

Libertinus and diacritics

Anchor model

Libertinus has an anchor model where the base anchors are generally where the mark would be placed relative to the base. See the blue dots in the left panel of Figure 1; from top to bottom, the above-anchor is the blue dot above base glyph, the overlay-anchor is blue dot inside the base glyph outline, and the below-anchor is the blue dot below the base glyph. The mark anchor is generally near the optical center of the mark glyph outline. See the red square in the middle panel of Figure 1; the mark's below-anchor is at the optical center of the mark. The base and mark are combined in the right panel of Figure 2 by superimposing their below-anchors.

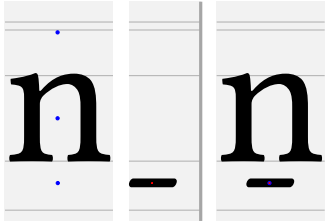


Figure 1: Libertinus n and macron with anchors.

Other fonts use a different geometric model for anchors. In Noto, the base's below-anchor is at the baseline, the overlay-anchor is inside the glyph, and the above-anchor is at the x-height. See the blue dots in the left panel of Figure 2; from the bottom to the top, the mark's below-anchor is the blue dot on the baseline, the overlay-anchor is blue dot inside the base glyph outline, and the above-anchor is the blue dot at the x-height. In Noto, the mark's below-anchor is above the mark glyph. In the middle panel of Figure 2, the mark's below-anchor is the red square, above the mark. The base and mark are combined in the right panel of Figure 2 by superimposing their below-anchors.

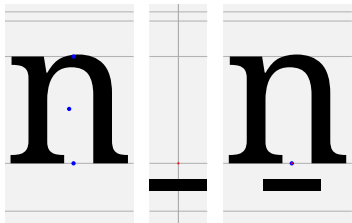


Figure 2: Noto n and macron with anchors.

Regular, above-anchors and below-anchors

See above- and below-anchor coordinates for A–Z and a–z for Libertinus serif regular in Table 1.

Table 1: (X, Y) coordinates of above-anchor (rows 1 and 2) and below-anchor (rows 3 and 4) for A–Z and a–z in Libertinus serif regular.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
354	267	340	306	281	284	365	361	150	182	336	151	431	346	335	277	348	269	232	307	346	336	450	332	295	320
850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850
308	268	363	309	287	209	367	362	147	109	342	262	393	348	350	240		258	234	300	328	318	479	307	295	287
-110	-110	-110	-110	-110	-110	-110	-110	-110	-319	-110	-110	-110	-110	-110	-110		-110	-110	-110	-110	-110	-110	-110	-110	-110
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
209		242	218	243		231	299	137		306	135	392	264	238	271	238	191	206		255	256	345	256	262	220
645		645	645	645		645	645	795		784	885	645	646	645	646	645	646	645		646	646	645	646	645	646
196	234	236	221	234	132	229	272	136	109	290	135	408	265	243	179	348	135	196	163	239	241	352	224	242	207
-110	-110	-110	-110	-110	-110	-319	-110	-110	-319	-214	-110	-110	-110	-110	-319	-319	-110	-110	-110	-110	-110	-110	-110	-319	-110

A few bases are missing anchors. The Y coordinates (rows 2 and 4) of base anchors can be set geometrically, relative to a few vertical aspects – descender height, baseline, x-height, ascender height, cap height – the gray horizontal lines of Figure 1 of the font. The X coordinates (rows 1 and 3) of base anchors are better set optically, by judging the optical weight of the top or bottom of the glyph outline, as well as the glyph width.

Patch J and Q regular, below-anchor

J’s below-anchor is too low. In Table 1, the Y coordinate of the below-anchor of J is the same as that of the lowercase letters with descenders. But the descender of J is not as low as that of j, p, q etc. Look at the J column in the grid labeled regular, Latin, below, which is later in this document. The below-marks are set with too much clearance below J.

Q has no below-anchor (Table 1). By harfbuzz fallback shaping (in the absence of anchors), a below-marks will be place below the baseline, without considering descenders. Look at the J column in the grid labeled regular, Latin, below, which is later in this document. All the below-marks crash into Q’s descender.

Let’s analyze the below-anchors in order to set the below-anchor for J and Q. The below clearance is clearly 110 units on the Y axis, as can be seen from the below-anchor Y coordinate of the letters that sit on the baseline. What should the below-anchor Y coordinate be for J and Q? For the Y coordinate, the lower bound of the J bounding box is at $Y = -172$. So, the below-anchor Y coordinate of J should arguably be $Y = -172 - 110 = -282$. But the designer set it at $Y = -319$, which is too low. For the Y coordinate, the lower bound of the Q bounding box is at $Y = -209$. So, the below-anchor Y coordinate of Q should arguably be $Y = -209 - 110 = -319$. But the J and Q have curves at the bottoms of their descenders, and to account for overshoot, the anchor should be moved up by a few units. But what is the proper overshoot correction? The O has a baseline overshoot of 10 units. So, the below-anchor Y coordinate of J should really be $Y = -282 + 10 = -272$, and the below-anchor Y coordinate of Q should really be $Y = -319 + 10 = -309$.

Now, let’s decide below-anchor X coordinate of Q. The Q and O are drawn with the same main oval outline coordinates. So, the below-anchor X coordinate of Q should the same as that for O, which is $X = 350$.

That is, the below-anchor of J should be $(109, -272)$, and the below-anchor of Q should be $(350, -309)$. Here is this positioning of J and Q in a patched version of the font (woth O and X for comparison only).

Original: XJQQ

Patched: XJQQ

But there is no sane reason to put a below-mark on J or Q, so this is not really a problem at all.

Patch k regular, below-anchor, Y coordinate

The below-anchor of k, regular, is at $Y = -214$. But it should be at $Y = -110$, like all other letters that sit on the baseline. That is, the below-anchor of k should be $(109, -110)$.

Here is this positioning of k in a patched version of the font (with o for comparison only).

Original: k ko ok

Patched: k ko ok

But there is no sane reason to put a below-mark on k, other than perhaps dot (which is a precomposed character), so this is not really a problem at all.

