

Adobe Type 1 Font Format

Font Program Organization

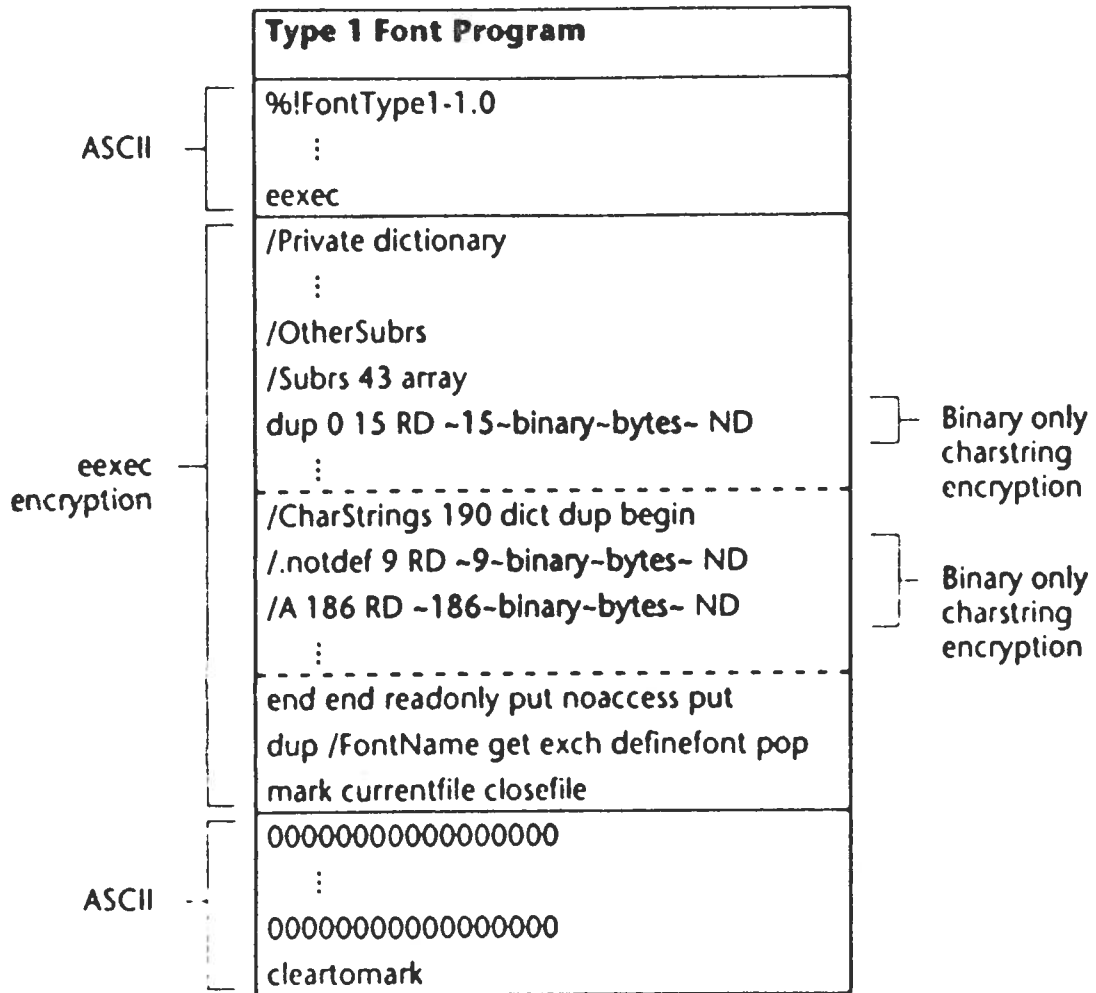
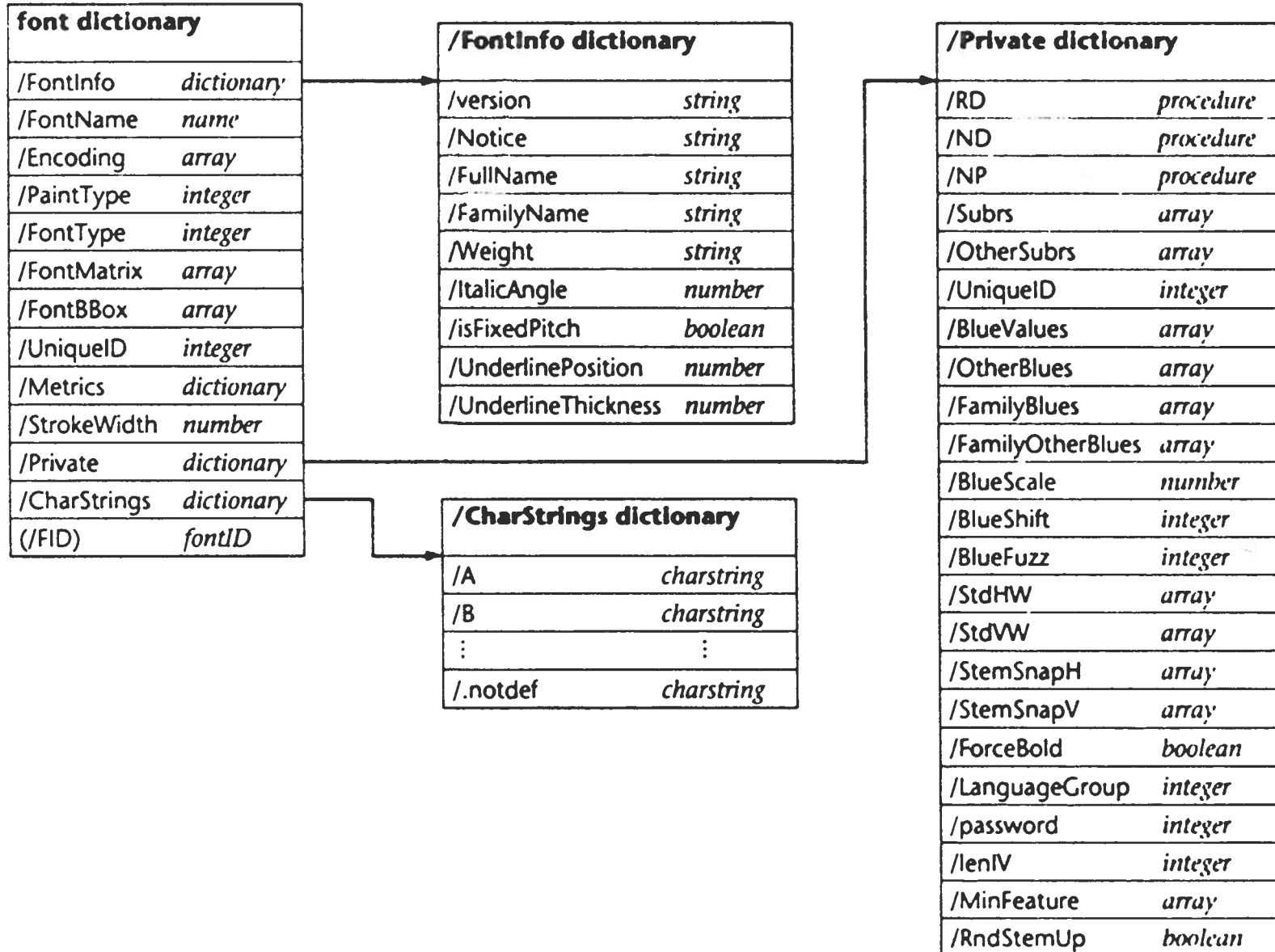


