2010 Global Document Conference and Vendor Forum
Tampa Bay, Florida

AFP 101: Font Basics (3 of 8)

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9:30 AM - 10:20 AM

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Agenda

- AFP Fonts
- Font Families and Type faces
- AFP Font Resource
- FOCA
  - AFP Font Architecture
- AFP Font Naming System
  - Expanded Core Font
  - Compatibility Font
- AFP Font Editor & Type Transformer (InfoPrint)
- AFP Font Manuals

Class Objectives

- What is a font
- Understand the types of files used to define fonts in an AFP document
- Comprehension of the font formats AFP use
- Understand the naming standards for AFP fonts
- Free Font tools

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AFP Fonts
Basics and Definitions

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What is a FONT

- A **font** is a combination of these:
  - A family or assortment of characters.
  - Type family
    - Courier example of a type family.
    - Typeface
  - Style, weight (for example, italic or bold), and width (normal or expanded) define typeface.
    - Normal means the typical size of characters, while expanded means that the character is wider than normal.
  - Type size
    - Fonts can range from small (4 point) to large (72 point).
- A font can include letters, numbers, punctuation marks and special characters.

Serif (Minion Pro)
- Old Style (Adobe Jenson Pro)
- Transitional (ITC New Baskerville)
- Modern (Bodoni)
Slab Serif (Clarendon)
Sans serif (Myriad)
Script (Coronet)
𝔅lackletter (Teutonic No. 1)
DISPLAY (LiquidCrystal)
Monospaced (Courier)
❖❀■❉❂❀▼ (ITC Zapf Dingbats)
(Dingbat)

The Quick Brown Fox Jumps Over The Lazy Dog.
abcdefghijklmnopqrstuvwxyz0123456789&?

AaBbCcDdEeFfGg
HhIiJjKkLlMmNn
OoPpQqRrSsTtUu
VvWwXxYyZz

Format of AFP character sets

- AFP supplies character sets in these formats:
  - Raster Format
    - 240-pel (un-bounded-box) raster format [3800 page mode]
    - 240-pel (bounded-box) raster format [IPDS]
    - 300-pel (bounded-box) raster format [IPDS]
  - Outline Format
    - Type1outline format for IBM Type Transformer
    - CID-keyed outline format for IBM Type Transformer
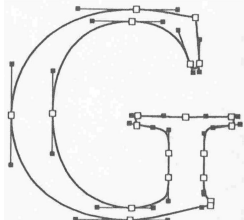   - AFP outline format

Bitmap vs Outline Fonts

- **Font rendering: how the font is generated.**
  - Drew from a raster pattern of dots
    OR
  - By a series of vector describing the character
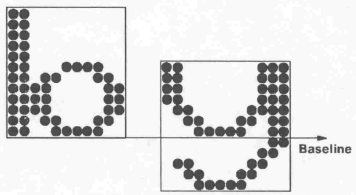
Bitmap or Raster Font   Outline Font
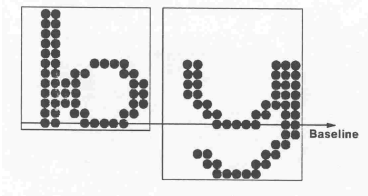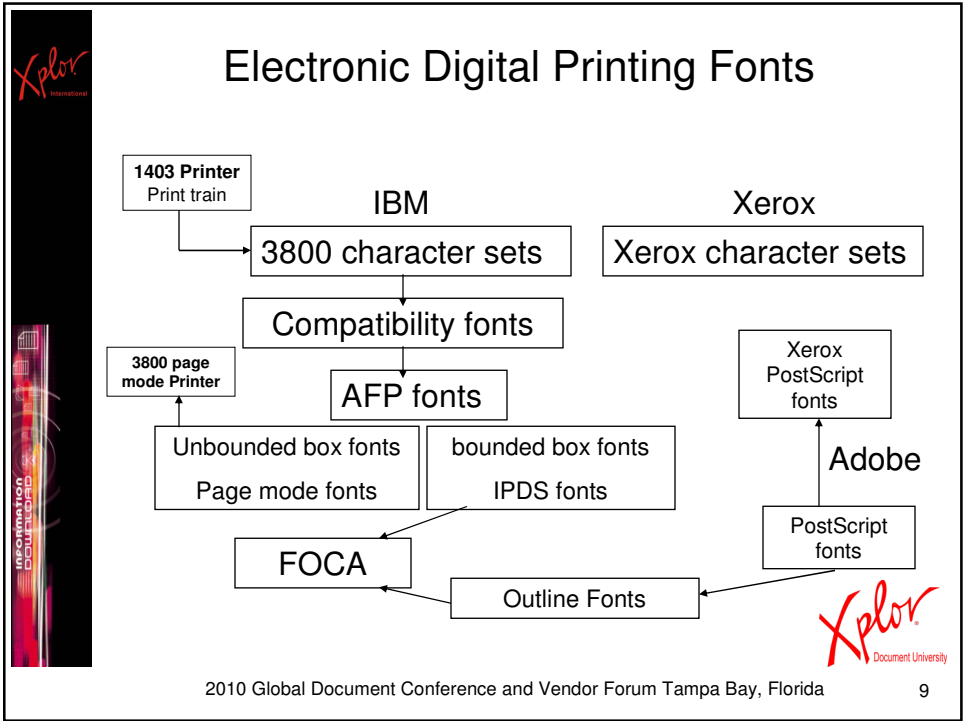

