degrees, 90 degrees, 180 degrees, 270 degrees respectively. They are encoded as X'0000', X'2D00', X'5A00', and X'8700'. Most structured fields limit rotation to one of these four orientations. See Figure 10 on page 40.

Figure 10. Rotation of the X and Y Axes



In addition, the data object area is subject to the full range of rotation. To obtain the rotation values one must take into careful consideration the multi-part bit-expanded derivation of the 2–byte CODE. For example, 123 degrees, 30 minutes rotation is represented as degrees (B'001111011') and minutes (B'011110') with the last bit (B'0') reserved. See Figure 11 .

Figure 11. Rotation Units for the Data Object Area — Arbitrary Orientation

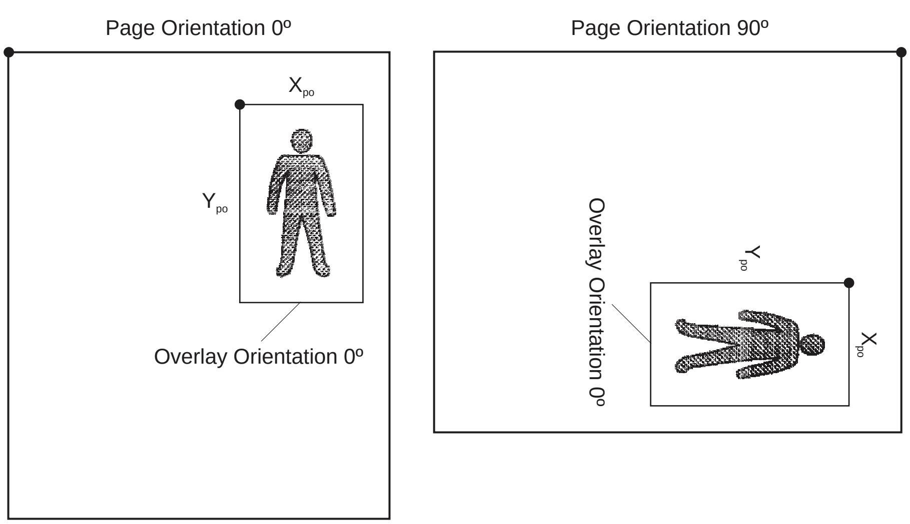


Overlays for a page are always positioned relative to the current orientation of the page coordinate system. However, their X and Y extent values remain constant regardless of the orientation. Figure 12 on page 41 shows this graphically.

Shape

The X and Y axes are perpendicular to each other, and the rotation of the Y axis is exactly 90 degrees more than the rotation specified for the X axis. All MO:DCA presentation spaces must be rectangles. The shape of the data object is not defined by the MO:DCA architecture and can take on any visual appearance.

Figure 12. A Page Overlay Applied to a Page in Two Different Orientations



Presentation Space Mixing

Foreground and Background

MO:DCA presentation spaces such as the medium, page, overlay, and data object presentation spaces consist of two parts: foreground and background. Foreground is the part of the presentation space that is occupied with object data. This data can be pure object data such as text, or mixed object data such as image overlaying text. Background is the part of the presentation space that is not occupied with object data. For data object presentation spaces, the data object defines foreground and background, and may specify a color attribute for both. For each data object type, foreground, background, and color attributes are defined by the architecture that defines the object content. For example, in a text presentation space, characters and rules are foreground, everything else is background. Foreground is assigned a color attribute using the “Set Extended Text Color” control sequence. Background cannot be assigned a color and is therefore implicitly assigned the color of the medium. When no color is specified for the background of a presentation space, the background is implicitly assigned the color of the medium. The medium, page, and overlay presentation spaces are initially empty. Empty MO:DCA presentation spaces contain only background, which is assigned the color of the medium.

Table 11 on page 42 summarizes the definition of foreground and background in AFP OCA-based object presentation spaces:

Table 11. Foreground/Background in Data Object Presentation Spaces

Data Type	Foreground	Background
PTOCA Text	• Stroked and filled portion of text characters • Stroked area of text rules • Stroked area of underscores	Everything else
IM image	B'1' image points	B'0' image points
IOCA bilevel image IOCA bilevel tiled image	Significant image points, except image points for which a transparency mask specifies B'0'	• Insignificant image points • Image points for which a transparency mask specifies B'0' • All portions of the presentation space not covered by image or tiles
IOCA grayscale or color image	Entire image, except image points for which a transparency mask specifies B'0'	• Image points for which a transparency mask specifies B'0' • All portions of the presentation space not covered by image points
IOCA grayscale or color tiled image	Entire tile, except image points for which a transparency mask specifies B'0'	• Image points for which a transparency mask specifies B'0' • All portions of the presentation space not covered by tiles
GOCA Graphics	• Stroked area of lines (including arcs) • Stroked and filled portion of pattern symbols • Stroked and filled portion of marker symbols • Stroked and filled portion of graphic characters • B'1' image points • Entire area with solid fill	Everything else
BCOCA Bar Code	• Bars and 2D modules • Stroked and filled portions of HRI characters • Stroked and filled portion of all other toned constructs in the symbol (for example, Bearer Bars)	Everything else
Colored object area, page, or overlay presentation space	Complete presentation space	None
Empty object area, page, or overlay presentation space	None	Complete presentation space
Non-OCA Presentation Objects	See “Object Type Identifiers” on page 609	See “Object Type Identifiers” on page 609

Merging Presentation Spaces

Presentation spaces in a MO:DCA document are merged in the order in which the document components that define these presentation spaces appear in the data stream, as follows:

- **Medium presentation space**. This is the base MO:DCA presentation space upon which all other presentation spaces are merged.
  - **Medium overlay presentation space**. Merged on the medium presentation space with a keyword on the Medium Modification Control (MMC) structured field in a Medium Map. Medium overlays are merged on the medium presentation space before any pages are merged. Multiple medium overlay presentation spaces are merged in the order in which their keywords appear on the MMC structured field.
  - **Page presentation space**. Merged on the medium presentation space in the order in which the corresponding page appears in the document, in accordance with the specifications in the active Medium Map.
    - **Object area presentation space**. Merged on the page presentation space in the order in which the corresponding data object is included on the page.
      - **Data object presentation space**. Merged on the corresponding object area presentation space.
    - **Page overlay presentation space**. If the page overlay is included via an IPO, it is merged on the page presentation space in the order in which the overlay is included on the page. If the page overlay is included via a PMC in a Medium Map, it is merged on the page presentation space before any data objects or overlays included via an IPO are merged.
      - **Object area presentation space**. Merged on the overlay presentation space in the order in which the corresponding data object is included on the overlay.
        - **Data object presentation space**. Merged on the corresponding object area presentation space.

The MO:DCA presentation space merge-order is shown in Figure 13 on page 44.

Figure 13. Merging Presentation Spaces

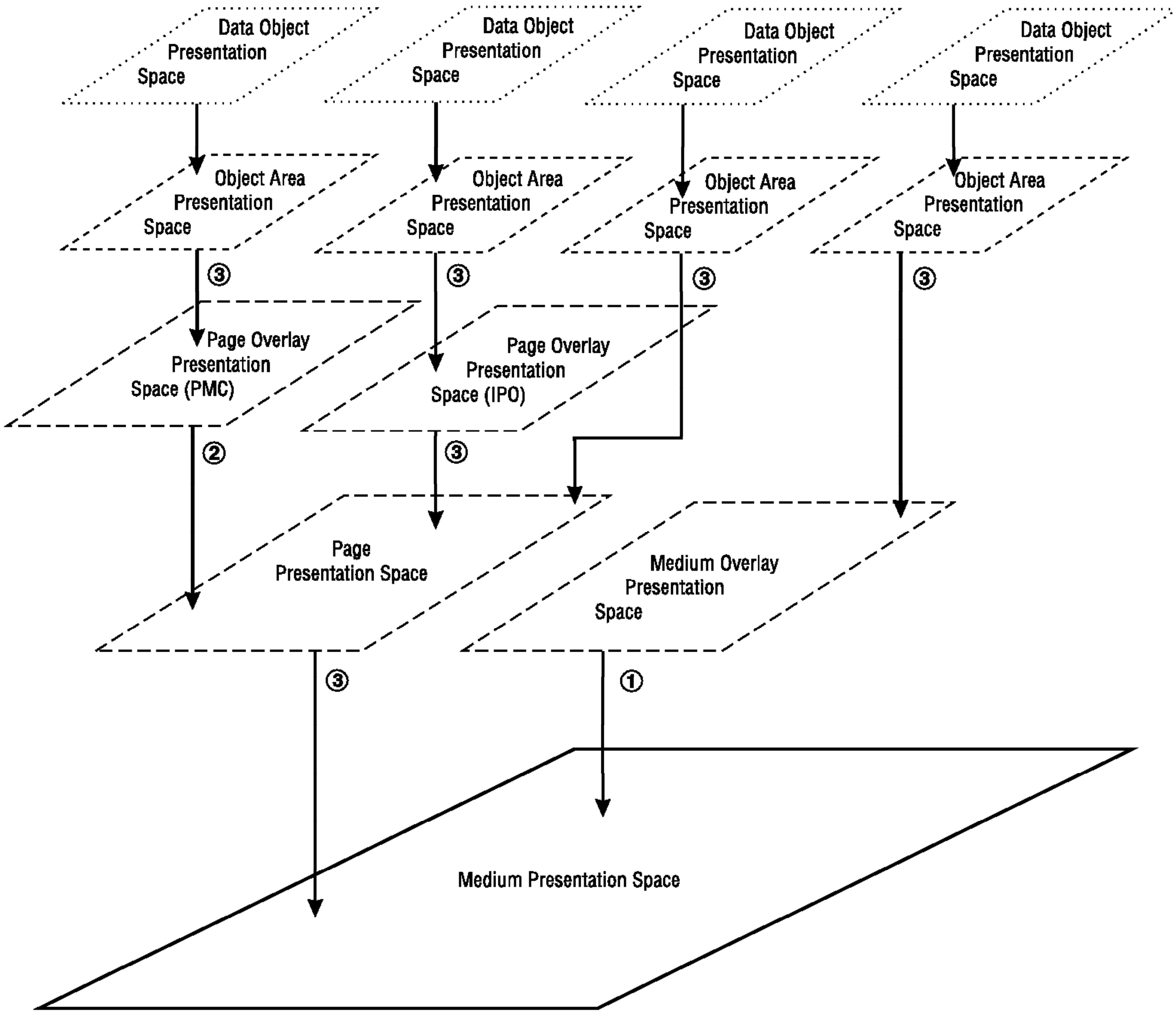


Figure Notes (numbers shown circled in the Figure):

1. Merged first on the medium presentation space as specified in a Medium Map print control object. Multiple medium overlays are merged in the order in which they occur. If the overlay is a Medium Preprinted Form Overlay (M-PFO), one such overlay may be specified and is merged last onto the medium presentation space, after all other data for that medium presentation space has been merged.
2. Merged first on the page presentation space as specified in a Medium Map print control object. Multiple overlays are merged in the order in which they occur in the data stream. If the overlay is a PMC Preprinted Form Overlay (PMC-PFO), one such overlay may be specified and is merged last onto the page presentation space, after all other data for that page presentation space has been merged.
3. May occur multiple times and is merged in the order in which it occurs in the data stream.

Mixing Rules

When multiple MO:DCA presentation spaces are merged, the background and foreground of the presentation spaces *mix*. The resultant foreground is the union of all presentation space foregrounds, that is, once an area is defined to be foreground, it remains foreground even if its color attribute is changed due to an “underpaint” mixing rule. The resultant background is everything else. The color of the resultant foreground and background is determined by the mixing rules specified in the MO:DCA architecture.

When a new presentation space P_n is merged onto an existing presentation space P_e, four types of mixing must be considered. Let F_e and B_e denote the P_e foreground and background, respectively, and let F_n and B_n denote the P_n foreground and background, respectively, then the mixing types can be characterized as follows:

Mixing Type	Description
B_n on B_e	Background on background
B_n on F_e	Background on foreground
F_n on B_e	Foreground on background
F_n on F_e	Foreground on foreground

For each type of mixing, the resultant color is determined by the mixing rule that is specified. The following mixing rules are defined for presentation space mixing:

Mixing Rule	Definition
Overpaint	When part of P_n overpaints part of P_e, the intersection is assigned the color attribute of P_n. This is also referred to as *opaque* or *knock-out* mixing.
Underpaint	When part of P_n underpaints part of P_e, the intersection keeps the color attribute of P_e. This is also referred to as *transparent* mixing or *leave alone* mixing.
Blend	When part of P_n blends with part of P_e, the intersection assumes a new color attribute which represents a color-mixing of the color attribute of P_n with the color attribute of P_e. For example, if P_n has foreground color attribute blue and P_e has foreground color attribute yellow, the area where the two foregrounds intersect would assume a color attribute of green.

Default Mixing Rule

When no presentation space mixing rule is specified, the following default MO:DCA mixing rule applies:

When a new presentation space P_n is merged onto an existing presentation space P_e, the background of P_n underpaints the background and foreground of P_e, and the foreground of P_n overpaints the background and foreground of P_e.

This default mixing rule can be summarized as follows:

Table 12. Default Color Mixing Rules

Mixing Type	Default Mixing Rule
B_n on B_e	Underpaint
B_n on F_e	Underpaint
F_n on B_e	Overpaint
F_n on F_e	Overpaint

Preprinted Form Overlay (PFO) Mixing

Preprinted Form Overlays (PFOs) are designed to enable proper simulation of preprinted forms, particularly their appearance when color data is presented on the form. This requires the definition of a special mixing rule, called *Formblend*, which is the mixing rule for foreground on foreground mixing when page data and other overlay data is merged with the PFO data. The Formblend mixing rule makes use of the fact that the PFO, whether it is an M-PFO or an PMC-PFO, is always merged last on the presentation space with which it is associated (the medium presentation space for an M-PFO, the page presentation space for a PMC-PFO). The Formblend mixing rule is defined as follows:

Formblend This mixing rule is only used when a simulated preprinted form, which is simulated as either a Medium Preprinted Form overlay (M-PFO) or a PMC Preprinted Form overlay (PMC-PFO), is merged as a new presentation space P_n, onto an existing presentation space P_e. The intersection of P_n and P_e is assigned the following color attribute:

- Wherever the color attribute of P_e is either the color of medium, or the color white (CMYK = X'00000000' or RGB = X'FFFFFF'), the intersection is assigned the color attribute of P_n.
- Wherever the color attribute of P_e is not the color of medium and not the color white, the intersection assumes a new color attribute that is generated in a device-specific manner to simulate how the P_e color attribute would mix onto a preprinted form that has the color attribute of P_n. In general, this mixing is a *blending* of the color attributes of P_n and P_e that is determined by the two color attributes and by the print media and the print technology.

Implementation Note: Since the result of merging one color with an existing color on a sheet is, in general, a darker color, it is recommended that the mixing rule used to implement Formblend simulates this behavior. A mixing rule with this property is defined as “Multiply” in *Document management — Portable document format — Part 1: PDF 1.7*, available at `www.adobe.com`. Use of this rule is recommended, particularly for non-printing devices such as viewers.

The complete mixing rules for PFOs are defined as follows. Since, by definition, a PFO presentation space (which is the overlay presentation space) is always merged last on its corresponding presentation space (the medium presentation space for M-PFOs and the page presentation space for PMC-PFOs), P_n corresponds to the PFO presentation space in this table:

Table 13. Color Mixing Rules for PFOs

Mixing Type	Mixing Rule
B_n (PFO) on B_e	Underpaint
B_n (PFO) on F_e	Underpaint
F_n (PFO) on B_e	Overpaint
F_n (PFO) on F_e	Formblend

UP3i Print Data Mixing

Special mixing rules are defined for mixing the UP3i Print Data object type with other data on a page or overlay. In that case, since the print data is presented by a UP3i device after (or possibly before) the complete page or overlay is rendered by the printer, the presentation container cannot mix with the remainder of the page data according to the default MO:DCA mixing rules. It would be difficult to merge this object type in the order in which it is specified on a page since the UP3i Print Data object is normally rendered last (or first) due to the physical configuration of the system. A new type of mixing is therefore architected for UP3i Print Data that is defined as follows:

- The object area of the presentation container mixes in accordance with the default MO:DCA mixing rules. An empty object area is transparent. If a Presentation Space Reset (X'70') Mixing triplet is specified on the OBD, it can reset the space under the object area to color of medium. If a Color Specification (X'4E') triplet is specified on the OBD, it can color the object area. Any object on the page that is specified after the Print Data object can overpaint the object area with other data.
- The UP3i Print Data object is processed in its own presentation space by the UP3i device in accordance with the Print Data format, as identified with the Print Data Format ID in the first 4 bytes of the object. It mixes with the remainder of the page data in a manner that is defined by the Print Data format. For example, Print Data format 'x' might define the mixing such that a bar code is printed with invisible ink that underpaints all underlying data (i.e. the Print Data is transparent). Print Data format 'y' might define the mixing such that a MICR ink is used to stroke the characters and overpaints all underlying data (i.e. the Print Data is opaque).

Color Management

The AFP Color Management Architecture (ACMA) is based on the concept of a color management resource (CMR). A CMR is an architected resource that is used to carry all of the color management information required to render a print file, document, group of pages or sheets, page, or data object with color fidelity. CMRs are defined in an Advanced Function Presentation (AFP) architecture: the Color Management Object Content Architecture (CMOCA). This architecture is defined in the *Color Management Object Content Architecture Reference*.

In AFP environments, CMRs can be associated with document components and are processed as AFP resources by print servers and printers so that they can be downloaded once, captured, and used repeatedly without requiring additional downloads. CMRs are also applicable to non-AFP environments such as PostScript, PDF, and PCL®.

CMR names

A CMR is identified with a fixed-length name that is specified in the CMR header and that is generated based on an architected naming scheme to ensure uniqueness. This naming scheme includes fields such as CMR type, manufacturer, device type and device model number, and properties specific to the CMR type.

CMR types

Each CMR carries a single type of color management resource. The type of CMR resource is specified by the CMR type parameter in the CMR header. The following CMR types are defined:

Color conversions (CCs)
CMRs that carry International Color Consortium (ICC) profiles which tie a device-specific color to or from the profile connection space (PCS).

The accuracy of color rendering is heavily dependent on the accuracy of the description of the input colors using color conversion CMRs. Therefore, AFP applications, document generators, and resource generators are strongly encouraged to focus on defining the input colors as accurately as possible.

Halftones (HTs)
CMRs that are applied to multi-bit data.

Indexed (IX) CMRs
CMRs that map indexed colors in the data to output device colors or colorant combinations.

Indexed (IX) CMRs are used to map a two-byte indexed color value, specified in the data stream using the highlight color space, to device colors on a highlight color, process color, or monochrome device. The device colors can be one of the following:

- A fractional mixture of one or more specific device colorants.
- A presentation-system-dependent process color (CMYK for printers, RGB for displays).
- A gray value.
- A CIELAB value. This value is always specified, even in the above cases, to provide a substitute color value if the device cannot generate the requested device color.

Link color conversions
CMRS that provide look-up tables (LUTs) that convert directly from an input color space in the presentation data to the output color space of the presentation device. There are two subtypes of Link color conversion CMRs - *Link LK CMRs* and *Link DL CMRs*.

Link LK CMRs are resources that are generated and processed internally in AFP systems; they are not exposed to the AFP application or the job submitter, and they cannot be referenced in the data stream. A Link LK CMR is created by combining the

CC CMR that defines an input color space with the CC CMR that defines the output color space. Link LK CMRs can be important for presentation device performance; therefore a goal of the AFP color management system is to provide Link LK CMRs for the presentation device whenever it needs to convert from an input color space in the presentation data to its own output color space.

Link DL CMRs carry *ICC DeviceLink Profiles*. They are similar to Link LK CMRs in that they provide a direct conversion from an input color space to the output color space of the presentation device. However Link DL CMRs are exposed to the AFP application and the job submitter and are referenced in the data stream. While Link DL CMRs apply to all supported color spaces, they are particularly useful in CMYK to CMYK conversions to minimize changes in the K component during the conversion.

Tone transfer curves (TTCs)
CMRs that are used to modify the values of a particular color component.

For more information on ICC profiles, see *ISO 15076-1:2010 “Image technology colour management – Architecture, profile format and data structure – Part 1: Based on ICC.1:2010”*.

Processing modes

The attributes that dictate how the CMR is processed by an AFP system are referred to as *processing modes* for CMRs. The following processing modes are defined:

Audit
Reflects processing that has been done on a document component.

The accuracy of color rendering is heavily dependent on the accuracy of the description of the input colors using audit color conversion CMRs.

Instruction
Specifies processing that is to be done to a document component.

Link
Links an input color space in the presentation data to the output color space of the presentation device. Only Link color conversion CMRs (Link LK CMRs and Link DL CMRs) can be processed as link CMRs.

Because some CMR types, such as a color conversion CMR, can be used in an audit mode or in an instruction mode, the processing mode is not specified in the CMR itself. Instead, it is specified in the context within which the CMR is associated with a document component.

IX CMRs should always be referenced as instruction CMRs. If they are referenced as audit CMRs, the output device ignores them. Because IX CMRs specify a direct mapping from the indexed color value in the data stream to an output color, audit CC CMRs and link CMRs are not used when an IX CMR is processed. Instruction CC CMRs are used with IX CMRs only if the Lab value from the IX CMR is used. In that case, the active CC CMR provides the conversion from the Lab value to the output device color value (CMYK, RGB, or gray). Note that, as with all other CMR types, the output device uses the CMR hierarchy to select a single IX CMR to be used with the data. If an indexed color value is not found in that IX CMR, no attempt is made to look for that indexed color value in another IX CMR.

Halftone CMRs and tone transfer curve CMRs can be specified in a generic sense and referenced as instruction CMRs to request an intended output appearance. Such CMRs are called *generic* CMRs. They are identified with a fixed character pattern in the version field of the CMR name and with the absence of device-specific fields in the name. The CMR Architecture registers all valid generic CMR names for HT and TTC CMRs. Generic CMRs are never used directly by an output device; they are always replaced by device-specific CMRs that provide the intended appearance. This replacement is done either by the print server based on processing inline CMRs or processing the CMR RAT, or by the output device. The output device ignores generic audit HT and TTC CMRs.

Color Conversion CMRs can be generated to force a passthrough of the colors in a presentation device without being subject to color management. This is done by specifying the character string “pasthru” in the version field of the CMR name. CMRs identified in this manner must be CC CMRs and must be referenced as audit CMRs.

The Prop4 property in the CMR name should be specified and indicates the color space is to be “passed through” to the presentation device. A passthrough CC CMR contains no data. When such a CC CMR is referenced as an audit CMR and is used for rendering data, if the color space specified matches the color space of the presentation device the color values in the data will be rendered without going through a color conversion. If the color space in the passthrough CMR is not the same as the device color space or if it is not specified, or if the CMR is an instruction CC CMR, it is ignored and not used for any color conversions. A passthrough CC CMR is treated like other audit CC CMRs in terms of selecting an audit CC CMR from the hierarchy. There is no device-specific CMR which can be substituted for the passthrough CC CMR; it merely instructs the device to not do a color conversion on the data.

Table 14 on page 49 shows what processing modes are valid for each CMR type and whether the CMR type can be specified as a generic CMR.

Table 14. CMR Type: Processing Mode and Generic Capability

<table>
<tr><th rowspan="3">CMR type</th><th colspan="3">Non-generic CMR</th><th colspan="3">Generic CMR</th></tr>
<tr><th colspan="3">Processing modes</th><th colspan="3">Processing modes</th></tr>
<tr><th>Audit</th><th>Instruction</th><th>Link</th><th>Audit</th><th>Instruction</th><th>Link</th></tr>
<tr><td>Color conversion (CC)</td><td>Valid</td><td>Valid</td><td rowspan="4">Invalid: error</td><td colspan="2">Invalid: error</td><td rowspan="5">Invalid: error</td></tr>
<tr><td>Tone transfer curve (TTC)</td><td>Valid</td><td>Valid</td><td>Valid: ignored</td><td>Valid</td></tr>
<tr><td>Halftone (HT)</td><td>Valid: ignored</td><td>Valid</td><td>Valid: ignored</td><td>Valid</td></tr>
<tr><td>Indexed (IX)</td><td>Valid: ignored</td><td>Valid</td><td colspan="2">Invalid: error</td></tr>
<tr><td>Link (LK and DL)</td><td colspan="2">Invalid: error</td><td>Valid</td><td colspan="2">Invalid: error</td></tr>
</table>

Note: A CC CMR that is referenced as an audit CMR may be defined as a passthrough audit CC CMR by specifying the character string “pasthru” in the version field of the CMR name. If such a CC CMR is referenced as an instruction CC CMR, it is ignored. If the CC CMR is referenced as a link CMR, or if any other CMR type is designated as a passthrough CMR, an error is generated.

Server Considerations:

1. Servers should download all valid combinations of CMR type and processing mode, even if the device ignores them. This allows the architecture to define possible future use of such combinations without causing errors on existing devices.
2. Servers should not download invalid combinations of CMR type and processing mode. Instead, they should generate an error.

CMR Installation

CMRs in resource libraries are accessed using a CMR Resource Access Table (RAT). When CMRs are installed in a resource library, the install program must build the CMR RAT entry that maps the CMR name to a file name, to an object OID, and optionally to additional CMRs such as Link LK CMRs. When a color conversion CMR is installed, a flag bit in the CMR RAT entry specifies whether this CMR would normally be used to define input colors in the print file, that is, as an audit CMR. This flag bit is used to trigger the generation of Link LK CMRs that convert from the input color space defined by that CMR to the output color spaces, defined by other CMRs, of all target presentation devices that are configured to the install program and that are to be used on the target print servers. These Link LK CMRs are then mapped to the color conversion CMR in the CMR RAT. For generic CMRs, the install program automatically builds a CMR RAT entry for each architected generic CMR name that points to a dummy generic CMR object and to an object OID for the dummy generic CMR object. This entry allows users to map device-specific CMRs to the generic CMR in the RAT.

CMRs and presentation devices

When a print server accesses the CMR RAT with a reference to an audit CMR in the data stream, it may encounter Link LK CMRs that are mapped to the referenced audit CMR. If the target device supports downloaded Link LK CMRs, the server uses the current target device type and model to select appropriate Link LK CMRs for converting the input color space defined by the audit CMR to the output color space of the target presentation device. Such Link LK CMRs are downloaded to the target device, if necessary.

Similarly, when a print server accesses the CMR RAT with a reference to a generic CMR in the data stream, it may encounter device-specific CMRs of the same type that are mapped to the referenced CMR. If the device supports downloaded CMRs of that type, the server uses the current device type and model to select appropriate device-specific CMRs that are to be sent to the device *in place of* the generic CMR.

Device support for downloaded CC CMRs and generic HT and TTC CMRs is mandatory. Device support for downloaded device-specific HT and TTC CMRs, for Link LK CMRs, and for IX CMRs is optional. If print file refers to an optional CMR that is not supported by the output device, the print server recognizes an exception condition. User-specified fidelity controls determine whether this exception condition is reported and whether print file processing continues.

Associating CMRs with document components

An audit or instruction CMR or a link CMR (subtype DL) can be associated with a MO:DCA document component and becomes a part of the CMR hierarchy that the presentation device uses to apply color management to presentation data. At any given level of the document hierarchy, a Link DL CMR has higher priority, in case of conflict, than an audit CC CMR. A Link LK CMR is not tied into the CMR hierarchy used by the presentation device. Instead, if supported by the presentation device, it is sent to the device by the server and is always used if a color conversion is needed to render presentation data and that conversion is defined precisely by that Link LK CMR.

CMRs are associated with MO:DCA document components in the following manner:

Print file
A CMR can be associated with the print file by referencing it as a resource in the Document Environment Group (DEG) of the form definition that is invoked for the print file by the job submitter.

Document
A CMR can be associated with a specific document in the print file by using a CMR that is referenced for the print file and targeting this CMR at the specific document.

Group of pages or sheets
A CMR can be associated with a group of pages by referencing it as a resource in the medium map that is invoked to process those pages.

Page or overlay
A CMR can be associated with a page or overlay by referencing it as a resource in the Active Environment Group (AEG) for the page or overlay. This reference is identified with scope page or overlay to differentiate it from similar object level references that can be factored up from the Object Environment Group (OEG) of a data object or from an Include Object (IOB) structured field.

Data object
A CMR can be associated with a data object such as IOCA, EPS, PDF, TIFF, JFIF, GIF in multiple ways:

- The data object can be installed with an install program that generates a data object Resource Access Table (RAT). When this program builds the RAT entry for the data object, it can also specify one or more CMRs that are to be associated with the object. Each CMR reference indicates the processing mode of the CMR (audit or instruction).

- If the data object is included on a page/overlay with an IOB, or if it is in a page segment that is included on a page/overlay with an IOB, a CMR can be associated with this object by specifying the name of the CMR on the IOB as an external resource reference and then referencing the CMR with a Map Data Resource (MDR) in the Active Environment Group (AEG) of the page. This method is similar to how a resident SWOP or Euroscale color profile is associated with an EPS or PDF object, and how a PDF resource is associated with a PDF object.
- If the data object is specified directly on the page/overlay, it can reference the CMR in its OEG with an MDR that references the CMR. Note that, for resource management, any CMR reference in the OEG must be factored up to the AEG of the including page or overlay.
- If the data object is an image object to be presented in conjunction with a QR Code with Image bar code, and the bar code is included on a page/overlay with an IOB, a tertiary CMR can be associated with the image object by specifying, on the IOB, the name of the CMR as an external resource reference, paired with the internal resource name used within the bar code object to reference the image object. In addition, the CMR must also be referenced with an MDR in the AEG of the page or overlay.
- If the data object is an image object to be presented in conjunction with a QR Code with Image bar code, and the bar code is specified directly on the page/overlay, a tertiary CMR can be associated with the image object by specifying, in an MDR in the OEG of the bar code object, the name of the CMR as an external resource reference, paired with the internal resource name used within the bar code object to reference the image object. Note that, for resource management, any CMR reference in the OEG must be factored up to the AEG of the including page or overlay.
- In either of the two previous cases, where the data object is an image object to be presented in conjunction with a QR Code with Image bar code, a CMR can also be associated with the image object by being associated with the bar code object—that is, for such image objects, an object-level CMR provided for the including QR Code with Image bar code object is considered to be also associated with the image object. Such image objects, then, can either have an object-level CMR associated *directly* to them, through the previous two cases, or can have an object-level CMR associated *indirectly* to them, by associating the object-level CMR with the bar code object that includes them. The direct association takes precedence.
- The data object can contain embedded CMR-like information. An example is the inclusion of an audit-like ICC profile in a TIFF object. Such information is used by the presentation device when an object level CMR is not provided. If the data object is installed using an install program, an embedded audit-like ICC profile can be copied and converted into an audit CC CMR that is then associated with the data object in the data object RAT. Optionally, the embedded profile can also be extracted from the object to reduce the object size; this version of the object is referred to as the compacted object. The copy and extract functions are allowed only if the embedded ICC profile can be used independently of the data object, as specified with a flag in the ICC header.

Note that if a data object is to be preprocessed with the Preprocess Presentation Object (PPO) structured field, the same CMRs that are to be associated with the object when rendered need to be associated with the object on the PPO. This is done by specifying the CMRs on the PPO as external resource references and by mapping the CMRs with a MDR in the Resource Environment Group (REG) that contains the PPO.

Rendering intent

The proper use of CC CMRs and LK CMRs in a presentation device involves the concept of rendering intent. Rendering intent is used to modify the appearance of color data. Rendering intents supported in AFP color management are based on the rendering intents defined by the ICC, which are also used in other presentation environments such as PostScript and PDF. The ICC defines four rendering intents:

- Perceptual
- Saturation
- Media-relative colorimetric
- ICC-absolute colorimetric

For more information on rendering intents, see *ISO 15076-1:2010 "Image technology colour management – Architecture, profile format and data structure – Part 1: Based on ICC.1:2010"*.

Rendering intent is specified with the Rendering Intent (X'95') triplet on the Presentation Environment Control (PEC) structured field. For document hierarchy levels other than the object level, rendering intents can be specified independently for each major AFP color object type category, as follows:

- IOCA objects
- Object containers (EPS, PDF, TIFF, etc.)
- PTOCA text
- GOCA graphics objects

This allows one object type, such as text, to be rendered with a different rendering intent than another object type, such as continuous tone IOCA image, with a single specification of the Rendering Intent triplet.

The rendering intent specified with the Rendering Intent (X'95') triplet, or with the Rendering Intent table vector in the data object RAT (DO RAT), or that is embedded in a data object, is not used when a Link DL CMR is used for a color conversion. Such CMRs specify the rendering intent internally and override any rendering intent specified elsewhere.

Process colors can also be specified for a Bar Code Object Content Architecture (BCOCA) object with the Color Specification (X'4E') triplet on the Bar Code Data Descriptor (BDD) structured field. However, the rendering intent for BCOCA objects is fixed as media-relative colorimetric.

Rendering intents may be associated with a MO:DCA document component at the same levels of the document hierarchy as CMRs, as follows:

- Print file
- Document
- Group of pages or sheets
- Page or overlay
- Data object; the rendering intent may be associated with a data object in a number of ways:
  - By specifying a PEC with RI triplet in the OEG for the data object
  - By specifying the RI triplet on the IOB that includes the data object
  - By specifying the RI triplet on the PPO that is used to preprocess the data object
  - By specifying the rendering intent in the data object RAT entry for a data object
  - By the data object containing embedded rendering intent information; such information is used by the presentation device when a rendering intent is not specified at the data object level using an RI triplet or a data object RAT table vector.

Normal MO:DCA hierarchy rules apply for processing rendering intents. That is, a rendering intent specified for a document component at a lower level in the hierarchy applies only to that document component and overrides any other rendering intent specified at a higher level in the hierarchy.

CMRs and print media

Color rendering may also be significantly affected by the characteristics of the print media. CMRs may therefore be tuned to specific media; this is indicated by specifying one of the following four media attributes in an instruction CMR:

- Media brightness
- Media color
- Media finish
- Media weight

Each attribute has a valid range of values that is defined in the *Color Management Object Content Architecture Reference*. An instruction CMR may specify none, some, or all of these attributes. The output device uses these CMR media attributes and the media attributes of the current media to select an optimum CMR using the following algorithm:

- If none of the media attributes are specified in an instruction CMR, the printer uses it
- If one or more of the media attributes in an instruction CMR are invalid, exception processing mode is entered
- If all of the media attributes are specified in an instruction CMR and are valid, the CMR is processed as follows:
  - If all attributes match the current media, the CMR is used.
  - If one or more attributes do not match the current media, the printer searches the hierarchy for a media-specific CMR that matches the current media. Multiple applicable CMRs may exist at each level of the hierarchy and are included in the search, and each level of the hierarchy is searched in the normal order, except for the printer default level, which is not part of the search. If no matching media-specific CMR is found, exception processing mode is entered.
- If some, but not all, of the media attributes are specified in an instruction CMR and are valid, the CMR is processed as follows:
  - If all the specified attributes match the current media, the printer searches the hierarchy for a CMR whose media attributes are a better match with the current media. Multiple applicable CMRs may exist at each level of the hierarchy and are included in the search, and each level of the hierarchy is searched in the normal order, except for the printer default level, which is not part of the search. If a better matching CMR is not found, the original CMR is used.
  - If one or more of the specified attributes do not match the current media, the printer searches the hierarchy for a CMR whose media attributes do match the current media. Multiple applicable CMRs may exist at each level of the hierarchy and are included in the search, and each level of the hierarchy is searched in the normal order, except for the printer default level, which is not part of the search. If no CMR is found whose attributes match the current media, exception processing mode is entered.

CMR Processing

CMR association and scope

CMRs are associated with a document component *implicitly*. That is, that document component does not call out the associated CMRs directly.

- At the print file level, a CMR is associated by referencing the CMR in a MDR in the DEG for the form definition. The CMR applies to all documents in the print file.
- At the document level, the CMR is associated by referencing the CMR in a MDR in the DEG for the form definition, and by pointing to the specific document in the print file. The CMR then applies only to that document.
- At the group of pages or sheets level, the CMR is associated by referencing the CMR with a MDR in the invoked medium map. The CMR applies to all pages or sheets processed with that medium map.
- At the page or overlay level, the CMR is associated by referencing the CMR in a MDR in the AEG for that page or overlay. The CMR applies only to that page or overlay.
- At the data object level, the CMR is associated with a data object in any of the following ways:
  - By referencing the CMR in the RAT entry for the object in a data object RAT
  - By referencing the CMR on the IOB that is used to include the data object
  - By referencing the CMR on the PPO that is used to preprocess the data object
  - By referencing the CMR with a MDR in the Object Environment Group (OEG) of the data object

In general, when a CMR is associated implicitly with a document component, the scope of the CMR is the complete document component, unless noted otherwise.

Resident SWOP or Euroscale color profiles are examples of color management resources that are associated implicitly with an EPS or PDF object. They are not called out directly within the object. Their scope is the complete EPS or PDF object with which they are associated.

CMR processing mode

The processing mode determines how a CMR is used in the presentation system. The *audit* processing mode indicates that the CMR defines an operation that has been done on a document component. For example, an audit CC CMR defines the device color that was used to generate the presentation data. It does that by defining the relationship between the input device color space (often called the *input* color space) and PCS. An audit HT CMR defines the halftone that was used to create the data. An audit TTC CMR defines a tone adjustment that was applied to a color component before the halftone was applied to that component.

The *instruction* processing mode indicates, in a similar manner, that the CMR defines an operation that is to be done on a document component. For example, an instruction CC CMR defines the relationship between PCS and the output device color space (often called the *output* color space). An instruction TTC CMR defines a tone adjustment that is to be applied to a color component before it is halftoned. An instruction HT CMR defines the halftone that is to be applied to the color component. An instruction IX CMR defines the mapping of indexed colors in a document component to output device colors.

The *link* processing mode is valid only with Link LK CMRs and Link DL CMRs and defines a direct conversion from input color space to device output color space. Link DL CMRs can be associated directly with a document component, but Link LK CMRs cannot. Instead, Link LK CMRs are associated with, or mapped to, CC CMRs either in the CMR RAT entry, or, for CC CMRs in print file level resource groups, on the Begin Resource (BRS) structured field that wraps the container of the CMR.

Audit, instruction, and link (for Link DL CMRs) processing modes are specified when a CMR is associated with a document component. For print files, documents, page or sheet groups, pages, and overlays, the processing mode is specified with the CMR Descriptor triplet on the MDR. For data objects, the processing mode can be specified in multiple ways:

- With a CMR Descriptor triplet on the MDR in the OEG for the object
- With a CMR Descriptor triplet on the IOB that includes the object
- With a CMR Descriptor triplet on the PPO that is used to preprocess the object

- With a CMR Descriptor table vector (TV) in the data object RAT entry for the object

IX CMRs should be processed as instruction CMRs. IX CMRs that are to be processed as audit CMRs are ignored by the output device.

The *link* processing mode is valid only with LK CMRs. Such CMRs are not associated directly with a document component. Instead, link CMRs are associated with, or mapped to, CC CMRs either in the CMR RAT entry, or, for CC CMRs in print file level resource groups, on the Begin Resource (BRS) structured field that wraps the container of the CMR.

CMR hierarchy rules

The interaction of CMRs at different levels of the document hierarchy follows MO:DCA hierarchy and state rules. When a CMR is associated with a document component at a given level, it replaces (for that level or state only) any conflicting CMR that is associated with a document component at a higher level. For example, if audit color conversion CMR (x) is associated with the print file, and audit color conversion CMR (y) is associated with a data object on a page in a document in that print file, audit color conversion CMR (y) is used as the active audit color conversion CMR for the duration of the data object processing, or the duration of the object state. When the object state is terminated, audit color conversion CMR (x) again becomes the active audit color conversion CMR.

Note that this CMR replacement rule applies only to conflicts. In the above example, if CMR (x) converts device RGB to PCS and CMR (y) converts device CMYK to PCS, the CMRs do not conflict. Both can be used to process RGB and CMYK colors in the data object. If two CMRS that conflict are specified at the same level of the document hierarchy, the last-specified CMR is used.

An audit CC CMR that is designated as a passthrough CC CMR is treated like any other audit CC CMR with respect to CMR hierarchy rules. That is, in the above example, the stated rules apply whether CMR (x) and/or CMR (y) is a passthrough CC CMR or a normal CC CMR.

In addition, at any given document level, a Link DL CMR that is referenced at that level takes precedence, in case of a conflict, over the audit CC CMR at that level. For example, if Link DL CMR (l) and audit CC CMR (a) are both specified at the page level and both convert CMYK, Link DL CMR (l) is used to convert CMYK colors on that page. Furthermore, Link DL CMR (l) would be the CMR that is inherited at the object level (i.e. the next lower document level) for CMYK conversions, unless a CC CMR or Link DL CMR is specified at the object level, in which case these CMRs would override any inherited CMR.

If two CMRs of the same type conflict and are specified at the same document level, the last-specified CMR is used. For example, if two audit CC CMRs that convert RGB to PCS are specified at the page level, the CMR that is specified last takes precedence.

Generic CMR processing

Halftone CMRs and tone transfer curve CMRs can be specified in a generic sense to request an intended output appearance. Such CMRs are called *generic* CMRs. They are identified with a fixed character pattern of `generic` (encoded in UTF-16BE) in the version field of the CMR name. Generic HT and TTC CMRs should be referenced as instruction CMRs. Generic HT and TTC audit CMRs are ignored by the output device. Generic CMRs are processed as follows:

- A server processes a reference to a generic instruction CMR in the same manner that it processes a reference to a device-specific CMR, with one exception. Because the CMR is generic, the server checks whether device-specific CMRs that match the device type and model of the target printer have been mapped to the generic CMR in the CMR RAT. If yes, the device-specific CMRs are used instead. Note that this mapping could occur inline as well by placing the generic CMR in an inline resource group and referencing device-specific CMR replacements that match the device type and model of the target printer on the BRS of the container. If no matching device-specific CMR is mapped to the generic CMR either inline or in the CMR RAT, the server downloads (if necessary), activates, and invokes the generic CMR.

- The printer processes the CMR hierarchy in the normal manner, with one exception. If the active instruction halftone CMR or TTC CMR is a generic CMR, the printer substitutes an appropriate version of a device-specific default CMR.

Default CMRs

When the presentation device requires color management information to render presentation data but no CMRs have been associated with the data in the document hierarchy, default CMRs are used. For converting to output color spaces, these default CMRs are presentation device default instruction CMRs. For converting from input color spaces, these default CMRs are architected default audit CMRs. For a definition of these defaults, see the *Color Management Object Content Architecture Reference*. Note that there are no architected default Link DL CMRs.

CMR exception processing

A CMR exception is detected when a CMR that has been referenced in the data stream (which includes FormDefs and Medium Maps) or a data object RAT cannot be processed as specified. For example, a FormDef may reference a device-specific instruction TTC CMR, but the output device does not support downloaded TTC CMRs. The processing of such exceptions is controlled by the Color Fidelity (X'75') triplet.

The above does not apply to CMRs that are *mapped* to referenced CMRs but that are themselves not directly referenced in the data stream or a data object RAT. This includes:

- Link LK CMRs that are mapped to color conversion CMRs in a CMR RAT or on the BRS of an inline CMR
- Device-specific halftone and tone transfer curve CMRs that are mapped to generic CMRs in a CMR RAT or on the BRS of an inline CMR

The processing of such mapped CMRs is not governed by the Color Fidelity triplet. If a device does not support the download of such a mapped CMR, it does not cause a CMR exception and the mapped CMR is ignored.

A CMR *tag* exception is detected when an unsupported CMR tag is encountered in a CMR. The processing of such exceptions is controlled by the CMR Tag Fidelity (X'76') triplet.

CMRs in Print file level Resource Groups

CMRs may also be carried in the resource group for a print file, in which case they are called inline CMRs. The CMR is first wrapped in a BOC/EOC object container, which in turn is wrapped in a BRS/ERS resource envelope. The BRS specifies the CMR name, and may also specify the names of CMRs that are mapped to the inline CMR. When resolving a CMR reference in the data stream, the print server must always search the print file resource group—if one exists—first. The CMRname is matched against the CMRname that is specified on the BRS structured field of the resource container. For a definition of the algorithm used by a print server to process inline CMRs, see “Using the MDR to Map a Color Management Resource (CMR)” on page 259.

Metadata Objects in AFP

A Metadata Object (MO) is an architected object used to carry descriptive metadata of predefined type and format. Metadata can be associated with a MO:DCA print file. MOs are defined in the Metadata Object Content Architecture (MOCA). This architecture is defined in the *Metadata Object Content Architecture Reference*.

In AFP environments, the MOs have no presentation semantic and may be ignored by print servers or printers.

Associating MOs with an AFP print file

MO association and scope

Metadata is optional. When metadata is present, one or more contiguous MOs may be associated with a MO:DCA print file. MOs are “inline”, are carried in a print file level resource group, must appear first within that resource group, and apply to the entire print file. Within the resource group, each MO is first wrapped in a BOC/EOC object container, which is wrapped in a BRS/ERS resource envelope.

MO Hierarchy Rules

When including multiple MOs the series of object containers must be contiguous and must appear first within that resource group, and, as a whole, constitutes the metadata for the print file. The MO:DCA architecture places no restriction on or significance to the sequence or order of included metadata; therefore, there are no rules that specify the interaction of MOs such as hierarchy or inheritance.

Default MOs

The concept of a default metadata object has no meaning; therefore, default MOs are not defined.

Font Technologies

The MO:DCA architecture supports references to various font technologies for rendering character data. These font technologies can be separated into two classes:

- FOCA fonts
- Non-FOCA fonts, also called *data-object fonts*

FOCA fonts have a structure that is defined by the Font Object Content Architecture (FOCA). They are referenced in a MO:DCA data stream using a Map Coded Font (MCF) structured field. For a description of FOCA fonts, see the *Font Object Content Architecture Reference*. Non-FOCA fonts are fonts whose structure is not defined by the FOCA architecture. The structure of such fonts is not modified when they are used in MO:DCA data streams and in AFP environments. However, such fonts may be carried in MO:DCA object containers, if, for example, they are to be placed in an AFP resource group. Non-FOCA fonts are referenced in a MO:DCA data stream using a Map Data Resource (MDR) structured field. Examples of non-FOCA fonts that are supported in MO:DCA data streams are TrueType fonts (TTFs) and OpenType fonts (OTFs).

Relationship Between FOCA Character Metrics and TrueType Character Metrics: Implementation Issues

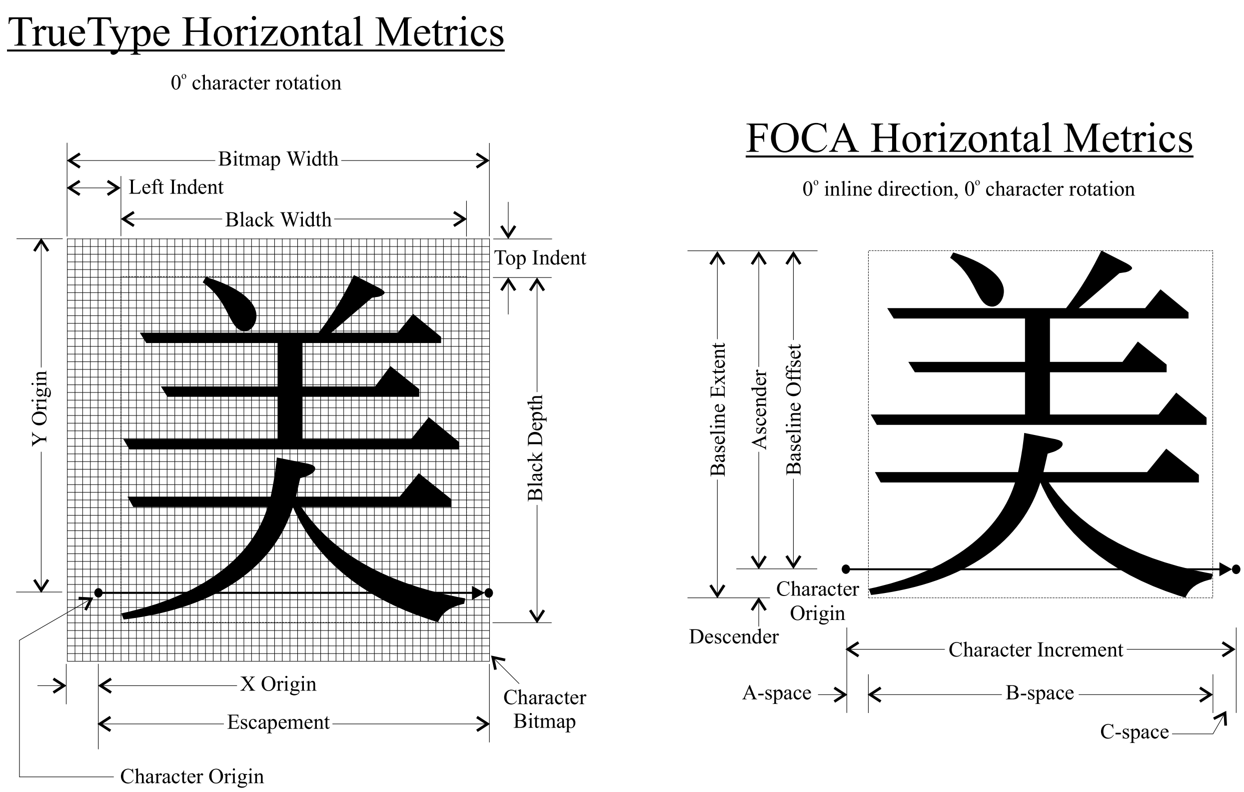
It is important to have consistent presentation results regardless of the font technology used. The FOCA Architecture defines the basic concepts and provides a rich set of font and character metrics; these FOCA concepts lay out the presentation goals. The PTOCA architecture provides the capability to present strings of text at various orientations as shown in Figure 78 on page 449. The following describes the relationship between various TrueType metrics and the corresponding FOCA-defined metrics and provides recommendations for simulating metrics that are needed for presentation but are not directly provided in some TrueType fonts.

Horizontal Metrics

When a TrueType rasterizer RIPs the outline descriptions into character bitmaps, TrueType metrics are provided for positioning the bitmaps horizontally within a line of text. These metric values provide enough information to calculate the metrics defined by FOCA for the 0 degree character rotation. This information includes the width and depth of the bitmap, the distance from the character origin to a corner of the bitmap, and the distance to the origin of the next character.

Figure 14 on page 58 compares the parameters commonly used with TrueType fonts to the horizontal (0 degree) metrics provided by a FOCA font. In practice, many TrueType fonts are built so that there is no top indent or left indent; in this case, the bitmap is a tight box around the character and the indent values are zero.

Figure 14. Horizontal Metrics: TrueType/OpenType Fonts and FOCA Fonts



Based on this illustration, the key FOCA horizontal metrics can be calculated as follows:

```
Character Increment (HCI) = Escapement
A-space (HAS) = Left Indent - X Origin
B-space (HBS) = Black Width
C-space (HCS) = Escapement - A-space - B-space
Baseline Extent (HBE) = Black Depth
Baseline Offset (HBO) = Y Origin - Top Indent
Character Descender (HCD) = Top Indent + Black Depth - Y Origin
```

The FOCA metrics for 180- degree rotation (upside-down) have a simple relationship to those for 0-degree rotation. The A-space and the C-space metrics are reversed, as are the baseline offset and character descender metrics. The character increment, B-space, and baseline extent metrics are identical.

Note that, in practice, font rasterizers don't provide all of the parameters shown in the picture, but do provide other parameters. For example, the font rasterizer can return the offset (xorigin, yorigin) from the character origin of the top-left corner of the bitmap. This information can be related to the metrics formulas; for example:

```
A-space (HAS) = Left Indent - X Origin = Left Indent + xorigin
Baseline Offset (HBO) = Y Origin - Top Indent = yorigin - Top Indent
```

Vertical Metrics

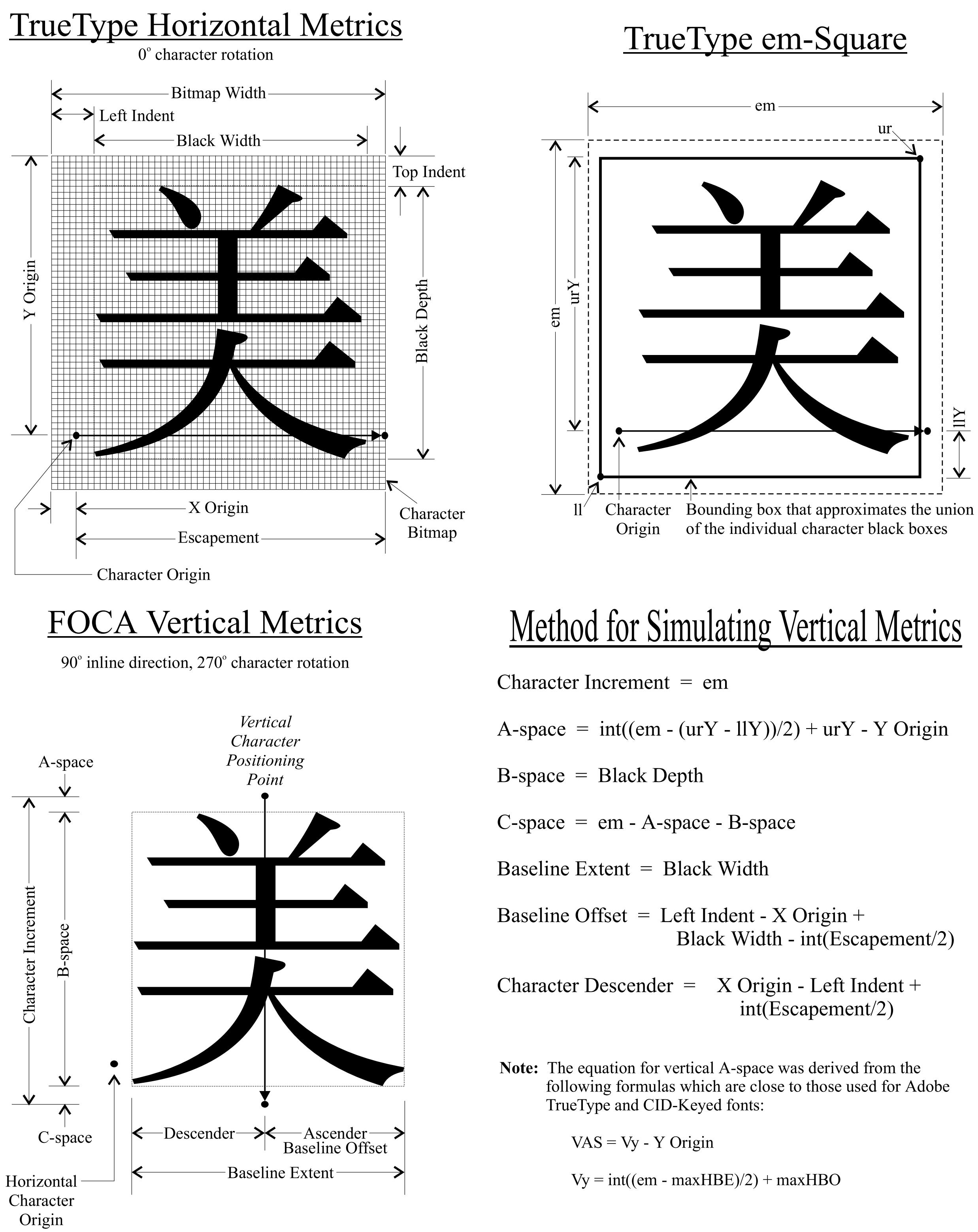
Character rotations of 90 and 270 degrees are used to support vertical forms of writing. In addition to the metrics mentioned earlier, vertical positioning and character increment metrics are needed to place characters in these rotations. Some TrueType fonts provide metrics for vertical writing in a structure called a “vtmx table”, but others don't provide these metrics. The TrueType advance height corresponds to the FOCA vertical character increment (VCI) and the TrueType top sidebearing corresponds to the FOCA vertical A-space (VAS), but there is no TrueType metric that corresponds to the FOCA baseline offset.

When the vtmx metrics are available they can be used to calculate the equivalent FOCA vertical metrics. But, when the font designer omitted them or when they can't be obtained from the TrueType rasterizer, a method is needed to estimate appropriate FOCA equivalent values.

Simulating Vertical Metrics

Figure 15 on page 60 shows again the TrueType horizontal metrics and some additional TrueType metrics that can be obtained to describe the em-square. The figure also shows the target FOCA vertical metrics and a method for simulating 270 degree FOCA vertical metrics from TrueType horizontal metrics.

Figure 15. Vertical Metrics: TrueType/OpenType Fonts and FOCA Fonts



Any approach taken to approximate these metrics is well served to consider the scripts in which vertical writing is most popular: East Asian scripts which use ideographic characters. These full width characters have properties that can be utilized to make these estimations. First, they typically have an equal, or fixed, increment. Second, they are designed on a square grid, so their width and height are equal. Third, they are usually the largest characters in the font.

For these reasons, using a fixed vertical character increment (VCI) equal to the largest horizontal increment will be quite satisfactory for vertical writing. Generally, the maximum values for many basic metrics, such as character increment, descender, and baseline offset can be obtained from the font file. Alternatively, the properties listed previously make it reasonable to set VCI to the Em-Space Increment. The Em-space is defined such that one em equals the height of the design space. Scalable font metrics are expressed as fractions of this unit-Em.

These alternatives can be summarized mathematically as:

```
Character Increment (VCIestimated) = max(Escapement)
  — or —
Character Increment (VCIestimated) = 1 em
```

Techniques to estimate appropriate values for VAS must keep two goals in mind. First, it should result in the bitmaps of ideographic characters being placed within the vertical increment. Second, the vertical position of the bitmap should reflect the relative horizontal baseline offset of the character. For example, the bitmap widths for the BLACK LENTICULAR BRACKETS, U+3010 and U+3011, are small compared to their increment and are designed to be positioned close to the character they enclose. This property must be preserved for vertical writing.

To accomplish these goals, first compute a constant value (Vy) to place the horizontal character origin relative to the vertical character positioning point, using the TrueType em-square metrics and the following equation (note that max(HBE) = urY + llY and max(HBO) = urY):

```
Vy(est) = int((em - max(HBE))/2) + max(HBO)
```

The first component of this equation, int((em - max(HBE))/2), is designed to position all of the character bitmaps of the font within the vertical increment. The second component, max(HBO), calibrates the V Origin metric to the highest character(s) within the font. With this reference, then calculate VAS for individual characters with the equation:

```
VASestimated = Vy(est) - Y Origin
```

and achieve the design goals.

For fonts that are not based on ideographic characters, a different method of constructing a vertical character increment and A-space could be used. For example, a fixed percentage (20%) of extra space, based on the desired pointsize, could be added to the black depth to yield the VCIestimated. The extra space could be divided evenly between the vertical A-space and vertical C-space. For characters without any black depth (space characters), the pointsize could be used as VCIestimated.

The last task to address is estimating the horizontal position of the character bitmap. For vertical rotations, this is reflected in the baseline offset (VBO) and character descender (VCD) metrics. Similar to the goal for vertical positions, this metric should reflect the character's horizontal position within its horizontal increment. Therefore, the metric calculations should essentially center the character's horizontal increment on the baseline and preserve its horizontal position with respect to the increment. This is achieved with the equations:

```
Baseline Offset (VBO) =  Left Indent - X Origin + Black Width - int(Escapement/2)
Character Descender (VCD) =  X Origin - Left Indent + int(Escapement/2)
```

The remaining metrics for 270-degree character rotation can be calculated from the horizontal bitmap metrics and those derived previously:

```
Baseline Extent (VBE) = Black Width
B-space (VBS) = Black Depth
C-space (VCS) =  VCI - VAS - Black Depth
```

The vertical metrics for 90-degree character rotation can be directly deduced from the 270-degree metrics, in the same manner used to convert 0-degree metrics to 180-degree metrics.

Document Indexing

The document index defined by the MO:DCA architecture provides functions for indexing the document based on document structure and on application-defined document tags. The index is delimited by a Begin Document Index structured field and an End Document Index structured field and may be located within the document or external to the document. MO:DCA elements that may be indexed are pages and page groups. When referenced by an index, they are called *indexed objects*. The MO:DCA elements within a document index that reference indexed objects are Index Element (IEL) structured fields. The MO:DCA elements within a document index that support content-based tagging are Tag Logical Element (TLE) structured fields.

A MO:DCA document index consists of the following structured fields. These structured fields are described in detail in Chapter 5, “MO:DCA Structured Fields”, on page 119. Note that the IEL and TLE structured fields may occur multiple times.

Begin Document Index (BDI)

Index Element (IEL)

Link Logical Element (LLE)

Tag Logical Element (TLE)

End Document Index (EDI)

When the document index is external to the document, the BDI structured field references the document using a Fully Qualified Name type X'83' triplet. The document name specified in this triplet is inherited by all IEL and TLE structured fields in the index.

Index Elements

The Index Element (IEL) structured field supports indexing of pages and page groups. When an IEL references an indexed object, the type of indexed object (page or page group) is indicated by the name reference to the indexed object. The name of the IEL structured field is specified by a Fully Qualified Name type X'CA' triplet, and the name of the indexed object is specified by either a Fully Qualified Name (FQN) type X'87' triplet for a page or by a FQN type X'0D' triplet for a page group. An IEL that references a page is called a page level IEL. An IEL that references a page group is called a page group level IEL. A MO:DCA index may contain page level IELs, page group-level IELs, or both. The order in which page level IELs and page group level IELs appear in the index must be the same as the order in which the indexed Begin Page and Begin Page Group structured fields appear in the document.

The IEL structured field provides the following information for the indexed object:

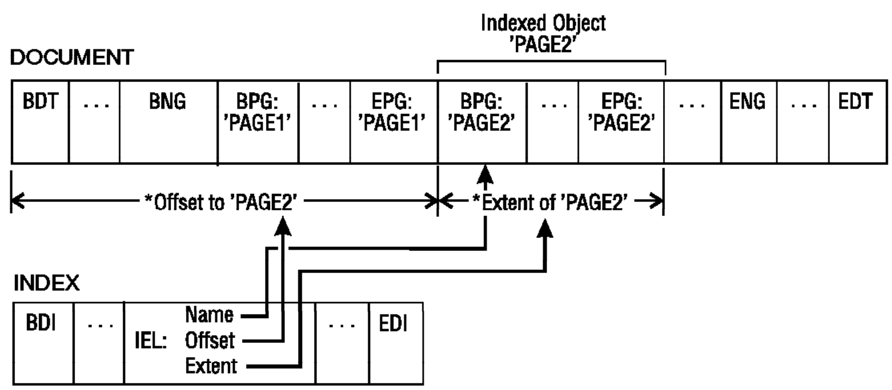
- Direct byte offset of the Begin indexed object structured field from the start of the Begin Document structured field.
- Byte extent of the indexed object, from the first byte in the Begin structured field to the last byte in the End structured field.
- Structured field offset of the Begin indexed object structured field, where the Begin Document structured field has offset 0, and all following structured fields increment the offset by 1.
- Structured field extent of the indexed object, which is a count of the number of structured fields in the indexed object, starting with the Begin indexed object structured field and ending with the End indexed object structured field.
- Object offset of the Begin indexed object structured field, using a specified object type. For example, this parameter may specify the number of pages that precede an indexed page group in the document.
- Object extent of the indexed object, using a specified subordinate object type. For example, if the subordinate object is a page, this parameter may specify the number of pages in an indexed page group.
- If the indexed object is a page:

- The name of the medium map object that is active for formatting the indexed page on a physical medium
- The number of the indexed page in the set of sequential pages controlled by the active medium map, where the first page in the set is number 1
- The PGP repeating group used to process the page

• If the indexed object is a page group:
  - The number of pages that precede the page group in the document
  - The number of pages contained in the page group
  - The name of the medium map object that is active for formatting the first page in the indexed page group on a physical medium
  - The number of the first page-group page in the set of sequential pages controlled by the active medium map, where the first page in the set is number 1, and where "active medium map" refers to the medium map that is active at the beginning of the page-group
  - The PGP repeating group used to process the first page-group page

An example of a page level IEL that specifies page offset and page extent is shown in Figure 16 on page 63.

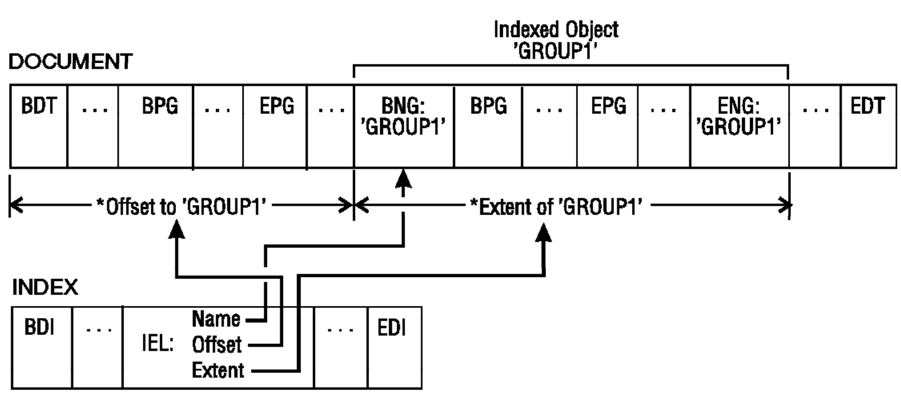
Figure 16. Page level IEL: Offset and Extent



* Can be measured in number of bytes or number of structured fields

An example of a page group level IEL that specifies page group offset and page group extent is shown in Figure 17 on page 63.

Figure 17. Page group level IEL: Offset and Extent



* Can be measured in number of bytes or number of structured fields

Figure 18 on page 64 shows how the Medium Map information in a page level IEL is used to determine page placement on a side of a sheet.

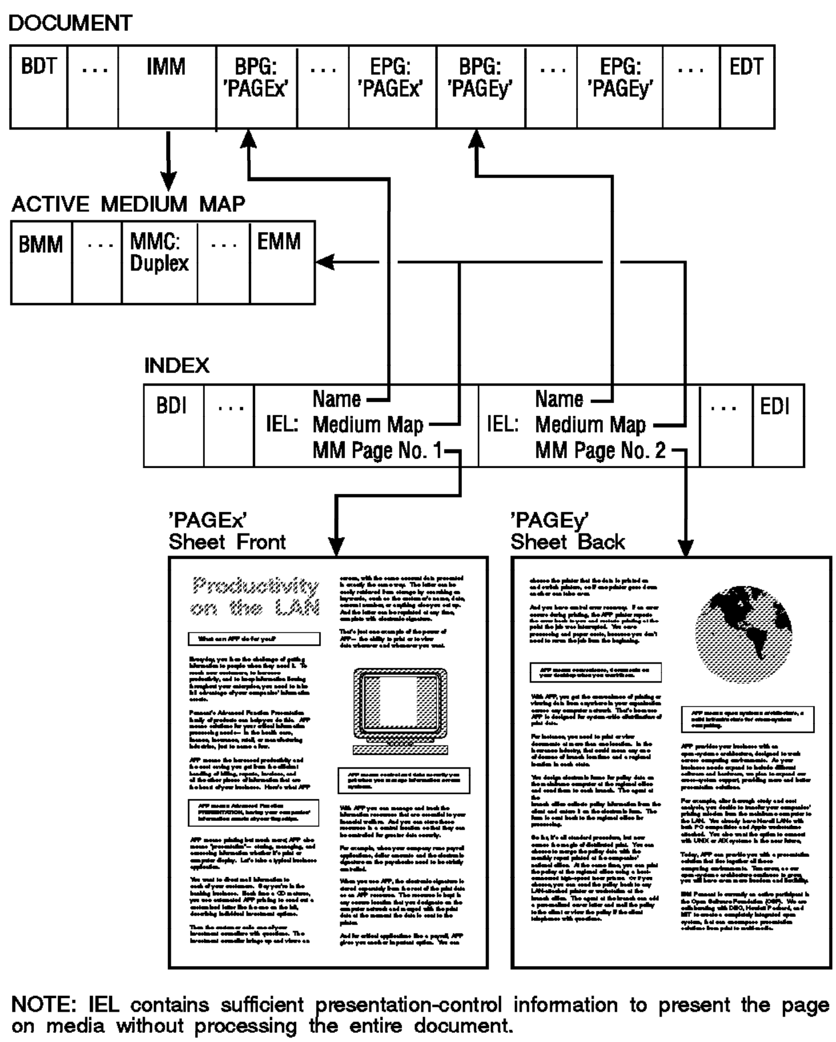
Tag Logical Elements

The Tag Logical Element (TLE) structured field supports the tagging of pages and page groups with an attribute that may be used as an index key. The attribute is specified using attribute name and attribute value triplets on the TLE structured field. When the TLE is specified in a document index, the element to be tagged may be identified using a Fully Qualified Name triplet on the TLE structured field:

- FQN type X'87' triplet for a page
- FQN type X'0D' triplet for a page group

If a TLE in a document index does not contain an explicit page or page group reference, it inherits such a reference from the last preceding IEL in the index. A TLE that explicitly references a page, or that inherits a page reference from the last preceding IEL, is called a page level TLE. A TLE that explicitly references a page group, or that inherits a page group reference from the last preceding IEL, is called a page group level TLE.

Figure 18. Page level IEL: Use of Medium Map Information



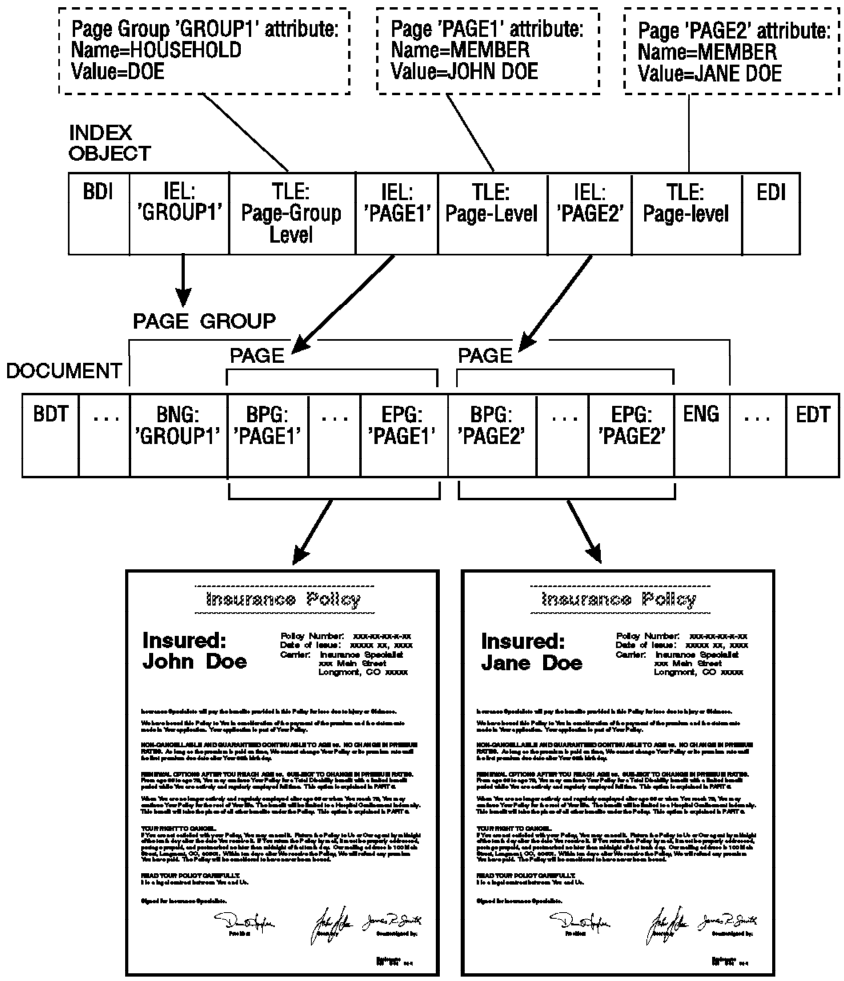
The TLE structured field tags the referenced element with the following information:

- Name of the attribute

- Value of the attribute
- Sequence number of the attribute, used to distinguish otherwise identical attributes
- Level number of the attribute, used to logically position the attribute in an application-defined hierarchy

Figure 19 on page 65 shows how logical tags are applied to pages in a document using TLEs in an external document index.

Figure 19. A Document with Logical Tags



Document Links

Online, interactive forms of document processing require that linkages be established among components within the document and from components within the document to components external to the document. One example of such processing is the use of *hypertext* links, which are logical connections from one string of text in a document to another string of text that is contextually related to the first. A viewing application can highlight the source text, such as a technical term, and using hypertext links can provide the user with the option of jumping to the linked text that is the glossary definition of the technical term. Another example is the processing of annotations. A reviewer of a document may add comments to a string of text in a source document, and require a link to connect these comments as annotations to the appropriate area in the source document. A third example is the processing of appends. A document may be composed of pages summarizing monthly phone calls. If a particular phone call is recorded late, it may need to be appended to an existing page in the document, which requires a link from the existing page to the document component that contains the late phone bill.

Document links in the MO:DCA architecture are supported with Link Logical Element (LLE) structured fields.

Link Logical Elements

Link Logical Elements (LLE) structured fields are process elements that provide a general and extendable linking capability between document components such as documents, page groups, pages, overlays, data objects, and logical tags. The LLE structured field identifies a source and a target and specifies the purpose of the link from source to target. The LLE optionally can specify a name that may be used to reference the LLE and parameter data to be associated with the link.

LLEs may be embedded directly in the document that contains the source for the link. In that case, the source link specified in the LLE inherits the document name and the names of all objects that are higher in the document hierarchy. For example, if the LLE is in a page that is part of a page group, and if the source link specifies an area on the page, then the source link inherits the names of the document, page group, and page.

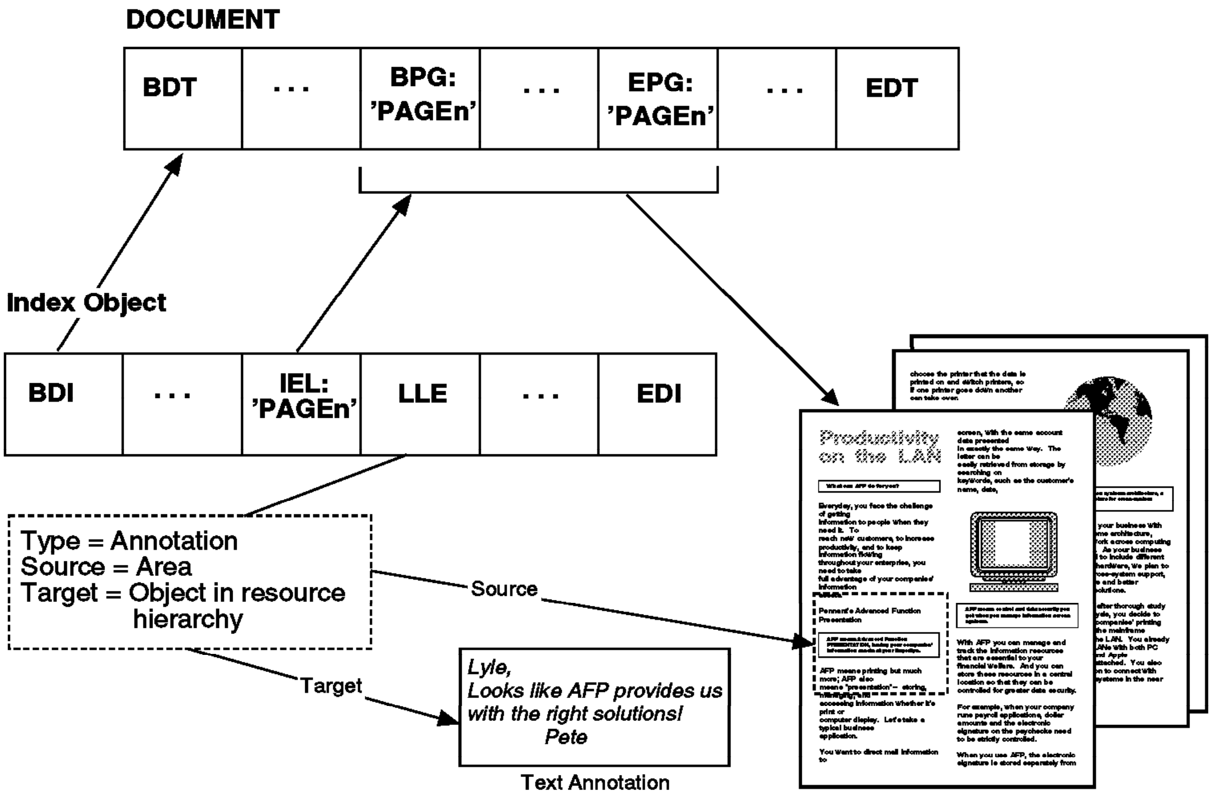
LLEs may be embedded directly in the document that contains the target for the link. In that case, the target link specified in the LLE inherits the document name and the names of all objects that are higher in the document hierarchy. For example, if the LLE is in a page that is part of a page group, and if the target link specifies an area on the page, then the target link inherits the names of the document, page group, and page.

LLEs may also be embedded in the index for the document that contains the source for the link, the target for the link, or both. In that case, the source or target link in the LLE can inherit the document name from the index if the document name is not explicitly specified in the respective repeating group. The source or target link may also inherit the page or page group name specified by a preceding Index Element (IEL) structured field if such names are not specified by the corresponding repeating group in the LLE and if the repeating group specifies an object that is lower in the document hierarchy than the object defined by the IEL.

Document links defined by LLEs do not provide a presentation specification. It is left up to the application using the LLEs to determine how to present the relationship between document components that are linked with an LLE. For example, if an LLE is used to link a source document page to an object containing an annotation, a viewing program may choose to highlight the annotated area on the source page and to display the annotation in a separate window next to the source page. On the other hand, a print subsystem may choose to simply gather all annotations and print them at the end of the source document with appropriate pointers to the source pages.

An example showing how an LLE can be embedded in a document index to link an area on a page in the source document to a text annotation is shown in Figure 20 on page 67.

Figure 20. Document Annotation using the LLE



Annotations and Appends

An *annotation* is a comment or explanation that is associated with the contents of a source document. Annotations are normally generated based on a review of the final-form document using an interactive presentation device such as a document viewer. Annotation data can be generated with a variety of data types such as text and image, and can be carried within a number of document components including object containers, overlays, pages, page groups, resource groups, and documents. Annotations are linked to the source document component to which they apply using a Link Logical Element structured field.

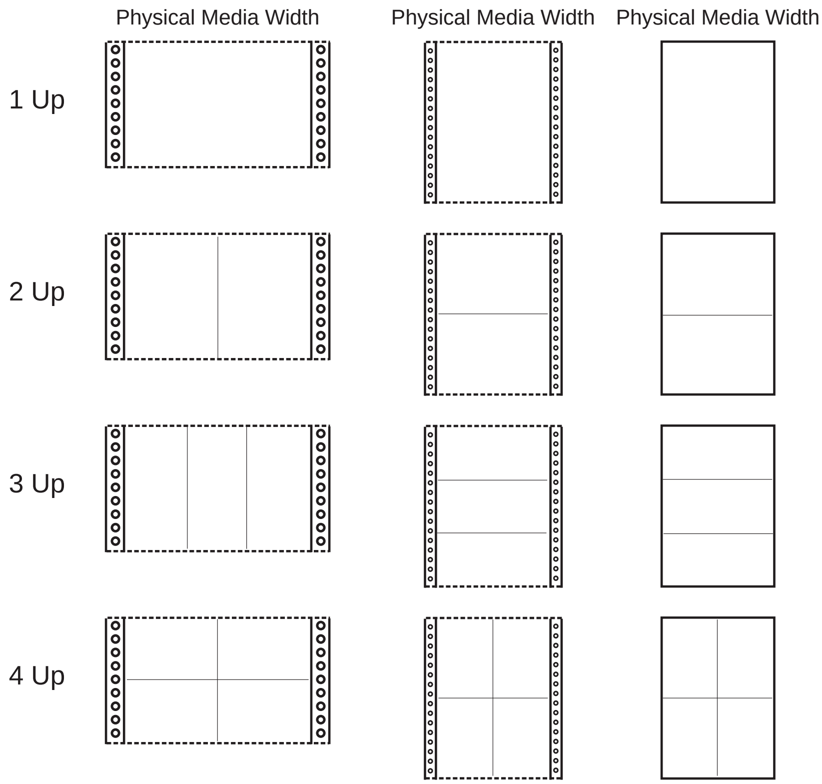
An *append* is an addition to a source document component or a continuation of a source document component. Appends can be generated with any MO:DCA document component. The simplest form of an append is one document appended to another document. Appends are linked to the source document component to which they apply using a Link Logical Element structured field.

The location of document components that carry annotations and appends follows the normal MO:DCA object structure rules. For example, if an annotation is built using a page or a page group, it must be carried in a document. If it is built using a data object, resource object, or object container, it can be carried in a resource group.

N-up Presentation

N-up is a presentation format where multiple pages are presented on a single physical medium. This format provides the user with a high degree of flexibility for composing page objects onto sheets. When used on a continuous-forms printer with a wide carriage, it can result in significant paper savings and improvements in print reliability. In N-up presentation, each side of the physical medium is divided into a number of equal-size partitions, where the number of partitions is indicated by the number “N” in “N-up”. If duplex is specified, the same N-up partitioning is applied to the back side as is applied to the front side. With simplex N-up presentation, N pages are placed on the physical medium, and with duplex N-up presentation, 2N pages are placed on the physical medium. Pages are placed into partitions using either a *default N-up page placement* or an *explicit N-up page placement*, as specified in the Page Position (PGP) structured field. In the default N-up page placement, consecutive pages in the data stream are placed into consecutively-numbered partitions. In explicit N-up page placement, consecutive pages in the data stream are placed into explicitly-specified partitions. For more information on page placement, see “Page Position (PGP) Format 2” on page 313. Pages may be rotated within their partitions, and Page Modification Control (PMC) overlays may be applied to pages before they are placed in their partition. Figure 21 on page 68 shows the partitioning for wide continuous-forms media, narrow continuous-forms media, and cut-sheet media; partitioning is not used with envelope media. Partition numbering for various media is shown in Figure 61 on page 320 to Figure 72 on page 326.

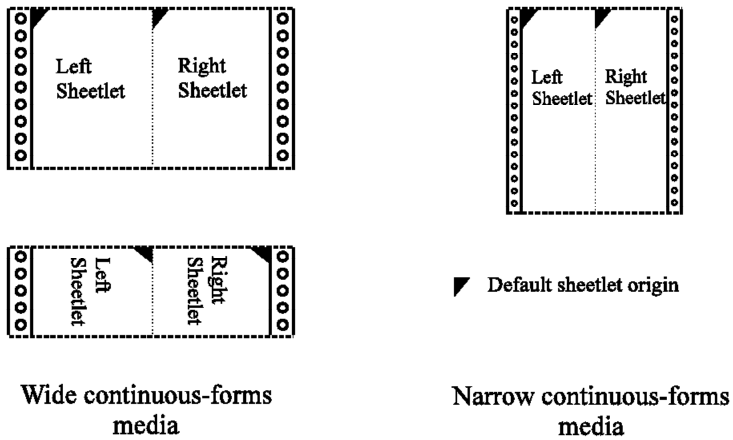
Figure 21. N-up Partitions for Various Physical Media



Cut-sheet Emulation (CSE) Print Mode

Some IPDS printers provide a *cut-sheet emulation mode* that can be used to print on continuous-forms media that, once slit and collated, emulates two sheets of cut-sheet output. In this mode, the printer logically divides the continuous-forms media in half parallel to the carrier strips and controls the placement of pages on either the left side or the right side of the physical media as defined by a printer configuration option. The two portions of the physical media are called *sheetlets* and are treated as if they were two separate pieces of cut-sheet media. This logical division of the continuous-forms media is shown in Figure 22 on page 69. When a MO:DCA document is sent to a print server for printing in CSE mode, MO:DCA sheets and their content are mapped to cut-sheet CSE sheetlets at the printer. Note that the top of each sheetlet is a narrow edge, and the default sheetlet origin is the top-left corner of the sheetlet.

Figure 22. Logical Division of Continuous Forms for Cut-sheet Emulation



The printer is configured for cut-sheet emulation mode by the printer operator while the printer is disconnected from the print server. Cut-sheet emulation mode is activated by the print server after the printer has indicated support for the mode. Note that cut-sheet emulation mode is not supported in viewing environments. Note also that cut-sheet emulation mode is not supported with N-up presentation. When N-up is specified in the active Medium Map, CSE mode is deactivated for the duration of that Medium Map.

When finishing operations are specified for a printer operating in CSE mode, the operations are specified for and applied to each CSE sheetlet. That is, for finishing operations in CSE mode, the media is the sheetlet. This is true whether the finishing operation is specified with a Finishing Operation (X'85') triplet or a UP3i Finishing Operation (X'8E') triplet.

Simulation of Preprinted Forms

Preprinted forms are often simulated with overlays. To ensure that this simulation works correctly with any type and color of page data, a new type of overlay, called a preprinted form overlay (PFO) is defined. In particular, there are two types of preprinted form overlays:

- Medium Preprinted Form Overlay (M-PFO), which is used to simulate a preprinted form on a sheet-side. This PFO is invoked using a keyword on the MMC structured field and causes the M-PFO to be applied to each sheet-side in a copy subgroup.
- PMC Preprinted Form Overlay (PMC-PFO), which is used to simulate a preprinted form on a page on a sheet-side. This PFO is invoked using the PMC structured field and causes the PFO to be applied to the page processed by a PGP repeating group.

Only one type of PFO is allowed per sheet-side, and an M-PFO always overrides PMC-PFOs. If a M-PFO is specified to simulate a preprinted form for a sheet-side, it is applied last, after all other page data and overlay data has been applied to the sheet-side. If PMC-PFOs are also specified for pages on that sheet-side, they are ignored, as are any additional M-PFOs. If a PMC-PFO is specified to simulate a preprinted form for a page on a sheet-side, it is applied last, after all data for that page has been applied. Any additional PMC-PFOs for that page are ignored.

Note that with N-up presentation, multiple pages can be presented on a sheet-side. Therefore it is possible to have multiple PMC-PFOs on a sheet-side, each tied to a different page. A PMC-PFO is associated with a single page, and should not overlap data from another page, because such overlap cannot occur with real preprinted forms. If a PMC-PFO specified for one page overlaps data from another page, whether this data is actual page data or PMC-PFO data for the other page, the appearance of the overlap area is presentation-system dependent.

PFOs are presented using a special mixing rule, called *Formblend*, that is designed to address the following inherent characteristics of preprinted forms:

1. The color of preprinted forms cannot be knocked out. That is, the color of a preprinted form is its “color of medium”. Unfortunately, a simulation of that color using AFP default mixing rules will allow that color to be knocked out by overpainting it with either color of medium or with “white” (CMYK = X'00000000', RGB = X'FFFFFF'). For example, if a yellow preprinted form is used and either color of medium or white is applied, the color of the form remains yellow. When that form is simulated with the color yellow, for example on an overlay, if either the color of medium or white is applied, the color of the form is the base color (usually white), not yellow.
2. When a non-white color is applied to a colored preprinted form, some “blending” of the form color and the new color occurs. The amount of blending depends on the two colors, the print technology (e.g. ink-jet or EP), and the halftoning technology. However, a simulation of that color using AFP default mixing rules will cause the new color to knock out the preprinted form color with no blending.

To properly simulate the behavior of true preprinted forms, the Formblend mixing rule is defined as the mixing rule for PFOs as follows. When PFO data is merged onto existing data:

- Wherever the color of the underlying data is either the color of medium or white (CMYK = X'00000000' or RGB = X'FFFFFF'), the resultant color is the PFO color
- Wherever the color of the underlying data is not color of medium or white, the resultant color is a device-specific blending of the underlying color with the PFO color that simulates how that device would blend the underlying data onto a real preprinted form that has the PFO color.

Document Finishing

Finishing operations, such as stapling and folding, for a print file may be specified using structures in the form definition invoked for the print file. Such finishing operations may be applied at different levels of the print file, and at each level the finishing operations have a defined scope:

- *Print file level finishing:* the scope is the complete print file.
- *Document level finishing, all documents:* the scope is each individual document in the print file.
- *Document level finishing, selected document:* the scope is a single document in the print file.
- *Medium map level finishing, group of sheets:* the scope is a collection of sheets.
- *Medium map level finishing, each sheet:* the scope is a single sheet.

Finishing operations for all levels are specified with a Medium Finishing Control (MFC) structured field. For print file level and document level finishing, the MFC is specified in the document environment group (DEG) of the form definition. For medium map level finishing, the MFC is specified in a medium map.

The actual finishing operation and its parameters are specified on the MFC with finishing triplets. Two triplets are supported:
- Finishing Operation (X'85') triplet
- UP3i Finishing Operation (X'8E') triplet

These two triplets may be specified in any combination at any level, however the finishing operations must be compatible.

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 (print file, document, medium collection), and second by the order of the operation in the data stream. Finishing operations with an inherently broader scope, for example, operations at the print file level, are nested outside of finishing operations with an inherently narrower scope, for example, operations at the medium map level. If more than one operation is specified with the same scope, the order of the finishing operation triplets defines the order of the nesting. The first finishing operation specified defines the outermost nesting, and the last finishing operation specified defines the innermost nesting. When a finishing operation is applied, all finishing operations nested inside this operation are also applied. Finishing operations that are nested outside this operation are not affected. For a complete definition of the finishing operation nesting rules, see "Finishing Operation Nesting Rules" on page 270.

Exception Conditions

The application creating the data stream is responsible for producing a valid MO:DCA data stream, and the application using the MO:DCA data stream is responsible for preserving a valid format. Nonetheless, exception conditions may arise. A valid MO:DCA data stream is one that does not violate the architecture. A MO:DCA data stream is in violation of the architecture when its structure or contents do not conform to the requirements of the architecture.

An error is a product failure that produces or results in a data stream that violates the architecture. Since the cause of an architecture violation cannot be determined when an application interprets a data stream, all architecture violations are handled as exception conditions.

If absolute fidelity of a presentation document is not required, MO:DCA documents can be interchanged among a larger set of products. It is possible for the processor of a MO:DCA data stream to continue processing when it encounters exception conditions. This permits a process that cannot faithfully present a document to continue with its best approximation.

Classifications

Exception conditions can be classified as:
- Syntactic
- Semantic

Syntactic exception conditions defined for this architecture include:
- Invalid or unknown structured field introducer (SFI); see "MO:DCA Structured Field Syntax" on page 20 for further discussion
- Invalid or unknown parameter within a recognized structured field
- Invalid parameter value within a recognized structured field
- Component appears in an invalid location or is missing
- Structured field appears in an invalid location or is missing
- Parameter is missing within a recognized structured field

Semantic exception conditions defined for this architecture include:
- Inconsistent or contradictory specifications
- Invalid relationships among the data-stream structured fields

Detection

A MO:DCA-compliant product must detect the exception conditions defined by the architecture that apply to the interchange set supported, within the scope of the supported OCAs. Exception conditions detected in the structured fields and parameters that it interprets as it processes the data stream should be identified to an exception handler within the receiver. The MO:DCA architecture defines eight categories of exception conditions that can occur in an interchange data stream. The eight categories and their descriptions are as follows:

Category	Description
Invalid structured field identifier	The structured field identifier contains invalid parameter values. Examples are structured field identifiers with length values less than eight or invalid flag settings. Not included in this category are invalid class codes, type codes, or category codes.
Unrecognized identifier code	This exception condition is caused by an unrecognized structured field identifier code. It includes class codes or type codes that are not valid in this architecture, or that are valid in this architecture, but are not acceptable in the particular interchange set being used. It does not include invalid category codes.
Data stream state violation	A valid structured field appears in an invalid context in the data stream. This exception includes: • Repetition of a structured field within a state where repetition is not permitted. An example is the appearance of two Page Descriptor structured fields in a MO:DCA Active Environment Group. • Appearance of a structured field within a state where it is not permitted. An example is a Page Descriptor structured field appearing in a MO:DCA Object Environment Group. • Appearance of a structured field outside the specified structured field order for that particular state. An example is a Begin Presentation Text Object structured field appearing in a MO:DCA Page before the Active Environment Group. **Note:** Not included in this category is the omission of a required structured field.
Unrecognized structured field or triplet	This exception includes: • An SFI containing a category code: – That is not valid in this architecture, or – That is valid in this architecture, but is not acceptable in the particular interchange set being used • A triplet containing an identifier: – That is not valid in this architecture, or – That is valid in this architecture, but is not valid in the particular interchange set being used
Required structured field missing	A structured field, required to begin a containing component or to satisfy an explicit invocation, is missing from the correct location in the data stream. An example is a Begin Active Environment Group structured field missing from the beginning of a page overlay.
Required parameter missing	A parameter or parameter group, required in a specific structured field or in a set of structured fields, is missing from the document component where it is required. An example is a Begin Document structured field missing a Coded Graphic Character Set Global Identifier triplet.

Unacceptable parameter value A parameter contains a value that is not valid in this architecture, or it contains a value that is valid in this architecture, but that is not acceptable in the particular interchange set being used. An example is a value of 254 for the X page units-base parameter in a Page Descriptor structured field. See "PGD (X'D3A6AF') Syntax" on page 310.

Inconsistent parameter values A parameter contains a value that is inconsistent with the value of another parameter in the structured field, or a parameter in another structured field. An example is a name in an end structured field that does not match the name in the corresponding begin structured field.

MO:DCA syntax tables identify the categories of exception conditions that can occur for each data element through the use of a code listed in the *Exc* column. Each of the exception conditions is related to a bit position, as shown in Table 15 on page 73. The value assigned to *Exc* is based on the positions of the bits that represent the exception condition categories that can apply to the data element. If no exception condition is possible, the *Exc* column will contain X'00'.

For example, if it is possible for the data element to contain a value outside of the prescribed range, or if it is possible for its value to conflict with that of another parameter, then both the unacceptable parameter value and the inconsistent parameter value exception conditions can apply. The unacceptable parameter value is represented by bit position six or B'00000010', and the inconsistent parameter value is represented by bit position seven or B'00000001'. The code that is entered into the *Exc* column is formed by ORing the bit representations of the exception condition categories that are possible, in this example resulting in B'00000011' or X'03'.

Table 15. Bit Representation of MO:DCA Exception Condition Categories

Bit Position	Exception Condition Category	Code	
		Binary	Hexadecimal
Bit 0	Invalid structured field identifier	B'10000000'	X'80'
Bit 1	Unrecognized identifier code	B'01000000'	X'40'
Bit 2	Data stream state violation	B'00100000'	X'20'
Bit 3	Unrecognized structured field or triplet	B'00010000'	X'10'
Bit 4	Required structured field missing	B'00001000'	X'08'
Bit 5	Required parameter missing	B'00000100'	X'04'
Bit 6	Unacceptable parameter value	B'00000010'	X'02'
Bit 7	Inconsistent parameter values	B'00000001'	X'01'
None	None	B'00000000'	X'00'

Exception Action

The action to be performed by a product that detects an exception condition is presentation-system dependent.

Chapter 4. MO:DCA Objects

This chapter:
- Defines the structure of a MO:DCA print file
- Defines the structure of a MO:DCA document
- Defines the structure of a MO:DCA index
- Defines the structure of a MO:DCA page
- Defines the structure of a MO:DCA page group
- Describes the resource objects that may be referenced in a MO:DCA document and defines their structure
- Describes how resource objects may be carried in resource groups
- Defines the structure of print control resource objects
- Describes the data objects that may be included in a MO:DCA document and defines their structure
- Defines the structure of object containers

Object Syntax Structure

This section specifies the syntax used to define MO:DCA objects.

If a structured field that is not identified as being part of the object appears anywhere within the object, a X'40' exception condition exists. If a structured field appears out of the stated order or more than the permitted number of times, a X'20' exception condition exists. If a structured field that is identified as required does not appear within the object, a X'08' exception condition exists.

The conventions used in these structured field groupings are:

( ) The structured field acronym and identifier are shown in parentheses. The presence of dots or periods in the identifier indicates that the item is not a structured field, but instead is a structure, for example a medium map. The structure is composed of an assortment of structured fields, and is defined separately.

[ ] Brackets indicate optional structured fields. When a structured field is shown without brackets, it *must* appear between the begin and end structured fields.

+ Plus signs indicate structured fields may appear in any order relative to those that precede or succeed it except when the preceding or succeeding structured field does not have a plus (+) sign. In that case, the order is as listed.

(S) The enclosed (S) indicates that the structured field may be repeated. When present on a required structured field, at least one occurrence of the structured field is required, but multiple instances of it may occur.

F2 An F2 indicates that the structured field is a format two structured field. See "Structured Field Formats" on page 25

Note: The No Operation structured field may appear within any begin-end domain. Therefore, it is not listed in the structured field groupings.

Print File

The print file is an object that contains one or more documents to be printed. A print file may also optionally contain an external resource group, also referred to as a *print file level* resource group, as well as document indexes. Resources carried in a print file level resource group are sometimes referred to as *inline* resources.

Print file

Figure 23. Print File Structure

```
[ Begin Print File (BPF, D3A8A5)                                            ]
      [  (       D3..C6)      Resource Group                                ]
         (       D3..A7/A8)   Index + Document                          (S)
[ End Print File (EPF, D3A9A5)                                              ]

  Index + Document Structure
      [  (       D3..A7)      Document Index                                ]
         (       D3..A8)      Document                                  (S)
```

Figure 23 on page 76 shows the interchange form of a MO:DCA print file.

Warning: Any other form may cause inconsistent, presentation-system-dependent results.

For a definition of the Resource Group structure, see "Resource Groups" on page 87.

Notes:

1. The BPF/EPF structured fields are optional as a pair; if one is specified, the other must be specified as well.
2. Only one BPF/EPF pair is allowed in a print file, and a single Form Map is associated with each print file.

   Architecture Note: The BPF / EPF pair is not intended to provide significant additional functionality in and of itself; it is intended to add an explicit wrapper to the existing print file definition. For example, it is not intended to allow trivial print stream concatenation, support multiple inline resource groups, or legalize any other function that is not otherwise allowed without the BPF / EPF wrapper. Simply adding BFP/EPF around an "illegal" print stream (multiple inline resource groups, for example) cannot be used to make it legal or correct, especially in the case of print stream concatenation.

   Application Note: All operating systems that support printing have the concept of a file that is to be printed. These systems know where the file starts and where it ends. Such a file is often generically referred to as a "physical file". When a physical file contains AFP data, that file is printed with a single MO:DCA Form Definition. The MO:DCA architecture does not define the relationship between a print file and a physical file. However, AFP consumers, including print servers that process MO:DCA data, should consider a physical file to be a single MO:DCA (AFP) print file that contains at most one BPF/EPF pair and at most one print file level resource group. MO:DCA IS/3 compliant consumers and print servers must treat the physical file in this manner and should generate a presentation-system-specific exception if the physical file contains more than one BPF/EPF pair. This is true even when the physical file is streamed with protocols such as sockets or named pipes. Consult your product documentation for its definition of a physical file and its relationship to a MO:DCA (AFP) print file.
3. The index, as shown in the Index + Document Structure, is optional. When specified, it must precede the document to be indexed and is implicitly tied to that document. Pointers from the index to the document and pointers from the document back to the index are not needed in this case and are ignored. That is, any FQN type X'83'—Begin Document triplet on the BDI is ignored, and any X'98'—Begin Document Index on the BDT is ignored.
4. Only a single resource group is permitted at the print file level. If multiple resource groups appear before the first document, or if one or more resource groups follow the first document, the treatment of these resource groups is presentation-system-dependent.
5. A single document index before the inline resource group is accepted by AFP print servers and is implicitly tied to the first document in the print file. However, this format is not compliant with the MO:DCA interchange print file format and its use is discouraged.
6. Metadata may be associated with a print file and is optional. To specify metadata, one or more metadata objects (MO) may be included within the resource group of the print file. The MO Type object container(s)

must directly follow the Begin Resource Group (BRG), otherwise they are ignored. When including multiple MOs the series of object containers must be contiguous and, as a whole, constitutes the metadata for the print file. The MO: DCA architecture places no restriction on or significance to the sequence or order of included metadata.

Document

The document is the highest level object in the MO:DCA document component hierarchy. A document is delimited by Begin Document and End Document structured fields.

Figure 24. Document Structure

```
Begin Document (BDT, D3A8A8)
        [   (       D3..92)     Object Container (MO Type only)       (S)   ]
   +    [   (IMM, D3ABCC)       Invoke Medium Map                     (S)   ]
   +    [   (IPG, D3AFAF)       Include Page                          (S)   ]
   +    [   (LLE, D3B490)       Link Logical Element                  (S)   ]
   +    [   (       D3..CC)     Medium Map                            (S)   ]
   +    [   (       D3..D9)     Resource Environment Group            (S)   ]
   +    [   (       D3..AF)     Page                                  (S)   ]
   +    [   (       D3..AD)     Page Group                            (S)   ]
End Document (EDT, D3A9A8)
```

Architecture Note: The retired MO:DCA IS/2 interchange set allows an optional Document Index, bounded by BDI/EDI, to occur once directly following BDT. The content of the document index structure is defined in the IS/2 definition; see "Retired Functions" on page 557. This structure is still allowed in products that support MO:DCA IS/2.

Figure 24 on page 77 shows the general form of a MO:DCA document. MO:DCA interchange sets may specify a more restrictive document structure; however, such a structure must be a proper subset of the general form.

Notes:

1. At the beginning of a document, if a document does not invoke a medium map by name, and if it does not include an internal medium map, the first medium map in the selected form map controls the printing. The Media Eject Control (X'45') triplet, which may be included on the Begin Medium Map structured field to specify a partition eject, is ignored when it occurs on the medium map that is activated at the beginning of a document regardless of whether this medium map is explicitly invoked or implicitly invoked as the default. As a result, a sheet-eject is processed when the first medium map in a document is selected to control printing. Note that in Cut-sheet Emulation mode (CSE), this means an eject to the front side of a new sheetlet.
2. If a medium map is included internal (inline) to the document, it is activated by immediately following it with an IMM that explicitly invokes it; otherwise, the internal medium map is ignored. An IMM that does not follow an internal medium map may not invoke an internal medium map elsewhere in the document and is assumed to reference a medium map in the processing system's form map.
3. A page that is included with an IPG in document state may be indexed using an offset to the location of the IPG in the document.
4. A Resource Environment Group (REG) maps *some* of the resources required to present the pages that follow. Resources mapped in a REG must still be mapped in the AEG for the page that uses the resources. The scope of the resource mapping in the REG is from the point where it occurs up to the next REG, which is a complete replacement for the current REG, or the end of the document, whichever occurs first.

5. Metadata is optional. If metadata is present, one or more metadata objects (MO) may be included within the document structure. The MO Type object container(s) must directly follow the Begin Document (BDT), otherwise they are ignored. When including multiple MOs the series of object containers must be contiguous and, as a whole, constitute the metadata for the document. The MO:DCA architecture places no restriction on or significance to the sequence or order of included metadata. If an object container is specified in document state, the ObjClass parameter on the mandatory Object Classification (X'10') triplet must be set to X'50'—Metadata; otherwise, the object container is ignored.

Application Notes:

1. Internal (inline) medium maps are not supported by all AFP print servers; consult your product documentation.
2. The use of internal medium maps may significantly decrease document processing throughput, especially if the internal Medium Map specifies conditional media ejects using the Media Eject Control (X'45') triplet.
3. For optimum performance a REG is normally placed at the beginning of the document before the first page.
4. When encountering a misplaced MO, some MO:DCA receivers ignore or discard it. Some MO:DCA receivers also issue a message when this occurs.

Document Index

A document index is an object that provides functions for indexing the document based on document structure and on application-defined document tags. A document index is delimited by Begin Document Index and End Document Index structured fields.

A document index is used for informational purposes only. Parameters in a document index are descriptive in nature and do not provide presentation specifications.

Figure 25. Document Index Structure

```
Begin Document Index  (BDI, D3A8A7)
  +      (IEL,   D3B2A7)   Index Element                          (S)
  +   [  (LLE,   D3B490)   Link Logical Element                   (S)   ]
  +   [  (TLE,   D3A090)   Tag Logical Element                    (S)   ]
End Document Index  (EDI, D3A9A7)
```

Resource Environment Group

A resource environment group (REG) is associated with a document or a group of pages in a document. It is contained in the document's begin-end envelope in the data stream. The REG is used to identify complex resources, such as high-resolution color images, that need to be downloaded to the presentation device before the pages that follow are processed. The scope of a REG is the pages that follow, up to the next REG, which is a complete replacement for the current REG, or the end of the document, whichever occurs first. The mapping of resources in a REG is optional. Resources mapped in a REG must still be mapped in the AEG for the page that uses the resources. When more than one REG is specified in a document, each REG is a complete replacement for the preceding REG.

Figure 26. Resource Environment Group Structure

```
Begin Resource Environment Group  (BSG, D3A8D9)
      [  (MDR,   D3ABC3)   Map Data Resource                     (S)   ]
      [  (MPO,   D3ABD8)   Map Page Overlay                      (S)   ]
      [  (PPO,   D3ADC3)   Preprocess Presentation Object        (S)   ]
```

```
End Resource Environment Group   (ESG, D3A9D9)
```

Notes:

1. When an MDR is specified in a REG, the FQN type X'BE' triplet, which specifies the internal identifier used to reference the resource being mapped, is ignored. An example of an internal identifier is the local ID used to reference a data-object font in a PTOCA object. The assignment of internal identifier to resource name is made when the MDR is specified in the environment group of the object that uses the resource. For example, in the case of a data-object font used in a PTOCA object, the internal identifier of the font is mapped to the font name in the AEG of the page. If the data-object font is used in an AFP GOCA object or a BCOCA object, the internal identifier of the font is mapped to the resource name in the OEG of the object.
2. There is no correlation between MPO Resource Local IDs (LIDs) in an AEG and MPO LIDs in an REG. For example, an MPO in an AEG can use LID x, and an MPO for the same overlay in a REG can use LID x or a different LID. The only restriction is that regardless of where the MPO is specified, it is not permissible *within a given MPO* to map the same LID to more than one overlay.
3. An MDR reference to a specific resource may only be specified once in the REG.
4. Any object specified for preprocessing in a PPO must first be mapped in an MDR or an MPO in the same REG. This includes secondary resources that are specified in the PPO and that are required by the object to be preprocessed.
5. When an MDR in the REG is used to map a Color Management Resource (CMR), the processing mode, as specified in the mandatory CMR Descriptor (X'91') triplet, is downloaded along with the CMR and is used by the presentation device. However, the CMR scope, which is also specified in the CMR Descriptor triplet, is ignored and must be established in an ensuing mapping of the same CMR with the same processing mode at the page/sheet group (Medium Map) level, page/overlay level, or data object level.

Application Note: For optimum performance a REG is normally placed at the beginning of the document before the first page.

Page

A page is an object that contains the data objects to be presented. A page establishes its own environment and is independent of any other page in the document. A page is delimited by Begin Page and End Page structured fields. A MO:DCA page object has the following syntax structure:

Figure 27. Page Structure

```
Begin Page  (BPG, D3A8AF)
           (      D3..C9)     Active Environment Group
  +   [   (IOB,  D3AFC3)     Include Object                          (S)   ]
  +   [   (IPG,  D3AFAF)     Include Page                                  ]
  +   [   (IPO,  D3AFD8)     Include Page Overlay                    (S)   ]
  +   [   (IPS,  D3AF5F)     Include Page Segment                    (S)   ]
  +   [   (LLE,  D3B490)     Link Logical Element                    (S)   ]
  +   [   (TLE,  D3A090)     Tag Logical Element                     (S)   ]
  +   [   (      D3..EB)     Bar Code Object                         (S)   ]
  +   [   (      D3..BB)     Graphics Object                         (S)   ]
  +   [   (      D3..FB)     Image Object                            (S)   ]
  +   [   (      D3..92)     Object Container (see Note 13 for MO)   (S)   ]
  +   [   (      D3..9B)     Presentation Text Object                (S)   ]
End Page  (EPG, D3A9AF)
```

```
Active Environment Group (AEG)
Begin Active Environment Group   (BAG, D3A8C9)
```

```
    [  (PEC,  D3A7A8)    Presentation Environment Control              ]
    [  (MCF,  D3AB8A)    Map Coded Font                    F2    (S)   ]
    [  (MDR,  D3ABC3)    Map Data Resource                       (S)   ]
    [  (MPG,  D3ABAF)    Map Page                                      ]
    [  (MPO,  D3ABD8)    Map Page Overlay                        (S)   ]
    [  (MPS,  D3B15F)    Map Page Segment                        (S)   ]
       (PGD,  D3A6AF)    Page Descriptor
    [  (OBD,  D3A66B)    Object Area Descriptor                        ]
    [  (OBP,  D3AC6B)    Object Area Position                          ]
       (PTD,  D3B19B)    Presentation Text Data Descriptor  F2
End Active Environment Group  (EAG, D3A9C9)
```

Architecture Note: The retired MO:DCA IS/2 interchange set allowed an optional Resource Group, bounded by BRG/ERG, to occur once directly following BPG. The content of the resource group structure is defined in the IS/2 definition; see "Retired Functions" on page 557. This structure is still allowed in products that support MO:DCA IS/2.

Figure 27 on page 79 shows the general form of a MO:DCA page object. MO:DCA interchange sets may specify a more restrictive page structure; however, such a structure must be a proper subset of the general form.

Notes:

1. The presentation text object in MO:DCA documents can have two structures that differ by the presence or absence of an optional Object Environment Group (OEG). When the presentation text object does not contain an OEG, some of the presentation parameters normally specified in the OEG are specified in the Active Environment Group (AEG) of the containing page.
2. The OBD and OBP structured fields in the AEG for the page are only used for presentation text objects that do not contain an Object Environment Group (OEG), in which case they are optional. MO:DCA interchange sets require that the OBD specify measurement units and extents that match those specified for the page in the PGD. If the OBD is omitted, the architected default is to use the measurement units and extents specified in the PGD for the text object area measurement units and object area extents. MO:DCA interchange sets also require that the OBP specifies zeros for the object area origin and the object content origin and that it specifies a 0° object area rotation. If the OBP is omitted, the architected default is to set the object area origin and the object content origin to zeros, and the object area rotation to 0°.
3. The PTD structured field in the AEG for the page is only used when the page contains one or more presentation text objects that do not contain an Object Environment Group (OEG), in which case it is mandatory. When the PTD is included in the AEG for a page, some AFP print servers require that the measurement units in the PTD match the measurement units in the Page Descriptor (PGD). It is therefore strongly recommended that whenever the PTD is included in the AEG, the same measurement units are specified in both the PTD and PGD.
4. If a presentation text object that does not contain an OEG specifies a font other than the presentation environment default font, the font local ID must be mapped to a font global name with an MCF or MDR structured field in the AEG for the page. This mapping must be unique, that is, the font local ID can only be mapped to one font in the AEG. However different font local IDs can be mapped to the same font. For rules on mapping local IDs (LIDs) to resource identifiers such as font global names, see "Environment Hierarchies" on page 25.
5. If a presentation text object contains an OEG, each MCF or MDR that maps a font in the text object's OEG must have a corresponding MCF or MDR mapping the same font in the AEG for that page. Local ID X'FE' may be used for such font mappings in the AEG to distinguish them from font mappings for presentation text objects without OEG.

6. If a presentation object container is included directly in a page, it must specify, at minimum, BOC/EOC, an OEG with OBD, OBP, CDD, and the object data must be carried in OCDs. If the object container data object is metadata (MO) then the object container must follow the Active Environment Group (AEG).
7. When an IPG structured field occurs in a page, the bit map for the referenced page is merged with the data defined for the current page. The referenced page must be mapped in the AEG for the current page and must not contain another IPG. Only a single IPG may occur within a page.
8. When an IPG occurs in a page, the included page becomes a part of the containing page, therefore only the containing page may be indexed using an offset to its location in the document.
9. For purposes of print server resource management, each MDR that is specified in an object container OEG must have a corresponding MDR mapping the same resource in the AEG for that page. Note that an FQN type X'BE' triplet, if specified on the MDR in the OEG, is not factored up to the AEG, unless the MDR maps a data-object font.
10. An MDR reference to a specific resource may only be specified once in the AEG. Note that an MDR reference to a specific CMR resource done using an FQN type X'DE' triplet and an MDR reference to the same CMR resource done using an FQN type X'EE' triplet are considered separate and can both be specified in the same AEG.
11. The retired MO:DCA IS/2 interchange set supports a resource group following BPG, called an *internal* resource group or a *page level* resource group, see "Retired Interchange Set" on page 575.
12. The PEC structured field in the AEG for the page is only used to specify the rendering intent for the page using the Rendering Intent triplet; all other PEC triplets are ignored.
13. Metadata is optional. If metadata is present, one or more metadata objects (MO) may be included within the page structure. The MO Type object container(s) must directly follow the Active Environment Group (AEG), otherwise they are ignored. When including multiple MOs the series of MO Type object containers must be contiguous and, as a whole, constitute the metadata for the document. The MO:DCA architecture places no restriction on or significance to the sequence or order of included metadata.

MO:DCA data streams support IM image objects on a page for migration purposes. One or more IM image objects may be included on a page in the same manner that IO image objects are included on a page. Both forms of image may coexist on the same page. For a definition of the IM image object, see Appendix C.

MO:DCA data streams support the Map Coded Font format-1 (MCF-1) structured field in the AEG for migration purposes. An MCF-1 may appear in place of an MCF format-2 (MCF-2) structured field. If both MCF-1 and MCF-2 structured fields are in the same environment group, the MCF-1 structured fields must precede the MCF-2 structured fields. For a definition of the MCF-1 structured field, see Appendix C.

Application Notes:

1. For purposes of print server resource management, each MCF or MDR that maps a font in a data object OEG must have a corresponding MCF or MDR mapping the same font in the AEG for that page. The local ID used in the page AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.
2. For purposes of print server resource management, each overlay included on a page with an IPO must first be mapped to a local ID with an MPO in the AEG for that page.
3. A page segment included on a page with an IPS may optionally be mapped with an MPS in the AEG for that page. If such a mapping exists, the page segment is sent to the presentation device as a separate object and is called a *hard* page segment. If such a mapping does not exist, the page segment is sent to the presentation device as part of the page and is called a *soft* page segment.
4. When encountering a misplaced MO, some MO:DCA receivers ignore or discard it. Some MO:DCA receivers also issue a message when this occurs.

Page Group

A page group object is a named set of sequential pages in a document. All pages in a page group inherit the attributes and processing characteristics that are assigned to the page group. A page group is delimited by Begin Named Page Group and End Named Page Group structured fields.

Figure 28. Page Group Structure

```
Begin Named Page Group  (BNG, D3A8AD)
       [   (TLE,   D3A090)      Tag Logical Element                 (S)   ]
       [   (       D3..92)      Object Container (MO Type only)     (S)   ]
   +   [   (IMM,   D3ABCC)      Invoke Medium Map                   (S)   ]
   +   [   (IPG,   D3AFAF)      Include Page                        (S)   ]
   +   [   (LLE,   D3B490)      Link Logical Element                (S)   ]
   +   [   (       D3..CC)      Medium Map                          (S)   ]
   +   [   (       D3..D9)      Resource Environment Group          (S)   ]
   +   [   (       D3..AF)      Page                                (S)   ]
   +   [   (       D3..AD)      Page Group                          (S)   ]
End Named Page Group  (ENG, D3A9AD)
```

Figure 28 on page 82 shows the general form of a MO:DCA page group object. MO:DCA interchange sets may specify a more restrictive page group structure; however, such a structure must be a proper subset of the general form.

Notes:

1. If a medium map is included internal (inline) to the document, it is activated by immediately following it with an IMM that explicitly invokes it, otherwise the internal medium map is ignored. An IMM that does not follow an internal medium map may not invoke an internal medium map elsewhere in the document and is assumed to reference a medium map in the processing system's form map.
2. A page that is included with an IPG in page-group state may be indexed using an offset to the location of the IPG in the document.
3. A resource environment group (REG) maps *some* of the resources required to present the pages that follow. Resources mapped in a REG must still be mapped in the AEG for the page that uses the resources. The scope of the resource mapping in the REG is from the point where it occurs up to the next REG, which is a complete replacement for the current REG, or the end of the document, whichever occurs first.
4. If the Keep Group Together (X'9D') triplet is specified on a BNG, that page group is subject to special nesting rules. See the "Begin Named Page Group (BNG)" on page 140 Semantics section for details.
5. Metadata is optional. If metadata is present, one or more metadata objects (MO) may be included within the page group structure. The MO Type object container(s) must directly follow the one or more optional Tag Logical Elements (TLE), otherwise they are ignored. When including multiple MOs the series of MO Type object containers must be contiguous and, as a whole, constitute the metadata for the page group. The MO:DCA architecture places no restriction on or significance to the sequence or order of included metadata. If an object container is specified in page group state (other than part of an included page), the ObjClass parameter on the mandatory Object Classification (X'10') triplet must be set to X'50'—Metadata; otherwise, the object container is ignored.

Application Notes:

1. Internal (inline) medium maps are not supported by all AFP print servers; consult your product documentation.
2. The use of internal medium maps may significantly decrease document processing throughput, especially if the internal Medium Map specifies conditional media ejects using the Media Eject Control (X'45') triplet.

3. Page groups are often processed in standalone fashion; that is, they are indexed, retrieved, and presented outside the context of the containing document. While the pages in the group are independent of each other and of any other pages in the document, their formatting on media depends on when the last medium map was invoked and on how many pages precede the BNG since this invocation. To make the media formatting of page groups self-contained, a Medium Map should be invoked at the beginning of the page group between the Begin Named Group (BNG) structured field and the first Begin Page (BPG) structured field. If this is not done, the presentation system may need to “play back” all pages between the invocation of the active medium map and the BNG to determine media formatting such as sheet-side and partition number for the first page in the group.

   It is therefore *strongly* recommended that in environments where standalone page group processing is required or anticipated, page groups are built with an Invoke Medium Map (IMM) structured field specified after the BNG and before the first BPG.

   A newer method to specify how a page or page group should be formatted involves use of the Page Position Information (X'81') triplet. This triplet may be specified on a BPG and indicates the repeating group in the PGP structured field in the active medium map that should be used to format the page.
4. For optimum performance a REG is normally placed at the beginning of the document before the first page.
5. Some AFP applications that generate page groups will support a user option that ensures that an IMM is specified after BNG and before the first BPG, and some AFP archive servers will expect an IMM there and may not present the page group correctly if none is found. However, note that this may cause the complete document to print differently.
6. When encountering a misplaced MO, some MO:DCA receivers ignore or discard it. Some MO:DCA receivers also issue a message when this occurs.

Resource Objects

Objects are considered to be resource objects when they are explicitly referenced from the document instead of being directly included in the document. Resource objects may reside in external resource libraries, or in print file level resource groups. Note that data objects such as IOCA image objects and object containers become resource objects when included with an Include Object (IOB) structured field.

Architecture Note: Any presentation object, other than an overlay, when processed as a resource, must not contain font mappings defined with Map Coded Font (MCF) structured fields in the object environment group. A presentation object is processed as a resource when it is mapped using a Map structured field and included using an Include structured field.

Font Objects

A font is a collection of graphic characters with the same type family, typeface, and size. Fonts are referenced by MO:DCA documents for presenting text.

Font Object Content Architecture (FOCA) Fonts

The Font Object Content Architecture (FOCA) defines a font format that is supported in MO:DCA documents. Such fonts are referenced in the data stream using an MCF structured field. This font format defines three types of font objects:
- Coded font objects
- Code page objects
- Font character set objects

Each object is bounded by begin and end structured fields that are registered as private structured fields in the MO:DCA architecture. The content of each object is carried in structured fields that are also registered as private structured fields in the MO:DCA architecture. For a description of these objects and their structured fields, see the *Font Object Content Architecture Reference*.

TrueType/OpenType Fonts

TrueType and OpenType fonts are non-FOCA fonts, also called data-object fonts, that are supported in MO:DCA documents. They are referenced in the data stream using an MDR structured field. They can be installed in a resource library in their native, unaltered format, or they can be carried in a print file level resource group in an object container. Collections of TrueType or OpenType fonts, called TrueType Collections, are also supported.

The TrueType font format is based on scalable outline technology with flexible hinting. Mathematically, TrueType shapes are based on quadratic curves; this is in contrast to Adobe® Type 1 outlines which are based on cubic curves. TrueType is an open font standard and is widely published. The technology is described in the following documents available from the Microsoft® and Apple® web sites:

- *TrueType Font Files Technical Specification* (Microsoft Corporation)
- *TrueType Reference Manual* (Apple Computer, Inc.)

The OpenType font format is an extension of the TrueType font format that allows better support for international character sets and broader multi-platform support. OpenType defines tables that can be used to carry the formatting information needed to fully support Unicode. Additionally, this format allows either TrueType or Adobe Type 1 outlines to be packaged as an OpenType font. The OpenType font format was developed jointly by the Adobe and Microsoft Corporations, and it is described in the *OpenType Specification*, which is available on the Microsoft web site.

Overlay Objects

An overlay is a MO:DCA resource object. It may be stored in an external resource library or it may be carried in a resource group. An overlay is similar to a page in that it defines its own environment and carries the same data objects.

Figure 29. Overlay Structure

```
Begin Overlay  (BMO, D3A8DF)
         (       D3..C9)     Active Environment Group
  +   [  (LLE,   D3B490)     Link Logical Element                    (S)   ]
  +   [  (TLE,   D3A090)     Tag Logical Element                     (S)   ]
  +   [  (       D3..EB)     Bar Code Object                         (S)   ]
  +   [  (       D3..BB)     Graphics Object                         (S)   ]
  +   [  (       D3..FB)     Image Object                            (S)   ]
  +   [  (       D3..9B)     Presentation Text Object                (S)   ]
  +   [  (       D3..92)     Object Container (see Note 10 for MO)   (S)   ]
  +   [  (IOB,   D3AFC3)     Include Object                          (S)   ]
  +   [  (IPS,   D3AF5F)     Include Page Segment                    (S)   ]
End Overlay  (EMO, D3A9DF)

Active Environment Group (AEG)
Begin Active Environment Group  (BAG, D3A8C9)
      [  (PEC,   D3A7A8)     Presentation Environment Control              ]
      [  (MCF,   D3AB8A)     Map Coded Font                     F2   (S)   ]
      [  (MDR,   D3ABC3)     Map Data Resource                       (S)   ]
      [  (MPS,   D3B15F)     Map Page Segment                        (S)   ]
         (PGD,   D3A6AF)     Page Descriptor
      [  (OBD,   D3A66B)     Object Area Descriptor                        ]
      [  (OBP,   D3AC6B)     Object Area Position                          ]
         (PTD,   D3B19B)     Presentation Text Data Descriptor  F2
End Active Environment Group  (EAG, D3A9C9)
```

Figure 29 on page 85 shows the general form of a MO:DCA overlay object. MO:DCA interchange sets may specify a more restrictive overlay structure; however, such a structure must be a proper subset of the general form.

Notes:

1. The presentation text object in MO:DCA documents can have two structures that differ by the presence or absence of an optional Object Environment Group (OEG). When the presentation text object does not contain an OEG, some of the presentation parameters normally specified in the OEG are specified in the Active Environment Group (AEG) of the containing overlay.

2. The OBD and OBP structured fields in the AEG for the overlay are only used for presentation text objects that do not contain an Object Environment Group (OEG), in which case they are optional. MO:DCA interchange sets require that the OBD specify measurement units and extents that match those specified for the overlay in the PGD. If the OBD is omitted, the architected default is to use the measurement units and extents specified in the PGD for the text object area measurement units and object area extents. MO:DCA interchange sets also require that the OBP specifies zeros for the object area origin and the object content origin and that it specifies a 0° object area rotation. If the OBP is omitted, the architected default is to set the object area origin and the object content origin to zeros, and the object area rotation to 0°.

3. The PTD structured field in the AEG for the overlay is only used when the overlay contains one or more presentation text objects that do not contain an Object Environment Group (OEG), in which case it is mandatory. When the PTD is included in the AEG for an overlay, some AFP print servers require that the

measurement units in the PTD match the measurement units in the Page Descriptor (PGD). It is therefore strongly recommended that whenever the PTD is included in the AEG, the same measurement units are specified in both the PTD and PGD.

4. If a presentation text object that does not contain an OEG specifies a font other than the presentation environment default font, the font local ID must be mapped to a font global name with an MCF or MDR structured field in the AEG for the overlay. This mapping must be unique, that is, the font local ID can only be mapped to one font in the AEG. However different font local IDs can be mapped to the same font. For rules on mapping local IDs (LIDs) to resource identifiers such as font global names, see "Environment Hierarchies" on page 25.
5. If a presentation text object contains an OEG, each MCF or MDR that maps a font in the text object's OEG must have a corresponding MCF or MDR mapping the same font in the AEG for that overlay. Local ID X'FE' may be used for such font mappings in the AEG to distinguish them from font mappings for presentation text objects without OEG.
6. If a presentation object container is included directly in an overlay, it must specify, at minimum, BOC/EOC, an OEG with OBD, OBP, CDD, and the object data must be carried in OCDs. See "Object Containers" on page 114 for a complete definition of the object container structure. If the object container data object is metadata (MO) then the object container must follow the Active Environment Group (AEG).
7. For purposes of print server resource management, each MDR that is specified in an object container OEG must have a corresponding MDR mapping the same resource in the AEG for that overlay. Note that an FQN type X'BE' triplet, if specified on the MDR in the OEG, is not factored up to the AEG, unless the MDR maps a data-object font.
8. An MDR reference to a specific resource may only be specified once in the AEG. Note that an MDR reference to a specific CMR resource done using an FQN type X'DE' triplet and an MDR reference to the same CMR resource done using an FQN type X'EE' triplet are considered separate and can both be specified in the same AEG.
9. The PEC structured field in the AEG for the overlay is only used to specify the rendering intent for the overlay using the Rendering Intent triplet; all other PEC triplets are ignored.
10. Metadata is optional. If metadata is present, one or more metadata objects (MO) may be included within the overlay structure. The MO Type object container(s) must directly follow the Active Environment Group (AEG), otherwise they are ignored. When including multiple MOs the series of MO Type object containers must be contiguous and, as a whole, constitute the metadata for the overlay. MO:DCA places no restriction on or significance to the sequence or order of included metadata.

MO:DCA data streams support IM image objects on an overlay for migration purposes. One or more IM image objects may be included on an overlay in the same manner that IO image objects are included on an overlay. Both forms of image may coexist on the same overlay. For a definition of the IM image object, see Appendix C, "MO:DCA Migration Functions", on page 553.

MO:DCA data streams support the Map Coded Font format-1 (MCF-1) structured field in the AEG for migration purposes. An MCF-1 may appear in place of an MCF format-2 (MCF-2) structured field. If both MCF-1 and MCF-2 structured fields are in the same environment group, the MCF-1 structured fields must precede the MCF-2 structured fields. For a definition of the MCF-1 structured field, see Appendix C, "MO:DCA Migration Functions", on page 553.

Application Notes:

1. For purposes of print server resource management, each MCF or MDR that maps a font in a data object OEG must have a corresponding MCF or MDR mapping the same font in the AEG for that overlay. The local ID used in the overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.
2. A page segment included on an overlay with an IPS may optionally be mapped with an MPS in the AEG for that overlay. If such a mapping exists, the page segment is sent to the presentation device as a separate

object and is called a *hard* page segment. If such a mapping does not exist, the page segment is sent to the presentation device as part of the overlay and is called a *soft* page segment.

3. When encountering a misplaced MO, some MO:DCA receivers ignore or discard it. Some MO:DCA receivers also issue a message when this occurs.

Page Segment Objects

A page segment is a MO:DCA resource object. It may be stored in an external resource library or it may be carried in a resource group. Page segments contain any combination of the following data objects:
- Image objects in IOCA format
- Graphics objects in GOCA format
- Bar code objects in BCOCA format

A page segment does not define a presentation space and has no coordinate system, therefore objects cannot be positioned relative to each other within a page segment. Instead, all objects in a page segment must specify an object area offset of zero. Objects within the page segment may be positioned on the including page or overlay at a reference point specified by the IPS structured field, or they may be positioned at the including page or overlay origin. This positioning is specified by the Reference Coordinate System parameter in the object's Object Area Position (OBP) structured field.

Application Note: A page segment included on a page or overlay with an IPS may optionally be mapped with an MPS in the AEG for that page or overlay. If such a mapping exists, the page segment is sent to the presentation device as a separate object and is called a *hard* page segment. If such a mapping does not exist, the page segment is sent to the presentation device as part of the page or overlay and is called a *soft* page segment.

A page segment resource object does not contain an active environment group and therefore does not define its own environment. Instead, the page segment assumes the environment definition of the including page or overlay.

Figure 30. Page Segment Structure

```
Begin Page Segment  (BPS, D3A85F)
  +   [  (      D3..EB)     Bar Code Object                        (S)   ]
  +   [  (      D3..BB)     Graphics Object                        (S)   ]
  +   [  (      D3..FB)     Image Object                           (S)   ]
End Page Segment  (EPS, D3A95F)
```

MO:DCA supports the AFP Page Segment object for migration purposes. For a definition of this object, see "AFP Page Segment" on page 594.

Application Note: For *hard* page segments included via IPS, the OEGs for all objects in the page segment must not contain any secondary resource mappings using MCF or MDR structured fields; such mappings are ignored. For page segments included via IOB, which are always processed as *soft* page segments, the OEGs for all objects in the page segment can only contain secondary resource mappings using MCFs to map FOCA fonts and MDRs to map data-object fonts (TrueType/OpenType fonts); all other secondary resource mappings are ignored.

Resource Groups

A resource group is an object that contains a collection of resource objects, including:
- Overlays
- Page segments
- Fonts

- Form maps
- Referenced data objects
- Object containers
- Color Mapping Table (CMT)

A resource group may be located in the print file, in which case it is called an *external or print file level* resource group. Resources that are carried in a resource group are said to be *inline*. A resource group is delimited by Begin Resource Group and End Resource Group structured fields.

Architecture Note: The retired MO:DCA IS/2 interchange set allowed an optional Resource Group, bounded by BRG/ERG, to occur once directly following BPG. The content of the resource group structure is defined in the IS/2 definition; see "Retired Functions" on page 557. This structure is still allowed in products that support MO:DCA IS/2.

The scope of a resource group is the object or component that contains the resource group. That is, the resources within the resource group are available for use by the presentation system only for the duration of the containing object or component. For example, when a resource group is specified as part of a print file, that is, when it is specified as an external resource group, the resources within the group are available only for the duration of the print file. Once the last document in the print file has been processed, these resources are no longer available to the presentation system for use with another print file.

The general search order for MO:DCA resources is as follows:
1. Print file level resource group
2. External resource libraries

Within a resource group, resource objects of the same type must have unique identifiers; if they do not, the treatment of such resources is presentation-system-dependent.

Figure 31. External (Print file level) Resource Group Structure

```
Begin Resource Group  (BRG, D3A8C6)
  +   [  (       D3..DF)      Overlay                                (S)   ]
  +   [  (       D3..5F)      Page Segment                           (S)   ]
  +   [  (       D3..CD)      Form Map                               (S)   ]
  +   [  (       D3..EB)      Bar Code Object                        (S)   ]
  +   [  (       D3..BB)      Graphics Object                        (S)   ]
  +   [  (       D3..FB)      Image Object                           (S)   ]
  +   [  (       D3..92)      Object Container                       (S)   ]
  +   [  (       D3..9B)      Presentation Text Object               (S)   ]
      [  (       D3..A8)      Document                               (S)   ]
End Resource Group  (ERG, D3A9C6)
```

Notes:

1. In AFP environments, resources carried in print file level (external) resource groups are called *inline* resources.
2. The retired MO:DCA IS/2 interchange set allowed an optional Resource Group, bounded by BRG/ERG, to occur once directly following BPG. The content of the resource group structure is defined in the IS/2 definition; see "Retired Functions" on page 557. This structure is still allowed in products that support MO:DCA IS/2.
3. If an object container is included in a resource group, it must at a minimum be bounded by a BOC/EOC pair, an Object Classification (X'10') triplet must be specified on the BOC with a registered object-type identifier (encoded object-type OID) for the object data, and the data must be carried in OCDs.
4. Within a resource group, resource objects of the same type must have unique identifiers.

5. Documents are carried as resource objects in a resource group so that pages in these documents can be processed and saved in the presentation device for fast subsequent retrieval using Include Page (IPG) structured fields.

6. The only presentation text objects supported in this structure are those that include an Object Environment Group (PTOCA with OEG).

In AFP environments, each resource object in an external resource group must be wrapped with a Begin Resource (BRS) and End Resource (ERS) envelope as shown in Figure 32 on page 89.

Figure 32. BRS/ERS Envelope for Resources in External (Print File Level) Resource Group

```
[  (BRS,  D3A8CE)     Begin Resource                              ]
   (      D3..xx)     Resource Object
[  (ERS,  D3A9CE)     End Resource                                ]
```

The BRS and ERS structured fields must be specified as a pair, that is, one may not be specified without the other.

Application Note: In AFP environments, the following objects may also be included in print file level (external) resource groups:

- Page Maps (also called Page Definitions or PageDefs)
- FOCA font objects
  - Coded fonts
  - Code pages
  - Font character sets

For a description of Page Maps, see the *Advanced Function Presentation: Programming Guide and Line Data Reference*. For a description of FOCA font objects, see the *Font Object Content Architecture Reference*

External Resource Naming Conventions

MO:DCA objects can be named using one of the following two formats:

- *Token name.* This name is specified using a fixed-length 8-byte parameter on Begin, Invoke, Map, and Include structured fields.
- *Fully qualified name.* This name can be up to 250 bytes long and is specified using the Fully Qualified Name (FQN) X'02' triplet on Begin, Map, and Include structured fields, as well as on object-processing structured fields. For names, the FQNFmt parameter on this triplet is set to X'00' to specify a character string format, and the FQNType parameter specifies how the name is used. When a fully qualified name is specified using FQNType X'01' on a Begin structured field, it overrides any token name that may have been specified on the structured field. The length of the name is determined by the length of the triplet, and all bytes in the triplet are considered to be part of the name.

MO:DCA object names are encoded using the code page and character set specified in a Coded Graphic Character Set Global ID X'01' triplet, except in those cases where the name defines a fixed encoding. Examples of such cases are the Code Page, Font Character Set, and Coded Font names carried in the FQN type X'85', X'86', and X'8E' triplets, respectively, which define a fixed EBCDIC encoding. The X'01' triplet can specify the encoding in two forms; use of the Coded Character Set Identifier (CCSID) form is recommended. For a definition of the X'01' triplet and its scope in the document hierarchy, see "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348. The X'01' triplet is mandatory on the Begin Document (BDT) structured field and may be specified on most MO:DCA structured fields that contain character data such as an object name. Careful specification of code page and character set is essential for interchange since the system defaults for code page and character set may vary from one system environment to another.

Application Note: In AFP environments, print servers treat an external object name—other than a TrueType or OpenType full font name—as a resource library member name and attempt to process a resource library member with the same name. This means that the external names are subject to the system-imposed file naming rules.

To ensure portability across all AFP platforms, external object names other than TrueType or OpenType full font names must be composed according to the following conventions:

- Names consist only of the following characters: A-Z, 0-9, $, #, @. When the object name is specified using the fixed-length 8-byte token name parameter, different systems impose additional constraints:
  - Systems that use fixed 8-byte file names require the complete 8-byte token name parameter, even if padded with space (X'40' in the EBCDIC encoding) or null (X'00') characters, match the name of the resource, whether the resource is located in an inline resource group or a resource library.
  - Systems that can use fewer than 8-byte resource names may require padding bytes be stripped from the 8-byte token name field. Some systems expect the space character to be used for padding; other systems may also accept the null code point for padding.
- To ensure portability across older versions of print servers that do not support encoding definitions in the X'01' triplet, names use only the recommended characters and are encoded in EBCDIC using code page 500 and a character set that includes the above-mentioned characters, such as character set 697. With this encoding, the code points for the characters are:
  A–I (code points X'C1'–X'C9')
  J–R (code points X'D1'–X'D9')
  S–Z (code points X'E2'–X'E9')
  0–9 (code points X'F0'–X'F9')
  $, #, and @ (code points X'5B', X'7B', and X'7C' respectively)
  Note that such older print servers normally assume this EBCDIC encoding as the default encoding for the document. This EBCDIC encoding can be identified with CCSID 500, which represents the combination of code page 500 and character set 697.

TrueType and OpenType full font names specified in the MDR structured field are not restricted to these characters and may be encoded as required by the AFP-generating application. However, since these names are used to search inline font containers and Resource Access Tables (RATs) which use a fixed UTF-16BE encoding for full font names, efficiency is gained if the full font names in the MDR are also encoded in UTF-16BE. This avoids an encoding conversion. The UTF-16BE encoding can be identified with CCSID 1200. This encoding needs to be specified with a X'01' triplet on the MDR that specifies the full font name.

Application Note: To optimize print performance, it is strongly recommended that the same encoding scheme be used for a resource reference wherever in a print file that resource reference is specified. That is, the encoding scheme used for the resource include, the resource map, and the resource wrapper should be the same. For TrueType/OpenType fonts, optimal performance can be achieved by using UTF-16BE as the encoding scheme.

Print Control Objects

Print control objects are resource objects that are used to control the presentation of pages on physical media, also known as forms or sheets, in a printer. There are two types of print control objects, *form maps*, also known as *form definitions* or *formdefs*, and *medium maps*, also known as *copy groups*.

Form Map

A form map is a print control resource object that consists of:

- An optional document environment group (DEG) that defines the print environment for the form map
- One or more medium map resource objects that are invokable on document and page boundaries and that specify a complete set of print controls. The name assigned to each medium map object is unique within the form map

A form map is selected for controlling print file presentation when the print request for the print file is generated.

The scope of a form map is a print file, and control for presentation starts with the first medium map in the form map. If the form map is associated with a print file that contains multiple documents, control for presentation is returned to the first medium map in the form map whenever a new document is encountered.

Figure 33. Form Map Structure

```
Begin Form Map  (BFM, D3A8CD)
       [  (      D3..C4)     Document Environment Group                 ]
       [  (      D3..92)     Object Container (MO Type only)        (S)  ]
          (      D3..CC)     Medium Map                             (S)
End Form Map  (EFM, D3A9CD)
```

Document Environment Group

The document environment group (DEG), when present, establishes the presentation environment for a form map resource object. This presentation environment consist of the following:

- A definition of the medium presentation space, including units of measure, size, and orientation
- The default position of the logical page on the medium presentation space
- A mapping of overlay local IDs, as specified in a medium map in the form map, to overlay names
- A mapping of text suppression local IDs, as specified in a medium map in the form map, to text suppression names
- A specification of the fidelity that is required for presentation
- A specification of finishing operations that are to be applied to media
- A specification of the rendering intent that is to be applied to the print file or to documents in the print file
- A specification of an appearance to be assumed by the presentation device for the processing of the print file
- A specification of Color Management Resources (CMRs) that are to be associated with the print file or with a document in the print file
- A specification of a setup name that is to be associated with the print file

If a parameter is specified in the DEG as well as in a medium map, the specification in the medium map takes precedence.

Note: When an internal (inline) medium map is used, structured fields which can be specified in the DEG and/or in a medium map, specifically the MDD, MMO, PEC, MDR, and PGP, must be specified in the internal medium map if they are to affect the pages/sheets processed using that medium map. If they are specified in the Document Environment Group (DEG), they do not apply to the pages/sheets processed using internal medium maps. Therefore if a PEC with the Device Appearance (X'97') triplet is not specified in the internal medium map, the device assumes its device default appearance, it does not inherit the appearance specified in the DEG. Similarly, if a PEC with Rendering Intent (X'95') triplet is not specified in the internal medium map, the rendering intent from the DEG is not inherited and does not apply to the pages/sheets processed with the inline medium map. Structured fields and triplets that can only be specified in the DEG and not in a medium map, such as the MSU, PFC, and Setup Name (X'9E') triplet in the PEC apply to the complete document or print file and are independent of internal medium maps and medium maps in the form map. The MFC structured field can be specified in the DEG and/or a Medium Map and defines its scope explicitly.

Figure 34. Document Environment Group Structure

```
Begin Document Environment Group  (BDG, D3A8C4)
      [  (PFC, D3B288)     Presentation Fidelity Control         (S)  ]
      [  (PEC, D3A7A8)     Presentation Environment Control      (S)  ]
      [  (MMO, D3B1DF)     Map Medium Overlay                         ]
      [  (MSU, D3ABEA)     Map Suppression                            ]
         (PGP, D3B1AF)     Page Position                     F2
         (MDD, D3A688)     Medium Descriptor
      [  (MFC, D3A088)     Medium Finishing Control              (S)  ]
      [  (MDR, D3ABC3)     Map Data Resource                     (S)  ]
End Document Environment Group  (EDG, D3A9C4)
```

Notes:

1. An MMO is required in either the document environment group or a medium map if an MMC structured field references a medium overlay. If specified in both, the structured field in the medium map takes precedence.
2. A PGP and an MDD is required in either the document environment group or a medium map. If specified in both, the structured field in the medium map takes precedence.
3. The DEG may contain one print file level MFC that applies to the complete print file, one document level MFC that applies to all documents in the print file, and one or more document level MFCs that apply to single documents in the print file. In the last case, only one MFC in the DEG may select a given document in the print file. If the DEG contains more than one print file level MFC, more than one document level MFC that applies to all documents, or more than one document level MFC that selects the same document, only the last-specified MFC having that particular scope is used.
4. The PEC may be specified with the Rendering Intent (X'95') triplet, the Device Appearance (X'97') triplet, or both. Only a single rendering intent and a single device appearance should be assigned to the print file or to a specific document in the print file; if more than one is assigned, only the last assignment is used and the rest are ignored. For example, if two PECs assign a rendering intent to the third document in the print file, the second rendering intent is used and the first is ignored.
5. The PEC may be specified with the Device Appearance (X'97') triplet in the DEG and in a medium map. If specified in both, the PEC with Device Appearance triplet in the medium map takes precedence.
6. The MDR may only be used in the DEG to reference Color Management Resources (CMRs); MDR repeating groups referencing any other resource are ignored.
7. Metadata is optional. If metadata is present, one or more metadata objects (MO) may be included within the form map structure. The MO Type object container(s) must directly follow the Document Environment Group (DEG), otherwise they are ignored. When including multiple MOs the series of MO Type object containers must be contiguous and, as a whole, constitute the metadata for the form map. While the scope of a form map is the print file, the scope of this embedded metadata is simply the form map, itself. MO:DCA places no restriction on or significance to the sequence or order of included metadata.

Application Note: When encountering a misplaced MO, some MO:DCA receivers ignore or discard it. Some MO:DCA receivers also issue a message when this occurs.

Medium Map

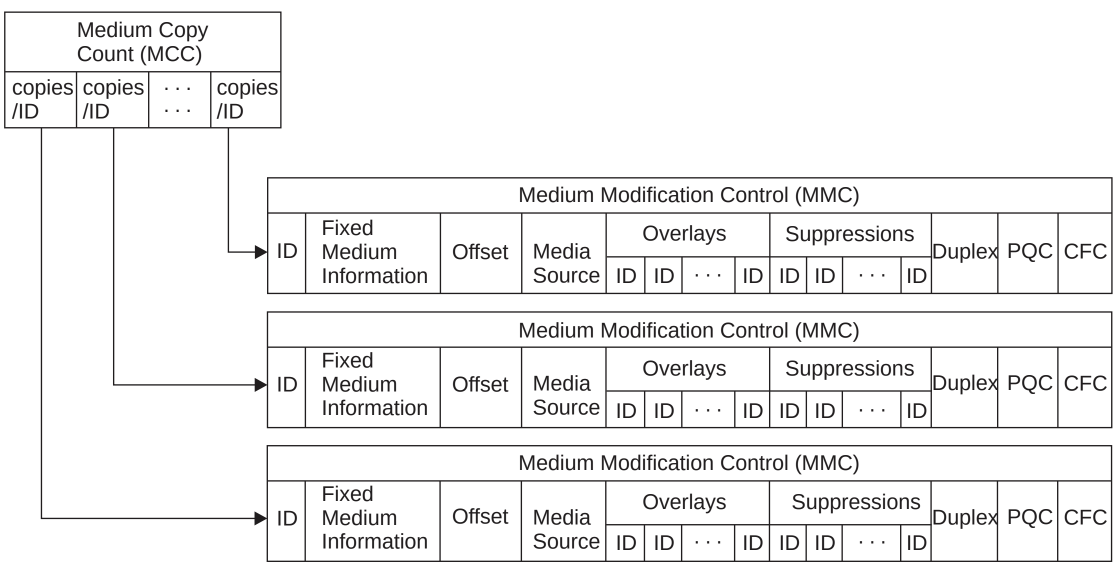
A medium map is a print control resource object that contains the print control parameters for presenting pages on a physical medium and for generating copies of the physical medium. Print control parameters may be grouped into two categories:

- Medium level controls
- Page level controls

Medium level controls are controls that affect the medium, such as the specification of medium overlays, medium size, medium orientation, medium copies, simplex or duplex, medium finishing, device appearance, rendering intent, and media source and destination selection. These controls are defined by the Map Medium Overlay (MMO), Medium Descriptor (MDD), Medium Copy Count (MCC), Medium Finishing Control (MFC), Map Media Type (MMT), Map Media Destination (MMD), Presentation Environment Control (PEC), and Medium Modification Control (MMC) structured fields. Page level controls are controls that affect the pages that are placed on the medium, such as the specification of page modifications, page position, and page orientation. These controls are defined by the Map Page Overlay (MPO), Page Position (PGP), and Page Modification Control (PMC) structured fields. When N-up partitioning is specified, the Media Eject Control (X'45') triplet may be included on the Begin Medium Map structured field to specify the type of media eject that is performed and the type of controls that are activated when the medium map is invoked.

A medium map contains one Medium Copy Count (MCC) structured field that generates a *copy group* for each sheet, therefore a medium map is also sometimes referred to as a copy group. Each MCC contains one or more *copy subgroups* that specify the number of copies of a sheet to be generated for the copy subgroup and the modifications to be applied to all copies in the copy subgroup. The modifications are specified by a Medium Modification Control (MMC) structured field. If the modifications for a copy subgroup specify duplexing, that copy subgroup and all successive copy subgroups are paired such that the first copy subgroup in the pair specifies the copy count as well as the modifications to be applied to the front side of each copy, and the second copy subgroup in the pair specifies the same copy count as well as an independent set of modifications to be applied to the back side of each copy. The pairing of copy subgroups continues as long as duplexing is specified. Note that with simplex printing, each copy subgroup builds the front sheet-side on all sheet copies generated by the copy subgroup. With duplex printing, the first and second copy subgroup in each pair of copy subgroups build front and back sheet-sides, respectively, on all sheet copies generated by the pair of copy subgroups. Figure 35 on page 93 illustrates the copy subgroup concept.

Figure 35. Copy Subgroups



Invocation of Medium Maps

- A medium map can be invoked by name on any page boundary in a document. This is done by including an IMM (Invoke Medium Map) structured field in the document data stream. Multiple IMMs may be used within a single document.
- A medium map can be directly included on any page boundary in the document data stream. Such a medium map is called an *internal* medium map. Multiple internal medium maps may be included in a document. An

internal medium map is activated by following it immediately with an IMM that invokes the internal medium map. If an internal medium map is not explicitly invoked with an immediately-following IMM, it is ignored. IMMs cannot be used to invoke internal medium maps elsewhere in the document. When an IMM does not follow and reference an internal medium map, it references an external medium map in the processing system's form map.

The name assigned to each internal medium map object is unique within the document.

Note: When an internal (inline) medium map is used, structured fields which can be specified in the DEG and/or in a medium map, specifically the MDD, MMO, PEC, MDR, and PGP, must be specified in the internal medium map if they are to affect the pages/sheets processed using that medium map. If they are specified in the Document Environment Group (DEG), they do not apply to the pages/sheets processed using internal medium maps. Therefore if a PEC with the Device Appearance (X'97') triplet is not specified in the internal medium map, the device assumes its device default appearance, it does not inherit the appearance specified in the DEG. Similarly, if a PEC with Rendering Intent (X'95') triplet is not specified in the internal medium map, the rendering intent from the DEG is not inherited and does not apply to the pages/sheets processed with the inline medium map. Structured fields and triplets that can only be specified in the DEG and not in a medium map, such as the MSU, PFC, and Setup Name (X'9E') triplet in the PEC apply to the complete document or print file and are independent of internal medium maps and medium maps in the form map. The MFC structured field can be specified in the DEG and/or a Medium Map and defines its scope explicitly.

Application Notes:

1. Internal (inline) medium maps are not supported by all AFP print servers; consult your product documentation.
2. The use of internal medium maps may significantly decrease document processing throughput, especially if the internal medium map specifies conditional media ejects using the Media Eject Control (X'45') triplet.
3. Internal medium maps are also sometimes referred to as *inline* medium maps. The term “internal” is preferred.

- If a parameter is specified both in the Document Environment Group (DEG) and in a medium map, the specification in the medium map takes precedence.
- A medium map remains in effect until another medium map is selected or the end of the document is reached.
- If a document does not invoke a medium map by name, and if it does not include an internal medium map, the first medium map in the selected form map controls the printing.
- When an invoked medium map is used to process medium overlays or variable page data, it causes a media eject to occur before any data is presented. If not explicitly specified otherwise, the eject is to a new physical medium (form). When N-up partitioning is specified, the Media Eject Control (X'45') triplet may be included on the Begin Medium Map structured field to specify one of the following partition ejects:
  – Conditional eject to next partition
  – Conditional eject to next front-side partition
  – Conditional eject to next back-side partition

  However, this triplet is ignored when it occurs on the medium map that is activated at the beginning of a document regardless of whether this medium map is explicitly invoked or implicitly invoked as the default.
- If a contiguous sequence of IMMs is specified in the data stream, they are processed according to the following rules:
  – If the sequence of IMMs is followed by a page, the last IMM must invoke a medium map that allows the presentation of pages. If it does not, an exception is generated.
  – If the sequence of IMMs is followed by a page, only the last invoked medium map is used for processing; preceding medium maps are ignored. For example, if the first invoked medium map specifies a conditional eject to the next front partition and the last invoked medium map specifies a conditional eject to the next partition, the page is placed into the next partition. Similarly, if the first invoked medium map specifies

"constant front" but allows page placement on the back, and if the last invoked medium map specifies "constant back" but allows page placement on the front, the first invoked medium map is ignored and the page is placed on the front, with constant data placed on the back. For a definition of the *constant forms* control, see page 283.

– If the sequence of IMMs invoke medium maps that prohibit the presentation of pages but that present medium overlays or PMC overlays, each medium map generates a sheet or multiple copies of a sheet with constant overlay data, as specified. These sheets are generated whether the last IMM is followed by a page or not.

Application Note: Page groups are often processed in standalone fashion, that is, they are indexed, retrieved, and presented outside the context of the containing document. While the pages in the group are independent of each other and of any other pages in the document, their formatting on media depends on when the last medium map was invoked and on how many pages precede the BNG since this invocation. To make the media formatting of page groups self-contained, a Medium Map should be invoked at the beginning of the page group between the Begin Named Group (BNG) structured field and the first Begin Page (BPG) structured field. If this is not done, the presentation system may need to "play back" all pages between the invocation of the active medium map and the BNG to determine media formatting such as sheet-side and partition number for the first page in the group.

It is therefore *strongly* recommended that in environments where standalone page group processing is required or anticipated, page groups are built with an Invoke Medium Map (IMM) structured field specified after the BNG and before the first BPG. Note that some AFP applications that generate page groups will support a user option which ensures that an IMM is specified after BNG and before the first BPG, and some AFP archive servers will expect an IMM there and may not present the page group correctly if none is found. This may cause the complete document to print differently.

A newer method to specify how a page or page group should be formatted involves use of the Page Position Information (X'81') triplet. This triplet may be specified on a BPG and indicates the repeating group in the PGP structured field in the active Medium Map that should be used to format the page.

Figure 36. Medium Map Structure

```
Begin Medium Map  (BMM, D3A8CC)
      [  (     D3..92)     Object Container (MO Type only)          (S)  ]
      [  (MMO, D3B1DF)     Map Medium Overlay                             ]
      [  (MPO, D3ABD8)     Map Page Overlay                         (S)  ]
      [  (MMT, D3AB88)     Map Media Type                           (S)  ]
      [  (MMD, D3ABCD)     Map Media Destination                    (S)  ]
      [  (MDR, D3ABC3)     Map Data Resource                        (S)  ]
         (PGP, D3B1AF)     Page Position                       F2
         (MDD, D3A688)     Medium Descriptor
         (MCC, D3A288)     Medium Copy Count
      [  (MMC, D3A788)     Medium Modification Control              (S)  ]
      [  (PMC, D3A7AF)     Page Modification Control                (S)  ]
      [  (MFC, D3A088)     Medium Finishing Control                 (S)  ]
      [  (PEC, D3A7A8)     Presentation Environment Control              ]
End Medium Map  (EMM, D3A9CC)
```

Notes:

1. An MMO is required in either the document environment group or a medium map if an MMC structured field references a medium overlay. If specified in both, the structured field in the medium map takes precedence.

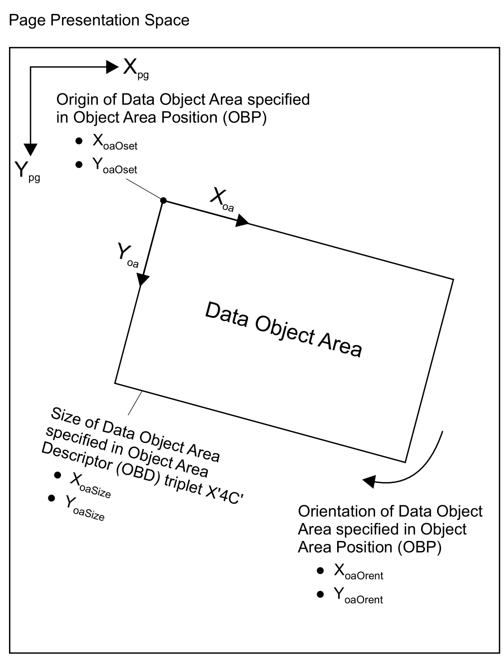
2. Within a medium map, a given media type local ID may only be mapped once to a media type OID and/or a media type name using an MMT.
3. The MDR may only be used in a Medium Map to reference Color Management Resources (CMRs); MDR repeating groups referencing any other resource are ignored.
4. A PGP and an MDD is required in either the document environment group or a medium map. If specified in both, the structured field in the medium map takes precedence.
5. MMC identifiers must be unique for all MMC structured fields in the medium map. PMC identifiers must be unique for all PMC structured fields in the medium map.
6. Each overlay included on a page with a PMC must first be mapped to a local ID with an MPO in the medium map containing the PMC.
7. Modifications specified by PMC structured fields are applied to pages on the medium depending on the MMC N-up Format Control (X'FC') keyword as follows:
   - If N-up is not specified, the page on each sheet-side is processed with the PGP repeating group for that sheet side. All modifications specified by all PMCs in the active medium map are applied to the page on the sheet-side.
   - If N-up with default page placement is specified, all pages on a sheet-side are processed with the PGP repeating group for that sheet side. If this repeating group does not specify a PMC identifier, or if the PMC identifier specifies X'FF', all modifications specified by all PMCs in the active medium map are applied to each page on the sheet side. If this repeating group specifies a PMC identifier, only the modifications included by the selected PMC are applied to all pages on the sheet-side.
   - If N-up with explicit page placement is specified, each page is processed with a PGP repeating group. If this repeating group does not specify a PMC identifier, or if the PMC identifier specifies X'FF', all modifications specified by all PMCs in the active medium map are applied to the page. If this repeating group specifies a PMC identifier, only the modifications included by the selected PMC are applied to the page.
8. The actual presentation of the selected PMC modifications is controlled by the MMC Constant Forms Control (X'F9') keyword and the PGP PgFlgs parameter. See "Page Position (PGP) Format 2" on page 313.
9. All overlays included with a PMC structured field are presented on the page presentation space *before* any variable page data is presented.
10. MFCs can be specified in the document environment group, in a medium map, or in both places. When specified in both places, all specified finishing operations are applied according to their scope, as long as the operations are compatible. Note that the location of the MFC may restrict which operations are supported. For rules on how finishing operations are nested, see "Finishing Operation Nesting Rules" on page 270.
11. The PEC may be specified with the Rendering Intent (X'95') triplet, the Device Appearance (X'97') triplet, or both. Only a single rendering intent and a single device appearance should be assigned to the group of pages/sheets processed by this medium map; if more than one is assigned, only the last assignment is used and the rest are ignored.
12. The PEC may be specified with the Rendering Intent (X'95') triplet and the Device Appearance (X'97') triplet in the DEG and in a medium map. If specified in both, the triplet on the PEC in the medium map takes precedence.
13. Metadata is optional. If metadata is present, one or more metadata objects (MO) may be included within the medium map structure. The MO Type object container(s) must directly follow the Begin Medium Map (BMM), otherwise they are ignored. When including multiple MOs the series of MO Type object containers must be contiguous and, as a whole, constitute the metadata for the document. The MO:DCA architecture places no restriction on or significance to the sequence or order of included metadata. If an object container is specified in medium map state, the ObjClass parameter on the mandatory Object Classification (X'10') triplet must be set to X'50'—Metadata; otherwise, the object container is ignored.

Application Note: When encountering a misplaced MO, some MO:DCA receivers ignore or discard it. Some MO:DCA receivers also issue a message when this occurs.

Data Objects

Data objects contain presentation data and the controls to present this data. Data objects are generated in an object presentation space in accordance with controls defined by the data object architecture. The object presentation space is mapped to an object area on the page in accordance with controls defined in MO:DCA environment groups. Data object mappings are shown in the specific object descriptions that follow. Object area positioning is shown in Figure 37.

Figure 37. Object Area Positioning on a Page



Data objects are defined for the following types of presentation data: text, image, graphics, and bar codes. The corresponding data object architectures may define various functional levels for the data objects. When such levels are formally defined, they are called *function sets* or *subsets*. Wherever support for a data object in MO:DCA is limited to particular function sets, the function-set level is indicated in the object structure definition. Wherever a MO:DCA interchange set further restricts the level of function set that is supported in the interchange set, such restriction is indicated in the interchange set definition.

Bar Code Objects

Bar code data consists of patterns of bars and spaces that represent alphanumeric information. Characteristics of the patterns are defined by specific bar code symbologies. A bar code object carries the alphanumeric information that is to be presented as a bar code and the controls to present this information using a specific bar code symbology. The bar code data object is defined by the Bar Code Object Content Architecture.

Figure 38. Bar Code Object Structure

```
Begin Bar Code Object  (BBC, D3A8EB)
         (     D3..C7)      Object Environment Group
      [  (     D3..92)      Object Container (MO Type only)           (S)   ]
      [  (BDA, D3EEEB)      Bar Code Data                             (S)   ]
End Bar Code Object  (EBC, D3A9EB)

Object Environment Group (OEG) for Bar Code Object
Begin Object Environment Group  (BOG, D3A8C7)
         (OBD, D3A66B)      Object Area Descriptor
         (OBP, D3AC6B)      Object Area Position
      [  (MBC, D3ABEB)      Map Bar Code Object                             ]
      [  (MCF, D3AB8A)      Map Coded Font                       F2   (S)   ]
      [  (MDR, D3ABC3)      Map Data Resource                         (S)   ]
         (BDD, D3A6EB)      Bar Code Data Descriptor
End Object Environment Group  (EOG, D3A9C7)
```

Note: Metadata is optional. If metadata is present, one or more metadata objects (MO) may be included within the data object structure. The MO Type object container(s) must directly follow the Object Environment Group (OEG), otherwise they are ignored. When including multiple MOs the series of MO Type object containers must be contiguous and, as a whole, constitute the metadata for the data object. MO:DCA places no restriction on or significance to the sequence or order of included metadata.

Application Notes:

1. For purposes of print server resource management, each MCF that maps a font in the bar code OEG must have a corresponding MCF mapping the same font in the AEG for the page or overlay that includes the bar code object. The local ID used in the page or overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.
2. An MDR is used to map a non-FOCA data-object font resource in a bar code object, for use as a secondary resource of the bar code object. For purposes of print server resource management, each MDR that maps a font in the bar code OEG must have a corresponding MDR mapping the same font resource and attributes in the AEG for the page or overlay that includes the bar code object. The local ID used in the page or overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.
3. An MDR is used to map a Color Management Resource (CMR) that is to be associated with the bar code object and that is to be used for rendering the bar code object. For purposes of print server resource management, each MDR that maps a CMR in the bar code OEG must have a corresponding MDR mapping the same CMR in the AEG for the page or overlay that includes the bar code object.
4. The mapping of a font local ID to a font must be unique; that is, the font local ID can only be mapped to one font in the OEG. However, different font local IDs can be mapped to the same font. The font mapping in an OEG must always be factored up to a mapping in the AEG.
5. The rendering intent for BCOCA objects is fixed as media-relative colorimetric.
6. An MDR is used to map a presentation data object in a QR Code with Image bar code object. For purposes of print server resource management, each MDR that is specified in the bar code OEG must have a

corresponding MDR mapping the same resource in the AEG for that page or overlay. Each MDR in the bar code OEG must specify both external and internal identifiers in the OEG and the external identifiers are factored up to the AEG for the page or overlay.

A QR Code with Image bar code object may contain secondary presentation data object resources mapped by the OEG. When the presentation data object resource is an IOCA image, the FQN type X'BE' triplet would be paired with an FQN type X'84' triplet. When the presentation data object resource is a non-OCA presentation object, the FQN type X'BE' triplet would be paired with an FQN type X'CE' triplet. Presentation data object resources supported for this purpose are IOCA images along with the object types shown in Table 48 on page 626.