Above anchor, a–z regular

b, f, j, and t are missing the above-anchor. d and h have an above-anchor above the meanline but not above the ascender. l has an above-anchor above the ascender. k has an above-anchor, but it is just below the ascender, so any marks other than the do crash into the ascender. These are all legitimate design choices. There are no above-marks, other than those with precomposed characters, the would ever be combined with b, f, or t.

Patch j dot removal for three above-marks

The dot of i and j should be removed before adding any above-mark. But the dot is not removed for three above-marks: x, turned tilde, double macron. So the GSUB table should be patched to fir the dotless j substitution in this context.

To do.

Capital mark alternates

Libertinus has custom glyphs for some marks (acute, grave, cicrumflex, breve, a.o.) that are designed better for capital letters. These alternates are flatter. GSUB lookups 23 and 24 implement the substitution. This substitution is not fired on some capital consonants (T, V, W, X) because these marks are not expected on these bases.

Libertinus has custom glyphs for some marks that are designed better for superscripts. These alternates are smaller. Regrettably?, no GSUB table implements their substitution.

Regular, above-anchor, capitals, X coordinate

Figure 3 (left panel) shows pairs of bases aligned at their above-anchor. If a capital letter has a bad X coordinate for its above-anchor, then it will look always off, right or left, in its black column relative to the gray letters that it overlays. Note that the above-anchor X coordinate is not in the geometric (horizontal) center of the glyph, by design. The above-anchor X coordinate is always off center by a few UPM units, sometimes left and sometimes right. But it very hard to discern a few UPM units. See the right panel of Figure 3 for an illustration of increasingly bad (spoofed) X coordinates of N's above-anchor.

Note that the above-anchor of L is above the major (vertical) stem of the L. For E, F, P and R, the above-anchor is optically centered above the glyph, not above the major stem.

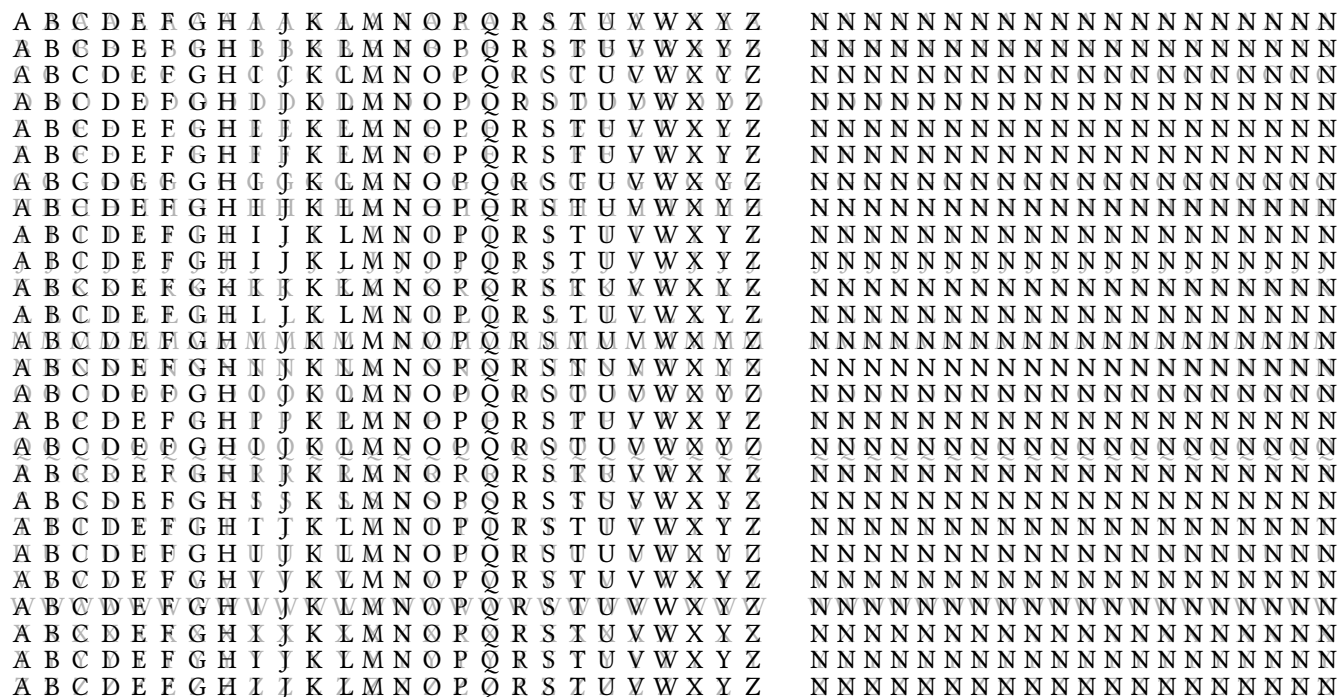


Figure 3: Above-anchor X coordinate alignment. In the left panel, the 26×26 grid shows letters A–Z aligned at their above-anchor. The right panel shows how hard it is to discern bad X coordinates. The right panel shows N aligned with letters at their above-anchor, starting at the first column with N's above-anchor as currently set by the font, and then spoofing increasing bad values for the X coordinate of N's above-anchor, by 5 UPM per column. At the rightmost column, it becomes evident that the (spoofed) X coordinate of N's above-anchor is bad, because in that column the black Ns are too far right of the gray letters below them.

Comma-style marks

Libertinus has some (precomposed) glyphs for Unicode characters (with code points) where the caron or cedilla has a comma-style shape, instead of a wedge or hook as might be naively expected. But all of these are appropriate for Czech/Slovak orthography (caron or *háček*) or Latvian orthography (cedilla, but really the comma-above mark or *komatiņš*, by a known mistake in Unicode).

Czech/Slovak *háček*

In Czech/Slovak orthography, the d, l, L, n and t may take a reduced caron that may look like a comma, not a wedge. In Libertinus, only the d, L, l, and t have the reduced comma-style caron in their precomposed form, and the n has wedge caron precomposed form.

`\char"010F` *ďďďď*

`\char"013D` *ĽĽĽĽ*

`\char"013E` *ĽĽĽĽ*

`\char"0148` *ňňňň*

`\char"0165` *ťťťť*

Libertinus even has a custom glyph for a small capital L with a caron, and it is comma-style.