resolution <u>dependent</u>   resolution <u>independent</u>

AFP Box Fonts

Unbounded box font

(3800 **page mode** font)

Bounded box font

(IPDS font)

4

Electronic Digital Printing Fonts

1403 Printer Print train	IBM	Xerox

3800 character sets → Xerox character sets

Compatibility fonts

3800 page mode Printer	AFP fonts	Xerox PostScript fonts

Unbounded box fonts

Page mode fonts

bounded box fonts

IPDS fonts

Adobe

FOCA

PostScript fonts

Outline Fonts

Font Spacing

- <u>Monospaced</u> font - Uniformly Spaced Font
  - *fixed-pitch* and *uniformly spaced* fonts
  - similar to typewriter characters
  - each character is the same width

  aiox

- <u>Proportionally</u> spaced fonts have characters with different widths.
  - Narrow characters such as "i" and "l" print w/ less space **aimox**
  - Wider characters such as "m" and "A"

    PITCH 1   2   3   1   1
  - The average spacing is 12 characters per inch (cpi)   Tri-Pitch

- *Typographic fonts* -- are proportionally spaced fonts.
  - Have variable character widths
  - The character increment is part of the design
  - Varies on a character-by-character basis
  - Character width space is in proportional to the glyph
  - the lowercase *i* and the '*.' (period)* occupy narrow spaces. The uppercase *M* and *W* occupies a wide space.
  - iM.WiM.WiM.W   **afimox**

  Monospaced   `i.M.i.M.i.M.i.M.i.M.i.M.i.M.`

 Typographic   `i.M.i.M.i.M.i.M.i.M.i.M.i.M.`

Pitch

- **Pitch** Monospaced fonts are often described or referred to in *pitch*, or the number of characters printed in 1 inch
- Pitch is also referred to as characters per inch (CPI).
- Examples Courier, Letter Gothic

```
1234567890
This is 10 pitch or 10 characters per inch.
  123456789012
  This is 12 pitch or 12 characters per inch.
    12345678901234567890
    This is 20 pitch or 20 characters per inch.
```
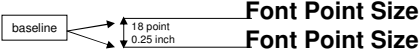
10-Pitch Type Width

10-pitch
1.0 inch
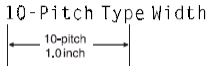
Point Size

- All fonts are measured in *points*, the vertical size of the font.
- One inch is equal to approximately 72 points.
- Point size is a baseline-to-baseline measurement, which includes minimal white space.
- The *baseline* is the line upon which the characters rest.
- Thus, the actual height of the characters in an 18-point font is less than 18 points.

baseline → 18 point 0.25 inch

Font Point Size
Font Point Size

- The line spacing usually includes one or more additional points of white space between lines of type.

This is 6 points.
This is 7 points.
This is 8 points.
This is 9 points.
This is 10 points.
This is 11 points.
This is 12 points.
This is 14 points.
This is 16 points.
This is 18 points.
This is 20 points.
This is 24 points.
This is 30 points.
This is 36 points.

