ADOBE® FONT METRIC FILES Specification Version 2.0

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PostScript® Developer Tools & Strategies Group

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1. INTRODUCTION

This document describes a standard interchange format for communicating font metric information to people and programs. The format is ASCII encoded (for both human and machine readability), machine independent, and extensible. Files in this format are known as Adobe® Font Metrics (AFM) files and are available for all of Adobe Systems's PostScript fonts.

2. PARSING DETAILS

Each AFM file contains the information for one PostScript printer font. The file begins with global information pertaining to the font as a whole, followed by sections with character metrics, kerning data (optional) and composite character data (optional). The file format is line-oriented, each line beginning with a property (key) name, followed by the values for that property. Keys and values are separated by one or more white space characters (space or tab).

The format is:

Key *value value ...*

Key names are case-sensitive. All keys beginning with a capital letter are reserved for use by Adobe Systems; user-defined non-standard entries should begin with a lowercase letter. The Adobe Systems standard keys are detailed below, but other keys are allowed and should be ignored by programs not recognizing them.

Values will be one of the following: **string**, **name**, **number**, **integer** or **boolean**.

- Strings are terminated by the end of line.
- Names are similar to strings except that they may not contain any white space characters; they are terminated by white space characters or by a special termination character (see section on ''Character Metrics'' below).
- Numbers, integers and booleans are separated by white space characters, which may be space, newline, or tab.
- A number can be either a real number or an integer, and both must be allowed for.
- A boolean is either the value **true** or **false**.

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2.1 COMMENTS

Comments may be present in a font metric file. They are introduced by the keyword **Comment**, and are terminated by the end of line. Lines should be no longer than 255 characters under any circumstances.

Comment *string*

The text is arbitrary, and should be ignored.

3. FILE STRUCTURE

An AFM file has several sections, each of which is delimited by a **Start** and **End** keyword. The main section contains a "header" of global font information, and each of the other sections of the file is hierarchically one level down from the main section.

StartFontMetrics *version*
EndFontMetrics

These comments delimit the entire font metrics file. The **StartFontMetrics** line should be the first line in the file, and the **EndFontMetrics** keyword should be the last line in the file.

3.1 GLOBAL FONT INFORMATION

The following global font keys are the same as those in the top level or **FontInfo** subdictionary of an Adobe Systems PostScript font dictionary. Their meanings are described in the chapter on fonts in the *PostScript Language Reference Manual*. Please note that although some of the keys in the PostScript **FontInfo** subdictionary begin with a lowercase letter (e.g., **isFixedPitch**, **version**) all keys listed here begin with uppercase letters to distinguish them as keys reserved for use by Adobe Systems. All numeric values are in the character coordinate system (1000 units per em).

FontName *string*

Name of the font as presented to the PostScript **findfont** operator.
Example: Garamond-Light.

FullName *string*

The full text name of the font. *Example:* ITC Garamond Light.

FamilyName *string*

The name of the ''font family'' to which the font belongs.
Example: ITC Garamond.

Weight *string*

Weight of the font. *Example:* Roman, Bold, Light, etc.

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ItalicAngle *number*

Angle (in degrees counter-clockwise from the vertical) of the dominant vertical strokes of the font.
Example: -12.

IsFixedPitch *boolean*

If *boolean* is **true**, this indicates that the font is a fixed pitch (monospaced) font. A value of false indicates a proportionally spaced font.

FontBBox *llx lly urx ury*

Four *numbers* giving the lower left corner and the upper right corner of the font bounding box. *Note:* the bounding box given here is that of the flattened paths, not the Bezier curve descriptions. These values are all *integers*, and should be rounded off if necessary.

UnderlinePosition *number*

Distance from the baseline for centering underlining strokes.

UnderlineThickness *number*

This is the stroke width for underlining, expressed in character coordinate space (proportional to the font characters). It should be adjusted for point size by any application wishing to perform underlining.

Version *string*

Font version identifier. Matches the string found in the FontInfo dictionary of the font itself.

Notice *string*

Font name trademark or copyright notice.

EncodingScheme *string*

String indicating the default encoding vector for this font. The most common one is *AdobeStandardEncoding*. Special fonts may simply state *FontSpecific*.

CapHeight *number*

Top of capital H, measured in character coordinate system.

XHeight *number*

Top of lower case x, measured in character coordinates.

Ascender *number*

Top of lower case d.

Descender *number*

Bottom of lower case p.