`\textsc{1\char"030C}` *ɹ*

`\textsc{\char"013E}` *ɹ*

Cedilla and Latvian *komatiņš*

Here are all precomposed characters with a cedilla.

`\char"00C7` *ÇÇÇÇ* `\char"00E7` *çççç*

`\char"1E08` *ĈĈĈĈ* `\char"1E08` *ĉĉĉĉ*

`\char"1E10` *ĎĎĎĎ* `\char"1E11` *ďďďď*

`\char"0228` *ĒĒĒĒ* `\char"0229` *ēēēē*

`\char"1E1C` *ĚĚĚĚ* `\char"1E1D` *ěěěě*

`\char"0122` *ĢĢĢĢ* `\char"0123` *ģģģģ*

`\char"1E28` *ĤĤĤĤ* `\char"1E29` *ĥĥĥĥ*

`\char"0136` *ķķķķ* `\char"0137` *ķķķķ*

`\char"013B` *ļļļļ* `\char"013C` *ļļļļ*

`\char"0145` *ņņņņ* `\char"0146` *ņņņņ*

`\char"0156` *ŗŗŗŗ* `\char"0157` *ŗŗŗŗ*

`\char"015E` *ȘȘȘȘ* `\char"015F` *șșșș*

`\char"0162` *ȚȚȚȚ* `\char"0163` *țțțț*

These characters – Ģ ģ Ķ ķ Ļ ļ Ļ ļ Ņ ņ Ņ ņ – use the Latvian *komatiņš* which is proper for Latvian orthography, but the result of a historical mistake in Unicode naming.

The Unicode characters of D and d with cedilla exist for scholarly and historical reasons, not Latvian orthography. Fonts design these Unicode characters differently. Libertinus designs them inconsistently: comma-style in regular and italic, and hook-style in (semi)bold and (semi)bold italic. I think the cedilla on a D or d should be hook-like, but I do not really know.

The other characters – c, e, h, s, t – with a cedilla should definitely be hook-like, and they are so in Libertinus.

Somewhat mysteriously, if the LaTeX source tries to combine any of these letters – c, d, e, g, h, k, l, n, r, s, t – with the combining cedilla, U+0327, then the precomposed character is produced.

c\char"0327 çç ç ç
d\char"0327 đđ đ đ
e\char"0327 ěě ě ě
g\char"0327 ġġ ġ ġ
h\char"0327 ħħ ħ ħ
k\char"0327 ķķ ķ ķ
l\char"0327 ļļ ļ ļ
n\char"0327 ņņ ņ ņ
r\char"0327 ŀŀ ŀ ŀ
s\char"0327 šš š š
t\char"0327 ťť ť ť

This behavior does not make sense for the Latvian *komatiņš* bases – g, k, l, n, r – because any person trying to produce Latvian g with *komatiņš* would not try g\char"0327 or \c{g}. This behavior is tolerable for the other bases – c, d, e, h, s, t.

IJ

The ij and IJ ligatures are Unicode characters (with code points) and are supported by Libertinus.

IJ \char"0132 U+0132 capital ligature IJ

ij \char"0133 U+0133 small ligature ij

Libertinus has custom glyphs for these ligatures with an acute, and the small capital ligature with an acute. The GSUB table that activates these custom glyphs only works when the language is set to Dutch by a font loading command. For example,

\newfontfamily\SerifRegularDutch[Language = Dutch]{LibertinusSerif-Regular.otf}

ÍĴ {\SerifRegularDutch \char"0132\char"0301} Dutch capital ligature IJ with acute

íĵ {\SerifRegularDutch \char"0133\char"0301} Dutch small ligature ij with acute

Ĳ {\SerifRegularDutch \textsc{\char"0133\char"0301}} Dutch small capital ligature IJ with acute

In an English LaTeX document, ij and IJ are kerned by the GPOS table to produce ij and IJ, so they look close together, but they are not substituted by the single glyph for the ligature.

f with dot below

tiyó ṛfa

tiyó ṛfa

tiyó ṛfa

tiyó ṛfa

ŗ = \char"1E5B is the precomposed character U+1E5B Latin small letter r with dot below.

ř = f\char"0323 is f with U+0323 combining dot below.

Here are some letters with a dot below.

ā ḅ đ ē ħ ị ḳ ḷ ṃ ṇ ọ ṛ ṣ ṭ ụ ṿ ỵ ẓ ç f̣ ġ j̣ p̣ q̣ x̣

a b d e h i k l m n o r s t u v w y z c f g j p q x
a b d e h i k l m n o r s t u v w y z c f g j p q x
a b d e h i k l m n o r s t u v w y z c f g j p q x

The left group of letters – a b d e h i k l m n o r s t u v w y z – have a precomposed character. For the right group of letters – c f g j p q x – the dot is placed according to the below-anchor (if the below-anchor is defined for the letter) or by harfbuzz fallback shaping (placing the dot below the baseline, regardless of the letter’s bounding box).

In all styles – regular, italic, semibold, and semibold italic – the precomposed glyph of y with dot below places the dot beside the descender, even though the y has a below-anchor below the descender.

Do the letters c, f, g, j, p, q, and x have good below-anchors? In regular, the below-anchor of all these combining bases is below the glyph outline (good). In italic, the below-anchor of f, p, and q is beside the descender (bad), the below-anchor of g and j is below the descender (good), and the below-anchor of c and x is below the baseline (good). In semibold, the below-anchor of g and j is below the descender (good), but the other bases – c, f, p, q – have no below-anchor, and harfbuzz fallback positioning places the combining dot below the baseline, not below the bounding box; for c, f and x this is good, but for p and q this is bad, because of the descenders. In semibold italic, the below-anchor of c, g, j, p and q is below the glyph outline (good), the below-anchor of f is inside the descender (very bad), and x has no below-anchor but harfbuzz fallback positioning places the combining dot below the baseline (good).