6 7 8 9 10 11 12 14 16 18 20 24 30 36

Font Metrics

- ## Fixed metrics
  - Fonts have all character positioning metrics expressed in whole-pel values
    - 240-pel fonts are fixed-metric fonts
    - Bottom line- fraction of units are rounded up or down (visually may introduce error)
- ## Relative metrics
  - Fonts were developed for scaleable outline fonts where a single metric value could be used to determine a pel value given a desired resolution and point size
  - Relative metrics are based on 1000 units per "em space," which means the fonts are designed for a hypothetical 1000 dpi,72-point font where each side of the bounding box is1000 pels
    - All AFP outlines and 300-dpi fonts contain relative metrics
    - Bottom line- white space is added for accumulated fraction of units

---

Font Orientation

CHARACTER ROTATION	RESULT
0 degrees	ABCDE
90 degrees	A B C D E (rotated 90°)
180 degrees	ƎⱭƆᗺⱯ (rotated 180°)
270 degrees	A B C D E (rotated 270°)

- Fonts can be rotated in AFP
- Font rotation is a separate function form print direction
- Orientation is a combination of:
  - Print direction
  - Font rotation
- Fonts can be rotated 4 ways with in each print direction
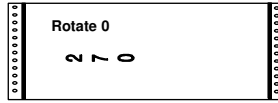- 3800 prints in only 3 directions (back is not supported)

Print Direction & Rotated Characters

Print Directions and Rotated Characters

ACROSS

Rotate 0

2 7 0

DOWN

2 7 0

Rotate 0

- Page printers require separate font for each PRINT ORIENTATION
  - Page Mode printers use **unbounded box fonts**
  - 12 possible orientations (3 directions X 4 rotations)
  - 2 possible directions (Across or Down)
    - Examples:
      - Direction Across Rotation 0
      - Direction Down Rotation 0
- Font naming conventions indicate rotation in 2nd digit
  - X1 = direction ACROSS rotate 0
  - X2 = direction DOWN rotate 0
- Rules are different for IPDS printers
  - IPDS printers use **bounded box fonts**
  - X0 is prefix for bounded box fonts

Print Direction	Character Rotation (in degrees)			
	0	90	180	270
Across (0)	ABCD		DCBA	
Down (90)				
Back (180)			DCBA	
Up (270)				

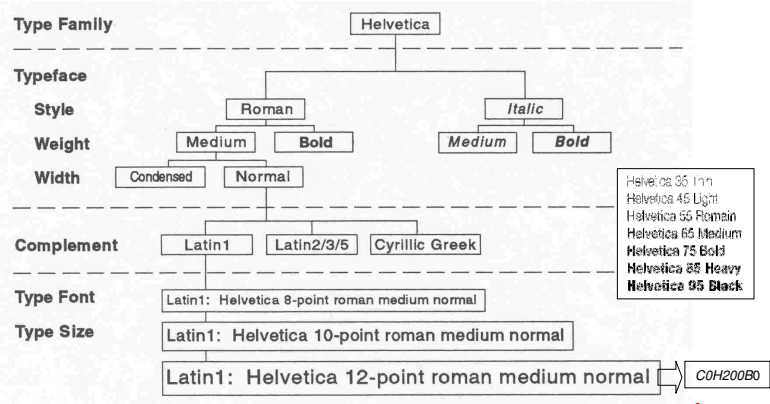# Font Families
&
Typeface

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Font Family: *Example Helvetica*

Type Family		Helvetica	
Typeface			
Style		Roman	Italic
Weight		Medium · Bold	Medium · Bold
Width	Condensed · Normal		

Helvetica 35 Thin
Helvetica 45 Light
Helvetica 55 Roman
Helvetica 65 Medium
Helvetica 75 Bold
Helvetica 85 Heavy
Helvetica 95 Black

Complement: Latin1 · Latin2/3/5 · Cyrillic Greek

Type Font: Latin1: Helvetica 8-point roman medium normal

Type Size: Latin1: Helvetica 10-point roman medium normal

Latin1: Helvetica 12-point roman medium normal → C0H200B0

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AFP Font Resource

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AFP Character Set

Font Character Set

Characters	Character Properties	Printing Attributes
	• Baseline • Position • Character ID	• Character rotation • Maximum ascender • Point size
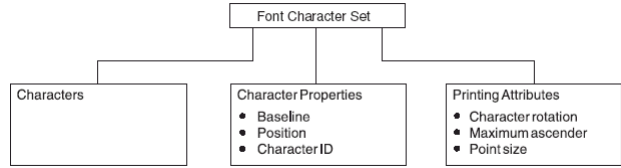
- Font Character Set
  - This resource contains the raster patterns for each character in the font and associates an 8-byte character identifier with each pattern. This resource also contains descriptive information for the entire character set.
  - Characters
    - ABC abc 123 !@#
  - Characters Properties
    - Baseline
    - Position
    - Character ID
  - Printing Attributes
    - Character rotation [0 90 180 270]
    - Maximum ascender
    - Point size
  - Example: **C0D0GT10**