Figure 2b. Typical dictionary structure of a Type 1 font program



```
%!FontType1-1.0: Symbol 001.003
%%CreationDate: Thu Apr 16 1987
%%VMusage: 27647 34029
% Copyright (c) 1985, 1987 Adobe Systems
% Incorporated. All rights reserved.
11 dict begin
/FontInfo 8 dict dup begin
/version (001.003) readonly def
/FullName (Symbol) readonly def
/FamilyName (Symbol) readonly def
/Weight (Medium) readonly def
/ItalicAngle 0 def
/isFixedPitch false def
/UnderlinePosition -98 def
/UnderlineThickness 54 def
end readonly def
/FontName /Symbol def
/PaintType 0 def
/FontType 1 def
/FontMatrix [0.001 0 0 0.001 0 0] readonly def
/Encoding 256 array
0 1 255 {1 index exch /.notdef put } for
dup 32 /space put
% ...
% ... repetitive assignments to Encoding array omitted
% ...
dup 254 /bracerightbt put
readonly def
/FontBBox {-180 -293 1090 1010} readonly def
/UniqueID 6859 def
currentdict end
currentfile eexec
05f3acf73b42a65ec11a12df4c6e26
5306f37b5075f007986cdacc4cd13a
49703465ba20c83c12707f179c0586
3d27adc72767ec06a47e733401fa8d
% ...
% ... thousands of eexec-encrypted bytes omitted
% ...
00000000000000000000000000000000
00000000000000000000000000000000
% ...
% ... many zeros omitted
% ...
00000000000000000000000000000000
00000000000000000000000000000000
cleartomark
```

```
dup /Private 8 dict dup begin
/RD {string currentfile exch readstring pop} executeonly def
/ND {noaccess def} executeonly def
/NP {noaccess put} executeonly def
/BlueValues [-17 0 487 500 673 685] def
/MinFeature {16 16} def
/password 5839 def
/UniqueID 6859 def
/Subrs 43 array
dup 0 15 RD ~15~binary~bytes~ NP
% ...
% ... 41 subroutine definitions omitted
% ...
dup 42 23 RD ~23~binary~bytes~ NP
ND
2 index /CharStrings 190 dict dup begin
/Alpha 186 RD ~186~binary~bytes~ ND
% ...
% ... 188 character definitions omitted
% ...
/.notdef 9 RD ~9~binary~bytes~ ND
end
end
readonly put
noaccess put
dup /FontName get exch definefont pop
mark currentfile closefile
```

Character Outline Considerations

Charstring Command Values

| <i>Value</i> | <i>Command</i> | <i>Value</i> | <i>Command</i> |
|--------------|------------------|--------------|------------------------|
| 1 | hstem | 12 0 | dotsection |
| 3 | vstem | 12 1 | vstem3 |
| 4 | vmoveto | 12 2 | hstem3 |
| 5 | rlineto | 12 6 | seac |
| 6 | hlineto | 12 7 | sbw |
| 7 | vlineto | 12 12 | div |
| 8 | rrcurveto | 12 16 | callothersubr |
| 9 | closepath | 12 17 | pop |
| 10 | callsubr | 12 33 | setcurrentpoint |
| 11 | return | | |
| 12 | escape | | |
| 13 | hsbw | | |
| 14 | endchar | | |
| 21 | rmoveto | | |
| 22 | hmoveto | | |
| 30 | vhcurveto | | |
| 31 | hvcurveto | | |