Which dots are used in precomposed characters and how big are the dots? In all styles (except semibold italic), the precomposed characters reference the dot of uni0307, combining dot above, U+0307, and take care to translate this above-mark to a position below the letter outline, except for m, which references dotbelowcomb, combining dot below, U+0323. In semibold italic, dotaccent is used instead of uni0307. These two dots are four-point Bézier circles (in regular and semibold, but ovals in italic and semibold italic), but of different diameter. In regular, uni0307 has diameter 100, and dotbelowcomb has diameter 108. That is, the precomposed characters (except m) use a smaller dot, and the non-precomposed letters (and m) take a bigger dot. In semibold, the size difference is reversed: uni0307 has larger diameter 124, and dotbelowcomb has small diameter 108. Actually, semibold dotbelowcomb is not a Bézier circle – the horizontal span is 109, and the vertical span is 108. In semibold italic, dotaccent is a skewed four-point Bézier oval – the horizontal and vertical spans are 120, offset by $(\pm 6, \pm 7.5)$ from the center – and dotbelowcomb is slightly larger, slightly flatter skewed six-point Bézier oval – horizontal span is 122 and the vertical span is 120. So, in semibold italic the two dots in precomposed and combining form are closest in size. Recall that f has a bad below-anchor, inside the descender, but g, j, p and q have a good below-anchor, below the glyph outline.

So, in order to solve the problem of the bad dot below f in italic, I need to decide the scope of the badness to correct. The simplest patch is move the below-anchor in italic and semibold italic below the descender. But this does not solve inconsistent below dot size across styles and letters. In italic and semibold italic, g and j have a (good) below-anchor at $Y = -319$, so that is also good Y coordinate for f’s below-anchor.

I asked Copilot/GPT-5.1 to calculate a good X coordinate for f’s below-anchor in italic and semibold italic, taking into account the U-pocket of f’s descender and the below-anchor of dotbelowcomb. I decided that this U-pocket strategy was appropriate after testing other strategies that accounted for the slant of onf the major stroke. Here is a reasonably faithful summary of the calculations and reasoning by Copilot/GPT-5.1.

For italic, the descender’s U-pocket is defined by the control points at (14, -238) and (33, -205), giving a U-center around $x \approx 24$. Using the (symmetric) italic dotbelowcomb anchor as the dot’s optical center, the dot should sit under this U-pocket, not under the ball or the stem. A balanced, U-centered, slightly inner-biased choice is $X \approx 30$.

For semibold italic, the U-pocket of the semibold italic descender is wider and more asymmetric, with a geometric U-center of $X = -33.5$. The semibold italic dotbelowcomb itself is also skewed, with its anchor already shifted relative to its mass. In practice, the visually correct position for the dot below f is under the open side of the U-pocket, clearly right of the ball and closer the right of the stem. The anchor candidate is $X \approx 62$.

Here are examples with the patched fonts, with f’s below-anchor in italic at (30, -319) and semibold italic at (62, -319). This does not solve the problem of inconsistent dot size below letters, and I did not touch p, q, or y.

Original	Patched italics (f only)
tiyô rfa	tiyô rfa
tiyô rfa	tiyô rfa
tiyô rfa	tiyô rfa
tiyô rfa	tiyô rfa

Original (repeated from above)

a b d e h i k l m n o r s t u v w y z c f g j p q x

a b d e h i k l m n o r s t u v w y z c f g j p q x

a b d e h i k l m n o r s t u v w y z c f g j p q x

a b d e h i k l m n o r s t u v w y z c f g j p q x

Patched italics (f only)

a b d e h i k l m n o r s t u v w y z c f g j p q x

a b d e h i k l m n o r s t u v w y z c f g j p q x

Marks

Above marks – GPOS anchor 0

[illegible]

Below marks – GPOS anchor 2

X
X
X
X X

Left angle – GPOS anchor 3

$$\mathbf{X}^T \mathbf{X}^T \bar{\mathbf{X}} \bar{\mathbf{x}}$$

Below-right marks – GPOS anchor 4

$$\begin{array}{c} \mathbf{x}_j \mathbf{x}_l \mathbf{x}_z \\ \mathbf{x}_j \mathbf{x}_l \mathbf{x}_z \\ \mathbf{x}_j \mathbf{x}_l \mathbf{x}_z \\ \mathbf{x}_j \mathbf{x}_l \mathbf{x}_z \end{array}$$

Cedilla – GPOS anchor 5

$$\mathbf{X} \quad \mathbf{x} \quad \mathbf{X}_5 \quad \mathbf{x}_5$$

Overlay marks – GPOS anchor 6

$\emptyset \emptyset \emptyset \emptyset \emptyset$
 $\emptyset \emptyset \emptyset \emptyset \emptyset$
 $\emptyset \emptyset \emptyset \emptyset \emptyset$
 $\emptyset \emptyset \emptyset \emptyset \emptyset$

Double marks

$\overbrace{XX} \overbrace{XX} \overbrace{XX} \overbrace{XX} \overbrace{XX} \overbrace{XX} \overbrace{XX}$
 $\underbrace{XX} \underbrace{XX} \underbrace{XX} \underbrace{XX} \underbrace{XX} \underbrace{XX} \underbrace{XX}$

$$\underbrace{xx}_{\sim} \underbrace{xx}_{\sim} \underbrace{xx}_{\sim} \underbrace{xx}_{\sim} \underbrace{xx}_{\sim} \underbrace{xx}_{\sim}$$

$\ddot{x}x$ $\ddot{x}x$ $\ddot{x}x$ $\hat{x}x$ $\ddot{x}x$ $\ddot{x}x$ $\ddot{x}x$

$x \otimes x \otimes x \otimes x \otimes x \otimes x \otimes x$

Overline and low line

O+0305 combining overline and U+0332 combining low line are applied by GSUB lookups that substitute a custom-width line mark according to width classes. GSUB lookup 51 effectively classifies the glyphs by width, and GSUB lookups 52–82 provide the appropriate custom-width mark for the base width class. Semibold and semibold italic do not have any combining low lines. Custom-width line marks do not have anchors. They are positioned by harfbuzz fallback shaping. The overlines are above the ascender line, so they are above all bases. The low lines are below the baseline, but above the descender line, and so they cut through any descenders. If a new glyph is added, and you want to support custom-width line marks for it, then remember to classify the new glyph in GSUB lookup 51.