AFP Code Page

- Code page
  - This resource associates code points with character identifiers, each representing a character raster pattern. A code point is an 8-bit binary number representing one of 256 potential characters.
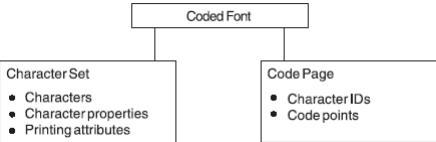- Example: **T1V10037   T1D0BASE**

AFP Coded Font

Coded Font

Character Set	Code Page
• Characters • Character properties • Printing attributes	• Character IDs • Code points

- **Coded Font**
  - This resource associates one or more code pages with the font character sets.
  - The glue that binds the characters to the map of which character to use
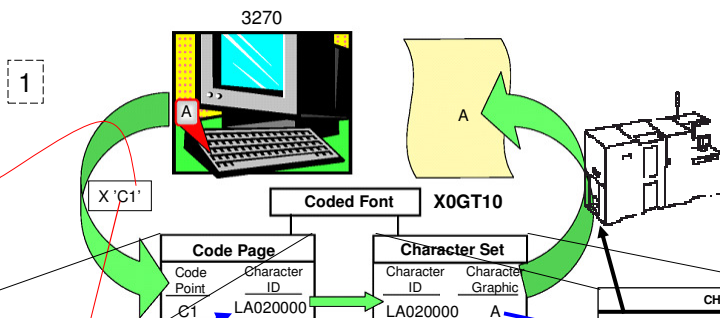- Example: **X0GT10**

Keyboard to Printed Character for AFP Fonts

Translation of a Keyboard Character into a Printed Character

3270

X 'C1'

Coded Font   **X0GT10**

Code Page		**Character Set**	
Code Point	Character ID	Character ID	Character Graphic
C1	LA020000	LA020000	A