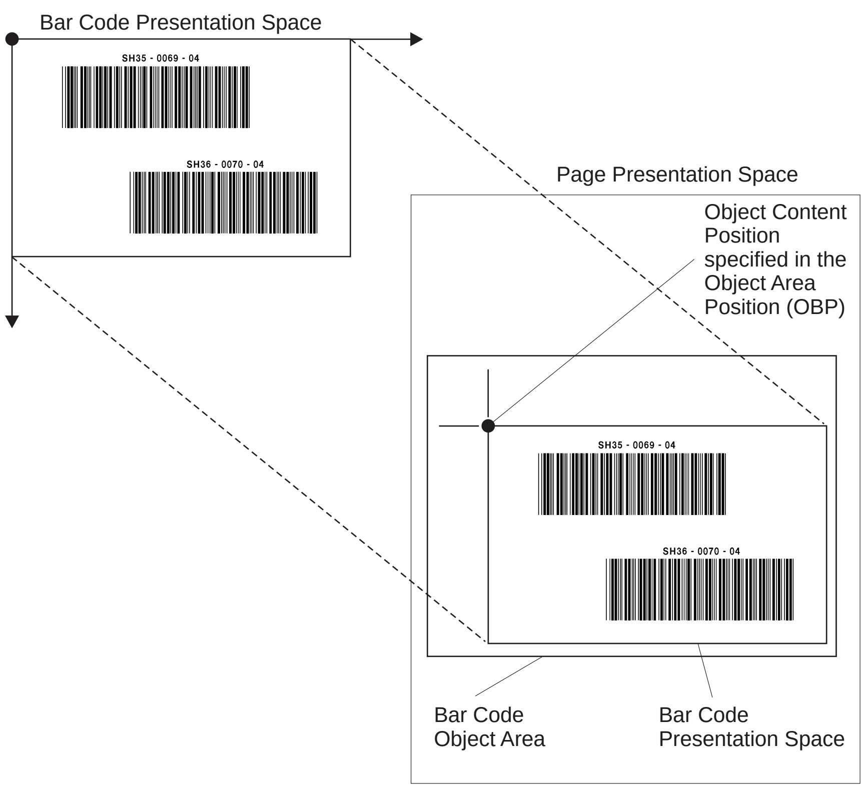
These secondary presentation data object resources may themselves contain OEGs with MDRs for non-presentation data object resources (IOCA tiles, CMRs, data object fonts, etc.), also known as tertiary objects. These tertiary MDRs have external names and some may have internal names. These tertiary MDRs must be specified in the bar code OEG, including both external and, if specified, internal names. The tertiary MDR external names must be factored up to the AEG for the page or overlay.

In the case where a tertiary CMR resource is mapped for use by a secondary image resource, the FQN type X'EE' triplet containing the CMR external name would be paired with the FQN type X'BE' triplet containing the internal name of the secondary image from within the QR Code with Image bar code object. This pairing identifies the image that uses this CMR, effectively making this association known to the print server. The X'EE' CMR external name must be factored up to the AEG for the page or overlay.

Note: All external IDs and internal IDs for secondary resources and tertiary resources must be unique and must be mapped in the QR Code with Image bar code OEG.

7. When encountering a misplaced MO, some MO:DCA receivers ignore or discard it. Some MO:DCA receivers also issue a message when this occurs.

Figure 39. Bar Code Presentation Space Mapping: Position



Note: Refer to the *Bar Code Object Content Architecture Reference* for a full description of the BCOCA object content, syntax, and semantics for MO:DCA data streams.

Mapping the Bar Code Presentation Space

The mapping option is specified by the Mapping Option (X'04') triplet on the Map Bar Code Object (MBC) structured field. The only valid option is *position*. This mapping is shown in Figure 39 on page 99.

Graphics Objects

Graphics data consists of controls and parameters to generate pictures based on lines, characters, and shaded areas. The graphics data object is defined by the Graphics Object Content Architecture for Advanced Function Presentation.

Figure 40. Graphics Object Structure

```
Begin Graphics Object  (BGR, D3A8BB)
         (     D3..C7)      Object Environment Group
      [  (     D3..92)      Object Container (MO Type only)             (S)   ]
      [  (GAD, D3EEBB)      Graphics Data                               (S)   ]
End Graphics Object  (EGR, D3A9BB)

Object Environment Group (OEG) for Graphics Object
Begin Object Environment Group  (BOG, D3A8C7)
      [  (PEC, D3A7A8)      Presentation Environment Control                  ]
         (OBD, D3A66B)      Object Area Descriptor
         (OBP, D3AC6B)      Object Area Position
      [  (MGO, D3ABBB)      Map Graphics Object                               ]
      [  (MCF, D3AB8A)      Map Coded Font                         F2   (S)   ]
      [  (MDR, D3ABC3)      Map Data Resource                           (S)   ]
         (GDD, D3A6BB)      Graphics Data Descriptor
End Object Environment Group  (EOG, D3A9C7)
```

Notes:

1. Refer to the *Graphics Object Content Architecture for AFP Reference* for a full description of the GOCA object content, syntax, and semantics for MO:DCA data streams.
2. Metadata is optional. If metadata is present, one or more metadata objects (MO) may be included within the data object structure. The MO Type object container(s) must directly follow the Object Environment Group (OEG), otherwise they are ignored. When including multiple MOs the series of MO Type object containers must be contiguous and, as a whole, constitute the metadata for the data object. MO:DCA places no restriction on or significance to the sequence or order of included metadata.

Application Notes:

1. For purposes of print server resource management, each MCF that maps a font in the graphics OEG must have a corresponding MCF mapping the same font in the AEG for the page or overlay that includes the graphics object. The local ID used in the page or overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.
2. An MDR is used to map a non-FOCA data-object font resource in a graphics object. For purposes of print server resource management, each MDR that maps a font in the graphics OEG must have a corresponding MDR mapping the same font resource and attributes in the AEG for the page or overlay that includes the graphics object. The local ID used in the page or overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.
3. An MDR is used to map a Color Management Resource (CMR) that is to be associated with the graphics object and that is to be used for rendering the graphics object. For purposes of print server resource management, each MDR that maps a CMR in the graphics OEG must have a corresponding MDR mapping the same CMR in the AEG for the page or overlay that includes the graphics object.
4. The mapping of a font local ID to a font must be unique; that is, the font local ID can only be mapped to one font in the OEG. However, different font local IDs can be mapped to the same font. The font mapping in an OEG must always be factored up to a mapping in the AEG.

5. When encountering a misplaced MO, some MO:DCA receivers ignore or discard it. Some MO:DCA receivers also issue a message when this occurs.

Architecture Note:

1. The PEC structured field in the OEG for the graphics object is only used to specify the rendering intent for the object using the Rendering Intent triplet; all other PEC triplets are ignored.

Mapping the Graphics Presentation Space

The mapping option is specified by the Mapping Option (X'04') triplet on the Map Graphics Object (MGO) structured field. The valid mapping options are:
- Scale to fit
- Scale to fill
- Center and trim
- Position and trim

The replicate-and-trim mapping option has been retired for graphics objects; see “Retired Parameters” on page 570.

These mapping options are shown in Figure 41 on page 103, Figure 42 on page 104, Figure 43 on page 105, and Figure 44 on page 106.

Figure 41. Graphics Presentation Space Mapping: Scale to Fit

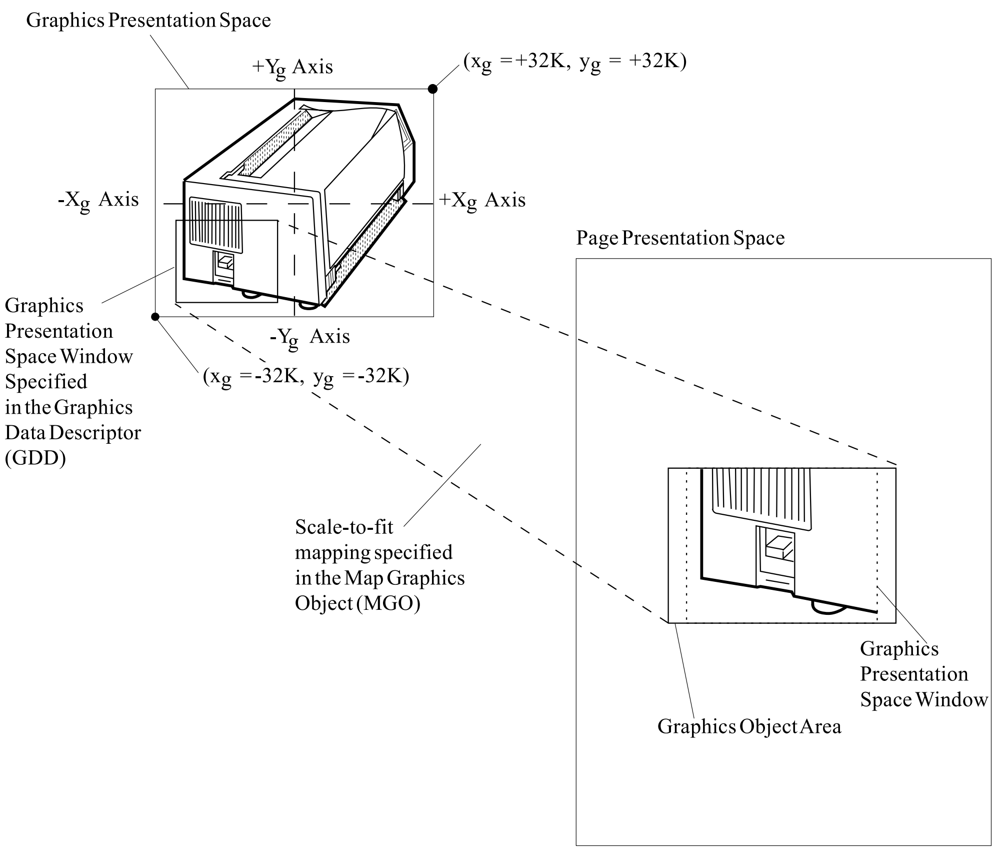
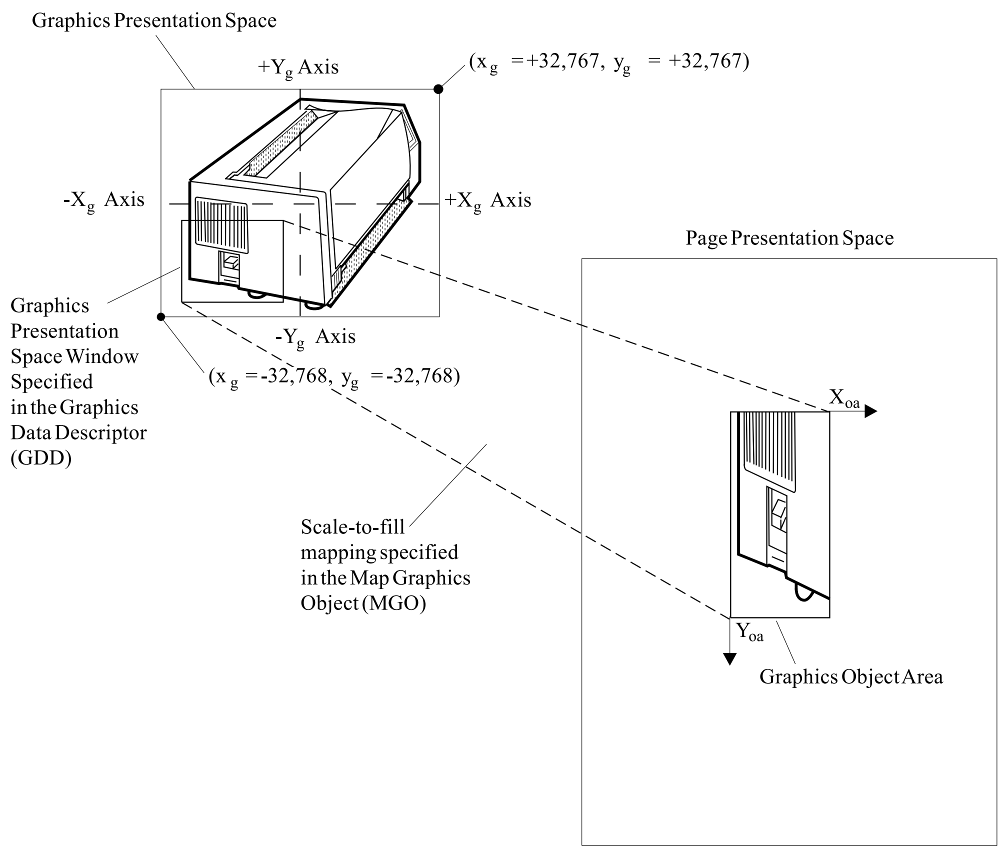


Figure 42. Graphics Presentation Space Mapping: Scale to Fill



Note that the scale to fill mapping option is similar to scale to fit except that the Graphics presentation space window may be scaled asymmetrically to fill the object area completely. This means that the aspect ratio of the graphics picture may not be preserved.

Figure 43. Graphics Presentation Space Mapping: Center and Trim

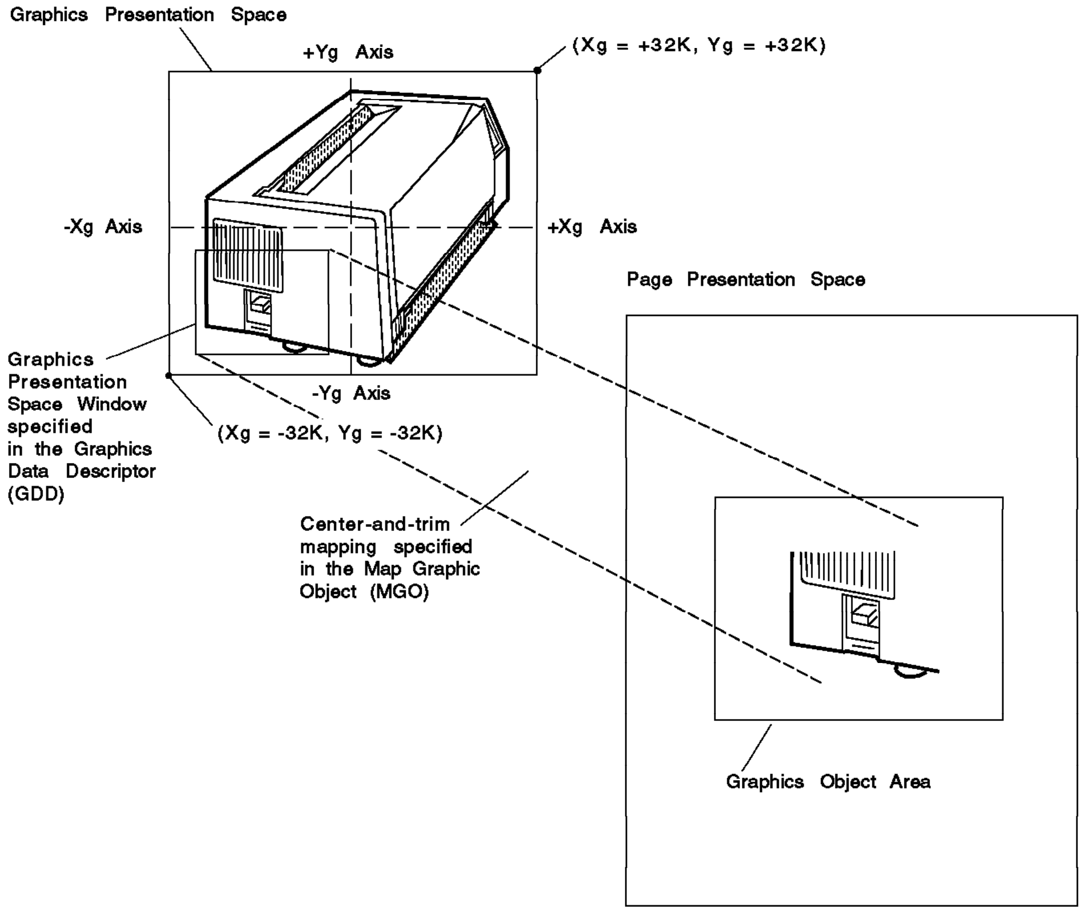


Figure 44. Graphics Presentation Space Mapping: Position and Trim

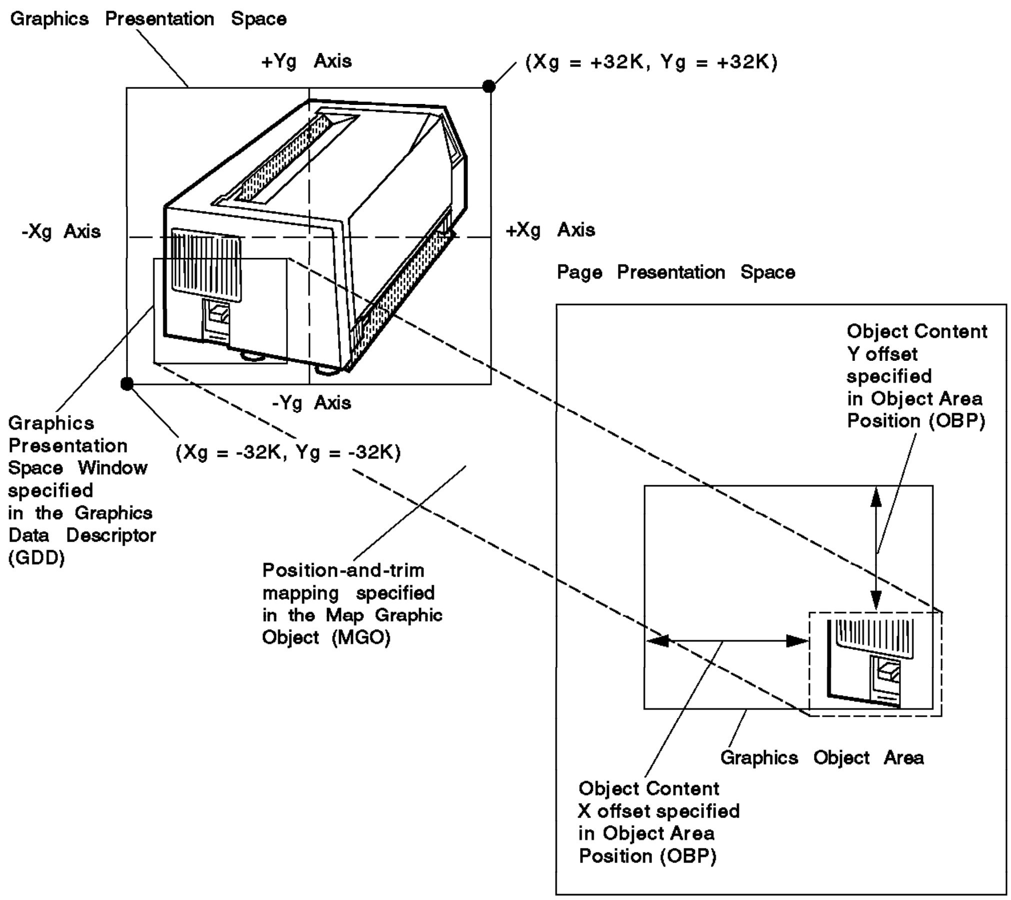


Image Objects

Image data consists of an electronic representation of a picture in the form of an array of raster data, along with the controls to present this data. The image data object is defined by the Image Object Content Architecture and is sometimes referred to as an *IO image* object.

MO:DCA also supports the IM image object for migration purposes. For a definition of this object, see "IM Image Object" on page 595.

Figure 45. Image Object Structure

```
Begin Image Object  (BIM, D3A8FB)
         (      D3..C7)      Object Environment Group
      [  (      D3..92)      Object Container (MO Type only)            (S)   ]
      [  (IPD, D3EEFB)       Image Picture Data                         (S)   ]
End Image Object  (EIM, D3A9FB)

Object Environment Group (OEG) for Image Object
Begin Object Environment Group  (BOG, D3A8C7)
      [  (PEC, D3A7A8)       Presentation Environment Control                 ]
         (OBD, D3A66B)       Object Area Descriptor
         (OBP, D3AC6B)       Object Area Position
      [  (MIO, D3ABFB)       Map Image Object                                 ]
      [  (MDR, D3ABC3)       Map Data Resource                          (S)   ]
         (IDD, D3A6FB)       Image Data Descriptor
End Object Environment Group  (EOG, D3A9C7)
```

Notes:

1. Refer to the *Image Object Content Architecture Reference* for a full description of the IOCA object content, syntax, and semantics for MO:DCA data streams.
2. Metadata is optional. If metadata is present, one or more metadata objects (MO) may be included within the data object structure. The MO Type object container(s) must directly follow the Object Environment Group (OEG), otherwise they are ignored. When including multiple MOs the series of MO Type object containers must be contiguous and, as a whole, constitute the metadata for the data object. MO:DCA places no restriction on or significance to the sequence or order of included metadata.

Application Notes:

1. An MDR is used to map a Tile Resource that is invoked by the IOCA object. For purposes of print server resource management, each MDR that maps a Tile Resource in the image OEG must have a corresponding MDR mapping the same resource in the AEG for the page or overlay that includes the image object.
2. An MDR is also used to map a Color Management Resource (CMR) that is to be associated with the IOCA object and that is to be used for rendering the IOCA object. For purposes of print server resource management, each MDR that maps a CMR in the image OEG must have a corresponding MDR mapping the same CMR in the AEG for the page or overlay that includes the image object.
3. When encountering a misplaced MO, some MO:DCA receivers ignore or discard it. Some MO:DCA receivers also issue a message when this occurs.

Architecture Note:

1. The PEC structured field in the OEG for the image object is only used to specify the rendering intent for the object using the Rendering Intent triplet; all other PEC triplets are ignored.

Mapping the Image Presentation Space

The mapping option is specified by the Mapping Option (X'04') triplet on the Map Image Object (MIO) structured field. The valid mapping options are:

- Scale to fit
- Scale to fill
- Center and trim
- Position and trim

These mapping options are shown in Figure 46 on page 108, Figure 47 on page 109, Figure 48 on page 110, and Figure 49 on page 111.

Figure 46. Image Presentation Space Mapping: Scale to Fit

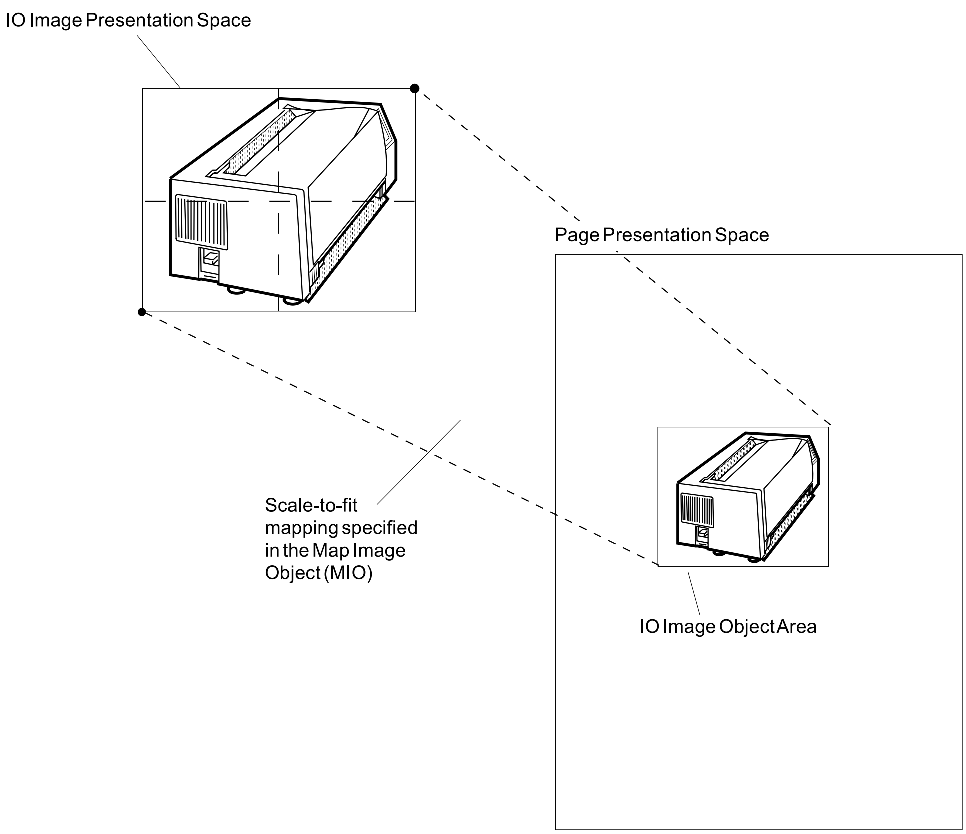
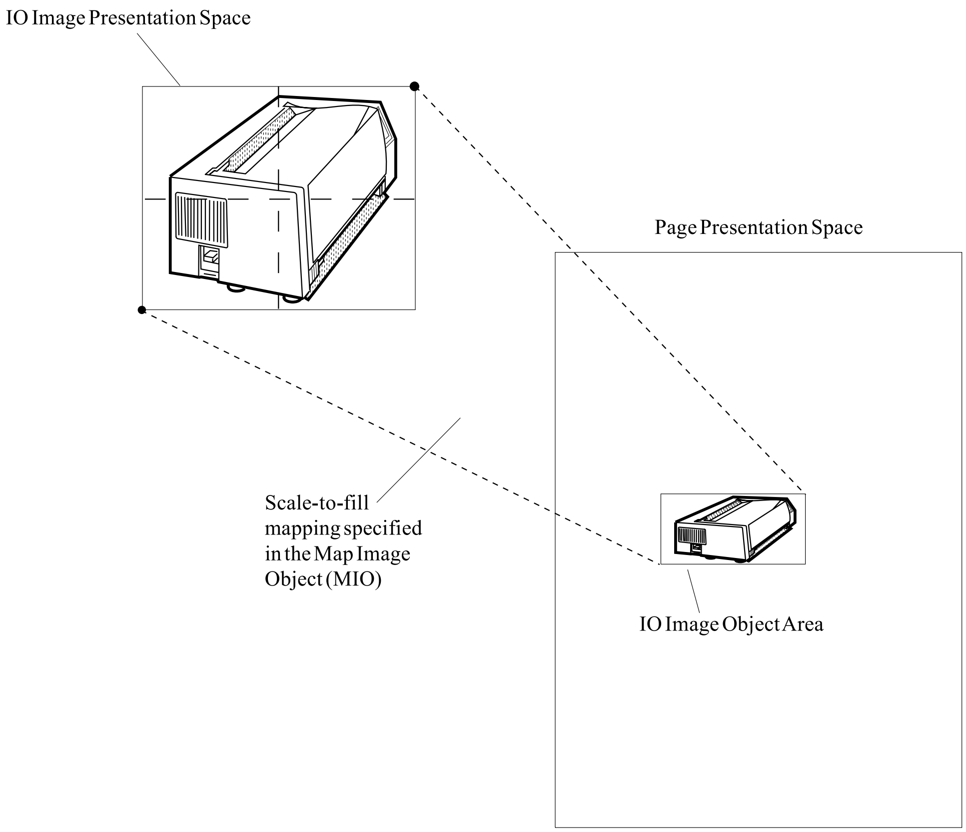


Figure 47. Image Presentation Space Mapping: Scale to Fill



Note that the scale to fill mapping option is similar to scale to fit except that the Image presentation space may be scaled asymmetrically to fill the object area completely. This means that the aspect ratio of the image may not be preserved.

Figure 48. Image Presentation Space Mapping: Center and Trim

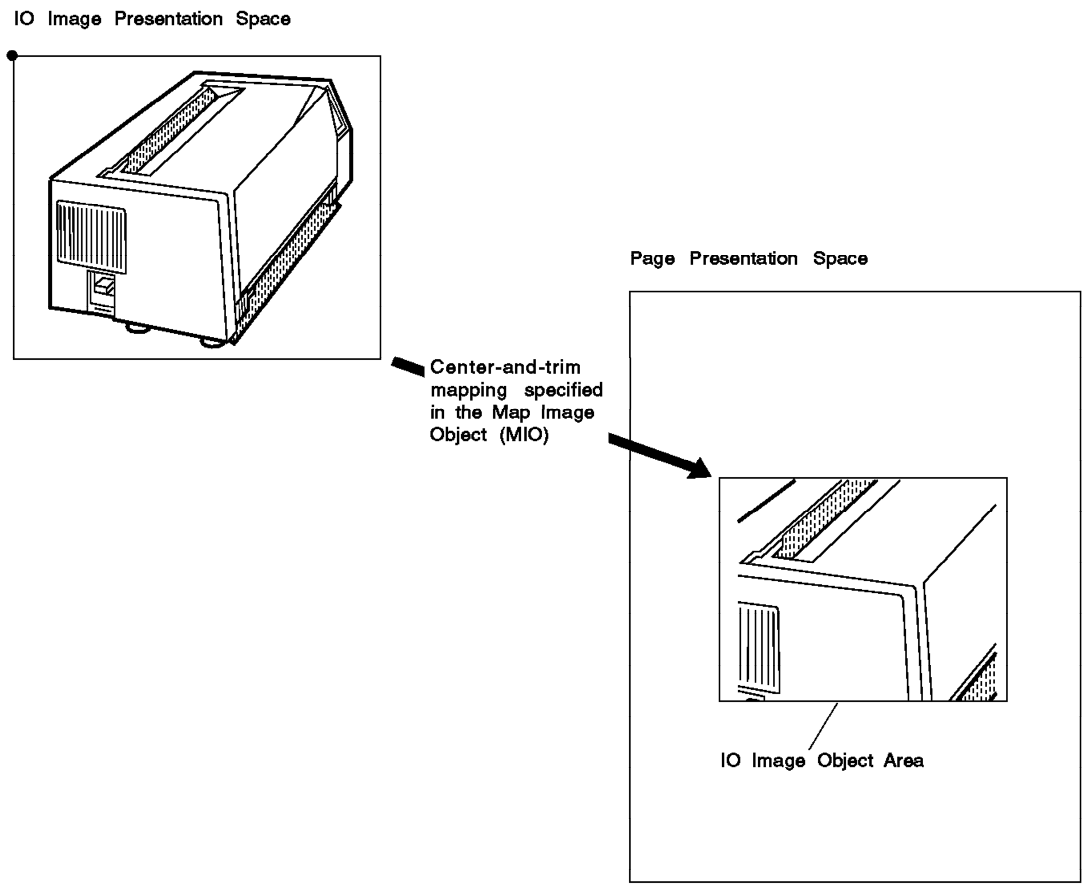
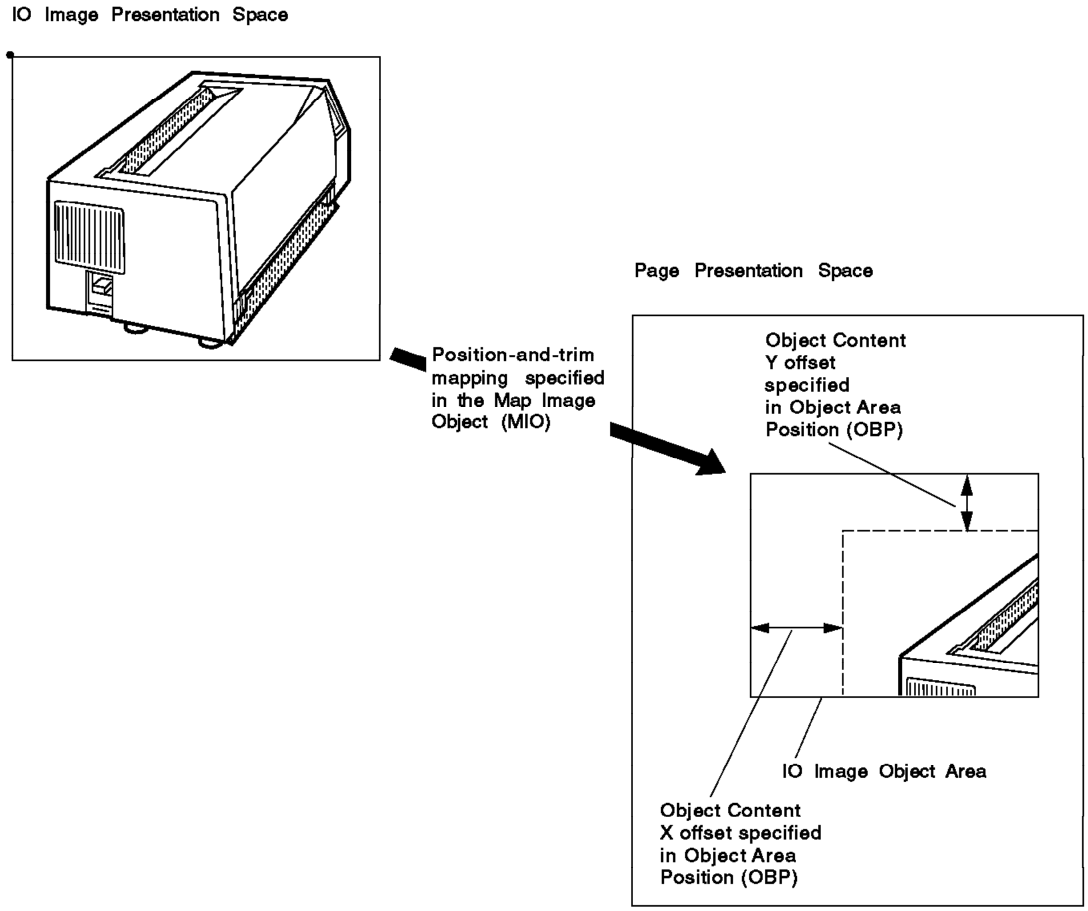


Figure 49. Image Presentation Space Mapping: Position and Trim



The MO:DCA architecture supports three additional mappings for the IOCA FS10 object for IM image migration purposes. For a definition of these mappings, see "Coexistence Triplets" on page 607.

Text Objects

Presentation text data consists of graphic character code points and the controls required to position and present the corresponding graphic characters. The presentation text data object is defined by the Presentation Text Object Content Architecture. The presentation text object in MO:DCA can have two structures that differ by the presence or absence of an Object Environment Group (OEG).

Note: Refer to the *Presentation Text Object Content Architecture Reference* for a full description of the PTOCA object content, syntax, and semantics for MO:DCA environments.

Figure 50. Presentation Text Object Structure - Without OEG

```
Begin Presentation Text Object   (BPT, D3A89B)
      [   (PTX, D3EE9B)        Presentation Text Data                   (S)   ]
End Presentation Text Object   (EPT, D3A99B)
```

When the presentation text object in a MO:DCA data stream does not contain an OEG, the presentation parameters normally specified in the OEG are specified in the Active Environment Group (AEG) of the containing page or overlay as follows:

- Object Area Descriptor (OBD). Optionally included once in the AEG, therefore it applies to all presentation text objects on the page or overlay that do not contain an OEG. Furthermore, MO:DCA interchange sets require that the OBD specify measurement units and extents that match those specified for the page or overlay in the PGD. If the OBD is omitted, the architected default is to use the measurement units and extents specified in the PGD for the text object area measurement units and object area extents.

- Object Area Position (OBP). Optionally included once in the AEG, therefore it applies to all presentation text objects on the page or overlay that do not contain an OEG. Furthermore, MO:DCA interchange sets require that the OBP specifies zeros for the object area origin and the object content origin and that it specifies a 0° object area rotation. If the OBP is omitted, the architected default is to set the object area origin and the object content origin to zeros, and the object area rotation to 0°.
- Object mapping options. Not defined for presentation text objects that do not contain an OEG. The text data is presented as specified by the text object.
- Font mapping. All fonts required by presentation text objects that do not contain an OEG must be mapped with MCF or MDR structured fields in the AEG of the page or overlay.
- Presentation Text Descriptor (PTD). Included once in the AEG, therefore it applies to all presentation text objects on the page or overlay that do not contain an OEG. When the BPT structured field is processed for a PTOCA object without OEG, all initial text conditions specified in the Presentation Text Descriptor (PTD) structured field of the page or overlay's AEG are set prior to processing the text object.

Application Note: Whenever a BPT is encountered for a text object without OEG, AFP servers set default page-level initial text conditions before the PTD initial conditions are set; see Table 16 on page 158.

Note: Presentation text objects that do not contain an OEG that are found in a page or overlay may be referred to as *text major*.

Figure 51. Presentation Text Object Structure - With OEG

```
Begin Presentation Text Object  (BPT, D3A89B)
         (      D3..C7)      Object Environment Group
      [  (      D3..92)      Object Container (MO Type only)          (S)   ]
      [  (PTX, D3EE9B)       Presentation Text Data                   (S)   ]
End Presentation Text Object  (EPT, D3A99B)

Object Environment Group (OEG) for Presentation Text Object
Begin Object Environment Group  (BOG, D3A8C7)
      [  (PEC, D3A7A8)       Presentation Environment Control               ]
         (OBD, D3A66B)       Object Area Descriptor
         (OBP, D3AC6B)       Object Area Position
      [  (MPT, D3AB9B)       Map Presentation Text                          ]
      [  (MCF, D3AB8A)       Map Coded Font                       F2  (S)   ]
      [  (MDR, D3ABC3)       Map Data Resource                        (S)   ]
         (PTD, D3B19B)       Presentation Text Data Descriptor
End Object Environment Group  (EOG, D3A9C7)
```

When the presentation text object in a MO:DCA data stream contains an OEG, all initial text conditions specified in the Presentation Text Descriptor (PTD) structured field of the OEG are set prior to processing the text object. For such text objects, the OBD, OBP, and PTD structured fields in the AEG of the page or overlay are ignored.

Architecture Note: The coexistence PTD-1 structured field is not allowed in the OEG of the Presentation Text Object.

Note: Metadata is optional. If metadata is present, one or more metadata objects (MO) may be included within the data object structure. The MO Type object container(s) must directly follow the Object Environment

Group (OEG), otherwise they are ignored. When including multiple MOs the series of MO Type object containers must be contiguous and, as a whole, constitute the metadata for the data object. MO:DCA places no restriction on or significance to the sequence or order of included metadata.

Application Notes:

1. For purposes of print server resource management, each MCF that maps a font in the text OEG must have a corresponding MCF mapping the same font in the AEG for the page or overlay that includes the text object. The local ID used in the page or overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.
2. An MDR is used to map a non-FOCA data-object font resource in a text object. For purposes of print server resource management, each MDR that maps a font in the text OEG must have a corresponding MDR mapping the same font resource and attributes in the AEG for the page or overlay that includes the text object. The local ID used in the page or overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.
3. An MDR is used to map a Color Management Resource (CMR) that is to be associated with the text object and that is to be used for rendering the text object. For purposes of print server resource management, each MDR that maps a CMR in the text OEG must have a corresponding MDR mapping the same CMR in the AEG for the page or overlay that includes the text object.
4. When encountering a misplaced MO, some MO:DCA receivers ignore or discard it. Some MO:DCA receivers also issue a message when this occurs.

Architecture Notes:

1. The PEC structured field in the OEG for the image object is only used to specify the rendering intent for the object using the Rendering Intent triplet; all other PEC triplets are ignored.
2. Any text suppressions that need to be applied, whether the text object contains an OEG or not, need to be specified in the active Medium Map.
3. The mapping of a font local ID to a font must be unique; that is, the font local ID can only be mapped to one font in the OEG. However, different font local IDs can be mapped to the same font. The font mapping in an OEG must always be factored up to a mapping in the AEG.

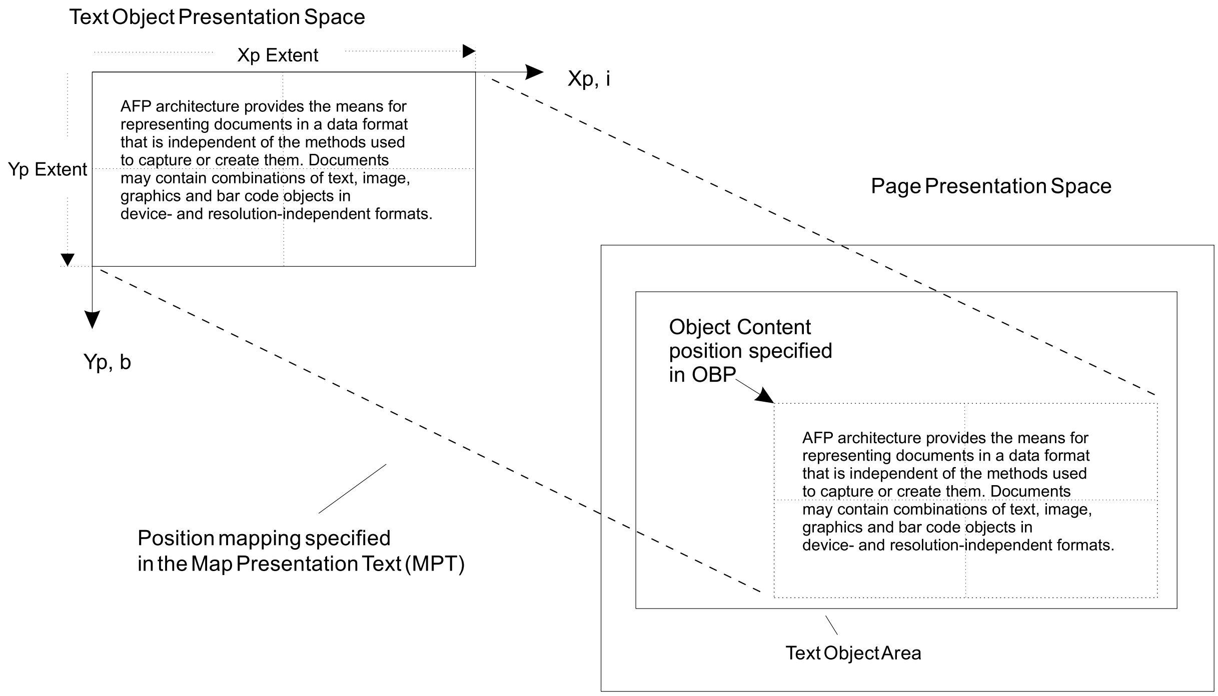
Mapping the Text Presentation Space (Text Object with OEG)

The mapping option is specified by the Mapping Option (X'04') triplet on the Map Presentation Text (MPT) structured field. The valid mapping option is:

- Position

This mapping option is shown in Figure 52.

Figure 52. Text Presentation Space Mapping: Position

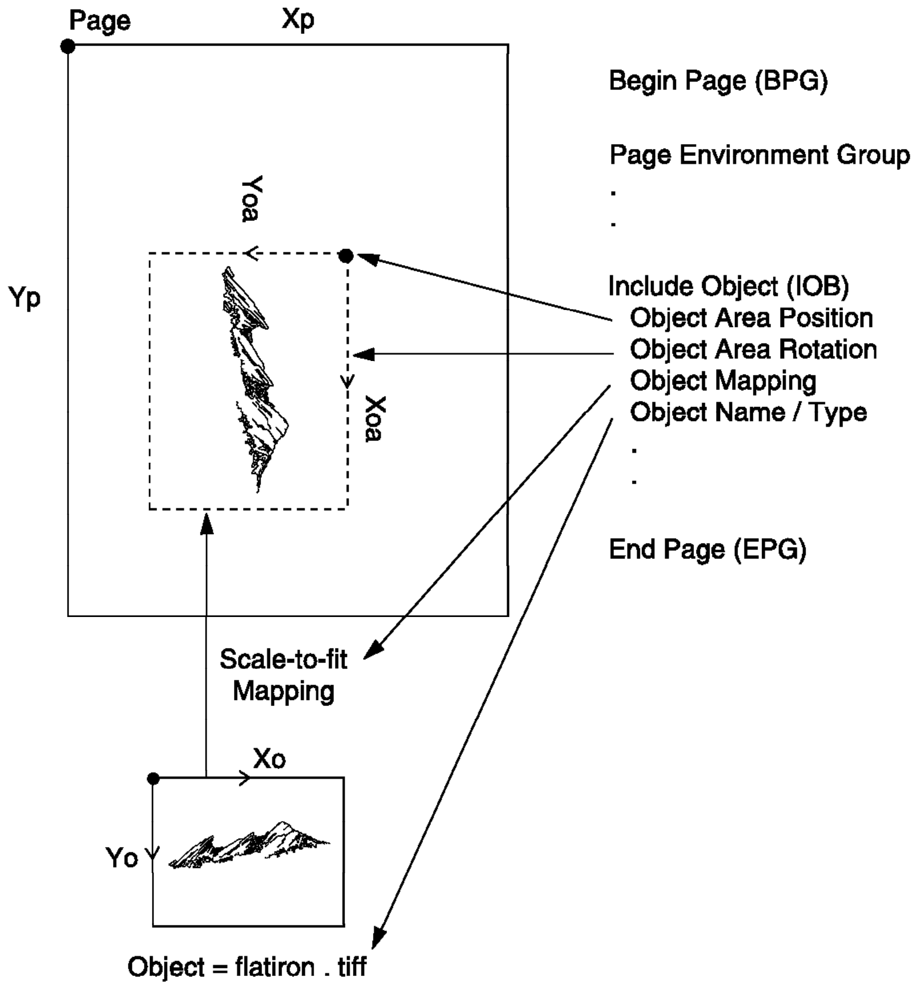


Object Containers

Object containers are MO:DCA objects that envelop and carry object data. The object data may or may not be specified by an AFP architecture. The object data is not constrained to be traditional text, image, or graphics. However if it is a presentation object, it must have a well-defined processing semantic resulting in a fixed, deterministic presentation when processed by a receiver capable of presenting the object. If the object is a traditional time-invariant presentation object, it must be paginated, that is its presentation space must be constrained to a single page. For presentation objects, the object data in the container is presented when the object container is included on a page or overlay using the Include Object (IOB) structured field. The object container may also be included directly on a page or overlay. Figure 53 on page 115 shows how object container data is included on a page using the Include Object (IOB) structured field.

When a presentation object container is included on a page or overlay, the object is first completely processed into final-form in its own presentation space, including applying any transformations specified within the object, before that object presentation space is mapped into the MO:DCA object area and the MO:DCA position, rotation, and scaling parameters are applied to the object area.

Figure 53. Use of the IOB to Include Object Container Data



The object container provides a range of functions that may be used to identify and structure the enveloped object data. At minimum, the container provides Begin and End structured fields, categorizes the object into a class, identifies the object type using a registered numeric identifier, and carries the object data in OCD structured fields. Above this minimum level of function, the object container may include additional optional functions such as an OEG to specify data object presentation space size, position, mapping and orientation.

For presentation objects, the required container structure depends on where the object is stored and how it is included in a page or overlay:

- If the object is included directly in a page or overlay, the container must, at a minimum, have the following structure:
  - BOC/EOC with the Object Classification (X'10') triplet on the BOC specifying the registered object-type identifier (encoded object-type OID) for the object data format
  - OEG with OBD, OBP, and CDD
  - All object data partitioned into OCDs
- If the object is included using an Include Object (IOB) structured field and is carried in an external (print file level) resource group, the container must, at a minimum, have the following structure:
  - BOC/EOC with the Object Classification (X'10') triplet on the BOC specifying the registered object-type identifier (encoded object-type OID) for the object data format
  - All object data partitioned into OCDs

- If the object is included using an Include Object (IOB) structured field and is stored in a resource library, there is no minimum container structure requirement, that is, the object may be stored and included in its unaltered, original form. However, if the included object is carried in a BOC/EOC container, the object data must be partitioned into OCDs. If the object is installed in a resource library using a Data Object Resource Access Table (DO RAT), it must not be wrapped with a MO:DCA object envelope such as BOC/EOC, that is, it must be installed in its raw source format. Examples of presentation objects that can be installed using a DO RAT are EPS, PDF, GIF, TIFF, and AFPC JPEG objects.

Figure 54. Object Container Structure for Presentation Objects

```
Begin Object Container  (BOC, D3A892)
      [  (      D3..C7)     Object Environment Group                    ]
      [  (      D3..92)     Object Container (MO Type only)        (S)  ]
      [  (OCD, D3EE92)      Object Container Data                  (S)  ]
End Object Container  (EOC, D3A992)

Object Environment Group (OEG) for Object Container
Begin Object Environment Group  (BOG, D3A8C7)
      [  (PEC, D3A7A8)      Presentation Environment Control            ]
      [  (OBD, D3A66B)      Object Area Descriptor                      ]
      [  (OBP, D3AC6B)      Object Area Position                        ]
      [  (MCD, D3AB92)      Map Container Data                          ]
      [  (MDR, D3ABC3)      Map Data Resource                     (S)   ]
      [  (CDD, D3A692)      Container Data Descriptor                   ]
End Object Environment Group  (EOG, D3A9C7)
```

Note: Metadata is optional. If metadata is present, one or more metadata objects (MO) may be included within the object container structure. The MO Type object container(s) must directly follow the Object Environment Group (OEG), otherwise they are ignored. When including multiple MOs the series of MO Type object containers must be contiguous and, as a whole, constitute the metadata for the data object. MO:DCA places no restriction on or significance to the sequence or order of included metadata.

Application Notes:

1. For purposes of print server resource management, each MDR that is specified in the object container OEG must have a corresponding MDR mapping the same resource in the AEG for the page or overlay that includes the object container. Note that an FQN type X'BE' triplet, if specified on the MDR in the OEG, is not factored up to the AEG, unless the MDR maps a data-object font.
2. An MDR is used to map a Color Management Resource (CMR) that is to be associated with the object in the container and that is to be used for rendering the object. For purposes of print server resource management, each MDR that maps a CMR in the object container OEG must have a corresponding MDR mapping the same CMR in the AEG for the page or overlay that includes the object container.
3. When encountering a misplaced MO, some MO:DCA receivers ignore or discard it. Some MO:DCA receivers also issue a message when this occurs.

Architecture Notes:

1. An MDR reference to a specific resource may only be specified once in the object container OEG.
2. The PEC structured field in the OEG for the object container is only used to specify the rendering intent for the object using the Rendering Intent triplet; all other PEC triplets are ignored.

For non-presentation objects, the required container structure depends on where the object is stored:

- If the object is carried in an external (print file level) resource group, the container must have the following structure:

  – BOC/EOC with the Object Classification (X'10') triplet on the BOC specifying the registered object-type identifier (encoded object-type OID) for the object data format
  – All object data partitioned into OCDs
- If the object is stored in a resource library, there is no minimum container structure requirement, that is, the object may be stored in its unaltered, original form. However, if the object is stored in a BOC/EOC container, the object data must be partitioned into OCDs. If the non-presentation object is installed in a resource library using a Resource Access Table (RAT), it must not be wrapped with a MO:DCA object envelope such as BOC/EOC, that is, it must be installed in its raw source format. Examples of non-presentation objects that are installed using a RAT and that must not be wrapped with a BOC/EOC envelope are:
  – TrueType/OpenType fonts and TrueType/OpenType Collections
  – Color Management Resources (CMRs)

Figure 55. Object Container Structure for Non-Presentation Objects

```
Begin Object Container  (BOC, D3A892)
      [  (      D3..92)      Object Container (MO Type only)              (S)   ]
      [  (OCD, D3EE92)       Object Container Data                        (S)   ]
End Object Container  (EOC, D3A992)
```

Notes:

1. Metadata is optional. If metadata is present, one or more metadata objects (MO) may be included within the object container structure. The MO Type only object container(s) must directly follow the Begin Object Container (BOC), otherwise they are ignored. When including multiple MOs, the series of MO Type object containers must be contiguous and, as a whole, constitute the metadata for the data object. MO:DCA places no restriction on or significance to the sequence or order of included metadata.
2. If the object container data in the non-presentation object contains an MO, then the additional metadata (MO type only) object containers are not allowed in the object container structure.

Application Notes:

1. When an object container is carried in an external (print file level) resource group in AFP environments, a BRS/ERS envelope is mandatory.
2. When encountering a misplaced MO, some MO:DCA receivers ignore or discard it. Some MO:DCA receivers also issue a message when this occurs.

Mapping the Container Data Presentation Space

The mapping option is specified by the Mapping Option (X'04') triplet on the Map Container Data (MCD) structured field. The valid mapping options are:
- Scale to fit
- Scale to fill
- Center and trim
- Position and trim
- Position
- UP3i Print Data mapping; only valid for the UP3i Print Data object

For a description of the supported mapping options see "Mapping Option Triplet X'04'" on page 360. For the scale-to-fit and scale-to-fill mapping of presentation data in an object container, a data object presentation space size is required. See "Object Type Identifiers" on page 609 for information on how the presentation space size is specified by various data objects. If the presentation space size is not specified by the object, the architected default is the presentation space size of the including page or overlay.

The UP3i Print Data mapping is only valid for the UP3i Print Data object type; if any other mapping option is specified for this object type a X'02' exception condition exists.

Chapter 5. MO:DCA Structured Fields

This chapter:
- Briefly describes the purpose of each MO:DCA structured field
- Provides the syntax and semantics for each MO:DCA structured field
- Identifies each structured field's parameter set
- Identifies exception conditions

General Information

Chapter 3, “MO:DCA Overview”, on page 19 provides a general discussion of the syntax and semantics of MO:DCA structured fields. Detailed formats, syntaxes and semantics are provided here to enable product developers to design and produce applications that can use MO:DCA data streams.

The syntax tables in this chapter describe the less restrictive requirements of the overall architecture. Thus, these syntax tables may not agree exactly with a specific interchange set with regard to:
- Whether a data element is mandatory or optional
- The number of times a particular data element may validly occur
- The order in which the data elements must occur

In those cases where there is disagreement with an interchange set, the interchange set requirement governs.

The exception condition column of the syntax tables for these structured fields identifies only those exception conditions that could occur for the individual parameters.

Structured fields that have triplets reflect an exception condition code of either X'10' or X'14' in this column for the triplet entry. This reflects only the possibility that the structured field could include an invalid triplet, or that a required triplet could be missing. Any exception conditions relating to a triplet's data elements are addressed in Chapter 6, “MO:DCA Triplets”, on page 345.

Those exception conditions that may occur because of special conditions such as a mismatch between the individual parameters of one or more structured fields are listed under the *Semantics* headings when only one such exception condition is identified. When multiple exception conditions are identified, all are listed under the “Exception Condition Summary” heading. A more detailed explanation may be provided under the “Semantics” heading.

Architected defaults are identified in the semantic description of the individual parameters. When an architected default exists for an entire structured field, the default is documented at the end of the semantic description for that structured field.

The following structured field definitions are sorted in alphabetical order based on structured field acronym.

Begin Active Environment Group (BAG)

The Begin Active Environment Group structured field begins an Active Environment Group, which establishes the environment parameters for the page or overlay. The scope of the active environment group is the containing page or overlay.

BAG (X'D3A8C9') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8C9'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	AEGName		Name of the active environment group	O	X'02'
8–*n*		Triplets		See BAG Semantics for triplet applicability.	O	X'10'

BAG Semantics

AEGName Is the name of the active environment group.

The page or overlay containing the Begin Active Environment Group structured field must also contain a subsequent matching End Active Environment Group structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

BAG Exception Condition Summary

X'08' A subsequent matching End Active Environment Group structured field is not present in the page or overlay.

Begin Bar Code Object (BBC)

The Begin Bar Code Object structured field begins a bar code data object, which becomes the current data object.

BBC (X'D3A8EB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8EB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	BCdoName		Name of the bar code data object	O	X'02'
8–*n*		Triplets		See BBC Semantics for triplet applicability.	O	X'10'

BBC Semantics

BCdoName Is the name of the bar code data object.

The page, overlay, or resource group containing the Begin Bar Code Object structured field must also contain a subsequent matching End Bar Code Object structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the Begin Bar Code Object structured field name and is used as the name of the bar code data object.
X'62'	Local Date and Time Stamp	Optional. This triplet or the Universal Date and Time Stamp (X'72') triplet may occur once. Assigns a date and time stamp to the object. See "Local Date and Time Stamp Triplet X'62'" on page 407.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'72'	Universal Date and Time Stamp	Optional. This triplet or the Local Date and Time Stamp (X'62') triplet may occur once. Assigns a universal date and time stamp to the object. See "Universal Date and Time Stamp Triplet X'72'" on page 418.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

Architecture Note: In AFP environments, the following retired triplet is used on this structured field:

- Line Data Object Position Migration (X'27') triplet; see "Line Data Object Position Migration Triplet X'27'" on page 561.

BBC Exception Condition Summary

X'08' A subsequent matching End Bar Code Object structured field is not present in the page, overlay, or resource group.

Bar Code Data (BDA)

The Bar Code Data structured field contains the data for a bar code object.

BDA (X'D3EEEB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3EEEB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–*n*	UNDF	BCOCAdat		Up to 32,759 bytes of BCOCA-defined data	O	X'00'

BDA Semantics

BCOCAdat Contains the BCOCA-defined data. See the MO:DCA environment appendix in the *Bar Code Object Content Architecture Reference* for detailed information.

Note: The number of data bytes allowed in this structured field may be restricted by an interchange set.

Bar Code Data Descriptor (BDD)

The Bar Code Data Descriptor structured field contains the descriptor data for a bar code data object.

BDD (X'D3A6EB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A6EB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–*n*	UNDF	BCOCAdes		Up to 32,759 bytes of BCOCA-defined descriptor data	O	X'00'

BDD Semantics

BCOCAdes Contains the BCOCA-defined descriptor data. See the MO:DCA environment appendix in the *Bar Code Object Content Architecture Reference* for detailed information.

Architecture Note: The BCOCA-defined descriptor supports the Color Specification (X'4E') triplet.

Note: The number of data bytes allowed in this structured field may be restricted by an interchange set.

Begin Document Environment Group (BDG)

The Begin Document Environment Group structured field begins a document environment group, which establishes the environment parameters for the form map object. The scope of the document environment group is the containing form map.

BDG (X'D3A8C4') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8C4'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	DEGName		Name of the document environment group	O	X'02'
8–*n*		Triplets		See BDG Semantics for triplet applicability.	O	X'10'

BDG Semantics

DEGName Is the name of the document environment group.

The form map containing the Begin Document Environment Group structured field must also contain a subsequent matching End Document Environment Group structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

BDG Exception Condition Summary

X'08' A subsequent matching End Document Environment Group structured field is not present in the form map.

Begin Document Index (BDI)

The Begin Document Index structured field begins the document index.

BDI (X'D3A8A7') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8A7'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	IndxName		Name of the document index	O	X'02'
8–*n*		Triplets		See BDI Semantics for triplet applicability.	O	X'10'

BDI Semantics

IndxName Is the name of the document index.

The print file containing the Begin Document Index structured field must also contain a subsequent matching End Document Index structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the Begin Document Index structured field name and is used as the name of the document index.
X'02'	Fully Qualified Name	Optional. May occur once. The Fully Qualified Name type that may appear is **X'83'**—*Begin Document Name*. Specifies the name of the document that is indexed by this document index. See "Fully Qualified Name Triplet X'02'" on page 351.
X'62'	Local Date and Time Stamp	Optional. This triplet or the Universal Date and Time Stamp (X'72') triplet may occur once. Assigns a date and time stamp to the object. See "Local Date and Time Stamp Triplet X'62'" on page 407

Triplet	Type	Usage
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'72'	Universal Date and Time Stamp	Optional. This triplet or the Local Date and Time Stamp (X'62') triplet may occur once. Assigns a universal date and time stamp to the object. See "Universal Date and Time Stamp Triplet X'72'" on page 418.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

BDI Exception Condition Summary

X'08' A subsequent matching End Document Index structured field is not present in the print file.

Begin Document (BDT)

The Begin Document structured field names and begins the document.

BDT (X'D3A8A8') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8A8'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	DocName		Name of the document	M	X'06'
8–9				Reserved; should be zero	M	X'06'
10–*n*		Triplets		See BDT Semantics for triplet applicability.	M	X'14'

BDT Semantics

DocName Is the name of the document described by the data stream. If a Fully Qualified Name type X'01' (Replace First GID) triplet appears in this structured field, the name specified in this parameter is ignored and the GID provided by the triplet is used instead.

Architecture Note: The semantic that stated “If the value of the first two bytes of DocName are X'FFFF', the processing system provides the document name” is no longer applicable and has been removed from the architecture. The document name on the BDT is first specified by the application that creates the document, and may be modified later by applications that process the document regardless of whether the first two bytes of DocName are X'FFFF' or not.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Mandatory. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348. **Implementation Note:** Not all MO:DCA products have historically implemented this triplet as a mandatory triplet on the BDT; instead they have assumed that the encoding for parameters with CHAR data type in a MO:DCA document is EBCDIC-based. To accommodate this practice, the MO:DCA IS/3 interchange set defines this triplet as optional and does not include support for the inheritance of encoding scheme definition by lower-level document components. Furthermore, IS/3 specifies the default encoding for character strings with CHAR data type to be defined by CCSID 500 (corresponding to the combination of CPGID 500 and GCSGID 697).
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID name*. This GID overrides the Begin Document structured field name and is used as the name of the document.
X'02'	Fully Qualified Name	Optional. May occur once. The Fully Qualified Name type that may appear is **X'0A'**—*Begin Resource Group Name*. Specifies the name of a resource group that contains resources referenced in this document. See "Fully Qualified Name Triplet X'02'" on page 351.
X'02'	Fully Qualified Name	Optional. May occur once. The Fully Qualified Name type that may appear is **X'98'**—*Begin Document Index Name*. Specifies the name of a document index resource object that provides index information for this document. See "Fully Qualified Name Triplet X'02'" on page 351.
X'18'	MO:DCA Interchange Set	For *interchange* data streams, this triplet is mandatory and must occur once. For *private* or *exchange* data streams, this triplet is not permitted. See "MO:DCA Interchange Set Triplet X'18'" on page 367.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'72'	Universal Date and Time Stamp	Optional. May occur once. Assigns a universal date and time stamp to the object. See "Universal Date and Time Stamp Triplet X'72'" on page 418.
X'8F'	MO:DCA Function Set	Mandatory if the MO:DCA Interchange Set (X'18') triplet is specified to indicate compliance with an interchange set and one or more function sets, in which case this triplet must occur at least once. If the MO:DCA Interchange Set triplet does not indicate compliance with an interchange set plus one or more function sets, or if that triplet is not specified, the MO:DCA Function Set triplet must not be specified. See "MO:DCA Function Set Triplet X'8F'" on page 455.

The data stream containing the Begin Document structured field must also contain a subsequent matching End Document structured field, or a X'08' exception condition exists.

Architecture Note: In AFP environments, the following retired triplet is used on this structured field:

- Object Function Set Specification (X'21') triplet; see "Object Function Set Specification Triplet X'21'" on page 559.

BDT Exception Condition Summary

X'01' This condition exists when:
- Multiple type X'01' (Replace First GID) Fully Qualified Name triplets appear.
- Multiple MO:DCA Interchange Set (X'18') triplets appear.

X'08' A subsequent matching End Document structured field is not present in the data stream.

Begin Form Map (BFM)

The Begin Form Map structured field begins a form map object, also called a *form definition* or *formdef*. A form map is a print control resource object that contains one or more medium map resource objects that are invokable on document and page boundaries and that specify a complete set of presentation controls. It also contains an optional document environment group (DEG) that defines the presentation environment for the form map.

BFM (X'D3A8CD') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8CD'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	FMName		Name of the form map	O	X'02'
8–*n*		Triplets		See BFM Semantics for triplet applicability.	O	X'10'

BFM Semantics

FMName Is the name of the form map.

A form map resource object must be terminated with a subsequent matching End Form Map structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'62'	Local Date and Time Stamp	Optional. This triplet or the Universal Date and Time Stamp (X'72') triplet may occur once. Assigns a date and time stamp to the object. See "Local Date and Time Stamp Triplet X'62'" on page 407.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'72'	Universal Date and Time Stamp	Optional. This triplet or the Local Date and Time Stamp (X'62') triplet may occur once. Assigns a universal date and time stamp to the object. See "Universal Date and Time Stamp Triplet X'72'" on page 418.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

BFM Exception Condition Summary

X'08' The form map is not terminated with a subsequent matching End Form Map structured field.

Begin Graphics Object (BGR)

The Begin Graphics Object structured field begins a graphics data object which becomes the current data object.

BGR (X'D3A8BB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8BB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	GdoName		Name of the graphics data object	O	X'02'
8–*n*		Triplets		See BGR Semantics for triplet applicability.	O	X'10'

BGR Semantics

GdoName Is the name of the graphics data object.

The page, overlay, or resource group containing the Begin Graphics Object structured field must also contain a subsequent matching End Graphics Object structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the Begin Graphics Object structured field name and is used as the name of the graphics data object.
X'62'	Local Date and Time Stamp	Optional. This triplet or the Universal Date and Time Stamp (X'72') triplet may occur once. Assigns a date and time stamp to the object. See "Local Date and Time Stamp Triplet X'62'" on page 407.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'72'	Universal Date and Time Stamp	Optional. This triplet or the Local Date and Time Stamp (X'62') triplet may occur once. Assigns a universal date and time stamp to the object. See "Universal Date and Time Stamp Triplet X'72'" on page 418.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

Architecture Note: In AFP environments, the following retired triplet is used on this structured field:

- Line Data Object Position Migration (X'27') triplet; see "Line Data Object Position Migration Triplet X'27'" on page 561.

BGR Exception Condition Summary

X'08' A subsequent matching End Graphics Object structured field is not present in the page, overlay, or resource group.

Begin Image Object (BIM)

The Begin Image Object structured field begins an IOCA image data object, which becomes the current data object.

Architecture Note: A migration form of the image object is supported in AFP environments and is defined as the *IM Image Object* in "IM Image Object" on page 595.

BIM (X'D3A8FB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8FB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	IdoName		Name of the image data object	O	X'02'
8–*n*		Triplets		See BIM Semantics for triplet applicability.	O	X'10'

BIM Semantics

IdoName Is the name of the IOCA image data object.

The page, overlay, or resource group containing the Begin Image Object structured field must also contain a subsequent matching End Image Object structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the Begin Image Object structured field name and is used as the identifier of the image data object. The identifier may be specified in one—and only one—of the following formats: • If FQNFmt = X'00', the identifier is a character-encoded name. See "External Resource Naming Conventions" on page 89 for a description of the naming conventions used in AFP environments.
X'62'	Local Date and Time Stamp	Optional. This triplet or the Universal Date and Time Stamp (X'72') triplet may occur once. Assigns a date and time stamp to the object. See "Local Date and Time Stamp Triplet X'62'" on page 407.

Triplet	Type	Usage
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'72'	Universal Date and Time Stamp	Optional. This triplet or the Local Date and Time Stamp (X'62') triplet may occur once. Assigns a universal date and time stamp to the object. See "Universal Date and Time Stamp Triplet X'72'" on page 418.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

Architecture Note: In AFP environments, the following retired triplet is used on this structured field:

- Line Data Object Position Migration (X'27') triplet; see "Line Data Object Position Migration Triplet X'27'" on page 561.

BIM Exception Condition Summary

X'08' A subsequent matching End Image Object structured field is not present in the page, overlay, or resource group.

Begin Medium Map (BMM)

The Begin Medium Map structured field begins a medium map resource object. A medium map is a print control resource object that contains a complete set of controls for presenting pages on physical media such as sheets and for generating multiple copies of sheets with selectable modifications. These controls may be grouped into two categories:

- Medium level controls
- Page level controls

Medium level controls are controls that affect the medium, such as the specification of medium overlays, medium size, medium orientation, medium copies, simplex or duplex, medium finishing, media type, and media source and destination selection. These controls are defined by the Map Medium Overlay (MMO), Medium Descriptor (MDD), Medium Copy Count (MCC), Medium Finishing Control (MFC), Map Media Type (MMT), Map Media Destination (MMD), Presentation Environment Control (PEC), and Medium Modification Control (MMC) structured fields. Page level controls are controls that affect the pages that are placed on the medium, such as the specification of page modifications, page position, and page orientation. These controls are defined by the Map Page Overlay (MPO), Page Position (PGP), and Page Modification Control (PMC) structured fields.

BMM (X'D3A8CC') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8CC'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	MMName		Name of the medium map	M	X'06'
8–*n*		Triplets		See BMM Semantics for triplet applicability.	O	X'10'

BMM Semantics

MMName Is the name of the medium map.

A medium map resource object must be terminated with a subsequent matching End Medium Map structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'45'	Media Eject Control	Optional. May occur once. See "Media Eject Control Triplet X'45'" on page 384. Specifies the type of media eject that should be performed when this medium map is invoked and N-up partitioning is specified. This triplet is ignored when it occurs on the medium map that is activated at the beginning of a document regardless of whether this medium map is explicitly invoked or implicitly invoked as the default. **Note:** If this triplet is not present, the architected default for the EjCtrl parameter in the triplet is X'01'; that is, perform a sheet eject and activate all controls specified by the medium map.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.

BMM Exception Condition Summary

X'01' This exception condition exists when:

- The Begin Medium Map structured field specifies a conditional eject to a front-side partition and the PGP in the medium map does not specify a front-side partition.
- The Begin Medium Map structured field specifies a conditional eject to a back-side partition and the PGP in the medium map does not specify a back-side partition.

X'08' The medium map is not terminated with a subsequent matching End Medium Map structured field.

Begin Overlay (BMO)

The Begin Overlay structured field begins an overlay. An overlay contains an active environment group to establish parameters such as the size of the overlay's presentation space and the fonts to be used by the data objects. It may also contain any mixture of:

- Bar code objects
- Graphics objects
- Image objects
- Object containers
- Presentation text objects

BMO (X'D3A8DF') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8DF'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	OvlyName		Name of the overlay	M	X'06'
8–*n*		Triplets		See BMO Semantics for triplet applicability.	O	X'10'

BMO Semantics

OvlyName Is the name of the overlay. This name may not appear on more than one Begin Overlay within the same resource group or a X'01' exception condition exists.

The resource group containing the Begin Overlay structured field must also contain a subsequent matching End Overlay structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is: **X'01'**—*Replace First GID Name*. This GID overrides the Begin Overlay structured field name and is used as the name of the overlay.
X'62'	Local Date and Time Stamp	Optional. This triplet or the Universal Date and Time Stamp (X'72') triplet may occur once. Assigns a date and time stamp to the object. See "Local Date and Time Stamp Triplet X'62'" on page 407. **Application Note:** In environments that include an intermediate caching device such as Remote Print Manager (RPM) or Distributed Print Facility (DPF), time stamps on the BMO structured field must be specified using the X'62' triplet.

Triplet	Type	Usage
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'72'	Universal Date and Time Stamp	Optional. This triplet or the Local Date and Time Stamp (X'62') triplet may occur once. Assigns a universal date and time stamp to the object. See "Universal Date and Time Stamp Triplet X'72'" on page 418.

Overlays reside in external resource libraries or in resource groups. See "Resource Groups" on page 16 for details on locating resource objects within libraries and resource groups.

Architecture Note: In AFP environments, the following retired triplets are used on this structured field:

- Object Checksum (X'63') triplet; see "Object Checksum Triplet X'63'" on page 567
- Object Origin Identifier (X'64') triplet; see "Object Origin Identifier Triplet X'64'" on page 568

BMO Exception Condition Summary

X'01' Multiple Begin Overlay structured fields with the same name exist within the same resource group.

X'08' A subsequent matching End Overlay structured field is not present in the same resource group.

Begin Named Page Group (BNG)

The Begin Named Page Group structured field begins a page group, which is a named, logical grouping of sequential pages. A page group may contain other nested page groups. All pages in the page group and all other page groups that are nested in the page group inherit the attributes that are assigned to the page group using TLE structured fields.

BNG (X'D3A8AD') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8AD'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	PGrpName		Name of the page group	M	X'06'
8–*n*		Triplets		See BNG Semantics for triplet applicability.	O	X'10'

BNG Semantics

PGrpName Is the name of the page group.

The document containing the Begin Named Page Group structured field must also contain a subsequent matching End Named Page Group structured field, or a X'08' exception condition exists.

If the Keep Group Together (X'9D') triplet is specified on the Begin Named Page Group structured field, the name of the page group must be unique in the document, and the same name must be specified on the corresponding End Named Page Group structured field, or a X'01' exception condition exists. That is, in this case, the value X'FFFF' cannot be specified for the page group name in the ENG structured field.

Triplets Appear in the Begin Named Page Group structured field as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See “Coded Graphic Character Set Global Identifier Triplet X'01'” on page 348.
X'02'	Fully Qualified Name	Optional. May occur once. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID name*. This GID overrides the Begin Named Page Group structured field name and is used as the name of the page group.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'8D'**—*Begin Medium Map Reference*. Specifies the name of the medium map that is active at the beginning of the page group. **Application Note:** This triplet is typically specified on the BNG structured fields when the page group is to be archived with a specific form map. It allows the page group to be retrieved and viewed at a later time without "playing back" the whole document. This triplet is ignored by print servers.
X'56'	Medium Map Page Number	Optional. May occur once. Specifies the sequence number of the first page-group page in the set of sequential pages controlled by the medium map that is active at the beginning of the page group. The first page in the set has sequence number 1. See "Medium Map Page Number Triplet X'56'" on page 398. **Application Note:** This triplet is typically specified on the BNG structured fields when the page group is to be archived with a specific form map. It allows the page group to be retrieved and viewed at a later time without "playing back" the whole document. This triplet is ignored by print servers. Note that similar functionality can be achieved by specifying the Page Position Information (X'81') triplet on the BPG for the pages in the page group.
X'5E'	Object Count	Optional. May occur once for each subordinate object type counted. Specifies how many subordinate objects of a particular type, such as a page, are contained within the page group. See "Object Count Triplet X'5E'" on page 405.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'83'	Presentation Control	Optional. May occur once. Specifies whether the page group is intended to be indexed. If this triplet is not specified, the architected default is that the page group is intended to be indexed. This triplet is ignored for printing. See "Presentation Control Triplet X'83'" on page 428.
X'9D'	Keep Group Together	Optional. May occur once. Specifies that the page group should be kept together for the purpose indicated by the triplet. See "Keep Group Together Triplet X'9D'" on page 468. **Architecture Note:** If this triplet specifies GrpFnct = X'01' - Keep group together as a recovery unit, full operation of this function at the IPDS level requires that the page group start on a sheet boundary.

Architecture Note: If page group level indexing is used for a document that contains page groups, it is recommended that the page group name, whether it is specified by an 8-byte token name or by a fully qualified name, be unique with respect to other page group names within the document.

Application Notes:

1. The FQN Begin Medium Map Reference (type X'8D') triplet and the Medium Map Page Number (X'56') triplet may be used by viewing applications to present the page group in standalone fashion as it would be presented within the context of the complete document. These triplets are ignored by print servers.
2. Page groups are often processed in standalone fashion, that is, they are indexed, retrieved, and presented outside the context of the containing document. While the pages in the group are independent of each

other and of any other pages in the document, their formatting on media depends on when the last medium map was invoked and on how many pages precede the BNG since this invocation. To make the media formatting of page groups self-contained, a medium map should be invoked at the beginning of the page group between the Begin Named Group (BNG) structured field and the first Begin Page (BPG) structured field. If this is not done, the presentation system may need to “play back” all pages between the invocation of the active medium map and the BNG to determine media formatting such as sheet-side and partition number for the first page in the group. It is therefore *strongly* recommended that in environments where standalone page group processing is required or anticipated, page groups are built with an Invoke Medium Map (IMM) structured field specified after the BNG and before the first BPG.

3. Some AFP applications that generate page groups will support a user option that ensures that an IMM is specified after BNG and before the first BPG, and some AFP archive servers will expect an IMM there and may not present the page group correctly if none is found. However, note that this may cause the complete document to print differently.

4. A newer method to specify how a page or page group should be formatted involves use of the Page Position Information (X'81') triplet. This triplet may be specified on a BPG and indicates the repeating group in the PGP structured field in the active medium map that should be used to format the page.

5. When the Keep Group Together (X'9D') triplet on the BNG specifies GrpFnct = X'01' - Keep group together as a recovery unit, full operation of this function in an IPDS environment requires that this group starts on a sheet boundary. It is therefore strongly recommended that if this triplet is specified on the BNG, a sheet eject is generated by:

   - immediately preceding the BNG by an Invoke Medium Map (IMM) that causes a sheet eject, or
   - following the BNG with an IMM that causes a sheet eject, as long as that IMM occurs before the first Begin Page (BPG) in the page group

   If such an IMM is not specified, IPDS printers in general will not be able to treat the group as a logical unit for error recovery, but normally can still indicate when an error has occurred while printing such a group.

6. Using cut-sheet emulation can affect the printer’s ability to keep recovery unit groups together because:

   - the printer increments the page counters on a sheet basis rather than on a sheetlet basis
   - the server cannot control when a group is on a sheet boundary

   When cut-sheet emulation is being used, if a “Keep Together” page group does not begin on a sheet boundary, the group operation is suspended and blank sheets might occur within that group; this results in a presentation-system exception (for example, IPDS exception ID X'4040..00' or X'0140..00' with action code X'2B'). For example, when the last pages of a group are on the left sheetlet and the first pages of another group are on the right sheetlet, the “Keep Together” group operation will be suspended for the second group.

Nesting Rules for Keep Group Together recovery units

When the data stream contains page groups defined by the Keep Group Together (X'9D') triplet on the BNG and also generates sheet groups based on functions specified in medium maps, such as medium finishing groups, care must be taken to avoid overlap of these two types of groups. In particular, the following rules must be followed:

- A “Keep Together” page group must not be nested inside another “Keep Together” page group.
- Sheet groups may be nested inside “Keep Together” page groups and vice versa, but the two group types must not overlap. That is, the two group types, if specified, must be properly nested. For example, if a “Keep Together” page group is started after a sheet group, it must be terminated before or at the point in the data stream where the sheet group is terminated. The same is true if a sheet group is started after a “Keep Together” page group: the sheet group must be terminated before or at the point in the data stream where the “Keep Together” page group is terminated.

If the above rules are not followed, a group may end up being terminated prematurely, and/or exceptions may be generated by the presentation system.

BNG Exception Condition Summary

X'01' The same subordinate object type, such as a page, is counted in more than one X'5E' triplet.

X'08' A subsequent matching End Named Page Group structured field is not present in the document.

Begin Object Container (BOC)

The Begin Object Container structured field begins an object container, which may be used to envelop and carry object data. The object data may or may not be defined by an AFP architecture.

BOC (X'D3A892') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A892'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	ObjCName		Name of the object container	M	X'06'
8–*n*		Triplets		See BOC Semantics for triplet applicability.	M	X'14'

BOC Semantics

ObjCName Is the name of the object container.

The page, overlay, or resource group containing the Begin Object Container structured field must also contain a subsequent matching End Object Container structured field, or a X'08' exception condition exists.

Triplets Appear in the Begin Object Container structured field as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348. **Application Note:** It is strongly recommended that this triplet is specified even if the parameter on the BOC defines a fixed encoding. For example, if the parameter defines a fixed UTF-16BE encoding, the triplet can be specified using the CCSID form with CCSID=1200 (X'04B0').
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID name*. This GID overrides the Begin Object Container structured field name and is used as the identifier of the object container. The identifier may be specified in one—and only one—of the following formats: • If FQNFmt = X'00', the identifier is a character-encoded name. See "External Resource Naming Conventions" on page 89 for a description of the naming conventions used in AFP environments. The character-encoded name on the BOC is optional if the container is in a print file level resource group and the name is already specified on the BRS that immediately precedes the BOC. If the object in the container is a TrueType/OpenType font (TTF), this version of the triplet may occur more than once, and each instance of the triplet is used to specify the full font name in a language used in the font naming table. The character encoding is UTF-16BE. • If FQNFmt = X'10', the identifier is a ASN.1 OID encoded using the definite short form. This format provides a unique and system-independent method to identify a resource. It may be used to identify resources that are resident in, or have been captured by, the presentation device. Such an identifier is referred to as an *object OID*. Note that the object OID is associated with the resource content; it does not reflect the MO:DCA wrappers used to carry the content. If the BOC specifies an object OID and envelopes either a TTF/OTF, a TrueType collection file, a data object, or a CMR, the OID may be used to locate a printer-resident version of the object. It also makes the object a candidate for capture by the printer. In this case this version of the triplet may only occur once. **Architecture Note:** If the BOC is used to carry a TTF/OTF, a data object, or a CMR in a print file level resource group, the FQN type X'01' triplet on the mandatory BRS must specify the full font name, or the data object name, or the CMR name using FQNFmt = X'00'. The FQN type X'01' triplet on the BOC may then be used to specify the object OID for the object using FQNFmt = X'10'; this enables the server to use a printer-resident version of the object and also makes the object a candidate for capture by the printer.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur more than once. See "Fully Qualified Name Triplet X'02'" on page 351. This triplet is optional on the BOC if the container is in a print file level resource group and the same triplet is already specified on the BRS that immediately precedes the BOC. The Fully Qualified Name type that may appear is **X'41'**—*Color Management Resource (CMR) Reference*. This triplet may be specified on a BOC to indicate the following: • If the resource is a Color Conversion (CC) CMR, this triplet specifies the name of a Link LK CMR that is to be mapped to the CC CMR in the container. • If the resource is a generic Halftone (HT) or Tone Transfer Curve (TTC) CMR, this triplet specifies the name of a device-specific CMR of the same type that is to replace the generic CMR. The identifier may be specified in the following format. • If FQNFmt = X'00', the identifier is a character-encoded name. The character string that identifies the CMR must be the *CMR name* specified in the CMR. The character encoding is UTF-16BE.
X'02'	Fully Qualified Name	Optional. May occur more than once. See "Fully Qualified Name Triplet X'02'" on page 351. This triplet is optional on the BOC if the container is in a print file level resource group and the same triplet is already specified on the BRS that immediately precedes the BOC. The Fully Qualified Name type that may appear is **X'6E'**—*Data-object Font Base Font Identifier*. This triplet may be specified on a BOC to indicate the following: • If the BOC envelopes a TrueType Collection (TTC) file, the FQN type X'6E' triplet specifies a base TrueType/OpenType font that is contained in the collection. The identifier may be specified in the following format. • If FQNFmt = X'00', the identifier is a character-encoded name. The character string that identifies the font must be the *full font name* specified in a name record in the mandatory Naming Table of the font file. This parameter is specified in a name record with Name ID 4. An example of a full font name is *Times New Roman Bold*. Each instance of the FQN type X'6E' triplet with FQNFmt = X'00' is used to specify the full font name of the base font in a language used in the font's Naming Table. The character encoding is UTF-16BE, which matches the encoding defined by EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001') in the Naming Table. The byte order is big endian. For example, if the font Naming Table contains two name records for the full font name (Name ID 4), one in English - United States (LCID = X'0409') and one in German - Standard (LCID = X'0407'), both in the encoding defined by EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001'), each of these names, encoded in UTF-16BE, is carried in a FQN type X'6E' triplet on the BOC.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur more than once. See "Fully Qualified Name Triplet X'02'" on page 351. This triplet is optional on the BOC if the container is in a print file level resource group and the same triplet is already specified on the BRS that immediately precedes the BOC. The Fully Qualified Name type that may appear is **X'7E'**—*Data-object Font Linked Font Identifier*. This triplet may be specified on a BOC to indicate the following: • If the BOC envelopes a TrueType/OpenType font (TTF/OTF) file, the FQN type X'7E' triplet specifies a linked font for the base font. The order in which the FQN type X'7E' triplets are specified determines the order in which the linked fonts are processed. • If the BOC envelopes a TrueType Collection (TTC) file, the FQN type X'7E' triplet specifies a linked font for the base font that is identified with the immediately preceding FQN type X'6E' triplet. Note that if the base font is specified in multiple languages using multiple FQN type X'6E' triplets, each instance of the FQN type X'6E' triplet must be followed by the sequence of FQN type X'7E' triplets that identify the linked fonts for the base font. The identifier may be specified in the following format. • If FQNFmt = X'00', the identifier is a character-encoded name. The character string that identifies the font must be the *full font name* specified in a name record in the mandatory Naming Table of the font file. This parameter is specified in a name record with Name ID 4. An example of a full font name is *Times New Roman Bold*. The character encoding is UTF-16BE, which matches the encoding defined by EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001') in the Naming Table. The byte order is big endian.
X'10'	Object Classification	Mandatory. Must occur once. Specifies information used to classify and identify the enveloped object data. See "Object Classification Triplet X'10'" on page 363.
X'57'	Object Byte Extent	Optional. May occur once. Specifies the number of bytes contained in the object container. The byte extent is measured starting with the first byte of the Begin Object Container (BOC) structured field up to and including the last byte of the End Object Container (EOC) structured field. See "Object Byte Extent Triplet X'57'" on page 399.
X'62'	Local Date and Time Stamp	Optional. This triplet or the Universal Date and Time Stamp (X'72') triplet may occur once. Assigns a date and time stamp to the object. See "Local Date and Time Stamp Triplet X'62'" on page 407.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'72'	Universal Date and Time Stamp	Optional. This triplet or the Local Date and Time Stamp (X'62') triplet may occur once. Assigns a universal date and time stamp to the object. See "Universal Date and Time Stamp Triplet X'72'" on page 418.

Application Note: To optimize print performance, it is strongly recommended that the same encoding scheme be used for a resource reference wherever in a print file that resource reference is specified. That is, the encoding scheme used for the resource include, the resource map, and the resource wrapper should be the same. For TrueType/OpenType fonts, optimal performance can be achieved by using UTF-16BE as the encoding scheme.

BOC Exception Condition Summary

X'01' This condition exists when a BOC parameter that is also allowed on a BRS in a BRS/BOC...EOC/ERS resource envelope and that is used for processing conflicts with the corresponding BRS parameter. Examples are:

- Object Classification (X'10') triplet
- FQN type X'41' - Color Management Resource (CMR) Reference triplet
- FQN type X'6E' - Data-object Font Base Font Identifier triplet
- FQN type X'7E' - Data-object Font Linked Font Identifier triplet

Note that since some of these parameters are simply optional repetitions of the same parameter on the BRS, they may not be used for processing by some applications and therefore may not result in an exception if specified inconsistently.

X'08' A subsequent matching End Object Container structured field is not present in the page, overlay, or resource group.

Begin Object Environment Group (BOG)

The Begin Object Environment Group structured field begins an Object Environment Group, which establishes the environment parameters for the object. The scope of an object environment group is its containing object.

BOG (X'D3A8C7') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8C7'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	OEGName		Name of the object environment group	O	X'02'
8–*n*		Triplets		See BOG Semantics for triplet applicability.	O	X'10'

BOG Semantics

OEGName Is the name of the object environment group.

The object containing the Begin Object Environment Group structured field must also contain a subsequent matching End Object Environment Group structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

BOG Exception Condition Summary

X'08' A subsequent matching End Object Environment Group structured field is not present in the object.

Begin Print File (BPF)

The Begin Print File structured field names and begins the print file.

BPF (X'D3A8A5') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8A5'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	PFName		Name of the print file	O	X'02'
8–*n*		Triplets		See BPF Semantics for triplet applicability.	O	X'10'

BPF Semantics

PFName Is the name of the print file described by the data stream.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies the encoding for structured field parameters defined with a CHAR data type. If this triplet is not specified, the architected default encoding is EBCDIC single-byte presentation, which is characterized with encoding scheme ID X'61nn', and which is identified with CCSID 500 (corresponding to the combination of CPGID 500 and GCSGID 697). See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID name*. This GID overrides the Begin Print File structured field name and is used as the name of the print file.
X'18'	MO:DCA Interchange Set	For *interchange* data streams, this triplet is mandatory and must occur once. For *private* or *exchange* data streams, this triplet is not permitted. See "MO:DCA Interchange Set Triplet X'18'" on page 367. **Application Note:** The X'18' triplet is used by AFP generators to indicate that the print file is intended to be compliant with the specified MO:DCA interchange set. Compliance and certification tools and utilities may use this indicator to check a print file for compliance with the specified interchange set. The triplet may also be used as a debug aid when diagnosing system interoperability problems. However, in general, AFP receivers such as print servers and transforms are not expected to verify whether the content of the print file matches the interchange set specification in the X'18' triplet, nor is there an exception defined for the case where the print file content does not match the interchange set specification in the X'18' triplet.

Triplet	Type	Usage
X'5E'	Object Count	Optional. May occur once with SubObj = X'AF' to specify the number of pages in this print file. See “Object Count Triplet X'5E'” on page 405. **Application Note:** The number of pages in a print file is defined by the number of page objects bounded by BPG/EPG or included by IPG in the documents in that print file. Pages that are specified in a document resource that is carried in a print-file-level resource group are not counted. A blank page that is generated by the print server for a sheet-side that does not contain page data is not counted as a page since there is no corresponding BPG/EPG or IPG in the document. Similarly, if a Medium Map generates multiple copies of a sheet-side that contains BPG/EPGs or IPGs, the corresponding pages are only counted once.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See “Comment Triplet X'65'” on page 409.
X'72'	Universal Date and Time Stamp	Optional. May occur once. Assigns a universal date and time stamp to the print file. See “Universal Date and Time Stamp Triplet X'72'” on page 418.
X'8F'	MO:DCA Function Set	Mandatory if the MO:DCA Interchange Set (X'18') triplet is specified to indicate compliance with an interchange set and one or more function sets, in which case this triplet must occur at least once. If the MO:DCA Interchange Set triplet does not indicate compliance with an interchange set plus one or more function sets, or if that triplet is not specified, the MO:DCA Function Set triplet must not be specified. See “MO:DCA Function Set Triplet X'8F'” on page 455.

The data stream containing the Begin Print File structured field must also contain a subsequent matching End Print File structured field, or a X'08' exception condition exists.

Note: If a triplet is included on this structured field, the optional PFName positional parameter becomes mandatory.

BPF Exception Condition Summary

X'08' A subsequent matching End Print File structured field is not present in the data stream.

Begin Page (BPG)

The Begin Page structured field begins a presentation page. A presentation page contains an active environment group to establish parameters such as the size of the page's presentation space and the fonts to be used by the data objects. It may also contain any mixture of:

- Bar code objects
- Graphics objects
- Image objects
- Object containers
- Presentation text objects

BPG (X'D3A8AF') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8AF'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	PageName		Name of the page	O	X'02'
8–*n*		Triplets		See BPG Semantics for triplet applicability.	O	X'10'

BPG Semantics

PageName Is the name of the page.

The document containing the Begin Page structured field must also contain a subsequent matching End Page structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See “Coded Graphic Character Set Global Identifier Triplet X'01'” on page 348.
X'02'	Fully Qualified Name	Optional. May occur once. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the Begin Page structured field name and is used as the name of the page.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'8D'**—*Begin Medium Map Reference*. Specifies the name of the medium map object that is active for presenting the page on a physical medium. **Application Note:** This triplet is typically specified on the BPG structured fields when the page or page group is to be archived with a specific form map. It allows the page or page group to be retrieved and viewed at a later time without "playing back" the whole document. This triplet is ignored by print servers.
X'56'	Medium Map Page Number	Optional. May occur once. Specifies the sequence number of the page in the set of sequential pages controlled by the active medium map. The first page in the set has sequence number 1. See "Medium Map Page Number Triplet X'56'" on page 398. **Application Note:** This triplet is typically specified on the BPG structured fields when the page is to be archived with a specific form map. It allows the page to be retrieved and viewed at a later time without "playing back" the whole document. This triplet is ignored by print servers. Note that the Medium Map Page Number (X'56') triplet is not needed if a Page Position Information (X'81') triplet is specified, and is overridden by the latter.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'81'	Page Position Information	Optional. May occur once. Specifies the PGP repeating group that is used to view the page and its PMC overlay data. The PGP is specified in the medium map referenced by a FQN type X'8D'—Begin Medium Map Reference triplet. If the X'81' triplet is specified, it overrides a Medium Map Page Number (X'56') triplet. This triplet is not used for printing and is ignored by print servers. See "Page Position Information Triplet X'81'" on page 426.
X'83'	Presentation Control	Optional. May occur once. Specified on a BPG to indicate whether the page is intended to be viewed. If this triplet is not specified, the architected default is that the page is intended to be viewed. If this triplet is also specified on an Index Element (IEL) that indexes the page, the IEL triplet overrides if there is a conflict. This triplet is ignored for printing. See "Presentation Control Triplet X'83'" on page 428.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

Application Notes:

1. If a page is to be indexed or if it is to be included in a resource document, a page name is required so that the page can be identified and referenced. It is therefore highly recommended that the BPG structured field always specify a page name.
2. If page level indexing is used for the document that contains this page, or if this page is part of a resource document, it is recommended that the page name, whether it is specified by an 8-byte token name or by a fully qualified name, be unique with respect to other page names within the document.
3. The FQN Begin Medium Map Reference (type X'8D') triplet, the Medium Map Page Number (X'56') triplet, the Page Position Information (X'81') triplet, and the Presentation Control (X'83') triplet may be used by viewing applications to present the page in standalone fashion as it would be presented within the context of the complete document. These triplets are ignored by print servers.

BPG Exception Condition Summary

X'08' A subsequent matching End Page structured field is not present in the document.

Begin Page Segment (BPS)

The Begin Page Segment structured field begins a page segment. A page segment is a resource object that can be referenced from a page or overlay and that contains any mixture of:
- Bar code objects (BCOCA)
- Graphics objects (GOCA)
- Image objects (IOCA)

Objects in a page segment must specify an object area offset of zero so that they are positioned either at the origin of the including page or overlay coordinate system or at a reference point that is defined on the including page or overlay coordinate system by the Include Page Segment (IPS) structured field.

A page segment does not contain an active environment group. The environment for a page segment is defined by the active environment group of the including page or overlay.

Architecture Note: A migration form of the page segment resource object is supported in AFP environments and is defined in "AFP Page Segment" on page 594.

BPS (X'D3A85F') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A85F'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	PsegName		Name of the page segment	M	X'06'
8–*n*		Triplets		See BPS Semantics for triplet applicability.	O	X'10'

BPS Semantics

PsegName Is the name of the page segment. This name may not appear on more than one Begin Page Segment within the same resource group or a X'01' exception condition exists.

A page segment resource definition must contain a subsequent matching End Page Segment structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'62'	Local Date and Time Stamp	Optional. This triplet or the Universal Date and Time Stamp (X'72') triplet may occur once. Assigns a date and time stamp to the object. See "Local Date and Time Stamp Triplet X'62'" on page 407. **Application Note:** In environments that include an intermediate caching device such as Remote Print Manager (RPM) or Distributed Print Facility (DPF), time stamps on the BPS structured field must be specified using the X'62' triplet.

Triplet	Type	Usage
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'72'	Universal Date and Time Stamp	Optional. This triplet or the Local Date and Time Stamp (X'62') triplet may occur once. Assigns a universal date and time stamp to the object. See "Universal Date and Time Stamp Triplet X'72'" on page 418.

Page segments reside in external resource libraries or in resource groups. See "Resource Groups" on page 16 for details on locating resource objects within libraries or resource groups.

Application Note: For purposes of print server resource management, the OEGs for all objects in a page segment must not contain MCF or MDR structured fields when the page segment is referenced with an IOB or IPS structured field.

Architecture Note: In AFP environments, the following retired triplets are used on this structured field:

- Object Checksum (X'63') triplet; see "Object Checksum Triplet X'63'" on page 567
- Object Origin Identifier (X'64') triplet; see "Object Origin Identifier Triplet X'64'" on page 568

BPS Exception Condition Summary

X'01' Multiple Begin Page Segment structured fields with the same name exist within the same resource group.

X'08' The page segment resource definition is not terminated by a subsequent matching End Page Segment structured field.

Begin Presentation Text Object (BPT)

The Begin Presentation Text Object structured field begins a presentation text object which becomes the current data object.

BPT (X'D3A89B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A89B'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	PTdoName		Name of the presentation text data object	O	X'02'
8–*n*		Triplets		See BPT Semantics for triplet applicability.	O	X'10'

BPT Semantics

PTdoName Is the name of the presentation text data object.

The page, or overlay containing a Begin Presentation Text Object structured field must also contain a subsequent matching End Presentation Text Object structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the Begin Presentation Text Object structured field name and is used as the name of the presentation text data object.
X'62'	Local Date and Time Stamp	Optional. This triplet or the Universal Date and Time Stamp (X'72') triplet may occur once. Assigns a date and time stamp to the object. See "Local Date and Time Stamp Triplet X'62'" on page 407.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'72'	Universal Date and Time Stamp	Optional. This triplet or the Local Date and Time Stamp (X'62') triplet may occur once. Assigns a universal date and time stamp to the object. See "Universal Date and Time Stamp Triplet X'72'" on page 418.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

Application Note: When the BPT structured field is processed, all initial text conditions specified in the Presentation Text Descriptor (PTD) structured field are set prior to processing the text object. In addition, AFP servers set the following default page level initial text conditions *before* the PTD initial text conditions are set:

Table 16. Default BPT Page-Level Initial Text Conditions

Parameter	Value
Initial (I,B) Presentation Position	(0,0)
Text Orientation	0°,90°
Font Local ID	X'FF' (default font)
Baseline Increment	6 lpi
Inline Margin	0
Intercharacter Adjustment	0
Text Color	X'FFFF' (default color)

Architecture Note: In AFP environments, the following retired triplet is used on this structured field:

- Line Data Object Position Migration (X'27') triplet; see “Line Data Object Position Migration Triplet X'27'” on page 561.

BPT Exception Condition Summary

X'08' A subsequent matching End Presentation Text Object structured field is not present in the page, or overlay.

Begin Resource Group (BRG)

The Begin Resource Group structured field begins a resource group, which becomes the current resource group at the same level in the document hierarchy.

BRG (X'D3A8C6') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8C6'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	RGrpName		Name of the resource group	O	X'02'
8–*n*		Triplets		See BRG Semantics for triplet applicability.	O	X'10'

BRG Semantics

RGrpName Is the name of the resource group.

The print file, document, page, or data object containing the Begin Resource Group structured field must also contain a subsequent matching End Resource Group structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the Begin Resource Group structured field name and is used as the name of the resource group.
X'02'	Fully Qualified Name	Optional. May occur more than once. The Fully Qualified Name type that may appear is **X'83'**—*Begin Document Name*. Specifies the name of a document that references resources contained in this resource group. See "Fully Qualified Name Triplet X'02'" on page 351.
X'62'	Local Date and Time Stamp	Optional. This triplet or the Universal Date and Time Stamp (X'72') triplet may occur once. Assigns a date and time stamp to the object. See "Local Date and Time Stamp Triplet X'62'" on page 407.

Triplet	Type	Usage
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.
X'72'	Universal Date and Time Stamp	Optional. This triplet or the Local Date and Time Stamp (X'62') triplet may occur once. Assigns a universal date and time stamp to the object. See "Universal Date and Time Stamp Triplet X'72'" on page 418.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

BRG Exception Condition Summary

X'08' A subsequent matching End Resource Group structured field is not present in the print file, document, page, or data object.

Begin Resource (BRS)

The Begin Resource structured field begins an envelope that is used to carry resource objects in print file level (external) resource groups. Resource references in the data stream are matched against the resource identifier specified by the Begin Resource structured field.

Application Note: To optimize print performance, it is strongly recommended that the same encoding scheme be used for a resource reference wherever in a print file that resource reference is specified. That is, the encoding scheme used for the resource include, the resource map, and the resource wrapper should be the same. For TrueType/OpenType fonts, optimal performance can be achieved by using UTF-16BE as the encoding scheme.

BRS (X'D3A8CE') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8CE'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	RSName		Identifier of the resource	M	X'02'
8–9				Reserved; should be zero	M	X'06'
10–*n*		Triplets		See BRS Semantics for triplet applicability.	M	X'14'

BRS Semantics

RSName Is the identifier used to select the resource. This identifier is matched against the resource reference in the data stream.

The resource group containing the Begin Resource structured field must also contain a subsequent matching End Resource structured field, or a X'08' exception condition exists.

Triplets Appear in the Begin Resource structured field as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348. **Implementation Note:** Not all AFP servers support the inheritance of encoding scheme from higher levels of the document hierarchy, therefore it is recommended that this triplet be specified directly on the BRS if required by a parameter such as the FQN type X'01' triplet. **Application Note:** It is strongly recommended that this triplet is specified even if the parameter on the BRS defines a fixed encoding. For example, if the parameter defines a fixed UTF-16BE encoding, the triplet can be specified using the CCSID form with CCSID=1200 (X'04B0').
X'02'	Fully Qualified Name	At least one occurrence of this triplet is mandatory if the BRS envelopes a TrueType Collection (TTC) file; may occur more than once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'6E'**—*Data-object Font Base Font Identifier*. This triplet may be specified on a BRS to indicate the following: • If the BRS envelopes a TrueType Collection (TTC) file, the FQN type X'6E' triplet specifies a base TrueType/OpenType font that is contained in the collection. The identifier may be specified in the following format. • If FQNFmt = X'00', the identifier is a character-encoded name. The character string that identifies the font must be the *full font name* specified in a name record in the mandatory Naming Table of the font file. This parameter is specified in a name record with Name ID 4. An example of a full font name is *Times New Roman Bold*. Each instance of the FQN type X'6E' triplet with FQNFmt = X'00' is used to specify the full font name of the base font in a language used in the font's Naming Table. The character encoding is UTF-16BE, which matches the encoding defined by EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001') in the Naming Table. The byte order is big endian. For example, if the font Naming Table contains two name records for the full font name (Name ID 4), one in English - United States (LCID = X'0409') and one in German - Standard (LCID = X'0407'), both in the encoding defined by EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001'), each of these names, encoded in UTF-16BE, is carried in a FQN type X'6E' triplet on the BRS.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID name*. This identifier overrides the Begin Resource structured field name and is used as the identifier of the resource. The identifier may be specified in one—and only one—of the following formats: • If FQNFmt = X'00', the identifier is a character-encoded name. See "External Resource Naming Conventions" on page 89 for a description of the naming conventions used in AFP environments. If the Resource Object Type (X'21') triplet specifies ObjType=X'92' - Object Container, and if the Object Classification Triplet indicates that the object in the container is a TrueType/OpenType font (TTF), the FQN type X'01' triplet, specified using FQNFmt = X'00', may occur more than once. In that case, each instance of the FQN type X'01' triplet is used to specify the full font name in a language used in the font naming table. The character encoding is UTF-16BE, which matches the encoding defined by EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001') in the font's Naming Table. For example, if the font Naming Table contains two name records for the full font name (Name ID 4), one in English - United States (LCID = X'0409') and one in German - Standard (LCID = X'0407'), both in the encoding defined by EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001'), each of these names, encoded in UTF-16BE, is carried in a FQN type X'01' triplet on the BRS. If the Resource Object Type (X'21') triplet specifies ObjType=X'92' - Object Container, and if the Object Classification Triplet indicates that the object in the container is a Color Management Resource (CMR), the FQN type X'01' triplet, specified using FQNFmt = X'00', is mandatory and is used to specify the CMR name. The character encoding is UTF-16BE.
X'02'	Fully Qualified Name	Optional. May occur more than once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'41'**—*Color Management Resource (CMR) Reference*. This triplet may be specified on a BRS to indicate the following: • If the resource is a Color Conversion (CC) CMR, this triplet specifies the name of a Link LK CMR that is to be mapped to the CC CMR in the container. • If the resource is a generic Halftone (HT) or Tone Transfer Curve (TTC) CMR, this triplet specifies the name of a device-specific CMR of the same type that is to replace the generic CMR. The identifier may be specified in the following format. • If FQNFmt = X'00', the identifier is a character-encoded name. The character string that identifies the CMR must be the *CMR name* specified in the CMR. The character encoding is UTF-16BE.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur more than once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'7E'**—*Data-object Font Linked Font Identifier*. This triplet may be specified on a BRS to indicate the following: • If the BRS envelopes a TrueType/OpenType font (TTF/OTF) file, the FQN type X'7E' triplet specifies a linked font for the base font. The order in which the FQN type X'7E' triplets are specified determines the order in which the linked fonts are processed. • If the BRS envelopes a TrueType Collection (TTC) file, the FQN type X'7E' triplet specifies a linked font for the base font that is identified with the immediately preceding FQN type X'6E' triplet. Note that if the base font is specified in multiple languages using multiple FQN type X'6E' triplets, each instance of the FQN type X'6E' triplet must be followed by the sequence of FQN type X'7E' triplets that identify the linked fonts for the base font. The identifier may be specified in the following format. • If FQNFmt = X'00', the identifier is a character-encoded name. The character string that identifies the font must be the *full font name* specified in a name record in the mandatory Naming Table of the font file. This parameter is specified in a name record with Name ID 4. An example of a full font name is *Times New Roman Bold*. The character encoding is UTF-16BE, which matches the encoding defined by EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001') in the Naming Table. The byte order is big endian.
X'10'	Object Classification	Mandatory if the Resource Object Type triplet specifies ObjType = X'92', Object Container, in which case it must occur once. Characterizes and identifies the object data carried in the object container. See "Object Classification Triplet X'10'" on page 363.
X'21'	Resource Object Type	In AFP environments, one occurrence of this triplet is mandatory to identify the type of resource object delimited by the BRS. See "Resource Object Type Triplet X'21'" on page 374
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.

Using the BRS to Envelop Inline TrueType/OpenType Resources

TrueType/OpenType fonts (TTFs/OTFs), TrueType/OpenType fonts that are used as linked fonts, and TrueType/OpenType font collections (TTCs), may be carried in the resource group for a print file. This is called a print file level resource group, and these resources are said to be *inline*. When presentation servers search for a font that is referenced in the data stream, such a resource group is searched ahead of system level resource libraries, and if an inline font is found it must be used in place of the system level font. To support this hierarchy, presentation servers process a TrueType/OpenType font reference in an MDR for inline resources as follows:

1. The resource group—if present—is searched for a font (TTF/OTF) container or a collection (TTC) container that specifies a matching full font name.
   - A font container specifies the full font name using a FQN type X'01' triplet on the Begin Resource (BRS) structured field for the font container.
   - A collection container specifies the full font name of a font in the collection using a Data Object Font Base Font Identifier (X'6E') triplet on the BRS of the collection container.

The first matching font container or collection container is used. If a collection containing the font is found, the complete TTC—if not already in the presentation device—is downloaded to the device, which must be able to index the required font in the collection. The font container or collection container may also specify one or more linked fonts for the referenced font.

- On a font container, linked fonts for the base font are specified with Data-object Font Linked Font Identifier (FQN type X'7E') triplets, which carry the full font name of the linked fonts, on the BRS of the font container.
- On a collection container, linked fonts are specified with Data-object Font Linked Font Identifier (FQN type X'7E') triplets that immediately follow the Data Object Font Base Font Identifier (X'6E') triplet for the base font on the BRS of the collection container. Note that if the base font is specified in multiple languages using multiple FQN type X'6E' triplets, each instance of the FQN type X'6E' triplet must be followed by the sequence of FQN type X'7E' triplets that identify the linked fonts for the base font.

The full font names for the linked fonts are used in turn to search the resource group for a font container or a collection container that carries a font that matches the full font name of the linked font. On a font container, the linked font name is matched against the FQN type X'01' triplet on the BRS; on a collection container it is matched against the FQN type X'6E' triplets on the BRS.

- The first matching font container or collection container is used, and its font is processed as a linked font for the base font. Multiple linked fonts may be specified, and the order in which they are specified on the BRS of the font container or collection container determines the order in which they are processed. The base font is always processed first, followed by the first-specified linked font, followed by the next-specified linked font, and so on. The last linked font is processed last.
- If a linked font cannot be found in either an inline font container or an inline collection container, the full font name of the linked font is used to index the RAT to locate the linked font in a resource library. If a specified linked font cannot be found in the resource group or in a resource library, a X'04' exception condition exists.

Only one level of linking is supported. That is, if a linked font specifies its own linked fonts, either with FQN type X'7E' triplets on its inline container or with linked font pointers in the RAT, these “secondary” linked fonts are not processed as linked fonts for the original base font.

2. If a font matching the MDR reference is not found in an inline font container or in an inline collection container, the presentation server accesses the RAT with the full font name to locate the referenced font in a resource library. In this case, all linked fonts are specified in the RAT repeating group for the referenced font, and the order in which they are specified determines the order in which they are processed. Both inline linked fonts and library-based linked fonts are used, and the print file level resource group is always searched for linked fonts ahead of the resource library. The resource group search includes font containers, in which case the linked font name is matched against the FQN type X'01' triplet on the BRS of the font container, and collection containers, in which case the linked font name is matched against the FQN type X'6E' triplets on the BRS of the collection container.

Using the BRS to Envelop Inline Color Management Resources

CMRs may also be carried in the resource group for a print file, in which case they are called *inline* CMRs. The CMR must first be wrapped in a BOC/EOC object container, which in turn must be wrapped in a BRS/ERS resource envelope. The BRS specifies the CMR name, encoded in UTF-16BE, with a FQN type X'01' triplet. If the CMR in the container is a Color Conversion (CC) CMR, the BRS may also specify the names of Link LK CMRs, also encoded in UTF-16BE, that are mapped to the CMR using FQN type X'41' - Color Management Resource (CMR) Reference triplets. If the CMR in the container is a generic HT or TTC CMR, the BRS may also specify device-specific CMR replacements for the generic CMR using the FQN type X'41' triplets. When resolving a CMR reference in the data stream, the print server must always search the print file resource group —if one exists—first. The CMRname is matched against the CMRname that is specified on the BRS of the resource container. If no match is found, the search continues with the CMR RAT.

If a match is found, the inline CMR is processed as follows.

Table 17. Print Server CMR Processing: Inline CMRs

CMR type	Processing mode	Device-specific or generic	Processing
Color conversion	Audit or instruction	Device-specific	The inline CMR is downloaded, if necessary, and activated. If the target device supports downloaded link CMRs, all Link LK CMRs that are mapped to the referenced CMR with a FQN type X'41' triplet on the BRS and that match the target device type and model are downloaded, if necessary, and activated. All other mapped CMRs are ignored.
Halftone	Audit	Device-specific	If the target device supports downloaded HT CMRs, the inline CMR can be downloaded and activated, but the target device ignores it. All mapped CMRs are also ignored.
Halftone	Audit	Generic	The inline CMR can be downloaded and activated, but the target device ignores it. All mapped CMRs are also ignored.
Halftone	Instruction	Device-specific	If the target device supports downloaded HT CMRs, the inline CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.
Halftone	Instruction	Generic	If the target device supports downloaded HT CMRs, and if the BRS references device-specific HT CMRs that match the device type and model of the target device, these CMRs are downloaded, if necessary, and activated. These CMRs replace the inline generic CMR. Otherwise, the search continues with the CMR RAT. If a matching generic CMR RAT entry is found, and if the target device supports downloaded HT CMRs, all mapped device-specific CMRs that match the device type and model of the target device are downloaded, if necessary, and activated. These CMRs replace the inline generic CMR. Otherwise, the inline generic CMR is downloaded, if necessary, activated, and replaced by the output device with a device-specific HT CMR.
Tone transfer curve	Audit	Device-specific	If the target device supports downloaded TTC CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.
Tone transfer curve	Audit	Generic	The referenced CMR can be downloaded and activated, but the target device ignores it. All mapped CMRs are also ignored.
Tone transfer curve	Instruction	Device-specific	If the target device supports downloaded TTC CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.

Table 17 Print Server CMR Processing: Inline CMRs (cont'd.)

CMR type	Processing mode	Device-specific or generic	Processing
Tone transfer curve	Instruction	Generic	If the target device supports downloaded TTC CMRs, and if the BRS references device-specific TTC CMRs that match the device type and model of the target device, these CMRs are downloaded, if necessary, and activated. These CMRs replace the inline generic CMR. Otherwise, the search continues with the CMR RAT. If a matching generic CMR RAT entry is found, and if the target device supports downloaded TTC CMRs, all mapped device-specific CMRs that match the device type and model of the target device are downloaded, if necessary, and activated. These CMRs replace the inline generic CMR. Otherwise, the inline generic CMR is downloaded, if necessary, activated, and replaced by the output device with a device-specific TTC CMR.
Indexed	Audit	Device-specific	If the target device supports downloaded IX CMRs, the referenced CMR can be downloaded and activated, but the target device ignores it. All mapped CMRs are also ignored.
Indexed	Instruction	Device-specific	If the target device supports downloaded IX CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.
Link DL	Link	Device-specific	If the target device supports downloaded Link DL CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.

Implementation Note: It is not necessary for resource-collection applications to collect Link LK CMRs and place them in the inline resource group it builds. Such applications should provide different CMR resource collection options:

- **Option 1**: the user wants all CMRs collected and specifies a device type and model. In this case all CMRs referenced in the datastream or via the Data Object RAT and CMR RAT (except Link LK CMRs) are collected. The character string specified for the device type and model is used to obtain any device specific CMRs substituted for generic instruction HT and TTC CMRs.
- **Option 2**: the user wants all CMRs collected (except Link LK CMRs) but no device type and model information has been specified. In this case, CMRs for all device type and models mapped to a given generic instruction CMR should be collected. If there are duplicates, the first one found in the search order should be the one collected.
- **Option 3**: the user just wants to collect any CMRs that are referenced explicitly in the datastream plus any non-device specific CMRs that are referenced by the Data Object RAT or CMR RAT. This will keep the output generated by the application from being device-specific unless the datastream explicitly referenced a device-specific CMR. The only CMRs referenced by the Data Object RAT or CMR RAT that should be collected are audit CC, HT, and TTC CMRs, generic instruction HT and TTC CMRs, and HT and TTC CMRs that are non-generic but have all '@' characters in the device type and model fields of the CMR name.

BRS Exception Condition Summary

X'08' The Begin Resource structured field is not followed by a subsequent End Resource structured field in the same resource group.

Begin Resource Environment Group (BSG)

The Begin Resource Environment Group structured field begins a Resource Environment Group (REG), which defines a subset of the resources required for a document or for a group of pages in a document. The scope of the Resource Environment Group is the group of pages that follow, up to the next REG, which is a complete replacement for the current REG, or the end of the document, whichever occurs first.

Note: Resources that are mapped in a REG must still be mapped in the AEG for the page that uses the resources.

BSG (X'D3A8D9') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8D9'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	REGName		Name of the resource environment group	O	X'02'
8–*n*		Triplets		See BSG Semantics for triplet applicability.	O	X'10'

BSG Semantics

REGName Is the name of the resource environment group.

The document containing the Begin Resource Environment Group structured field must also contain a subsequent matching End Resource Environment Group structured field, or a X'08' exception condition exists.

Triplets Appear as follows:

Triplets	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'65'	Comment	Optional. May occur more than once. Carries unarchitected data. See "Comment Triplet X'65'" on page 409.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

BSG Exception Condition Summary

X'08' A subsequent matching End Resource Environment Group structured field is not present in the document.

Container Data Descriptor (CDD)

The Container Data Descriptor structured field specifies control information for a presentation data object that is carried in an object container.

CDD (X'D3A692') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A692'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–11				Retired parameters; see “Retired Parameters” on page 570	M	X'06'
12–*n*		Triplets		See CDD Semantics for triplet applicability.	O	X'10'

CDD Semantics

Triplets Specify control information for object data. To be defined as required by the object data. Triplets appear in the Container Data Descriptor structured field as follows:

Triplet	Type	Usage
X'4E'	Color Specification	Optional. May occur once. Specifies the color that is to be used as the default color, or the initial color, for the object. Note that this color may in turn be overridden by a color that is specified inside the object. This triplet only specifies the color specified for the object presentation space; it does not affect colors assigned to the object's object area. This triplet only applies to image file formats, as defined in the Appendix D, "MO:DCA Registry", on page 609 appendix, that specify a bilevel or grayscale image; it is ignored when the object is not a bilevel or grayscale image. Note that all 1-bit per pixel image objects are considered bilevel. When the image is grayscale, this triplet specifies the color that is to be grayscaled. If ColSpce =X'06' - Highlight color space, the % coverage and % shading parameters are ignored. See "Color Specification Triplet X'4E'" on page 391.
X'5A'	Object Offset	Optional. If this container is specified directly within a page or overlay and carries a file that contains multiple pages or paginated objects, may occur once with ObjTpe=X'AF' to specify that pages or paginated objects are the objects to be counted. The triplet is ignored in all other cases. Selects a single paginated object to be presented by specifying how many paginated objects in the file precede that object. The offset is measured from the beginning of the file, so that the first paginated object has offset 0, the second has offset 1, and the *n*th has offset (*n*-1). Only the selected object is presented. If this triplet is not specified on a container that is specified directly within a page or overlay and that contains a file with multiple paginated objects, the default is to present the first paginated object in the file. For more information on selecting paginated objects, see "Object Offset Triplet X'5A'" on page 402.
X'9A'	Image Resolution	Optional. May occur once. Specifies the resolution of the image for containers that carry a raster image object; ignored for all other object types. See "Image Resolution Triplet X'9A'" on page 464. This triplet overrides any resolution specified inside the image. If the resolution is not specified outside the image or inside the image, the default is to assume that the image resolution is the same as the output device resolution. This is not intended for containers that are not image formats but might have embedded images inside of them (such as PDF).
X'9C'	Object Container Presentation Space Size	Optional. May occur once for the following object types: • PDF - all presentation object types • AFPC SVG Subset Specifies the presentation space size of the object container. For PDF object types, specifies how this size is determined. For SVG, specifies the actual size, and overrides any presentation space size specified within the SVG object. See "Object Container Presentation Space Size Triplet X'9C'" on page 466.

For presentation objects, a presentation space size is required for a scale-to-fit or scale-to-fill mapping of the object presentation space to the object area. See "Object Type Identifiers" on page 609 for information on how the presentation space size is specified by various objects. If the presentation space size is not specified, the architected default is the presentation space size of the including page or overlay.

This structured field is not applicable to non-presentation objects and may be ignored if it appears in the object container for such objects.

End Active Environment Group (EAG)

The End Active Environment Group structured field terminates the definition of an Active Environment Group initiated by a Begin Active Environment Group structured field.

EAG (X'D3A9C9') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9C9'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	AEGName		Name of the active environment group	O	X'02'

EAG Semantics

AEGName Is the name of the active environment group being terminated. If a name is specified, it must match the name in the most recent Begin Active Environment Group structured field in the page or a X'01' exception condition exists. If the first two bytes in AEGName contain the value X'FFFF', the name matches any name specified on the Begin Active Environment Group structured field that initiated the current definition.

A matching Begin Active Environment Group structured field must appear within the page at some location preceding the End Active Environment Group structured field, or a X'20' exception condition exists.

EAG Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Active Environment Group structured field.

X'20' Not preceded by a matching Begin Active Environment Group structured field.

End Bar Code Object (EBC)

The End Bar Code Object structured field terminates the current bar code object initiated by a Begin Bar Code Object structured field.

EBC (X'D3A9EB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9EB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	BCdoName		Name of the bar code data object	O	X'02'
8–*n*		Triplets		See EBC Semantics for triplet applicability.	O	X'10'

EBC Semantics

BCdoName Is the name of the bar code data object being terminated. If a name is specified, it must match the name in the most recent Begin Bar Code Object structured field in the page, overlay, or resource group, or a X'01' exception condition exists. If the first two bytes of BCdoName contain the value X'FFFF', the name matches any name specified on the Begin Bar Code Object structured field that initiated the current definition.

A matching Begin Bar Code Object structured field must appear within the containing structure at some location preceding the End Bar Code Object structured field, or a X'20' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the End Bar Code Object structured field name and is used as the name of the bar code data object being terminated.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

EBC Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Bar Code Object structured field.

X'20' The End Bar Code Object structured field is not preceded by a matching Begin Bar Code Object structured field.

End Document Environment Group (EDG)

The End Document Environment Group structured field terminates the definition of a document environment group initiated by a Begin Document Environment Group structured field.

EDG (X'D3A9C4') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9C4'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	DEGName		Name of the document environment group	O	X'02'

EDG Semantics

DEGName Is the name of the document environment group being terminated. If a name is specified, it must match the name in the most recent Begin Document Environment Group structured field in the form map or a X'01' exception condition exists. If the first two bytes in DEGName contain the value X'FFFF', the name matches any name specified on the Begin Document Environment Group structured field that initiated the current definition.

A matching Begin Document Environment Group structured field must appear at some location within the form map preceding the End Document Environment Group structured field, or a X'20' exception condition exists.

EDG Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Document Environment Group structured field.

X'20' The End Document Environment Group structured field is not preceded by a matching Begin Document Environment Group structured field.

End Document Index (EDI)

The End Document Index structured field terminates the document index initiated by a Begin Document Index structured field.

EDI (X'D3A9A7') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9A7'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	IndxName		Name of the document index	O	X'02'
8–*n*		Triplets		See EDI Semantics for triplet applicability.	O	X'10'

EDI Semantics

IndxName Is the name of the document index being terminated. If a name is specified, it must match the name in the most recent Begin Document Index structured field in the print file or document, or a X'01' exception condition exists. If the first two bytes of IndxName contain the value X'FFFF', the name matches any name specified on the Begin Document Index structured field that initiated the current definition.

A matching Begin Document Index structured field must appear within the print file or document at some location preceding the End Document Index structured field, or a X'20' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the End Document Index structured field name and is used as the name of the document index being terminated.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

EDI Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Document Index structured field.

X'20' The End Document Index structured field is not preceded by a matching Begin Document Index structured field.

End Document (EDT)

The End Document structured field terminates the MO:DCA document data stream initiated by a Begin Document structured field.

EDT (X'D3A9A8') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9A8'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	DocName		Name of the document	O	X'02'
8–*n*		Triplets		See EDT Semantics for triplet applicability.	O	X'10'

EDT Semantics

DocName Is the name of the document being terminated. If a name is specified, it must match the name in the most recent Begin Document structured field in the data stream or a X'01' exception condition exists. If the first two bytes of DocName contain the value X'FFFF', the name matches any name specified on the Begin Document structured field that initiated the current definition.

A matching Begin Document structured field must appear within the data stream at some location preceding the End Document structured field, or a X'20' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The only Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the End Document structured field name and is used as the name of the document being terminated.

Note: If a triplet is included on this structured field, the optional DocName positional parameter becomes mandatory.

EDT Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Document structured field.

X'20' The End Document structured field is not preceded by a matching Begin Document structured field.

End Form Map (EFM)

The End Form Map structured field terminates the form map object initiated by a Begin Form Map structured field

EFM (X'D3A9CD') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9CD'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	FMName		Name of the form map	O	X'02'

EFM Semantics

FMName Is the name of the form map being terminated. If a name is specified, it must match the name in the most recent Begin Form Map structured field or a X'01' exception condition exists. If the first two bytes of FMName contain the value X'FFFF', the name matches any name specified on the Begin Form Map structured field that initiated the current definition.

A matching Begin Form Map structured field must appear at some location preceding the End Form Map structured field, or a X'20' exception condition exists.

EFM Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Form Map structured field.

X'20' The End Form Map structured field is not preceded by a matching Begin Form Map structured field.

End Graphics Object (EGR)

The End Graphics Object structured field terminates the current graphics object initiated by a Begin Graphics Object structured field.

EGR (X'D3A9BB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9BB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	GdoName		Name of the graphics data object	O	X'02'
8–*n*		Triplets		See EGR Semantics for triplet applicability.	O	X'10'

EGR Semantics

GdoName Is the name of the graphics data object being terminated. If a name is specified, it must match the name in the most recent Begin Graphics Object structured field in the containing page, overlay, or resource group, or a X'01' exception condition exists. If the first two bytes of GdoName contain the value X'FFFF', the name matches any name specified on the Begin Graphics Object structured field that initiated the current definition.

A matching Begin Graphics Object structured field must appear within the containing structure at some location preceding the End Graphics Object structured field, or a X'20' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the End Graphics Object structured field name and is used as the name of the graphics data object being terminated.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

EGR Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Graphics Object structured field.

X'20' The End Graphics Object structured field is not preceded by a matching Begin Graphics Object structured field.

End Image Object (EIM)

The End Image Object structured field terminates the current image object initiated by a Begin Image Object structured field.

EIM (X'D3A9FB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9FB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	IdoName		Name of the image data object	O	X'02'
8–*n*		Triplets		See EIM Semantics for triplet applicability.	O	X'10'

EIM Semantics

IdoName Is the name of the image data object being terminated. If a name is specified, it must match the name in the most recent Begin Image Object structured field in the containing page, overlay, or resource group, or a X'01' exception condition exists. If the first two bytes of IdoName contain the value X'FFFF', the name matches any name specified on the Begin Image Object structured field that initiated the current definition.

A matching Begin Image Object structured field must appear within the containing structure at some location preceding the End Image Object structured field, or a X'20' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the End Image Object structured field name and is used as the name of the image data object being terminated.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

EIM Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Image Object structured field.

X'20' The End Image Object structured field is not preceded by a matching Begin Image Object structured field.

End Medium Map (EMM)

The End Medium Map structured field terminates the medium map object initiated by a Begin Medium Map structured field

EMM (X'D3A9CC') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9CC'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	MMName		Name of the medium map	O	X'02'

EMM Semantics

MMName Is the name of the medium map being terminated. If a name is specified, it must match the name in the most recent Begin Medium Map structured field or a X'01' exception condition exists. If the first two bytes of MMName contain the value X'FFFF', the name matches any name specified on the Begin Medium Map structured field that initiated the current definition.

A matching Begin Medium Map structured field must appear at some location preceding the End Medium Map structured field, or a X'20' exception condition exists.

EMM Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Medium Map structured field.

X'20' The End Medium Map structured field is not preceded by a matching Begin Medium Map structured field.

End Overlay (EMO)

The End Overlay structured field terminates the overlay resource object initiated by a Begin Overlay structured field.

EMO (X'D3A9DF') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9DF'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	OvlyName		Name of the overlay	O	X'02'
8–*n*		Triplets		See EMO Semantics for triplet applicability.	O	X'10'

EMO Semantics

OvlyName Is the name of the overlay that is being terminated. If a name is specified, it must match the name in the most recent Begin Overlay structured field in the resource group or a X'01' exception condition exists. If the first two bytes of OvlyName contain the value X'FFFF', the name matches any name specified on the Begin Overlay structured field that initiated the current definition.

A matching Begin Overlay structured field must appear within the resource group at some location preceding the End Overlay structured field, or a X'20' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the End Overlay structured field name and is used as the name of the overlay being terminated.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

EMO Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Overlay structured field.

X'20' The End Overlay structured field is not preceded by a matching Begin Overlay structured field.

End Named Page Group (ENG)

The End Named Page Group structured field terminates a page group that was initiated by a Begin Named Page Group structured field.

ENG (X'D3A9AD') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9AD'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	PGrpName		Name of the overlay	O	X'02'
8–*n*		Triplets		See ENG Semantics for triplet applicability.	O	X'10'

ENG Semantics

PGrpName Is the name of the page group that is being terminated. If a name is specified, it must match the name in the most recent Begin Named Page Group structured field in the document or a X'01' exception condition exists. If the first two bytes of PGrpName contain the value X'FFFF', the name matches any name specified on the Begin Named Page Group structured field that initiated the current definition.

A matching Begin Named Page Group structured field must appear within the document at some location preceding the End Named Page Group structured field, or a X'20' exception condition exists.

If the Keep Group Together (X'9D') triplet is specified on the Begin Named Page Group structured field that corresponds to this End Named Page Group structured field, the page group name in the ENG must exactly match the page group name in the BNG, or a X'01' exception condition exists. That is, in this case, the value X'FFFF' cannot be specified for the page group name in the ENG structured field.

Triplets Appear in the End Named Page Group structured field as follows:

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID name*. This GID overrides the End Named Page Group structured field name and is used as the name of the page group being terminated.

Note: If a triplet is included on this structured field, the optional PGrpName positional parameter becomes mandatory.

ENG Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Named Page Group structured field.

X'20' The End Named Page Group structured field is not preceded by a matching Begin Named Page Group structured field.

End Object Container (EOC)

The End Object Container structured field terminates an object container initiated by a Begin Object Container structured field.

EOC (X'D3A992') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A992'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	ObjCName		Name of the object container	O	X'02'
8–*n*		Triplets		See EOC Semantics for triplet applicability.	O	X'10'

EOC Semantics

ObjCName Is the name of the object container that is being terminated. If a name is specified, it must match the name in the most recent Begin Object Container structured field or a X'01' exception condition exists. If the first two bytes of ObjCName contain the value X'FFFF', the name matches any name specified on the Begin Object Container structured field that initiated the current definition.

A matching Begin Object Container structured field must appear at some location preceding the End Object Container structured field, or a X'20' exception condition exists.

Triplets Appear in the End Object Container structured field as follows:

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID name*. This GID overrides the End Object Container structured field name and is used as the name of the object container being terminated.

Note: If a triplet is included on this structured field, the optional ObjCName positional parameter becomes mandatory.

EOC Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Object Container structured field.

X'20' The End Object Container structured field is not preceded by a matching Begin Object Container structured field.

End Object Environment Group (EOG)

The End Object Environment Group structured field terminates the definition of an Object Environment Group initiated by a Begin Object Environment Group structured field.

EOG (X'D3A9C7') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9C7'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	OEGName		Name of the object environment group	O	X'02'

EOG Semantics

OEGName Is the name of the object environment group that is being terminated. If a name is specified, it must match the name in the most recent Begin Object Environment Group structured field in the object or a X'01' exception condition exists. If the first two bytes of OEGName contain the value X'FFFF', the name matches any name specified on the Begin Object Environment Group structured field that initiated the current definition.

A matching Begin Object Environment Group structured field must appear within the object at some location preceding the End Object Environment Group structured field, or a X'20' exception condition exists.

EOG Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Object Environment Group structured field.

X'20' The End Object Environment Group structured field is not preceded by a matching Begin Object Environment Group structured field.

End Print File (EPF)

The End Print File structured field terminates the data stream initiated by a Begin Print File structured field.

EPF (X'D3A9A5') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9A5'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	PFName		Name of the print file	O	X'02'
8–*n*		Triplets		See EPF Semantics for triplet applicability.	O	X'10'

EPF Semantics

PFName Is the name of the print file being terminated. If a name is specified, it must match the name in the most recent Begin Print File structured field in the data stream or a X'01' exception condition exists. If the first two bytes of PFName contain the value X'FFFF', the name matches any name specified on the Begin Print File structured field that initiated the current definition.

A matching Begin Print File structured field must appear within the data stream at some location preceding the End Print File structured field, or a X'20' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See “Fully Qualified Name Triplet X'02'” on page 351. The only Fully Qualified Name type that may appear is **X'01'**—*Replace First GID name*. This GID overrides the End Print File structured field name and is used as the name of the print file being terminated.

Note: If a triplet is included on this structured field, the optional PFName positional parameter becomes mandatory.

EPF Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Print File structured field.

X'20' The End Print File structured field is not preceded by a matching Begin Print File structured field.

End Page (EPG)

The End Page structured field terminates the current presentation page definition initiated by a Begin Page structured field.

EPG (X'D3A9AF') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9AF'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	PageName		Name of the page	O	X'02'
8–*n*		Triplets		See EPG Semantics for triplet applicability.	O	X'10'

EPG Semantics

PageName Is the name of the page that is being terminated. If a name is specified, it must match the name in the most recent Begin Page structured field in the document or a X'01' exception condition exists. If the first two bytes of PageName contain the value X'FFFF', the name matches any name specified on the Begin Page structured field that initiated the current definition.

A matching Begin Page structured field must appear within the document at some location preceding the End Page structured field, or a X'20' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the End Page structured field name and is used as the name of the page being terminated.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

EPG Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Page structured field.

X'20' The End Page structured field is not preceded by a matching Begin Page structured field.

End Page Segment (EPS)

The End Page Segment structured field terminates the page segment resource object initiated by a Begin Page Segment structured field.

EPS (X'D3A95F') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A95F'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	PsegName		Name of the page segment	O	X'02'

EPS Semantics

PsegName Is the name of the page segment that is being terminated. If a name is specified, it must match the name in the most recent Begin Page Segment structured field or a X'01' exception condition exists. If the first two bytes of PsegName contain the value X'FFFF', the name matches any name specified on the Begin Page Segment structured field that initiated the current definition.

A matching Begin Page Segment structured field must appear at some location preceding the End Page Segment structured field, or a X'20' exception condition exists.

EPS Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Page Segment structured field.

X'20' The End Page Segment structured field is not preceded by a matching Begin Page Segment structured field.

End Presentation Text Object (EPT)

The End Presentation Text Object structured field terminates the current presentation text object initiated by a Begin Presentation Text Object structured field.

EPT (X'D3A99B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A99B'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	PTdoName		Name of the presentation text data object	O	X'02'
8–*n*		Triplets		See EPT Semantics for triplet applicability.	O	X'10'

EPT Semantics

PTdoName Is the name of the presentation text data object that is being terminated. If a name is specified, it must match the name in the most recent Begin Presentation Text Object structured field in the page, or overlay, or a X'01' exception condition exists. If the first two bytes of PTdoName contain the value X'FFFF', the name matches any name specified on the Begin Presentation Text Object structured field that initiated the current definition.

A matching Begin Presentation Text Object structured field must appear within the containing structure at some location preceding the End Presentation Text Object structured field, or a X'20' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the End Presentation Text Object structured field name and is used as the name of the presentation text data object being terminated.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

EPT Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Presentation Text Object structured field.

X'20' The End Presentation Text Object structured field is not preceded by a matching Begin Presentation Text Object structured field.

End Resource Group (ERG)

The End Resource Group structured field terminates the definition of a resource group initiated by a Begin Resource Group structured field.

ERG (X'D3A9C6') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9C6'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	RGrpName		Name of the resource group	O	X'02'
8–*n*		Triplets		See ERG Semantics for triplet applicability.	O	X'10'

ERG Semantics

RGrpName Is the name of the resource group that is being terminated. If a name is specified, it must match the name in the most recent Begin Resource Group structured field in the print file, document, page, or data object, or a X'01' exception condition exists. If the first two bytes of RGrpName contain the value X'FFFF', the name matches any name specified on the Begin Resource Group structured field that initiated the current definition.

A matching Begin Resource Group structured field must appear within the print file, document, page, or data object at some location preceding the End Resource Group structured field, or a X'20' exception condition exists.

Triplets Appear as follows:

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the End Resource Group structured field name and is used as the name of the resource group being terminated.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

ERG Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Resource Group structured field.

X'20' The End Resource Group structured field is not preceded by a matching Begin Resource Group structured field.

End Resource (ERS)

The End Resource structured field terminates an envelope that is used to carry resource objects in external (print file level) resource groups. The envelope is initiated by a Begin Resource (BRS) structured field.

ERS (X'D3A9CE') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9CE'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	RSName		Name of the resource	O	X'02'

ERS Semantics

RSName Is the name of the resource being terminated. If a name is specified, it must match the name in the most recent Begin Resource structured field. If the first two bytes in RSName contain the value X'FFFF', the name matches any name specified on the Begin Resource structured field that initiated the current definition.

A matching Begin Resource structured field must appear within the resource group at some location preceding the End Resource structured field, or a X'20' exception condition exists.

ERS Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Resource structured field.

X'20' The End Resource structured field is not preceded by a matching Begin Resource structured field.

End Resource Environment Group (ESG)

The End Resource Environment Group structured field terminates the definition of a Resource Environment Group initiated by a Begin Resource Environment Group structured field.

ESG (X'D3A9D9') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9D9'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	REGName		Name of the resource environment group	O	X'02'

ESG Semantics

REGName Is the name of the resource environment group being terminated. If a name is specified, it must match the name in the most recent Begin Resource Environment Group structured field in the document or a X'01' exception condition exists. If the first two bytes in REGName contain the value X'FFFF', the name matches any name specified on the Begin Resource Environment Group structured field that initiated the current definition.

A matching Begin Resource Environment Group structured field must appear within the document at some location preceding the End Resource Environment Group structured field, or a X'20' exception condition exists.

ESG Exception Condition Summary

X'01' A name is specified that does not match the name on the most recent Begin Resource Environment Group structured field.

X'20' The End Resource Environment Group structured field is not preceded by a matching Begin Resource Environment Group structured field.

Graphics Data (GAD)

The Graphics Data structured field contains the data for a graphics object.

GAD (X'D3EEBB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3EEBB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–n	UNDF	GOCAdat		Up to 32,759 bytes of GOCA-defined data	O	X'00'

GAD Semantics

GOCAdat Contains the GOCA-defined data. See the MO:DCA environment appendix in the *Graphics Object Content Architecture for AFP Reference* for detailed information.

Note: The number of data bytes allowed in this structured field may be restricted by an interchange set.

Graphics Data Descriptor (GDD)

The Graphics Data Descriptor structured field contains the descriptor data for a graphics object.

GDD (X'D3A6BB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A6BB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–*n*	UNDF	GOCAdes		Up to 32,759 bytes of GOCA-defined descriptor data	O	X'00'

GDD Semantics

GOCAdes Contains the GOCA-defined descriptor data. See the MO:DCA environment appendix in the *Graphics Object Content Architecture for AFP Reference* for detailed information.

Note: The number of data bytes allowed in this structured field may be restricted by an interchange set.

Image Data Descriptor (IDD)

The Image Data Descriptor structured field contains the descriptor data for an image data object.

IDD (X'D3A6FB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A6FB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–*n*	UNDF	IOCAdes		Up to 32,759 bytes of IOCA-defined descriptor data	O	X'00'

IDD Semantics

IOCAdes Contains the IOCA-defined descriptor data. See the MO:DCA environment appendix in the *Image Object Content Architecture Reference* for detailed information.

Note: The number of data bytes allowed in this structured field may be restricted by an interchange set.

Index Element (IEL)

The Index Element structured field identifies begin structured fields for use within a document index.

IEL (X'D3B2A7') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3B2A7'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–*n*		Triplets		See IEL Semantics for triplet applicability.	M	X'14'

IEL Semantics

Triplets Appear in the Index Element structured field as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See “Coded Graphic Character Set Global Identifier Triplet X'01'” on page 348.
X'02'	Fully Qualified Name	Mandatory. Must occur once. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'CA'**—*Index Element GID*, which is used as the name of this Index Element structured field.
X'02'	Fully Qualified Name	Optional. One of the following Fully Qualified Name types may appear on the Index Element structured field. • **X'0D'**—*Begin Page Group Name*. Specifies the name of the page group indexed by the Index Element structured field. • **X'87'**—*Begin Page Name*. Specifies the name of the page indexed by the Index Element structured field.
X'02'	Fully Qualified Name	Optional. May occur once. The Fully Qualified Name type that may appear is **X'8D'**—*Begin Medium Map Name*. For a page level IEL, specifies the name of the medium map that is active for presenting the indexed page on a physical medium. For a page group level IEL, specifies the name of the medium map that is active for presenting the first page in the indexed page group on a physical medium.
X'2D'	Object Byte Offset	Mandatory. Must occur once. Specifies the offset, in bytes, from the beginning of the document to the indexed object. See “Object Byte Offset Triplet X'2D'” on page 381.

Triplet	Type	Usage
X'56'	Medium Map Page Number	Optional. May occur once. For a page level IEL, specifies the sequence number of the indexed page in the set of sequential pages controlled by the active medium map. For a page group level IEL, specifies the sequence number of the first page-group page in the set of sequential pages controlled by the medium map that is active at the beginning of the indexed page group. See "Medium Map Page Number Triplet X'56'" on page 398. If the Page Position Information (X'81') triplet is also specified on this IEL, it overrides the Medium Map Page Number (X'56') triplet.
X'57'	Object Byte Extent	Optional. May occur once. Specifies the extent, in bytes, of the indexed object. See "Object Byte Extent Triplet X'57'" on page 399.
X'58'	Object Structured Field Offset	Optional. May occur once. Specifies the offset, in structured fields, from the beginning of the document to the indexed object. See "Object Structured Field Offset Triplet X'58'" on page 400.
X'59'	Object Structured Field Extent	Optional. May occur once. Specifies the extent, in structured fields, of the indexed object. See "Object Structured Field Extent Triplet X'59'" on page 401.
X'5A'	Object Offset	Optional. May occur once for each object type counted. Specifies how many objects of a particular type precede the indexed object in the document. See "Object Offset Triplet X'5A'" on page 402.
X'5E'	Object Count	Optional. May occur once for each subordinate object type counted. Specifies how many subordinate objects of a particular type are contained within the indexed object. See "Object Count Triplet X'5E'" on page 405.
X'81'	Page Position Information	Optional. May occur once. For a page level IEL, specifies the PGP repeating group that is used to view the page and its PMC overlay data. For a page group level IEL, specifies the PGP repeating group that is used to view the first page in the group. The PGP is specified in the medium map referenced by a FQN type X'8D'—Begin Medium Map Reference triplet. If the X'81' triplet is specified, it overrides a Medium Map Page Number (X'56') triplet. See "Page Position Information Triplet X'81'" on page 426.
X'83'	Presentation Control	Optional. May occur once. Specified on a page level IEL to indicate whether the page is intended to be viewed. If this triplet is not specified, the architected default is that the page is intended to be viewed. See "Presentation Control Triplet X'83'" on page 428.

IEL Exception Condition Summary

X'01' This exception condition exists when:

- Multiple type X'CA' (Index Element GID) Fully Qualified Name triplets appear.
- The same object type is counted in more than one X'5A' triplet.
- The same subordinate object type is counted in more than one X'5E' triplet.

Invoke Medium Map (IMM)

The Invoke Medium Map structured field identifies the medium map that is to become active for the document. An Invoke Medium Map structured field affects the document's current environment. The medium map's effect on current environment parameter values lasts until a new medium map is invoked.

The processing system's form map is searched for the specified medium map unless the IMM directly follows an internal medium map, in which case the IMM can reference and activate that internal medium map. An IMM that does not follow an internal medium map cannot be used to reference an internal medium map elsewhere in the document and is assumed to reference a medium map in the processing system's form map.

If a document does not invoke a medium map by name, and if it does not include an internal medium map, the first medium map in the selected form map controls document presentation.

For a detailed description of IMM processing, particularly when contiguous IMMs are specified and when constant forms control is used, see 94.

IMM (X'D3ABCC') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3ABCC'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	MMPName		Name of the medium map to be invoked	M	X'0E'
8–*n*		Triplets		See IMM Semantics for triplet applicability.	O	X'10'

IMM Semantics

MMPName Is the name of the medium map.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.

Effect On Parameter Values

The parameter values contained in the structured fields within the invoked medium map replace those that were established previously by those structured fields.

Parameter Conflict Resolution

All conflicts with existing environment settings are resolved in favor of the medium map specified by the Invoke Medium Map structured field.

Application Notes:

1. Page groups are often processed in standalone fashion, that is, they are indexed, retrieved, and presented outside the context of the containing document. While the pages in the group are independent of each other and of any other pages in the document, their formatting on media depends on when the last medium map was invoked and on how many pages precede the BNG since this invocation. To make the media formatting of page groups self-contained, a medium map should be invoked at the beginning of the page group between the Begin Named Group (BNG) structured field and the first Begin Page (BPG) structured field. If this is not done, the presentation system may need to “play back” all pages between the invocation of the active medium map and the BNG to determine media formatting such as sheet-side and partition number for the first page in the group. It is therefore *strongly* recommended that in environments where standalone page group processing is required or anticipated, page groups are built with an Invoke Medium Map (IMM) structured field specified after the BNG and before the first BPG.
2. Some AFP applications that generate page groups will support a user option that ensures that an IMM is specified after BNG and before the first BPG, and some AFP archive servers will expect an IMM there and may not present the page group correctly if none is found. However, note that this may cause the complete document to print differently.
3. A newer method to specify how a page or page group should be formatted involves use of the Page Position Information (X'81') triplet. This triplet may be specified on a BPG and indicates the repeating group in the PGP structured field in the active medium map that should be used to format the page.

Architecture Note: In AFP environments, the following retired triplet is used on this structured field:

- IMM Insertion triplet X'73'; see “IMM Insertion Triplet X'73'” on page 569.

Include Object (IOB)

An Include Object structured field references an object on a page or overlay. It optionally contains parameters that identify the object and that specify presentation parameters such as object position, size, orientation, mapping, and default color. Where the presentation parameters conflict with parameters specified in the object's environment group (OEG), the parameters in the Include Object structured field override. If the referenced object is a page segment, the IOB parameters override the corresponding environment group parameters on all data objects in the page segment.

IOB (X'D3AFC3') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3AFC3'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	ObjName		Name of the object	M	X'06'
8				Reserved; should be zero	M	X'06'
9	CODE	ObjType	X'5F', X'92', X'9B', X'BB', X'EB', X'FB'	Object type: **X'5F'** Page Segment **X'92'** Other object data **X'9B'** Presentation Text (PTOCA) with OEG **X'BB'** Graphics (GOCA) **X'EB'** Bar Code (BCOCA) **X'FB'** Image (IOCA)	M	X'06'
10–12	SBIN	XoaOset	-32,768–32,767	X-axis origin of the object area	M	X'06'
			X'FFFFFF'	Use the X-axis origin defined in the object		
13–15	SBIN	YoaOset	-32,768–32,767	Y-axis origin of the object area	M	X'06'
			X'FFFFFF'	Use the Y-axis origin defined in the object		
16–17	CODE	XoaOrent		The object area's X-axis rotation from the X axis of the reference coordinate system, in degrees and minutes. Frequently used values: **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees **X'FFFF'** Use the X-axis rotation defined in the object	M	X'06'
Bits 0–8		Degrees	B'000000000' — B'101100111'	Degrees rotation (0–359)		
			B'111111111'	Use the X-axis rotation defined in the object when all 16 bits in XoaOrent are B'1'		

Offset	Type	Name	Range	Meaning	M/O	Exc
Bits 9–14		Minutes	B'000000' — B'111011'	Minutes rotation (0–59)		
			B'111111'	Use the X-axis rotation defined in the object when all 16 bits in XoaOrent are B'1'		
Bit 15			B'0'	Reserved		
			B'1'	Use the X-axis rotation defined in the object when all 16 bits in XoaOrent are B'1'		
18–19	CODE	YoaOrent		The object area's Y-axis rotation from the X axis of the reference coordinate system, in degrees and minutes. Frequently used values: **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees **X'FFFF'** Use the X-axis rotation defined in the object	M	X'06'
Bits 0–8		Degrees	B'000000000' — B'101100111'	Degrees rotation (0–359)		
			B'111111111'	Use the Y-axis rotation defined in the object when all 16 bits in YoaOrent are B'1'		
Bits 9–14		Minutes	B'000000' — B'111011'	Minutes rotation (0–59)		
			B'111111'	Use the Y-axis rotation defined in the object when all 16 bits in YoaOrent are B'1'		
Bit 15			B'0'	Reserved		
			B'1'	Use the Y-axis rotation defined in the object when all 16 bits in YoaOrent are B'1'		
20–22	SBIN	XocaOset	-32,768–32,767	X-axis origin for object content	M	X'06'
			X'FFFFFF'	Use the X-axis origin defined in the object		
23–25	SBIN	YocaOset	-32,768–32,767	Y-axis origin for object content	M	X'06'
			X'FFFFFF'	Use the Y-axis origin defined in the object		
26	CODE	RefCSys	X'01'	Reference coordinate system: **X'01'** Page or overlay coordinate system	M	X'06'
27–*n*		Triplets		See "IOB Semantics" on page 203 for triplet applicability.	M	X'14'

IOB Semantics

ObjName Is the name of the object being referenced. This name may be a file name or any other identifier associated with the object data.

ObjType Identifies the type of object being referenced.

Value	Description
X'5F'	Page segment object. The page segment must be a MO:DCA page segment. AFP migration page segments are not supported in the IOB. For a definition of MO:DCA page segments, see “Page Segment Objects” on page 87. For a definition of AFP page segments, see “AFP Page Segment” on page 594.

Application Notes:

1. A page segment included via IOB is always processed as a *soft* object. The OEGs for all objects in the page segment should only contain secondary resource mappings using MCFs to map FOCA fonts and MDRs to map data-object fonts (TrueType/OpenType fonts); these mappings must be factored up to the including page or overlay. All other secondary resource mappings in the OEGs, such as CMR references, are ignored and must be specified directly on the IOB.
2. Page segments have traditionally been referenced with 8-byte names using a single-byte EBCDIC encoding, such as the encoding defined by code page 500 and character set 697. The 8-byte name limit is a formal restriction in the IPS and MPS structured fields, which do not support the FQN type X'01' triplet for extended name references. As a result, some AFP print servers only support 8-byte single-byte encoded page segment names, even when the page segment is referenced with an IOB which does support the FQN type X'01' triplet. It is therefore strongly recommended that page segment references in an IOB be limited to 8 bytes and use a single-byte EBCDIC encoding.

X'92' Other object data. The object data to be included is a paginated presentation object whose format may or may not be defined by an AFP architecture. The object data is characterized and identified by a mandatory Object Classification (X'10') triplet, which must specify the registered encoded object-type OID for the object type and must characterize the object as being a presentation object. This triplet also specifies whether the object data is carried in a MO:DCA object container, whether it is unwrapped object data, or whether the container structure of the object data is unknown.

Application Note: If the object is installed in a resource library using a Resource Access Table (RAT), it must not be wrapped with a MO:DCA object container envelope, that is, it must be installed in its raw source format.

This value is not used for OCA objects since they are referenced using object-specific values for the ObjType parameter.

To ensure proper presentation of the object, the encoded object-type OID must be supported by the AFP system. This means that the encoded object-type OID is supported by the presentation server, and that it is either supported directly by the presentation device, or that it can be transformed by the server into a format that is directly supported by the presentation device.

See “Non-OCA Object Types Supported by the IOB Structured Field” on page 626 for a list of object types that may be included with an IOB in MO:DCA data streams. To see which encoded object-type OIDs are supported by the presentation system, consult the product documentation.

X'9B' Presentation Text (PTOCA) object that contains an OEG, with MO:DCA object syntax as defined in "Text Objects" on page 111. If the text object does not contain an OEG, exception condition X'01'exists.

Application Note: A PTOCA object that contains an OEG is always processed as a *soft* object. The OEG for the object should only contain secondary resource mappings using MCFs to map FOCA fonts and MDRs to map data-object fonts (TrueType/OpenType fonts); these mappings must be factored up to the including page or overlay. All other secondary resource mappings in the OEG, such as CMR references, are ignored and must be specified directly on the IOB.

X'BB' Graphics (GOCA) object with MO:DCA object syntax as defined in "Graphics Objects" on page 101.

Application Note: A GOCA object included via IOB is always processed as a *soft* object. The OEG for the object should only contain secondary resource mappings using MCFs to map FOCA fonts and MDRs to map data-object fonts (TrueType/OpenType fonts); these mappings must be factored up to the including page or overlay. All other secondary resource mappings in the OEG, such as CMR references, are ignored and must be specified directly on the IOB.

X'EB' Bar code (BCOCA) object with MO:DCA object syntax as defined in "Bar Code Objects" on page 98.

Application Note: A BCOCA object included via IOB is always processed as a *soft* object. The OEG of a BCOCA object may contain several types of secondary resources and if it is a QR Code with Image bar code, tertiary resources. Refer to the Application Notes in "Bar Code Objects" on page 98 for how to factor up resources mapped in the bar code OEG to the AEG of the page or overlay that is including the bar code. The following secondary and tertiary resources, if specified in the bar code OEG, must also be specified on the IOB:

- Secondary presentation data objects (only when including QR Code with Image bar codes): Both the external name (FQN types X'CE', X'DE', or X'84') and, if specified in the OEG, the corresponding internal name (FQN type X'BE').
- Tertiary non-presentation data objects (only when including QR Code with Image bar codes): As with secondary presentation data objects, both the external name and, if specified in the OEG, the corresponding internal name. However, in the case of a secondary image resource with a tertiary CMR resource, the external name of the CMR must instead be mapped using an FQN type X'EE', which must be paired with the internal name (FQN type X'BE') of the image; this is the internal name that is specified inside the QR Code with Image bar code object.
- CMRs used directly by the bar code: The external name using FQN type X'DE'.

X'FB' Image (IOCA) object with MO:DCA object syntax as defined in "Image Objects" on page 107.

Application Note: Secondary resource mappings in the OEG of the IOCA object, such as CMR references, are ignored and must be specified directly on the IOB.

All others Reserved

XoaOset Specifies the offset along the X axis, X_{pg} or X_{ol}, of the including page or overlay coordinate system to the origin of the X axis, X_{oa}, of the object area coordinate system. The value for this parameter is expressed in terms of the number of page or overlay coordinate system X-axis measurement units.

If the referenced object specifies an object environment group (OEG), this parameter overrides the corresponding parameter in the Object Area Position (OBP) structured field of the OEG.

If the object is a page segment, this parameter overrides the corresponding OBP parameters in the environment groups of all objects that comprise the page segment and specifies the object area offsets from the page or overlay origin for all data objects in the page segment.

A value of X'FFFFFF' indicates that the X-axis offset specified in the object's OEG is to be used. Therefore, the offset value (-1) is not included in the allowed range.

If the object does not specify the X-axis offset in an OEG, the architected default is X'000000'.

YoaOset Specifies the offset along the Y axis, Y_{pg} or Y_{ol}, of the including page or overlay coordinate system to the origin of the Y axis, Y_{oa}, of the object area coordinate system. The value for this parameter is expressed in terms of the number of page or overlay coordinate system Y-axis measurement units.

If the referenced object specifies an object environment group (OEG), this parameter overrides the corresponding parameter in the Object Area Position (OBP) structured field of the OEG.

If the object is a page segment, this parameter overrides the corresponding OBP parameters in the environment groups of all objects that comprise the page segment and specifies the object area offsets from the page or overlay origin for all data objects in the page segment.

A value of X'FFFFFF' indicates that the Y-axis offset specified in the object's OEG is to be used. Therefore, the offset value (-1) is not included in the allowed range.

If the object does not specify the Y-axis offset in an OEG, the architected default is X'000000'.

XoaOrent Specifies the amount of clockwise rotation of the object area's X axis, X_{oa}, about its defined origin relative to the X axis of the page or overlay coordinate system.

If the referenced object specifies an object environment group (OEG), this parameter overrides the corresponding parameter in the Object Area Position (OBP) structured field of the OEG.

If the object is a page segment, this parameter overrides the corresponding OBP parameters in the environment groups of all objects that comprise the page segment.

A value of B'1111111111111111' indicates that the X-axis rotation specified in the object's OEG is to be used.

If the object does not specify the X-axis rotation in an OEG, the architected default is B'0000000000000000' (0 degrees).

YoaOrent Specifies the amount of clockwise rotation of the object area's Y axis, Y_{oa}, about its defined origin relative to the X axis of the page or overlay coordinate system. The YoaOrent value must be 90 degrees greater than the XoaOrent value or a X'01' exception condition exists.

If the referenced object specifies an object environment group (OEG), this parameter overrides the corresponding parameter in the Object Area Position (OBP) structured field of the OEG.

If the object is a page segment, this parameter overrides the corresponding OBP parameters in the environment groups of all objects that comprise the page segment.

A value of B'1111111111111111' indicates that the Y-axis rotation specified in the object's OEG is to be used.

If the object does not specify the Y-axis rotation in an OEG, the architected default is B'0010110100000000' (90 degrees).

Note: If the object area orientation is such that the sum of the object area origin offset and the object area extent exceeds the size of the including presentation space in either the X or Y direction, all of the object area will not fit in the including presentation space. The including presentation space in this case is the page or overlay presentation space. If an attempt is made to actually present data in the portion of the object area that falls outside the including presentation space, that portion of the data is not presented, and a X'01' exception condition exists.

XocaOset Used in *position* and *position and trim* mappings to specify the offset along the X axis of the object area coordinate system, X_{oa}, to the X origin of the object content. The value for this parameter is expressed in terms of the number of object area coordinate system X-axis measurement units.

If the referenced object specifies an object environment group (OEG), this parameter overrides the corresponding parameter in the Object Area Position (OBP) structured field of the OEG.

If the object is a page segment, this parameter overrides the corresponding OBP parameters in the environment groups of all objects that comprise the page segment.

A value of X'FFFFFF' indicates that the X-axis offset specified in the object's OEG is to be used. Therefore, the offset value (-1) is not included in the allowed range.

If the object does not specify the X-axis offset in an OEG, the architected default is X'000000'.

YocaOset Used in *position* and *position and trim* mappings to specify the offset along the Y axis of the object area coordinate system, Y_{oa}, to the Y origin of the object content. The value for this parameter is expressed in terms of the number of object area coordinate system Y-axis measurement units.

If the referenced object specifies an object environment group (OEG), this parameter overrides the corresponding parameter in the Object Area Position (OBP) structured field of the OEG.

If the object is a page segment, this parameter overrides the corresponding OBP parameters in the environment groups of all objects that comprise the page segment.

A value of X'FFFFFF' indicates that the Y-axis offset specified in the object's OEG is to be used. Therefore, the offset value (-1) is not included in the allowed range.

If the object does not specify the Y-axis offset in an OEG, the architected default is X'000000'.

RefCSys Specifies the coordinate system used to position the object area.

Value	Description
X'00'	Retired for private use. **Architecture Note:** This value is used in AFP line-data environments to position and rotate the object area with respect to the current text (I,B) coordinate system. For more information, see *Advanced Function Presentation: Programming Guide and Line Data Reference*.
X'01'	Page or overlay coordinate system
All others	Reserved

Triplets Appear in the Include Object structured field as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See “Coded Graphic Character Set Global Identifier Triplet X'01'” on page 348. **Implementation Note:** Not all AFP servers support the inheritance of encoding scheme from higher levels of the document hierarchy, therefore it is recommended that this triplet be specified directly on the IOB if required by a parameter such as the FQN type X'DE' triplet.
X'02'	Fully Qualified Name	Optional. May occur once. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID name*. This identifier overrides the Include Object structured field name and is used as the identifier of the object. The identifier may be specified in one—and only one—of the following formats: • If FQNFmt = X'00', the identifier is a character-encoded name. See “External Resource Naming Conventions” on page 89 for a description of the naming conventions used in AFP environments.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur more than once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'DE'**—*Data Object External Resource Reference*. Specifies the external identifier of a resource object that is used by the object being included. The identifier is used by the presentation system to locate the resource object in the resource hierarchy. The identifier may be specified in one of the following two formats, but not in both formats: • If FQNFmt = X'00', the identifier is a character-encoded name. See "External Resource Naming Conventions" on page 89 for a description of the naming conventions used in AFP environments. • If FQNFmt = X'10', the identifier is an ASN.1 OID encoded using the definite short form. This format provides a unique and system-independent method to identify and reference an object. It may be used to select resources that are resident in the presentation device. Such an identifier is referred to as an *object OID*. **Architecture Note:** The FQN type X'DE' triplet with FQNFmt = X'10' (OID) is only used to reference the CMYK SWOP and CMYK Euroscale resident color profiles registered in the MO:DCA Registry; see "Resident Color Profile Identifiers" on page 634. If the resource is mapped with an MDR reference, the FQN type X'DE' triplet must specify the same reference using the same FQN format. If the included object also references the resource with an internal identifier, this identifier must be specified on the IOB with a FQN type X'BE' triplet that immediately follows the FQN type X'DE' triplet. The paired triplets map the internal identifier to the external identifier. Resources that are used by data objects that may themselves be processed as resources are called *secondary resources*. See "Secondary Resource Objects" on page 12. Note that, if the included object contains an OEG, the FQN type X'DE'/X'BE' mappings on the IOB override any FQN type X'DE'/X'BE' mappings on an MDR in the OEG; the mappings on the OEG MDR are ignored when the object is included with an IOB. If the FQN type X'DE' triplet on the IOB references a Color Management Resource (CMR), the referenced CMR also overrides any other conflicting CMR that is associated with that object, such as a CMR that is associated with the object in the Data Object RAT. Note also that the FQN type X'DE' triplet on the IOB cannot be used to reference a data-object font (TrueType/OpenType font) for a GOCA or BCOCA object (other than a QR Code with Image bar code); such a reference causes an exception. **Note:** When a non-OCA object such as PDF or SVG references a TTF/OTF as a secondary resource, the FQN type X'DE' triplet on the IOB must specify the full font name of the font. This font must also be mapped with an MDR reference that specifies the same FFN.
X'02'	Fully Qualified Name	Optional. May occur more than once if the IOB also specifies FQN type X'DE' triplets. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'BE'**—*Data Object Internal Resource Reference*.