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyzÆæØøÐðÞþǾǿǪǫǬǭǮǯǱǲǳǴǵǶǷǸǹǺǻǼǽǾǿǪǫǬǭǮǯǱǲǳǴǵǶǷǸǹǺǻǼǽǾǿ

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyzÆæØøÐðÞþǾǿǪǫǬǭǮǯǱǲǳǴǵǶǷǸǹǺǻǼǽǾǿ

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyzÆæØøÐðÞþǾǿǪǫǬǭǮǯǱǲǳǴǵǶǷǸǹǺǻǼǽǾǿ

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyzÆæØøÐðÞþǾǿǪǫǬǭǮǯǱǲǳǴǵǶǷǸǹǺǻǼǽǾǿ

БЦДДдгГЕЕеЖЖжЙЙйККкЛЛлММмННнООоППпРРрССсТТтУУуФФфХХхЦЦцЧЧчШШшЩЩщЪЪъЫЫыЭЭэЮЮюЯЯяабвгдежзийклмнопрстуфхцчшщъыэюяАБВГДЕЖЗИЙКЛМНОПРСТУФХЦЧШЩЪЫЭЮЯабвгдежзийклмнопрстуфхцчшщъыэюя

БЦДДдгГЕЕеЖЖжЙЙйККкЛЛлММмННнООоППпРРрССсТТтУУуФФфХХхЦЦцЧЧчШШшЩЩщЪЪъЫЫыЭЭэЮЮюЯЯяабвгдежзийклмнопрстуфхцчшщъыэюяАБВГДЕЖЗИЙКЛМНОПРСТУФХЦЧШЩЪЫЭЮЯабвгдежзийклмнопрстуфхцчшщъыэюя

БЦДДдгГЕЕеЖЖжЙЙйККкЛЛлММмННнООоППпРРрССсТТтУУуФФфХХхЦЦцЧЧчШШшЩЩщЪЪъЫЫыЭЭэЮЮюЯЯяабвгдежзийклмнопрстуфхцчшщъыэюяАБВГДЕЖЗИЙКЛМНОПРСТУФХЦЧШЩЪЫЭЮЯабвгдежзийклмнопрстуфхцчшщъыэюя

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Above-right marks – GPOS anchor 1

Libertinus has three combining marks with GPOS anchor 1 – U+031B horn, U+0315 comma above right, and U+0358 dot above right.

A few bases in Libertinus have this anchor (anchor 1), but none that possibly need it.

Horn

The Vietnamese alphabet has two horn vowels – Ô ô Ư ư – and these vowels may take tonal marks. All these combinations are Unicode characters (with code points).

Ô ô Ư ư Ô ố Ồ ồ Ỗ ỗ Ỗ ỗ Ỗ ỗ Ớ ớ Ứ ứ Ừ ừ Ỡ ỡ Ỡ ỡ

Ô ơ Ư ư Ồ ồ Ồ ồ Ỗ ỗ Ỗ ỗ Ỗ ỗ Ớ ớ Ớ ớ Ứ ứ Ừ ừ Ỡ ỡ Ỡ ỡ

Ô ơ Ư ư Ồ ồ Ồ ồ Ỗ ỗ Ỗ ỗ Ỗ ỗ Ớ ớ Ớ ớ Ứ ứ Ừ ừ Ỡ ỡ Ỡ ỡ

Ô ơ Ư ư Ồ ồ Ồ ồ Ỗ ỗ Ỗ ỗ Ỗ ỗ Ớ ớ Ớ ớ Ứ ứ Ừ ừ Ỡ ỡ Ỡ ỡ

There is a Unicode character for the combining horn mark: ``\char"031B` U+031B, but this is not used in practice. The Vietnamese vowels are usually entered in a LaTeX document as Unicode characters, also with `\usepackage[vietnamese]{babel}` for hyphenation and spacing.

Comma above right

There is a Unicode character for the combining comma above right mark: ``\char"0315` U+0315.

U+0315 (comma above right) is used in rare cases when another comma-like mark does not fit.

In IPA, the glottalization diacritic mark uses U+0313 (comma above) as a combining mark. But when a glottalization mark is needed for a superscript consonant (1) or superscript consonant cluster (2), then the combining mark U+0315 (comma above right) is used instead, because its positioning is hopefully better than that of U+0313.

(1) k^wkt [k^{wkxt}] ‘to scrape’ (Nuxalk)

(2) p^ak [p^{kxak}] ‘he/she cut it’ (Upper Chehalis)

In (1), the superscript consonant cluster is wkx and it is glottalized. In (2), the superscript consonant x is glottalized.

Because U+0315 is being used in superscript position on a smaller sized glyph, U+0315 should probably be smaller than U+0313, but it is not so in Libertinus.

Dot above right

There is a Unicode character for the combining dot above right mark: ``\char"0358` U+0358 dot above right

U+0358 should be a small, above-right dot, used to mark palatalization or similar secondary articulations on superscript consonants, created for the same typographic reason U+0315 exists – the standard palatalization diacritic (U+0307, dot above) is too big and too high.

In Libertinus, U+0358 is a 104-diameter Bezier circle, and U+0307 is a smaller Bezier oval, inverting the desired size difference.

There are only a few IPA superscript letters that may serve as the possible host of U+0315 or U+0358 on superscript consonants or on superscript consonant clusters. In Libertinus, regrettably none of these characters has the anchor (anchor 1), so the mark (U+0315 and U+0358) is positioned by harfbuzz fallback shaping, which seems to place the mark at the right boundary of the glyph at a constant vertical aspect (effectively at the superscript x-height).

These IPA marks U+0315 and U+0358 should only be used in regular (not italic and not semibold). Regrettably, in Libertinus serif semibold, U+0358 looks like a grave, not a dot, and there is no U+0358 glyph in Libertinus serif semibold italic.

h ħ j r r ı ſ w y ſ i s x ſ h k m p t u v œ ß γ δ

h ħ j r r ı ſ w y ſ i s x ſ h k m p t u r v œ ß γ δ

h h j r j l z w y y l s x f b k m p t u v ☐☐☐☐
h h j r j r l z w y y l s x f b k m p t u v ☐☐☐☐
h h j r j l z w y y l s x f b k m p t u v ☐☐☐☐
h h j r j l z w y y l s x f b k m p t u v ☐☐☐☐
h h j r j l z w y y l s x f b k m p t u v ☐☐☐☐
h h j r j l z w y y l s x f b k m p t u v ☐☐☐☐

There are three comma/apostrophe glyphs that could possibly mark glottalization: U+0313 combining comma above, U+0315 combining comma above right, and U+02BC modifier letter apostrophe. In Libertinus, U+0315 has the worst appearance, even though U+0315 is intended for superscript letters. In Gentium Plus (SIL Global), U+0315 is tightly above-right the superscript letter, as expected.