CHARACTER SET

LA020000	LB020000	LC020000
A	B	C
LA010000	LB010000	LC010000
a	b	c
ND010000	ND020000	ND030000
1	2	3
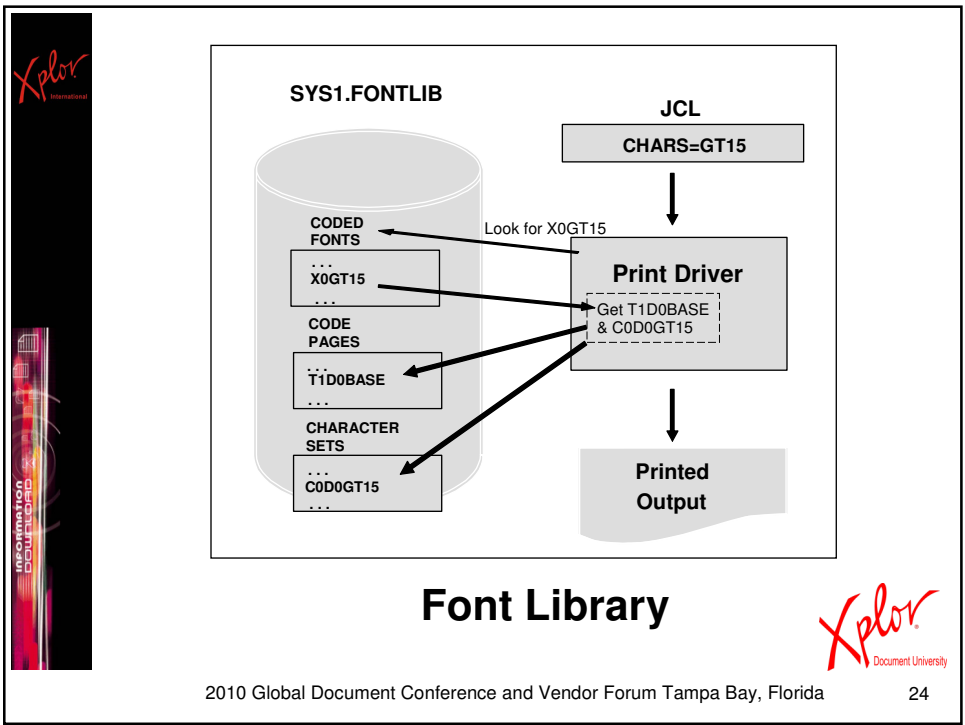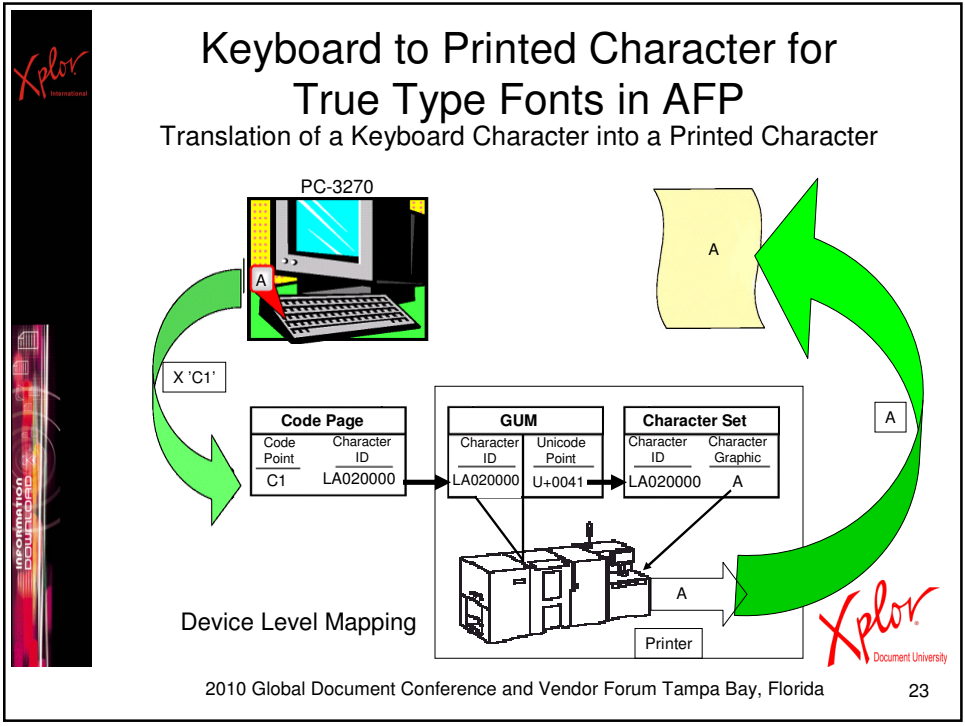
T1V10037

Code Page Map

C0D0GT10

Keyboard to Printed Character for True Type Fonts in AFP
Translation of a Keyboard Character into a Printed Character

PC-3270

A

X 'C1'

Code Page	
Code Point	Character ID
C1	LA020000

GUM	
Character ID	Unicode Point
LA020000	U+0041

Character Set	
Character ID	Character Graphic
LA020000	A

A

A

Device Level Mapping

Printer

SYS1.FONTLIB

JCL

CHARS=GT15

CODED FONTS

Look for X0GT15

. . .
X0GT15
. . .

Print Driver

Get T1D0BASE & C0D0GT15

CODE PAGES

. . .
T1D0BASE
. . .

CHARACTER SETS

. . .
C0D0GT15
. . .

Printed Output

Font Library

FOCA
AFP Font Architecture

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FOCA Introduction

- **FOCA** (Font Object Content Architecture) defines the content of:
  - Font Resources
  - Reference to Font Resources
  - Information access from font Resources
- *Font* (in FOCA) is a set of graphic character symbols that share a characteristic design
- **Font Resource** consists of a collection of graphic characters & associated descriptive character position & character shape information that represents a particular type family in one or more type faces & type size.