Triplet	Type	Usage
		Specifies the identifier of a resource object that is used by the object being included. The identifier is used internally by the included object to reference the resource. The identifier must be specified using FQNFmt X'00', which, for this FQN type, indicates that the data type is defined by the specific data object that generates the internal resource reference and is undefined (UNDF) at the MO:DCA data stream level. When specified, this triplet must *immediately* follow the FQN type X'DE' triplet that specifies the external identifier of the resource, or a X'04' exception condition exists. Resources that are used by data objects that may themselves be processed as resources are called *secondary resources*. See "Secondary Resource Objects" on page 12. Note that, if the included object contains an OEG, the FQN type X'DE'/X'BE' mappings on the IOB override any FQN type X'DE'/X'BE' mappings on an MDR in the OEG; the mappings on the OEG MDR are ignored when the object is included with an IOB.
X'02'	Fully Qualified Name	Optional. May occur more than once if the included object is a QR Code with Image bar code. If the OEG of the bar code object has an MDR that references an object container from Table 48 on page 626, then this triplet is mandatory. See "Fully Qualified Name Triplet X'02'" on page 351 The Fully Qualified Name type that may appear is **X'CE'**—*Other Object Data Reference*. Specifies the identifier of a resource object that is used by the object being included. The identifier is used by the presentation system to locate the resource object in the resource hierarchy. The identifier must be specified using FQNFmt X'00', which is a character-encoded name. See "External Resource Naming Conventions" on page 89 for a description of the naming conventions used in AFP environments. If the resource is mapped with an MDR reference, the FQN type X'CE' triplet must specify the same reference using the same FQN format. If the included object also references the resource with an internal identifier, this identifier must be specified on the IOB with a FQN type X'BE' triplet that immediately follows the FQN type X'CE' triplet. The paired triplets map the internal identifier to the external identifier. Resources that are used by data objects that may themselves be processed as resources are called *secondary resources*. See "Secondary Resource Objects" on page 12. **Architecture Note:** For purposes of print server resource management, each MDR that maps a presentation data object resource in the bar code OEG must have a corresponding MDR mapping the same resource in the AEG for the page or overlay, without the FQN type X'BE' triplet. The same presentation data object can be used as a primary resource on the page or overlay and as a secondary resource in the bar code by using the FQN type X'BE' triplet on the MDR of the barcode OEG. When both the FQN type X'BE' triplet and the FQN type X'CE' triplet id are specified on an MDR repeating group, they map the internal resource identifier to the external resource identifier.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. Must occur once for every FQN type X'CE' triplet specified on the IOB. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'BE'**—*Data Object Internal Resource Reference*. Specifies the identifier that is used internally by the bar code to reference the resource whose external identifier is specified by the FQN type X'CE' triplet. The identifier must be specified using FQNFmt X'00', which, for this FQN type, indicates that the data type is defined by the specific data object that generates the internal resource reference and is undefined (UNDF) at the MO:DCA data stream level. When specified, this triplet must *immediately* follow the FQN type X'CE' triplet that specifies the identifier of the Other Object Data resource, or a X'04' exception condition exists. Resources that are used by data objects that may themselves be processed as resources are called *secondary resources*. See "Secondary Resource Objects" on page 12.
X'02'	Fully Qualified Name	Optional. May occur more than once if the included object is a QR Code with Image bar code. If the OEG of the bar code object has an MDR that references an IOCA object then this triplet is mandatory. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'84'**—*Begin Resource Object Reference*. Specifies the identifier of a resource object that is used by the object being included. The identifier is used by the presentation system to locate the resource object in the resource hierarchy. The identifier must be specified using FQNFmt X'00', which is a character-encoded name. See "External Resource Naming Conventions" on page 89 for a description of the naming conventions used in AFP environments. If the resource is mapped with an MDR reference, the FQN type X'84' triplet must specify the same reference using the same FQN format. If the included object also references the resource with an internal identifier, this identifier must be specified on the IOB with a FQN type X'BE' triplet that immediately follows the FQN type X'84' triplet. The paired triplets map the internal identifier to the external identifier. Resources that are used by data objects that may themselves be processed as resources are called *secondary resources*. See "Secondary Resource Objects" on page 12. **Architecture Note:** For purposes of print server resource management, each MDR that maps an IOCA object resource in the bar code OEG must have a corresponding MDR mapping the same resource in the AEG for the page or overlay, without the FQN type X'BE' triplet. The same IOCA object can be used as a primary resource on the page or overlay and as a secondary resource in the bar code by using the FQN type X'BE' triplet on the MDR of the barcode OEG. When both the FQN type X'BE' triplet and the FQN type X'84' triplet id are specified on an MDR repeating group, they map the internal resource identifier to the external resource identifier.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. Must occur once for every FQN type X'84' triplet specified on the IOB. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'BE'**—*Data Object Internal Resource Reference*. Specifies the identifier that is used internally by the bar code to reference the resource whose external identifier is specified by the FQN type X'84' triplet. The identifier must be specified using FQNFmt X'00', which, for this FQN type, indicates that the data type is defined by the specific data object that generates the internal resource reference and is undefined (UNDF) at the MO:DCA data stream level. When specified, this triplet must *immediately* follow the FQN type X'84' triplet that specifies the identifier of the IOCA Image resource, or a X'04' exception condition exists. Resources that are used by data objects that may themselves be processed as resources are called *secondary resources*. See "Secondary Resource Objects" on page 12.
X'02'	Fully Qualified Name	Optional. May occur more than once if the included object is a QR Code with Image bar code. If the OEG of the bar code object has an MDR that references a secondary image resource that requires a tertiary CMR resource, then this triplet is mandatory. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'EE'**—*Tertiary Data Object External Resource Reference*. Specifies the external name of the tertiary CMR associated with the secondary image resource. The identifier is used by the presentation system to locate the tertiary resource object in the resource hierarchy. The identifier must be specified using FQNFmt X'00', which is a character-encoded name. See "External Resource Naming Conventions" on page 89 for a description of the naming conventions used in AFP environments. The FQN type X'EE' for the tertiary CMR must be followed by an FQN type X'BE' triplet identifying the local id of the secondary image resource that uses it. The paired triplets map the external CMR identifier with the internal secondary image resource identifier. Resources that are used by data objects that may themselves be processed as resources are called *secondary resources* and resources used by secondary resources are called *tertiary resources*. See "Secondary Resource Objects" on page 12 and "Tertiary Resource Objects" on page 13. **Architecture Note:** For purposes of print server resource management, each MDR that maps a CMR to a secondary image resource in the bar code OEG must have a corresponding MDR mapping the same resource in the AEG for the page or overlay.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. Must occur once for every FQN type X'EE' triplet specified on the IOB. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'BE'**—*Data Object Internal Resource Reference*. Specifies the identifier that is used internally by the bar code to reference the secondary image resource that is to be associated with the tertiary CMR whose external identifier is specified by the FQN type X'EE' triplet. The identifier must be specified using FQNFmt X'00', which, for this FQN type, indicates that the data type is defined by the specific data object that generates the internal resource reference and is undefined (UNDF) at the MO:DCA data stream level. When specified, this triplet must *immediately* follow the FQN type X'EE' triplet that specifies the identifier of the CMR external name, or a X'04' exception condition exists. Resources that are used by data objects that may themselves be processed as resources are called *secondary resources* and resources used by secondary resources are called *tertiary resources*. See "Secondary Resource Objects" on page 12 and "Tertiary Resource Objects" on page 13.
X'04'	Mapping Option	Optional. May occur once. If present, defines the mapping of the object data to the object area. If the referenced object specifies an object environment group (OEG), this triplet overrides the corresponding triplet on the mapping structured field of the OEG. The specified mapping option must be valid for the object or a X'02' exception condition exists. If the referenced object is a page segment, this triplet overrides the corresponding triplet on the mapping structured field of the OEG in all objects that comprise the page segment. The specified mapping option must be valid for all objects in the page segment or a X'02' exception condition exists. See "Mapping Option Triplet X'04'" on page 360. If this triplet is omitted, the mapping option specified in the object's OEG is used. If the object does not specify the mapping option in an OEG, the architected default mapping for the object is used. Note that for objects referenced with ObjType = X'92', the architected default mapping is scale-to-fit.
X'10'	Object Classification	Mandatory for *ObjType* = X'92', other object data, in which case it must occur once. Specifies information used to characterize and identify the object data to be included. The included object must be a presentation object. See "Object Classification Triplet X'10'" on page 363.
X'4B'	Measurement Units	Mandatory if the IOB specifies an override for any of the following parameters: • XocaOset • YocaOset • XoaSize, specified in the Object Area Size (X'4C') triplet • YoaSize, specified in the Object Area Size (X'4C') triplet In this case, this triplet occurs once and defines the measurement units for the override values. See "Measurement Units Triplet X'4B'" on page 388.

Triplet	Type	Usage
X'4C'	Object Area Size	Optional. May occur once. If present, specifies the size of the object area (XoaSize, YoaSize) into which the object data is mapped. If the referenced object specifies an Object Environment Group (OEG), this triplet overrides the corresponding triplet on the Object Area Descriptor (OBD) structured field of the OEG. If the referenced object is a page segment, this triplet overrides the corresponding triplet on the OBD structured field in all objects that comprise the page segment. If this triplet is omitted, the object area size specified in the object's OEG is used. If the object does not specify the object area size in an OEG, the architected default is to use the presentation space size of the including page or overlay. See "Object Area Size Triplet X'4C'" on page 389. **Note:** For presentation objects, a presentation space size is required for a scale-to-fit or scale-to-fill mapping of the object presentation space to the object area. See "Object Type Identifiers" on page 609 for information on how the presentation space size is specified by various objects. If the object does not specify the presentation space size, the architected default is the presentation space size of the including page or overlay.
X'4E'	Color Specification	Optional. May occur once. Specifies the color that is to be used as the default color, or the initial color, for the object. This triplet overrides the default color specified in the data descriptor and in the Data Object RAT, or sets the color if none is specified. Note that this color may in turn be overridden by a color that is specified inside the object. This triplet only overrides default colors specified for the object presentation space; it does not affect colors assigned to the object's object area. The IOB must specify one of the following object types: **X'5F'** Page segment **X'92'** Other object data. Triplet is ignored if the object type is not an image file format that specifies a bilevel or grayscale image, as defined in Appendix D, "MO:DCA Registry", on page 609. **X'9B'** Presentation Text (PTOCA) **X'BB'** Graphics (GOCA) **X'EB'** Bar code (BCOCA) **X'FB'** Image (IOCA); triplet is ignored if the image is not bilevel When this triplet is applied to IOCA image, it only applies to bilevel image; it is ignored when the image is not bilevel. When this triplet is applied to non-OCA image file formats, it only applies to bilevel or grayscale image; it is ignored when the image is not bilevel or grayscale. Note that all 1-bit per pixel image objects are considered bilevel. When the image is grayscale, this triplet specifies the color that is to be grayscaled. The color space selected in the triplet must be supported in the object's data descriptor structured field. For example, if the triplet specifies a default color using ColSpce = X'08' - CIELAB, the object's data descriptor must also support the CIELAB color space. If ColSpce = X'06'- Highlight color space, the % coverage and % shading parameters are ignored. If the above conditions are not met, the triplet is ignored. See "Color Specification Triplet X'4E'" on page 391.

Triplet	Type	Usage
X'5A'	Object Offset	Optional. If this IOB references a file with *ObjType* = X'92' that contains multiple pages or paginated objects, may occur once with ObjTpe=X'AF' to specify that pages or paginated objects are the objects to be counted. The triplet is ignored in all other cases. Selects a single paginated object to be included by specifying how many paginated objects in the referenced file precede that object. The offset is measured from the beginning of the file, so that the first paginated object has offset 0, the second has offset 1, and the *n*th has offset (*n*-1). Only the selected object is included. The IOB triplet overrides any Object Offset triplet specified on the CDD. If this triplet is not specified when the IOB references a file with *ObjType* = X'92' that contains multiple paginated objects, the default is to include the first paginated object in the file. For more information on selecting paginated objects, see "Object Offset Triplet X'5A'" on page 402. **Architecture Note:** While only the selected paginated object in the file is actually presented on the page or overlay, the file referenced by the IOB can be processed by the presentation system as a complete entity. This means that the complete file can be downloaded to the presentation device and multiple paginated objects in the file can be processed using the environment defined by the file. For example, if the file is a multi-page PDF, pages included from that file can be processed by the presentation device with the same PDF RIP initialization.
X'70'	Presentation Space Reset Mixing	Optional. May occur once. This triplet may not appear on the Include Object structured field with a Presentation Space Mixing Rule (X'71') triplet. If present with BgMxFlag=1, specifies that both background and foreground of the referenced object data presentation space overpaint the area of the page or overlay presentation space that lies beneath it. If the referenced object specifies an Object Environment Group (OEG), this triplet overrides the corresponding triplet on the OBD structured field of the OEG. If the referenced object is a page segment, this triplet overrides the corresponding triplet on the OBD structured field in all objects that comprise the page segment. If this triplet is omitted, the triplet specified on the OBD of the object's OEG is used. If the object does not specify this triplet on the OBD in an OEG, the architected default is to use the default mixing rule, that is, this triplet is ignored. For a definition of mixing rules see "Mixing Rules" on page 44. See "Presentation Space Reset Mixing Triplet X'70'" on page 414.
X'71'	Presentation Space Mixing Rules	Optional. May occur once. This triplet may not appear on the Include Object structured field with a Presentation Space Reset Mixing (X'70') triplet. If present, specifies the mixing rules for color mixing foreground and background object data on the portion of the page or overlay presentation space that lies beneath the object area. If the referenced object specifies an Object Environment Group (OEG), this triplet overrides the corresponding triplet on the OBD structured field of the OEG. If the referenced object is a page segment, this triplet overrides the corresponding triplet on the OBD structured field in all objects that comprise the page segment. If this triplet is omitted, the triplet specified on the OBD of the object's OEG is used. If the object does not specify this triplet on the OBD in an OEG, the architected default is to use the default mixing rule, that is, this triplet is ignored. For a definition of mixing rules see "Mixing Rules" on page 44. See "Presentation Space Mixing Rules Triplet X'71'" on page 416. **Implementation Note:** The Presentation Space Mixing Rules (X'71') triplet is currently not used in AFP environments.

Triplet	Type	Usage
X'91'	Color Management Resource Descriptor	Optional. May occur when the IOB references a Color Management Resource (CMR) with the FQN type X'DE' or type X'EE' triplet, in which case this triplet is mandatory and must occur once for each CMR reference. It is ignored in all other cases. Specifies the processing mode and scope for the CMR. The CMRScpe parameter in the triplet must be set to X'01' to indicate that the scope of the CMR is a data object. When specified with an FQN type X'DE' triplet, this triplet must *immediately* follow the FQN type X'DE' triplet that specifies the CMR name or a X'04' exception condition exists. When specified with an FQN type X'EE' triplet, this triplet must *immediately* follow the FQN type X'BE' triplet that follows the FQN type X'EE' triplet that specifies the CMR name or a X'04' exception condition exists. See "Color Management Resource Descriptor Triplet X'91'" on page 456.
X'95'	Rendering Intent	Optional. May occur once. See "Rendering Intent Triplet X'95'" on page 458. This triplet specifies the rendering intent that is to be used when presenting the object that is referenced with this structured field. Only the rendering intent that applies to the object type of the referenced object is used; the other rendering intents are ignored. This triplet overrides all rendering intents specified elsewhere for the object, such as in the object's OEG or in a Data Object RAT entry for the object. The triplet also overrides any rendering intent information embedded in the data object. The rendering intent in this triplet is downloaded to the presentation device but may not be used if a Link DL CMR is used for a color conversion in this object; in that case the rendering intent specified in the Link DL CMR is used for that color conversion.
X'9A'	Image Resolution	Optional. May occur once for non-IOCA raster image object types defined by ObjType = X'92' - "other object data"; ignored for IOCA image objects and all other object types. Specifies the resolution of the raster image object. See "Image Resolution Triplet X'9A'" on page 464. The IOB triplet overrides any image resolution specified in the Data Object RAT, on the CDD, or inside the image. If the resolution is not specified outside the image or inside the image, the default is to assume that the image resolution is the same as the output device resolution.

<table>
<tr><th>Triplet</th><th>Type</th><th>Usage</th></tr>
<tr><td>X'9C'</td><td>Object Container Presentation Space Size</td><td>Optional. May occur once for certain object types defined by ObjType = X'92' - “other object data”; ignored for IOCA image objects and all other object types. See “Object Container Presentation Space Size Triplet X'9C'” on page 466.

May be specified for the following object types:
• PDF - all presentation object types
• AFPC SVG Subset

Specifies the presentation space size of the object container. For PDF object types, specifies how this size is determined. For SVG, specifies the actual size, and overrides any presentation space size specified within the SVG object. The IOB triplet overrides any specification on object container presentation space size in the Data Object RAT or on the CDD.</td></tr>
<tr><td>X'FF'</td><td>Triplet Extender</td><td>Optional. May occur more than once in a contiguous sequence, but only in the following cases. It is ignored in all other cases. See “Triplet Extender Triplet X'FF'” on page 470.

• The IOB must specify one of the following object types:
X'92' Other object data
– The IOB references a secondary resource for other object data using an FQN type X'DE' triplet
– The secondary resource is the generic non-OCA Resource object
– The IOB associates an internal resource reference to the secondary resource with an FQN type X'BE' triplet
– The triplet extenders must follow the FQN type X'BE' triplet and must occur in a contiguous sequence
X'EB' Bar code object
– The IOB references a secondary resource for other object data using an FQN type X'CE' triplet
– That secondary resource references a tertiary resource that is the generic non-OCA Resource object, using the FQN type X'DE' triplet
– The IOB associates an internal resource reference to the tertiary resource referenced by the FQN type X'DE' with an FQN type X'BE' triplet
– The triplet extenders must follow the FQN type X'BE' triplet and must occur in a contiguous sequence

Specifies a portion of a secondary or tertiary resource reference that occurs internal to the data object referenced by the IOB. Use of the triplet extender allows the length of the internal resource reference to exceed the 250 byte capacity of the FQN type X'BE' triplet.

Note: The non-OCA Resource Object must be mapped with an MDR reference that matches the FQN type X'DE' reference on the IOB.</td></tr>
</table>

Application Note: To optimize print performance, it is strongly recommended that the same encoding scheme be used for a resource reference wherever in a print file that resource reference is specified. That is, the encoding scheme used for the resource include, the resource map, and the resource wrapper should be the same.

Architecture Note: When the IOB structured field is used in a page definition object in AFP line-data environments, an Extended Resource Local Identifier (X'22') triplet must be specified with ResType= X'30'—IOB Reference. The same triplet is used on a Descriptor in the Page Definition to reference the IOB and cause the specified object to be included.

IOB Exception Condition Summary

X'01' This exception condition exists when:

- The value specified for YoaOrent is not 90 degrees greater rotation than the value specified for XoaOrent.
- An attempt is made to present data outside the presentation space of the containing coordinate system.
- The mapping option is position and an attempt is made to present data outside the object area presentation space.
- A Presentation Space Reset Mixing triplet and a Presentation Space Mixing Rules triplet are specified.
- A Presentation Text object is to be included, but it does not contain an OEG.

X'02' The mapping option specified in a Mapping Option triplet is not valid for one or more of the referenced objects.

X'04' This exception condition exists when:

- An FQN type X'BE' triplet is specified but does not immediately follow an FQN type X'DE', X'84', X'CE', or X'EE' triplet.
- A Color Management Resource Descriptor triplet is specified but does not either immediately follow an FQN type X'DE' triplet that references a CMR, or immediately follow the FQN type X'BE' triplet that follows the FQN type X'EE' triplet that references a CMR.

Image Picture Data (IPD)

The Image Picture Data structured field contains the data for an image data object.

IPD (X'D3EEFB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3EEFB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	**Type**	**Name**	**Range**	**Meaning**	**M/O**	**Exc**
0–*n*	UNDF	IOCAdat		Up to 32,759 bytes of IOCA defined data	O	X'00'

IPD Semantics

IOCAdat Contains the IOCA defined data. See the MO:DCA environment appendix in the *Image Object Content Architecture Reference* for detailed information.

Note: The number of data bytes allowed in this structured field may be restricted by an interchange set.

Include Page (IPG)

The Include Page structured field references a page that is to be included in the document. The Include Page structured field may occur in document state, page-group state, or page state. In all three cases the referenced page is positioned on the media using the (X_m, Y_m) offsets specified in the PGP structured field in the active medium map. The referenced page must not contain another Include Page structured field.

IPG (X'D3AFAF') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3AFAF'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	PgName		Name of the page	M	X'06'
8–15				Reserved; should be zero	M	X'06'
16	BITS	IPgFlgs		Specify control information for the included page. See IPG Semantics for bit definitions.	M	X'06'
17–*n*		Triplets		See IPG Semantics for triplet applicability.	M	X'14'

IPG Semantics

PgName Is the name of the page being referenced. The page name is qualified, using the Fully Qualified Name (X'02') type X'83' triplet, with the name of the document that contains the page.

IPgFlgs Specify control information for the included page.

Bit **Description**

0 Format of included page, must be set to B'1'.

B'0' Reserved

B'1' The referenced page is carried in a document in a print file level resource group. Before this page can be included with the IPG, it must be processed with all required resources and saved in the presentation device. The processing includes the application of all text suppressions specified in the medium map that is active when the page is saved.

1–7 Reserved; all bits should be B'0'.

Triplets Appear in the Include Page structured field as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See “Coded Graphic Character Set Global Identifier Triplet X'01'” on page 348.
X'02'	Fully Qualified Name	Mandatory. Must occur once. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'83'**—*Begin Document Name*. Specifies the name of the document that contains the referenced page.
X'02'	Fully Qualified Name	Optional. May occur once. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the Include Page structured field name and is used as the name of the page.
X'5A'	Object Offset	Optional. May occur once, with *ObjTpe*=X'AF' to specify that pages are the objects to be counted for the offset. Specifies how many pages in the referenced document precede the page to be included. The page offset is measured from the beginning of the referenced document, so that the first page has offset 0, the second page has offset 1, and the *n*th page has offset (*n*-1). When this triplet is specified, the page name, as specified by the *PgName* parameter or by the Fully Qualified Name type X'01' triplet, is ignored. See “Object Offset Triplet X'5A'” on page 402.

Application Note: To optimize print performance, it is strongly recommended that the same encoding scheme be used for a resource reference wherever in a print file that resource reference is specified. That is, the encoding scheme used for the resource include, the resource map, and the resource wrapper should be the same.

Notes:

1. Care must be taken when activating text suppressions on pages to be saved. The document that contains the pages to be saved must be processed with the same form map as the document that references the saved pages. However, unless the two documents have the identical structure with respect to pages, Invoke Medium Map (IMM) structured fields, and internal (inline) medium maps, the medium map that is active when the page is saved may specify different text suppressions than the medium map that is active when the page is included, which may yield unexpected results.
2. If the medium map specifies multiple copy subgroups with different text suppression activations, the presentation device must process and save a copy of the page for each set of text suppressions. When an IPG is processed for multiple copy subgroups, the presentation device uses the copy of the saved page whose text suppressions match those required by the current medium map.
3. The following rules apply to overlays when a page is processed and saved by the presentation device:
   - Page overlays are processed and saved with the page.
   - PMC overlays are not processed and saved with the page. They are applied to the page when it is included with an IPG as specified by the medium map that is active during page presentation.
   - Medium overlays are not processed and saved with the page. They are applied to the medium as specified by the medium map that is active during page presentation.

4. Overlays that are included on the saved page may overflow the saved page presentation space. Such overflow areas need to be saved with the page since they only cause an exception at presentation time if they contain data that overflows the medium presentation space. If an attempt is made to present overlay data that overflows the medium presentation space, that portion of the data is not presented and a X'01' exception condition exists.
5. The size of the page may exceed the size of the medium presentation space in either the X_m or Y_m direction. If an attempt is made to present data in the portion of the page that overflows the medium presentation space, that portion of the data is not presented and a X'01' exception condition exists.
6. A page that is included with an IPG may be indexed as follows:
   - If the IPG occurs in document state or in page-group state, the included page may be indexed using an offset to the location of the IPG in the document.
   - If the IPG occurs in page state, the included page becomes a part of the containing page, therefore only the containing page may be indexed using an offset to its location in the document.

Include Page Overlay (IPO)

The Include Page Overlay structured field references an overlay resource definition that is to be positioned on the page. A page overlay can be referenced at any time during the page state, but not during an object state. The overlay contains its own active environment group definition.

The current environment of the page that included the overlay is restored when the Include Page Overlay has been completed.

IPO (X'D3AFD8') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3AFD8'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	OvlyName		Name of the overlay resource	M	X'06'
8–10	SBIN	XolOset	-32,768–32,767	X-axis origin for the page overlay	M	X'06'
			X'FFFFFF'	Retired value		
11–13	SBIN	YolOset	-32,768–32,767	Y-axis origin for the page overlay	M	X'06'
			X'FFFFFF'	Retired value		
14–15	CODE	OvlyOrent	X'0000', X'2D00', X'5A00', X'8700'	The overlay's X-axis rotation from the X axis of the including page coordinate system: **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees	O	X'02'
16–*n*		Triplets		See IPO Semantics for triplet applicability.	O	X'10'

IPO Semantics

OvlyName Is the name of the overlay resource being referenced.

XolOset Specifies the offset along the X-axis of the including page coordinate system, X_{pg}, to the origin of the X axis for the page overlay coordinate system, X_{ol}. The value X'FFFFFF' is retired, therefore the offset value (-1) is not included in the allowed range. See the architecture note following the Triplets section. The value for this parameter is expressed in terms of the number of page coordinate system X-axis measurement units.

YolOset Specifies the offset along the Y axis of the including page coordinate system, Y_{pg}, to the origin of the Y axis for the page overlay coordinate system, Y_{ol}. The value X'FFFFFF' is retired, therefore the offset value (-1) is not included in the allowed range. See the architecture note following the Triplets section. The value for this parameter is expressed in terms of the number of page coordinate system Y-axis measurement units.

OvlyOrent Specifies the amount of rotation of the page overlay's X axis, X_{ol}, about the page overlay origin relative to the X axis, X_{pg}, of the including page coordinate system. The page overlay X axis rotation is limited to 0, 90, 180, and 270 degrees. The page overlay Y-axis rotation is always 90 degrees greater than the page overlay X-axis rotation.

If no value is specified for this parameter, the architected default is 0 degrees.

Note: If the rotation is such that the sum of the page overlay origin offset and the page overlay extent exceeds the size of the including presentation space in either the X or Y direction, all of the object area will not fit on the including presentation space. The including presentation space in this case is the medium presentation space. If an attempt is made to actually present data in the portion of the page overlay that falls outside the including presentation space, that portion of the data is not presented, and a X'01' exception condition exists.

Triplets Appear in the Include Page Overlay structured field as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Optional. May occur once. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'01'**—*Replace First GID Name*. This GID overrides the Include Overlay structured field name and is used as the name of the overlay.

Note: If a triplet is included on this structured field, the optional positional parameter becomes mandatory.

Application Note: To optimize print performance, it is strongly recommended that the same encoding scheme be used for a resource reference wherever in a print file that resource reference is specified. That is, the encoding scheme used for the resource include, the resource map, and the resource wrapper should be the same.

Architecture Notes:

1. In AFP environments, the following retired triplets are used on this structured field:
   - Page Overlay Conditional Processing (X'46') triplet, may occur zero or more times; see "Page Overlay Conditional Processing Triplet X'46'" on page 564.
   - Resource Usage Attribute (X'47') triplet, may occur zero or once; see "Resource Usage Attribute Triplet X'47'" on page 566.
2. In AFP line data environments, the value X'FFFFFF' is supported for the XolOset and YolOset parameters to indicate that the X_p or Y_p position, respectively, defined by the current Line Descriptor (LND) in the page definition is to be used as the origin for the overlay. This value was also valid in pre-1992 AFP data streams to specify the current text print position and is supported by some print servers for migration of such data streams. However, this value is not valid in MO:DCA data streams and should not be generated by MO:DCA applications. To record support for this value by some AFP print servers and to limit any further use, this value is retired; see "Retired Parameters" on page 570.

IPO Exception Condition Summary

X'01' An attempt is made to present data outside the medium presentation space. See the note under *OvlyOrent* for details.

Include Page Segment (IPS)

The Include Page Segment structured field references a page segment resource object that is to be presented on the page or overlay presentation space. The IPS specifies a reference point on the including page or overlay coordinate system that may be used to position objects contained in the page segment. A page segment can be referenced at any time during page or overlay state, but not during an object state. The page segment inherits the active environment group definition of the including page or overlay.

IPS (X'D3AF5F') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3AF5F'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	PsegName		Name of the page segment resource	M	X'06'
8–10	SBIN	XpsOset	-32,768–32,767	X axis origin for positioning objects	M	X'06'
			X'FFFFFF'	Retired value		
11–13	SBIN	YpsOset	-32,768–32,767	Y-axis origin for positioning objects	M	X'06'
			X'FFFFFF'	Retired value		
14–*n*		Triplets		See IPS Semantics for triplet applicability.	O	X'10'

IPS Semantics

PsegName Is the name of the page segment resource object being referenced.

XpsOset Specifies the offset along the X axis of the including page coordinate system, X_{pg}, or the including overlay coordinate system, X_{ol}, to the reference point that may be used to position objects in the page segment. The value X'FFFFFF' is retired, therefore the offset value (-1) is not included in the allowed range. See the architecture note following the Triplets section. The value for this parameter is expressed in terms of the number of page or overlay coordinate system X-axis measurement units.

YpsOset Specifies the offset along the Y axis of the including page coordinate system, Y_{pg}, or the including overlay coordinate system, Y_{ol}, to the reference point that may be used to position objects in the page segment. The value X'FFFFFF' is retired, therefore the offset value (-1) is not included in the allowed range. See the architecture note following the Triplets section. The value for this parameter is expressed in terms of the number of page or overlay coordinate system Y-axis measurement units.

Triplets Appear as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See “Coded Graphic Character Set Global Identifier Triplet X'01'” on page 348.

Application Notes:

1. A page segment included on a page or overlay with an IPS may optionally be mapped with an MPS in the AEG for that page or overlay. If such a mapping exists, the page segment is sent to the presentation device as a separate object and is called a *hard* page segment. If such a mapping does not exist, the page segment data is sent to the presentation device as part of the page or overlay and is called a *soft* page segment.
2. For a *hard* page segment included via IPS, the OEGs for all objects in the page segment should not contain any secondary resource mappings, such as font mappings and CMR references using MCF and MDR structured fields; such mappings are ignored.
3. For a *soft* page segment included via IPS, all secondary resource mappings in the OEGs for objects in the page segment, such as font mappings and CMR references using MCF and MDR structured fields, must be factored up to the including page or overlay.
4. To optimize print performance, it is strongly recommended that the same encoding scheme be used for a resource reference wherever in a print file that resource reference is specified. That is, the encoding scheme used for the resource include, the resource map, and the resource wrapper should be the same.

Architecture Notes:

1. In AFP environments, the following retired triplet is used on this structured field:
   - Line Data Object Position Migration (X'27') triplet; see “Line Data Object Position Migration Triplet X'27'” on page 561.
2. In AFP line data environments, the value X'FFFFFF' is supported for the XpsOset and YpsOset parameters to indicate that the X_p or Y_p position, respectively, defined by the current Line Descriptor (LND) in the Page Definition is to be used as the “origin” for the page segment. This value was also valid in pre-1992 AFP data streams to specify the current text print position and is supported by some print servers for migration of such data streams. However this value is not valid in MO:DCA data streams and should not be generated by MO:DCA applications. To record support for this value by some AFP print servers and to limit any further use, this value is retired, see “Retired Parameters” on page 570.

IPS Exception Condition Summary

X'01' An attempt is made to present data outside the medium presentation space.

Link Logical Element (LLE)

A Link Logical Element structured field specifies the linkage from a source document component to a target document component. The LLE identifies the source and target and indicates the purpose of the linkage by specifying a link type. The link source and link target may be in the same document component or in different document components, and they need not be of the same document component type. The linkage may involve a complete document component, or it may be restricted to a rectangular area on the presentation space associated with the document component. The Link Logical Element structured field can be embedded in the document that contains the link source, in the document that contains the link target, in the document index for either document, or in any combination of these structures. Link Logical Element parameters do not provide any presentation specifications.

LLE (X'D3B490') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3B490'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0	CODE	LnkType	X'01'–X'03'	Link type: **X'01'** Navigation link **X'02'** Annotation link **X'03'** Append link	M	X'06'
1				Reserved; should be zero	M	X'06'
Two or three repeating groups in the following format:						
0–1	UBIN	RGLength	3–(*n*+1)	Total length of this repeating group	M	X'06'
2	CODE	RGFunct	X'01'–X'03'	Repeating group function: **X'01'** Link attribute specification **X'02'** Link source specification **X'03'** Link target specification	M	X'06'
3–*n*		Triplets		See LLE Semantics for triplet applicability.	O	X'14'

LLE Semantics

LnkType Specifies the purpose of the link.

Value	Description
X'01'	Navigation link. Specifies the linkage from a source document component to a contextually-related target document component. Navigation links may be used to support applications such as hypertext and hypermedia.
X'02'	Annotation link. Specifies the linkage from a source document component to a target document component that contains an annotation for the source.

X'03'	Append link. Specifies the linkage from the end of a source document component to a target document component that contains an append to the source.
All others	Reserved

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

RGFunct Identifies the function of the repeating group:

Value	Description
X'01'	The repeating group specifies general attributes of the link.
X'02'	The repeating group specifies the source of the link.
X'03'	The repeating group specifies the target of the link.

Every Link Logical Element structured field must contain one repeating group that specifies the source of the link, and one repeating group that specifies the target of the link. Every Link Logical Element structured field may optionally contain one additional repeating group that specifies attributes of the link.

The optional attribute repeating group can be used to specify attributes and data that apply to the whole link, such as the name of the Link Logical Element structured field, the code page and character set used to encode character data in the Link Logical Element structured field, and parameter data to be associated with the link.

The source and target repeating groups specify the document components that are the source and target of the link and may further restrict the source and target to rectangular areas on the corresponding document component presentation spaces. The source and target repeating groups may qualify the name of a document component with the names of the document components that are higher in the document hierarchy. For example, if the target of the link is a page, the target repeating group may specify the name of the page, the name of the page group that contains the page, and the name of the document that contains the page group. If the names of the document components that are higher in the document hierarchy are not explicitly specified in the LLE repeating groups, they are inherited from the document components that contain the Link Logical Element structured field. For example, if a source repeating group only specifies an area, then the Link Logical Element structured field must be located within a page or overlay definition, and the name of the page or overlay, as well as the name of the document, are inherited by the source repeating group.

The inheritance of names is bypassed if the repeating group indicates that the source or target is located in the MO:DCA resource hierarchy. In that case, the source or target is located using the resource search order defined in "Resource Search Order" on page 26. The inheritance of names is also bypassed if the repeating group references the source or target with FQNFmt X'20' - URL. In that case, the source or target is a resource located on the Internet.

In general, source and target repeating groups may specify multiple document component names, however within each repeating group the identified document components must all be part of the same document hierarchy, and the actual source or target of the link is determined by the lowest specified member of that document component hierarchy.

If any positional processing is associated with the link source or link target on a page, such as the positioning of a cursor, processing starts at the location in the source or target that is closest to the page origin. For example, if the link target is specified to be an area on a page, positional processing starts at the corner of the area that is closest to the page origin. If the link target is specified to be a group of areas on a page, positional processing starts at the area corner that is closest to the page origin. If the link target is a page, positional processing starts at the page origin. Closest in this case is defined to be the minimum geometric distance. A given point (X,Y) on the page has a distance to the page origin defined by $\sqrt{(X^2+Y^2)}$, so that for a set of points, the point closest to the page origin is defined by the minimum $\sqrt{(X^2+Y^2)}$.

Table 18 on page 228 shows which document components may be specified as link sources in a link source repeating group or as link targets in a link target repeating group.

Table 18. Link Sources and Link Targets

Component	Link Source	Link Target
Document	Yes	Yes
Page group	Yes	Yes
Page	Yes	Yes
Overlay	Yes	Yes
Process element (TLE)	Yes	Yes
Rectangular area	Yes	Yes
Other object data	Yes	Yes

Triplets Appear in Link Logical Element structured field repeating groups as shown in Figure 56 on page 228.

Figure 56. Triplets in Link Attribute, Source, and Target Repeating Groups

Link Attribute Repeating Group
- Coded Graphic Character Set Global Identifier (X'01') triplet
- Fully Qualified Name (X'02') triplet, type X'0C'—Process Element (LLE) Name
- Parameter Value (X'82') triplet

Link Source Repeating Group
- Coded Graphic Character Set Global Identifier (X'01') triplet
- Fully Qualified Name (X'02') triplet, type X'09'—MO:DCA Resource Hierarchy Reference
- Fully Qualified Name (X'02') triplet, type X'0A'—Begin Resource Group Reference
- Fully Qualified Name (X'02') triplet, type X'0C'—Process Element (TLE) Name
- Fully Qualified Name (X'02') triplet, type X'0D'—Begin Page Group Reference
- Fully Qualified Name (X'02') triplet, type X'83'—Begin Document Reference
- Fully Qualified Name (X'02') triplet, type X'87'—Begin Page Reference
- Fully Qualified Name (X'02') triplet, type X'B0'—Begin Overlay Reference
- Fully Qualified Name (X'02') triplet, type X'CE'—Other Object Data Reference
- Object Classification (X'10') triplet
- Measurement Units (X'4B') triplet
- Area Definition (X'4D') triplet

Link Target Repeating Group
- Coded Graphic Character Set Global Identifier (X'01') triplet
- Fully Qualified Name (X'02') triplet, type X'09'—MO:DCA Resource Hierarchy Reference
- Fully Qualified Name (X'02') triplet, type X'0A'—Begin Resource Group Reference
- Fully Qualified Name (X'02') triplet, type X'0C'—Process Element (TLE) Name
- Fully Qualified Name (X'02') triplet, type X'0D'—Begin Page Group Reference
- Fully Qualified Name (X'02') triplet, type X'83'—Begin Document Reference
- Fully Qualified Name (X'02') triplet, type X'87'—Begin Page Reference
- Fully Qualified Name (X'02') triplet, type X'B0'—Begin Overlay Reference
- Fully Qualified Name (X'02') triplet, type X'CE'—Other Object Data Reference
- Object Classification (X'10') triplet
- Measurement Units (X'4B') triplet
- Area Definition (X'4D') triplet

Note that by specifying FQNFmt = X'20' - URL for the FQN format of the target name, the LLE can be used to link to resources on the Internet using a Uniform Resource Locator (URL).

Details on triplet semantics and on rules for including each triplet on the repeating groups are as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur multiple times in each repeating group. If in a link attribute repeating group, specifies the code page and character set for all character data in all three LLE repeating groups, unless overridden by a Coded Graphic Character Set Global Identifier triplet in a source or target repeating group, in which case the latter triplet specifies the code page and character set for that repeating group. If in a link source or link target repeating group, specifies the code page and character set for that repeating group. By specifying this triplet multiple times in a link source or link target repeating group, you can specify a unique code page and character set for the character data in every triplet on that repeating group.
X'02'	Fully Qualified Name	Optional. May occur once in a link source repeating group and once in a link target repeating group. The Fully Qualified Name type that may appear is **X'09'**—*MO:DCA Resource Hierarchy Reference*. If in a link source repeating group, specifies that the link source object is located in the MO:DCA resource hierarchy. If in a link target repeating group, specifies that the link target object is located in the MO:DCA resource hierarchy. See "Resource Search Order" on page 26.
X'02'	Fully Qualified Name	Optional. May occur once in a link source repeating group and once in a link target repeating group. The Fully Qualified Name type that may appear is **X'0A'**—*Begin Resource Group Reference*. If in a link source repeating group, specifies a resource group that contains the link source. If in a link target repeating group, specifies a resource group that contains the link target.
X'02'	Fully Qualified Name	Optional. May occur once in each repeating group. The Fully Qualified Name type that may appear is **X'0C'**—*Process Element Name*. If in a link attribute repeating group, specifies the name of the Link Logical Element. If in a link source repeating group, specifies the name of a Tag Logical Element that is the link source. If in a link target repeating group, specifies the name of a Tag Logical Element that is the link target.
X'02'	Fully Qualified Name	Optional. May occur once in a link source repeating group and once in a link target repeating group. The Fully Qualified Name type that may appear is **X'0D'**—*Begin Page Group Reference*. If in a link source repeating group, specifies a page group that is the link source or that contains the link source. If in a link target repeating group, specifies a page group that is the link target or that contains the link target.
X'02'	Fully Qualified Name	Optional. May occur once in a link source repeating group and once in a link target repeating group. The Fully Qualified Name type that may appear is **X'83'**—*Begin Document Reference*. If in a link source repeating group, specifies a document that is the link source or that contains the link source. If in a link target repeating group, specifies a document that is the link target or that contains the link target.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur once in a link source repeating group and once in a link target repeating group. The Fully Qualified Name type that may appear is **X'87'**—*Begin Page Reference*. If in a link source repeating group, specifies a page that is the link source or that contains the link source. If in a link target repeating group, specifies a page that is the link target or that contains the link target.
X'02'	Fully Qualified Name	Optional. May occur once in a link source repeating group and once in a link target repeating group. The Fully Qualified Name type that may appear is **X'B0'**—*Begin Overlay Reference*. If in a link source repeating group, specifies an overlay that is the link source or that contains the link source. If in a link target repeating group, specifies an overlay that is the link target or that contains the link target.
X'02'	Fully Qualified Name	Optional. May occur once in a link source repeating group and once in a link target repeating group. The Fully Qualified Name type that may appear is **X'CE'**—*Other Object Data Reference*. If in a link source repeating group, specifies other object data that is the link source or that contains the area that is the link source. If in a link target repeating group, specifies other object data that is the link target or that contains the area that is the link target. The object data being linked may or may not be defined by an AFP architecture. The object data is characterized and identified by a mandatory Object Classification (X'10') triplet, which also specifies whether the object data is carried in a MO:DCA object container, whether it is unwrapped object data, or whether the container structure of the object data is unknown. Note that if FQNFmt X'20' (URL) is used to specify a link source or target, the object type is defined by the URL itself and the Object Classification (X'10') triplet becomes optional.
X'10'	Object Classification	Mandatory if the Fully Qualified Name type X'CE', Other Object Data Reference, appears in a link source or a link target repeating group, in which case it must occur once in that repeating group. Otherwise this triplet is not allowed in a repeating group. Specifies information used to characterize and identify other object data. Note however that if FQN type X'CE' with FQNFmt X'20' (URL) is used to specify the link source or target, the object type is defined by the URL itself and the Object Classification (X'10') triplet becomes optional. See “Object Classification Triplet X'10'” on page 363.
X'4B'	Measurement Units	Optional if one or more Area Definition (X'4D') triplets are present in a link source or link target repeating group, in which case it may occur once in that repeating group. Specifies the units of measure to be used for positioning areas and for determining their size. If this triplet is omitted when an Area Definition triplet is present, the units of measure are specified by the document component on which the area is defined. See “Measurement Units Triplet X'4B'” on page 388.

Triplet	Type	Usage
X'4D'	Area Definition	Optional. May occur multiple times in a link source repeating group and multiple times in a link target repeating group. Defines a rectangular area on the presentation space of the lowest document component in the document hierarchy that is specified by the repeating group or that is inherited by the repeating group. If the repeating group does not explicitly specify an object, then the object specification is inherited from the document hierarchy. For example, if the LLE is located in a page, and if the repeating group does not specify any document component at the page level or at a lower level in the document hierarchy, then the area is defined on the presentation space for the page that contains the LLE. The units of measure for resolving the offset and size of the area are specified by a Measurement Units triplet, if present, or by the document component on which the presentation space is defined if the triplet is not present. When this triplet occurs multiple times on a link source repeating group, the logical union of the areas defines the link source. When this triplet occurs multiple times on a link target repeating group, the logical union of the areas defines the link target. See "Area Definition Triplet X'4D'" on page 390.
X'82'	Parameter Value	Optional. May occur multiple times in a link attribute repeating group. Used to pass parameter values to the link target. See "Parameter Value Triplet X'82'" on page 427.

LLE Exception Condition Summary

X'04' The Area Definition triplet is present in a repeating group but the Measurement Units triplet is absent and the lowest identified document component in the document hierarchy does not define units of measure.

Map Bar Code Object (MBC)

The Map Bar Code Object structured field specifies how a bar code data object is to be mapped into its object area.

MBC (X'D3ABEB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3ABEB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One repeating group in the following format:						
0–1	UBIN	RGLength	5	Total length of this repeating group	M	X'06'
2–4		Triplets		Mapping Option triplet	M	X'14'

MBC Semantics

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

Triplets Appear in the Map Bar Code Object structured field as follows:

Triplet	Type	Usage
X'04'	Mapping Option	Mandatory. Must occur once in each repeating group. See "Mapping Option Triplet X'04'" on page 360. The valid mapping options for the MBC structured field are: **Value** **Description** **X'00'** Position **All others** Reserved

Note: If this structured field is not present in the data stream, the architected default is *position*.

MBC Exception Condition Summary

X'01' The Map Bar Code Object structured field contains more than one repeating group.

X'02' A Mapping Option (X'04') triplet value other than X'00' is specified.

Medium Copy Count (MCC)

The Medium Copy Count structured field specifies the number of copies of each medium, or sheet, to be presented, and the modifications that apply to each copy. This specification is called a *copy group*. The MCC contains repeating groups that specify *copy subgroups*, such that each copy subgroup may be specified independently of any other copy subgroup. For each copy subgroup, the number of copies, as well as the modifications to be applied to each copy, is specified by the repeating group. If the modifications for a copy subgroup specify duplexing, that copy subgroup and all successive copy subgroups are paired such that the first copy subgroup in the pair specifies the copy count as well as the modifications to be applied to the front side of each copy, and the second copy subgroup in the pair specifies the same copy count as well as an independent set of modifications to be applied to the back side of each copy. The pairing of copy subgroups continues as long as duplexing is specified.

MCC (X'D3A288') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A288'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One to 128 repeating groups in the following format:						
0–1	UBIN	Startnum	1–32,386	Starting copy number	M	X'06'
2–3	UBIN	Stopnum	1–32,640	Ending copy number	M	X'06'
4				Reserved; should be zero	M	X'06'
5	CODE	MMCid	0–127	Medium Modification Control identifier	M	X'06'

MCC Semantics

Startnum The number of the first copy of the sheet for this copy subgroup. For the first copy subgroup this value must be 1. For other copy subgroups, this value must be one greater than the ending copy number of the preceding copy subgroup, or a X'01' exception condition exists.

Stopnum The number of the last copy of the sheet for this copy subgroup. This value must be greater than or equal to the value specified by *Startnum*, or a X'01' exception condition exists. The number of copies requested by the copy subgroup, called the copy count, which is defined by (*Stopnum*–*Startnum*) + 1, must be less than or equal to 255, or a X'02' exception condition exists. The total number of copies for the copy group, which is the sum of the copy counts for all copy subgroups, is equal to the value of *Stopnum* in the last copy subgroup.

MMCid Identifies a Medium Modification Control (MMC) structured field that specifies the modifications to be applied to all copies for the copy subgroup. A value of 0 selects an environment-specific set of default modifications.

MCC Exception Condition Summary

X'01' This exception condition exists when:

- For all copy subgroups other than the first, the starting copy number in a copy subgroup is not 1 greater than the ending copy number in the preceding copy subgroup.
- The ending copy number in a copy subgroup is not equal to or greater than the starting copy number in the same copy subgroup.

X'02' The copy count in a copy subgroup is greater than 255.

Map Container Data (MCD)

The Map Container Data structured field specifies how a presentation data object that is carried within an object container is mapped into its object area.

MCD (X'D3AB92') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3AB92'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One repeating group in the following format:						
0–1	UBIN	RGLength	5	Total length of this repeating group	M	X'06'
2–4		Triplets		Mapping Option triplet	M	X'14'

MCD Semantics

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

Triplets Appear in the Map Container Data structured field as follows:

Triplet	Type	Usage
X'04'	Mapping Option	Mandatory. Must occur once. See "Mapping Option Triplet X'04'" on page 360. The valid mapping options for the MCD structured field are: **Value** — **Description** **X'00'** Position **X'10'** Position and trim **X'20'** Scale to fit **X'30'** Center and trim **X'60'** Scale to fill **X'70'** UP3i Print Data mapping; valid only for the UP3i Print Data object type **All others** Reserved

Notes:

1. If this structured field is not present in the data stream, the architected default for the mapping option is *scale to fit*.
2. A presentation space size is required for a scale-to-fit or scale-to-fill mapping of the object presentation space to the object area. See "Object Type Identifiers" on page 609 for information on how the presentation space size is specified by various objects. If the presentation space size is not specified by the object, the architected default is the presentation space size of the including page or overlay.

3. This structured field is not applicable to non-presentation objects. It may be ignored if it appears in the object container for such objects.
4. The UP3i Print Data mapping is only valid for the UP3i Print Data object type; if any other mapping option is specified for this object type a X'02' exception condition exists.

MCD Exception Condition Summary

X'01' The Map Container Data structured field contains more than one repeating group.

X'02' The mapping option X'70' is specified for an object type other than UP3i Print Data.

Map Coded Font (MCF) Format 2

The Map Coded Font structured field maps a unique coded font resource local ID, which may be embedded one or more times within an object's data and descriptor, to the identifier of a coded font resource object. This identifier may be specified in one of the following formats:

- A coded font Global Resource Identifier (GRID)
- A coded font name
- A combination of code page name and font character set name

Additionally, the Map Coded Font structured field specifies a set of resource attributes for the coded font. For a description of coded fonts, see the *Font Object Content Architecture Reference*.

MCF (X'D3AB8A') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3AB8A'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One to 254 repeating groups in the following format:						
0–1	UBIN	RGLength	7–(*n*+1)	Total length of this repeating group	M	X'06'
2–*n*		Triplets		See MCF Semantics for triplet applicability.	M	X'14'

MCF Semantics

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

Triplets Appear within each repeating group as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Mandatory. A Fully Qualified Name (X'02') triplet of any permitted type may appear only once in a repeating group. The Fully Qualified Name types permitted in a repeating group are: • **X'07'**—*Font Family Name* • **X'08'**—*Font Typeface Name* • **X'84'**—*Coded Font GRID Reference* • **X'85'**—*Code Page Name Reference* • **X'86'**—*Font Character Set Name Reference* • **X'8E'**—*Coded Font Name Reference* At a minimum, each repeating group must contain one of these triplets or triplet groups: • A single Fully Qualified Name type X'84' (Coded Font GRID Reference) triplet • A Fully Qualified Name type X'85' (Code Page Name Reference) and a Fully Qualified Name type X'86' (Font Character Set Name Reference) triplet • A single Fully Qualified Name type X'8E' (Coded Font Name Reference) triplet See "Fully Qualified Name Triplet X'02'" on page 351. The type X'84' (Coded Font GRID Reference) is not permitted in the same repeating group with the type X'8E' (Coded Font Name Reference), and neither is permitted in the same repeating group with a type X'85' (Code Page Name Reference) or a type X'86' (Font Character Set Name Reference). When the type X'84' (Coded Font GRID Reference) identifies a font encoded using the EBCDIC Presentation double-byte encoding scheme (encoding scheme ID X'62*nn*') or the EBCDIC Presentation single-byte encoding scheme (encoding scheme ID X'61*nn*'), it is not permitted in the same repeating group with a Resource Section Number (X'25') triplet having a value other than X'00'. For a description of coded font naming conventions, see the *Font Summary for AFP Font Collection*. If a Fully Qualified Name type X'84' triplet specifies a font width in the global resource identifier (GRID), and if a vertical font size is not specified by a Font Descriptor (X'1F') triplet, this parameter may be used to generate the vertical font size, which is used to scale outline technology fonts to the desired point size. For a description of the GRID, see "Global Resource Identifier (GRID) Definition" on page 358 **Architecture Note:** If a coded font reference consists of only the GRID and does not contain a Font Descriptor triplet, it is assumed to have been generated by an application that was using integer point sizes. When the font width in such a font reference is used to calculate a specified vertical font size for scaling outline technology fonts, the calculated vertical font size is rounded to the nearest positive, non-zero, integer point size.

Triplet	Type	Usage
X'1F'	Font Descriptor Specification	Optional. May occur once in each repeating group. The specified vertical font size in this triplet may be used to scale an outline technology font to the desired point size and overrides any vertical font size that is calculated from a specified horizontal font size. If the vertical font size is not specified, the font width in the GRID may be used to calculate the specified vertical font size for scaling outline technology fonts. If a font width was not specified in the GRID, the specified horizontal font size in this triplet may be used to calculate the specified vertical font size for scaling outline technology fonts. If the specified vertical font size conflicts with the nominal vertical font size in the font object, the specified vertical font size overrides. A coded font reference may not always specify a vertical font size, such as when the reference does not include a GRID or a Font Descriptor triplet. In that case, the font object must provide the vertical font size for scaling an outline technology font. See “Font Descriptor Specification Triplet X'1F'” on page 369.
X'20'	Font Coded Graphic Character Set Global Identifier	Optional. May occur once in each repeating group. See “Font Coded Graphic Character Set Global Identifier Triplet X'20'” on page 373.
X'24'	Resource Local Identifier	Optional. May occur once in each repeating group. See “Resource Local Identifier Triplet X'24'” on page 378. The only resource type that may appear is **X'05'**—*Coded Font*. **Note:** If a resource LID is not specified in a Map Coded Font structured field, the architected default LID is X'00' and the architected default LID type is X'00'. **Application Notes:** • For purposes of print server resource management, each MCF that maps a font in a data object OEG must have a corresponding MCF mapping the same font in the AEG for that page or overlay. The ID used in the AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG. • Most AFP print servers only support the LID range that is defined in the MO:DCA IS/1 interchange set definition which is X'01' to X'7F', and the value X'FE'.
X'25'	Resource Section Number	Optional. May occur once in each repeating group. See “Resource Section Number Triplet X'25'” on page 379.
X'26'	Character Rotation	Optional. May occur once in each repeating group. See “Character Rotation Triplet X'26'” on page 380.

Triplet	Type	Usage
X'50'	Encoding Scheme ID	Optional. May occur once in each repeating group. See "Encoding Scheme ID Triplet X'50'" on page 395. The ESidCP parameter specifies the encoding scheme associated with the code page in the referenced font. Additionally, the ESidUD parameter may be specified to indicate the encoding scheme for the user data to be rendered with the referenced font. When the two encoding schemes do not match, the presentation system may need to transform the user data to match the encoding in the code page. Not all presentation systems support such transforms. To see which transforms are supported, consult your product documentation. See Table 19 on page 241 for the combinations of ESidCP and ESidUD that are valid for the MCF. **Note:** If this triplet is omitted, the architected default for the encoding scheme is EBCDIC Presentation for single-byte fonts and EBCDIC Presentation for double-byte fonts. The architected default for the user data encoding scheme is the code page encoding scheme; that is, it is assumed that the encoding for the user data matches the encoding in the font used to render the user data.
X'5D'	Font Horizontal Scale Factor	Optional. May occur once in each repeating group. Carries information that allows an outline technology font to be scaled anamorphically by specifying a horizontal scale factor. This horizontal scale factor is applied to the horizontal font dimension. If the font horizontal scale factor is the same as the specified vertical font size, the font scaling is uniform. If the font horizontal scale factor is not the same as the specified vertical font size, the font scaling is anamorphic; and the graphic characters are stretched or compressed in the horizontal direction relative to the vertical direction by the ratio of font horizontal scale factor divided by the specified vertical font size. If this triplet is omitted, the font horizontal scale factor defaults to the specified vertical font size and the scaling is uniform. A coded font reference may not always specify a vertical font size, such as when the reference does not include a GRID or a Font Descriptor triplet. In that case, if a Horizontal Scale Factor triplet is specified on the coded font reference, it is ignored. The vertical font size in the font object is then used to scale an outline technology font in the vertical direction, and the horizontal scale factor in the font object, if supplied, is used for anamorphic scaling. If a horizontal scale factor is not supplied in the font object, scaling is uniform. See "Font Horizontal Scale Factor Triplet X'5D'" on page 404.
X'84'	Font Resolution and Metric Technology	Optional. May occur once in each repeating group. Specifies metric information for a raster coded font. See page "Font Resolution and Metric Technology Triplet X'84'" on page 429. Note that the presence of this triplet indicates that the MCF references a raster-technology coded font.

Architecture Note: In AFP environments, the following retired triplet is used on this structured field:

- Text Orientation (X'1D') triplet. See "Text Orientation Triplet X'1D'" on page 558.

MCF Usage Information

Only a Map Coded Font structured field can map a resource local ID to a pair of code page/font character set names.

The names of coded fonts, code pages, and font character sets can be specified in several ways. See the appropriate interchange set definition, "MO:DCA Interchange Set 1" on page 473, for the correct syntax of these names.

Multiple Resource Local Identifier (X'24') triplet values (LIDs) may be mapped to the same font, but the same Resource Local Identifier (X'24') triplet value may not be mapped to more than one font within the same structured field.

Double-byte Font References

The same Resource Local Identifier (X'24') triplet value may be mapped to different sections of the same double-byte font. When this is done, the following rules apply:

- All repeating groups associated with the double-byte font must be contiguous.
- Each repeating group must either default the LID value or contain a Resource Local Identifier (X'24') triplet with the same value.
- Each repeating group must contain a Fully Qualified Name type X'85' (Code Page Name Reference) and Fully Qualified Name type X'86' (Font Character Set Name Reference).
- When the font uses the EBCDIC Presentation double-byte encoding scheme (encoding scheme ID X'62*nn*'), each repeating group must contain a Resource Section Number (X'25') triplet that specifies a valid double-byte section number in the range X'41' through X'FE'.
- Each Resource Section Number (X'25') triplet value specified must be unique within the entire set of repeating groups associated with the double-byte font.
- A Character Rotation (X'26') triplet may be specified in *any* of the repeating groups associated with the font and *need only* be specified in *one* of the repeating groups. However, if specified in more than one of the associated repeating groups, the value of all Character Rotation (X'26') triplets must be identical.
- A Encoding Scheme ID (X'50') triplet may be specified in *any* of the repeating groups associated with the font and *need only* be specified in *one* of the repeating groups. However, if specified in more than one of the associated repeating groups, the value of all Encoding Scheme ID (X'50') triplets must be identical.
- A Font Horizontal Scale Factor (X'5D') triplet may be specified in *any* of the repeating groups associated with the font and *need only* be specified in *one* of the repeating groups. However, if specified in more than one of the associated repeating groups, the value of all Font Horizontal Scale Factor (X'5D') triplets must be identical.
- A Font Resolution and Metric Technology (X'84') triplet may be specified in *any* of the repeating groups associated with the font and *need only* be specified in *one* of the repeating groups. If specified in more than one of the associated repeating groups, the last specified Font Resolution and Metric Technology (X'84') triplet is used.

Using the X'50' Triplet to Specify Encoding

If the optional ESidUD parameter is included, the following ESidCP and ESidUD combinations are allowed in the X'50' triplet when specified in an MCF repeating group:

Table 19. Valid ESidCP/ESidUD Combinations for the MCF

ESidUD	ESidCP
X'7200'—UTF-16, including surrogates; byte order is big endian (UTF-16BE)	X'8200'—Unicode Presentation; byte order is big endian

Architecture Note: The following additional ESidUD/ESidCP combinations are supported in the AFP Line Data architecture when the X'50' triplet is specified on the MCF in a Page Definition. Note that for the combination ESidUD = X'7200' and ESidCP = X'2100', it is assumed that the user data only uses UTF-16 code points X'0020'–X'007F', since these are the only UTF-16 code points that transform to one-byte ASCII code points. Similarly, for the combination ESidUD = X'7807' and ESidCP = X'2100', it is assumed that the user data only uses UTF-8 code points X'20'–X'7F', since these are the only UTF-8 code points that transform to one-byte ASCII code points.

ESidUD	ESidCP
X'7200'—UTF-16, including surrogates; byte order is big endian (UTF-16BE)	X'2100'—PC-Data SBCS (ASCII-based)
X'7807'—UTF-8	X'2100'—PC-Data SBCS (ASCII-based)

MCF Exception Condition Summary

X'01' The exception condition exists when any of the following conditions are encountered in *any* of the repeating groups:

- A Fully Qualified Name type X'84' (Coded Font GRID Reference) and a Fully Qualified Name of either type X'85' (Code Page Name Reference) or type X'86' (Font Character Set Name Reference).
- A Fully Qualified Name type X'8E' (Coded Font Name Reference) and a Fully Qualified Name of either type X'85' (Code Page Name Reference) or type X'86' (Font Character Set Name Reference).
- A Fully Qualified Name type X'84' (Coded Font GRID Reference) and a Fully Qualified Name type X'8E' (Coded Font Name Reference).
- A Fully Qualified Name type X'84' (Coded Font GRID Reference) that identifies a font encoded using the EBCDIC Presentation double-byte encoding scheme (encoding scheme ID X'62*nn*') or the EBCDIC Presentation single-byte encoding scheme (encoding scheme ID X'61*nn*'), and a Resource Section Number with a value other than X'00'.
- A Fully Qualified Name type X'8E' (Coded Font Name Reference) that identifies a font encoded using the EBCDIC Presentation double-byte encoding scheme (encoding scheme ID X'62*nn*') or the EBCDIC Presentation single-byte encoding scheme (encoding scheme ID X'61*nn*'), and a Resource Section Number with a value other than X'00'.
- Multiple Fully Qualified Names of the same type.
- Multiple triplets of the same type, except Fully Qualified Name (X'02') triplet.
- An Encoding Scheme ID where either the encoding scheme or the bytes-per-code-point indicator do not match the characteristics of the specified code page.

The exception condition *also* exists when any of the following conditions are encountered *within the same* Map Coded Font structured field:

- The Resource Local Identifier value is repeated in two or more repeating groups that do not map to the same double-byte font using a Fully Qualified Name type X'85' (Code Page Name Reference) and a Fully Qualified Name type X'86' (Font Character Set Name Reference).
- The Resource Local Identifier value is repeated in two or more repeating groups that are not contiguous.
- The Resource Local Identifier value is repeated in two or more repeating groups that do not each have a valid, unique Resource Section Number value.
- The Resource Local Identifier value is repeated in two or more repeating groups that have different Character Rotation values.
- The Resource Local Identifier value is repeated in two or more repeating groups that have different Encoding Scheme ID values.
- The Resource Local Identifier value is repeated in two or more repeating groups that have different Font Horizontal Scale Factor values.

X'02' The exception condition exists when:

- A Fully Qualified Name (X'02') triplet other than a type X'07' (Font Family Name), a type X'08' (Font Typeface Name), type X'84' (Coded Font GRID Reference), type X'85' (Code Page Name Reference), type X'86' (Font Character Set Name Reference), or a type X'8E' (Coded Font Name Reference) appears within any repeating group.
- A Resource Local Identifier (X'24') triplet type other than X'05' appears within any repeating group.

X'04' The exception condition exists when any repeating group does not contain one of the following:

- A Fully Qualified Name type X'84' (Coded Font GRID Reference).
- A Fully Qualified Name type X'85' (Code Page Name Reference) and a Fully Qualified Name type X'86' (Font Character Set Name Reference).
- A Fully Qualified Name type X'8E' (Coded Font Name Reference).

Medium Descriptor (MDD)

The Medium Descriptor structured field specifies the size and orientation of the medium presentation space for all sheets that are generated by the medium map that contains the Medium Descriptor structured field.

MDD (X'D3A688') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A688'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0	CODE	XmBase	X'00'–X'01'	Medium unit base for the X axis: **X'00'** 10 inches **X'01'** 10 centimeters	M	X'06'
1	CODE	YmBase	X'00'–X'01'	Medium unit base for the Y axis: **X'00'** 10 inches **X'01'** 10 centimeters	M	X'06'
2–3	UBIN	XmUnits	1–32,767	Medium units per unit base for the X axis	M	X'06'
4–5	UBIN	YmUnits	1–32,767	Medium units per unit base for the Y axis	M	X'06'
6–8	UBIN	XmSize	1–32,767	Medium extent for the X axis	M	X'06'
			X'000000'	X-axis extent not specified		
			X'FFFFFF'	Presentation process default		
9–11	UBIN	YmSize	1–32,767	Medium extent for the Y axis	M	X'06'
			X'000000'	Y-axis extent not specified		
			X'FFFFFF'	Presentation process default		
12	BITS	MDDFlgs		Specify control information for the media. See MDD Semantics for bit definitions.	M	X'06'
13–*n*		Triplets		See MDD Semantics for triplet applicability.	O	X'10'

Architecture Note: Pre-1989 AFP Data Stream documentation defined a short MDD that ended with the YmUnits parameter at byte offset 4 - 5. To accommodate old AFP applications that generate such MDDs, MO:DCA receivers should tolerate MDDs whose data field ends after this parameter. The total structured field length in that case is X'000E'.

MDD Semantics

XmBase Specifies the unit base for the X axis of the medium coordinate system.

YmBase Specifies the unit base for the Y axis of the medium coordinate system.

Note: A X'01' exception condition exists if the XmBase and YmBase values are not identical.

XmUnits Specifies the number of units per unit base for the X axis of the medium coordinate system.

YmUnits Specifies the number of units per unit base for the Y axis of the medium coordinate system.

XmSize Specifies the extent of the medium presentation space along the X axis. This is also known as the medium's size in the X-direction. A value of X'000000' indicates that the extent along the X axis is not specified and the size in the X-direction of the currently loaded medium, as defined by presentation device sensors or presentation device operator input, is used. A value of X'FFFFFF' indicates that a presentation process default should be used for the X-axis extent.

YmSize Specifies the extent of the medium presentation space along the Y axis. This is also known as the medium's size in the Y-direction. A value of X'000000' indicates that the extent along the Y axis is not specified and the size in the Y-direction of the currently loaded medium, as defined by presentation device sensors or presentation device operator input, is used. A value of X'FFFFFF' indicates that a presentation process default should be used for the Y-axis extent.

MDDFlgs Specify control information for the media.

Bit **Description**

0 Medium orientation enablement for cut-sheet printers.

- **B'0'** Do not pass the medium orientation specified on this structured field to cut-sheet printers; the medium orientation on such printers is always defined to be X'00' (portrait).
- **B'1'** Pass the medium orientation specified on this structured field to cut-sheet printers.

If this parameter is not specified, the architected default for MDDFlgs bit 0 is B'0' (do not pass the medium orientation to cut-sheet printers). Note that the medium orientation is always passed to continuous-forms printers. It is always passed to cut-sheet printers when N-up presentation is active. Note also that a continuous-forms printer in cut-sheet emulation (CSE) mode is treated as a continuous-forms printer when processing the MDDFlgs parameter.

1–7 Reserved; all bits must be B'0'.

Triplets Appear in the Medium Descriptor structured field as follows:

Triplet	Type	Usage
X'68'	Medium Orientation	Optional. May occur once. Specifies the orientation of the medium presentation space on the physical medium. See “Medium Orientation Triplet X'68'” on page 410. If this triplet is not specified, the architected default for the medium orientation is X'00' (portrait).

Architecture Note: In AFP environments, the following retired triplet is used on this structured field:

- MDD Two-up Triplet X'10'; see “Retired Triplets” on page 557.

Map Data Resource (MDR)

The Map Data Resource structured field specifies resources that are required for presentation. Each resource reference is defined in a repeating group and is identified with a file name, the identifier of a begin structured field for the resource, or any other identifier associated with the resource. The MDR repeating group may additionally specify a local or internal identifier for the resource object. Such a local identifier may be embedded one or more times within an object's data.

Application Note: To optimize print performance, it is strongly recommended that the same encoding scheme be used for a resource reference wherever in a print file that resource reference is specified. That is, the encoding scheme used for the resource include, the resource map, and the resource wrapper should be the same. For TrueType/OpenType fonts, optimal performance can be achieved by using UTF-16BE as the encoding scheme.

MDR (X'D3ABC3') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3ABC3'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One to 254 repeating groups in the following format:						
0–1	UBIN	RGLength	14–(*n*+1)	Total length of this repeating group	M	X'06'
2–*n*		Triplets		See MDR Semantics for triplet applicability.	M	X'14'

MDR Semantics

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

Triplets Appear in the Map Data Resource structured field repeating groups as follows. For examples of the triplet groups that can be specified for various types of MDR repeating groups, see Figure 58 on page 258.

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. See “Coded Graphic Character Set Global Identifier Triplet X'01'” on page 348. **Implementation Note:** Not all AFP servers support the inheritance of encoding scheme from higher levels of the document hierarchy, therefore it is recommended that this triplet be specified directly on the MDR if required by a parameter such as the FQN type X'DE' triplet.
X'02'	Fully Qualified Name	Mandatory. Must occur once in each repeating group. Specifies the reference to the resource object. The GID is used to locate the resource object in the resource hierarchy, which may include the presentation device, and must match the identifier for an object or a X'01' exception condition exists. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name types that may appear are: • **X'84'**—*Begin Resource Object Reference*, which is used to map an IOCA image object. The GID is used to locate the resource object in the resource hierarchy, which may include the presentation device, and must match the identifier for an object or a X'01' exception condition exists. • **X'CE'**—*Other Object Data Reference*, which is used to map a data object whose format may or may not be defined by an AFP architecture. The GID is used to locate the object in the resource hierarchy, which may include the presentation device, and must match the identifier for an object or a X'01' exception condition exists. This FQN type may not be used to map OCA objects, that is, IOCA, GOCA, BCOCA, or PTOCA objects. FQN type X'84' is used to map IOCA objects. **Application Note:** If the object is installed in a resource library using a Resource Access Table (RAT), it must not be wrapped with a MO:DCA object container envelope, that is, it must be installed in its raw source format. • **X'DE'**—*Data Object External Resource Reference*, which is used to map a resource object that is used by a data object. The GID is used to locate the resource object in the resource hierarchy, which may include the presentation device, and must match the identifier for an object resource or a X'01' exception condition exists. Resources that are used by data objects that may themselves be processed as resources are called *secondary resources*. See “Secondary Resource Objects” on page 12. Also see Table 49 on page 626.

Triplet	Type	Usage
		• **X'EE'**—*Tertiary Data Object External Resource Reference*, which is used to map a tertiary CMR resource object that is used by a secondary image resource object in a QR Code with Image bar code. The GID is used to locate the CMR resource object in the resource hierarchy, and must match the identifier for an object resource or a X'01' exception condition exists. Secondary presentation data object resources may themselves contain OEGs with MDRs for non-presentation data object resources (IOCA tiles, CMRs, data object fonts,etc.); these are known as *tertiary resources*. See “Tertiary Resource Objects” on page 13. Note that in MO:DCA data streams, the FQN type X'84', X'CE', and X'EE' triplets may appear on an MDR that is specified in an OEG for a QR Code with Image bar code (BCOCA) data object. However, such triplets may not appear on an MDR that is specified in an OEG for any other data object, or a X'02' exception condition exists. The reference in the FQN type X'84', FQN type X'CE', and FQN type X'EE' triplets may be specified in the following format: • FQNFmt = X'00' - the reference is made with a character-encoded name. See “External Resource Naming Conventions” on page 89 for a description of the naming conventions used in AFP environments. The reference in the FQN type X'DE' triplet may be specified in one of the following two formats: • FQNFmt = X'00' - the reference is made with a character-encoded name. See “External Resource Naming Conventions” on page 89 for a description of the naming conventions used in AFP environments. • FQNFmt = X'10' - the reference is made with a ASN.1 OID encoded using the definite short form. This format provides a unique and system-independent method to identify and reference an object. It may be used to select objects that are resident in the presentation device. Such an identifier is referred to as an *object OID*. **Architecture Note:** The FQN type X'DE' triplet with FQNFmt = X'10' (OID) is only used to reference the CMYK SWOP and CMYK Euroscale resident color profiles registered in the MO:DCA Registry; see “Resident Color Profile Identifiers” on page 634. When an FQN type X'DE' triplet with FQNFmt X'00' is used to reference a data-object font, the GID is a full font name that uniquely identifies the font. The encoding for this character string is specified by the X'01' triplet, which can be located either in this structured field or in the MO:DCA document hierarchy. See “Using the MDR to Map a TrueType/OpenType Font” on page 254. **Architecture Notes:**

Triplet	Type	Usage
		1. If the TTF/OTF is used as a secondary resource by a non-OCA object such as PDF or SVG, the association of internal identifier to full font name is specified on the IOB or PPO that includes the non-OCA object. In that case the MDR does not specify the internal identifier for the TTF/OTF using the FQN type X'BE' triplet; if specified, it is ignored. 2. A non-OCA object that is placed directly on a page or overlay can reference a TTF/OTF used on that page or overlay. **Application Note:** When a full font name is specified in a Resource Access Table (RAT), the encoding for the name is UTF-16BE. This encoding is characterized by CCSID 1200 (X'04B0'). A performance benefit may be achieved if the full font name specified on the MDR—which is used to index the RAT—already uses this encoding, thereby eliminating the need for an encoding conversion. When an FQN type X'DE' or X'EE' triplet with FQNFmt X'00' is used to reference a Color Management Resource (CMR), the GID is a CMR name that matches the name specified in the header of the CMR and that uniquely identifies the CMR. The encoding for this character string is specified by the X'01' triplet, which can be located either in this structured field or in the MO:DCA document hierarchy. If an IOB is used to reference the mapped object, the IOB must specify the same reference, using the same FQNFmt, as the MDR.
X'02'	Fully Qualified Name	Optional. May occur once in each repeating group that also specifies a FQN type X'DE' triplet, but only: • when the MDR is specified in the OEG of a data object or object container • when the MDR references a data-object font and – the MDR is in the AEG for PTOCA text, or – the MDR is in the OEG for BCOCA or AFP GOCA Text, or – the MDR is in the OEG of an object container in which case this triplet is mandatory. When the MDR is in the AEG for BCOCA or AFP GOCA text, this triplet is also mandatory but the LID is not used; ID X'FE' may be specified in that case. Aside from the FQN type X'84', FQN type X'CE', or FQN type X'EE' triplet cases described in the following two rows, this triplet is ignored in all other cases. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'BE'**—*Data Object Internal Resource Reference*. The identifier is used internally by the data object to reference the resource whose external identifier is specified by the FQN type X'DE' triplet. The identifier must be specified using FQNFmt X'00', which, for this FQN type, indicates that the data type is defined by the specific data object that generates the internal resource reference and is undefined (UNDF) at the MO:DCA data stream level. **Architecture Notes:**

Triplet	Type	Usage
		1. For data-object fonts referenced by AFP text (PTOCA),AFP graphics (GOCA), and AFP bar code (BCOCA) objects, the data type of the internal identifier is a CODE that consists of a one-byte local ID. 2. For tile resources referenced by IOCA data objects, the data type of the internal identifier is a CODE that consists of a four-byte local ID. 3. For purposes of print server resource management, each MDR that is specified in an OEG for a data-object font must have a corresponding MDR mapping the same font in the AEG for the page or overlay. The local ID used in the page or overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG. 4. For a TrueType/OpenType font that is used as a secondary resource by a non-OCA object such as PDF or SVG, the association of internal identifier to full font name is specified on the IOB or PPO that includes the non-OCA object. In that case the MDR does not specify the internal identifier for the TTF/OTF using the FQN type X'BE' triplet; if specified, it is ignored. When both the FQN type X'DE' and the FQN type X'BE' triplets are specified on an MDR repeating group, they map the internal resource identifier to the external resource identifier. Resources that are used by data objects that may themselves be processed as resources are called *secondary resources*. See "Secondary Resource Objects" on page 12.
X'02'	Fully Qualified Name	Optional. May occur once in each repeating group that also specifies an FQN type X'84' or X'CE' triplet, but only: • when the MDR is specified in the OEG of a bar code object and the MDR references an IOCA image or an object container from Table 48 on page 626, in which case this triplet is mandatory. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'BE'**—*Data Object Internal Resource Reference*. The identifier is used internally by the bar code to reference the resource whose external identifier is specified by the FQN type X'84' or FQN type X'CE' triplets. The identifier must be specified using FQNFmt X'00', which, for this FQN type, indicates that the data type is defined by the specific data object that generates the internal resource reference and is undefined (UNDF) at the MO:DCA data stream level. **Architecture Note:** For purposes of print server resource management, each MDR that maps a presentation data object resource in the bar code OEG must have a corresponding MDR mapping the same resource in the AEG for the page or overlay, without the FQN type X'BE' triplet. The same presentation data object can be used as a primary resource on the page or overlay and as a secondary resource in the bar code by using the FQN type X'BE' triplet on the MDR of the barcode OEG. When the presentation data object resource is an IOCA image, the FQN type X'BE' triplet would be paired with an FQN type X'84' triplet. When the presentation data object resource is a non-OCA presentation object, the FQN type X'BE' triplet would be paired with an FQN type X'CE' triplet. Presentation data object resources supported for this purpose are IOCA images along with the object types shown in Table 48 on page 626.

Triplet	Type	Usage
		When both the FQN type X'BE' triplet and one of the FQN type X'CE' or X'84' triplets are specified on an MDR repeating group, they map the internal resource identifier to the external resource identifier.
X'02'	Fully Qualified Name	Optional. May occur once in each repeating group that also specifies an FQN type X'EE' triplet, but only: • when the MDR is specified in the OEG of a QR Code with Image bar code object, in which case this triplet is mandatory. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'BE'**—*Data Object Internal Resource Reference*. Specifies the identifier that is used internally by the bar code to reference the secondary image resource that is to be associated with the CMR whose external identifier is specified by the FQN type X'EE' triplet. The identifier must be specified using FQNFmt X'00', which, for this FQN type, indicates that the data type is defined by the specific data object that generates the internal resource reference and is undefined (UNDF) at the MO:DCA data stream level. When both the FQN type X'EE' and FQN type X'BE' triplets are specified on an MDR repeating group, they map the internal identifier of the secondary image resource to the external identifier of the tertiary CMR resource used by the secondary image resource. Resources that are used by data objects that may themselves be processed as resources are called *secondary resources* and resources used by secondary resources are called *tertiary resources*. See "Secondary Resource Objects" on page 12 and "Tertiary Resource Objects" on page 13.
X'02'	Fully Qualified Name	Optional. May occur once in each repeating group. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is: **X'85'**—*Code Page Name Reference*. Only used when the MDR references a data-object font with the FQN type X'DE' triplet, in which case this triplet specifies the name of an AFP code page that defines the encoding in the user data. It is ignored in all other cases. Either this triplet or the X'20' triplet may be specified. If the MDR repeating group specifies both the FQN type X'85' triplet and a X'20' triplet, the FQN type X'85' triplet is ignored. **Application Notes:** 1. The referenced code page must map code points to AFP Graphic Character Global Identifiers (GCGIDs). The presentation device maps GCGIDs to the UTF-16 code points in the font. 2. The code page name consists of 8 characters and follows the naming conventions for AFP code pages defined in *Font Summary for AFP Font Collection*. An example of a code page name is T1V10500. 3. If the user-data encoding is double-byte, the referenced code page must be a valid double-byte code page.

<table>
<tr><th>Triplet</th><th>Type</th><th>Usage</th></tr>
<tr><td>X'10'</td><td>Object Classification</td><td>Mandatory if the repeating group specifies a Fully Qualified Name type X'CE'—Other Object Data Reference, a Fully Qualified Name type X'DE'—Data Object External Resource Reference, or a Fully Qualified Name type X'EE'—Tertiary Data Object External Resource Reference, in which case it must occur once in the repeating group and identifies the resource type. See “Object Classification Triplet X'10'” on page 363.</td></tr>
<tr><td>X'20'</td><td>Font Coded Graphic Character Set Global Identifier</td><td>Optional. May occur once in each repeating group. Only used when the MDR references a data-object font with the FQN type X'DE' triplet, in which case this triplet specifies the Code Page Global Identifier (CPGID) and Graphic Character Set Global Identifier (GCSGID) of an AFP code page that defines the encoding in the user data. It is ignored in all other cases. See “Font Coded Graphic Character Set Global Identifier Triplet X'20'” on page 373. Either this triplet or the FQN type X'85' triplet may be specified. If the MDR repeating group specifies both the FQN type X'85' triplet and a X'20' triplet, the FQN type X'85' triplet is ignored.
Application Notes:
1. The referenced code page must map code points to AFP Graphic Character Global Identifiers (GCGIDs). The presentation device maps GCGIDs to the UTF-16 code points in the font.
2. For a description of GCGIDs, GCSGIDs, and CPGIDs, see Character Data Representation Architecture Reference and Registry.
3. If the user-data encoding is double-byte, the referenced code page must be a valid double-byte code page.
4. Note that this code page is not part of the referenced data-object font. In particular, the code page is not within the scope of the flag in the Data-Object Font Descriptor triplet that may indicate that the font is in the print file resource group.</td></tr>
<tr><td>X'50'</td><td>Encoding Scheme ID</td><td>Optional. May occur once in each repeating group. Only used when the MDR references a data-object font and the encoding in the user data is different than the encoding in the referenced font. In that case this triplet specifies the encoding in the user data. The user data encoding can be specified in two ways:
• With a code page identifier—specified either as a CPGID in the X'20' triplet or as a name in the FQN type X'85' triplet—and an optional X'50' triplet with the ESidCP parameter that specifies the encoding for the code page. The ESidUD parameter in the X'50' triplet is ignored in this case since the user data encoding is defined by the code page.
• With the ESidUD parameter in the X'50' triplet and no code page identifier. The ESidCP parameter in the X'50' triplet is ignored in this case.
For a list of valid ESidUD and ESidCP combinations, see “Using the X'50' Triplet to Specify Encoding” on page 254.
If the X'50' triplet is omitted and a code page is specified—either as a CPGID in the X'20' triplet or as a name in the FQN type X'85' triplet—the architected default is that the ESidUD and ESidCP parameters match the code page encoding. If the X'50' triplet is omitted and no code page is specified the architected default is that the ESidUD = ESidCP = X'7200' (UTF-16), which matches the encoding in the data object font. See “Encoding Scheme ID Triplet X'50'” on page 395.</td></tr>
</table>

Triplet	Type	Usage
X'5A'	Object Offset	Optional. If this MDR references a CMR and is specified in the DEG of a Form Map, may occur once with ObjTpe=X'A8' to specify that documents are the objects to be counted. The triplet is ignored in all other cases. Specifies how many documents in the print file precede the document to be associated with the CMR. If this triplet is not specified in this case, the first document in the print file is selected. The offset is measured from the beginning of the print file, so that the first document has offset 0, the second document has offset 1, and the *n*th document has offset (*n*-1). See "Object Offset Triplet X'5A'" on page 402.
X'8B'	Data-Object Font Descriptor	Optional. May occur once in each repeating group. Only used when the MDR references a data-object font with the FQN type X'DE' triplet, in which case this triplet specifies information used to render the font, and is mandatory for OCA objects. It is ignored in all other cases. See "Data-Object Font Descriptor Triplet X'8B'" on page 447.
X'8C'	Locale Selector	Optional. May occur once. Establishes the creation locale for the resource referenced by the MDR. If the MDR references a data-object font such as a TrueType font, this parameter defines the creation locale for the character string that is rendered with this font. See "Locale Selector Triplet X'8C'" on page 451.
X'91'	Color Management Resource Descriptor	Optional. May occur once. Only used when the MDR references a Color Management Resource (CMR) with the FQN type X'DE' or type X'EE' triplet, in which case it is mandatory; it is ignored in all other cases. This triplet specifies the processing mode and scope for the CMR. See "Color Management Resource Descriptor Triplet X'91'" on page 456.
X'FF'	Triplet Extender	Optional. May occur more than once in a contiguous sequence, but only in the following case. It is ignored in all other cases. See "Triplet Extender Triplet X'FF'" on page 470. • The MDR must specify one of the following object types: **X'92'** Other object data • The MDR references a secondary resource for other object data using an FQN type X'DE' triplet • The secondary resource is the generic non-OCA Resource object • The MDR associates an internal resource reference to the secondary resource with an FQN type X'BE' triplet • The triplet extenders must follow the FQN type X'BE' triplet and must occur in a contiguous sequence Specifies a portion of a secondary resource reference that occurs internal to the data object referenced by the MDR. Use of the triplet extender allows the length of the internal resource reference to exceed the 250 byte capacity of the FQN type X'BE' triplet.

Architecture Note: The Extended Resource Local Identifier Mandatory (X'22') triplet is mandatory on the MDR in MO:DCA-L data streams and must occur once in each repeating group when the MDR maps a resource with a FQN type X'84'—Begin Resource Object Reference triplet. See "Extended Resource Local Identifier Triplet X'22'" on page 376. The only resource type that may be specified in the X'22' triplet is Restype = X'10' - Image resource. Note that within the same MDR structured field, it is not permissible to map the same local ID to more than one image resource or a X'01' exception condition exists. However, two or more repeating groups within the same MDR structured field may be used to map different local IDs to the same image resource. Note that the MO:DCA-L format has been functionally capped and is no longer defined in the MO:DCA reference; for a definition of this format, see *MO:DCA-L: The OS/2 PM Metafile (.met) Format*.

Application Note: A non-OCA data object or an IOCA image object that is included on a page or overlay with an IOB, if first mapped with an MDR in the AEG for that page or overlay, is processed as a *hard* object. In that case the object is sent to the presentation device once as a resource object and can then be presented multiple times using IOBs. If the object is not mapped, it is processed as a *soft* object and is sent to the presentation device as part of the page or overlay.

Using the X'50' Triplet to Specify Encoding

Table 20 on page 254 shows the ESidCP and ESidUD combinations that are allowed in the X'50' triplet when the MDR references a TrueType/OpenType font with EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001'):

Table 20. Valid ESidUD/ESidCP Combinations for the MDR

ESidUD	ESidCP
Not specified	X'2100'—PC-Data SBCS (ASCII)
Not specified	X'6100'—EBCDIC SBCS
Not specified	X'6200'—EBCDIC DBCS
X'7807'—UTF-8	Ignored

Using the MDR to Map a TrueType/OpenType Font

Font Name

When the MDR is used to map a data-object font resource that is a TrueType/OpenType font and specifies a FQN type X'DE' triplet with FQNFmt = X'00', the character string that identifies the font must be the *full font name* specified in a name record in the mandatory Naming Table of the font file. This parameter is specified in a name record with Name ID 4. An example of a full font name is *Times New Roman Bold*. Two characteristics of the full font name must be taken into account when using it to reference a TrueType/OpenType font: language and encoding.

- *Language.* The full font name may be specified in a number of languages. The language used for a given name record is specified with a language identifier (LCID). For example, English-United States is assigned LCID X'0409' (1033). The language used to specify the full font name in the FQN type X'DE' triplet may be any of the languages specified in a name record for the full font name with the encoding defined by EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001').
- *Encoding.* The encoding used to specify the character string in the FQN type X'DE' triplet is defined by a Coded Graphic Character Set Global Identifier (X'01') triplet that precedes the FQN type X'DE' triplet. This triplet may be specified on the MDR or on a structured field that is higher in the document hierarchy than the MDR: for example on the BPG for the page that contains the MDR or on the BDT for the document. See “Coded Graphic Character Set Global Identifier Triplet X'01'” on page 348 for a definition of the scoping rules for the X'01' triplet. Note that the encoding for the FQN type X'DE' triplet need not match the encoding for the full font name in the font Naming Table.

  Implementation Note: Not all AFP servers support the inheritance of encoding scheme from higher levels of the document hierarchy, therefore it is recommended that this triplet be specified directly on the MDR if required by a parameter such as the FQN type X'DE' triplet.

Font Install Program

In general, the full font name does not provide sufficient information to find the font resource on a given platform. Additional information such as the file name is normally required to locate the font resource. The mapping from full font name to file name is provided for each platform that requires this by a font install program. This program builds a Resource Access Table (RAT) that must, at minimum, contain the following information:

- The full font name encoded in UTF-16BE. This full font name is specified multiple times in all languages used in the naming table. The UTF-16 encoding matches the encoding defined by EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001') in the Naming Table. Figure 57 shows the full font name of the MS Mincho font in two different languages.

Figure 57. Example of a Full Font Name in Two Languages

Platform ID = 3
Encoding ID = 1
Language ID = 1033 (English - United States)
Field Value = 004D 0053 0020 004D 0069 006E 0068 006F
Example: ms mincho

Platform ID = 3
Encoding ID = 1
Language ID = 1041 (Japanese)
Field Value = FF2D FF33 0020 660E 671D
Example: ＭＳ 明朝

- A mapping of the full font name—in each language—to the name of the file that contains the font. For example, if the Naming Table contains two name records for the full font name (Name ID 4), one in English-United States (LCID = X'0409') and one in German-Standard (LCID = X'0407'), both in the encoding defined by EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001'), the font install table must map both language versions of this full font name to the same file name.
- If the font also has an object OID assigned and can therefore be resident in the printer, the mapping from full font name to font file name also includes the object OID for the font. This allows use of the resident version of the font and avoids a font download.
- If the font is contained in a TrueType Collection file (TTC), the full font name must be mapped to the file name of the TTC. A TTC consists of a collection of TrueType/OpenType font files which may share some of the font tables. The table directories for each font file are indexed from a single TTC Header Table. If the collection has an object OID assigned, the mapping from full font name to collection file name also includes the object OID for the collection. When a mapped TrueType/OpenType font is part of a TTC, the complete TTC (if not already in the presentation device) is downloaded to the device, which must be able to index the required font in the collection.
- If the font has linked fonts the RAT must link the full font name of the font to the full font names of the linked fonts. When a font has linked fonts, it is referred to as a *base font* to differentiate it from its linked fonts. Linked fonts are TTFs/OTFs that can be used to extend the character sets in a base font or to add user-defined characters (UDCs) to the base font. All linked fonts for a base font (if not already in the presentation device) are downloaded to the device and are treated as extensions to the base font by the device. The order in which the linked fonts are specified determines the order in which they are processed by the device. The base font is always processed first, followed by the first-specified linked font, followed by the next-specified linked font, and so on. The last linked font is processed last.

The Resource Access Table (RAT) used in AFP environments is defined in "The Resource Access Table (RAT)" on page 531.

TrueType/OpenType Font Resources in a Resource Library

When TrueType/OpenType fonts are installed in a resource library, they must not be wrapped with a MO:DCA object envelope such as BOC/EOC, that is, they must be installed in their raw source format. This allows the font resources to be used by all system components, particularly those that do not understand MO:DCA object envelopes such as BOC/EOC. Any of the necessary information that such an envelope normally provides, such as an object OID, is associated with the raw font resource by the Resource Access Table (RAT). The font install program must ensure that the TrueType/OpenType font resources are installed in this manner. BOC/EOC object containers for TrueType/OpenType font resources are only supported when such resources are placed into a print file resource group, in which case they are mandatory.

Architecture Note: In AFP environments, when a TrueType/OpenType font resource is carried in a BOC/EOC container in an external (print file level) resource group, the container must be wrapped with a BRS/ERS envelope.

TrueType/OpenType Font Resources in an External (Print file level) Resource Group

TrueType/OpenType fonts (TTFs/OTFs), TrueType/OpenType fonts that are used as linked fonts, and TrueType/OpenType font collections (TTCs), may be carried in the resource group for a print file. This is called a print file level resource group, and these resources are said to be *inline*. When presentation servers search for a font that is referenced in the data stream, such a resource group is searched ahead of system level resource libraries, and if an inline font is found it must be used in place of the system level font. To support this hierarchy, presentation servers process a TrueType/OpenType font reference in an MDR for inline resources as follows:

1. The resource group, if present, is searched for a font (TTF/OTF) container or a collection (TTC) container that specifies a matching full font name.
   - A font container specifies the full font name using a FQN type X'01' triplet on the Begin Resource (BRS) structured field for the font container.
   - A collection container specifies the full font name of a font in the collection using a FQN type X'6E'—Data Object Font Base Font Identifier triplet on the BRS of the collection container.

   The first matching font container or collection container is used. If a collection containing the font is found, the complete TTC (if not already in the presentation device) is downloaded to the device, which must be able to index the required font in the collection. The font container or collection container may also specify one or more linked fonts for the referenced font.
   - On a font container, linked fonts for the base font are specified with FQN type X'7E'—Data-object Font Linked Font Identifier triplets, which carry the full font name of the linked fonts, on the BRS of the font container.
   - On a collection container, linked fonts are specified with FQN type X'7E' triplets that immediately follow the FQN type X'6E' triplet for the base font on the BRS of the collection container. Note that if the base font is specified in multiple languages using multiple FQN type X'6E' triplets, each instance of the FQN type X'6E' triplet must be followed by the sequence of FQN type X'7E' triplets that identify the linked fonts for the base font.

   The full font names for the linked fonts are used in turn to search the resource group for a font container or a collection container that carries a font that matches the full font name of the linked font. On a font container, the linked font name is matched against the FQN type X'01' triplet on the BRS; on a collection container it is matched against the FQN type X'6E' triplets on the BRS.
   - The first matching font container or collection container is used, and its font is processed as a linked font for the base font. Multiple linked fonts may be specified, and the order in which they are specified on the

BRS of the font container or collection container determines the order in which they are processed. The base font is always processed first, followed by the first-specified linked font, followed by the next-specified linked font, and so on. The last linked font is processed last.

- If a linked font cannot be found in either an inline font container or an inline collection container, the full font name of the linked font is used to index the RAT to locate the linked font in a resource library. If a specified linked font cannot be found in the resource group or in a resource library, a X'04' exception condition exists.

Only one level of linking is supported. That is, if a linked font specifies its own linked fonts, either with FQN type X'7E' triplets on its inline container or with linked font pointers in the RAT, these “secondary” linked fonts are not processed as linked fonts for the original base font.

2. If a font matching the MDR reference is not found in an inline font container or in an inline collection container, the presentation server accesses the RAT with the full font name to locate the referenced font in a resource library. In this case, all linked fonts are specified in the RAT repeating group for the referenced font, and the order in which they are specified determines the order in which they are processed. Both inline linked fonts and library-based linked fonts are used, and the print file level resource group is always searched for linked fonts ahead of the resource library. The resource group search includes font containers, in which case the linked font name is matched against the FQN type X'01' triplet on the BRS of the font container, and collection containers, in which case the linked font name is matched against the FQN type X'6E' triplets on the BRS of the collection container.

Figure 58. Examples of MDR Repeating Groups

MDR Repeating Group Mapping an IOCA Image in an AEG
- Fully Qualified Name (X'02') triplet, type X'84'—*Begin Resource Object Reference*

MDR Repeating Group Mapping a PDF Object in an AEG
- Fully Qualified Name (X'02') triplet, type X'CE'—*Other Object Data Reference*
- Object Classification (X'10') triplet

MDR Repeating Group Mapping a PDF Resource in an AEG
- Fully Qualified Name (X'02') triplet, type X'DE'—*Data Object External Resource Reference*
- Object Classification (X'10') triplet

MDR Repeating Group Mapping an IOCA image for use as a secondary resource to a BCOCA QR Code with Image bar code, in the OEG of the bar code
- Fully Qualified Name (X'02') triplet, type X'84'—*Begin Resource Object Reference*
- Fully Qualified Name (X'02') triplet, type X'BE'—*Data Object Internal Resource Reference*

MDR Repeating Group Mapping a TIFF image for use as a secondary resource to a BCOCA QR Code with Image bar code, in the OEG of the bar code
- Fully Qualified Name (X'02') triplet, type X'CE'—*Other Object Data Reference*
- Fully Qualified Name (X'02') triplet, type X'BE'—*Data Object Internal Resource Reference*
- Object Classification (X'10') triplet

MDR Repeating Group Mapping a CMR for use as a tertiary resource to a TIFF image being used as a secondary resource to a BCOCA QR Code with Image bar code, in the OEG of the bar code
- Fully Qualified Name (X'02') triplet, type X'EE'—*Tertiary Data Object External Resource Reference*
- Fully Qualified Name (X'02') triplet, type X'BE'—*Data Object Internal Resource Reference*
- Coded Graphic Character Set Global Identifier (X'01') triplet
- Object Classification (X'10') triplet
- Color Management Resource Descriptor (X'91') triplet

MDR Repeating Group Mapping a TrueType/OpenType Font (user encoding = font encoding) in an AEG
- Coded Graphic Character Set Global Identifier (X'01') triplet
- Fully Qualified Name (X'02') triplet, type X'DE'—*Data Object External Resource Reference*
- Fully Qualified Name (X'02') triplet, type X'BE'—*Data Object Internal Resource Reference*
- Object Classification (X'10') triplet
- Data-Object Font Descriptor (X'8B') triplet

MDR Repeating Group Mapping a TrueType/OpenType Font (user encoding = UTF-8) in an AEG
- Coded Graphic Character Set Global Identifier (X'01') triplet
- Fully Qualified Name (X'02') triplet, type X'DE'—*Data Object External Resource Reference*
- Fully Qualified Name (X'02') triplet, type X'BE'—*Data Object Internal Resource Reference*
- Object Classification (X'10') triplet
- Encoding Scheme ID (X'50') triplet
- Data-Object Font Descriptor (X'8B') triplet

MDR Repeating Group Mapping a TrueType/OpenType Font (user encoding defined by EBCDIC/ASCII code page) in an AEG
- Coded Graphic Character Set Global Identifier (X'01') triplet
- Fully Qualified Name (X'02') triplet, type X'DE'—*Data Object External Resource Reference*
- Fully Qualified Name (X'02') triplet, type X'BE'—*Data Object Internal Resource Reference*
- Object Classification (X'10') triplet
- Font Coded Graphic Character Set Global Identifier (X'20') triplet
- Encoding Scheme ID (X'50') triplet
- Data-Object Font Descriptor (X'8B') triplet

Using the MDR to Map a Color Management Resource (CMR)

CMR Name

When the MDR is used to map a Color Management Resource (CMR) and specifies a FQN type X'DE' or X'EE' triplet with FQNFmt = X'00', the character string that identifies the CMR must be the *CMRname* specified in the CMR header of the CMR file. The CMR name has a fixed length of 73 characters (146 bytes if encoded in UTF-16BE). The encoding used to specify the character string in the FQN type X'DE' or X'EE' triplet is defined by a Coded Graphic Character Set Global Identifier (X'01') triplet that precedes the FQN type X'DE' or X'EE' triplet. This triplet may be specified on the MDR or on a structured field that is higher in the document hierarchy than the MDR, for example on the BPG for the page that contains the MDR or on the BDT for the document. See the X'01' triplet description for a definition of the scoping rules for the X'01' triplet. Note that the encoding for the FQN type X'DE' or X'EE' triplet need not match the UTF-16BE encoding for the CMR name in the CMR header.

Implementation Note: Not all AFP servers support the inheritance of encoding scheme from higher levels of the document hierarchy, therefore it is recommended that this triplet be specified directly on the MDR if required by a parameter such as the FQN type X'DE' or X'EE' triplet.

Generic CMRs

Halftone CMRs and Tone Transfer Curve CMRs can be specified in a generic sense and referenced as instruction CMRs to request an intended output appearance. When used in this manner, such CMRs are called *generic* CMRs. They are identified with a fixed character pattern of “generic” in the version field of the CMR name and with the absence of device-specific fields in the name. The CMR Architecture registers all valid generic CMR names for HT and TTC CMRs. Generic CMRs are never used directly by an output device, they are always replaced by device-specific CMRs that will provide the intended appearance. This replacement is done either by the print server based on processing inline CMRs or the CMR RAT, or by the output device. Generic audit HT and TTC CMRs are ignored by the output device.

Device support for downloaded CC CMRs and generic HT and TTC CMRs is mandatory. Device support for downloaded device-specific HT and TTC CMRs, and for IX CMRs is optional. If an optional CMR is referenced in a print file and is not supported by the output device, the print server recognizes an exception condition. The reporting of this exception condition and the continuation of print file processing are controlled by user-specified fidelity controls.

Link CMRs

Link color conversion CMRs provide look-up tables (LUTs) that convert directly from an input color space in the presentation data to the output color space of the presentation device. There are two subtypes of Link color conversion CMRs - *Link LK CMRs* and *Link DL CMRs*. Link LK CMRs are generated and processed internally in AFP systems and cannot be referenced in the data stream. Link LK CMRs can be important for presentation device performance, but device support for downloaded Link LK CMRs is optional; devices that do not support this function may generate Link LK CMRs internally. Link DL CMRs carry *ICC DeviceLink Profiles*. They are similar to Link LK CMRs in that they provide a direct conversion from an input color space to the output color space of the presentation device. However Link DL CMRs are exposed to the AFP application and the job submitter and are referenced in the data stream.

CMR Install Program

In general, the CMR name does not provide sufficient information to find the CMR on a given platform. Additional information such as the file name is normally required to locate the CMR. The mapping from CMR name to file name is provided for each platform that requires this by a CMR install program. This program builds a CMR Resource Access Table (RAT) entry that must, at minimum, contain the following information:

- The CMR name encoded in UTF-16BE.

- A mapping of the CMR name to the name of the file that contains the CMR.
- A mapping of the CMR name to the object OID for the CMR. This allows use of a printer-resident version of the CMR, allows the CMR to be captured by the printer, and also allows the accurate generation of Link LK CMRs.
- Optionally, mappings to other CMRs. For Color Conversion CMRs, these may be mappings to Link LK CMRs that convert the color space in the CC CMR to the color spaces, defined by other CC CMRs, of presentation devices. For generic Halftone and Tone Transfer Curve CMRs, these may be mappings to device-specific versions of the same CMR type.

CMRs in a Resource Library

When CMRs are installed in a resource library, they must not be wrapped with a MO:DCA object envelope such as BOC/EOC, that is, they must be installed in their raw source format. This allows the CMRs to be used by system components that do not understand MO:DCA object envelopes. Any of the necessary information that such an envelope normally provides, such as an object OID, is associated with the CMR by the CMR Resource Access Table (RAT). The install program must ensure that the CMRs are installed in this manner. When a presentation server accesses the CMR RAT with a CMR reference from an MDR, which can only occur after the print file level resource group has been accessed unsuccessfully with that CMR reference, the following algorithm is used. Note that the same algorithm is used if the CMR was referenced from an IOB, a PPO, or from an entry in the Data Object RAT.

The print server accesses the RAT entry with the CMR name, the processing mode—audit or instruction—and the device type and model of the target output device, and processes the CMR RAT entry as follows. Note that all Color Conversion CMRs, all Indexed CMRs, and all Link Color Conversion CMRs, are normally device-specific and their device type and model are specified as part of the CMR name. The only CMR types that can be specified as generic CMRs, identified with a fixed character pattern in the version field of the CMR name and with the absence of device-specific fields in the name, are Tone Transfer Curve (TTC) CMRs and Halftone (HT) CMRs. Note also that if a mapped CMR does not specify a device type and model, it matches any target device type and model.

Table 21. Print Server CMR Processing: CMRs in Resource Libraries

CMR type	Processing mode	Device-specific or generic	Processing
Color conversion	Audit or instruction	Device-specific	The referenced CMR is downloaded, if necessary, and activated. If the target device supports downloaded Link LK CMRs, all Link LK CMRs that are mapped to the referenced CMR and that match the target device type and model are downloaded, if necessary, and activated. All other mapped CMRs are ignored.
Halftone	Audit	Device-specific	If the target device supports downloaded HT CMRs, the referenced CMR can be downloaded and activated, but the target device ignores it. All mapped CMRs are also ignored.
Halftone	Audit	Generic	The referenced CMR can be downloaded and activated, but the target device ignores it. All mapped CMRs are also ignored.
Halftone	Instruction	Device-specific	If the target device supports downloaded HT CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.

Table 21 Print Server CMR Processing: CMRs in Resource Libraries (cont'd.)

CMR type	Processing mode	Device-specific or generic	Processing
Halftone	Instruction	Generic	If the target device supports downloaded HT CMRs, all mapped device-specific HT CMRs that match the device type and model of the target output device are downloaded, if necessary, and activated. These CMRs replace the referenced generic CMR. Otherwise, the generic CMR is downloaded, if necessary, activated, and replaced by the output device with a device-specific HT CMR.
Tone transfer curve	Audit	Device-specific	If the target device supports downloaded TTC CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.
Tone transfer curve	Audit	Generic	The referenced CMR can be downloaded and activated, but the target device ignores it. All mapped CMRs are also ignored.
Tone transfer curve	Instruction	Device-specific	If the target device supports downloaded TTC CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.
Tone transfer curve	Instruction	Generic	If the target device supports downloaded TTC CMRs, all mapped device-specific TTC CMRs that match the device type and model of the target output device are downloaded, if necessary, and activated. These CMRs replace the referenced generic CMR. Otherwise, the generic CMR is downloaded, if necessary, activated, and replaced by the output device with a device-specific TTC CMR.
Indexed	Audit	Device-specific	If the target device supports downloaded IX CMRs, the referenced CMR can be downloaded and activated, but the target device ignores it. All mapped CMRs are also ignored.
Indexed	Instruction	Device-specific	If the target device supports downloaded IX CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.
Link DL	Link	Device-specific	If the target device supports downloaded Link DL CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.

CMRs in an External (Print file level) Resource Group

CMRs may also be carried in the resource group for a print file, in which case they are called *inline* CMRs. The CMR must first be wrapped in a BOC/EOC object container, which in turn must be wrapped in a BRS/ERS resource envelope. The BRS specifies the CMR name, encoded in UTF-16BE, with a FQN type X'01' triplet. If the CMR in the container is a Color Conversion (CC) CMR, the BRS may also specify the names of Link LK CMRs, also encoded in UTF-16BE, that are mapped to the CMR using FQN type X'41' - Color Management

Resource (CMR) Reference triplets. If the CMR in the container is a generic HT or TTC instruction CMR, the BRS may also specify device-specific CMR replacements for the generic CMR using the FQN type X'41' triplets. When resolving a CMR reference in the data stream, the print server must always search the print file resource group—if one exists—first. The CMRname is matched against the CMRname that is specified on the BRS of the resource container. If no match is found, the search continues with the CMR RAT.

If a match is found, the inline CMR is processed as follows.

Table 22. Print Server CMR Processing: Inline CMRs

CMR type	Processing mode	Device-specific or generic	Processing
Color conversion	Audit or instruction	Device-specific	The inline CMR is downloaded, if necessary, and activated. If the target device supports downloaded Link LK CMRs, all Link LK CMRs that are mapped to the referenced CMR with a FQN type X'41' triplet on the BRS and that match the target device type and model are downloaded, if necessary, and activated. All other mapped CMRs are ignored.
Halftone	Audit	Device-specific	If the target device supports downloaded HT CMRs, the inline CMR can be downloaded and activated, but the target device ignores it. All mapped CMRs are also ignored.
Halftone	Audit	Generic	The inline CMR can be downloaded and activated, but the target device ignores it. All mapped CMRs are also ignored.
Halftone	Instruction	Device-specific	If the target device supports downloaded HT CMRs, the inline CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.
Halftone	Instruction	Generic	If the target device supports downloaded HT CMRs, and if the BRS references device-specific HT CMRs that match the device type and model of the target device, these CMRs are downloaded, if necessary, and activated. These CMRs replace the inline generic CMR. Otherwise, the search continues with the CMR RAT. If a matching generic CMR RAT entry is found, and if the target device supports downloaded HT CMRs, all mapped device-specific CMRs that match the device type and model of the target device are downloaded, if necessary, and activated. These CMRs replace the inline generic CMR. Otherwise, the inline generic CMR is downloaded, if necessary, activated, and replaced by the output device with a device-specific HT CMR.
Tone transfer curve	Audit	Device-specific	If the target device supports downloaded TTC CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.
Tone transfer curve	Audit	Generic	The referenced CMR can be downloaded and activated, but the target device ignores it. All mapped CMRs are also ignored.

Table 22 Print Server CMR Processing: Inline CMRs (cont'd.)

CMR type	Processing mode	Device-specific or generic	Processing
Tone transfer curve	Instruction	Device-specific	If the target device supports downloaded TTC CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.
Tone transfer curve	Instruction	Generic	If the target device supports downloaded TTC CMRs, and if the BRS references device-specific TTC CMRs that match the device type and model of the target device, these CMRs are downloaded, if necessary, and activated. These CMRs replace the inline generic CMR. Otherwise, the search continues with the CMR RAT. If a matching generic CMR RAT entry is found, and if the target device supports downloaded TTC CMRs, all mapped device-specific CMRs that match the device type and model of the target device are downloaded, if necessary, and activated. These CMRs replace the inline generic CMR. Otherwise, the inline generic CMR is downloaded, if necessary, activated, and replaced by the output device with a device-specific TTC CMR.
Indexed	Audit	Device-specific	If the target device supports downloaded IX CMRs, the referenced CMR can be downloaded and activated, but the target device ignores it. All mapped CMRs are also ignored.
Indexed	Instruction	Device-specific	If the target device supports downloaded IX CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.
Link DL	Link	Device-specific	If the target device supports downloaded Link DL CMRs, the referenced CMR is downloaded, if necessary, and activated. All mapped CMRs are ignored.

Figure 59. Examples of MDR Repeating Groups

MDR Repeating Group Mapping a CMR

- Coded Graphic Character Set Global Identifier (X'01') triplet
- Object Classification (X'10') triplet
- Fully Qualified Name (X'02') triplet, type X'DE'—*Data Object External Resource Reference*
- Color Management Resource Descriptor (X'91') triplet

MDR Repeating Group Mapping a Tertiary CMR

- Coded Graphic Character Set Global Identifier (X'01') triplet
- Object Classification (X'10') triplet
- Fully Qualified Name (X'02') triplet, type X'EE'—*Tertiary Data Object External Resource Reference*
- Fully Qualified Name (X'02') triplet, type X'BE'—*Data Object Internal Resource Reference*
- Color Management Resource Descriptor (X'91') triplet

Using the MDR to Map a Data Object Resource

Data Objects can also be installed with an install program and processed by the print server using a Resource Access Table (RAT), which in this case is called the Data Object RAT. A significant advantage of installing and processing with a RAT is that the data object reference in the data stream is not subject to any platform-specific file system naming conventions. That is, the object can be referenced using an unrestricted, natural, platform-independent name, and the RAT entry is then used to map this name to a platform-specific file name. Data objects can also be installed in any number of traditional methods and processed without a RAT. In general, if a data object reference on an MDR, PPO, or IOB is processed against a resource library that contains a Data Object RAT, the reference is first processed against the RAT.

If a data object is referenced using its natural name and not a file name, additional information is required to locate and process the object on a given platform. This information is provided in the Data Object RAT entry built by the install program when the object is installed. This entry must, at minimum, contain the following information:

- The object name encoded in UTF-16BE.
- A mapping of the data object name to the name of the file that contains the object.
- A mapping of the data object name to the object OID for the object.
- Optionally, mappings to CMRs that are to be associated with the data object. Such mappings must also specify the processing mode for the CMR—audit or instruction. Note that if mapped CMRs are to be used with a data object that is processed with a Data Object RAT, the data object must be mapped as a resource in the data stream, that is, it must be a *hard* object.

The install program may also optionally provide the capability to copy or extract ICC profiles embedded in the data object, to transform these profiles into CC CMRs to be associated with the object, and to install a compacted version of the data object.

When non-OCA data objects, such as EPS, PDF, GIF, TIFF, JFIF are installed in a resource library, they are not wrapped with a MO:DCA BOC/EOC envelope, that is, they are installed in their raw source format. This allows these objects to be used by system components that do not understand MO:DCA container envelopes.

MDR Exception Condition Summary

X'01' This exception condition exists when:

- A resource with the same identifier as that specified on the type X'84' (Begin Resource Object Reference) Fully Qualified Name triplet, or on the type X'CE' (Other Object Data Reference) Fully Qualified Name triplet, or on the type X'DE' (Data Object External Resource Reference) Fully Qualified Name triplet, or on the type X'EE' (Tertiary Data Object External Resource Reference) Fully Qualified Name triplet cannot be located.
- The same repeating group contains an invalid number or combination of Fully Qualified Name triplets.
- The same Resource LID is mapped to more than one resource object of the same type within the same structured field.

X'02' This exception condition exists when:

- A Fully Qualified Name (X'02') triplet other than a type X'84' (Begin Resource Object Reference), a type X'85' (Code Page Name Reference), a type X'CE' (Other Object Data Reference), a type X'DE' (Data Object External Resource Reference), a type X'EE' (Tertiary Data Object External Resource Reference), or a type X'BE' (Data Object Internal Resource Reference) appears within any repeating group.
- The same resource reference is specified in more than one repeating group.

Medium Finishing Control (MFC)

The Medium Finishing Control structured field specifies the finishing requirements for physical media. Finishing can be specified for a media *collection* at the print file level or at the document level by placing the MFC in the document environment group (DEG) of the form map. Finishing can be specified for a media collection at the medium map level by placing the MFC in a medium map. Finishing can be specified for individual media, or sheets, at the medium map level by placing the MFC in a medium map.

- When the MFC is specified in the document environment group (DEG) of the form map, its scope is specified to be one of the following:
  - The complete print file
  - Each individual document in the print file
  - A selected document in the print file

  If the scope is the print file, the MFC defines *print file level finishing*, and all media in the print file are collected for finishing in a *print file level media collection*. The specified finishing operations are applied to the complete collection, that is, the complete print file. Note that the print file level media collection excludes other material that may accompany the print file, such as header pages, trailer pages, and message pages. Such material can be generated as a separate print file. Therefore, it may be collected in a separate print file level media collection and processed with separate finishing operations.

  If the scope is each individual document in the print file, the MFC defines *document level finishing*, and all media in each document are collected for finishing in a *document level media collection*. The specified finishing operations are applied to each collection, that is each document, individually. Note that, in this case, the same finishing operations are applied to each document.

  If the scope is a selected document in the print file, the MFC defines *document level finishing*, and all media in the selected document are collected for finishing in a *document level media collection*. The specified finishing operations are applied to this single collection. If the same document is selected multiple times, finishing operations are applied in the order specified. Note that, using this type of MFC, unique finishing operations may be specified for each document in the print file.

  A single print file level MFC, a single document level MFC for all documents, or multiple document level MFCs for single documents can be specified in the DEG. If a print file level MFC and document level MFCs are specified in the same DEG, document level finishing is applied to the selected documents, and print file level finishing is applied to the complete print file.

  If a document is selected for finishing using an MFC whose scope is each document in the print file, and if it is also selected by one or more MFCs whose scope is a single document, the finishing operations that apply to each document in the print file are applied before the finishing operations that apply to a single document.

- When the MFC is specified in a medium map, its scope is specified to be one of the following:
  - Each medium, or sheet, generated by the medium map. When the scope is each medium in the medium map, the MFC defines *medium map level sheet finishing*, and the specified finishing operations are applied to each medium, *not* to the media collection.
  - The collection of media, or the collection of sheets generated by the medium map. In this case the MFC defines *medium map level group finishing*, and all media generated by the medium map are collected for finishing in a *medium map level sheet finishing*. The specified finishing operations are applied to this single collection.

When an MFC is specified both in a medium map and in the DEG, both sets of finishing operations are applied according to their scope, as long as the operations are compatible. For rules on how finishing operations are nested, see "Finishing Operation Nesting Rules" on page 270. Note that not all combinations of finishing operations are compatible. Compatible combinations of finishing operations are presentation-device specific.

MFC (X'D3A088') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A088'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0	BITS	MFCFlgs		See “MFC Semantics” on page 267 for the MFCFlgs parameter bit definitions.	M	X'06'
1				Reserved; should be zero	M	X'06'
2	CODE	MedColl	X'00'–X'02'	Boundary conditions for medium-map level sheet collection **X'00'** No sheet collection processed at the medium map level **X'01'** Begin medium map level sheet collection **X'02'** Continue medium map level sheet collection	M	X'06'
3	CODE	MFCScpe	X'01'–X'05'	MFC Scope: **X'01'** Print file level MFC **X'02'** Document level MFC, all documents **X'03'** Document level MFC, selected document **X'04'** Medium map level MFC, each medium or sheet **X'05'** Medium map level MFC, collection of media or sheets **X'06'** Retired value; see “Retired Parameters” on page 570	M	X'06'
4–*n*		Triplets		See “MFC Semantics” on page 267 for triplet applicability.	M	X'14'

MFC Semantics

MFCFlgs The following flags are defined:

Bit	Description	
0	Activate Medium Finishing Control	
	B'0'	Process this structured field as a NoOp.
	B'1'	Process this structured field as specified.
1–7	Reserved; all bits must be B'0'.	

MedColl is a parameter that defines the boundary conditions for the media collection generated by this medium map. This parameter is only processed if MFCScpe = X'05'—medium map level MFC, collection of sheets. It is ignored in all other cases.

Value **Scope**

X'00' No sheet collection is to be processed at the medium map level. This value should be specified when MFCScpe is set to values other than X'05'—medium map level MFC, collection of sheets. If this value is specified when MFCScpe is set to X'05', a X'01' exception condition exists.

X'01' Begin medium map level sheet collection.

This causes a sheet eject to be generated and starts a medium map level sheet collection for the finishing operation specified on this MFC. Note that if a collection for this *same* finishing operation is already in progress from a previous medium map, that collection is terminated and the specified finishing operation is applied. The sheet collection that is started by this MFC continues until:

1. A medium map is invoked that does not contain an MFC with MFCScpe= X'05' and MedColl = X'02' (Continue) for this *same* operation.
2. A medium map level finishing operation with MFCScpe = X'05' that is nested outside this operation is applied.
3. End of document is reached.

When this sheet collection is terminated for any of the above reasons, the specified finishing operation is applied to the collection, and a sheet eject is generated.

X'02' Continue medium map level sheet collection.

This continues a medium map level sheet collection that was started for the *same* finishing operation by a previous medium map. The sheet collection that is continued by this MFC continues until:

1. A medium map is invoked that does not contain an MFC with MFCScpe= X'05' and MedColl = X'02' (Continue) for this *same* operation.
2. A medium map level finishing operation with MFCScpe = X'05' that is nested outside this operation is applied.
3. End of document is reached.

When a sheet collection is terminated for any of the above reasons, the specified finishing operation is applied to the collection, and a sheet eject is generated.

If the same finishing operation was not previously started, the continue operation request is ignored.

Note that the MFC that continues an operation need not be specified in the same order in the medium map as the MFC that started the operation.

All others	Reserved.

MFCScpe Is a parameter that defines the scope of the finishing operations specified by this MFC structured field.

Value	**Scope**
X'01'	Print file level MFC. The scope of this MFC is the complete print file. All media in the print file are collected for finishing in a print file level media collection, and the specified finishing operations are applied to this collection.
X'02'	Document level MFC, all documents. The scope of this MFC is each individual document in the print file. The media in each document are collected for finishing in a document level media collection, and the specified finishing operations are applied to each collection individually.
X'03'	Document level MFC, single document. The scope of this MFC is a single document in the print file. The document is selected by specifying its position in the print file using an Object Offset (X'5A') triplet. If this triplet is not specified, the first document in the print file is selected. The media in this document are collected for finishing in a document level media collection, and the specified finishing operations are applied to that collection.
X'04'	Medium map level MFC, each medium, or sheet. The scope of this MFC is each medium generated by the medium map, and the specified finishing operations are applied to each medium, or sheet, individually.
X'05'	Medium map level MFC, collection of media or sheets. The scope of this MFC is the set of media, or sheets, generated by the medium map. All sheets generated by this medium map are collected in a medium map level sheet collection, and the specified finishing operations are applied to this collection. The MedColl parameter specifies whether this MFC begins a collection (MedColl = X'01'), or continues a collection (MedColl = X'02').
X'06'	Retired value; see “Retired Parameters” on page 570.
All others	Reserved

When the MFC is specified in a DEG, the following values for MFCScpe are supported:

X'01'	Print file level MFC
X'02'	Document level MFC, all documents
X'03'	Document level MFC, single document
X'06'	Retired value; see “Retired Parameters” on page 570

If any other value is specified, the MFC is ignored.

When the MFC is specified in a medium map, the following values for MFCScpe are supported:

X'04'	Medium map level MFC, each medium
X'05'	Medium map level MFC, collection of media

If any other value is specified, the MFC is ignored.

The MedColl and MFCScpe parameters affect the generation of sheet ejects when N-up processing is active. For a description of how sheet and partition ejects are handled when N-up processing is active and an MFC is specified in the medium map, see “Media Eject Control Triplet X'45'” on page 384.

Triplets Appear in the Medium Finishing Control structured field as follows:

Triplet	Type	Usage
X'5A'	Object Offset	Optional. If MFCScpe=X'03' and the MFC is specified in the DEG of a Form Map, may occur once with ObjTpe=X'A8' to specify that documents are the objects to be counted. The triplet is ignored in all other cases. If this triplet is not specified in this case, the first document in the print file is selected. Specifies how many documents in the print file precede the document to be finished. The offset is measured from the beginning of the print file, so that the first document has offset 0, the second document has offset 1, and the *n*th document has offset (*n*-1). See "Object Offset Triplet X'5A'" on page 402.
X'85'	Finishing Operation	One occurrence of either this triplet or the UP3i Finishing Operation (X'8E') triplet is mandatory. May occur more than once. Specifies finishing operations to be applied to collected media. If this triplet is specified more than once, finishing operations are applied in the order in which the triplets are specified. Multiple identical X'85' triplets are ignored. See "Finishing Operation Triplet X'85'" on page 430. For rules on how finishing operations are nested, see "Finishing Operation Nesting Rules" on page 270. The following finishing operations may be specified when this triplet is specified on the MFC in a DEG: **X'01'** Corner Staple **X'02'** Saddle Stitch Out **X'03'** Edge Stitch **X'04'** Fold In **X'05'** Separation Cut **X'06'** Perforation Cut **X'08'** Center Fold In **X'09'** Trim after center fold or saddle stitch **X'0A'** Punch **X'0C'** Perfect bind **X'0D'** Ring bind **X'0E'** C-fold In **X'0F'** Accordion Fold In **X'12'** Saddle Stitch In **X'14'** Fold Out **X'18'** Center Fold Out **X'19'** Trim **X'1E'** C-fold Out **X'1F'** Accordion Fold Out **X'22'** Single Gate Fold In **X'32'** Single Gate Fold Out If any other finishing operation is specified, this triplet is ignored. The following finishing operations may be specified when this triplet is specified on the MFC in a medium map with MFCScpe = X'04': **X'04'** Fold In **X'05'** Separation Cut **X'06'** Perforation Cut **X'07'** Z-fold **X'08'** Center Fold In **X'0A'** Punch **X'0E'** C-fold In **X'0F'** Accordion Fold In **X'14'** Fold Out **X'18'** Center Fold Out **X'19'** Trim **X'1E'** C-fold Out

Triplet	Type	Usage
		X'1F' Accordion Fold Out **X'20'** Double Parallel Fold In **X'21'** Double Gate Fold In **X'22'** Single Gate Fold In **X'30'** Double Parallel Fold Out **X'31'** Double Gate Fold Out **X'32'** Single Gate Fold Out If any other finishing operation is specified, this triplet is ignored. The following finishing operations may be specified when this triplet is specified on the MFC in a medium map with MFCScpe = X'05': **X'01'** Corner Staple **X'02'** Saddle Stitch Out **X'03'** Edge Stitch **X'04'** Fold In **X'05'** Separation Cut **X'06'** Perforation Cut **X'08'** Center Fold In **X'09'** Trim after center fold or saddle stitch **X'0A'** Punch **X'0C'** Perfect bind **X'0D'** Ring bind **X'0E'** C-fold In **X'0F'** Accordion Fold In **X'12'** Saddle Stitch In **X'14'** Fold Out **X'18'** Center Fold Out **X'19'** Trim **X'1E'** C-fold Out **X'1F'** Accordion Fold Out **X'22'** Single Gate Fold In **X'32'** Single Gate Fold Out If any other finishing operation is specified, this triplet is ignored.
X'8E'	UP3i Finishing Operation	One occurrence of either this triplet or the Finishing Operation (X'85') triplet is mandatory. May occur more than once. Specifies finishing operations to be applied to collected media. If this triplet is specified more than once, finishing operations are applied in the order in which the triplets are specified. See the UP3i Finishing Operation triplet description. Multiple identical X'8E' triplets are ignored. See "UP3i Finishing Operation Triplet X'8E'" on page 454. For rules on how finishing operations are nested, see "Finishing Operation Nesting Rules" on page 270. The UP3i Finishing Operation triplet can be specified on the MFC either in a DEG or in a medium map with all architected values for the MFCScpe parameter. There is no architected restriction on which UP3i finishing operations may be specified with MFCScpe = X'04' or MFCScpe = X'05'. However, the UP3i Specification as well as UP3i equipment may limit the scope of UP3i finishing operations; for further information consult the current UP3i Specification. This specification is available at: `www.afpcinc.org`.

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 (print file, document, medium), and second by the order of the operation in the data stream. Finishing operations with an inherently broader scope, e.g. operations at the print file level, are nested outside of finishing operations with an inherently narrower scope, for example, operations at the medium map level.

If more than one operation is specified with the same scope, for example, if two operations are specified at the medium map level, the order of the Finishing Operation (X'85') triplets and of the UP3i Finishing Operation (X'8E') triplets (whether specified on the same MFC or on different MFCs) defines the order of the nesting. In that case, the first finishing operation specified defines the outermost nesting, and the last finishing operation specified defines the innermost nesting.

The following defines how finishing operations are nested starting with the outermost nesting and ending with the innermost nesting.

Printfile level finishing (outermost level), MFCScpe = X'01'

Document level finishing: each document in the print file, MFCScpe = X'02'

Document level finishing: a selected document in the print file, MFCScpe = X'03'

Medium map level finishing: collection of sheets (innermost level), MFCScpe = X'05'.

Nesting may in turn affect the scope of a finishing operation. When a finishing operation is applied, all finishing operations nested inside this operation are also applied. Finishing operations that are nested outside this operation are not affected. Note that nesting does not apply to medium map level sheet finishing (MFCScpe = X'04'). Such finishing is applied to individual sheets and does not involve starting, continuing, and ending a collection of sheets. Each medium map that is to generate such finishing must specify the operation explicitly.

Implementation Notes:

1. AFP Environments limit the number of finishing operations that can be nested at the medium map level to sixteen. This limit does not apply to nesting at the document or print file level. For example, if two finishing operations are nested at the medium map level, and these operations are nested within one finishing operation at the document level, which in turn is nested within one finishing operation at the print file level, the level of nesting counted against the AFP nesting limit is two.
2. In AFP environments, the nesting of identical finishing operations at the medium map level is not supported. Two finishing operations are considered identical if they are specified by the same triplet (either the Finishing Operation (X'85') triplet or the UP3i Finishing Operation (X'8E') triplet), and the triplet contents are identical.

Architecture Notes:

1. For some printers, the offset stacking function (X'D1*nn*' keyword on the MMC structured field), when invoked inside a document or print file, cannot be combined with a finishing operation. In this case, the offset stacking request is ignored and the finishing operation is performed.
2. Finishing operations may be applied to print files that contain a mixture of MO:DCA documents and non-MO:DCA data. The following rules specify how the scope of the finishing operations applies to a print file that contains line-data and mixed-data documents, with or without BDT/EDT, as well as composed documents. For more information on line data and mixed data, see the *Advanced Function Presentation: Programming Guide and Line Data Reference*.
   - If the MFC specifies print file level finishing, all media in the print file is collected for finishing in a print file level media collection, and the finishing operations are applied to the complete collection, that is, the complete print file.
   - If the MFC specifies document level finishing and selects all documents, the print file is processed as a set of documents as follows:
     - Any document bounded by BDT/EDT is processed as a single document regardless of whether the data between BDT/EDT is line data, mixed data, or composed data.

– Line data and mixed data that is not bounded explicitly by BDT/EDT is processed as an implied document with implied BDT/EDT. When such data follows the resource group or an EDT, a BDT is implied, and the implied document lasts until a BDT is encountered or until the end of the print file is reached. In either case, the implied document is terminated with an implied EDT.

The media in each document, whether implied or explicit, is collected for finishing in a document level media collection, and the finishing operations are applied to each collection, that is each document, individually.

- If the MFC specifies document level finishing and selects a single document, the print file is processed as a set of documents in the same manner as when all documents are selected. The offset of the selected document is calculated by counting all documents, whether implied or explicit, and the selected document may itself be an implied document. The media in the selected document are collected for finishing, and the finishing operations are applied to the single collection, that is the single document.

MFC Exception Condition Summary

X'01' This exception condition exists when:
- The FOpCnt parameter in a Finishing Operation (X'85') triplet is non-zero but does not match the specified number of OpPos parameters.
- The MedColl parameter is X'00' and the MFCScpe parameter is X'05'.

Map Graphics Object (MGO)

The Map Graphics Object structured field specifies how a graphics data object is mapped into its object area.

MGO (X'D3ABBB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3ABBB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One repeating group in the following format:						
0–1	UBIN	RGLength	5	Total length of this repeating group	M	X'06'
2–4		Triplets		Mapping Option triplet	M	X'14'

MGO Semantics

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

Triplets Appear in the Map Graphics Object structured field as follows:

Triplet	Type	Usage
X'04'	Mapping Option	Mandatory. Must occur once. See "Mapping Option Triplet X'04'" on page 360. The valid mapping options for the MGO structured field are: **Value** **Description** **X'10'** Position and trim **X'20'** Scale to fit **X'30'** Center and trim **X'50'** Retired mapping option; see "Retired Parameters" on page 570. **X'60'** Scale to fill **All others** Reserved

Note: If this structured field is not present in the data stream, the architected default is *scale to fit*.

MGO Exception Condition Summary

X'01' The Map Graphics Object structured field contains more than one repeating group.

X'02' A Mapping Option (X'04') triplet value of X'00' is specified.

Map Image Object (MIO)

The Map Image Object structured field specifies how an image data object is mapped into its object area.

MIO (X'D3ABFB') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3ABFB'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One repeating group in the following format:						
0–1	UBIN	RGLength	5	Total length of this repeating group	M	X'06'
2–4		Triplets		Mapping Option triplet	M	X'14'

MIO Semantics

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

Triplets Appear in the Map Image Object structured field as follows:

Triplet	Type	Usage
X'04'	Mapping Option	Mandatory. Must occur once. See "Mapping Option Triplet X'04'" on page 360. The valid mapping options for the MIO structured field are: **Value** **Description** **X'10'** Position and trim **X'20'** Scale to fit **X'30'** Center and trim **X'41'** Migration mapping option: Image point-to-pel. See "Coexistence Triplets" on page 607 for a description. **X'42'** Migration mapping option: Image point-to-pel with double dot. See "Coexistence Triplets" on page 607 for a description. **X'50'** Migration mapping option: Replicate and trim. See "Coexistence Triplets" on page 607 for a description. **X'60'** Scale to fill **All others** Reserved

Note: If this structured field is not present in the data stream, the architected default is *scale to fit*.

MIO Exception Condition Summary

X'01' The Map Image Object structured field contains more than one repeating group.

X'02' A Mapping Option (X'04') triplet value of X'00' is specified.

Medium Modification Control (MMC)

The Medium Modification Control structured field specifies the medium modifications to be applied for a copy subgroup specified in the Medium Copy Count (MCC) structured field.

MMC (X'D3A788') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A788'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0	CODE	MMCid	1–127	Medium Modification Control identifier	M	X'06'
1	CODE		X'FF'	Constant data	M	X'06'
2–*n*	CODE	Zero or more keywords in ascending order, in the format shown in the following table. When keywords occur in pairs, the ordering applies to the first keyword.				

Keyword ID	Parameter Range	Meaning	M/O	Exc
X'0E'	X'01'–X'20', X'FF'	Horizontal print adjustment; retired for the IBM 3800 printer	O	X'02'
X'90'	X'01'–X'FF'. **Note:** X'00' is not valid with keyword X'9100'	Media destination selector—high	O	X'02'
X'91'	X'01'–X'FF'. **Note:** X'00' is not valid with keyword X'9000'	Media destination selector—low	O	X'02'
X'A0'	X'00'–X'FE'	Fixed medium information: a local identifier for the particular fixed medium information selected	O	X'02'
	X'FF'	Apply all currently supported fixed medium information identifiers		
X'A1'	X'00'	Fixed perforation cut. Apply a perforation cut at a fixed location on the physical medium.	O	X'02'
X'A2'	X'00'	Fixed separation cut. Apply a separation cut at a fixed location on the physical medium.	O	X'02'
X'B4'	X'00'–X'FF'	Presentation subsystem set-up ID: high-order byte	O	X'00'
X'B5'	X'00'–X'FF'	Presentation subsystem set-up ID: low-order byte	O	X'00'
X'D1'	X'00'–X'01'	Offset stack/edge mark change: **X'00'** No offset stack or edge mark change **X'01'** Apply offset stack or edge mark change	O	X'02'

Keyword ID	Parameter Range	Meaning	M/O	Exc
X'D2'	X'01'–X'7F'	Medium Preprinted Form Overlay (M-PFO) local ID	O	X'02'
X'E0'	X'01'–X'02'	Media source selection format: **X'01'** Media source selector in Format 1 **X'02'** Media source selector in Format 2	O	X'02'
X'E1'	X'01'–X'04', X'41', X'64'	Media source selector, Format 1: **X'01'–X'04'** Media source ID **X'41'** Envelope media source **X'64'** Manual feed media source	O	X'02'
	X'01'–X'FF'	Media source selector, Format 2		
X'E8'	X'00'–X'FF'	Media type local ID: high-order byte	O	X'02'
X'E9'	X'00'–X'FF'	Media type local ID: low-order byte	O	X'02'
X'F1'	X'00'–X'01'	Forms flash; retired for the IBM 3800 printer	O	X'02'
X'F2'	X'01'–X'7F'	Medium overlay local identifier	O	X'02'
X'F3'	X'01'–X'7F'	Text suppression local identifier	O	X'02'
X'F4'	X'01'– X'03'	Duplex control: **X'01'** Simplex **X'02'** Normal duplex **X'03'** Tumble duplex	O	X'02'
X'F8'	X'01'–X'FE', X'FF'	Print quality control: **X'01'** Lowest quality level **X'FE'** Highest quality level **X'FF'** Printer default	O	X'02'
X'F9'	X'00'–X'01'	Constant forms control: **X'00'** Inactive **X'01'** Active	O	X'02'
X'FC'	X'01'–X'04'	N-up format control: **X'01'** 1-up format **X'02'** 2-up format **X'03'** 3-up format **X'04'** 4-up format	O	X'02'

MMC Semantics

MMCid Medium Modification Control Identifier. The identifier for the modifications specified by this structured field. This identifier is specified in a repeating group in the Medium Copy Control (MCC) structured field.

Keyword X'0E*nn*' Retired keyword for the IBM 3800 printer. See "Retired Parameters" on page 570 for a description.

Keyword X'90*nn*' Specifies the high-order portion of a two-byte media destination ID. The allowed range is X'00'—X'FF'. The value X'00' is not valid if keyword X'91' also specifies a value of X'00', that is, the media destination ID X'0000' is reserved. This keyword may appear once. If this keyword is not present, the high-order portion of the media destination ID is set to X'00'. If this keyword is not present and the X'91' keyword is not present, the media destination is not specified and a presentation environment default is used.

Note: If the copy subgroup that references this MMC belongs to a duplex copy-subgroup pair, the media destination specified by this keyword must match the media destination specified for the other copy subgroup in the pair.

Keyword X'91*nn*'
Specifies the low-order portion of a two-byte media destination ID. The allowed range is X'00'—X'FF'. The value X'00' is not valid if keyword X'90' also specifies a value of X'00', that is, the media destination ID X'0000' is reserved. This keyword may appear once. If this keyword is not present, the low-order portion of the media destination ID is set to X'00'. If this keyword is not present and the X'90' keyword is not present, the media destination is not specified and a presentation environment default is used.

Note: If the copy subgroup that references this MMC belongs to a duplex copy-subgroup pair, the media destination specified by this keyword must match the media destination specified for the other copy subgroup in the pair.

Keyword X'A0*nn*'
Specifies the local ID of fixed medium information that a printer or a printer-attached device applies to a sheet-side. This application is independent of data provided through the data stream, and does not mix with the print data provided in the data stream. Fixed medium information is applied either before or after the data stream information is presented.

Value	Description
X'00'—X'FE'	Select a particular local ID for fixed medium information to be applied to the sheet-side.
X'FF'	Select all currently-supported local IDs for fixed medium information to be applied to the sheet-side.

This keyword may appear multiple times and specify multiple local IDs for fixed medium information.

Note: All Medium Modification Control structured fields that are referenced by the same Medium Copy Count structured field must specify the same local IDs for fixed medium information.

Keyword X'A100'
Specifies a perforation cut at a fixed location on the physical medium according to the current setup of the printer or printer-attached device.

Note: All Medium Modification Control structured fields that are referenced by the same Medium Copy Count structured field must specify the same perforation cuts.

Keyword X'A200'
Specifies a separation cut at a fixed location on the physical medium according to the current setup of the printer or printer-attached device.

Note: All Medium Modification Control structured fields that are referenced by the same Medium Copy Count structured field must specify the same separation cuts.

Keyword X'B4*nn*'
Specifies the high-order portion of a two-byte presentation subsystem set-up ID. The allowed range is X'00'—X'FF'. This keyword must be paired with a X'B5*nn*' keyword that immediately follows it and that specifies the low-order portion of the two-byte presentation subsystem set-up ID. The X'B4*nn*'—X'B5*nn*' keyword pair may appear multiple times. If the keyword pair is not present, a presentation subsystem set-up ID is not specified. The set-up ID specified by the X'B4*nn*' and X'B5*nn*' keywords is compared against the set-up IDs generated by the presentation subsystem, which typically consists of the presentation device and pre/post processing devices. If a match is found, presentation is allowed to proceed. If there is no match, the required set-up is not active in the presentation subsystem and presentation is terminated.

Note: A set-up ID is not the same as a setup name, which is a user-created name for a set of specific settings on a presentation device. A presentation device can support setup names, or set-up IDs, or both (the two functions do not necessarily interact).

Keyword X'B5*nn*'

Specifies the low-order portion of a two-byte presentation subsystem set-up ID. The allowed range is X'00'—X'FF'. This keyword must be paired with a X'B4*nn*'keyword that immediately precedes it and that specifies the high-order portion of the two-byte presentation subsystem set-up ID. The X'B4*nn*'—X'B5*nn*' keyword pair may appear multiple times. If the keyword pair is not present, a presentation subsystem set-up ID is not specified. The set-up ID specified by the X'B4*nn*' and X'B5*nn*' keywords is compared against the set-up IDs generated by the presentation subsystem, which typically consists of the presentation device and pre/post processing devices. If a match is found, presentation is allowed to proceed. If there is no match, the required set-up is not active in the presentation subsystem and presentation is terminated.

Note: All Medium Modification Control structured fields that are referenced by the same Medium Copy Count structured field must specify the same presentation subsystem set-up IDs.

Application Notes:

1. When presentation is terminated, the print file is put into a state where it can be resubmitted when the presentation subsystem is reconfigured to generate the required set-up IDs.
2. Presentation Subsystem set-up IDs are intended to be specified for one or more documents in a print file. It is therefore recommended that the same IDs are specified in all the medium maps in the form map.

Keyword X'D1*nn*'

Specifies whether the sheets generated by the current medium map should be offset (jogged) from the sheets generated by the previous medium map or whether the edge marks applied to sheets generated by this medium map should be changed from the edge marks applied to sheets generated by the previous medium map. This keyword applies to all sheets generated by the current medium map and needs to be specified only once. If this keyword is omitted, the default is X'00' (no offset, no change in edge marks).

The keyword values are defined as follows:

Value	Description
X'00'	No offset (no jog), no change in edge marks
X'01'	Apply offset (jog) or change edge marks

Note: When processing partition ejects with N-up presentation, multiple medium maps may be invoked while building a single sheet. In that case, only the first X'D1*nn*' keyword is processed for a sheet. All other X'D1*nn*' keywords specified in medium maps invoked for the *same* sheet are ignored.

Implementation Note: Print servers that automatically issue a jog command between jobs and between multiple copies of a job may ignore the X'D1*nn*' keyword in the medium map used for the first sheet of the user's print file.

Table 23 on page 280 shows how the jog control specified by this keyword is processed with N-up presentation and conditional media ejects when an existing medium map (MM) is replaced by a new medium map. The “Result” column defines whether the sheet processed with the new medium map is jogged with respect to the previous sheet and what type of media eject (sheet or partition) occurs when the new medium map is invoked. Note that in AFP environments a jog is accomplished with the generation of an IPDS jog command when the medium map that specifies the jog is first invoked.

Table 23. Sheet Jogging and Conditional Ejects

Jog Control in Existing MM	Jog Control in New MM	Eject Control in New MM	Result	
			Eject	Jog
No jog	Jog	Partition	New sheet	Jog
No jog	Jog	New sheet	New sheet	Jog
Jog	Jog	Partition	Partition	Jog
Jog	Jog	New sheet	New sheet	Jog
Jog	No jog	Partition	New sheet	No jog
Jog	No jog	New sheet	New sheet	No jog
No jog	No jog	Partition	Partition	No jog
No jog	No jog	New sheet	New sheet	No jog

Keyword X'D2*nn*'

Specifies the local identifier of a Medium Preprinted Form Overlay (M-PFO) that is to be applied to all sheet-sides generated by this copy subgroup. The M-PFO is applied last, after all other data has been applied to the sheet-side. The allowed ID range is X'01'—X'7F'. The X'D2*nn*' keyword may appear once. If this keyword is specified more than once, the additional occurrences are ignored. This limits the number of M-PFOs to one per sheet-side. The local ID must be mapped to the name of an M-PFO in a Map Medium Overlay (MMO) structured field.

Keyword X'E0*nn*'

Specifies the format of the media source selector (X'E1') keyword. This keyword may appear once. If this keyword is omitted, the X'E1' keyword, if present, is specified in Format 1.

The keyword values are defined as follows:

Value	Description
X'01'	The X'E1' keyword is specified in Format 1.
X'02'	The X'E1' keyword is specified in Format 2.

Keyword X'E1*nn*'

Specifies the media source. This keyword is defined in several formats. The format is selected by a X'E0' keyword or is defaulted to Format 1 if the X'E0' keyword is omitted. This keyword may appear once. If this keyword is omitted, the media source is not specified and a presentation environment default is used.

Notes:

1. If the copy subgroup that references this MMC belongs to a duplex copy-subgroup pair, the media source specified by this keyword must match the media source specified for the other copy subgroup in the pair.
2. The selected media source may be an *inserter bin*. Inserter bins do not support printing from the data stream, therefore printing is suppressed when pages, PMC overlays, and medium overlays are processed with media from an inserter bin. When a requested media source, which may be an inserter bin, is not available, the presentation systems uses a default bin and ensures that it is not an inserter bin, therefore pages and overlays that are associated with an inserter bin are printed if the inserter bin is not available.

Application Notes:

1. In AFP environments, the default media source is normally the first media source reported by the printer in the IPDS XOH-OPC reply.
2. To cause the insertion of a single sheet from the inserter bin, the application generates a data stream with one (simplex printing) or two (duplex printing) “placeholder” pages that are processed with the medium map that selects an inserter bin as the media source. If the inserter bin is available, a sheet is inserted but these pages will not be printed on the inserted sheet. However, if the inserter bin is not available, the presentation system will

use a default media source that is not an inserter bin and the placeholder pages will be printed. This method can be extended to inserting multiple sheets by specifying multiple placeholder pages in the data stream.

3. An application can also cause the insertion of one or more sheets without generating placeholder pages. This is done by specifying two consecutive Invoke Medium Map (IMM) structured fields in the data stream, where the first invoked medium map selects an inserter bin and specifies the constant front (keyword X'F901') function and simplex printing, and the second invoked medium map resumes page printing from a non-inserter bin. Multiple inserted sheets can be generated in this manner by specifying a copy count that is greater than one.

X'E1*nn*' Format 1
Specifies a value that identifies either a presentation device media source ID or the characteristics associated with a presentation device media source. The keyword values in Format 1 are defined as follows:

Value	Description
X'01'	Media source ID X'00'
X'02'	Media source ID X'01'
X'03'	Media source ID X'02'
X'04'	Media source ID X'03'
X'41'	Envelope media source
X'64'	Manual feed media source

X'E1*nn*' Format 2
Specifies a value that identifies a presentation device media source ID. The keyword values in Format 2 can be in the range X'01' to X'FF' and specify media source IDs whose values are one less than the keyword values:

Value	Description
X'01'	Media source ID X'00'
X'02'	Media source ID X'01'
	⋮
X'FE'	Media source ID X'FD'
X'FF'	Media source ID X'FE'

Keyword X'E8*nn*'
Specifies the high-order portion of a two-byte local ID to select a media type. The allowed range is X'00'—X'FF'. This keyword must be paired with a X'E9*nn*' keyword that immediately follows it and that specifies the low-order portion of the two-byte media type local ID. The X'E8*nn*'–X'E9*nn*' keyword pair may appear only once. The media type local ID is mapped to a media type name or media type OID in the Map Media Type (MMT) structured field. If it is mapped to both, the media type OID takes precedence. If this keyword pair is present, it overrides the media source specified with the X'E1*nn*' keyword unless the presentation device doesn't support media type selection, in which case a specified media source is used. If the keyword pair is not present, the media is selected from the media source specified with the X'E1*nn*' keyword. A registry of standard media types along with their OID is provided in "Media Type Identifiers" on page 628.

Keyword X'E9*nn*'
Specifies the low-order portion of a two-byte local ID to select a media type. The allowed range is X'00'—X'FF'. This keyword must be paired with a X'E8*nn*' keyword that immediately precedes it and that specifies the high-order portion of the two-byte media type local ID. The X'E8*nn*'–X'E9*nn*' keyword pair may appear only once. The media type local ID is mapped to a media type name or media type OID in the Map Media Type (MMT) structured field. If it is mapped to both, the media type OID takes precedence. If this keyword pair is present, it overrides the media source specified with the X'E1*nn*' keyword unless the presentation device doesn't support media type selection, in which case a specified media source is used. If the keyword pair is not present, the media is selected from the media source specified with the X'E1*nn*' keyword. A registry of standard media types along with their OID is provided in "Media Type Identifiers" on page 628.

Note: If the copy subgroup that references this MMC belongs to a duplex copy-subgroup pair, the media type specified by this keyword must match the media type specified for the other copy subgroup in the pair.

Implementation Note: AFP print servers will attempt to select the media type requested by the X'E8'/X'E9' keyword pair using the following priority:

1. Attempt to find an available media source containing the media type that matches the specified OID. The media source cannot be an inserter bin.
2. Attempt to find an available media source containing the media type that matches the specified name. The media source cannot be an inserter bin.
3. Attempt to find an available media source whose ID matches the ID specified in a X'E1' keyword on the MMC.
4. Use the presentation process defaults for finding an available media source.

Keyword X'F1*nn*'
Retired keyword for the IBM 3800 printer. See “Retired Parameters” on page 570 for a description.

Keyword X'F2*nn*'
Specifies the local identifier of a medium overlay that is to be applied to all sheet-sides generated by this copy subgroup. This keyword may appear a maximum of eight times in an MMC structured field. The allowed ID range is X'01'–X'7F'. The local ID must be mapped to the name of the medium overlay in a Map Medium Overlay (MMO) structured field.

Keyword X'F3*nn*'
Specifies the local identifier of a text suppression that is to be applied to all sheet-sides generated by this copy subgroup. This keyword may appear a maximum of eight times in an MMC structured field. The allowed ID range is X'01'–X'7F'.

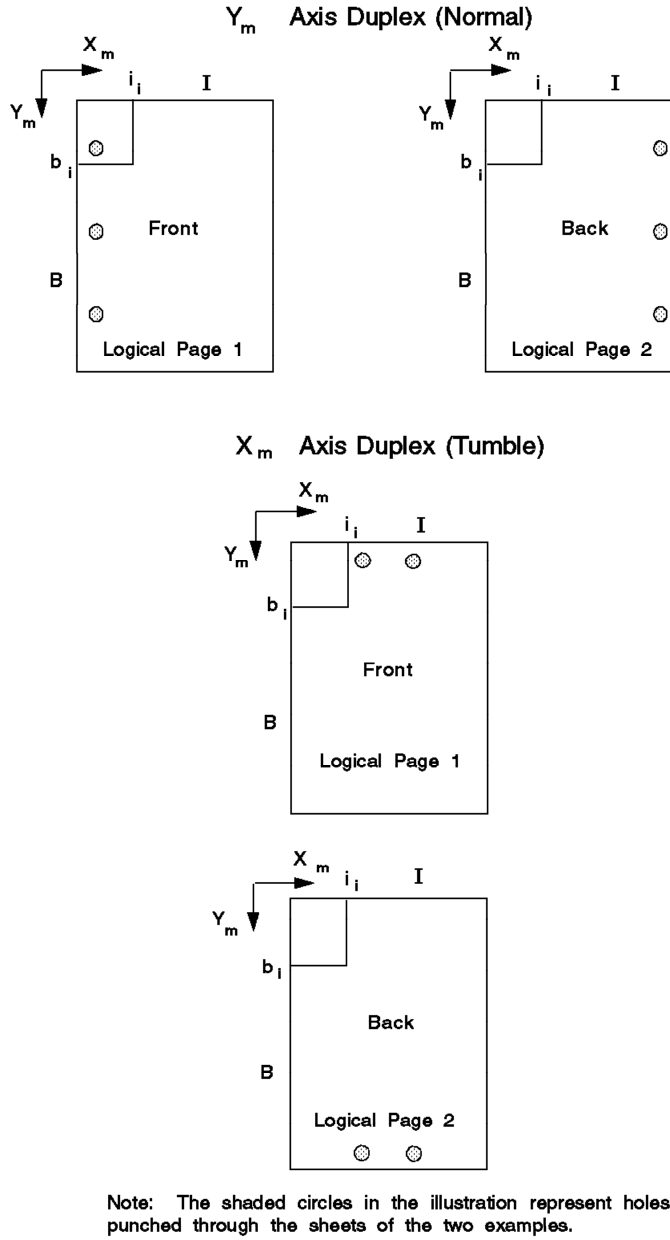
Keyword X'F4*nn*'
Specifies whether data is generated on the front side of the sheet (simplex) or on both sides of the sheet (duplex). If duplex is specified, the first copy subgroup in a pair generates the front sheet-side, and the second copy subgroup in the pair generates the back sheet-side. This keyword may appear once. If this keyword is omitted, the default is X'01' (simplex).

The keyword values are defined as follows:

Value	Description
X'01'	Simplex
X'02'	Normal duplex. The media is turned around the Y_m axis.
X'03'	Tumble duplex. The media is turned around the X_m axis.

See Figure 60 on page 283 for a description of normal duplex and tumble duplex.

Figure 60. Normal Duplex and Tumble Duplex Printing



Note: All Medium Modification Control structured fields that are referenced by the same Medium Copy Count structured field must specify the same value for this keyword.

Keyword X'F8*nn*' Specifies the level of print quality to be used on all sheet-sides generated by this copy subgroup. The mapping of print quality levels to physical print quality is presentation-system-dependent. This keyword may appear once.

The allowed quality level range is X'01'–X'FF', and is defined as follows:

Value	Description
X'01'	Lowest print quality level
X'FE'	Highest print quality level
X'FF'	Device default print quality

Keyword X'F9*nn*' Specifies whether both variable page data and medium overlay data or only medium overlay data should be generated on all sheet-sides generated by this copy subgroup. This functions is known as *constant forms control*. Note that PMC overlays are considered variable page data for this keyword. This keyword may appear once. If this keyword is omitted, the default is X'00' (present both medium overlay data and variable page data).

The keyword values are defined as follows:

Value	Description
X'00'	Present both medium overlay data and variable page data
X'01'	Present only medium overlay data. If no medium overlays are specified for this copy subgroup, no data is presented on the sheet-sides generated by this copy subgroup.

Keyword X'FC*nn*'

Specifies the number of pages to be placed on a physical medium using N-up partitioning. In N-up partitioning, each side of the physical medium is divided into a number of equal-size partitions, where the number of partitions is indicated by the number N in “N-up”. If duplex is specified, the same N-up partitioning is applied to the back side as is applied to the front side. With simplex N-up partitioning, N pages are placed on the physical medium, and with duplex N-up partitioning, 2N pages are placed on the physical medium. Pages placed into partitions may be blank pages generated by setting PgFlgs bit 0 = B'1' in the Page Position (PGP) structured field repeating group.

Pages are placed into partitions using either a *default N-up page placement* or an *explicit N-up page placement*, as specified in the Page Position (PGP) structured field. In default N-up page placement, consecutive pages in the data stream are placed into consecutively-numbered partitions. In explicit N-up page placement, consecutive pages in the data stream are processed using consecutive PGP repeating groups and are placed into explicitly-specified partitions. For more information on page placement, see “Page Position (PGP) Format 2” on page 313.

Pages may be rotated within their partitions so that the page presentation space X axis is at a 0°, 90°, 180°, or 270° orientation with respect to the medium presentation space X axis. This rotation is specified in the Page Position structured field.

Pages are positioned within their partition relative to the partition origin using the offsets specified in the Page Position structured field. Modifications may be applied to pages before they are placed in their partition using the Page Modification Control (PMC) structured field. Figure 21 on page 68 shows the partitioning for wide continuous-forms media, narrow continuous-forms media, and cut-sheet media. Partitioning is not used with envelope media. Figure 61 on page 320 through Figure 72 on page 326 show partition numbering for various media. This keyword may appear once.

The keyword values are defined as follows:

Value	Description
X'01'	1-up partitioning. The medium presentation space is divided into one partition. One page (simplex) or two pages (duplex) are presented on the physical medium.
X'02'	2-up partitioning. The medium presentation space is divided into two partitions. Two pages (simplex) or four pages (duplex) are presented on the physical medium.
X'03'	3-up partitioning. The medium presentation space is divided into three partitions. Three pages (simplex) or six pages (duplex) are presented on the physical medium.
X'04'	4-up partitioning. The medium presentation space is divided into four partitions. Four pages (simplex) or eight pages (duplex) are presented on the physical medium.

Note: All Medium Modification Control structured fields that are referenced by the same Medium Copy Count structured field must specify the same value for this keyword.

Application Note: IPDS printers require that pages be contained within their partition if default N-up page placement is specified, otherwise an exception is generated. This restriction does not exist if explicit N-up page placement is specified. That is, pages may overflow their partition without necessarily causing an exception.

MMC Exception Condition Summary

X'02' An undefined keyword is encountered in an MMC structured field.

Map Media Destination (MMD)

The Map Media Destination structured field maps a media destination local ID to the name of a media destination.

Architecture Note: A media destination local ID is specified with the X'90*nn*' + X'91*nn*' keyword pair on the MMC structured field.

MMD (X'D3ABCD') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3ABCD'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One or more repeating groups in the following format:						
0–1	UBIN	RGLength	14–(*n*+1)	Total length of this repeating group	M	X'06'
2–*n*		Triplets		See MMD Semantics for triplet applicability.	M	X'14'

MMD Semantics

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

Triplets Appear in the Map Media Destination structured field repeating groups as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Mandatory. Must occur once in each repeating group. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'12'**—*Media Destination Reference*. The media destination reference may be specified in the following format: • FQNFmt = X'00'; the reference is made with a character-encoded name. **Architecture Note:** In the UP3i architecture, the media destination name must be encoded using UTF-16BE; it is therefore recommended that the same encoding be used in the FQN type X'12' triplet when FQNFmt = X'00'.
X'22'	Extended Resource Local Identifier	Mandatory. Must occur once in each repeating group. See "Extended Resource Local Identifier Triplet X'22'" on page 376. The only Extended Resource Local Identifier type that may appear is **X'42'**—*Media Destination Resource*. **Architecture Note:** The local IDs used with resource type X'42' are specified with a X'90*nn*' + X'91*nn*' keyword pair on the MMC that can only carry a 2-byte ID. Therefore, the range for this resource type is restricted to 2-byte values.

Within the same medium map, you may not map the same media destination local ID to more than one media destination name or a X'01' exception condition exists. Within the same medium map, different media destination local IDs may be mapped to the same media destination name.

Implementation Note: AFP print servers will process the media destination name as follows. Note that, for UP3i devices, media destination names are reported as UP3i tupel names in the UP3i Tupel sdf in the IPDS XOH-OPC reply. The same UP3i Tupel sdf also specifies a 2-byte tupel ID.

- If a media destination local ID is specified in the MMC, the server checks for a mapping to a media destination name in MMD structured fields in the Medium Map.
  - If a mapping is found, the server checks the UP3i Tupel sdfs in the IPDS XOH-OPC for a matching tupel name. If one is found, the server uses the tupel ID (which is also reported in the UP3i Tupel sdf) that corresponds to that name as a media destination ID to select the media destination.
  - If no mapping is found, or if a mapping is found but there is no matching tupel name, the server uses the MMC media destination local ID to select the media destination.
- If there is no media destination local ID specified in the MMC, the servers selects a default media destination.

MMD Exception Condition Summary

X'01' The same LID is mapped to more than one media destination within the same structured field.

X'02' This exception condition exists when:
- A Fully Qualified Name (X'02') triplet other than a type X'12' (Media Destination Reference) appears within any repeating group.
- An Extended Resource Local Identifier (X'22') triplet type other than X'42' appears within any repeating group.

Map Medium Overlay (MMO)

The Map Medium Overlay structured field maps one-byte medium overlay local identifiers that are specified by keywords in the Medium Modification Control (MMC) structured field to medium overlay names.

MMO (X'D3B1DF') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3B1DF'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	RGLength	X'0C'	Length of each repeating group	M	X'06'
1–3				Reserved; should be zero	M	X'06'
Zero to 127 repeating groups in the following format:						
0	UBIN	OVLid	X'01'–X'7F'	Medium overlay local identifier	M	X'06'
1	BITS	Flags			M	X'06'
Bit 0			B'0'–B'1'	Raster indicator; retired for the IBM 3800 printer		
Bits 1–7			B'0000000'	Reserved; should be zero		
2–3				Reserved; should be zero	M	X'06'
4–11	CHAR	OVLname		Name of medium overlay	M	X'06'

MMO Semantics

RGLength Length of each repeating group. Set to 12.

OVLid Medium overlay local identifier as specified by a keyword in an MMC structured field. The allowed range is X'01'–X'7F' and must be unique to each repeating group.

Flags

Bit	**Description**
0	Retired parameter for the IBM 3800 printer. See “Retired Parameters” on page 570 for a description.
1–7	Reserved; should be zero.

OVLname External name of the medium overlay.

Map Media Type (MMT)

The Map Media Type structured field maps a media type local ID to the name or OID of a media type. See “Media Type Identifiers” on page 628 for a list of media types registered by their name and their OID.

Architecture Note: A media type local ID is specified with the X'E8*nn*' + X'E9*nn*' keyword pair on the MMC structured field.

MMT (X'D3AB88') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3AB88'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One or more repeating groups in the following format:						
0–1	UBIN	RGLength	14–(*n*+1)	Total length of this repeating group	M	X'06'
8–*n*		Triplets		See MMT Semantics for triplet applicability.	M	X'14'

MMT Semantics

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

Triplets Appear in the Map Media Type structured field repeating groups as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Mandatory. Must occur once in each repeating group. May occur twice in each repeating group if one occurrence uses FQNFmt X'00' (name), and the other occurrence uses FQNFmt X'10' (OID). See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'11'**—*Media Type Reference*. The media type reference may be specified in one of two ways: • If FQNFmt = X'00', the reference is made with a character-encoded name. **Architecture Note:** In the IPDS architecture, the media type name must be encoded using IBM code page 500, character set 640 (plus space character). It is strongly recommended that the same encoding be used in the FQN type X'11' triplet when FQNFmt = X'00', since not all print servers are able to process other encodings. Note that when the OID format is used to identify the media type, it is specified in hexadecimal format as defined in "Media Type Identifiers" on page 628. • If FQNFmt = X'10', the reference is made with an ASN.1 OID encoded using the definite short form. A registry of standard media types along with their OID is provided in "Media Type Identifiers" on page 628. If the FQN type X'11' triplet is specified twice in a repeating group, the FQNFmt X'10'—OID reference, takes precedence.
X'22'	Extended Resource Local Identifier	Mandatory. Must occur once in each repeating group. See "Extended Resource Local Identifier Triplet X'22'" on page 376. The only Extended Resource Local Identifier type that may appear is **X'40'**—*Media Type resource*. **Architecture Note:** The local IDs used with resource type X'40' are specified with a X'E8*nn*' + X'E9*nn*' keyword pair on the MMC that can only carry a 2-byte ID. Therefore, the range for this resource type is restricted to 2-byte values.

Within the same medium map, you may not map the same Resource Local ID to more than one media type or a X'01' exception condition exists. The media type may be specified with an FQN type X'11' triplet using FQNFmt X'10' (OID reference), an FQN type X'11' triplet using FQNFmt X'00' (name reference), or both. Within the same medium map, different Resource Local IDs may be mapped to the same media type.

Implementation Note: AFP print servers will attempt to select the requested media type using the following priority:

1. Attempt to find an available media source containing the media type that matches the specified OID. The media source cannot be an inserter bin.
2. Attempt to find an available media source containing the media type that matches the specified name. The media source cannot be an inserter bin.
3. Attempt to find an available media source whose ID matches the ID specified in a X'E1' keyword on the MMC.
4. Use the presentation process defaults for finding an available media source.

MMT Exception Condition Summary

X'01' The same LID is mapped to more than one media type within the same structured field.

X'02' This exception condition exists when:

- A Fully Qualified Name (X'02') triplet other than a type X'11' (Media Type Reference) appears within any repeating group.
- An Extended Resource Local Identifier (X'22') triplet type other than X'40' appears within any repeating group.

Map Page (MPG)

The Map Page structured field identifies a page that is to be merged with data specified for the current page by using an Include Page (IPG) structured field.

MPG (X'D3ABAF') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3ABAF'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One repeating group in the following format:						
0–1	UBIN	RGLength	12–(*n*+1)	Total length of this repeating group	M	X'06'
2–*n*		Triplets		See MPG Semantics for triplet applicability.	M	X'14'

MPG Semantics

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

Triplets Appear in the Map Page structured field as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once in each repeating group. Specifies encoding for structured field parameters defined with a CHAR data type. See “Coded Graphic Character Set Global Identifier Triplet X'01'” on page 348.
X'02'	Fully Qualified Name	Mandatory. Must occur once in each repeating group. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'83'**—*Begin Document Reference*. Specifies the name of the document that contains the page to be mapped and included with an IPG.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Mandatory. Must occur once in each repeating group. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name type that may appear is **X'87'**—*Begin Page Reference*. Specifies the name of the page to be mapped and included with an IPG.
X'5A'	Object Offset	Optional. May occur once, with *ObjTpe*=X'AF', to specify that pages are the objects to be counted for the offset. Specifies how many pages in the referenced document precede the page to be mapped. The page offset is measured from the beginning of the referenced document, so that the first page has offset 0, the second page has offset 1, and the *n*th page has offset (*n*-1). When this triplet is specified, the page name, as specified by the Fully Qualified Name type X'87' triplet, is ignored. See "Object Offset Triplet X'5A'" on page 402.

Application Note: To optimize print performance, it is strongly recommended that the same encoding scheme be used for a resource reference wherever in a print file that resource reference is specified. That is, the encoding scheme used for the resource include, the resource map, and the resource wrapper should be the same.

MPG Exception Condition Summary

X'01' This exception condition exists when:

- Multiple type X'87' (Begin Page Reference) Fully Qualified Name triplets appear within the repeating group.
- Multiple type X'83' (Begin Document Reference) Fully Qualified Name triplets appear within the repeating group.

X'02' A Fully Qualified Name (X'02') triplet other than a type X'87' (Begin Page Reference) or a type X'83' (Begin Document Reference) appears within the repeating group.

Map Page Overlay (MPO)

The Map Page Overlay structured field maps local identifiers to page overlay names.

MPO (X'D3ABD8') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3ABD8'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One to 254 repeating groups in the following format:						
0–1	UBIN	RGLength	11–(*n*)+1	Total length of this repeating group	M	X'06'
2–*n*		Triplets		See MPO Semantics for triplet applicability.	M	X'14'

MPO Semantics

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

Triplets Appear in the Map Page Overlay structured field as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once. Specifies encoding for structured field parameters defined with a CHAR data type. See “Coded Graphic Character Set Global Identifier Triplet X'01'” on page 348.
X'02'	Fully Qualified Name	Mandatory. Must occur once in each repeating group. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is **X'84'**—*Begin Resource Object Reference* which must match the name of an overlay resource or a X'01' exception condition exists.
X'24'	Resource Local Identifier	Mandatory. Must occur once in each repeating group. See “Resource Local Identifier Triplet X'24'” on page 378. The only Resource Local Identifier type that may appear is **X'02'**—*Page Overlay.*

Within the same Map Page Overlay structured field, you may not map the same Resource Local ID to more than one page overlay resource or a X'01' exception condition exists. However, you may use two or more repeating groups within the same Map Page Overlay structured field to map different LIDs to the same page overlay resource.

Application Notes:

1. The local identifier specified in the MPO structured field is not used to reference the page overlay when it is included on a page with an IPO or PMC structured field. It may optionally be used in an application-dependent manner to manage the overlay resource.
2. To optimize print performance, it is strongly recommended that the same encoding scheme be used for a resource reference wherever in a print file that resource reference is specified. That is, the encoding scheme used for the resource include, the resource map, and the resource wrapper should be the same.