Figure 3a. *Horizontal stems, vertical stems, and serifs*

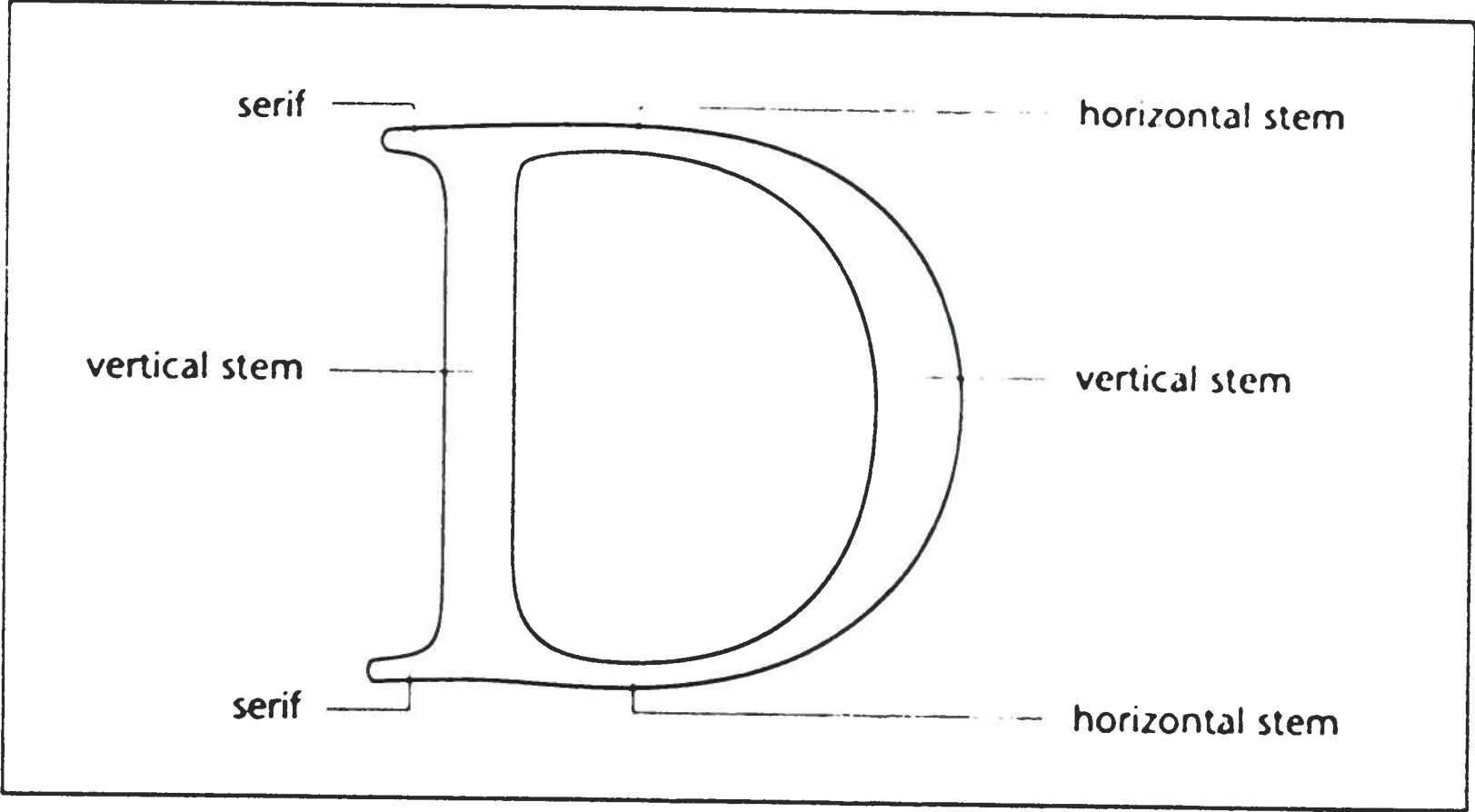


Figure 3b. *Origin, width, left sidebearing and left sidebearing point*

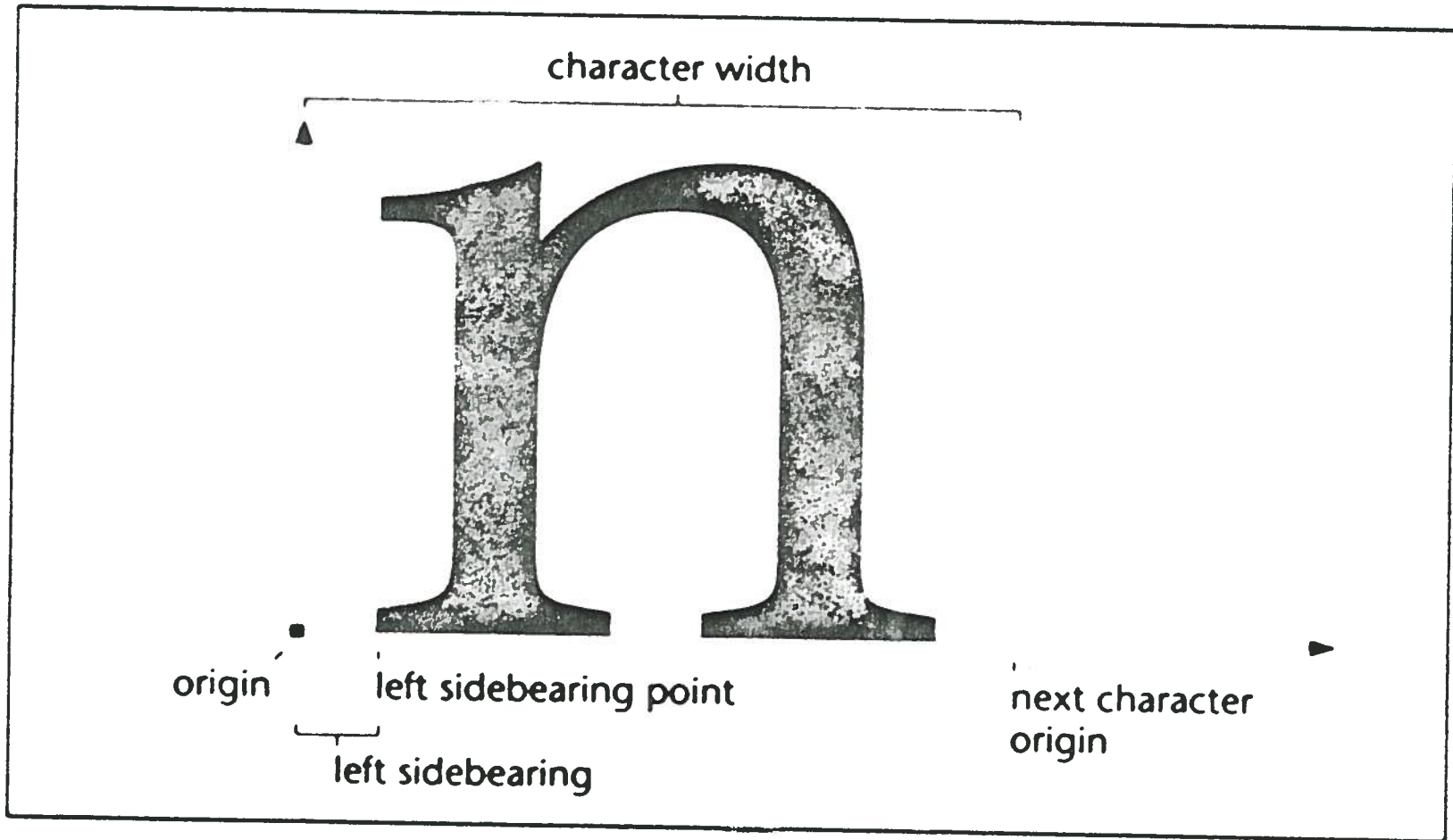


Figure 3c. Vertical measurements: baseline and baseline overshoot position, x-height and x-height overshoot position, cap-height and cap-height overshoot position