FOCA Components

- A common model for
  - identifying,
  - measuring and
  - position the characters of a font
- A device & technology independent method of defining font measurements
- Set of parameters that can be used to create
  - font reference
  - access for font resource information
- General structure of font resource information
  - Data type
  - Range of values for each font attribute

FOCA Font References

- Font References- identify font used for a document
- Font identification can be in two ways:
  - A) specify 4 attributes that ID a font;
    - Character set content
    - Character set encoding
    - Font typeface
    - Font size
  - The 4 attributes are specified as using a global character set ID (GCSGID), code page, typeface, font size
  - B) specify characteristics that font must meet
    - Defining list of significant font attributes
    - Application selects font that best matches the list of attributes

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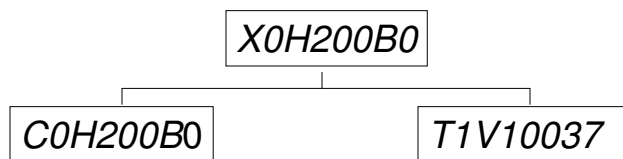**Tampa Bay, Florida**

Understanding AFP Font Naming System

Naming Format for:
- Expanded Core Fonts
- Compatibility Fonts

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AFP Font Naming Convention Expanded Core Fonts

X0H200B0

C0H200B0   T1V10037

First Character	Font Component	Example
C	Character Set	**C**0H200B0
X	Coded Font	**X**0H200B0
T	Code Page	**T**1V10037

EXAMPLE | Latin1: Helvetica 12-point roman medium normal

Example of Character Set Name

A — Component

C	Character set
X	Coded font

Format or Orientation

F	240 Bounded-Box and 300-Pel
0	Character set
0	Coded font
F	240 Unbounded-Box
1,2,4	Character set
1,2,4	Coded font
F	AFP Outline
Z	Character set
Z	Coded font

R — Type Family

4	Courier
5	Letter Gothic
6	Gothic Text
7	Prestige
8	Boldface
9	OCR
B	BookMaster
H	Helvetica
I	IBM Logo
N	Times New Roman

S — Typeface

2	Roman medium
3	Italic medium
4	Roman bold
5	Italic bold
6	Roman Medium Reverse
B	IBM Logo

Typographic Fonts

P	Point Size	P	Point Size
6 =	6 points	L =	22 points
7 =	7 points	M =	23 points
8 =	8 points	N =	24 points
9 =	9 points	O =	25 points
0 =	10 points	P =	26 points
A =	11 points	Q =	27 points
B =	12 points	R =	28 points
C =	13 points	S =	29 points
D =	14 points	T =	30 points
E =	15 points	U =	31 points
F =	16 points	V =	32 points
G =	17 points	W =	33 points
H =	18 points	X =	34 points
I =	19 points	Y =	35 points
J =	20 points	Z =	36 points
K =	21 points		

Uniformly Spaced Fonts

P	Point Size	Pitch Size
5 =	5 points	24 pitch
6 =	6 points	20 pitch
7 =	7 points	17.1 pitch
8 =	8 points	15 pitch
9 =	9 points	13.3 pitch
0 =	10 points	12 pitch
B =	12 points	10 pitch
D =	14 points	8.5 pitch
J =	20 points	6 pitch

Expanded Core Fonts
(240-pel, 300-pel, AFP Outlines)

A — F — R — S₂ — T — C — P* — X*
C — 0 — H — 2 — 0 — 0 — B — 0 ⟸ Character set name

Code Page Category

T	Character Set
0	Character set
M	IBM Logo

T — Coded Font

2	Latin1 country extended code pages
3	Latin1 publishing code pages
4	Latin1 ASCII code pages
5	Latin1 OCF code pages
6	Latin2345 EBCDIC and ASCI code pages
7	International non-Latin code pages
8	Special purpose EBCDIC and ASCII code pages
M	International non-Latin ASCII code pages
	IBM Logo

C — Complement

0	Latin1
1	Symbols
2	Latin235
3	Cyrillic Greek
4	Arabic
5	Hebrew
6	Thai
7	Latin4
8	Katakana
9	Lao
A	OCR A
B	OCR B
C	BookMaster Special
D	Baltic
L	Latin
P	APL2

✱ **P** and **X** are not used for AFP outline font character sets.