Architecture Note: In AFP environments, the following retired triplets are used on this structured field:

- Page Overlay Conditional Processing (X'46') triplet, may occur zero or more times; see "Page Overlay Conditional Processing Triplet X'46'" on page 564.
- Resource Usage Attribute (X'47') triplet, may occur zero or once; see "Resource Usage Attribute Triplet X'47'" on page 566.

MPO Exception Condition Summary

X'01' This exception condition exists when:
- An overlay with the same name as that specified on the FQN type X'84' triplet cannot be located.
- Multiple FQN type X'84' triplets appear within the same repeating group.
- Multiple type X'02' Resource Local Identifier (X'24') triplets appear within the same repeating group.
- The same LID is mapped to more than one page overlay within the same structured field.

X'02' This exception condition exists when:
- A Fully Qualified Name (X'02') triplet other than a type X'84' (Begin Resource Object Reference) appears within any repeating group.
- A Resource Local Identifier (X'24') triplet type other than X'02' appears within any repeating group.

Map Page Segment (MPS)

The Map Page Segment structured field identifies page segments that are required to present a page on a physical medium.

MPS (X'D3B15F') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3B15F'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	RGLength	X'0C'	Length of each repeating group	M	X'06'
1–3				Reserved; should be zero	M	X'06'
Zero to 127 repeating groups in the following format:						
0–3				Reserved; should be zero	M	X'06'
4–11	CHAR	PsegName		Name of page segment	M	X'06'

MPS Semantics

RGLength Length of each repeating group. Set to 12.

PsegName External name of the page segment.

Application Notes:

1. A page segment included on a page or overlay with an IPS may optionally be mapped with an MPS in the AEG for that page or overlay. If such a mapping exists, the page segment is sent to the presentation device as a separate object and is called a *hard* page segment. If such a mapping does not exist, the page segment data is sent to the presentation device as part of the page or overlay and is called a *soft* page segment.
2. To optimize print performance, it is strongly recommended that the same encoding scheme be used for a resource reference wherever in a print file that resource reference is specified. That is, the encoding scheme used for the resource include, the resource map, and the resource wrapper should be the same.

Map Presentation Text (MPT)

The Map Presentation Text structured field specifies how a presentation text object that contains an Object Environment Group (OEG) is mapped into its object area.

MPT (X'D3AB9B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3AB9B'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One repeating group in the following format:						
0–1	UBIN	RGLength	5	Total length of this repeating group	M	X'06'
2–4		Triplets		See MPT Semantics for triplet applicability.	M	X'14'

MPT Semantics

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

Triplets Appear in the Map Presentation Text structured field as follows:

Triplet	Type	Usage
X'04'	Mapping Option	Mandatory. Must occur once. See "Mapping Option Triplet X'04'" on page 360. The valid mapping options for the MPT structured field are: **Value** **Description** **X'00'** Position **All others** Reserved

Note: If this structured field is not present in the data stream, the architected default is *position*.

MPT Exception Condition Summary

X'01' The Map Presentation Text structured field contains more than one repeating group.

Map Suppression (MSU)

The Map Suppression structured field maps one-byte text suppression local identifiers to text suppression names. Suppressible text is identified in presentation text objects with a local identifier and is bracketed with control sequences that specify the beginning and the end of the suppression. A text suppression is activated by specifying its local identifier in a Medium Modification Control (MMC) structured field in a medium map.

MSU (X'D3ABEA') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3ABEA'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
Zero to 127 repeating groups in the following format:						
0–7	CHAR	SUPname		Name of text suppression	M	X'06'
8				Reserved; should be zero	M	X'06'
9	CODE	SUPid	X'01'–X'7F'	Text suppression local identifier	M	X'06'

MSU Semantics

SUPname Name of the text suppression.

SUPid Text suppression local identifier, as specified by a keyword in an MMC structured field. The allowed range is X'01'—X'7F'.

Note: The local ID may be mapped to more than one text suppression name.

Architecture Note: When processing AFP line data with Page Definitions, the Descriptor structured fields can enable the text suppression function for a record, and, if so, assign an eight-byte name to the suppression function. This name is mapped to a local identifier using the MSU structured field. For more information on line data and Page Definitions, see the *Advanced Function Presentation: Programming Guide and Line Data Reference*.

No Operation (NOP)

The No Operation structured field performs no function.

NOP (X'D3EEEE') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3EEEE'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–*n*	UNDF	UndfData		Up to 32,759 bytes of data with no architectural definition	O	X'00'

NOP Semantics

UndfData Is data that has no architectural definition.

The No Operation structured field may be specified within any begin-end domain.

Note: The No Operation structured field may be used to carry comments or any other type of unarchitected data. Although this is not recommended, it may also be used to carry semantic data in private or exchange data streams. However, because receivers of interchange data streams should ignore the content of No Operation structured fields, and because receiver-generator products are not required to propagate No Operation structured fields, no semantics should be attached to the data carried by the No Operation structured field in interchange data streams.

Object Area Descriptor (OBD)

The Object Area Descriptor structured field specifies the size and attributes of an object area presentation space.

OBD (X'D3A66B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A66B'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–19		Triplets		See OBD Semantics for triplet applicability.	M	X'14'

OBD Semantics

Triplets Appear in the Object Area Descriptor structured field as follows:

Triplet	Type	Usage
X'43'	Descriptor Position	Mandatory. Must occur once. See "Descriptor Position Triplet X'43'" on page 383.
X'4B'	Measurement Units	Mandatory. Must occur once. See "Measurement Units Triplet X'4B'" on page 388.
X'4C'	Object Area Size	Mandatory. Must occur once. See "Object Area Size Triplet X'4C'" on page 389.
X'4E'	Color Specification	Optional. May occur once. Specifies a color for the object area. The color specification defines a color space, the syntax for specifying color values in the color space, and the actual color value. When this triplet is specified on an object area, the complete object area becomes foreground data that is colored with the specified color *before* any object data is added to the area. If the default mixing rules are used, the object area, once it becomes foreground data, overpaints (covers) any data that is underneath. See "Color Specification Triplet X'4E'" on page 391. **Note:** This triplet is not permitted on the OBD for presentation text that may optionally occur in the AEG for a page or overlay.

Triplet	Type	Usage
X'70'	Presentation Space Reset Mixing	Optional. May occur once. If this triplet specifies a reset to the color of medium (BgMxFlag=B'1'), the reset takes place at the point in the data stream where the triplet occurs. This triplet may not appear in the Object Area Descriptor structured field with a Presentation Space Mixing Rules triplet. See "Presentation Space Reset Mixing Triplet X'70'" on page 414.
X'71'	Presentation Space Mixing Rules	Optional. May occur once. This triplet may not appear in the Object Area Descriptor structured field with a Presentation Space Reset Mixing triplet. See "Presentation Space Mixing Rules Triplet X'71'" on page 416. **Implementation Note:** The Presentation Space Mixing Rules (X'71') triplet is currently not used in AFP environments.

Architecture Note: Triplets that affect the object area presentation space are processed in the order in which they occur on the OBD. For example, if a Presentation Space Reset Mixing (X'70') triplet on the OBD is followed by a Color Specification (X'4E') triplet, the object area is colored with the color specified in the X'4E' triplet and covers any data underneath it regardless of whether the X'70' triplet specified "reset to color of medium" or "do not reset to color of medium". If a Color Specification (X'4E') triplet is followed by a X'70' triplet, and if the X'70' triplet specified "reset to color of medium", the object area is colored with color of medium. If the X'70' triplet specified "do not reset to color of medium", the X'70' triplet does not change the object area and it remains foreground data colored with the color specified by the X'4E' triplet.

OBD Exception Condition Summary

X'01' The OBD structured field contains both a Presentation Space Reset Mixing triplet and a Presentation Space Mixing Rules triplet.

Object Area Position (OBP)

The Object Area Position structured field specifies the origin and orientation of the object area, and the origin and orientation of the object content within the object area.

OBP (X'D3AC6B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3AC6B'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0	CODE	OAPosID	X'01'–X'7F'	The object area position identifier	M	X'06'
One repeating group in the following format:						
1	UBIN	RGLength	23	Total length of this repeating group	M	X'06'
2–4	SBIN	XoaOset	-32,768–32,767	X-axis origin of the object area	M	X'06'
5–7	SBIN	YoaOset	-32,768–32,767	Y-axis origin of the object area	M	X'06'
8–9	CODE	XoaOrent		The object area's X-axis rotation from the X axis of the reference coordinate system, in degrees and minutes. Frequently used values: **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees	M	X'06'
Bits 0–8		Degrees	B'00000000'-B'101100111'	Degrees rotation (0–359)		
Bits 9–14		Minutes	B'000000'-B'111011'	Minutes rotation (0–59)		
Bit 15			B'0'	Reserved		
10-11	CODE	YoaOrent		The object area's Y axis rotation from the X axis of the reference coordinate system, in degrees and minutes. Frequently used values: **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees	M	X'06'
Bits 0–8		Degrees	B'000000000'-B'101100111'	Degrees rotation (0–359)		
Bits 9–14		Minutes	B'000000'-B'111011'	Minutes rotation (0–59)		
Bit 15			B'0'	Reserved		

Offset	Type	Name	Range	Meaning	M/O	Exc
12				Reserved; should be zero	M	X'06'
13–15	SBIN	XocaOset	-32,768–32,767	X-axis origin for object content	M	X'06'
16–18	SBIN	YocaOset	-32,768–32,767	Y-axis origin for object content	M	X'06'
19–20	CODE	XocaOrent	X'0000'	The object content's X-axis rotation from the X axis of the object area coordinate system	M	X'06'
21–22	CODE	YocaOrent	X'2D00'	The object content's Y-axis rotation from the X axis of the object area coordinate system	M	X'06'
23	CODE	RefCSys	X'00', X'01', X'05'	Reference coordinate system: **X'00'** Page or overlay coordinate system; origin is defined by IPS structured field **X'01'** Page or overlay coordinate system; standard origin **X'05'** Retired value	M	X'06'

OBP Semantics

OAPosID Specifies an identifier for this Object Area Position structured field that is unique within the environment group. It is used to associate the Object Area Position structured field with the Object Area Descriptor structured field.

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

XoaOset Specifies the offset along the X axis, X_{pg} or X_{ol}, of the referenced coordinate system to the origin of the X axis, X_{oa}, for the object area coordinate system. The value for this parameter is expressed in terms of the number of referenced coordinate system X-axis measurement units. The reference coordinate system is described below under *RefCSys*.

YoaOset Specifies the offset along the Y axis, Y_{pg} or Y_{ol}, of the referenced coordinate system to the origin of the Y axis, Y_{oa}, for the object area coordinate system. The value for this parameter is expressed in terms of the number of referenced coordinate system Y-axis measurement units. The reference coordinate system is described below under *RefCSys*.

XoaOrent Specifies the amount of clockwise rotation of the object area's X axis, X_{oa}, about its defined origin relative to the X axis of the reference coordinate system.

YoaOrent Specifies the amount of clockwise rotation of the object area's Y axis, Y_{oa}, about its defined origin relative to the X axis of the reference coordinate system. The YoaOrent value must be 90 degrees greater than the XoaOrent value or a X'01' exception condition exists.

Note: If the object area orientation is such that the sum of the object area origin offset and the object area extent exceeds the size of the including presentation space in either the X or Y direction, all of the object area will not fit on the including presentation space. The including presentation space in this case is the page or overlay presentation space. If an attempt is made to actually present data in the portion of the object area that falls outside the including presentation space, that portion of the data is not presented, and a X'01' exception condition exists.

XocaOset Specifies the offset along the X axis of the object area coordinate system, X_{oa}, to the X origin of the object content. The value for this parameter is expressed in terms of the number of object area coordinate system X-axis measurement units.

YocaOset Specifies the offset along the Y axis of the object area coordinate system, Y_{oa}, to the Y origin of the object content. The value for this parameter is expressed in terms of the number of object area coordinate system Y-axis measurement units.

Notes:

1. The object content is developed in the *data object presentation space*; within the context of this structured field the two terms are synonymous.
2. The XocaOset and YocaOset parameters are used only when a *position* or *position and trim* mapping is specified to map the object content to the object area. They are ignored for all other mappings.

XocaOrent Specifies the amount of rotation of the object content's X axis about its defined origin relative to the X axis of the object area coordinate system.

YocaOrent Specifies the amount of rotation of the object content's Y axis about its defined origin relative to the X axis of the object area coordinate system.

Note: If the object content orientation is such that the object content origin offset exceeds the size of the object area presentation space in either the X or Y direction, the object data will not fit on the object area presentation space. If the mapping option is position, that is X'00', and an attempt is made to actually present data outside the object area presentation space, that portion of the data is not presented, and a X'01' exception condition exists.

RefCSys Specifies the coordinate system and origin used to position the object area.

Value	Description
X'00'	Used only if the object is part of a page segment. The reference coordinate system is the including page or overlay coordinate system. Object areas are positioned in this coordinate system with respect to a point (X_p, Y_p) or (X_{ol}, Y_{ol}) that is defined by the Include Page Segment (IPS) structured field.
X'01'	The reference coordinate system is the including page or overlay coordinate system. Object areas are positioned in this coordinate system with respect to the standard origin defined by (X_p=0, Y_p=0) or (X_{ol}=0, Y_{ol}=0).
X'05'	Retired value. See “Retired Parameters” on page 570.
All others	Reserved

OBP Exception Condition Summary

X'01' This exception condition exists when:

- The value specified for YoaOrent is not 90 degrees greater rotation than the value specified for XoaOrent.
- An attempt is made to present data outside the presentation space of the containing coordinate system.
- The mapping option is position and an attempt is made to present data outside the object area presentation space.

Object Container Data (OCD)

The Object Container Data structured field contains the data for an object carried in an object container. See "Object Type Identifiers" on page 609 for the list of object types that may be carried in an object container.

OCD (X'D3EE92') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3EE92'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–*n*	UNDF	ObjCdat		Up to 32,759 bytes of object data	O	X'00'

OCD Semantics

ObjCdat Contains the object data.

Note: The number of data bytes allowed in this structured field may be restricted by an interchange set.

Presentation Environment Control (PEC)

The Presentation Environment Control structured field specifies parameters that affect the rendering of presentation data, the appearance that is to be assumed by the presentation device, and the setup name to be used.

PEC (X'D3A7A8') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A7A8'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–1				Reserved; should be zero	M	X'06'
2–*n*		Triplets		See PEC Semantics for triplet applicability.	O	X'10'

PEC Semantics

Triplets Appear as follows:

Triplet	Type	Usage
X'5A'	Object Offset	Optional. If this PEC specifies the Rendering Intent X'95' triplet and/or the Device Appearance X'97' triplet and is specified in the DEG of a form map, this triplet may occur once with ObjTpe=X'A8' to specify that documents are the objects to be counted. Specifies how many documents in the print file precede the document to be assigned this rendering intent and/or to be processed with this device appearance. The offset is measured from the beginning of the print file, so that the first document has offset 0, the second document has offset 1, and the *n*th document has offset (*n*-1). This triplet is ignored in all other cases. See "Object Offset Triplet X'5A'" on page 402.
X'95'	Rendering Intent	Optional. May occur once. Specifies the rendering intent that is to be used when presenting the document component that this PEC applies to. See "Rendering Intent Triplet X'95'" on page 458.
X'97'	Device Appearance	Optional. May occur once. Specifies the appearance that is to be assumed by the presentation device. See "Device Appearance Triplet X'97'" on page 463.
X'9E'	Setup Name	Optional. May occur once. Specifies the setup name to be used by the presentation device. See "Setup Name Triplet X'9E'" on page 469.

Notes:

1. The PEC can be used to specify a rendering intent with the Rendering Intent (X'95') triplet as follows:
   - in the Document Environment Group (DEG) of a form map

- in a medium map, in which case it is considered to be a *medium level* control for purposes of n-up partition/sheet eject processing
- in the Active Environment Group (AEG) of a page or overlay
- in the Object Environment Group (OEG) of a PTOCA, GOCA, or IOCA object, or in the OEG of an Object Container

For more information, see the appropriate environment group structure definitions in Chapter 4, “MO:DCA Objects”, on page 75.

2. The PEC can be used to specify a device appearance with the Device Appearance (X'97') triplet as follows:
   - in the Document Environment Group (DEG) of a form map
   - in a medium map, in which case it is considered to be a *medium level* control for purposes of n-up partition/sheet eject processing

   For more information, see the appropriate environment group and medium map structure definitions in Chapter 4, “MO:DCA Objects”, on page 75.

3. The PEC can be used to specify a setup name with the Setup Name (X'9E') triplet as follows:
   - in the Document Environment Group (DEG) of a form map

   For more information, see the appropriate environment group structure definitions in Chapter 4, “MO:DCA Objects”, on page 75.

   Note: A setup name is not the same as a set-up ID (see “Medium Modification Control (MMC)” on page 276). A presentation device can support setup names, or set-up IDs, or both (the two functions do not necessarily interact).

Presentation Fidelity Control (PFC)

The Presentation Fidelity Control structured field specifies the user fidelity requirements for data presented on physical media and for operations performed on physical media. The scope of the Presentation Fidelity Control structured field is the document or print file controlled by the form map that contains this structured field.

PFC (X'D3B288') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3B288'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0				Reserved; should be zero	M	X'06'
1	BITS	PFCFlgs		Flags	M	X'06'
Bit 0			B'0', B'1'	**B'0'** Reset fidelity controls to defaults and apply PFC controls **B'1'** Do not reset fidelity controls to defaults before applying PFC controls		
Bits 1–7			B'0000000'	Reserved; should be zero		
2–3				Reserved; should be zero	M	X'06'
4–*n*		Triplets		See PFC Semantics for triplet applicability.	O	X'10'

PFC Semantics

Triplets are used on the Presentation Fidelity Control structured field to define specific presentation fidelity requirements that are to be applied by the presentation process as data is presented on physical media. While triplets may be conceptually related, each triplet is processed independently of any other triplet. Therefore, it is the responsibility of the generator of the Presentation Fidelity Control structured field to ensure cross-triplet consistency. If a particular fidelity triplet is not specified on this structured field, or if this structured field is not specified, presentation process defaults are used to control the presentation fidelity.

PFCFlgs The following flags are defined:

Bit **Description**

0 Fidelity Control Activation

B'0' Reset all fidelity controls to their presentation process defaults, then apply fidelity controls specified by this PFC structured field

B'1' Leave all fidelity controls at their current setting, and additionally apply fidelity controls specified by this PFC structured field. If there is a conflict between an existing fidelity control and a new fidelity control, the last-specified fidelity control takes precedence.

1–7 Reserved; all bits should be B'0'.

Triplets Appear in the Presentation Fidelity Control structured field as follows:

Triplet	Type	Usage
X'74'	Toner Saver	Optional. May occur once. Used to activate and deactivate a toner saver mode for printing. See "Toner Saver Triplet X'74'" on page 420.
X'75'	Color Fidelity	Optional. May occur once. Specifies the actions to be taken by the presentation process when a color exception is detected while processing the data stream. See "Color Fidelity Triplet X'75'" on page 421.
X'78'	Font Fidelity	May occur once. Specifies the actions to be taken by the presentation process when a font resolution exception is detected while processing the data stream. See "Font Fidelity Triplet X'78'" on page 424.
X'86'	Text Fidelity	Optional. May occur once. Specifies the actions to be taken by the presentation process when a text exception is detected while processing the data stream. See "Text Fidelity Triplet X'86'" on page 442.
X'87'	Media Fidelity	Optional. May occur once. Specifies the actions to be taken by the presentation process when a request for a specific media or a specific media bin cannot be satisfied. See "Media Fidelity Triplet X'87'" on page 444.
X'88'	Finishing Fidelity	Optional. May occur once. Specifies the actions to be taken by the presentation process when a finishing exception is detected while processing the data stream. See "Finishing Fidelity Triplet X'88'" on page 445.
X'96'	CMR Tag Fidelity	Optional. May occur once. Specifies the actions to be taken by the presentation process when a CMR tag exception is detected while processing the data stream. See "CMR Tag Fidelity Triplet X'96'" on page 461.

Application Note: Some presentation platforms allow presentation fidelity parameters to be specified in the print request. For example, in the MVS™ environment, invalid character exceptions and positioning exceptions may be blocked with a data check parameter in the JCL. In the OS/400® environment, a print fidelity indicator may be used to specify whether absolute fidelity is required, so that the presentation process can determine how to continue following exceptions such as font not available, duplexing not available, media source not available, and data stream function not available. Print request fidelity specifications are outside the scope of the MO:DCA architecture. It is up to the print requestor to ensure that fidelity specifications in the form map are consistent and compatible with fidelity specifications in the print request. If there is a clear conflict between the fidelity specification in the form map and the fidelity specification in the print request, the presentation process may terminate processing of the print job.

Page Descriptor (PGD)

The Page Descriptor structured field specifies the size and attributes of a page or overlay presentation space.

PGD (X'D3A6AF') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A6AF'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0	CODE	XpgBase	X'00'–X'01'	Page unit base for the X axis: **X'00'** 10 inches **X'01'** 10 centimeters	M	X'07'
1	CODE	YpgBase	X'00'–X'01'	Page unit base for the Y axis: **X'00'** 10 inches **X'01'** 10 centimeters	M	X'07'
2–3	UBIN	XpgUnits	1–32,767	Page units per unit base for the X axis	M	X'06'
4–5	UBIN	YpgUnits	1–32,767	Page units per unit base for the Y axis	M	X'06'
6–8	UBIN	XpgSize	1–32,767	Page extent for the X axis	M	X'06'
9–11	UBIN	YpgSize	1–32,767	Page extent for the Y axis	M	X'06'
12–14				Reserved; should be binary zero	M	X'06'
15–*n*		Triplets		See PGD Semantics for triplet applicability.	O	X'10'

PGD Semantics

XpgBase Specifies the unit base for the X axis of the page or overlay coordinate system.

YpgBase Specifies the unit base for the Y axis of the page or overlay coordinate system.

Note: A X'01' exception condition exists if the XpgBase and YpgBase values are not identical.

XpgUnits Specifies the number of units per unit base for the X axis of the page or overlay coordinate system.

YpgUnits Specifies the number of units per unit base for the Y axis of the page or overlay coordinate system.

XpgSize Specifies the extent of the X axis of the page or overlay coordinate system. This is also known as the page or overlay's X-axis size.

YpgSize Specifies the extent of the Y axis of the page or overlay coordinate system. This is also known as the page or overlay's Y-axis size.

Note: If the sum of the page or overlay origin offset and the page or overlay extent exceeds the size of the including presentation space in either the X or Y direction, all of the page or overlay will not fit on the including presentation space. The including presentation space in this case is the medium presentation space. If an attempt is made to actually present data in the portion of the page or overlay that falls outside the including presentation space, that portion of the data is not presented, and a X'01' exception condition exists.

Application Notes:

1. Some AFP print servers require that the measurement units in the PGD match the measurement units in the Presentation Text Descriptor (PTD) when the latter is included in the AEG for a page. It is therefore strongly recommended that whenever the PTD is included in the AEG, the same measurement units are specified in both the PTD and PGD.
2. The IS/1 interchange set definition limits the page size to 22.75 inches in the X and Y directions; the IS/3 interchange set definition does not. To specify a larger page size, 240 units per inch should be specified in the PGD for the page measurement units. Using a range of 1 to 32,767, this allows a maximum page size in the X and Y directions of 136.5 inches, is supported by all IPDS printers, and keeps the complete page presentation space within the range of 2-byte addressing parameters in the IPDS architecture.

Application Note:

Triplets Appear in the Page Descriptor structured field as follows:

Triplet	Type	Usage
X'4E'	Color Specification	Optional. May occur once. Specifies a color for the page or overlay presentation space. The color specification defines a color space, the syntax for specifying color values in the color space, and the actual color value. When this triplet is specified on a page or overlay presentation space, the complete presentation space becomes foreground data that is colored with the specified color *before* any object data is added to the presentation space. If the default mixing rules are used, the page or overlay presentation space, when it becomes foreground data, overpaints (covers) any data that is underneath. See "Color Specification Triplet X'4E'" on page 391.
X'70'	Presentation Space Reset Mixing	Optional. May occur once. If this triplet specifies a reset to the color of medium (BgMxFlag=B'1'), the reset takes place at the point in the data stream where the triplet occurs. This triplet may not appear in the Page Descriptor structured field with a Presentation Space Mixing Rules triplet. See "Presentation Space Reset Mixing Triplet X'70'" on page 414.
X'71'	Presentation Space Mixing Rules	Optional. May occur once. This triplet may not appear in the Page Descriptor structured field with a Presentation Space Reset Mixing triplet. See "Presentation Space Mixing Rules Triplet X'71'" on page 416. **Implementation Note:** The Presentation Space Mixing Rules (X'71') triplet is currently not used in AFP environments.

Architecture Note: Triplets that affect the page or overlay presentation space are processed in the order in which they occur on the PGD. For example, if a Presentation Space Reset Mixing (X'70') triplet on the PGD is followed by a Color Specification (X'4E') triplet, the presentation space is colored with the color specified in the X'4E' triplet and covers any data underneath it regardless of whether the X'70' triplet specified "reset to color of medium" or "do not reset to color of medium". If a Color Specification (X'4E') triplet is followed by a X'70' triplet, and if the X'70' triplet specified "reset to color of medium", the presentation space is colored with color of medium. If the X'70' triplet specified "do not reset to color of medium", the X'70' triplet does not change the presentation space and it remains foreground data colored with the color specified by the X'4E' triplet.

PGD Exception Condition Summary

X'01' This exception condition exists when:

- The XpgBase and YpgBase values are not identical.
- An attempt is made to present data outside the medium presentation space. See the note under *YpgSize* for details.
- The PGD structured field contains both a Presentation Space Reset Mixing triplet and a Presentation Space Mixing Rules triplet.

Page Position (PGP) Format 2

The Page Position structured field specifies the position and orientation of a page's presentation space on the medium presentation space for the physical medium. The PGP may be located in a medium map or in the document environment group of a form map. When present in the active medium map, it overrides a PGP in the document environment group of the form map. If N-up partitioning is specified by the Medium Modification Control structured field in the active medium map, the medium presentation spaces on the front and back sides of a sheet are divided into N partitions; and the Page Position structured field specifies the partition into which each page is mapped and with respect to which the page presentation space is positioned and oriented. The N-up page-to-partition mapping can be specified in two mutually exclusive ways:

- Default N-up page placement. Pages are processed in the order in which they appear in the data stream and are placed into consecutively-numbered partitions, that is, the first page is placed into partition 1, the second page is placed into partition 2, the third page is placed into partition 3, and the 4th page is placed into partition 4. Partition numbering for various media is shown in Figure 61 on page 320 to Figure 72 on page 326.
- Explicit N-up page placement. Pages are processed in the order in which they appear in the data stream and are placed into the partition that is explicitly specified by the repeating group for the page. Multiple pages may be placed into the same partition. If N-up simplex is specified, the Page Position structured field *must* contain N repeating groups, one for each page on the sheet-side. If N-up duplex is specified, the Page Position structured field *must* contain 2N repeating groups, one for each page on the sheet.

PGP (X'D3B1AF') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3B1AF'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0	CODE	Constant	X'01'	Reserved constant; must be X'01'	M	X'06'
One or more repeating groups in the following format:						
0	UBIN	RGLength	X'0A'–X'0C'	Length of each repeating group	M	X'06'
1–3	SBIN	X_mOset	-32,768–32,767	X_m coordinate of page presentation space origin	M	X'06'
4–6	SBIN	Y_mOset	-32,768–32,767	Y_m coordinate of page presentation space origin	M	X'06'
7–8	CODE	PGorient	X'0000', X'2D00', X'5A00', X'8700'	The page presentation space X-axis rotation from the X axis of the medium presentation space: **X'0000'** 0° rotation **X'2D00'** 90° rotation **X'5A00'** 180° rotation **X'8700'** 270° rotation	M	X'06'

Page Position (PGP)

Offset	Type	Name	Range	Meaning	M/O	Exc
9	CODE	SHside	X'00'–X'01', X'10'–X'11', X'20'–X'21', X'30'–X'31', X'40'–X'41'	Sheet side and partition selection **X'00'** Page on front side if no N-up, default page placement on front side if N-up **X'01'** Page on back side if no N-up, default page placement on back side if N-up **X'10'** Explicit N-up page placement: partition 1, front side **X'11'** Explicit N-up page placement: partition 1, back side **X'20'** Explicit N-up page placement: partition 2, front side **X'21'** Explicit N-up page placement: partition 2, back side **X'30'** Explicit N-up page placement: partition 3, front side **X'31'** Explicit N-up page placement: partition 3, back side **X'40'** Explicit N-up page placement: partition 4, front side **X'41'** Explicit N-up page placement: partition 4, back side	M	X'06'
10	BITS	PgFlgs		Specify additional presentation controls for the partition. See PGP Semantics for PgFlgs bit definitions.	O	X'02'
11	CODE	PMCid	0–127	Page Modification Control identifier	O	X'02'
			X'FF'	Apply all modifications		

PGP Semantics

The Page Position structured field contains repeating groups that are used to map pages to the medium presentation space or to partitions on the medium presentation space. The number of repeating groups that may appear on the Page Position structured field is determined as follows:

- If N-up is not specified by the Medium Modification Control structured field in the active medium map, the Page Position structured field contains one repeating group for the front sheet-side for simplex printing, and two repeating groups, one for the front sheet-side and one for the back sheet-side for duplex printing. Each repeating group specifies the offset, orientation, and optional modifications for the page that is to be presented on the sheet-side. The page offset is measured with respect to the medium presentation space origin, and the page orientation is measured with respect to the medium presentation space X axis. Pages are processed sequentially as they appear in the data stream. For duplex printing, the front sheet-side is always processed before the back sheet-side, regardless of the order of the two repeating groups.

- If N-up is specified by the Medium Modification Control structured field in the active medium map and the default N-up page placement is desired, the Page Position structured field contains one repeating group for the front sheet-side for simplex printing, and two repeating groups, one for the front sheet-side and one for the back sheet-side for duplex printing. Each repeating group must specify default N-up page placement, and the specified page offset, page orientation, and page modifications apply to all pages placed on the sheet-side. The page offset is measured with respect to the origin of the partition into which the page is placed, and the page orientation is measured with respect to the medium presentation space X axis. Pages are processed sequentially as they appear in the data stream. For duplex printing, the front sheet-side is always processed before the back sheet-side, regardless of the order of the two repeating groups.
- If N-up is specified by the Medium Modification Control structured field in the active medium map and if explicit N-up page placement is desired, the Page Position structured field contains N repeating groups for simplex printing, and 2N repeating groups for duplex printing. Pages are processed sequentially as they appear in the data stream using consecutive PGP repeating groups. The first page is processed using the first repeating group, the second page is processed using the second repeating group, and so on. Each repeating group must specify a sheet-side, a partition number in the range from 1 to N, a page offset, and a page orientation. Each repeating group may also specify optional modifications to be applied to the page. Multiple repeating groups may specify the same partition number. The page offset is measured with respect to the origin of the partition specified by the repeating group. The page orientation is measured with respect to the medium presentation space X axis.

Notes:

1. The processing of PGP repeating groups is driven by pages in the data stream. If page *n* is the last page in a document, the repeating group used to present page *n* is the last repeating group that is processed. Similarly, if page *n* is followed by an IMM, the repeating group used to present page *n* is the last repeating group processed before the new medium map is invoked. As a result, if a PGP repeating group is to present a PMC overlay without any page data, placing it before the last repeating group that presents page data will ensure that this repeating group is processed and the PMC overlay is presented.
2. Pages can be placed in the partitions that correspond to default page placement but still be individually offset, oriented, and modified by specifying explicit page placement and sequential partition numbers in the repeating groups. For example, for 2-up duplex, the first repeating group specifies SHside = X'10', the second repeating group specifies SHside = X'20', the third repeating group specifies SHside = X'11', and the fourth repeating group specifies SHside = X'21'.

RGLength Length of each repeating group. Set to 10, 11, or 12.

X_mOset Offset of the page's presentation space origin along the X_m axis of the medium presentation space using the measurement units specified in the Medium Descriptor structured field. If N-up partitioning is specified by the Medium Modification Control structured field in the active medium map, the offset is measured from the partition origin.

Y_mOset Offset of the page's presentation space origin along the Y_m axis of the medium presentation space using the measurement units specified in the Medium Descriptor structured field. If N-up partitioning is specified by the Medium Modification Control structured field in the active medium map, the offset is measured from the partition origin.

PGorient Specifies the amount of clockwise rotation of the page presentation space X axis, X_p, about the page presentation space origin, relative to the X_m axis of the medium presentation space. The rotation of the Y axis of the page presentation space is always 90° greater than the rotation of the X axis. The allowed rotations are:

Value	Description
X'0000'	0° rotation
X'2D00'	90° rotation
X'5A00'	180° rotation
X'8700'	270° rotation

Note: If the page rotation is such that the sum of the page origin offset and the page extent exceeds the size of the including medium presentation space in either the X_m or Y_m direction, all of the page presentation space will not fit on the medium presentation space. If an attempt is made to actually present data in the portion of the page presentation space that falls outside the medium presentation space, that portion of the data is not presented, and a X'01' exception condition exists.

SHside Specifies the sheet side to which the repeating group applies and the manner in which pages are placed on the sheet side. If N-up partitioning is specified by the Medium Modification Control structured field in the active medium map, this parameter specifies the N-up page placement. It may specify the default N-up page placement, where pages are placed into consecutive partitions, or it may specify explicit N-up page placement, where pages are placed into explicitly-specified partitions.

Value	Description
X'00'	Single page placed on front sheet-side if no N-up specified, default page placement on front sheet-side if N-up specified.
X'01'	Single page placed on back sheet-side if no N-up specified, default page placement on back sheet-side if N-up specified. **Note:** If default N-up page placement is specified for the front sheet-side, it must also be specified for the back sheet-side. With default N-up page placement, one repeating group (simplex) or two repeating groups (duplex) are specified, and the specified offset and orientation apply to all pages mapped to the sheet-side.
X'10'	Explicit N-up page placement; page is mapped to partition 1, front sheet-side.
X'11'	Explicit N-up page placement; page is mapped to partition 1, back sheet-side.
X'20'	Explicit N-up page placement; page is mapped to partition 2, front sheet-side.
X'21'	Explicit N-up page placement; page is mapped to partition 2, back sheet-side.
X'30'	Explicit N-up page placement; page is mapped to partition 3, front sheet-side.
X'31'	Explicit N-up page placement; page is mapped to partition 3, back sheet-side.
X'40'	Explicit N-up page placement; page is mapped to partition 4, front sheet-side.
X'41'	Explicit N-up page placement; page is mapped to partition 4, back sheet-side.

Application Note: IPDS printers require that pages be contained within their partition if default N-up page placement is specified, otherwise an exception is generated. This restriction does not exist if explicit N-up page placement is specified, that is, pages may overflow their partition without necessarily causing an exception.

PgFlgs Specify additional presentation controls for the partition. Bits 0–2 of this parameter are used only if N-up is specified by the Medium Modification Control structured field in the active medium map. If N-up is not specified and this parameter is present, bits 0–2 are ignored, and the architected default for PgFlgs bits 0–2 is B'000' (present variable page data, present PMC overlays, position PMC overlays with respect to the page origin).

Bit	Description
0	Variable page data: **B'0'** Present variable page data in the partition **B'1'** Do not present variable page data in the partition. This causes a blank page to be presented in the partition.
1	PMC overlays: **B'0'** Present PMC overlays in partition **B'1'** Do not present PMC overlays in partition

2 PMC overlay position:

B'0' The offset specified for PMC overlays is measured with respect to the page origin using the measurement units specified in the PMC structured field. If no measurement units are specified in the PMC, the measurement units specified in the MDD structured field are used.

B'1' The offset specified for PMC overlays is measured with respect to the partition origin using the measurement units specified in the PMC structured field. If no measurement units are specified in the PMC, the measurement units specified in the MDD structured field are used. The measurement of the PMC overlay offset is done with the page in the 0° rotation. This fixes the position of the overlay origin with respect to the page origin along the X_{pg} and Y_{pg} axes, or along extensions of the X_{pg} and Y_{pg} axes in the *negative* direction. If a non-zero degree page rotation is specified, each PMC overlay is positioned by rotating the page coordinate system, extending the X_{pg} and Y_{pg} axes in the negative direction, and placing the PMC overlay origin in the extended (X_{pg},Y_{pg}) coordinate system at the same position, relative to the page, that it occupied in the 0° page rotation.

3 Page view control:

B'0' The data presented by this repeating group is intended for viewing. This is the architected default if the PgFlgs parameter is not specified.

B'1' The data presented by this repeating group is not intended for viewing.

4–7 Reserved; all bits should be B'0'.

Notes:

1. If this optional parameter is omitted, the PMCid parameter must be omitted as well and the architected default for PgFlgs bits 0–3 is B'0000', that is, present variable page data in the partition, present all PMC overlays in the active medium map in the partition, position PMC overlays with respect to the page origin, and view the data presented by this repeating group.
2. PMC overlays are page overlays whether they are positioned with respect to the page origin or the partition origin. PMC overlays rotate with the page if a non-zero page rotation is specified by the PGorient parameter. Media level controls, such as the Constant Forms Control X'F9' keyword in the MMC, treat PMC overlays as variable page data.
3. The functions enabled at the page level by bits 0–1 of this parameter are analogous to the functions provided by the Constant Forms Control (X'F9') keyword and the Medium Overlay Local ID (X'F2') keyword in the MMC at the medium level. When the PgFlgs parameter, the X'F9' keyword, and the X'F2' keyword are present, they interact as follows:
   - The Constant Forms Control (X'F9') keyword is not supported with N-up explicit page placement and is ignored if it occurs. Similar functionality can be achieved for a sheet side by explicitly including the medium overlay as a PMC overlay on a partition without any variable page data.

     When N-up with default page placement is specified, this keyword controls the application of variable page data that may include PMC overlays to a sheet side, while the PgFlgs parameter controls the application of variable page data and PMC overlays to a partition.

     When the X'F9' keyword specifies that no variable page data is to be applied to the sheet side, it overrides the page level specification in the PgFlgs parameter for that sheet side. The resulting effect is the same as if the PGP repeating group for partitions on that sheet side specified bits 0,1 = B'11' (do not present variable page data in the partitions and do not present PMC overlays in the partitions). In that case, the medium overlay is applied to the sheet side but neither variable page data nor PMC overlays are applied to any partition on the sheet side.

When the X'F9' keyword specifies that variable page data including PMC overlays can be applied to the sheet side, the PgFlgs parameter determines whether variable page data and PMC overlay data is placed into partitions on that sheet side.

- With default N-up page placement, if a sheet-side contains only constant data (MMC Constant Forms Control X'F9' keyword is specified or PGP PgFlgs bit 0 = B'1'), it is built as long as:
  - At least a single page is placed anywhere on that sheet; or
  - The other sheet-side also contains only constant data
- The Medium Overlay Local ID (X'F2') keyword controls the application of medium overlays to the sheet side, while the PgFlgs parameter controls the application of PMC overlays to the page in a partition. These two overlay types are included or omitted *independently*.

  Note that medium overlays are only guaranteed to be presented on a sheet side if a page, which could be a blank page generated by setting PgFlgs bit 0 = B'1', is also presented on the sheet side, or if the Constant Forms Control (X'F9') keyword specifies X'01' (present only medium overlay data) for that sheet side.

  For example, if the PGP specifies explicit page placement but does not contain a repeating group for a back-side partition, and if the MMC for the back side copy subgroup calls out a medium overlay with the X'F2' keyword, this medium overlay will not be presented.
- In general, if the Constant Forms Control (X'F9') keyword is not specified for a sheet-side, any medium overlays specified for that sheet-side are only presented if at least a single page is placed on *the same* sheet-side. Note that this page could be a page with variable data, a blank page with only PMC overlays, or even a blank page without PMC overlays, as determined by the setting of the PgFlgs parameter.

Application Note: Bits 0–1 of the PgFlgs parameter can be used to place a blank page into a partition or to fill a partition with constant data specified in a PMC overlay.

PMCid Identifies a Page Modification Control (PMC) structured field in the active medium map that specifies modifications to be applied to the page before it is placed in the partition. If this parameter is not specified on a repeating group, or if the parameter specifies X'FF', all modifications specified by all PMCs in the active medium map are applied to the page. If this parameter is specified on a repeating group, only the modifications included by the selected PMC are applied to the page. If the medium map does not contain a PMC with the specified ID, no PMC modifications are applied. This parameter is used only if N-up is specified by the Medium Modification Control structured field in the active medium map. If N-up is not specified and this parameter is present, it is ignored, and all modifications specified by all PMCs in the active medium map are applied to the page. PMC structured fields in the active medium map may specify Preprinted Form overlays (PMC-PFOs). Only one PMC-PFO may be included on the page processed by this PGP repeating group; if more than one PMC-PFO is referenced, the additional PMC-PFOs are ignored. If a specific PMC ID is not selected for a page, and therefore all PMCs in the active medium map are applied to the page, only the first PMC-PFO is applied, all additional PMC-PFOs are ignored. Note that if the active medium map specifies a Medium PFO (M-PFO) for a sheet-side, all PMC-PFOs for pages on that sheet-side are ignored.

Notes:

1. If the PMCid parameter is included in a repeating group, the optional PgFlgs positional parameter is mandatory for that repeating group.
2. All PMC overlays that are not PMC-PFOs are presented on the page presentation space *before* any variable page data is presented. If a PMC-PFO is included, it is presented on the page presentation space *after* all other data has been presented, using the special mixing rules defined for PMC-PFOs. See "Mixing Rules" on page 44.

3. All PMC overlays included by a PGP repeating group must be mapped with an MPO structured field.

Application Note: The N-up function provided by the PGP structured field provides powerful and flexible functionality for placing multiple pages on a single sheet. Not all of this functionality maps easily to a viewing environment, which is normally page-based. When creating N-up applications that are to be both printed and viewed, you should follow these guidelines:

- Do not use medium overlays. Medium overlays are tied to a sheet-side, not to a page, and should be replaced with PMC overlays, which can be tied to a page. If medium overlays are used, the page and PMC overlay position and rotation with respect to the medium origin must be preserved. This may generate blank space on the display screen and may even cause the page and PMC overlays to position or rotate off the screen. To avoid these problems, some viewing applications may not support medium overlays when presenting N-up data.
- Generate the PGP so that all data that must be displayed with a particular page is referenced by the PGP repeating group that is used to process the page.
- Avoid creating special effects by overlapping two or more pages since these effects will not be displayed by a page-based N-up viewing system.
- Avoid splitting page content across more than one page, since this would require a multi-page viewing capability.

PGP Exception Condition Summary

X'01' This exception condition exists when:

- One repeating group specifies default N-up page placement and another repeating group specifies explicit N-up page placement.
- The Page Position structured field contains an invalid number of repeating groups for the given N-up and simplex/duplex specification.
- Explicit N-up page placement is specified, but the active medium map does not specify N-up partitioning.
- A repeating group specifies invalid data, such as a back sheet-side partition when the active medium map specifies simplex, or partition #3 when the active medium map specifies 2-up.

Partition Numbering for N-up

Partition numbering for various media is shown in Figure 61 on page 320 to Figure 72 on page 326. The numbering depends on whether 1-up, 2-up, 3-up, or 4-up is specified, and on how the medium presentation space is oriented on the physical medium. The medium presentation space orientation is specified by the Medium Orientation (X'68') triplet on the Medium Descriptor structured field to be Portrait (X'00'), Landscape (X'01'), Reverse Portrait (X'02'), Reverse Landscape (X'03'), Portrait 90 (X'04'), or Landscape 90 (X'05'). Note that when duplexing, the location of the partitions on the back sheet-side *relative* to the location of the partitions on the front sheet-side is dependent on whether normal duplexing (turning the media around the Y_m axis) or tumble duplexing (turning the media around the X_m axis) is specified.

Legend: The small circles in Figure 61 on page 320 to Figure 72 on page 326 represent holes punched through the sheets and are intended to show how the sheets were flipped from front-side to back-side. All sheets have three holes punched along one of the long sides and one hole punched along the other long side. The small square indicates the medium origin, and the arrow indicates the direction of the medium X_m axis.

Figure 61. 1-up Partition Numbering, Front Sheet-Side

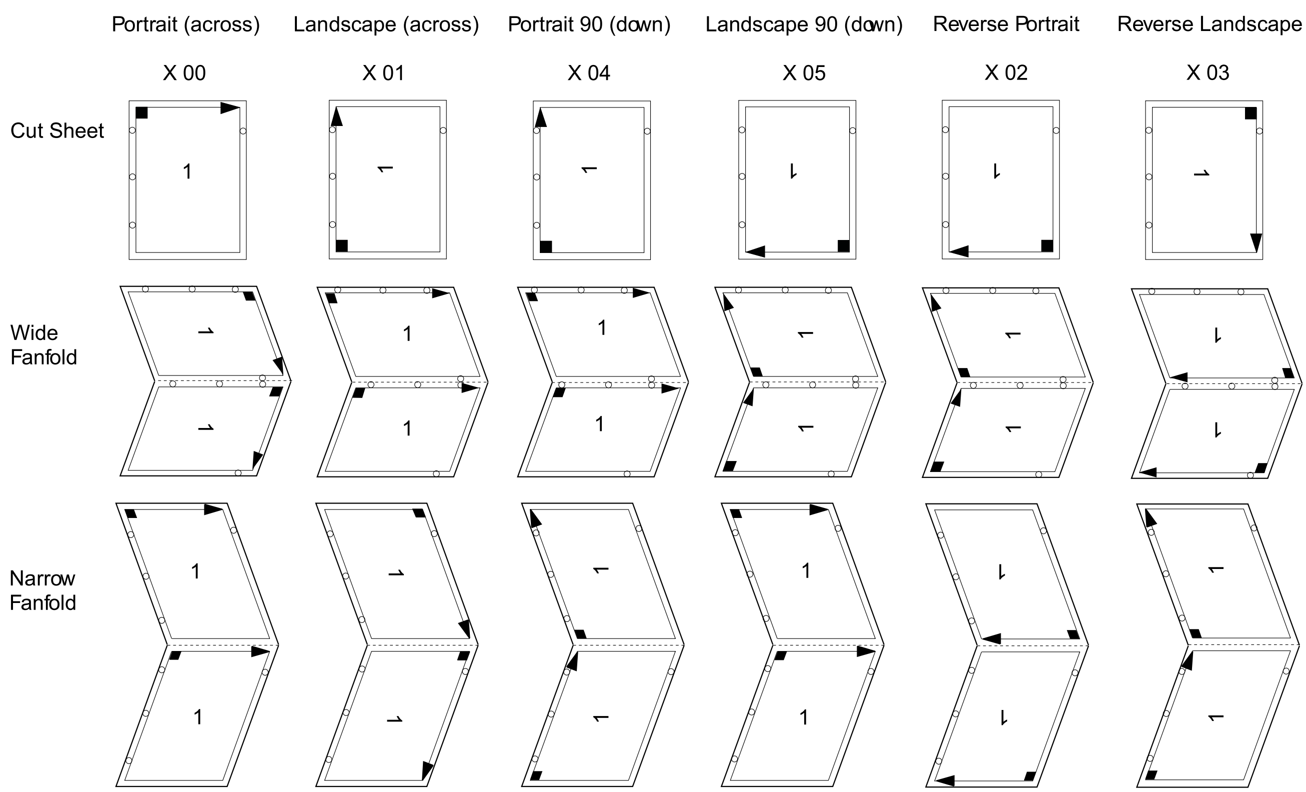


Figure 62. 2-up Partition Numbering, Front Sheet-Side

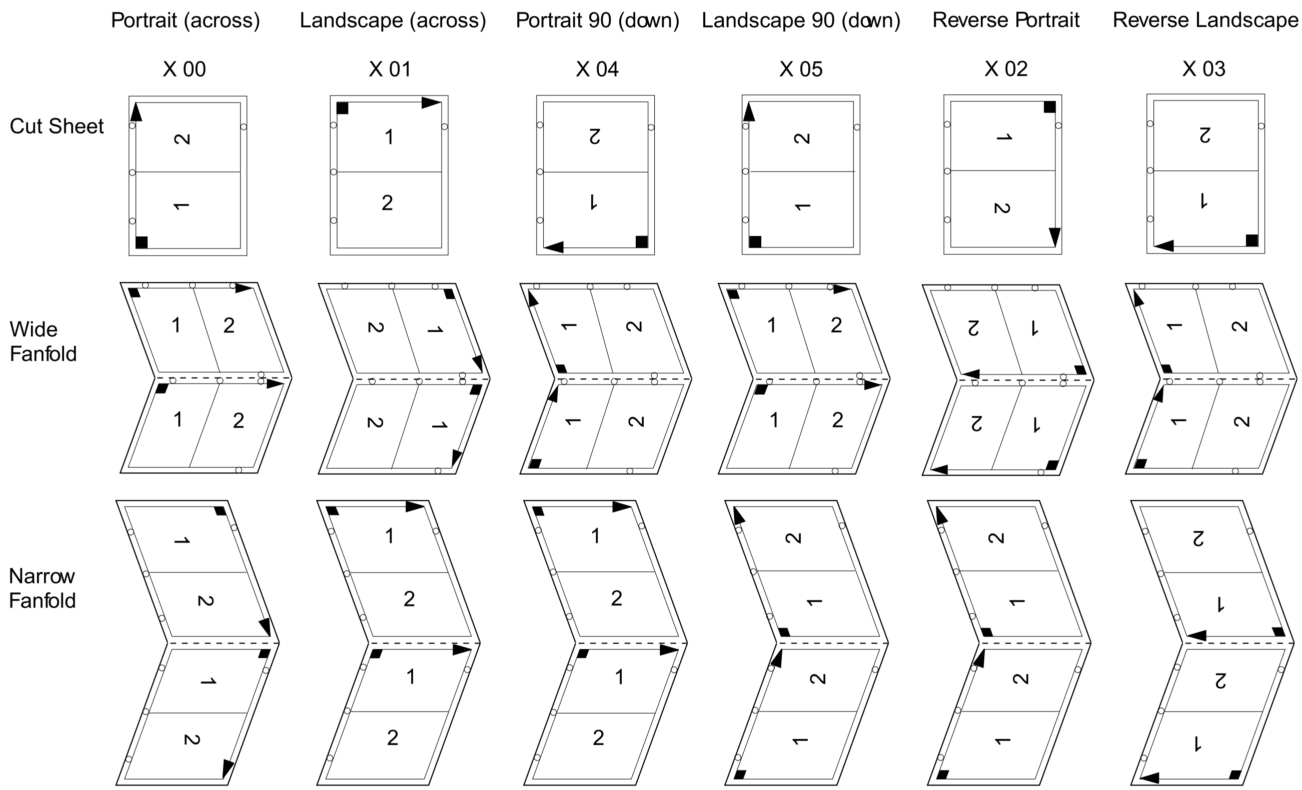


Figure 63. 3-up Partition Numbering, Front Sheet-Side

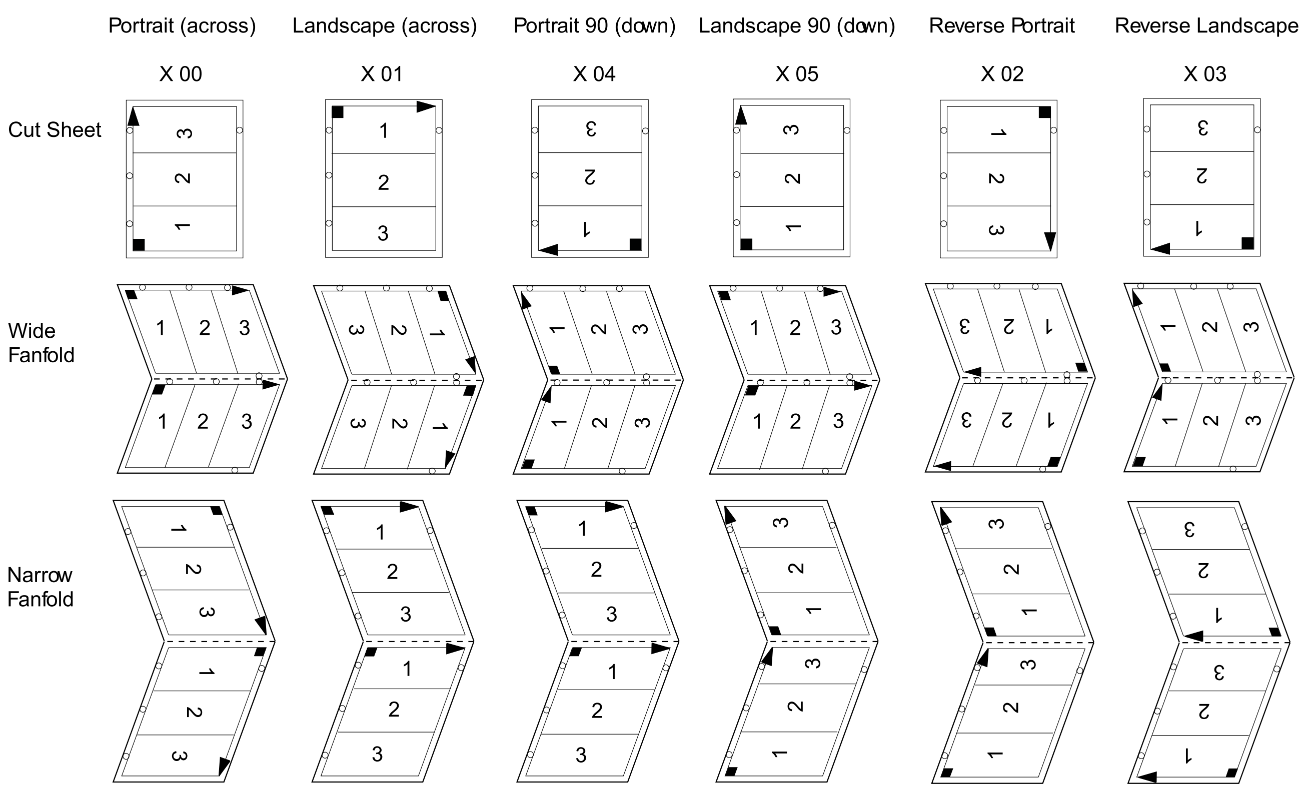


Figure 64. 4-up Partition Numbering, Front Sheet-Side

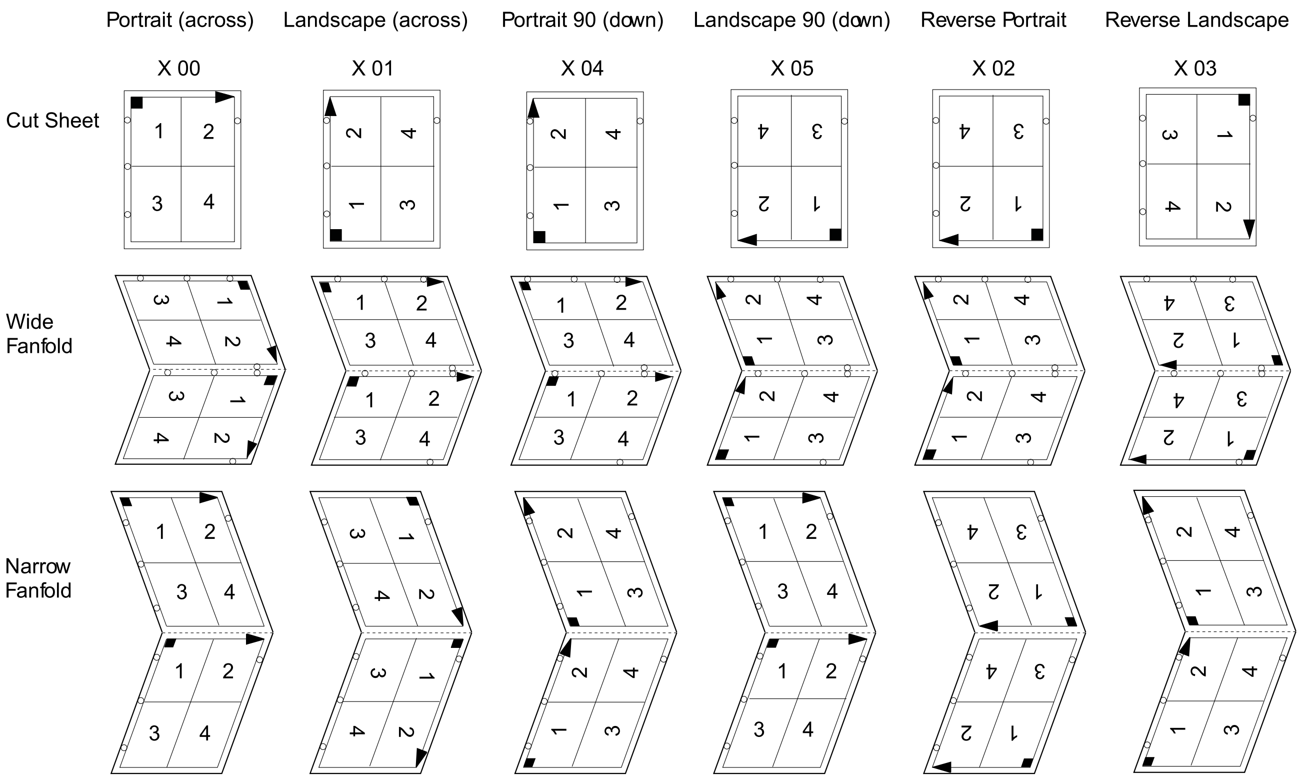


Figure 65. 1-up Partition Numbering, Back Sheet-Side, Normal Duplex

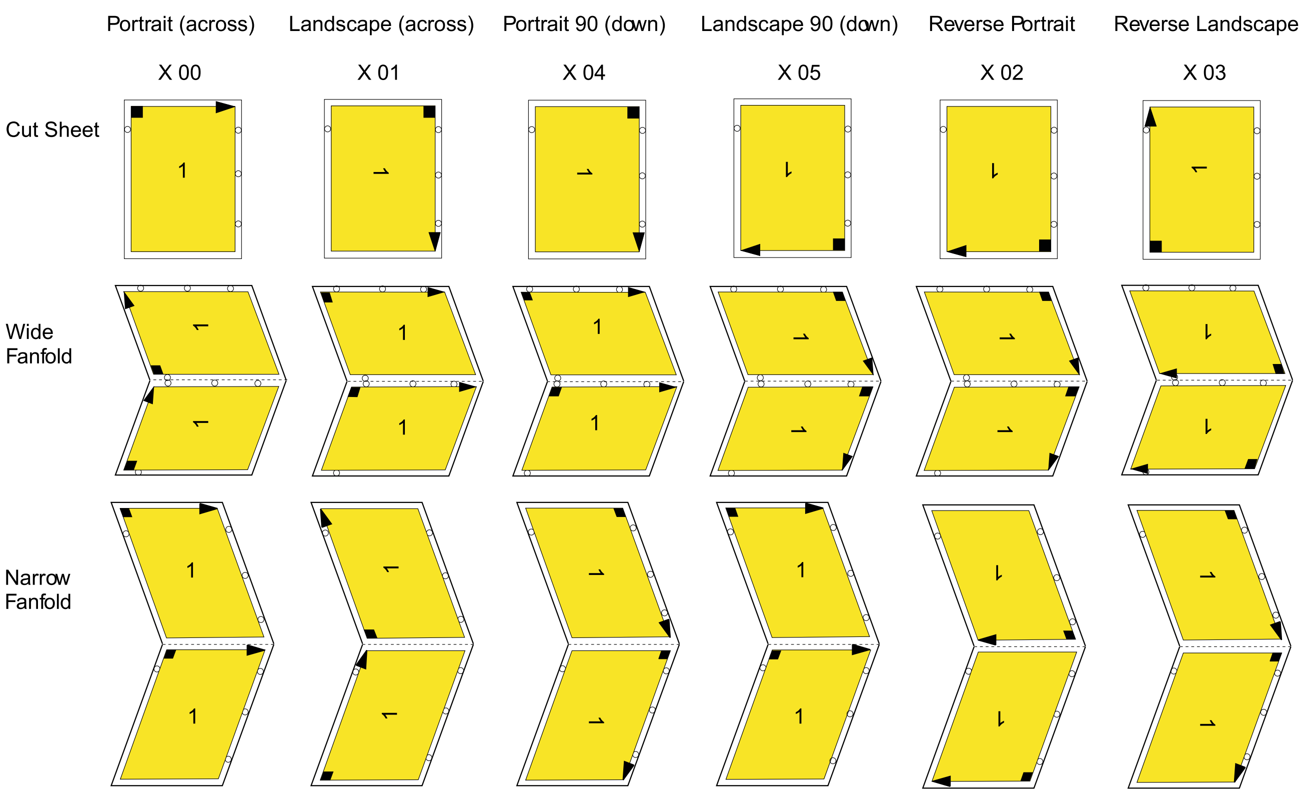


Figure 66. 2-up Partition Numbering, Back Sheet-Side, Normal Duplex

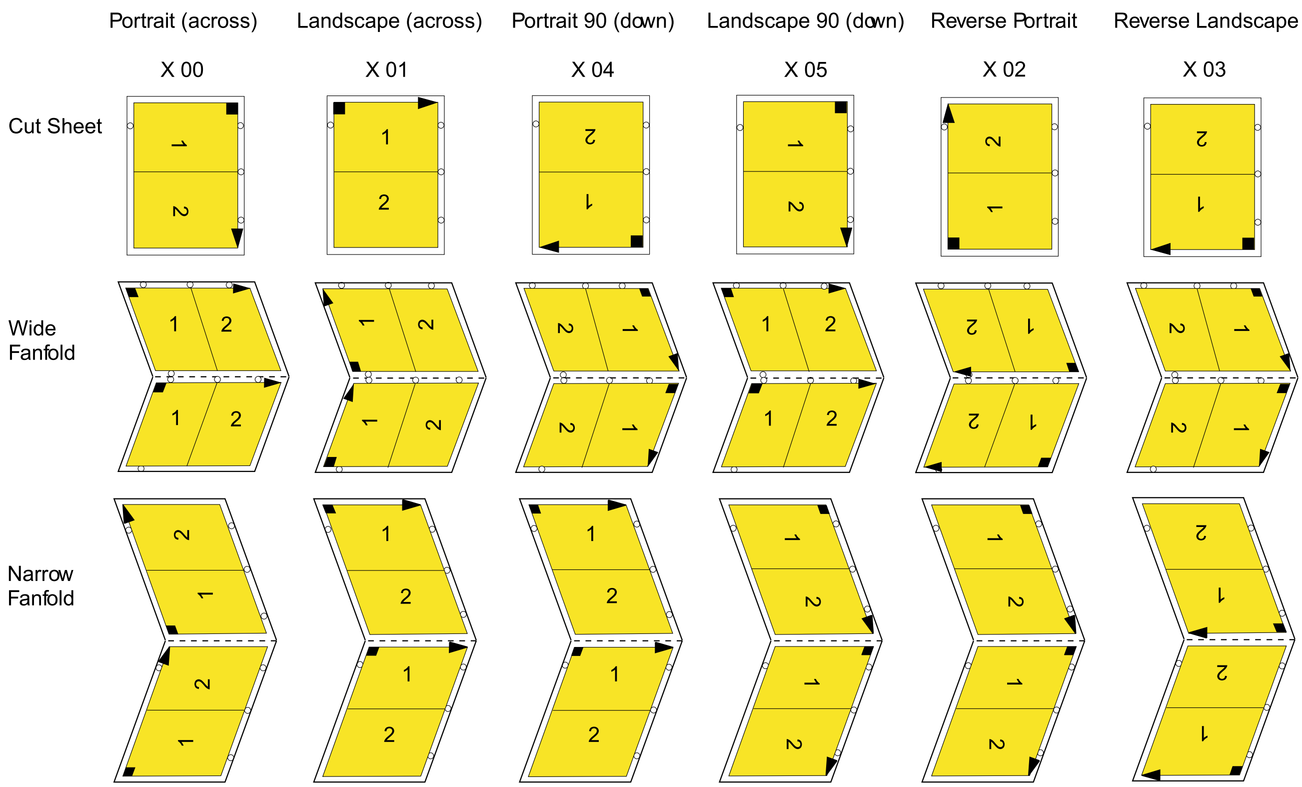


Figure 67. 3-up Partition Numbering, Back Sheet-Side, Normal Duplex

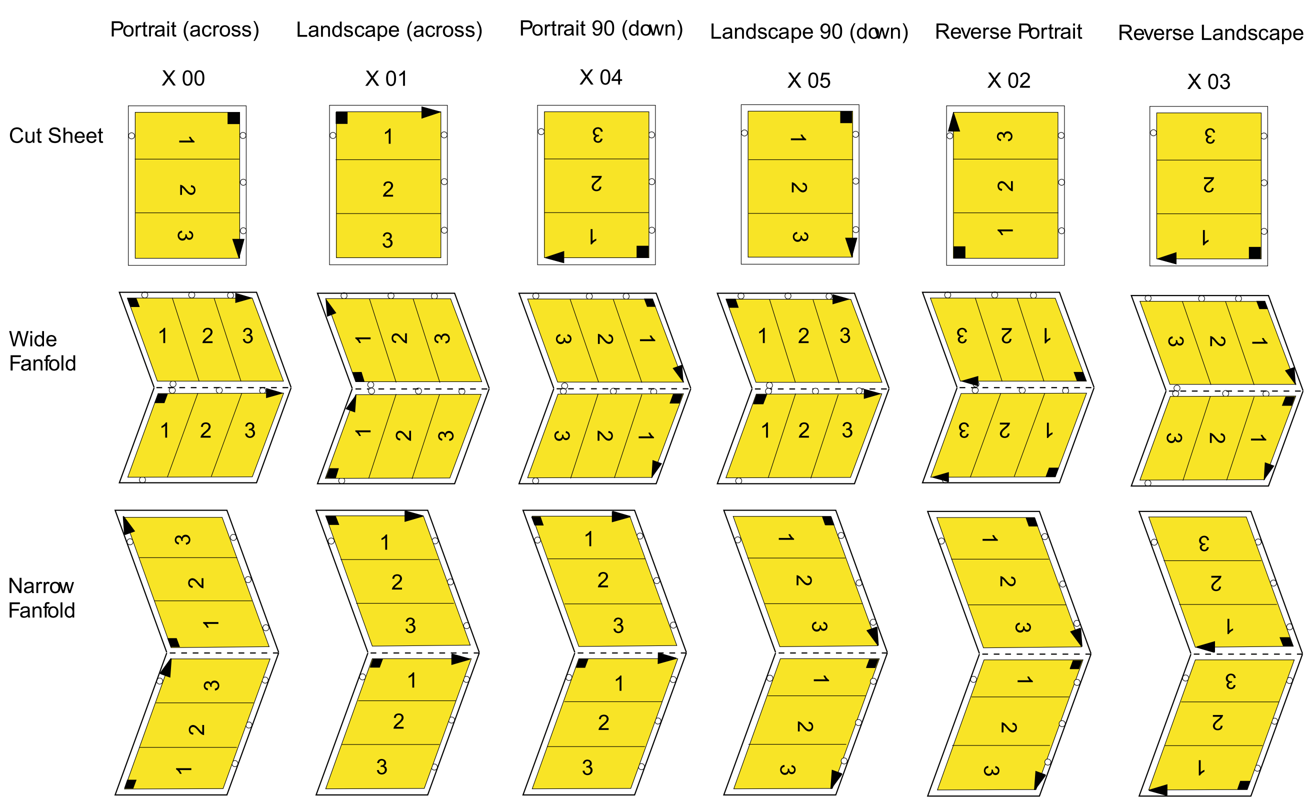


Figure 68. 4-up Partition Numbering, Back Sheet-Side, Normal Duplex

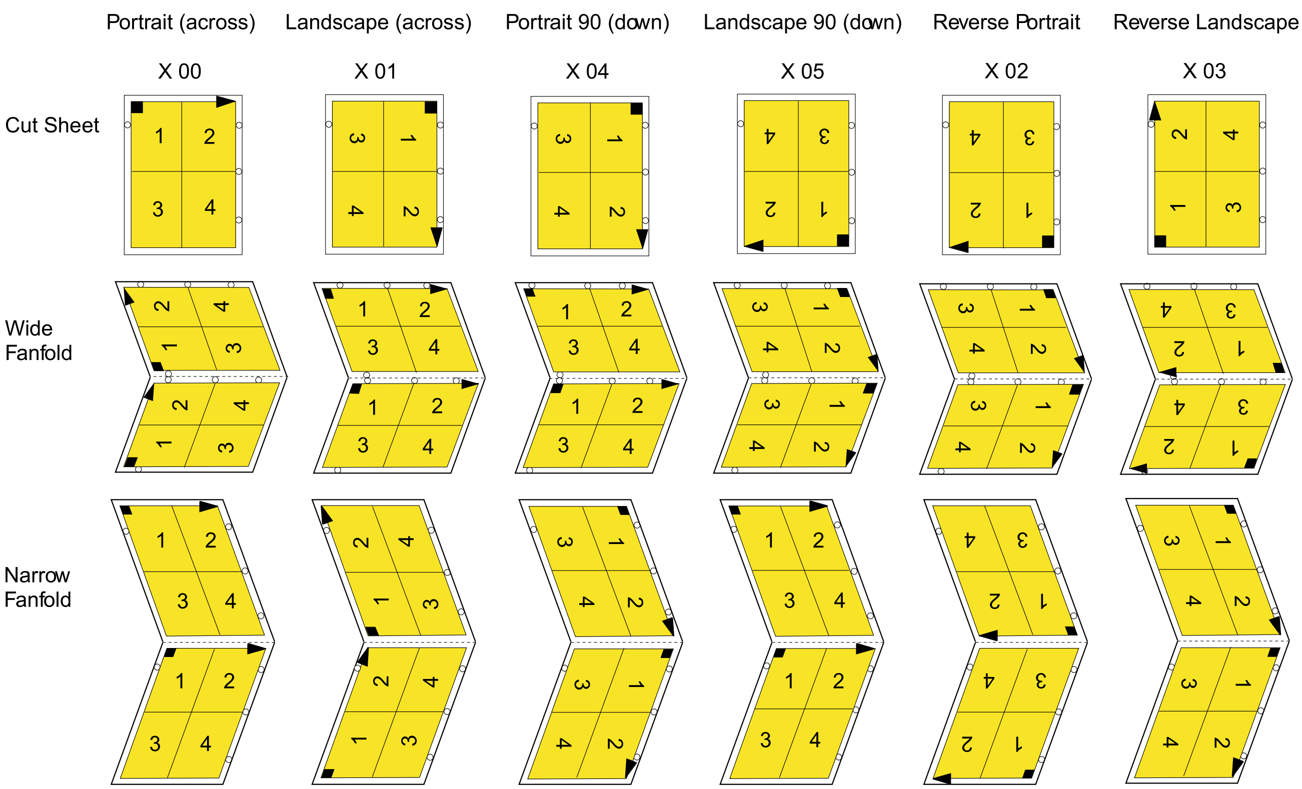


Figure 69. 1-up Partition Numbering, Back Sheet-Side, Tumble Duplex

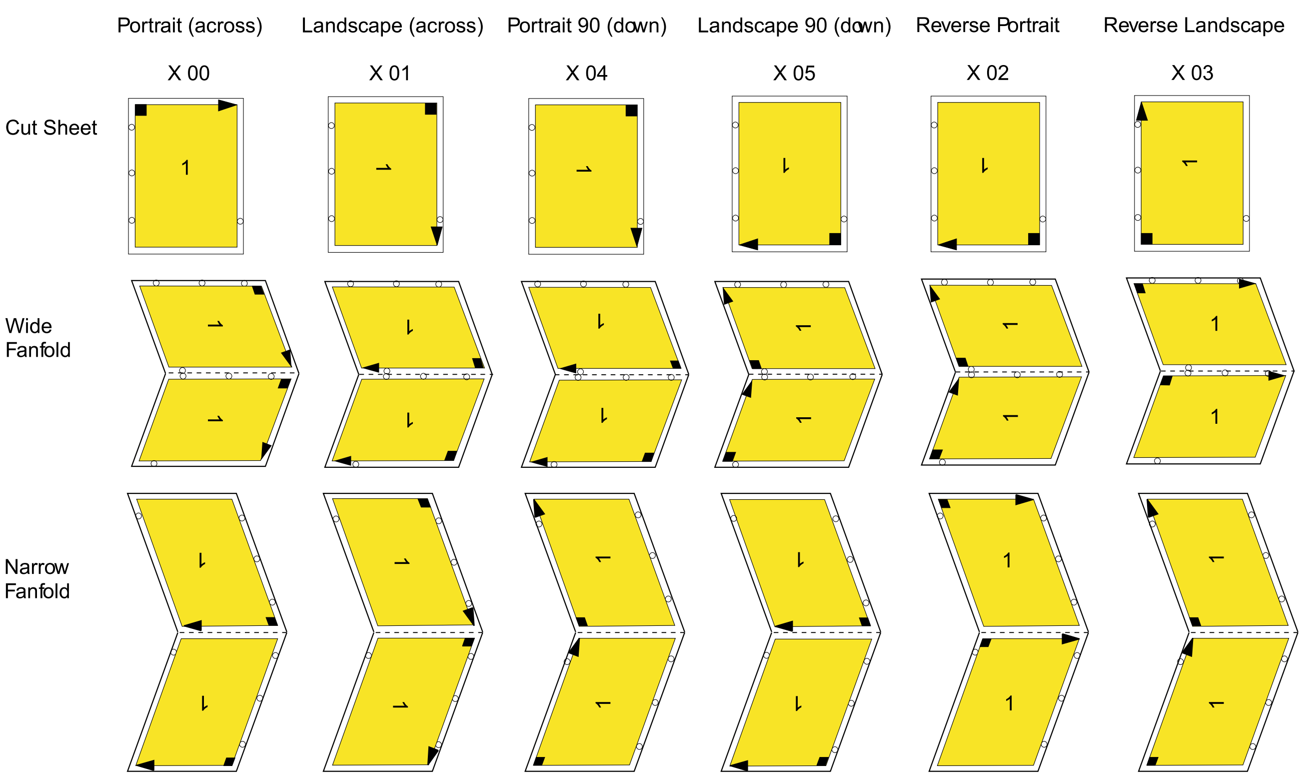


Figure 70. 2-up Partition Numbering, Back Sheet-Side, Tumble Duplex

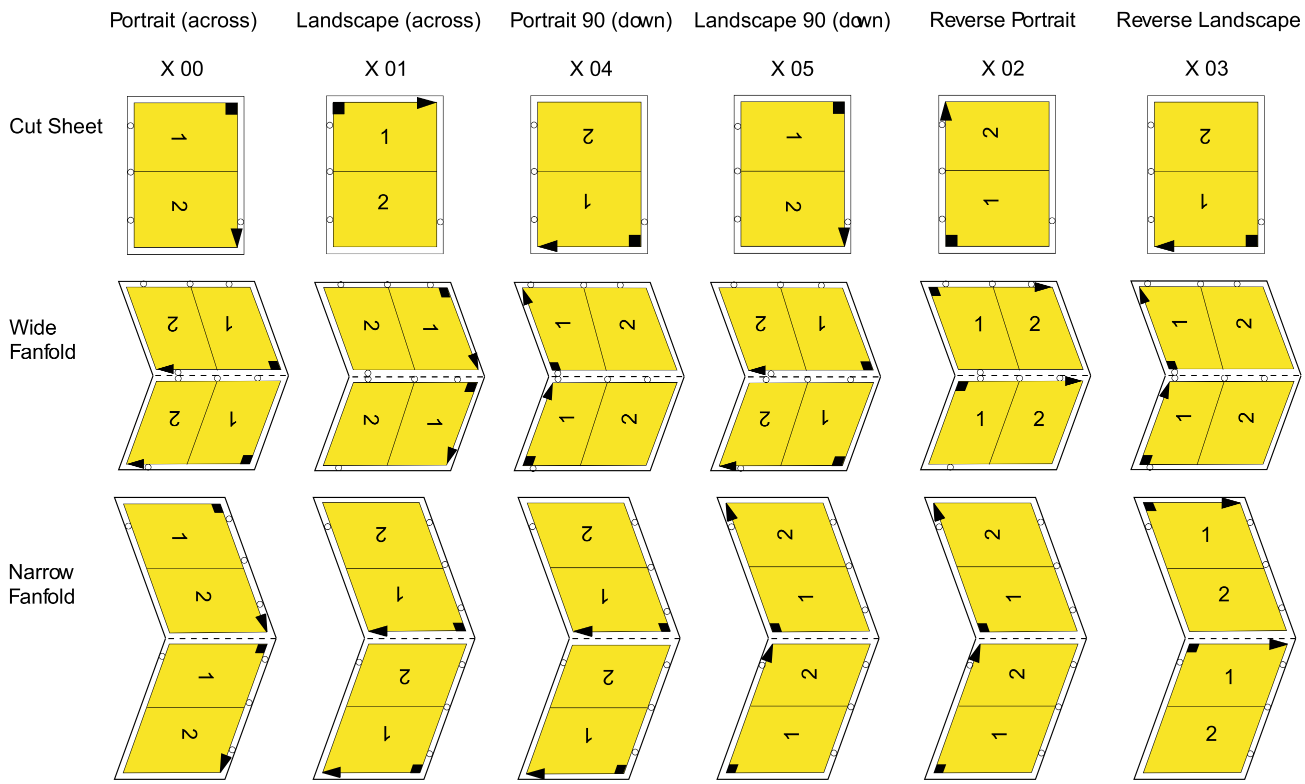


Figure 71. 3-up Partition Numbering, Back Sheet-Side, Tumble Duplex

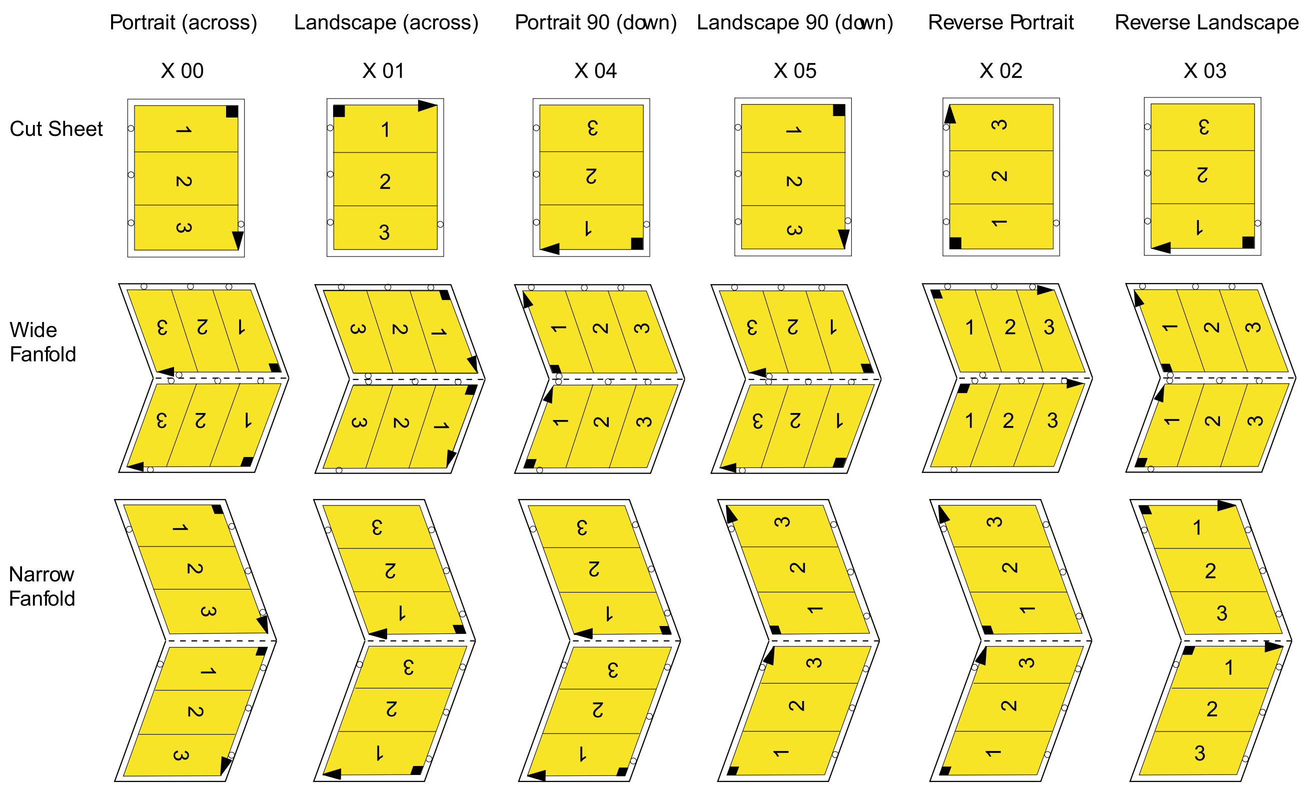
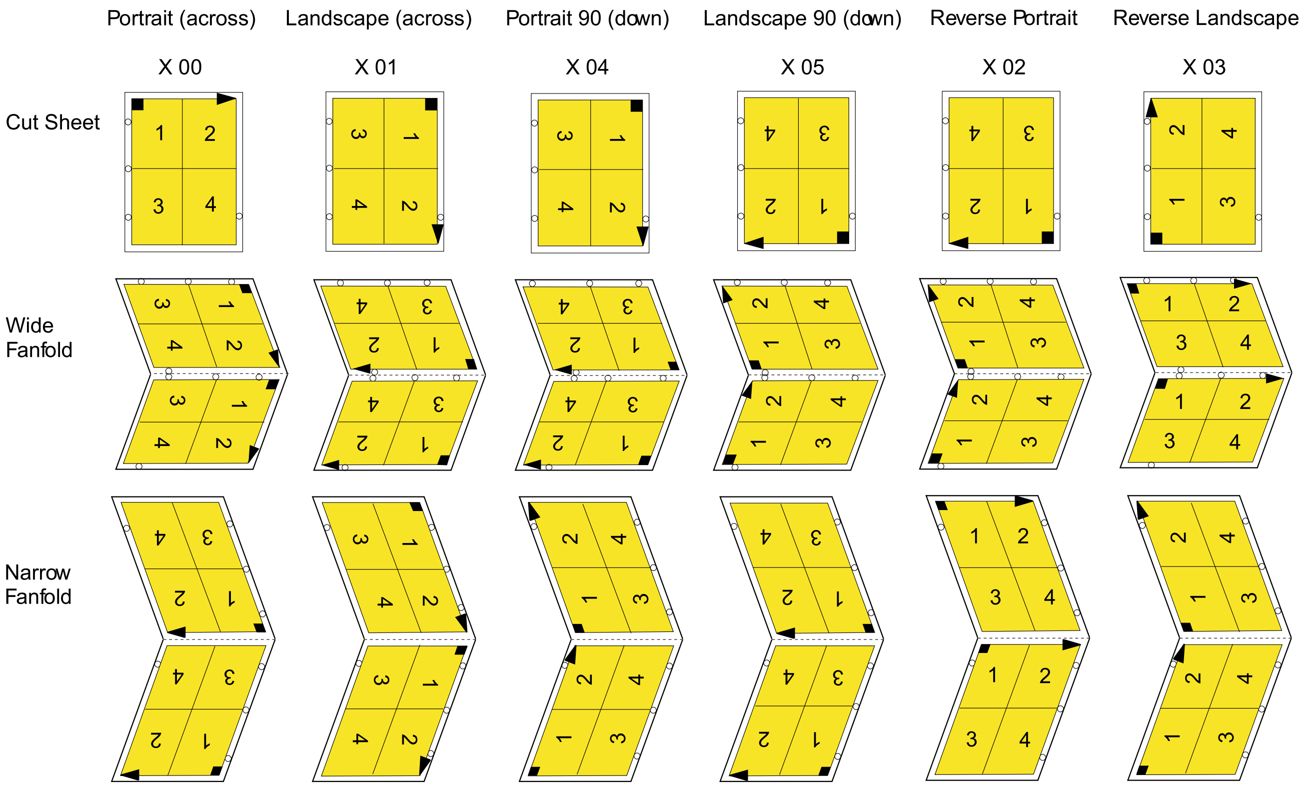


Figure 72. 4-up Partition Numbering, Back Sheet-Side, Tumble Duplex



Page Modification Control (PMC)

The Page Modification Control structured field specifies modifications to be applied to a page presented on a physical medium.

If the ID of a specific PMC is selected in the PGP structured field of the active medium map in N-up mode, only the modifications specified by that PMC are applied to pages placed on the medium. If a specific PMC is not selected in N-up mode, all modifications specified by all PMCs in the active medium map are applied to pages placed on the medium.

A PMC structured field may specify only one Preprinted Form Overlay (PMC-PFO); if it specifies more than one, the additional PMC-PFOs are ignored. If a specific PMC ID is not selected for a page, and therefore all PMCs in the active medium map are applied to the page, only the first PMC-PFO is applied; all additional PMC-PFOs are ignored. Note that if the active medium map specifies a Medium PFO (M-PFO) for a sheet-side, all PMC-PFOs for pages on that sheet-side are ignored.

PMC (X'D3A7AF') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A7AF'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0	CODE	PMCid	0–127	Page Modification Control identifier	M	X'06'
1				Reserved; should be zero	M	X'06'
2–*n*		Triplets		See PMC Semantics for triplet applicability.	O	X'10'

PMC Semantics

PMCid Page Modification Control Identifier. The identifier for the modifications specified by this structured field.

Triplets Appear in the Page Modification Control structured field as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur multiple times. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'4B'	Measurement Units	Optional. May occur once. Specifies the units of measure to be used for positioning included objects on the page. See "Measurement Units Triplet X'4B'" on page 388. If this triplet is omitted, the units of measure specified in the Medium Descriptor (MDD) that is in the same medium map as the PMC are used to position included objects on the page.
X'6C'	Resource Object Include	Optional. May occur more than once, but only one occurrence can specify object type X'DC' - Preprinted Form Overlay (PFO). If this triplet is specified more than once with object type X'DC', the additional occurrences are ignored. Identifies an object to be included on the page at a specified position. See "Resource Object Include Triplet X'6C'" on page 412.

Note: Overlays that are included on a page using the PMC structured field are called *PMC overlays*. If the overlay is a Preprinted Form (PFO) overlay, it is called a PMC-PFO. Each overlay included on a page with a PMC must first be mapped to a local ID with an MPO in the medium map containing the PMC.

Preprocess Presentation Object (PPO)

The Preprocess Presentation Object structured field specifies presentation parameters for a data object that has been mapped as a resource. These parameters allow the presentation device to preprocess and cache the object so that it is in presentation-ready format when it is included with a subsequent include structured field in the document. Such preprocessing may involve a rasterization or *RIP* of the object, but is not limited to that. The resource is identified with a file name, the identifier of a begin structured field for the resource, or any other identifier associated with the resource. The referenced resource and all required secondary resources must previously have been mapped with an MDR or an MPO in the same environment group.

Preprocessing is not supported for objects that are included with structures that are outside the document. Examples of such objects are medium overlays and PMC overlays, both of which are included with structures in the form map.

PPO (X'D3ADC3') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3ADC3'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
One to 254 repeating groups in the following format:						
0–1	UBIN	RGLength	18–(*n*+1)	Total length of this repeating group	M	X'06'
2	CODE	ObjType	X'92', X'DF', X'FB'	Object type: **X'92'** Other object data **X'DF'** Overlay **X'FB'** Image (IOCA)	M	X'06'
3–4				Reserved; should be zero	M	X'06'
5	BITS	ProcFlgs		Processing flags; see PPO Semantics for bit definitions	M	X'06'
6–8	SBIN	XocaOset	-32,768–32,767	X axis origin for object content	M	X'06'
			X'FFFFFF'	Not specified		
9–11	SBIN	YocaOset	-32,768–32,767	Y axis origin for object content	M	X'06'
			X'FFFFFF'	Not specified		
12–*n*		Triplets		See PPO Semantics for triplet applicability.	M	X'14'

PPO Semantics

RGLength Specifies the total length of the repeating group, including the length of the RGLength parameter itself.

ObjType Identifies the type of object being referenced.

Value	Description
X'92'	Other object data. The object data to be preprocessed is a non-OCA paginated presentation object. The object data is characterized and identified by a mandatory Object Classification (X'10') triplet, which must specify the registered OID for the object type and must characterize the object as being a presentation object. See "Non-OCA Object Types Supported by the IOB Structured Field" on page 626 for a list of object types that may be included in MO:DCA data streams. To see which encoded object-type OIDs are supported by the presentation system, consult the product documentation. **Application Note:** If the object is installed in a resource library using a Resource Access Table (RAT), it must not be wrapped with a MO:DCA object container envelope, that is, it must be installed in its raw source format.
X'DF'	Overlay object.
X'FB'	Image (IOCA) object with MO:DCA object syntax as defined in "Image Objects" on page 107.
All others	Reserved

ProcFlgs Specify additional processing information for the PPO structured field

Bits 0–3: Object Orientation

Specify one or more orientations, measured in a clockwise direction, of the X-axis of the object with respect to the leading edge of the media.

Application Note: Many factors, such as media selection, media side, media loading, media orientation, page rotation, and object area rotation affect the orientation of an object with respect to the media leading edge. Proper specification of this parameter may require visual inspection of physical output.

Bit	Description
0	0 degrees **B'0'** Do not preprocess the object at 0 degree orientation. **B'1'** Preprocess and cache the object at 0 degree orientation with respect to the leading edge of the media.
1	90 degrees **B'0'** Do not preprocess the object at 90 degree orientation. **B'1'** Preprocess and cache the object at 90 degree orientation with respect to the leading edge of the media.
2	180 degrees **B'0'** Do not preprocess the object at 180 degree orientation. **B'1'** Preprocess and cache the object at 180 degree orientation with respect to the leading edge of the media.
3	270 degrees **B'0'** Do not preprocess the object at 270 degree orientation. **B'1'** Preprocess and cache the object at 270 degree orientation with respect to the leading edge of the media.

If no orientations are specified, the object is preprocessed at a 0 degree orientation with respect to the leading edge of the media.

Bit 4: Preprocess all objects

If this PPO references a file with *ObjType* = X'92' that contains multiple pages or paginated objects, specifies whether only the selected paginated object or all paginated objects in the file should be preprocessed. This bit is ignored in all other cases.

B'0' Preprocess only the selected paginated object.

B'1' Preprocess all paginated objects in the file.

Bits 5–7

Reserved; all bits must be B'0'.

XocaOset Used in *position* and *position and trim* mappings to specify the offset along the X axis of the object area coordinate system, X_{oa}, to the X origin of the object content. The measurement units for this parameter are specified with a Measurement Units (X'4B') triplet. A value of X'FFFFFF' indicates that the X axis offset is not specified, therefore the offset value (-1) is not included in the allowed range. This parameter is ignored for ObjType = X'DF'—Overlay.

YocaOset Used in *position* and *position and trim* mappings to specify the offset along the Y axis of the object area coordinate system, Y_{oa}, to the Y origin of the object content. The measurement units for this parameter are specified with a Measurement Units (X'4B') triplet. A value of X'FFFFFF' indicates that the Y axis offset is not specified, therefore the offset value (-1) is not included in the allowed range. This parameter is ignored for ObjType = X'DF'—Overlay.

Notes:

1. The object content is developed in the *data object presentation space*; within the context of this structured field the two terms are synonymous.
2. The XocaOset and YocaOset parameters are treated as a pair. If one is assigned the value X'FFFFFF' (not specified), the other is treated that way as well, regardless of its assigned value.

Triplets Appear in the Preprocess Presentation Object structured field repeating groups as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur more than once in each repeating group. Specifies encoding for structured field parameters defined with a CHAR data type. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348. **Implementation Note:** Not all AFP servers support the inheritance of encoding scheme from higher levels of the document hierarchy, therefore it is recommended that this triplet be specified directly on the PPO if required by a parameter such as the FQN type X'DE' triplet.
X'02'	Fully Qualified Name	Mandatory. Must occur once in each repeating group. Specifies the reference to the resource object to be preprocessed. See "Fully Qualified Name Triplet X'02'" on page 351. The Fully Qualified Name types that may appear are: **X'84'**—*Begin Resource Object Reference*, which is used to preprocess an overlay or an IOCA image object. The GID is used to locate the resource object in the resource hierarchy, which may include the presentation device, and must match the identifier for an object or a X'01' exception condition exists. This FQN type is used with ObjType = X'DF'—Overlay, and with ObjType = X'FB'—IOCA image. **X'CE'**—*Other Object Data Reference*, which is used to preprocess a data object whose format may or may not be defined by an AFP architecture. The GID is used to locate the object in the resource hierarchy, which may include the presentation device, and must match the identifier for an object or a X'01' exception condition exists. This FQN type is used with ObjType = X'92'—other object data. The reference in the above FQN triplets may be specified in one—and only one—of the following formats: If FQNFmt = X'00', the reference is made with a character-encoded name. See "External Resource Naming Conventions" on page 89 for a description of the naming conventions used in AFP environments. The object reference must be specified in the same manner, using the same FQNFmt, as the MDR or MPO that maps the object as a resource.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. May occur more than once in each repeating group. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is: **X'DE'**—*Data Object External Resource Reference*. Specifies the external identifier of a resource object that is used by the object to be preprocessed. The identifier is used by the presentation system to locate the resource object in the resource hierarchy. The identifier may be specified in one of the following two formats, but not in both formats: If FQNFmt = X'00', the identifier is a character-encoded name. See “External Resource Naming Conventions” on page 89 for a description of the naming conventions used in AFP environments. If FQNFmt = X'10', the identifier is an ASN.1 OID encoded using the definite short form. This format provides a unique and system-independent method to identify and reference an object. It may be used to select resources that are resident in the presentation device. Such an identifier is referred to as an *object OID*. **Architecture Note:** The FQN type X'DE' triplet with FQNFmt = X'10' (OID) is only used to reference the CMYK SWOP and CMYK Euroscale resident color profiles registered in the MO:DCA Registry; see “Resident Color Profile Identifiers” on page 634. If the data object that requires this resource is also processed as a resource, the term *secondary resource* is applied to the resource used by the data object. See “Secondary Resource Objects” on page 12. The secondary resource reference must be specified in the same manner, using the same FQNFmt, as the MDR that maps the secondary resource. If the object to be preprocessed also references the secondary resource with an internal identifier, this identifier must be specified on the PPO with a FQN type X'BE' triplet that immediately follows the FQN type X'DE' triplet. The paired triplets map the internal identifier to the external identifier. **Note:** When a non-OCA object such as PDF or SVG references a TTF/OTF as a secondary resource, the FQN type X'DE' triplet on the PPO must specify the full font name of the font. This font must also be mapped with an MDR reference that specifies the same full font name.
X'02'	Fully Qualified Name	Optional. May occur more than once in the repeating group if the PPO also specifies FQN type X'DE' triplets. See “Fully Qualified Name Triplet X'02'” on page 351. The Fully Qualified Name type that may appear is: **X'BE'**—*Data Object Internal Resource Reference*. Specifies the identifier of a resource object that is used by the object being preprocessed. The identifier is used internally by the object to be preprocessed to reference

Triplet	Type	Usage
		the secondary resource. The identifier must be specified using FQNFmt X'00', which, for this FQN type, indicates that the data type is defined by the specific data object that generates the internal resource reference and is undefined (UNDF) at the MO:DCA data stream level. If the data object that requires this resource is also processed as a resource, the term *secondary resource* is applied to the resource used by the data object. See "Secondary Resource Objects" on page 12. When specified, this triplet must *immediately* follow the FQN type X'DE' triplet that specifies the external identifier of the secondary resource, or a X'04' exception condition exists.
X'04'	Mapping Option	Optional. May occur once in each repeating group. This triplet is ignored for ObjType = X'DF'—Overlay. If present, defines the mapping of the object presentation space to the object area. The specified mapping option must be valid for the object or a X'02' exception condition exists. See "Mapping Option Triplet X'04'" on page 360.
X'10'	Object Classification	Mandatory if the repeating group specifies a Fully Qualified Name type X'CE'—Other Object Data Reference, in which case it must occur once in the repeating group and identifies the object type to be preprocessed. See "Object Classification Triplet X'10'" on page 363.
X'4B'	Measurement Units	Mandatory if the PPO specifies any of the following parameters: • XocaOset • YocaOset • XoaSize, specified in the Object Area Size (X'4C') triplet • YoaSize, specified in the Object Area Size (X'4C') triplet In which case this triplet must occur once in the repeating group and defines the measurement units for the parameter values. This triplet is ignored for ObjType = X'DF'—Overlay. See "Measurement Units Triplet X'4B'" on page 388. **Application Note:** When the units of measure values specified on the PPO are different than the values specified on a subsequent IOB that includes the preprocessed object, the presentation device might calculate the sizes and offsets differently when processing the two structured fields, and—due to round-off errors—might not use the preprocessed version of the object. To avoid such problems, matching units of measure values should be specified on the PPO and the corresponding IOB.
X'4C'	Object Area Size	Optional. May occur once in each repeating group. This triplet is ignored for ObjType = X'DF'—Overlay. If present, specifies the size of the object area (XoaSize, YoaSize) into which the object data is mapped. See "Object Area Size Triplet X'4C'" on page 389.

Triplet	Type	Usage
X'4E'	Color Specification	Optional. May occur once. Specifies the color that is to be used as the default color, or the initial color, for the object. This triplet overrides the color specified in the object's data descriptor and in the Data Object RAT, or sets the color if none is specified. Note that this color may in turn be overridden by a color that is specified inside the object. This triplet only overrides the color specified for the object presentation space; it does not affect colors assigned to the object's object area. The PPO must specify one of the following object types: **X'92'** Other object data. Triplet is ignored if the object type is not an image file format that specifies a bilevel or grayscale image, as defined in Appendix D, “MO:DCA Registry”, on page 609. **X'FB'** Image (IOCA); triplet is ignored if the image is not bilevel. When this triplet is applied to IOCA image, it only applies to bilevel image; it is ignored when the image is not bilevel. When this triplet is applied to non-OCA image file formats, it only applies to bilevel or grayscale image; it is ignored when the image is not bilevel or grayscale. Note that all 1-bit per pixel image objects are considered bilevel. When the image is grayscale, this triplet specifies the color that is to be grayscaled. The color space selected in the triplet must be supported in the object’s data descriptor structured field. For example, if the triplet specifies a default color using ColSpce =X'08' - CIELAB, the object’s data descriptor must also support the CIELAB color space. If ColSpce =X'06' - Highlight color space, the % coverage and % shading parameters are ignored. If the above conditions are not met, the triplet is ignored. See “Color Specification Triplet X'4E'” on page 391.
X'5A'	Object Offset	Optional. May occur once in each repeating group. If this PPO references a file with *ObjType* = X'92' that contains multiple pages or paginated objects, may occur once with ObjTpe=X'AF' to specify that pages or paginated objects are the objects to be counted. The triplet is ignored in all other cases. Selects a single paginated object to be preprocessed by specifying how many paginated objects in the referenced file precede that object. The offset is measured from the beginning of the file, so that the first paginated object has offset 0, the second has offset 1, and the *n*th has offset (*n*-1). Only the selected object is preprocessed. The PPO triplet overrides any Object Offset triplet specified on the CDD. If this triplet is not specified when the PPO references a file with *ObjType* = X'92' that contains multiple paginated objects, the default is to preprocess the first paginated object in the file. For more information on selecting paginated objects, see “Object Offset Triplet X'5A'” on page 402. **Architecture Note:** While only the selected paginated object in the file is actually presented on the page or overlay, the file referenced by the PPO can be processed by the presentation system as a complete entity. This means that the complete file can be downloaded to the presentation device and multiple paginated objects in the file can be processed using the environment defined by the file. For example, if the file is a multi-page PDF, pages included from that file can be

Triplet	Type	Usage
		processed by the presentation device with the same PDF RIP initialization.
X'91'	Color Management Resource Descriptor	Mandatory when the PPO references a Color Management Resource (CMR) with the FQN type X'DE' triplet, in which case this triplet must occur once in the repeating group. It is ignored in all other cases. Specifies the processing mode and scope for the CMR. The CMRScpe parameter in the triplet must be set to X'01' - data object, when the PPO references a data object, and to X'02' - page/overlay, when the PPO references an overlay. When specified, this triplet must *immediately* follow the FQN type X'DE' triplet that specifies the CMR name, or a X'04' exception condition exists. See “Color Management Resource Descriptor Triplet X'91'” on page 456.
X'95'	Rendering Intent	Optional. May occur once in each repeating group. See “Rendering Intent Triplet X'95'” on page 458. This triplet specifies the rendering intent that is to be used when presenting the object that is referenced with this structured field. When the PPO references a data object, only the rendering intent that applies to the object type of the referenced object is used; the other rendering intents are ignored. The triplet overrides any rendering intent information embedded in the data object. When the PPO references an overlay, all the rendering intents that apply to the object types in the overlay are used; the other rendering intents are ignored. The rendering intent in this triplet is not used if a Link DL CMR is used for a color conversion in this object; in that case the rendering intent specified in the Link DL CMR is used for that color conversion.
X'9A'	Image Resolution	Optional. May occur once in each repeating group for non-IOCA raster image object types defined by ObjType = X'92' - “other object data”; ignored for IOCA image objects and all other object types. Specifies the resolution of the raster image object. See “Image Resolution Triplet X'9A'” on page 464. The PPO triplet overrides any image resolution specified in the data object RAT, on the CDD, or inside the image. If the resolution is not specified outside the image or inside the image, the default is to assume that the image resolution is the same as the output device resolution.

Triplet	Type	Usage
X'9C'	Object Container Presentation Space Size	Optional. May occur once in each repeating group for certain object types defined by ObjType = X'92' - "other object data"; ignored for IOCA image objects and all other object types. May be specified for the following object types: • PDF - all presentation object types • AFPC SVG Subset Specifies the presentation space size of the object container. For PDF object types, specifies how this size is determined. For SVG, specifies the actual size, and overrides any presentation space size specified within the SVG object. The PPO triplet overrides any specification of object container presentation space size in the Data Object RAT or on the CDD. See "Object Container Presentation Space Size Triplet X'9C'" on page 466.
X'FF'	Triplet Extender	Optional. May occur more than once in a contiguous sequence, but only in the following case. It is ignored in all other cases. • The PPO must specify one of the following object types: **X'92'** Other object data • The PPO references a secondary resource for the other object data using an FQN type X'DE' triplet • The secondary resource is the generic non-OCA Resource object • The PPO associates an internal resource reference to the secondary resource with an FQN type X'BE' triplet • The triplet extenders must follow the FQN type X'BE' triplet and must occur in a contiguous sequence. Specifies a portion of a secondary resource reference that occurs internal to the data object referenced by the PPO. Use of the triplet extender allows the length of the internal resource reference to exceed the 250 byte capacity of the FQN type X'BE' triplet. **Note:** The non-OCA Resource Object must be mapped with an MDR reference that matches the FQN type X'DE' reference on the PPO. See "Triplet Extender Triplet X'FF'" on page 470.

Application Note: Objects referenced by a PPO are always processed as *hard* objects. If the referenced object contains an OEG, secondary resource mappings in the OEG, such as CMR references, are ignored and must be specified directly on the PPO.

Processing Rules

The purpose of the PPO is to improve system printing throughput by allowing the printer to preprocess and cache resource objects that are preloaded. If the resource is subsequently included using an IOB or IPO, a presentation-ready bit map is available. The following considerations need to be taken into account when selecting an object for preprocessing. Note that the efficiency of preprocessing is presentation-system and presentation-environment dependent.

Preprocessing overlays

Only the orientation parameter is required; all other presentation parameters, if specified, are ignored. If a subsequent include specifies one of the preprocessed orientations, the cached version of the overlay is used. The preprocessed and cached version of an overlay might not be used if any portion of the overlay exceeds the printable area when it is included.

Preprocessing data objects

A mapping that specifies how the object presentation space is mapped to the object area is required for preprocessing. For preprocessing, the mapping may be specified on the PPO with a Mapping Option (X'04') triplet. If this triplet is omitted, the mapping specified in the object's OEG is used. If the object does not specify the mapping in an OEG, the architected default mapping for the object is used. Note that for objects referenced with ObjType = X'92' and ObjType = X'FB', the architected default mapping is scale to fit. Only the following mapping options are supported for preprocessing.

Scale-to-fit or scale-to-fill

If the mapping is scale-to-fit or scale-to-fill, the object is preprocessed into an object area size (which is required for these mappings) and cached.

For preprocessing, the object area size may be specified on the PPO with an Object Area Size (X'4C') triplet. If this triplet is omitted, the object area size specified in the object's OEG is used. If the object does not specify the object area size in an OEG, the presentation space size of the object is used. If a subsequent include specifies the same mapping, one of the preprocessed orientations, and the same object area size, the cached version of the object is used.

See "Object Type Identifiers" on page 609 for information on how the object presentation space size is specified by various non-OCA objects.

Position, position-and-trim, or center-and-trim

If the mapping is position, position-and-trim, or center-and-trim, the object is first preprocessed at the size of the object presentation space.

If a presentation window is specified by the PPO—which is defined by an object area size for center-and-trim and both an object area size and object content offset for position and position-and-trim—the preprocessed object is positioned, trimmed if required, and cached. No caching occurs if the mapping is position and there is an overflow of the object area. If a subsequent include specifies the same mapping, one of the preprocessed orientations, and the same window, the cached version of the object is used.

If a window is not specified by the PPO, the preprocessed object is cached at its presentation space size. If a subsequent include specifies any of these three mappings, one of the preprocessed orientations, and a presentation window, the cached version of the object is processed at print time—with a potential performance penalty—and trimmed if required. If the mapping is position, an exception is detected if there is an overflow of the object area.

Limitations

The PPO supports most presentation parameters that may be in effect when the preprocessed object is actually presented. However there are presentation parameters that may be in effect at presentation time that were not taken into account when the object was preprocessed. In such cases the preprocessed and cached object is not used for presentation and the system throughput improvement is not realized. Examples of such presentation parameters are:

- Specification of an unsupported preprocessing mapping, such as a migration image mapping, on the include structured field

- Specification of a color override on the include structured field, such as use of the Color Specification (X'4E') triplet to override a default OCA color
- Invocation of a non-reset Color Mapping Table
- Specification of a non-default print quality (objects are always preprocessed at default print quality)
- Activation of a text suppression for overlays (overlays are always preprocessed without text suppressions)

PPO Exception Condition Summary

X'01' This exception condition exists when:

- A resource with the same identifier as that specified on the type X'84' (Coded Font Reference), Fully Qualified Name triplet, or on the type X'CE' (Other Object Data Reference) Fully Qualified Name triplet, or on the type X'DE' (Data Object External Resource Reference) Fully Qualified Name triplet was not previously mapped in the same resource group or could not be located.
- The same repeating group contains an invalid number or combination of Fully Qualified Name triplets.

X'02' This exception condition exists when:

- A Fully Qualified Name (X'02') triplet other than a type X'84' (Coded Font Reference), a type X'BE' (Data Object Internal Resource Reference), type X'CE' (Other Object Data Reference), or a type X'DE' (Data Object External Resource Reference) appears within any repeating group.
- The resource reference is specified using FQNFmt X'10' (object OID), but the object either is not carried in a valid MO:DCA structure or is carried in a valid MO:DCA structure but does not have a matching object OID.

X'04' This exception condition exists when:

- A FQN type X'BE' triplet is specified but does not immediately follow a FQN type X'DE' triplet.
- A Color Management Resource Descriptor triplet is specified but does not immediately follow a FQN type X'DE' triplet that references a CMR.

Presentation Text Data Descriptor (PTD) Format 2

The Presentation Text Data Descriptor structured field contains the descriptor data for a presentation text data object.

PTD (X'D3B19B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3B19B'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–*n*	UNDF	PTOCAdes		Up to 32,759 bytes of PTOCA-defined descriptor data	O	X'00'

PTD Semantics

PTOCAdes Contains the PTOCA-defined text descriptor. See the MO:DCA environment appendix in the *Presentation Text Object Content Architecture Reference* for detailed information.

Note: The number of data bytes allowed in this structured field may be restricted by an interchange set.

Application Note: When the PTD is included in the AEG for a page, some AFP print servers require that the measurement units in the PTD match the measurement units in the Page Descriptor (PGD). It is therefore strongly recommended that whenever the PTD is included in the AEG, the same measurement units are specified in both the PTD and PGD.

Presentation Text Data (PTX)

The Presentation Text Data structured field contains the data for a presentation text data object.

PTX (X'D3EE9B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3EE9B'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–*n*	UNDF	PTOCAdat		Up to 32,759 bytes of PTOCA-defined data	O	X'00'

PTX Semantics

PTOCAdat Contains the PTOCA-defined text descriptor. See the MO:DCA environment appendix in the *Presentation Text Object Content Architecture Reference* for detailed information.

Note: The number of data bytes allowed in this structured field may be restricted by an interchange set.

Tag Logical Element (TLE)

A Tag Logical Element structured field assigns an attribute name and an attribute value to a page or page group. The Tag Logical Element structured field may be embedded directly in the page or page group, or it may reference the page or page group from a document index.

When a Tag Logical Element structured field references a page or is embedded in a page following the active environment group, it is associated with the page. When a Tag Logical Element structured field references a page group or is embedded in a page group following the Begin Named Page Group structured field, it is associated with the page group. When a Tag Logical Element structured field is associated with a page group, the parameters of the Tag Logical Element structured field are inherited by all pages in the page group and by all other page groups that are nested in the page group.

The scope of a Tag Logical Element is determined by its position with respect to other TLEs that reference, or are embedded in, the same page or page group. The Tag Logical Element structured field does not provide any presentation specifications and therefore has no effect on the appearance of a document when it is presented.

TLE (X'D3A090') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A090'**	Flags (1B)	Reserved; X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–*n*		Triplets		See TLE Semantics for triplet applicability.	M	X'14'

TLE Semantics

Triplets Appear in the Tag Logical Element structured field as follows:

Triplet	Type	Usage
X'01'	Coded Graphic Character Set Global Identifier	Optional. May occur multiple times. If present, specifies the code page and character set for interpretation of subsequent character strings in the TLE. If not present, the including object specifies the code page and character set for interpretation of character strings in the TLE. By including the triplet multiple times, you can specify a unique code page and character set for the character data in every triplet on the TLE. See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348.
X'02'	Fully Qualified Name	Mandatory. Must occur once. The Fully Qualified Name type that may appear is **X'0B'**—*Attribute Name*. Specifies the attribute name of the tag logical element. See "Fully Qualified Name Triplet X'02'" on page 351.

Triplet	Type	Usage
X'02'	Fully Qualified Name	Optional. One of the following Fully Qualified Name types may appear once if the Tag Logical Element structured field references a page or page group from a document index: • **X'87'**—*Begin Page Name*. Specifies the name of the page that is referenced by the tag logical element. • **X'0D'**—*Begin Page Group Name*. Specifies the name of the page group that is referenced by the tag logical element. See “Fully Qualified Name Triplet X'02'” on page 351.
X'02'	Fully Qualified Name	Optional. May occur once. The Fully Qualified Name type that may appear is **X'0C'**—*Process Element Name*. Specifies the name of the tag logical element. See “Fully Qualified Name Triplet X'02'” on page 351.
X'36'	Attribute Value	Mandatory. Must occur once. Specifies the attribute value of the tag logical element. See “Attribute Value Triplet X'36'” on page 382.
X'80'	Attribute Qualifier	Optional. May occur once. Specifies an attribute qualifier for the tag logical element. See “Attribute Qualifier Triplet X'80'” on page 425.

Chapter 6. MO:DCA Triplets

This chapter:
- Describes the format, syntax, and semantics for each MO:DCA triplet
- Describes the purpose of each MO:DCA triplet parameter
- Identifies values that can be given to triplet parameters

General Information

Triplets appear after all fixed parameters in a structured field. Some structured fields may contain repeating groups of triplets. Each repeating group contains a length parameter followed by one or more triplets. An optional triplet may not appear at all, in which case a default value is used when a value is needed.

In general, when a triplet description refers to the structured field in which it appears, it refers to it as *the structured field*. When the description refers to a structured field other than the one in which it appears, it refers to that structured field by its proper name, such as *Begin Document structured field*.

Triplet Format

A triplet is a self-identifying parameter that contains three components: the length of the triplet, an ID identifying the triplet, and the associated parameters. The general format for the triplet data structure is shown below.

Triplet Format

Off-set	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3–254	Length of the triplet, including the length of Tlength	M	X'06'
1	CODE	Tid	X'01'–X'02', X'04', X'10', X'18', X'1F', X'20'–X'22', X'24'–X'26', X'2D', X'36', X'43', X'45', X'4B'–X'4E', X'50', X'56'–X'5A', X'5D'–X'5E', X'62', X'65', X'68', X'6C', X'70'–X'72', X'74'–X'75', X'78', X'80'–X'88', X'8B', X'8C', X'8E', X'8F', X'91', X'95'–X'97', X'9A', X'9C', X'9D', X'9E', X'FF'	Identifies the triplet: **X'01'** Coded Graphic Character Set Global Identifier **X'02'** Fully Qualified Name **X'04'** Mapping Option **X'10'** Object Classification **X'18'** MO:DCA Interchange Set **X'1F'** Font Descriptor Specification **X'20'** Font Coded Graphic Character Set Global Identifier **X'21'** Resource Object Type **X'22'** Extended Resource Local Identifier **X'24'** Resource Local Identifier **X'25'** Resource Section Number **X'26'** Character Rotation **X'2D'** Object Byte Offset **X'36'** Attribute Value **X'43'** Descriptor Position **X'45'** Media Eject Control **X'4B'** Measurement Units **X'4C'** Object Area Size **X'4D'** Area Definition **X'4E'** Color Specification **X'50'** Encoding Scheme ID **X'56'** Medium Map Page Number **X'57'** Object Byte Extent **X'58'** Object Structured Field Offset **X'59'** Object Structured Field Extent **X'5A'** Object Offset **X'5D'** Font Horizontal Scale Factor **X'5E'** Object Count **X'62'** Local Date and Time Stamp **X'65'** Comment **X'68'** Medium Orientation **X'6C'** Resource Object Include **X'70'** Presentation Space Reset Mixing **X'71'** Presentation Space Mixing Rules **X'72'** Universal Date and Time Stamp **X'74'** Toner Saver **X'75'** Color Fidelity **X'78'** Font Fidelity **X'80'** Attribute Qualifier **X'81'** Page Position Information **X'82'** Parameter Value **X'83'** Presentation Control **X'84'** Font Resolution and Metric Technology **X'85'** Finishing Operation **X'86'** Text Fidelity **X'87'** Media Fidelity **X'88'** Finishing Fidelity **X'8B'** Data-Object Font Descriptor **X'8C'** Locale Selector	M	X'10'

Off-set	Type	Name	Range	Meaning	M/O	Exc
				X'8E' UP3i Finishing Operation **X'8F'** MO:DCA Function Set **X'91'** Color Management Resource Descriptor **X'95'** Rendering Intent **X'96'** CMR Tag Fidelity **X'97'** Device Appearance **X'9A'** Image Resolution **X'9C'** Object Container Presentation Space Size **X'9D'** Keep Group Together **X'9E'** Setup Name **X'FF'** Triplet Extender		
2–*n*		Con-tents		Contents of the triplet as identified by the MO:DCA architecture	M	X'06'

Triplet Syntax

The syntax for triplet data is the same as for structured field data. Refer to "How to Read the Syntax Diagrams" on page v for a description of this syntax.

Triplet Semantics

Tlength Specifies the total length of the triplet, including the one-byte Tlength field. It contains a numeric value of UBIN type that ranges from 3 to 254, expressed in bytes.

Tid Identifies the triplet identifier. Permitted values are listed in the syntax table. If the value of Tid is not one of those listed in the Range column, a X'10' exception condition exists.

Contents Contains the triplet data elements. The number of data elements and the length of each is dependent on the triplet identifier.

Architected defaults are identified in the semantic description of the individual parameters. When an architected default exists for an entire triplet, the default is documented at the end of the semantic description for that triplet.

Coded Graphic Character Set Global Identifier Triplet X'01'

Certain structured fields within the data stream carry parameters that consist of a character string, such as a name. These parameters are defined to have a CHAR data type. For example the name parameter on the Include Page Overlay structured field can be used as an identifier for a component, and as a viewable identifier to be recorded whenever the processor of the data stream associates an exception condition with the component.

The Coded Graphic Character Set Global Identifier (CGCSGID) triplet is used to establish the values of the code page and character set for interpretation of all structured field parameters having a CHAR data type, such as name parameters, except where such parameters define a fixed encoding. An example of a parameter that defines its own encoding is the character string specified with a Fully Qualified Name (X'02') triplet using FQNFmt = X'20' - URL, which is encoded using the US-ASCII coded character set.

The character set is specified with a Graphic Character Set Global ID (GCSGID), and the code page is specified with a Code Page Global ID (CPGID). Alternatively, the Coded Graphic Character Set Global Identifier triplet may be used to identify a Coded Character Set Identifier (CCSID) as defined and registered by the Character Data Representation Architecture (CDRA). The CCSID can be resolved to identify the value of the code page and character set for interpretation of parameters with a CHAR data type. See the *Character Data Representation Architecture Reference and Registry*, SC09-2190, for detailed information.

The scope of the Coded Graphic Character Set Global Identifier triplet is defined as follows:

- The most recent occurrence of a X'01' triplet on a structured field establishes the code page and character set used to interpret all subsequent parameters within that structured field with a CHAR data type.
- If the structured field syntax allows parameters with a CHAR data type to be positioned before the allowed triplets, then the first occurrence of a X'01' triplet on that structured field establishes the code page and character set to be used to interpret such parameters.
- If X'01' triplets appear on a Begin structured field, the last X'01' triplet specified establishes the code page and character set used to interpret all parameters with CHAR data type on all structured fields that lie between the Begin structured field and its corresponding End structured field, unless specifically overridden by a X'01' triplet on an enveloped structured field. Object names on an End structured field are always interpreted with the same code page and character set used for the object name on the corresponding Begin structured field.

Triplet X'01' Syntax: GCSGID/CPGID Form

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'01'	Identifies the Coded Graphic Character Set Global Identifier triplet	M	X'00'
2–3	CODE	GCSGID	X'0001'–X'FFFE'	Specifies the Graphic Character Set Global Identifier	M	X'06'
			X'FFFF'	Specifies the character set consisting of all characters in the code page		
4–5	CODE	CPGID	X'0001'–X'FFFE'	Specifies the Code Page Global Identifier	M	X'06'

Triplet X'01' Syntax: CCSID Form

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'01'	Identifies the Coded Graphic Character Set Global Identifier triplet	M	X'00'
2–3	CODE		X'0000'	Must be set to X'0000' to identify the CCSID form of the triplet	M	X'06'
4–5	CODE	CCSID	X'0000'–X'FFFF'	Coded Character Set Identifier defined by CDRA	M	X'06'

Triplet X'01' Semantics

GCSGID/CPGID Form

Tlength Contains the length of the triplet.

Tid Identifies the Coded Graphic Character Set Global Identifier triplet.

GCSGID Specifies the Graphic Character Set Global Identifier of the character set to be used in conjunction with the Code Page Global Identifier to identify the graphic characters that are represented by code points in any parameter with a data type of CHAR. The GCSGID may identify a subset or the maximal set of all of the graphic characters supported for the associated code page. Valid values for Graphic Character Set Global Identifiers are 1 through 65,534. A value of 65,535 (X'FFFF') indicates that a character set consisting of all characters that have assigned code points in the associated code page is to be used.

CPGID Specifies the Code Page Global Identifier of the code page to be used in conjunction with the character set to identify the graphic characters that are represented by code points in any parameter with a data type of CHAR. Valid values for Code Page Global Identifiers are 1 through 65,534.

Note: The concatenation of the GCSGID and CPGID is currently referred to as the Coded Graphic Character Set Global Identifier (CGCSGID). In the past, it was also known as the Global Character Set Identifier (GCID).

CCSID Form

Bytes 2–3 Must be X'0000'. Identifies the CCSID form of the triplet.

CCSID Coded Character Set Identifier. Defined by the Character Data Representation Architecture. Can be resolved to specify the code page and character set for interpretation of parameters with CHAR data type. See the *Character Data Representation Architecture Reference and Registry*, SC09-2190, for detailed information.

Application Notes:

1. Most MO:DCA character strings are carried in Fully Qualified Name (FQN) triplets. This triplet limits the length of the data to 250 bytes. When such a character string is converted from one character encoding (such as single-byte EBCDIC) to another character encoding (such as double-byte UTF-16) the string may increase in length. When the new length exceeds the 250 byte triplet limit, AFP servers generate an exception. Such encoding conversions are commonly used to compare object names that are specified in

different encodings, therefore it is strongly recommended that object names that are specified using a single-byte encoding are limited to 125 characters or fewer.

2. There is better system support for encoding conversions using a CCSID instead of a CPGID + GCSGID combination to define the encoding of a character string, therefore it is recommended that the CCSID form of this triplet is used whenever possible.

3. It is strongly recommended that this triplet is properly specified even if the parameter on a structured field defines a fixed encoding. For example, if the parameter defines a fixed UTF-16BE encoding, the triplet can be specified using the CCSID form with CCSID=1200 (X'04B0').

Structured Fields Using Triplet X'01'

- "Begin Active Environment Group (BAG)" on page 120
- "Begin Bar Code Object (BBC)" on page 121
- "Begin Document (BDT)" on page 128
- "Begin Document Environment Group (BDG)" on page 125
- "Begin Document Index (BDI)" on page 126
- "Begin Form Map (BFM)" on page 131
- "Begin Graphics Object (BGR)" on page 132
- "Begin Image Object (BIM)" on page 134
- "Begin Medium Map (BMM)" on page 136
- "Begin Object Container (BOC)" on page 144
- "Begin Object Environment Group (BOG)" on page 149
- "Begin Overlay (BMO)" on page 138
- "Begin Print File (BPF)" on page 150
- "Begin Page (BPG)" on page 152
- "Begin Named Page Group (BNG)" on page 140
- "Begin Page Segment (BPS)" on page 155
- "Begin Presentation Text Object (BPT)" on page 157
- "Begin Resource Group (BRG)" on page 159
- "Begin Resource (BRS)" on page 161
- "Begin Resource Environment Group (BSG)" on page 169
- "Include Object (IOB)" on page 201
- "Include Page (IPG)" on page 219
- "Include Page Overlay (IPO)" on page 222
- "Include Page Segment (IPS)" on page 224
- "Index Element (IEL)" on page 197
- "Invoke Medium Map (IMM)" on page 199
- "Link Logical Element (LLE)" on page 226
- "Map Coded Font (MCF) Format 2" on page 237
- "Map Data Resource (MDR)" on page 246
- "Map Media Destination (MMD)" on page 286
- "Map Media Type (MMT)" on page 289
- "Map Page (MPG)" on page 292
- "Map Page Overlay (MPO)" on page 294
- "Page Modification Control (PMC)" on page 327
- "Preprocess Presentation Object (PPO)" on page 329
- "Tag Logical Element (TLE)" on page 342

Fully Qualified Name Triplet X'02'

The Fully Qualified Name triplet enables the identification and referencing of objects using Global Identifiers (GIDs). A GID can be one of the following:

- A Coded Graphic Character Set Global Identifier (CGCSGID)
- A Code Page Global ID (CPGID)
- A Font Typeface Global Identifier (FGID)
- A Graphic Character Set Global Identifier (GCSGID)
- A Global Resource Identifier (GRID)
- An ASN.1 object identifier (OID), as defined in ISO/IEC 8824:1990(E)
- An encoded graphic character string that, when qualified by the associated CGCSGID, specifies a reference name
- An identifier used by a data object to reference a resource
- A Uniform Resource Locator (URL), as defined in RFC 1738, Internet Engineering Task Force (IETF), December, 1994

Application Note: Most MO:DCA character strings are carried in Fully Qualified Name (FQN) triplets. This triplet limits the length of the data to 250 bytes. When such a character string is converted from one character encoding (such as single-byte EBCDIC) to another character encoding (such as double-byte UTF-16), the string may increase in length. When the new length exceeds the 250 byte triplet limit, AFP servers generate an exception. Such encoding conversions are commonly used to compare object names that are specified in different encodings, therefore it is strongly recommended that object names that are specified using a single-byte encoding are limited to 125 characters or fewer.

Triplet X'02' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	5–254	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'02'	Identifies the Fully Qualified Name triplet	M	X'00'

Triplet X'02'

Offset	Type	Name	Range	Meaning	M/O	Exc
2	CODE	FQNType	X'01', X'07'–X'0D', X'11', X'12', X'41', X'6E', X'7E', X'83'–X'87', X'8D'–X'8E', X'98', X'B0', X'BE', X'CA', X'CE', X'DE', X'EE'	Specifies how the GID will be used: **X'01'** Replace First GID name **X'07'** Font Family Name **X'08'** Font Typeface Name **X'09'** MO:DCA Resource Hierarchy Reference **X'0A'** Begin Resource Group Reference **X'0B'** Attribute GID **X'0C'** Process Element GID **X'0D'** Begin Page Group Reference **X'11'** Media Type Reference **X'12'** Media Destination Reference **X'41'** Color Management Resource (CMR) Reference **X'6E'** Data-object Font Base Font Identifier **X'7E'** Data-object Font Linked Font Identifier **X'83'** Begin Document Reference **X'84'** Resource Object Reference **X'85'** Code Page Name Reference **X'86'** Font Character Set Name Reference **X'87'** Begin Page Reference **X'8D'** Begin Medium Map Reference **X'8E'** Coded Font Name Reference **X'98'** Begin Document Index Reference **X'B0'** Begin Overlay Reference **X'BE'** Data Object Internal Resource Reference **X'CA'** Index Element GID **X'CE'** Other Object Data Reference **X'DE'** Data Object External Resource Reference **X'EE'** Tertiary Data Object External Resource Reference	M	X'06'
3	CODE	FQNFmt	X'00', X'10', X'20'	Specifies the GID format: **X'00'** Character string **X'10'** OID **X'20'** URL	M	X'06'
4–*n*		FQName		GID of the MO:DCA construct. Can be up to 250 bytes in length. The data type is format-	M	X'04'

Offset	Type	Name	Range	Meaning	M/O	Exc
				dependent. See the semantic description of the *FQNFmt* parameter.		

Triplet X'02' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Fully Qualified Name triplet.

FQNType Specifies how the fully qualified name is to be used.

FQNType	Description
X'01'	This GID replaces the first parameter in the structured field that contains a GID name. **Note:** Global Identifiers that override eight-byte positional GID names have the same semantics as the eight-byte name parameter.
X'07'	The triplet contains the name of the font family. This identifier corresponds to the family name of the font design. For example, `Times New Roman` is the family name for the Monotype Times New Roman Expanded font design. The family name is a character string that normally also appears as a substring in the typeface name as specified in the Fully Qualified Name type X'08'. Font Typeface Name triplet. **Implementation Note:** Font family names are not consistently identified in the industry, therefore it may be necessary for implementations to define a synonym table for mapping names. For example, the name `TimesNewRoman` may need to be mapped to `Times New Roman`.
X'08'	This triplet contains the name of the font typeface. This identifier corresponds to the full name of the typeface as specified by the font supplier. This is the user interface name which, for example, may be used for specification or selection of the font design. It is possible that it does not correspond exactly to the font resource name, character content or supported sizes, such as in the case of ITC Italic Bold Garamond or Monotype Times New Roman Expanded.
X'09'	The triplet specifies a reference to the MO:DCA resource hierarchy. The normal MO:DCA resource search order should be used for resolving a resource object reference when this triplet is specified. See "Resource Groups" on page 87.
X'0A'	The triplet contains a GID reference to a Begin Resource Group structured field.
X'0B'	The triplet contains the GID of a document attribute.
X'0C'	The triplet contains the GID of a process element.
X'0D'	The triplet contains a GID reference to a Begin Named Page Group structured field.
X'11'	The triplet contains a GID reference to a media type.
X'12'	The triplet contains a GID reference to a media destination.
X'41'	The triplet contains a GID reference to a Color Management Resource (CMR). CMRs specify color management information that is used to render a document component. The GID is the CMR name that is specified in the CMR

header for the resource. CMRs are defined in the *Color Management Object Content Architecture Reference*.

Architecture Note: This triplet is used on the BRS of a CMR container to

- specify a Link LK Color Conversion CMR that is mapped to the CMR in the container, or
- specify a device-specific HT or TTC CMR replacement for a generic HT or TTC CMR

X'6E' The triplet contains a GID reference to a data-object font file that defines a base font. In font linking, the base font is the font that is referenced in the data stream and that is processed first. The GID is a full font name that has been assigned to the font.

Architecture Note: This triplet is used on a TrueType Collection (TTC) container in a print file level resource group to specify a base TrueType/OpenType font (TTF/OTF) that is contained in the collection. Although the triplet may be specified on both the Begin Resource (BRS) and the Begin Object Container (BOC) structured fields of the collection container, AFP servers always search for the triplet on the BRS.

X'7E' The triplet contains a GID reference to a data-object font file that defines a linked font. In font linking, a linked font is not referenced in the data stream and is processed in the order in which it is linked to the base font. The GID is a full font name that has been assigned to the font.

Architecture Note: This triplet is used on a TrueType/OpenType font (TTF/OTF) container or a TrueType Collection (TTC) container in a print file level resource group to specify a linked font that is to be associated with a base font in the container. Although the triplet may be specified on both the Begin Resource (BRS) and the Begin Object Container (BOC) structured fields of the container, AFP servers always use the triplet on the BRS, as follows:

- If the BRS envelopes a TTF/OTF container, the FQN type X'7E' triplet specifies a linked TTF/OTF for the font in the container.
- If the BRS envelopes a TTC container, the FQN type X'7E' triplet specifies a linked TTF/OTF for the base font that is defined by the immediately preceding FQN type X'6E' triplet.

X'83' The triplet contains a GID reference to a Begin Document structured field.

X'84' The triplet contains a GID name reference to a begin structured field or other identifier associated with a resource; or it contains a GRID (Global Resource Identifier). For a description of the GRID, see "Global Resource Identifier (GRID) Definition" on page 358.

Architecture Note: This triplet is used in MO:DCA-L data streams on an MCF-2 structured field to reference a coded font, and on an MDR structured field to reference an image object. Note that the MO:DCA-L format has been functionally capped and is no longer defined in the MO:DCA reference; for a definition of this format, see *MO:DCA-L: The OS/2 PM Metafile (.met) Format*.

X'85' The triplet contains a GID name reference to a code page that specifies the code points and graphic character names for a coded font.

Application Note: In AFP environments, the name consists of 8 characters and follows the naming conventions for AFP code pages. For a definition of these naming conventions, see the font publications referenced in “Related Publications” on page vii. An example of a code page name is T1V10500. The name is encoded in EBCDIC using code page 500 and a character set that includes the characters allowed for the name, such as character set 697. The allowed characters are A–Z, 0–9, $, #, @. For more information on the AFP naming conventions, see “External Resource Naming Conventions” on page 89.

X'86' The triplet contains a GID name reference to a font character set that specifies a set of graphic characters.

Application Note: In AFP environments, the name consists of 8 characters and follows the naming conventions for AFP font character sets. For a definition of these naming conventions, see the font publications referenced in “Related Publications” on page vii. An example of a font character set name is C0H40080. The name is encoded in EBCDIC using code page 500 and a character set that includes the characters allowed for the name, such as character set 697. The allowed characters are A–Z, 0–9, $, #, @. For more information on the AFP naming conventions, see “External Resource Naming Conventions” on page 89.

X'87' The triplet contains a GID reference to a Begin Page structured field.

X'8D' The triplet contains a GID reference to a Begin Medium Map structured field.

X'8E' The triplet contains a GID name reference to a coded font, which identifies a specific code page and a specific font character set.

Application Note: In AFP environments, the name consists of 8 characters and follows the naming conventions for AFP coded fonts. For a definition of these naming conventions, see the font publications referenced in “Related Publications” on page vii. An example of a coded font name is X0H4108C, which identifies a Helvetica Roman Bold 8 point typeface for the Latin 1 language group. The code page is T1V10500, and the font character set is C0H40080. The name is encoded in EBCDIC using code page 500 and a character set that includes the characters allowed for the name, such as character set 697. The allowed characters are A–Z, 0–9, $, #, @. For more information on the AFP naming conventions, see “External Resource Naming Conventions” on page 89.

X'98' The triplet contains a GID reference to a Begin Document Index structured field.

X'B0' The triplet contains a GID reference to a Begin Overlay structured field.

X'BE' The triplet contains a GID reference to a resource used by a data object. The GID is the identifier that is used internally by the data object to reference the resource, therefore it is called an *internal* resource reference. The data type of the identifier is defined by the specific data object. Therefore, it is undefined (UNDF) at the MO:DCA data stream level. The data object that uses this resource may or may not be defined by an AFP architecture.

Note: If the data object that requires this resource is also processed as a resource, the term *secondary resource* is applied to the resource used by the data object.

Architecture Note: The identifier specified by the FQN type X'BE' triplet is the identifier used within the data object to reference the resource object. It is analogous to the local ID that is used, for example, within PTOCA and GOCA objects to reference a font.

X'CA' This triplet contains the GID of an Index Element structured field.

X'CE' The triplet contains a GID reference to other object data, which may or may not be defined by an AFP architecture. The GID may be a file name or any other identifier associated with the object data.

X'DE' The triplet contains a GID reference to a resource used by a data object. The GID may be a file name or any other identifier associated with the resource and is used to locate the resource object in the resource hierarchy. The data object that uses this resource may or may not be defined by an AFP architecture.

Note: If the data object that requires this resource is also processed as a resource, the term *secondary resource* is applied to the resource used by the data object.

Architecture Note: The GID specified by the FQN type X'DE' triplet is the identifier used to find the resource object in the presentation system. In that sense, it is analogous, for example, to the name of a coded font that is used to find the font in a font library, or the GRID used to find a resident printer font.

X'EE' The triplet contains a GID reference to a tertiary resource used by a data object that is being used as a secondary resource. The GID may be a file name or any other identifier associated with the resource and is used to locate the resource object in the resource hierarchy. The data object that uses this resource may or may not be defined by an AFP architecture.

Architecture Note: The GID specified by the FQN type X'EE' triplet is the identifier used to find the resource object in the presentation system. In that sense, it is analogous, for example, to the name of a coded font that is used to find the font in a font library, or the GRID used to find a resident printer font.

All others Reserved

FQNFmt Specifies the format of the Global Identifier:

FQNFmt	**Description**
X'00'	The GID is either a character-encoded name, in which case the data type is CHAR, or a binary identifier, in which case the data type is CODE. The GID is a binary identifier when the FQN type X'84' specifies a GRID reference to a coded font. See "Global Resource Identifier (GRID) Definition" on page 358. In the case of FQN type X'BE'—Other Object Internal Resource Reference, the data type of the GID reference is undefined (UNDF) at the MO:DCA data stream level; it is not character (CHAR) data. In that case the data type is defined internally by the data object that generates the reference.
X'10'	The GID is an ASN.1 Object Identifier (OID), defined in ISO/IEC 8824:1990 (E). The data type is CODE. The OID is encoded using the Basic Encoding Rules for ASN.1 specified in ISO/IEC 8825:1990(E). The encoding is in the definite short form and has the following syntax:

Byte	**Description**
0	Identifier byte, set to X'06' to indicate an OID encoding.
1	Length of content bytes that follow. Bit 0 of the length byte must be set to zero, which limits the number of content bytes to X'7F' = 127.
2–*n*	Content bytes that encode the OID component identifiers.

See "Constructing Object Identifiers (OIDs)" on page 357.

X'20' The GID is a Uniform Resource Locator (URL), defined in RFC 1738, Internet Engineering Task Force (IETF), December, 1994. The data type is CHAR.

The URL is encoded using the US-ASCII coded character set, which is defined in *Coded Character Set—7-bit American Standard Code for Information Interchange, ANSI X3.4* (1986).

Architecture Note: Use of this GID is limited to the LLE structured field. See "Link Logical Element (LLE)" on page 226.

All others Reserved

FQName Contains the Global Identifier (GID) of a MO:DCA construct or the GID reference to a MO:DCA construct. The format and data type of the identifier is defined by the FQNFmt parameter.

Constructing Object Identifiers (OIDs)

The construction of OIDs is shown in the following examples. Given an OID consisting of a sequence of component Identifiers, for example the OID {2.100.3} consisting of component identifiers {2, 100, 3}, the content bytes for the encoding are generated as follows.

- Each component identifier, except for the first two which are treated as a special case, is represented as a series of one or more bytes. Bit 0 of each byte is reserved to indicate whether the byte is the last in the series:

  Bit 0 = 1 The byte is not the last byte.
  Bit 0 = 0 The byte is the last byte.

  Bits 1–7 of each byte in the series are concatenated to carry the encoding of the component identifier as an unsigned binary number. The component identifier is encoded in the fewest possible bytes, that is, the leading byte of the encoding cannot have the value X'80'. Encoding starts by placing the least significant bit of the component identifier into the least significant bit of the encoded bytes.

  Example 1:
  ```
  component identifier = 200
                       = X'C8'
                       = B'1100 1000'
  ```
  Because this number has 8 significant bits, two bytes are needed to encode it:
  `B'1 000 0001 0 100 1000' = X'8148'.`

  Example 2:
  ```
  component identifier = 3
                       = X'03'
                       = B'0000 0011'
  ```
  Because this number has 2 significant bits, only one byte is needed to encode it:
  `B'0 000 0011' = X'03'.`

- The first two component identifiers, represented by x and y in the OID (x.y.z.....), are combined into a single number using the equation
  `(x × 40) + y`
  The resulting number is then encoded into the first series of content bytes using the previously defined algorithm. Therefore, the *n*th component identifier in the OID (*n*>2) is represented by the (*n*–1)'th series of bytes in the content.

  Example 3:
  ```
  OID {2.100.3}
  Encoded OID = X'06 03 813403'
  ```

  Example 4:
  ```
  OID {1.3.18.0.4.1.1.14}
  Encoded OID = X'06 07 2B12000401010E'
  ```

Application Note: The purpose of supporting ISO object identifiers in the FQN triplet is to provide a means for generating MO:DCA object identifiers that are *guaranteed* to be unique across all environments that generate these identifiers in accordance with the ISO standard. When OIDs are used in a MO:DCA data stream to identify and reference objects, the presentation system assumes that the OIDs have been generated properly and have been uniquely assigned to objects. That is, the MO:DCA presentation system assumes that:

- If an object is assigned an OID, no other object can be assigned the same OID
- If the object definition is changed, the object must be assigned a new and different OID

This allows the presentation system to manage objects by their OIDs in a manner that is independent of time, location, and platform. Any violation of these rules will result in unpredictable and incorrect presentation.

Global Resource Identifier (GRID) Definition

The global resource identifier (GRID) is an eight-byte binary identifier used to reference a coded font. It consists of a concatenation of the following four binary items:

Byte	Content
0–1	The two-byte binary Graphic Character Set Global Identifier (GCSGID). The character set defined by the GCSGID is associated with the coded font and identifies a minimum set of coded font graphic characters required for presentation. It may be a character set that is associated with the code page, or with the font character set, or with both. Valid values are 1–65,534. A value of 65,535 (X'FFFF') indicates that a character set consisting of all characters that have assigned code points in the associated code page is to be used.
2–3	The two-byte binary Code Page Global Identifier (CPGID) assigned to the code page. Valid values are 1–65,534.
4–5	The two-byte binary Font Typeface Global ID (FGID) assigned to the font design. Valid values are 1–65,534.
6–7	A two-byte binary number that represents the font width (specified horizontal font size) in 1440ths of an inch (see the *Font Object Content Architecture Reference* for a description of the horizontal font size parameter). Valid values are 1–32,767. A value of 0 indicates that the font width is not specified. The value X'FFFF' is retired; see "Retired Parameters" on page 570.

For a list of GCSGIDs and CPGIDs, see the *Character Data Representation Architecture Reference and Registry*. For a list of FGIDs, see the *AFPC Font Typeface Registry (FGIDs)*.

The font width may be used to generate the specified vertical font size, which is used to scale outline technology fonts to the desired point size, as follows:

- For typographic, proportionally-spaced fonts, the vertical font size is three times the font width.
- For fixed-pitch, uniform character increment fonts, including Proportional Spacing Machine (PSM) fonts, the vertical font size is calculated as follows:

```
                          1000 × font width
vertical font size =   -------------------------
                       space character increment
                          (in relative units)
```

  If the generated vertical font size conflicts with the nominal vertical font size in the font object, the generated vertical font size overrides.

Implementation Notes:

1. For IBM Core Interchange Courier fonts, and for IBM Expanded Core fonts with FGID values less than 750 and with FGID values between 3,840 and 4,095 inclusive (fixed pitch, uniform character increment, and PSM fonts), a value of 600 relative units can be used for the space character increment.

2. Code page objects and font character set objects may each be associated with multiple character sets. Because the GRID only specifies a single character set, the presentation server that resolves the GRID reference must understand subset/superset relationships between the character set specified in the GRID and the character sets associated with the referenced code page and font character set. All graphic characters in the specified character set must also belong to a character set associated with the code page and a character set associated with the font character set. To optimize coded font selection, generators of the GRID should specify the smallest character set that is a subset of both a character set associated with the code page and a character set associated with the font character set.

Structured Fields Using Triplet X'02'

- "Begin Bar Code Object (BBC)" on page 121
- "Begin Document (BDT)" on page 128
- "Begin Document Index (BDI)" on page 126
- "Begin Graphics Object (BGR)" on page 132
- "Begin Image Object (BIM)" on page 134
- "Begin Overlay (BMO)" on page 138
- "Begin Named Page Group (BNG)" on page 140
- "Begin Print File (BPF)" on page 150
- "Begin Page (BPG)" on page 152
- "Begin Object Container (BOC)" on page 144
- "Begin Presentation Text Object (BPT)" on page 157
- "Begin Resource Group (BRG)" on page 159
- "Begin Resource (BRS)" on page 161
- "End Bar Code Object (EBC)" on page 174
- "End Document (EDT)" on page 177
- "End Document Index (EDI)" on page 176
- "End Graphics Object (EGR)" on page 179
- "End Image Object (EIM)" on page 180
- "End Overlay (EMO)" on page 182
- "End Object Container (EOC)" on page 185
- "End Page (EPG)" on page 188
- "End Named Page Group (ENG)" on page 183
- "End Print File (EPF)" on page 187
- "End Presentation Text Object (EPT)" on page 190
- "End Resource Group (ERG)" on page 191
- "Index Element (IEL)" on page 197
- "Include Object (IOB)" on page 201
- "Include Page (IPG)" on page 219
- "Include Page Overlay (IPO)" on page 222
- "Link Logical Element (LLE)" on page 226
- "Map Coded Font (MCF) Format 2" on page 237
- "Map Data Resource (MDR)" on page 246
- "Map Media Destination (MMD)" on page 286
- "Map Media Type (MMT)" on page 289
- "Map Page (MPG)" on page 292
- "Map Page Overlay (MPO)" on page 294
- "Preprocess Presentation Object (PPO)" on page 329
- "Tag Logical Element (TLE)" on page 342

Mapping Option Triplet X'04'

The Mapping Option is used to specify the mapping of a data object presentation space to an object area.

Triplet X'04' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'04'	Identifies the Mapping Option triplet	M	X'00'
2	CODE	MapValue	X'00', X'10', X'20', X'30', X'41', X'42', X'50', X'60', X'70'	Data object mapping option: **X'00'** Position **X'10'** Position and trim **X'20'** Scale to fit **X'30'** Center and trim **X'41'** Migration mapping **X'42'** Migration mapping **X'50'** Migration mapping **X'60'** Scale to fill **X'70'** UP3i Print Data mapping	M	X'06'

Triplet X'04' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Mapping Option triplet.

MapValue Specifies the mapping option to be used for the data object referenced by the structured field.

Note: Not all mapping options are supported for all data objects; see the Map structured field for each data object to see which options are supported.

Value **Description**

X'00' Position. The upper left corner of the data object's presentation space or window is positioned coincident with the data object's content origin specified in the XocaOset and YocaOset parameters in the Object Area Position structured field. All data must be presented within the object area extents, or a X'01' exception condition exists.

X'10' Position and trim. The upper left corner of the data object's presentation space or window is positioned coincident with the data object's content origin specified in the XocaOset and YocaOset parameters in the Object Area Position structured field. All data that falls within the object area extents is presented, but data that falls outside of the object area is not presented.

Note: The Position and trim mapping option has value X'30' in IPDS.

X'20' Scale to fit. The center of the data object's presentation space or window is mapped to the center of the object area defined by the associated Object Area Descriptor structured field. The data object is symmetrically scaled up or down while preserving the aspect ratio so that, at its maximum data size, it is totally contained in the object area.

When this option is specified, the data object's content origin specified in the XocaOset and YocaOset parameters in the Object Area Position structured field is ignored.

Notes:

1. For presentation objects, a presentation space size is required for a scale-to-fit mapping of the object presentation space to the object area. If the size of the presentation space is not specified by the object data descriptor, the object data itself may specify the size. See "Object Type Identifiers" on page 597 for information on how the presentation space size is specified by various objects. If the presentation space size is not specified in the data descriptor, and if it is also not specified by the object, the architected default is the presentation space size of the including page or overlay.
2. The Scale to fit mapping option has value X'10' in IPDS and in BCOCA.

X'30' Center and trim. The center of the data object's presentation space or window is mapped to the center of the object area defined by the associated Object Area Descriptor structured field. All data that falls within the object area is presented, but data that falls outside of the object area is not presented.

When this option is specified, the data object's content origin specified in the XocaOset and YocaOset parameters in the Object Area Position structured field is ignored.

Note: The Center and trim mapping option has value X'20' in IPDS.

X'41' Migration mapping. See "Coexistence Parameters" on page 607 for a description.

X'42' Migration mapping. See "Coexistence Parameters" on page 607 for a description.

X'50' Migration mapping. See "Coexistence Parameters" on page 607 for a description.

X'60' Scale to fill. The center of the data object's presentation space or window is mapped to the center of the object area defined by the associated Object Area Descriptor structured field. The data object is scaled up or down so that it totally fills the object area in both the X and Y directions. This may require that the object presentation space be asymmetrically scaled by different scale factors in the X and Y directions. Therefore, this mapping does not, in general, preserve the aspect ratio of the data object.

When this option is specified, the data object's content origin specified in the XocaOset and YocaOset parameters in the Object Area Position structured field is ignored.

Note: For presentation objects, a presentation space size is required for a scale-to-fill mapping of the object presentation space to the object area. If the size of the presentation space is not specified by the object data descriptor, the object data itself may specify the size. See "Object Type Identifiers" on page 609 for information on how the presentation space size is specified by various objects. If the presentation space size is not specified in the data descriptor, and if it is also not specified by the object, the architected default is the presentation space size of the including page or overlay.

X'70' UP3i Print Data mapping. This mapping is only used to map UP3i Print Data objects. The specific mapping function is defined by the UP3i Print Data format, which is identified by the Print Data Format ID that is specified in the first 4 bytes of the UP3i Print Data object. For a definition of UP3i Print Data formats, see the UP3i specification available at the UP3i web site at: `www.afpcinc.org`.

All others	Reserved

Structured Fields Using Triplet X'04'

- "Include Object (IOB)" on page 201
- "Map Bar Code Object (MBC)" on page 232
- "Map Container Data (MCD)" on page 235
- "Map Graphics Object (MGO)" on page 273
- "Map Image Object (MIO)" on page 274
- "Map Presentation Text (MPT)" on page 297
- "Preprocess Presentation Object (PPO)" on page 329

Object Classification Triplet X'10'

The Object Classification is used to classify and identify object data. The object data may or may not be defined by an AFP architecture.

Triplet X'10' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	24–96	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'10'	Identifies the Object Classification triplet	M	X'00'
2				Reserved; should be zero	M	X'06'
3	CODE	ObjClass	X'01', X'10', X'20', X'30', X'40', X'41', X'50'	Specifies the object class: **X'01'** Time-invariant paginated presentation object **X'10'** Time-variant presentation object **X'20'** Executable program (non-presentation object) **X'30'** Set-up file (non-presentation object); document level **X'40'** Secondary Resource **X'41'** Data-object font **X'50'** Metadata Object (non-presentation object)	M	X'06'
4–5				Reserved; should be zero	M	X'06'
6–7	BITS	StrucFlgs		Provides information on the structure of the object container. See "Triplet X'10' Semantics" on page 363 for StrucFlgs bit definitions.	M	X'06'
8–23	CODE	RegObjId		MO:DCA-registered ASN.1 object identifier (OID) for object type.	M	X'06'
24–55	CHAR	ObjTpName		Name of the object type	O	X'00'
56–63	CHAR	ObjLev		Release level or version number of the object type	O	X'00'
64–95	CHAR	CompName		Name of company or organization that owns object definition	O	X'00'

Triplet X'10' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Object Classification triplet.

ObjClass Specifies the object class based on differentiators such as temporal characteristics and presentation form.

Value	Description
X'01'	Time-invariant paginated presentation object. If included for presentation, the scope of the object is the including page or overlay, or if used as a secondary resource to a QR Code with Image bar code object, the scope of the presentation object is the bar code object that uses the presentation object.
X'10'	Time-variant presentation object. The scope of the object is not defined.
X'20'	Executable program such as an object handler. This is not a presentation object, that is, it is not a specification of final-form paginated object data. The scope of the object is not defined.
X'30'	Set-up information file, document level. This is not a presentation object, that is, it is not a specification of final-form paginated object data. The scope of the object is the document or documents for which the set-up file is invoked.
X'40'	Secondary or tertiary resource. This is a resource used by a presentation object that may itself be a resource object. The resource itself is not a standalone page level presentation object. The scope of the resource is the object that uses the resource.
X'41'	Data-object font. This is a non-FOCA font resource used to present text in a data object. Examples of data-object fonts are TrueType fonts and OpenType fonts. This object class includes collections of data-object fonts, such as TrueType Collections (TTCs). The resource itself is not a standalone page level presentation object. The scope of the resource is the data object that uses the resource. If the data object that uses this font is also a resource, the font resource becomes a secondary resource.
X'50'	Metadata object. This is not a presentation object. The object is used to specify metadata that may be associated with MO:DCA print file components at various levels of the MO:DCA hierarchy (see "Metadata Objects in AFP" on page 56).
All others	Reserved

StrucFlgs Flags that characterize the structure of the object data. StrucFlgs bits have the following definitions:

Bits	Description
0–1	Object Container (BOC/EOC)

B'00' Reserved

B'01' The object data is not carried in a MO:DCA object container.

B'10' The container structure of the object data is unknown.

B'11' The object data is carried in a MO:DCA object container.

Notes:

1. These bits must be set to B'11' when the triplet appears on a Begin Object Container (BOC) structured field.
2. When bits 0–1 are set to B'11', bits 4–5 must also be set to B'11'.
3. It is not advisable to set the bits to B'11' when the triplet appears on a structured field that references the object such as an Include Object (IOB), since the reference would become invalid if the object data is eventually carried in a MO:DCA object container.

2–3 Object environment group (OEG)

B'00' Reserved

B'01' Object container does not include an OEG.

B'10' It is not known whether the object structure includes an OEG.

B'11' Object container includes an OEG for the object data.

Notes:

1. When bits 2–3 are set to B'11', bits 0–1 must be set to B'11', and bits 4–5 must be set to B'11'.
2. It is not advisable to set the bits to B'01' when the triplet appears on a structured field that references the object such as an Include Object (IOB), since the reference would become invalid if an OEG is eventually added.

4–5 Object Container Data (OCD) structured fields

B'00' Reserved

B'01' Object data is not carried in OCD structured fields.

B'10' It is not known whether the object data is carried in OCD structured fields.

B'11' Object data is carried in OCD structured fields.

Notes:

1. When bits 4–5 are set to B'11', bits 0–1 must also be set to B'11'. Conversely, when bits 0–1 are set to B'11', bits 4–5 must also be set to B'11'.
2. It is not advisable to set the bits to B'01' when the triplet appears on a structured field that references the object such as an Include Object (IOB), since the reference would become invalid if the object data is eventually carried in OCD structured fields.

6–15 Reserved; all bits must be B'0'.

RegObjId Specifies a unique numeric identifier for the object type carried in the object container. The numeric identifier is an ASN.1 Object Identifier (OID), defined in ISO/IEC 8824:1990(E), whose last component identifier is registered in the MO:DCA architecture. The complete OID is encoded using the Basic Encoding Rules for ASN.1 specified in ISO/IEC 8825:1990(E). A table of the registered component identifiers and the encoded OIDs is provided in "Object Type Identifiers" on page 609. The OID is left justified and padded with zeros. This identifier is mandatory.

ObjTpName Specifies the generic name used to refer to the object type. The name is left-justified and padded with blanks. A value of all blanks, encoded using the active code page and character set, indicates that the name is not specified.

ObjLev Specifies the release level or version number of the object type. The level is left-justified and padded with blanks. A value of all blanks, encoded using the active code page and character set, indicates that the level is not specified.

CompName Specifies the name of the company or organization that owns the syntactic and semantic definition of the object type. The name is left-justified and padded with blanks. If the object type is defined by a standards organization, specifies the name of that standards organization. A value of all blanks, encoded using the active code page and character set, indicates that the name is not specified.

Note: If an optional positional parameter is included on this triplet, all preceding optional positional parameters become mandatory.

Application Note: The following illustrates how the parameters in this triplet can be used to identify and classify non-OCA object data:

- Encapsulated PostScript object that is carried in a MO:DCA object container:

Parameter	Value
ObjClass	X'01'
StrucFlgs	X'EC00'
ObjId	X'06072B12000401010D'
ObjTpName	Encapsulated PostScript
ObjLev	2.0
CompName	Adobe

- TIFF single-page image object whose container structure is not known:

Parameter	Value
ObjClass	X'01'
StrucFlgs	X'A800'
ObjId	X'06072B12000401010E'
ObjTpName	TIFF
ObjLev	6.0
CompName	Aldus

Architecture Note: A similar triplet, the MDD Two-up triplet, which also uses triplet ID X'10', is retired but is still used on the MDD structured field in some implementations; see "MDD Two-up Triplet X'10'" on page 557

Structured Fields Using Triplet X'10'

- "Begin Object Container (BOC)" on page 144
- "Begin Resource (BRS)" on page 161
- "Include Object (IOB)" on page 201
- "Link Logical Element (LLE)" on page 226
- "Map Data Resource (MDR)" on page 246
- "Preprocess Presentation Object (PPO)" on page 329

MO:DCA Interchange Set Triplet X'18'

The MO:DCA Interchange Set triplet identifies the interchange set and the data stream type.

Triplet X'18' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	5	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'18'	Identifies the MO:DCA Interchange Set triplet	M	X'00'
2	CODE	IStype	X'01', X'05'	Specifies the type of interchange set: **X'01'** Presentation **X'05'** Archive/Presentation	M	X'06'
3–4	CODE	ISid	X'0001', X'0900', X'0980', X'0C00', X'0D00', X'0D01', X'0D80'	Interchange set identifier: For IStype X'01': **X'0900'** MO:DCA IS/1 **X'0980'** MO:DCA IS/1 + Function Set(s) **X'0C00'** Retired value **X'0D00'** MO:DCA IS/3 **X'0D80'** MO:DCA IS/3 + Function Set(s) See the Architecture notes on page 368 of the Semantics section. For IStype X'05': **X'0001'** MO:DCA AFP/A **X'0D01'** MO:DCA AFP/A, MO:DCA IS/3	M	X'06'

Triplet X'18'Semantics

Tlength Contains the length of the triplet.

Tid Identifies the MO:DCA Interchange Set triplet.

ISType Specifies the interchange set type. The valid interchange set type codes are:

Value	Description
X'01'	Presentation Document
X'05'	Archive/Presentation
All others	Reserved

Architecture Note: ISType X'03' is reserved and is only used in MO:DCA-L data streams to indicate a Resource (MO:DCA-L) interchange set. Note that the MO:DCA-L format has been functionally capped and is no longer defined in the MO:DCA reference; for a definition of this format, see *MO:DCA-L: The OS/2 PM Metafile (.met) Format*.

ISid Specifies the interchange set identifier.

The code assignments for a presentation document interchange set, type X'01', are:

Value	Description
X'0900'	MO:DCA IS/1
X'0980'	MO:DCA IS/1 + Function Set(s)
X'0C00'	Retired for MO:DCA IS/2; see “Retired Parameters” on page 570.
X'0D00'	MO:DCA IS/3. See “MO:DCA Interchange Set 3 (IS/3)” on page 489.
X'0D80'	MO:DCA IS/3 + Function Set(s)
All others	Reserved

The code assignments for an archive/presentation interchange set, type X'05', are:

Value	Description
X'0001'	MO:DCA AFP/A. See “MO:DCA AFP Archive Interchange Set (AFP/A)” on page 516.
X'0D01'	MO:DCA AFP/A, MO:DCA IS/3
All others	Reserved

Architecture Notes:

1. ISid X'0C00' is used in MO:DCA-L data streams with ISType X'03' to indicate a Resource (MO:DCA-L) interchange set. Note that the MO:DCA-L format has been functionally capped and is no longer defined in the MO:DCA reference.
2. For ISType X'01', the ISid two-byte code is treated architecturally as two fields of one byte each, where the first byte identifies the interchange set and the second byte specifies additional information. For ISType X'05', the ISid two-byte code is treated as one field.

Note: Data streams that do not comply completely with an interchange set, such as those intended for private use or exchange purposes, must ensure that this triplet is *not* specified on the BPF and BDT structured fields.

Structured Fields Using Triplet X'18'

- “Begin Document (BDT)” on page 128
- “Begin Print File (BPF)” on page 150

Font Descriptor Specification Triplet X'1F'

The Font Descriptor Specification triplet specifies the attributes of the desired font in a coded font reference.

Triplet X'1F' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	9–20	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'1F'	Identifies the Font Descriptor Specification triplet	M	X'00'
2	CODE	FtWtClass	X'00'–X'09'	Specifies character stroke thickness: **X'00'** Not specified **X'01'** Ultra-light **X'02'** Extra-light **X'03'** Light **X'04'** Semi-light **X'05'** Medium (normal) **X'06'** Semi-bold **X'07'** Bold **X'08'** Extra-bold **X'09'** Ultra-bold	M	X'06'
3	CODE	FtWdClass	X'00'–X'09'	Specifies character width-to-height ratio: **X'00'** Not specified **X'01'** Ultra-condensed **X'02'** Extra-condensed **X'03'** Condensed **X'04'** Semi-condensed **X'05'** Medium (normal) **X'06'** Semi-expanded **X'07'** Expanded **X'08'** Extra-expanded **X'09'** Ultra-expanded	M	X'06'
4–5	UBIN	FtHeight	0–32,767	Specifies vertical font size in 1440ths of an inch (20ths of a point)	M	X'06'
6–7	UBIN	FtWidth	0–32,767	Specifies horizontal font size in 1440ths of an inch (20ths of a point)	M	X'06'
8	BITS	FtDsFlags		Qualifies the type of font characters. See “Triplet X'1F' Semantics” on page 370 for FtDsFlags bit definitions.	M	X'06'
9–18				Reserved; not checked	O	X'00'
19	BITS	FtUsFlags		Describes the font environment. See “Triplet X'1F' Semantics” on page 370 for FtUsFlags bit definitions.	O	X'02'

Triplet X'1F' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Font Descriptor Specification triplet.

FtWtClass Is a code that describes the thickness of strokes of the characters as one of the following values:

Value	Description
X'00'	Not specified
X'01'	Ultra-light
X'02'	Extra-light
X'03'	Light
X'04'	Semi-light
X'05'	Medium (normal)
X'06'	Semi-bold
X'07'	Bold
X'08'	Extra-bold
X'09'	Ultra-bold
All others	Reserved

FtWdClass Is a code that describes the relative width-to-height ratio of the characters as one of the following values:

Value	Description
X'00'	Not specified
X'01'	Ultra-condensed
X'02'	Extra-condensed
X'03'	Condensed
X'04'	Semi-condensed
X'05'	Medium (normal)
X'06'	Semi-expanded
X'07'	Expanded
X'08'	Extra-expanded
X'09'	Ultra-expanded
All others	Reserved

FtHeight Specifies the vertical size of the font character set in 1440ths of an inch (20ths of a point). See the *Font Object Content Architecture Reference* for a description of the Vertical Font Size parameter. The specified vertical font size is used to select a raster font or to scale an outline technology font to the desired point size. A value of zero indicates that the vertical font size is not specified. If the specified vertical font size conflicts with the nominal vertical font size in the font object, the specified vertical font size overrides.

FtWidth Specifies the horizontal size of the font character set in 1440ths of an inch (20ths of a point). See the *Font Object Content Architecture Reference* for a description of the Horizontal Font Size parameter. A value of zero indicates that the horizontal font size is not specified.

Architecture Note: When the X'1F' triplet is specified on an MCF structured field in MO:DCA-L data streams, the vertical font size and the horizontal font size are specified in *world coordinate values*. Note that the MO:DCA-L format has been functionally capped and is no longer defined in the MO:DCA reference; for a definition of this format, see *MO:DCA-L: The OS/2 PM Metafile (.met) Format*.

Note: The specified horizontal font size may be used to generate the vertical font size, which is used to select a raster font or to scale an outline technology font to the desired point size, as follows:

- For typographic, proportionally-spaced fonts, the vertical font size is three times the horizontal font size.
- For fixed-pitch, uniform character increment fonts, including Proportional Spacing Machine (PSM) fonts, the vertical font size is calculated as follows:

```
                            1000 × font width
vertical font size =  -------------------------
                        space character increment
                           (in relative units)
```

If the generated vertical font size conflicts with the specified vertical font size, the specified vertical font size takes precedence.

Implementation Note: For IBM Core Interchange Courier fonts, and for IBM Expanded Core fonts with FGID values less than 750 and with FGID values between 3,840 and 4,095 inclusive (fixed pitch, uniform character increment, and PSM fonts), a value of 600 relative units can be used for the space character increment.

FtDsFlags Qualify the type of font characters. Flag bit 7 defines the meaning of this parameter when all other flag bits have the value B'0'. FtDsFlags bits have the following descriptions:

Bit **Description**

0 Italic characters:
- **B'0'** Font contains no italic characters.
- **B'1'** Font contains italic characters.

1 Underscored characters:
- **B'0'** Font contains no underscored characters.
- **B'1'** Font contains underscored characters.