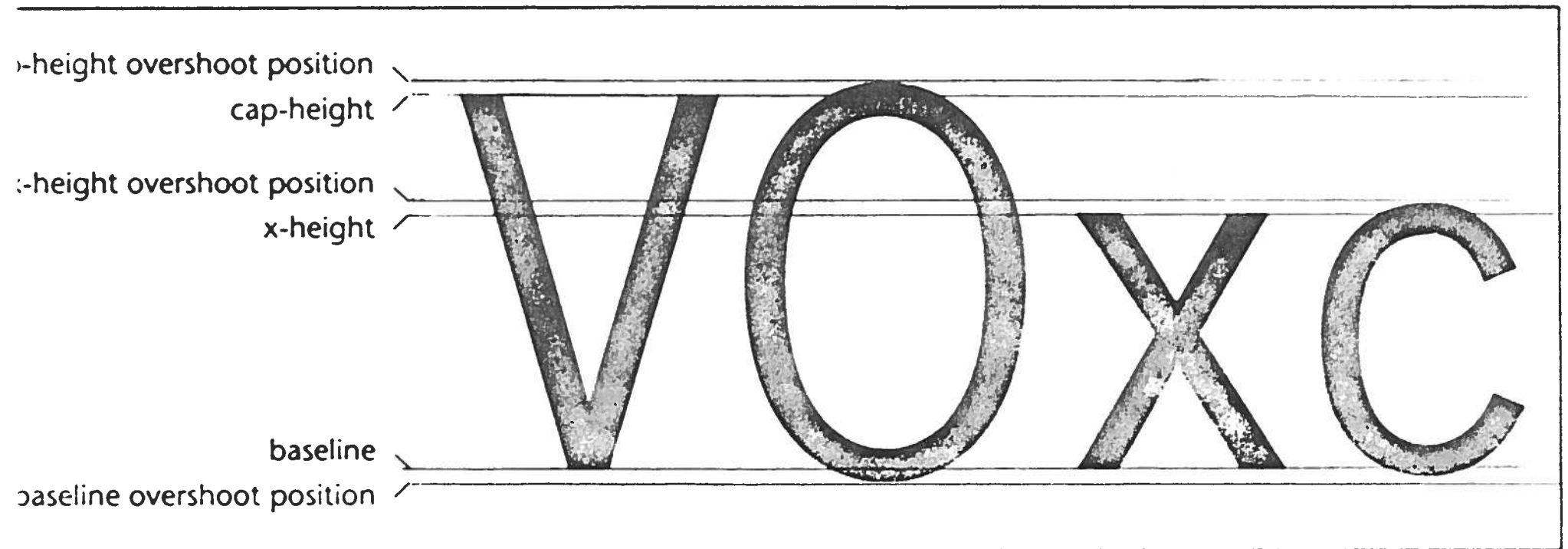


Figure 3d. *Character space coordinate system*

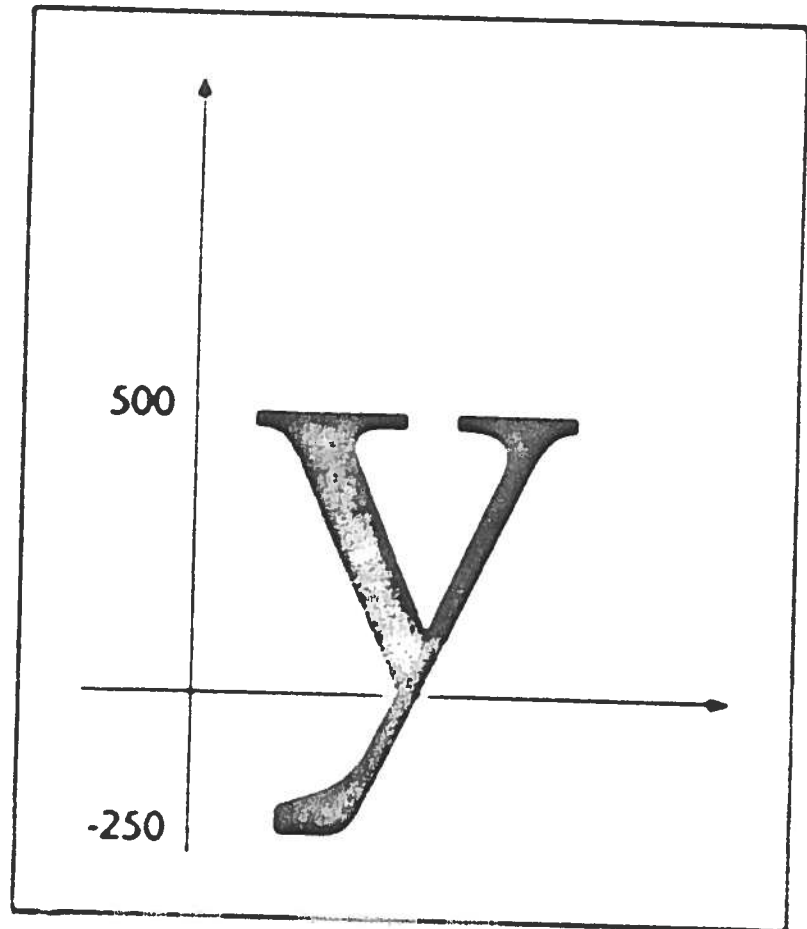
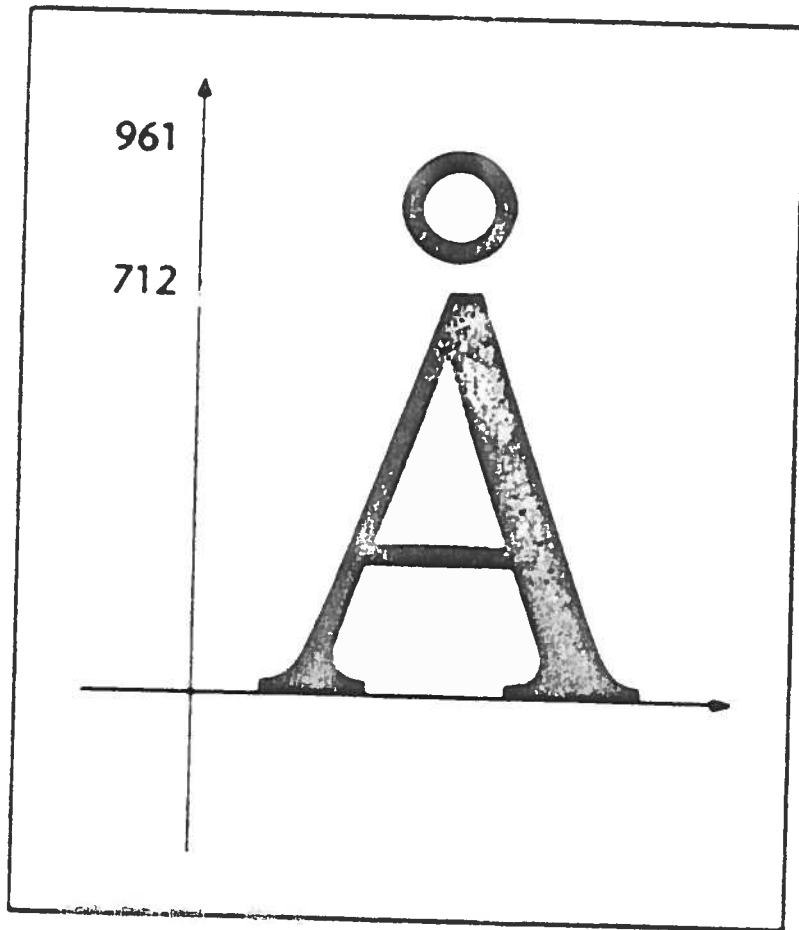