Libertinus

[k\char"0313\char"02B7\char"1D4F\char"02E3\char"0313 t] [k^{wkx̄}t]
[k\char"0313\char"02B7\char"1D4F\char"02E3\char"0315 t] [k^{wkx̄}t]
[k\char"0313\char"02B7\char"1D4F\char"02E3\char"02BC t] [k^{wkx̄}t]

Gentium Plus

[k\char"0313\char"02B7\char"1D4F\char"02E3\char"0313 t] [k^{wkx̣}t]

[k\char"0313\char"02B7\char"1D4F\char"02E3\char"0315 t] [k^{wkx̣}t]

[k\char"0313\char"02B7\char"1D4F\char"02E3\char"02BC t] [k^{wkx̣}t]

I patched Libertinus to add anchors to those IPA superscript letters to support U+0315.

Patched Libertinus, selected IPA superscript letters with U+0315 and U+0358

h'h'j'r'i'ɬ'w'y'y'l's'x'ŋ'b'k'm'p't'w'v'ʌ'β'γ'δ'

h'f'j'r'i'q'w'y's'x'v'b'k'm'p't'u'v'♣'β'γ'δ'

[k\char"0313\char"02B7\char"1D4F\char"02E3\char"0315 t] [k^{wkx}t]

Gentium Plus, selected IPA superscript letters with U+0315 and U+0358

h' f' j' r' x' ɬ' w' y' ɣ' l' s' x' ɹ' b' k' m' p' t' u' v' ʌ' β' γ' δ'

h' f' j' r' x' ɬ' w' y' ʎ' l' s' x' ɕ' b' k' m' p' t' u' v' ʁ' β' γ' δ'

[k\char"0313\char"02B7\char"1D4F\char"02E3\char"0315 t] [k^{wkx}t]

Here are the IPA superscript letters considered and their new anchor (anchor 1).

U+02B0: (347, 648), U+02B1: (339, 648), U+02B2: (193, 648), U+02B3: (284, 648), U+02B4: (274, 648), U+02B5: (319, 648), U+02B6: (308, 648), U+02B7: (497, 648), U+02B8: (368, 648), U+02E0: (341, 648), U+02E1: (193, 648), U+02E2: (270, 648), U+02E3: (344, 648), U+02E4: (282, 648), U+1D47: (319, 648), U+1D4F: (353, 648), U+1D50: (533, 648), U+1D56: (334, 648), U+1D57: (241, 648), U+1D5A: (525, 648), U+1D5B: (354, 648), U+1D5C: (508, 648), U+1D5D: (335, 648), U+1D5E: (372, 648), U+1D5F: (353, 648)

I did not change the anchor-1 of U+315 and U+0358. U+0358 has its anchor at the xMin and yMin of its bounding box. But U+0315 already has some clearance built in to its anchor: its anchor is 62 units below its yMin, but 25 units right of its xMin. So, I decided to provide x-clearance of 12 units and y-clearance of 80 units from the bases. All these IPA superscript letters already have a superscript meanline at $Y = 630$. So their anchor will be at $Y = 630 - 62 + 80 = 648$. The X coordinate depends on their bounding box and its xMax. To provide the desired clearance of 12 units, the anchor is at $X = \text{xMax} + 26 + 12$. These anchor coordinate values were optimized for U+0315 but they work fine for U+0358.

Bases

Latin

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyzÆæƎœØøÐðÞþßƒĐđĤĥıĲıĴıĴı
 ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyzÆæƎœØøÐðÞþßƒĐđĤĥıĲıĴıĴı
 ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyzÆæƎœØøÐðÞþßƒĐđĤĥıĲıĴıĴı
 ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyzÆæƎœØøÐðÞþßƒĐđĤĥıĲıĴıĴı

IPA

[illegible]

Superscript consonants

hñj r l q b w y Y l s x f b k m p t u v ☐☐☐☐
hñj r l q b w y Y l s x f b k m p t u v ☐☐☐☐
hñ j r l q b w y Y l s x f b k m p t u v ☐☐☐☐
hñj r l q b w y Y l s x f b k m p t u v ☐☐☐☐

Greek

$\text{AB}\Gamma\Delta\text{EZH}\Theta\text{IK}\Lambda\text{MN}\Xi\text{O}\Pi\rho\sigma\tau\upsilon\phi\chi\psi\Omega\alpha\beta\gamma\delta\epsilon\zeta\eta\theta\iota\kappa\lambda\mu\nu\xi\omicron\pi\rho\sigma\tau\upsilon\phi\chi\psi\omega$
 $\text{AB}\Gamma\Delta\text{EZH}\Theta\text{IK}\Lambda\text{MN}\Xi\text{O}\Pi\rho\sigma\tau\upsilon\phi\chi\psi\Omega\alpha\beta\gamma\delta\epsilon\zeta\eta\theta\iota\kappa\lambda\mu\nu\xi\omicron\pi\rho\sigma\tau\upsilon\phi\chi\psi\omega$
 $\text{AB}\Gamma\Delta\text{EZH}\Theta\text{IK}\Lambda\text{MN}\Xi\text{O}\Pi\rho\sigma\tau\upsilon\phi\chi\psi\Omega\alpha\beta\gamma\delta\epsilon\zeta\eta\theta\iota\kappa\lambda\mu\nu\xi\omicron\pi\rho\sigma\tau\upsilon\phi\chi\psi\omega$
 $\text{AB}\Gamma\Delta\text{EZ}\text{H}\Theta\text{IK}\Lambda\text{MN}\Xi\text{O}\Pi\rho\sigma\tau\upsilon\phi\chi\psi\Omega\alpha\beta\gamma\delta\epsilon\zeta\eta\theta\iota\kappa\lambda\mu\nu\xi\omicron\pi\rho\sigma\tau\upsilon\phi\chi\psi\omega$

Cyrillic

АБВГДЕЖЗИЙКЛМНОПРСТУФХЦЧШЩЪЫЬЭЮЯабвгдежзийклмнопрстуфхцчшщъыьэюяЁёЄєĬĩŸŷǼǾħñİ
 АБВГДЕЖЗИЙКЛМНОПРСТУФХЦЧШЩЪЫЬЭЮЯабвгдежзийклмнопрстуфхцчшщъыьэюяЁёЄєĬĩŸŷǼǾħñİ
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No marks: rare, digraph etc.