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4. INDIVIDUAL CHARACTER METRICS

Each character's metrics consists of a list of keys and values separated by semicolons; the metrics for a given character will always be contained in one line. The characters are sorted by numerically ascending character code. Unencoded characters follow the encoded characters and are identified by character codes of **-1**.

Example: A character metric data line might look like this:

C 102; **WX** 333; **N** f; **B** 21 0 382 685; **L** i fi; **L** l fl;

StartCharMetrics *integer*
EndCharMetrics

These comments introduce (and conclude) the character metrics section of the file. The *integer* value indicates how many individual characters to expect.

C *integer*

Decimal value of default PostScript character code (-1 if unencoded).

WX *number*

Character width in *x* (*y* is 0).

W $number_x$ $number_y$

Character width vector *(x,y)*

N *name*

PostScript character name.

B *llx lly urx ury*

Character bounding box where *llx, lly, urx,* and *ury* are all *numbers*.

L *successor ligature*

Ligature sequence where *successor* and *ligature* are both *names*. The current character may join with the character named *successor* to form the character named *ligature*. Note that characters may have more than one such entry. (*See example above.)*

5. KERNING DATA

The kerning data section is optional; it may or may not be present for a given font. The section is surrounded by the lines **StartKernData** and **EndKernData**. Kerning data is supplied in two forms: track kerning and pair-wise kerning. Track kerning is applied to all characters uniformly whereas pair-wise kerning is applied to specific character pairs. Track kerning and pair-wise kerning may be used independently or together (i.e., it is possible to apply track kerning to a line of text and then to apply pair-wise kerning on top of that). The two forms of kerning data are treated as subsections within the kerning data section and both sections need not be present.

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StartKernData
EndKernData

These comments introduce (and conclude) the kerning section of the file.

5.1 TRACK KERNING

The track kerning data is surrounded by the lines:

StartTrackKern *integer*
EndTrackKern

Where *integer* indicates how many different sets of track kerning data are present.

Normally track kerning is provided in different *degrees* of tightness. Within a track (a degree of tightness), the amount to decrease (or possibly increase) the amount of space between characters increases (or possibly decreases) with the point size of the font (e.g., for tight track kerning, the amount to decrease the space between characters at 6 point might be 0.1 points and at 72 point it might be 3.78 points).

The data itself begins with the key **TrackKern** and is followed by the track kerning information:

TrackKern *degree min-ptsize min-kern max-ptsize max-kern*

The *degree* is an integer where increasingly negative degrees represent tighter track kerning and increasingly positive degrees represent looser track kerning. *min-pt-size*, *min-kern-amt*, *max-pt-size* and *max-kern-amt* are all *numbers*. Since the track kerning is a linear function, the minimum and maximum cut-off values (point sizes) are provided along with the amount to track kern by at the point size. The kerning amounts are given relative to the point size. From those 4 values, the track kerning function can be derived. The track kerning function is a linear function. The equation for the line can be determined from the data provided and, therefore, the track kerning values for any point size can be determined. The track kerning values for any point size below/above the minimum/maximum point size are constant (the minimum kerning amount/maximum kerning amount).

In general the track kerning function is as follows:

TrackKern ***degree*** $p_0\ k_0\ p_1\ k_1$

Where x = current point size
Where k_1 = max-kern-amt, k_0 = min-kern-amt
Where p_1 = max-pt-size, p_0 = min-pt-size

$$f(x) = k_0 \qquad \text{for } x < p_0$$

$$f(x) = \frac{(k_j - k_0)}{(p_1 - p_0)} * x + \frac{(k_0 * p_1 - k_1 * p0)}{(p_1 - p_0)} \qquad \text{for } p_0 \le x \le p_1$$