2 Reserved; must be B'0'

3 Hollow characters:
- **B'0'** Font contains no hollow characters.
- **B'1'** Font contains hollow characters.

4 Overstruck characters:
- **B'0'** Font contains no overstruck characters.
- **B'1'** Font contains overstruck characters.

5 Proportionally spaced characters:
- **B'0'** Font contains uniformly spaced characters.
- **B'1'** Font contains proportionally spaced characters.

6 Pairwise kerned characters:
- **B'0'** Font contains no pairwise kerned characters.
- **B'1'** Font contains pairwise kerned characters.

7 Definition of FtDsFlags parameter when bits 0–6 = B'0000000':
- **B'0'** Parameter is not specified.
- **B'1'** Parameter is specified; each flag bit carries its assigned meaning.

FtUsFlags Describe the font environment.

Bit **Description**

0 Reserved; must be B'0'

1 Font type:
- **B'0'** Bitmapped font
- **B'1'** Outline or vector font

2 Transform font:

B'0' Font will not be transformed.
B'1' Font may be transformed, that is, scaled, rotated, or sheared.

3–7 Reserved; all bits must be B'0'.

Structured Field Using Triplet X'1F'

- "Map Coded Font (MCF) Format 2" on page 237

Font Coded Graphic Character Set Global Identifier Triplet X'20'

The Font Coded Graphic Character Set Global Identifier triplet is used to specify the code page and character set for a coded font.

Triplet X'20' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'20'	Identifies the Font Coded Graphic Character Set Global Identifier triplet	M	X'00'
2–3	CODE	GCSGID	X'0001'–X'FFFE'	Specifies the Graphic Character Set Global Identifier	M	X'06'
			X'FFFF'	Specifies the character set consisting of all characters in the code page		
4–5	CODE	CPGID	X'0001'–X'FFFE'	Specifies the Code Page Global Identifier	M	X'06'

Triplet X'20' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Font Coded Graphic Character Set Global Identifier triplet.

GCSGID Specifies the two-byte binary Graphic Character Set Global Identifier (GCSGID). The character set defined by the GCSGID is associated with the coded font and identifies a minimum set of coded font graphic characters required for presentation. It may be a character set that is associated with the code page, or with the font character set, or with both. Valid values for Graphic Character Set Global Identifiers are 1 through 65,534. A value of 65,535 (X'FFFF') indicates that a character set consisting of all characters that have assigned code points in the associated code page is to be used.

CPGID Specifies the two-byte binary Code Page Global Identifier (CPGID) assigned to the code page associated with the coded font. Valid values for Code Page Global Identifiers are 1 through 65,534.

Note: The concatenation of the GCSGID and CPGID is currently referred to as the Coded Graphic Character Set Global Identifier (CGCSGID). In the past, it was also known as the Global Character Set Identifier (GCID).

Structured Fields Using Triplet X'20'

- “Map Coded Font (MCF) Format 2” on page 237
- “Map Data Resource (MDR)” on page 246

Resource Object Type Triplet X'21'

The Resource Object Type triplet identifies the type of object enveloped by the Begin Resource (BRS) and End Resource (ERS) structured fields.

Architecture Note: A similar triplet, the Object Function Set Specification triplet, that unfortunately also uses triplet ID X'21', is retired but is still used on the BDT structured field; see “Object Function Set Specification Triplet X'21'” on page 559.

Triplet X'21' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	10	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'21'	Identifies the Resource Object Type triplet	M	X'00'
2	CODE	ObjType	X'03', X'05'–X'06', X'40'–X'42', X'92', X'9B', X'A8', X'FB'–X'FE'	Specifies the object type: **X'03'** Graphics (GOCA) object **X'05'** Bar Code (BCOCA) object **X'06'** Image (IOCA) object **X'40'** Font Character Set object **X'41'** Code Page object **X'42'** Coded Font object **X'92'** Object Container **X'9B'** Presentation Text (PTOCA) object with OEG **X'A8'** Document object **X'FB'** Page Segment object **X'FC'** Overlay object **X'FD'** Reserved; see Triplet X'21' Semantics **X'FE'** Form Map object	M	X'06'
3–9	CODE	ConData		Constant data	M	X'06'

Triplet X'21' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Resource Object Type triplet.

ObjType Specifies the object type.

Value	Description
X'03'	Graphics (GOCA) object
X'05'	Bar Code (BCOCA) object
X'06'	Image (IOCA) object
X'40'	Font Character Set object
X'41'	Code Page object

X'42'	Coded Font object
X'92'	Object Container
X'9B'	Presentation Text (PTOCA) object with OEG
X'A8'	Document object
X'FB'	Page Segment object
X'FC'	Overlay object
X'FD'	Reserved. This value is used in AFP Line Data environments to identify a Page Map, also called Page Definition or PageDef object. For a description of Page Maps, see the *Advanced Function Presentation: Programming Guide and Line Data Reference*.
X'FE'	Form Map object
All others	Reserved

ConData Constant data. Must be set to X'0000 0000 0000 00'.

Structured Field Using Triplet (X'21')

- "Begin Resource (BRS)" on page 161

Extended Resource Local Identifier Triplet X'22'

The Extended Resource Local Identifier triplet specifies a resource type and a four-byte local identifier or LID. The LID usually is associated with a specific resource name by a map structured field, such as a Map Media Type structured field.

Triplet X'22' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	7	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'22'	Identifies the Extended Resource Local Identifier triplet	M	X'00'
2	CODE	ResType	X'30', X'40', X'42'	Specifies the resource type: **X'30'** Retired value **X'40'** Media Type resource **X'42'** Media Destination resource	M	X'06'
3–6	CODE	ResLID	X'00000000'–X'FFFFFFFF'	Specifies the extended resource local ID: **X'00000000'–X'0000FFFF'** Resource type X'40' **X'00000001'–X'0000FFFF'** Resource type X'42' **X'00000000'–X'FFFFFFFF'** Resource types other than X'40' and X'42'	M	X'06'

Triplet X'22' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Extended Resource Local Identifier triplet.

ResType Specifies the resource type associated with the extended local ID.

Value	**Description**
X'30'	Retired for private use. See “Retired Parameters” on page 570. **Architecture Note:** This value is used in AFP line-data environments in a Page Definition object to denote an IOB Reference. It matches an Include Object (IOB) structured field to a Descriptor. For more information see *Advanced Function Presentation: Programming Guide and Line Data Reference*.
X'40'	Media Type resource
X'42'	Media Destination resource
All others	Reserved

Architecture Note: The value ResType X'10' = Image Resource is reserved and is only used when this triplet is specified on an MDR in MO:DCA-L data streams. Note that the MO:DCA-L format has been functionally capped and is no longer defined in the MO:DCA reference; for a definition of this format, see *MO:DCA-L: The OS/2 PM Metafile (.met) Format*.

ResLID Specifies a unique resource object Local ID. It may be in the range of X'00000000' to X'FFFFFFFF' for all resource types other than X'40' and X'42'. For resource type X'40' (Media Type), the range is restricted to X'00000000' to X'0000FFFF'. For resource type X'42' (Media Destination), the range is restricted to X'00000001' to X'0000FFFF'.

Architecture Notes:

- The local IDs used with resource type X'40' are specified with a X'E8*nn*' + X'E9*nn*' keyword pair on the MMC that can only carry a 2-byte ID. Therefore, the range for this resource type is restricted to 2-byte values.
- The local IDs used with resource type X'42' are specified with a X'90*nn*' + X'91*nn*' keyword pair on the MMC that can only carry a 2-byte ID. Therefore, the range for this resource type is restricted to 2-byte values.

Structured Fields Using Triplet X'22'

- “Map Media Destination (MMD)” on page 286
- “Map Media Type (MMT)” on page 289

Resource Local Identifier Triplet X'24'

The Resource Local Identifier triplet may be used to specify a resource type and a one-byte local identifier or LID. The LID usually is associated with a specific resource name by a map structured field, such as a Map Coded Font structured field.

Triplet X'24' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	4	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'24'	Identifies the Resource Local Identifier triplet	M	X'00'
2	CODE	ResType	X'00', X'02', X'05'	Specifies the resource type: **X'00'** Usage-dependent **X'02'** Page Overlay **X'05'** Coded Font	M	X'06'
3	CODE	ResLID	X'00'–X'FE'	Specifies the resource local ID	M	X'06'

Triplet X'24' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Resource Local Identifier triplet.

ResType Specifies the resource type associated with the local ID.

Value	Description
X'00'	Usage-dependent. The resource type is implied by the context of the structured field in which this triplet parameter occurs. A X'01' exception condition exists if more than one resource local ID occurs within a given structured field and this value is specified.
X'02'	Page Overlay resource
X'05'	Coded Font resource
All others	Reserved

Architecture Note: The value ResType X'07' = Color Attribute Table is reserved and is only used when this triplet is specified on a Map Color Attribute Table (MCA) structured field in MO:DCA-L data streams. Note that the MO:DCA-L format has been functionally capped and is no longer defined in the MO:DCA reference; for a definition of this format, see *MO:DCA-L: The OS/2 PM Metafile (.met) Format*.

ResLID Specifies a unique resource object local ID. It may be in the range of X'00' to X'FE'.

Application Note: Most AFP print servers only support the LID range that is defined in the MO:DCA IS/1 and IS/3 interchange set definitions, which is X'01' to X'7F', and also the value X'FE'.

Structured Fields Using Triplet X'24'

- "Map Coded Font (MCF) Format 2" on page 237
- "Map Page Overlay (MPO)" on page 294

Resource Section Number Triplet X'25'

The Resource Section Number triplet specifies a coded font section number. It may be used to select a single section of a double-byte coded font if less than the entire double-byte coded font is required for processing. For a description of coded fonts see the *Font Object Content Architecture Reference*.

Triplet X'25' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'25'	Identifies the Resource Section Number triplet	M	X'00'
2	CODE	ResSNum	X'00'–X'FF'	Specifies the resource section number	M	X'06'

Triplet X'25' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Resource Section Number triplet.

ResSNum Specifies the resource section number. The valid resource section number values are determined by the encoding scheme used for the font. For fonts encoded using the EBCDIC Presentation double-byte encoding scheme (encoding scheme ID X'62*nn*') or the EBCDIC Presentation single-byte encoding scheme (encoding scheme ID X'61*nn*'), the valid resource section numbers are:

Value	Comments
X'00'	Must be used when this triplet references a single-byte coded font. Specifies all sections when this triplet references a double-byte coded font.
X'41'–X'FE'	Used only for double-byte coded fonts to select a specific font section
All others	Reserved

Notes:

1. If this triplet is omitted, the architected default value for the resource section number is X'00'.
2. The encoding scheme is specified by the Encoding Scheme ID triplet; see "Encoding Scheme ID Triplet X'50'" on page 395.

Structured Field Using Triplet X'25'

- "Map Coded Font (MCF) Format 2" on page 237

Character Rotation Triplet X'26'

The Character Rotation triplet is used to specify character rotation relative to the character coordinate system. See the *Font Object Content Architecture Reference* for further information.

Triplet X'26' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	4	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'26'	Identifies the Character Rotation triplet	M	X'00'
2–3	CODE	CharRot	X'0000', X'2D00', X'5A00', X'8700'	Specifies the clockwise character rotation: **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees	M	X'06'

Triplet X'26' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Character Rotation triplet.

CharRot Specifies the clockwise character rotation relative to the character coordinate system. Valid values are the following:

Value	Character Rotation
X'0000'	0 degrees
X'2D00'	90 degrees
X'5A00'	180 degrees
X'8700'	270 degrees
All others	Reserved

Note: If this triplet is omitted, the architected default value for the character rotation is X'0000', zero degrees.

Structured Field Using Triplet X'26'

- "Map Coded Font (MCF) Format 2" on page 237

Object Byte Offset Triplet X'2D'

The Object Byte Offset triplet is used to specify the byte offset of an indexed object within a document.

Triplet X'2D' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6, 10	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'2D'	Identifies the Object Byte Offset triplet	M	X'00'
2–5	UBIN	DirByOff	X'00000000'–X'FFFFFFFE'	Byte offset	M	X'06'
			X'FFFFFFFF'	If bytes 6–9 are not specified, object is outside document		
6–9	UBIN	DirByHi	X'00000000'–X'FFFFFFFF'	Byte offset, high-order bytes	O	X'00'

Triplet X'2D' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Object Byte Offset triplet.

DirByOff Specifies the offset, in bytes, of an indexed object from the beginning of the document. The Begin Document (BDT) structured field begins the document object and has an offset of 0. The first byte in the BDT is counted as byte 1 of the offset to objects that follow, so that if the BDT consists of *n* bytes, the offset to a Begin Object structured field that immediately follows the BDT is *n*. The byte offset has a range of X'00000000' to X'FFFFFFFE'. A value of X'FFFFFFFF' signifies that the indexed object is outside the document.

DirByHi If specified, indicates that this triplet specifies the byte offset as an 8-byte parameter, where DirByOff specifies the low-order 4 bytes and DirByHi specifies the high-order 4 bytes. In that case, the value DirByOff = X'FFFFFFFF' is a real offset value and does *not* signify that the indexed object is outside the document.

Structured Field Using Triplet X'2D'

- "Index Element (IEL)" on page 197

Attribute Value Triplet X'36'

The Attribute Value triplet is used to specify a value for a document attribute.

Triplet X'36' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	4–254	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'36'	Identifies the Attribute Value triplet	M	X'00'
2–3				Reserved; should be zero	M	X'06'
4–*n*	CHAR	AttVal		Attribute Value	O	X'00'

Triplet X'36' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Attribute Value triplet.

AttVal Is a character string which specifies the value of a document attribute. If this parameter is omitted, the value of the document attribute is specified to be null, that is, no value is assigned to the attribute.

Structured Field Using Triplet X'36'

- "Tag Logical Element (TLE)" on page 342

Descriptor Position Triplet X'43'

The Descriptor Position triplet is used to associate an Object Area Position structured field with an Object Area Descriptor structured field.

Triplet X'43' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'43'	Identifies the Descriptor Position triplet	M	X'00'
2	CODE	DesPosID	X'01'–X'7F'	Specifies the associated Object Area Position structured field	M	X'06'

Triplet X'43' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Descriptor Position triplet.

DesPosID Specifies the identifier of the Object Area Position structured field that is associated with the descriptor for this object area.

Structured Field Using Triplet X'43'

- “Object Area Descriptor (OBD)” on page 300

Media Eject Control Triplet X'45'

The Media Eject Control triplet is used to specify the type of media eject that is performed and the type of controls that are activated when a new medium map is invoked and N-up partitioning is specified.

Triplet X'45' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	4	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'45'	Identifies the Media Eject Control triplet	M	X'00'
2				Reserved; should be zero	M	X'06'
3	CODE	EjCtrl	X'01'–X'04'	Media eject controls: **X'01'** Eject to new sheet **X'02'** Conditional eject to next partition **X'03'** Conditional eject to next front-side partition **X'04'** Conditional eject to next back-side partition	M	X'06'

Triplet X'45' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Media Eject Control triplet.

EjCtrl Is a code that identifies the type of media eject that should be performed and the type of controls that should be activated when the medium map containing this triplet is invoked and N-up partitioning is specified. This triplet is ignored when it occurs on the medium map that is activated at the beginning of a document regardless of whether this medium map is explicitly invoked or implicitly invoked as the default. The following types of media eject can be specified:

- Eject to new sheet
- Conditional eject to next partition
- Conditional eject to next front-side partition
- Conditional eject to next back-side partition

The two types of controls that may be activated are medium level controls and page level controls. Media level controls are controls that affect the medium, such as the specification of medium overlays, medium size, medium orientation, medium copies, N-up, simplex or duplex, medium finishing, media type, and media source and destination selection. They are defined by the Map Medium Overlay (MMO), Medium Descriptor (MDD), Medium Copy Count (MCC), Medium Finishing Control (MFC), Map Media Type (MMT), Map Media Destination (MMD), Presentation Environment Control (PEC), and Medium Modification Control (MMC) structured fields. Page level controls are controls that affect the pages that are placed on the medium, such as the specification of page modifications, page position, and page orientation. They are defined by the Map Page Overlay (MPO), Page Position (PGP), and Page Modification Control (PMC) structured fields.

In the following descriptions, the term “existing PGP” refers to the Page Position (PGP) structured field that was active with the existing medium map, and the term “new PGP” refers to the PGP that is activated with the new medium map. The media level controls in the new and existing medium maps are considered to be *identical* if and only if all of the following conditions are met:

- Any MMO, MDD, MCC, MFC with MFCScpe = X'04' (medium map level MFC, each sheet), MMD, PEC, MMT, and MMC structured field that appears in the existing medium map must also appear in the new medium map.
- The MMO, MDD, MCC, MFC with MFCScpe = X'04' (medium map level MFC, each sheet), MMD, PEC, MMT, and MMC structured fields that appear in both the new and existing medium maps must not only have the same functional content but also must have the same form. For example, if both medium maps contain an MMO structured field, the MMO repeating groups must map the same overlay names to the same local IDs, and the repeating groups must appear in the same order. Similarly, if both medium maps contain an MMC structured field, the MMC keywords must be the same, must specify the same values, and must appear in the same order.

Note that MFCs that start and continue medium map level sheet collections for finishing (MFCScpe = X'05') are excluded from the media level controls compare. These structured fields are processed and may cause a sheet eject based on their own processing rules. If processing such MFCs does not cause a sheet eject, the media level control compare determines whether or not a sheet eject is performed. Note also that a sheet eject is always generated after a finishing operation is applied to a collection of media or sheets.

The following values are supported for the EjCtrl parameter:

Value	Description
X'01'	Eject to new sheet. The new medium map is a complete replacement for the existing medium map and specifies the medium level controls and page level controls to be used to process the new sheet.
X'02'	Conditional eject to next partition. This control is used with N-up partitioning. If N-up is not specified, or if the presentation device does not support N-up, this control is processed as X'01' (eject to new sheet). If the medium level controls in the new medium map are not *identical* to the medium level controls in the existing medium map, or if the page level controls in the new medium map specify a different page placement than the page level controls in the existing medium map, this control is processed as X'01' (eject to new sheet). If the medium level controls in the new medium map are *identical* to the medium level controls in the existing medium map, and if both medium maps specify default page placement or both specify explicit page placement, the page level controls in the new medium map are activated and an eject to the next partition is performed. The location of the next partition is determined as follows: • *Default page placement*: The next partition is the next sequential partition on the current sheet-side. If all partitions on the current sheet-side have been used, it is the first partition on the next sheet-side, which for simplex printing is always the front side of the next sheet, and for duplex printing is either the back side of the current sheet (if currently on a front side) or the front side of the next sheet (if currently on a back side). • *Explicit page placement*: The next partition is defined by the repeating group in the new PGP that corresponds to the next repeating group that was to be processed in the existing PGP. If all PGP repeating groups have been processed, an implicit sheet eject is performed and processing continues with the first repeating group in the new PGP. For example, if the first repeating group in the existing PGP was last used to place a page, processing continues with the second repeating group in the new PGP.

Note: The new PGP should place pages into the same partitions as the existing PGP. Otherwise, previously placed pages may be overwritten.

X'03' Conditional eject to next front-side partition. This control is used with N-up partitioning. If N-up is not specified, or if the presentation device does not support N-up, this control is processed as X'01' (eject to new sheet). If the medium level controls in the new medium map are not *identical* to the medium level controls in the existing medium map, or if the page level controls in the new medium map specify a different page placement than the page level controls in the existing medium map, this control is processed as X'01' (eject to new sheet). If the medium level controls in the new medium map are *identical* to the medium level controls in the existing medium map, and if both medium maps specify default page placement or both specify explicit page placement, the page level controls in the new medium map are activated and an eject to the next front-side partition is performed. The location of the next front-side partition is determined as follows:

- *Default page placement:* If currently placing pages on the front sheet side, the next front-side partition is the next sequential partition. If all partitions on the front sheet-side have been used, an implicit sheet eject is performed and processing continues with the first partition on the front side of the next sheet. If currently placing pages on the back sheet side, an implicit sheet eject is performed and processing continues with the first partition on the front side of the next sheet.
- *Explicit page placement:* The next front-side partition is defined by the repeating group in the new PGP that corresponds to the next repeating group specifying front sheet-side that was to be processed in the existing PGP. If all PGP repeating groups that specify front sheet-side have been processed, an implicit sheet eject is performed and processing continues with the first repeating group in the new PGP that specifies front sheet-side. For example, if the first repeating group in the existing PGP was last used to place a page, and if the second repeating group specifies a back-side partition and the third repeating group specifies a front-side partition, processing continues with the third repeating group in the new PGP.

Note: The new PGP should place pages into the same partitions as the existing PGP, otherwise previously-placed pages may be overwritten.

X'04' Conditional eject to next back-side partition. This control is used with N-up partitioning. If N-up is not specified, or if the presentation device does not support N-up, this control is processed as X'01' (eject to new sheet). If the medium level controls in the new medium map are not *identical* to the medium level controls in the existing medium map, or if the page level controls in the new medium map specify a different page placement than the page level controls in the existing medium map, this control is processed as X'01' (eject to new sheet). If the medium level controls in the new medium map are *identical* to the medium level controls in the existing medium map, and if both medium maps specify default page placement or both specify explicit page placement, the page level controls in the new medium map are activated and an eject to the next back-side partition is performed. The location of the next back-side partition is determined as follows:

- *Default page placement:* If currently placing pages on the back sheet side, the next back-side partition is the next sequential partition. If all partitions on the back sheet-side have been used, an implicit sheet eject is performed and processing continues with the first partition on the back side of the next sheet. If currently placing pages on the front sheet-side, processing continues with the first partition on the back sheet-side.

- *Explicit page placement:* The next back-side partition is defined by the repeating group in the new PGP that corresponds to the next repeating group specifying back sheet-side that was to be processed in the existing PGP. If all PGP repeating groups that specify back sheet-side have been processed, an implicit sheet eject is performed and processing continues with the first repeating group in the new PGP that specifies back sheet-side. For example, if the first repeating group in the existing PGP was last used to place a page, and if the second and third repeating groups specify front-side partitions and the fourth repeating group specifies a back-side partition, processing continues with the fourth repeating group in the new PGP.

  Note: The new PGP should place pages into the same partitions as the existing PGP, otherwise previously-placed pages may be overwritten.

All others Reserved

Note: If this triplet is not specified, the architected default for the EjCtrl parameter is X'01'; that is, perform a sheet eject and activate all controls specified by the invoked medium map.

Structured Field Using Triplet X'45'

- "Begin Medium Map (BMM)" on page 136

Measurement Units Triplet X'4B'

The Measurement Units triplet is used to specify the units of measure for a presentation space.

Triplet X'4B' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	8	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'4B'	Identifies the Measurement Units triplet	M	X'00'
2	CODE	XoaBase	X'00'–X'01'	Presentation space unit base for the X axis: **X'00'** 10 inches **X'01'** 10 centimeters	M	X'06'
3	CODE	YoaBase	X'00'–X'01'	Presentation space unit base for the Y axis: **X'00'** 10 inches **X'01'** 10 centimeters	M	X'06'
4–5	UBIN	XoaUnits	1–32,767	Presentation space units per unit base for the X axis	M	X'06'
6–7	UBIN	YoaUnits	1–32,767	Presentation space units per unit base for the Y axis	M	X'06'

Triplet X'4B' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Measurement Units triplet.

XoaBase Specifies the unit base for the X axis of the presentation space coordinate system.

YoaBase Specifies the unit base for the Y axis of the presentation space coordinate system.

Note: A X'01' exception condition exists if the XoaBase and YoaBase values are not identical.

XoaUnits Specifies the number of units per unit base for the X axis of the presentation space coordinate system.

YoaUnits Specifies the number of units per unit base for the Y axis of the presentation space coordinate system.

Structured Fields Using Triplet X'4B'

- “Include Object (IOB)” on page 201
- “Link Logical Element (LLE)” on page 226
- “Object Area Descriptor (OBD)” on page 300
- “Page Modification Control (PMC)” on page 327
- “Preprocess Presentation Object (PPO)” on page 329

Object Area Size Triplet X'4C'

The Object Area Size triplet is used to specify the extent of an object area in the X and Y directions.

Triplet X'4C' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	9	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'4C'	Identifies the Object Area Size triplet	M	X'00'
2	CODE	SizeType	X'02'	Specifies the actual object area size to be used	M	X'06'
3–5	UBIN	XoaSize	1–32,767	Object area extent for the X axis	M	X'06'
6–8	UBIN	YoaSize	1–32,767	Object area extent for the Y axis	M	X'06'

Triplet X'4C' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Object Area Size triplet.

SizeType Specifies the object area size type.

Value	Description
X'02'	Object Area Size
All others	Reserved

XoaSize Specifies the extent of the X axis of the object area coordinate system. This is also known as the object area's X axis size.

YoaSize Specifies the extent of the Y axis of the object area coordinate system. This is also known as the object area's Y axis size.

Structured Fields Using Triplet X'4C'

- "Include Object (IOB)" on page 201
- "Object Area Descriptor (OBD)" on page 300
- "Preprocess Presentation Object (PPO)" on page 329

Area Definition Triplet X'4D'

The Area Definition triplet is used to define the position and size of a rectangular area on a document component presentation space. The document component may be a page or overlay, in which case the area is defined on the page or overlay presentation space, or it may be a data object, in which case the area is defined on the object area presentation space.

Triplet X'4D' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	15	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'4D'	Identifies the Area Definition triplet	M	X'00'
2				Reserved; should be zero	M	X'06'
3–5	SBIN	XarOset	0–32,767	X-axis origin of the area	M	X'06'
6–8	SBIN	YarOset	0–32,767	Y-axis origin of the area	M	X'06'
9–11	UBIN	XarSize	1–32,767	Area extent for the X axis	M	X'06'
12–14	UBIN	YarSize	1–32,767	Area extent for the Y axis	M	X'06'

Triplet X'4D' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Area Definition triplet

XarOset Specifies the offset along the X axis of the presentation space coordinate system to the origin of the area.

YarOset Specifies the offset along the Y axis of the presentation space coordinate system to the origin of the area.

XarSize Specifies the extent of the area along the X axis of the presentation space coordinate system.

YarSize Specifies the extent of the area along the Y axis of the presentation space coordinate system.

Structured Field Using Triplet X'4D'

- “Link Logical Element (LLE)” on page 226

Color Specification Triplet X'4E'

The Color Specification triplet is used to specify a color value and defines the color space and encoding for that value.

Triplet X'4E' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	14–16	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'4E'	Identifies the Color Specification triplet	M	X'00'
2				Reserved; should be zero	M	X'06'
3	CODE	ColSpce	X'01', X'04', X'06', X'08', X'40'	Color space: **X'01'** RGB **X'04'** CMYK **X'06'** Highlight color space **X'08'** CIELAB **X'40'** Standard OCA color space	M	X'06'
4–7				Reserved; should be zero	M	X'06'
8	UBIN	ColSize1	X'01'–X'08', X'10'	Number of bits in component 1; see color space definitions	M	X'06'
9	UBIN	ColSize2	X'00'–X'08'	Number of bits in component 2; see color space definitions	M	X'06'
10	UBIN	ColSize3	X'00'–X'08'	Number of bits in component 3; see color space definitions	M	X'06'
11	UBIN	ColSize4	X'00'–X'08'	Number of bits in component 4; see color space definitions	M	X'06'
12–*n*		Color		Color specification; see "Triplet X'4E' Semantics" on page 391 for details	M	X'06'

Triplet X'4E' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Color Specification triplet.

ColSpce Is a code that defines the color space and the encoding for the color specification.

Value	Description
X'01'	RGB color space. The color value is specified with three components. Components 1, 2, and 3 are unsigned binary numbers that specify the red, green, and blue intensity values, in that order. ColSize1, ColSize2, and ColSize3 are non-zero and define the number of bits used to specify each component. ColSize4 is reserved and should be set to zero. The intensity range for the R,G,B components is 0 to 1, which is mapped to the binary value range 0 to ($2^{ColSizeN}$ - 1), where N=1,2,3.

Architecture Note: The reference white point and the chromaticity coordinates for RGB are defined in SMPTE RP 145-1987, entitled *Color Monitor Colorimetry*, and in RP 37-1969, entitled *Color Temperature for Color Television Studio Monitors*, respectively. The reference white point is commonly known as *Illuminant* D_{6500} or simply *D65*. The R,G,B components are assumed to be gamma-corrected (nonlinear) with a gamma of 2.2.

X'04' CMYK color space. The color value is specified with four components. Components 1, 2, 3, and 4 are unsigned binary numbers that specify the cyan, magenta, yellow, and black intensity values, in that order. ColSize1, ColSize2, ColSize3, and ColSize4 are non-zero and define the number of bits used to specify each component. The intensity range for the C,M,Y,K components is 0 to 1, which is mapped to the binary value range 0 to ($2^{\text{ColSize}N}$ - 1), where *N*=1,2,3,4. This is a presentation-system-dependent color space.

X'06' Highlight color space. This color space defines a request for the presentation device to generate a highlight color. The color value is specified with one to three components.

Component 1 is a two-byte unsigned binary number that specifies the highlight color number. The first highlight color is assigned X'0001', the second highlight color is assigned X'0002', and so on. The value X'0000' specifies the presentation device default color. ColSize1 = X'10' and defines the number of bits used to specify component 1.

Component 2 is an optional one-byte unsigned binary number that specifies a percent coverage for the specified color. Percent coverage can be any value from 0% to 100% (X'00'–X'64'). The number of distinct values supported is presentation-system dependent. If the coverage is less than 100%, the remaining coverage is achieved with color of medium. ColSize2 = X'00' or X'08' and defines the number of bits used to specify component 2. A value of X'00' indicates that component 2 is not specified in the color value, in which case the architected default for percent coverage is 100%. A value of X'08' indicates that component 2 is specified in the color value.

Component 3 is an optional one-byte unsigned binary number that specifies a percent shading, which is a percentage of black that is to be added to the specified color. Percent shading can be any value from 0% to 100% (X'00'–X'64'). The number of distinct values supported is presentation-system dependent. If percent coverage and percent shading are specified, the effective range for percent shading is 0% to (100-coverage)%. If the sum of percent coverage plus percent shading is less than 100%, the remaining coverage is achieved with color of medium. ColSize3 = X'00' or X'08' and defines the number of bits used to specify component 3. A value of X'00' indicates that component 3 is not specified in the color value, in which case the architected default for percent shading is 0%. A value of X'08' indicates that component 3 is specified in the color value.

Implementation Note: The percent shading parameter is currently not supported in AFP environments.

ColSize4 is reserved and should be set to zero. This is a presentation-system-dependent color space.

Architecture Notes:

1. The color that is rendered when a highlight color is specified is presentation-system dependent. For presentation devices that support colors other than black, highlight color values in the range X'0001' to

X'FFFF' may be mapped to any color. For bilevel devices, the color may be simulated with a graphic pattern.

2. If the specified highlight color is “presentation device default”, devices whose default color is black use the percent coverage parameter, which is specified in component 2, to render a percent shading.
3. On printing devices, the color of medium is normally white, in which case a coverage of *n*% results in adding (100-*n*)% white to the specified color, or *tinting* the color with (100-*n*)% white. Display devices may assume the color of medium to always be white and use this algorithm to render the specified coverage.
4. The highlight color space can also specify indexed colors when used in conjunction with a Color Mapping Table (CMT) or an Indexed (IX) Color Management Resource (CMR). In that case, component 1 specifies a two-byte value that is the index into the CMT or the IX CMR, and components 2 and 3 are ignored. Note that when both a CMT and Indexed CMRs are used, the CMT is always accessed first. To preserve compatibility with existing highlight color devices, indexed color values X'0000' – X'00FF' are reserved for existing highlight color applications and devices. That is, indexed colors values in the range X'0000' – X'00FF', assuming they are not mapped to a different color space in a CMT, are mapped directly to highlight colors. Indexed color values in the range X'0100' – X'FFFF', assuming they are not mapped to a different color space in a CMT, are used to access Indexed CMRs. For a description of the CMT, see “The Color Mapping Table Resource” on page 524.

X'08' CIELAB color space. The color value is specified with three components. Components 1, 2, and 3 are binary numbers that specify the L, a, b values, in that order, where L is the luminance and a and b are the chrominance differences. Component 1 specifies the L value as an unsigned binary number; components 2 and 3 specify the a and b values as signed binary numbers. ColSize1, ColSize2, and ColSize3 are non-zero and define the number of bits used to specify each component. ColSize4 is reserved and should be set to zero. The range for the L component is 0 to 100, which is mapped to the binary value range 0 to (2^{ColSize1} - 1). The range for the a and b components is -127 to +127, which is mapped to the binary range -($2^{\text{ColSize}N-1}$ - 1) to +($2^{\text{ColSize}N-1}$ - 1).

For color fidelity, 8-bit encoding should be used for each component, that is, ColSize1, ColSize2, and ColSize3 are set to X'08'. When the recommended 8-bit encoding is used for the a and b components, the range is extended to include -128, which is mapped to the value X'80'. If the encoding is less than 8 bits, treatment of the most negative binary endpoint for the a and b components is presentation-system dependent, and tends to be insignificant because of the quantization error.

Architecture Note: The reference white point for CIELAB is known as *D50* and is defined in CIE publication 15-2 entitled *Colorimetry*.

X'40' Standard OCA color space. The color value is specified with one component. Component 1 is an unsigned binary number that specifies a named color using a two-byte value from the Standard OCA Color Value Table. For a complete description of the Standard OCA Color Value Table, see “Standard OCA Color Value Table” on page 521. ColSize1 = X'10' and defines the number of bits used to specify component 1. ColSize2, ColSize3, ColSize4 are reserved and should be set to zero. This is a presentation-system-dependent color space.

All others Reserved

ColSize1 Defines the number of bits used to specify the first color component. The color component is right-aligned and padded with zeros on the left to the nearest byte boundary. For example, if ColSize1 = X'06', the first color component has two padding bits.

ColSize2 Defines the number of bits used to specify the second color component. The color component is right-aligned and padded with zeros on the left to the nearest byte boundary.

ColSize3 Defines the number of bits used to specify the third color component. The color component is right-aligned and padded with zeros on the left to the nearest byte boundary.

ColSize4 Defines the number of bits used to specify the fourth color component. The color component is right-aligned and padded with zeros on the left to the nearest byte boundary.

Color Specifies the color value in the defined format and encoding. Note that the number of bytes specified for this parameter depends on the color space. For example, when using 8 bits per component, an RGB color value is specified with 3 bytes, while a CMYK color value is specified with 4 bytes. If extra bytes are specified, they are ignored as long as the triplet length is valid.

Architecture Note: For a description of color spaces and their relationships, see R. Hunt, *The Reproduction of Colour in Photography, Printing, and Television* (Fifth Edition, Fountain Press, 1995).

Structured Fields Using Triplet X'4E'

- "Container Data Descriptor (CDD)" on page 170
- "Include Object (IOB)" on page 201
- "Object Area Descriptor (OBD)" on page 300
- "Page Descriptor (PGD)" on page 310
- "Preprocess Presentation Object (PPO)" on page 329

Encoding Scheme ID Triplet X'50'

The Encoding Scheme ID triplet is used to specify the encoding scheme associated with a code page. It may optionally also specify the encoding scheme for the user data.

Triplet X'50' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	4, 6	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'50'	Identifies the Encoding Scheme ID triplet	M	X'00'
2–3	CODE	ESidCP	See “Triplet X'50' Semantics” on page 395	Encoding Scheme Identifier for Code Page	M	X'06'
4–5	CODE	ESidUD	See “Triplet X'50' Semantics” on page 395	Encoding Scheme Identifier for User Data	O	X'00'

Triplet X'50' Semantics

Architecture Note: The encoding scheme defined in this triplet is based on the encoding scheme identifier defined by the IBM Character Data Representation Architecture (CDRA). However, only those values applicable to MO:DCA environments are exposed. The remainder of the values are reserved at this time. Note also that the bit definitions for the ESidCP and ESidUD parameters are informational; the codes defined in Table 24 on page 397, Table 25 on page 397, and Table 26 on page 397 should be used as the valid parameter values. See the *Character Data Representation Architecture Reference and Registry*, SC09-2190, for detailed information on the encoding scheme identifier.

Tlength Contains the length of the triplet.

Tid Identifies the Encoding Scheme ID triplet.

ESidCP Specifies the encoding scheme used for a code page.

Note: See the appropriate structured field descriptions for definitions of the default code page encoding if this triplet is omitted.

Bit **Description**

0–3 Basic Encoding Structure

X'0' Encoding structure not specified. Defaults to presentation environment encoding structure.

X'2' IBM-PC Data; an extension of the ISO 646 (ASCII-based) 7-bit encoding to an 8-bit encoding.

X'3' IBM-PC Display; an extension of the ISO 646 (ASCII-based) 7-bit encoding to an 8-bit encoding.

Implementation Note: The IBM-PC Display encoding scheme is not used in AFP FOCA fonts.

X'6' EBCDIC Presentation; all code points assigned to graphic characters.

X'7' UTF-16, including surrogates.

Architecture Note: The UTF-16 character encoding is defined in the Unicode Standard, which is available from the Unicode Consortium at: `www.unicode.org`.

X'8' Unicode Presentation; a subset of UTF-16 that contains only 2-byte code points that can be directly mapped to a single glyph. The byte order is big endian.

Implementation Note: The Unicode Presentation encoding scheme is only used in the AFP FOCA Unicode Migration fonts.

All others Reserved

4–7 Number of Bytes per Code Point

X'0' Reserved for use with zero value for the basic encoding structure
X'1' Fixed single-byte
X'2' Fixed double-byte
All others Reserved

8–15 Code Extension Method

X'00' No extensions are specified

ESidUD Specifies the encoding scheme for the user data that is to be rendered with the referenced font.

Note: See the appropriate structured field descriptions for definitions of the default user data encoding if this parameter in the X'50' triplet is omitted or if the complete X'50' triplet is omitted.

Bit **Description**

0–3 Basic Encoding Structure

X'7' UTF-16, including surrogates. The byte order is big endian (UTF-16BE).
All others Reserved

4–7 Number of Bytes per Code Point

X'2' Fixed double-byte
X'8' UTF-n variable number of bytes, self describing
All others Reserved

8–15 Code Extension Method

X'00' No extensions are specified
X'07' UTF-8 Universal Transformation Format
All others Reserved

Architecture Note: The UTF-16 character encoding is defined in the Unicode Standard, which is available from the Unicode Consortium at: `www.unicode.org`.

Table 24 on page 397 and Table 25 on page 397 list the complete ESidCP and ESidUD values that are supported.

Table 24. Supported ESidCP Values

ESidCP	Definition
X'0000'	ESidCP not specified; use presentation environment default encoding
X'0100'	Presentation environment default SBCS encoding
X'0200'	Presentation environment default DBCS encoding
X'2100'	PC-Data SBCS (ASCII-based)
X'3100'	PC-Display SBCS (ASCII-based)
X'6100'	EBCDIC Presentation SBCS
X'6200'	EBCDIC Presentation DBCS
X'7200'	UTF-16, including surrogates
X'8200'	Unicode Presentation; byte order is big endian

Table 25. Supported ESidUD Values

ESidUD	Definition
X'7200'	UTF-16, including surrogates; byte order is big endian (UTF-16BE)
X'7807'	UTF-8

Application Note: When ESidUD does not match ESidCP, the presentation system may need to transform the user data to match the encoding in the code page. Not all presentation systems support such transforms. To see which transforms are supported, consult your product documentation.

Architecture Note: The following additional ESidUD values are allowed in AFP Line Data when the X'50' triplet is specified on the Begin Data Map (BDM) structured field in a Page Definition.

Table 26. Additional ESidUD Values in AFP Line Data

ESidUD	Definition
X'2100'	PC-Data SBCS (ASCII-based)
X'6100'	EBCDIC Presentation SBCS

Structured Fields Using Triplet X'50'

- “Map Coded Font (MCF) Format 2” on page 237
- “Map Data Resource (MDR)” on page 246

Medium Map Page Number Triplet X'56'

The Medium Map Page Number triplet is used to specify the sequence number of the page in the set of sequential pages whose presentation is controlled by the most recently activated medium map.

Triplet X'56' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'56'	Identifies the Medium Map Page Number triplet	M	X'00'
2–5	UBIN	PageNum	X'00000001'–X'7FFFFFFF'	Sequence Number of Page	M	X'06'

Triplet X'56' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Medium Map Page Number triplet.

PageNum Specifies the sequence number of the page in the set of sequential pages whose presentation is controlled by the active medium map. The first page in this set has sequence number 1.

Structured Fields Using Triplet X'56'

- "Begin Named Page Group (BNG)" on page 140
- "Begin Page (BPG)" on page 152
- "Index Element (IEL)" on page 197

Object Byte Extent Triplet X'57'

The Object Byte Extent triplet is used to specify the number of bytes contained in an object.

Triplet X'57' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6, 10	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'57'	Identifies the Object Byte Extent triplet	M	X'00'
2–5	UBIN	ByteExt	X'00000000'–X'FFFFFFFF'	Byte Extent of Object	M	X'06'
6–9	UBIN	BytExtHi	X'00000000'–X'FFFFFFFF'	Byte extent of object, high-order bytes	O	X'00'

Triplet X'57' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Object Byte Extent triplet.

ByteExt Specifies the number of bytes contained in the object. The first byte of the Begin Object structured field is counted as the first byte in the object, and the last byte in the End Object structured field is counted as the last byte of the object. Objects that are bounded by Begin/End structured fields have a minimum byte extent of X'00000010'. When this triplet is used to specify the byte extent of object data that is not bounded by Begin/End structured fields, the minimum byte extent is X'00000000'.

BytExtHi If specified, indicates that this triplet specifies the byte extent as an 8-byte parameter, where ByteExt specifies the low-order 4 bytes and BytExtHi specifies the high-order 4 bytes.

Structured Fields Using Triplet X'57'

- “Begin Object Container (BOC)” on page 144
- “Index Element (IEL)” on page 197

Object Structured Field Offset Triplet X'58'

The Object Structured Field Offset triplet is used to specify the structured field offset of an indexed object from the beginning of the document.

Triplet X'58' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6, 10	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'58'	Identifies the Object Structured Field Offset triplet	M	X'00'
2–5	UBIN	SFOff	X'00000000'–X'FFFFFFFE'	Structured field offset	M	X'06'
			X'FFFFFFFF'	If bytes 6–9 are not specified, object is outside document		
6–9	UBIN	SFOffHi	X'00000000'–X'FFFFFFFF'	Structured field offset, high-order bytes	O	X'00'

Triplet X'58' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Object Structured Field Offset triplet.

SFOff Specifies the offset, in structured fields, of the Begin structured field of an indexed object from the beginning of the document. The first structured field in the document, which is the Begin Document (BDT) structured field, has an offset of 0. The second structured field, which immediately follows the BDT, has an offset of 1, and the *n*th structured field in the document has an offset of (*n*-1). The structured field offset has a range of X'00000000' to X'FFFFFFFE'. A value of X'FFFFFFFF' signifies that the indexed object is outside the document.

SFOffHi If specified, indicates that this triplet specifies the structured field offset as an 8-byte parameter, where SFOff specifies the low-order 4 bytes and SFOffHi specifies the high-order 4 bytes. In that case, the value SFOff = X'FFFFFFFF' is a real offset value and does *not* signify that the indexed object is outside the document.

Structured Field Using Triplet X'58'

- "Index Element (IEL)" on page 197

Object Structured Field Extent Triplet X'59'

The Object Structured Field Extent triplet is used to specify the number of structured fields contained in an object, starting with the Begin Object structured field and ending with the End Object structured field.

Triplet X'59' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6, 10	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'59'	Identifies the Object Structured Field Extent triplet	M	X'00'
2–5	UBIN	SFExt	X'00000002'–X'FFFFFFFF'	Number of structured fields in Object	M	X'06'
6–9	UBIN	SFExtHi	X'00000000'–X'FFFFFFFF'	Number of structured fields in object, high-order bytes	O	X'00'

Triplet X'59' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Object Structured Field Extent triplet.

SFExt Specifies the number of structured fields contained in the object. The Begin Object structured field is counted as the first structured field in the object, and the End Object structured field is counted as the last structured field of the object.

SFExtHi If specified, indicates that this triplet specifies the structured field extent as an 8-byte parameter, where SFExt specifies the low-order 4 bytes and SFExtHi specifies the high-order 4 bytes.

Structured Field Using Triplet X'59'

- "Index Element (IEL)" on page 197

Object Offset Triplet X'5A'

The Object Offset triplet specifies the number of objects of a particular type that precede a selected object in the document. If the object being counted is a document, this triplet specifies the number of documents that precede the selected object in the print file.

Triplet X'5A' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	8, 12	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'5A'	Identifies the Object Offset triplet	M	X'00'
2	CODE	ObjTpe	X'A8', X'AF'	Object type to be counted: **X'A8'** Document **X'AF'** Page or paginated object	M	X'06'
3				Reserved; should be zero	M	X'06'
4–7	UBIN	ObjOset	X'00000000'–X'FFFFFFFF'	Number of objects that precede the selected object in the document or print file	M	X'06'
8–11	UBIN	ObjOstHi	X'00000000'–X'FFFFFFFF'	Number of objects that precede the selected object, high-order bytes	O	X'00'

Triplet X'5A' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Object Offset triplet.

ObjTpe Specifies the object type to be counted. An object may occur at multiple levels. For instance, a page object may occur directly in a document, which would be considered a first-level occurrence of the page object, or it may occur in a page group in the document, which would be considered a second-level occurrence of the page object, and so on.

Value **Description**

X'A8' The object is a document. The ObjOset and optional ObjOstHi parameters specify the number of documents that precede the selected object in the print file.

X'AF' The object is a page or paginated object. The ObjOset and optional ObjOstHi parameters specify the number of pages or paginated objects that precede the selected object in the document or file.

Note: If a page is included with an Include Page (IPG) structured field in document state or page-group state, it is counted as a page object. If the IPG occurs in page state, the included page becomes part of the containing page, therefore only the containing page is counted as a page object.

Architecture Note: A paginated object is a data object that can be rendered on a single page and that can be treated as a single page. An example of a paginated object is a single image in a multi-image TIFF file. Note that in TIFF files, image-like structures such as thumbnails and image masks are considered to be a part of the paginated image object but are not themselves considered paginated objects. Another example is a single page object in a PDF file. Such a page object is selected for presentation by its page number; other identifiers such as object numbers in the PDF file are not used for selection.

Implementation Note: The ordering of paginated image objects in a TIFF file may be defined explicitly with page numbers, or implicitly based on the position of the image object in the file. The page offset specified by this triplet can be applied to either ordering, but the explicit page numbering, if specified, always has higher priority.

All others Reserved

ObjOset Specifies the number of objects, whose type is identified by ObjTpe, that precede the selected object. Only complete objects, that is, objects bounded by a Begin and an End, are counted. For example, if this triplet occurs on the BNG of a nested page group Gn, the page group containing Gn is not counted since its End structured field does not precede Gn. For a given object type being counted, the offset to the *n*th occurrence of that object type is (*n*-1). For example, if pages are being counted, the page offset of the first page in the document is 0, the page offset of the second page is 1, and the page offset of the *n*th page is (*n*-1). A page included with an IPG is also counted, but only when the IPG occurs in document state or page-group state, not when it occurs in page state. Unless otherwise specified, all complete object occurrences at all levels are counted.

ObjOstHi If specified, indicates that this triplet specifies the number of preceding objects as an 8-byte parameter, where ObjOset specifies the low-order 4 bytes and ObjOstHi specifies the high-order 4 bytes.

Structured Fields Using Triplet X'5A'

- “Container Data Descriptor (CDD)” on page 170
- “Index Element (IEL)” on page 197
- “Include Object (IOB)” on page 201
- “Include Page (IPG)” on page 219
- “Map Data Resource (MDR)” on page 246
- “Medium Finishing Control (MFC)” on page 265
- “Map Page (MPG)” on page 292
- “Presentation Environment Control (PEC)” on page 306
- “Preprocess Presentation Object (PPO)” on page 329

Font Horizontal Scale Factor Triplet X'5D'

The Font Horizontal Scale Factor triplet is used to carry information to support anamorphic scaling of an outline technology font.

Triplet X'5D' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	4	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'5D'	Identifies the Font Horizontal Scale Factor triplet	M	X'00'
2–3	UBIN	Hscale	1–32,767	Specifies the horizontal scale factor in 1440ths of an inch (20ths of a point)	M	X'06'

Triplet X'5D' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Font Horizontal Scale Factor triplet.

Hscale Specifies the horizontal scale factor that is to be applied to the horizontal font dimension when scaling an outline technology font. This scale factor is specified in 1440ths of an inch (20ths of a point). If the font horizontal scale factor is the same as the specified vertical font size, the font scaling is uniform. If the font horizontal scale factor is not the same as the specified vertical font size, the font scaling is anamorphic, and the graphic characters are stretched or compressed in the horizontal direction relative to the vertical direction by the ratio of font horizontal scale factor divided by the specified vertical font size.

Structured Field Using Triplet X'5D'

- “Map Coded Font (MCF) Format 2” on page 237

Object Count Triplet X'5E'

The Object Count triplet specifies the number of subordinate objects of a particular type contained in an object.

Triplet X'5E' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	8, 12	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'5E'	Identifies the Object Count triplet	M	X'00'
2	CODE	SubObj	X'AF'	Subordinate object type: **X'AF'** Page	M	X'04'
3				Reserved; should be zero	M	X'06'
4–7	UBIN	SObjNum	X'00000000'–X'FFFFFFFF'	Number of subordinate objects contained in this object	M	X'06'
8–11	UBIN	SObjNmHi	X'00000000'–X'FFFFFFFF'	Number of subordinate objects, high-order bytes	O	X'00'

Triplet X'5E' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Object Count triplet.

SubObj Specifies the subordinate object type. A subordinate object may occur at multiple levels within an object. For instance, a page object may occur directly in a page group, which would be considered a first-level occurrence of the subordinate object, or it may occur in a page group that is nested in the first page group, which would be considered a second-level occurrence of the subordinate object, and so on.

Value	Description
X'AF'	The subordinate object is a page. The SObjNum and optional SObjNmHi parameters specify the number of pages contained in the object. **Note:** If a page is included with an Include Page (IPG) structured field in document state or page group state, it is counted as a page object. If the IPG occurs in page state, the included page becomes part of the containing page, therefore only the containing page is counted as a page object.
All others	Reserved

SObjNum Specifies the number of subordinate objects, whose type is identified by SubObj, that are contained in this object. Unless otherwise specified, all subordinate-object occurrences at all levels are counted.

SObjNmHi If specified, indicates that this triplet specifies the count of subordinate objects as an 8-byte parameter, where SObjNum specifies the low-order 4 bytes and SObjNmHi specifies the high-order 4 bytes.

Structured Fields Using Triplet X'5E'

- "Begin Named Page Group (BNG)" on page 140

- “Begin Print File (BPF)” on page 150
- “Index Element (IEL)” on page 197

Local Date and Time Stamp Triplet X'62'

The Local Date and Time Stamp triplet specifies a date and time stamp to be associated with an object.

Triplet X'62' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	17	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'62'	Identifies the Local Date and Time Stamp triplet	M	X'00'
2	CODE	StampType	X'00'–X'01', X'03'	Specifies the date and time stamp type: **X'00'** Creation **X'01'** Retired value **X'03'** Revision	M	X'06'
3	CODE	THunYear	X'40', X'F0'–X'F9'	Hundreds position and implied thousands position of year AD: **X'40'** 19*xx* **X'F0'–X'F9'** 20*xx*–29*xx*	M	X'06'
4–5	CODE	TenYear	X'F0F0'–X'F9F9'	Tens and units position of year AD	M	X'06'
6–8	CODE	Day	X'F0F0F1'–X'F3F6F6'	Day of year	M	X'06'
9–10	CODE	Hour	X'F0F0'–X'F2F3'	Hour of day	M	X'06'
11–12	CODE	Minute	X'F0F0'–X'F5F9'	Minute of hour	M	X'06'
13–14	CODE	Second	X'F0F0'–X'F5F9'	Second of minute	M	X'06'
15–16	CODE	HundSec	X'F0F0'–X'F9F9'	Hundredth of second	M	X'06'

Triplet X'62' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Local Date and Time Stamp triplet.

StampType Specifies the type of date and time stamp.

Value	**Description**
X'00'	Object creation date and time stamp
X'01'	Retired date and time stamp type. See "Retired Parameters" on page 570.
X'03'	Object revision date and time stamp
All others	Reserved

THunYear Implies the thousands position (the millennium) of the year AD and specifies the hundreds position, using the Gregorian calendar. The 20*xx*s are encoded as X'F0', the 21*xx*s as X'F1', the 22*xx*s as X'F2', and so on. To differentiate the 19*xx*s (9*xx*s in the second millennium AD) from the 29*xx*s (9*xx*s in the third millennium AD), the 19*xx*s are encoded as X'40'. This parameter therefore generates the CC component of a date in the format *CCYYDDD* as defined in ISO 8601:1988(E), *Data elements and interchange formats—Information Interchange—Representation of dates and times*.

TenYear Specifies the tens position and the units position of the year AD, using the Gregorian calendar. Forms the *YY* component of a date in the format *CCYYDDD*.

This parameter, together with the ThunYear parameter, specifies the year AD. For example, the year 1999 AD is encoded as X'40F9F9', the year 2000 AD is encoded as X'F0F0F0', and the year 2001 AD is encoded as X'F0F0F1'.

Day Specifies the day of the year, using the Gregorian calendar. Forms the *DDD* component of a date in the format *CCYYDDD*.

As an example, the date February 1, 1972 is restructured as “72032” and encoded as X'40F7F2F0F3F2', the date December 31, 1999 is restructured as “99365” and encoded as X'40F9F9F3F6F5', the date January 1, 2000 is restructured as “000001” and encoded as X'F0F0F0F0F0F1', and the date February 3, 2072 is restructured as “072034” and encoded as X'F0F7F2F0F3F4'.

Hour Specifies the hour of the day. Forms the *HH* component of a timestamp in the format *HHMMSShh*.

Minute Specifies the minute of the hour. Forms the *MM* component of a timestamp in the format *HHMMSShh*.

Second Specifies the second of the minute. Forms the *SS* component of a timestamp in the format *HHMMSShh*.

HundSec Specifies hundredth of a second. Forms the *hh* component of a timestamp in the format *HHMMSShh*.

As an example, the time 4:35:21.56 PM is encoded as X'F1F6F3F5F2F1F5F6'.

Architecture Notes:

1. This triplet specifies an EBCDIC encoding for numbers used to record date and time. This encoding represents a number in the range 0–9 with a code point X'F*n*', where *n* is the number.

Structured Fields Using Triplet X'62'

Either this triplet or the Universal Date and Time Stamp (X'72') triplet may occur once.

- “Begin Bar Code Object (BBC)” on page 121
- “Begin Document Index (BDI)” on page 126
- “Begin Form Map (BFM)” on page 131
- “Begin Graphics Object (BGR)” on page 132
- “Begin Image Object (BIM)” on page 134
- “Begin Overlay (BMO)” on page 138
- “Begin Object Container (BOC)” on page 144
- “Begin Page Segment (BPS)” on page 155
- “Begin Presentation Text Object (BPT)” on page 157
- “Begin Resource Group (BRG)” on page 159

Comment Triplet X'65'

The Comment triplet is used to include comments for documentation purposes within a structured field.

Triplet X'65' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3–254	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'65'	Identifies the Comment triplet	M	X'00'
2–*n*	CHAR	Comment		Text of the comment	M	X'06'

Triplet X'65' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Comment triplet.

Comment Is a character string which has meaning only to the generator of this MO:DCA document. There can be no semantics associated with this character string. Therefore, the content of the triplet may be ignored by receivers of the MO:DCA document.

Structured Fields Using Triplet X'65'

- "Begin Active Environment Group (BAG)" on page 120
- "Begin Bar Code Object (BBC)" on page 121
- "Begin Document Environment Group (BDG)" on page 125
- "Begin Document Index (BDI)" on page 126
- "Begin Document (BDT)" on page 128
- "Begin Form Map (BFM)" on page 131
- "Begin Graphics Object (BGR)" on page 132
- "Begin Image Object (BIM)" on page 134
- "Begin Medium Map (BMM)" on page 136
- "Begin Overlay (BMO)" on page 138
- "Begin Named Page Group (BNG)" on page 140
- "Begin Object Container (BOC)" on page 144
- "Begin Object Environment Group (BOG)" on page 149
- "Begin Print File (BPF)" on page 150
- "Begin Page (BPG)" on page 152
- "Begin Page Segment (BPS)" on page 155
- "Begin Presentation Text Object (BPT)" on page 157
- "Begin Resource (BRS)" on page 161
- "Begin Resource Group (BRG)" on page 159
- "Begin Resource Environment Group (BSG)" on page 169

Medium Orientation Triplet X'68'

The Medium Orientation triplet may be used to specify the orientation of the medium presentation space on the physical medium.

Triplet X'68' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'68'	Identifies the Medium Orientation triplet	M	X'00'
2	CODE	MedOrient	X'00'–X'05'	Orientation of the medium presentation space: **X'00'** Portrait **X'01'** Landscape **X'02'** Reverse Portrait **X'03'** Reverse Landscape **X'04'** Portrait 90 **X'05'** Landscape 90	M	X'06'

Triplet X'68' Semantics

Tlength Contains the length of the triplet.

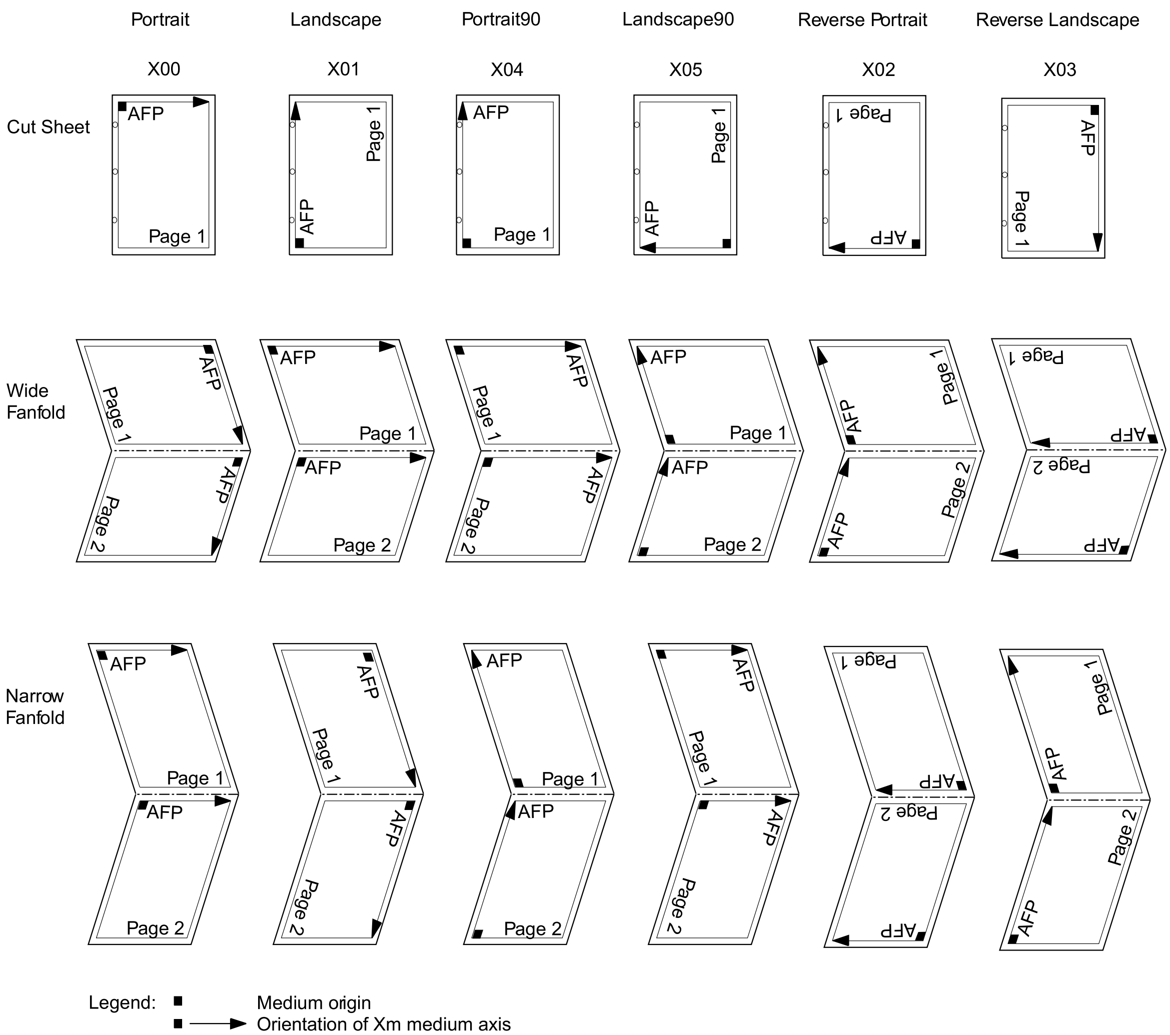
Tid Identifies the Medium Orientation triplet.

MedOrient Specifies the position and orientation of the medium presentation space on the physical medium.

Value	Description
X'00'	**Portrait**. The origin of the medium presentation space is positioned such that the top of the presentation space (X_m axis) is parallel to a short side of the physical medium as shown in the Portrait column of Figure 73 on page 411.
X'01'	**Landscape**. The origin of the medium presentation space is positioned such that the top of the presentation space (X_m axis) is parallel to a long side of the physical medium as shown in the Landscape column of Figure 73 on page 411.
X'02'	**Reverse Portrait**. The origin of the medium presentation space is positioned such that the top of the presentation space (X_m axis) is parallel to a short side of the physical medium as shown in the Reverse Portrait column of Figure 73 on page 411.
X'03'	**Reverse Landscape**. The origin of the medium presentation space is positioned such that the top of the presentation space (X_m axis) is parallel to a long side of the physical medium as shown in the Reverse Landscape column of Figure 73 on page 411.
X'04'	**Portrait 90**. The origin of the medium presentation space is positioned such that the top of the presentation space (X_m axis) is parallel to a long side of the physical medium as shown in the Portrait 90 column of Figure 73 on page 411.

X'05' **Landscape 90**. The origin of the medium presentation space is positioned such that the top of the presentation space (X_m axis) is parallel to a short side of the physical medium as shown in the Landscape 90 column of Figure 73 on page 411.

Figure 73. Landscape and Portrait Orientation and Layout



Note: In Figure 73 on page 411, the text "AFP", "Page 1", and "Page 2" is printed in the 0° text orientation for the Portrait, Landscape, Reverse Portrait, and Reverse Landscape medium orientations, and in the 90° text orientation for the Portrait 90 and Landscape 90 medium orientations.

See Figure 61 on page 320 to Figure 72 on page 326 for a complete description of medium orientations with N-up presentation.

Structured Field Using Triplet X'68'

- "Medium Descriptor (MDD)" on page 244

Resource Object Include Triplet X'6C'

The Resource Object Include triplet identifies an object to be included on a presentation space at a specified position.

Triplet X'6C' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	17, 19	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'6C'	Identifies the Resource Object Include triplet	M	X'00'
2	CODE	ObjType	X'DC', X'DF', X'5F'	Specifies the object type: **X'DC'** Preprinted Form Overlay (PFO) object **X'DF'** Overlay object **X'5F'** Retired for private use	M	X'06'
3–10	CHAR	ObjName		Name of the object	M	X'06'
11–13	SBIN	XobjOset	-32,768 – 32,767	X axis origin for the object	M	X'06'
14–16	SBIN	YobjOset	-32,768 – 32,767	Y axis origin for the object	M	X'06'
17–18	CODE	ObOrent	X'0000', X'2D00', X'5A00', X'8700'	The overlay's X-axis rotation from the X axis of the including presentation system **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees	O	X'00'

Triplet X'6C' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Resource Object Include triplet.

ObjType Specifies the object type.

Value	**Description**
X'DC'	Preprinted Form Overlay (PFO) object
X'DF'	Overlay object
X'5F'	Retired for private use
All others	Reserved

ObjName Specifies the object name.

XobjOset Specifies the offset along the X axis of the including presentation space coordinate system to the origin of the X axis for the object.

YobjOset Specifies the offset along the Y axis of the including presentation space coordinate system to the origin of the Y axis for the object.

ObOrent This is an optional parameter that is only supported for ObjType X'DF' = Overlay object; the parameter is ignored for other object types. Specifies the amount of rotation of the overlay's X axis, X_{ol}, about the overlay origin relative to the X axis of the including presentation space.

Note that if this triplet is specified on a Page Modification Control (PMC) structured field, the including presentation space is a page, and the rotation is measured with respect to the X_p axis of the page coordinate system. Valid values are the following:

Value	Character Rotation
X'0000'	0 degrees
X'2D00'	90 degrees
X'5A00'	180 degrees
X'8700'	270 degrees
All others	Reserved

The overlay Y axis rotation is always 90 degrees greater than the overlay X axis rotation.

Note: If this parameter is omitted, the architected default value for the overlay rotation is X'0000', zero degrees.

Architecture Note: This triplet is used in AFP line-data environments on an LND structured field in a Page Definition object to position overlays (ObjType = X'DF') and page segments (ObjType = X'5F') with respect to line data. For a description of the Page Definition object and the processing of line data in AFP environments, see the *Advanced Function Presentation: Programming Guide and Line Data Reference*.

Structured Field Using Triplet X'6C'

- "Page Modification Control (PMC)" on page 327

Presentation Space Reset Mixing Triplet X'70'

This triplet is used to specify the resulting appearance when data in a new presentation space is merged with data in an existing presentation space.

Triplet X'70' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'70'	Identifies the Presentation Space Reset Mixing triplet	M	X'00'
2	BITS	BgMxFlag	See Triplet X'70' Semantics for details.	Background mixing flags	M	X'04'

Triplet X'70' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Presentation Space Reset Mixing triplet.

BgMxFlag Specifies the type of presentation space mixing as follows:

Bit **Description**

0 Reset Flag

B'0' Do not reset to the color of the medium prior to placing data into this MO:DCA presentation space. This results in the new presentation space mixing with the existing presentation space in accordance with the default MO:DCA mixing rule. Specifically, the background of the new presentation space underpaints both the background and the foreground of the existing presentation space, and the foreground of the new presentation space overpaints the background and the foreground of the existing presentation space.

B'1' Reset to the color of the medium prior to placing data into this MO:DCA presentation space. The presentation space becomes foreground data that is colored with the color of medium before any data is placed into this space. This results in the new presentation space mixing with the existing presentation space in an opaque manner. Specifically, the new presentation space, which is all foreground data, overpaints the background and foreground of the existing presentation space.

All others Reserved

Note: If this triplet is omitted, the architected default value for the Reset Flag is B'0'—do not reset to color of medium.

Structured Fields Using Triplet X'70'

- “Include Object (IOB)” on page 201
- “Object Area Descriptor (OBD)” on page 300

- "Page Descriptor (PGD)" on page 310

Presentation Space Mixing Rules Triplet X'71'

This triplet is used to specify the rules for establishing the color attribute of areas formed by the intersection of two presentation spaces. It is specified on structured fields associated with a presentation space that is to be merged onto an existing presentation space.

Triplet X'71' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	4–10	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'71'	Identifies the Presentation Space Mixing Rules triplet	M	X'00'
2–*n*	CODE	One or more occurrences of the keywords in the following table, in ascending order				

Keyword ID	Parameter Range	Meaning	M/O	Exc
X'70'	X'01'–X'03', X'FF'	Mixing rule for background-on-background mixing	O	X'02'
X'71'	X'01'–X'03', X'FF'	Mixing rule for background-on-foreground mixing	O	X'02'
X'72'	X'01'–X'03', X'FF'	Mixing rule for foreground-on-background mixing	O	X'02'
X'73'	X'01'–X'03', X'FF'	Mixing rule for foreground-on-foreground mixing	O	X'02'

Triplet X'71' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Presentation Space Mixing Rules triplet.

Keywords One or more keywords that specify the rules for presentation space mixing. Each keyword may appear once and specifies one of the four mixing types along with the mixing rule for that mixing type. In the definitions that follow, the existing presentation space is identified by the subscript *e*, the new presentation space that is merged with the existing presentation space and that contains the Presentation Space Mixing Rules triplet is identified by the subscript *n*, the letter “B” stands for “Background”, and the letter “F” stands for “Foreground”. The Presentation Space Mixing Rules triplet appears on structures associated with the new presentation space. To completely specify the mixing of two presentation spaces, this triplet must contain four mixing rule keywords, one for each mixing type. If no keyword is specified for a particular mixing type, the MO:DCA default mixing rule is applied to this mixing type.

Keyword X'70*nn*' May occur once. Specifies the mixing rule for B_n on B_e (background on background) mixing.

Keyword X'71*nn*' May occur once. Specifies the mixing rule for B_n on F_e (background on foreground) mixing.

Keyword X'72*nn*' May occur once. Specifies the mixing rule for F_n on B_e (foreground on background) mixing.

Keyword X'73*nn*' May occur once. Specifies the mixing rule for F_n on F_e (foreground on foreground) mixing.

The following mixing rule specifications are supported in the data bytes for keywords X'70'–X'73'. For a definition of these mixing rules, see "Mixing Rules" on page 44.

Value	Definition
X'01'	Overpaint
X'02'	Underpaint
X'03'	Blend
X'FF'	MO:DCA default mixing rule
All others	Reserved

Note: If this triplet is not supported by a receiver, the architected default is to use the default mixing rule when mixing the new presentation space with the existing presentation space.

Implementation Note: The Presentation Space Mixing Rules (X'71') triplet is currently not used in AFP environments.

Structured Fields Using Triplet X'71'

- "Include Object (IOB)" on page 201
- "Object Area Descriptor (OBD)" on page 300
- "Page Descriptor (PGD)" on page 310

Universal Date and Time Stamp Triplet X'72'

The Universal Date and Time Stamp triplet specifies a date and time in accordance with the format defined in ISO 8601:1988 (E).

Triplet X'72' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	13	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'72'	Identifies the Universal Date and Time Stamp triplet	M	X'00'
2				Reserved; should be zero	M	X'06'
3–4	UBIN	YearAD	0–65,535	Year AD using Gregorian calendar	M	X'06'
5	UBIN	Month	1–12	Month of the year	M	X'06'
6	UBIN	Day	1–31	Day of the month	M	X'06'
7	UBIN	Hour	0–23	Hour of the day in 24-hour format	M	X'06'
8	UBIN	Minute	0–59	Minute of the hour	M	X'06'
9	UBIN	Second	0–59	Second of the minute	M	X'06'
10	CODE	TimeZone	X'00'–X'02'	Relationship of time to UTC: **X'00'** Coordinated Universal Time (UTC) **X'01'** Ahead of UTC **X'02'** Behind UTC	M	X'06'
11	UBIN	UTCDiffH	0–23	Hours ahead of or behind UTC	M	X'06'
12	UBIN	UTCDiffM	0–59	Minutes ahead of or behind UTC	M	X'06'

Triplet X'72' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Universal Date and Time Stamp triplet.

YearAD Specifies the year AD using the Gregorian calendar. For example, the year 1999 is specified as X'07CF', the year 2000 as X'07D0', and the year 2001 asX'07D1'. Represents the *YYYY* component of a date in the format *YYYYMMDD*.

Month Specifies the month of the year. January is specified as X'01', and subsequent months are numbered in ascending order. Represents the MM component of a date in the format *YYYYMMDD*.

Day Specifies the day of the month. The first day of any month is specified as X'01', and subsequent days are numbered in ascending order. Represents the DD component of a date in the format *YYYYMMDD*. For example, the date December 31, 1999 is specified as X'07CF0C1F', and January 1, 2000 is specified as X'07D00101'.

Hour Specifies the hour of the day in 24-hour format. Represents the *hh* component of a time in the format *hhmmss*.

Minute Specifies the minute of the hour. Represents the *mm* component of a time in the format *hhmmss*.

Second Specifies the second of the minute. Represents the *ss* component of a time in the format *hhmmss*. For example, the time 4:35:21 PM is specified as X'102315'.

TimeZone Defines the relation of the specified time with respect to Coordinated Universal Time (UTC). This parameter, along with the UTCDiffH and UTCDiffM parameters, is used to accommodate differences between a specified local time and UTC because of time zones and daylight savings programs. For example, Mountain Time in the US is seven hours behind UTC when daylight savings is inactive, and six hours behind UTC when daylight savings is active.

Value	Description
X'00'	Time is specified in Coordinated Universal Time (UTC). With this value, the UTCDiffH and UTCDiffM parameters should be set to X'00'. When this time is displayed or printed, the equivalence with UTC time is normally indicated with a **Z** suffix, that is, *hhmmss***Z**.
X'01'	Specified time is ahead of UTC. The number of hours ahead of UTC is specified by the UTCDiffH parameter; and the number of minutes ahead of UTC is specified by the UTCDiffM parameter. When this time is displayed or printed, the relationship with UTC time is normally indicated with a **+** character, followed by the actual time difference in hours and minutes, that is *hhmmss***+***hhmm*.
X'02'	Specified time is behind UTC. The number of hours behind UTC is specified by the UTCDiffH parameter; and the number of minutes behind UTC is specified by the UTCDiffM parameter. When this time is displayed or printed, the relationship with UTC time is normally indicated with a **-** character, followed by the actual time difference in hours and minutes, that is *hhmmss***-***hhmm*.
All others	Reserved

UTCDiffH Indicates how many hours the specified time is ahead of UTC or behind UTC. If the TimeZone parameter is X'00', this value is ignored.

UTCDiffM Indicates how many minutes the specified time is ahead of UTC or behind UTC. If the TimeZone parameter is X'00', this value is ignored.

Structured Fields Using Triplet X'72'

Either this triplet or the Local Date and Time Stamp (X'62') triplet may occur once. Only the Universal Date and Time Stamp (X'72') triplet is allowed on the BDT.

- "Begin Bar Code Object (BBC)" on page 121
- "Begin Document Index (BDI)" on page 126
- "Begin Document (BDT)" on page 128
- "Begin Form Map (BFM)" on page 131
- "Begin Graphics Object (BGR)" on page 132
- "Begin Image Object (BIM)" on page 134
- "Begin Overlay (BMO)" on page 138
- "Begin Object Container (BOC)" on page 144
- "Begin Print File (BPF)" on page 150
- "Begin Page Segment (BPS)" on page 155
- "Begin Presentation Text Object (BPT)" on page 157
- "Begin Resource Group (BRG)" on page 159

Toner Saver Triplet X'74'

The Toner Saver triplet activates a toner saver mode for printing. The toner saver control specified by this triplet overrides any other toner saver controls that may be active in the printer.

Triplet X'74' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'74'	Identifies the Toner Saver triplet	M	X'00'
2				Reserved; should be zero	M	X'06'
3	CODE	TSvCtrl	X'00'–X'01', X'FF'	Specifies controls for the toner saver function: **X'00'** Deactivate toner saver **X'01'** Activate toner saver **X'FF'** Use device default toner saver setting	M	X'06'
4–5				Reserved; should be zero	M	X'06'

Triplet X'74' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Toner Saver triplet.

TSvCtrl Specifies how the toner saver function is to be applied to data in the presentation device. Valid values are the following:

Value **Description**

X'00' Deactivate the toner saver function.

X'01' Activate the toner saver function. Toner saver is applied to presentation data in a presentation-system-dependent manner. In general, this may degrade print quality, and may also impact performance.

X'FF' Use the printer default toner saver setting. Some printers allow a default for toner saving (activate or deactivate) to be set by the operator at the printer console.

If this triplet is not specified, the architected default is TSvCtrl = X'FF' (use the device default toner saver setting).

Application Note: Toner Saver for color printers is a function that is based on the principle that equal amounts of cyan, magenta, and yellow generate a monochromatic gray level. This leads to procedures where, given a CMY color that has some percentage of equal amounts of CMY, a percentage of CMY toner is removed (“undercolor removal”) and replaced with a percentage of K (“gray replacement”). In practice, such procedures may result in poorer color quality and may incur a performance hit.

Structured Field Using Triplet X'74'

- “Presentation Fidelity Control (PFC)” on page 308

Color Fidelity Triplet X'75'

The Color Fidelity triplet is used to specify the exception continuation and reporting rules for color exceptions, which consist of the following types:

- Invalid or unsupported color-value exceptions. A color-value exception is detected when the color specification in the data stream cannot be rendered as specified by the presentation process.
- Color Management Resource (CMR) exceptions. This does not include unsupported CMR *tag* exceptions, which are covered separately by the CMR Tag Fidelity (X'96') triplet. A CMR exception is detected when a CMR that has been referenced in the data stream (which includes FormDefs and Medium Maps) or a data object RAT cannot be processed as specified. This does not include CMRs that are *mapped* to referenced CMRs but that are themselves not directly referenced in the data stream or a data object RAT:
  - Link LK CMRs that are mapped to color conversion CMRs in a CMR RAT or on the BRS of an inline CMR
  - Device-specific halftone and tone transfer curve CMRs that are mapped to generic CMRs in a CMR RAT or on the BRS of an inline CMR

  The processing of such mapped CMRs is not governed by the Color Fidelity triplet; if a device does not support the download of such a mapped CMR, it does not cause a CMR exception and the mapped CMR is ignored.
- Device Appearance exceptions. A Device Appearance exception is detected when a requested appearance is not supported by the presentation device.

This triplet also specifies a substitution rule to be used by the presentation process when continuing after such exceptions.

Triplet X'75' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	8	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'75'	Identifies the Color Fidelity triplet	M	X'00'
2	CODE	StpCoEx	X'01'–X'02'	Color exception continuation rule: **X'01'** Stop presentation at point of first color exception and report exception **X'02'** Do not stop presentation because of color exceptions	M	X'06'
3				Reserved; should be zero	M	X'06'
4	CODE	RepCoEx	X'01'–X'02'	Color exception reporting rule if exception does not stop presentation: **X'01'** Report color exception **X'02'** Do not report color exception	M	X'06'
5				Reserved; should be zero	M	X'06'

Triplet X'75'

Offset	Type	Name	Range	Meaning	M/O	Exc
6	CODE	ColSub	X'01'	Substitution rule if exception does not stop presentation **X'01'** For color-value exceptions, any color substitution is permitted; for CMR exceptions, use presentation system defaults	M	X'06'
7				Reserved; should be zero	M	X'06'

Triplet X'75' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Color Fidelity triplet.

StpCoEx Is a parameter that specifies whether presentation should be continued when a color exception is detected. Valid values are:

Value	Description
X'01'	Stop presentation at the point of the first color exception. A color exception that stops presentation must be reported.
X'02'	Do not stop presentation because of color exceptions.
All others	Reserved

RepCoEx Is a parameter that specifies whether color exceptions should be reported if they do not stop presentation. Valid values are:

Value	Description
X'01'	Report color exceptions that do not stop presentation.
X'02'	Do not report color exceptions that do not stop presentation.
All others	Reserved

ColSUb Is a parameter that specifies color substitutions that the presentation process may use in order to continue presentation following a color exception. Valid values are:

Value	Description
X'01'	For color-value exceptions, any color or grayscale may be substituted for a color that cannot be rendered by the presentation process. For CMR exceptions, use the presentation system default for that CMR type.
All others	Reserved

Implementation Note: The following rules describe how AFP servers process the color fidelity triplet:

- If the Color Fidelity triplet is specified and is supported by the printer, the triplet is sent to the printer.
- If the Color Fidelity triplet is specified and is not supported by the printer, then
  - If StpCoEx = X'01' (stop and report), the server issues an error message and the job will not be printed.
  - If StpCoEx = X'02' (do not stop), the job will be printed.
- If the Color Fidelity triplet is not specified but is supported by the printer, the printer is instructed to reset color fidelity controls to defaults.

- If the Color Fidelity triplet is not specified and is also not supported by the printer, presentation system defaults determine how color exceptions are handled.

Structured Field Using Triplet X'75'

- “Presentation Fidelity Control (PFC)” on page 308

Font Fidelity Triplet X'78'

The Font Fidelity triplet is used to specify the exception continuation rules for font resolution exceptions. Font resolution exceptions are generated when either:

- the font referenced in an MCF structured field is not available to the presentation system at the resolution specified in a Font Resolution and Metric Technology (X'84') triplet, or
- the resolution of the font selected by the presentation server does not match the resolution of the presentation device.

Triplet X'78' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	7	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'78'	Identifies the Font Fidelity triplet	M	X'00'
2	CODE	StpFntEx	X'01'–X'02'	Font resolution exception continuation rule: **X'01'** Stop presentation at point of first font resolution exception and report exception **X'02'** Do not stop presentation because of font resolution exceptions	M	X'06'
3–6				Reserved; should be zero	M	X'04'

Triplet X'78' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Font Fidelity triplet.

StpFntEx Is a parameter that specifies whether presentation should be continued when a font resolution exception is detected. Valid values are:

Value	Description
X'01'	Stop presentation at the point of the first font resolution exception. A font resolution exception that stops presentation must be reported.
X'02'	Do not stop presentation because of font resolution exceptions. Presentation continues either with the font at a different resolution, which may require the presentation device to apply resolution correction, or with an outline-technology version of the font.
All others	Reserved

Structured Field Using Triplet X'78'

- "Presentation Fidelity Control (PFC)" on page 308

Attribute Qualifier Triplet X'80'

The Attribute Qualifier triplet is used to specify a qualifier for a document attribute.

Triplet X'80' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	10	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'80'	Identifies the Attribute Qualifier triplet	M	X'00'
2–5	UBIN	SeqNum	X'00000000'–X'7FFFFFFF'	Sequence Number	M	X'06'
6–9	UBIN	LevNum	X'00000000'–X'7FFFFFFF'	Level Number	M	X'06'

Triplet X'80' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Attribute Qualifier triplet.

SeqNum Is a number used to distinguish multiple instances of the same attribute.

LevNum Is a number used to maintain a hierarchical relationship between groups of attributes.

Structured Field Using Triplet X'80'

- "Tag Logical Element (TLE)" on page 342

Page Position Information Triplet X'81'

The Page Position Information triplet is used to tag a page with the Page Position (PGP) structured field repeating group information that is used to present the page. The PGP is specified in the medium map referenced by the FQN type X'8D'—Begin Medium Map Reference triplet. This information is used for viewing the page with a particular form map, which is normally the form map that the document containing this page was archived with.

This triplet is not used for printing and is ignored by print servers.

Triplet X'81' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'81'	Identifies the Page Position Information triplet	M	X'00'
2	UBIN	PGPRG	1–8	PGP repeating group number	M	X'06'

Triplet X'81' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Page Position Information triplet.

PGPRG Identifies the PGP repeating group that is used to view the page. The PGP is specified in the medium map referenced by the FQN type X'8D' triplet. PGP repeating groups are numbered sequentially from 1 to a maximum of 8, where the first repeating group is number 1.

Structured Fields Using Triplet X'81'

- “Begin Page (BPG)” on page 152
- “Index Element (IEL)” on page 197

Parameter Value Triplet X'82'

The Parameter Value triplet is used to pass parameter values to an executable program such as an object handler or a system command interpreter.

Triplet X'82' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	4–(*n*+1)	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'82'	Identifies the Parameter Value triplet	M	X'00'
2				Reserved; should be zero	M	X'06'
3	CODE	ParmSyn	X'00'–X'06'	Parameter syntax: **X'00'** Undefined **X'01'** Unsigned binary number **X'02'** Signed binary number **X'03'** Bit string **X'04'** Defined constant **X'05'** Character string **X'06'** Name	M	X'06'
4–*n*		ParmVal		Parameter value passed	O	X'00'

Triplet X'82' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Parameter Value triplet.

ParmSyn Specifies the syntax of the parameter whose value is to be passed.

Value	Description
X'00'	Syntax is undefined, data type is UNDF
X'01'	Unsigned binary number, data type is UBIN
X'02'	Signed binary number, data type is SBIN
X'03'	Bit string, where each bit can be individually and independently assigned a value, data type is BITS
X'04'	Defined or architected constant, data type is CODE
X'05'	Encoded character data, data type is CHAR
X'06'	Name, data type is CHAR
All others	Reserved

ParmVal Specifies the parameter value that is passed. If omitted, the value of the parameter is specified to be null; that is, no value is passed.

Structured Field Using Triplet X'82'

- "Link Logical Element (LLE)" on page 226

Presentation Control Triplet X'83'

The Presentation Control triplet specifies flags that control the presentation of an object.

Triplet X'83' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'83'	Identifies the Presentation Control triplet	M	X'00'
2	BITS	PRSFlg	See "Triplet X'83' Semantics" on page 428 for bit definitions	Flags that control the presentation of an object	M	X'06'

Triplet X'83' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Presentation Control triplet

PRSFlg Specifies presentation control flags as follows:

Bit **Description**

0 Object view control.

B'0' The specified object is intended for viewing. This is the architected default if the triplet is omitted.

B'1' The specified object is not intended for viewing.

1 Object indexing control.

B'0' The specified object is intended to be indexed. This is the architected default if the triplet is omitted.

B'1' The specified object is not intended to be indexed.

2–7 Reserved

Structured Fields Using Triplet X'83'

- "Begin Named Page Group (BNG)" on page 140
- "Begin Page (BPG)" on page 152
- "Index Element (IEL)" on page 197

Font Resolution and Metric Technology Triplet X'84'

The Font Resolution and Metric Technology specifies certain metric characteristics of a FOCA raster-technology font character set which may have affected the formatting of the document with this font. This information, as carried by the X'84' triplet, may be used by presentation servers and presentation devices to select the best-matching coded font for presentation.

Triplet X'84' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'84'	Identifies the Font Resolution and Metric Technology triplet	M	X'00'
2	CODE	MetTech	X'01'–X'02'	Metric Technology: **X'01'** Fixed-metric technology **X'02'** Relative-metric technology	M	X'06'
3	CODE	RPuBase	X'00'	Raster-pattern resolution unit base: **X'00'** 10 inches	M	X'06'
4–5	UBIN	RPUnits	X'0960', X'0BB8'	Raster-pattern resolution units per unit base	M	X'06'

Triplet X'84' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Font Resolution and Metric Technology triplet.

MetTech Specifies the metric technology used by this raster font. For a description of fixed-metric and relative-metric technologies, see the *Intelligent Printer Data Stream (IPDS) Reference* and the *Font Object Content Architecture Reference*.

RPuBase Specifies the unit base for the raster font's resolution.

RPUnits Specifies the number of pels per unit base of the font's raster-pattern shape data.

X'0960' 2400

X'0BB8' 3000

Implementation Note: While 240-pel and 300-pel resolutions are the only fixed resolutions defined for AFP FOCA raster fonts, some AFP products support additional resolutions such as 480 pel and 600 pel. In particular, many IPDS printers will accept raster fonts at any pel resolution and automatically convert them to the device resolution (support for “all resolutions in the range X'0001'-X'7FFF'”is indicated in the printer's OPC reply).

Structured Field Using Triplet X'84'

- “Map Coded Font (MCF) Format 2” on page 237

Finishing Operation Triplet X'85'

The Finishing Operation triplet is used to specify finishing operations that are to be applied to media.

Architecture Note: The format for specifying finishing operations and their associated parameters is based on the Document Printing Application (DPA) ISO/IEC DLS 10175:1991 draft standard. The definition of an operation or parameter in this triplet does not guarantee its support in an AFP system. To see which operations and parameters are supported by AFP printers, consult the appropriate product documentation.

Triplet X'85' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	9–253	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'85'	Identifies the Finishing Operation triplet	M	X'00'
2	CODE	FOpType	X'01'–X'0A', X'0C'–X'0F', X'12', X'14', X'18', X'19', X'1E'–X'22', X'30'–X'32'	Finishing operation type: **X'01'** Corner staple **X'02'** Saddle stitch out **X'03'** Edge stitch **X'04'** Fold in **X'05'** Separation cut **X'06'** Perforation cut **X'07'** Z-fold **X'08'** Center fold in **X'09'** Trim after center fold or saddle stitch **X'0A'** Punch **X'0C'** Perfect bind **X'0D'** Ring bind **X'0E'** C-fold in **X'0F'** Accordion fold in **X'12'** Saddle stitch in **X'14'** Fold out **X'18'** Center fold out **X'19'** Trim **X'1E'** C-fold out **X'1F'** Accordion fold out **X'20'** Double parallel fold in **X'21'** Double gate fold in **X'22'** Single gate fold in **X'30'** Double parallel fold out **X'31'** Double gate fold out **X'32'** Single gate fold out	M	X'06'
3	CODE	FOpOpt	X'00', X'01'	Finishing operation option: **X'00'** No finishing option **X'01'** Crease	M	X'06'

Offset	Type	Name	Range	Meaning	M/O	Exc
4				Reserved; should be zero	M	X'06'
5	CODE	RefEdge	X'00'–X'03', X'FF'	Finishing operation reference corner or edge: **X'00'** Bottom-right corner, bottom edge **X'01'** Top-right corner, right edge **X'02'** Top-left corner, top edge **X'03'** Bottom-left corner, left edge **X'FF'** Device default reference corner or edge	M	X'06'
6	UBIN	FOpCnt	X'00'–X'7A'	Finishing operation count: **X'00'** Not specified; use OpPos parameters or device default **X'01'–X'7A'** Number of operations to apply; must match number of OpPos parameters if they are specified	M	X'06'
7–8	UBIN	AxOffst	0–32,767	Finishing operation axis offset in millimeters	M	X'06'
			X'FFFF'	Device default axis offset		
Zero or more occurrences of the following parameters:						
0–1	UBIN	OpPos	0–32,767	Operation position on finishing operation axis in millimeters	O	X'02'

Triplet X'85' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Finishing Operation triplet.

FOpType Is a parameter that specifies the type of finishing operation. In most cases, the operation is applied either on a reference corner or along a finishing operation axis that is offset from a reference edge.

Value	Operation Type
X'01'	Corner staple. A staple is driven into the media at the reference corner. The offset of the staple from the corner and the staple angle are presentation-system-dependent. The AxOffset, FOPCnt, FOpOpt, and OpPOS parameters are ignored for this operation. This operation is applied to collected media, not to individual media.

X'02' Saddle stitch out. One or more staples are driven into the media along the finishing operation axis, which is positioned at the center of the media parallel to the reference edge. The AxOffset and the FOpOpt parameters are 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. Note that the pages in the datastream must already be properly ordered for this operation.

X'03' Edge stitch. One or more staples are driven into the media along the finishing operation axis. This operation is applied to collected media, not to individual media. The FOpOpt parameter is ignored for this operation.

X'04' Fold in. The media is folded inward on the front sheet-side. If applied to a collection of media, the collection is folded inward on the front sheet-side of the first sheet, and at the end of this operation the back side of the last sheet of the collection is on the outside. The folding is performed along the finishing operation axis. The FOpCnt and OpPos parameters are ignored for this operation. Note that if applied to a collection of media, the pages in the datastream must already be properly ordered for this operation. This type of fold is also known as single fold.

X'05' Separation cut. A separation cut is applied to the media along the finishing operation axis. The FOPCnt, FOpOpt, and OpPOS parameters are ignored for this operation.

X'06' Perforation cut. A perforation cut is applied to the media along the finishing operation axis. The FOPCnt, FOpOpt, and OpPOS parameters are ignored for this operation.

X'07' Z-fold. A Z-fold is applied to each medium, or sheet. The medium is first folded in half inwards along a line parallel to the reference edge. The half of the medium furthest from the reference edge is then again folded in half outwards along a line parallel to the reference edge. When applied to an 11×17-inch sheet with the reference edge specified as the top edge, the result is an 8.5×11-inch fold-out.

Note: If additional finishing operations are applied to the Z-folded sheet, the original reference edge becomes the left edge of the Z-folded sheet. In the example above, the reference edge for the Z-fold was the top (11-inch) edge. After Z-folding is applied, the sheet is reoriented so that this reference edge now becomes the *left* edge for additional finishing operations. Therefore if the Z-folded sheets are to be stapled to the left edge of 8.5×11–inch sheets, the stapling reference edge for both sets of sheets is the left edge.

Architecture Note: There is an exception to the rule for reorientation after Z-fold. If the media is sized such that the reference edge is less than half the size of the other sheet dimension, the reorientation causes the reference edge to become the new top edge for additional finishing operations instead of the new left edge.

The FOpCnt, AxOffst, and OpPos parameters are ignored for this operation. Note that the Z-fold is applied to each individual medium, not to the collected media. This type of fold is also known as engineering fold.

X'08' Center fold in. The media is folded inward on the front sheet-side. If applied to a collection of media, the collection is folded inward on the front sheet-side of the first sheet, and at the end of this operation the back side of the last sheet of the collection is on the outside. The folding is performed along the center line that is parallel to the finishing operation axis. The FOpCnt, AxOffst, and

OpPos parameters are ignored for this operation. Note that if applied to a collection of media, the pages in the datastream must already be properly ordered for this operation. This type of fold is also known as bi-fold, half fold, and 2-fold.

X'09' Trim after center fold or saddle stitch. This operation is intended to accompany either a center-fold operation or a saddle-stitch operation. The FOpOpt parameter is ignored for this operation:

- If this operation is specified immediately after a finishing operation that causes a center fold (either saddle-stitch or center-fold), the edges opposite the center fold are trimmed by the amount specified in the AxOffst parameter measured from the edges of the innermost sheet that are opposite the center fold.
- If this operation is specified, but is not immediately after a center-fold or saddle-stitch operation, the trim operation is ignored.

X'0A' Punch. One or more holes are punched or drilled into the media along the finishing operation axis. This operation is applied to collected media, not to individual media. The FOpOpt parameter is ignored for this operation.

X'0C' Perfect bind. This operation is a type of book binding in which the sheets of the group are glued together at the reference edge (spine). The device may optionally include a cover sheet which was pre-loaded in the binding machine, is wrapped around the front, spine, and back, and is attached at or near the spine. The FOpOpt parameter is ignored for this operation.

X'0D' Ring bind. This operation is a type of book binding in which 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. This allows the sheets of a document to be flexibly turned and laid flat against a surface without breaking the spine. When the wire pattern is a wire helix, this operation is also called a spiral bind or coil bind. The device may optionally include front and back cover sheets which were pre-loaded in the binding machine. The FOpOpt parameter is ignored for this operation.

X'0E' C-fold in. The media is folded inward on the front sheet-side. If applied to a collection of media, the collection is folded inward on the front sheet-side of the first sheet, and at the end of this operation the back side of the last sheet of the collection is on the outside. The folding is performed along two lines parallel to the finishing operation axis. To allow the panels to nest inside each other properly, the folded in bottom panel is usually 1/32" to 1/8" narrower than the other two panels. This bottom panel is the bottom part of the sheet, seen from the top edge. C-fold in is used for letters when envelopes without address windows are used. The FOpCnt, AxOffst, and OpPos parameters are ignored for this operation. Note that if applied to a collection of media, the pages in the datastream must already be properly ordered for this operation. This type of fold is also known as business-letter fold, letter fold, roll fold, spiral fold, and tri fold.

X'0F' Accordion fold in. The media is folded inward (top fold) and outward (2nd fold) on the front sheet-side. If applied to a collection of media, at the end of this operation the lower panel of the front side of the first sheet of the collection and the upper panel of the back side of the last sheet of the collection will be visible on the outside. The folding is performed along two lines parallel to the finishing operation axis. The sheet is folded into a Z-like shape of three panels. The middle panel is usually slightly larger than the two outer panels. The FOpCnt, AxOffst, and OpPos parameters are ignored for this operation.

Note that if applied to a collection of media, the pages in the datastream must already be properly ordered for this operation. This type of fold is also known as concertina fold, letter fold, tri fold, and zig-zag fold.

X'12' Saddle stitch in. One or more staples are driven into the media along the finishing operation axis, which is positioned at the center of the media parallel to the reference edge. The AxOffset and the FOpOpt parameters are ignored for this operation. This operation also includes a fold of the media inward along the finishing operation axis so that the front-side page 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 that the pages in the datastream must already be properly ordered for this operation.

X'14' Fold out. The media is folded outward on the front sheet-side. If applied to a collection of media, the collection is folded outward on the front sheet-side of the first sheet, and at the end of this operation the back side of the last sheet of the collection is on the inside. The folding is performed along the finishing operation axis. The FOpCnt and OpPos parameters are ignored for this operation. Note that if applied to a collection of media, the pages in the datastream must already be properly ordered for this operation.

X'18' Center fold out. The media is folded outward on the front sheet-side. If applied to a collection of media, the collection is folded outward on the front sheet-side of the first sheet, and at the end of this operation the front side of the first sheet of the collection is on the outside. The folding is performed along the center line that is parallel to the finishing operation axis. Center fold out is often used to fold A4 letters for an A5 envelope so that the address on the first page will then show through the window of the envelope. The FOpCnt, AxOffst, and OpPos parameters are ignored for this operation. Note that if applied to a collection of media, the pages in the datastream must already be properly ordered for this operation. This type of fold is also known as bi-fold, half fold, and 2-fold.

X'19' Trim. This operation causes the media to be trimmed along the reference edge. The edge is trimmed by the amount specified in the AxOffst parameter measured from the edge of the media. Once cut, the part of the media that is adjacent to the reference edge is discarded. The FOpOpt, FOpCnt, and OpPos parameters are ignored for this operation.

X'1E' C-fold out. The media is folded outward on the front sheet-side. If applied to a collection of media, the collection is folded outward on the front sheet-side of the first sheet, and at the end of this operation the front side of the first sheet of the collection is on the outside. The folding is performed along two lines parallel to the finishing operation axis. To allow the panels to nest inside each other properly, the folded in bottom panel is usually 1/32" to 1/8" narrower than the other two panels. This bottom panel is the bottom part of the sheet, seen from the top edge. C-fold out is often used for letters when envelopes with windows are used so that the address on the first page will then show through the window of the envelope. The FOpCnt, AxOffst, and OpPos parameters are ignored for this operation. Note that if applied to a collection of media, the pages in the datastream must already be properly ordered for this operation. This type of fold is also known as business-letter fold, letter fold, roll fold, spiral fold, and tri fold.

X'1F' Accordion fold out. The media is folded outward (top fold) and inward (2nd fold) on the front sheet-side. If applied to a collection of media, at the end of this operation the upper panel of the front side of the first sheet of the collection and the lower panel of the back side of the last sheet of the collection will be visible on the outside. The folding is performed along two lines parallel to the finishing operation axis. The sheet is folded into a Z-like shape of three panels. The middle panel is usually slightly larger than the two outer panels. Accordion fold out is often used for letters instead of C-fold out. The FOpCnt, AxOffst, and OpPos parameters are ignored for this operation. Note that if applied to a collection of media, the pages in the datastream must already be properly ordered for this operation. This type of fold is also known as concertina fold, letter fold, tri fold, and zig-zag fold.

X'20' Double parallel fold in. This fold is applied to each medium, or sheet, and causes the sheet to be folded inwards, first in the middle and then the folded sheet is folded once again so that four panels of roughly equal size are formed. The folding is performed parallel to the finishing operation axis. The front of the sheet is inside. The two inside folded panels are 1/32" to 1/8" smaller than the two inner panels to allow for proper nesting. The FOpCnt, AxOffst, and OpPos parameters are ignored for this operation. Note that this fold is applied to each individual medium, not the collected media. This type of fold is also known as double fold, parallel fold, and quarter fold.

X'21' Double gate fold in. This fold is applied to each medium, or sheet, and causes the sheet to be folded into four panels of roughly equal size. First the two outer panels are folded inwards so that the top and the bottom edges of the sheet meet. The folded sheet is then folded inward again in the middle so that the top and bottom panels are inside. The back of the second and third panel will be visible on the outside. The front of the sheet will be inside the folded product. The two outer panels are usually 1/32" to 1/8" smaller than the two inner panels to allow for proper folding and nesting. The double gate fold is sometimes used for large magazine centerfolds. The RefEdge, FOpCnt, AxOffst, and OpPos parameters are ignored for this operation. Note that this fold is applied to each individual medium, not the collected media. This type of fold is also known as closed-gate fold, and gate fold.

X'22' Single gate fold in. The media is folded inward on the front sheet-side. If applied to a collection of media, the collection is folded inward on the front sheet-side of the first sheet, and at the end of this operation the back side of the last sheet of the collection will be visible on the outside and the front of the first sheet will be inside the folded product. The sheet or collection is folded into three panels with two outer panels and a larger middle panel. The two outer panels are folded inwards so that the top and the bottom edges of the sheet meet. This fold is sometimes used for menus and brochures. The RefEdge, FOpCnt, AxOffst, and OpPos parameters are ignored for this operation. Note that if applied to a collection of media, the pages in the datastream must already be properly ordered for this operation. This type of fold is also known as gate fold, simple gate fold, and window fold.

X'30' Double parallel fold out. This fold is applied to each medium, or sheet, and causes the sheet to be folded outwards, first in the middle and then the folded sheet is folded once again so that four panels of roughly equal size are formed. The folding is performed parallel to the finishing operation axis. The top and the second panel of the front of the sheet is visible on the outside. The two inside folded panels are 1/32" to 1/8" smaller than the two inner panels to allow for proper nesting. The FOpCnt, AxOffst, and OpPos parameters are ignored for this operation. Note that this fold is applied to each individual medium, not the collected media. This type of fold is also known as double fold, parallel fold, and quarter fold.

X'31' Double gate fold out. This fold is applied to each medium, or sheet, and causes the sheet to be folded into four panels of roughly equal size. First the two outer panels are folded outwards so that the top and the bottom edges of the sheet meet. The folded sheet is then folded outward again in the middle so that the top and bottom panels are inside. The front sides of the two middle panels will be visible on the outside. The two outer panels are usually 1/32" to 1/8" smaller than the two inner panels to allow for proper folding and nesting. The RefEdge, FOpCnt, AxOffst, and OpPos parameters are ignored for this operation. Note that this fold is applied to each individual medium, not the collected media. This type of fold is also known as closed-gate fold, and gate fold.

X'32' Single gate fold out. The media is folded outward on the front sheet-side. If applied to a collection of media, the collection is folded outward on the front sheet-side of the first sheet, and at the end of this operation the front side of the first sheet of the collection will be visible on the outside and the back of the last sheet will be inside the folded product. The sheet or collection is folded into three panels with two outer panels and a larger middle panel. The two outer panels are folded outwards so that the top and the bottom edges of the sheet meet. The RefEdge, FOpCnt, AxOffst, and OpPos parameters are ignored for this operation. Note that if applied to a collection of media, the pages in the datastream must already be properly ordered for this operation. This type of fold is also known as gate fold, simple gate fold, and window fold.

All others Reserved

Figure 74 on page 437, Figure 76 on page 439, and Figure 75 on page 438 show examples of these finishing operations.

Figure 74. Examples of Finishing Operations

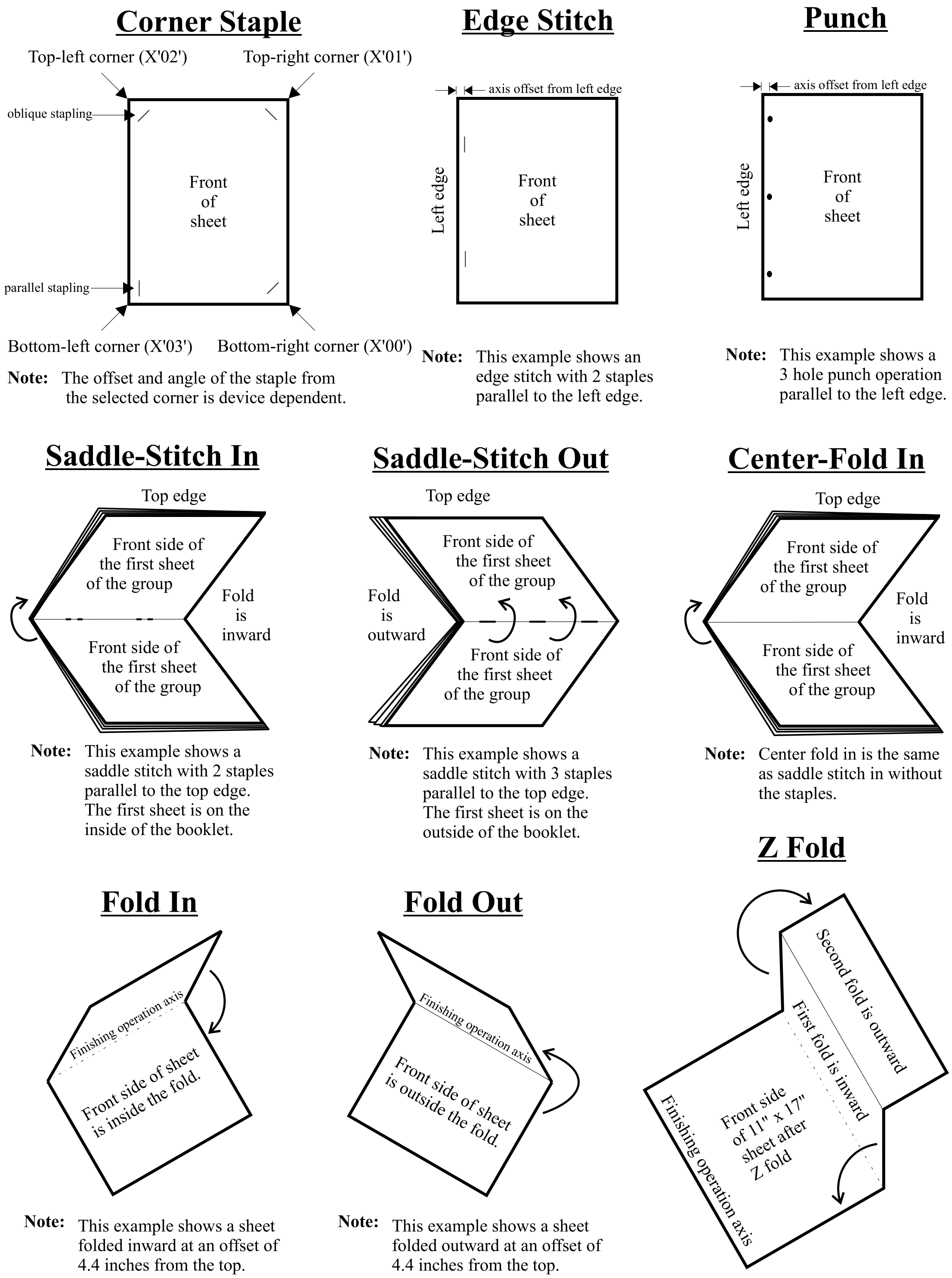


Figure 75. Examples of Additional Finishing Operations

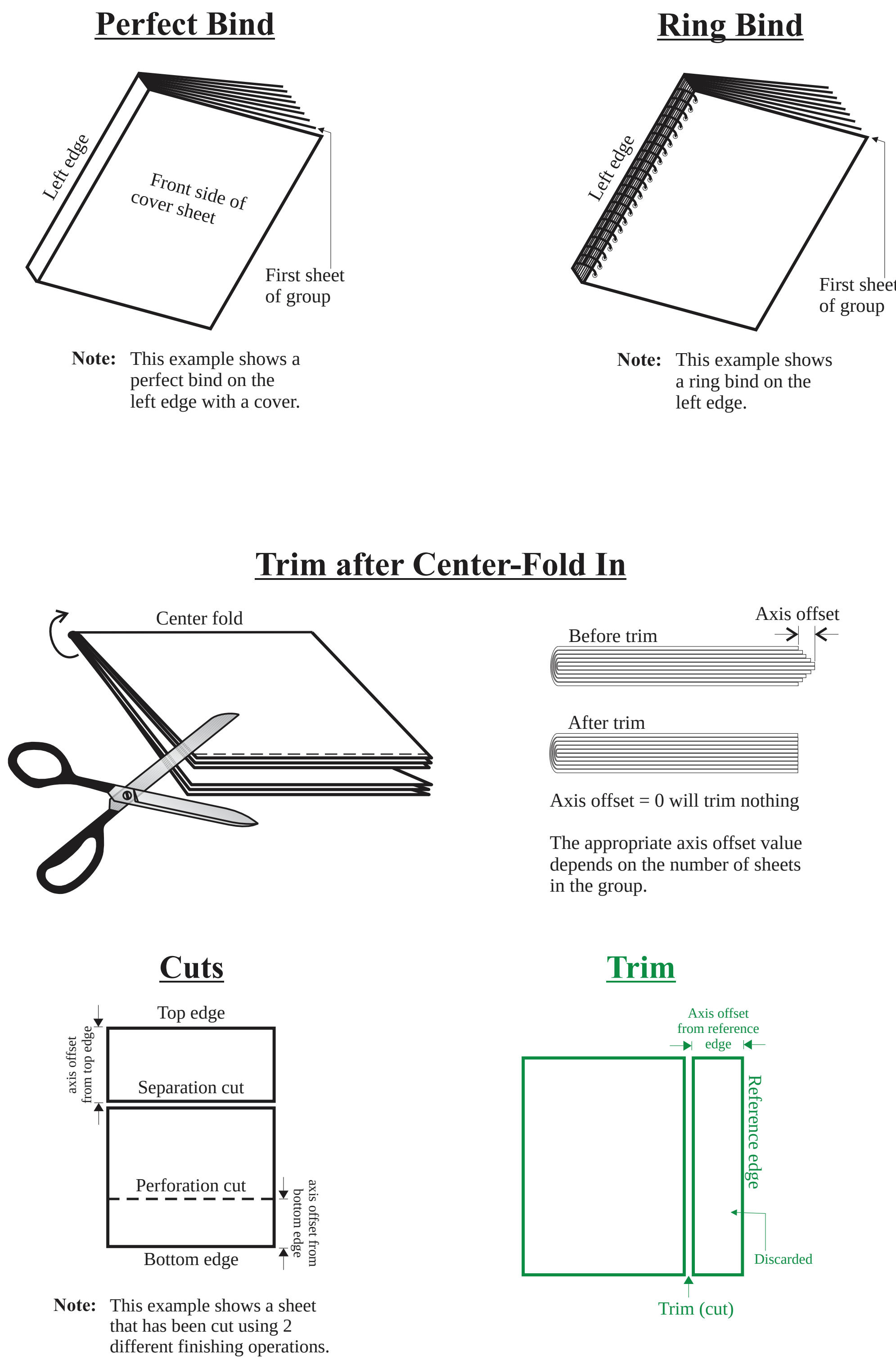
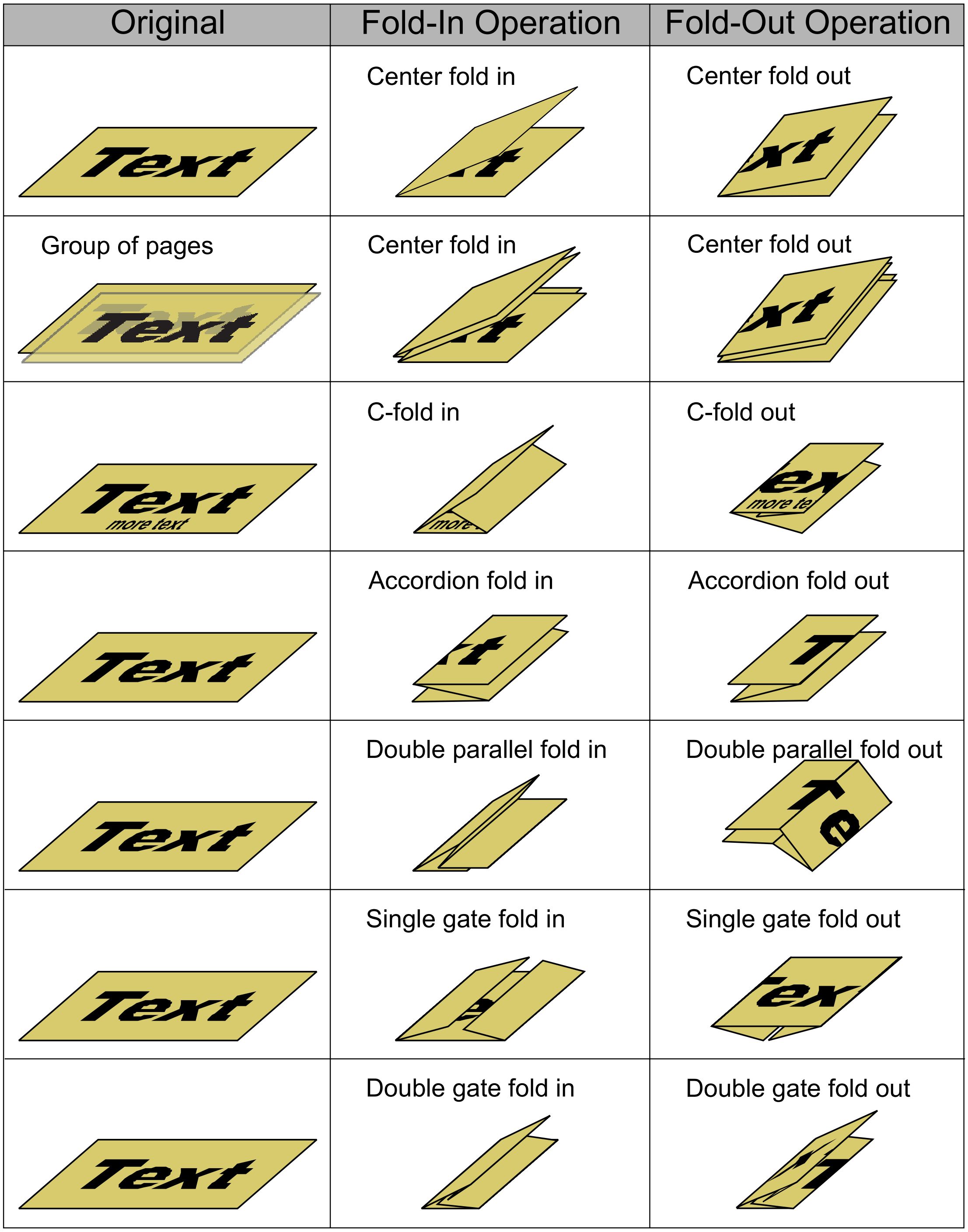


Figure 76. More Examples of Additional Finishing Operations



FOpOpt Is a parameter that specifies the finishing option that modifies the existing finishing operation selected. Valid values are:

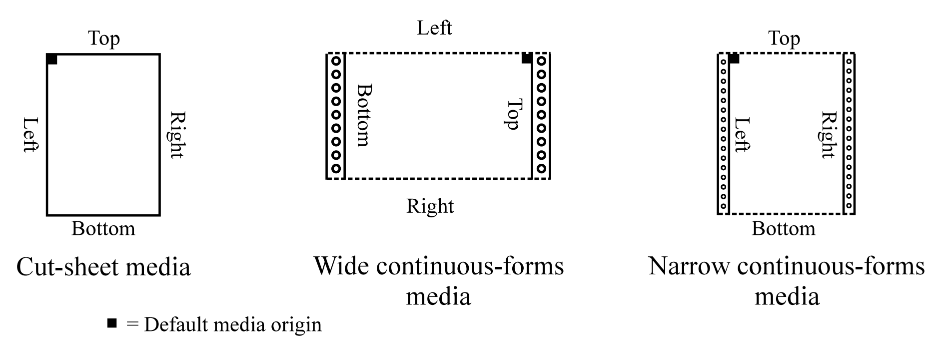
Value	Description
X'00'	No finishing options specified.
X'01'	Crease finishing option. Crease is very similar to a fold, except that instead of doing a full fold, it simply creates a crease line in the paper. For an accordion fold, c-fold, center-fold, double-gate-fold, double-parallel fold, fold, single-gate-fold, or Z-fold operation, this value specifies that a crease operation is performed instead of each fold defined for the operation. For example, for an accordion fold, rather than an inward fold and outward fold, an inward crease and outward crease are made, at the same locations the two folds would have been performed. For a corner staple, saddle stitch, edge stitch, separation cut, perforation cut, trim, trim after center fold or saddle stitch, punch, perfect bind, or ring bind operation, this value is ignored. The Crease option does not change the scope of finishing operations.
All others	Reserved

RefEdge Is a parameter that selects the medium reference corner and the medium reference edge for finishing operations. Edge and corner definitions for cut-sheet and continuous-forms media are shown in Figure 77 on page 440. Valid values are:

Value	Description
X'00'	Bottom-right corner, bottom edge
X'01'	Top-right corner, right edge
X'02'	Top-left corner, top edge
X'03'	Bottom-left corner, left edge
X'FF'	Presentation device default reference corner or edge
All others	Reserved

Note: For all types of media shown in Figure 77 on page 440, the top-left corner is defined to be the default media origin of the front side. A change in the orientation of the medium presentation space does not change the finishing corners or edges. For continuous-forms media, the carrier strips are not considered to be part of the physical media.

Figure 77. Media Reference Edge and Corner Definitions



FOpCnt Is a parameter that specifies the number of discrete finishing operations that are to be applied by this operation type along the finishing operation axis. For example, if the operation type is edge-stitch, the FOpCnt parameter specifies how many staples are to be applied along the finishing operation axis. Valid values are:

Value	Description
X'00'	Count not specified. Use the count implied by the number of OpPos parameters if they are specified or use the presentation device default count if OpPos parameters are not specified.
X'01'–X'7A'	Apply the specified number of finishing operations. This count must match the number of OpPos parameters if OpPos parameters are specified; if OpPos parameters are not specified, presentation device default positions are used.
All others	Reserved

AxOffst Is a parameter that specifies the offset of the finishing operation axis from the reference edge. The offset is measured in millimeters from the reference edge toward the center of the medium. A value of X'FFFF' indicates that the presentation device default finishing operation axis offset is to be used.

OpPos Is a parameter that specifies the offset of the finishing operation along the finishing operation axis. The offset is measured in millimeters from the point where the finishing operation axis intersects either the bottom edge or the left edge of the medium, toward the center of the medium. Each consecutive OpPos parameter is used to position a single finishing operation centered on the specified point on the finishing operation axis. This continues until the last OpPos parameter has been processed.

Structured Field Using Triplet X'85'

- "Medium Finishing Control (MFC)" on page 265

Text Fidelity Triplet X'86'

The Text Fidelity triplet is used to specify the exception continuation and reporting rules for text exceptions. A text exception is detected when an unrecognized or unsupported text control sequence is encountered in a PTOCA text object.

Triplet X'86' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	7	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'86'	Identifies the Text Fidelity triplet	M	X'00'
2	CODE	StpTxtEx	X'01'–X'02'	Text exception continuation rule: **X'01'** Stop presentation at point of first text exception and report exception **X'02'** Do not stop presentation because of text exceptions	M	X'06'
3				Reserved; should be zero	M	X'06'
4	CODE	RepTxtEx	X'01'–X'02'	Text exception reporting rule if exception does not stop presentation: **X'01'** Report text exception **X'02'** Do not report text exception	M	X'06'
5–6				Reserved; should be zero	M	X'06'

Triplet X'86' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Text Fidelity triplet.

StpTxtEx Is a parameter that specifies whether presentation should be continued when a text exception is detected. Valid values are:

Value	Description
X'01'	Stop presentation at the point of the first text exception. A text exception that stops presentation must be reported. **Application Note:** When presentation is terminated, the print file is put into a state where it can be resubmitted when the text can be rendered without exceptions.
X'02'	Do not stop presentation because of text exceptions.
All others	Reserved

RepTxtEx Is a parameter that specifies whether text exceptions should be reported if they do not stop presentation. Valid values are:

Value	Description
X'01'	Report text exceptions that do not stop presentation.
X'02'	Do not report text exceptions that do not stop presentation.
All others	Reserved

Implementation Note: The following rules describe how AFP servers process the Text Fidelity triplet:

- If the Text Fidelity triplet is specified and is supported by the printer, the triplet is sent to the printer and processed by both server and printer. If StpTxtEx = X'02' and a text exception is detected, the text control sequence that generated the exception is skipped or processed in non-optimal fashion and printing continues with the next text control sequence.
- If the Text Fidelity triplet is specified and is not supported by the printer, the triplet is processed by the server. Text exceptions will flow from the printer to the server. If StpTxtEx = X'02' and a text exception is detected, printing continues after the remainder of the text object—which could encompass the whole page—is skipped.
- If the Text Fidelity triplet is not specified, presentation system defaults determine how text exceptions are handled.

Structured Field Using Triplet X'86'

- "Presentation Fidelity Control (PFC)" on page 308

Media Fidelity Triplet X'87'

The Media Fidelity triplet is used to specify the continuation rule if a request for a specific media or a specific media bin cannot be satisfied.

Triplet X'87' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	7	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'87'	Identifies the Media Fidelity triplet	M	X'00'
2	CODE	StpMedEx	X'01'–X'02'	Media exception continuation rule: **X'01'** Terminate job and hold **X'02'** Continue with defaults	M	X'06'
3–6				Reserved; should be zero	M	X'06'

Triplet X'87' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Media Fidelity triplet.

StpMedEx Is a parameter that specifies the continuation rule for the presentation system if the requested media or the requested media bin is not available in the presentation device. Valid values are:

Value	Description
X'01'	Terminate presentation **Application Note:** When presentation is terminated, the print file is put into a state where it can be resubmitted when the proper media is loaded or when the proper media source is made available.
X'02'	Continue with the presentation system defaults
All others	Reserved

Implementation Note: AFP print servers will attempt to select the media using the following priority:

1. Attempt to find an available media source containing the media type that matches the specified media OID. The media source cannot be an inserter bin.
2. Attempt to find an available media source containing the media type that matches the specified media name. The media source cannot be an inserter bin.
3. Attempt to find an available media source whose ID matches the specified ID.
4. If the continuation rule is X'02' (continue with defaults), use the presentation process defaults for finding an available media source. If the continuation rule is X'01', presentation is terminated.

Structured Field Using Triplet X'87'

- "Presentation Fidelity Control (PFC)" on page 308

Finishing Fidelity Triplet X'88'

The Finishing Fidelity triplet is used to specify the exception continuation and reporting rules for finishing exceptions. A finishing exception is detected when the specified finishing operation cannot be satisfied.

Triplet X'88' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	7	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'88'	Identifies the Finishing Fidelity triplet	M	X'00'
2	CODE	StpFinEx	X'01'–X'02'	Finishing exception continuation rule: **X'01'** Stop presentation at point of first finishing exception and report exception **X'02'** Do not stop presentation due to finishing exceptions	M	X'06'
3				Reserved; should be zero	M	X'06'
4	CODE	RepFinEx	X'01'–X'02'	Finishing exception reporting rule if exception does not stop presentation: **X'01'** Report finishing exception **X'02'** Do not report finishing exception	M	X'06'
5–6				Reserved; should be zero	M	X'06'

Triplet X'88' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Finishing Fidelity triplet.

StpFinEx Is a parameter that specifies whether presentation should be continued when a finishing exception is detected. Valid values are:

Value **Description**

X'01' Stop presentation at point of first finishing exception. A finishing exception that stops presentation must be reported.

Application Note: When presentation is terminated, the print file is put into a state where it can be resubmitted when the finishing operation can be performed.

X'02' Do not stop presentation due to finishing exceptions. Presentation continues without applying the finishing operation that cannot be satisfied. Note, however, that if a device supports a different finishing operation that is reasonably equivalent to the requested operation, the supported operation may be applied in place of the requested operation. For example, C-fold out and Accordion fold out are often interchangeable when the output is to be inserted into a window envelope; if the device supports Accordion fold out (and not C-fold out), but the triplet requests a C-fold out operation, a device can use Accordion fold out when applying the continuation rule.

All others Reserved

RepFinEx Is a parameter that specifies whether finishing exceptions should be reported if they do not stop presentation. Valid values are:

Value	Description
X'01'	Report finishing exceptions that do not stop presentation.
X'02'	Do not report finishing exceptions that do not stop presentation.
All others	Reserved

Note: This triplet covers finishing operations that the printer is incapable of processing such as a stapling operation on a device that does not have a stapler attached. It does not cover temporary exceptions such as out-of-finishing-supplies conditions, which result in a printer intervention condition that is cleared as soon as supplies are added.

Implementation Note: The following rules describe how AFP servers process the Finishing Fidelity triplet:

- If the Finishing Fidelity triplet is specified and is supported by the printer, the triplet is sent to the printer and processed by both server and printer.
- If the Finishing Fidelity triplet is specified and is not supported by the printer, the triplet is processed by the server. Finishing exceptions will flow from the printer to the server; this may cause a performance degradation. If StpFinEx = X'02' and RepFinEx = X'02', the server will suppress the finishing error messages.
- If the Finishing Fidelity triplet is not specified, the job is printed and the finishing operations that cannot be satisfied are not applied. Finishing exceptions are reported.

Structured Field Using Triplet X'88'

- "Presentation Fidelity Control (PFC)" on page 308

Data-Object Font Descriptor Triplet X'8B'

The Data-Object Font Descriptor triplet is used to specify the parameters needed to render a data-object font. Data-object fonts are non-FOCA font resources, such as TrueType and OpenType fonts. An MDR structured field is used to map a data-object font as a resource.

Triplet X'8B' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	16	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'8B'	Identifies the Data-Object Font Descriptor triplet	M	X'00'
2	BITS	DOFtFlgs	See "Triplet X'8B' Semantics" on page 447 for bit definitions	Flags that specify additional font information	M	X'06'
3	CODE	FontTech	X'20'	Font technology: **X'20'** TrueType/ OpenType	M	X'06'
4–5	UBIN	VFS	1–32,767	Specified vertical font size	M	X'06'
6–7	UBIN	HFS	1–32,767	Horizontal scale factor	M	X'06'
			X'0000'	Not specified		
8–9	CODE	CharRot	X'0000', X'2D00', X'5A00', X'8700'	Clockwise character rotation in degrees **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees	M	X'06'
10–11	CODE	EncEnv	X'0003'	Encoding environment **X'0003'** Microsoft	M	X'06'
12–13	CODE	EncID	X'0001'	Environment-specific encoding identifier **X'0001'** Unicode	M	X'06'
14–15				Reserved; should be zero	M	X'06'

Triplet X'8B' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Data-Object Font Descriptor triplet.

DOFtFlgs provide additional information for the parameters in this triplet. Valid values are:

Bits **Description**

0 MICR print. Defines whether the font is to be used for Magnetic Ink Character Recognition (MICR) printing. If MICR printing is requested, the font needs to be designed for use in MICR applications. MICR text is normally printed using a toner that is mixed with a magnetic material.

B'0' The font is to be used for non-MICR printing.

B'1' The font is to be used for MICR printing.

1 Location of font in resource hierarchy. May specify that the font and all associated linked fonts are in a print file resource group and that the search for this font and all associated linked fonts must be limited to the resource group.

B'0' The font and all associated linked fonts can be located anywhere in the MO:DCA resource hierarchy.

B'1' The font and all associated linked fonts are located in the resource group for the print file; that is, they are “inline”. The search for this font and all associated linked fonts must be limited to this resource group. If the font or an associated linked font is not found in the print file resource group, the search is not extended to resource libraries and exception condition X'04' is recognized.

2–7 Reserved; should be zero

Application Note:

AFP support for complex text uses glyph runs. Since this support uses glyph IDs instead of code points to identify a glyph to be rendered, and since glyph IDs can change even with a minor re-versioning of the font, it is critical that the composition application that generates the PTOCA complex text uses precisely the same font that is used by the presentation device that renders the text. This is ensured by requiring the font OID to be specified for each glyph run. The presentation device compares the font OID in the text object to the OID of the active font or a font linked to the active font, and if the OIDs do not match, an error is generated and presentation does not occur.

If such fonts are placed in resource libraries, it is relatively easy to lose the correct version of the font due to library updates, etc. This can result in a presentation device error due to a font OID mismatch. Moreover, this error cannot be corrected easily if the required version of the font is lost.

It is therefore strongly recommended that all TrueType/OpenType fonts that are used for complex text rendering be placed in the print file resource group. This ensures that the formatting application and the presentation device both work with the exact same version of the same font. To ensure that only a font from the print file resource group is used by the presentation system, it is strongly recommended that DOFtFlgs bit one be set to B'1' for such fonts.

FontTech Identifies the font technology of the font. Valid values are:

Value	Description
X'20'	TrueType/OpenType
All others	Reserved

VFS Specifies the vertical font size in 1440ths of an inch. The specified vertical font size is the desired distance between adjacent character baselines when character rotation is zero degrees and no external leading is used. The desired vertical size of the font is often called “point size” because formatting programs typically specify this size in point units (1/72 inch); in this case, the vertical font size can be calculated by multiplying the desired point size by 20.

HSF Specifies the horizontal scale factor in 1440ths of an inch. The horizontal scale factor specifies the numerator of a scale factor for the horizontal direction in 1440ths of an inch. The character shapes and metrics are stretched or compressed in the horizontal direction by the ratio of HSF/VFS. When the vertical font size and the horizontal scale factor are identical or when HSF=X'0000' is specified, a uniform scaling occurs; when these two parameters are different, an anamorphic scaling occurs.

CharRot Specifies the clockwise character rotation in degrees. This parameter specifies a clockwise rotation of a character pattern (glyph) from the character baseline. For a description of character rotation, see the *Font Object Content Architecture (FOCA) Reference*. The four allowed character rotations provide for different writing modes (left-to-right, top-to-bottom, right-to-left, and bottom-to-top). A normal (right-side-up) character has a character rotation of 0 degrees; an upside down character has a character rotation of 180 degrees. A character rotation of 270 degrees is normally used for vertical writing. The valid character rotation values are:

X'0000' 0 degrees (left-to-right writing)

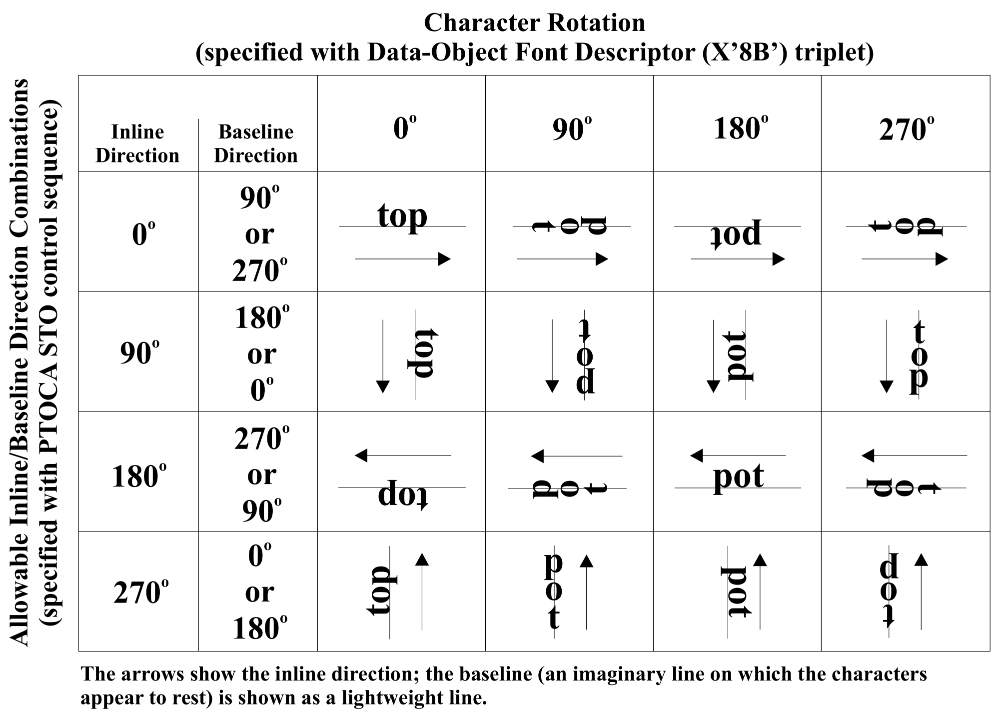
X'2D00' 90 degrees (bottom-to-top writing)

X'5A00' 180 degrees (right-to-left writing)

X'8700' 270 degrees (top-to-bottom writing)

Figure 78 on page 449 shows the placement of characters based on the character rotation value and the PTOCA inline and baseline direction values.

Figure 78. Character Placement Based on Character Rotation and Inline and Baseline Direction



TrueType fonts provide two sets of metrics to allow character placement for different writing modes. The metrics for horizontal writing are used when the character rotation is 0 degrees, and a modified version of the horizontal metrics is used for a 180 degree character rotation. Likewise, the metrics for vertical writing are used when the character rotation is 270 degrees, and a modified version of the vertical metrics is used for a 90 degree character rotation.

Architecture Notes:

1. The character rotation parameter is used in PTOCA text objects along with the current inline and baseline directions to determine the character orientation with respect to the page (X_p, Y_p) coordinate system.
2. The character-rotation parameter applies only to characters used in PTOCA text objects or BCOCA bar code objects. For GOCA graphics objects, the Set Character Angle drawing order provides analogous function.

EncEnv Specifies the environment for the encoding in the font.

Architecture Note: In TrueType/OpenType font files, this parameter is called the *Platform ID*.

Value	Description
X'0003'	Microsoft
All others	Reserved

This parameter, along with the EncID parameter, identifies a character encoding within the font that is used to map code points to glyphs and metrics. Note that different font technologies use different methods to achieve this purpose:

- The TrueType/OpenType font technology uses an internal cmap table for this purpose; most TrueType fonts contain a Unicode cmap subtable and some TrueType fonts also contain additional cmap subtables to allow the font to be used with a variety of character encoding schemes. The cmap subtable is indexed with the EncEnv and EncID parameters.

  Application Note: A TrueType/OpenType font can also be used with user data that is encoded to be rendered with a traditional AFP FOCA font. Such FOCA fonts use an IBM code page to map code points to graphic character identifiers. To support the presentation of such data with TrueType/OpenType fonts, the user data encoding and the corresponding code page are specified on the MDR that is used to reference the TrueType/OpenType font. A mapping function in the presentation system is invoked to map the IBM graphic character identifiers to Unicode code points in the TrueType/OpenType font's cmap subtable defined by EncEnv = Microsoft (X'0003') and EncID = Unicode (X'0001').

The valid encoding-environment values for each font technology are:

Font Technology	Encoding Environment
TrueType/OpenType	Microsoft (X'0003')

EncID Specifies the character encoding that is to be used to interpret the meaning of each code point.

Architecture Note: In TrueType/OpenType font files, this parameter is called the *Encoding ID*.

The values that are valid for the encoding identifier depend on the specified encoding environment parameter. For the Microsoft encoding environment (EncEnv = X'0003'), the following encoding identifiers are supported:

Value	Description
X'0001'	Unicode

Structured Field Using Triplet X'8B'

- “Map Data Resource (MDR)” on page 246

Locale Selector Triplet X'8C'

The Locale Selector triplet is used to identify the end-user community for presentation text data. The locale information consists of an ISO-639 based language code, an ISO-15924 based script code, an ISO-3166 based region code, and an application-specific variant code. The encoding for all four parameters is UTF-16BE. Additional information on these parameters can be found at the following URLs:

- The definition of language codes can be found at:
  `http://lcweb.loc.gov/standards/iso639-2/iso639jac.html`
- The definition of script codes can be found at:
  `www.unicode.org/reports/tr24`
- The definition of region codes can be found at:
  `www.iso.org/iso-3166-country-codes.html`

The locale may be specified at job submission time. In that case the locale reflects the intent of the job submitter and is called a *submission* locale. The locale may also be specified directly in the document or print file, such as on an MDR structured field that identifies a font to be used for rendering a specific text string. In that case the locale reflects the intent of the document creator and is called a *creation* locale. The submission locale establishes the locale for all objects and components in the document or print file that do not specify a creation locale. Where the submission locale and creation locale conflict, the creation locale overrides. If no submission locale is specified, the presentation system default locale is applied as the default submission locale. Note that in this case different locales may exist in various parts of the system and inconsistent results may be generated.

The scope of the Locale Selector triplet, when it is used to specify a creation locale, is defined as follows:

- If a X'8C' triplet appears on an MDR structured field that references a data-object font, its scope is the text string that is rendered with that font.

Architecture Note: The locale information carried in this triplet is based on the definition established by the International Components for Unicode (ICU) project, which is jointly managed by a group of companies and individual volunteers throughout the world.

Triplet X'8C' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	36 – 254; even values	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'8C'	Identifies the Locale Selector triplet	M	X'00'
2				Reserved; should be zero	M	X'06'
3	BITS	LocFlgs	See “Triplet X'8C' Semantics” on page 452 for bit definitions	Flags that specify additional syntax information	M	X'06'
4–11	CHAR	LangCode		Language code as registered in ISO-639; encoding is UTF-16BE	M	X'06'
12–19	CHAR	ScrptCde		Script code as registered in ISO-15924; encoding is UTF-16BE	M	X'06'
20–27	CHAR	RegCde		Region code as registered in ISO-3166; encoding is UTF-16BE	M	X'06'

Triplet X'8C'

Offset	Type	Name	Range	Meaning	M/O	Exc
28–35				Reserved; should be zero	M	X'06'
36–*n*	CHAR	VarCde		Variant code; encoding is UTF-16BE	O	X'00'

Triplet X'8C' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Locale Selector triplet.

LocFlgs provide syntax information for the parameters in this triplet. Valid values are:

Bits **Description**

1–3 Language code syntax

Note: ISO-639 is the international standard for the representation of names of languages.

B'000' Language code is not specified; the parameter should be ignored.

B'010' The language code is specified using a two-character language identifier (ISO 639 Alpha-2 code) defined in ISO 639-1.

B'011' The language code is specified using a three-character language identifier (ISO 639-2/B bibliographic code) defined in ISO 639-2.

All others Reserved

4 Script code

Note: ISO-15924 is the international standard for the representation of names of scripts.

B'0' Script code is not specified; the parameter should be ignored.

B'1' The script code is specified using a four-character script identifier defined in ISO 15924.

5–7 Region code syntax

Note: ISO-3166 is the international standard for the representation of names of regions.

B'000' Region code is not specified; the parameter should be ignored.

B'010' The region code is specified using a two-character region identifier (ISO 3166 Alpha-2 code) defined in ISO 3166-1.

B'011' The region code is specified using a three-character region identifier (ISO 3166 Alpha-3 code) defined in ISO 3166-1.

All others Reserved

LangCde identifies the language. The language code is left-justified and padded on the right with the null (U+0000) character. The encoding is UTF-16BE. Sample language codes are:

Code **Language**

chi Chinese

eng English

fre French

ger	German
jpn	Japanese
kor	Korean
vie	Vietnamese

ScrptCde identifies the script. The encoding is UTF-16BE. Sample script codes are:

Code	**Script**
Latn	Latin
Cyrl	Cyrillic
Armn	Armenian
Hebr	Hebrew
Arab	Arabic

RegCde identifies the region. The region code is left-justified and padded on the right with the null (U +0000) character. The encoding is UTF-16BE. Sample region codes are:

Code	**Region**
CHN	China
DEU	Germany
JPN	Japan
PRK	Korea, Democratic People's Republic of
KOR	Korea, Republic of
USA	United States
VNM	Vietnam

VarCde specifies an optional application-specific variant code. The encoding is UTF-16BE. The variant code is an additional qualifier that can be added to the language code and region code to further identify the locale. An example of a variant code is 'EURO' to specify support of the Euro currency in the locale.

Structured Field Using Triplet X'8C'

- "Map Data Resource (MDR)" on page 246

UP3i Finishing Operation Triplet X'8E'

The UP3i Finishing Operation triplet is used to specify finishing operations that are to be applied to media. More specifically, this triplet is a carrier for finishing operations and parameters that are defined by the UP3i consortium in the UP3i Specification.

Triplet X'8E' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	13–254	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'8E'	Identifies the UP3i Finishing Operation triplet	M	X'00'
2	UBIN	Seqnum	X'00'-X'FF'	Sequence number	M	X'06'
3				Reserved; should be zero	M	X'06'
4–*n*		UP3iDat		Finishing operation data as defined in the UP3i Specification; this parameter contains bytes 4–end of the UP3i Form Finishing Operating (X'03') triplet	M	X'06'

Triplet X'8E' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the UP3i Finishing Operation triplet.

SeqNum Specifies the sequence number of this triplet. This parameter is used to distinguish otherwise identical X'8E' triplets.

UP3iDat Specifies finishing operations and parameters defined by the UP3i consortium. This parameter contains bytes 4–end of the UP3i Form Finishing Operating (X'03') triplet. At least bytes 4–12 of the UP3i Form Finishing Operating (X'03') triplet are mandatory and must be specified for the UP3iDat parameter; additional bytes are optional. The semantics of the bytes are defined by the UP3i Specification. For a definition of the UP3i Form Finishing Operating (X'03') triplet, see the current UP3i Specification. This specification is available at: `www.afpcinc.org`.

Structured Field Using Triplet X'8E'

- "Medium Finishing Control (MFC)" on page 265

MO:DCA Function Set Triplet X'8F'

The MO:DCA Function Set triplet is used to specify the registered value of a MO:DCA Function Set.

Triplet X'8F' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'8F'	Identifies the MO:DCA Function Set triplet	M	X'00'
2-3				Reserved; should be zero	M	X'06'
4–5	CODE	FctSetID	X'0001'	Specifies the MO:DCA Function Set ID: **X'0001'** MO:DCA GA	M	X'06'

Triplet X'8F' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the MO:DCA Function Set triplet.

FctSetID Is a code which specifies the registered value of a MO:DCA Function Set. For a list and description of the registered function set values see Chapter 8, “MO:DCA Function Sets”, on page 517.

X'0001' MO:DCA GA

Structured Fields Using Triplet X'8F'

- “Begin Document (BDT)” on page 128
- “Begin Print File (BPF)” on page 150

Color Management Resource Descriptor Triplet X'91'

The Color Management Resource Descriptor triplet specifies the processing mode and scope for a Color Management Resource (CMR).

Triplet X'91' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	5	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'91'	Identifies the Color Management Descriptor triplet	M	X'00'
2				Reserved; should be zero	M	X'06'
3	CODE	ProcMode	X'01'–X'03'	Specifies the processing mode for the CMR: **X'01'** Process the CMR as an audit CMR **X'02'** Process the CMR as an instruction CMR **X'03'** Process the CMR as a link CMR; valid only for Link DL CMRs	M	X'06'
4	CODE	CMRScpe	X'01'–X'05'	Specifies the scope of the CMR: **X'01'** Scope of CMR is a data object **X'02'** Scope of CMR is a page or overlay **X'03'** Scope of CMR is a document **X'04'** Scope of CMR is a print file **X'05'** Scope of CMR is a page/sheet group	M	X'06'

Triplet X'91' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Color Management Resource Descriptor triplet.

ProcMode Specifies the processing mode for the CMR. Valid values are the following:

Value	Description
X'01'	This CMR describes processing that has been done to a document component; process the CMR as an *audit* CMR.
X'02'	This CMR describes processing that needs to be done to a document component; process the CMR as an *instruction* CMR.
X'03'	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 Link DL CMRs.
All others	Reserved

CMRScpe Specifies the scope of the CMR when used inside a document. Valid values are the following:

Value	Description
X'01'	The scope of the CMR is a data object.
X'02'	The scope of the CMR is a page or overlay.
X'03'	The scope of the CMR is a document.
X'04'	The scope of the CMR is a print file.
X'05'	The scope of the CMR is a page/sheet group.
All others	Reserved

Structured Fields Using Triplet X'91'

- "Include Object (IOB)" on page 201
- "Map Data Resource (MDR)" on page 246
- "Preprocess Presentation Object (PPO)" on page 329

Rendering Intent Triplet X'95'

The Rendering Intent triplet specifies the rendering intent parameter, which is used to modify the final appearance of color data. This parameter is based on the rendering intents defined by the International Color Consortium (ICC). For more information on rendering intents, see *ISO 15076-1:2010 “Image technology colour management – Architecture, profile format and data structure – Part 1: Based on ICC.1:2010”*.

Triplet X'95' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	10	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'95'	Identifies the Rendering Intent triplet	M	X'00'
2 - 3				Reserved; should be zero	M	X'06'
4	CODE	IOCARI	X'00'–X'03', X'FF'	Rendering intent for IOCA objects: **X'00'** perceptual **X'01'** media-relative colorimetric **X'02'** saturation **X'03'** ICC-absolute colorimetric **X'FF'** not specified	M	X'06'
5	CODE	OCRI	X'00'–X'03', X'FF'	Rendering intent for container (non–OCA) objects: **X'00'** perceptual **X'01'** media-relative colorimetric **X'02'** saturation **X'03'** ICC-absolute colorimetric **X'FF'** not specified	M	X'06'
6	CODE	PTOCARI	X'00'–X'03', X'FF'	Rendering intent for PTOCA texts: **X'00'** perceptual **X'01'** media-relative colorimetric **X'02'** saturation **X'03'** ICC-absolute colorimetric **X'FF'** not specified	M	X'06'
7	CODE	GOCARI	X'00'–X'03', X'FF'	Rendering intent for AFP GOCA objects: **X'00'** perceptual **X'01'** media-relative colorimetric **X'02'** saturation **X'03'** ICC-absolute colorimetric **X'FF'** not specified	M	X'06'
8 - 9				Reserved; should be zero	M	X'06'

Triplet X'95' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Rendering Intent triplet.

IOCARI Specifies the rendering intent for IOCA objects. Valid values are the following. The same values also apply to the OCRI, PTOCARI, and GOCARI parameters.

Value	Description
X'00'	**Perceptual**. Gamut mapping is vendor-specific, and colors are adjusted to give a pleasing appearance. This intent is typically used to render continuous-tone images.
X'01'	**Media-relative colorimetric**. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered with respect to the source white point and are adjusted for the media white point. Therefore colors printed on two different media with different white points won't match colorimetrically, but may match visually. This intent is typically used for vector graphics.
X'02'	**Saturation**. 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.
X'03'	**ICC-absolute colorimetric**. In-gamut colors are rendered accurately, and out-of-gamut colors are mapped to the nearest value within the gamut. Colors are rendered only with respect to the source white point, and are not adjusted for the media white point. Therefore colors printed on two different media with different white points should match colorimetrically, but may not match visually. This intent is typically used for logos.
X'FF'	The rendering intent is not specified.
All others	Reserved

OCRI Specifies the rendering intent for non-OCA objects that are carried in an object container or that are referenced as object containers. The same rendering intent values that are defined for IOCARI apply.

PTOCARI Specifies the rendering intent for PTOCA text. The same rendering intent values that are defined for IOCARI apply.

GOCARI Specifies the rendering intent for AFP GOCA objects. The same rendering intent values that are defined for IOCARI apply.

If a rendering intent is not specified for a document component, a rendering intent specified at a higher level in the MO:DCA document hierarchy is applied in accordance with normal MO:DCA hierarchy rules. For example, if a rendering intent is not specified at the data object level, the next higher level, which is the page/overlay level, is searched, and so on. Note that the rendering intent at the data object level includes rendering intent information embedded in the data object, although such embedded information is overridden by a X'95' triplet at this level or a Rendering Intent table vector in the data object RAT. If a rendering intent has not been specified anywhere in the document hierarchy, the “preferred” rendering intent specified in the active instruction Color Conversion CMR, which is the same as the default rendering intent specified in the corresponding active Link Color Conversion CMR, is used.

Architecture Notes:

1. The rendering intent for bar code (BCOCA) objects and for IM-image objects cannot be specified with the Rendering Intent triplet and is fixed as media-relative colorimetric.

2. The rendering intent for object area coloring is determined by the rendering intent of the data object that is defined on that presentation space. The rendering intent for page/overlay presentation space coloring is determined by the PTOCA rendering intent for the page/overlay.

Structured Fields Using Triplet X'95'

- "Include Object (IOB)" on page 201
- "Presentation Environment Control (PEC)" on page 306
- "Preprocess Presentation Object (PPO)" on page 329

CMR Tag Fidelity Triplet X'96'

The CMR Tag Fidelity triplet is used to specify 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 Color Management Resource (CMR).

Architecture Note: The purpose of the CMR Tag Fidelity triplet is to allow the CMR architecture to be extended with additional tags in the future without necessarily having these new tags cause exceptions in printers that do not support the new tags.

Triplet X'96' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	7	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'96'	Identifies the CMR Tag Fidelity triplet	M	X'00'
2	CODE	StpCMREx	X'01'–X'02'	CMR tag exception continuation rule: **X'01'** Stop presentation at point of first CMR tag exception and report exception **X'02'** Do not stop presentation because of CMR tag exceptions; ignore tag and continue processing CMR tags	M	X'06'
3				Reserved; should be zero	M	X'06'
4	CODE	RepCMREx	X'01'–X'02'	CMR tag exception reporting rule if exception does not stop presentation: **X'01'** Report CMR tag exception **X'02'** Do not report CMR tag exception	M	X'06'
5–6				Reserved; should be zero	M	X'06'

Triplet X'96' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Text Fidelity triplet.

StpCMREx Is a parameter that specifies whether presentation should be continued when a CMR tag exception is detected. Valid values are:

Value	Description
X'01'	Stop presentation at the point of the first CMR tag exception. A CMR tag exception that stops presentation must be reported.

Application Note: When presentation is terminated, the print file is put into a state where it can be resubmitted when the CMR can be processed without exceptions.

X'02'	Do not stop presentation because of CMR tag exceptions; ignore tag and continue processing CMR tags.
All others	Reserved

RepCMREx Is a parameter that specifies whether CMR tag exceptions should be reported if they do not stop presentation. Valid values are:

Value	**Description**
X'01'	Report CMR tag exceptions that do not stop presentation.
X'02'	Do not report CMR tag exceptions that do not stop presentation.
All others	Reserved

Implementation Note: The following rules describe how AFP servers process the CMR Tag Fidelity triplet with printers that support CMRs but that may or may not support this triplet. Note that a printer that does not support CMRs will not generate a CMR tag exception and therefore will not cause this triplet to be processed:

- If the CMR Tag Fidelity triplet is specified and is supported by the printer, the triplet is sent to the printer and processed by both server and printer. If StpCMREx = X'02' and a CMR tag exception is detected, the CMR tag that generated the exception is skipped or processed in non-optimal fashion and processing continues with the next CMR tag.
- If the CMR Tag Fidelity triplet is specified and is not supported by the printer, the triplet is processed by the server. CMR tag exceptions will flow from the printer to the server. If StpCMREx = X'02' and a CMR tag exception is detected, printing continues after the printer chooses an appropriate substitute CMR in place of the CMR that caused the CMR tag exception.
- If the CMR Tag Fidelity triplet is not specified, presentation system defaults determine how CMR tag exceptions are handled.

Structured Field Using Triplet X'96'

- “Presentation Fidelity Control (PFC)” on page 308

Device Appearance Triplet X'97'

The Device Appearance triplet specifies one of a set of architected appearances to be assumed by the presentation device.

Triplet X'97' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	7	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'97'	Identifies the Device Appearance triplet	M	X'00'
2				Reserved; should be zero	M	X'06'
3 - 4	CODE	DevApp	X'0000'–X'0001'	Specifies the appearance to be assumed by the device: **X'0000'** Device default appearance **X'0001'** Device default monochrome appearance	M	X'06'
5 - 6				Reserved; should be zero	M	X'06'

Triplet X'97' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Device Appearance triplet.

DevApp Specifies the output appearance to be generated by the presentation device. Valid values are the following:

Value	Description
X'0000'	Device default appearance. The device assumes its normal appearance. For example, a process-color printer generates full color output.
X'0001'	Device default 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 using the default color, or it can simulate color values by simply substituting the default color, or it can use some combination of the two.
All others	Reserved

Architecture Note: The IPDS architecture defines the minimal set of functions that must be supported by a printer for AFP color management. Support for the Device Appearance (X'97') triplet with DevApp = X'0000' specifies the resolution of a raster image(device default appearance) is part of this set; however support for additional device appearances is optional.

Structured Field Using Triplet X'97'

- “Presentation Environment Control (PEC)” on page 306

Image Resolution Triplet X'9A'

The Image Resolution triplet specifies the resolution of a raster image.

Triplet X'9A' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	10	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'9A'	Identifies the Image Resolution triplet	M	X'00'
2-3				Reserved; should be zero	M	X'06'
4	CODE	XBase	X'00'–X'01'	Unit base for image resolution in the X direction: **X'00'** 10 inches **X'01'** 10 centimeters	M	X'06'
5	CODE	YBase	X'00'–X'01'	Unit base for image resolution in the Y direction: **X'00'** 10 inches **X'01'** 10 centimeters	M	X'06'
6–7	UBIN	XResol	1–32,767	Number of image points in X direction per X unit base	M	X'06'
8–9	UBIN	YResol	1–32,767	Number of image points in Y direction per Y unit base	M	X'06'

Triplet X'9A' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Image Resolution triplet.

XBase Specifies the unit base for the image resolution in the X direction.

YBase Specifies the unit base for the image resolution in the Y direction.

Note: A X'01' exception condition exists if the XBase and YBase values are not identical.

XResol Specifies the resolution of the image in the X direction in number of image points per X-direction unit base.

YResol Specifies the resolution of the image in the Y direction in number of image points per Y-direction unit base.

Architecture Note: The presentation space size of a raster image, such as an image in TIFF format, is determined by two parameters - (1) the pixel count in the x and y directions, and (2) the resolution of the pixels in the x and y directions. The use of these two parameters when presenting an image depends on the mapping option that is in effect:

- When the mapping option is scale-to-fill, the pixel counts are sufficient since the intent is to scale the complete raster into the object area.
- When the mapping option is scale-to-fit, if the resolution in the x and y directions is the same, the pixel counts are also sufficient since again the intent is to scale the complete raster into the object area and thus the physical dimensions of the image are unimportant. However, if the resolution in the x and y

directions are different, then both the pixel counts and the resolutions are needed to define the physical dimensions of the image that will be scaled.

- When the mapping option is position, position-and-trim, or center-and-trim, both the pixel counts and the resolutions are needed to define the physical dimensions of the image, since the intent is to render a portion of the image at its native size into the object area.

Structured Fields Using Triplet X'9A'

- “Container Data Descriptor (CDD)” on page 170
- “Include Object (IOB)” on page 201
- “Preprocess Presentation Object (PPO)” on page 329

Object Container Presentation Space Size Triplet X'9C'

The Object Container Presentation Space Size triplet specifies the presentation space size, or how such a size is determined, for certain container object types.

Triplet X'9C' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	5, 17	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'9C'	Identifies the Object Container Presentation Space Size triplet	M	X'00'
2-3				Reserved; should be zero	M	X'06'
4	CODE	PDFSize	X'01'–X'05'	Parameter used to determine the PDF presentation space size: **X'01'** MediaBox **X'02'** CropBox **X'03'** BleedBox **X'04'** TrimBox **X'05'** ArtBox	M	X'06'
5	CODE	XocBase	X'00'–X'01'	Presentation space size unit base for the width (along X axis): **X'00'** 10 inches **X'01'** 10 centimeters	O	X'02'
6	CODE	YocBase	X'00'–X'01'	Presentation space size unit base for the height (along Y axis): **X'00'** 10 inches **X'01'** 10 centimeters	O	X'02'
7–8	UBIN	XocUnits	1–32,767	Presentation space size units per unit base for the width (along X axis)	O	X'02'
9–10	UBIN	YocUnits	1–32,767	Presentation space size units per unit base for the height (along Y axis)	O	X'02'
11–13	UBIN	XpsSize	1–32,767	Presentation space width (extent along X axis)	O	X'02'
14–16	UBIN	YpsSize	1–32,767	Presentation space height (extent along Y axis)	O	X'02'

Bytes 5–16 are optional as a unit; that is, either all are specified or none are specified.

Triplet X'9C' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Object Container Presentation Space Size triplet.

PDFSize Specifies how the presentation space size is determined for all PDF presentation object types:
- Portable Document Format (PDF) single page
- Portable Document Format (PDF) single page with transparency

- PDF Multiple Page File
- PDF Multiple Page - with Transparency - File

It is ignored for all other object types. The following values are defined:

X'01' Use the size specified by the MediaBox parameter

X'02' Use the size specified by the CropBox parameter

X'03' Use the size specified by the BleedBox parameter

X'04' Use the size specified by the TrimBox parameter

X'05' Use the size specified by the ArtBox parameter

If this triplet is not specified and if the Object Container Presentation Space Size TV is not specified in the RAT for the object, the architected default is X'01' - MediaBox. This is a mandatory parameter in PDF. If this triplet is specified or if the Object Container Presentation Space Size TV is specified, but the selected size parameter is not specified in the PDF object, the PDF default mechanism is used to select the presentation space size.

Architecture Notes:

1. In addition to specifying the presentation space size, this parameter also indicates the PDF box that the PDF should be rendered to.
2. As specified in the PDF specification, if the CropBox, BleedBox, TrimBox, or ArtBox parameters extend beyond the boundaries of the MediaBox, their definition is redefined to be their intersection with the MediaBox. Thus the presentation space size is reduced to the size of the intersection, and the reduced box is what is rendered to.

XocBase Specifies the unit base for determining the width of the presentation space (along the X axis).

YocBase Specifies the unit base for determining the height of the presentation space (along the Y axis).

Note: A X'01' exception condition exists if the XocBase and YocBase values are not identical.

XocUnits Specifies the number of units per unit base for determining the width of the presentation space (along the X axis).

YocUnits Specifies the number of units per unit base for determining the height of the presentation space (along the Y axis).

XpsSize Specifies the width (extent along the X axis) of the presentation space.

YpsSize Specifies the height (extent along the Y axis) of the presentation space.

The XocBase, YocBase, XocUnits, YocUnits, XpsSize, and YpsSize parameters are optional as a unit, that is, either all are specified or none are specified. These parameters are ignored for all PDF presentation object types.

Structured Fields Using Triplet X'9C'

- “Container Data Descriptor (CDD)” on page 170
- “Include Object (IOB)” on page 201
- “Preprocess Presentation Object (PPO)” on page 329

Keep Group Together Triplet X'9D'

The Keep Group Together triplet indicates that a group of pages is a complete logical entity that should be processed as a unit for the purpose indicated.

Triplet X'9D' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	5	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'9D'	Identifies the Keep Group Together triplet	M	X'00'
2-3				Reserved; should be zero	M	X'06'
4	CODE	GrpFnct	X'01'	Specifies the purpose of the grouping: **X'01'** Keep group together as a recovery unit	M	X'06'

Triplet X'9D' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Keep Group Together triplet.

GrpFcnt Specifies the purpose of the grouping. The following values are defined:

X'01' Keep group together as a recovery unit. Process the page group as a unit for error recovery purposes, such as in cases of a printer recovery from an error that occurs in the middle of the group.

All others Reserved

Structured Field Using Triplet X'9D'

- "Begin Named Page Group (BNG)" on page 140

Setup Name Triplet X'9E'

The Setup Name triplet specifies a setup name that encompasses some number of settings on a device. The name is created by a user of the device and must be coordinated with the presentation systems that use the device; the specific implementation of setup names might differ between devices.

Triplet X'9E' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6-204	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'9E'	Identifies the Setup Name triplet	M	X'00'
2-3				Reserved; should be zero	M	X'06'
4–*n*	CHAR	SetupName		Setup name; encoding is UTF-16BE	M	X'00'

Triplet X'9E' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Setup Name triplet.

SetupName Specifies a setup name specified as a UTF-16BE character string.

The name is not syntax checked for proper UTF-16 data; however, an ill-formed name is unlikely to match any device-supported setup name.

Structured Field Using Triplet X'9E'

- "Presentation Environment Control (PEC)" on page 306

Triplet Extender Triplet X'FF'

The Triplet Extender triplet is used to extend the data portion of the preceding triplet.

Triplet X'FF' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	5-254	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'FF'	Identifies the Triplet Extender triplet	M	X'00'
2-3				Reserved; should be zero	M	X'06'
4–*n*	CODE	DatExt		Data bytes that extend the data field of the previous triplet	M	X'06'

Triplet X'FF' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Triplet Extender triplet.

DatExt Specifies bytes to be appended directly to the data field of the preceding triplet.

Structured Fields Using Triplet X'FF'

- “Include Object (IOB)” on page 201
- “Map Data Resource (MDR)” on page 246
- “Preprocess Presentation Object (PPO)” on page 329

Chapter 7. MO:DCA Interchange Sets

This chapter:

- Describes compliance in terms of interchange sets
- Outlines MO:DCA compliance rules
- Provides complete syntactic and semantic descriptions of
  - MO:DCA Presentation Interchange Set 1
  - MO:DCA Presentation Interchange Set 3
- References the MO:DCA AFP Archive (AFP/A) interchange set, which is defined in the ISO 18565:2015 "Document management – AFP/Archive" standard. Refer to this standard for a complete definition of AFP/A.

Interchange Sets

An interchange set is a constrained version of the general MO:DCA architecture usually aimed at both progression and interoperability. A new interchange set definition is typically warranted based on a major new feature or when enough overall new function has been added to the architecture that a new compliance target is needed to align implementations. Note that a new interchange set definition may also deprecate architecture that has been superseded or which has never materialized in terms of implementation or, in practice, ended up the subject of a very narrow market segment.

Function sets provide a means for incrementally modifying an interchange set, often in the interim. A function set may address a specific market or business need or may represent a universal alteration while there is insufficient motivation for a new interchange set; see Chapter 8, "MO:DCA Function Sets", on page 517.

This edition of the *Mixed Object Document Content Architecture (MO:DCA) Reference* contains detailed descriptions of two MO:DCA interchange sets: MO:DCA IS/1 and MO:DCA IS/3. Note that MO:DCA Interchange Set 2 (MO:DCA IS/2) has been retired; see "Retired Interchange Set" on page 575. Note also that the MO:DCA AFP Archive (AFP/A) interchange set is not defined in this Reference. See the ISO 18565:2015 "Document management – AFP/Archive" standard for a definition of this interchange set.

While an interchange set cannot be defined that violates the overall MO:DCA architecture, the interchange set definition can include restrictions that are not part of the overall architecture. These restrictions may limit:
- What structured fields may or must appear
- Where the structured fields may or must appear
- The order in which the structured fields may or must appear
- What structured field parameters may or must appear
- The order in which the structured field parameters may or must appear
- What structured field parameter values may or must appear

Interchange Set Compliance Requirements

Two general classes of products may claim compliance with an interchange set, as follows:

Generator Any product that is capable of producing print files containing a valid subset of the interchange set. A valid subset of an interchange set is one in which all generated structured fields belong to the interchange set and comply with all of its ordering and pairing requirements, and all parameter values fall within the ranges specified by the interchange set.