Coded Font
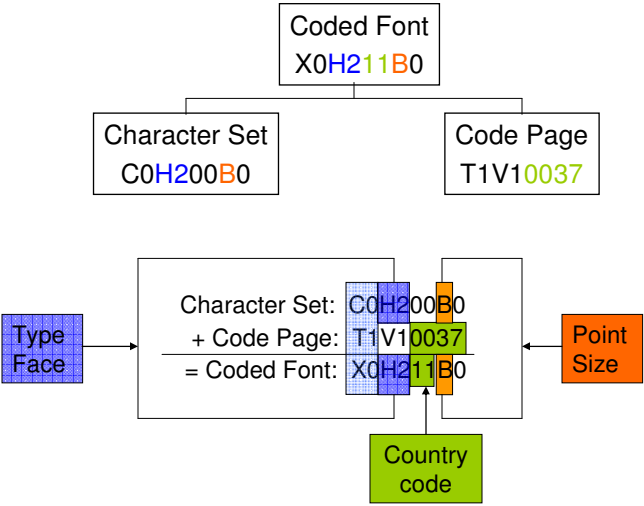See parts 2 and 3 of this figure. (Does not apply to BookMaster Fonts)

Font: Character Set Names

For example, *C0H200B0*

identifies a specific font character set. In the example, the name identifies different properties of the font character set:

Latin1: Helvetica 12-point roman medium normal

Component	A	C	Identifies the object as a font **character set**
Format or Orientation	F	0	Identifies the font as one that will print on a **bounded-box printer** (0 orientation)
Type Family	R	H	Identifies the type family as **Helvetica**
Typeface	S	2	Identifies the style as **roman medium** normal
Code Page Category	T	0	Identifies the character as **Character set**
Complement	C	0	Identifies the character list as **Latin1**
Typographic Font	P	B	Identifies the point size as **12 points**
Coded Font	X	0	Identifies the point Coded font 0=not coded font

Slide 33

Code Page Names
Expanded Core Fonts

| **T** | **1** | **V** | **1** | **0** | **0** | **3** | **7** |

Extended Core
For US and Canada
countries

| T | 1 | Y | Y | Y | Y | Y | Y |

Preferred Code Pages

Y	Y	Y	Y	Y	Y	Category
0	0	n	n	n	n	Expanded Core
V	1	n	n	n	n	Expanded Core
B	0	0	n	n	n	BookMaster

Language	Code page ID	CDP	ECP	Description
	T1V10037	X	X	Country Extended: United States, Canada
	T1V10273	X	X	Country Extended: Austria, Germany, Switzerland
	T1V10274	X	X	Country Extended: Belgium

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Font: Code Page Names

For example, *T1V10037*
identifies a specific code page. In the example, the name identifies
different properties of the code page:

Component	**T**	**T**	Identifies the object as a font **code page**
Format or Orientation	**1**	**1**	Identifies the font as one that will
Type Family	**Y**	**V**	Identifies the Expanded Core
Typeface	**Y**	**1**	Identifies the Expanded Core
Code Page Category	**Y**	**0**	Identifies Country Extended: US Canada
Complement	**Y**	**0**	Identifies Country Extended: US Canada
Typographic Font	**Y**	**3**	Identifies Country Extended: US Canada
Coded Font	**Y**	**7**	Identifies Country Extended: US Canada

Font: Coded Font Names

For example, *X0H210B0*

identifies a specific coded font. In the example, the name identifies different properties of the coded font:

Component	**A**	**X**	Identifies the object as a font **Coded Font**
Format or Orientation	**F**	**0**	Identifies the font as one that will print on a **bounded-box printer** (0 orientation)
Type Family	**R**	**H**	Identifies the type family as **Helvetica**
Typeface	**S**	**2**	Identifies the style as **roman medium** normal
Code Page Category	**T**	**1**	Identifies the **Code page T1V10037**
Complement	**C**	**1**	Identifies the **Code page T1V10037**
Typographic Font	**P**	**B**	Identifies the point size 12
Coded Font	**X**	**n**	Identifies the

Example of AFP Font Name Correlation
Character Set-Code Page- Coded Font

Coded Font
X0H211B0

Character Set
C0H200B0

Code Page
T1V10037

Character Set: C0H200B0
+ Code Page: T1V10037
= Coded Font: X0H211B0

Type Face

Point Size

Country code

Compatibility Fonts

AFP Font Naming Convention Compatibility

X0GT10

C0D0GT10   T1D0BASE

First Character	Font Component	Example
C	Character Set	**C**0D0GT10
X	Coded Font	**X**0GT10
T	Code Page	**T**1D0BASE

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AFP Font Editor
&
Type Transformer