Figure 3e. *Construct subpaths in the correct direction*

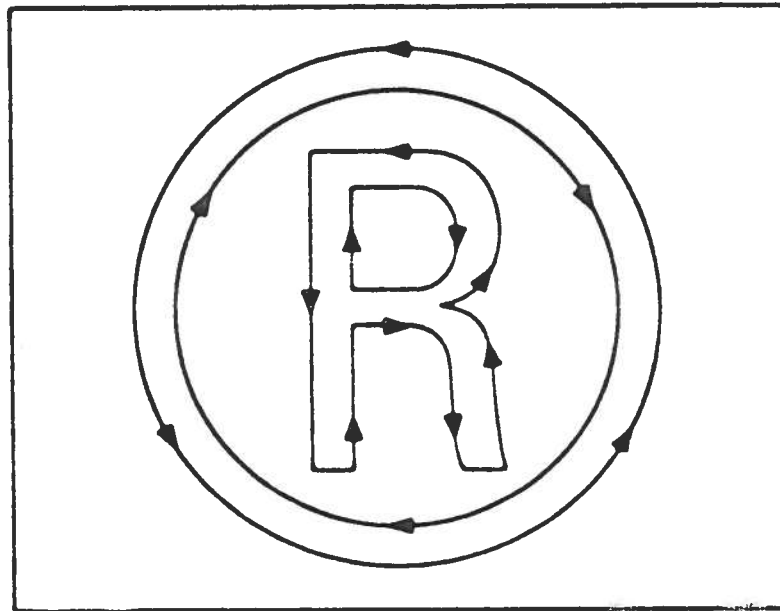
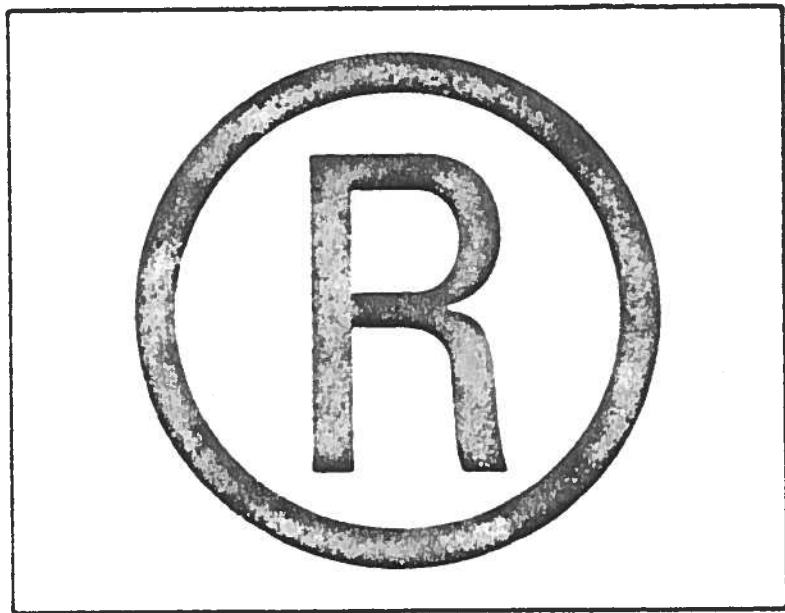
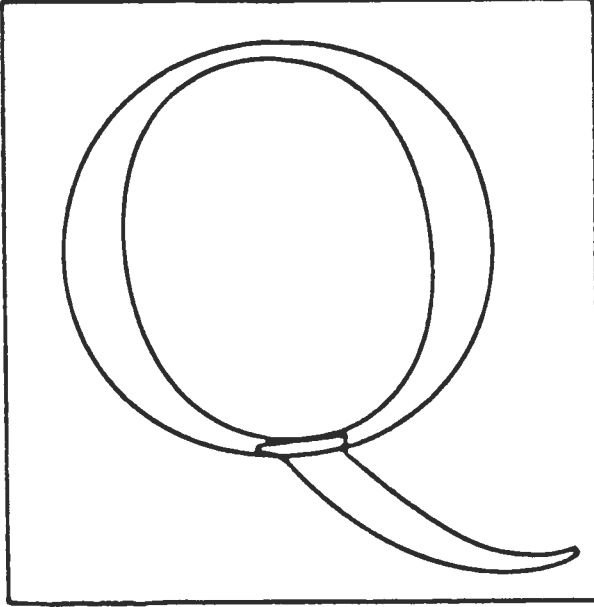


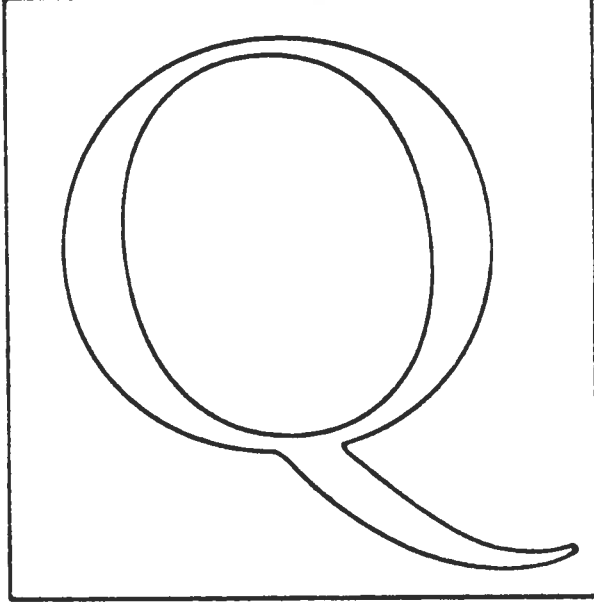
Figure 3f. *Avoid overlapping subpaths*



Filled character



Stroked character: incorrect



Stroked character: correct

Figure 4a. Place endpoints at most extremes (arrow indicates a possible exception)