Receiver Any product that is capable of properly interpreting all MO:DCA structured fields in print files that are compliant with the interchange set.

Note that products, such as transforms, may act as both a generator and a receiver.

All products should identify, within their product documentation, which interchange set(s) they support. If a product supports one or more function sets in addition to an interchange set, those function sets should also be identified in the product documentation.

Specific interchange sets may have additional compliance rules. See the specific interchange set definition for more information.

Note: The primary intent of the MO:DCA architecture is the interchange of data among products that support one or more defined interchange sets. However, products may also use MO:DCA data streams for their own private use or for data exchange with other known products.

MO:DCA Interchange Set 1

This section defines the MO:DCA Interchange Set 1 (MO:DCA IS/1) used for presentation documents.

For information on the level of function required for the OCAs included in this interchange set, refer to the MO:DCA environment appendix in the following AFP documents:

GOCA *Graphics Object Content Architecture for AFP Reference*

IOCA *Image Object Content Architecture Reference*

PTOCA *Presentation Text Object Content Architecture Reference*

Data Stream Syntax Structure

The groupings of MO:DCA structured fields that follow identify those structured fields which appear within each begin-end structured field pair or state. This section specifies the structured fields allowed within a MO:DCA Presentation Interchange Set 1 data stream. It shows the MO:DCA state hierarchy and the validity of structured fields within each state.

If a structured field that is not identified as being part of this interchange set appears anywhere within the data stream, a X'40' exception condition exists. If a structured field appears within any state where it is not permitted, or if it appears out of the stated order or more than the permitted number of times, a X'20' exception condition exists. If a structured field that is identified as required does not appear within a specific state, a X'08' exception condition exists.

The conventions used in these structured field groupings are:

( ) The structured field acronym and identifier are shown in parentheses. The presence of dots or periods in the identifier indicates that the item is not a structured field, but instead is a structure, for example a page. The structure is composed of an assortment of structured fields, and is defined separately.

[ ] Brackets indicate optional structured fields. When a structured field is shown without brackets, it *must* appear between the begin and end structured fields.

+ Plus signs indicate structured fields may appear in any order relative to those that precede or succeed it except when the preceding or succeeding structured field does not have a plus (+) sign. Then the order is as listed.

(S) The enclosed (S) indicates that the structured field may be repeated. When it is present on a required structured field, at least one occurrence of the structured field is required, but multiple instances of it may occur.

F2 An F2 indicates that the structured field is a format two structured field. See "Structured Field Formats" on page 25 for further details.

Notes:

1. The Begin Document and End Document structured fields are required in a MO:DCA data stream.
2. The No Operation structured field may appear within any begin-end domain and thus is not listed in the structured field groupings.
3. The architecture that owns and controls the content of each of the data and resource objects carried in a MO:DCA data stream is identified in the following structured field groupings. Please refer to the referenced documentation for further details.
4. The Flag byte (byte 5) in the Structured Field Introducer (SFI) must be set to X'00'. MO:DCA IS/1 does not support SFI extension, structured field segmentation, or structured field padding.

Document

Figure 79. MO:DCA IS/1: Document Structure

```
Begin Document  (BDT, D3A8A8)
 +    [   (IMM,   D3ABCC)     Invoke Medium Map                        (S)    ]
 +    [   (       D3..AF)     Page                                     (S)    ]
End Document  (EDT, D3A9A8)
```

Page

Figure 80. MO:DCA IS/1: Page Structure

```
Begin Page  (BPG, D3A8AF)
          (       D3..C9)     Active Environment Group
 +    [   (       D3..BB)     Graphics Object                          (S)    ]
 +    [   (       D3..FB)     Image Object                             (S)    ]
 +    [   (IPO,   D3AFD8)     Include Page Overlay                     (S)    ]
 +    [   (       D3..9B)     Presentation Text Object                 (S)    ]
End Page  (EPG, D3A9AF)
```

Active Environment Group (AEG)

Figure 81. MO:DCA IS/1: Active Environment Group Structure

```
Begin Active Environment Group  (BAG, D3A8C9)
      [   (MCF,   D3AB8A)     Map Coded Font                      F2   (S)    ]  2
      [   (MPO,   D3ABD8)     Map Page Overlay                         (S)    ]  1
          (PGD,   D3A6AF)     Page Descriptor
      [   (OBD,   D3A66B)     Object Area Descriptor                          ]  3
      [   (OBP,   D3AC6B)     Object Area Position                            ]  3
          (PTD,   D3B19B)     Presentation Text Data Descriptor   F2             4
End Active Environment Group  (EAG, D3A9C9)
```

Notes:

1. For purposes of print server resource management, each overlay included on a page with an IPO must first be mapped to a local ID with an MPO in the AEG for that page. Note that the MPO is only specified in the AEG for a page; it is not allowed in the AEG for an overlay.
2. For purposes of print server resource management, an MCF mapping the same font must be specified in the AEG whenever an MCF is specified in a graphics OEG. The local ID used in the page or overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.
3. Used for presentation text objects only and is optional. For graphics and image objects, the OBD and OBP must be specified in the OEG associated with the graphic or image object.
4. Required only when the associated page contains one or more presentation text objects.

Graphics Object (GOCA DR/2V0)

Figure 82. MO:DCA IS/1: Graphics Object Structure

```
Begin Graphics Object  (BGR, D3A8BB)
        (      D3..C7)     Object Environment Group
     [  (GAD,  D3EEBB)     Graphics Data                           (S)  ]
End Graphics Object  (EGR, D3A9BB)
```

Note: Refer to the *Graphics Object Content Architecture for AFP Reference* for a full description of the GOCA DR/2V0 content, syntax, and semantics for MO:DCA IS/1.

Object Environment Group (OEG) for Graphics Object

Figure 83. MO:DCA IS/1: Object Environment Group for Graphics Object Structure

```
Begin Object Environment Group  (BOG, D3A8C7)
        (OBD,  D3A66B)     Object Area Descriptor
        (OBP,  D3AC6B)     Object Area Position
     [  (MGO,  D3ABBB)     Map Graphics Object                          ]
     [  (MCF,  D3AB8A)     Map Coded Font                      F2       ]  1
        (GDD,  D3A6BB)     Graphics Data Descriptor
End Object Environment Group  (EOG, D3A9C7)
```

Notes:

1. For purposes of print server resource management, an MCF mapping the same font must be specified in the AEG whenever an MCF is specified in a graphics OEG. The local ID used in the page or overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.

Image Object (IOCA FS10)

Figure 84. MO:DCA IS/1: Image Object Structure

```
Begin Image Object  (BIM, D3A8FB)
        (      D3..C7)     Object Environment Group
     [  (IPD,  D3EEFB)     Image Picture Data                      (S)  ]
End Image Object  (EIM, D3A9FB)
```

Note: Refer to the *Image Object Content Architecture Reference* for a full description of the IOCA FS10 content, syntax, and semantics for MO:DCA IS/1.

Object Environment Group (OEG) for Image Object

Figure 85. MO:DCA IS/1: Object Environment Group for Image Object Structure

```
Begin Object Environment Group  (BOG, D3A8C7)
        (OBD,  D3A66B)     Object Area Descriptor
        (OBP,  D3AC6B)     Object Area Position
     [  (MIO,  D3ABFB)     Map Image Object                             ]
        (IDD,  D3A6FB)     Image Data Descriptor
End Object Environment Group  (EOG, D3A9C7)
```

Presentation Text Object (PTOCA PT1)

Figure 86. MO:DCA IS/1: Presentation Text Object Structure

```
Begin Presentation Text Object  (BPT, D3A89B)
     [   (PTX,   D3EE9B)     Presentation Text Data                (S)   ]
End Presentation Text Object  (EPT, D3A99B)
```

Note: Refer to the *Presentation Text Object Content Architecture Reference* for a full description of the PTOCA PT1 content, syntax, and semantics for MO:DCA IS/1.

Resource Syntax Structure

The following groupings of MO:DCA structured fields identify those structured fields which may/must appear within the Begin/End structured field pair for each supported resource object. The same conventions used for the data stream syntax structure apply.

Note: Only those resources that may be included from within the data stream are described here.

Overlay

Figure 87. MO:DCA IS/1: Overlay Structure

```
Begin Overlay  (BMO, D3A8DF)
         (       D3..C9)     Active Environment Group
  +  [   (       D3..BB)     Graphics Object                       (S)   ]
  +  [   (       D3..FB)     Image Object                          (S)   ]
  +  [   (       D3..9B)     Presentation Text Object              (S)   ]
End Overlay  (EMO, D3A9DF)
```

Permitted Structured Fields

This section describes the parameters and ranges of values supported for each of the structured fields contained in this interchange set.

The structured fields are listed alphabetically and described using tables. The table heading for each structured field contains the structured field's acronym, its three-byte hexadecimal identifier, and its full name. Also included is the page number in the document where a detailed description of the structured field can be found.

Structured Field Parameters

In general, the structured field tables contain the following information for each parameter:

1. The offset from the beginning of the data portion of the structured field or from the beginning of the triplet.
2. Values and description:
   - When a specific parameter value is required, the specific value or the range of acceptable values is specified, followed by “→” and an explanation or description of the parameter.
   - When no specific value is required, or when a choice of values is required, the parameter name or a

description of the parameter is given. If a choice of values is required, the choices are identified in the table.

3. For those parameters defined and owned by the MO:DCA architecture, occurrence is specified either as a lowercase *n* indicating that the occurrence is unlimited by the interchange set, or as a number representing the maximum number of times the parameter may appear within the containing structured field, repeating group, or triplet.
4. For those parameters defined and owned by the MO:DCA architecture, optionally is specified as:
   O Optional. The parameter may or may not appear.
   M Mandatory. The parameter must always appear.
   C Conditional. The parameter is mandatory under certain conditions, but is optional or not allowed under other conditions.

Unless a specific order is required, self-identifying parameters are listed in alphanumeric sequence by identifier and include the page number in the document where a detailed description of the parameter is located.

In general, no exception conditions are identified within the interchange set definition for the structured fields or their parameters. The page numbers provided for each structured field and each triplet provide the source for determining what exception conditions may be anticipated. However, the following general rules apply:

- For those structured fields where a parameter order is stated, if a parameter appears outside that stated order, a X'01' exception condition exists.
- If a parameter value appears that is outside the range specified for that parameter, a X'02' exception condition exists.
- If a parameter that is identified as mandatory does not appear on a specific structured field, a X'04' exception condition exists.
- Unless otherwise stated, if any unrecognized parameter or triplet appears on any structured field, a X'10' exception condition exists.

Notes:

1. Any triplet encountered on any of the *Begin* structured fields listed below that is not explicitly defined as being valid for that structured field should be ignored and should not cause an exception condition.
2. If specified, the name contained in the name parameter on an *End* structured field must match that specified in the name parameter on its matching *Begin* structured field, or a X'01' exception condition exists.

Begin Active Environment Group

BAG X'D3A8C9' Begin Active Environment Group (See “Begin Active Environment Group (BAG)” on page 120)			
0–7	Active Environment Group name (8 characters)	1	O

Begin Document

BDT X'D3A8A8' Begin Document (See “Begin Document (BDT)” on page 128)			
0–7	Document name (8 characters)	1	M
8–9	**X'0000'** → Reserved; must be binary zero	1	M
10–*n*	The following triplets, in any order:		
	Coded Graphic Character Set Global Identifier Triplet (See “Coded Graphic Character Set Global Identifier Triplet X'01'” on page 348)	1	M

BDT X'D3A8A8' Begin Document (See "Begin Document (BDT)" on page 128)			
0–1	X'0601' → Triplet length and identifier	1	M
2–5	Character set and code page identification	1	M
Fully Qualified Name Triplet (See "Fully Qualified Name Triplet X'02'" on page 351)		1	O
0–1	**X'*nn*02'** → Triplet length and identifier	1	M
2–3	**X'0100'** → FQN type and format. Replace first GID Name.	1	M
4–*n*	Name of the document. It may be 1 to 250 bytes in length.	1	M
MO:DCA Interchange Set Triplet (See "MO:DCA Interchange Set Triplet X'18'" on page 367)		1	M
0–1	**X'0518'** → Triplet length and identifier	1	M
2	**X'01'** → Interchange set type, presentation	1	M
3–4	**X'0900'** → Interchange set identifier (MO:DCA IS/1)	1	M
Object Function Set Specification Triplet (See "Resource Object Type Triplet X'21'" on page 374)		1	C
0–1	**X'*nn*21'** → Triplet length and identifier	1	M
2	**X'02'** → Object type, *presentation text*	1	M
3	**X'00'** → Architecture version	1	M
4–5	**X'8000'** → MO:DCA function set definition	1	M
6–7	**X'0000'** → Presentation text function set definition (PT/1)	1	M
8–*n*	Reserved, not checked	1	O
Note: One and only one instance of this triplet is *mandatory* when the data stream contains a presentation text object. If the data stream does not contain a presentation text object, this triplet should not appear.			
Object Function Set Specification Triplet (See "Resource Object Type Triplet X'21'" on page 374)		1	C
0–1	**X'*nn*21'** → Triplet length and identifier	1	M
2	**X'03'** → Object type, *graphics*	1	M
3	**X'00'** → Architecture version	1	M
4–5	**X'8000'** → MO:DCA function set definition	1	M
6–7	**X'4000'** → Graphics function set definition (DR/2V0)	1	M
8–*n*	Reserved, not checked	1	O
Note: One and only one instance of this triplet is *mandatory*: when the data stream contains a graphics object. If the data stream does not contain a graphics object, this triplet should not appear.			
Object Function Set Specification Triplet (See "Resource Object Type Triplet X'21'" on page 374)		1	C
0–1	**X'*nn*21'** → Triplet length and identifier	1	M
2	**X'06'** → Object type, *image*	1	M
3	**X'00'** → Architecture version	1	M
4–5	**X'8000'** → MO:DCA function set definition	1	M
6–7	**X'8000'** → Image function set definition (FS10)	1	M

BDT X'D3A8A8' Begin Document (See "Begin Document (BDT)" on page 128)			
8–*n*	Reserved, not checked	1	O
Note: One and only one instance of this triplet is *mandatory* when the data stream contains an image object. If the data stream does not contain an image object, this triplet should not appear.			

Begin Graphics Object

BGR X'D3A8BB' Begin Graphics Object (See "Begin Graphics Object (BGR)" on page 132)			
0–7	Graphics Object name (8 characters)	1	O

Begin Image Object

BIM X'D3A8FB' Begin Image Object (See "Begin Image Object (BIM)" on page 134)			
0–7	Image Object name (8 characters)	1	O

Begin Object Environment Group

BOG X'D3A8C7' Begin Object Environment Group (See "Begin Object Environment Group (BOG)" on page 149)			
0–7	Object Environment Group name (8 characters)	1	O

Begin Overlay

BMO X'D3A8DF' Begin Overlay (See "Begin Overlay (BMO)" on page 138)			
0–7	Overlay name (8 characters)	1	M

Begin Page

BPG X'D3A8AF' Begin Page (See "Begin Page (BPG)" on page 152)			
0–7	Page name (8 characters)	1	O

Begin Presentation Text Object

BPT X'D3A89B' Begin Presentation Text Object (See "Begin Presentation Text Object (BPT)" on page 157)			
0–7	Presentation Text Object name (8 characters)	1	O

End Active Environment Group

EAG X'D3A9C9' End Active Environment Group (See "End Active Environment Group (EAG)" on page 173)			
0–7	Active Environment Group name (8 characters)	1	O

End Document

EDT X'D3A9A8' End Document (See "End Document (EDT)" on page 177)			
0–7	Document name (8 characters)	1	O

End Graphics Object

EGR X'D3A9BB' End Graphics Object (See "End Graphics Object (EGR)" on page 179)			
0–7	Graphics Object name (8 characters)	1	O

End Image Object

EIM X'D3A9FB' End Image Object (See "End Image Object (EIM)" on page 180)			
0–7	Image Object name (8 characters)	1	O

End Object Environment Group

EOG X'D3A9C7' End Object Environment Group (See "End Object Environment Group (EOG)" on page 186)			
0–7	Object Environment Group name (8 characters)	1	O

End Overlay

EMO X'D3A9DF' End Overlay (See "End Overlay (EMO)" on page 182)			
0–7	Overlay name (8 characters)	1	O

End Page

EPG X'D3A9AF' End Page (See "End Page (EPG)" on page 188)			
0–7	Page name (8 characters)	1	O

End Presentation Text Object

EPT X'D3A99B' End Presentation Text Object (See "End Presentation Text Object (EPT)" on page 190)			
0–7	Presentation Text Object name (8 characters)	1	O

Graphics Data

GAD X'D3EEBB' Graphics Data (See "Graphics Data (GAD)" on page 194)	
0–*n*	Up to 8,192 bytes of graphics data as defined by GOCA DR/2V0

Graphics Data Descriptor

GDD X'D3A6BB' Graphics Data Descriptor (See "Graphics Data Descriptor (GDD)" on page 195)	
0–*n*	Graphics descriptor data as defined by GOCA

Image Data Descriptor

IDD X'D3A6FB' Image Data Descriptor (See "Image Data Descriptor (IDD)" on page 196)	
0–*n*	Image descriptor data as defined by IOCA FS10

Image Picture Data

IPD X'D3EEFB' Image Picture Data (See "Image Picture Data (IPD)" on page 218)	
0–*n*	Up to 8,192 bytes of image segment data as defined by IOCA FS10

Include Page Overlay

IPO X'D3AFD8' Include Page Overlay (See "Include Page Overlay (IPO)" on page 222)				
0–7	Page overlay reference name.		1	M
8–10	Page overlay origin, X-coordinate. It must be one of the following:		1	M
	X'000000'–X'001555' →	In the range of 0 to 5,461 when using 240 units per inch for the page X measurement units		
	X'000000'–X'007FFF' →	In the range of 0 to 32,767 when using 1440 units per inch for the page X measurement units		
11–13	Page overlay origin, Y-coordinate. It must be one of the following:		1	M
	X'000000'–X'001555' →	In the range of 0 to 5,461 when using 240 units per inch for the page Y measurement units		
	X'000000'–X'007FFF' →	In the range of 0 to 32,767 when using 1440 units per inch for the page Y measurement units		

Invoke Medium Map

IMM X'D3ABCC' Invoke Medium Map (See "Invoke Medium Map (IMM)" on page 199)			
0–7	External name of the medium map to be invoked (8 characters)	1	M

Map Coded Font, Format 2

MCF X'D3AB8A' Map Coded Font (See "Map Coded Font (MCF) Format 2" on page 237)			
0–1	**X'00*nn*'** → Length of this repeating group	254	M
2–*n*	The following triplets, in any order:		
	Fully Qualified Name Triplet (See "Fully Qualified Name Triplet X'02'" on page 351) **Note:** See "MCF Font Names" on page 483 for details.	2	M

MCF X'D3AB8A' Map Coded Font (See "Map Coded Font (MCF) Format 2" on page 237)			
0–1 X'0C02' → Triplet length and identifier		1	M
2	The FQN type. It must be one of the following: **X'84'** → Coded Font Reference **X'85'** → Code Page Reference **X'86'** → Font Character Set Reference	1	M
3	**X'00'** → FQN format	1	M
4–11	External name of the coded font, code page, or font character set.	1	M
Fully Qualified Name Triplet (See "Fully Qualified Name Triplet X'02'" on page 351)		1	O
0–1	**X'*nn*02'** → Triplet length and identifier	1	M
2–3	**X'0800'** → FQN type and format, Font Typeface Name	1	M
4–*n*	External name of the font typeface. It may be 1 to 32 bytes in length.	1	M
Font Descriptor Specification Triplet (See "Font Descriptor Specification Triplet X'1F'" on page 369)		1	O
0–1	**X'141F'** → Triplet length and identifier	1	M
2	**X'01'–X'09'** → Font Weight Class. It must be in the range of 1 to 9.	1	M
3	**X'01'–X'09'** → Font Width Class. It must be in the range of 1 to 9.	1	M
4–5	**X'0000'–X'7FFF'** → Font Height. It must be in the range of 0 to 32,767 1440ths of an inch.	1	M
6–7	**X'0000'–X'7FFF'** → Font Width. It must be in the range of 0 to 32,767 1440ths of an inch.	1	M
8	Font Descriptor Flags, as follows: **Bit** **Description** **0** Italics **1** Underscored **2** Reserved, must be B'0' **3** Hollow **4** Overstruck **5** Proportional **6** Kerned characters (pairwise) **7** Reserved, must be B'0'	1	M
9–19	Reserved	1	M
Font Coded Graphic Character Set Global Identifier Triplet (See "Font Coded Graphic Character Set Global Identifier Triplet X'20'" on page 373)		1	O
0–1	**X'0620'** → Triplet length and identifier	1	M
2–5	The GCSGID and CPGID for the font	1	M
Resource Local Identifier Triplet (See "Resource Local Identifier Triplet X'24'" on page 378)		1	M
0–1	**X'0424'** → Architecture version	1	M
2	**X'05'** → Resource type, coded font	1	M
3	Resource Local Identifier. It must be one of the following: **X'01'–X'7F'** → It must be in the range of 1 to 127 when used for mapping a font. **X'FE'** → It must be 254 when used for resource management purposes in the AEG.	1	M

MCF X'D3AB8A' Map Coded Font (See "Map Coded Font (MCF) Format 2" on page 237)			
	Resource Section Number Triplet (See "Resource Section Number Triplet X'25'" on page 379)	1	O
0–1	**X'0325'** → Triplet length and identifier	1	M
2	Resource Section Number. It must be one of the following: **X'00'** → It must be 0 when referencing an EBCDIC Presentation single-byte coded font (encoding scheme ID X'61*xx*') or all sections of an EBCDIC Presentation double-byte coded font (encoding scheme ID X'62*xx*'). **X'41'–X'FE'** → It must be in the range of 65 to 254 when referencing a specific section of an EBCDIC Presentation double-byte coded font (encoding scheme ID X'62*xx*').	1	M
	Character Rotation Triplet (See "Character Rotation Triplet X'26'" on page 380)	1	O
0–1	**X'0426'** → Triplet length and identifier	1	M
2–3	Character Rotation. It must be one of the following: **X'0000'** → 0-degree character rotation **X'2D00'** → 90-degree character rotation **X'5A00'** → 180-degree character rotation **X'8700'** → 270-degree character rotation	1	M

MCF Font Names

The MCF must have one of the following:

- A type X'84' (Coded Font Reference) Fully Qualified Name (X'02') triplet. To support existing products, the coded font name must be specified as a global resource identifier (GRID). For a definition of the GRID, see "Global Resource Identifier (GRID) Definition" on page 358.
- Both a type X'85' (Code Page Name Reference) and a type X'86' (Font Character Set Name Reference) Fully Qualified Name (X'02') triplet. To support existing products, the names of the code page and font character set must be eight characters in length and must match the external names of these objects in their respective resource libraries.

Map Graphics Object

MGO X'D3ABBB' Map Graphics Object (See "Map Graphics Object (MGO)" on page 273)			
0–1	**X'0005'** →Length of this repeating group is 5 bytes	1	M
2–4	The following triplet:		
	Mapping Option Triplet (See "Mapping Option Triplet X'04'" on page 360)	1	M
0–1	**X'0304'** →Triplet length and identifier	1	M
2	Output Option. It must be one of the following: **X'10'** → Position and trim **X'20'** → Scale to fit **X'30'** → Center and trim	1	M

Note: If this structured field is not specified, the architected default is *scale to fit*.

Map Image Object

MIO X'D3ABFB' Map Image Object (See "Map Image Object (MIO)" on page 274)			
0–1	**X'0005'** →Length of this repeating group is 5 bytes	1	M
2–4	The following triplet:		
	Mapping Option Triplet (See "Mapping Option Triplet X'04'" on page 360)	1	M
	0–1 **X'0304'** →Triplet length and identifier	1	M
	2 Output Option. It must be one of the following: **X'10'** → Position and trim **X'20'** → Scale to fit **X'30'** → Center and trim	1	M

Note: If this structured field is not specified, the architected default is *scale to fit*.

Map Page Overlay

MPO X'D3ABD8' Map Page Overlay (See "Map Page Overlay (MPO)" on page 294)			
0–1	**X'0012'** →Length of this repeating group is 18 bytes	127	M
2–17	The following triplet:		
	Fully Qualified Name Triplet (See "Fully Qualified Name Triplet X'02'" on page 351)	1	M
	0–1 **X'0C02'** →Triplet length and identifier	1	M
	2–3 **X'8400'** →FQN type and format, reference to overlay	1	M
	4–11 External name of the overlay.	1	M
	Resource Local Identifier Triplet (See "Resource Local Identifier Triplet X'24'" on page 378)	1	M
	0–1 **X'0424'** →Triplet length and identifier	1	M
	2 **X'02'** →Resource type, page overlay	1	M
	3 **X'01'–X'7F'** →Resource Local Identifier. It must be in the range of 1 to 127.	1	M

No Operation

NOP X'D3EEEE' No Operation (See "No Operation (NOP)" on page 299)	
0–*n*	Up to 32,759 bytes of data.

Object Area Descriptor

OBD X'D3A66B' Object Area Descriptor (See "Object Area Descriptor (OBD)" on page 300)			
0–*n*	The following triplets, in any order:		
	Descriptor Position Triplet (See "Descriptor Position Triplet X'43'" on page 383)	1	M
	0–1 **X'0343'** →Triplet length and identifier	1	M
	2 **X'01'–X'7F'** →Descriptor position ID. It must be in the range of 1 to 127.	1	M

OBD X'D3A66B' Object Area Descriptor (See “Object Area Descriptor (OBD)” on page 300)			
	Measurement Units Triplet (See “Measurement Units Triplet X'4B'” on page 388)	1	M
0–1	**X'084B'** →Triplet length and identifier	1	M
2–3	**X'0000'** →Object area measurement units base for X and Y	1	M
4–5	Object area measurement units value for X. It must be one of the following: **X'0960'** → 2400 units per unit base (240 units per inch) **X'3840'** → 14400 units per unit base (1440 units per inch)		
6–7	Object area measurement units value for Y. It must be identical to bytes 4–5.	1	M
	Object Area Size Triplet (See “Object Area Size Triplet X'4C'” on page 389)	1	M
0–1	**X'094C'** →Triplet length and identifier	1	M
2	**X'02'** →Type, actual object area size	1	M
3–5	Object area size in the X direction. It must be one of the following: **X'000001'–X'001555'** → In the range of 1 to 5,461 when using 240 units per inch for the object area X measurement units **X'000001'–X'007FFF'** → In the range of 1 to 32,767 when using 1440 units per inch for the object area X measurement units	1	M
6–8	Object area size in the Y direction. It must be one of the following: **X'000001'–X'001555'** → In the range of 1 to 5,461 when using 240 units per inch for the object area Y measurement units **X'000001'–X'007FFF'** → In the range of 1 to 32,767 when using 1440 units per inch for the object area Y measurement units	1	M

Note: If the presentation text Object Area Descriptor structured field appears in the AEG, the measurement units and extents specified on it must match those specified on the Page Descriptor structured field, or a X'01' exception condition exists. If the presentation text Object Area Descriptor structured field is omitted, the architected default is to use the measurement units and extents specified on the Page Descriptor structured field for the presentation text object area. Thus, the presentation text object area and the page are always the same size and points within their respective coordinate systems are always coincident.

Object Area Position

OBP X'D3AC6B' Object Area Position (See “Object Area Position (OBP)” on page 302)			
0	**X'01'–X'7F'** →Object Area Position ID. It must be in the range of 1 to 127.	1	M
1	**X'17'** →Length of this repeating group is 23 bytes	1	M
2–4	Object area origin for X. It must be one of the following: **X'000000'–X'001555'** → In the range of 0 to 5,461 when using 240 units per inch for the page or overlay X measurement units **X'000000'–X'007FFF'** → In the range of 0 to 32,767 when using 1440 units per inch for the page or overlay X measurement units	1	M

OBP X'D3AC6B' Object Area Position (See “Object Area Position (OBP)” on page 302)				
5–7	Object area origin for Y. It must be one of the following:		1	M
	X'000000'–X'001555' →	In the range of 0 to 5,461 when using 240 units per inch for the page or overlay Y measurement units		
	X'000000'–X'007FFF' →	In the range of 0 to 32,767 when using 1440 units per inch for the page or overlay Y measurement units		
8–11	Object Area orientation, X and Y coordinates. It must be one of the following:		1	M
	X'0000 2D00' →	X=0 degrees, Y=90 degrees		
	X'2D00 5A00' →	X=90 degrees, Y=180 degrees		
	X'5A00 8700' →	X=180 degrees, Y=270 degrees		
	X'8700 0000' →	X=27 degrees, Y=0 degrees		
12	**X'00'** →Reserved; must be binary zero		1	M
13–15	Object content origin for X. It must be one of the following:		1	M
	X'000000'–X'001555' →	In the range of 0 to 5,461 when using 240 units per inch for the object area X measurement units		
	X'000000'–X'007FFF' →	In the range of 0 to 32,767 when using 1440 units per inch for the object area X measurement units		
16–18	Object content origin for Y. It must be one of the following:		1	M
	X'000000'–X'001555' →	In the range of 0 to 5,461 when using 240 units per inch for the object area Y measurement units		
	X'000000'–X'007FFF' →	In the range of 0 to 32,767 when using 1440 units per inch for the object area Y measurement units		
19–20	**X'0000'** →Object content orientation, X (0 degrees)		1	M
21–22	**X'2D00'** →Object content orientation, Y (90 degrees)		1	M
23	Referenced coordinate system. It must be one of the following:		1	M
	X'00' →	Current coordinate system		
	X'01' →	Page or overlay coordinate system		

Notes:

1. If the presentation text Object Area Position structured field appears in the AEG, the X and Y values for the object area origin and the object content origin must be set to zero, or a X'01' exception condition exists. If the presentation text Object Area Position structured field is omitted, the architected default is to set the X and Y values for the object area origin and the object content origin to zero. For presentation text, the data object presentation space origin is positioned coincident with the object content origin. Thus, the presentation text object presentation space, the presentation text object area, and the page always have the same origin.
2. If the presentation text OBP appears in the AEG, the object area orientation must be set to X'0000 2D00' (0°,90°). If it is omitted, the architected default is to set the object area orientation to X'0000 2D00' (0°,90°).
3. For this interchange set, the values X'00' and X'01' in byte 23 specify the same function since positioning with respect to a page segment offset is not part of the interchange set definition. That is, both values specify that the object area is to be positioned with respect to the including page or overlay coordinate system.

Page Descriptor

PGD X'D3A6AF' Page Descriptor (See "Page Descriptor (PGD)" on page 310)			
0–1	**X'0000'** →Page measurement units base for X and Y	1	M
2–3	Page measurement units value for X. It must be one of the following: **X'0960'** → 2400 units per unit base (240 units per inch) **X'3840'** → 14400 units per unit base (1440 units per inch)	1	M
4–5	Page measurement units value for Y. It must be identical to bytes 2–3.	1	M
6–8	Page size in the X direction. It must be one of the following: **X'000001'–X'001555'** → In the range of 1 to 5,461 when using 240 units per inch for the page X measurement units **X'000001'–X'007FFF'** → In the range of 1 to 32,767 when using 1440 units per inch for the page X measurement units	1	M
9–11	Page size in the Y direction. It must be one of the following: **X'000001'–X'001555'** → In the range of 1 to 5,461 when using 240 units per inch for the page Y measurement units **X'000001'–X'007FFF'** → In the range of 1 to 32,767 when using 1440 units per inch for the page Y measurement units	1	M
12–14	**X'000000'** →Reserved; must be binary zero	1	M

Application Note: The IS/1 and IS/2 interchange set definitions limit the page size to 22.75 inches in the X and Y directions. To specify a larger page size, 240 units per inch should be specified in the PGD for the page measurement units. Using a range of 1 to 32,767, this will allow a maximum page size in the X and Y directions of 136.5 inches, is supported by all IPDS printers, and keeps the complete page presentation space within the range of two-byte addressing parameters in the IPDS and PTOCA architectures.

Presentation Text Data

PTX X'D3EE9B' Presentation Text Data (See "Presentation Text Data (PTX)" on page 341)	
0–*n*	Up to 8,192 bytes of presentation text data as defined by PTOCA PT1

Presentation Text Data Descriptor, Format 2

PTD X'D3B19B' Presentation Text Data Descriptor (See "Presentation Text Data Descriptor (PTD) Format 2" on page 340)	
0–*n*	Presentation text descriptor data as defined by PTOCA

Note: When the PTD is included in the AEG for a page, some AFP print servers require that the measurement units in the PTD match the measurement units in the Page Descriptor (PGD). It is therefore strongly recommended that whenever the PTD is included in the AEG, the same measurement units are specified in both the PTD and PGD.

MO:DCA Presentation Interchange Set 2 (IS/2)

The MO:DCA Interchange Set 2 (MO:DCA IS/2) has been retired for products that implemented this set before 2012; see “Retired Interchange Set” on page 575. This interchange set is no longer part of the MO:DCA interchange set hierarchy.

MO:DCA Interchange Set 3 (IS/3)

This section defines the MO:DCA Interchange Set 3 (MO:DCA IS/3) used for presentation documents. MO:DCA IS/3 is based on MO:DCA Presentation Interchange Set 1 (MO:DCA IS/1) and contains most of the functions added to the MO:DCA architecture since the IS/1 interchange set was defined in 1991. IS/3 does not include functions in IS/1 that have a strategic successor and that may eventually be formally retired from the MO:DCA architecture. A primary example is the support for FOCA font technology, which is not included in IS/3 because the MO:DCA architecture now supports the more modern industry-standard TrueType/OpenType font technology.

For details on the level of function required for the objects that are defined by AFP Object Content Architectures (OCAs) and that are included in this interchange set, refer to the following documents:

BCOCA	*Bar Code Object Content Architecture Reference*
CMOCA	*Color Management Object Content Architecture Reference*
GOCA	*Graphics Object Content Architecture for AFP Reference*
IOCA	*Image Object Content Architecture Reference*
PTOCA	*Presentation Text Object Content Architecture Reference*
FOCA	*Font Object Content Architecture Reference*

The AFP Consortium (AFPC) has defined subsets for several industry-standard presentation object containers that are also included in IS/3. These subsets are:

- AFPC TIFF
- AFPC JPEG

Both are formally defined in *Presentation Object Subsets for AFP*, available from the AFP Consortium.

Note: This version of the MO:DCA Reference includes all published Errata for the prior version of this Reference.

1.0 Functional Subsets

The MO:DCA IS/3 interchange set comprises the following major MO:DCA functional subsets above and beyond the functional subsets contained in MO:DCA IS/1:

- Page and page group level indexing using TLEs
- Document component and area linking using LLEs
- N-up presentation
- Process color
- AFP finishing
- TrueType/OpenType font support
- Color management

2.0 Compliance

General compliance with MO:DCA interchange sets is defined in "Interchange Set Compliance Requirements" on page 472. The MO:DCA architecture definition of compliance with the IS/3 interchange set is limited to what compliance means for MO:DCA print files, it does not include definitions of IS/3 compliance for product compliance classes, e.g. generators and receivers. That is, the architecture defines the content of IS/3-compliant print files in terms of what is permitted (**may**), what is recommended (**should**), what is mandatory (**must**), and what is prohibited (**must not**). The definition of what constitutes an IS/3-compliant product must be provided in documentation that is outside the scope of the MO:DCA architecture.

A MO:DCA print file is compliant with the IS/3 interchange set definition if all the following conditions are met:

- all objects and their content must be in IS/3 and must comply with the IS/3 object structure definitions
- all structured fields must be in IS/3 and must comply with the IS/3 parameter and triplet definitions
- all structured field triplets must be in IS/3 and must comply with applicable IS/3 restrictions
- all parameter values must fall within the ranges defined by IS/3
- the print file must not include any migration functions (as defined in Appendix C - MO:DCA Migration Functions), unless they are explicitly allowed in IS/3 (see “7.0 Migration Functions included in IS/3” on page 515)
- the maximum structured field length must be limited to X'7FF0' = 32,752
- all Begin Document (BDT) structured fields must specify the MO:DCA Interchange Set (X'18') triplet with ISid = X'0D00' (MO:DCA IS/3)
- the print file must be enveloped with the Begin Print File (BPF) and End Print File (EPF) structured fields and the Begin Print File (BPF) structured field must specify the MO:DCA Interchange Set (X'18') triplet with ISid = X'0D00' (MO:DCA IS/3)

2.1 Migration Functions (as defined in Appendix C - MO:DCA Migration Functions)

In general, MO:DCA IS/3 does not include any obsolete, retired, or coexistence parameters, triplets, structured fields, or objects. For exceptions, see “7.0 Migration Functions included in IS/3” on page 515.

2.2 Structured Field Introducer

The Flag byte (byte 5) in the Structured Field Introducer (SFI) must be set to X'00'. MO:DCA IS/3 does not include support for the following functions:

- SFI extension
- Structured field segmentation
- Structured field padding

The maximum structured field length in IS/3 is limited to X'7FF0' = 32,752.

Application Note: This restriction avoids problems on platforms that include structured fields into a larger “record” by adding several bytes (such as the X'5A' character) resulting in a record length greater than X'7FFF'. Such a record length can be misinterpreted as a negative number if the length is treated as SBIN. Note that the maximum structured field length in IS/1 is X'2000' = 8,192

2.3 Exception Conditions

In general, no exception conditions are defined within the IS/3 definition for the structured fields or their parameters above and beyond what the general MO:DCA architecture defines. The following general rules apply:

- Exception conditions should not be generated solely due to noncompliance with IS/3. When a valid print file is noncompliant with IS/3, it should always be processed to the best of a receiver's capabilities. That is, any object, object content, structured field, or structured field triplet that is valid in the general architecture but that is not included in the IS/3 definition should be processed to the best of a receiver's capability. For example, a receiver may generate an exception because it detected an error while processing an MCF-2 structured field, but not because the print file claimed to be IS/3 compliant and the MCF-2 structured field is not part of IS/3.

3.0 Data Stream Object Structure

This section defines the objects that make up an IS/3 data stream.

Notes:

1. The Begin Print File and End Print File structured fields are required in a MO:DCA IS/3 data stream.
2. The Begin Document and End Document structured fields are required in a MO:DCA IS/3 data stream.
3. The No Operation structured field may appear within any begin-end domain and thus is not listed in the structured field groupings.
4. Object content must not include functions that are not in IS/3. That is, a print file is not IS/3-compliant if it includes such content.
5. Table 27 contains summaries of the IS/3 object structure. All syntax, semantics, and notes in the object structure definitions in Chapter 4, "MO:DCA Objects", on page 75 apply, unless explicitly specified otherwise.

Table 27. IS/3 Objects

IS/3 Data Stream Object Structure		
Object Name	**Object Envelope**	**Summary of IS/3 object structure; differences from general MO:DCA Architecture noted**

Print File	Begin Print File (BPF) X'D3A8A5' - End Print File (EPF) X'D3A9A5'	The print file:
		• must be enveloped by the Begin Print File (BPF) and End Print File (EPF) structured fields
		• must specify the MO:DCA Interchange Set X'18' triplet on the BPF and must indicate ISid = X'0D00' = MO:DCA IS/3.
		The print file contains only the following structured fields and objects, as defined in the general architecture subject to all applicable IS/3 restrictions.
		Print File
		`(BPF, D3A8A5)`
		`    [   (Resource Grp)        ]`
		`        (Index + Doc )   (S)`
		`(EPF, D3A9A5)`
		
		Index + Document
		`    [   (Index        )        ]`
		`        (Document     )    (S)`
		Note: IS/3 compliant consumers must consider a physical file, which is an operating system file that, when it contains AFP data, is printed with a single Form Definition, as a single MO:DCA (AFP) print file that contains at most one BPF/EPF pair and at most one print file level resource group. Such consumers should generate a presentation-system-specific exception if the physical file contains more than one BPF/EPF pair.

Table 27 IS/3 Objects (cont'd.)

IS/3 Data Stream Object Structure		
Object Name	**Object Envelope**	**Summary of IS/3 object structure; differences from general MO:DCA Architecture noted**

Resource Group (print file)	Begin Resource Group (BRG) X'D3A8C6' - End Resource Group (ERG) X'D3A9C6'	The resource group may only contain the following structured fields and resource objects, as defined in the general architecture subject to all applicable IS/3 restrictions.
		`(BRG, D3A8C6)`
		`  + [  (Overlay      )  (S)  ]`
		`  + [  (MO:DCA Pseg )  (S)  ]`
		`  + [  (Form Map     )  (S)  ]`
		`  + [  (BCOCA        )  (S)  ]`
		`  + [  (GOCA         )  (S)  ]`
		`  + [  (IOCA         )  (S)  ]`
		`  + [  (Object Cont )  (S)  ]`
		`  + [  (FOCA Object )  (S)  ]`
		`(ERG, D3A9C6)`
		The only FOCA objects that may be included are:
		• FOCA code page object
		• FOCA Unicode-extended code page object
		
		IS/3 may limit the function in the resource objects; for details see the individual IS/3 object definitions in this table.

Resource Object (in print file resource group)	Begin Resource (BRS) X'D3A8CE' - End Resource (ERS) X'D3A9CE'	The resource object must be enveloped by the Begin Resource (BRS) and End Resource (ERS) structured fields:
		`(BRS,  D3A8CE)`
		`        (Res Object   )`
		`(ERS,  D3A9CE)`

Document Index	Begin Document Index (BDI) X'D3A8A7' - End Document Index (EDI) X'D3A9A7'	The document index contains only the following structured fields, as defined in the general architecture subject to all applicable IS/3 restrictions.
		`(BDI, D3A8A7)`
		`  +    (IEL,  D3B2A7)  (S)`
		`  + [  (LLE,  D3B490)  (S)  ]`
		`  + [  (TLE,  D3A090)  (S)  ]`
		`(EDI, D3A9A7)`

Document	Begin Document (BDT) X'D3A8A8' - End Document (EDT) X'D3A9A8'	The document contains only the following structured fields and objects, as defined in the general architecture subject to all applicable IS/3 restrictions.
		`(BDT, D3A8A8)`
		`  + [  (IMM,  D3ABCC)  (S)  ]`
		`  + [  (LLE,  D3B490)  (S)  ]`
		`  + [  (Medium Map  )  (S)  ]`
		`  + [  (REG         )  (S)  ]`
		`  + [  (Page        )  (S)  ]`
		`  + [  (Page Group  )  (S)  ]`
		`(EDT, D3A9A8)`

Resource Environment Group (REG)	Begin Resource Environment Group (BSG) X'D3A8D9' - End Resource Environment Group (ESG) X'D3A9D9'	The Resource Environment Group contains only the following structured fields, as defined in the general architecture subject to all applicable IS/3 restrictions.
		`(BSG, D3A8D9)`
		`    [  (MDR,  D3ABC3)  (S)  ]`
		`    [  (MPO,  D3ABD8)  (S)  ]`
		`    [  (PPO,  D3ADC3)  (S)  ]`
		`(ESG, D3A9D9)`

Table 27 IS/3 Objects (cont'd.)

IS/3 Data Stream Object Structure		
Object Name	**Object Envelope**	**Summary of IS/3 object structure; differences from general MO:DCA Architecture noted**

Page	Begin Page (BPG) X'D3A8AF' - End Page (EPG) X'D3A9AF'	The page contains only the following structured fields and objects, as defined in the general architecture subject to all applicable IS/3 restrictions.
		Page
		`(BPG, D3A8AF)`
		`       (AEG         )`
		`  + [  (IOB,  D3AFC3)  (S)  ]`
		`  + [  (IPO,  D3AFD8)  (S)  ]`
		`  + [  (IPS,  D3AF5F)  (S)  ]`
		`  + [  (LLE,  D3B490)  (S)  ]`
		`  + [  (TLE,  D3A090)  (S)  ]`
		`  + [  (BCOCA       )  (S)  ]`
		`  + [  (GOCA        )  (S)  ]`
		`  + [  (IOCA        )  (S)  ]`
		`  + [  (PTOCA       )  (S)  ]`
		`  + [  (Object Cont )  (S)  ]`
		`(EPG, D3A9AF)`
		
		AEG
		`(BAG, D3A8C9)`
		`    [  (PEC,  D3A7A8)       ]`
		`    [  (MDR,  D3ABC3)  (S)  ]`
		`    [  (MPO,  D3ABD8)  (S)  ]`
		`    [  (MPS,  D3B15F)  (S)  ]`
		`       (PGD,  D3A6AF)`
		`    [  (OBD,  D3A66B)       ]`
		`    [  (OBP,  D3AC6B)       ]`
		`       (PTD,  D3B19B)    F2`
		`(EAG, D3A9C9)`
		Notes:
		1. The OBD is only used for PTOCA objects without an OEG, and if specified:
		• the measurement units must match the PGD units
		• the extents must match the PGD extents
		These are the architected defaults if the OBD is not specified, and cause the text object area to have the same units and extents as the page.
		2. The OBP is only used for PTOCA objects without an OEG, and if specified:
		• the object area origin must be set to zero
		• the object content origin must be set to zero
		• the object area orientation must be set to (0°,90°)
		These are the architected defaults if the OBP is not specified, and cause the text object area to be positioned coincident with the page.
		3. The PTD is only mandatory if the page contains one or more PTOCA objects without an OEG. It is strongly recommended that the measurement units in the PTD match the PGD units.
		
		IS/3 may limit the function in the data objects; for details see the individual IS/3 object definitions in this table.

Page Group	Begin Named Page Group (BNG) X'D3A8AD' - End Named Page Group (ENG) X'D3A9AD'	The page group contains only the following structured fields and objects, as defined in the general architecture subject to all applicable IS/3 restrictions.
		`(BNG, D3A8AD)`
		`    [  (TLE,  D3A090)  (S)  ]`

Table 27 IS/3 Objects (cont'd.)

IS/3 Data Stream Object Structure		
Object Name	**Object Envelope**	**Summary of IS/3 object structure; differences from general MO:DCA Architecture noted**
		+ [(IMM, D3ABCC) (S)] + [(LLE, D3B490) (S)] + [(Medium Map) (S)] + [(REG) (S)] + [(Page) (S)] + [(Page Group) (S)] (ENG, D3A9AD)
Overlay	Begin Overlay (BMO) X'D3A8DF' - End Overlay (EMO) X'D3A9DF'	The overlay contains only the following structured fields and objects, as defined in the general architecture subject to all applicable IS/3 restrictions. ***Overlay*** (BMO, D3A8DF) (AEG) + [(IOB, D3AFC3) (S)] + [(IPS, D3AF5F) (S)] + [(LLE, D3B490) (S)] + [(TLE, D3A090) (S)] + [(BCOCA) (S)] + [(GOCA) (S)] + [(IOCA) (S)] + [(PTOCA) (S)] + [(Object Cont) (S)] (EMO, D3A9DF) ***AEG*** (BAG, D3A8C9) [(PEC, D3A7A8)] [(MDR, D3ABC3) (S)] [(MPS, D3B15F) (S)] (PGD, D3A6AF) [(OBD, D3A66B)] [(OBP, D3AC6B)] (PTD, D3B19B) F2 (EAG, D3A9C9) **Notes:** 1. The OBD is only used for PTOCA objects without an OEG, and if specified: • the measurement units must match the PGD units • the extents must match the PGD extents These are the architected defaults if the OBD is not specified, and cause the text object area to have the same units and extents as the overlay. 2. The OBP is only used for PTOCA objects without an OEG, and if specified: • the object area origin must be set to zero • the object content origin must be set to zero • the object area orientation must be set to (0°,90°) These are the architected defaults if the OBP is not specified, and cause the text object area to be positioned coincident with the overlay. 3. The PTD is only mandatory if the overlay contains one or more PTOCA objects without an OEG. It is strongly recommended that the measurement units in the PTD match the PGD units. IS/3 may limit the function in the data objects; for details see the individual IS/3 object definitions in this table.

Table 27 IS/3 Objects (cont'd.)

IS/3 Data Stream Object Structure		
Object Name	**Object Envelope**	**Summary of IS/3 object structure; differences from general MO:DCA Architecture noted**
Page Segment	Begin Page Segment (BPS) X'D3A85F' - End Page Segment (EPS) X'D3A95F'	The page segment must be a MO:DCA page segment and contains only the following structured fields and objects, as defined in the general architecture subject to all applicable IS/3 restrictions. ***Page Segment*** (BPS, D3A85F) + [(BCOCA) (S)] + [(GOCA) (S)] + [(IOCA) (S)] (EPS, D3A95F) IS/3 may limit the function in the data objects; for details see the individual IS/3 object definitions in this table.
Bar Code Object	Begin Bar Code Object (BBC) X'D3A8EB' - End Bar Code Object (EBC) X'D3A9EB'	The object content must comply with the BCOCA BCD2 subset definition. The bar code object contains only the following structured fields, as defined in the general architecture subject to all applicable IS/3 restrictions. ***Bar Code Object*** (BBC, D3A8EB) (OEG) [(BDA, D3EEEB) (S)] (EBC, D3A9EB) ***OEG*** (BOG, D3A8C7) (OBD, D3A66B) (OBP, D3AC6B) [(MBC, D3ABEB)] [(MDR, D3ABC3) (S)] (BDD, D3A6EB) (EOG, D3A9C7)
Graphics Object	Begin Graphics Object (BGR) X'D3A8BB' - End Graphics Object (EGR) X'D3A9BB'	The object content must comply with the AFP GOCA GRS3 subset definition. The graphics object contains only the following structured fields, as defined in the general architecture subject to all applicable IS/3 restrictions. ***Graphics Object*** (BGR, D3A8BB) (OEG) [(GAD, D3EEBB) (S)] (EGR, D3A9BB) ***OEG*** (BOG, D3A8C7) [(PEC, D3A7A8)] (OBD, D3A66B) (OBP, D3AC6B) [(MGO, D3ABBB)] [(MDR, D3ABC3) (S)] (GDD, D3A6BB) (EOG, D3A9C7) **Note:** If the boundary for an area is to be drawn but is not properly closed, IS/3 receivers should not draw a line to close the figure.

Table 27 IS/3 Objects (cont'd.)

IS/3 Data Stream Object Structure		
Object Name	**Object Envelope**	**Summary of IS/3 object structure; differences from general MO:DCA Architecture noted**

Image Object	Begin Image Object (BIM) X'D3A8FB' - End Image Object (EIM) X'D3A9FB'	The object content must comply with the IOCA FS10 or FS45 subset definitions. Note that compliance with IOCA FS45 includes compliance with IOCA FS40 and FS42. The image object contains only the following structured fields, as defined in the general architecture subject to all applicable IS/3 restrictions.
		Image Object
		`(BIM, D3A8FB)`
		`        (OEG        )`
		`    [   (IPD, D3EEFB)    (S)   ]`
		`(EIM, D3A9FB)`
		
		OEG
		`(BOG, D3A8C7)`
		`    [   (PEC, D3A7A8)          ]`
		`        (OBD, D3A66B)`
		`        (OBP, D3AC6B)`
		`    [   (MIO, D3ABFB)          ]`
		`    [   (MDR, D3ABC3)    (S)   ]`
		`        (IDD, D3A6FB)`
		`(EOG, D3A9C7)`
		
		The object content includes support for the following additional IOCA functions:
		• IDD Set Extended Bilevel Image Color self-defining field
		• All MO:DCA color spaces for bilevel tiles on the Tile Set Color parameter

Presentation Text Object	Begin Presentation Text Object (BPT) X'D3A89B' - End Presentation Text (EPT) X'D3A99B'	The object content must comply with the PTOCA PT3 subset definition, with support for the following additional PTOCA functions:
		• Set Text Color (STC) control sequence "Precision" parameter (byte 6) is retired
		• New Exception id EC-1A03: Invalid Unicode Data
		• Highlight Color Space, range X'0100' - X'FFFF', for Indexed CMRs
		• Support for the full range of color values, as defined in the "Standard OCA Color Value Table" on page 521, in the STC control sequence
		• Support for the full PTOCA parameter ranges in the DBR, DIR, SIA, and SVI control sequences
		
		The text object contains only the following structured fields, as defined in the general architecture subject to all applicable IS/3 restrictions.
		Text Object
		`(BPT, D3A89B)`
		`    [   (PTX, D3EE9B)    (S)   ]`
		`(EPT, D3A99B)`

Table 27 IS/3 Objects (cont'd.)

IS/3 Data Stream Object Structure		
Object Name	**Object Envelope**	**Summary of IS/3 object structure; differences from general MO:DCA Architecture noted**

Object Container - Presentation Object	Begin Object Container (BOC) X'D3A892' - End Object Container (EOC) X'D3A992'	See Table 28 on page 498 for the presentation object containers included in IS/3. The object container contains only the following structured fields, as defined in the general architecture subject to all applicable IS/3 restrictions.
		Presentation Object Container
		`(BOC, D3A892)`
		`[ (OEG ) ]`
		`[ (OCD, D3EE92) (S) ]`
		`(EOC, D3A992)`
		
		OEG
		`(BOG, D3A8C7)`
		`[ (PEC, D3A7A8) ]`
		`[ (OBD, D3A66B) ]`
		`[ (OBP, D3AC6B) ]`
		`[ (MCD, D3AB92) ]`
		`[ (MDR, D3ABC3) (S) ]`
		`[ (CDD, D3A692) ]`
		`(EOG, D3A9C7)`
		• If included directly on a page/overlay, BOC/EOC is mandatory, OEG with OBD, OBP, CDD is mandatory, and all object data must be carried in OCDs.
		• If included with an IOB and located in the resource group, BOC/EOC is mandatory and all object data must be carried in OCDs; OEG is optional.
		• If included with an IOB and located in a resource library, it can be wrapped: with a BOC/EOC wrapper, all object data in OCDs, and an optional OEG; or unwrapped: where the data is unaltered in its original form. If installed with a RAT, the object must not be wrapped.
		
		See Table 30 on page 499 for the IS/3 presentation object containers that can be referenced with an IOB structured field and that can be processed with a Data Object Resource (DOR) RAT (Resource Access Table).

Object Container - Non-Presentation Object	Begin Object Container (BOC) X'D3A892' - End Object Container (EOC) X'D3A992'	See Table 29 on page 498 for the non-presentation object containers included in IS/3. The object container contains only the following structured fields, as defined in the general architecture subject to all applicable IS/3 restrictions.
		Non-presentation Object Container
		`(BOC, D3A892)`
		`[ (OCD, D3EE92) (S) ]`
		`(EOC, D3A992)`
		• If located in the resource group, BOC/EOC is mandatory and all object data must be carried in OCDs.
		• If located in a resource library:
		– a CMT must be wrapped: BOC/EOC wrapper and all data in OCDs
		– an IOCA tile resource can be wrapped or unwrapped
		– TTF/OTFs, TTF collections, and CMRs, since always installed with a RAT, must not be wrapped

FOCA Objects	Only a FOCA code page can occur in the print file resource group within following container: Begin Resource (BRS) X'D3A8CE' - End	The following objects are supported and may be referenced with an MDR structured field that specifies the name of the code page: • FOCA code pages: – Single-byte and double-byte – Single-byte and double-byte with Unicode values

Table 27 IS/3 Objects (cont'd.)

IS/3 Data Stream Object Structure		
Object Name	**Object Envelope**	**Summary of IS/3 object structure; differences from general MO:DCA Architecture noted**
	Resource (ERS) X'D3A9CE'	

Table 28. IS/3 Containers - Presentation Objects

Component ID	Object Type	Encoded Object-type OID
14	TIFF	X'06072B12000401010E'
22	GIF	X'06072B120004010116'
23	AFPC JPEG **Note:** This object type was formerly referred to as *JFIF (JPEG)*.	X'06072B120004010117'
60	TIFF without Transparency	X'06072B12000401013C'
61	TIFF Multiple Image File	X'06072B12000401013D'
62	TIFF Multiple Image - without Transparency - File	X'06072B12000401013E'
66	AFPC TIFF	X'06072B120004010142'

Table 29. IS/3 Containers - Non-Presentation Objects

Component ID	Object Type	Encoded Object-type OID
20	Color Mapping Table (CMT)	X'06072B120004010114'
47	IOCA Tile Resource	X'06072B12000401012F'
51	TrueType/OpenType Font: • TrueType shapes (Unicode Cmap) • CFF Type 1 shapes (Unicode Cmap) • CFF CID shapes (Unicode Cmap)	X'06072B120004010133'
53	TrueType/OpenType Font Collection	X'06072B120004010135'
57	Color Management Resource (CMR) Baseline support as defined in the CMOCA reference, plus support for Indexed (IX) CMRs. Therefore the following CMR types are supported: • Color Conversion (CC) CMRs • Generic Halftone (HT) CMRs • Generic Tone Transfer Curves (TTC) CMRs • Indexed (IX) CMRs Support for the CMYK passthru function.	X'06072B120004010139'

Table 30 on page 499 lists the IS/3 presentation object containers that can be referenced for presentation by the Include Object (IOB) structured field with ObjType = X'92'— other object data. This is also the list of IS/3 presentation object containers that can be processed with a Data Object Resource (DOR) RAT.

Table 30. IS/3 IOB and DOR RAT Presentation Object Containers

Component ID	Object Type	Encoded Object-type OID
14	TIFF	X'06072B12000401010E'
22	GIF	X'06072B120004010116'
23	AFPC JPEG **Note:** This object type was formerly referred to as *JFIF (JPEG)*.	X'06072B120004010117'
60	TIFF without Transparency	X'06072B12000401013C'
61	TIFF Multiple Image File	X'06072B12000401013D'
62	TIFF Multiple Image - without Transparency - File	X'06072B12000401013E'
66	AFPC TIFF	X'06072B120004010142'

Table 31 on page 499 lists the secondary resources that are supported by various IS/3 data object resources.

Table 31. IS/3 Data Objects and Secondary Resources

Data Object Resource	Secondary Resource	Internal Resource Identifier
IOCA Image	IOCA Tile Resource Color Management Resource	4-byte local ID None
PTOCA Text; see Note	TrueType/OpenType Font	1-byte local ID
AFP GOCA; see Note	TrueType/OpenType Font Color Management Resource	1-byte local ID None
BCOCA Text; see Note	TrueType/OpenType Font Color Management Resource	1-byte local ID None
TIFF - all formats	Color Management Resource	None
GIF	Color Management Resource	None
AFPC JPEG **Note:** This object type was formerly referred to as *JFIF (JPEG)*.	Color Management Resource	None
Note: These table entries are not formally primary resource with secondary resource pairs since PTOCA, AFP GOCA, and BCOCA objects currently cannot be processed as resource objects. However, the resources for these objects are processed like other secondary resources.		

4.0 Print Control Object Structure

This section defines the objects that are used to control the presentation of an IS/3 data stream.

Table 32. IS/3 Print Control Objects

IS/3 Print Control Object Structure		
Object Name	**Object Envelope**	**Summary of IS/3 object structure; differences from general MO:DCA Architecture noted**

Form Map	Begin Form Map (BFM) X'D3A8CD' - End Form Map (EFM) X'D3A9CD'	The form map contains only the following objects, as defined in the general architecture subject to all applicable IS/3 restrictions.
		`(BFM, D3A8CD)`
		`     [   (DEG          )          ]`
		`         (Medium Map   )    (S)`
		`(EFM, D3A9CD)`

Document Environment Group	Begin Document Environment Group (BDG) X'D3A8C4' - End Document Environment Group (EDG) X'D3A9C4'	The Document Environment Group (DEG) contains only the following structured fields, as defined in the general architecture subject to all applicable IS/3 restrictions.
		`(BDG, D3A8C4)`
		`     [   (PFC, D3B288)    (S)   ]`
		`     [   (PEC, D3A7A8)    (S)   ]`
		`     [   (MMO, D3B1DF)          ]`
		`     [   (MSU, D3ABEA)          ]`
		`         (PGP, D3B1AF)       F2`
		`         (MDD, D3A688)`
		`     [   (MFC, D3A088)    (S)   ]`
		`     [   (MDR, D3ABC3)    (S)   ]`
		`(EDG, D3A9C4)`
		Notes:
		1. The PGP and MDD are mandatory in either the DEG or the Medium Map.
		2. When the same structured field is specified in both the DEG and the Medium Map, the Medium Map overrides.
		3. IS/3 does not include support for UP3i finishing operations.

Medium Map	Begin Medium Map (BMM) X'D3A8CC' - End Medium Map (EMM) X'D3A9CC'	The Medium Map contains only the following structured fields, as defined in the general architecture subject to all applicable IS/3 restrictions.
		`(BMM, D3A8CC)`
		`     [   (MMO, D3B1DF)          ]`
		`     [   (MPO, D3ABD8)    (S)   ]`
		`     [   (MMT, D3AB88)    (S)   ]`
		`     [   (MDR, D3ABC3)    (S)   ]`
		`         (PGP, D3B1AF)       F2`
		`         (MDD, D3A688)`
		`         (MCC, D3A288)`
		`     [   (MMC, D3A788)    (S)   ]`
		`     [   (PMC, D3A7AF)    (S)   ]`
		`     [   (MFC, D3A088)    (S)   ]`
		`     [   (PEC, D3A7A8)          ]`
		`(EMM, D3A9CC)`
		Notes:
		1. The PGP and MDD are mandatory in either the DEG or the Medium Map.
		2. When the same structured field is specified in both the DEG and the Medium Map, the Medium Map overrides.
		3. IS/3 does not include support for UP3i finishing operations.

5.0 Structured Fields and Triplets

This section lists the IS/3 structured fields and their supported triplets. Triplets that are not listed but that are allowed in the general architecture must not be specified in an IS/3-compliant print file. Unless otherwise noted, all non-migration structured field positional parameters are supported in IS/3. Also, unless otherwise noted, the complete architected parameter range is supported in IS/3 for all structured field positional parameters and triplets. In general, IS/3 does not include any obsolete, retired, or coexistence parameters or triplets as defined in Appendix C, “MO:DCA Migration Functions”, on page 553; for exceptions, see “7.0 Migration Functions included in IS/3” on page 515. For brevity the tables in this section are only intended to summarize the triplets that are allowed on a structured field; for a complete definition of how these triplets are used on a structured field and what restrictions may apply, the general architecture must be consulted. Note that if a triplet is allowed to have 0 occurrences, it is an optional triplet. If it is allowed to have 1 or 1 or more occurrences but not 0 occurrences, it is a mandatory triplet.

The following rules apply to all IS/3 structured fields:

- The Local Date and Time Stamp (X'62') triplet is not included in IS/3 and must not be specified; it is replaced by the ISO-based Universal Date and Time Stamp (X'72') triplet.
- The Presentation Space Mixing Rules (X'71') triplet is not included in IS/3 and must not be specified.
- The Coded Graphic Character Set Global ID (X'01') triplet, while allowed on most structured fields in the general architecture, is only used in IS/3 on the BOC, BRS, IOB, MDR, PPO, and TLE structured fields, as noted explicitly in the following tables. Support for the inheritance of encoding scheme, as specified with the X'01' triplet on Begin structured fields, to lower levels of the MO:DCA hierarchy is not included in IS/3. While the X'01' triplet is mandatory on the BDT in the general architecture, it is optional on the BDT in IS/3, and if specified, must be ignored. It must not be specified on any other structured field. The architected default encoding for the IS/3 print file or document is EBCDIC single-byte presentation, which is characterized with encoding scheme ID X'61nn', and which is identified with CCSID 500 (corresponding to the combination of CPGID 500 and GCSGID 697). This default can be overridden on the BOC, BRS, IOB, MDR, PPO, and TLE structured fields. The inheritance of the encoding scheme to lower levels of the MO:DCA hierarchy using the X'01' triplet is not included in IS/3.

5.1 Begin Structured Fields

The following rules apply to all Begin structured fields in IS/3:

- The matching of names using the FQN type X'01' triplets on Begin/End structured fields is not part of IS/3. MO:DCA IS/3 generators can use matching 8-byte token names on Begin/End structured fields, or they can use the X'FFFF' wild card on End structured fields which matches any name on the corresponding Begin structured field. The FQN type X'01' triplet on End structured fields, while allowed in the general architecture on most End structured fields, must not be specified on End structured fields in an IS/3 print file.

Table 33. IS/3 Begin Structured Fields

IS/3 Begin Structured Fields			
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**	
Begin Active Environment Group (BAG)	X'D3A8C9'	**X'65'**	0 or more
Begin Bar Code Object (BBC)	X'D3A8EB'	**X'02' Tpe X'01'** **X'65'** **X'72'**	0 or 1 0 or more 0 or 1
Begin Document Environment Group (BDG)	X'D3A8C4'	**X'65'**	0 or more

Table 33 IS/3 Begin Structured Fields (cont'd.)

IS/3 Begin Structured Fields		
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**
Begin Document Index (BDI)	X'D3A8A7'	**X'02' Tpe X'01'** 0 or 1 **X'02' Tpe X'83'** 0 or 1 **X'65'** 0 or more **X'72'** 0 or 1
Begin Document (BDT)	X'D3A8A8'	**X'18'** 1 occurrence; must specify ISID = X'0D00' - MO:DCA IS/3 **X'01'** 0 or more. Must be ignored. **X'02' Tpe X'01'** 0 or 1 **X'65'** 0 or more **X'72'** 0 or 1 IS/3 does not include support for the inheritance by lower-level document components of the encoding scheme specified in the CGCSGID (X'01') triplet on the BDT. While this triplet is mandatory on the BDT in the general architecture, it is optional on the BDT in IS/3, and if specified, must be ignored. The architected default encoding for the document is EBCDIC single-byte presentation, which is characterized with encoding scheme ID X'61nn', and which is identified with CCSID 500 (corresponding to the combination of CPGID 500 and GCSGID 697). This default can be overridden on those structured fields where the X'01' triplet is supported in IS/3 (BOC, BRS, IOB, MDR, PPO, TLE). **Note:** A document can be made compliant both with the IS/3 encoding rules and with encoding scheme inheritance if the CGCSGID (X'01') triplet is specified last on the BDT, and if it specifies CCSID 500 (corresponding to the combination of CPGID 500 and GCSGID 697).
Begin Form Map (BFM)	X'D3A8CD'	**X'65'** 0 or more **X'72'** 0 or 1
Begin Graphics Object (BGR)	X'D3A8BB'	**X'02' Tpe X'01'** 0 or 1 **X'65'** 0 or more **X'72'** 0 or 1
Begin Image Object (BIM)	X'D3A8FB'	**X'02' Tpe X'01'** 0 or 1 **X'65'** 0 or more **X'72'** 0 or 1
Begin Medium Map (BMM)	X'D3A8CC'	**X'45'** 0 or 1 **X'65'** 0 or more
Begin Overlay (BMO)	X'D3A8DF'	**X'02' Tpe X'01'** 0 or 1. The overlay name must be less than or equal to 8 characters (bytes) in length. **X'65'** 0 or more **X'72'** 0 or 1
Begin Named Page Group (BNG)	X'D3A8AD'	**X'02' Tpe X'01'** 0 or 1 **X'02' Tpe X'8D'** 0 or 1 **X'56'** 0 or 1 **X'5E'** 0 or 1 occurrence for pages counted **X'65'** 0 or more **X'83'** 0 or 1

Table 33 IS/3 Begin Structured Fields (cont'd.)

IS/3 Begin Structured Fields		
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**
Begin Object Container (BOC)	X'D3A892'	**X'10'** 1 **X'01'** 0 or more **Notes:** 1. IS/3 requires full support of the CGCSGID (X'01') triplet on the BOC. 2. It is strongly recommended that this triplet is specified even if the parameter on the BOC defines a fixed encoding. For example, if the parameter defines a fixed UTF-16BE encoding, the triplet can be specified using the CCSID form with CCSID= 1200 (X'04B0'). **X'02' Tpe X'01'** 0 or 1 **X'02' Tpe X'41'** 0 or more **X'02' Tpe X'6E'** 0 or more **X'02' Tpe X'7E'** 0 or more **X'57'** 0 or 1 **X'65'** 0 or more **X'72'** 0 or 1
Begin Object Environment Group (BOG)	X'D3A8C7'	**X'65'** 0 or more
Begin Print File (BPF)	X'D3A8A5'	**X'18'** 1 occurrence; must specify ISID = X'0D00' - MO:DCA IS/3 **X'02' Tpe X'01'** 0 or 1 **X'65'** 0 or more **X'72'** 0 or 1 IS/3 does not include support for the inheritance by lower-level document components of the encoding scheme specified in the CGCSGID (X'01') triplet on the BPF. The architected default encoding for the print file is EBCDIC single-byte presentation, which is characterized with encoding scheme ID X'61nn', and which is identified with CCSID 500 (corresponding to the combination of CPGID 500 and GCSGID 697). This default can be overridden on those structured fields where the X'01' triplet is supported in IS/3 (BOC, BRS, IOB, MDR, PPO, TLE).
Begin Page (BPG)	X'D3A8AF'	**X'02' Tpe X'01'** 0 or 1 **X'02' Tpe X'8D'** 0 or 1 **X'56'** 0 or 1 **X'65'** 0 or more **X'81'** 0 or 1 **X'83'** 0 or 1
Begin Page Segment (BPS)	X'D3A85F'	The page segment must be a MO:DCA page segment; see Table 27 on page 491. **X'65'** 0 or more **X'72'** 0 or 1
Begin Presentation Text Object (BPT)	X'D3A89B'	**X'02' Tpe X'01'** 0 or 1 **X'65'** 0 or more **X'72'** 0 or 1

Table 33 IS/3 Begin Structured Fields (cont'd.)

IS/3 Begin Structured Fields			
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**	
Begin Resource Group (BRG)	X'D3A8C6'	**X'02' Tpe X'01'** **X'65'** **X'72'**	0 or 1 0 or more 0 or 1
Begin Resource (BRS)	X'D3A8CE'	**X'02' Tpe X'6E'**	1 or more if resource is a TTC; otherwise should not be specified
		X'10'	1 occurrence if ObjType = X'92' - Object Container; otherwise should not be specified
		X'21'	1 **Note:** This is the Resource Object Type triplet that was formally retired but is now part of the general architecture.
		X'01'	0 or more **Notes:** 1. IS/3 requires full support of the CGCSGID (X'01') triplet on the BRS. 2. It is strongly recommended that this triplet is specified even if the parameter on the BRS defines a fixed encoding. For example, if the parameter defines a fixed UTF-16BE encoding, the triplet can be specified using the CCSID form with CCSID= 1200 (X'04B0').
		X'02' Tpe X'01'	0 or more; 1 occurrence mandatory if resource is a CMR
		X'02' Tpe X'41'	0 or more if resource is a CMR; otherwise should not be specified
		X'02' Tpe X'7E'	0 or more if resource is a TTF/TTC; otherwise should not be specified
		X'65'	0 or more
Begin Resource Environment Group (BSG)	X'D3A8D9'	**X'65'**	0 or more

5.2 End Structured Fields

The following rules apply to all End structured fields in IS/3:

- The matching of names using the FQN type X'01' triplets on Begin/End structured fields is not part of IS/3. MO:DCA IS/3 generators can use matching 8-byte token names on Begin/End structured fields, or they can use the X'FFFF' wild card on End structured fields which matches any name on the corresponding Begin structured field. The FQN type X'01' triplet on End structured fields, while allowed in the general architecture on most End structured fields, must not be specified on End structured fields in an IS/3 print file.

Table 34. IS/3 End Structured Fields

IS/3 End Structured Fields		
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**
End Active Environment Group (EAG)	X'D3A9C9'	
End Bar Code Object (EBC)	X'D3A9EB'	

Table 34 IS/3 End Structured Fields (cont'd.)

IS/3 End Structured Fields		
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**
End Document Environment Group (EDG)	X'D3A9C4'	
End Document Index (EDI)	X'D3A9A7'	
End Document (EDT)	X'D3A9A8'	
End Form Map (EFM)	X'D3A9CD'	
End Graphics Object (EGR)	X'D3A9BB'	
End Image Object (EIM)	X'D3A9FB'	
End Medium Map (EMM)	X'D3A9CC'	
End Overlay (EMO)	X'D3A9DF'	
End Named Page Group (ENG)	X'D3A9AD'	
End Object Container (EOC)	X'D3A992'	
End Object Environment Group (EOG)	X'D3A9C7'	
End Print File (EPF)	X'D3A9A5'	
End Page (EPG)	X'D3A9AF'	
End Page Segment (EPS)	X'D3A95F'	The page segment must be a MO:DCA page segment; see Table 27 on page 491.
End Presentation Text Object (EPT)	X'D3A99B'	
End Resource Group (ERG)	X'D3A9C6'	
End Resource (ERS)	X'D3A9CE'	
End Resource Environment Group (ESG)	X'D3A9D9'	

5.3 Structured Fields without Triplets

The following IS/3 structured fields do not support any triplets.

Table 35. IS/3 Structured Fields without Triplets

IS/3 Structured Fields without Triplets		
Structured Field Name	**Structured Field ID**	**Differences from general MO:DCA Architecture**
Bar Code Data (BDA)	X'D3EEEB'	

Table 35 IS/3 Structured Fields without Triplets (cont'd.)

IS/3 Structured Fields without Triplets		
Structured Field Name	**Structured Field ID**	**Differences from general MO:DCA Architecture**
Graphics Data (GAD)	X'D3EEBB'	The GAD content must comply with the AFP GOCA GRS3 subset definition. **Note:** If the boundary for an area is to be drawn but is not properly closed, IS/3 receivers should not draw a line to close the figure.
Graphics Data Descriptor (GDD)	X'D3A6BB'	GDD content as defined by the AFP GOCA GRS3 subset definition. Measurement unit restrictions: • unit base = 10 inches • X units per unit base = Y units per unit base • range for X units per unit base and Y units per unit base is 1-32,767
Image Data Descriptor (IDD)	X'D3A6FB'	IDD content as defined for MO:DCA data streams by IOCA, with the following optional self-defining fields (listed by ID) and their allowed occurrences: **X'F4'** 0 or more **X'F6'** 0 or more **X'F7'** 0 or 1 Measurement unit restrictions: • unit base = 10 inches • X units per unit base and Y units per unit base can be different • range for X units per unit base and Y units per unit base is 1-32,767
Image Picture Data (IPD)	X'D3EEFB'	The content must comply with the IOCA FS10 or FS45 subset definitions. Note that compliance with IOCA FS45 includes compliance with IOCA FS40 and FS42.
Medium Copy Count (MCC)	X'D3A288'	
Medium Modification Control (MMC)	X'D3A788'	The following keywords, with allowed occurrences: **X'90nn'** 0 or 1 **X'91nn'** 0 or 1 **X'B4nn'** 0 or more; must be paired with X'B5nn' **X'B5nn'** 0 or more; must be paired with X'B4nn' **X'D1nn'** 0 or 1 **X'E0nn'** 0 or 1 **X'E1nn'** 0 or 1 **X'E8nn'** 0 or 1; must be paired with X'E9nn' **X'E9nn'** 0 or 1; must be paired with X'E8nn' **X'F2nn'** 0 or more, up to a maximum of 8 **X'F3nn'** 0 or more, up to a maximum of 8 **X'F4nn'** 0 or 1 **X'F9nn'** 0 or 1 **X'FCnn'** 0 or 1
Map Medium Overlay (MMO)	X'D3B1DF'	
Map Page Segment (MPS)	X'D3B15F'	The page segment must be a MO:DCA page segment subject to all applicable IS/3 restrictions; see Table 27 on page 491.
Map Suppression (MSU)	X'D3ABEA'	
No Operation (NOP)	X'D3EEEE'	

Table 35 IS/3 Structured Fields without Triplets (cont'd.)

IS/3 Structured Fields without Triplets		
Structured Field Name	**Structured Field ID**	**Differences from general MO:DCA Architecture**
Object Area Position (OBP)	X'D3AC6B'	The object area position in IS/3 only supports the 4 orthogonal orientations: 0 degrees, 90 degrees, 180 degrees, and 270 degrees. **Note:** IS/3 does not impose any restrictions on object area position or object content position as was done in IS/1. Since IS/3 also supports MO:DCA page segments, it includes support for positioning objects in a page segment at the IPS reference point using RefCSys = X'00', which IS/1 did not support.
Object Container Data (OCD)	X'D3EE92'	Content as defined by the object types listed in Table 28 on page 498 for presentation object containers and Table 29 on page 498 for non-presentation object containers.
Page Position Format 2 (PGP)	X'D3B1AF'	
Presentation Text Data Descriptor Format 2 (PTD)	X'D3B19B'	PTD content as defined for MO:DCA data streams by PTOCA, with the following optional control sequences. Each can have 0 or more occurrences: • AMB, AMI, SBI, SCFL, SEC, SIA, SIM, STC, STO Measurement unit restrictions: • X unit base = Y unit base = 10 inches • X units per unit base = Y units per unit base • range for X units per unit base and Y units per unit base is 1-32,767
Presentation Text Data (PTX)	X'D3EE9B'	The content must comply with the PTOCA PT3 subset definition.

5.4 Structured Fields with Triplets

The following IS/3 structured fields support triplets.

Table 36. IS/3 Structured Fields with Triplets

IS/3 Structured Fields with Triplets		
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**
Bar Code Data Descriptor (BDD)	X'D3A6EB'	BDD content as defined by the BCOCA BCD2 subset definition. **X'4E'** 0 or 1 Measurement unit restrictions: • unit base = 10 inches • X units per unit base = Y units per unit base • range for X units per unit base and Y units per unit base is 1-32,767
Container Data Descriptor (CDD)	X'D3A692'	**X'5A'** 0 or 1 occurrences with ObjTpe=X'AF' if the container contains one of the multi-page TIFF object types supported in IS/3 (see Table 28 on page 498); otherwise should not be specified. **X'9A'** 0 or 1 occurrences if the container contains one of the object types listed in Table 28 on page 498; otherwise should not be specified. Measurement unit restrictions: • X unit base = Y unit base = 10 inches • X units per unit base and Y units per unit base can be different • range for X units per unit base and Y units per unit base is 1-32,767

Table 36 IS/3 Structured Fields with Triplets (cont'd.)

IS/3 Structured Fields with Triplets		
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**
Index Element (IEL)	X'D3B2A7'	**X'02' Tpe X'CA'** 1 **X'2D'** 1 **X'02'** 0 or 1 occurrence of one of the following: • Type X'0D' • Type X'87' **X'02' Tpe X'8D'** 0 or 1 **X'56'** 0 or 1 **X'57'** 0 or 1 **X'58'** 0 or 1 **X'59'** 0 or 1 **X'5A'** 0 or 1 occurrences for each object type counted **X'5E'** 0 or 1 occurrences for pages counted **X'81'** 0 or 1 **X'83'** 0 or 1
Invoke Medium Map (IMM)	X'D3ABCC'	

Table 36 IS/3 Structured Fields with Triplets (cont'd.)

IS/3 Structured Fields with Triplets		
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**
Include Object (IOB)	X'D3AFC3'	The include object in IS/3 only supports the 4 orthogonal orientations: 0 degrees, 90 degrees, 180 degrees, and 270 degrees. **X'10'** 1 occurrence if ObjType = X'92' - Other object data; otherwise should not be specified **X'4B'** 1 occurrence if the IOB specifies an override for any of the following: • XocaOset • YocaOset • XoaSize • YoaSize Otherwise should not be specified. Measurement unit restrictions: • X unit base = Y unit base = 10 inches • X units per unit base = Y units per unit base • range for X units per unit base and Y units per unit base is 1-32,767 **X'01'** 0 or more **Note:** IS/3 requires full support of the CGCSGID (X'01') triplet on the IOB. **X'02' Tpe X'01'** 0 or 1 **X'02' Tpe X'DE'** 0 or more **X'02' Tpe X'BE'** 0 or more **X'04'** 0 or 1 **X'4C'** 0 or 1 **X'4E'** 0 or 1 **X'5A'** 0 or 1 occurrences with ObjTpe=X'AF' if the IOB includes one of the multi-page TIFF object types supported in IS/3 (see Table 28 on page 498); otherwise should not be specified. **X'70'** 0 or 1 **X'91'** 1 occurrence for each FQN type X'DE' that references a CMR; otherwise should not be specified. **X'95'** 0 or 1 **X'9A'** 0 or 1 occurrences if the container contains one of the object types listed in Table 28 on page 498; otherwise should not be specified. Measurement unit restrictions: • X unit base = Y unit base = 10 inches • X units per unit base and Y units per unit base can be different • range for X units per unit base and Y units per unit base is 1-32,767
Include Page Overlay (IPO)	X'D3AFD8'	**X'02' Tpe X'01'** 0 or 1. The overlay name must be less than or equal to 8 characters (bytes) in length. **Note:** IS/3 does not impose any restrictions on the page overlay orientation and origin, as was done in IS/1.
Include Page Segment (IPS)	X'D3AF5F'	The page segment must be a MO:DCA page segment subject to all applicable IS/3 restrictions; see Table 27 on page 491.

Table 36 IS/3 Structured Fields with Triplets (cont'd.)

IS/3 Structured Fields with Triplets		
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**
Link Logical Element (LLE)	X'D3B490'	**X'02' Tpe X'09'** 0 or 1 in source and target RG **X'02' Tpe X'0A'** 0 or 1 in source and target RG **X'02' Tpe X'0C'** 0 or 1 in each RG **X'02' Tpe X'0D'** 0 or 1 in source and target RG **X'02' Tpe X'83'** 0 or 1 in source and target RG **X'02' Tpe X'87'** 0 or 1 in source and target RG **X'02' Tpe X'B0'** 0 or 1 in source and target RG **X'02' Tpe X'CE'** 0 or 1 in source and target RG **X'10'** 1 occurrence in source and target RG that specifies FQN Type X'CE'; otherwise must not be specified. **X'4B'** 0 or 1 occurrences in source or target RG that specifies X'4D' triplet; otherwise should not be specified. Measurement unit restrictions: • X unit base = Y unit base = 10 inches • X units per unit base = Y units per unit base • range for X units per unit base and Y units per unit base is 1-32,767 **X'4D'** 0 or more in source and target RG **X'82'** 0 or more in attribute RG
Map Bar Code Object (MBC)	X'D3ABEB'	**X'04'** 1. Mapping options: **X'00'** Position
Map Container Data (MCD)	X'D3AB92'	**X'04'** 1. Mapping options: **X'00'** Position **X'10'** Position and trim **X'20'** Scale to fit **X'30'** Center and trim **X'60'** Scale to fill
Medium Descriptor (MDD)	X'D3A688'	**X'68'** 0 or 1 Measurement unit restrictions: • X unit base = Y unit base = 10 inches • X units per unit base = Y units per unit base • range for X units per unit base and Y units per unit base is 1-32,767

Table 36 IS/3 Structured Fields with Triplets (cont'd.)

IS/3 Structured Fields with Triplets		
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**
Map Data Resource (MDR)	X'D3ABC3'	**X'02'** 1 occurrence in each RG of one of the following: • Type X'84' • Type X'CE' • Type X'DE' **X'10'** 1 occurrence if RG specifies FQN Type X'CE' or X'DE'; otherwise should not be specified. **X'01'** 0 or more. **Note:** IS/3 requires full support of the CGCSGID (X'01') triplet on the MDR. **X'02' Tpe X'BE'** 0 or 1 occurrences in each RG that specifies FQN Type X'DE'; otherwise should not be specified. **X'02' Tpe X'85'** 0 or 1 occurrences in each RG that references a TTF/OTF with FQN Type X'DE'; otherwise should not be specified. **X'50'** 0 or 1 occurrences in each RG that references a TTF/OTF with FQN Type X'DE'; otherwise should not be specified. **X'5A'** 0 or 1 occurrences with ObjTpe=X'A8' in each RG that references a CMR with FQN Type X'DE'; otherwise should not be specified. **X'8B'** 1 occurrence in each RG that references a TTF/OTF with FQN Type X'DE'; otherwise should not be specified. **X'91'** 1 occurrence in each RG that references a CMR with FQN Type X'DE'; otherwise should not be specified. IS/3 does not include the FOCA code page reference using the combination of CPGID/GCSGID specified with the Font Coded Graphic Character Set Global Identifier X'20' triplet. IS/3 does include the FOCA code page reference using the code page name specified with the FQN type X'85' triplet.
Medium Finishing Control (MFC)	X'D3A088'	**X'85'** 1 or more **X'5A'** 0 or 1 occurrences with ObjTpe=X'A8' when MFC specified in DEG; otherwise should not be specified.
Map Graphics Object (MGO)	X'D3ABBB'	**X'04'** 1. Mapping options: **X'10'** Position and trim **X'20'** Scale to fit **X'30'** Center and trim Note that the Scale to fill mapping option is not included in IS/3.
Map Image Object (MIO)	X'D3ABFB'	**X'04'** 1. Mapping options: **X'10'** Position and trim **X'20'** Scale to fit **X'30'** Center and trim **X'60'** Scale to fill
Map Media type (MMT)	X'D3AB88'	**X'02' Tpe X'11'** 1 in each RG; may occur twice in each RG if specified using FQN formats X'00' and X'10'. **X'22'** 1 in each RG
Map Page Overlay (MPO)	X'D3ABD8'	**X'02' Tpe X'84'** 1 in each RG. The overlay name must be less than or equal to 8 characters (bytes) in length. **X'24'** 1 in each RG. The LID range is limited to X'01' - X'7F'.

Table 36 IS/3 Structured Fields with Triplets (cont'd.)

IS/3 Structured Fields with Triplets		
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**
Object Area Descriptor (OBD)	X'D3A66B'	**X'43'** 1 **X'4B'** 1 occurrence. Measurement unit restrictions: • X unit base = Y unit base = 10 inches • X units per unit base = Y units per unit base • range for X units per unit base and Y units per unit base is 1-32,767 **X'4C'** 1 **X'4E'** 0 or 1 **X'70'** 0 or 1
Presentation Environment Control (PEC)	X'D3A7A8'	**X'5A'** 0 or 1 occurrences with ObjTpe=X'A8' when PEC specified in DEG; otherwise should not be specified. **X'95'** 0 or 1 **X'97'** 0 or 1 occurrences. Only the following value is supported: Dev App = X'0000'.
Presentation Fidelity Control (PFC)	X'D3B288'	**X'75'** 0 or 1 **X'86'** 0 or 1 **X'87'** 0 or 1 **X'88'** 0 or 1 **X'96'** 0 or 1
Page Descriptor (PGD)	X'D3A6AF'	**X'4E'** 0 or 1 **X'70'** 0 or 1 Measurement unit restrictions: • X unit base = Y unit base = 10 inches • X units per unit base = Y units per unit base • range for X units per unit base and Y units per unit base is 1-32,767
Page Modification Control (PMC)	X'D3A7AF'	**X'4B'** 0 or 1 occurrences. Measurement unit restrictions: • X unit base = Y unit base = 10 inches • X units per unit base = Y units per unit base • range for X units per unit base and Y units per unit base is 1-32,767 **X'6C'** 0 or more

Table 36 IS/3 Structured Fields with Triplets (cont'd.)

IS/3 Structured Fields with Triplets			
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from general MO:DCA Architecture noted**	
Preprocess Presentation Object (PPO)	X'D3ADC3'	**X'02'**	1 in each RG of one of the following: • Type X'84' • Type X'CE'
		X'10'	1 occurrence in the RG if ObjType = X'92' - Other object data; otherwise should not be specified.
		X'4B'	1 occurrence if the RG specifies any of the following: • XocaOset • YocaOset • XoaSize • YoaSize Otherwise should not be specified. Measurement unit restrictions: • X unit base = Y unit base = 10 inches • X units per unit base = Y units per unit base • range for X units per unit base and Y units per unit base is 1-32,767
		X'01'	0 or more in each RG **Note:** IS/3 requires full support of the CGCSGID (X'01') triplet on the PPO.
		X'02' Tpe X'DE'	0 or more in each RG
		X'02' Tpe X'BE'	0 or more occurrences in each RG that also specifies a FQN type X'DE'.
		X'04'	0 or 1 in each RG
		X'4C'	0 or 1 in each RG
		X'5A'	0 or 1 occurrences with ObjTpe=X'AF' if the RG processes one of the multi-page TIFF object types supported in IS/3 (see Table 28 on page 498); otherwise should not be specified.
		X'91'	1 occurrence for each FQN type X'DE' in the RG that references a CMR; otherwise should not be specified.
		X'95'	0 or 1 in each RG
		X'9A'	0 or 1 occurrences in the RG if the container contains one of the object types listed in Table 28 on page 498; otherwise should not be specified. Measurement unit restrictions: • X unit base = Y unit base = 10 inches • X units per unit base and Y units per unit base can be different • range for X units per unit base and Y units per unit base is 1-32,767
Tag Logical Element (TLE)	X'D3A090'	**X'01'**	0 or more **Note:** IS/3 requires full support of the CGCSGID X'01' triplet on the TLE.
		X'02' Tpe X'0B'	1
		X'36'	1
		X'02'	0 or 1 occurrence of one of the following: • Type X'0D' • Type X'87'
		X'02' Tpe X'0C'	0 or 1
		X'80'	0 or 1

6.0 Architected Tables

The following tables are part of the IS/3 definition.

6.1 Standard OCA Color Value Table

All color values.

6.2 Color Mapping Table (CMT)

All parameters.

6.3 Resource Access Tables (RATs)

The following repeating group types.

TrueType/OpenType Font (TTF/OTF) Repeating Group

- Flag bits 0-4
- The following table vectors, listed by ID and showing their allowed occurrences:

X'01'	1 or more
X'04'	1
X'08'	1
X'1A'	1
X'24'	1 or more
X'30'	0 or 1

Color Management Resource (CMR) Repeating Group

- Flag bits 1-5, 7, 8
- The following table vectors, listed by ID and showing their allowed occurrences:

X'01'	1
X'04'	1
X'08'	1
X'18'	0 or 1
X'24'	1 or more

Data Object Resource (DOR) Repeating Group

All objects defined in Table 37 on page 515.

- Flag bits 1-5
- The following table vectors, listed by ID and showing their allowed occurrences:

X'01'	1
X'04'	1
X'08'	1
X'14'	1
X'18'	1
X'1C'	1
X'24'	1 or more; must be paired with TV X'28'
X'28'	1 or more; must be paired with TV X'24'
X'30'	0 or 1 for one of the non-IOCA object types listed in Table 37 on page 515, with the following restrictions:

– X unit base = Y unit base = 10 inches
– X units per unit base and Y units per unit base can be different
– range for X units per unit base and Y units per unit base is 1-32,767

Table 37. Presentation Objects Processed with Data Object Resource (DOR) RAT

Component ID	Object Type	Encoded Object-type OID
05	IOCA FS10	X'06072B120004010105'
12	IOCA FS45	X'06072B12000401010C'
14	TIFF	X'06072B12000401010E'
22	GIF	X'06072B120004010116'
23	AFPC JPEG **Note:** This object type was formerly referred to as *JFIF (JPEG)*.	X'06072B120004010117'
60	TIFF without Transparency	X'06072B12000401013C'
61	TIFF Multiple Image File	X'06072B12000401013D'
62	TIFF Multiple Image - without Transparency - File	X'06072B12000401013E'
66	AFPC TIFF	X'06072B120004010142'

7.0 Migration Functions included in IS/3

MO:DCA migration functions are defined in Appendix C, “MO:DCA Migration Functions”, on page 553.

7.1 Obsolete Functions

No obsolete parameters, triplets, structured fields or objects are included in the IS/3 definition.

7.2 Retired Functions

No retired parameters, triplets, structured fields or objects are included in the IS/3 definition.

7.3 Coexistence Functions

No coexistence parameters, triplets, structured fields or objects are included in the IS/3 definition.

MO:DCA AFP Archive Interchange Set (AFP/A)

The MO:DCA AFP Archive (AFP/A) interchange set is defined in the ISO 18565:2015 “Document management – AFP/Archive” standard. Refer to this standard for a complete definition of AFP/A.

Chapter 8. MO:DCA Function Sets

This chapter:

- Describes function sets
- Describes compliance in terms of function sets
- Registers each function set
- Defines the extensions made by each registered function set to specific interchange sets

Function Sets

A MO:DCA function set is a set of constructs that are used to extend the functionality of a MO:DCA interchange set. The function set is normally not sufficiently pervasive or complex to warrant definition of a new interchange set. Therefore each function set is defined by its formal extensions to one or more interchange sets. MO:DCA function sets are identified using the MO:DCA Function Set (X'8F') triplet. This triplet specifies the identifier of the function set using the 2–byte FctSetID parameter.

Since MO:DCA interchange compliance is based on interchange sets, when an interchange set is extended with one or more function sets, compliance is based on the definition of the interchange set plus the function set(s). A print file or document that claims compliance with an interchange set plus a function set must specify this compliance as follows:

- The MO:DCA Interchange Set (X'18') triplet on the BPF/BDT must specify the interchange set and indicate that the interchange set is extended with one or more function sets, e.g. ISid=X'0D80': IS/3 + function set(s)
- The MO:DCA Function Set (X'8F') triplet on the BPF/BDT must specify the function set ID using the FctSetID parameter, e.g. FctSetID=X'0001': MO:DCA GA.

This edition of the *Mixed Object Document Content Architecture Reference* contains one function set definition:

- MO:DCA GA (Graphic Arts)

MO:DCA Function Set X'0001': MO:DCA GA (Graphic Arts)

The FctSetID parameter in the MO:DCA Function Set (X'8F') triplet is set to X'0001' for this function set.

MO:DCA GA and IS/3

The following defines the extensions made by the MO:DCA GA function set to IS/3. Compliance with IS/3 + MO:DCA GA requires compliance with the IS/3 definition and compliance with these extensions.

Table 38. IS/3 + MO:DCA GA Containers - Presentation Objects. This table contains rows that extend *Table 28 on page 498*.

Component ID	Object Type	Encoded Object-type OID
25	PDF Single-page Object	X'06072B120004010119'
49	PDF Single-page Object with Transparency	X'06072B120004010131'
63	PDF Multiple Page File	X'06072B12000401013F'
64	PDF Multiple Page - with Transparency - File	X'06072B120004010140'

Table 39. IS/3 + MO:DCA GA IOB and DOR RAT Presentation Object Containers. This table contains rows that extend *Table 30 on page 499**.*

Component ID	Object Type	Encoded Object-type OID
25	PDF Single-page Object	X'06072B120004010119'
49	PDF Single-page Object with Transparency	X'06072B120004010131'
63	PDF Multiple Page File	X'06072B12000401013F'
64	PDF Multiple Page - with Transparency - File	X'06072B120004010140'

Table 40. IS/3 + MO:DCA GA Data Objects and Secondary Resources. This table contains rows that extend *Table 31 on page 499**.*

Data Object Resource	Secondary Resource	Internal Resource Identifier
PDF Single-Page Object or Multi-page File (with or without transparency)	PDF Resource Object Color Management Resource	Identifier with syntax defined by PDF None

Table 41. IS/3 + MO:DCA GA Begin Structured Fields. This table contains rows that extend *Table 33 on page 501**.*

IS/3 Begin Structured Fields		
Structured Field Name	**Structured Field ID**	**IS1/3 triplets (listed by ID) and their allowed occurrence; differences from IS/3 noted**
Begin Document (BDT)	X'D3A8A8'	**X'18'** 1 occurrence; must specify ISID = X'0D80' - MO:DCA IS/3 + function set **X'8F'** 1 occurrence; must specify FctSetID = X'0001' - MO:DCA GA function set
Begin Print File (BPF)	X'D3A8A5'	**X'18'** 1 occurrence; must specify ISID = X'0D80' - MO:DCA IS/3 + function set **X'8F'** 1 occurrence; must specify FctSetID = X'0001' - MO:DCA GA function set

Table 42. IS/3 + MO:DCA GA Structured Fields with Triplets. This table contains rows that extend *Table 36 on page 507**.*

IS/3 Structured Fields with Triplets		
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from IS/3 noted**
Container Data Descriptor (CDD)	X'D3A692'	**X'5A'** 0 or 1 occurrences with ObjTpe=X'AF' if the container contains one of the multi-page TIFF object types supported in IS/3 (see Table 28 on page 498) or multi-page PDF object types supported in MO:DCA GA (see Table 40 on page 518); otherwise should not be specified. **X'9C'** 0 or 1 occurrences if the container contains one of the PDF object types listed in Table 40 on page 518; otherwise should not be specified.

Table 42 IS/3 + MO:DCA GA Structured Fields with Triplets (cont'd.)

IS/3 Structured Fields with Triplets			
Structured Field Name	**Structured Field ID**	**IS/3 triplets (listed by ID) and their allowed occurrence; differences from IS/3 noted**	
Include Object (IOB)	X'D3AFC3'	**X'5A'**	0 or 1 occurrences with ObjTpe=X'AF' if the container contains one of the multi-page TIFF object types supported in IS/3 (see Table 28 on page 498) or multi-page PDF object types supported in MO:DCA GA (see Table 40 on page 518); otherwise should not be specified.
		X'9C'	0 or 1 occurrences if the container contains one of the PDF object types listed in Table 40 on page 518; otherwise should not be specified.
Preprocess Presentation Object (PPO)	X'D3ADC3'	**X'5A'**	0 or 1 occurrences with ObjTpe=X'AF' if the container contains one of the multi-page TIFF object types supported in IS/3 (see Table 28 on page 498) or multi-page PDF object types supported in MO:DCA GA (see Table 40 on page 518); otherwise should not be specified.
		X'9C'	0 or 1 occurrences if the container contains one of the PDF object types listed in Table 40 on page 518; otherwise should not be specified.

Appendix A. Color Resources

This appendix describes color resources that may be used in MO:DCA environments. For a discussion of font resources, see *Font Object Content Architecture Reference*.

Standard OCA Color Value Table

The following table defines the valid color values used to specify named colors in PTOCA, IOCA, GOCA, BCOCA, and IM Image objects. The table also specifies the RGB values that can be used for each named color, assuming that each component is specified with 8 bits and that the component intensity range 0 to 1 is mapped to the binary value range 0 to 255. Although all values in this table are syntactically valid in these objects, some objects support only a subset of the colors. For a definition of the supported colors, see the Object Content Architecture references for the individual objects. Note that this table defines the complete set of colors supported by the GOCA Set Extended Color drawing order. The Color Specification (X'4E') triplet also supports these colors for the Standard OCA color space; see "Color Specification Triplet X'4E'" on page 391.

Table 43. Color Values

Value	**Color**	**Red (R)**	**Green (G)**	**Blue (B)**
X'0000' or X'FF00'	Presentation-process default; see Note 1 on page 522			
X'0001' or X'FF01'	Blue	0	0	255
X'0002' or X'FF02'	Red	255	0	0
X'0003' or X'FF03'	Pink/Magenta	255	0	255
X'0004' or X'FF04'	Green	0	255	0
X'0005' or X'FF05'	Turquoise/cyan	0	255	255
X'0006' or X'FF06'	Yellow	255	255	0
X'0007'	White; see Note 2 on page 522	255	255	255
X'0008'	Black	0	0	0
X'0009'	Dark blue	0	0	170
X'000A'	Orange	255	128	0
X'000B'	Purple	170	0	170
X'000C'	Dark green	0	146	0
X'000D'	Dark turquoise	0	146	170
X'000E'	Mustard	196	160	32
X'000F'	Gray	131	131	131
X'0010'	Brown	144	48	0
X'FF07'	Presentation-process default; see Note 3 on page 522	—	—	—
X'FF08'	Color of medium	—	—	—

Table 43 Color Values (cont'd.)

Value	Color	Red (R)	Green (G)	Blue (B)
All others	Reserved	—	—	—

Notes:

1. The presentation-process default specified by X'0000' and X'FF00' is resolved based on data type as follows:
   - For PTOCA text data, it is the presentation device default.
   - For bilevel IOCA Image data (FS10), it is the presentation device default.
   - For IM Image data, it is the presentation device default.
   - For GOCA graphics data, it is the drawing order default defined in the Graphics Data Descriptor (GDD) structured field.
   - For BCOCA bar code data, it is the presentation device default.
2. The color rendered on presentation devices that do not support white is presentation-system dependent. For example, some printers simulate with color of medium, which results in white if white media is used.
3. The presentation-process default specified by X'FF07' is resolved as the presentation device default. This color value is also known in GOCA as neutral white for compatibility with display devices.
4. The value X'FFFF' is not defined in the Standard OCA Color Value Table but is used by some objects as a default indicator as follows:
   - For PTOCA text data, X'FFFF' may be specified in the Set Text Color (STC) control sequence to indicate that the PTOCA default hierarchy is used to generate the color value. Note that X'FFFF' is not supported in the Set Extended Text Color (SEC) control sequence.
   - For IM image data in MO:DCA environments, X'FFFF' may be specified to indicate use of a presentation process default color value. The value X'FFFF' is not valid for IM image in IPDS environments.
   - For bilevel IOCA image data (FS10), X'FFFF' may be specified to indicate use of a presentation process default color.
   - For BCOCA data, X'FFFF' may be specified to indicate use of a presentation device default color.
5. While the RGB values in the table can be used to render the OCA named colors, many implementations are and have been presentation-system dependent. Nevertheless, it is recommended that OCA Black (X'0008') be rendered as C = M = Y = X'00', and K = X'FF'.

Converting Colors to Grayscale in MO:DCA Environments

Documents containing color specifications may be sent to bilevel devices such as black and white printers. If the presentation process decides, based on user fidelity requirements or on defaults, that the document is to be presented using grayscale substitution, the specified colors in the document should be simulated in a consistent and predictable manner by varying the intensity of the available color. On black and white printers, this means that colors are simulated with a grayscale where the intensity level of the output gray is determined by the lightness (L) of the color being simulated. A lightness of 0 is defined to be black and a lightness of 100 is defined to be white.

The following equations specify how the lightness (L) is derived from a color specified in one of the MO:DCA-supported color spaces.

CIELab Color Space

```
L = L

 assuming
    0 <= L <= 100
```

RGB Color Space

First the CIE luminance (Y) is generated:

$$Y = 0.212(R^{2.2}) + 0.701(G^{2.2}) + 0.087(B^{2.2})$$

```
 assuming
    0 <= R,G,B <= 1
```

Note: In this equation, R, G, B are the gamma-corrected (nonlinear) components of the source color.

The lightness (L) is calculated from the CIE luminance (Y) using the following equation:

$$L = 116(Y^{1/3}) - 16 \quad \text{for } Y > 0.008856$$

$$L = 903.3Y \quad \text{for } Y <= 0.008856$$

```
 assuming
    0 <= Y <= 1
```

CMYK Color Space

First the CIE luminance (Y) is generated:

```
Y = 1 - min(1, 0.212C + 0.701M + 0.087Y + K)

 assuming
    0 <= C,M,Y,K <= 1
```

where the function min(a,b) selects the smaller of (a,b).

The lightness (L) is calculated from the CIE luminance (Y) using the following equation:

$$L = 116(Y^{1/3}) - 16 \quad \text{for } Y > 0.008856$$

$$L = 903.3Y \quad \text{for } Y<= 0.008856$$

```
 assuming
    0 <= Y <= 1
```

Standard OCA Color Space (Named Colors)

Named colors are first converted to RGB values using the mapping defined in the Standard OCA Color Value Table; see "Standard OCA Color Value Table" on page 521. Once the named color is converted to an RGB value, the equations for calculating lightness (L) from RGB are used.

Note: The Standard OCA color space also supports a value for color of medium. This color is not simulated with a grayscale intensity.

Highlight Color Space

In the absence of a color mapping, each highlight color is simulated with black, and % coverage is applied.

The Color Mapping Table Resource

The Color Mapping Table (CMT) is used to map color values specified in a source color space to color values specified in a target color space. This allows colors specified in one or more source documents to be mapped to colors more suitable to the selected presentation device without requiring changes to the applications that generate the documents.

Color Mapping Table in MO:DCA Environments

The Color Mapping Table (CMT) is invoked when the print request to present a MO:DCA print file is issued. The CMT specified in the print request may be located in the resource group associated with the print file, or it may be located in a resource library, or it may be the presentation process default CMT. The scope of the CMT in a MO:DCA presentation environment is the print file for which it is invoked. The invoked CMT remains active until another CMT is invoked. If no CMT is active, or if the reset table is active, no color mapping takes place.

The Color Mapping Table is a non-presentation resource object that is carried in a MO:DCA object container with the following structure:

Color Mapping Table Container

Figure 88. Color Mapping Table Container

```
Begin Object Container  (BOC, D3A892)
    [  (OCD,  D3EE92)    Object Container Data                            (S)   ]
End Object Container  (EOC, D3A992)
```

The table may be split on any byte boundary across any number of OCD structured fields. The mandatory Object Classification (X'10') triplet on the BOC structured field specifies the following parameter values:

ObjClass X'30' (set-up file)

StrucFlgs X'DC00' (data is carried within a container, does not include an OEG, and is carried in OCD structured fields)

RegObjId X'06072B120004010114'

Color Mapping Table in IPDS Environments

When a Color Mapping Table is sent to an IPDS printer in a non-presentation object container, it applies to all selected presentation data that is printed from that time on until the CMT is replaced by another CMT or by the reset table. The CMT is not applied to data in a resource object, such as an overlay or page segment, until that resource object is included on a logical page. This means that if the CMT changes between includes of an overlay, the overlay can be printed in different colors. However, this is not true for pages that are being processed and saved as resources in the presentation device. For that case, the CMT that is active when the page is saved is used to map colors in the page, not the CMT that is active when the saved page is included.

Note that if a color specified in the data stream is mapped with a CMT, the determination of color support is based on the CMT output color value, not on the CMT input (data stream) color value. Therefore, if an exception is detected because a color is not supported, the exception applies to the CMT output value, not to the data stream value.

Color Mapping Table Definition

The table definition consists of a base part, followed by zero or more repeating groups. The base part specifies the table to be a color mapping table or a reset color mapping table. If a reset color mapping table is specified, the repeating groups are optional and no color mappings occur when this table is invoked. If a color mapping table is specified, the base part is followed by two or more repeating groups. Each repeating group specifies a color space and a set of color values. Additionally, each repeating group specifies whether the color values are to be treated as sources, in which case it is a source repeating group, or as targets, in which case it is a target repeating group. Source repeating groups also specify the type of source data the color values should be associated with. The color mapping table must contain at least one source repeating group and one target repeating group. One or more source repeating groups can be associated with a single target repeating group by matching the repeating group IDs. While there may be multiple source repeating groups with the same repeating group ID, there cannot be more than one target repeating group with the same ID, and there must be a target repeating group for every source repeating group. If there is more than one target repeating group with the same ID, the first group is used and the rest are ignored. For example, if the table contains two source repeating groups, each with ID X'01', and if it contains a target repeating group with ID X'01', then the color values in both source repeating groups are mapped to the color values in the target repeating group for all object data specified by the source repeating groups. Repeating groups must be ordered such that all source repeating groups are specified first, sorted in ascending order of ID, followed by all target repeating groups sorted in ascending order of ID. Any repeating group that has a lower ID than a previous repeating group and is of the same type (source or target) is ignored, as is any source repeating group that follows a target repeating group.

Once a source repeating group has been matched with a target repeating group, the color values in the source repeating group are mapped sequentially to the color values in the target repeating group. That is, the first color value in the source repeating group is mapped to the first color value in the associated target repeating group, the second color value in the source repeating group is mapped to the second color value in the associated target repeating group, and so on. If there are more source color values than target color values, the source color values that do not have targets are mapped to presentation process default color values. If there are more target color values than source color values, the extra target color values are ignored. If the same source color value is mapped to more than one target color value, the first-specified target color value is used.

The presentation device uses the color mapping table to search the specified data objects for the source color values, and to replace the source color values with the target color values when rendering the data.

Color Mapping Table Syntax

Offset	Type	Name	Range	Meaning	M/O
0–1	UBIN	TBLlngth	6–65,535	Table length	M
2–3	CODE	TBLid	1–65,534	Table ID	M
4	CODE	TBLtpe	X'01', X'81'	Table type: **X'01'** Color mapping table **X'81'** Reset color mapping table	M
5				Reserved; should be zero	M
For a color mapping table (TBLtpe = X'01'), at least one source and one target repeating group in the following format:					
Source Repeating Group					
0–1	UBIN	RGLngth	30–(n+1)	Repeating group length	M
2	UBIN	RGId	1–127	Repeating group ID	M
3	CODE	RGTpe	X'01'	Repeating group type: **X'01'** Source color value repeating group **All others** Reserved	M
4	CODE	ColSpce	X'06', X'40', X'50'	Color space: **X'06'** Highlight color space **X'40'** Standard OCA color space **X'50'** GOCA Pattern Fill space **All others** Reserved	M
5–8				Reserved; should be zero	M
9	UBIN	ColSize1	X'08', X'10'	Number of bits in component 1; see color space definitions	M
10	UBIN	ColSize2	X'00', X'08'	Number of bits in component 2; see color space definitions	M
11	UBIN	ColSize3	X'00', X'08'	Number of bits in component 3; see color space definitions	M
12				Reserved; should be zero	M

Offset	Type	Name	Range	Meaning	M/O
13	CODE	ObjSel	X'6B', X'7B', X'9B', X'AF', X'BB', X'DF', X'EB', X'FB', X'FE', X'FF'	Source object type selector: **X'6B'** Object area **X'7B'** IM Image data **X'9B'** PTOCA data **X'AF'** Page presentation space **X'BB'** GOCA data **X'DF'** Overlay presentation space **X'EB'** BCOCA data **X'FB'** Non-tiled bilevel IOCA image data **X'FE'** All PTOCA, GOCA, BCOCA, non-tiled bilevel IOCA, and IM Image object data **X'FF'** All objects, object areas, and presentation spaces **All others** Reserved	M
14–29				Reserved; should be zero	M
30–*n*		Color Values		Sequential list of color values to be mapped	O
Target Repeating Group					
0–1	UBIN	RGLngth	13–(*m*+1)	Repeating group length	M
2	UBIN	RGId	1–127	Repeating group ID	M
3	CODE	RGTpe	X'02'	Repeating group type: **X'02'** Target color value repeating group **All others** Reserved	M
4	CODE	ColSpce	X'01', X'04', X'06', X'08'	Color space: **X'01'** RGB **X'04'** CMYK **X'06'** Highlight color space **X'08'** CIELAB **All others** Reserved	M
5–8				Reserved; should be zero	M
9	UBIN	ColSize1	X'01'–X'08', X'10'	Number of bits in component 1; see color space definitions	M
10	UBIN	ColSize2	X'00'–X'08'	Number of bits in component 2; see color space definitions	M
11	UBIN	ColSize3	X'00'–X'08'	Number of bits in component 3; see color space definitions	M
12	UBIN	ColSize4	X'00'–X'08'	Number of bits in component 4; see color space definitions	M
13–*m*		Color Values		Sequential list of color values to be mapped	O

Color Mapping Table Semantics

TBLlngth Contains the length of the table, including this length field, in bytes.

TBLid Contains the identifier for the table.

TBLtpe Is a code that defines the type of table.

Value	Description
X'01'	Color Mapping Table. The table specifies mappings of source color values to target color values.
X'81'	Reset Color Mapping Table. The table resets all source-color-value to target-color-value mappings. The remainder of the table is ignored.

RGlngth Contains the length of the repeating group, including this length field, in bytes. The limits *n* and *m*, defined for source and target repeating groups respectively, are determined by the overall mapping table length limitation, which is 65,535, and by the number of repeating groups and their size.

RGid Contains the identifier for the repeating group. This identifier is used to match source color value repeating groups with a target color value repeating group.

RGtpe Is a code that defines the type of repeating group.

Value	Description
X'01'	Source color value repeating group. The repeating group specifies a list of color values that are sources of a color mapping.
X'02'	Target color value repeating group. The repeating group specifies a list of color values that are targets of a color mapping.

ColSpce Is a code that defines the color space and the encoding for the color specification. Color spaces are defined in the MO:DCA Color Specification (X'4E') triplet; see "Color Specification Triplet X'4E'" on page 391. Only color spaces that are not defined in the X'4E' triplet, or color spaces that have a special meaning when used in a CMT, are described here.

Value **Description**

X'06' Highlight color space. This is the same color space as that defined in the Color Specification (X'4E') triplet. In addition, if this color space is specified in a source repeating group, a value of X'FF' for the percent coverage parameter indicates that all percentages of this parameter for the specified highlight color are mapped to the target color.

Application Note: When the Highlight Color space is specified in a target repeating group, the percent coverage parameter is normally only supported for areas such as object areas and graphic fill areas. For other data types this parameter is normally simulated with 100% coverage.

Implementation Note: The percent shading parameter for highlight colors is currently not supported in AFP environments.

X'40' Standard OCA color space. This is the same color space as that defined in the Color Specification (X'4E') triplet. All syntactically valid color values defined in the Standard OCA Color Value Table are supported for mapping. For a list of all valid color values, see "Standard OCA Color Value Table" on page 521.

X'50' GOCA Pattern Fill space. Component 1 defines the GOCA pattern set local ID as specified by the Set Pattern Set drawing order, and must be set to X'00' to select the GOCA default pattern set. ColSize1 is set to X'08' and defines the number of bits used to specify component 1. Component 2 defines a code point, as specified by the Set Pattern Symbol drawing order, that selects a specific pattern symbol from the default pattern set and is in the range X'00'–X'10', X'40'. ColSize2 is set to X'08' and defines the number of bits used to specify component 2. ColSize3 and ColSize4 are reserved and must be set to zero. If this color space is specified in a source repeating group, the pattern fill is replaced by the target color value independent of any color that may have been specified for the pattern in the GOCA data. If the pattern fill is not to be replaced by a color, this pattern should not be mapped. For a description of graphics area fill, pattern sets, and pattern symbols, see the *Graphics Object Content Architecture for AFP Reference*.

ColSize1–Colsize4 For a definition of these parameters, see the description of the "Color Specification Triplet X'4E'" on page 391.

ObjSel Is a code that defines the data type to which the color values specified in the source repeating group apply.

Value	**Description**
X'00'	The parameter is not specified. This value must be used in target repeating groups.
X'6B'	The source color values apply to object areas.
X'7B'	The source color values apply to data in IM Image objects.
X'9B'	The source color values apply to data in PTOCA text objects.
X'AF'	The source color values apply to page presentation spaces whose color is specified with a Color Specification (X'4E') triplet.
X'BB'	The source color values apply to data in GOCA graphics objects.
X'DF'	The source color values apply to overlay presentation spaces whose color is specified with a Color Specification (X'4E') triplet.
X'EB'	The source color values apply to data in BCOCA bar code objects.
X'FB'	The source color values apply to data in non-tiled bilevel IOCA image objects.
X'FE'	The source color values apply to all PTOCA, GOCA, BCOCA, non-tiled bilevel IOCA, and IM Image data objects.
X'FF'	The source color values apply to all objects, object areas, and presentation spaces.

Color Values Is a sequential list of color values in the defined format and encoding. For source repeating groups, these values, when encountered in one of the specified source object types, are mapped to target values. For target repeating groups, these are the values that are rendered by the presentation device in place of the corresponding source color values.

Color Mapping Table Exception Condition Summary

An exception condition exists when the following is detected:

- The table is a color mapping table and does not contain at least one source repeating group and one target repeating group
- The table is a color mapping table and contains a source repeating group that does not have a matching target repeating group
- The table contains invalid data

Appendix B. Resource Access Table (RAT)

Font Interchange Information

This appendix formerly contained information on acceptable values that may be used in the Map Coded Font (MCF) structured field to identify a particular Font Object Content Architecture (FOCA) font. It is no longer practical to maintain this material in an appendix. For detailed information on the FOCA fonts that may be referenced with a MCF structured field in a MO:DCA data stream, please see the font publications listed in "Related Publications" on page vii.

Note: The referenced documents use the term *character set* as a short form of the qualified term *font character set*. The latter form is used throughout this book. In this context, the two forms are equivalent.

The Resource Access Table (RAT)

The Resource Access Table (RAT) is used to map a resource name specified in the MO:DCA data stream to information used to find and process the resource on a given system. The following resources can be processed via a RAT:

- TrueType fonts (TTFs) and OpenType fonts (OTFs); the resource name is a full font name
- Color Management Resources (CMRs); the resource name is a CMR name
- Data objects; the resource name is the object name

Resource Access Table in MO:DCA Environments

The Resource Access Table (RAT) is installed on a given system by an application program. It is updated whenever new resources that need to be accessed through a RAT are installed on that system, or whenever such resources are updated, such as when a new version of a resource replaces an existing version. The installed RAT remains active until it is updated or replaced. If no RAT is active, resources which require a RAT to be accessed cannot be processed.

The RAT resides in the directory that it represents. There can be multiple RATs in a system, one for each directory. The file names in the RAT do not contain path information.

Implementation Notes:

1. In AFP systems, the file name for the various RATs is hard-coded, as follows:
   - TrueType/OpenType Font RAT: *IBM_DataObjectFont.rat*
   - Color Management Resource RAT: *AFP_ColorManagementResource.rat*
   - Data Object RAT: *AFP_DataObjectResource.rat*
2. Data objects may be installed in AFP resource libraries with or without a Data Object RAT. Print servers should maintain the functionality of legacy applications that reference data objects that were not installed with a RAT. However, if a library does contain a Data Object RAT, the RAT should be searched first to ensure that the RAT information is used for any object in the library that was installed with the RAT.

Resource Access Table in IPDS Environments

The Resource Access Table is not used at the IPDS level.

Resource Access Table Definition

The table definition consists of a table header followed by zero or more variable-length repeating groups. The table header specifies information that applies to the whole table including an identifier for the table, the length of the table, and a table creation/update time stamp. A repeating group consists of a header followed by zero or more variable-length table vectors. Each repeating group specifies the information needed to access and process a specific resource. The repeating group content is defined by the resource object type, which is identified by the resource encoded object-type OID. Repeating groups for a specific resource object type, such as repeating groups for TTFs or OTFs, have the same syntax. Only a single repeating group is allowed for a specific resource object. That is, a single resource object may only be defined and indexed once in the RAT. Repeating groups must be compact. This means that for a table vector that can be repeated, all occurrences of the vector must specify valid content, that is, the vectors cannot be empty unless there is only one occurrence of that vector.

Resource Access Table Syntax

Offset	Type	Name	Range	Meaning	M/O
Resource Access Table Header					
0–3	UBIN	Tlength	18–4,294,967,295	Table length	M
4–5	CODE	TBLid	1–65,534	Table ID	M
6	CODE	TBLtpe	X'02', X'03', X'04'	Table type: **X'02'** TTF/OTF Resource Access Table **X'03'** CMR Resource Access Table **X'04'** Data Object Resource Access Table	M
7–16	CODE	UTStmp		Universal Date and Time Stamp	M
17	CODE	InstInf	X'00', X'01'	Installer information: **X'00'** Installer information not specified; this parameter ends the table header **X'01'** Installer information specified in bytes 18–57	
40 bytes of Installer information that are only specified if InstInf = X'01'; these bytes are optional as a unit.					
18–49	CHAR	InstNme		Name of Installer application	O
50	UBIN	InstVrs		Version number of Installer application	O
51	UBIN	InstRel		Release level of Installer application	O
52	UBIN	InstMod		Modification level of Installer application	O
53	UBIN	InstSrv		Service level of Installer application	O
54–57				Reserved; should be zero	O
Zero or more variable-length repeating groups					

Offset	Type	Name	Range	Meaning	M/O
Repeating Group Structure					
0–1	UBIN	RGLngth	22–65,535	Repeating group length	M
2				Reserved; should be zero	M
3	CODE	RGTpe	X'10'	Repeating group type: **X'10'** Resource access table repeating group **All others** Reserved	M
4–5	BITS	RGFlgs		Repeating group flags; semantics defined by resource object-type	M
6–21	CODE	ObjTpe		Encoded object-type OID for resource being accessed	M
Zero or more variable-length table vectors in fixed order. The table vector semantics and their order in the repeating group are defined by the resource object type					

Resource Access Table

Offset	Type	Name	Range	Meaning	M/O
Table Vector Structure					
0	UBIN	TVLngth	2–252	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid		Table vector identifier	M
2–251		TVData		Table vector data	O

Resource Access Table Semantics

TBLlngth Contains the length of the table, including this length field, in bytes.

TBLid Contains the identifier for the table.

TBLtpe Is a code that defines the type of table.

Value	Description
X'02'	TrueType/OpenType Font (TTF/OTF) Resource Access Table. The table specifies information needed to access and process a TTF/OTF resource.
X'03'	Color Management Resource (CMR) Resource Access Table. The table specifies information needed to access and process a CMR.
X'04'	Data Object (DO) Resource Access Table. The table specifies information needed to access and process a data object that is referenced in the data stream as a resource object.

UTStmp Contains the time stamp that specifies when the table was created or when it was last updated. The time stamp is specified with 10 bytes using the syntax specified in bytes 3-12 of the Universal Date and Time Stamp (X'72') triplet, see "Universal Date and Time Stamp Triplet X'72'" on page 418.

InstInf Is a code that defines whether the table header contains information about the Installer application that generated this RAT.

Value	Description
X'00'	No additional Installer information is specified. This parameter terminates the table header. No additional RAT header bytes are allowed and will cause a RAT processing error if specified.
X'01'	40 additional bytes of Installer information are specified in bytes 18 - 57 of the RAT header.

InstNme Is a character string that identifies the Installer application, encoded in UTF-16BE. The name is left-justified and padded with blanks (space character = X'0020').

Architecture Note: The InfoPrint Font Installer Application is identified as "IBM FI". The InfoPrint Resource Installer Application is identified as "IBM RI".

InstVrs Version number of the Installer application. For example, version 1 is identified with InstVrs = X'01'.

InstRel Release level of the Installer application. For example, release level 2 is identified with InstRel = X'02'.

InstMod Modification level of the Installer application. For example, modification level 3 is identified with InstMod = X'03'.

InstSrv Service level of the Installer application. For example, service level 4 is identified with InstSrv = X'04'.

RGlngth Contains the length of the repeating group, including this length field, in bytes.

RGtpe Is a code that defines the type of repeating group.

Value	Description
X'10'	Resource Access Table repeating group. The repeating group specifies information needed to access and process a resource.

RGFlgs Specifies processing flags for the resource. The flag semantics are defined by the resource object type.

ObjTpe Specifies the encoded object-type OID for the resource that is accessed and processed with this repeating group. The encoded object-type OID for resource objects supported in MO:DCA environments is registered in "Object Type Identifiers" on page 609. The OID is left-justified and padded with zeros. For example, the encoded object-type OID for TrueType font objects is X'06072B120004010133'. This OID is specified in the ObjTpe parameter as X'06072B1200040101330000000000000000'. The encoded object-type OID for CMRs is X'06072B120004010139'. This OID is specified in the ObjTpe parameter as X'06072B1200040101390000000000000000'. The encoded object-type OIDs for data objects installed using the Data Object Resource Access Table are summarized in Table 44 on page 543.

Resource Access Table Exception Condition Summary

An exception condition exists when the following is detected:
- The RAT header does not specify a valid TBLtpe parameter value
- A RAT repeating group header does not specify RGTpe = X'10'
- The ObjTpe parameter does not specify a supported encoded object-type OID
- The table contains invalid data

Repeating Group Definition for TrueType and OpenType Font Resources

TrueType and OpenType font resources are identified by encoded object-type OID = X'06072B120004010133'. They are referenced in the MO:DCA data stream using Map Data Resource (MDR) structured fields. They can also be referenced from a Begin Resource (BRS) structured field. The reference specifies a full font name that is also specified by the font manufacturer in the font naming table. The full font name in the font may be specified in multiple languages; the supported encoding is UTF-16. The full font name from the font reference is used to index the RAT repeating groups, which specify the full font name of a TrueType/OpenType font in all supported languages using the UTF-16 encoding. Within a repeating group the full font names in all languages must be sorted so that the UTF-16 code point sequences for the names are in ascending numerical order. The repeating groups are then sorted so that the UTF-16 code point sequences for the first full font names in each repeating group are in ascending order. Note that in MO:DCA environments, all UTF-16 data is considered to be in big-endian format (UTF-16BE).

Repeating Group Flag Definitions for TrueType and OpenType Font Resources

Following are the flag definitions for TrueType and OpenType font resources.

RGFlgs Provide additional information for accessing and processing the TrueType/OpenType font resource. RGFlgs bits have the following descriptions:

Bit **Description**

0 TrueType Collection (TTC)

B'0' The font is not packaged in a TTC. If this bit is set to B'0', the TTF/TTC File Name vector (TVid = X'04') references a TrueType/OpenType font (TTF/OTF), and the TTF/TTC Object OID vector (TVid = X'08'), if not empty, specifies an object OID for the font. The TTC Font Index vector (TVid = X'1A') should be empty and is ignored.

B'1' The font is packaged in a TTC. If this bit is set to B'1', the TTF/TTC File Name vector (TVid = X'04') references a TrueType Collection (TTC), and the TTF/TTC Object OID vector (TVid = X'08'), if not empty, specifies an object OID for the collection. The TTC Font Index vector (TVid = X'1A') must specify a valid index, and the collection must contain and index a version of the referenced font that is logically equivalent to the font.

1 Linked Fonts

B'0' The font does not have any linked fonts. If this bit is set to B'0', the Linked TTF/OTF Full Font Name vector (TVid = X'24') should be empty and is ignored.

B'1' The font has linked fonts. A linked font is a complete TTF/OTF that is processed as a logical extension of the base font. If this bit is set to B'1', the Linked TTF/OTF Full Font Name vector (TVid = X'24') and any additional Linked TTF/OTF Full Font Name vectors must specify valid full font names for TTFs/OTFs. Note that linked fonts can be packaged in a TTC. Note also that only one level of linking is supported. That is, if a linked font specifies its own linked fonts, these “secondary” linked fonts are not processed as linked fonts for the original base font.

2 Private

B'0' The installer considers this font or the TTC that contains this font to be a public resource. A public resource is a candidate for resource capture by a printer. A public resource may also be resident in the printer, and this version can be used if the object OID matches the object OID associated with the resource reference.

B'1' The installer considers this font or the TTC that contains this font to be a private resource. A private resource is not a candidate for resource capture by printers. A private resource is always downloaded to the printer; if an object OID has been generated for the resource, it is ignored.

3 Embed

B'0' The installer does not allow this font or the TTC that contains this font to be embedded inline into a print file level resource group.

B'1' The installer allows this font or the TTC that contains this font to be embedded inline into a print file level resource group.

4 Capture

B'0' The installer does not allow this font or the TTC that contains this font to be captured.

B'1' The installer allows this font or the TTC that contains this font to be captured. A number of requirements must be met before the presentation system will actually let resource capture take place:

- The font or collection must be identified as "public" (RGFlgs bit 2 set to B'0') by the installer
- The font or collection must have an object OID associated with it
- The font or collection must be in a location that the presentation system considers secure

5–15 Reserved; all bits must be B'0'.

Architecture Note:

1. The setting of RGFlgs bits 2-4 reflect not only the intent of the person running the install process, but also the processing of the font permission bits (fsType parameter in the OS/2 Table of the TTF file) by the install program. For example, if RGFlgs bit 2 = B'0' (font is public), this means (i) the intent of the person running the install process is to install the font as a public font, and (ii) the font permission bits allow the font to be treated as a public font.
2. If the RAT repeating group maps a full font name to the file name of a collection, the installer needs to ensure that RGFlgs bits 2-4 apply to all fonts in the collection. For example, if RGFlgs bit 4 = B'1' (capture allowed), then this needs to reflect all fonts in the collection, since the complete collection may end up being captured.

Table Vector Definitions for TrueType and OpenType Font Resources

Following are the table vectors defined for TrueType and OpenType font resources. The table vectors must appear in the order shown. Unless indicated otherwise, each table vector must occur once, regardless of whether its data parameter is specified or not. If a table vector contains no data, its length must be set to X'02' to indicate that the table vector data is not specified. This is also referred to as an empty table vector. Table vectors within a RAT repeating group must be compact. This means that for a table vector that can be repeated, all occurrences of the vector must specify valid content, that is, the vectors cannot be empty unless there is only one occurrence of that vector.

Offset	Type	Name	Range	Meaning	M/O
TrueType/OpenType Font (TTF/OTF) Full Font Name; table vector may be repeated to specify the full font name in all supported languages					
0	UBIN	TVLngth	4–252; even values only	Table vector length	M
1	CODE	TVid	X'01'	Table vector identifier	M
2–251	CHAR	FFName		Full font name of the base font. This parameter must be specified.	M
TrueType/OpenType Font or TrueType/OpenType Collection (TTC) File Name; table vector must be specified only once					
0	UBIN	TVLngth	4–252; even values only	Table vector length	M
1	CODE	TVid	X'04'	Table vector identifier	M

Resource Access Table

Offset	Type	Name	Range	Meaning	M/O
2–251	CHAR	FileNme		File name with which the font or the collection that contains the font has been stored in the presentation system's resource library. RGFlgs bit 0 = B'0' indicates that the file name references a TrueType/OpenType font (TTF/OTF). RGFlgs bit 0 = B'1' indicates that the file name references a TrueType Collection (TTC). The file name does not include path information. This parameter must be specified.	M
TrueType/OpenType Font or TrueType/OpenType Collection Object OID; table vector must be specified only once					
0	UBIN	TVLngth	2–131	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'08'	Table vector identifier	M
2–130	CODE	ObjOID		The object OID that is assigned to the font or to the collection that contains the font. RGFlgs bit 0 = B'0' indicates that the object OID is associated with a TrueType/ OpenType font (TTF/OTF). RGFlgs bit 0 = B'1' indicates that the object OID is associated with a TrueType Collection (TTC). The length of this parameter must reflect the length of the actual OID; padding bytes are not allowed. The object OID enables the font or the collection to be captured and made resident in the printer.	O
TrueType/OpenType Collection Font Index; table vector must be specified only once					
0	UBIN	TVLngth	2, 4	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'1A'	Table vector identifier	M
2–3	UBIN	FntIndx		The index used to locate the TTF/ OTF in the TTC. This is an index into the array of offsets that comprise the 4th parameter in the TTC Header. Each offset points to the directory of a specific TTF/OTF in the TTC. An index value of X'0000' selects the first offset, a value of X'0001' selects the second offset, a value of (*n*-1) selects the *n*th offset. This index must be specified if RGFlgs bit 0 = B'1'. This vector should be empty and is ignored if RGFlgs bit 0 = B'0'.	O
Linked TrueType/OpenType Font Full Font Name; table vector must be specified at least once and may be repeated to specify multiple linked fonts					

Offset	Type	Name	Range	Meaning	M/O
0	UBIN	TVLngth	2–252; even values only	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'24'	Table vector identifier	M
2–251	CHAR	LFFName		Full font name of the linked font. This parameter must be specified if RGFlgs bit 1 = B'1'.	O
Language Code Information for Full Font Names; table vector is optional and may be specified once					
0	UBIN	TVLngth	2–252; even values only	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'30'	Table vector identifier	M
2–251	CODE	LCIDs		An ordered sequence of two-byte Language Code IDs (LCIDs) that correspond in one-to-one fashion to the ordered sequence of full font name table vectors (TV ID = X'01') in this repeating group.	O

Table Notes:

1. All character data in the table vectors is encoded in UTF-16BE. This encoding is characterized by the following parameters:

   Encoding scheme ID - as carried in the Encoding Scheme ID (X'50') triplet: X'7200'

   CCSID - as carried in the Coded Graphic Character Set Global Identifier (X'01') triplet (CCSID form): 1200 (X'04B0').

   Note that in MO:DCA environments, all UTF-16 data is considered to be in big-endian format (UTF-16BE).
2. If multiple TrueType/OpenType Font (TTF/OTF) Full Font Name table vectors are specified, each vector must specify a valid full font name.
3. If multiple Linked TrueType/OpenType Font (TTF/OTF) Full Font Name table vectors are specified, each vector must specify a valid full font name.
4. The order in which multiple Linked TrueType/OpenType Font (TTF/OTF) Full Font Name table vectors are specified in the repeating group determines the order in which the linked fonts are processed by the presentation system:
   - The base font is processed first, followed by the first linked font in the repeating group, followed by the next linked font in the repeating group, and so on; the last linked font in the repeating group is processed last.
   - If an external (print file level) resource group is specified for the print file, this resource group is searched first for a specified linked font. If the specified linked font is not found in the resource group, the RAT is accessed to locate the linked font in a library. Note that linked fonts can be packaged in a TTC.
   - Only one level of linking is supported. That is, if a linked font specifies its own linked fonts, these “secondary” linked fonts are not processed as linked fonts for the original base font.
5. A specific linked font should only be specified once in a given repeating group.
6. LCIDs specify language and locale information for a character string that specifies a full font name and are defined in the TrueType Font Files Technical Specification available on the Microsoft web site. Examples of LCIDs are X'0409': Primary Language = English, Locale Name = American; X'0807': Primary Language = German, Locale Name = Swiss. A given LCID applies to the full font name that is in the same ordered

position in the repeating group. The first LCID applies to the first name, the second LCID applies to the second name, and so on. The total number of LCIDs should match the total number of full font names. For example, if the RAT RG for a given font contains two full font names, the first in English-US and the second in German-Switzerland, table vector X'30' could optionally be specified once with data = X'04090807'.

7. When TrueType/OpenType fonts are installed in a resource library, they must not be wrapped with a MO:DCA object envelope such as BOC/EOC, that is, they must be installed in their raw source format.
8. The minimum length of a TTF/OTF font OID or of a TTF/OTF font collection OID, assuming that the MD5 checksum is a value less than X'7F' preceded by all zeros and can therefore be represented by 1 byte, has been calculated to be 13 bytes. The maximum length is 129 bytes.

Repeating Group Definition for Color Management Resources (CMRs)

CMRs are identified by encoded object-type OID = X'06072B120004010139'. They are referenced in the MO:DCA data stream using Map Data Resource (MDR), Include Object (IOB), and Preprocess Presentation Object (PPO) structured fields. They can also be referenced from a Begin Resource (BRS) structured field, and from a Data Object RAT. The reference specifies a CMR name that is also specified by the CMR generator in the CMR header. The encoding of the CMR name in the CMR header and in the CMR RAT entry is UTF-16BE. The CMR name from the CMR reference is used to index the RAT repeating groups, which specify CMR names using the UTF-16BE encoding. Repeating groups are sorted so that the UTF-16BE code point sequences for the CMR names are in ascending numerical order. Note that in MO:DCA environments, all UTF-16 data is considered to be in big-endian format (UTF-16BE).

Repeating Group Flag Definitions for Color Management Resources

Following are the flag definitions for CMRs.

RGFlgs Provide additional information for accessing and processing the CMR. RGFlgs bits have the following descriptions:

Bit	Description
0	Reserved; must be B'0'.
1	Mapped CMRs. **B'0'** There are no Link LK CMRs or device-specific CMRs in this repeating group that are mapped to the referenced CMR. The Mapped Device CMR TV (TVid = X'24') should be empty and is ignored. **B'1'** The repeating group contains Link LK CMRs or device-specific CMRs that are mapped to the referenced CMR. If this bit is set to B'1', the Mapped Device CMR TV (TVid = X'24') and any additional Mapped Device CMR TVs must specify valid CMR names.
2	Private **B'0'** The installer considers this CMR to be a public resource. A public resource is a candidate for resource capture by a printer. A public resource may also be resident in the printer, and this version can be used if the object OID matches the object OID associated with the resource reference. **B'1'** The installer considers this CMR to be a private resource. A private resource is not a candidate for resource capture by printers. A private resource is always downloaded to the printer.
3	Embed **B'0'** The installer does not allow this CMR to be embedded inline into a print file level resource group. **B'1'** The installer allows this CMR to be embedded inline into a print file level resource group.

4 Capture

B'0' The installer does not allow this CMR to be captured.

B'1' The installer allows this CMR to be captured. A number of requirements must be met before the presentation system will actually let resource capture take place:

- The CMR must be identified as “public” (RGFlgs bit 2 set to B'0') by the installer
- The CMR must have an object OID associated with it
- The CMR must be in a location that the presentation system considers secure

5 Copied/extracted Profile

B'0' The referenced CMR is not a Color Conversion CMR that was generated from an ICC profile that was copied or extracted from a data object.

B'1' The referenced CMR is a Color Conversion CMR that was generated from an ICC profile that was copied or extracted from a data object.

6 Reserved; must be B'0'.

7 CMR normal use Indicator - Audit or Instruction

B'0' The referenced CMR is normally intended to be used as an instruction CMR. If the CMR is a Color Conversion CMR, this setting allows a CMR Installer to generate Link LK CMRs that link the referenced CMR to all Color Conversion CMRs that are normally intended to be used as audit CMRs.

B'1' The referenced CMR is normally intended to be used as an audit CMR. If the CMR is a Color Conversion CMR, this setting allows a CMR Installer to generate Link LK CMRs that link the referenced CMR to all Color Conversion CMRs that are normally intended to be used as instruction CMRs.

8 CMR normal use Indicator - Audit and Instruction

B'0' RGFlgs bit 7 is to used to determine how the referenced CMR is normally intended to be used.

B'1' RGFlgs bit 7 is ignored. The referenced CMR is normally intended to be used as both an audit CMR and an instruction CMR. If the CMR is a Color Conversion (CC) CMR, this setting allows the installer to generate Link LK CMRs between the referenced CMR and all CC CMRs that are normally intended to be used as either audit, instruction, or both audit and instruction CMRs. That is, an installer can generate the following Link LK CMRs:

- From the referenced CMR to each CC CMR that is intended to be used as an instruction CMR and map these Link LK CMRs to the referenced CMR.
- From each CC CMR that is intended to be used as an audit CMR to the referenced CMR and map each Link LK CMR to the audit CMR.
- From the referenced CMR to each CC CMR that is intended to be used as both an audit and an instruction CMR and map these Link LK CMRs to the referenced CMR.
- From each CC CMR that is intended to be used as an audit and an instruction CMR to the referenced CMR and map each Link LK CMR to the audit/instruction CMR.

9–15 Reserved; all bits must be B'0'.

Table Vector Definitions for Color Management Resources

Following are the table vectors defined for CMRs. The table vectors must appear in the order shown. Unless indicated otherwise, each table vector must occur once, regardless of whether its data parameter is specified or not. If a table vector contains no data, its length must be set to X'02' to indicate that the table vector data is not specified. This is also referred to as an empty table vector. Table vectors within a RAT repeating group must be compact. This means that for a table vector that can be repeated, all occurrences of the vector must specify valid content, that is, the vectors cannot be empty unless there is only one occurrence of that vector.

Offset	Type	Name	Range	Meaning	M/O
CMR Name; table vector must be specified only once					
0	UBIN	TVLngth	148	Table vector length	M
1	CODE	TVid	X'01'	Table vector identifier	M
2–147	CHAR	CMRName		Name of the CMR. This parameter must be specified.	M
CMR File Name; table vector must be specified only once					
0	UBIN	TVLngth	4–252; even values only	Table vector length	M
1	CODE	TVid	X'04'	Table vector identifier	M
2–251	CHAR	FileNme		File name with which the CMR has been stored in the presentation system's resource library. The file name does not include path information. This parameter must be specified.	M
CMR Object OID; table vector must be specified only once					
0	UBIN	TVLngth	12–131	Table vector length	M
1	CODE	TVid	X'08'	Table vector identifier	M
2–(n-1)	CODE	ObjOID		The object OID that is assigned to the CMR. The length of this parameter must reflect the length of the actual OID; padding bytes are not allowed. The object OID enables the CMR to be captured and made resident in the printer. For CC CMRs, the object OID also allows the printer to search for Link LK CMRs.	M
Mapped CMR Name; table vector must be specified at least once and may be repeated to specify multiple mapped CMRs					
0	UBIN	TVLngth	2, 148	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'24'	Table vector identifier	M
2–147	CHAR	CMRName		Name of the mapped device-specific CMR. This parameter must be specified if RGFlgs bit 1 = B'1'.	O
ICC Profile OID; table vector is optional and may be specified once for a CC CMR; ignored if specified for other CMR types					
0	UBIN	TVLngth	2, 12–131	Table vector length; a length of 2 indicates that the table vector data is not specified	M

Offset	Type	Name	Range	Meaning	M/O
1	CODE	TVid	X'18'	Table vector identifier	M
2–(n-1)	CODE	ObjOID		The object OID for the ICC profile that is carried by this CC CMR. The length of this parameter must reflect the length of the actual OID; padding bytes are not allowed. The object OID enables the unique identification of ICC profiles in CC CMRs.	O

Table Notes:

1. All character data in the table vectors is encoded in UTF-16BE. This encoding is characterized by the following parameters:

   Encoding scheme ID - as carried in the Encoding Scheme ID (X'50') triplet: X'7200'

   CCSID - as carried in the Coded Graphic Character Set Global Identifier (X'01') triplet (CCSID form): 1200 (X'04B0')

   Note that in MO:DCA environments, all UTF-16 data is considered to be in big-endian format (UTF-16BE).
2. The Mapped CMR TV must be specified at least once, and can occur multiple times. If there are no mapped CMRs, this TV must be specified once as an empty TV (TVLngth = 2). The order in which multiple Mapped Device CMRs are specified in the repeating group is not significant. This TV is used to:
   - map a Link LK CMR to this Color Conversion CMR if it is normally referenced as an audit CMR
   - map a device-specific Halftone or Tone Transfer Curve CMR to this generic Halftone or Tone Transfer Curve CMR.
3. The minimum length of a CMR object OID, assuming that the MD5 checksum is a value less than X'7F' preceded by all zeros and can therefore be represented by 1 byte, has been calculated to be 10 bytes. The maximum length is 129 bytes.
4. See the *Color Management Object Content Architecture Reference* for a definition of the CMR header and the CMR name syntax.
5. When CMRs are installed in a resource library, they must not be wrapped with a MO:DCA object envelope such as BOC/EOC, that is, they must be installed in their raw source format.
6. Link LK CMRs and Link DL CMRs are distinguished in the CMR RAT by the “LK” and “DL” Link CMR sub-type designations in the CMRType field of the CMR name; this drives the different processing that is associated with each Link CMR sub-type.

Repeating Group Definition for Data Object Resources

The following data objects can be processed with this RAT repeating group type:

Table 44. Data Object Resources Processed with RAT RG

Component ID	Object Type	Encoded Object-type OID
05	IOCA FS10	X'06072B120004010105'
11	IOCA FS11	X'06072B12000401010B'
12	IOCA FS45	X'06072B12000401010C'
13	EPS	X'06072B12000401010D'
14	TIFF	X'06072B12000401010E'

Table 44 Data Object Resources Processed with RAT RG (cont'd.)

Component ID	Object Type	Encoded Object-type OID
22	GIF	X'06072B120004010116'
23	AFPC JPEG **Note:** This object type was formerly referred to as *JFIF (JPEG)*.	X'06072B120004010117'
25	PDF Single-page Object	X'06072B120004010119'
34	PCL Page Object	X'06072B120004010122'
45	IOCA FS42	X'06072B12000401012D'
48	EPS with Transparency	X'06072B120004010130'
49	PDF with Transparency	X'06072B120004010131'
55	IOCA FS40	X'06072B120004010137'
58	JPEG2000 (JP2)	X'06072B12000401013A'
60	TIFF without Transparency	X'06072B12000401013C'
61	TIFF Multiple Image File	X'06072B12000401013D'
62	TIFF Multiple Image - without Transparency - File	X'06072B12000401013E'
63	PDF Multiple Page File	X'06072B12000401013F'
64	PDF Multiple Page - with Transparency - File	X'06072B120004010140'
65	AFPC PNG Subset	X'06072B120004010141'
66	AFPC TIFF Subset	X'06072B120004010142'
68	AFPC SVG Subset	X'06072B120004010144'
70	IOCA FS48	X'06072B120004010146'
71	IOCA FS14	X'06072B120004010147'

These data object resources are referenced in the MO:DCA data stream using Map Data Resource (MDR), Include Object (IOB), and Preprocess Presentation Object (PPO) structured fields. The data object name from the reference is used to index the RAT repeating groups, which specify data object names using the UTF-16BE encoding. Repeating groups are sorted so that the UTF-16BE code point sequences for the data object names are in ascending numerical order. Note that in MO:DCA environments, all UTF-16 data is considered to be in big-endian format (UTF-16BE).

Repeating Group Flag Definitions for Data Object Resources

Following are the flag definitions for data object resources.

RGFlgs Provide additional information for accessing and processing the data object resource. RGFlgs bits have the following descriptions:

Bit **Description**

0 Reserved; must be B'0'.

1 Color Management Resources (CMRs).

B'0' There are no CMRs that are to be associated with the referenced data object. The CMR Name TV (TVid = X'24') and the CMR Descriptor TV (TVid = X'28') should be empty and are ignored.

B'1' The repeating group specifies CMRs that are to be associated with the referenced data object. If this bit is set to B'1', the TV pairs consisting of a

CMR Name TV (TVid = X'24') and a CMR Descriptor TV (TVid = X'28') must specify a valid CMR name and a valid CMR processing mode.

2 Private

B'0' The installer considers this data object resource to be a public resource. A public resource is a candidate for resource capture by a printer. A public resource may also be resident in the printer, and this version can be used if the object OID matches the object OID associated with the resource reference.

B'1' The installer considers this data object resource to be a private resource. A private resource is not a candidate for resource capture by printers. A private resource is always downloaded to the printer.

3 Embed

B'0' The installer does not allow this data object resource to be embedded inline into a print file level resource group.

B'1' The installer allows this data object resource to be embedded inline into a print file level resource group.

4 Capture

B'0' The installer does not allow this data object resource to be captured.

B'1' The installer allows this data object resource to be captured. A number of requirements must be met before the presentation system will actually let resource capture take place:

- The data object resource must be identified as “public” (RGFlgs bit 2 set to B'0') by the installer
- The data object resource must have an object OID associated with it
- The data object resource must be in a location that the presentation system considers secure

5 Compacted Object

B'0' A compacted object has not been generated from the data object. If this bit is set to B'0', the TV pair consisting of a Compacted Object File Name TV (TVid = X'14') and a Compacted Object OID TV (TVid = X'18') should be empty and are ignored.

B'1' A compacted object has been generated by extracting the embedded ICC profile from the referenced data object. If this bit is set to B'1', the TV pair consisting of a Compacted Object File Name TV (TVid = X'14') and a Compacted Object OID TV (TVid = X'18') must not be empty and must specify valid data.

Implementation Note: To differentiate the file name of the compacted object from the file name of the referenced object, it is recommended that the file name of the compacted object, encoded in UTF-16BE, be formed by prepending the file name of the referenced data object with the character string “iccr_”. For example, if the file name of the referenced object is “image.jpeg”, the file name of the compacted object would be “iccr_image.jpeg”.

6–15 Reserved; all bits must be B'0'.

Table Vector Definitions for Data Object Resources

Following are the table vectors defined for data object resources. The table vectors must appear in the order shown. Unless indicated otherwise, each table vector must occur once, regardless of whether its data parameter is specified or not. If a table vector contains no data, its length must be set to X'02' to indicate that the table vector data is not specified. This is also referred to as an empty table vector. Table vectors within a RAT repeating group must be compact. This means that for a table vector that can be repeated, all occurrences of the vector must specify valid content, that is, the vectors cannot be empty unless there is only one occurrence of that vector.

Offset	Type	Name	Range	Meaning	M/O
Data Object Resource Name; table vector must be specified only once					
0	UBIN	TVLngth	4–252; even values only	Table vector length	M
1	CODE	TVid	X'01'	Table vector identifier	M
2–251	CHAR	DORName		Name of the data object resource. This parameter must be specified.	M
Data Object Resource File Name; table vector must be specified only once					
0	UBIN	TVLngth	4–252; even values only	Table vector length	M
1	CODE	TVid	X'04'	Table vector identifier	M
2–251	CHAR	FileNme		File name with which the data object resource has been stored in the presentation system's resource library. The file name does not include path information. This parameter must be specified.	M
Data Object Resource Object OID; table vector must be specified only once					
0	UBIN	TVLngth	2–131	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'08'	Table vector identifier	M
2–(n-1)	CODE	ObjOID		The object OID that is assigned to the data object resource. The length of this parameter must reflect the length of the actual OID; padding bytes are not allowed. The object OID enables the data object resource to be captured and made resident in the printer.	O
Compacted Object File Name; table vector must be specified only once					
0	UBIN	TVLngth	2–252; even values only;	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'14'	Table vector identifier	M

Offset	Type	Name	Range	Meaning	M/O
2–251	CHAR	FileNme		File name with which the compacted object has been stored in the presentation system's resource library. The file name does not include path information. This parameter is optional and is ignored if RGFlgs bit 5 = B'0'. This parameter must be specified if RGFlgs bit 5 = B'1'. **Implementation Note:** It is recommended that the file name of the compacted object, encoded in UTF-16BE, be formed by prepending the file name of the referenced data object with the character string “iccr_”.	O
Compacted Object OID; table vector must be specified only once					
0	UBIN	TVLngth	2–131	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'18'	Table vector identifier	M
2–(n-1)	CODE	ObjOID		The object OID that is assigned to the compacted object. The length of this parameter must reflect the length of the actual OID; padding bytes are not allowed. The object OID enables the compacted object to be captured and made resident in the printer. This parameter is optional and is ignored if RGFlgs bit 5 = B'0'.	O
Data Object Rendering Intent; table vector must be specified only once					
0	UBIN	TVLngth	2, 10	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'1C'	Table vector identifier	M
2–3				Reserved; should be zero	O
4	CODE	IOCARI	X'00'-X'03', X'FF'	Rendering intent for IOCA objects: **X'00'** perceptual **X'01'** media-relative colorimetric **X'02'** saturation **X'03'** ICC-absolute colorimetric **X'FF'** not specified	O
5	CODE	OCARI	X'00'-X'03', X'FF'	Rendering intent for container (non-OCA) objects; code definitions same as for IOCARI	O
6–7				Reserved; should be zero	O
8–9				Reserved; should be zero	O
CMR Name; table vector must be specified at least once and must be followed by a CMR Descriptor TV (TVid = X'28'); the TV pair may be repeated to specify multiple {CMR name + CMR processing mode} combinations					

Resource Access Table

Offset	Type	Name	Range	Meaning	M/O
0	UBIN	TVLngth	2, 148	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'24'	Table vector identifier	M
2–147	CHAR	CMRName		Name of the CMR. This parameter must be specified if RGFlgs bit 1 = B'1'.	O
CMR Descriptor; table vector must be specified at least once and must follow the CMR Name TV (TVid = X'24'); the TV pair may be repeated to specify multiple {CMR name + CMR processing mode} combinations					
0	UBIN	TVLngth	2, 4	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'28'	Table vector identifier	M
2	CODE	ProcMode	X'01', X'02'	CMR processing mode. This parameter must be specified if RGFlgs bit 1 = B'1'. **Value** **Meaning** **X'01'** process as audit CMR **X'02'** process as instruction CMR	O
3				Reserved; should be zero. This parameter must be specified if RGFlgs bit 1 = B'1'.	O
Image Resolution; table vector is optional and may be specified once for non-IOCA raster image objects; ignored if specified for other objects					
0	UBIN	TVLngth	2, 10	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'30'	Table vector identifier	M
2–3				Reserved; should be zero	O
4	CODE	XBase	X'00'-X'01'	Unit base for image resolution in the X direction: **X'00'** 10 inches **X'01'** 10 centimeters	O
5	CODE	YBase	X'00'-X'01'	Unit base for image resolution in the Y direction; must be the same as XBase: **X'00'** 10 inches **X'01'** 10 centimeters	O
6-7	UBIN	XResol	1-32,767	Number of image points in X direction per X unit base	O
8-9	UBIN	YResol	1-32,767	Number of image points in Y direction per Y unit base	O
Object Container Presentation Space Size; table vector is optional and may be specified once for PDF and SVG presentation container objects; ignored if specified for other object types; bytes 5–16 are optional as a unit; either all are specified or none are specified					
0	UBIN	TVLngth	2, 5, 17	Table vector length; a length of 2 indicates the table vector data is not specified	M

Offset	Type	Name	Range	Meaning	M/O
1	CODE	TVid	X'32'	Table vector identifier	M
2–3				Reserved; should be zero	O
4	CODE	PDFSize	X'01'-X'05'	Parameter used to determine the PDF presentation space size: **X'01'** MediaBox **X'02'** CropBox **X'03'** BleedBox **X'04'** TrimBox **X'05'** ArtBox	O
5	CODE	XocBase	X'00'–X'01'	Presentation space size unit base for the width (along X axis): **X'00'** 10 inches **X'01'** 10 centimeters	O
6	CODE	YocBase	X'00'–X'01'	Presentation space size unit base for the height (along Y axis): **X'00'** 10 inches **X'01'** 10 centimeters	O
7–8	UBIN	XocUnits	1–32,767	Presentation space size units per unit base for the width (along X axis)	O
9–10	UBIN	YocUnits	1–32,767	Presentation space size units per unit base for the height (along Y axis)	O
11–13	UBIN	XpsSize	1–32,767	Presentation space width (extent along X axis)	O
14–16	UBIN	YpsSize	1–32,767	Presentation space height (extent along Y axis)	O
Color Specification; table vector is optional and may be specified once for IOCA bilevel image or non-OCA bilevel and grayscale image; ignored if specified for other object types					
0	UBIN	TVLngth	2, n	Table vector length; a length of 2 indicates the table vector data is not specified	M
1	CODE	TVid	X'34'	Table vector identifier	M
2				Reserved; should be zero	O
3	CODE	ColSpce	X'01', X'04', X'06', X'08', X'40'	Color space: **X'01'** RGB **X'04'** CMYK **X'06'** Highlight color space **X'08'** CIELAB **X'40'** Standard OCA color space	O
4-7				Reserved; should be zero	O
8	UBIN	ColSize1	X'01'–X'08', X'10'	Number of bits in component 1; see color space definitions	O
9	UBIN	ColSize2	X'00'–X'08'	Number of bits in component 2; see color space definitions	O
10	UBIN	ColSize3	X'00'–X'08'	Number of bits in component 3; see color space definitions	O

Offset	Type	Name	Range	Meaning	M/O
11	UBIN	ColSize4	X'00'–X'08'	Number of bits in component 4; see color space definitions	O
12–*n*		Color		Color specification	O

Table Notes:

1. All character data in the table vectors is encoded in UTF-16BE. This encoding is characterized by the following parameters:

   Encoding scheme ID - as carried in the Encoding Scheme ID (X'50') triplet: X'7200'

   CCSID - as carried in the Coded Graphic Character Set Global Identifier (X'01') triplet (CCSID form): 1200 (X'04B0').

   Note that in MO:DCA environments, all UTF-16 data is considered to be in big-endian format (UTF-16BE).

2. When non-OCA objects such as EPS, PDF, GIF, TIFF, JFIF are installed in a resource library, they must not be wrapped with a MO:DCA object envelope such as BOC/EOC, that is, they must be installed in their raw source format.

3. The data content (bytes 2 - 9) of the Data Object Rendering Intent TV (TVid = X'1C') is optional as a unit; that is bytes 2 - 9 are either all specified or none are specified.

4. The rendering intent specified in the Data Object Rendering Intent TV overrides the rendering intent specified in the OEG of the data object, and any rendering intent information embedded in the data object. The rendering intent specified in this table vector is downloaded to the presentation device but may not be used if a Link DL CMR is associated with the data object; in that case the rendering intent specified in the Link DL CMR is used to render the object

5. CMRs that are mapped to a data object in the RAT become *secondary resources* of that data object and override any conflicting CMRs specified in the OEG of the data object. In order for these secondary resources to be processed, the data object must itself be mapped as a resource in the AEG of the page or overlay that includes the data object. This allows the print server to process the data object RAT entry while processing the AEG and thereby ensure that secondary resources, such as mapped CMRs, are downloaded to the presentation device before the device enters the page-build state. Data objects that are mapped as resources before being included on a page or overlay are sometimes called *hard* objects. Data objects that are not mapped as resources before being included on a page or overlay are sometimes called *soft* objects. Therefore, using that terminology, CMRs that are mapped to a data object in the RAT will only be processed for *hard* objects.

6. The minimum length of a data object OID, assuming that the MD5 checksum is a value less than X'7F' preceded by all zeros and can therefore be represented by 1 byte, has been calculated to be 10 bytes. The maximum length is 129 bytes.

7. The resolution specified in the Image Resolution TV overrides any raster image resolution specified on the CDD in the OEG of the image object or inside the image.

8. The size specified in the Object Container Presentation Space Size TV overrides any presentation space size specified on the CDD in the OEG of the container object.

9. The Object Container Presentation Space Size TV may be specified for PDF object types and for the AFPC SVG Subset object type. For PDF, if this TV is not specified and if the Object Container Presentation Space Size (X'9C') triplet is not specified for the object, the architected default is X'01' - MediaBox, which is a mandatory parameter in PDF. If the Object Container Presentation Space Size TV or the Object Container Presentation Space Size (X'9C') triplet is specified, but the selected size parameter is not specified in the PDF object, the PDF default mechanism is used to select the presentation space size. For SVG, this TV specifies the size of the SVG presentation space. Bytes 5–16 are optional as a unit; either all are specified or none are specified.

10. The definition of bytes 2-n in the Color Specification (ID X'34') table vector matches the definition for the corresponding bytes in the Color Specification (X'4E') triplet. These bytes are optional as a unit, that is, bytes 2-n are either all specified or none are specified.
11. The Color Specification (ID X'34') table vector specifies the color that is to be used as the default color, or the initial color, for an image object. This vector only specifies the color for the object presentation space; it does not affect colors assigned to the object's object area. This table vector may be specified for IOCA image, in which case it only applies to bilevel image; it is ignored when the image is not bilevel. It may also be specified for non-OCA image file formats, as defined in the MO:DCA Object Type Registry appendix, in which case it only applies to bilevel or grayscale image; it is ignored when the object is not a bilevel or grayscale image. Note that all 1-bit per pixel image objects are considered bilevel. When the image is grayscale, this table vector specifies the color that is to be grayscaled. The color space selected in the table vector must be supported in the object’s data descriptor structured field. For example, if the table vector specifies a default color using ColSpce =X'08' - CIELAB, the object’s data descriptor must also support the CIELAB color space. If ColSpce =X'06' - Highlight color space, the % coverage and % shading parameters are ignored. If the above conditions are not met, the table vector is ignored.

Appendix C. MO:DCA Migration Functions

This appendix:
- Describes obsolete structured fields and triplets that may occur in a MO:DCA data stream
- Describes retired structured fields and triplets that may occur in a MO:DCA data stream
- Describes coexistence functions that may occur in a MO:DCA data stream

The objective in defining obsolete, retired, and coexistence functions is twofold:
- To allow existing MO:DCA applications to run unchanged
- To provide a clear growth direction for future MO:DCA applications

Migration Functions

The migration functions are divided into three different categories:

- *Obsolete functions.* These are objects, structured fields, triplets, and parameters that will be accepted but ignored. New products must not generate these functions.
- *Retired functions.* Retired functions are objects, structured fields, triplets, and parameters whose use has been retired except for specific products. Only these specific products may use these functions. Other products should not use these functions, that is, generators should not generate these functions and receivers may ignore them.
- *Coexistence functions.* These are objects, structured fields, triplets, and parameters whose function has been enhanced or superseded by newer functions. In this case, the old and new functions can *coexist*. New generators must generate the new functions. New receivers must process the new functions, but may also continue to process the old functions.

Obsolete Functions

Obsolete functions are objects, structured fields, triplets, and parameters that will be accepted but ignored. New products must not generate these functions.

Obsolete Structured Fields

The following four structured fields are obsolete in the current data stream, but are still allowed to be present as constant data. AFP servers recognize these fields and ignore them:
- Composed-Text Control (CTC)
- Begin Form Environment Group (BFG)
- End Form Environment Group (EFG)
- Form Environment Group Descriptor (FGD)

The CTC can appear as a constant in the Active Environment Group of a page. The BFG, EFG, and FGD can appear optionally in the Medium Map object of a Form Map.

New applications must not generate these structured fields.

Composed Text Control (CTC)

CTC (X'D3A79B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A79B'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–9		ConData		Constant data	M	X'06'

CTC Semantics

ConData Constant data. Must be set to X'0000 0000 0000 0000 2D00'.

Begin Form Environment Group (BFG)

BFG (X'D3A8C5') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A8C5'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	FEGName		Name of the Form Environment Group	O	X'02'

BFG Semantics

FEGName Is the name of the form environment group.

End Form Environment Group (EFG)

EFG (X'D3A9C5') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A9C5'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	FEGName		Name of the Form Environment Group	O	X'02'

EFG Semantics

FEGName Is the name of the form environment group being terminated. If a name is specified, it must match the name in the most recent Begin Form Environment Group structured field in the Form Map. If the first two bytes in FEGName contain the value X'FFFF', the name matches any name specified on the Begin Form Environment Group structured field that initiated the current definition.

Form Environment Group Descriptor (FGD)

FGD (X'D3A6C5') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A6C5'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–3		ConData		Constant data	M	X'06'

FGD Semantics

Constant data Must be set to X'0001 00FF'.

Obsolete Structured Field Names

The following structured fields are still in use, but have been renamed:
- Composed Text Data (CTX)
- Composed Text Descriptor (CTD)
- Begin Composed Text (BCT)
- End Composed Text (ECT)

Composed Text Data (CTX) Structured Field (X'D3EE9B')

This structured field has been renamed Presentation Text Data (PTX).

Composed Text Descriptor (CTD) Structured Field (X'D3A69B')

This structured field has been renamed Presentation Text Data Descriptor Format 1 (PTD-1).

Begin Composed Text (BCT) Structured Field (X'D3A89B')

This structured field has been renamed Begin Presentation Text (BPT).

End Composed Text (ECT) Structured Field (X'D3A99B')

This structured field has been renamed End Presentation Text (EPT).

Retired Functions

Retired functions. Retired functions are objects, structured fields, triplets, and parameters whose use has been retired except for specific products. Only these specific products may use these functions. Other products should not use these functions, that is, generators should not generate these functions and receivers may ignore them.

Retired Structured Fields

The following structured fields were previously retired but are now valid MO:DCA structured fields:

- Begin Resource (BR), see "Begin Resource (BRS)" on page 161.
- End Resource (ER), see "End Resource (ERS)" on page 192.