Σ ξ DZ Dz dz DŽ Dž dž LJ Lj lj NJ Nj nj
Σ ξ *DZ Dz dz DŽ Dž dž LJ Lj lj NJ Nj nj*
Σ ξ DZ Dz dz DŽ Dž dž LJ Lj lj NJ Nj nj
Σ ξ *DZ Dz dz DŽ Dž dž LJ Lj lj NJ Nj nj*

Small capitals

ABCDEF GHIJ KLMNOP QRSTUV WXYZ Æ Ð Œ Þ Ĳ ß ŋ
ABCDEF GHIJ KLMNOP QRSTUV WXYZ Æ Ð Œ Þ Ĳ ß ŋ
ABCDEF GHIJ KLMNOP QRSTUV WXYZ Æ Ð Œ Þ Ĳ ß ŋ
ABCDEF GHIJ KLMNOP QRSTUV WXYZ Æ Ð Œ Þ Ĳ ß ŋ

Base and mark shaping

These grids display base and mark rendering in XeLaTeX documents in Libertinus serif regular, italic, semibold and semibold italic. Note that LSP uses the Libertinus fonts named “Semibold“, e.g. `LibertinusSerif-Semibold.otf`, for all boldface style.

A black color means GPOS anchor positioning.

A blue color means a precomposed glyph.

A red color means harfbuzz fallback shaping.

A dark blue color means a substituted base or mark

A light gray color means a mark (or less likely a base) is not in the font

A light blue color means a precomposed glyphs is expected by substitution, but somehow missing in the font (probably impossible).

This is similar to the Anchor Control window in FontForge, but instead prints the real rendering of base-mark combos in XeLaTeX, instead of the just the base-mark combos with set anchors.

Regular, Latin, Above

[illegible]

Regular patched, Latin, Above

À B C D È F Ğ H I J K L M N Ò P Q R S T Û V W X Y Z à b c d e f g h i j k l m n ò p q r s t ù v w x y z Æ æ Ċ ċ Đ đ Þ þ ß f D d H h i j L l Þ B
Á Â Ċ D É F Ğ H I J K L M N Ó P Q R S T Ú V W X Y Z á â ċ d é f g h i j k l m n ó p q r s t ú v w x y z Æ æ Ċ ċ Đ đ Þ þ ß f D d H h i j L l Þ B
Ā B Ċ D È F Ğ H I J K L M N Ò P Q R S T Û V W X Y Z ā b c d e f g h i j k l m n ò p q r s t ù v w x y z Æ æ Ċ ċ Đ đ Þ þ ß f D d H h i j L l Þ B
Ă Ć Ċ D È F Ğ H I J K L M N Ò P Q R S T Û V W X Y Z ă ċ d e f g h i j k l m n ò p q r s t ù v w x y z Æ æ Ċ ċ Đ đ Þ þ ß f D d H h i j L l Þ B
Ā B Ċ D È F Ğ H I J K L M N Ò P Q R S T Û V W X Y Z ā b c d e f g h i j k l m n ò p q r s t ù v w x y z Æ æ Ċ ċ Đ đ Þ þ ß f D d H h i j L l Þ B
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Ā B Ċ D È F Ğ H I J K L M N Ò P Q R S T Û V W X Y Z ā b c d e f g h i j k l m n ò p q r s t ù v w x y z Æ æ Ċ ċ Đ đ Þ þ ß f D d H h i j L l Þ B
Ă Ć Ċ D È F Ğ H I J K L M N Ò P Q R S T Û V W X Y Z ă ċ d e f g h i j k l m n ò p q r s t ù v w x y z Æ æ Ċ ċ Đ đ Þ þ ß f D d H h i j L l Þ B

[illegible]

Semibold, Latin, Above

Semibold italic, Latin, Above

À B C D È F G H I J K L M N Ò P Q R S T Û V W X Y Z à B c d e f g h i j k l m n ò p q r s t ù v w x y z Æ æ Œ œ Ø ø Đ đ Þ þ ß f Đ d H h i j L l B b
Á Ā Ą Ċ Ď Ē Ė Ğ Ĩ Ĵ Ķ Ĺ Ļ Ņ Ő Ű Ų Ÿ Ž á Ā ā Ą Ċ ċ Ď ě Ē ē Ė ğ Ĩ ĳ Ĵ ĵ Ķ ĳ Ĺ ĺ Ļ Ļ Ņ ņ Ő ő Ű ű Ų ų Ÿ ž Æ æ Œ œ Ø ø Đ đ Þ þ ß f Đ d H h i j L l B b
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Ā Ą Ċ ċ Ď ě Ē ē Ė ğ Ĩ ĳ Ĵ ĵ Ķ ĳ Ĺ ĺ Ļ Ļ Ņ ņ Ő ő Ű ű Ų ų Ÿ ž Æ æ Œ œ Ø ø Đ đ Þ þ ß f Đ d H h i j L l B b
Ā Ą Ċ ċ Ď ě Ē ē Ė ğ Ĩ ĳ Ĵ ĵ Ķ ĳ Ĺ ĺ Ļ Ļ Ņ ņ Ő ő Ű ű Ų ų Ÿ ž Æ æ Œ œ Ø ø Đ đ Þ þ ß f Đ d H h i j L l B b
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Ā Ą Ċ ċ Ď ě Ē ē Ė ğ Ĩ ĳ Ĵ ĵ Ķ ĳ Ĺ ĺ Ļ Ļ Ņ ņ Ő ő Ű ű Ų ų Ÿ ž Æ æ Œ œ Ø ø Đ đ Þ þ ß f Đ d H h i j L l B b
ABCDEF GHIJ KLMNOP QRSTUVWXY Z abcdef ghijklm nopqrst uvwxyz Æ æ Œ œ Ø ø Đ đ Þ þ ß f Đ d H h i j L l B b
ABCDEF GHIJ KLMNOP QRSTUVWXY Z abcdef ghijklm nopqrst uvwxyz Æ æ Œ œ Ø ø Đ đ Þ þ ß f Đ d H h i j L l B b
ABCDEF GHIJ KLMNOP QRSTUVWXY Z abcdef ghijklm nopqrst uvwxyz Æ æ Œ œ Ø ø Đ đ Þ þ ß f Đ d H h i j L l B b