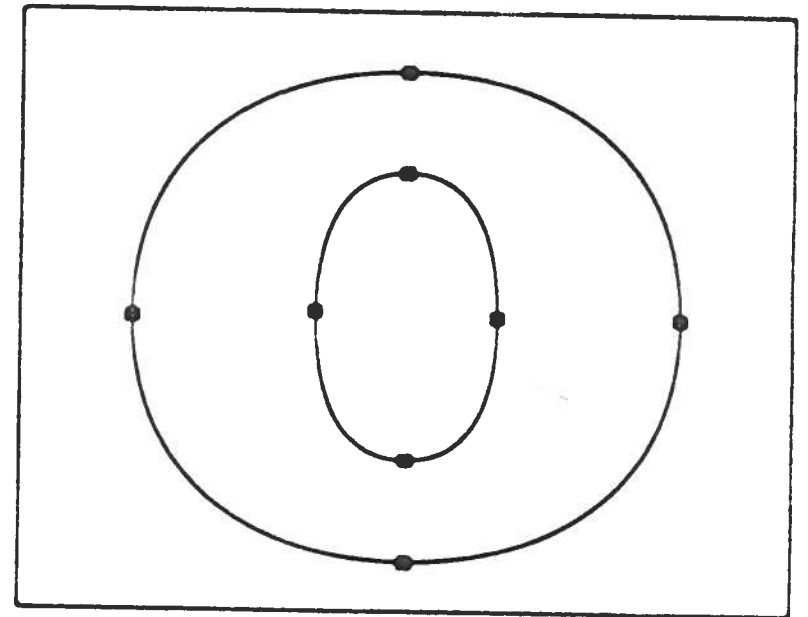
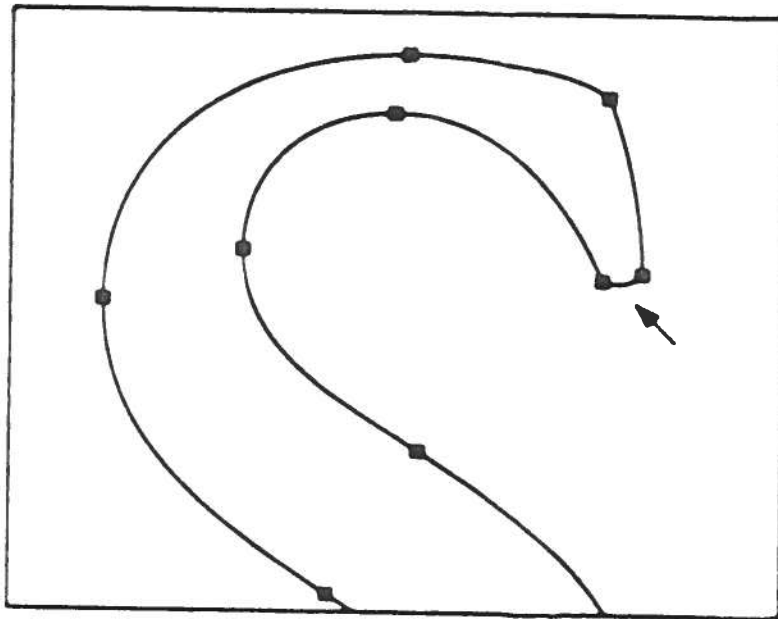
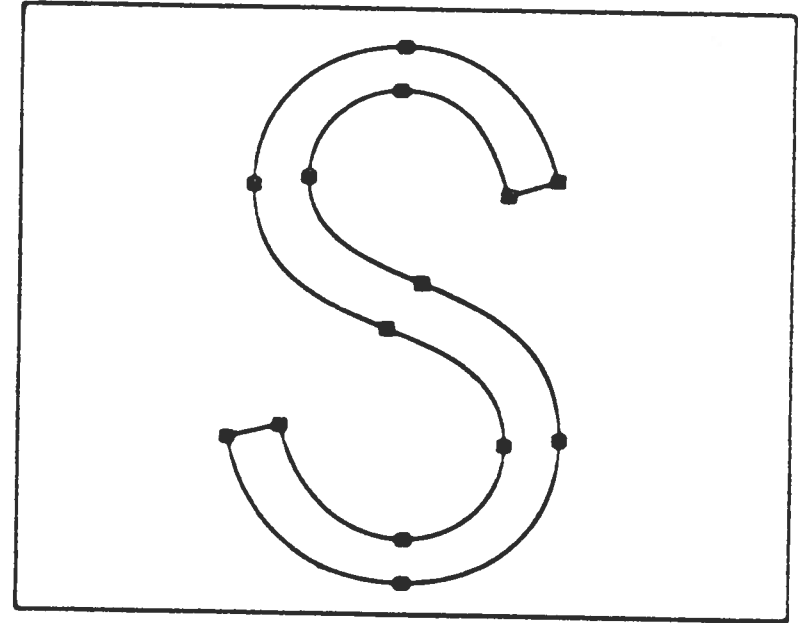
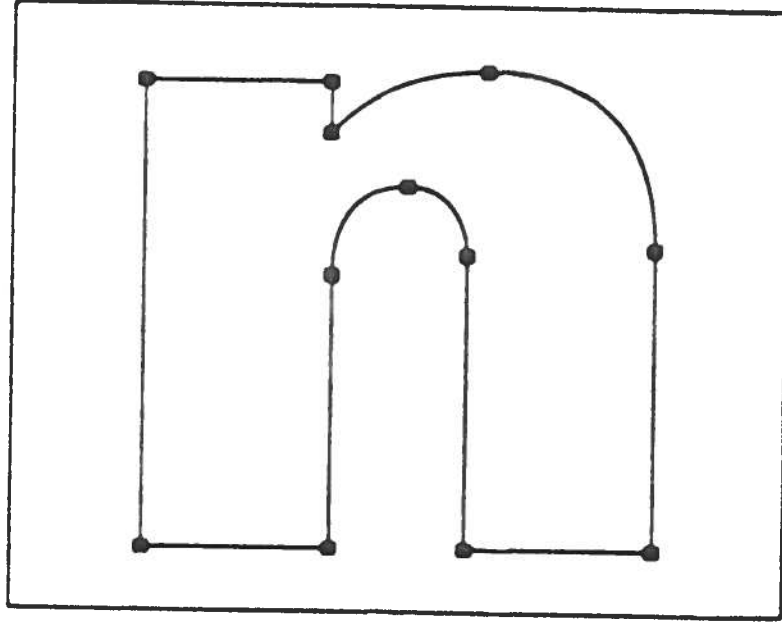
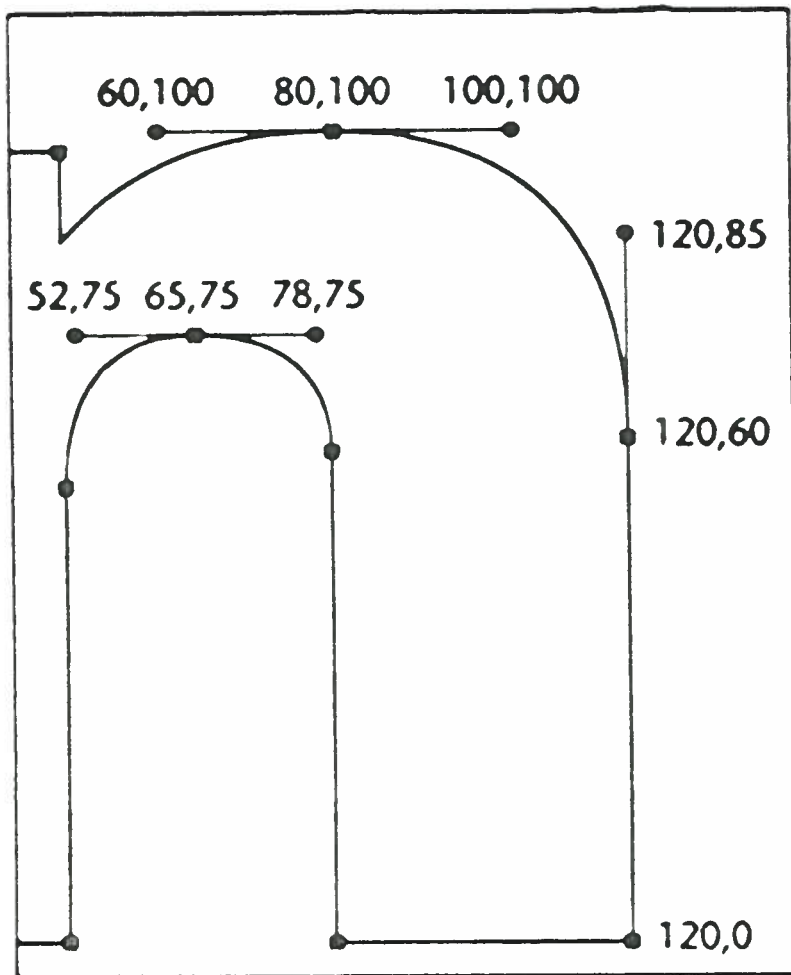
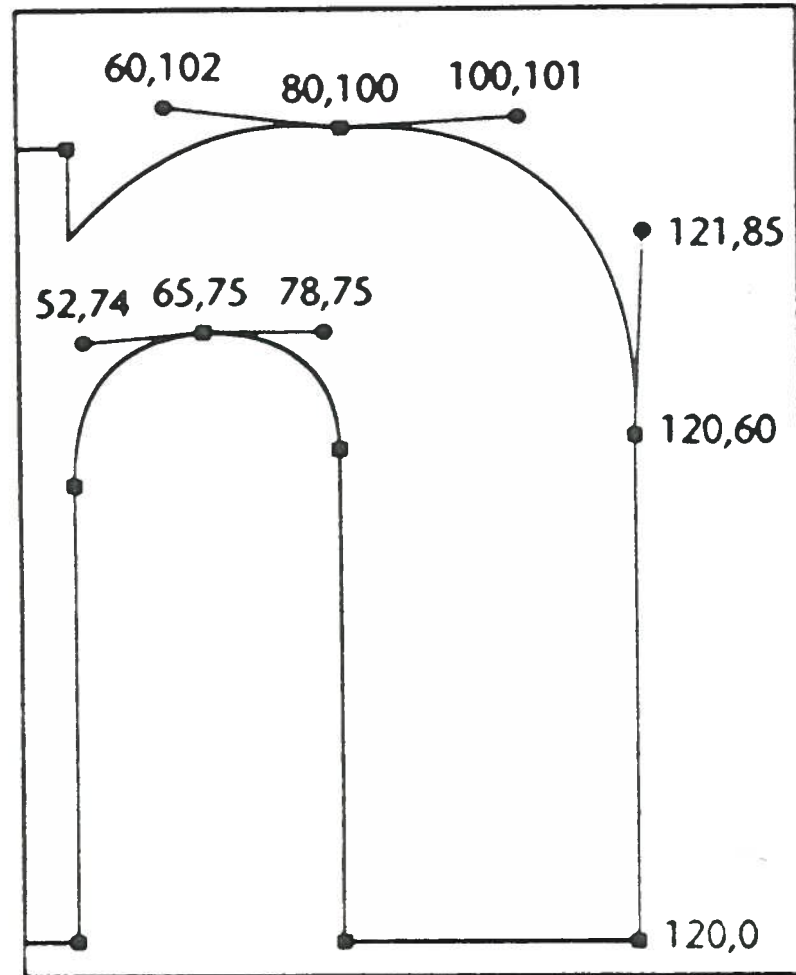