$$f(x) = k_1 \qquad \text{for } x > p_1$$

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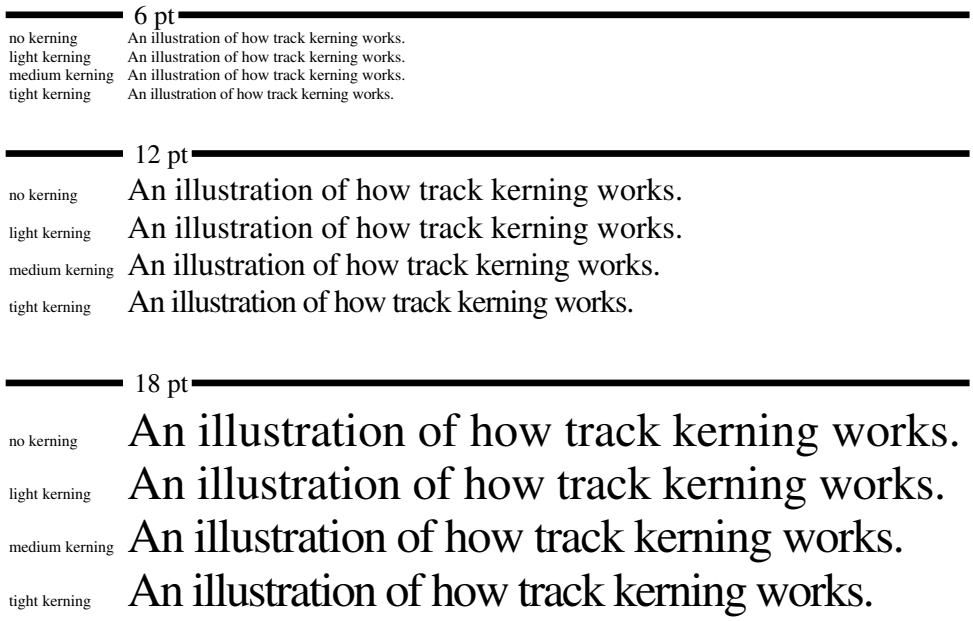
See the last section of this document for a good example of these keywords in use. Below is a sample of text printed using these track kerning values.

Figure 1: Track Kerning



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5.2 PAIR-WISE KERNING

The pair-wise kerning data is surrounded by the lines:

StartKernPairs *integer*
EndKernPairs

Where *integer* indicates how many pairs to expect.

There will be one kerning pair per line. Each line will begin with a keyword of the form **KP** or **KPX**.

KP $name_1$ $name_2$ $number_x$ $number_y$

Name of the first character in the kerning pair followed by the name of the second character followed by the kerning vector specified as an *(x,y)* pair. The kerning vector is the amount to move the second character by relative to the first character to position it properly. The kerning vector is specified in the character coordinate system. In order to use this vector it is necessary to transform it into user space and scale it by the point size in use. The best way to do this is to use the **FontMatrix** entry in the current font dictionary.

KPX $name_1$ $name_2$ $number_x$

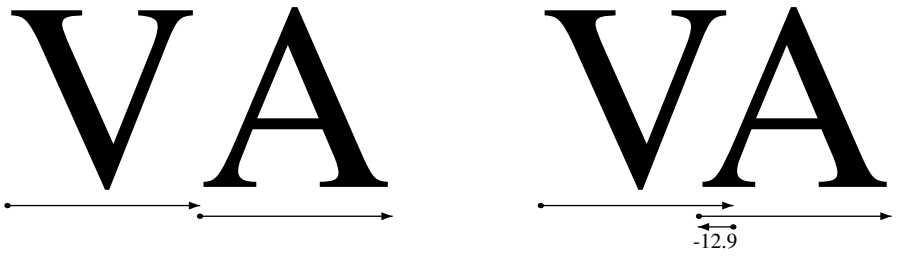
Name of the first character in the kerning pair followed by the name of the second character followed by the kerning amount in the x direction (y is zero). The kerning amount is specified in the units of the character coordinate system.

A character pair kerning line might look like this:

KPX V A -129

Below is an example of pair-wise kerning applied to 100 point characters:

Figure 2: Pair-wise kerning



Characters printed without kerning Pair-wise kerning applied

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6. COMPOSITE CHARACTER DATA

The composite character data section is also optional. Composite characters are new characters that are made up of characters already existing in the font, such as accented characters. Character metric information for composite characters is found in the Character Metrics section of the AFM file. Although most PostScript fonts available from Adobe Systems include a rather extensive set of composite characters, some applications may wish to generate their own. This section provides the data necessary for accurate positioning of the individual pieces. All units are expressed in the 1000 unit-per-em character coordinate system.

StartComposites *integer*
EndComposites

Where *integer* indicates how many pairs to expect.

The data for each composite character is represented as a list of keys and values separated by semicolons. Each composite character gets one line of description. The standard keys are:

CC *name integer*

The composite character name followed by the number of parts that make up the composite.