Retired Triplets

The following triplets have been retired:

- MDD Two-up Triplet X'10'
- Text Orientation Triplet X'1D'
- Object Function Set Specification Triplet X'21'
- Line Data Object Position Migration Triplet X'27'
- Page Overlay Conditional Processing Triplet X'46'
- Resource Usage Attribute Triplet X'47'
- Object Checksum Triplet X'63'
- Object Origin Identifier Triplet X'64'
- IMM Insertion Triplet X'73'

MDD Two-up Triplet X'10'

Provides two-up functionality specific to Océ implementations. The use of this triplet is restricted to the MDD structured field for the following products:

- Océ PRISMAproduction Server
- Océ printers driven by the Océ PRISMAproduction Server that support two-up printing using this control

MDD Two-up Triplet X'10' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'10'	Identifies the Océ Two-up triplet	M	X'00'
2	CODE	Oce2up	X'00', X'01', X'02', X'05'	Specifies the Océ Two-up method to be used: **X'00'** No Two-up **X'01'** Two-up left/right **X'02'** Two-up identical copies **X'05'** Two-up right/left	M	X'06'

MDD Two-up Triplet X'10' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Océ Two-up triplet.

Oce2up Specifies the Océ Two-up method to be used:

Value	Two-up Method
X'00'	No Two-up
X'01'	Two-up left/right
X'02'	Two-up identical copies
X'05'	Two-up right/left
All others	Reserved

Structured Field Using MDD Two-up Triplet X'10'

• "Medium Descriptor (MDD)" on page 244

Text Orientation Triplet X'1D'

The use of this triplet is restricted to the MCF-2 structured field for IBM 3800 printer compatibility for the following products:
- PSF/MVS
- PSF/VM
- PSF/VSE
- PSF/400
- PSF/2
- Infoprint Manager (IPM)
- IBM 3800 printer
- Applications that generate MCF-2s in documents to be printed on the IBM 3800 printer

The Text Orientation triplet is used to specify the text orientation for a coded font.

When the MCF-2 structured field is used to reference different sections of the same double-byte font, a Text Orientation (X'1D') triplet may be specified in *any* of the repeating groups associated with the font and *need only* be specified in *one* of the repeating groups. However, if specified in more than one of the associated repeating groups, the value of all Text Orientation (X'1D') triplets must be identical.

Triplet X'1D' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'1D'	Identifies the Text Orientation triplet	M	X'00'

Offset	Type	Name	Range	Meaning	M/O	Exc
2–3	CODE	IAxis	X'0000', X'2D00', X'5A00', X'8700'	Specifies the orientation of the Inline axis: **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees	M	X'06'
4–5	CODE	BAxis	X'0000', X'2D00', X'5A00', X'8700'	Specifies the orientation of the Baseline axis: **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees	M	X'06'

Triplet X'1D' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Text Orientation triplet.

IAxis Specifies the orientation of the I-axis with respect to the X axis of the page or overlay. Valid values are the following:

Value	**I-Axis Orientation**
X'0000'	0 degrees
X'2D00'	90 degrees
X'5A00'	180 degrees
X'8700'	270 degrees
All others	Reserved

BAxis Specifies the orientation of the B-axis with respect to the X axis of the page or overlay. Valid values are the following:

Value	**B-Axis Orientation**
X'0000'	0 degrees
X'2D00'	90 degrees
X'5A00'	180 degrees
X'8700'	270 degrees
All others	Reserved

Structured Field Using Triplet X'1D'

- “Map Coded Font (MCF) Format 2” on page 237

Object Function Set Specification Triplet X'21'

The use of this triplet is restricted to the BDT structured field in the following products:

- Pre-year 2012 AFP applications.

The Object Function Set Specification triplet is used to specify the Object Content Architecture (OCA) level for objects in a MO:DCA document.

Architecture Note: A similar triplet, the Resource Object Type triplet, that unfortunately also uses triplet ID X'21', is used on the BRS structured field; see “Resource Object Type Triplet X'21'” on page 374.

Triplet X'21' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	8–254	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'21'	Identifies the Object Function Set Specification triplet	M	X'00'
2	CODE	ObjType	X'02'–X'03', X'05'–X'06'	Specifies the OCA: **X'02'** Presentation Text **X'03'** Graphics **X'05'** Bar Code **X'06'** Image	M	X'06'
3	CODE	ArchVrsn	X'00'	Specifies the architecture level of the OCA	M	X'06'
4–5	CODE	DCAFnSet	X'8000'	Specifies the MO:DCA function set identifier	M	X'06'
6–7	CODE	OCAFnSet	X'0000', X'4000', X'8000'	Identifies the OCA function set: **X'0000'** PTOCA PT1 or BCOCA BCD1 **X'4000'** GOCA DR/2V0 (GRS2) or PTOCA PT2 **X'8000'** IOCA FS10	M	X'06'
8–*n*				Reserved; not checked	O	X'00'

Triplet X'21' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Object Function Set Specification triplet.

ObjType Specifies the object for which a function set is being defined. The codes for the objects are as follows:

Value	Description
X'02'	Presentation Text (PTOCA)
X'03'	Graphics (GOCA)
X'05'	Bar Code (BCOCA)
X'06'	Image (IOCA)
All others	Reserved

ArchVrsn Specifies the architecture level of the OCA.

DCAFnSet Defines the function set for the group of MO:DCA constructs identified by the ObjType parameter.

OCAFnSet Specifies the function set of the OCA defined by the ObjType parameter. The presence of this parameter containing the value X'0000' indicates that at least one object from the base function set is present in the data stream. OCAFnSet values have the following meanings:

Value	Description
X'0000'	Presentation Text data - PTOCA PT1 level, or Bar Code data - BCOCA BCD1 level
X'4000'	Graphics data - GOCA DR/2V0 (GRS2) level, or Presentation Text data - PTOCA PT2 level
X'8000'	Image data - IOCA FS10 level
All others	Reserved

Structured Field Using Triplet X'21'

- "Begin Document (BDT)" on page 128

Line Data Object Position Migration Triplet X'27'

The use of this triplet is restricted to the BBC, BGR, BII, BIM, BPT, and IPS structured fields for the migration of line-data containing bar code objects, graphic objects, image objects, text objects with OEG, and page segments to MO:DCA document format. This triplet may be specified on these structured fields only for objects that occur directly in a page. The triplet may not be specified on objects in a resource group or in a resource library; if it is specified, it is ignored.

Triplet X'27' Syntax

Use of this triplet is restricted to the following products:
- ACIF
- PSF/MVS
- PSF/VM
- PSF/VSE
- PSF/2
- Infoprint Manager (IPM)
- PSF/400
- AFP Workbench

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'27'	Identifies the Line Data Object Position Migration triplet	M	X'00'
2	CODE	TempOrient	X'00'–X'03'	Location and orientation of coordinate system for object position and rotation: **X'00'** Standard page origin, 0° rotation **X'01'** Lower left origin, 270° rotation **X'02'** Lower right origin, 180° rotation **X'03'** Upper right origin, 90° rotation	M	X'06'

Triplet X'27' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Line Data Object Position Migration triplet.

TempOrient Specifies a temporary page coordinate system (X,Y) that matches the text coordinate (I,B) system that was defined when the objects that specify this triplet were included in line data. The origin of the temporary coordinate system is specified as one of the four corners of the page presentation space. The orientation of the temporary coordinate system is specified as a rotation of the X axis with respect to the page presentation space X_p axis. The temporary coordinate system uses the same units of measure as the page coordinate system. The temporary coordinate system is used as follows:

- For objects in a page segment, the X'27' triplet may be specified on the IPS and has the following effect on object offset and orientation:
  - *IM image objects.* The image origin offset from the page segment origin is measured using the temporary (X,Y) coordinate system. If the image is celled, cell offsets from the image origin are also measured using the temporary (X,Y) coordinate system. The image rotation is measured using the page (X_p,Y_p) coordinate system.
  - *OCA objects (bar code, graphics, image).* If OBP byte 23 = X'00', the object area offset from the page segment origin and the object area rotation are measured using the temporary (X,Y) coordinate system. If OBP byte 23 = X'01', the object area offset from the page segment origin and the object area rotation are measured using the page (X_p,Y_p) coordinate system.

  If specified on the IPS, the X'27' triplet overrides any X'27' triplet that is specified on the Begin structured field of an object in the page segment.
- For standalone objects, the X'27' triplet may be specified on the object Begin structured field and has the following effect on object offset and orientation:
  - *IM image objects.* The image origin offset is measured from the temporary (X,Y) coordinate system origin (X=0,Y=0) using the temporary (X,Y) coordinate system. If the image is celled, cell offsets from the image origin are also measured using the temporary (X,Y) coordinate system. The image rotation is measured using the page (X_p,Y_p) coordinate system.
  - *OCA objects (bar code, graphics, image, text with OEG).* If OBP byte 23 = X'00', the object area offset is measured from the temporary (X,Y) coordinate system origin (X=0,Y= 0) using the temporary (X,Y) coordinate system. The object area rotation is also measured using the temporary (X,Y) coordinate system. If OBP byte 23 = X'01', the object area offset is measured from the page origin (X_p=0,Y_p=0) using the page (X_p,Y_p) coordinate system. Object area rotation is also measured using the page (X_p,Y_p) coordinate system.

The following values are defined:

Value	**Description**
X'00'	The temporary (X,Y) coordinate system is the page (X_p,Y_p) coordinate system. This is the standard MO:DCA page coordinate system that is used for object positioning and rotation. This coordinate system is used if this triplet is omitted.
X'01'	The temporary coordinate system origin is the lower-left corner of the page presentation space (X_p=0, Y_p=Y_{extent}). Its axes are rotated 270° from the axes of the page presentation space, so that the X axis increases from bottom to top and the Y axis increases from left to right.
X'02'	The temporary coordinate system origin is the lower-right corner of the page presentation space (X_p=X_{extent}, Y_p=Y_{extent}). Its axes are rotated 180° from the axes of the page presentation space, so that the X axis increases from right to left and the Y axis increases from bottom to top.
X'03'	The temporary coordinate system origin is the upper-right corner of the page presentation space (X_p=X_{extent}, Y_p=0). Its axes are rotated 90° from the axes of the page presentation space, so that the X axis increases from top to bottom and the Y axis increases from right to left.

Table 45 on page 563 provides a comparison of object position and rotation in line data and object position and rotation in MO:DCA data transformed from line data.

Table 45. Position and Rotation of Objects in Line Data and MO:DCA Data

Objects in Line Data	Objects with X'27' Triplet in MO:DCA Data Transformed from Line Data
Page Segment Object	
Page Segment Origin	
(XpsOset,YpsOset) in IPS specify an offset from the current text coordinate system origin (I=0,B=0). The offset is measured using the current text (I,B) coordinate system.	(XpsOset,YpsOset) in IPS specify an offset from the page origin (X_p=0,Y_p=0). The offset is measured using the page (X_p,Y_p) coordinate system. The offset was adjusted to include the LND position.
IM Image Object in Page Segment	
IM Image Object Origin	
(XoaOset,YoaOset) in IOC specify an offset from the page segment origin. The offset is measured using the current text (I,B) coordinate system.	(XoaOset,YoaOset) in IOC specify an offset from the page segment origin. The offset is measured using the temporary (X,Y) coordinate system.
IM Image Object Rotation	
(XoaOrent,YoaOrent) in IOC specify a rotation that is measured with respect to the page (X_p,Y_p) coordinate system X_p-axis.	(XoaOrent,YoaOrent) in IOC specify a rotation that is measured with respect to the page (X_p,Y_p) coordinate system X_p-axis.
IM Image Cell Origin	
(XCOset,YCOset) in ICP specify an offset from the image object origin. The offset is measured using the current text (I,B) coordinate system.	(XCOset,YCOset) in ICP specify an offset from the image object origin. The offset is measured using the temporary (X,Y) coordinate system.
OCA Object in Page Segment	
OCA Object Origin—Byte 23=X'00'	
(XoaOset,YoaOset) in OBP specify an offset from the page segment origin. The offset is measured using the current text (I,B) coordinate system.	(XoaOset,YoaOset) in OBP specify an offset from the page segment origin. The offset is measured using the temporary (X,Y) coordinate system.
OCA Object Origin—Byte 23=X'01'	
(XoaOset,YoaOset) in OBP specify an offset from the page origin (X_p=0,Y_p=0). The offset is measured using the page (X_p,Y_p) coordinate system.	(XoaOset,YoaOset) in OBP specify an offset from the page origin (X_p=0,Y_p=0). The offset is measured using the page (X_p,Y_p) coordinate system.
OCA Object Rotation—Byte 23=X'00'	
(XoaOrent,YoaOrent) in OBP specify a rotation that is measured with respect to the current text (I,B) coordinate system I-axis.	(XoaOrent,YoaOrent) in OBP specify a rotation that is measured with respect to the temporary (X,Y) coordinate system X-axis.
OCA Object Rotation—Byte 23=X'01'	
(XoaOrent,YoaOrent) in OBP specify a rotation that is measured with respect to the page (X_p,Y_p) coordinate system X_p-axis.	(XoaOrent,YoaOrent) in OBP specify a rotation that is measured with respect to the page (X_p,Y_p) coordinate system X_p-axis.
Stand-alone IM Image Object	
IM Image Object Origin	
(XoaOset,YoaOset) in IOC specify an offset from the current LND position. The offset is measured using the current text (I,B) coordinate system.	(XoaOset,YoaOset) in IOC specify an offset from the temporary coordinate system (X=0,Y=0) origin. The offset is measured using the temporary (X,Y) coordinate system. The offset was adjusted to include the LND position.

Table 45 Position and Rotation of Objects in Line Data and MO:DCA Data (cont'd.)

Objects in Line Data	**Objects with X'27' Triplet in MO:DCA Data Transformed from Line Data**
IM Image Object Rotation	
(XoaOrent,YoaOrent) in IOC specify a rotation that is measured with respect to the page (X_p,Y_p) coordinate system X_p-axis.	(XoaOrent,YoaOrent) in IOC specify a rotation that is measured with respect to the page (X_p,Y_p) coordinate system X_p-axis.
IM Image Cell Origin	
(XCOset,YCOset) in ICP specify an offset from the image object origin. The offset is measured using the current text (I,B) coordinate system.	(XCOset,YCOset) in ICP specify an offset from the image object origin. The offset is measured using the temporary (X,Y) coordinate system.
Stand-alone OCA Object	
OCA Object Origin—OBP Byte 23= X'00'	
(XoaOset,YoaOset) in OBP specify an offset from current LND position. The offset is measured using the current text (I,B) coordinate system.	(XoaOset,YoaOset) in OBP specify an offset from the temporary coordinate system (X=0,Y=0) origin. The offset is measured using the temporary (X,Y) coordinate system. The offset was adjusted to include the LND position.
OCA Object Origin—OBP Byte 23= X'01'	
(XoaOset,YoaOset) in OBP specify an offset from the page origin (X_p=0,Y_p=0). The offset is measured using the page (X_p,Y_p) coordinate system.	(XoaOset,YoaOset) in OBP specify an offset from the page origin (X_p=0,Y_p=0). The offset is measured using the page (X_p,Y_p) coordinate system.
OCA Object Rotation—OBP Byte 23= X'00'	
(XoaOrent,YoaOrent) in OBP specify a rotation that is measured with respect to the current text (I,B) coordinate system I-axis.	(XoaOrent,YoaOrent) in OBP specify a rotation that is measured with respect to the temporary (X,Y) coordinate system X-axis.
OCA Object Rotation—OBP Byte 23= X'01'	
(XoaOrent,YoaOrent) in OBP specify a rotation that is measured with respect to the page (X_p,Y_p) coordinate system X_p-axis.	(XoaOrent,YoaOrent) in OBP specify a rotation that is measured with respect to the page (X_p,Y_p) coordinate system X_p-axis.

Structured Fields Using Triplet X'27'

- “Begin Bar Code Object (BBC)” on page 121
- “Begin Graphics Object (BGR)” on page 132
- “Begin IM Image Object (BII)” on page 601
- “Begin Image Object (BIM)” on page 134
- “Begin Presentation Text Object (BPT)” on page 157
- “Include Page Segment (IPS)” on page 224

Page Overlay Conditional Processing Triplet X'46'

The use of this triplet is restricted to products that generate or process the retired MO:DCA interchange set MO:DCA IS/2.

The Page Overlay Conditional Processing triplet is used to identify the intended utilization of a page overlay as produced by a generator. This triplet can also be used to define an overlay level that determines whether the overlay is to be processed.

Triplet X'46' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3–4	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'46'	Identifies the Page Overlay Conditional Processing triplet	M	X'00'
2	CODE	PgOvType	X'00'–X'03'	Specifies the page overlay type: **X'00'** Type 0: Normal **X'01'** Type 1: Annotation **X'02'** Type 2: Redaction **X'03'** Type 3: Highlight	M	X'06'
3	CODE	Level	X'01'–X'FE'	The level of the overlay	O	X'02'

Triplet X'46' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Page Overlay Conditional Processing triplet.

PgOvType Specifies the intended use of the overlay. If this parameter contains a value that is not supported by the receiver, the overlay is not processed.

The page overlay types are defined as follows:

Type **Description**

Type 0 Normal page overlay.

Type 1 Annotation overlay. Type 1 indicates that the page overlay is an annotation overlay used to indicate changes or annotations to the contents of the page to which it applies.

Type 2 Redaction overlay. Type 2 indicates that the page overlay is a redaction overlay used to mask or hide all or a portion of the page to which it applies.

Type 3 Highlight overlay. Type 3 indicates that the page overlay is a highlight overlay used to highlight all or a portion of the page to which it applies.

Level Specifies the processing level of the overlay. An overlay level is used to determine whether the overlay is to be processed by a particular application.

Value **Description**

X'01'–X'FE' Level

All others Reserved

Note: Should the optional *Level* value be omitted, the architected default is X'01'.

Overlay Type Conditional Processing

Conditional processing is applied to the overlay types as follows:

Type **Conditional Processing Description**

Type 0 No conditional processing is applied. If a level value was specified, it is ignored, and the page overlay is processed normally.

Type 1 The overlay level is matched against one contained within the application, and if it is equal to or lower than the application's level it is processed. Should the level be higher than the level contained in the application, or if the application does not contain a level, overlay processing is not performed.

Type 2 The overlay level is matched against one contained within the application, and if it is higher than the application's level, or if the application does not contain a level, it is processed. If the level be equal to or lower than the level contained in the application, overlay processing is not performed.

Type 3 If the receiver is enabled to present highlighted areas, the overlay is processed. If the receiver is not enabled to present highlighted areas, the overlay is not processed. The enablement is achieved external to the data stream. The overlay level is not used with highlight overlays. If a level is specified, it is ignored.

Architecture Note: In general, the highlighting effect is achieved by including a colored highlight overlay on a page using a specified set of mixing rules. When a presentation device does not support the functions necessary to present the specified highlighting, as in the case of a bilevel device, it may choose to default to a highlighting implementation where the area defined by the highlight overlay is presented in reverse video.

Note: If this triplet is omitted, the architected default value for PgOvType is X'00', Type 0, which indicates that the page overlay is always processed.

Structured Fields Using Triplet X'46'

- "Include Page Overlay (IPO)" on page 222
- "Map Page Overlay (MPO)" on page 294

Resource Usage Attribute Triplet X'47'

The use of this triplet is restricted to products that generate or process the retired MO:DCA interchange set MO:DCA IS/2.

The Resource Usage Attribute triplet can be used for resource management. It is used with the Include Page Overlay and Map Page Overlay structured fields to identify the approximate frequency with which an associated page overlay is processed. This is indicated by assigning either a *low* or *high* value to this triplet. The Resource Usage Attribute triplet has no processing semantics associated with it.

Triplet X'47' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	3	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'47'	Identifies the Resource Usage Attribute triplet	M	X'00'
2	CODE	Frequency	X'00', X'FF'	Frequency of use: **X'00'** Low **X'FF'** High	M	X'06'

Triplet X'47' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Resource Usage Attribute triplet.

Frequency Specifies the processing frequency of the associated page overlay. The valid values are:

Value	Description
X'00'	Low
X'FF'	High
All others	Reserved

Structured Fields Using Triplet X'47'

- "Include Page Overlay (IPO)" on page 222
- "Map Page Overlay (MPO)" on page 294

Object Checksum Triplet X'63'

The use of this triplet is restricted to the BMO and BPS structured fields in external (print file level) AFP resource groups for the following products:
- PSF/MVS
- PSF/VSE
- RPM 2.0
- RPM 3.0
- PSF/2 (DPF)
- RMARK

The Object Checksum specifies a qualifier that can be used to identify or fingerprint an object.

Triplet X'63' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	6	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'63'	Identifies the Object Checksum	M	X'00'
2	CODE	Format	X'01'–X'02'	Specifies the format of the checksum: **X'01'** Object Cyclic Redundancy Check (CRC) **X'02'** Retired for private use	M	X'06'
3–4	UBIN	Qualifier	X'0000'–X'FFFF'	Object CRC check sum	M	X'06'
5	BITS	ClassFlgs		Object class flags. See "Triplet X'63' Semantics" on page 567 for ClassFlgs bit definitions.	M	X'06'

Triplet X'63' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Object Checksum.

Format Specifies the format of the checksum.

Value	Description
X'01'	Cyclic Redundancy Code (CRC) check sum
X'02'	Retired for private use

All others Reserved

Application Note: Format X'02' is used in AFP environments for font resource management. For a description, see the *Font Object Content Architecture Reference*.

Qualifier A two-byte value that may be used to support object identification based on the bit-content of the object. This value is the Cyclic Redundancy Check (CRC) check sum and is generated as follows:

1. All bits in the object, from the first bit in the Begin structured field to the last bit in the End structured field, are treated as coefficients of an nth order polynomial.
2. A second bit string is formed based on the coefficients of a generator polynomial, which is the CCITT V.41 polynomial defined as $X^{16} + X^{12} + X^{5} + 1$.
3. The object polynomial is divided by the generator polynomial using binary division on the bit strings that represent the coefficients of the two polynomials.
4. The remainder of this division is a polynomial of order less than 16. The coefficients of this polynomial are the CRC check sum.

ClassFlgs Classifies objects for resource management. ClassFlgs bits have the following descriptions:

Bit **Description**

0 Usage scope:
B'0' Public resource object, unlimited usage
B'1' Private resource object, limited usage

1 Resource retention indicator:
B'0' Save resource
B'1' Do not save resource

2–7 Reserved; all bits must be B'0'

Structured Fields Using Triplet X'63'

- “Begin Overlay (BMO)” on page 138
- “Begin Page Segment (BPS)” on page 155

Object Origin Identifier Triplet X'64'

The use of this triplet is restricted to the BMO and BPS structured fields in external (print file level) AFP resource groups for the following products:
- PSF/MVS
- PSF/VSE
- RPM 2.0
- PSF/2
- RMARK

The Object Origin Identifier triplet is used to identify the system on which an object originated.

Triplet X'64' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	61	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'64'	Identifies the Object Origin Identifier triplet	M	X'00'

Offset	Type	Name	Range	Meaning	M/O	Exc
2	CODE	System	X'01'–X'04'	Identifies originating system: **X'01'** MVS **X'02'** VM **X'03'** PC-DOS **X'04'** VSE	M	X'06'
3–10	CHAR	SysID		System ID and serial number	M	X'06'
11–16	CHAR	MedID		Storage media ID	M	X'06'
17–60	CHAR	DSID		Data set ID	M	X'06'

Triplet X'64' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the Object Origin Identifier triplet.

System Specifies the type of system on which the object originated:

Value	**Description**
X'01'	MVS
X'02'	VM
X'03'	PC-DOS
X'04'	VSE
All others	Reserved

SysID Specifies the ID and serial number of the processor on which the object originated

MedID Identifies the storage media that contains the object (for example, the Volume Serial Number on an MVS system)

DSID Identifies the data set on the storage media that contains the object

Structured Fields Using Triplet X'64'

- “Begin Overlay (BMO)” on page 138
- “Begin Page Segment (BPS)” on page 155

IMM Insertion Triplet X'73'

The use of this triplet is restricted to the IMM structured field for the following products:
- AFP OnDemand
- AFP Workbench

The IMM Insertion triplet is used to indicate that the Invoke Medium Map (IMM) structured field on which it is specified was inserted at the beginning of a page group by a filtering application. The IMM was inserted between the BNG and the first BPG in the group, but only if an IMM was not already specified there. The purpose of the inserted IMM is to allow the page group to be processed in standalone fashion. This triplet is ignored by presentation servers, and the IMM on which it is specified is processed as if the triplet were absent. The presence of this triplet on an IMM may be used by an inverse filtering application to remove the IMM when it is desired to present the complete document as it appeared before the IMM was inserted.

Triplet X'73' Syntax

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	Tlength	4	Length of the triplet, including Tlength	M	X'02'
1	CODE	Tid	X'73'	Identifies the IMM Insertion triplet	M	X'00'
2–3				Reserved; should be zero	M	X'06'

Triplet X'73' Semantics

Tlength Contains the length of the triplet.

Tid Identifies the IMM Insertion triplet.

Structured Field Using Triplet X'73'

- "Invoke Medium Map (IMM)" on page 199

Retired Parameters

The following parameters have been retired:

- MMC Keyword X'0E*nn*'
- MMC Keyword X'F1*nn*'
- MMO Flag Byte Bit 0
- Triplet X'62' StampType X'01'
- OBP RefCSys (Byte 23) = X'05'
- IPO value of X'FFFFFF' for XolOset, YolOset
- IPS value of X'FFFFFF' for XpsOset, YpsOset
- CDD Bytes 0–11
- GRID Font Width value of X'FFFF'
- MGO Mapping Option X'50': Replicate-and-Trim
- IOB RefCSys = X'00'
- Triplet X'22' ResType = X'30'
- MFC MFCScpe = X'06' - Printjob MFC
- Triplet X'18' ISid = X'0C00'

MMC Keyword X'0Enn'

The use of this keyword is restricted to products that generate and process Form Maps for the IBM 3800 printer.

The maximum horizontal adjustment, in pels, that an IBM 3800 printer operator can make to position the printing on each form in this subgroup. This modification can occur only in the first repeating group. If X'0E' is not specified, the previous horizontal adjustment value remains in effect.

If more than one MMC contains an adjustment value, the maximum value is specified to the operator. The operator can make an adjustment from 0 to twice the value of this parameter.

At the start of a data stream, this value defaults to 0. Once a value is set, it remains in effect for the entire print job unless it is changed in another subgroup.

The value of *nn* must be from 0 through 20 or X'FF'. X'FF' indicates that the maximum horizontal adjustment is unchanged.

MMC Keyword X'F1nn'

The use of this keyword is restricted to products that generate and process Form Maps for the IBM 3800 printer.

Shows whether forms flash is active. This value is not used by printers that do not support forms flash. This modification can occur only once in the structured field. If this keyword is not present, forms flash is not active.

The value of *nn* can be:

Value	Description
X'00'	Forms flash is not active
X'01'	Forms flash is active

MMO Flag Byte Bit 0

The use of this flag bit is restricted to products that generate and process Form Maps for the IBM 3800 printer.

Bit	Description
0	Raster Indicator

Shows whether the overlay is to be loaded into the printer as a raster pattern overlay or as a coded overlay:

B'0'	Coded overlay
B'1'	Raster overlay

If this bit is B'1' and a raster overlay is already loaded, the overlay is processed as a coded overlay.

Triplet X'62' StampType X'01'

Use of this parameter value is restricted to RMARK.

Value	Description
X'01'	Date and time stamp indicates when the resource object was marked by the RMARK utility program.

OBP RefCSys (Byte 23) = X'05'

Use of this parameter value is restricted to the following products:
- PSF/MVS
- PSF/VSE
- PSF/VM
- PSF/400
- PSF/2
- Infoprint Manager (IPM)

This value is used to specify the current text (I,B) coordinate system as the reference coordinate system. The products that use this value also use three additional bytes in the Object Area Position (OBP) structured field to identify which text coordinate system (absolute I,B or relative I,B) is specified.

IPO value of X'FFFFFF' for XolOset, YolOset

Use of this parameter value is restricted to the following products:
- ACIF
- PSF/MVS
- PSF/VSE
- PSF/VM
- PSF/400
- Infoprint Manager (IPM)

When specified for XolOset or YolOset, this value indicates that the X_p or Y_p value, respectively, of the current text print position should be used for the origin of the overlay.

IPS value of X'FFFFFF' for XpsOset, YpsOset

Use of this parameter value is restricted to the following products:
- ACIF
- PSF/MVS
- PSF/VSE
- PSF/VM
- PSF/400
- Infoprint Manager (IPM)

When specified for XpsOset or YpsOset, this value indicates that the X_p or Y_p value, respectively, of the current text print position should be used for the “origin” of the page segment.

CDD Bytes 0–11

Use of this parameter is restricted to the following products:
- Pre-year 2000 AFP applications

These parameters define the unit base, units per unit base, and extents for the object presentation space:

XocBase (byte 0)
Specifies the unit base for the X axis of the object presentation space coordinate system. The range is X'00', X'01' (10 inches, 10 centimeters).

YocBase (byte 1)
Specifies the unit base for the Y axis of the object presentation space coordinate system. The range is X'00', X'01' (10 inches, 10 centimeters).

XocUnits (bytes 2–3)
Specifies the number of units per unit base for the X axis of the object presentation space coordinate system. The range is 1–32,767. A value of X'0000' indicates that this parameter is not specified.

YocUnits (bytes 4–5)
Specifies the number of units per unit base for the Y axis of the object presentation space coordinate system. The range is 1–32,767. A value of X'0000' indicates that this parameter is not specified.

XocSize (bytes 6–8)
Specifies the extent of the X axis of the object presentation space coordinate system. This is also known as the object presentation space's X axis size. The range is 1–32,767; a value of X'000000' indicates that the presentation space X axis extent is not specified.

YocSize (bytes 9–11)
Specifies the extent of the Y axis of the object presentation space coordinate system. This is also known as the object presentation space's Y axis size. The

range is 1–32,767; a value of X'000000' indicates that the presentation space Y axis extent is not specified.

GRID Font Width value of X'FFFF'

Use of this parameter value is restricted to the following products:
- OS/400® print applications

When specified for the GRID font width on an FQN type X'84' triplet, this value indicates that the device default font width should be used.

MGO Mapping Option X'50': Replicate-and-Trim

Use of this parameter is restricted to the following products:
- PSF/390
- PSF/400
- Infoprint Manager for AIX®
- Infoprint Manager for Windows®

This parameter defines the following mapping option.

The Graphics Presentation Space Window is positioned so that the top left corner of the window is coincident with the origin of the object area and the window size is unchanged. The Graphics Presentation Space Window is then replicated in the X and Y directions of the object area until the object area is filled. Each new replicate of the window in the X direction is precisely aligned with the window previously placed in the X direction. Each new replicate of the window in the Y direction is precisely aligned with the window previously placed in the Y direction. If the last Graphics Presentation Space Window in either the X or Y direction fits only partially into the object area, the portion of the window that falls outside the object area is trimmed. All data that falls within the object area extents is presented, but data that falls outside of the object area is not presented. When this option is specified, the data object's content origin specified in the XocaOset and YocaOset parameters in the Object Area Position structured field is ignored.

IOB RefCSys = X'00'

This parameter value is retired for private use in AFP line-data environments. It is used in AFP line-data environments to position and rotate the object area with respect to the current text (I,B) coordinate system. For more information, see *Advanced Function Presentation: Programming Guide and Line Data Reference*.

Triplet X'22' ResType = X'30'

This parameter value is retired for private use in AFP line-data environments. It is used in AFP line-data environments in a PageDef object to denote an IOB Reference. It matches an Include Object (IOB) structured field to a Descriptor. For more information, see *Advanced Function Presentation: Programming Guide and Line Data Reference*.

MFC MFCScpe = X'06'– Printjob MFC

Use of this parameter is restricted to the following products:
- PSF for z/OS®

This parameter value defines the following scope for the MFC.

The scope of this MFC is the complete printjob, which includes the printjob header pages, the user print files that follow the header pages, all message pages and trailer pages, and all other separator pages that are associated with the printjob. This scope may only be specified on an MFC in the DEG of the form map that is used to generate the header pages for a printjob; if specified anywhere else it is ignored. The message, separator, and trailer pages are optional and have finishing applied if they are generated.

Triplet X'18' ISid = X'0C00'

The use of this parameter value is restricted to products that generate or process the retired MO:DCA interchange set MO:DCA IS/2.

Retired Interchange Set

The MO:DCA Interchange Set 2 (MO:DCA IS/2) has been retired for products that implemented this set before 2012. This interchange set is no longer part of the MO:DCA interchange set hierarchy.

MO:DCA Interchange Set 2

This section defines the MO:DCA Interchange Set 2 (MO:DCA IS/2) used for presentation documents.

For information on the level of function required for the OCAs included in this interchange set, refer to the MO:DCA environment appendix in the following AFP documents:

BCOCA *Bar Code Object Content Architecture Reference*
GOCA *Graphics Object Content Architecture for AFP Reference*
IOCA *Image Object Content Architecture Reference*
PTOCA *Presentation Text Object Content Architecture Reference*

Note: MO:DCA IS/2 is a proper superset of MO:DCA IS/1 and therefore contains all of the function defined by MO:DCA IS/1. Generators of data streams that contain only MO:DCA IS/1 function may choose to identify those data streams as either MO:DCA IS/1 or MO:DCA IS/2 data streams. However, be aware that identifying them as MO:DCA IS/2 potentially limits the receivers of the data stream to only those that claim to support MO:DCA IS/2.

Data Stream Syntax Structure

The groupings of MO:DCA structured fields that follow identify those structured fields which appear within each begin-end structured field pair or state. This section specifies the structured fields allowed within a MO:DCA Presentation Interchange Set 2 data stream and shows both the MO:DCA state hierarchy and the validity of structured fields within each state.

If a structured field that is not identified as being part of this interchange set appears anywhere within the data stream, a X'40' exception condition exists. If a structured field appears within any state where it is not permitted, or if it appears out of the stated order or more than the permitted number of times, a X'20' exception condition exists. If a structured field that is identified as required does not appear within a specific state, a X'08' exception condition exists.

The conventions used in these structured field groupings are:

( ) The structured field acronym and identifier are shown in parentheses. The presence of dots or periods in the identifier indicates that the item is not a structured field, but instead is a structure, for example a page. The structure is composed of an assortment of structured fields, and is defined separately.

[ ] Brackets indicate optional structured fields. When a structured field is shown without brackets, it *must* appear between the begin and end structured fields.

+ Plus signs indicate structured fields may appear in any order relative to those that precede or succeed it except when the preceding or succeeding structured field does not have a plus (+) sign. Then the order is as listed.

(S) The enclosed (S) indicates that the structured field may be repeated. When present on a required structured field, at least one occurrence of the structured field is required, but multiple instances of it may occur.

F2 An F2 indicates that the structured field is a format two structured field. See “Structured Field Formats” on page 25 for further details.

Notes:

1. The Begin Document and End Document structured fields are required in a MO:DCA data stream.
2. The No Operation structured field may appear within any begin-end domain and thus is not listed in the structured field groupings.
3. The architecture that owns and controls the content of each of the data and resource objects carried in a MO:DCA data stream is identified in the following structured field groupings. Please refer to the referenced documentation for further details.
4. The Flag byte (byte 5) in the Structured Field Introducer (SFI) must be set to X'00'. MO:DCA IS/2 does not support SFI extension, structured field segmentation, or structured field padding.

Document

Figure 89. MO:DCA IS/2: Document Structure

```
Begin Document  (BDT, D3A8A8)
     [  (      D3..A7)    Document Index                                 ]
 +   [  (IMM,  D3ABCC)    Invoke Medium Map                         (S)  ]
 +   [  (      D3..AF)    Page                                      (S)  ]
End Document  (EDT, D3A9A8)
```

Document Index

Figure 90. MO:DCA IS/2: Document Index Structure

```
Begin Document Index  (BDI, D3A8A7)
        (IEL,  D3B2A7)    Index Element                             (S)
End Document Index  (EDI, D3A9A7)
```

Note: These structured fields are used for informational purposes only. Thus, there is no requirement that these fields be processed by a receiver. A compliant receiver must be able to recognize the document index structure, but it may elect to simply skip the entire structure without processing its content.

Resource Group

Figure 91. MO:DCA IS/2: Resource Group Structure

```
Begin Resource Group  (BRG, D3A8C6)
  +  [  (      D3..DF)    Overlay                                   (S)  ]
End Resource Group  (ERG, D3A9C6)
```

Page

Figure 92. MO:DCA IS/2: Page Structure

```
Begin Page  (BPG, D3A8AF)
     [  (      D3..C6)    Resource Group                                 ]
        (      D3..C9)    Active Environment Group
  +  [  (      D3..EB)    Bar Code Object                           (S)  ]
  +  [  (      D3..BB)    Graphics Object                           (S)  ]
  +  [  (      D3..FB)    Image Object                              (S)  ]
  +  [  (IPO,  D3AFD8)    Include Page Overlay                      (S)  ] 1
  +  [  (      D3..9B)    Presentation Text Object                  (S)  ]
End Page  (EPG, D3A9AF)
```

Notes:

1. For purposes of print server resource management, each overlay included on a page with an IPO must first be mapped to a local ID with an MPO in the AEG for that page. Note that the MPO is only specified in the AEG for a page; it is not allowed in the AEG for an overlay.

Overlay

Figure 93. MO:DCA IS/2: Overlay Structure

```
Begin Overlay  (BMO, D3A8DF)
        (      D3..C9)    Active Environment Group
  +  [  (      D3..EB)    Bar Code Object                        (S)  ]
  +  [  (      D3..BB)    Graphics Object                        (S)  ]
  +  [  (      D3..FB)    Image Object                           (S)  ]
  +  [  (      D3..9B)    Presentation Text Object               (S)  ]
End Overlay  (EMO, D3A9DF)
```

Active Environment Group

Figure 94. MO:DCA IS/2: Active Environment Group Structure

```
Begin Active Environment Group  (BAG, D3A8C9)
     [  (MCF,  D3AB8A)    Map Coded Font                     F2  (S)  ] 3
     [  (MPO,  D3ABD8)    Map Page Overlay                       (S)  ] 4
        (PGD,  D3A6AF)    Page Descriptor
     [  (OBD,  D3A66B)    Object Area Descriptor                      ] 1
     [  (OBP,  D3AC6B)    Object Area Position                        ] 1
     [  (PTD,  D3B19B)    Presentation Text Data Descriptor  F2 2
End Active Environment Group  (EAG, D3A9C9)
```

Notes:

1. Used for presentation text objects only and is optional. For graphics and image objects, the OBD and OBP must be specified in the OEG associated with the graphic, bar code, or image object.
2. Required only when the associated page contains one or more presentation text objects.
3. For purposes of print server resource management, an MCF mapping the same font must be specified in the AEG whenever an MCF is specified in a bar code or graphics OEG. The local ID used in the page or overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.
4. For purposes of print server resource management, each overlay included on a page with an IPO must first be mapped to a local ID with an MPO in the AEG for that page. Note that the MPO is only specified in the AEG for a page; it is not allowed in the AEG for an overlay.

Bar Code Object (BCOCA BCD1)

Figure 95. MO:DCA IS/2: Bar Code Object Structure

```
Begin Bar Code Object  (BBC, D3A8EB)
        (       D3..C7)     Object Environment Group
     [  (BDA,   D3EEEB)     Bar Code Data                                   (S)   ]
End Bar Code Object  (EBC, D3A9EB)
```

Note: Refer to the *Bar Code Object Content Architecture Reference* for a full description of the BCOCA content, syntax, and semantics for MO:DCA IS/2.

Object Environment Group (OEG) for Bar Code Object

Figure 96. MO:DCA IS/2: Object Environment Group for Bar Code Object Structure

```
Begin Object Environment Group  (BOG, D3A8C7)
        (OBD,   D3A66B)     Object Area Descriptor
        (OBP,   D3AC6B)     Object Area Position
     [  (MBC,   D3ABEB)     Map Bar Code Object                                      ]
     [  (MCF,   D3AB8A)     Map Coded Font                              F2    (S)    ]1
        (BDD,   D3A6EB)     Object Area Descriptor
End Object Environment Group  (EOG, D3A9C7)
```

Notes:

1. For purposes of print server resource management, an MCF mapping the same font must be specified in the AEG whenever an MCF is specified in a bar code or graphics OEG. The local ID used in the page or overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.

Graphics Object (GOCA DR/2V0)

Figure 97. MO:DCA IS/2: Graphics Object Structure

```
Begin Graphics Object  (BGR, D3A8BB)
        (       D3..C7)     Object Environment Group
     [  (GAD,   D3EEBB)     Graphics Data                                   (S)   ]
End Graphics Object  (EGR, D3A9BB)
```

Note: Refer to the *Graphics Object Content Architecture for AFP Reference* for a full description of the GOCA DR/2V0 content, syntax, and semantics for MO:DCA IS/2.

Object Environment Group (OEG) for Graphics Object

Figure 98. MO:DCA IS/2: Object Environment Group for Graphics Object Structure

```
Begin Object Environment Group  (BOG, D3A8C7)
        (OBD,   D3A66B)     Object Area Descriptor
        (OBP,   D3AC6B)     Object Area Position
     [  (MGO,   D3ABBB)     Map Graphics Object                                   ]
     [  (MCF,   D3AB8A)     Map Coded Font                             F2   (S)   ] 1
        (GDD,   D3A6BB)     Graphics Data Descriptor
End Object Environment Group  (EOG, D3A9C7)
```

Notes:

1. For purposes of print server resource management, an MCF mapping the same font must be specified in the AEG whenever an MCF is specified in a bar code or graphics OEG. The local ID used in the page or overlay AEG need not match the ID in the object OEG. ID X'FE' may be used in the AEG for fonts mapped in the AEG solely due to their presence in an object's OEG.

Image Object (IOCA FS10 or FS11)

Figure 99. MO:DCA IS/2: Image Object Structure

```
Begin Image Object  (BIM, D3A8FB)
         (      D3..C7)     Object Environment Group
      [  (IPD,  D3EEFB)     Image Picture Data                            (S)  ]
End Image Object  (EIM, D3A9FB)
```

Note: Refer to the *Image Object Content Architecture Reference* for a full description of the IOCA FS10 and FS11 content, syntax, and semantics for MO:DCA IS/2.

Object Environment Group (OEG) for Image Object

Figure 100. MO:DCA IS/2: Object Environment Group for Image Object Structure

```
Begin Object Environment Group  (BOG, D3A8C7)
         (OBD,  D3A66B)     Object Area Descriptor
         (OBP,  D3AC6B)     Object Area Position
      [  (MIO,  D3ABFB)     Map Image Object                                   ]
         (IDD,  D3A6FB)     Image Data Descriptor
End Object Environment Group  (EOG, D3A9C7)
```

Presentation Text Object (PTOCA PT1)

Figure 101. MO:DCA IS/2: Presentation Text Object Structure

```
Begin Presentation Text Object  (BPT, D3A89B)
      [  (PTX,  D3EE9B)     Presentation Text Data                        (S)  ]
End Presentation Text Object  (EPT, D3A99B)
```

Note: Refer to the *Presentation Text Object Content Architecture Reference* for a full description of the PTOCA PT1 content, syntax, and semantics for MO:DCA IS/2.

Permitted Structured Fields

This section describes the parameters and ranges of values supported for each of the structured fields contained in this interchange set.

The structured fields are listed alphabetically and described using tables. The table heading for each structured field contains the structured field's acronym, its three-byte hexadecimal identifier, and its full name. Also included is the page number in the document where a detailed description of the structured field can be found.

Structured Field Parameters

In general, the structured field tables contain the following information for each parameter:

1. The offset from the beginning of the data portion of the structured field or from the beginning of the triplet.
2. Values and description:
   - When a specific parameter value is required, the specific value or the range of acceptable values is specified, followed by "→" and an explanation or description of the parameter.
   - When no specific value is required, or when a choice of values is required, the parameter name or a description of the parameter is given. If a choice of values is required, the choices are identified in the table.
3. For those parameters defined and owned by the MO:DCA architecture, occurrence is specified either as a lowercase *n* indicating that the occurrence is unlimited by the interchange set, or as a number representing the maximum number of times the parameter may appear within the containing structured field, repeating group, or triplet.
4. For those parameters defined and owned by the MO:DCA architecture, optionally is specified as:

   O Optional. The parameter may or may not appear.

   M Mandatory. The parameter must always appear.

   R Retired. A *receiver must be able* to receive this parameter, but a *generator should not* generate it.

Unless a specific order is required, self-identifying parameters are listed in alphanumeric sequence by identifier and include the page number in the document where a detailed description of the parameter is located.

In general, no exception conditions are identified within the interchange set definition for the structured fields or their parameters. The page numbers provided for each structured field and each triplet provide the source for determining what exception conditions may be anticipated. However, the following general rules apply:

- For those structured fields where a parameter order is stated, if a parameter appears outside that stated order, a X'01' exception condition exists.
- If a parameter value appears that is outside the range specified for that parameter, a X'02' exception condition exists.
- If a parameter that is identified as mandatory does not appear on a specific structured field, a X'04' exception condition exists.
- Unless otherwise stated, if any unrecognized parameter or triplet appears on any structured field, a X'10' exception condition exists.

Notes:

1. Any triplet encountered on any of the *Begin* structured fields listed below that is not explicitly defined as being valid for that structured field should be ignored and should not cause an exception condition.
2. If specified, the name contained in the name parameter on an *End* structured field must match that specified in the name parameter on its matching *Begin* structured field, or a X'01' exception condition exists.

Bar Code Data

BDA X'D3EEEB' Bar Code Data (See "Bar Code Data (BDA)" on page 123)	
0–*n*	Up to 8,192 bytes of bar code data as defined by BCOCA BCD1

Bar Code Data Descriptor

BDD X'D3A6EB' Bar Code Data Descriptor (See **"Bar Code Data Descriptor (BDD)" on page 124****)**			
0–*n*	Bar Code descriptor data as defined by BCOCA BCD1		

Begin Active Environment Group

BAG X'D3A8C9' Begin Active Environment Group (See **"Begin Active Environment Group (BAG)" on page 120****)**			
0–7	Active Environment Group name (8 characters)	1	O

Begin Bar Code Object

BBC X'D3A8EB' Begin Bar Code Object (See **"Begin Bar Code Object (BBC)" on page 121****)**			
0–7	Bar Code Object name (8 characters)	1	O

Begin Document Index

BDI X'D3A8A7' Begin Document Index (See **"Begin Document Index (BDI)" on page 126****)**			
0–7	Document Index name (8 characters)	1	O

Begin Document

BDT X'D3A8A8' Begin Document (See **"Begin Document (BDT)" on page 128****)**				
0–7	Document name (8 characters)		1	M
8–9	**X'0000'** → Reserved; must be binary zero		1	M
10–*n*	The following triplets, in any order:			
Coded Graphic Character Set Global Identifier Triplet (See "Coded Graphic Character Set Global Identifier Triplet X'01'" on page 348)				
	0–1	**X'0601'** → Triplet length and identifier	1	M
	2–5	Character set and code page identification	1	M
	Fully Qualified Name (See "Fully Qualified Name Triplet X'02'" on page 351)		1	O
	0–1	**X'*nn*02'** → Triplet length and identifier	1	M
	2–3	**X'0100'** → FQN type and format. Replace first GID Name.	1	M
	4–*n*	Name of the document. It may be 1 to 250 bytes in length.	1	M
	MO:DCA Interchange Set Triplet (See "MO:DCA Interchange Set Triplet X'18'" on page 367)		1	M
	0–1	**X'0518'** → Triplet length and identifier	1	M
	2	**X'01'** → Interchange set type, presentation	1	M
	3–4	**X'0C00'** → Interchange set identifier (MO:DCA IS/2)	1	M
	Object Function Set Specification Triplet (See "Resource Object Type Triplet X'21'" on page 374)		1	R

BDT X'D3A8A8' Begin Document (See “Begin Document (BDT)” on page 128)			
0–1	**X'*nn*21'** → Triplet length and identifier	1	M
2	**X'02'** → Object type, *presentation text*	1	M
3	**X'00'** → Architecture version	1	M
4–5	**X'8000'** → MO:DCA function set definition	1	M
6–7	**X'0000'** → Presentation text function set definition (PT/1)	1	M
8–*n*	Reserved, not checked	1	O
Note: For compatibility with MO:DCA IS/1, one instance of this triplet is *permitted* when the data stream contains a PT1 presentation text object. However, this triplet has been retired and should not be included in MO:DCA IS/2 data streams.			
Object Function Set Specification Triplet (See “Resource Object Type Triplet X'21'” on page 374)		1	R
0–1	**X'*nn*21'** → Triplet length and identifier	1	M
2	**X'03'** → Object type, *graphics*	1	M
3	**X'00'** → Architecture version	1	M
4–5	**X'8000'** → MO:DCA function set definition	1	M
6–7	**X'4000'** → Graphics function set definition (DR/2V0)	1	M
8–*n*	Reserved, not checked	1	O
Note: For compatibility with MO:DCA IS/1, one instance of this triplet is *permitted* when the data stream contains a DR/2V0 graphics object. However, this triplet has been retired and should not be included in MO:DCA IS/2 data streams.			
Object Function Set Specification Triplet (See “Resource Object Type Triplet X'21'” on page 374)		1	R
0–1	**X'*nn*21'** → Triplet length and identifier	1	M
2	**X'06'** → Object type, *image*	1	M
3	**X'00'** → Architecture version	1	M
4–5	**X'8000'** → MO:DCA function set definition	1	M
6–7	**X'8000'** → Image function set definition (FS10)	1	M
8–*n*	Reserved, not checked	1	O
For compatibility with MO:DCA IS/1, one instance of this triplet is *permitted* when the data stream contains an FS10 image object. However, this triplet has been retired and should not be included in MO:DCA IS/2 data streams. For this reason, no value has been provided for IOCA FS11.			

Begin Graphics Object

BGR X'D3A8BB' Begin Graphics Object (See “Begin Graphics Object (BGR)” on page 132)			
0–7	Graphics Object name (8 characters)	1	O

Begin Image Object

BIM X'D3A8FB' Begin Image Object (See “Begin Image Object (BIM)” on page 134)			
0–7	Image Object name (8 characters)	1	O

Begin Object Environment Group

BOG X'D3A8C7' Begin Object Environment Group (See "Begin Object Environment Group (BOG)" on page 149)			
0–7	Object Environment Group name (8 characters)	1	O

Begin Overlay

BMO X'D3A8DF' Begin Overlay (See "Begin Overlay (BMO)" on page 138)			
0–7	Overlay name (8 characters)	1	M

Begin Page

BPG X'D3A8AF' Begin Page (See "Begin Page (BPG)" on page 152)			
0–7	Page name (8 characters)	1	O

Begin Presentation Text Object

BPT X'D3A89B' Begin Presentation Text Object (See "Begin Presentation Text Object (BPT)" on page 157)			
0–7	Presentation Text Object name (8 characters)	1	O

Begin Resource Group

BRG X'D3A8C6' Begin Resource Group (See "Begin Resource Group (BRG)" on page 159)			
0–7	Resource Group name (8 characters)	1	O

End Active Environment Group

EAG X'D3A9C9' End Active Environment Group (See "End Active Environment Group (EAG)" on page 173)			
0–7	Active Environment Group name (8 characters)	1	O

End Bar Code Object

EBC X'D3A9EB' End Bar Code Object (See "End Bar Code Object (EBC)" on page 174)			
0–7	Bar Code Object name (8 characters)	1	O

End Document Index

EDI X'D3A9A7' End Document Index (See "End Document Index (EDI)" on page 176)			
0–7	Document Index name (8 characters)	1	O

End Document

EDT X'D3A9A8' End Document (See “End Document (EDT)” on page 177)			
0–7	Document name (8 characters)	1	O

End Graphics Object

EGR X'D3A9BB' End Graphics Object (See “End Graphics Object (EGR)” on page 179)			
0–7	Graphics Object name (8 characters)	1	O

End Image Object

EIM X'D3A9FB' End Image Object (See “End Image Object (EIM)” on page 180)			
0–7	Image Object name (8 characters)	1	O

End Object Environment Group

EOG X'D3A9C7' End Object Environment Group (See “End Object Environment Group (EOG)” on page 186)			
0–7	Object Environment Group name (8 characters)	1	O

End Overlay

EMO X'D3A9DF' End Overlay (See “End Overlay (EMO)” on page 182)			
0–7	Overlay name (8 characters)	1	O

End Page

EPG X'D3A9AF' End Page (See “End Page (EPG)” on page 188)			
0–7	Page name (8 characters)	1	O

End Presentation Text Object

EPT X'D3A99B' End Presentation Text Object (See “End Presentation Text Object (EPT)” on page 190)			
0–7	Presentation Text Object name (8 characters)	1	O

End Resource Group

ERG X'D3A9C6' End Resource Group (See “End Resource Group (ERG)” on page 191)			
0–7	Resource Group name (8 characters)	1	O

Graphics Data

GAD X'D3EEBB' Graphics Data (See "Graphics Data (GAD)" on page 194)	
0–*n*	Up to 8,192 bytes of graphics data as defined by GOCA DR/2V0

Graphics Data Descriptor

GDD X'D3A6BB' Graphics Data Descriptor (See "Graphics Data Descriptor (GDD)" on page 195)	
0–*n*	Graphics descriptor data as defined by GOCA

Image Data Descriptor

IDD X'D3A6FB' Image Data Descriptor (See "Image Data Descriptor (IDD)" on page 196)	
0–*n*	Image descriptor data as defined by IOCA FS10 and FS11

Image Picture Data

IPD X'D3EEFB' Image Picture Data (See "Image Picture Data (IPD)" on page 218)	
0–*n*	Up to 8,192 bytes of image segment data as defined by IOCA FS10 or FS11

Include Page Overlay

IPO X'D3AFD8' Include Page Overlay (See "Include Page Overlay (IPO)" on page 222)			
0–7	Page overlay reference name.	1	M
8–10	Page overlay origin, X-coordinate. It must be one of the following: **X'000000'–X'001555'** → In the range of 0 to 5,461 when using 240 units per inch for the page X measurement units **X'000000'–X'007FFF'** → In the range of 0 to 32,767 when using 1440 units per inch for the page X measurement units	1	M
11–13	Page overlay origin, Y-coordinate. It must be one of the following: **X'000000'–X'001555'** → In the range of 0 to 5,461 when using 240 units per inch for the page Y measurement units **X'000000'–X'007FFF'** → In the range of 0 to 32,767 when using 1440 units per inch for the page Y measurement units	1	M
14–15	**X'0000'** → Overlay orientation of 0 degrees	1	O
16–*n*	The following triplets, in any order:		
	Page Overlay Conditional Processing Triplet (See "Page Overlay Conditional Processing Triplet X'46'" on page 564)	*n*	O
	0–1 **X'*nn*46'** → Triplet length and identifier	1	M
	2 Page Overlay Type. It must be one of the following: **X'00'** → Type 0 (No conditional processing) **X'01'** → Type 1 (Annotation)	1	M
	3 **X'01'–X'FE'** → Level. It must be in the range of 1 to 254.	1	O

IPO X'D3AFD8' Include Page Overlay (See "Include Page Overlay (IPO)" on page 222)				
	Resource Usage Attribute Triplet (See "Resource Usage Attribute Triplet X'47'" on page 566)		1	O
	0–1	**X'0347'** → Triplet length and identifier	1	M
	2	Frequency of use. It must be one of the following: **X'00'** → Low **X'FF'** → High	1	M

Index Element

IEL X'D3B2A7' Index Element (See "Index Element (IEL)" on page 197)				
0–*n*	The following triplets, in any order:			
	Fully Qualified Name Triplet (See "Fully Qualified Name Triplet X'02'" on page 351)		1	M
	0–1	**X'*nn*02'** → Triplet length and identifier	1	M
	2–3	**X'CA00'** → FQN type and format, Index Element Name	1	M
	4–*n*	Name of this IEL. It may be 1 to 250 bytes in length.	1	M
	Object Byte Offset Triplet (See "Object Byte Offset Triplet X'2D'" on page 381)		1	M
	0–1	**X'062D'** → Triplet length and identifier	1	M
	2–5	Direct byte offset. It must be one of the following: **X'00000000'–X'7FFFFFFF'** → Byte offset from beginning of document containing indexed element **X'FFFFFFFF'** → Indexed element is outside the document	1	M

Invoke Medium Map

IMM X'D3ABCC' Invoke Medium Map (See "Invoke Medium Map (IMM)" on page 199)			
0–7	External name of the medium map to be invoked (8 characters)	1	M

Map Bar Code Object

MBC X'D3ABEB' Map Bar Code Object (See "Map Bar Code Object (MBC)" on page 232)				
0–1	**X'0005'** → Length of this repeating group is 5 bytes		1	M
2–4	The following triplet:			
	Mapping Option Triplet (See "Mapping Option Triplet X'04'" on page 360)		1	M
	0–1	**X'0304'** → Triplet length and identifier	1	M
	2	**X'00'** → Output option (position)	1	M

Note: If this structured field is not specified, the architected default is *position*.

Map Coded Font, Format 2

MCF X'D3AB8A' Map Coded Font (See "Map Coded Font (MCF) Format 2" on page 237)				
0–1	**X'00*nn*'** → Length of this repeating group		254	M
2–*n*	The following triplets, in any order:			
	Fully Qualified Name Triplet (See "Fully Qualified Name Triplet X'02'" on page 351) **Note:** See "MCF Font Names" on page 588 for details.		2	M
	0–1	**X'0C02'** → Triplet length and identifier	1	M
	2	The FQN type. It must be one of the following: **X'84'** → Coded Font Reference **X'85'** → Code Page Reference **X'86'** → Font Character Set Reference	1	M
	3	**X'00'** → FQN format	1	M
	4–11	External name of the coded font, code page, or font character set.	1	M
	Fully Qualified Name Triplet (See "Fully Qualified Name Triplet X'02'" on page 351)		1	O
	0–1	**X'*nn*02'** → Triplet length and identifier	1	M
	2–3	**X'0800'** → FQN type and format, Font Typeface Name	1	M
	4–*n*	External name of the font typeface. It may be 1 to 32 bytes in length.	1	M
	Font Descriptor Specification Triplet (See "Font Descriptor Specification Triplet X'1F'" on page 369)		1	O
	0–1	**X'141F'** → Triplet length and identifier	1	M
	2	**X'01'–X'09'** → Font Weight Class. It must be in the range of 1 to 9.	1	M
	3	**X'01'–X'09'** → Font Width Class. It must be in the range of 1 to 9.	1	M
	4–5	**X'0000'–X'7FFF'** → Font Height. It must be in the range of 0 to 32,767 1440ths of an inch.	1	M
	6–7	**X'0000'–X'7FFF'** → Font Width. It must be in the range of 0 to 32,767 1440ths of an inch.	1	M
	8	Font Descriptor Flags, as follows: **Bit** **Description** **0** Italics **1** Underscored **2** Reserved, must be B'0' **3** Hollow **4** Overstruck **5** Proportional **6** Kerned characters (pairwise) **7** Reserved, must be B'0'	1	M
	9–19	Reserved	1	M
	Font Coded Graphic Character Set Global Identifier Triplet (See "Font Coded Graphic Character Set Global Identifier Triplet X'20'" on page 373)		1	O
	0–1	**X'0620'** → Triplet length and identifier	1	M
	2–5	The GCSGID and CPGID for the font.	1	M
	Resource Local Identifier Triplet (See "Resource Local Identifier Triplet X'24'" on page 378)		1	M

MCF X'D3AB8A' Map Coded Font (See “Map Coded Font (MCF) Format 2” on page 237)			
0–1	**X'0424'** → Triplet length and identifier	1	M
2	**X'05'** → Resource type, coded font	1	M
3	Resource Local Identifier. It must be one of the following: **X'01'–X'7F'** → It must be in the range of 1 to 127 when used for mapping a font. **X'FE'** → It must be 254 when used for resource management purposes in the AEG.	1	M
Resource Section Number Triplet (See “Resource Section Number Triplet X'25'” on page 379)		1	O
0–1	**X'0325'** → Triplet length and identifier	1	M
2	Resource Section Number. It must be one of the following: **X'00'** → It must be 0 when referencing an EBCDIC Presentation single-byte coded font (encoding scheme ID X'61*xx*') or all sections of an EBCDIC Presentation double-byte coded font (encoding scheme ID X'62*xx*'). **X'41'–X'FE'** → It must be in the range of 65 to 254 when referencing a specific section of an EBCDIC Presentation double-byte coded font (encoding scheme ID X'62*xx*').	1	M
Character Rotation Triplet (See “Character Rotation Triplet X'26'” on page 380)		1	O
0–1	**X'0426'** → Triplet length and identifier	1	M
2–3	Character Rotation. It must be one of the following: **X'0000'** → 0-degree character rotation **X'2D00'** → 90-degree character rotation **X'5A00'** → 180-degree character rotation **X'8700'** → 270-degree character rotation	1	M

MCF Font Names

The MCF must have one of the following:

- A type X'84' (Coded Font Reference) Fully Qualified Name (X'02') triplet. To support existing products, the coded font name must be specified as a global resource identifier (GRID). For a definition of the GRID, see “Global Resource Identifier (GRID) Definition” on page 358.
- Both a type X'85' (Code Page Name Reference) and a type X'86' (Font Character Set Name Reference) Fully Qualified Name (X'02') triplet. To support existing products, the names of the code page and font character set must be eight characters in length and must match the external names of these objects in their respective resource libraries.

Map Graphics Object

MGO X'D3ABBB' Map Graphics Object (See “Map Graphics Object (MGO)” on page 273)			
0–1	**X'0005'** → Length of this repeating group is 5 bytes	1	M
2–4	The following triplet:		
	Mapping Option Triplet (See “Mapping Option Triplet X'04'” on page 360)	1	M

MGO X'D3ABBB' Map Graphics Object (See "Map Graphics Object (MGO)" on page 273)				
	0–1	**X'0304'** → Triplet length and identifier	1	M
	2	Output Option. It must be one of the following: **X'10'** → Position and trim **X'20'** → Scale to fit **X'30'** → Center and trim	1	M

Note: If this structured field is not specified, the architected default is *scale to fit*.

Map Image Object

MIO X'D3ABFB' Map Image Object (See "Map Image Object (MIO)" on page 274)				
0–1	**X'0005'** → Length of this repeating group is 5 bytes		1	M
2–4	The following triplet:			
	Mapping Option Triplet (See "Mapping Option Triplet X'04'" on page 360)		1	M
	0–1	**X'0304'** → Triplet length and identifier	1	M
	2	Output Option. It must be one of the following: **X'10'** → Position and trim **X'20'** → Scale to fit **X'30'** → Center and trim	1	M

Note: If this structured field is not specified, the architected default is *scale to fit*.

Map Page Overlay

MPO X'D3ABD8' Map Page Overlay (See "Map Page Overlay (MPO)" on page 294)				
0–1	**X'*nnnn*'** → Length of this repeating group		127	M
2–17	The following triplet:			
	Fully Qualified Name Triplet (See "Fully Qualified Name Triplet X'02'" on page 351)		1	M
	0–1	**X'0C02'** → Triplet length and identifier	1	M
	2–3	**X'8400'** → FQN type and format, reference to overlay	1	M
	4–11	External name of the overlay.	1	M
	Resource Local Identifier Triplet (See "Resource Local Identifier Triplet X'24'" on page 378)		1	M
	0–1	**X'0424'** → Triplet length and identifier	1	M
	2	**X'02'** → Resource type, page overlay	1	M
	3	**X'01'–X'7F'** → Resource Local Identifier. It must be in the range of 1 to 127.	1	M
	Page Overlay Conditional Processing Triplet (See "Page Overlay Conditional Processing Triplet X'46'" on page 564)		*n*	O
	0–1	**X'*nn*46'** → Triplet length and identifier	1	M
	2	Page Overlay Type. It must be one of the following: **X'00'** → Type 0 (No conditional processing) **X'01'** → Type 1 (Annotation)	1	M

MPO X'D3ABD8' Map Page Overlay (See "Map Page Overlay (MPO)" on page 294)				
	3	**X'01'–X'FE'** → It must be in the range of 1 to 254.	1	O
	Resource Usage Attribute Triplet (See "Resource Usage Attribute Triplet X'47'" on page 566)		1	O
	0–1	**X'0347'** → Triplet length and identifier	1	M
	2	Frequency of use. It must be one of the following: **X'00'** → Low **X'FF'** → High	1	M

No Operation

NOP X'D3EEEE' No Operation (See "No Operation (NOP)" on page 299)	
0–*n*	Up to 32,759 bytes of data.

Object Area Descriptor

OBD X'D3A66B' Object Area Descriptor (See "Object Area Descriptor (OBD)" on page 300)				
0–*n*	The following triplets, in any order:			
	Descriptor Position Triplet (See "Descriptor Position Triplet X'43'" on page 383)		1	M
	0–1	**X'0343'** → Triplet length and identifier	1	M
	2	**X'01'–X'7F'** → Descriptor position ID. It must be in the range of 1 to 127.	1	M
	Measurement Units Triplet (See "Measurement Units Triplet X'4B'" on page 388)		1	M
	0–1	**X'084B'** → Triplet length and identifier	1	M
	2–3	**X'0000'** → Object area measurement units base for X and Y	1	M
	4–5	Object area measurement units value for X. It must be one of the following: **X'0960'** → 2400 units per unit base (240 units per inch) **X'3840'** → 14400 units per unit base (1440 units per inch)	1	M
	6–7	Object area measurement units value for Y. It must be identical to bytes 4–5.	1	M
	Object Area Size Triplet (See "Object Area Size Triplet X'4C'" on page 389).		1	M
	0–1	**X'094C'** → Triplet length and identifier	1	M
	2	**X'02'** → Type, actual object area size	1	M
	3–5	Object area size in the X direction. It must be one of the following: **X'000001'–X'001555'** → In the range of 1 to 5,461 when using 240 units per inch for the object area X measurement units **X'000001'–X'007FFF'** → In the range of 1 to 32,767 when using 1440 units per inch for the object area X measurement units	1	M

OBD X'D3A66B' Object Area Descriptor (See "Object Area Descriptor (OBD)" on page 300)			
6–8	Object area size in the Y direction. It must be one of the following: **X'000001'–X'001555'** → In the range of 1 to 5,461 when using 240 units per inch for the object area Y measurement units **X'000001'–X'007FFF'** → In the range of 1 to 32,767 when using 1440 units per inch for the object area Y measurement units	1	M
	Presentation Space Reset Mixing Triplet (See "Presentation Space Reset Mixing Triplet X'70'" on page 414)	1	O
0–1	**X'0370'** → Triplet length and identifier	1	M
2	Mixing Flags, as follows: **Bit** **Description** **0** Reset **0** Do not reset to color of medium **1** Reset to color of medium **1–7** Reserved, must be zero	1	M
Note: This triplet is *only* permitted on Object Area Descriptor structured fields that are contained within a page overlay. The page overlay itself *must* be carried within the inline page resource group. If specified on any other Object Area Descriptor structured field, a X'01' exception condition exists.			

Note: If the presentation text Object Area Descriptor structured field appears in the AEG, the measurement units and extents specified on it must match those specified on the Page Descriptor structured field, or a X'01' exception condition exists. If the presentation text Object Area Descriptor structured field is omitted, the architected default is to use the measurement units and extents specified on the Page Descriptor structured field for the presentation text object area. Thus, the presentation text object area and the page are always the same size and points within their respective coordinate systems are always coincident.

Object Area Position

OBP X'D3AC6B' Object Area Position (See "Object Area Position (OBP)" on page 302)			
0	**X'01'–X'7F'** → Object Area Position ID. It must be in the range of 1 to 127.	1	M
1	**X'17'** → Length of this repeating group is 23 bytes	1	M
2–4	Object area origin for X. It must be one of the following: **X'000000'–X'001555'** → In the range of 0 to 5,461 when using 240 units per inch for the page or overlay X measurement units **X'000000'–X'007FFF'** → In the range of 0 to 32,767 when using 1440 units per inch for the page or overlay X measurement units	1	M
5–7	Object area origin for Y. It must be one of the following: **X'000000'–X'001555'** → In the range of 0 to 5,461 when using 240 units per inch for the page or overlay Y measurement units **X'000000'–X'007FFF'** → In the range of 0 to 32,767 when using 1440 units per inch for the page or overlay Y measurement units	1	M
8–11	Object Area orientation, X and Y coordinates. It must be one of the following: **X'0000 2D00'** → X=0 degrees, Y=90 degrees **X'2D00 5A00'** → X=90 degrees, Y=180 degrees **X'5A00 8700'** → X=180 degrees, Y=270 degrees **X'8700 0000'** → X=270 degrees, Y=0 degrees	1	M

OBP X'D3AC6B' Object Area Position (See “Object Area Position (OBP)” on page 302)			
12	**X'00'** → Reserved; must be binary zero	1	M
13–15	Object content origin for X. It must be one of the following: **X'000000'–X'001555'** → In the range of 0 to 5,461 when using 240 units per inch for the page or overlay X measurement units **X'000000'–X'007FFF'** → In the range of 0 to 32,767 when using 1440 units per inch for the page or overlay X measurement units	1	M
16–18	Object content origin for Y. It must be one of the following: **X'000000'–X'001555'** → In the range of 0 to 5,461 when using 240 units per inch for the page or overlay Y measurement units **X'000000'–X'007FFF'** → In the range of 0 to 32,767 when using 1440 units per inch for the page or overlay Y measurement units	1	M
19–20	**X'0000'** → Object content orientation, X (0 degrees)	1	M
21–22	**X'2D00'** → Object content orientation, Y (90 degrees)	1	M
23	Referenced coordinate system. It must be one of the following: **X'00'** → Current coordinate system **X'01'** → Page or overlay coordinate system	1	M

Notes:

1. If the presentation text Object Area Position structured field appears in the AEG, the X and Y values for the object area origin and the object content origin must be set to zero, or a X'01' exception condition exists. If the presentation text Object Area Position structured field is omitted, the architected default is to set the X and Y values for the object area origin and the object content origin to zero. For presentation text, the data object presentation space origin is positioned coincident with the object content origin. Thus, the presentation text object presentation space, the presentation text object area, and the page always have the same origin.
2. If the presentation text OBP appears in the AEG, the object area orientation must be set to X'0000 2D00' (0°,90°). If it is omitted, the architected default is to set the object area orientation to X'0000 2D00' (0°,90°).
3. For this interchange set, the values X'00' and X'01' in byte 23 specify the same function since positioning with respect to a page segment offset is not part of the interchange set definition. That is, both values specify that the object area is to be positioned with respect to the including page or overlay coordinate system.

Page Descriptor

PGD X'D3A6AF' Page Descriptor (See “Page Descriptor (PGD)” on page 310)			
0–1	**X'0000'** → Page measurement units base for X and Y	1	M
2–3	Page measurement units value for X. It must be one of the following: **X'0960'** → 2400 units per unit base (240 units per inch) **X'3840'** → 14400 units per unit base (1440 units per inch)	1	M
4–5	Page measurement units value for Y. It must be identical to bytes 2–3.	1	M
6–8	Page size in the X direction. It must be one of the following: **X'000001'–X'001555'** In the range of 1 to 5,461 when using 240 units per inch for the page X measurement units **X'000001'–X'007FFF'** In the range of 1 to 32,767 when using 1440 units per inch for the page X measurement units	1	M

PGD X'D3A6AF' Page Descriptor (See “Page Descriptor (PGD)” on page 310)				
9–11	Page size in the Y-direction. It must be one of the following: **X'000001'–X'001555'** In the range of 1 to 5,461 when using 240 units per inch for the page Y measurement units **X'000001'–X'007FFF'** In the range of 1 to 32,767 when using 1440 units per inch for the page Y measurement units		1	M
12–14	**X'000000'** → Reserved; must be binary zero		1	M
15–17	The following triplet:			
	Presentation Space Reset Mixing Triplet (See “Presentation Space Reset Mixing Triplet X'70'” on page 414)		1	O
	0–1	**X'0370'** → Triplet length and identifier	1	M
	2	Mixing Flags, as follows: **Bit** **Description** **0** Reset **0** Do not reset to color of medium **1** Reset to color of medium **1–7**	1	M
Note: This triplet is permitted *only* on Page Descriptor structured fields that are contained within a page overlay. The page overlay itself *must* be carried within the inline page resource group. If specified on any other Page Descriptor structured field, a X'01' exception condition exists.				

Application Note: The IS/1 and IS/2 interchange set definitions limit the page size to 22.75 inches in the X and Y directions. To specify a larger page size, 240 units per inch should be specified in the PGD for the page measurement units. Using a range of 1 to 32,767, this will allow a maximum page size in the X and Y directions of 136.5 inches, is supported by all IPDS printers, and keeps the complete page presentation space within the range of two-byte addressing parameters in the IPDS and PTOCA architectures.

Presentation Text Data

PTX X'D3EE9B' Presentation Text Data (See “Presentation Text Data (PTX)” on page 341)	
0–*n*	Up to 8,192 bytes of presentation text data as defined by PTOCA PT1

Presentation Text Data Descriptor, Format 2

PTD X'D3B19B' Presentation Text Data Descriptor (See “Presentation Text Data Descriptor (PTD) Format 2” on page 340)	
0–*n*	Presentation text descriptor data as defined by PTOCA

Note: When the PTD is included in the AEG for a page, some AFP print servers require that the measurement units in the PTD match the measurement units in the Page Descriptor (PGD). It is therefore strongly recommended that whenever the PTD is included in the AEG, the same measurement units are specified in both the PTD and PGD.

Coexistence Functions

Coexistence functions are objects, structured fields, triplets, and parameters whose function has been enhanced or superseded by newer functions. In this case, the old and new functions can *coexist*. New generators must generate the new functions. New receivers must process the new functions, but may also continue to process the old functions.

Coexistence Objects

The following objects are coexistence objects:
- AFP page segment
- IM image

AFP Page Segment

The AFP page segment is a coexistence resource object that is being superseded by the MO:DCA page segment. The AFP page segment has the following structure:

Figure 102. AFP Page Segment Structure

```
Begin Page Segment  (BPS, D3A85F)
    +  [  (      D3..FB)     Image Object                          (S)  ]
    +  [  (      D3..7B)     IM Image Object                       (S)  ]
       [  (      D3..BB)     Graphics Object                       (S)  ]
       [  (      D3..9B)     Presentation Text Object                   ]
End Page Segment  (EPS, D3A95F)
```

Architecture Note: The PTOCA object with OEG is not supported in the AFP page segment.

Positioning of IM Image Objects in an AFP Page Segment

When an IM image object is included in an AFP page segment, it is always positioned relative to the reference point defined in the Include Page Segment (IPS) structured field using the offset, in *image points*, specified in the Image Output Control (IOC) structured field. This offset is resolved using the units of measure specified in the Image Input Descriptor (IID) structured field.

Orientation of Objects in an AFP Page Segment

Unless a Line Data Object Position Migration (X'27') triplet is specified for the AFP page segment or for objects in the page segment, the orientation of the objects in an AFP page segment is always measured with respect to the including page (X_p,Y_p) or overlay (X_{ol},Y_{ol}) coordinate system. For a description of object orientation when the X'27' triplet is specified, see Table 45 on page 563.

Positioning of IO Image and Graphics Objects in an AFP Page Segment

When an IO image object or a graphics object is included in an AFP page segment, it is positioned relative to the page or overlay coordinate system reference point defined in the IPS or relative to the page or overlay coordinate system origin. This is determined by the Reference Coordinate System parameter in the object's OBP structured field. The OBP also specifies the offset with respect to either reference point. This offset is specified in logical units, and if non-zero, must be resolved using the including page or overlay's units of measure. *Because these units of measure are, in general, not known when the page segment is created, using* *non-zero offsets can lead to unpredictable object positioning and is strongly discouraged*. A MO:DCA page segment or an overlay should be generated to avoid these positioning problems.

Font Mapping for Graphics Objects in an AFP Page Segment

The OEG of a graphics object may not contain any MCF structured fields.

Text Objects in an AFP Page Segment

If an AFP page segment contains text, the following rules apply:

- Text suppressions specified for the including page or overlay also apply to text in the page segment if the suppression local IDs are the same.
- The Absolute Move Baseline (AMB) and Absolute Move Inline (AMI) PTOCA control sequences are processed relative to the origin of the including page or overlay coordinate system.
- The Relative Move Baseline (RMB) and Relative Move Inline (RMI) PTOCA control sequences are processed relative to the reference point defined on the including page or overlay coordinate system by the IPS when these control sequences occur first in the text object.
- Fonts used in the text object must be mapped in the AEG of the including page or overlay. If the text object does not explicitly specify a font using the Set Coded Font Local (SCFL) control sequence, the font that is currently active on the including page or overlay is used. *Because this font is, in general, not known when the page segment is created, including a text object that does not explicitly specify a font can lead to unpredictable text presentation and is strongly discouraged*.
- AFP print servers initialize the following PTOCA control sequences as shown prior to processing a text object in an AFP page segment:

Control Sequence	Value
Set Baseline Increment	6 lines per inch
Set Inline Margin	0
Set Intercharacter Adjustment	0
Set Text Color	X'FFFF' (printer default color)
Set Text Orientation	0°,90°

The initial print position for text in the page segment is the reference point defined on the including page or overlay coordinate system by the IPS.

Architecture Note: In non-MO:DCA data streams that contain a mixture of structured fields and line data, an IPS offset set to (X'FFFFFF') indicates that the position defined by the current Line Descriptor (LND) is to be used as the reference point for the IPS.

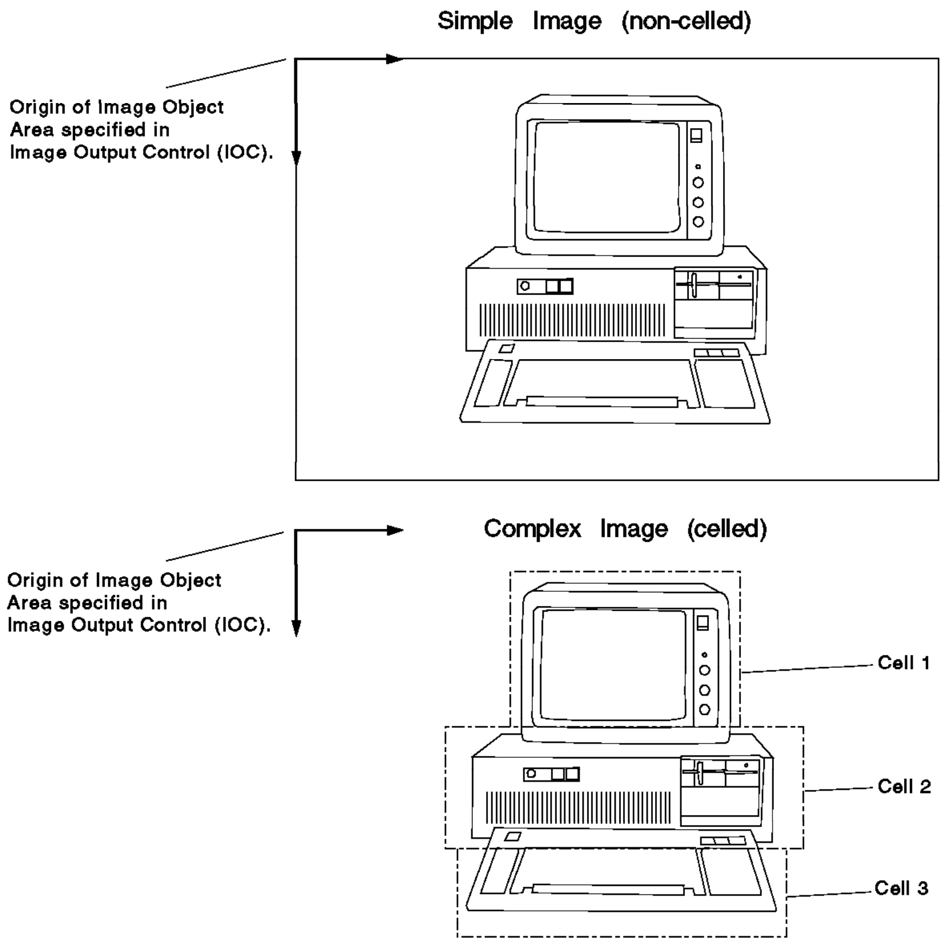
IM Image Object

An IM image data object specifies the contents of a raster image and its placement on a page, overlay, or page segment. An IM image can be either *simple* or *complex*. A simple image is composed of one or more Image Raster Data (IRD) structured fields that define the raster pattern for the entire image. A complex image is divided into regions called *image cells*. Each image cell is composed of one or more IRD structured fields that define the raster pattern for the image cell, and one Image Cell Position (ICP) structured field that defines the position of the image cell relative to the origin of the entire image. Each ICP also specifies the size of the image cell and a fill rectangle into which the cell is replicated. An example of a simple image and a complex image is shown in Figure 103 on page 596.

The IM image object is a valid MO:DCA object, but has been superseded by the IOCA image object. This object may appear in MO:DCA structures wherever the IOCA image object may appear. New MO:DCA generators must generate IO image objects instead of IM image objects. New MO:DCA receivers can continue to receive and process IM image objects. The same MO:DCA document can contain both types of objects.

This provides upward compatible growth for applications to take advantage of the expanded functions offered by IO Image objects: data compression, image scaling, and resolution-independent output mappings.

Figure 103. Two Forms of IM Image



In the description of the IM image structured fields that follow, the X-direction, unless otherwise qualified, is the direction in which image points are added to a scan line. The image width is measured in the X-direction. The Y-direction, unless otherwise qualified, is the direction in which scan lines are added to the image. The image height is measured in the Y-direction.

IM Image Object Structure

The structure of an IM image data object is defined as follows using the notation conventions defined in Chapter 4, "MO:DCA Objects", on page 75.

Figure 104. IM Image Object Structure: Simple (Non-celled) Image

```
Begin IM Image Object  (BII, D3A87B)
         (IOC,  D3A77B)      IM Image Output Control
         (IID,  D3A67B)      IM Image Input Descriptor
         (IRD,  D3EE7B)      IM Image Raster Data                     (S)
End IM Image Object  (EII, D3A97B)
```

Figure 105. IM Image Object Structure: Complex (Celled) Image

```
Begin IM Image Object  (BII, D3A87B)
         (IOC,  D3A77B)     IM Image Output Control
         (IID,  D3A67B)     IM Image Input Descriptor
         (      D3..7B)     IM Image Cell                           (S)
End IM Image Object  (EII, D3A97B)

IM Image Cell
         (ICP,  D3AC7B)     IM Image Cell Position
         (IRD,  D3EE7B)     IM Image Raster Data                    (S)
```

IM Image Structured Fields

The following IM Image structured fields are described under "Coexistence Structured Fields" on page 597:
- Begin IM Image Object
- End IM Image Object
- IM Image Cell Position
- IM Image Input Descriptor
- IM Image Output Control
- IM Image Raster Data

Coexistence Structured Fields

The following structured fields are provided in two formats:
- Map Coded Font (MCF)
- Page Position (PGP)
- Presentation Text Descriptor (PTD)

MCF structured fields are called MCF Format 1 and MCF Format 2. PGP structured fields are called PGP Format 1 and PGP Format 2. PTD structured fields are called PTD Format 1 and PTD Format 2. An obsolete name for the PTD Format 1 is Composed Text Descriptor (CTD).

MO:DCA receivers may continue to receive and process format-1 structured fields. New MO:DCA generators must generate only format-2 versions of these structured fields.

Application Note: The Format 1 version of these structured fields is supported by current AFP data stream applications; but Format 2 is the designated format that is to be used by new AFP applications. IBM print servers accept both Format 1 and format 2 structured fields. If both MCF Format 1 and MCF Format 2 structured fields are present in the same environment group, IBM print servers require that the MCF Format 1 structured fields precede the MCF Format 2 structured fields.

The following structured fields are described in this section because they are used by a coexistence object, the IM Image object:
- Begin IM Image Object (BII)
- End IM Image Object (EII)
- IM Image Cell Position (ICP)
- IM Image Input Descriptor (IID)
- IM Image Output Control (IOC)
- IM Image Raster Data (IRD)

Map Coded Font (MCF-1) Format 1

The Map Coded Font Format 1 structured field identifies the correspondence between external font names and resource local identifiers.

A font is specified either with the name for a coded font or with a pair of names for the code page and font character set. For a double-byte font, a coded font name is specified, or each coded font section is specified by a code page and font character set pair.

MCF-1 (X'D3B18A') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3B18A'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0	UBIN	RGLength	X'1C', X'1E'	Length of each repeating group	M	X'06'
1–3				Reserved; must be zero	M	X'04'
Zero or more repeating groups in the following format:						
0	UBIN	CFLid	X'01'–X'7F', X'FE'	Coded font local ID	M	X'06'
1				Reserved; must be zero	M	X'04'
2	CODE	Sectid	X'00', X'41'–X'FE'	Coded font section ID: **X'00'** Single-byte coded font **X'41'–X'FE'** Double-byte coded font	M	X'04'
3				Reserved; must be zero	M	X'04'
4–11	CHAR	CFName		Coded font name	M	X'04'
12–19	CHAR	CPName		Code page name	M	X'06'
20–27	CHAR	FCSName		Font character set name	M	X'06'
28–29	CODE	CharRot	X'0000', X'2D00', X'5A00', X'8700'	Character rotation for font: **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees	O	X'02'

MCF-1 Semantics

RGLength Length of each repeating group. Set to 28 if no character rotation is specified; set to 30 if character rotation is specified.

CFLid Coded font local ID. The value must be from 1 to 127. A value of 254 may be used when the MCF-1 structured field is included in the Active Environment Group of a page or overlay for resource management purposes. When a local ID is mapped to a single-byte coded font, or when it is mapped to a double-byte coded font identified with a coded font name, the local ID must be unique across all repeating groups. When a local ID is mapped to a double-byte coded font section, the same local ID must be used to map all sections of the double-byte coded font, and the repeating groups must be contiguous and in ascending order by section number.

Architecture Note: A unique local ID must be mapped for each character rotation of a font.

Sectid Coded font section ID. For a single-byte coded font, only one section ID can be specified and must be X'00'. For a double-byte coded font that is identified using a coded font name, the sections are specified in the font resource object, and the section ID in the MCF-1 repeating group should be set to X'00'. For a double-byte coded font that is identified using code page and font character set pairs for each section, this value specifies the coded font section number (the first byte of each two-byte code point). The value must be from X'41' to X'FE' for bounded box coded fonts and from X'41' to X'7F' for unbounded box fonts. Each repeating group with the same font local ID must have a unique coded font section ID, and the section ID must be greater than the section ID of the previous repeating group.

CFName Coded font name. Specifies the name of the coded font. If the name contains a value of X'FFFF' in the first two bytes, it is considered to be a null name, and the coded font must be identified using a code page name and a font character set name. Multiple font local IDs may be mapped to the same coded font name.

CPName Code page name. Specifies the name of the code page for the single-byte coded font or double-byte coded font section. If the name contains a value of X'FFFF' in the first two bytes, it is considered to be a null name, and the coded font must be identified using a coded font name. In this case, the font character set name must also be specified with a null name. A code page name can appear in multiple repeating groups coupled with the same font character set or with a different font character set.

FCSName Font character set name. Specifies the name of the font character set for the single-byte coded font or double-byte coded font section. If the name contains a value of X'FFFF' in the first two bytes, it is considered to be a null name, and the coded font must be identified using a coded font name. In this case, the code page name must also be specified with a null name. A font character set name can appear in multiple repeating groups coupled with the same code page or with a different code page.

CharRot Character rotation (optional). Specifies the clockwise character rotation of a font relative to the character baseline. It must be one of the following:

Value	Rotation
X'0000'	0°
X'2D00'	90°
X'5A00'	180°
X'8700'	270°

If the character rotation is not specified, the architected default value for the character rotation should be X'0000' = zero degrees. However, in practice, most AFP products derive the default character rotation from the second character of the coded font name or of the font character set name if the character rotation is not specified. If the first character is either “X”, which denotes a coded font, or “C”, which denotes a font character set, the second character is used to determine the character rotation as follows:

0,1,2,3,4	0 degrees
5,6,7,8	90 degrees
9,A,B,C	180 degrees
D,E,F,G	270 degrees

If the first two characters of the name do not follow this convention, a default character rotation of X'0000' = zero degrees is assumed.

Application Notes: The character rotation parameter does not exist for unbounded-box fonts, such as the fonts used by the IBM 3800 printer.

Application Note: In AFP environments, the names specified in this structured field must be encoded using the conventions defined in “External Resource Naming Conventions” on page 89.

Page Position (PGP-1) Format 1

The Page Position Format 1 structured field specifies the position of a page's presentation space on the medium presentation space of the physical medium. The page presentation space is oriented so that its X axis, X_{pg} is oriented at zero degrees relative to the X_m axis of the medium presentation space.

PGP-1 (X'D3ACAF') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3ACAF'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–2	UBIN	X_mOset	X'0000'–X'7FFF'	X_m coordinate of page presentation space origin	M	X'06'
3–5	UBIN	Y_mOset	X'0000'–X'7FFF'	Y_m coordinate of page presentation space origin	M	X'06'

PGP-1 Semantics

X_mOset Offset of the page's presentation space origin along the X_m axis of the medium presentation space using the measurement units specified in the Medium Descriptor structured field.

Y_mOset Offset of the page's presentation space origin along the Y_m axis of the medium presentation space using the measurement units specified in the Medium Descriptor structured field.

Application Note: In AFP environments, the offset range for X_mOset and Y_mOset is 0 to 5,461 when the medium coordinate system units of measure are 240 units per inch, and 0 to 32,767 when they are 1440 units per inch.

Presentation Text Data Descriptor (PTD-1) Format 1

The Presentation Text Data Descriptor Format 1 structured field specifies the size of a text object presentation space and the measurement units used for the size and for all linear measurements within the text object.

PTD-1 (X'D3A69B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A69B'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0	CODE	XptBase	X'00'	Text presentation space unit base for the X axis: **X'00'** 10 inches	M	X'06'
1	CODE	YptBase	X'00'	Text presentation space unit base for the Y axis: **X'00'** 10 inches	M	X'06'

Offset	Type	Name	Range	Meaning	M/O	Exc
2–3	UBIN	XptUnits	2400, 14400	Text presentation space units per unit base for the X axis	M	X'06'
4–5	UBIN	YptUnits	2400, 14400	Text presentation space units per unit base for the Y axis	M	X'06'
6–7	UBIN	XptSize	X'0001'–X'7FFF'	Text presentation space extent for the X axis	M	X'06'
8–9	UBIN	YptSize	X'0001'–X'7FFF'	Text presentation space extent for the Y axis	M	X'06'
10–11				Reserved; must be binary zero	O	X'00'

PTD-1 Semantics

XptBase Specifies the unit base for the X axis of the text presentation space.

YptBase Specifies the unit base for the Y axis of the text presentation space.

XptUnits Specifies the number of units per unit base for the X axis of the text presentation space.

YptUnits Specifies the number of units per unit base for the Y axis of the text presentation space.

XptSize Specifies the extent along the X axis of the text presentation space. This must be equal to the extent along the X axis of the including page or overlay presentation space.

YptSize Specifies the extent along the Y axis of the text presentation space. This must be equal to the extent along the Y axis of the including page or overlay presentation space.

Begin IM Image Object (BII)

The Begin IM Image Object structured field begins an IM image data object, which becomes the current data object.

BII (X'D3A87B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A87B'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	ImoName		Name of the IM image data object	O	X'02'

BII Semantics

ImoName Is the name of the IM image data object.

The page, overlay, or resource group containing the Begin IM Image Object structured field must also contain a subsequent matching End IM Image Object structured field, or a X'08' exception condition exists.

Application Note: In AFP environments, the following retired triplet is used on this structured field:

- Line Data Object Position Migration (X'27') triplet; see "Line Data Object Position Migration Triplet X'27'" on page 561.

End IM Image Object (EII)

The End IM Image Object structured field terminates the current IM image object initiated by a Begin IM Image Object structured field.

EII (X'D3A97B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A97B'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–7	CHAR	ImoName		Name of the IM image data object	O	X'02'

EII Semantics

ImoName Is the name of the IM image data object being terminated. If a name is specified, it must match the name in the most recent Begin IM Image Object structured field in the containing page, overlay, or resource group or a X'01' exception condition exists. If the first two bytes of ImoName contain the value X'FFFF', the name matches any name specified on the Begin IM Image Object structured field that initiated the current definition.

A matching Begin IM Image Object structured field must appear at some location preceding the End Image Object structured field, or a X'20' exception condition exists.

IM Image Cell Position (ICP)

The IM Image Cell Position structured field specifies the placement, size, and replication of IM image cells.

ICP (X'D3AC7B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3AC7B'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–1	UBIN	XCOset	X'0000'–X'7FFF'	Offset of image cell in X direction	M	X'06'
2–3	UBIN	YCOset	X'0000'–X'7FFF'	Offset of image cell in Y direction	M	X'06'
4–5	UBIN	XCSize	X'0001'–X'7FFF'	Size of image cell in X direction	M	X'06'
			X'FFFF'	Use default X-extent in IID		
6–7	UBIN	YCSize	X'0001'–X'7FFF'	Size of image cell in Y direction	M	X'06'

Offset	Type	Name	Range	Meaning	M/O	Exc
			X'FFFF'	Use default Y-extent in IID		
8–9	UBIN	XFilSize	X'0001'–X'7FFF'	Size of fill rectangle in X direction	M	X'06'
			X'FFFF'	Use image cell X-extent		
10–11	UBIN	YFilSize	X'0001'–X'7FFF'	Size of fill rectangle in Y direction	M	X'06'
			X'FFFF'	Use image cell Y-extent		

ICP Semantics

XCOset Specifies the offset along the X_p direction, in image points, of this image cell from the IM image object area origin.

YCOset Specifies the offset along the Y_p direction, in image points, of this image cell from the IM image object area origin.

XCSize Specifies the extent in the X direction, in image points, of this image cell. A value of X'FFFF' indicates that the default extent specified in bytes 28–29 of the Image Input Descriptor (IID) is to be used.

YCSize Specifies the extent in the Y direction, in image points, of this image cell. A value of X'FFFF' indicates that the default extent specified in bytes 30–31 of the Image Input Descriptor (IID) is to be used.

XFilSize Specifies the extent of the fill rectangle in the X direction, in image points. This value can be smaller than, equal to, or larger than the image cell extent in the X direction (XCSize). A value of X'FFFF' indicates that the image cell X-extent should be used as the fill rectangle X-extent. The fill rectangle is filled in the X direction by repeating the image cell in the X direction. The image cell can be truncated to fit the rectangle.

YFilSize Specifies the extent of the fill rectangle in the Y direction, in image points. This value can be smaller than, equal to, or larger than the image cell extent in the Y direction (YCSize). A value of X'FFFF' indicates that the image cell Y-extent should be used as the fill rectangle Y-extent. The fill rectangle is filled in the Y direction by repeating the image cell in the Y direction. The image cell can be truncated to fit the rectangle.

IM Image Input Descriptor (IID)

The IM Image Input Descriptor structured field contains the descriptor data for an IM image data object. This data specifies the resolution, size, and color of the IM image.

IID (X'D3A67B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A67B'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–11	CODE	ConData1		Constant data	M	X'06'
12	CODE	XBase	X'00'	Unit base for the image X axis: **X'00'** 10 inches	M	X'06'

Offset	Type	Name	Range	Meaning	M/O	Exc
13	CODE	YBase	X'00'	Unit base for the image Y axis: **X'00'** 10 inches	M	X'06'
14–15	UBIN	XUnits	1–32,767	Image points per unit base for the image X axis	M	X'06'
16–17	UBIN	YUnits	1–32,767	Image points per unit base for the image Y axis	M	X'06'
18–19	UBIN	XSize	X'0001'–X'7FFF'	Size of image in X direction	M	X'06'
20–21	UBIN	YSize	X'0001'–X'7FFF'	Size of image in Y direction	M	X'06'
22–27	CODE	ConData2		Constant data	M	X'06'
28–29	UBIN	XCSizeD	X'0000'–X'7FFF'	Default size of image cell in X direction	M	X'06'
30–31	UBIN	YCSizeD	X'0000'–X'7FFF'	Default size of image cell in Y direction	M	X'06'
32–33	CODE	ConData3		Constant data	M	X'06'
34–35	CODE	Color	See IID Semantics for details	Image color	M	X'06'

IID Semantics

ConData1 Constant data. Must be set to X'0000 0960 0960 0000 0000 0000'.

XBase Specifies the unit base for the X axis of the image.

YBase Specifies the unit base for the Y axis of the image.

XUnits Specifies the number of image points per unit base for the X axis of the image. This value is ten times the resolution of the image in the X direction.

YUnits Specifies the number of image points per unit base for the Y axis of the image. This value is ten times the resolution of the image in the Y direction.

XSize Specifies the extent in the X direction, in image points, of an non-celled (simple) image.

YSize Specifies the extent in the Y direction, in image points, of an non-celled (simple) image.

ConData2 Constant data. Must be set to X'0000 0000 2D00'.

XCSizeD Specifies the default extent in the X direction, in image points, of the image cell. This value is used if the IM Image Cell Position (ICP) structured field does not specify the image cell X extent in bytes 4–5. This value must be set to X'0000' for non-celled images.

YCSizeD Specifies the default extent in the Y direction, in image points, of the image cell. This value is used if the IM Image Cell Position (ICP) structured field does not specify the image cell Y extent in bytes 6–7. This value must be set to X'0000' for non-celled images.

ConData3 Constant data. Must be set to X'0001'.

Color Specifies the color of the image. Syntactically valid values for specifying colors are X'0000' through X'0010' and X'FF00' through X'FF08', which is the range of values defined in the Standard OCA Color Value Table. For a complete description of this table, see "Standard OCA Color Value Table" on page 521. An additional valid value for IM image is X'FFFF'—presentation process default.

Architecture Note: The value X'FFFF' is not a valid color value for IM image in IPDS environments.

IM Image Output Control (IOC)

The IM Image Output Control structured field specifies the position and orientation of the IM image object area and the mapping of the image points to presentation device pels.

IOC (X'D3A77B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3A77B'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–2	UBIN	XoaOset	0–32,767	X-axis origin of the object area	M	X'06'
3–5	UBIN	YoaOset	0–32,767	Y-axis origin of the object area	M	X'06'
6–7	CODE	XoaOrent	X'0000', X'2D00', X'5A00', X'8700'	The object area's X-axis rotation from the X axis of the reference coordinate system: **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees	M	X'06'
8–9	CODE	YoaOrent	X'0000', X'2D00', X'5A00', X'8700'	The object area's Y-axis rotation from the X axis of the reference coordinate system: **X'0000'** 0 degrees **X'2D00'** 90 degrees **X'5A00'** 180 degrees **X'8700'** 270 degrees	M	X'06'
Note: See "IOC Semantics" on page 605 for valid combinations of the XoaOrent and YoaOrent values.						
10–17	CODE	ConData1		Constant data	M	X'06'
18–19	CODE	XMap	X'03E8', X'07D0'	Image mapping in X direction: **X'03E8'** Image point-to-pel **X'07D0'** Image point-to-two pel (double-dot)	M	X'06'
20–21	CODE	YMap	X'03E8', X'07D0'	Image mapping in Y direction: **X'03E8'** Image point-to-pel **X'07D0'** Image point-to-two pel (double-dot)	M	X'06'
22–23	CODE	ConData2		Constant data	M	X'06'

IOC Semantics

XoaOset Specifies the offset, along the X-axis, of the IM image object area origin to the origin of the including page or overlay coordinate system. If the IM image object is contained in a page segment, specifies the offset, along the X-axis, of the IM image object area origin to the reference point on the including page or overlay coordinate system defined by the Include Page Segment (IPS) structured field. The offset is specified in image points and is resolved using the units of measure specified for the image in the IID structured field.

YoaOset Specifies the offset, along the Y axis, of the IM image object area origin to the origin of the including page or overlay coordinate system. If the IM image object is contained in a page segment, specifies the offset, along the Y-axis, of the IM image object area origin to the reference point on the including page or overlay coordinate system defined by the Include Page Segment (IPS) structured field. The offset is specified in image points and is resolved using the units of measure specified for the image in the IID structured field.

XoaOrent Specifies the amount of clockwise rotation of the IM image object area's X axis about its defined origin relative to the X axis of the page or overlay coordinate system.

YoaOrent Specifies the amount of clockwise rotation of the IM image object area's Y axis about its defined origin relative to the Y axis of the page or overlay coordinate system. The YoaOrent value must be 90 degrees greater than the XoaOrent value or a X'01' exception condition exists.

Note: The following combinations of values are the only ones valid for the XoaOrent and YoaOrent parameters:

Table 46. IOC: Valid Values for XoaOrent and YoaOrent

XoaOrent	YoaOrent	Description
X'0000'	X'2D00'	0 and 90 degrees respectively
X'2D00'	X'5A00'	90 and 180 degrees respectively
X'5A00'	X'8700'	180 and 270 degrees respectively
X'8700'	X'0000'	270 and 0 degrees respectively

Note: When a complex image is rotated, each cell must be repositioned and rotated.

Application Note: The XoaOrent and YoaOrent values do not affect the placement of image cell origins. Image cell origins can be expressed only in the Xp, Yp coordinate system. When the orientation of a complex (celled) image is changed, the image cell origins must be recalculated so that the appearance of the image is preserved. To simplify the processing of image rotation, it is recommended that the orientation of complex images always be (0, 90).

ConData1 Constant data. Must be set to X'0000 0000 0000 0000'.

XMap Specifies mapping of image points to presentation device pels in the X direction. This value must match the value for YMap.

Value	Description
X'03E8'	Map an image point to a single presentation device pel in the X direction of the IM image object area
X'07D0'	Map an image point to two presentation device pels in the X direction of the IM image object area (double-dot)

YMap Specifies mapping of image points to presentation device pels in the Y direction. This value must match the value for XMap.

Value	Description
X'03E8'	Map an image point to a single presentation device pel in the Y direction of the IM image object area
X'07D0'	Map an image point to two presentation device pels in the Y direction of the IM image object area (double-dot)

Note: If the double-dot function is specified for a complex (celled) image, this function is performed before the cells are used to populate the fill rectangle and before any truncation occurs to fit the cell into the rectangle.

ConData2 Constant data. Must be set to X'FFFF'.

IM Image Raster Data (IRD)

The IM Image Raster Data structured field contains the image points that define the raster pattern for an IM image data object.

IRD (X'D3EE7B') Syntax

Structured Field Introducer				
SF Length (2B)	ID = **X'D3EE7B'**	Flags (1B)	Reserved X'0000'	Structured Field Data

Offset	Type	Name	Range	Meaning	M/O	Exc
0–*n*	UNDF	IMdata		Up to 32,759 bytes of IM image raster data	O	X'00'

IRD Semantics

IMdata Contains the image points that define the IM image raster pattern. A *raster pattern* is the array of presentation device pels that forms the image. The image data is uncompressed. Bits are grouped into bytes and are ordered from left to right within each byte. Each bit in the image data represents an image point and is mapped to presentation device pels as specified in the IOC structured field. A bit with value B'1' indicates a significant image point; a bit with value B'0' indicates an insignificant image point.

Image points are recorded from left to right in rows that represents scan lines (X direction), and rows representing scan lines are recorded from top to bottom (Y direction). When the image is presented, all image points in a row are presented before any image points in the next sequential row are presented, and all rows have the same number of image points. If the total number of image points is not a multiple of 8, the last byte of the image data is padded to a byte boundary. The padding bits do not represent image points and are ignored by presentation devices.

Architecture Note: The presentation environment determines how to map significant image points and insignificant image points to presentation device pels. For example, some printers map significant image points to toned pels and insignificant image points to untoned pels.

Coexistence Triplets

None.

Coexistence Parameters

The following parameters are coexistence parameters:
- Triplet X'04' mapping option X'41': image point-to-pel
- Triplet X'04' mapping option X'42': image point-to-pel with double dot

- Triplet X'04' mapping option X'50': replicate and trim

Triplet X'04' Mapping Option X'41': Image Point-to-Pel

This mapping is supported for IOCA FS10 for the migration of IM image objects. It provides a mapping for the IOCA FS10 image object similar to the mapping defined for the IM image object. The origin of the IOCA FS10 presentation space is positioned at the origin of the object area. Each image point in the presentation space is mapped to a presentation device pel. Any portion of the image that falls outside the object area is trimmed.

Architecture Note: Resolution correction is not required with this mapping. Therefore, the size of the image presented in the object area is dependent on the pel resolution of the presentation device.

Triplet X'04' Mapping Option X'42': Image Point-to-Pel with Double Dot

This mapping is supported for IOCA FS10 for the migration of IM image objects. It provides a mapping for the IOCA FS10 image object similar to that defined for the IM image object. The origin of the IOCA FS10 presentation space is positioned at the origin of the object area. Each image point in the presentation space is doubled in both directions, resulting in four new image points. The four new image points are then mapped to presentation device pels. Any portion of the image that falls outside the object area is trimmed.

Architecture Note: Resolution correction is not required with this mapping; therefore the size of the image presented in the object area is dependent on the pel resolution of the presentation device.

Triplet X'04' Mapping Option X'50': Replicate and Trim

This mapping is supported for IOCA FS10 for the migration of IM image objects. It provides a function for the IOCA FS10 image object similar to that defined for the celled IM image object. The IOCA FS10 presentation space is positioned in the object area so that its origin is coincident with the origin of the object area and its size is unchanged. The presentation space is then replicated in the X and Y directions of the object area until the object area is filled. Each new replicate of the presentation space in the X direction is precisely aligned with the presentation space previously placed in the X direction. Each new replicate of the presentation space in the Y direction is precisely aligned with the presentation space previously placed in the Y direction. If the last presentation space in either the X or Y direction fits only partially into the object area, the portion of the presentation space that falls outside the object area is trimmed. All data that falls within the object area extents is presented, but data that falls outside of the object area is not presented. When this option is specified, the data object's content origin specified in the XocaOset and YocaOset parameters in the Object Area Position structured field is ignored.

Appendix D. MO:DCA Registry

This appendix provides a registry for the following object type identifiers:

- non-OCA object-type identifiers, which can identify either *presentation* object types or *non-presentation* object types
- media type identifiers
- resident color profile identifiers. Note that resident color profiles have been replaced by Color Management Resources (CMRs)

Object Type Identifiers

Non-OCA object types supported in MO:DCA document interchange must be identified using ASN.1 Object Identifiers (OIDs) defined in ISO/IEC 8824:1990(E), whose last component identifier is registered in this appendix. Such identifiers are referred to as *encoded object-type OIDs*.

Architecture Note: Encoded object-type OIDs are only assigned to objects that have a clear presentation semantic. Objects can be registered as presentation objects or as non-presentation objects. If an object can be a presentation object and a non-presentation object, a different encoded object-type OID will be assigned to each usage.

The following ISO OID sub-tree is used for the registry:

ISO (1)
  Identified Organization (3)
    IBM (18)
      Objects (0)
        Print (4)
          Document Format (1)
            MO:DCA (1)
              Object Type (*nnnn*)

The complete encoded object-type OID is encoded using the Basic Encoding Rules for ASN.1 specified in ISO/IEC 8825:1990(E). The encoding is in the “definite short form” and has the following syntax:

Byte	Description
0	Identifier byte, set to X'06' to indicate an OID encoding
1	Length of content bytes that follow
2–*n*	Content bytes that encode the OID component identifiers

Application Note: The definition of an encoded object-type OID in this registry does not guarantee that the object type identified by the OID is supported in an AFP system. To see which encoded object-type OIDs are supported, consult the product documentation.

Registered Encoded Object-type OIDs

- **IOCA FS10:** Image Object Content Architecture, subset FS10. This is an IOCA subset for bilevel raster image.

Definition	This IOCA subset is defined in *Image Object Content Architecture Reference*.
Object Type	Presentation
Presentation Space Size	Specified in Image Data Descriptor (IDD)
Foreground	Significant image points
Background	Insignificant image points; all portions of object space not covered by image points
Component ID	(5)
Encoded Object-type OID	X'06072B120004010105'

- **IOCA FS11:** Image Object Content Architecture, subset FS11. This is an IOCA subset for grayscale and color raster image.

Definition	This IOCA subset is defined in *Image Object Content Architecture Reference*.
Object Type	Presentation
Presentation Space Size	Specified in Image Data Descriptor (IDD)
Foreground	All image points
Background	All portions of object space not covered by image points
Component ID	(11)
Encoded Object-type OID	X'06072B12000401010B'

- **IOCA FS45:** Image Object Content Architecture, subset FS45. This is an IOCA subset for grayscale and color tiled raster image.

Definition	This IOCA subset is defined in *Image Object Content Architecture Reference*.
Object Type	Presentation
Presentation Space Size	Specified in Image Data Descriptor (IDD)
Foreground	For color or grayscale tiles, all image points in the tile, except image points for which a transparency mask specifies B'0'; for bilevel tiles, all significant image points in the tile, except image points for which a transparency mask specifies B'0'
Background	Insignificant image points (bilevel image), image points for which a transparency mask specifies B'0', and all portions of the presentation space not covered by image points or tiles
Component ID	(12)
Encoded Object-type OID	X'06072B12000401010C'

- **EPS:** Encapsulated Postscript.

Definition	Encapsulated Postscript is defined in Appendix H of the *Postscript Language Reference Manual* (Second Edition, Adobe Systems Incorporated).
Object Type	Presentation
Presentation Space Size	Specified by the mandatory “%%BoundingBox” comment in the EPS header.
Foreground	Complete object presentation space
Background	None
Component ID	(13)
Encoded Object-type OID	X'06072B12000401010D'

- **TIFF:** Tag Image File Format. This is a raster image format for bilevel, grayscale, and color images. The object contains a single, paginated image, defined by TIFF fields.

Definition	TIFF is defined in *TIFF Revision 6.0* (Aldus Corporation, June 3, 1992).
Object Type	Presentation
Presentation Space Size	Specified by the ImageLength (Tag 257), ImageWidth (Tag 256), XResolution (Tag 282), YResolution (Tag 283), and ResolutionUnit (Tag 296) TIFF tags.
Foreground	Grayscale & color: all image points; bilevel: all significant image points
Background	Grayscale & color: none; bilevel: all insignificant image points
Component ID	(14)
Encoded Object-type OID	X'06072B12000401010E'

Architecture Note: Transparency mask images and alpha channels are ignored for this object type.

- **COM Set-up File:** This is a set-up file that contains information used to present MO:DCA data on microfiche media with Anacomp devices.

Definition	Anacomp COM Set-up files are defined in *XFP2000 Reference* (XF-07-9201 [Device Recorder Software], Anacomp Inc., July 15, 1992).
Object Type	Non-presentation
Presentation Space Size	N/A; this is not a page level presentation object
Foreground	N/A; this is not a page level presentation object
Background	N/A; this is not a page level presentation object
Component ID	(15)
Encoded Object-type OID	X'06072B12000401010F'

- **Tape Label Set-up File:** This is a set-up file that contains information used to present MO:DCA documents that exists in tape libraries on microfiche media.

Definition	Tape Label Set-up files are defined in *MVS/DFP V3.3: Using Magnetic Tape Labels and File Structure*, SC26-4565.
Object Type	Non-presentation
Presentation Space Size	N/A; this is not a page level presentation object

Foreground	N/A; this is not a page level presentation object
Background	N/A; this is not a page level presentation object
Component ID	(16)
Encoded Object-type OID	X'06072B120004010110'

- **Device Independent Bit Map (DIB), Windows Version:** This is an image file format used by Microsoft Windows Version 3.0 and higher for bilevel and color images.

Definition	This image file format is defined in *Microsoft Windows Software Development Kit: Reference Volume 2, Version 3.0* (Microsoft Corporation, 1990).
Object Type	Presentation
Presentation Space Size	Specified by the biWidth and biHeight parameters in the BITMAPINFOHEADER structure.
Foreground	Grayscale & color: all image points; bilevel: all significant image points
Background	Grayscale and color: none; bilevel: all insignificant image points
Component ID	(17)
Encoded Object-type OID	X'06072B120004010111'

- **Device Independent Bit Map (DIB), OS/2 PM Version:** This is an image file format used by OS/2 PM Version 1.1 and 1.2 for bilevel and color images.

Definition	This image file format is defined in *Microsoft Windows Software Development Kit: Reference Volume 2, Version 3.0* (Microsoft Corporation, 1990).
Object Type	Presentation
Presentation Space Size	Specified by the bcWidth and bcHeight parameters in the BITMAPCOREHEADER structure.
Foreground	Grayscale & color: all image points; bilevel: all significant image points
Background	Grayscale & color: none; bilevel: all insignificant image points
Component ID	(18)
Encoded Object-type OID	X'06072B120004010112'

- **Paintbrush Picture File Format (PCX):** This is an image file format for bilevel and color images.

Definition	This image file format is defined in *Technical Documentation for PC Paintbrush & Frieze Graphics* (Z Soft Corporation, 1985).
Object Type	Presentation
Presentation Space Size	Header bytes 4–11 define the x,y coordinates of the upper-left and lower-right corners of the image, in pixels. The x-difference + 1 is the width of the image, the y-difference + 1 is the height of the image.
Foreground	Gray-scale and color: all image points; bilevel: all significant image points
Background	Gray-scale & color: none; bilevel: all insignificant image points
Component ID	(19)
Encoded Object-type OID	X'06072B120004010113'

- **Color Mapping Table (CMT):** This is a set-up file that provides mappings for color values specified in one or more documents.

Definition	The Color Mapping Table is defined in the *Mixed Object Document Content Architecture (MO:DCA) Reference*.
Object Type	Non-presentation
Presentation Space Size	N/A; this is not a page level presentation object
Foreground	N/A; this is not a page level presentation object
Background	N/A; this is not a page level presentation object
Component ID	(20)
Encoded Object-type OID	X'06072B120004010114'

- **Graphics Interchange Format (GIF):** This is an image file format for bilevel and color images.

Definition	This image file format is defined in *Graphics Interchange Format, Version 89a Programming Reference* (CompuServe Incorporated, July 31, 1990).
Object Type	Presentation
Presentation Space Size	The width and height of the image, in pixels, is specified in the Image Descriptor.
Foreground	All image points
Background	None
Component ID	(22)
Encoded Object-type OID	X'06072B120004010116'

- **AFPC JPEG Subset:** This is an image file format for grayscale and color images.

Architecture Note: This object type was previously called *JPEG File Interchange Format (JFIF)*. The object has been renamed and redefined to correct inconsistencies between the object definition, which was based on the JFIF definition, and what has actually been implemented in support of this object type within the AFP community. This object type registration previously referenced the following document for the definition of the file format: *JPEG File Interchange Format*, Version 1.02 (Eric Hamilton, C-Cube Microsystems, Inc., September 31, 1990). In practice, receivers of this format have supported functionality not defined in this document, such as the 4-component CMYK color space. The document that is now referenced for the object definition, *Presentation Object Subsets for AFP*, has been generated by the AFP Consortium (AFPC) to reflect the support that receivers have implemented and should implement for this object type in AFP environments.

Definition	This image file format is defined in *Presentation Object Subsets for AFP*, available from the AFP Consortium (AFPC) at `www.afpcinc.org`.
Object Type	Presentation
Presentation Space Size	The number of rows and number of columns for the image are specified in the frame header of the Start of Frame (SOF) Marker. **Application Note:** Image resolution information specified inside the object is unreliable and should be specified using the Image Resolution (X'9A') triplet.
Foreground	All image points. **Note:** This definition has not changed.

Background None.

Note: This definition has not changed.

Component ID (23)

Note: This definition has not changed.

Encoded Object-type OID X'06072B120004010117'

Note: This definition has not changed.

- **Anacomp AnaStak Control Record:** This is a set-up file that contains accounting and control information to present MO:DCA documents on microfiche media using Anacomp devices via tape or data transmission.

Definition	The Anacomp AnaStak Control Record is defined in *AnaStak, The Anacomp Report-Stacking System: User's Guide and Reference* (Anast203, Anacomp Inc.).
Object Type	Non-presentation
Presentation Space Size	N/A; this is not a page level presentation object
Foreground	N/A; this is not a page level presentation object
Background	N/A; this is not a page level presentation object
Component ID	(24)
Encoded Object-type OID	X'06072B120004010118'

- **Portable Document Format (PDF) Single-page Object:** This is a presentation object consisting of a PDF file that defines a single page containing text, graphics, and image using PDF operators.

Definition	The PDF file format is defined in the *Portable Document Format Reference Manual* (Adobe Systems Incorporated, 1993).
Object Type	Presentation
Presentation Space Size	The (x,y) coordinates of the lower-left corner and upper-right corner are specified by the required MediaBox key in the Page Object dictionary. **Architecture Note:** An Object Container Presentation Space Size (X'9C') triplet may be used to specify a different key in the PDF to use as the presentation space size. This triplet is specified on the structured field that includes the PDF, such as an IOB or PPO.
Foreground	Complete object presentation space
Background	None
Component ID	(25)
Encoded Object-type OID	X'06072B120004010119'

- **Portable Document Format (PDF) Resource Object:** This is a resource object that may be referenced by a PDF single-page object. Examples of PDF resource objects are fonts, font descriptors, and images.

Definition	The PDF file format is defined in the *Portable Document Format Reference Manual* (Adobe Systems Incorporated, 1993).
Object Type	Non-presentation
Presentation Space Size	N/A; this is not a page level presentation object

Foreground	N/A; this is not a page level presentation object
Background	N/A; this is not a page level presentation object
Component ID	(26)
Encoded Object-type OID	X'06072B12000401011A'

- **PCL Page Object:** This is a paginated presentation object that is specified using the PCL language.

Definition	The PCL printer language is defined in the *PCL 5 Printer Language Technical Reference Manual* (Hewlett-Packard® Company).
Object Type	Presentation
Presentation Space Size	Specified by the E_c&l#A command.
Foreground	Complete object presentation space
Background	None
Component ID	(34)
Encoded Object-type OID	X'06072B120004010122'

- **IOCA FS42:** Image Object Content Architecture, subset FS42. This is an IOCA subset for bilevel and color (1 bit per CMYK component) tiled raster image.

Definition	This IOCA subset is defined in *Image Object Content Architecture Reference*.
Object Type	Presentation
Presentation Space Size	Specified in Image Data Descriptor (IDD)
Foreground	All image points
Background	None
Component ID	(45)
Encoded Object-type OID	X'06072B12000401012D'

- **Resident Color Profile Resource Object:** This is a device-resident resource object that defines how presentation-system-dependent colors in a data object are related to presentation-system-independent colors.

Definition	Resident Color Profile objects are presentation-system dependent and are defined by the presentation device.
Object Type	Non-presentation
Presentation Space Size	N/A; this is not a page level presentation object
Foreground	N/A; this is not a page level presentation object
Background	N/A; this is not a page level presentation object
Component ID	(46)
Encoded Object-type OID	X'06072B12000401012E'

Implementation Note: If a presentation object references a color profile resource object and this resource is not supported by the presentation device, AFP print servers will issue a warning message and allow presentation to proceed without the color profile.

- **IOCA Tile Resource:** This is an IOCA tile resource.

Definition	The IOCA resource tile is defined in *Image Object Content Architecture Reference*.
Object Type	Non-presentation
Presentation Space Size	N/A; this is not a page level presentation object
Foreground	N/A; this is not a page level presentation object
Background	N/A; this is not a page level presentation object
Component ID	(47)
Encoded Object-type OID	X'06072B12000401012F'

- **Encapsulated PostScript (EPS) Object with Transparency:**

Definition	Encapsulated Postscript is defined in Appendix H of the *Postscript Language Reference Manual* (Second Edition, Adobe Systems Incorporated).
Object Type	Presentation
Presentation Space Size	Specified by the mandatory “%%BoundingBox” comment in the EPS header.
Foreground	The painted portions of the object presentation space
Background	The unpainted portions of the object presentation space
Component ID	(48)
Encoded Object-type OID	X'06072B120004010130'

- **Portable Document Format (PDF) Single-page Object with Transparency:** This is a presentation object consisting of a PDF file that defines a single page containing text, graphics, and image using PDF operators.

Definition	The PDF file format is defined in the *Portable Document Format Reference Manual* (Adobe Systems Incorporated, 1993).
Object Type	Presentation
Presentation Space Size	The (x,y) coordinates of the lower-left corner and upper-right corner are specified by the required MediaBox key in the Page Object dictionary. **Architecture Note:** An Object Container Presentation Space Size (X'9C') triplet may be used to specify a different key in the PDF to use as the presentation space size. This triplet is specified on the structured field that includes the PDF, such as an IOB or PPO.
Foreground	The painted portions of the object presentation space
Background	The unpainted portions of the object presentation space
Component ID	(49)
Encoded Object-type OID	X'06072B120004010131'

- **TrueType/OpenType Font Resource Object:** This is a font resource object that may be referenced by a data object.

Definition	The TrueType Font format is defined in the *TrueType Reference Manual* (Apple Computer, Inc., 1999). It is a subset of the OpenType Font Format,

which is defined in the *OpenType Specification* (Microsoft Corporation and Adobe Systems Incorporated, 2000).

Object Type Non-presentation

Presentation Space Size N/A; this is not a page level presentation object

Foreground N/A; this is not a page level presentation object

Background N/A; this is not a page level presentation object

Component ID (51)

Encoded Object-type OID X'06072B120004010133'

- **TrueType/OpenType Collection Resource Object:** This is a collection of TrueType/OpenType font resources. It is identified with a *TTC* file extension in Windows environments.

  Definition The TrueType Font collection format is defined in the *TrueType Reference Manual* (Apple Computer, Inc., 1999). It is a subset of the OpenType Font Format, which is defined in the *OpenType Specification* (Microsoft Corporation and Adobe Systems Incorporated, 2000).

  Object Type Non-presentation

  Presentation Space Size N/A; this is not a page level presentation object

  Foreground N/A; this is not a page level presentation object

  Background N/A; this is not a page level presentation object

  Component identifier (53)

  Encoded Object-type OID X'06072B120004010135'

- **Resource Access Table (RAT):** This is a set-up file that provides information used to access and process resources that are referenced in MO:DCA documents.

  Definition The Resource Access Table is defined in the *Mixed Object Document Content Architecture (MO:DCA) Reference*.

  Object Type Non-presentation

  Presentation Space Size N/A; this is not a page level presentation object

  Foreground N/A; this is not a page level presentation object

  Background N/A; this is not a page level presentation object

  Component ID (54)

  Encoded Object-type OID X'06072B120004010136'

- **IOCA FS40:** Image Object Content Architecture, subset FS40. This is an IOCA subset for bilevel tiled raster image.

  Definition This IOCA subset is defined in the *Image Object Content Architecture Reference*.

  Object Type Presentation

  Presentation Space Size Specified in Image Data Descriptor (IDD)

  Foreground Significant image points

  Background Insignificant image points; all portions of object space not covered by image points

Component ID (55)

Encoded Object-type OID X'06072B120004010137'

- **UP3i Print Data Object:** This is an object that contains data to be processed and presented by a UP3i-attached pre/post processing device.

Definition
The UP3i Print Data object is defined in the *UP3i Specification*, available at `www.afpcinc.org`. This object comprises the data destined for bytes 3–n of the UP3i-defined Print Data triplet. The structure of the data, its encoding, and its presentation rules are defined by the Print Data Format ID, which is registered in the UP3i specification and is specified in the first 4 bytes of the Print Data object.

Architecture Note: Since the UP3i print data is presented by a UP3i device after (or possibly before) the complete page is rendered by the printer, the presentation container cannot mix with the remainder of the page data according to the default MO:DCA mixing rules. A new type of mixing is defined for this object type, as follows:

- The object area of the presentation container is mixed according to the default MO:DCA mixing rules.
- The UP3i Print Data object is processed in its own presentation space by the UP3i device in accordance with the Print Data format. It is mixed in a manner that is defined by the specific Print Data format.

Object Type
Presentation

Presentation Space Size
Defined by the UP3i Print Data format, which is identified by the Print Data Format ID that is specified in the first 4 bytes of the Print Data object. The only presentation space mapping option supported for this object type is *UP3i Print Data mapping*.

Foreground
This object type does not mix in accordance with the default mixing rules. The foreground mixing is defined by the UP3i Print Data format, which is identified by the Print Data Format ID that is specified in the first 4 bytes of the Print Data object. For a definition of the foreground and a description of the appearance of this object type when rendered, see the UP3i specification.

Background
This object type does not mix in accordance with the default mixing rules. The background mixing is defined by the UP3i Print Data format, which is identified by the Print Data Format ID that is specified in the first 4 bytes of the Print Data object. For a definition of the background and a description of the appearance of this object type when rendered, see the UP3i specification.

Component ID (56)

Encoded Object-type OID X'06072B120004010138'

- **Color Management Resource (CMR):** This is a resource object that provides information used to process color or grayscale data.

Definition
The Color Management Resource is defined in the *Color Management Resource (CMR) Architecture Reference*.

Object Type
Non-presentation

Presentation Space Size
N/A; this is not a page level presentation object

Foreground	N/A; this is not a page level presentation object
Background	N/A; this is not a page level presentation object
Component ID	(57)
Encoded Object-type OID	X'06072B120004010139'

- **JPEG2000 (JP2) File Format:** This is an image file format for grayscale and color images.

Definition	The JPEG2000 (JP2) File Format is defined in the *ISO/IEC 15444–1. Image Coding System, 2000, standard*.
Object Type	Presentation
Presentation Space Size	The height and width of the image are specified by the H and W parameters, respectively, in the Image Header Box.
Foreground	All image points that are not identified as transparent
Background	All image points that are identified as transparent
Component ID	(58)
Encoded Object-type OID	X'06072B12000401013A'

- **TIFF without Transparency:** Tag Image File Format. This is a raster image format for bilevel, grayscale, and color images. The object contains a single, paginated image, defined by TIFF fields.

Definition	TIFF is defined in *TIFF Revision 6.0* (Aldus Corporation, June 3, 1992).
Object Type	Presentation
Presentation Space Size	Specified by the ImageLength (Tag 257), ImageWidth (Tag 256), XResolution (Tag 282), YResolution (Tag 283), and ResolutionUnit (Tag 296) TIFF tags.
Foreground	All image points
Background	None
Component ID	(60)
Encoded Object-type OID	X'06072B12000401013C'

Architecture Note: Transparency mask images and alpha channels are ignored for this object type.

- **TIFF Multiple Image File:** This is a TIFF file containing multiple TIFF images in bilevel, grayscale, or color format. Each TIFF image is assumed to be a paginated object and is defined by encoded object-type OID X'06072B12000401010E' (component ID 14). Image-like structures such as thumbnails and image masks are considered to be a part of the paginated image object but are not themselves considered paginated objects.

Definition	See encoded object-type OID X'06072B12000401010E'
Object Type	Presentation
Presentation Space Size	See encoded object-type OID X'06072B12000401010E'
Foreground	See encoded object-type OID X'06072B12000401010E'
Background	See encoded object-type OID X'06072B12000401010E'
Component ID	(61)
Encoded Object-type OID	X'06072B12000401013D'

- **TIFF Multiple Image - without Transparency - File:** This is a TIFF file containing multiple TIFF images in bilevel, grayscale, or color format. Each TIFF image is assumed to be a paginated object and is defined by encoded object-type OID X'06072B12000401013C' (component ID 60). Image-like structures such as thumbnails and image masks are considered to be a part of the paginated image object but are not themselves considered paginated objects.

Definition	See encoded object-type OID X'06072B12000401013C'
Object Type	Presentation
Presentation Space Size	See encoded object-type OID X'06072B12000401013C'
Foreground	See encoded object-type OID X'06072B12000401013C'
Background	See encoded object-type OID X'06072B12000401013C'
Component ID	(62)
Encoded Object-type OID	X'06072B12000401013E'

- **PDF Multiple Page File:** This is a PDF file containing multiple PDF page objects. Each PDF page object is defined by encoded object-type OID X'06072B120004010119' (component ID 25). A PDF page object is selected for presentation by its page number; other identifiers such as object numbers in the PDF file are not used for selection.

Definition	See encoded object-type OID X'06072B120004010119'
Object Type	Presentation
Presentation Space Size	See encoded object-type OID X'06072B120004010119'
Foreground	See encoded object-type OID X'06072B120004010119'
Background	See encoded object-type OID X'06072B120004010119'
Component ID	(63)
Encoded Object-type OID	X'06072B12000401013F'

- **PDF Multiple Page - with Transparency - File:** This is a PDF file containing multiple PDF page objects. Each PDF page object is defined by encoded object-type OID X'06072B120004010131' (component ID 49). A PDF page object is selected for presentation by its page number; other identifiers such as object numbers in the PDF file are not used for selection.

Definition	See encoded object-type OID X'06072B120004010131'
Object Type	Presentation
Presentation Space Size	See encoded object-type OID X'06072B120004010131'
Foreground	See encoded object-type OID X'06072B120004010131'
Background	See encoded object-type OID X'06072B120004010131'
Component ID	(64)
Encoded Object-type OID	X'06072B120004010140'

- **AFPC PNG Subset:** This is an image file format for bilevel, grayscale, indexed color, and color images.

Definition	The AFPC PNG Subset is defined in *Presentation Object Subsets for AFP*, available from the AFP Consortium (AFPC) at `www.afpcinc.org`.
Object Type	Presentation

Presentation Space Size The width and height of the image in pixels are specified by the Width and Height parameters in the Image Header (IHDR chunk).

Application Note: Image resolution information specified inside the object is ignored (pHYs chunk) and can be specified using the Image Resolution (X'9A') triplet.

Foreground All image points if no alpha channel is specified. If an alpha channel is specified, all image points that are not identified as transparent (alpha channel values 1-255).

Background No image points if no alpha channel is specified. If an alpha channel is specified, all image points that are identified as transparent (alpha channel value 0).

Component ID (65)

Encoded Object-type OID X'06072B120004010141'

- **AFPC Tag Image File Format (TIFF) Subset:** This is a TIFF file containing one or more TIFF images in bilevel, grayscale, or color format. If there are multiple images, each image is assumed to be a paginated object. Image-like structures such as thumbnails and image masks are considered to be a part of the paginated image object but are not themselves considered paginated objects.

Definition TIFF is defined in *TIFF Revision 6.0 Specification (Aldus Corporation, June 3, 1992).* The AFPC subset is defined in *Presentation Object Subsets for AFP*, available from the AFP Consortium (AFPC) at: `www.afpcinc.org`.

Object Type Presentation

Presentation Space Size Specified by the ImageLength (Tag 257), ImageWidth (Tag 256), XResolution (Tag 282), YResolution (Tag 283), and ResolutionUnit (Tag 296) TIFF tags.

Foreground All image points if no alpha channel is specified. If an alpha channel is specified, all image points that are not identified as transparent (alpha channel values 1-255).

Background No image points if no alpha channel is specified. If an alpha channel is specified, all image points that are identified as transparent (alpha channel value 0).

Component ID (66)

Encoded Object-type OID X'06072B120004010142'

- **Metadata Object (MO):** Metadata for MO:DCA components.

Definition The Metadata Object is defined in the *Metadata Object Content Architecture (MOCA) Reference*.

Object Type Non-presentation

Presentation Space Size N/A; this is not a page-level presentation object

Foreground N/A; this is not a page-level presentation object

Background N/A; this is not a page-level presentation object

Component ID (67)

Encoded Object-type OID X'06072B120004010143'

- **AFPC SVG Subset:** This is a presentation object consisting of an SVG (Scalable Vector Graphics) file that defines a single page containing text, image, and graphics.

Definition	The SVG definition is available from the W3C at: `www.w3.org/Graphics/SVG`. The AFPC SVG subset is defined in *Presentation Object Subsets for AFP*, available from the AFP Consortium (AFPC) at: `www.afpcinc.org`.
Object Type	Presentation
Presentation Space Size	The size of the SVG presentation space is defined by the SVG viewport when absolute width and height values are specified within the SVG file. **Architecture Note:** An Object Container Presentation Space Size (X'9C') triplet may be used to override the presentation space size specified within the SVG file. This triplet is specified on the structured field that includes the SVG, such as an IOB or PPO. If a presentation space size is not specified with a X'9C' triplet, and if the SVG viewport does not specify absolute width and height values, then the architected default is to use the size of the including page or overlay.
Foreground	The stroked and filled portions of the SVG presentation space.
Background	All other portions of the SVG presentation space.
Component ID	(68)
Encoded Object-type OID	X'06072B120004010144'

- **Non-OCA Resource Object:** This is a non-presentation object. The object may be referenced as a secondary resource by a non-OCA object such as SVG and PDF. The format of this resource object is not known to the AFP system, but is understood by the non-OCA object that references this resource object.

Definition	The supported formats for the non-OCA Resource Object, or any restrictions on those formats, are described in the document that defines that non-OCA object.
Object Type	Non-presentation
Presentation Space Size	N/A; this is not a page level presentation object
Foreground	N/A; this is not a page level presentation object
Background	N/A; this is not a page level presentation object
Component ID	(69)
Encoded Object-type OID	X'06072B120004010145'

- **IOCA FS48:** Image Object Content Architecture, subset FS48. This is an IOCA subset for grayscale and color tiled raster image.

Definition	This IOCA subset is defined in *Image Object Content Architecture Reference*.
Object Type	Presentation
Presentation Space Size	Specified in Image Data Descriptor (IDD)
Foreground	For color or grayscale tiles, all image points in the tile, except image points for which a transparency mask specifies B'0'; for bilevel tiles, all significant image points in the tile, except image points for which a transparency mask specifies B'0'

Background	Insignificant image points (bilevel image), image points for which a transparency mask specifies B'0', and all portions of the presentation space not covered by image points or tiles
Component ID	(70)
Encoded Object-type OID	X'06072B120004010146'

- **IOCA FS14:** Image Object Content Architecture, subset FS14. This is an IOCA subset for bilevel, grayscale, and color images that allow use of transparency masks.

Definition	This IOCA subset is defined in *Image Object Content Architecture Reference*.
Object Type	Presentation
Presentation Space Size	Specified in Image Data Descriptor (IDD)
Foreground	All image points except image points for which a transparency mask specifies B'0'
Background	Image points for which a transparency mask specifies B'0', and all portions of the object space not covered by image points
Component ID	(71)
Encoded Object-type OID	X'06072B120004010147'

Object Type Summary

Table 47 lists the object types registered in the MO:DCA architecture along with their component identifier and their encoded object-type OID.

Table 47. Registered Object Types Sorted by Component ID

Component ID	Object Type	Encoded Object-type OID
5	IOCA FS10	X'06072B120004010105'
11	IOCA FS11	X'06072B12000401010B'
12	IOCA FS45	X'06072B12000401010C'
13	EPS	X'06072B12000401010D'
14	TIFF	X'06072B12000401010E'
15	COM Set-up	X'06072B12000401010F'
16	Tape Label Set-up	X'06072B120004010110'
17	DIB, Windows Version	X'06072B120004010111'
18	DIB, OS/2 PM Version	X'06072B120004010112'
19	PCX	X'06072B120004010113'
20	Color Mapping Table (CMT)	X'06072B120004010114'
22	GIF	X'06072B120004010116'
23	AFPC JPEG Subset	X'06072B120004010117'
24	AnaStak Control Record	X'06072B120004010118'
25	PDF Single-page Object	X'06072B120004010119'
26	PDF Resource Object	X'06072B12000401011A'
34	PCL Page Object	X'06072B120004010122'
45	IOCA FS42	X'06072B12000401012D'
46	Resident Color Profile	X'06072B12000401012E'
47	IOCA Tile Resource	X'06072B12000401012F'
48	EPS with Transparency	X'06072B120004010130'
49	PDF with Transparency	X'06072B120004010131'
51	TrueType/OpenType Font	X'06072B120004010133'
53	TrueType/OpenType Font Collection	X'06072B120004010135'
54	Resource Access Table	X'06072B120004010136'
55	IOCA FS40	X'06072B120004010137'
56	UP3i Print Data	X'06072B120004010138'
57	Color Management Resource (CMR)	X'06072B120004010139'
58	JPEG2000 (JP2) File Format	X'06072B12000401013A'
60	TIFF without Transparency	X'06072B12000401013C'
61	TIFF Multiple Image File	X'06072B12000401013D'
62	TIFF Multiple Image - without Transparency - File	X'06072B12000401013E'

Table 47 Registered Object Types Sorted by Component ID (cont'd.)

Component ID	Object Type	Encoded Object-type OID
63	PDF Multiple Page File	X'06072B12000401013F'
64	PDF Multiple Page - with Transparency - File	X'06072B120004010140'
65	AFPC PNG Subset	X'06072B120004010141'
66	AFPC TIFF Subset	X'06072B120004010142'
67	Metadata Object	X'06072B120004010143'
68	AFPC SVG Subset	X'06072B120004010144'
69	Non-OCA Resource Object	X'06072B120004010145'
70	IOCA FS48	X'06072B120004010146'
71	IOCA FS14	X'06072B120004010147'

Non-OCA Object Types Supported by the IOB Structured Field

Table 48 lists the object types that can be included for presentation by the Include Object (IOB) structured field with ObjType = X'92'—Other object data. All object types in this table are not supported by all presentation systems.

Table 48. Non-OCA Object Types Supported by the IOB

Component ID	Object Type	Encoded Object-type OID
13	EPS	X'06072B12000401010D'
14	TIFF	X'06072B12000401010E'
17	DIB, Windows Version	X'06072B120004010111'
18	DIB, OS/2 PM Version	X'06072B120004010112'
19	PCX	X'06072B120004010113'
22	GIF	X'06072B120004010116'
23	AFPC JPEG Subset	X'06072B120004010117'
25	PDF Single-page Object	X'06072B120004010119'
34	PCL Page Object	X'06072B120004010122'
48	EPS with Transparency	X'06072B120004010130'
49	PDF with Transparency	X'06072B120004010131'
58	JPEG2000 (JP2) File Format	X'06072B12000401013A'
60	TIFF without Transparency	X'06072B12000401013C'
61	TIFF Multiple Image File	X'06072B12000401013D'
62	TIFF Multiple Image - without Transparency - File	X'06072B12000401013E'
63	PDF Multiple Page File	X'06072B12000401013F'
64	PDF Multiple Page - with Transparency - File	X'06072B120004010140'
65	AFPC PNG Subset	X'06072B120004010141'
66	AFPC TIFF Subset	X'06072B120004010142'
68	AFPC SVG Subset	X'06072B120004010144'

Data Objects and Supported Secondary Resources

Table 49 lists the secondary resources that are supported by various data objects.

Table 49. Data Objects and Secondary Resources

Data Object	Secondary Resource	Internal Resource Identifier
IOCA Image	IOCA Tile Resource Color Management Resource	4-byte local ID None
Encapsulated PostScript (EPS) (with or without transparency)	Resident Color Profile Color Management Resource	None None

Table 49 Data Objects and Secondary Resources (cont'd.)

Data Object	Secondary Resource	Internal Resource Identifier
PDF Single-Page Object or Multi-page File (with or without transparency); see Note 2	Resident Color Profile PDF Resource Object Color Management Resource Non-OCA Resource Object TrueType/OpenType Font	None Identifier with syntax defined by PDF None Identifier with syntax defined by PDF Identifier with syntax defined by PDF
PTOCA Text; see Note 1	TrueType/OpenType Font	1-byte local ID
AFP GOCA; see Note 1	TrueType/OpenType Font Color Management Resource	1-byte local ID None
BCOCA Text; see Note 1	TrueType/OpenType Font Color Management Resource	1-byte local ID None
TIFF Single Image or Multi-image File (with or without transparency), and AFPC TIFF Subset	Color Management Resource	None
GIF	Color Management Resource	None
AFPC JPEG Subset	Color Management Resource	None
PCL	Color Management Resource	None
JPEG2000 (JP2)	Color Management Resource	None
AFPC PNG Subset	Color Management Resource	None
AFPC SVG Subset; see Note 2	Non-OCA Resource Object Color Management Resource TrueType/OpenType Font	Identifier with syntax defined by SVG None Identifier with syntax defined by SVG
BCOCA QR Code with Image; see Notes 1 and 3	Presentation data object resource Color Management Resource	2-byte local ID None

Notes:

1. These table entries are not formally primary resource/secondary resource pairs since PTOCA, AFP GOCA, and BCOCA objects currently cannot be processed as resource objects. However, the resources for these objects are processed like other secondary resources.
2. When a non-OCA object such as PDF or SVG references a TTF/OTF as a secondary resource, the FQN type X'DE' triplet on the IOB/PPO/MDR must specify the full font name of the font.
3. The potential secondary resource object types used by a BCOCA QR Code with Image bar code are the presentation data object resources, which are defined to be IOCA images along with the object types shown in Table 48 on page 626. When such a secondary resource is a multi-page resource object, such as a PDF Multi-page File or TIFF Multi-image File, then only the first paginated object in the file is presented.

Media Type Identifiers

Media types supported in MO:DCA document interchange may be identified using ASN.1 Object Identifiers (OIDs) defined in ISO/IEC 8824:1990(E), whose last component identifier is registered in this appendix. Such identifiers are referred to as *media-type OIDs*.

The following ISO OID sub-tree is used for the registry:
ISO(1)
  Identified Organization (3)
    IBM (18)
      Objects (0)
        Print (4)
          Print Attributes (3)
            Media Types (1)
              Media (*nnnn*)

Architecture Note: The Document Printing Application (DPA) ISO/IEC DIS 10175:1991 draft standard has also registered media types with OIDs using a DPA ISO OID sub-tree. Wherever media types in the MO:DCA registry are also registered in the DPA registry, the last leaf in the MO:DCA OID, also called the MO:DCA media type component ID, has been chosen to match the last leaf in the DPA OID.

The complete media-type OID is encoded using the Basic Encoding Rules for ASN.1 specified in ISO/IEC 8825:1990(E). The encoding is in the “definite short form” and has the following syntax:

Byte	Description
0	Identifier byte, set to X'06' to indicate an OID encoding
1	Length of content bytes that follow
2–*n*	Content bytes that encode the OID component identifiers

Media Type Summary

Table 50 on page 629 and Table 51 on page 631 list the media types registered in the MO:DCA architecture along with their component identifier and their encoded media-type OID.

Table 50. Registered Media Types Sorted by Component ID

Component ID	Media Name	Media Type	Encoded Media-type OID
0	ISO A4	ISO A4 white (210 × 297 mm)	X'06072B120004030100'
1	ISO A4 CO	ISO A4 colored	X'06072B120004030101'
2	ISO A4 TR	ISO A4 transparent	X'06072B120004030102'
5	ISO A4 THD	ISO 1/3 A4	X'06072B120004030105'
7	ISO A4 TAB	ISO A4 tab (225 × 297 mm)	X'06072B120004030107'
10	ISO A3	ISO A3 white (297 × 420 mm)	X'06072B12000403010A'
11	ISO A3 CO	ISO A3 colored	X'06072B12000403010B'
20	ISO A5	ISO A5 white (148.5 × 210 mm)	X'06072B120004030114'
21	ISO A5 CO	ISO A5 colored	X'06072B120004030115'
30	ISO B4	ISO B4 white (250 × 353 mm)	X'06072B12000403011E'
31	ISO B4 CO	ISO B4 colored	X'06072B12000403011F'
40	ISO B5	ISO B5 white (176 × 250 mm)	X'06072B120004030128'
41	ISO B5 CO	ISO B5 colored	X'06072B120004030129'
42	JIS B4	JIS B4 (257 × 364 mm)	X'06072B12000403012A'
43	JIS B5	JIS B5 (182 × 257 mm)	X'06072B12000403012B'
50	LETTER	North American letter white (8.5 × 11 in.)	X'06072B120004030132'
51	LETTER CO	North American letter colored	X'06072B120004030133'
52	LETTER TR	North American letter transparent	X'06072B120004030134'
60	LEGAL	North American legal white (8.5 × 14 in.)	X'06072B12000403013C'
61	LEGAL CO	North American legal colored	X'06072B12000403013D'
63	LEGAL 13	North American legal 13 (Folio) (8.5 × 13 in.)	X'06072B12000403013F'
65	EXEC	North American executive (7.25 × 10.5 in.)	X'06072B120004030141'
67	LEDGER	North American ledger (11 × 17 in.)	X'06072B120004030143'
69	STATEMNT	North American statement (5.5 × 8.5 in.)	X'06072B120004030145'
73	ISO B5 ENV	ISO B5 envelope (176 × 250 mm)	X'06072B120004030149'
75	COM 10 ENV	Com10 envelope (9.5 × 4.125 in.)	X'06072B12000403014B'
76	MON ENV	Monarch envelope (7.5 × 3.875 in.)	X'06072B12000403014C'
77	DL ENV	DL envelope (220 × 110 mm)	X'06072B12000403014D'

Table 50 Registered Media Types Sorted by Component ID (cont'd.)

Component ID	Media Name	Media Type	Encoded Media-type OID
79	C5 ENV	C5 envelope (229 × 162 mm)	X'06072B12000403014F'
80	JP PC ENV	Japan postcard envelope (200 × 150 mm)	X'06072B120004030150'
81	JP PC	Japan postcard (Hagaki) (100 × 148 mm)	X'06072B120004030151'
83	ISO B4 ENV	ISO B4 envelope (250 × 353 mm)	X'06072B120004030153'
93	ISO C4 ENV	ISO C4 envelope (229 × 324 mm)	X'06072B12000403015D'
103	ISO C5 ENV	ISO C5 envelope (162 × 229 mm)	X'06072B120004030167'
113	ISO LNG ENV	ISO long envelope	X'06072B120004030171'
123	10×13 ENV	North American 10×13 envelope	X'06072B12000403017B'
133	9×12 ENV	North American 9×12 envelope	X'06082B12000403018105'
143	BSNS ENV	North American business envelope (9.5 x 4.125 in)	X'06082B1200040301810F'
145	LETTER TAB	Letter tab (9 × 11 in.)	X'06082B12000403018111'
146	LEGAL TAB	Legal tab (9 × 14 in.)	X'06082B12000403018112'
147	9×12 MAN	Manual (9 × 12 in.)	X'06082B12000403018113'
148	8×10.5 MED	Media (8 × 10.5 in.)	X'06082B12000403018114'
149	9×14 MED	Media (9 × 14 in.)	X'06082B12000403018115'
150	INDEX CD	Index Card	X'06082B12000403018116'
151	US PC	US Postcard	X'06082B12000403018117'
152	ISO A6 PC	ISO A6 Postcard (105 × 148 mm)	X'06082B12000403018118'
153	RA3	Oversize A3 (16.923 × 12.007 in.)	X'06082B12000403018119'
154	14×17 MED	Media (14 × 17 in.)	X'06082B1200040301811A'
155	12×18 MED	Media (12 × 18 in.)	X'06082B1200040301811B'
156	14×18 MED	Media (14 × 18 in.)	X'06082B1200040301811C'
157	8.5×10 MED	Media (8.5 × 10 in.)	X'06082B1200040301811D'
160	8×10 MED	Media (8 × 10 in.)	X'06082B12000403018120'
162	RA4	Oversize A4 (8.465 × 12.007 in.)	X'06082B12000403018122'
163	8×13 MED	Media (8 × 13 in)	X'06082B12000403018123'
164	8.25×13 MED	Media (8.25 × 13 in)	X'06082B12000403018124'
165	8.25×14 MED	Media (8.25 × 14 in)	X'06082B12000403018125'
166	8.5×12.4 MED	Media (8.5 × 12.4 in)	X'06082B12000403018126'
167	10×14 MED	Media (10 × 14 in)	X'06082B12000403018127'
168	10×15 MED	Media (10 × 15 in)	X'06082B12000403018128'
169	11×14 MED	Media (11 × 14 in)	X'06082B12000403018129'
170	11×15 MED	Media (11 × 15 in)	X'06082B1200040301812A'

Table 50 Registered Media Types Sorted by Component ID (cont'd.)

Component ID	Media Name	Media Type	Encoded Media-type OID
171	ISO B6	ISO B6 (128 × 182 mm)	X'06082B1200040301812B'
172	REP PD PC	Reply-paid PC (148 × 200 mm)	X'06082B1200040301812C'
173	170×210 MED	Media (170 × 210 mm)	X'06082B1200040301812D'
174	182×210 MED	Media (182 × 210 mm)	X'06082B1200040301812E'
175	210×340 MED	Media (210 × 340 mm)	X'06082B1200040301812F'
176	8KAI	8KAI Media (267 × 390 mm)	X'06082B12000403018130'
177	16KAI	16KAI Media (195 × 267 mm)	X'06082B12000403018131'

Table 51. Registered Media Types Sorted by Media Names

Media Name	Media Type	Component ID	Encoded Media-type OID
BSNS ENV	North American business envelope (9.5 x 4.125 in)	143	X'06082B1200040301810F'
COM 10 ENV	Com10 envelope (9.5 × 4.125 in.)	75	X'06072B12000403014B'
C5 ENV	C5 envelope (229 × 162 mm)	79	X'06072B12000403014F'
DL ENV	DL envelope (220 × 110 mm)	77	X'06072B12000403014D'
EXEC	North American executive (7.25× 10.5 in.)	65	X'06072B120004030141'
INDEX CD	Index Card	150	X'06082B12000403018116'
ISO A3	ISO A3 white (297 × 420 mm)	10	X'06072B12000403010A'
ISO A3 CO	ISO A3 colored	11	X'06072B12000403010B'
ISO A4	ISO A4 white (210 × 297 mm)	0	X'06072B120004030100'
ISO A4 CO	ISO A4 colored	1	X'06072B120004030101'
ISO A4 TAB	ISO A4 tab (225 × 297 mm)	7	X'06072B120004030107'
ISO A4 THD	ISO 1/3 A4	5	X'06072B120004030105'
ISO A4 TR	ISO A4 Transparent	2	X'06072B120004030102'
ISO A5	ISO A5 white (148.5 × 210 mm)	20	X'06072B120004030114'
ISO A5 CO	ISO A5 colored	21	X'06072B120004030115'
ISO A6 PC	ISO A6 Postcard (105 × 148 mm)	152	X'06082B12000403018118'
ISO B4	ISO B4 white (250 × 353 mm)	30	X'06072B12000403011E'
ISO B4 CO	ISO B4 colored	31	X'06072B12000403011F'
ISO B5	ISO B5 white (176 × 250 mm)	40	X'06072B120004030128'
ISO B5 CO	ISO B5 colored	41	X'06072B120004030129'
ISO B4 ENV	ISO B4 envelope (250 × 353 mm)	83	X'06072B120004030153'
ISO B5 ENV	ISO B5 envelope (176 × 250 mm)	73	X'06072B120004030149'
ISO B6	ISO B6 (128 × 182 mm)	171	X'06082B1200040301812B'
ISO C4 ENV	ISO C4 envelope (229 × 324 mm)	93	X'06072B12000403015D'

Table 51 Registered Media Types Sorted by Media Names (cont'd.)

Media Name	Media Type	Component ID	Encoded Media-type OID
ISO C5 ENV	ISO C5 envelope (162 × 229 mm)	103	X'06072B120004030167'
ISO LNG ENV	ISO long envelope	113	X'06072B120004030171'
JIS B4	JIS B4 (257 × 364 mm)	42	X'06072B12000403012A'
JIS B5	JIS B5 (182 × 257 mm)	43	X'06072B12000403012B'
JP PC	Japan postcard (Hagaki) (100 × 148 mm)	81	X'06072B120004030151'
JP PC ENV	Japan postcard envelope (200 × 150 mm)	80	X'06072B120004030150'
LEDGER	North American ledger (11 × 17 in.)	67	X'06072B120004030143'
LEGAL	North American legal white (8.5 × 14 in.)	60	X'06072B12000403013C'
LEGAL CO	North American legal colored	61	X'06072B12000403013D'
LEGAL TAB	Legal tab (9 × 14 in.)	146	X'06082B12000403018112'
LEGAL 13	North American legal 13 (Folio) (8.5 × 13 in.)	63	X'06072B12000403013F'
LETTER	North American letter white (8.5 × 11 in.)	50	X'06072B120004030132'
LETTER CO	North American letter colored	51	X'06072B120004030133'
LETTER TAB	Letter tab (9 × 11 in.)	145	X'06082B12000403018111'
LETTER TR	North American letter transparent	52	X'06072B120004030134'
MON ENV	Monarch envelope (7.5 × 3.875 in.)	76	X'06072B12000403014C'
RA3	Oversize A3 (16.923 × 12.007 in.)	153	X'06082B12000403018119'
RA4	Oversize A4 (8.465 × 12.007 in.)	162	X'06082B12000403018122'
REP PD PC	Reply-paid PC (148 × 200 mm)	172	X'06082B1200040301812C'
STATEMNT	North American statement (5.5 × 8.5 in.)	69	X'06072B120004030145'
US PC	US Postcard	151	X'06082B12000403018117'
8×10 MED	Media (8 × 10 in.)	160	X'06082B12000403018120'
8×10.5 MED	Media (8 × 10.5 in.)	148	X'06082B12000403018114'
8×13 MED	Media (8 × 13 in.)	163	X'06082B12000403018123'
8.25×13 MED	Media (8.25 × 13 in.)	164	X'06082B12000403018124'
8.25×14 MED	Media (8.25 × 14 in.)	165	X'06082B12000403018125'
8.5×10 MED	Media (8.5 × 10 in.)	157	X'06082B1200040301811D'
8.5×12.4 MED	Media (8.5 × 12.4 in.)	166	X'06082B12000403018126'
9×12 ENV	North American 9×12 envelope	133	X'06082B12000403018105'
9×12 MAN	Manual (9 × 12 in.)	147	X'06082B12000403018113'
9×14 MED	Media (9 × 14 in.)	149	X'06082B12000403018115'

Table 51 Registered Media Types Sorted by Media Names (cont'd.)

Media Name	Media Type	Component ID	Encoded Media-type OID
10×13 ENV	North American 10×13 envelope	123	X'06072B12000403017B'
10×14 MED	Media (10 × 14 in)	167	X'06082B12000403018127'
10×15 MED	Media (10 × 15 in)	168	X'06082B12000403018128'
11×14 MED	Media (11 × 14 in)	169	X'06082B12000403018129'
11×15 MED	Media (11 × 15 in)	170	X'06082B1200040301812A'
12×18 MED	Media (12 × 18 in.)	155	X'06082B1200040301811B'
14×17 MED	Media (14 × 17 in.)	154	X'06082B1200040301811A'
14×18 MED	Media (14 × 18 in.)	156	X'06082B1200040301811C'
170×210 MED	Media (170 × 210 mm)	173	X'06082B1200040301812D'
182×210 MED	Media (182 × 210 mm)	174	X'06082B1200040301812E'
210×340 MED	Media (210 × 340 mm)	175	X'06082B1200040301812F'
8KAI	8KAI Media (267 × 390 mm)	176	X'06082B12000403018130'
16KAI	16KAI Media (195 × 267 mm)	177	X'06082B12000403018131'

Architecture Notes:

1. A total of 2^7 = 128 media types can be registered using one byte to encode the component ID, as, for example, in the encoding for component IDs 0–123. A total of 2^{14} = 16,384 media types can be registered using two bytes to encode the component ID, as, for example, in the encoding for component IDs 133 and 143. A total of 2^{21} = 2,097,152 media types can be registered using three bytes to encode the component ID. A total of 2^{28} = 268,435,456 media types can be registered using four bytes to encode the component ID. This registry will support a maximum of 4 bytes for the encoding of the component ID.
2. The range from media type OID X'06082B1200040301E000' (component ID 12,288) to X'060A2B1200040301FFFFFF7F' (component ID 268,435,455) is reserved for user-defined media types.

Resident Color Profile Identifiers

Resident color profiles may be identified using ASN.1 Object Identifiers (OIDs) defined in ISO/IEC 8824:1990 (E), whose last component identifier is registered in this appendix. Such identifiers are referred to as *object OIDs*. Note that such resident color profiles have been replaced by Color Management Resources (CMRs).

The following ISO OID sub-tree is used for the registry:

- ISO (1)
  - Identified Organization (3)
    - IBM (18)
      - Objects (0)
        - Print (4)
          - Print Attributes (3)
            - Color Profiles (3)
              - Profiles (*nnnn*)

The complete OID is encoded using the Basic Encoding Rules for ASN.1 specified in ISO/IEC 8825:1990(E). The encoding is in the “definite short form” and has the following syntax:

Byte	Description
0	Identifier byte, set to X'06' to indicate an OID encoding
1	Length of content bytes that follow
2–*n*	Content bytes that encode the OID component identifiers

Resident Color Profile Summary

Table 52 on page 635 lists the color profiles registered in the MO:DCA architecture along with their component identifier and their object OID.

Table 52. Color Profile Registry

Component ID	Profile Name	Object OID
0	CMYK SWOP	X'06072B120004030300'
1	CMYK Euroscale	X'06072B120004030301'

Architecture Notes:

1. A total of 2^7 = 128 color profiles can be registered using one byte to encode the component ID. A total of 2^{28} = 268,435,456 color profiles can be registered using four bytes to encode the component ID. This registry will support a maximum of 4 bytes for the encoding of the component ID.
2. Many PostScript level 1 files contain color specified in the CMYK color space but tuned to one of a number of offset press standards that are geography-based. Two such standards are CMYK SWOP (US), and CMYK Euroscale (Europe). The standards essentially define the color rendering of hypothetical presses. For example, a specific color $C_1M_1Y_1K_1$ defined as SWOP CMYK has a specific colorimetric representation that is normally defined by a color swatch. The CMYK SWOP and CMYK Euroscale color profiles are supported in AFP environments for EPS objects and PDF objects.

Appendix E. Cross-References

This appendix provides tables that list:
- MO:DCA structured fields sorted by identifier
- MO:DCA structured fields sorted by acronym
- MO:DCA triplets sorted by identifier
- MO:DCA triplets sorted by name

Note: The MO:DCA architecture serves as a central registry for MO:DCA-like structures, such as structured fields and triplets, that are used in other AFP architectures, such as the Font Object Content Architecture (FOCA), the AFP Line Data Architecture, and the Intelligent Printer Data Stream (IPDS) Architecture. While the IDs of these structures are registered in the MO:DCA architecture and their syntax is based on the MO:DCA syntax, these structures are formally defined in the documents that define these respective architectures, that is, the *Font Object Content Architecture Reference*, the *Advanced Function Presentation: Programming Guide and Line Data Reference,* and the *Intelligent Printer Data Stream Reference*. Therefore these IDs are not listed as MO:DCA structured fields and triplets in this appendix; for more information on these structures, consult the referenced architecture documents.

Architecture Note: The MO:DCA-L format is no longer documented in the MO:DCA reference; therefore MO:DCA-L structured fields are no longer included in the following tables. For a definition of the MO:DCA-L format, see the document *MO:DCA-L: The OS/2 Presentation Manager Metafile (.met) Format*, available at `www.afpcinc.org`.

MO:DCA Structured Fields Sorted by Identifier

Table 53. Structured Fields Sorted by ID

Identifier	Acronym	Structured Field Name	Page
X'D3A088'	MFC	Medium Finishing Control	265
X'D3A090'	TLE	Tag Logical Element	342
X'D3A288'	MCC	Medium Copy Count	233
X'D3A66B'	OBD	Object Area Descriptor	300
X'D3A67B'	IID	IM Image Input Descriptor (**C**)	603
X'D3A688'	MDD	Medium Descriptor	244
X'D3A692'	CDD	Container Data Descriptor	170
X'D3A69B'	PTD-1	Presentation Text Descriptor Format-1 (**C**)	600
X'D3A6AF'	PGD	Page Descriptor	310
X'D3A6BB'	GDD	Graphics Data Descriptor	195
X'D3A6C5'	FGD	Form Environment Group Descriptor (**O**)	555
X'D3A6EB'	BDD	Bar Code Data Descriptor	124
X'D3A6FB'	IDD	Image Data Descriptor	196
X'D3A77B'	IOC	IM Image Output Control (**C**)	605
X'D3A788'	MMC	Medium Modification Control	276

Table 53 Structured Fields Sorted by ID (cont'd.)

Identifier	Acronym	Structured Field Name	Page
X'D3A79B'	CTC	Composed Text Control (**O**)	554
X'D3A7A8'	PEC	Presentation Environment Control	306
X'D3A7AF'	PMC	Page Modification Control	327
X'D3A85F'	BPS	Begin Page Segment	155
X'D3A87B'	BII	Begin IM Image (**C**)	601
X'D3A892'	BOC	Begin Object Container	144
X'D3A89B'	BPT	Begin Presentation Text Object	157
X'D3A8A5'	BPF	Begin Print File	150
X'D3A8A7'	BDI	Begin Document Index	126
X'D3A8A8'	BDT	Begin Document	128
X'D3A8AD'	BNG	Begin Named Page Group	140
X'D3A8AF'	BPG	Begin Page	152
X'D3A8BB'	BGR	Begin Graphics Object	132
X'D3A8C4'	BDG	Begin Document Environment Group	125
X'D3A8C5'	BFG	Begin Form Environment Group (**O**)	554
X'D3A8C6'	BRG	Begin Resource Group	159
X'D3A8C7'	BOG	Begin Object Environment Group	149
X'D3A8C9'	BAG	Begin Active Environment Group	120
X'D3A8CC'	BMM	Begin Medium Map	136
X'D3A8CD'	BFM	Begin Form Map	131
X'D3A8CE'	BRS	Begin Resource	161
X'D3A8D9'	BSG	Begin Resource Environment Group	169
X'D3A8DF'	BMO	Begin Overlay	138
X'D3A8EB'	BBC	Begin Bar Code Object	121
X'D3A8FB'	BIM	Begin Image Object	134
X'D3A95F'	EPS	End Page Segment	189
X'D3A97B'	EII	End IM Image (**C**)	602
X'D3A992'	EOC	End Object Container	185
X'D3A99B'	EPT	End Presentation Text Object	190
X'D3A9A5'	EPF	End Print File	187
X'D3A9A7'	EDI	End Document Index	176
X'D3A9A8'	EDT	End Document	177
X'D3A9AD'	ENG	End Named Page Group	183
X'D3A9AF'	EPG	End Page	188
X'D3A9BB'	EGR	End Graphics Object	179

Table 53 Structured Fields Sorted by ID (cont'd.)