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Type Transformer & Editor

- Type Transformer, a part of IBM(R) Infoprint(R) Fonts,
  is a program that transforms IBM Type 1 format and CID-keyed format
  outline fonts into fonts that can be used with IBM's AFP/IPDS printers. The
  following utilities are included with Type Transformer to enable you to add
  user-defined characters (UDCs) to the Japanese, Korean, Simplified
  Chinese, and Traditional Chinese fonts in IBM Infoprint Fonts:

  - The FontLab graphic character editor
  - The AFP(TM) Font Editor for code pages and coded fonts
  - Sample code pages and batch files
  - The AFP2FON utility, which converts raster fonts to outline
    fonts
  - The CID2EPS utility, which extracts a a character from a font
    and presents it as an EPS image
  - The DUVRMARK utility, which changes the date and time
    stamp or capture setting of a font

- Now available Free down load from:
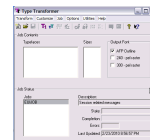
http://www-01.ibm.com/support/docview.wss?rs=95&context=SWK60&dc=D400&q1=%2bfonts&uid=psd1P4000840&loc=en_US&cs=utf-8&cc=us&lang=all

AFP Font Editor
Editing Character set C0H280B0

AFP Font Editor
Editing Code Page T1V10037

AFP Font Editor
Editing Coded Font X0H200B0

Character set   Code Page

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AFP Font Manuals

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AFP Font Publications Online

- Font Summary for AFP Font Collection, S544-5633
- IBM AFP Font Collection Licensed Program Specification, G544-5229
- IBM AFP Fonts: Technical Reference for Expanded Core Fonts, S544-5228
- IBM AFP Fonts: Technical Reference for AFP Font Collection Japanese Fonts, S544-5685
- IBM AFP Fonts: Technical Reference for AFP Font Collection Korean Fonts, S544-5686
- IBM AFP Fonts: Technical Reference for AFP Font Collection Simplified Chinese Fonts, S544-5687
- IBM AFP Fonts: Technical Reference for AFP Font Collection Traditional Chinese Fonts, S544-5688
- IBM AFP Fonts: Type Transformer User's Guide, G544-3796
- Installation Program Directories for AFP Font Collection Fonts

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AFP Education & Consulting

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e-mail: dscrima@gmail.com

AFP Education and Training Courses at *YOUR* site
for the same cost to send one person to a vendor scheduled class.

Courses offered—

Introduction to AFP
AFP A functional Perspective (CEU Certification Continuing Education Units)
IPDS
AFP Color for TransPromo Printing

About the instructor

Donald Scrima, M-EDP has some 30 years experience in the IT industry and Transaction Printing. He has been a System Programmer, Computer Operations Manager, Computer Trainer and System Engineer during this time. Mr. Scrima has been involved with Advanced Function Printing [Presentation] (AFP) since 1988, working with PSF, application and resource generation and IPDS hardware.

Mr. Scrima received his EDP certification in 1995 and since re-certified 2 times. Don in 2009 Certified as a Master–EDP (Expertise in Print Datastreams specializing in AFP Architecture and Data Stream) newly offered by XPLOR, being one of the first to receive this EDP expert level. He has been a speaker at Xplor Global Conferences each year since 1994, primarily speaking on AFP. Don has also, presented at numerous Xplor Chapter meetings, SHARE Technical Conferences, and NaSPA, NaSTC conferences. He is currently President of the XPLOR Ohio Chapter, and has been Vise President. He is also currently XOLPR Midwest Region is President. Previously Don has served as the Southern Region President and VP, and as XPLOR Citrus Chapter President. A strong supporter of EDP certification he is currently Chair of the EDP commission and has served 2 terms on the commission.

Mr. Scrima is Principle at AFP Education & Consulting, A consulting firm providing AFP training, applications development and support. Previously, he was a Sr. System Analyst Workflow Solutions III with Eastman Kodak Company, in the Inkjet Printing Solutions, Graphic Communications Group. Providing AFP and multiple data stream support for the Versamark ink jet color systems.

In the past, Don was with Océ North America (Siemens Printing Systems) as a Sr. National System Engineer and Sr. Software Trainer. He has worked at Computer Learning Center, Los Angeles teaching computer operations and programming.

Don began his AFP career with IBM's class on DOS/VSE PSF this to implement AFP printing in the Operations Classes he was teaching in 1988. Since then he has developed applications for print, created resources, and provided system support for PSF on VSE, VM and MVS. He has been the instructor for

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THANK YOU!

For More Information

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