Figure 4b. *Make smooth transitions between path elements*

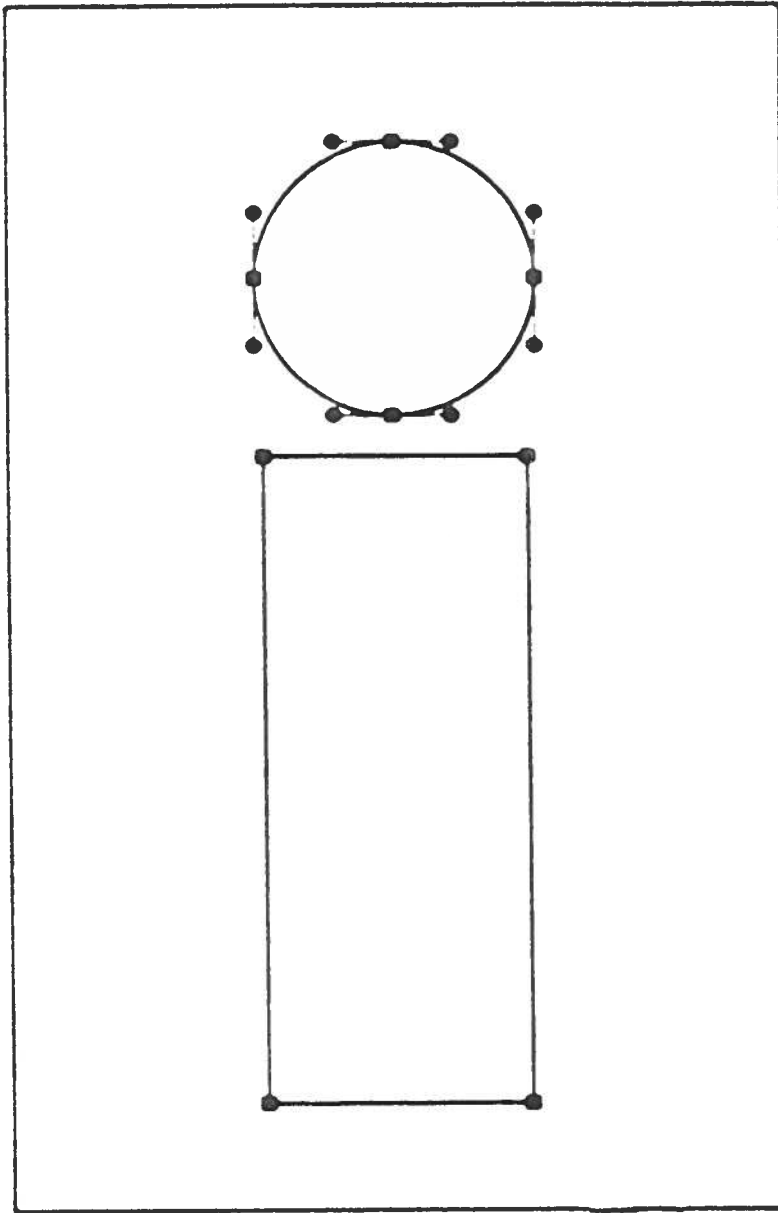


Correct

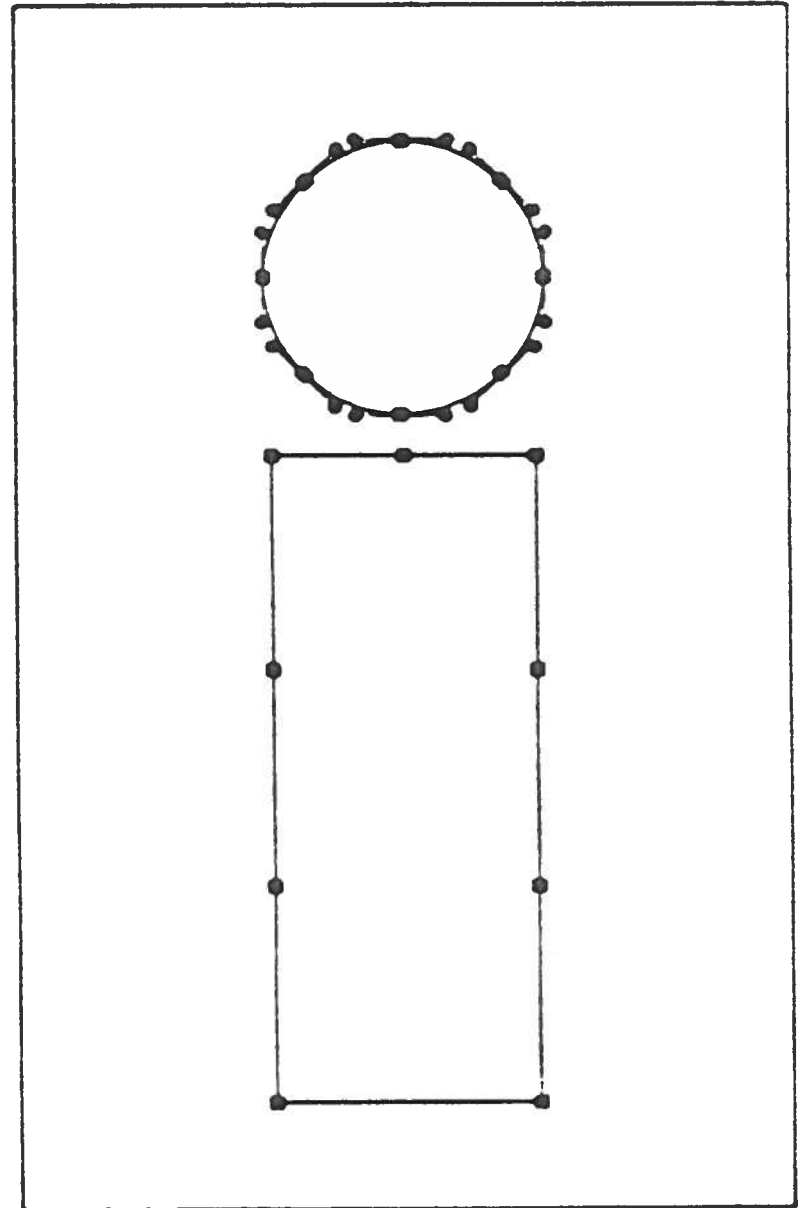


Incorrect

Figure 4c. Paths should be concise



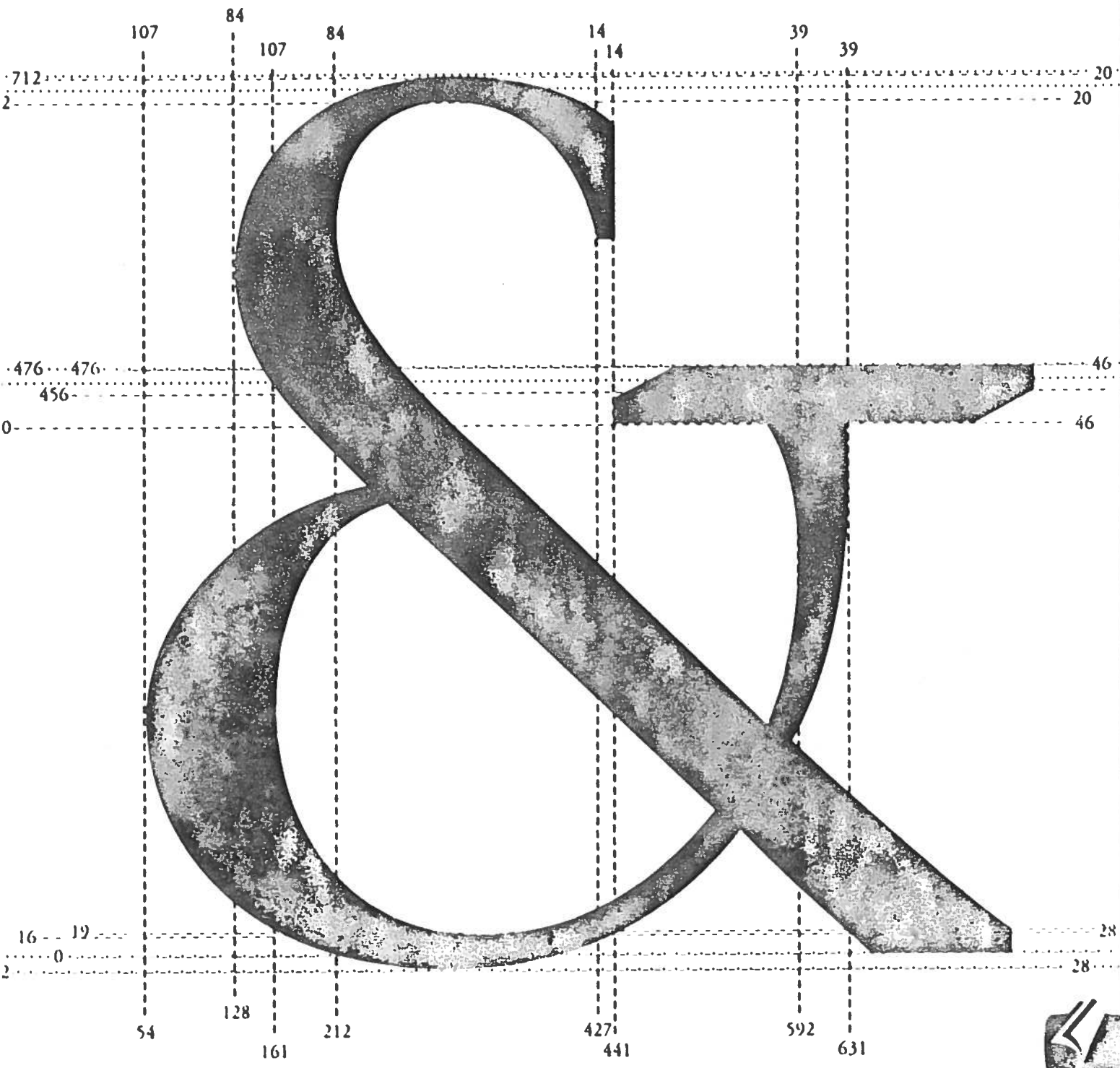
Correct



Incorrect

4.4 Consistency

The key to getting the best possible results is consistency. The original designs of most typefaces include many repeating weights, alignments, and shapes. Often, however, the process of creating digital outlines introduces small errors that can obscure the repeating nature of these features. Seemingly insignificant differences can become exaggerated on digital devices. Wherever possible, these errors should be eliminated.



Private Dictionary Entries

| <i>Entry</i> | <i>Page</i> | <i>Description</i> |
|-------------------------|-------------|---|
| BlueFuzz | 41 | Extends the range of alignment zones. Optional. |
| BlueScale | 39 | Related to point size at which to deactivate overshoot suppression. Optional. |
| BlueShift | 40 | Overshoot enforcement. If Flex feature is used, then the maximum Flex feature height plus 1. Optional, but relevant even if there is no Flex in the font program. |
| BlueValues | 36 | Font-wide vertical alignment zones. Required. |
| ExpansionFactor | 45 | Provides control over rendering of counters. Optional. |
| FamilyBlues | 38 | Family-wide vertical alignment zones. Optional. |