Identifier	Acronym	Structured Field Name	Page
X'D3A9C4'	EDG	End Document Environment Group	175
X'D3A9C5'	EFG	End Form Environment Group (**O**)	555
X'D3A9C6'	ERG	End Resource Group	191
X'D3A9C7'	EOG	End Object Environment Group	186
X'D3A9C9'	EAG	End Active Environment Group	173
X'D3A9CC'	EMM	End Medium Map	181
X'D3A9CD'	EFM	End Form Map	178
X'D3A9CE'	ERS	End Resource	192
X'D3A9D9'	ESG	End Resource Environment Group	193
X'D3A9DF'	EMO	End Overlay	182
X'D3A9EB'	EBC	End Bar Code Object	174
X'D3A9FB'	EIM	End Image Object	180
X'D3AB88'	MMT	Map Media Type	289
X'D3AB8A'	MCF	Map Coded Font	237
X'D3AB92'	MCD	Map Container Data	235
X'D3AB9B'	MPT	Map Presentation Text	297
X'D3ABAF'	MPG	Map Page	292
X'D3ABBB'	MGO	Map Graphics Object	273
X'D3ABC3'	MDR	Map Data Resource	246
X'D3ABCC'	IMM	Invoke Medium Map	199
X'D3ABCD'	MMD	Map Media Destination	286
X'D3ABD8'	MPO	Map Page Overlay	294
X'D3ABEA'	MSU	Map Suppression	298
X'D3ABEB'	MBC	Map Bar Code Object	232
X'D3ABFB'	MIO	Map Image Object	274
X'D3AC6B'	OBP	Object Area Position	302
X'D3AC7B'	ICP	IM Image Cell Position (**C**)	602
X'D3ACAF'	PGP-1	Page Position Format-1 (**C**)	600
X'D3ADC3'	PPO	Preprocess Presentation Object	329
X'D3AF5F'	IPS	Include Page Segment	224
X'D3AFAF'	IPG	Include Page	219
X'D3AFC3'	IOB	Include Object	201
X'D3AFD8'	IPO	Include Page Overlay	222
X'D3B15F'	MPS	Map Page Segment	296

Table 53 Structured Fields Sorted by ID (cont'd.)

Identifier	Acronym	Structured Field Name	Page
X'D3B18A'	MCF-1	Map Coded Font Format-1 (**C**)	598
X'D3B19B'	PTD	Presentation Text Data Descriptor	340
X'D3B1AF'	PGP	Page Position	313
X'D3B1DF'	MMO	Map Medium Overlay	288
X'D3B288'	PFC	Presentation Fidelity Control	308
X'D3B2A7'	IEL	Index Element	197
X'D3B490'	LLE	Link Logical Element	226
X'D3EE7B'	IRD	IM Image Raster Data (**C**)	607
X'D3EE92'	OCD	Object Container Data	305
X'D3EE9B'	PTX	Presentation Text Data	341
X'D3EEBB'	GAD	Graphics Data	194
X'D3EEEB'	BDA	Bar Code Data	123
X'D3EEEE'	NOP	No Operation	299
X'D3EEFB'	IPD	Image Picture Data	218

Key:
O Obsolete
R Retired
C Coexistence

MO:DCA Structured Fields Sorted by Acronym

Table 54. Structured Fields Sorted by Acronym

Acronym	Identifier	Structured Field Name	Page
BAG	X'D3A8C9'	Begin Active Environment Group	120
BBC	X'D3A8EB'	Begin Bar Code Object	121
BDA	X'D3EEEB'	Bar Code Data	123
BDD	X'D3A6EB'	Bar Code Data Descriptor	124
BDG	X'D3A8C4'	Begin Document Environment Group	125
BDI	X'D3A8A7'	Begin Document Index	126
BDT	X'D3A8A8'	Begin Document	128
BFG	X'D3A8C5'	Begin Form Environment Group (**O**)	554
BFM	X'D3A8CD'	Begin Form Map	131
BGR	X'D3A8BB'	Begin Graphics Object	132
BII	X'D3A87B'	Begin IM Image (**C**)	601
BIM	X'D3A8FB'	Begin Image Object	134
BMM	X'D3A8CC'	Begin Medium Map	136
BMO	X'D3A8DF'	Begin Overlay	138
BNG	X'D3A8AD'	Begin Named Page Group	140
BOC	X'D3A892'	Begin Object Container	144
BOG	X'D3A8C7'	Begin Object Environment Group	149
BPF	X'D3A8A5'	Begin Print File	150
BPG	X'D3A8AF'	Begin Page	152
BPS	X'D3A85F'	Begin Page Segment	155
BPT	X'D3A89B'	Begin Presentation Text Object	157
BRG	X'D3A8C6'	Begin Resource Group	159
BRS	X'D3A8CE'	Begin Resource	161
BSG	X'D3A8D9'	Begin Resource Environment Group	169
CDD	X'D3A692'	Container Data Descriptor	170
CTC	X'D3A79B'	Composed Text Control (**O**)	554
EAG	X'D3A9C9'	End Active Environment Group	173
EBC	X'D3A9EB'	End Bar Code Object	174
EDG	X'D3A9C4'	End Document Environment Group	175
EDI	X'D3A9A7'	End Document Index	176
EDT	X'D3A9A8'	End Document	177
EFG	X'D3A9C5'	End Form Environment Group (**O**)	555

Table 54 Structured Fields Sorted by Acronym (cont'd.)

Acronym	Identifier	Structured Field Name	Page
EFM	X'D3A9CD'	End Form Map	178
EGR	X'D3A9BB'	End Graphics Object	179
EII	X'D3A97B'	End IM Image (**C**)	602
EIM	X'D3A9FB'	End Image Object	180
EMM	X'D3A9CC'	End Medium Map	181
EMO	X'D3A9DF'	End Overlay	182
ENG	X'D3A9AD'	End Named Page Group	183
EOC	X'D3A992'	End Object Container	185
EOG	X'D3A9C7'	End Object Environment Group	186
EPF	X'D3A9A5'	End Print File	187
EPG	X'D3A9AF'	End Page	188
EPS	X'D3A95F'	End Page Segment	189
EPT	X'D3A99B'	End Presentation Text Object	190
ERG	X'D3A9C6'	End Resource Group	191
ERS	X'D3A9CE'	End Resource	192
ESG	X'D3A9D9'	End Resource Environment Group	193
FGD	X'D3A6C5'	Form Environment Group Descriptor (**O**)	555
GAD	X'D3EEBB'	Graphics Data	194
GDD	X'D3A6BB'	Graphics Data Descriptor	195
ICP	X'D3AC7B'	IM Image Cell Position (**C**)	602
IDD	X'D3A6FB'	Image Data Descriptor	196
IEL	X'D3B2A7'	Index Element	197
IID	X'D3A67B'	Image Input Descriptor (**C**)	603
IMM	X'D3ABCC'	Invoke Medium Map	199
IOB	X'D3AFC3'	Include Object	201
IOC	X'D3A77B'	IM Image Output Control (**C**)	605
IPD	X'D3EEFB'	Image Picture Data	218
IPG	X'D3AFAF'	Include Page	219
IPO	X'D3AFD8'	Include Page Overlay	222
IPS	X'D3AF5F'	Include Page Segment	224
IRD	X'D3EE7B'	IM Image Raster Data (**C**)	607
LLE	X'D3B490'	Link Logical Element	226
MBC	X'D3ABEB'	Map Bar Code Object	232
MCC	X'D3A288'	Medium Copy Count	233
MCD	X'D3AB92'	Map Container Data	235

Table 54 Structured Fields Sorted by Acronym (cont'd.)

Acronym	Identifier	Structured Field Name	Page
MCF	X'D3AB8A'	Map Coded Font	237
MCF-1	X'D3B18A'	Map Coded Font Format-1 (**C**)	598
MDD	X'D3A688'	Medium Descriptor	244
MDR	X'D3ABC3'	Map Data Resource	246
MFC	X'D3A088'	Medium Finishing Control	265
MGO	X'D3ABBB'	Map Graphics Object	273
MIO	X'D3ABFB'	Map Image Object	274
MMC	X'D3A788'	Medium Modification Control	276
MMD	X'D3ABCD'	Map Media Destination	286
MMO	X'D3B1DF'	Map Medium Overlay	288
MMT	X'D3AB88'	Map Media Type	289
MPG	X'D3ABAF'	Map Page	292
MPO	X'D3ABD8'	Map Page Overlay	294
MPS	X'D3B15F'	Map Page Segment	296
MPT	X'D3AB9B'	Map Presentation Text	297
MSU	X'D3ABEA'	Map Suppression	298
NOP	X'D3EEEE'	No Operation	299
OBD	X'D3A66B'	Object Area Descriptor	300
OBP	X'D3AC6B'	Object Area Position	302
OCD	X'D3EE92'	Object Container Data	305
PEC	X'D3A7A8'	Presentation Environment Control	306
PFC	X'D3B288'	Presentation Fidelity Control	308
PGD	X'D3A6AF'	Page Descriptor	310
PGP	X'D3B1AF'	Page Position	313
PGP-1	X'D3ACAF'	Page Position Format-1 (**C**)	600
PMC	X'D3A7AF'	Page Modification Control	327
PPO	X'D3ADC3'	Preprocess Presentation Object	329
PTD	X'D3B19B'	Presentation Text Data Descriptor	340
PTD-1	X'D3A69B'	Presentation Text Descriptor Format-1 (**C**)	600
PTX	X'D3EE9B'	Presentation Text Data	341
TLE	X'D3A090'	Tag Logical Element	342

Key:
O Obsolete
R Retired
C Coexistence

MO:DCA Triplets Sorted by Identifier

Table 55. Triplets Sorted by ID

Triplet ID	Triplet Name	Page
X'01'	Coded Graphic Character Set Global ID	348
X'02'	Fully Qualified Name	351
X'04'	Mapping Option	360
X'10'	Object Classification	363
X'10'	MDD Two-up (**R**)	557
X'18'	MO:DCA Interchange Set	367
X'1D'	Text Orientation (**R**)	558
X'1F'	Font Descriptor Specification	369
X'20'	Font Coded Graphic Character Set Global Identifier	373
X'21'	Resource Object Type	374
X'21'	Object Function Set Specification (**R**)	559
X'22'	Extended Resource Local ID	376
X'24'	Resource Local ID	378
X'25'	Resource Section Number	379
X'26'	Character Rotation	380
X'27'	Line Data Object Position Migration (**R**)	561
X'2D'	Object Byte Offset	381
X'36'	Attribute Value	382
X'43'	Descriptor Position	383
X'45'	Media Eject Control	384
X'46'	Page Overlay Conditional Processing (**R**)	564
X'47'	Resource Usage Attribute (**R**)	566
X'4B'	Object Area Measurement Units	388
X'4C'	Object Area Size	389
X'4D'	Area Definition	390
X'4E'	Color Specification	391
X'50'	Encoding Scheme ID	395
X'56'	Medium Map Page Number	398
X'57'	Object Byte Extent	399
X'58'	Object Structured Field Offset	400
X'59'	Object Structured Field Extent	401
X'5A'	Object Offset	402
X'5D'	Font Horizontal Scale Factor	404

Table 55 Triplets Sorted by ID (cont'd.)

Triplet ID	Triplet Name	Page
X'5E'	Object Count	405
X'62'	Local Date and Time Stamp	407
X'63'	Object Checksum (**R**)	567
X'64'	Object Origin Identifier (**R**)	568
X'65'	Comment	409
X'68'	Medium Orientation	410
X'6C'	Resource Object Include	412
X'70'	Presentation Space Reset Mixing	414
X'71'	Presentation Space Mixing Rules	416
X'72'	Universal Date and Time Stamp	418
X'73'	IMM Insertion (**R**)	569
X'74'	Toner Saver	420
X'75'	Color Fidelity	421
X'78'	Font Fidelity	424
X'80'	Attribute Qualifier	425
X'81'	Page Position Information	426
X'82'	Parameter Value	427
X'83'	Presentation Control	428
X'84'	Font Resolution and Metric Technology	429
X'85'	Finishing Operation	430
X'86'	Text Fidelity	442
X'87'	Media Fidelity	444
X'88'	Finishing Fidelity	445
X'8B'	Data-Object Font Descriptor	447
X'8C'	Locale Selector	451
X'8E'	UP3i Finishing Operation	454
X'8F'	MO:DCA Function Set	455
X'91'	Color Management Resource Descriptor	456
X'95'	Rendering Intent	458
X'96'	CMR Tag Fidelity	461
X'97'	Device Appearance	463
X'9A'	Image Resolution	464
X'9C'	Object Container Presentation Space Size	466
X'9D'	Keep Group Together	468
X'9E'	Setup Name	469

Table 55 Triplets Sorted by ID (cont'd.)

Triplet ID	Triplet Name	Page
X'FF'	Triplet Extender	470

Key:

O	Obsolete
R	Retired
C	Coexistence

MO:DCA Triplets Sorted by Name

Table 56. Triplets Sorted by Name

Triplet Name	Triplet ID	Page
Area Definition	X'4D'	390
Attribute Qualifier	X'80'	425
Attribute Value	X'36'	382
Character Rotation	X'26'	380
CMR Tag Fidelity	X'96'	461
Coded Graphic Character Set Global ID	X'01'	348
Color Fidelity	X'75'	421
Color Management Resource Descriptor	X'91'	456
Color Specification	X'4E'	391
Comment	X'65'	409
Data-Object Font Descriptor	X'8B'	447
Descriptor Position	X'43'	383
Device Appearance	X'97'	463
Encoding Scheme ID	X'50'	395
Extended Resource Local ID	X'22'	376
Finishing Fidelity	X'88'	445
Finishing Operation	X'85'	430
Font Coded Graphic Character Set Global Identifier	X'20'	373
Font Descriptor Specification	X'1F'	369
Font Fidelity	X'78'	424
Font Horizontal Scale Factor	X'5D'	404
Font Resolution and Metric Technology	X'84'	429
Fully Qualified Name	X'02'	351
Image Resolution	X'9A'	464
IMM Insertion (**R**)	X'73'	569
Keep Group Together	X'9D'	468
Line Data Object Position Migration (**R**)	X'27'	561
Local Date and Time Stamp	X'62'	407
Locale Selector	X'8C'	451
Mapping Option	X'04'	360
MDD Two-up (**R**)	X'10'	557
Media Eject Control	X'45'	384
Media Fidelity	X'87'	444

Table 56 Triplets Sorted by Name (cont'd.)

Triplet Name	Triplet ID	Page
Medium Map Page Number	X'56'	398
Medium Orientation	X'68'	410
MO:DCA Function Set	X'8F'	455
MO:DCA Interchange Set	X'18'	367
Object Area Measurement Units	X'4B'	388
Object Area Size	X'4C'	389
Object Byte Extent	X'57'	399
Object Byte Offset	X'2D'	381
Object Checksum (**R**)	X'63'	567
Object Classification	X'10'	363
Object Container Presentation Space Size	X'9C'	466
Object Count	X'5E'	405
Object Function Set Specification (**R**)	X'21'	559
Object Offset	X'5A'	402
Object Origin Identifier (**R**)	X'64'	568
Object Structured Field Extent	X'59'	401
Object Structured Field Offset	X'58'	400
Page Overlay Conditional Processing (**R**)	X'46'	564
Page Position Information	X'81'	426
Parameter Value	X'82'	427
Presentation Control	X'83'	428
Presentation Space Mixing Rules	X'71'	416
Presentation Space Reset Mixing	X'70'	414
Rendering Intent	X'95'	458
Resource Local ID	X'24'	378
Resource Object Include	X'6C'	412
Resource Object Type	X'21'	374
Resource Section Number	X'25'	379
Resource Usage Attribute (**R**)	X'47'	566
Setup Name	X'9E'	469
Text Fidelity	X'86'	442
Text Orientation (**R**)	X'1D'	558
Toner Saver	X'74'	420
Triplet Extender	X'FF'	470
Universal Date and Time Stamp	X'72'	418

Table 56 Triplets Sorted by Name (cont'd.)

Triplet Name	Triplet ID	Page
UP3i Finishing Operation	X'8E'	454

Key:
O Obsolete
R Retired
C Coexistence

Appendix F. Object OID Algorithms

This appendix provides the definitions for the object OID algorithms used in the MO:DCA architecture:

- The object OID algorithm used for TrueType and OpenType fonts. This is the same algorithm previously published in the document *Using OpenType Fonts in an AFP System; G544-5876-02*.
- The object OID algorithm used for Color Management Resources and Data Objects. This is the same algorithm previously published in the document *AFP Color Management Architecture (ACMA) Release 1*.

TrueType and OpenType Font Object OID Generation Algorithm

The object OID that is placed into the TrueType/OpenType Resource Access Table by an application that installs TrueType/OpenType fonts consists of two parts: (1) a constant part or seed that is based on a fixed sequence of nodes in the ISO OID naming tree, and (2) a variable part that is algorithmically generated based on the font object content. This scheme allows the object OID to be regenerated and verified by any component in the presentation system, such as the print server or the printer control unit. All components that follow the first five components (that is, those after 1.3.18.0.4) are managed by the InfoPrint Solutions Company.

Seed (constant part)

The seed is a predefined constant that has seven components defined as follows:

1. **ISO**, value = 1
2. **Identified organization**, value = 3
3. **IBM**, value = 18
4. **Objects**, value = 0
5. **InfoPrint - Print**, value = 4
6. **Document Formats**, value = 1
7. **Object OID algorithm**, value = 5

Therefore, the constant part for a font or TTC object OID takes the following form: 1.3.18.0.4.1.5

Object-unique components (variable part)

This part consists of 5 components defined as follows:

1. MD5 fingerprint, 16 byte hexadecimal value in the human readable form of the OID. This is a checksum calculated from the entire object (in stream format, that is, after any environment-specific encapsulation or blocking has been removed). The algorithm is the RSA Data Security, Inc. MD5 Message-Digest Algorithm described in RFC 1321. This algorithm claims to be unique to a 1 in 2^{64} probability, given two different byte strings of independent size.
2. Size of the object, number of bytes in the object; this is the actual size of the object after any environment-specific encapsulation or blocking has been removed. This is a variable-length value.
3. Supplier ID, value = 0 (for unspecified supplier) or value = 1 (for IBM); additional supplier IDs could be registered in the future.
4. Customer ID, value = 0 (for unspecified customer ID); actual customer IDs could be registered in the future.
5. Component reserved for future use, value = 0 (for unspecified) .

Component growth

Since all object OID components except the last four components are a fixed size, component growth is minimal; an object OID computed from this algorithm is approximately 33 bytes long in ASN.1 definite short form.

Note: The minimum length of a TTF/OTF font OID or of a TTF/OTF font collection OID, assuming that the MD5 checksum is a value less than X'7F' preceded by all zeros and can therefore be represented by 1 byte, has been calculated to be 13 bytes. The maximum length is 129 bytes.

Example

This example shows an OID in two useful forms:

- Human-readable OID:
  `1.3.18.0.4.1.5.X'FFEEDDCCBBAA99887766554433221100'.X'0F4240'.0.0.0`
- ASN.1 definite short form OID:
  `X'061F2B120004010583FFEEEEF397BAD4E690F7B395A8C39988A200BD8440000000'`

For a description of the ASN.1 short form notation, see the description of the FQN triplet, FQNFmt = X'10' - OID.

Color Management Resource and Data Object OID Generation Algorithm

The object OID that is placed into the CMR Resource Access Table or into the Data Object Resource Access Table by an application that installs such objects consists of two parts: (1) a constant part or seed that is based on a fixed sequence of nodes in the ISO OID naming tree, and (2) a variable part that is algorithmically generated based on the CMR or data object content. This scheme allows the object OID to be regenerated and verified by any component in the presentation system, such as the print server or the printer control unit. All components that follow the first four components (that is, those after 1.2.208.171) are managed by the AFP Consortium.

Seed (constant part)

The seed is a predefined constant that has five components defined as follows:

1. **ISO**, value = 1
2. **Member body**, value = 2
3. **Denmark**, value = 208
4. **AFP Consortium**, value = 171
5. **OID algorithm**, value = 1

Therefore, a seed for a CMR or data object OID takes the following form:
`1.2.208.171.1`

Object-unique components (variable part)

Two object-unique components are predefined, as follows:

1. **MD5 fingerprint**, a 16-byte hexadecimal value in the human-readable form of the OID. This is a checksum calculated from the entire object (in stream format; that is, after any environment-specific encapsulation or blocking has been removed). The algorithm is the RSA Data Security, Inc. MD5 Message-Digest Algorithm described in RFC 1321. This algorithm claims to be unique to a 1 in 2^{64} probability, given two different byte strings of independent size.
2. **Size of the object**, the number of bytes in the object. This is the actual size of the object after any environment-specific encapsulation or blocking has been removed. This is a variable-length value.

Component growth

Because all components except the last component are of fixed size, component growth is minimal. An OID computed using this algorithm is approximately 30 bytes long in ASN.1 definite short form. The minimum length of an OID in this form is calculated to be 10 bytes.

Note: The minimum length of an object OID for a CMR or Data Object, assuming that the MD5 checksum is a value less than X'7F' preceded by all zeros and can therefore be represented by 1 byte, has been calculated to be 10 bytes. The maximum length is 129 bytes.

Example

This example shows an OID in two useful forms:

- Human-readable OID:
  `1.2.208.171.1.X‘FFEEDDCCBBAA99887766554433221100‘.X‘0F4240‘`
- ASN.1 definite short form OID:
  `X'061C2A8150812B0183FFEEEEF397BAD4E690F7B395A8C39988A200BD8440'`

For a description of the ASN.1 short form notation, see the description of the FQN triplet, FQNFmt = X'10' - OID.

Notices

The AFP Consortium or consortium member companies might have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents.

The following statement does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: AFP CONSORTIUM PROVIDES THIS PUBLICATION “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement might not apply to you.

This publication could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. The AFP Consortium might make improvements and/or changes in the architecture described in this publication at any time without notice.

Any references in this publication to Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this architecture and use of those Web sites is at your own risk.

The AFP Consortium may use or distribute any information you supply in any way it believes appropriate without incurring any obligation to you.

This information contains examples of data and reports used in daily business operations. To illustrate them in a complete manner, some examples include the names of individuals, companies, brands, or products. These names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

Trademarks

Apple is a registered trademark of Apple Computer, Inc..

These terms are trademarks or registered trademarks of Adobe Systems Incorporated in the United States, in other countries, or both:

Acrobat
Adobe
Photoshop
PostScript

AFPC and AFP Consortium are trademarks of the AFP Consortium.

These terms are trademarks or registered trademarks of Hewlett-Packard Company in the United States, in other countries, or both:

Hewlett-Packard
PCL

These terms are trademarks or registered trademarks of the International Business Machines Corporation in the United States, other countries, or both:

AIX
IBM
MVS
OS/400

These terms are registered trademarks of Microsoft Corporation in the United States, other countries, or both:

Microsoft
Windows

PANTONE is a registered trademark of Pantone LLC.

These terms are trademarks or registered trademarks of Ricoh Co., Ltd., in the United States, other countries, or both:

ACMA
Advanced Function Presentation
AFP
AFPCC
AFP Color Consortium
AFP Color Management Architecture
Bar Code Object Content Architecture
BCOCA
CMOCA
Color Management Object Content Architecture
InfoPrint
Intelligent Printer Data Stream
IPDS
Mixed Object Document Content Architecture
MO:DCA
Ricoh

UP^{3}I is a trademark of UP^{3}I Limited.

Other company, product, or service names might be trademarks or service marks of others.

Glossary

This glossary contains terms that apply to the Advanced Function Presentation (AFP) Architecture and also terms that apply to other related presentation architectures.

If you do not find the term that you are looking for, please refer to the *IBM Dictionary of Computing*, document number ZC20-1699 or the *InfoPrint Dictionary of Printing*.

The following definitions are provided as supporting information only, and are not intended to be used as a substitute for the semantics described in the body of this reference.

A

absolute coordinate. One of the coordinates that identify the location of an addressable point with respect to the origin of a specified coordinate system. Contrast with relative coordinate.

absolute move. A method used to designate a new presentation position by specifying the distance from the designated axes to the new presentation position. The reference for locating the new presentation position is a fixed position as opposed to the current presentation position.

absolute positioning. The establishment of a position within a coordinate system as an offset from the coordinate system origin. Contrast with relative positioning.

abstract profile. An ICC profile that represents abstract transforms and does not represent any device model. Color transformations using abstract profiles are performed from PCS to PCS. Abstract profiles cannot be embedded in images.

Abstract Syntax Notation One (ASN.1). A notation for defining data structures and data types. The notation is defined in international standard ISO/IEC 8824(E). See also object identifier.

ACK. See Positive Acknowledge Reply.

Acknowledge Reply. A printer-to-host reply that returns printer information or reports exceptions. An Acknowledge Reply can be positive or negative. See also Positive Acknowledge Reply and Negative Acknowledge Reply.

Acknowledgment Request. A request from the host for information from the printer. An example of an Acknowledgment Request is the use of the acknowledgment-required flag by a host system to request an Acknowledge Reply from an attached printer.

acknowledgment-required flag (ARQ). A flag that requests a printer to return an Acknowledge Reply. The acknowledgment-required flag is bit zero of an IPDS command's flag byte.

active coded font. The coded font that is currently being used by a product to process text.

additive primary colors. Red, green, and blue light, transmitted in video monitors and televisions. When used in various degrees of intensity and variation, they create all other colors of light; when superimposed equally, they create white. Contrast with subtractive primary colors.

addressable position. A position in a presentation space or on a physical medium that can be identified by a coordinate from the coordinate system of the presentation space or physical medium. See also picture element. Synonymous with position.

Advanced Function Presentation (AFP). An open architecture for the management of presentable information that is developed by the AFP Consortium (AFPC). AFP comprises a number of data stream and data object architectures:

- Mixed Object Document Content Architecture (MO:DCA); formerly referred to as AFPDS
- Intelligent Printer Data Stream (IPDS)
- AFP Line Data Architecture
- Bar Code Object Content Architecture (BCOCA)
- Color Management Object Content Architecture (CMOCA)
- Font Object Content Architecture (FOCA)
- Graphics Object Content Architecture for AFP (AFP GOCA)
- Image Object Content Architecture (IOCA)
- Metadata Object Content Architecture (MOCA)
- Presentation Text Object Content Architecture (PTOCA)

AEA. See alternate exception action.

AFM file. A file containing the metric information required for positioning the characters of a font. The metric information contained in this file was extracted from a PFB file, in an ASCII file format defined by Adobe Systems Inc., and used for character positioning and page formatting.

AFP. See Advanced Function Presentation.

AFP archive. See AFP/A.

AFP Consortium (AFPC). A formal open standards body that develops and maintains AFP architecture. Information about the consortium can be found at `www.afpconsortium.org`.

AFP data stream. A presentation data stream that is processed in AFP environments. The MO:DCA architecture defines the strategic AFP interchange data stream. The IPDS architecture defines the strategic AFP printer data stream.

AFPDS. A term formerly used to identify the composed-page MO:DCA-based data stream interchanged in AFP environments. See also MO:DCA and AFP data stream.

AFP environment. Wherever the AFP architecture is used in any way; by an AFP vendor, an AFP customer, or any combination thereof.

AFP GOCA. A subset of the GOCA architecture, originally defined by IBM, specifically designed for AFP environments. See Graphics Object Content Architecture (GOCA).

AFP Line Data Architecture. An AFP architecture that controls formatting of line data using a Page Definition (PageDef).

AFP Tagging. (1) Associating extra information, contained in a metadata object, with a given piece of AFP data. Among other uses, such information could enable users with vision impairments or other restrictions to make full use of the content provided by an AFP system. (2) In MOCA, a known format of a metadata object.

AFP/A. A constrained version of the general MO:DCA architecture aimed at interoperability for AFP documents in an archiving system. Refer to the ISO 18565:2015 “Document management – AFP/Archive” standard for a complete definition of AFP/A.

AIAG. See Automotive Industry Action Group.

AIM. See Automatic Identification Manufacturers, Inc.

all points addressable (APA). The capability to address, reference, and position data elements at any addressable position in a presentation space or on a physical medium. Contrast with character cell addressable, in which the presentation space is divided into a fixed number of character-size rectangles in which characters can appear. Only the cells are addressable. An example of all points addressable is the positioning of text, graphics, and images at any addressable point on the physical medium. See also picture element.

alternate exception action (AEA). In the IPDS architecture, a defined action that a printer can take when a clearly defined, but unsupported, request is received. Control over alternate exception actions is specified by an Execute Order Anystate Exception-Handling Control command.

American National Standards Institute (ANSI). An organization consisting 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).

anamorphic scaling. Scaling an object differently in the vertical and horizontal directions. See also scaling, horizontal font size, and vertical font size.

annotation. (1) A process by which additional data or attributes, such as highlighting, are associated with a page or a position on a page. Application of this data or attributes to the page is typically under the control of the user. Common functions such as applying adhesive removable notes to paper documents or using a transparent highlighter are emulated electronically by the annotation process. (2) A comment or explanation associated with the contents of a document component. An example of an annotation is a string of text that represents a comment on an image object on a page.

annotation link. In MO:DCA, a link type that specifies the linkage from a source document component to a target document component that contains an annotation.

annotation object. In MO:DCA, an object that contains an annotation. Objects that are targets of annotation links are annotation objects.

ANSI. See American National Standards Institute.

APA. See all points addressable.

append. In MO:DCA, an addition to or continuation of the contents of a document component. An example of an append is a string of text that is an addition to an existing string of text on a page.

append link. In MO:DCA, a link type that specifies the linkage from the end of a source document component to a target document component that contains an append.

append object. In MO:DCA, an object that contains an append. Objects that are targets of append links are append objects.

application. (1) The use to which an information system is put. (2) A collection of software components used to perform specific types of work on a computer.

application program. A program written for or by a user that applies to the user's work.

arc. A continuous portion of the curved line of a circle or ellipse. See also full arc.

architected. Identifies data that is defined and controlled by an architecture. Contrast with unarchitected.

archive interchange set. A constrained version of the general MO:DCA architecture aimed at interoperability for AFP documents in an archiving system. For archive systems, the key requirement is to make each page stand alone by eliminating the use of resolution-dependent fonts and images, device-default fonts, and external resources. See AFP/A.

arc parameters. Variables that specify the curvature of an arc.

area. In GOCA, a set of closed figures that can be filled with a pattern or a color.

area filling. A method used to fill an area with a pattern or a color.

ARQ. See acknowledgment-required flag.

array. A structure that contains an ordered group of data elements. All elements in an array have the same data type.

article. The physical item that a bar code identifies.

ascender. The parts of certain lowercase letters, such as *b*, *d*, or *f*, that at zero-degree character rotation rise above the top edge of other lowercase letters such as *a*, *c*, and *e*. Contrast with descender.

ascender height. The character shape's most positive character coordinate system Y-axis value.

ASCII. Acronym for American Standard Code for Information Interchange. A standard code used for information exchange among data processing systems, data communication systems, and associated equipment. ASCII uses a coded character set consisting of 7-bit coded characters.

ASN.1. See Abstract Syntax Notation One.

A space. The distance from the character reference point to the least positive character coordinate system X-axis value of the character shape. A-space can be positive, zero, or negative. See also B space and C space.

aspect ratio. (1) The ratio of the horizontal size of a picture to the vertical size of the picture. (2) In a bar code symbol, the ratio of bar height to symbol length.

asynchronous exception. Any exception other than those used to report a synchronous data-stream defect (action code X'01' or X'1F'), function no longer achievable (action code X'06'), or synchronous resource-storage problem (action code X'0C'). Asynchronous exceptions occur after the received page station. An example of an asynchronous exception is a paper jam. See also data-stream exception. Contrast with synchronous exception.

attribute. A property or characteristic of one or more constructs. See also character attribute, color attribute, current drawing attributes, default drawing attributes, line attributes, marker attributes, and pattern attributes.

audit CMR. A color management resource that reflects processing that has been done on an object.

Automatic Identification Manufacturers, Inc. (AIM). A trade organization consisting of manufacturers, suppliers, and users of bar codes.

Automotive Industry Action Group (AIAG). The coalition of automobile manufacturers and suppliers working to standardize electronic communications within the auto industry.

B

+B. Positive baseline direction.

B. See baseline direction.

background. (1) The part of a presentation space that is not occupied with object data. Contrast with foreground. (2) In GOCA, that portion of a graphics primitive that is mixed into the presentation space under the control of the current values of the background mix and background color attributes. (3) In GOCA, that portion of a character cell that does not represent a character. (4) In bar codes, the spaces, quiet zones, and area surrounding a printed bar code symbol.

background color. The color of a background. Contrast with foreground color.

background mix. (1) An attribute that determines how the color of the background of a graphics primitive is combined with the existing color of the graphics presentation space. (2) An attribute that determines how the points in overlapping presentation space backgrounds are combined. Contrast with foreground mix.

band. An arbitrary layer of an image. An image can consist of one or more bands of data.

bar. In bar codes, the darker element of a printed bar code symbol. See also element. Contrast with space.

bar code. An array of elements, such as bars, spaces, and two-dimensional modules that together represent data elements or characters in a particular symbology. The elements are arranged in a predetermined pattern following unambiguous rules defined by the symbology. See also bar code symbol.

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 three to ten cpi. See also character density, density, and information density.

bar code object area. The rectangular area on a logical page into which a bar code presentation space is mapped.

Bar Code Object Content Architecture (BCOCA). An architected collection of constructs used to interchange and present bar code data.

bar code presentation space. A two-dimensional conceptual space in which bar code symbols are generated.

bar code symbol. A combination of characters including start and stop characters, quiet zones, data characters, and check characters required by a particular symbology, that form a complete, scannable entity. See also bar code.

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. See also 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.

bar width reduction. In bar codes, the reduction of the nominal bar width dimension on film masters or printing plates to compensate for systematic errors in some printing processes.

base-and-towers concept. A conceptual illustration of an architecture that shows the architecture as a base with optional towers. The base and the towers represent different degrees of function achieved by the architecture.

baseline. A conceptual line with respect to which successive characters are aligned. See also character baseline. Synonymous with printing baseline and sequential baseline.

baseline coordinate. One of a pair of values that identify the position of an addressable position with respect to the origin of a specified I,B coordinate system. This value is specified as a distance in addressable positions from the I axis of an I,B coordinate system. Synonymous with B coordinate.

baseline direction (B). The direction in which successive lines of text appear on a logical page. Synonymous with baseline progression and B direction.

baseline extent. A rectangular space oriented around the character baseline and having one dimension parallel to the character baseline. The space is measured along the Y axis of the character coordinate system. For bounded character boxes, the baseline extent at any rotation is its character coordinate system Y-axis extent. Baseline extent varies with character rotation. See also maximum baseline extent.

baseline increment. The distance between successive baselines.

baseline offset. The perpendicular distance from the character baseline to the character box edge that is parallel to the baseline and has the more positive character coordinate system Y-axis value. For characters entirely within the negative Y-axis region, the baseline offset can be zero or negative. An example is a subscript character. Baseline offset can vary with character rotation.

baseline presentation origin (B_o). The point on the B axis where the value of the baseline coordinate is zero.

baseline progression (B). The direction in which successive lines of text appear on a logical page. Synonymous with baseline direction and B direction.

base LND. The first Line Descriptor (LND) used to process an input line-data record. See also reuse LND.

base support level. Within the base-and-towers concept, the smallest portion of architected function that is allowed to be implemented. This is represented by a base with no towers. Synonymous with mandatory support level.

B axis. The axis of the I,B coordinate system that extends in the baseline or B direction. The B axis does not have to be parallel to the Y_p axis of its bounding X_p,Y_p coordinate space.

B_c. See current baseline presentation coordinate.

b_c. See current baseline print coordinate.

BCOCA. See Bar Code Object Content Architecture.

B coordinate. One of a pair of values that identify the position of an addressable position with respect to the origin of a specified I,B coordinate system. This value is specified as a distance in addressable positions from the I axis of an I,B coordinate system. Synonymous with baseline coordinate.

B direction (B). The direction in which successive lines of text appear on a logical page. Synonymous with baseline direction and baseline progression.

Bearer Bars. Bars that surround an Interleaved 2-of-5 bar code to prevent misreads and short scans that might occur when a skewed scanning beam enters or exits the bar code symbol through its top or bottom edge. When plates are used in the printing process, Bearer Bars help equalize the pressure exerted by the printing plate over the entire surface of the symbol to improve print quality. There are two styles: 1) four bars that completely surround the bar/space pattern and 2) two bars that are placed at the top and the bottom of the bar/space pattern.

Begin Segment Introducer (BSI). An IPDS graphics self-defining field that precedes all of the drawing orders in a graphics segment.

between-the-pels. The concept of pel positioning that establishes the location of a pel's reference point at the edge of the pel nearest to the preceding pel rather than through the center of the pel.

B extent. The extent in the B-axis direction of an I,B coordinate system. The B extent must be parallel to one of the axes of the coordinate system that contains the I,B coordinate system. The B extent is parallel to the Y_p extent when the B axis is parallel to the Y_p axis or to the X_p extent when the B axis is parallel to the X_p axis.

b_i. See initial baseline print coordinate.

big endian. A format for storage or transmission of binary data in which the most significant bit (or byte) is placed first. Contrast with little endian.

bilevel. Having two levels; for example, every point in a bilevel image has the value 1 or 0, representing a colored image point or empty space. Contrast with multilevel.

bilevel custom pattern. In GOCA, a custom pattern that is uncolored at definition time, then has a single color assigned to it when it is used to fill an area. Contrast with full-color custom pattern.

bilevel device. A device that is used in a manner that permits it to process two-level color data. Contrast with multilevel device.

BITS. A data type for architecture syntax, indicating one or more bytes to be interpreted as bit string information.

blend. A mixing rule in which the intersection of part of a new presentation space P_{new} with part of an existing presentation space $P_{existing}$ changes to a new color attribute that represents a color-mixing of the color attributes of P_{new} with the color attributes of $P_{existing}$. For example, if P_{new} has foreground color-attribute blue and $P_{existing}$ has foreground color-attribute yellow, the area where the two foregrounds intersect changes to a color attribute of green. See also mixing rule. Contrast with overpaint and underpaint.

B_o. See baseline presentation origin.

body. (1) On a printed page, the area between the top and bottom margins that can contain data. (2) In a book, the portion between the front matter and the back matter.

boldface. A heavy-faced type weight. Printing in a heavy-faced type weight.

boundary alignment. A method used to align image data elements by adding padding bits to each image data element.

bounded character box. A conceptual rectangular box, with two sides parallel to the character baseline, that circumscribes a character and is just large enough to contain the character, that is, just touching the shape on all four sides.

brightness. Attribute of a visual sensation according to which an area appears to exhibit more or less light.

BSI. See Begin Segment Introducer.

B space. The distance between the character coordinate system X-axis values of the two extremities of a character shape. See also A space and C space.

buffered pages. Pages and copies of pages that have been received but not yet reflected in committed page counters and copy counters.

BYTE. A data type for architecture syntax consisting of 8 bits and indicating that each byte has no predefined interpretation. Therefore, in CMOCA, each byte is interpreted as defined in the tag explanation.

C

calibration. To adjust the correct value of a reading by comparison to a standard.

Canadian Grocery Product Code (CGPC). The bar code symbology used to code grocery items in Canada.

cap-M height. The average height of the uppercase characters in a font. This value is specified by the designer of a font and is usually the height of the uppercase M.

Cartesian coordinate system. In a plane, an image coordinate system that has positive values for the X and Y axis in the top-right quadrant. The origin is the upper left-hand corner of the bottom-right quadrant. A pair of (x,y) values corresponds to one image point. Each image point is described by an image data element.

CCSID. See Coded Character Set Identifier.

CGCSGID. See Coded Graphic Character Set Global Identifier.

CGPC. See Canadian Grocery Product Code.

CHAR. A data type for architecture syntax, indicating one or more bytes to be interpreted as character information.

character. (1) A member of a set of elements used for the organization, control, or representation of data. A character can be either a graphic character or a control character. See also graphic character and control character. (2) In bar codes, a single group of bar code elements that represent an individual number, letter, punctuation mark, or other symbol.

character angle. The angle that is between the baseline of a character string and the horizontal axis of a presentation space or physical medium.

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 box. A conceptual rectangular box with two sides parallel to the character baseline. A character's shape is formed within a character box by a presentation process, and the character box is then positioned in a presentation space or on a physical medium. The character box can be rotated before it is positioned.

character-box reference edges. The four edges of a character box.

character cell addressable. Allowing characters to be addressed, referenced, and positioned only in a fixed number of character-size rectangles into which a presentation space is divided. Contrast with all points addressable.

character cell size. The size of a rectangle in a drawing space used to scale font symbols into the drawing space.

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 will be used to represent each occurrence of the character in a character string.

character coordinate system. An orthogonal coordinate system that defines font and character measurement distances. The origin is the character reference point. The X axis coincides with the character baseline.

character density. The number of characters per inch (cpi) in a bar code symbology. In most cases, the range is three to ten cpi. See also bar code density, density, and information density.

character direction. In GOCA, an attribute controlling the direction in which a character string grows relative to the inline direction. Values are: left-to-right, right-to-left, top-to-bottom, and bottom-to-top. Synonymous with direction.

character escapement point. The point where the next character reference point is usually positioned. See also character increment and presentation position.

character identifier. The unique name for a graphic character.

character increment. The distance from a character reference point to a character escapement point. For each character, the increment is the sum of a character's A space, B space, and C space. A character's character increment is the distance the inline coordinate is incremented when that character is placed in a presentation space or on a physical medium. Character increment is a property of each graphic character in a font and of the font's character rotation.

character increment adjustment. In a scaled font, an adjustment to character increment values. The adjustment value is derived from the kerning track values for the font used to present the characters.

character metrics. Measurement information that defines individual character values such as height, width, and space. Character metrics can be expressed in specific fixed units, such as pels, or in relative units that are independent of both the resolution and the size of the font. Often included as part of the more general term font metrics. See also character set metrics and font metrics.

character origin. The point within the graphic pattern of a character that is to be aligned with the presentation position. See also character reference point.

character pattern. The scan pattern for a graphic character of a particular size, style, and weight.

character-pattern descriptor. Information that the printer needs to separate font raster patterns. Each character pattern descriptor is eight bytes long and specifies both the character box size and an offset value; the offset value permits the printer to find the beginning of the character raster pattern within the character raster pattern data for the complete coded font.

character positioning. A method used to determine where a character is to appear in a presentation space or on a physical medium.

character precision. The acceptable amount of variation in the appearance of a character on a physical medium from a specified ideal appearance, including no acceptable variation. Examples of appearance characteristics that can vary for a character are character shape and character position.

character reference point. The origin of a character coordinate system. The X axis is the character baseline. See also character origin.

character rotation. The alignment of a character with respect to its character baseline, 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 counter-clockwise rotation. Contrast with rotation.

character set. A finite set of different graphic characters or control characters that is complete for a given purpose. For example, the character set in ISO Standard 646, *7-Bit Coded Character Set for Information Processing Interchange*.

character set attribute. An attribute used to specify a coded font.

character set metrics. The measurements used in a font. Examples are height, width, and character increment for each character of the font. See also character metrics and font metrics.

character shape. The visual representation of a graphic character.

character shape presentation. A method used to form a character shape on a physical medium at an addressable position.

character shear. The angle of slant of a character cell that is not perpendicular to a baseline. Synonymous with shear.

character string. A sequence of characters.

check character. In bar codes, a character included within a bar code message whose value is used to perform a mathematical check to ensure the accuracy of that message. Synonymous with check digit.

check digit. In bar codes, a character included within a bar code message whose value is used to perform a mathematical check to ensure the accuracy of that message. Synonymous with check character.

CID file. A file containing the font information required for presenting the characters of a font. The shape information (glyph procedures) contained in this file is in a binary encoded format defined by Adobe Systems Inc., optimized for large character set fonts (for example, Japanese ideographic fonts having several thousand characters).

CIE. See Commission Internationale d'Éclairage.

CIELAB color space. Internationally accepted color space model used as a standard to define color within the graphic arts industry, as well as other industries. L*, a*, and b* are plotted at right angles to one another. Equal distances in the space represent approximately equal color difference.

CIEXYZ color space. The fundamental CIE-based color space that allows colors to be expressed as a mixture of the three tristimulus values X, Y, and Z.

CJK fonts. Fonts that contain a set of unified ideographic characters used in the written Chinese, Japanese, and Korean languages. The character encoding is the same for each language, but there might be glyph variants between languages.

clear area. A clear space that contains no machine-readable marks preceding the start character of a bar code symbol or following the stop character. Synonymous with quiet zone. Contrast with intercharacter gap and space.

clipping. Eliminating those parts of a picture that are outside of a clipping boundary such as a viewing window or presentation space. See also viewing window. Synonymous with trimming.

cluster-dot screening. A halftone method that uses multiple pixels that vary from small to large dots as the color gets darker. It is characterized by a polka-dot look.

CMAP file. A file containing the mapping of code points to the character index values used in a CID file. The code points conform to a particular character coding system that is used to identify the characters in a document data stream. The character index values are assigned in a CID file for identification of the glyph procedure used to define the character shape. The mapping information in this file is in an ASCII file format defined by Adobe Systems Inc.

CMOCA. See Color Management Object Content Architecture.

CMR. See color management resource.

CMY. Cyan, magenta, and yellow, the subtractive primary colors.

CMYK color space. (1) The color model used in four-color printing. Cyan, magenta, and yellow, the subtractive primary colors, are used with black to effectively create a multitude of other colors. (2) The primary colors used together in printing to effectively create a multitude of other colors: cyan, magenta, yellow, and black. Based on the subtractive color theory; the primary colors used in four-color printing processes.

Codabar. A bar code symbology characterized by a discrete, self-checking, numeric code with each character represented by a standalone group of four bars and the three spaces between them.

CODE. A data type for architecture syntax that indicates an architected constant to be interpreted as defined by the architecture.

Code 39. A bar code symbology 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.

Code 128. A bar code symbology characterized by a variable-length, alphanumeric code with 128 characters.

Coded Character Set Identifier (CCSID). A 16-bit number identifying a specific set consisting of an encoding scheme identifier, character set identifiers, code page identifiers, and other relevant information that uniquely identifies the coded graphic character representation used.

coded font. (1) A resource containing elements of a code page and a font character set, used for presenting text, graphics character strings, and bar code HRI. See also code page and font character set. (2) In FOCA, a resource containing 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. (3) In the IPDS architecture, a raster font resource containing code points that are directly paired to font metrics and the raster representation of character shapes, for a specific graphic character set. (4) In the IPDS architecture, a font resource containing descriptive information, a code page, font metrics, and a digital-technology representation of character shapes for a specific graphic character set.

coded font local identifier. A binary identifier that is mapped by the controlling environment to a named resource to identify a coded font. See also local identifier.

coded graphic character. A graphic character that has been assigned one or more code points within a code page.

coded graphic character set. A set of graphic characters with their assigned code points.

Coded Graphic Character Set Global Identifier (CGCSGID). A four-byte binary or a ten-digit decimal identifier consisting 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. (1) A resource object containing 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 should be used. See also coded graphic character set. (2) 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 given 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 code point and section.

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

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 will be used to represent each occurrence of the character in a character string. Code points are one or more bytes long. See also code table and section.

code table. A table showing the character allocated to each code point in a code. See also code page and code point.

color. A visual attribute of things that results from the light they emit, transmit, or reflect.

colorants. Colors (pigments, dyes, inks) used by a device, primarily a printer, to reproduce colors.

color attribute. An attribute that affects the color values provided in a graphics primitive, a text control sequence, or an IPDS command. Examples of color attributes are foreground color and background color.

color calibration. The process of altering the behavior of an input or output device to make it conform to an established state, specified by a manufacturer, user, industry specification, or standard.

color component. A dimension of a color value expressed as a numeric value. For example, a color value might consist of one, two, three, four, or eight components, also referred to as channels.

color conversion. The process of converting colors from one color space to another.

color image. Images whose image data elements are represented by multiple bits or whose image data element values are mapped to color values. Constructs that map image-data-element values to color values are look-up tables and image-data-element structure parameters. Examples of color values are screen color values for displays and color toner values for printers.

colorimetric intent. A gamut mapping method that is intended to preserve the relationships between in-gamut colors at the expense of out-of-gamut colors.

colorimetry. The science of measuring color and color appearance. Classical colorimetry deals primarily with color matches rather than with color appearance as such. The main focus of colorimetry has been the development of methods for predicting perceptual matches on the basis of physical measurements.

color management. The technology to calibrate the color of input devices (such as scanners or digital cameras), display devices, and output devices (such as printers or offset presses).

Color Management Object Content Architecture (CMOCA). An architected collection of constructs used for the interchange and presentation of the color management information required to render a print file, document, group of pages or sheets, page, overlay, or data object with color fidelity.

color management resource. An object that provides color management in presentation environments.

color management system. A set of software designed to increase the accuracy and consistency of color between color devices like a scanner, display, and printer.

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). Also referred to as color space.

color of medium. The color of a presentation space before any data is added to it. Synonymous with reset color.

color palette. A system of designated colors that are used in conjunction with each other to achieve visual consistency.

Color Rendering Dictionary. A PostScript language construct for converting colors from the CIEXYZ color space to the device color space. It is analogous to the “from PCS” part of an ICC printer profile with one rendering intent; that is, the part used when the profile is a destination profile.

color space. 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). Also referred to as color model.

ColorSpace conversion profile. An ICC profile that provides the relevant information to perform a color space transformation between the non-device color spaces and the Profile Connection Space. It does not represent any device model. ColorSpace conversion profiles can be embedded in images.

color table. A collection of color element sets. The table can also specify the method used to combine the intensity levels of each element in an element set to produce a specific color. Examples of methods used to combine intensity levels are the additive method and the subtractive method. See also color model.

column. A subarray consisting of all elements that have an identical position within the low dimension of a regular two-dimensional array.

command. (1) In the IPDS architecture, a structured field sent from a host to a printer. (2) In GOCA, a data-stream construct used to communicate from the controlling environment to the drawing process. The command introducer is environment dependent. (3) A request for system action.

command set. A collection of IPDS commands.

command-set vector. Information that identifies an IPDS command set and data level supported by a printer. Command-set vectors are returned with an Acknowledge Reply to an IPDS Sense Type and Model command.

Commission Internationale d'Éclairage (CIE). An association of international color scientists who produced the standards that are used as the basis of the description of color.

complex text layout. The typesetting of writing systems that require complex transformations between text input and text display for proper rendering on the screen or the printed page.

compression algorithm. An algorithm used to compress image data. Compression of image data can decrease the volume of data required to represent an image.

construct. An architected set of data such as a structured field or a triplet.

continuous code. A bar code symbology characterized by designating all spaces within the symbol as parts of characters, for example, Interleaved 2 of 5. There is no intercharacter gap in a continuous code. Contrast with discrete code.

continuous-form media. Connected sheets. An example of connected sheets is sheets of paper connected by a perforated tear strip. Contrast with cut-sheet media.

control character. (1) 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. (2) A control function the coded representation of which consists of a single code point.

control instruction. A data construct transmitted from the controlling environment and interpreted by the environment interface to control the operation of the graphics processor.

controlled white space. White space caused by execution of a control sequence. See also white space.

controlling environment. The environment in which an object is embedded, for example, the IPDS and MO:DCA data streams.

control sequence. A sequence of bytes that specifies a control function. A control sequence consists of a control sequence introducer and zero or more parameters.

control sequence chaining. A method used to identify a sequential string of control sequences so they can be processed efficiently.

control sequence class. An assigned coded character that identifies a control sequence's syntax and how that syntax is to be interpreted. An example of a control sequence class is X'D3', that identifies presentation text object control sequences.

control sequence function type. The coded character occupying the fourth byte of an unchained control sequence introducer. This code defines the function whose semantics can be prescribed by succeeding control sequence parameters.

control sequence introducer. The information at the beginning of a control sequence. An unchained control sequence introducer consists of a control sequence prefix, a class, a length, and a function type. A chained control sequence introducer consists of a length and a function type.

control sequence length. The number of bytes used to encode a control sequence excluding the control sequence prefix and class.

control sequence prefix. The escape character used to identify a control sequence. The control sequence prefix is the first byte of a control sequence. An example of a control sequence prefix is X'2B'.

coordinates. A pair of values that specify a position in a coordinate space. See also absolute coordinate and relative coordinate.

coordinate system. A Cartesian coordinate system. An example is the image coordinate system that uses the fourth quadrant with positive values for the Y axis. The origin is the upper left-hand corner of the fourth quadrant. A pair of (x,y) values corresponds to one image point. Each image point is described by an image data element. See also character coordinate system.

copy control. A method used to specify the number of copies for a presentation space and the modifications to be made to each copy.

copy counter. Bytes in an Acknowledge Reply that identify the number of copies of a page that have passed a particular point in the logical paper path.

copy group. A set of copy subgroups that specify all copies of a sheet. In the IPDS architecture, a copy group is specified by a Load Copy Control command. In MO:DCA, a copy group is specified within a Medium Map. See also copy subgroup.

copy modification. The process of adding, deleting, or replacing data on selected copies of a presentation space.

copy set. A collection of pages intended to be printed multiple times. For example, when multiple copies of a book or booklet is printed, each copy of the book or booklet is a copy set. This term was originally used with copy machines to identify collections of copies that are delivered as sets or stapled as sets. The term was also used when printing multiple copies of an MVS data set.

copy subgroup. A part of a copy group that specifies a number of identical copies of a sheet and all modifications to those copies. Modifications include the media source, the media destination, medium overlays to be presented on the sheet, text suppressions, the number of pages on the sheet, and either simplex or duplex presentation. In the IPDS architecture, copy subgroups are specified by Load Copy Control command entries. In MO:DCA, copy subgroups are specified by repeating groups in the Medium Copy Count structured field in a Medium Map. See also copy group.

correlation. A method used in the IPDS architecture to match exceptions with commands.

correlation ID. A two-byte value that specifies an identifier of an IPDS command. The correlation ID is optional and is present only if bit one of the command's flag byte is B'1'.

CPGID. See Code Page Global Identifier.

cpi. Characters per inch.

C space. The distance from the most positive character coordinate system X-axis value of a character shape to the character escapement point. C-space can be positive, zero, or negative. See also A space and B space.

current baseline coordinate. The baseline presentation position at the present time. The baseline presentation position is the summation of the increments of all baseline controls since the baseline was established in the presentation space. The baseline presentation position is established in a presentation space either as part of the initialization procedures for processing an object or by an Absolute Move Baseline control sequence. Synonymous with current baseline presentation coordinate.

current baseline presentation coordinate (B_c). The baseline presentation position at the present time. The baseline presentation position is the summation of the increments of all baseline controls since the baseline was established in the presentation space. The baseline presentation position is established in a presentation space either as part of the initialization procedures for processing an object or by an Absolute Move Baseline control sequence. Synonymous with current baseline coordinate.

current baseline print coordinate (b_c). In the IPDS architecture, the baseline coordinate corresponding to the current print position on a logical page. The current baseline print coordinate is a coordinate in an I,B coordinate system. See also I,B coordinate system.

current drawing attributes. The set of attributes used at the present time to direct a drawing process. Contrast with default drawing attributes.

current drawing controls. The set of drawing controls used at the present time to direct a drawing process. Contrast with default drawing controls.

current inline coordinate. The inline presentation position at the present time. This inline presentation position is the summation of the increments of all inline controls since the inline coordinate was established in the presentation space. An inline presentation position is established in a presentation space either as part of the initialization procedures for processing an object or by an Absolute Move Inline control sequence. Synonymous with current inline presentation coordinate.

current inline presentation coordinate (I_c). The inline presentation position at the present time. This inline presentation position is the summation of the increments of all inline controls since the inline coordinate was established in the presentation space. An inline presentation position is established in a presentation space either as part of the initialization procedures for processing an object or by an Absolute Move Inline control sequence. Synonymous with current inline coordinate.

current inline print coordinate (i_c). In the IPDS architecture, the inline coordinate corresponding to the current print position on a logical page. The current inline print coordinate is a coordinate in an I,B coordinate system. See also I,B coordinate system.

current logical page. The logical page presentation space that is currently being used to process the data within a page object or an overlay object.

current position. The position identified by the current presentation space coordinates. For example, the coordinate position reached after the execution of a drawing order. See also current baseline presentation coordinate and current inline presentation coordinate. Contrast with given position.

custom line type value. A user-defined line type, defined by a series of pairs of a dash/dot length followed by a move length. Contrast with standard line type value.

custom pattern. In GOCA, a user-defined pattern, defined by the picture drawn by a series of drawing orders between a Begin Custom Pattern drawing order and an End Custom Pattern drawing order. Custom patterns can be either bilevel custom patterns or full-color custom patterns. Contrast with patterns in the default pattern set.

custom pattern mode. In GOCA, a mode that is entered when a Begin Custom Pattern drawing order is executed and exited when an End Custom Pattern drawing order is executed. While in this mode, drawing is done in a separate, temporary graphics presentation space rather than in the graphics presentation space of the current GOCA object.

cut-sheet media. Unconnected sheets. Contrast with continuous-form media.

D

data block. A deprecated term for object area.

data element. A unit of data that is considered indivisible.

data frame. A rectangular division of computer output on microfilm.

Data Map. A print control object in a Page Definition (PageDef) that establishes the page environment and specifies the mapping of line data to the page. Synonymous with Page Format.

data mask. A sequence of bits that can be used to identify boundary alignment bits in image data.

data object. In the IPDS architecture, a presentation-form object that is either specified within a page or overlay or is activated as a resource and later included in a page or overlay via the IDO command. Examples include: PDF single-page objects, Encapsulated PostScript objects, and IO Images. See also resource and data object resource.

data-object font. (1) In the IPDS architecture, a complete-font resource that is a combination of font components at a particular size, character rotation, and encoding. A data-object font can be used in a manner analogous to a coded font. The following useful combinations can be activated into a data-object font:

- A TrueType/OpenType font, an optional code page, and optional linked TrueType/OpenType objects; activated at a particular size, character rotation, and encoding
- A TrueType/OpenType collection, either an index value or a full font name to identify the desired font within the collection, an optional code page, and optional linked TrueType/OpenType objects; activated at a particular size, character rotation, and encoding

See also data-object-font component. (2) In the MO:DCA architecture, a complete non-FOCA font resource object that is analogous to a coded font. Examples of data-object fonts are TrueType fonts and OpenType fonts.

data-object-font component. In the IPDS architecture, a font resource that is either printer resident or is downloaded using object container commands. Data-object-font components are used as components of a data-object font. Examples of data-object-font components include TrueType/OpenType fonts and TrueType/OpenType collections. See also data-object font.

data object resource. In the IPDS architecture, an object-container resource or IO-Image resource that is either printer resident or downloaded. Data object resources can be:

- Used to prepare for the presentation of a data object; such as with a color management resource (CMR) or Resident Color Profile Resource
- Included in a page or overlay via the Include Data Object command; examples include: PDF single-page objects, Encapsulated PostScript objects, and IO Images

- Invoked from within a data object; examples include: PDF Resource objects and Non-OCA Resource objects

See also data object and resource.

data stream. A continuous stream of data that has a defined format. An example of a defined format is a structured field.

data-stream exception. In the IPDS architecture, a condition that exists when the printer detects an invalid or unsupported command, order, control, or parameter value from the host. Data-stream exceptions are those whose action code is X'01', X'19', or X'1F'. See also asynchronous exception and synchronous exception.

DBCS. See double-byte character set.

decoder. In bar codes, the component of a bar code reading system that receives the signals from the scanner, performs the algorithm to interpret the signals into meaningful data, and provides the interface to other devices. See also reader and scanner.

decryption. The process of taking encrypted data and converting it back into data that a human or a computer can read and understand. See also encryption

default. A value, attribute, or option that is assumed when none has been specified and one is needed to continue processing. See also default drawing attributes and default drawing controls.

default drawing attributes. The set of drawing attributes adopted at the beginning of a drawing process and usually at the beginning of each root segment that is processed. See also root segment. Contrast with current drawing attributes.

default drawing controls. The set of drawing controls adopted at the start of a drawing process and usually at the start of each root segment that is processed. See also root segment. Contrast with current drawing controls.

default indicator. A field whose bits are all B'1' indicating that a hierarchical default value is to be used. The value can be specified by an external parameter. See also external parameter.

default pattern set. In GOCA, a set of predefined patterns, like solid, dots, or horizontal lines. Contrast with custom pattern.

density. The number of characters per inch (cpi) in a bar code symbology. In most cases, the range is three to ten cpi. See also bar code density, character density, and information density.

deprecated. An architected construct is marked as “deprecated” to indicate that it should no longer be used because it has been superseded by a newer construct. Use or support of a deprecated construct is permitted but no longer recommended. Constructs are deprecated rather than immediately removed to provide backward compatibility.

descender. The part of the character that extends into the character coordinate system negative Y-axis region. Examples of letters with descenders at zero-degree character rotation are *g*, *j*, *p*, *q*, *y*, and *Q*. Contrast with ascender.

descender depth. The character shape's most negative character coordinate system Y-axis value.

design metrics. A set of quantitative values, recommended by a font designer, to describe the characters in a font.

design size. The size of the unit Em for a font. All relative font measurement values are expressed as a proportion of the design size. For example, the width of the letter *I* can be specified as one-fourth of the design size.

device attribute . A property or characteristic of a device.

Device-Control command set. In the IPDS architecture, a collection of commands used to set up a page, communicate device controls, and manage printer acknowledgment protocol.

device dependent. Dependent upon one or more device characteristics. An example of device dependency is a font whose characteristics are specified in terms of addressable positions of specific devices. See also system-level font resource.

device independent. Not dependent upon device characteristics.

device-independent color space. A CIE-based color space that allows color to be expressed in a device-independent way. It ensures colors to be predictably and accurately matched among various color devices.

device level font resource. A device-specific font object from which a presentation device can obtain the font information required to present character images.

device profile. A structure that provides a means of defining the color characteristics of a given device in a particular state.

device resolution. The number of pels that can be printed in an inch, both horizontally and vertically. This is the resolution that the printer uses when printing. Some printers can be configured to print with a variety of resolutions that can be selected by the operator. The device resolution can be different in the two directions (for example, a resolution of 360 by 720).

device-version code page. In the IPDS architecture, a device version of a code page contains all of the characters that were registered for the CPGID at the time the printer was developed; since then, more characters might have been added to the registry for that CPGID. A device-version code page is identified by a CPGID. See also code page.

digital halftoning. A method used to simulate gray levels on a bilevel device.

digital image. An image whose image data was sampled at regular intervals to produce a digital representation of the image. The digital representation is usually restricted to a specified set of values.

dimension. The attribute of size given to arrays and tables.

direction. In GOCA, an attribute that controls the direction in which a character string grows relative to the inline direction. Values are: left-to-right, right-to-left, top-to-bottom, and bottom-to-top. Synonymous with character direction.

discrete code. A bar code symbology characterized by placing spaces that are not a part of the code between characters, that is, intercharacter gaps.

dispersed-dot halftone. Any halftone algorithm that turns on binary pixels individually without grouping them into clusters. The “smallest available” dots are scattered in a pseudorandom manner to print varying densities. Commonly contrasted with cluster-dot screening.

dither. An intentional form of noise added to an image to randomize quantization error. Dithering an image can prevent unwanted patterns from appearing within the image.

DOCS. See drawing order coordinate space.

document. (1) A machine-readable collection of one or more objects that represents a composition, a work, or a collection of data. (2) A publication or other written material.

document component. An architected part of a document data stream. Examples of document components are documents, pages, page groups, indexes, resource groups, objects, and process elements.

document-component hierarchy. In MO:DCA, an ordering of the document in terms of its lower-level components. The components are ordered by decreasing level as follows:

- Print file (highest level)
- Document
- Page group
- Page
- Data object (lowest level)

document content architecture. A family of architectures that define the syntax and semantics of the document component. See also document component and structured field.

document editing. A method used to create or modify a document.

document element. A self-identifying, variable-length, bounded record, that can have a content portion that provides control information, data, or both. An application or device does not have to understand control information or data to parse a data stream when all the records in the data stream are document elements. See also structured field.

document fidelity. The degree to which a document presentation preserves the creator's intent.

document formatting. A method used to determine where information is positioned in presentation spaces or on physical media.

document presentation. A method used to produce a visible copy of formatted information on physical media.

dot gain. The phenomenon that occurs when ink is transferred from the plate to the blanket of the press and finally to the paper on which it is being printed. A dot for a halftone or a screen gets larger because of the mechanical process of transferring ink.

dots per inch. (1) The number of dots that will fit in an inch. (2) A unit of measure for output resolution. (3) Dots per inch (dpi) is also used to measure the quality of input when using a scanner. In this case, dpi becomes a square function measuring the dots both vertically as well as horizontally. Consequently, when an image is scanned in at 300 dpi, there are 90,000 dots or bits of electronic data (300 x 300) in every square inch.

double-byte character set (DBCS). A character set that can contain up to 65536 characters.

double-byte coded font. A coded font in which the code points are two bytes long.

downloaded resource. In the IPDS architecture, a resource in a printer that is installed and removed under control of a host presentation services program. A downloaded resource is referenced by a host-assigned name that is valid for the duration of the session between the presentation services program and the printer. Contrast with resident resource.

dpi. See dots per inch.

drag. To use a pointing device to move an object. For example, clicking on a window border, and dragging it to make the window larger.

draw functions. Functions that can be done during the drawing of a picture. Examples of draw functions are displaying a picture, boundary computation, and erasing a graphics presentation space.

drawing control. A control that determines how a picture is drawn. Examples of drawing controls are arc parameters, transforms, and the viewing window.

drawing defaults. In GOCA, the set of attributes adopted at the start of each segment that is processed. These attributes are set either from standard defaults defined by the controlling environment or from the Set Current Defaults instruction that is contained in the Graphics Data Descriptor. Synonymous with default drawing attributes. Contrast with current drawing attributes.

drawing order. In GOCA, a graphics construct that the controlling environment builds to instruct a drawing processor about what to draw and how to draw it. The order can specify, for example, that a graphics primitive be drawn, a change to drawing attributes or drawing controls be effected, or a segment be called. One or more graphics primitives can be used to draw a picture. Drawing orders can be included in a structured field. See also order.

drawing order coordinate space (DOCS). A two-dimensional conceptual space in which graphics primitives are drawn, using drawing orders, to create pictures.

drawing process control. In GOCA, a control used by the graphics processor that determines how a picture is drawn. Examples of drawing process controls are arc parameters.

drawing processor. A graphics processor component that executes segments to draw a picture in a presentation space. See also segment, graphics presentation space, and image presentation space.

drawing units. Units of measurement used within a graphics presentation space to specify absolute and relative positions.

draw rule. A method used to construct a line, called a rule, between two specified presentation positions. The line that is constructed is either parallel to the inline I axis or baseline B axis.

duplex. A method used to print data on both sides of a sheet. Normal-duplex printing occurs when the sheet is turned over the Y_m axis. Tumble-duplex printing occurs when the sheet is turned over the X_m axis.

duplex printing. A method used to print data on both sides of a sheet. Contrast with simplex printing.

dynamic segment. A segment whose graphics primitives can be redrawn in different positions by dragging them from one position to the next across a picture without destroying the traversed parts of the picture.

E

EAN. See European Article Numbering.

EBCDIC. See Extended Binary-Coded Decimal Interchange Code.

Efficient XML Interchange (EXI). A format that allows XML documents to be encoded as binary data, rather than as plain text.

element. (1) A bar or space in a bar code character or a bar code symbol. (2) A structured field in a document content architecture data stream. (3) In GOCA, a portion of a segment consisting of either a single order or a group of orders enclosed in an element bracket, in other words, between a *begin* element and an *end* element. (4) A basic member of a mathematical or logical class or set.

Em. In printing, a unit of linear measure referring to the baseline-to-baseline distance of a font, in the absence of any external leading.

embedded ICC profile. ICC profiles that are embedded within graphic documents and images. An embedded ICC profile allows users to transparently move color data between different computers, networks and even operating systems without having to worry if the necessary profiles are present on the destination systems.

Em square. A square layout space used for designing each of the characters of a font.

encoding scheme. A set of specific definitions that describe the philosophy used to represent character data. The number of bits, the number of bytes, the allowable ranges of bytes, the maximum number of characters, and the meanings assigned to some generic and specific bit patterns, are some examples of specifications to be found in such a definition.

Encoding Scheme Identifier (ESID). A 16-bit number assigned to uniquely identify a particular encoding scheme specification. See also encoding scheme.

encryption. A process to manipulate data to achieve data security. To read an encrypted data string, access to key information that enables decryption of the data is required. See also decryption

environment interface. The part of the graphics processor that interprets commands and instructions from the controlling environment.

EPS. Acronym for Encapsulated PostScript. A standard file format for importing and exporting PostScript language files among applications in a variety of heterogeneous environments.

error diffusion halftone. A specific halftone method in which quantization errors are diffused spatially in a quasi-random manner.

escapement direction. In FOCA, the direction from a character reference point to the character escapement point, that is, the font designer's intended direction for successive character shapes. See also character direction and inline direction.

escape sequence. (1) In the IPDS architecture, the first two bytes of a control sequence. An example of an escape sequence is X'2BD3'. (2) A string of bit combinations that is used for control in code extension procedures. The first of these bit combinations represents the control function Escape.

ESID. See Encoding Scheme Identifier.

established baseline coordinate. The current baseline presentation coordinate when no temporary baseline exists or the last current baseline presentation coordinate that existed before the first active temporary baseline was created. If temporary baselines are created, the current baseline presentation coordinate coincides with the presentation coordinate of the most recently created temporary baseline.

European Article Numbering (EAN). The bar code symbology used to code grocery items in Europe.

exception. (1) An invalid or unsupported data-stream construct. (2) In the IPDS architecture, a condition requiring host notification. (3) In the IPDS architecture, a condition that requires the host to resend data. See also data-stream exception, asynchronous exception, and synchronous exception.

exception action. Action taken when an exception is detected.

exception condition. The condition that exists when a product finds an invalid or unsupported construct.

exchange. The predictable interpretation of shared information by a family of system processes in an environment where the characteristics of each process must be known to all other processes. Contrast with interchange.

EXI. See Efficient XML Interchange.

expanded. A type width that widens all characters of a typeface.

Extended Binary-Coded Decimal Interchange Code (EBCDIC). A coded character set that consists of eight-bit coded characters.

Extensible Markup Language (XML). A set of rules for encoding documents in a format that is both human-readable and machine-readable.

Extensible Metadata Platform (XMP). An ISO standard, originally created by Adobe Systems Incorporated, for the creation, processing, and interchange of standardized and custom metadata for all kinds of resources.

external leading. The amount of white space, in addition to the internal leading, that can be added to interline spacing without degrading the aesthetic appearance of a font. This value is usually specified by a font designer. Contrast with internal leading.

external parameter. A parameter for which the current value can be provided by the controlling environment, for example, the data stream, or by the application itself. Contrast with internal parameter.

F

factoring. The movement of a parameter value from one state to a higher-level state. This permits the parameter value to apply to all of the lower-level states unless specifically overridden at the lower level.

FGID. See Font Typeface Global Identifier.

filename map file. A file containing the mapping of object names to file names for use in establishing a font file system. Object names and file names do not conform to the same naming requirements, so it is necessary to provide a mapping between them. The mapping information in this file is in an ASCII file format defined by Adobe Systems Inc.

fillet. A curved line drawn tangential to a specified set of straight lines. An example of a fillet is the concave junction formed where two lines meet.

final form data. Data that has been formatted for presentation.

first read rate. In bar codes, the ratio of the number of successful reads on the first attempt to the total number of attempts made to obtain a successful read. Synonymous with read rate.

fixed medium information. Information that can be applied to a sheet by a printer or printer-attached device that is independent of data provided through the data stream. Fixed medium information does not mix with the data 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.

fixed metrics. Graphic character measurements in physical units such as pels, inches, or centimeters.

FNN linked. In FOCA, the FNN (Font Name map) structured field permits the mapping of a set of IBM GCGIDs to the character index values that occur in either a CMAP file or a rearranged file. Because the set of GCGIDs and the set of character index values must correspond to the same set of characters, it is necessary to identify which CMAP or rearranged file (among the many that could be located in a font file system) is associated (linked) with the FNN structured field. Note that the Font Name Map is known as the Character ID Map in IPDS.

FOCA. See Font Object Content Architecture.

font. A set of graphic characters that have a characteristic design, or a font designer's concept of how the graphic characters should appear. The characteristic design specifies the characteristics of its graphic characters. Examples of characteristics are character shape, graphic pattern, style, size, weight class, and increment. Examples of fonts are fully described fonts, symbol sets, and their internal printer representations. See also coded font and symbol set.

font baseline extent. In the IPDS architecture, the sum of the uniform or maximum baseline offset and the maximum baseline descender of all characters in the font.

font character set. A FOCA resource containing descriptive information, font metrics, and the digital representation of character shapes for a specified graphic character set.

font control record. The record sent in an IPDS Load Font Control command to specify a font ID and other font parameters that apply to the complete font.

font height (FH). (1) A characteristic value, perpendicular to the character baseline, that represents the size of all graphic characters in a font. Synonymous with vertical font size. (2) In a font character set, nominal font height is a font-designer defined value corresponding to the nominal distance between adjacent baselines when character rotation is zero degrees and no external leading is used. This distance represents the baseline-to-baseline increment that includes the font's maximum baseline extent and the designer's recommendation for internal leading. The font designer can also define a minimum and a maximum vertical font size to represent the limits of scaling. (3) In font referencing, the specified font height is the desired size of the font when the characters are presented. If this size is different from the nominal vertical font size specified in a font character set, the character shapes and character metrics might need to be scaled prior to presentation.

font index. (1) The mapping of a descriptive font name to a font member name in a font library. An example of a font member in a font library is a font resource object. Examples of attributes used to form a descriptive font name are typeface, family name, point size, style, weight class, and width class. (2) In the IPDS architecture, an LF1-type raster-font resource containing character metrics for each code point of a raster font or raster-font section for a particular font inline sequence. There can be a font index for 0 degree, 90 degree, 180 degree, and 270 degree font inline sequences. A font index can be downloaded to a printer using the Load Font Index command. An LF1-type coded font or coded-font section is the combination of one fully described font and one font index. See also fully described font.

font inline sequence. The clockwise rotation of the inline direction relative to a character pattern. Character rotation and font inline sequence are related in that character rotation is a clockwise rotation; font inline sequence is a counter-clockwise rotation.

font local identifier. A binary identifier that is mapped by the controlling environment to a named resource to identify a font. See also local identifier.

font metrics. Measurement information that defines individual character values such as height, width, and space, as well as overall font values such as averages and maximums. Font metrics can be expressed in specific fixed units, such as pels, or in relative units that are independent of both the resolution and the size of the font. See also character metrics and character set metrics.

font modification parameters. Parameters that alter the appearance of a typeface.

font object. A resource object that contains some or all of the description of a font.

Font Object Content Architecture (FOCA). An architected collection of constructs used to describe fonts and to interchange those font descriptions.

font production. A method used to create a font. This method includes designing each character image, converting the character images to a digital-technology format, defining parameter values for each character, assigning appropriate descriptive and identifying information, and creating a font resource that contains the required information in a format that can be used by a text processing system. Digital-technology formats include bit image, vector drawing orders, and outline algorithms. Parameter values include such attributes as height, width, and escapement.

font referencing. A method used to identify or characterize a font. Examples of processes that use font referencing are document editing, document formatting, and document presentation.

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

font width (FW). (1) A characteristic value, parallel to the character baseline, that represents the size of all graphic characters in a font. Synonymous with horizontal font size. (2) In a font character set, nominal font width is a font-designer defined value corresponding to the nominal character increment for a font character set. The value is generally the width of the space character and is defined differently for fonts with different spacing characteristics.

- For fixed-pitch, uniform character increment fonts: the fixed character increment, that is also the space character increment
- For PSM fonts: the width of the space character
- For typographic, proportionally spaced fonts: one-third of the vertical font size, that is also the default size of the space character.

The font designer can also define a minimum and a maximum horizontal font size to represent the limits of scaling. (3) In font referencing, the specified font width is the desired size of the font when the characters are presented. If this size is different from the nominal horizontal font size specified in a font character set, the character shapes and character metrics might need to be scaled prior to presentation.

foreground. (1) The part of a presentation space that is occupied by object data. (2) In GOCA, the portion of a graphics primitive that is mixed into the presentation space under the control of the current value of the mix and color attributes. See also pel. Contrast with background.

foreground color. A color attribute used to specify the color of the foreground of a primitive. Contrast with background color.

foreground mix. An attribute used to determine how the foreground color of data is combined with the existing color of a graphics presentation space. An example of data is a graphics primitive. Contrast with background mix.

form. A division of the physical medium; multiple forms can exist on a physical medium. For example, a roll of paper might be divided by a printer into rectangular pieces of paper, each representing a form. Envelopes are an example of a physical medium that comprises only one form. The IPDS architecture defines four types of forms: cut-sheet media, continuous-form media, envelopes, and computer output on microfilm. Each type of form has a top edge. A form has two sides, a front side and a back side. Synonymous with sheet.

format. The arrangement or layout of data on a physical medium or in a presentation space.

formatter. A process used to prepare a document for presentation.

formblend. (1) In IPDS, this mixing rule is only used when a preprinted form overlay (PFO) is merged as presentation space P_{PFO} with other presentation data (presentation space P_{data}). The intersection of P_{PFO} and P_{data} is assigned the following color attribute:

- Wherever the color attribute of P_{PFO} is either color of medium, or “white” (CMYK = X'00000000' for a printer, RGB = X'FFFFFF' for an RGB display), the intersection is assigned the color attribute of P_{data}. Likewise, wherever the color attribute of P_{data} is either color of medium, or “white” (CMYK = X'00000000' for a printer, RGB = X'FFFFFF' for an RGB display), the intersection is assigned the color attribute of P_{PFO}.
- With other overlapping color values, the intersection assumes a new color attribute that is generated in a device-specific manner to simulate how the P_{data} color attribute would mix onto a preprinted form that has the color attribute of P_{PFO}. In general, this mixing is a blending of the color attributes of P_{data} and P_{PFO} that is determined by the two color attributes and by the print media and the print technology.

See also mixing rule. (2) In MO:DCA, this mixing rule is only used when a simulated preprinted form, which is simulated as either a Medium Preprinted Form overlay (M-PFO) or a PMC Preprinted Form overlay (PMC-PFO), is merged as a new presentation space P_n, onto an existing presentation space P_e. The intersection of the foregrounds of P_n and P_e is assigned the following color attribute:

- Wherever the color attribute of P_e is either the color of medium, or the color white (CMYK = X'00000000' or RGB = X'FFFFFF'), the intersection is assigned the color attribute of P_n.
- Wherever the color attribute of P_e is not the color of medium and not the color white, the intersection assumes a new color attribute that is generated in a device-specific manner to simulate how the P_e color attribute would mix onto a preprinted form that has the color attribute of P_n. In general, this mixing is a blending of the color attributes of P_n and P_e that is determined by the two color attributes and by the print media and the print technology.

Formdef. See Form Definition.

Form Definition (Formdef). A print control object that contains an environment definition and one or more Medium Maps. Synonymous with Form map.

Form Map. A print control object that contains an environment definition and one or more Medium Maps. Synonymous with Form Definition. See also Medium Map.

full arc. A complete circle or ellipse. See also arc.

full-color custom pattern. In GOCA, a custom pattern that has its colors completely assigned during its definition, and can therefore contain any number of colors. Contrast with bilevel custom pattern.

fully described font. In the IPDS architecture, an LF1-type raster-font resource containing font metrics, descriptive information, and the raster representation of character shapes, for a specific graphic character set. A fully described font can be downloaded to a printer using the Load Font Control and Load Font commands. An LF1-type coded font or coded-font section is the combination of one fully described font and one font index. See also font index.

function set. (1) A collection of architecture constructs and associated values. Function sets can be defined across or within subsets. (2) In the MO:DCA architecture, a formal extension to a MO:DCA interchange set that provides additional capabilities beyond those provided by the interchange set.

FW. See font width.

G

gamma. A measure of contrast in photographic images. More precisely, a parameter that describes the shape of the transfer function for one or more stages in an imaging pipeline. The transfer function is given by the expression output = input ^{gamma} where both input and output are scaled to the range 0 to 1.

gamut. In color reproduction, the subset of colors that can be accurately represented in a given circumstance, such as within a given color space or by a certain output device.

GCGID. See Graphic Character Global Identifier.

GCSGID. See Graphic Character Set Global Identifier.

GCUID. See Graphic Character UCS Identifier.

generic. Relating to, or characteristic of, a whole group or class.

GID. See global identifier.

GIF. See Graphic Interchange Format.

given position. The coordinate position at which drawing is to begin. A given position is specified in a drawing order. Contrast with current position.

GLC chain. The set of glyph layout control sequences used to present a set of glyphs. It consists of a GLC control sequence followed by one or more GIR/GAR/GOR control sequence groupings, wherein the GOR is always optional. These control sequences must be chained together using PTOCA chaining rules. No other control sequences can be interspersed within the GIR/GAR/GOR groupings or between the groupings. The GLC chain may be terminated by an optional UCT control sequence that carries the code points of the glyphs rendered by the GLC chain.

Global Identifier (GID). Any of the following:

- Coded Character Set Identifier (CCSID).
- Coded Graphic Character Set Global Identifier (CGCSGID)
- Code Page Global ID (CPGID)
- Font Typeface Global Identifier (FGID)
- Global Resource Identifier (GRID)
- Graphic Character Global Identifier (GCGID)
- Graphic Character Set Global Identifier (GCSGID)
- Graphic Character UCS Identifier (GCUID)
- An identifier used by a data object to reference a resource
- In MO:DCA, an encoded graphic character string that provides a reference name for a document element.
- Object identifier (OID)
- A Uniform Resource Locator (URL), as defined in RFC 1738, Internet Engineering Task Force (IETF), December, 1994

Global Resource Identifier (GRID). An eight-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 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.

glyph. (1) A member of a set of symbols that represent data. Glyphs can be letters, digits, punctuation marks, or other symbols. Synonymous with graphic character. See also character. (2) In typography, a glyph is a particular graphical representation of a grapheme, or sometimes several graphemes in combination (a composed glyph), or only a part of a grapheme. In computing as well as typography, the term character refers to a grapheme or grapheme-like unit of text, as found in natural language writing systems (scripts). A character or grapheme is a unit of text, whereas a glyph is a graphical unit. TrueType/OpenType fonts describe glyphs as a set of paths.

glyph advance. A glyph advance is the absolute displacement of a glyph's origin on the baseline in the inline direction from a specific point. In the context of complex text rendering using GLC chains, the specific point is the current text position at the beginning of the GLC chain.

glyph ID. A glyph ID is an index to a table entry in a TrueType/OpenType font that allows an application to retrieve the glyph's shape data.

glyph offset. A glyph offset is the offset of the glyph's origin from the current baseline in the baseline direction. In the context of complex text rendering using GLC chains, the current baseline is the baseline defined at the beginning of the GLC chain.

GOCA. See Graphics Object Content Architecture.

GPS. See graphics presentation space.

gradient. In GOCA, an area fill where one color gradually changes to another. A gradient is a type of pattern.

grapheme. (1) A minimally distinctive unit of writing in the context of a particular writing system. For example, å (“a + Combining Ring Above” or “Latin Small Letter A with Ring Above”) is a grapheme in the Danish writing system. (2) What an end-user thinks of as a character. (3) In typography, a grapheme is the fundamental unit in written language. Graphemes include alphabetic letters, Chinese characters, numerals, punctuation marks, and all the individual symbols of any of the world's writing systems. In a typeface each character typically corresponds to a single glyph, but there are exceptions, such as a font used for a language with a large alphabet or complex writing system, where one character may correspond to several glyphs, or several characters to one glyph.

graphic arts. Image rich, customized content that is typically used for brochures and marketing documents.

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 used to identify a specific graphic character. A GCGID can be from four bytes to eight 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 two-byte binary or a five-digit decimal value.

Graphic Character UCS Identifier (GCUID). An alphanumeric character string used to identify a specific graphic character. The GCUID naming scheme is used for additional characters and sets of characters that exist in UNICODE; each GCUID begins with the letter *U* and ends with a UNICODE code point. The Unicode Standard is fully compatible with the earlier Universal Character Set (UCS) Standard.

Graphic Interchange Format (GIF). An image format type generated specifically for computer use. Its resolution is usually very low (72 dpi, or that of your computer screen), making it undesirable for printing purposes.

Graphics command set. In the IPDS architecture, a collection of commands used to present GOCA data in a page, page segment, or overlay.

graphics data. Data containing lines, arcs, markers, and other constructs that describe a picture.

graphics model space. A two-dimensional conceptual space in which a picture is constructed. All model transforms are completed before a picture is constructed in a graphics model space. Contrast with graphics presentation space. Synonymous with model space.

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 used to interchange and present graphics data. GOCA was originally defined by IBM; this architecture is no longer used in AFP. Instead, a subset of GOCA was defined for use in AFP environments, called AFP GOCA. Usually when the term “GOCA” is used in AFP documentation, it means AFP GOCA.

graphics presentation space. A two-dimensional conceptual space in which a picture is constructed. In this space graphics drawing orders are defined. The picture can then be mapped onto an output medium. All viewing transforms are completed before the picture is generated for presentation on an output medium. An example of a graphics presentation space is the abstract space containing graphics pictures defined in an IPDS Write Graphics Control command. Contrast with graphics model space.

graphics presentation space window. The portion of a graphics presentation space that can be mapped to a graphics object area on a logical page.

graphics primitive. A basic construct used by an output device to draw a picture. Examples of graphics primitives are arc, line, fillet, character string, and marker.

graphics processor. The processing capability required to interpret a GOCA object, that is, to present the picture represented by the object. It includes the environment interface, that interprets commands and instructions, and the drawing processor, that interprets the drawing orders.

graphics segment. A set of graphics drawing orders contained within a Begin Segment command. See also segment.

grayscale. A means of specifying color using only one color component in shades of gray ranging from black to white.

grayscale image. Images whose image data elements are represented by multiple bits and whose image data element values are mapped to more than one level of brightness through an image data element structure parameter or a look-up table.

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.

gzip. A widely-used, free software compression algorithm.

H

HAID. See Host-Assigned ID.

halftone. A method of generating, on a press or laser printer, an image that requires varying densities or shades to accurately render the image. This is achieved by representing the image as a pattern of dots of varying size. Larger dots represent darker areas, and smaller dots represent lighter areas of an image.

hard object. An object that is mapped with a Map structured field in the environment group of a Form Map, page, or overlay, that causes the server to retrieve the object and send it to the presentation device. The object is then referenced for inclusion at a later time. Contrast with soft object.

height. 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 through 9 and characters A through F are used to represent hexadecimal digits. The hexadecimal digits A through F correspond to the decimal numbers 10 through 15, respectively. An example of a hexadecimal number is X'1B', that is equal to the decimal number 27.

hierarchy. A series of elements that have been graded or ranked in some useful manner.

highlight color. A spot color that is used to accentuate or contrast monochromatic areas. See also spot color.

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.

hollow font. A font design in which the graphic character shapes include only the outer edges of the strokes.

home state. An initial IPDS operating state. A printer returns to home state at the end of each page, and after downloading a font, overlay, or page segment.

horizontal bar code. A bar code pattern presenting the axis of the symbol in its length dimension parallel to the X_{bc} axis of the bar code presentation space. Synonymous with picket fence bar code.

horizontal font size. (1) A characteristic value, parallel to the character baseline, that represents the size of all graphic characters in a font. Synonymous with font width. (2) In a font character set, nominal horizontal font size is a font-designer defined value corresponding to the nominal character increment for a font character set. The value is generally the width of the space character and is defined differently for fonts with different spacing characteristics.

- For fixed-pitch, uniform character increment fonts: the fixed character increment, that is also the space character increment
- For PSM fonts: the width of the space character
- For typographic fonts and proportionally spaced fonts: one-third of the vertical font size, that is also the default size of the space character.

The font designer can also define a minimum and a maximum horizontal font size to represent the limits of scaling. (3) In font referencing, the specified horizontal font size is the desired size of the font when the characters are presented. If this size is different from the nominal horizontal font size specified in a font character set, the character shapes and character metrics might need to be scaled prior to presentation.

horizontal scale factor. (1) In outline-font referencing, the specified horizontal adjustment of the Em square. The horizontal scale factor is specified in 1440ths of an inch. When the horizontal and vertical scale factors are different, anamorphic scaling occurs. See also vertical scale factor. (2) In FOCA, the numerator of a scaling ratio, determined by dividing the horizontal scale factor by the vertical font size. If the value specified is greater or less than the specified vertical font size, the graphic characters and their corresponding metric values are stretched or compressed in the horizontal direction relative to the vertical direction by the scaling ratio indicated.

host. (1) In the IPDS architecture, a computer that drives a printer. (2) In IOCA, the host is the controlling environment.

Host-Assigned ID (HAID). A two-byte ID in the range X'0001'–X'7EFF' that is assigned to an IPDS resource by a presentation-services program in the host. This ID uniquely identifies a resource until that resource is deactivated, in which case the HAID can be reused. HAIDs are used in IPDS resource management commands.

Host-Assigned Resource ID. The combination of a Host-Assigned ID with a section identifier, or a font inline sequence, or both. The section identifier and font inline sequence values are ignored for both page segments and overlays. See also section identifier and font inline sequence.

HRI. See human-readable interpretation.

HSV color space. (1) A transformation of the RGB color space that allow colors to be described in terms more natural to an artist. The name HSV stands for hue, saturation, and value. (2) Abbreviation for hue, saturation, and value (a color model used in some graphics programs). HSV must be translated to another model for color printing or for forming screen colors.

human-readable interpretation (HRI). The printed translation of bar code characters into equivalent Latin alphabetic characters, Arabic numeral decimal digits, and common special characters normally used for printed human communication.

hypermedia. Interlinked pieces of information consisting of a variety of data types such as text, graphics data, image, audio, and video.

hypertext. Interlinked pieces of information consisting primarily of text.

I

+I. Positive inline direction.

I. See inline direction.

I axis. The axis of an I,B coordinate system that extends in the inline direction. The I axis does not have to be parallel to the X_p axis of its bounding X_p,Y_p coordinate space.

I,B coordinate system. The coordinate system used to present graphic characters. This coordinate system is used to establish the inline direction and baseline direction for the placement of successive graphic characters within a presentation space. See also X_p,Y_p coordinate system.

I_c. See current inline presentation coordinate.

i_c. See current inline print coordinate.

ICC. See International Color Consortium.

ICC-absolute colorimetric. A rendering intent in which the chromatically adapted tristimulus values of the in-gamut colors are unchanged. It is useful for spot colors and when simulating one medium on another (proofing). Note that this definition of ICC-absolute colorimetry is actually called “relative colorimetry” in CIE terminology, since the data has been normalized relative to the perfect diffuser viewed under the same illumination source as the sample.

ICC DeviceLink profile. An ICC profile that provides a mechanism in which to save and store a series of device profiles and non-device profiles in a concatenated format as long as the series begins and ends with a device profile. This is useful for workflows where a combination of device profiles and non-device profiles are used repeatedly.

ICC profile. A file in the International Color Consortium profile format, containing information about the color reproduction capabilities of a device such as a scanner, a digital camera, a monitor, or a printer. An ICC profile includes three elements: 128-byte file header, tag table, and tagged element data. The intent of this format is to provide a cross-platform device profile format. Such device profiles can be used to translate color data created on one device into another device's native color space.

ID. Identifier. See also Host-Assigned ID (HAID), correlation ID, font control record, and overlay ID.

IDE. See image data element.

I direction. (1) The direction in which successive characters appear in a line of text. (2) In GOCA, the direction specified by the character angle attribute. Synonymous with inline direction.

IDP. See image data parameter.

IEEE. Institute of Electrical and Electronics Engineers.

I extent. The X_p extent when the I axis is parallel to the X_p axis or the Y_p extent when the I axis is parallel to the Y_p axis. The definition of the I extent depends on the X_p or Y_p extent because the I,B coordinate system is contained within an X_p,Y_p coordinate system.

i_i. See initial inline print coordinate.

illuminant. Something that can serve as a source of light.

image. An electronic representation of a picture produced by means of sensing light, sound, electron radiation, or other emanations coming from the picture or reflected by the picture. An image can also be generated directly by software without reference to an existing picture.

image block. A deprecated term for image object area.

image content. Image data and its associated image data parameters.

image coordinate system. An X,Y Cartesian coordinate system using only the fourth quadrant with positive values for the Y axis. The origin of an image coordinate system is its upper left hand corner. An X,Y coordinate specifies a presentation position that corresponds to one and only one image data element in the image content.

image data. Rectangular arrays of raster information that define an image.

image data element (IDE). A basic unit of image information. An image data element expresses the intensity of a signal at a corresponding image point. An image data element can use a look-up table to introduce a level of indirection into the expression of grayscale image or color image.

image data parameter (IDP). A parameter that describes characteristics of image data.

image distortion. Deformation of an image such that the original proportions of the image are changed and the original balance and symmetry of the image are lost.

image object. An object that contains image data. See also object.

image object area. A rectangular area on a logical page into which an image presentation space is mapped.

Image Object Content Architecture (IOCA). An architected collection of constructs used to interchange and present images.

image point. A discrete X,Y coordinate in the image presentation space. See also addressable position.

image presentation space (IPS). A two-dimensional conceptual space in which an image is generated.

image segment. Image content bracketed by Begin Segment and End Segment self-defining fields. See also segment.

IM Image. A migration image object that is resolution dependent, bi level, and cannot be compressed or scaled. Contrast with IO Image.

IM-Image command set. In the IPDS architecture, a collection of commands used to present IM-Image data in a page, page segment, or overlay.

immediate mode. The mode in which segments are executed as they are received and then discarded. Contrast with store mode.

indexed color. A color image format that contains a palette of colors to define the image. Indexed color can reduce file size while maintaining visual quality.

indexed object. An object in a MO:DCA document that is referenced by an Index Element structured field in a MO:DCA index. Examples of indexed objects are pages and page groups.

information density. The number of characters per inch (cpi) in a bar code symbology. In most cases, the range is three to ten cpi. See also bar code density, character density, and density.

initial addressable position. The values assigned to I_c and B_c by the data stream at the start of object state. The standard action values are I_o and B_o.

initial baseline print coordinate (b_i). The baseline coordinate of the first print position on a logical page. See also initial inline print coordinate.

initial inline print coordinate (i_i). The inline coordinate of the first print position on a logical page. See also initial baseline print coordinate.

inline-baseline coordinate system. See I,B coordinate system.

inline coordinate. The first of a pair of values that identifies the position of an addressable position with respect to the origin of a specified I,B coordinate system. This value is specified as a distance in addressable positions from the B axis of an I,B coordinate system.

inline direction (I). (1) The direction in which successive characters appear in a line of text. (2) In GOCA, the direction specified by the character angle attribute. Synonymous with I direction.

inline margin. The inline coordinate that identifies the initial addressable position for a line of text.

inline presentation origin (I_o). The point on the I axis where the value of the inline coordinate is zero.

inline resource. A resource object carried in a resource group that precedes all documents in an AFP print file.

input profile. An ICC profile that is associated with the image and describes the characteristics of the device on which the image was created.

instruction CMR. A color management resource that identifies processing that is to be done to an object.

Intelligent Printer Data Stream (IPDS). An architected host-to-printer data stream that contains both data and controls defining how the data is to be presented.

intensity. The extreme strength, degree, or amount of ink.

interchange. The predictable interpretation of shared information in an environment where the characteristics of each process need not be known to all other processes. Contrast with exchange.

interchange set. A defined set of MO:DCA function that describes a level of interchange.

intercharacter adjustment. Additional distance applied to a character increment that increases or decreases the distance between presentation positions, effectively modifying the amount of white space between graphic characters. The amount of white space between graphic characters is changed to spread the characters of a word for emphasis, distribute excess white space on a line among the words of that line to achieve right justification, or move the characters on the line closer together as in kerning. Examples of intercharacter adjustment are intercharacter increment and intercharacter decrement.

intercharacter decrement. Intercharacter adjustment applied in the negative I direction from the current presentation position. See also intercharacter adjustment.

intercharacter gap. In bar codes, the space between two adjacent bar code characters in a discrete code, for example, the space between two characters in Code 39. Synonymous with intercharacter space. Contrast with clear area, element, and space.

intercharacter increment. Intercharacter adjustment applied in the positive I direction from the current presentation position. See also intercharacter adjustment.

intercharacter space. In bar codes, the space between two adjacent bar code characters in a discrete code, for example, the space between two characters in Code 39. Synonymous with intercharacter gap. Contrast with element and space.

interleaved bar code. A bar code symbology in which characters are paired, using bars to represent the first character and spaces to represent the second. An example is Interleaved 2 of 5.

intermediate device. In the IPDS architecture, a device that operates on the data stream and is situated between a printer and a presentation services program in the host. Examples include devices that capture and cache resources and devices that spool the data stream.

internal leading. A font design parameter referring to the space provided between lines of type to keep ascenders separated from descenders and to provide an aesthetically pleasing interline spacing. The value of this parameter usually equals the difference between the vertical font size and the font baseline extent. Contrast with external leading.

internal parameter. In PTOCA, a parameter whose current value is contained within the object. Contrast with external parameter.

International Color Consortium (ICC). A group of companies chartered to develop, use, and promote cross-platform standards so that applications and devices can exchange color data without ambiguity.

International Organization for Standardization (ISO). An organization of national standards bodies from various countries established to promote development of standards to facilitate international exchange of goods and services, and develop cooperation in intellectual, scientific, technological, and economic activity.

interoperability. The capability to communicate, execute programs, or transfer data among various functional units in a way that requires the user to have little or no knowledge of the unique characteristics of those units.

introducer. In GOCA, that part of the data stream passed from a controlling environment to a communication processor that indicates whether entities are to be processed in immediate mode or store mode. See also immediate mode and store mode.

I_o. See inline presentation origin.

IOCA. See Image Object Content Architecture.

IO Image. An image object containing IOCA constructs. Contrast with IM Image.

IO-Image command set. In the IPDS architecture, a collection of commands used to present IOCA data in a page, page segment, or overlay.

IPDS. See Intelligent Printer Data Stream.

IPDS dialog. A series of IPDS commands and IPDS Acknowledge Replies. An IPDS dialog begins with the first IPDS command that an IPDS device receives and ends either when an IPDS command explicitly ends the dialog or when the carrying-protocol session ends. There can be multiple independent sessions each with an IPDS dialog. See also session.

IPS. See image presentation space.

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.

J

JAN. See Japanese Article Numbering.

Japanese Article Numbering (JAN). The bar code symbology used to code grocery items in Japan.

JFIF. See JPEG File Interchange Format.

jog. To cause printed sheets to be stacked in an output stacker offset from previously stacked sheets. Jogging is requested by using an IPDS Execute Order Anystate Alternate Offset Stacker command.

Joint Photographic Experts Group (JPEG). The Joint Photographic Experts Group (JPEG) is a standards committee that designed an image compression format. The compression format they designed is lossy, in that it deletes information from an image that it considers unnecessary. JPEG files can range from small amounts of lossless compression to large amounts of lossy compression.

JPEG. An image compression standard. See Joint Photographic Experts Group.

JPEG File Interchange Format (JFIF). (1) JPEG File Interchange Format (JFIF) is the most common file format for JPEG images. (TIFF is another file format that can be used to store JPEG images, and JNG is a third.) JFIF is not a formal standard; it was designed by a group of companies (though it is most often associated with C-Cube Microsystems, one of whose employees published it) and became a de facto industry standard. (2) Three-component JPEG images. RGB data is assumed without gamma correction and the APP0 marker is used to specify the resolution and optionally the thumbnail.

K

Kanji. A graphic character set for symbols used in Japanese ideographic alphabets.

kerning. The design of graphic characters so that their character boxes overlap, resulting in the reduction of space between characters. This allows characters to be designed for cursive languages, ligatures, and proportionally spaced fonts. An example of kerning is the printing of adjacent graphic characters so they overlap on the left or right side.

kerning track. A straight-line graph that associates vertical font size with white space adjustment. The result of this association is used to scale fonts.

kerning track intercept. The X-intercept of a kerning track for a given vertical font size or white space adjustment value.

kerning track slope. The slope of a kerning track.

key information. Bytes used by the decryption system to decrypt data that has been encrypted.

keyword. A two-part self-defining parameter consisting of a one-byte identifier and a one-byte value.

L

ladder bar code. A bar code pattern presenting the axis of the symbol in its length dimension parallel to the Y_{bc} axis of the bar code presentation space. Synonymous with vertical bar code.

LAN. See local area network.

landscape. A presentation orientation in which the X_m axis is parallel to the long sides of a rectangular physical medium. Contrast with portrait.

language. A set of symbols, conventions, and rules that is used for conveying information. See also pragmatics, semantics, and syntax.

LCID. See Local Character Set Identifier.

leading. A printer's term for the amount of space between lines of a printed page. Leading refers to the lead slug placed between lines of type in traditional typesetting. See also internal leading and external leading.

leading edge. (1) The edge of a character box that in the inline direction precedes the graphic character. (2) The front edge of a sheet as it moves through a printer.

legibility. Characteristics of presented characters that affect how rapidly, easily, and accurately one character can be distinguished from another. The greater the speed, ease, and accuracy of perception, the more legible the presented characters. Examples of characteristics that affect legibility are character shape, spacing, and composition.

LID. See local identifier.

ligature. A single glyph representing two or more characters. Examples of characters that can be presented as ligatures are *ff* and *ffi*.

linear gradient. In GOCA, a gradient where the color change takes place along a line. Contrast with radial gradient.

line art. An image that contains only black and white with no shades of gray.

line attributes. Those attributes that pertain to straight and curved lines. Examples of line attributes are line type and line width.

line data. Unformatted text data. Line data can be formatted using a Page Definition (PageDef).

line screen frequency. The measure of distance between the rows of dots that make up a halftone screen. Lower line screens are used on rougher, low quality printing substrates (such as newsprint), while higher line screens are used for high quality print jobs on smooth art papers.

lines per inch (lpi). (1) The number of lines per inch on a halftone screen. (2) Units used when measuring line screen frequency.

line type. A line attribute that controls the appearance of a line. The line type can either be a standard line type value or a custom line type value. Contrast with line width.

line width. A line attribute that controls the appearance of a line. Examples of line width are normal and thick. Contrast with line type.

link. A logical connection from a source document component to a target document component.

little endian. A bit or byte ordering where the right-most bits or bytes (those with a higher address) are most significant. Contrast with big endian.

Loaded-Font command set. In the IPDS architecture, a collection of commands used to load font information into a printer and to deactivate font resources.

local area network (LAN). A data network located on a user's premises in which serial transmission is used for direct data communication among data stations.

Local Character Set Identifier (LCID). A local identifier used as a character, marker, or pattern set attribute.

local identifier (LID). An identifier that is mapped by the controlling environment to a named resource.

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. A presentation space. One or more object areas can be mapped to a logical page. A logical page has specifiable characteristics, such as size, shape, orientation, and offset. The shape of a logical page is the shape of a rectangle. Orientation and offset are specified relative to a medium coordinate system.

logical unit. A unit of linear measurement expressed with a unit base and units per unit-base value. For example, in MO:DCA and IPDS architectures, the following logical units are used:

- 1 logical unit = 1/1440 inch
  (unit base = 10 inches,
  units per unit base = 14,400)
- 1 logical unit = 1/240 inch
  (unit base = 10 inches,
  units per unit base = 2400)

Synonymous with L unit.

look-up table (LUT). (1) A table used to map one or more input values to one or more output values. (2) A logical list of colors or intensities. The list has a name and can be referenced to select a color or intensity. See also color table.

lossless. A form of image transformation in which all of the data is retained. Contrast with lossy.

lossy. A form of image transformation in which some of the data is lost. Contrast with lossless.

lowercase. Pertaining to small letters as distinguished from capital letters. Examples of small letters are *a*, *b*, and *g*. Contrast with uppercase.

lpi. See lines per inch.

L unit. A unit of linear measurement expressed with a unit base and units per unit-base value. For example, in MO:DCA and IPDS architectures, the following L units are used:

- 1 L unit = 1/1440 inch
  (unit base = 10 inches,
  units per unit base = 14,400)
- 1 L unit = 1/240 inch
  (unit base = 10 inches,
  units per unit base = 2400)

Synonymous with logical unit.

LUT. See look-up table.

Luv color space. The CIE color space in which L*, u* and v* are plotted at right angles to one another. Equal distances in the space represent approximately equal color difference.

M

magnetic ink character recognition (MICR). Recognition of characters printed with ink that contains particles of a magnetic material.

mainframe interactive (MFI). Pertaining to systems in which nonprogrammable terminals are connected to a mainframe.

mandatory support level. Within the base-and-towers concept, the smallest portion of architected function that is allowed to be implemented. This is represented by a base with no towers. Synonymous with base support level.

marker. A symbol with a recognizable appearance that is used to identify a particular location. An example of a marker is a symbol that is positioned by the center point of its cell.

marker attributes. The characteristics that control the appearance of a marker. Examples of marker attributes are size and color.

marker cell. A conceptual rectangular box that can include a marker symbol and the space surrounding that symbol.

marker precision. A method used to specify the degree of influence that marker attributes have on the appearance of a marker; this method has been made obsolete.

marker set. In GOCA, an attribute used to access a coded font.

marker symbol. A symbol that is used for a marker.

maximum ascender height. The maximum of the individual character ascender heights. A value for maximum ascender height is specified for each supported character rotation. Contrast with maximum descender depth.

maximum baseline extent. In FOCA, the sum of the maximum of the individual character baseline offsets and the maximum of the individual character descender depths, for a given font.

maximum descender depth. The maximum of the individual character descender depths. A value for maximum descender depth is specified for each supported character rotation. Contrast with maximum ascender height.

meaning. A table heading for architecture syntax. The entries under this heading convey the meaning or purpose of a construct. A meaning entry can be a long name, a description, or a brief statement of function.

measurement base. A base unit of measure from which other units of measure are derived.

media. Plural of medium. See also medium.

media destination. The destination to which sheets are sent as the last step in the print process. Some printers support several media destinations to allow options such as print job distribution to one or more specific destinations, collated copies without having to resend the document to the printer multiple times, and routing output to a specific destination for security reasons. Contrast with media source.

media-relative colorimetric. This rendering intent rescales the in-gamut, chromatically-adapted tristimulus values such that the white point of the actual medium is mapped to the PCS white point (for either input or output). It is useful for colors that have already been mapped to a medium with a smaller gamut than the reference medium (and therefore need no further compression).

media source. The source from which sheets are obtained for printing. Some printers support several media sources so that media with different characteristics (such as size, color, and type) can be selected when desired. Contrast with media destination.

medium. A two-dimensional conceptual space with a base coordinate system from which all other coordinate systems are either directly or indirectly derived. A medium is mapped onto a physical medium in a presentation-system-dependent manner. Synonymous with medium presentation space. See also logical page, physical medium, and presentation space.

Medium Map. A print control object in a Form Map that defines resource mappings and controls modifications to a form, page placement on a form, and form copy generation. See also Form Map.

medium preprinted form overlay (M-PFO). In MO:DCA, a PFO that is designed to simulate a preprinted form for a sheet-side. An M-PFO is invoked with the MMC structured field and is applied last to the medium presentation space after all other data for the sheet-side has been applied.

medium presentation space. A two-dimensional conceptual space with a base coordinate system from which all other coordinate systems are either directly or indirectly derived. A medium presentation space is mapped onto a physical medium in a presentation-system-dependent manner. Synonymous with medium. See also logical page, physical medium, and presentation space.

metadata. Descriptive information that is associated with and augments other data.

Metadata command set. In the IPDS architecture, a collection of commands used to associate MOCA data with objects.

metadata object. In AFP, the resource object that carries metadata.

Metadata Object Content Architecture (MOCA). A resource object architecture to carry metadata that serves to provide context or additional information about an AFP object or other AFP data.

MFI. See mainframe interactive.

MICR. See magnetic ink character recognition.

Microfilm frame. A rectangular area on the microfilm bounded by imaginary, intersecting grid lines within which a data frame may be recorded. The grid lines are part of gauges used for checking microfilm, but they do not actually appear on the microfilm.

mil. 1/1000 inch.

mix. A method used to determine how the color of a graphics primitive is combined with the existing color of a graphics presentation space. See also foreground mix and background mix.

Mixed Object Document Content Architecture (MO:DCA). An architected, presentation-system-independent data stream for interchanging documents.

mixing. (1) Combining foreground and background of one presentation space with foreground and background of another presentation space in areas where the presentation spaces intersect. (2) Combining foreground and background of multiple intersecting object data elements in the object presentation space.

mixing rule. A method for specifying the color attributes of the resulting foreground and background in areas where two presentation spaces intersect.

M/O. A table heading for architecture syntax. The entries under this heading indicate whether the construct is mandatory (M) or optional (O).

MOCA. See Metadata Object Content Architecture.

MO:DCA. See Mixed Object Document Content Architecture.

MO:DCA GA. A MO:DCA function set that supports levels of PDF used in graphic arts printing.

MO:DCA IS/1. MO:DCA Interchange Set 1. A subset of MO:DCA that defines an interchange format for presentation documents.

MO:DCA IS/2. MO:DCA Interchange Set 2. A retired subset of MO:DCA that defines an interchange format for presentation documents.

MO:DCA IS/3. MO:DCA Interchange Set 3. A subset of MO:DCA that defines an interchange format for print files that supersedes MO:DCA IS/1.

MO:DCA-L. A MO:DCA subset that defines the OS/2 Presentation Manager (PM) metafile. This format is also known as a .met file. The definition of this MO:DCA subset is stabilized and is no longer being developed as part of the MO:DCA architecture. It is defined in the document *MO:DCA-L: The OS/2 Presentation Manager Metafile (.met) Format*, available at `www.afpconsortium.org`.

MO:DCA-P. A subset of the MO:DCA architecture that defines presentation documents. This term is now synonymous with the term MO:DCA.

model space. A two-dimensional conceptual space in which a picture is constructed. All model transforms are completed before a picture is constructed in a graphics model space. Contrast with graphics presentation space. Synonymous with graphics model space.

model transform. A transform that is applied to drawing-order coordinates. Contrast with viewing transform.

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.

modulo-N check. A check in which an operand is divided by a modulus to generate a remainder that is retained and later used for checking. An example of an operand is the sum of a set of digits. See also modulus.

modulus. In a modulo check, the number by which an operand is divided. An example of an operand is the sum of a set of digits. See also modulo-N check.

monochrome. A single color. Monochrome usually refers to a black-and-white image. Also referred to as line art or bitmap mode in Adobe Photoshop®. See also bilevel.

monospaced font. A font with graphic characters having a uniform character increment. The distance between reference points of adjacent graphic characters is constant in the escapement direction. The blank space between the graphic characters can vary. Synonymous with uniformly spaced font. Contrast with proportionally spaced font and typographic font.

move order. A drawing order that specifies or implies movement from the current position to a given position. See also current position and given position.

M-PFO. See medium preprinted form overlay (M-PFO).

multilevel. Having multiple levels; for example, every point in a multilevel image can have values from 0 to n, where n is greater than 1. Contrast with bilevel.

multilevel device. A device that is used in a manner that permits it to process color data of more than two levels. Contrast with bilevel device.

N

NACK. See Negative Acknowledge Reply.

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.

named color. A color that is specified with a descriptive name. An example of a named color is “green”.

navigation. The traversing of a document based on links between contextually related document components.

navigation link. A link type that specifies the linkage from a source document component to a contextually related target document component. Navigation links can be used to support applications such as hypertext and hypermedia.

nColor color space. The color model used in IOCA images that contain color components that typically do not match any of the standard AFP color spaces, such as RGB and CMYK. Often such images contain more than four color components, although the number of color components can be anywhere from two to fifteen, inclusive.

Negative Acknowledge Reply (NACK). In the IPDS architecture, a reply from a printer to a host, indicating that an exception has occurred. Contrast with Positive Acknowledge Reply.

neighborhood-operation halftone. Halftone algorithm that transfers the quantization error due to thresholding to the unhalftoned neighbors of the current pixel. Error diffusion is a neighborhood operation since it operates not only on the input pixel, but also its neighbors. Contrast with point-operation halftone.

nested resource. A resource that is invoked within another resource using either an Include command or a local ID. See also nesting resource.

nesting coordinate space. A coordinate space that contains another coordinate space. Examples of coordinate spaces are medium, overlay, page, and object area.

nesting resource. A resource that invokes nested resources. See also nested resource.

neutral white. A color attribute that gives a presentation-system-dependent default color, typically white on a screen and black on a printer. Note that neutral white and color of medium are two different colors.

non-presentation object. An object that is not a presentation object.

nonprocess runout (NPRO). An operation that moves sheets of physical media through the printer without printing on them. This operation is used to stack the last printed sheet.

no operation (NOP). A construct whose execution causes a product to proceed to the next instruction to be processed without taking any other action.

NOP. See no operation.

normal-duplex printing. Duplex printing that simulates the effect of physically turning the sheet around the Y_m axis.

NPRO. See nonprocess runout.

N-up. The partitioning of a side of a sheet into a fixed number of equal size partitions. For example, 4-up divides each side of a sheet into four equal partitions.

O

object. (1) A collection of structured fields. The first structured field provides a begin-object function, and the last structured field provides an end-object function. The object can contain one or more other structured fields whose content consists of one or more data elements of a particular data type. An object can be assigned a name, that can be used to reference the object. Examples of objects are presentation text, font, graphics, and image objects. (2) Something that a user works with to perform a task.

object area. A rectangular area in a presentation space into which a data object is mapped. The presentation space can be for a page or an overlay. Examples are a graphics object area, an image object area, and a bar code object area.

object data. A collection of related data elements bundled together. Examples of object data include graphic characters, image data elements, and drawing orders.

object identifier (OID). (1) A notation that assigns a globally unambiguous name to an object or a document component. The notation is defined in international standard ISO/IEC 8824(E). (2) A variable length (2-bytes long to 129-bytes long) binary ID that uniquely identifies an object. OIDs use the ASN.1 definite-short-form object identifier format defined in the ISO/IEC 8824:1990(E) international standard and described in the MO:DCA Registry Appendix of the *Mixed Object Document Content Architecture Reference*. An OID consists of a one-byte identifier (X'06'), followed by a one-byte length (between X'00' and X'7F'), followed by 0–127 content bytes.

obsolete. Removed from the architecture, and thus ignored by receivers.

OCR A. See Optical Character Recognition A.

OCR B. See Optical Character Recognition B.

offline. A device state in which the device is not under the direct control of a host. Contrast with online.

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.

OID. See object identifier.

online. A device state in which the device is under the direct control of a host. Contrast with offline.

opacity. In bar codes, the optical property of a substrate material that minimizes showing through from the back side or the next sheet.

Optical Character Recognition A (OCR A). A font containing the character set in ANSI standard X3.17-1981, that contains characters that are both human readable and machine readable.

Optical Character Recognition B (OCR B). A font containing the character set in ANSI standard X3.49-1975, that contains characters that are both human readable and machine readable.

order. (1) In GOCA, a graphics construct that the controlling environment builds to instruct a drawing processor about what to draw and how to draw it. The order can specify, for example, that a graphics primitive be drawn, a change to drawing attributes or drawing controls be effected, or a segment be called. One or more graphics primitives can be used to draw a picture. Orders can be included in a structured field. Synonymous with drawing order. (2) In the IPDS architecture, a construct within an execute-order command. (3) In IOCA, a functional operation that is performed on the image content.

ordered page. In the IPDS architecture, a logical page that does not contain any page segments or overlays, and in which all text data and all image, graphics, and bar code objects are ordered. The order of the data objects is such that physical pel locations on the physical medium are accessed by the printer in a sequential left-to-right and top-to-bottom manner, where these directions are relative to the top edge of the physical medium. Once a physical pel location has been accessed by the printer, the page data does not require the printer to access that same physical pel location again.

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. See also presentation space orientation and text orientation.

origin. The point in a coordinate system where the axes intersect. Examples of origins are the addressable position in an X_m,Y_m coordinate system where both coordinate values are zero and the character reference point in a character coordinate system.

orthogonal. Intersecting at right angles. An example of orthogonal is the positional relationship between the axes of a Cartesian coordinate system.

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.

output profile. An ICC profile that describes the characteristics of the output device for which the image is destined. The profile is used to color match the image to the device's gamut.

overhead. In a bar code symbology, the fixed number of characters required for starting, stopping, and checking a bar code symbol.

overlay. (1) A resource object that contains presentation data such as, text, image, graphics, and bar code data. Overlays define their own environment and are often used as pre-defined pages or electronic forms. Overlays are classified according to how they are presented with other presentation data: a medium overlay is positioned at the origin of the medium presentation space before any pages are presented, and a page overlay is positioned at a specified point in a page's logical page. A Page Modification Control (PMC) overlay is a special type of page overlay used in MO:DCA environments. (2) The final representation of such an object on a physical medium. Contrast with page segment.

Overlay command set. In the IPDS architecture, a collection of commands used to load, deactivate, and include overlays.

overlay ID. A one-byte ID assigned by a host to an overlay. Overlay IDs are used in IPDS Begin Overlay, Deactivate Overlay, Include Overlay, and Load Copy Control commands.

overlay state. An operating state that allows overlay data to be downloaded to a product. For example, a printer enters overlay state from home state when the printer receives an IPDS Begin Overlay command.

overpaint. A mixing rule in which the intersection of part of a new presentation space P_{new} with an existing presentation space $P_{existing}$ keeps the color attribute of P_{new}. This is also referred to as “opaque” mixing. See also mixing rule. Contrast with blend and underpaint.

overscore. A line parallel to the baseline and placed above the character.

overstrike. In PTOCA, the presentation of a designated character as a string of characters in a specified text field. The intended effect is to make the resulting presentation appear as though the text field, whether filled with characters or blanks, has been marked out with the overstriking character.

overstriking. The method used to merge two or more graphic characters at the same addressable position in a presentation space or on a physical medium.

P

page. (1) A data stream object delimited by a Begin Page structured field and an End Page structured field. A page can contain presentation data such as text, image, graphics, and bar code data. (2) The final representation of a page object on a physical medium.

page counter. Bytes in an IPDS Acknowledge Reply that specify the number of pages that have passed a particular point in a logical paper path.

PageDef. See Page Definition.

Page Definition (PageDef). A print control object used to format line data into page data. A Page Definition contains one or more Data Maps and may optionally specify conditional processing of the line data. Synonymous with Page Map. See also Data Map.

Page Format. Synonymous with Data Map.

page group. A named group of sequential pages. A page group is delimited by a Begin Named Page Group structured field and an End Named Page Group structured field. A page group can contain nested page groups. All pages in the page group inherit the attributes and processing characteristics that are assigned to the page group.

Page Map. A print control object used to format line data into page data. A Page Map contains one or more Data Maps and may optionally specify conditional processing of the line data. Synonymous with Page Definition. See also Data Map.

page segment. (1) In the IPDS architecture, a resource object that can contain text, image, graphics, and bar code data. Page segments do not define their own environment, but are processed in the existing environment. (2) In MO:DCA, a resource object that can contain any mixture of bar code objects, graphics objects, and IOCA image objects. A page segment does not contain an active environment group. The environment for a page segment is defined by the active environment group of the including page or overlay. (3) The final representation of such an object on a physical medium. Contrast with overlay.

Page-Segment command set. In the IPDS architecture, a collection of commands used to load, deactivate, and include page segments.

page-segment state. An operating state that makes page-segment data available to a product. For example, a printer enters page-segment state from home state when it receives an IPDS Begin Page Segment command.

page state. In the IPDS architecture, an operating state that makes page data available to a product. For example, a printer enters page state from home state when it receives an IPDS Begin Page command.

paginated object. A data object that can be rendered on a single page or overlay. An example of a paginated object is a single image in a multi-image TIFF file.

palette. The collection of colors or shades available to a graphics system or program.

PANTONE. The proprietary PANTONE® color matching system is the most popular method of specifying extra colors—not out of the CMYK four color process—for print. PANTONE colors are numbered and mixed from a base set of colors. By specifying a specific PANTONE color, a designer knows that there is little chance of color variance on the presses.

parameter. (1) A variable that is given a constant value for a specified application. (2) A variable used in conjunction with a command to affect its result.

partition. Dividing the medium presentation space into a specified number of equal-sized areas in a manner determined by the current physical media.

partitioning. A method used to place parts of a control into two or more segments or structured fields. Partitioning can cause difficulties for a receiver if one of the segments or structured fields is not received or is received out of order.

pattern. An array of symbols used to fill an area.

pattern attributes. The characteristics that specify the appearance of a pattern.

pattern reference point. In GOCA, a position in the graphics presentation space to be used as the origin of a custom pattern; the pattern is tiled in all directions from this position.

pattern set. An attribute in GOCA used to access a symbol set or coded font.

pattern symbol. The geometric construct that is used repetitively to generate a pattern. Examples of pattern symbols are dots, squares, and triangles.

PCL. A set of printer commands, developed by Hewlett-Packard, that provide access to printer features.

PCS. (1) See Print Contrast Signal. (2) See Profile Connection Space.

PDF. An acronym for Acrobat® Portable Document Format. PDF files are cross platform and contain all of the image and font data. Design attributes are retained in a compressed single package.

pel. 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. Pels per inch is often used as a measurement of presentation granularity. Synonymous with picture element and pixel.

perceptual rendering intent. The exact gamut mapping of the perceptual rendering intent is vendor specific and involves compromises such as trading off preservation of contrast in order to preserve detail throughout the tonal range. It is useful for general reproduction of images, particularly pictorial or photographic-type images.

PFB file. A file containing the font information required for presenting the characters of a font. The shape information (glyph procedures) contained in this file is in a binary encoded format defined by Adobe Systems Inc., optimized for small character set fonts having one to two hundred characters (for example, English, Greek, and Cyrillic).

PFO. See preprinted form overlay (PFO).

physical file. A single operating system file intended for presentation. The format of the file, and its delineation, is defined by the operating system.

physical medium. A physical entity on which information is presented. Examples of a physical medium are a sheet of paper, a roll of paper, an envelope, and a display screen. See also medium presentation space and sheet.

physical printable area. A bounded area defined on a side of a sheet within which printing can take place. The physical printable area is an attribute of sheet size and printer capabilities, and cannot be altered by the host. The physical printable area is mapped to the medium presentation space, and is used in user printable area and valid printable area calculations. Contrast with user printable area and valid printable area.

picket fence bar code. A bar code pattern presenting the axis of the symbol in its length dimension parallel to the X_{bc} axis of the bar code presentation space. Synonymous with horizontal bar code.

picture chain. A string of segments that defines a picture. Synonymous with segment chain.

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. Picture elements per inch is often used as a measurement of presentation granularity. Synonymous with pel and pixel.

pixel. 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. Picture elements per inch is often used as a measurement of presentation granularity. Synonymous with pel and picture element.

PMC-PFO. See PMC preprinted form overlay (PMC-PFO).

PMC preprinted form overlay (PMC-PFO). In MO:DCA, a PFO that is designed to simulate a preprinted form for a page. A PMC-PFO is invoked with the PMC structured field and is applied last to the page presentation space after all other data for the page has been applied.

PNG. See Portable Network Graphics.

point. (1) A unit of measure used mainly for measuring typographical material. There are seventy-two points to an inch. (2) In GOCA, a parameter that specifies the position within the drawing order coordinate space. See also drawing order coordinate space.

point-operation halftone. Any halftone algorithm that produces output for a given location based only on the single input pixel at that location, independent of its neighbors. Thus, it is accomplished by a simple point-wise comparison of the input image against a predetermined threshold array or mask. Contrast with neighborhood-operation halftone.

polyline. A sequence of connected lines.

Portable Network Graphics (PNG). A lossless image format.

portrait. A presentation orientation in which the X_m axis is parallel to the short sides of a rectangular physical medium. Contrast with landscape.

position. A position in a presentation space or on a physical medium that can be identified by a coordinate from the coordinate system of the presentation space or physical medium. See also picture element. Synonymous with addressable position.

Positive Acknowledge Reply (ACK). In the IPDS architecture, a reply to an IPDS command that has its acknowledgment-required flag on and in which no exception is reported. Contrast with Negative Acknowledge Reply.

PostScript. A page description programming language created by Adobe Systems Inc. that is a presentation-system-independent industry standard for outputting documents and graphics. It describes pages to any output device with a PostScript interpreter.

posture. Inclination of a letter with respect to a vertical axis. Examples of inclination are upright and inclined. An example of upright is Roman. An example of inclined is italics.

pragmatics. Information related to the usage of a construct. See also semantics and syntax.

preprinted form. A form or sheet that is not blank when it is selected as input media for presentation.

preprinted form overlay (PFO). An overlay and associated processing designed to simulate a preprinted form.

presentation data stream. A presentation data stream that is processed in AFP environments. The MO:DCA architecture describes the AFP interchange data stream. The IPDS architecture describes the AFP printer data stream.

presentation device. A device that produces character shapes, graphics pictures, images, or bar code symbols on a physical medium. Examples of a physical medium are a display screen and a sheet of paper.

presentation object. An object that describes presentation data such as text, image, and graphics, in a paginated, final-form format suitable for presentation on a page. Contrast with non-presentation object.

presentation position. An addressable position that is coincident with a character reference point. See also addressable position and character reference point.

presentation process. Synonymous with presentation system.

presentation services. In printing, a software component that communicates with a printer using a printer data stream, such as the IPDS data stream, to print pages, download and manage print resources, and handle exceptions.

presentation space. A conceptual address space with a specified coordinate system and a set of addressable positions. The coordinate system and addressable positions can coincide with those of a physical medium. Examples of presentation spaces are medium, logical page, and object area. See also graphics presentation space, image presentation space, logical page, medium presentation space, and text presentation space.

presentation space orientation. The number of degrees and minutes a presentation space is rotated in a specified coordinate system. For example, the orientation of printing on a physical medium, relative to the X_m axis of the X_m,Y_m coordinate system. See also orientation and text orientation.

presentation system. A system for presenting data. In AFP environments such a system normally contains at least a formatting application, a print server, and a printer. Synonymous with presentation process.

presentation text object. An object that contains presentation text data. See also object.

Presentation Text Object Content Architecture (PTOCA). An architected collection of constructs used to interchange and present presentation text data.

print contrast. A measurement of the ratio of the reflectivities between the bars and spaces of a bar code symbol, commonly expressed as a percent. Synonymous with Print Contrast Signal.

Print Contrast Signal (PCS). A measurement of the ratio of the reflectivities between the bars and spaces of a bar code symbol, commonly expressed as a percent. Synonymous with print contrast.

print control object. A resource object that contains layout, finishing, and resource mapping information used to present a document on physical media. Examples of print control objects are Form Maps and Medium Maps.

print direction. In FOCA, the direction in which successive characters appear in a line of text.

print file. A file that is created for the purpose of printing data. The print file is the highest level of the MO:DCA data-stream document-component hierarchy.

printing baseline. A conceptual line with respect to which successive characters are aligned. See also character baseline. Synonymous with baseline and sequential baseline.

print quality. In bar codes, the measure of compliance of a bar code symbol to the requirements of dimensional tolerance, edge roughness, spots, voids, reflectance, PCS, and quiet zones defined within a bar code symbology.

print unit. In the IPDS architecture, a group of pages bounded by XOH-DGB commands and subject to the group operation *keep group together as a print unit*. A print unit is commonly referred to as a print job.

process color. A color that is specified as a combination of the components, or primaries, of a color space. A process color is rendered by mixing the specified amounts of the primaries. An example of a process color is C=0.1, M=0.8, Y=0.2, K=0.1 in the cyan/magenta/yellow/black (CMYK) color space. Contrast with spot color.

process element. In MO:DCA, a document component that is defined by a structured field and that facilitates a form of document processing that does not affect the presentation of the document. Examples of process elements are Tag Logical Elements (TLEs) that specify document attributes and Link Logical Elements (LLEs) that specify linkages between document components.

Profile Connection Space (PCS). The reference color space defined by ICC, in which colors are encoded in order to provide an interface for connecting source and destination transforms. The PCS is based on the CIE 1931 standard colorimetric observer.

prolog. The first portion of a segment's data. Prologs are optional. They contain attribute settings and drawing controls. Synonymous with segment prolog.

propagation. A method used to retain a segment's properties through other segments that it calls.

proper subset. A set whose members are also members of a larger set.

proportion. Relationship of the width of a letter to its height.

proportionally spaced font. A font with graphic characters that have varying character increments. Proportional spacing can be used to provide the appearance of even spacing between presented characters and to eliminate excess blank space around narrow characters. An example of a narrow character is the letter i. Synonymous with typographic font. Contrast with monospaced font and uniformly spaced font.

proportional spacing. The spacing of characters in a printed line so that each character is allotted a space based on the character's width.

Proportional Spacing Machine font (PSM font). A font originating with the electric typewriter and having character increment values that are integer multiples of the narrowest character width.

PSM font. See Proportional Spacing Machine font.

PTOCA. See Presentation Text Object Content Architecture.

Q

quantization. The process of reducing an image with many colors to one with fewer colors, usually in preparation for its conversion to a palette-based image. As a result, most parts of the image (that is, most of its pixels) are given slightly different colors that amounts to a certain level of error at each location. Since photographic images usually have extended regions of similar colors that get converted to the same quantized color, a quantized image tends to have a flat or banded (contoured) appearance unless it is also dithered.

quiet zone. A clear space that contains no machine-readable marks preceding the start character of a bar code symbol or following the stop character. Synonymous with clear area. Contrast with intercharacter gap and space.

R

radial gradient. In GOCA, a gradient where the color change takes place between two full arcs. Contrast with linear gradient.

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. (1) The area of the video display that is covered by sweeping the electron beam of the display horizontally and vertically. Normally the electronics of the display sweep each line horizontally from top to bottom and return to the top during the vertical retrace interval. (2) In computer graphics, a predetermined pattern of lines that provides uniform coverage of a display space. (3) In nonimpact printers, an on-or-off pattern of electrostatic images produced by the laser print head under control of the character generator.

raster direction. An attribute that controls the direction in which a character string grows relative to the inline direction. Values are: left-to-right, right-to-left, top-to-bottom, and bottom-to-top.

rasterize. To convert presentation data into raster (bitmap) form for display or printing.

raster pattern. A rectangular array of pels arranged in rows called scan lines.

readability. The characteristics of visual material that determine the degree of comfort with which it can be read over a sustained period of time. Examples of characteristics that influence readability are type quality, spacing, and composition.

reader. In bar code systems, the scanner or combination of scanner and decoder. See also decoder and scanner.

read rate. In bar codes, the ratio of the number of successful reads on the first attempt to the total number of attempts made to obtain a successful read. Synonymous with first read rate.

rearranged file. A file containing the mapping of code points to the character index values used in a CID file and to the character names used in one or more PFB files. This is a special case of the CMAP file that permits linking of multiple font files and formats together. The code points conform to a particular character coding system that is used to identify the characters in a document data stream. The mapping information in this file is in an ASCII file format defined by Adobe Systems Inc.

record-format line data. A form of line data where each record is preceded by a 10-byte identifier. The record is presented by matching its ID to the ID specified on a Record Descriptor in the Data Map of a Page Definition.

recording algorithm. An algorithm that determines the relationship between the physical location and logical location of image points in image data.

recovery-unit group. (1) In the IPDS architecture, a group of pages identified by the XOH Define Group Boundary command and controlled by the Keep-Group-Together-as-a-Recovery-Unit group operation specified by the XOH Specify Group Operation command. The recovery-unit group also includes all copies specified by the Load Copy Control command. (2) In the MO:DCA architecture, a group of pages identified as a unit for error recovery purposes, such as in cases of a printer recovery from an error that occurs in the middle of the group. A recovery-unit group is identified by a Begin Named Group (BNG) and End Named Group (ENG) pair that contains a Keep Group Together (X'9D') triplet.

redaction. The process of applying an opaque mask over a page so that a selected portion of the page is visible. Since this function is typically used to prevent unauthorized viewing of data, an associated security level is also provided.

reflectance. In bar codes, the ratio of the amount of light of a specified wavelength or series of wavelengths reflected from a test surface to the amount of light reflected from a barium oxide or magnesium oxide standard under similar illumination conditions.

relative coordinate. One of the coordinates that identify the location of an addressable point by means of a displacement from some other addressable point. Contrast with absolute coordinate.

relative line. A straight line developed from a specified point by a given displacement.

relative metrics. Graphic character measurements expressed as fractions of a square, called the Em square, whose sides correspond to the vertical size of the font. Because the measurements are relative to the size of the Em square, the same metrics can be used for different point sizes and different raster pattern resolutions. Relative metrics require defining the unit of measure for the Em square, the point size of the font, and, if applicable, the resolution of the raster pattern.

relative move. A method used to establish a new current position. Distance and direction from the current position are used to establish the new current position. The direction of displacement is inline along the I axis in the I direction, or baseline along the B axis in the B direction, or both.

relative positioning. The establishment of a position within a coordinate system as an offset from the current position. Contrast with absolute positioning.

rendering intent. A particular gamut-mapping style or method of converting colors in one gamut to colors in another gamut. ICC profiles support four different rendering intents: perceptual, media-relative colorimetric, saturation, and ICC-absolute colorimetric.

repeating group. A group of parameter specifications that can be repeated.

repeat string. A method used to repeat the character content of text data until a given number of characters has been processed. Any control sequences in the text data are ignored. This method provides the functional equivalence of a Transparent Data control sequence when the given number of repeated characters is equal to the number of characters in the text data.

reserved. Having no assigned meaning and put aside for future use. The content of reserved fields is not used by receivers, and should be set by generators to a specified value, if given, or to binary zeros. A reserved field or value can be assigned a meaning by an architecture at any time.

reset color. The color of a presentation space before any data is added to it. Synonymous with color of medium.

resident resource. In the IPDS architecture, a resource in a printer or in a resource-caching intermediate device. A resident resource can be installed manually or can be captured by the device if it is intended for public use. A resident resource is referenced by a global ID that is valid for the duration of the resource's presence in the device. Contrast with downloaded resource.

resolution. (1) A measure of the sharpness of an input or output device capability, as given by some measure relative to the distance between two points or lines that can just be distinguished. (2) The number of addressable pels per unit of length.

resolution correction. A method used to present an image on a printer without changing the physical size or proportions of the image when the resolutions of the printer and the image are different.

resolution-correction ratio. The ratio of a device resolution to an image presentation space resolution.

resolution modification. A method used to write an image on an image presentation space without changing the physical size of the image when the resolutions of the presentation space and the image are different.

resource. An object that is referenced by a data stream or by another object to provide data or information. Resource objects can be stored in libraries. In MO:DCA, resource objects can be contained within a resource group. Examples of resources are fonts, overlays, and page segments. See also downloaded resource, resident resource, and secondary resource.

resource caching. In the IPDS architecture, a function in a printer or intermediate device whereby downloaded resources are captured and made resident in the printer or intermediate device.

retired. Set aside for a particular purpose, and not available for any other purpose. Retired fields and values are specified for compatibility with existing products and identify one of the following:

- Fields or values that have been used by a product in a manner not compliant with the architected definition
- Fields or values that have been removed from an architecture

reuse LND. A Line Descriptor (LND) in a chain of LNDs, also called a reuse chain, where all LNDs process fields in the same line-data record. See also base LND.

RGB. Red, green and blue, the additive primary colors.

RGB color space. The basic additive color model used for color video display, as on a computer monitor.

RIP. A raster image processor (RIP) is a hardware or software tool that processes a presentation data stream and converts it—rasterizes it—to a printable format.

RM4SCC. See Royal Mail 4 State Customer Code.

Roman. Relating to a type style with upright letters.

root segment. A segment in the picture chain that is not called by any other segment. If a single segment that is not in a segment chain is drawn, it is treated as a root segment for the duration of the drawing process.

rotating. In computer graphics, turning all or part of a picture about an axis perpendicular to the presentation space.

rotation. The orientation of a presentation space with respect to the coordinate system of a containing presentation space. Rotation is measured in degrees in a clockwise direction. Zero-degree rotation exists when the angle between a presentation space's positive X axis and the containing presentation space's positive X axis is zero degrees. Contrast with character rotation.

row. A subarray that consists of all elements that have an identical position within the high dimension of a regular two-dimensional array.

Royal Mail 4 State Customer Code (RM4SCC). A two-dimensional bar code symbology developed by the United Kingdom's Royal Mail postal service for use in automated mail-sorting processes.

rule. A solid line of any line width.

S

sans serif. A type style characterized by strokes that end with no flaring or crossing of lines at the stroke ends. Contrast with serif.

saturation rendering intent. The exact gamut mapping of the saturation rendering intent is vendor specific and involves compromises such as trading off preservation of hue in order to preserve the vividness of pure colors. It is useful for images that contain objects such as charts or diagrams.

SBCS. See single-byte character set.

SBIN. A data type for architecture syntax, that indicates that one or more bytes be interpreted as a signed binary number, with the sign bit in the high-order position of the leftmost byte. Positive numbers are represented in true binary notation with the sign bit set to B'0'. Negative numbers are represented in twos-complement binary notation with a B'1' in the sign-bit position.

Scalable Vector Graphics (SVG). An XML-based vector image format.

scaling. Making all or part of a picture smaller or larger by multiplying the coordinate values of the picture by a constant amount. If the same multiplier is applied along both dimensions, the scaling is uniform, and the proportions of the picture are unaffected. Otherwise, the scaling is anamorphic, and the proportions of the picture are changed. See also anamorphic scaling.

scaling ratio. (1) The ratio of an image-object-area size to its image-presentation-space size. (2) In FOCA, the ratio of horizontal to vertical scaling of the graphic characters. See also horizontal scale factor.

scan line. A series of picture elements. Scan lines in raster patterns form images. See also picture element and raster pattern.

scanner. In bar codes, an electronic device that converts optical information into electrical signals. See also reader.

screen. (1) A halftone-threshold array. (2) The display surface of a display device such as a computer monitor.

scrolling. A method used to move a displayed image vertically or horizontally so that new data appears at one edge as old data disappears at the opposite edge. Data disappears at the edge toward which an image is moved and appears at the edge away from which the data is moved.

SDA. See special data area.

secondary resource. A resource for an object that is itself a resource.

section. A portion of a double-byte code page that consists of 256 consecutive entries. The first byte of a two-byte code point is the section identifier. A code-page section is also called a code-page ward in some environments. See also code page and code point.

section identifier. A value that identifies a section. Synonymous with section number.

section number. A value that identifies a section. Synonymous with section identifier.

secure overlay. An overlay that can be printed anywhere within the physical printable area. A secure overlay is not affected by an IPDS Define User Area command.

segment. (1) In GOCA, a set of graphics drawing orders contained within a Begin Segment command. See also graphics segment. (2) In IOCA, image content bracketed by Begin Segment and End Segment self-defining fields. See also image segment.

segment chain. A string of segments that defines a picture. Synonymous with picture chain.

segment exception condition. An architecture-provided classification of the errors that can occur in a segment. Segment exception conditions are raised when a segment error is detected. Examples of segment errors are segment format, parameter content, and sequence errors.

segment offset. A position within a segment, measured in bytes from the beginning of the segment. The beginning of a segment is always at offset zero.

segment prolog. The first portion of a segment's data. Prologs are optional. They contain attribute settings and drawing controls. Synonymous with prolog.

segment properties. The segment characteristics used by a drawing process. Examples of segment properties are segment name, segment length, chained, dynamic, highlighted, propagated, and visible.

segment transform. A model transform that is applied to a whole segment.

self checking. In bar codes, using a checking algorithm that can be applied to each character independently to guard against undetected errors.

semantics. The meaning of the parameters of a construct. See also pragmatics and syntax.

sequential baseline. A conceptual line with respect to which successive characters are aligned. See also character baseline. Synonymous with baseline and printing baseline.

sequential baseline position. The current addressable position for a baseline in a presentation space or on a physical medium. See also baseline coordinate and current baseline presentation coordinate.

serif. A short line angling from or crossing the free end of a stroke. Examples are horizontal lines at the tops and bottoms of vertical strokes on capital letters, for example, *I* and *H*, and the decorative strokes at the ends of the horizontal members of a capital E. Contrast with sans serif.

server. In a network, hardware or software that provides facilities to other stations. Examples include: a file server, a printer server, and a mail server.

session. In the IPDS architecture, the period of time during which a presentation services program has a two-way communication with an IPDS device. The session consists of a physical attachment and a communications protocol; the communications protocol carries an IPDS dialog by transparently transmitting IPDS commands and Acknowledge Replies. See also IPDS dialog.

setup file. In the IPDS architecture, an object container that provides setup information for a printer. Setup files are downloaded in home state and take effect immediately. Setup files are not managed as resources.

setup name. A user-created name for a set of specific settings on a device. There is at most one setup name active on a device at any time, and it is allowed for there to be no active setup name on a device.

shade. Variation of a color produced by mixing it with black.

shape compression. A method used to compress digitally encoded character shapes using a specified algorithm.

shape technology. A method used to encode character shapes digitally using a specified algorithm.

shear. The angle of slant of a character cell that is not perpendicular to a baseline. Synonymous with character shear.

shearline direction. In GOCA, the direction specified by the character shear and character angle attributes.

sheet. A division of the physical medium; multiple sheets can exist on a physical medium. For example, a roll of paper might be divided by a printer into rectangular pieces of paper, each representing a sheet. Envelopes are an example of a physical medium that comprises only one sheet. The IPDS architecture defines four types of sheets: cut-sheet media, continuous-form media, envelopes, and computer output on microfilm. Each type of sheet has a top edge. A sheet has two sides, a front side and a back side. Synonymous with form.

show through. In bar codes, the generally undesirable property of a substrate that permits underlying markings to be seen.

side. A physical surface of a sheet. A sheet has a front side and a back side. See also sheet.

signed integers. The positive natural numbers (1, 2, 3, ...), their negatives (-1, -2, -3, ...) and the number zero. The set of all integers is usually denoted in mathematics by Z, which stands for *Zahlen* (German for “numbers”).

simplex printing. A method used to print data on one side of a sheet; the other side is left blank. Contrast with duplex printing.

single-byte character set (SBCS). A character set that can contain up to 256 characters.

single-byte coded font. A coded font in which the code points are one byte long.

slope. The posture, or incline, of the main strokes in the graphic characters of a font. Slope is specified in degrees by a font designer.

soft object. An object that is not mapped in an environment group and is therefore not sent to the presentation device until it is referenced within a page or overlay. Contrast with hard object.

space. In bar codes, the lighter element of a printed bar code symbol, usually formed by the background between bars. See also element. Contrast with bar, clear area, intercharacter gap, and quiet zone.

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.

spanning. In the IPDS architecture, a method in which one command is used to start a sequence of constructs. Subsequent commands continue and terminate that sequence. See also control sequence chaining.

special data area (SDA). The data area in an IPDS Acknowledge Reply that contains data requested by the host or generated by a printer as a result of an exception.

Specifications for Web Offset Publications (SWOP). A standard set of specifications for color separations, proofs, and printing to ensure consistency of color printing.

spot. In bar codes, the undesirable presence of ink or dirt in a bar code symbol space.

spot color. A color that is specified with a unique identifier such as a number. A spot color is normally rendered with a custom colorant instead of with a combination of process color primaries. See also highlight color. Contrast with process color.

sRGB. One of the standard RGB color spaces, a means of specifying precisely how any given RGB value should appear on a display or printed paper or any other output device. sRGB was promoted by the ICC and submitted for standardization by the International Electrotechnical Commission (IEC).

stack. A list that is constructed and maintained so that the next item to be retrieved and removed is the most recently stored item still in the list. This is sometimes called last-in-first-out (LIFO).

standard action. The architecture-defined action to be taken on detecting an exception condition, when the controlling environment specifies that processing should continue.

standard line type value. A predefined line type, like solid, invisible, or dash dot. Contrast with custom line type value.

start-stop character or pattern. In bar codes, a special bar code character that provides the scanner with start and stop reading instructions as well as 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 symbol.

stochastic. A method that uses a pseudo-random dot size and/or frequency to create halftone images, but without the visible regularity in the dot patterns found in traditional screening.

store mode. A mode in which segments are stored for later execution. Contrast with immediate mode.

stroke. A straight or curved line used to create the shape of a letter.

structured field. A self-identifying, variable-length, bounded record, that can have a content portion that provides control information, data, or both. See also document element.

structured field introducer. In MO:DCA, the header component of a structured field that provides information that is common for all structured fields. Examples of information that is common for all structured fields are length, function type, and category type. Examples of structured field function types are begin, end, data, and descriptor. Examples of structured field category types are presentation text, image, graphics, and page.

subordinate object. An object that is lower in the document-component hierarchy than a given object. For example, a page is a subordinate object to a page group, and a page group is a subordinate object to a document.

subpage. A part of a logical page on which line data may be placed. A line data record is identified as belonging to a particular subpage with the subpage identifier byte in the Line Descriptor (LND) structured field. Conditional processing can be used with a Page Definition to select a new Data Map and/or Medium Map to take effect before or after the current subpage is printed.

subset. Within the base-and-towers concept, a portion of architecture represented by a particular level in a tower or by a base. See also subsetting tower.

subsetting tower. Within the base-and-towers concept, a tower representing an aspect of function achieved by an architecture. A tower is independent of any other towers. A tower can be subdivided into subsets. A subset contains all the function of any subsets below it in the tower. See also subset.

substrate. In bar codes, the surface on which a bar code symbol is printed.

subtractive primary colors. Cyan, magenta, and yellow colorants used to subtract a portion of the white light that is illuminating an object. Subtractive colors are reflective on paper and printed media. When used together with various degrees of coverage and variation, they have the ability to create billions of other colors. Contrast with additive primary colors.

suppression. A method used to prevent presentation of specified data. Examples of suppression are the processing of text data without placing characters on a physical medium and the electronic equivalent of the “spot carbon,” that prevents selected data from being presented on certain copies of a presentation space or a physical medium.

surrogate pair. A sequence of two Unicode code points that allow for the encoding of as many as 1 million additional characters without any use of escape codes.

surrogates. A way to refer to one or more surrogate pairs.

SVG. See Scalable Vector Graphics.

SWOP. See Specifications for Web Offset Publications.

symbol. (1) A visual representation of something by reason of relationship, association, or convention. (2) In GOCA, the subpicture referenced as a character definition within a font character set and used as a character, marker, or fill pattern. A bitmap can also be referenced as a symbol for use as a fill pattern. See also bar code symbol.

symbol length. In bar codes, the distance between the outside edges of the quiet zones of a bar code symbol.

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 Canadian Grocery Product Code (CGPC), European

Article Numbering (EAN), Japanese Article Numbering (JAN), and Universal Product Code (UPC).

symbol set. A coded font that is usually simpler in structure than a fully described font. Symbol sets are used where typographic quality is not required. Examples of devices that might not provide typographic quality are dot-matrix printers and displays. See also character set, marker set, and pattern set.

synchronous exception. In the IPDS architecture, a data-stream, function no longer achievable, or resource-storage exception that must be reported to the host before a printer can return a Positive Acknowledge Reply or can increment the received-page counter for a page containing the exception. Synchronous exceptions are those with action code X'01', X'06', X'0C', or X'1F'. See also data-stream exception. Contrast with asynchronous exception.

syntax. The rules governing the structure of a construct. See also pragmatics and semantics.

system-level font resource. A common-source font from which:

- Document-processing applications can obtain resolution-independent formatting information.
- Device-service applications can obtain device-specific presentation information.

T

tag. A data structure that is used within the data portion of a color management resource (CMR). A CMR tag consists of TagID, FieldType, Count, and ValueOffset.

Tagged Image File Format (TIFF). A rich and flexible graphics image format.

temporary baseline. The shifted baseline used for subscript and superscript.

temporary baseline coordinate. The B value of the I,B coordinate pair of an addressable position on the temporary baseline.

temporary baseline increment. A positive or negative value that is added to the current baseline presentation coordinate to specify the position of a temporary baseline in a presentation space or on a physical medium. Several increments might have been used to place a temporary baseline at the current baseline presentation coordinate.

tertiary resource. A resource for an object that is itself a secondary resource to another resource.

text. A graphic representation of information. Text can consist of alphanumeric characters and symbols arranged in paragraphs, tables, columns, and other shapes. An example of text is the data sent in an IPDS Write Text command.

Text command set. In the IPDS architecture, a collection of commands used to present PTOCA text data in a page, page segment, or overlay.

text major. A description for text where the Presentation Text Data Descriptor (PTD) is specified in page controls. In MO:DCA, the PTD is in the Active Environment Group (AEG) for the page; in IPDS, the PTD is specified as initial text-major conditions in the Logical Page Descriptor command.

text object. (1) An object that contains text data. (2) A presentation-system-independent, self-defining representation of a two-dimensional presentation space, called the text object space, that contains presentation text data.

text object space. Synonymous with text presentation space.

text orientation. A description of the appearance of text as a combination of inline direction and baseline direction. See also baseline direction, inline direction, orientation, and presentation space orientation.

text presentation. The transformation of document graphic character content and its associated font information into a visible form. An example of a visible form of text is character shapes on a physical medium.

text presentation space. A two-dimensional conceptual space in which text is generated for presentation on an output medium.

throughscore. A line parallel to the baseline and placed through the character.

TIFF. See Tagged Image File Format.

tint. Variation of a color produced by mixing it with white.

toned. Containing marking agents such as toner or ink. Contrast with untoned.

tone transfer curve. A mathematical representation of the relationship between the input and output of a system, subsystem, or equipment. The function is normally one dimensional consisting of a single channel of input corresponding to a single channel of output. In imaging systems, it is mainly used for contrast adjustments. In printing, the tone transfer curve is also used to modify images to compensate for dot gain.

transform. A modification of one or more characteristics of a picture. Examples of picture characteristics that can be transformed are position, orientation, and size. See also model transform, segment transform, and viewing transform.

transform matrix. A matrix that is applied to a set of coordinates to produce a transform.

translating. In computer graphics, moving all or part of a picture in the presentation space from one location to another without rotating.

transparent data. A method used to indicate that any control sequences occurring in a specified portion of data can be ignored.

trimming. Eliminating those parts of a picture that are outside of a clipping boundary such as a viewing window or presentation space. See also viewing window. Synonymous with clipping.

triplet. A three-part self-defining variable-length parameter consisting of a length byte, an identifier byte, and parameter-value bytes.

triplet identifier. A one-byte type identifier for a triplet.

tristimulus values. Three values that together are used to describe a specific color. These values are the amounts of three reference colors (such as red, green, and blue) that can be mixed to give the same visual sensation as the specific color.

truncation. Planned or unplanned end of a presentation space or data presentation. This can occur when the presentation space extends beyond one or more boundaries of its containing presentation space or when there is more data than can be contained in the presentation space.

tumble-duplex printing. A method used to simulate the effect of physically turning a sheet around the X_m axis.

twip. A unit of measure equal to 1/20 of a point. There are 1440 twips in one inch.

type. A table heading for architecture syntax. The entries under this heading indicate the types of data present in a construct. Examples include: BITS, CHAR, CODE, SBIN, UBIN, UNDF.

typeface. All characters of a single type family or style, weight class, width class, and posture, regardless of size. For example, Helvetica Bold Condensed Italics, in any point size.

type family. All characters of a single design, regardless of attributes such as width, weight, posture, and size. Examples are Courier and Gothic.

type structure. Attributes of characters other than type family or typeface. Examples are solid shape, hollow shape, and overstruck.

type style. The form of characters within the same font, for example, Courier or Gothic.

type weight. A parameter indicating the degree of boldness of a typeface. A character's stroke thickness determines its type weight. Examples are light, medium, and bold. Synonymous with weight class.

type width. A parameter indicating a relative change from the font's normal width-to-height ratio. Examples are normal, condensed, and expanded. Synonymous with width class.

typographic font. A font with graphic characters that have varying character increments. Proportional spacing can be used to provide the appearance of even spacing between presented characters and to eliminate excess blank space around narrow characters. An example of a narrow character is the letter *i*. Synonymous with proportionally spaced font. Contrast with monospaced font and uniformly spaced font.

U

UBIN. A data type for architecture syntax, indicating one or more bytes to be interpreted as an unsigned binary number.

unarchitected. Identifies data that is neither defined nor controlled by an architecture. Contrast with architected.

unbounded character box. A character box that can have blank space on any sides of the character shape.

underpaint. A mixing rule in which the intersection of part of a new presentation space P_{new} with part of an existing presentation space $P_{existing}$ keeps the color attribute of $P_{existing}$. This is also referred to as “transparent” or “leave alone” mixing. See also mixing rule. Contrast with blend and overpaint.

underscore. A method used to create an underline beneath the characters in a specified text field. An example of underscore is the line presented under one or more characters. Also a special graphic character used to implement the underscoring function.

UNDF. A data type for architecture syntax, indicating one or more bytes that are undefined by the architecture.

Unicode. A character encoding standard for information processing that includes all major scripts of the world. Unicode defines a consistent way of encoding multilingual text. Unicode specifies a numeric value, a name, and other attributes, such as directionality, for each of its characters; for example, the name for $ is “dollar sign” and its numeric value is X'0024'. This Unicode value is called a Unicode code point and is represented as U+nnnn. Unicode provides for three encoding forms (UTF-8, UTF-16, and UTF-32), described as follows:

UTF-8 A byte-oriented form that is designed for ease of use in traditional ASCII environments. Each UTF-8 code point contains from one to four bytes. All Unicode code points can be encoded in

UTF-8 and all 7-bit ASCII characters can be encoded in one byte.

UTF-16 The default Unicode encoding. A fixed, two-byte Unicode encoding form that can contain surrogates and identifies the byte order of each UTF-16 code point via a Byte Order Mark in the first 2 bytes of the data. Surrogates are pairs of Unicode code points that allow for the encoding of as many as 1 million additional characters without any use of escape codes.

UTF-16BE UTF-16 that uses big endian byte order; this is the byte order for all multi-byte data within AFP data streams. The Byte Order Mark is not necessary when the data is externally identified as UTF-16BE (or UTF-16LE).

UTF-16LE UTF-16 that uses little endian byte order.

UTF-32 A fixed, four-byte Unicode encoding form in which each UTF-32 code point is precisely identical to the Unicode code point.

UTF-32BE UTF-32 serialized as bytes in most-significant-byte-first order (big endian). UTF-32BE is structurally the same as UCS-4.

UTF-32LE UTF-32 serialized as bytes in least-significant-byte-first order (little endian).

uniformly spaced font. A font with graphic characters having a uniform character increment. The distance between reference points of adjacent graphic characters is constant in the escapement direction. The blank space between the graphic characters can vary. Synonymous with monospaced font. Contrast with proportionally spaced font and typographic font.

Uniform Symbol Specification (USS). A series of bar code symbology specifications published by AIM; currently included are USS-Interleaved 2 of 5, USS-39, USS-93, USS-Codabar, and USS-128.

unit base. A one-byte code that represents the length of the measurement base. For example, X'00' might specify that the measurement base is ten inches.

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.

untoned. Unmarked portion of a physical medium. Contrast with toned.

UP³I. Universal Printer Pre- and Post-Processing Interface; an industry standard interface designed for use in complex printing systems. A specification for this interface can be obtained at `www.afpconsortium.org`.

UPA. See user printable area.

UPC. See Universal Product Code.

uppercase. Pertaining to capital letters. Examples of capital letters are *A*, *B*, and *C*. Contrast with lowercase.

upstream data. IPDS commands that exist in a logical path from a specific point in a printer back to, but not including, host presentation services.

usable area. An area on a physical medium that can be used to present data. See also viewport.

user printable area (UPA). The portion of the physical printable area to which user-generated data is restricted. See also logical page, physical printable area, and valid printable area.

USS. See Uniform Symbol Specification.

UTC. Coordinated Universal Time, the standard time reference for Earth and the human race. Knowing the UTC time and one's time zone offset from it, makes it possible to calculate the local time; for example, 1:00 PM UTC corresponds to 5:00 AM Pacific Standard Time (on the same day). UTC is almost the same thing as Greenwich Mean Time (GMT), that was originally used as the standard time reference.

V

valid printable area (VPA). The intersection of a logical page with the area of the medium presentation space in which printing is allowed. If the logical page is a secure overlay, the area in which printing is allowed is the physical printable area. If the logical page is not a secure overlay and if a user printable area is defined, the area in which printing is allowed is the intersection of the physical printable area with the user printable area. If a user printable area is not defined, the area in which printing is allowed is the physical printable area. See also logical page, physical printable area, secure overlay, and user printable area.

variable space. A method used to assign a character increment dimension of varying size to space characters. The space characters are used to distribute white space within a text line. The white space is distributed by expanding or contracting the dimension of the variable space character's increment dependent upon the amount of white space to be distributed. See also variable space character and variable space character increment.

variable space character. The code point assigned by the data stream for which the character increment varies according to the semantics and pragmatics of the variable space function. This code point is not presented, but its character increment parameter is used to provide spacing. See also variable space character increment.

variable space character increment. The variable value associated with a variable space character. The variable space character increment is used to calculate the dimension from the current presentation position to a new presentation position when a variable space character is found. See also variable space character.

vector graphics. A vector has a defined starting point, a designated direction, and a specified distance. Vector graphics is line-based graphics data, where vectors determine how straight and curved lines are shaped between specific points. A picture consists of lines and colors to fill the areas enclosed by the lines.

verifier. In bar code systems, a device that measures the bars, spaces, quiet zones, and optical characteristics of a bar code symbol to determine if the symbol meets the requirements of a bar code symbology, specification, or standard.

vertical bar code. A bar code pattern that presents the axis of the symbol in its length dimension parallel to the Y_{bc} axis of the bar code presentation space. Synonymous with ladder bar code.

vertical font size. (1) A characteristic value, perpendicular to the character baseline, that represents the size of all graphic characters in a font. Synonymous with font height. (2) In a font character set, nominal vertical font size is a font-designer defined value corresponding to the nominal distance between adjacent baselines when character rotation is zero degrees and no external leading is used. This distance represents the baseline-to-baseline increment that includes the font's maximum baseline extent and the designer's recommendation for internal leading. The font designer can also define a minimum and a maximum vertical font size to represent the limits of scaling. (3) In font referencing, the specified vertical font size is the desired size of the font when the characters are presented. If this size is different from the nominal vertical font size specified in a font character set, the character shapes and character metrics might need to be scaled prior to presentation.

vertical scale factor. In outline-font referencing, the specified vertical adjustment of the Em square. The vertical scale factor is specified in 1440ths of an inch. When the horizontal and vertical scale factors are different, anamorphic scaling occurs. See also horizontal scale factor.

viewing transform. A transform that is applied to model-space coordinates. Contrast with model transform.

viewing window. That part of a model space that is transformed, clipped, and moved into a graphics presentation space.

viewport. The portion of a usable area that is mapped to the graphics presentation space window. See also graphics model space and graphics presentation space.

visibility. The property of a segment that declares whether the part of a picture defined by the segment is to be displayed or not displayed during the drawing process.

void. In bar codes, the undesirable absence of ink in a bar code symbol bar element.

VPA. See valid printable area.

W

ward. A deprecated term for section.

weight class. A parameter indicating the degree of boldness of a typeface. A character's stroke thickness determines its weight class. Examples are light, medium, and bold. Synonymous with type weight.

white point. One of a number of reference illuminants used in colorimetry that serve to define the color “white”. Depending on the application, different definitions of white are needed to give acceptable results. For example, photographs taken indoors might be lit by incandescent lights, that are relatively orange compared to daylight. Defining “white” as daylight will give unacceptable results when attempting to color correct a photograph taken with incandescent lighting.

white space. The portion of a line that is not occupied by characters when the characters of all the words that can be placed on a line and the spaces between those words are assembled or formatted on a line. When a line is justified, the white space is distributed among the words, characters, or both on the line in some specified manner. See also controlled white space.

width class. A parameter indicating a relative change from the font's normal width-to-height ratio. Examples are normal, condensed, and expanded. Synonymous with type width.

window. A predefined part of a graphics presentation space. See also graphics presentation space window.

writing mode. An identified mode for the setting of text in a writing system, usually corresponding to a nominal escapement direction of the graphic characters in that mode; for example, left-to-right, right-to-left, top-to-bottom.

X

X_{bc} extent. The size of a bar code presentation space in the X_{bc} dimension. See also bar code presentation space.

X_{bc},Y_{bc} coordinate system. The bar code presentation space coordinate system.

X dimension. In bar codes, the nominal dimension of the narrow bars and spaces in a bar code symbol.

X_g,Y_g coordinate system. In the IPDS architecture, the graphics presentation space coordinate system.

X height. The nominal height above the baseline, ignoring the ascender, of the lowercase characters in a font. X height is usually the height of the lowercase letter *x*. See also lowercase and ascender.

X_{io},Y_{io} coordinate system. The IO-Image presentation space coordinate system.

XML. See Extensible Markup Language.

XMP. See Extensible Metadata Platform.

X_m,Y_m coordinate system. (1) In the IPDS architecture, the medium presentation space coordinate system. (2) In MO:DCA, the medium coordinate system.

X_{oa},Y_{oa} coordinate system. The object area coordinate system.

X_{ol},Y_{ol} coordinate system. The overlay coordinate system.

X_p extent. The size of a presentation space or logical page in the X_p dimension. See also presentation space and logical page.

X_{pg},Y_{pg} coordinate system. The coordinate system of a page presentation space. This coordinate system describes the size, position, and orientation of a page presentation space. Orientation of an X_{pg},Y_{pg} coordinate system is relative to an environment specified coordinate system, for example, an X_m,Y_m coordinate system.

X_p,Y_p coordinate system. The coordinate system of a presentation space or a logical page. This coordinate system describes the size, position, and orientation of a presentation space or a logical page. Orientation of an X_p, Y_p coordinate system is relative to an environment-specified coordinate system. An example of an environment-specified coordinate system is the X_m,Y_m coordinate system. The X_p,Y_p coordinate system origin is specified by an IPDS Logical Page Position command. See also logical page, medium presentation space, and presentation space.

Y

Y_{bc} extent. The size of a bar code presentation space in the Y_{bc} dimension. See also bar code presentation space.

YCbCr. A three-component color space that approximately models how color is interpreted by the human visual system, with an intensity value and two color values. YCbCr and YCrCb use the same three values, but in a different order.

YCCK. CMYK data carried in the luminance-chrominance form. YCC are computed from CMY, while K is the black channel carried in the reverse-video form (K = 255 - K). See Appendix B, “Adobe APP14 JPEG Marker” in *Presentation Object Subsets for AFP*.

YCrCb. A three-component color space that approximately models how color is interpreted by the human visual system, with an intensity value and two color values. YCbCr and YCrCb use the same three values, but in a different order.

Y_p extent. The size of a presentation space or logical page in the Y_p dimension. See also presentation space and logical page.

Yxy color space. A color space belonging to the XYZ base family that expresses the XYZ values in terms of x and y chromaticity coordinates, somewhat analogous to the hue and saturation coordinates of the HSV color space.

Index

A

B

C

G

H

I

L

M

N

O

P

R

S

T

U

Advanced Function Presentation Consortium

Mixed Object Document Content Architecture (MO:DCA) Reference

AFPC-0004-10

AFPConsortium™
Advanced Function Presentation