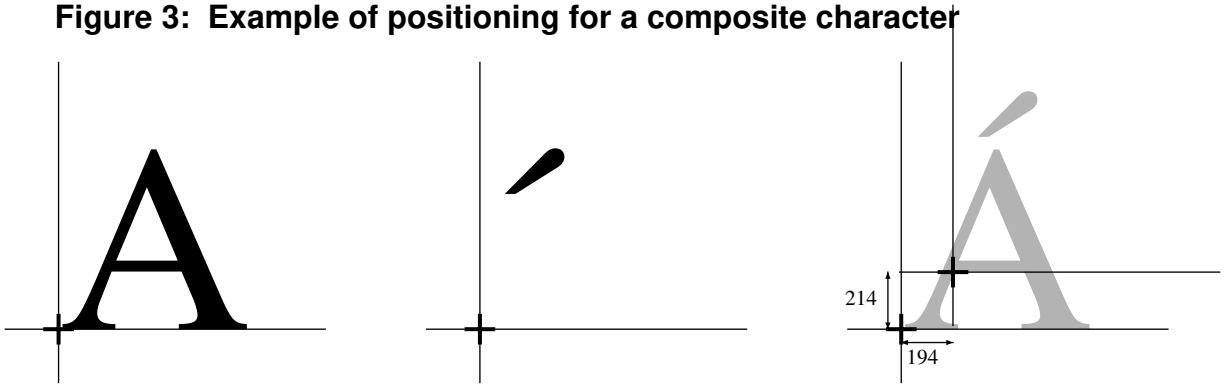
PCC *name deltax deltay*

One of the parts of the composite character. The character name is given followed by the x and y displacement from the origin.

A composite character line might look like this:

CC Aacute 2; **PCC** A 0 0; **PCC** acute 194 214;

Figure 3: Example of positioning for a composite character



Positioning of character A

Positioning of character acute

Composite Aacute

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7. EXAMPLE FILE

The following is an example of an AFM file for Times Roman, although some of the data have been omitted to keep it short.

```
StartFontMetrics 2.0
Comment Copyright (c) 1984 Adobe Systems Incorporated.
Comment All Rights Reserved.
FontName Times-Roman
FullName Times Roman
FamilyName Times
Weight Medium
ItalicAngle 0.0
IsFixedPitch false
UnderlinePosition -98
UnderlineThickness 54
Version 001.000
Notice Times is a trademark of Allied Corporation.
EncodingScheme AdobeStandardEncoding
FontBBox -167 -252 1004 904
CapHeight 673
XHeight 445
Descender -219
Ascender 686
StartCharMetrics 210
C 32 ; WX 250 ; N space ; B 0 0 0 0 ;
C 33 ; WX 333 ; N exclam ; B 128 -17 240 673 ;
C 34 ; WX 408 ; N quotedbl ; B 46 445 313 685 ;
C 35 ; WX 500 ; N numbersign ; B 20 -17 481 673 ;
C 36 ; WX 500 ; N dollar ; B 45 -92 456 726 ;
C 37 ; WX 833 ; N percent ; B 63 -36 771 655 ;
. . . -- lines omitted for brevity --
C 101 ; WX 444 ; N e ; B 24 -17 416 469 ;
C 102 ; WX 333 ; N f ; B 21 0 382 685 ; L i fi ; L l fl ;
C 103 ; WX 500 ; N g ; B 24 -220 469 468 ;
C 104 ; WX 500 ; N h ; B 11 0 487 686 ;
C 105 ; WX 278 ; N i ; B 25 0 255 685 ;
C 106 ; WX 278 ; N j ; B -56 -217 205 685 ;
C 107 ; WX 500 ; N k ; B 7 0 496 686 ;
. . . -- lines omitted for brevity --
C 248 ; WX 278 ; N lslash ; B 0 0 283 685 ;
C 249 ; WX 500 ; N oslash ; B 30 -104 469 566 ;
C 250 ; WX 722 ; N oe ; B 30 -10 684 462 ;
C 251 ; WX 500 ; N germandbls ; B 13 0 468 686 ;
C -1 ; WX 722 ; N Aacute ; B 22 0 702 873 ;
C -1 ; WX 722 ; N Acircumflex ; B 22 0 702 875 ;
C -1 ; WX 722 ; N Adieresis ; B 22 0 702 819 ;
. . . -- lines omitted for brevity --
EndCharMetrics
StartKernData
StartTrackKern 3
```

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```
 Comment Light kerning
 TrackKern -1 14 0 72 -1.89
Comment Medium kerning
 TrackKern -2 8 0 72 -3.2
Comment Tight kerning
 TrackKern -3 6 -.1 72 -3.78
 EndTrackKern
 StartKernPairs 2
 KPX V A -129
 KPX A Y -92
 EndKernPairs
EndKernData
StartComposites 1
 CC Aacute 2; PCC A 0 0; PCC acute 194 214;
EndComposites
EndFontMetrics
```


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