| FamilyOtherBlues | 38 | Family-wide bottom alignment zones. Optional. |
| ForceBold | 43 | Set to true to force bold appearance at small sizes. Set to false to inhibit this behavior. Optional. |
| LanguageGroup | 44 | Identifies language group of font. Optional. |
| lenIV | 45 | Number of bytes at beginning of charstring. Optional. |

| | | |
|------------|----|--|
| NP | 16 | Procedure that abbreviates <code>noaccess put</code> . Required (may be named <code>l</code>). |
| OtherBlues | 38 | Additional bottom alignment zones. Optional. |
| OtherSubrs | 67 | Flex, hint replacement, and future extensions. Required if Flex or hint replacement are used. |
| password | 45 | Compatibility entry. Set to 5839. Required. |
| RD | 16 | Procedure that reads a charstring from the input stream. Required (may be named <code>-l</code>). |
| RndStemUp | 44 | Compatibility entry. Use only for font programs in language group 1. Optional. |
| StdHW | 42 | Dominant horizontal stem width. Optional. |
| StdVW | 42 | Dominant vertical stem width. Optional. |
| StemSnapH | 42 | Array of common horizontal stem widths. Optional. |
| StemSnapV | 43 | Array of common vertical stem widths. Optional. |
| Subrs | 67 | Charstring subroutines. Optional. Required if OtherSubrs are used. |
| UniqueID | 17 | Number unique to each Type 1 font program. Optional, but strongly recommended. |