Regular, Latin, Below

[illegible]

Regular patched, Latin, Below

[illegible]

Italic, Latin, Below

[illegible]

Semibold, Latin, Below

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Regular, IPA, Below

[illegible]

Regular patched, IPA, Below

[illegible]

[illegible]

Semibold, IPA, Below

၁၂၃၄၅၆၇၈၉၁၀၁၁၂၁၃၁၄၁၅၁၆၁၇၁၈၁၉၂၀၂၁၂၂၂၃၂၄၂၅၂၆၂၇၂၈၂၉၃၀၃၁၃၂၃၃၃၄၃၅၃၆၃၇၃၈၃၉၄၀၄၁၄၂၄၃၄၄၄၅၄၆၄၇၄၈၄၉၅၀၅၁၅၂၅၃၅၄၅၅၅၆၅၇၅၈၅၉၆၀၆၁၆၂၆၃၆၄၆၅၆၆၆၇၆၈၆၉၇၀၇၁၇၂၇၃၇၄၇၅၇၆၇၇၇၈၇၉၈၀၈၁၈၂၈၃၈၄၈၅၈၆၈၇၈၈၈၉၉၀၉၁၉၂၉၃၉၄၉၅၉၆၉၇၉၈၉၉၁၀၁၁၂၁၃၁၄၁၅၁၆၁၇၁၈၁၉၂၀၂၁၂၂၂၃၂၄၂၅၂၆၂၇၂၈၂၉၃၀၃၁၃၂၃၃၃၄၃၅၃၆၃၇၃၈၃၉၄၀၄၁၄၂၄၃၄၄၄၅၄၆၄၇၄၈၄၉၅၀၅၁၅၂၅၃၅၄၅၅၅၆၅၇၅၈၅၉၆၀၆၁၆၂၆၃၆၄၆၅၆၆၆၇၆၈၆၉၇၀၇၁၇၂၇၃၇၄၇၅၇၆၇၇၇၈၇၉၈၀၈၁၈၂၈၃၈၄၈၅၈၆၈၇၈၈၈၉၉၀၉၁၉၂၉၃၉၄၉၅၉၆၉၇၉၈၉၉

Semibold italic, IPA, Below

[illegible]

IPA diacritics, anchors required

Here are some IPA diacritics. Each row shows all bases that the mark could reasonably be combined with, in some notational system, except for those marks (such as the horn) whose only reasonable combinations are already precomposed character. So, these rows represent those marks that require an anchor, because not all of their reasonable combinations are already precomposed. Of course, anchors are useful during the design stage of a font to normalize precomposed glyphs. But some bases or marks may not need anchors, simply because they form no reasonable combinations that are not already precomposed.

A black color means GPOS anchor positioning.

A blue color means a precomposed glyph.

A red color means harfbuzz fallback shaping.

IPA diacritics – Regular

à è ì ò ù æ œ ð à ò é é é ý ù è œ ú à ý

á d é í l m n ó r s t ú ý z æ œ ē ě á þ ç š ž é ě š ě ř q ý ŷ ú é œ ů á ý ž

â ê î ô û ŷ æ œ ƒ â ɖ ʒ ʔ ɛ ʒ ɛ ʏ ʉ ɐ ɕ ʊ ʌ ʏ

ã ẽ ĩ õ ũ ÿ æ œ ę ă ǻ ǿ ǻ ǣ ǣ ǿ ỹ ũ ɵ Ɔ Ʊ Ǝ Ǝ

ā ē ī l̄ m̄ n̄ ō r̄ ū ȳ æ œ v̄ ā p̄ ǣ ǫ ē ɜ̅ ȳ w̅ θ ð ŭ Ȧ Y

ṁ ṅ ñ̇ ŋ̇ l̇ ḟ ṫ k̇ ṙ i̇ l̇ j̇ Ṙ Ḃ U̇ Ü̇ Å̇ ĵ̇ Ł̇

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 104

a e i o u y æ œ ʋ ɑ ɒ ɓ ɔ ɗ ɠ ɨ ɜ ɛ ɜ ɞ ɟ ɡ ɣ ɥ ɣ ɦ ɭ ɯ ɲ ɵ Ɔ ɐ ʀ ʁ ʂ ʃ ʈ ʉ ʋ ʌ ʏ ʐ

b d g y z z m n l r w j m p n n

l m n r t l k m j n N

t d s z n

p ṭ ḳ ṣ ʃ̣ ʒ̣ ʑ̣ q̣

\mathfrak{P} \mathfrak{Q} \mathfrak{R} \mathfrak{S} \mathfrak{T} \mathfrak{U} \mathfrak{V} \mathfrak{W} \mathfrak{X} \mathfrak{Y} \mathfrak{Z}

Þ Ð Ŋ Ɔ 3 Ɔ ə Ŋ Ų Ų Λ Ų ə Ɔ

t d s z n

t d s z n

IPA diacritics – Italic

à è ì Ì ò ñ ù ý æ œ v à v ò á é z Z y ü ö Ü À Ý

á â é í ĩ Ĺ Ĺ Ń ó ŕ ŝ ŧ ů ý ž æ œ v á v ċ ǵ đ é ǝ é ĵ ġ ý ŷ ů é œ ů Á Ý Ž

â ê î ô û ŷ æ œ **ê á â ã** **ä å** **ă ą** **ç** **š** **ž** **ü** **ø** **œ** **û** **Û** **Ÿ**

ã ê ï õ ù ÿ æ œ **ẽ ă ǃ ǫ ǵ ǧ Ǩ Ǭ Ǯ ǰ ǲ Ǵ Ƕ Ǹ Ǻ Ǽ ǿ ǻ ǽ ǿ**

ā ē ī l̄ m̄ n̄ ō r̄ ū ȳ æ œ ē ā ǫ ǿ ǻ ǣ ȳ ũ ƿ ƿ̄ ƿ̆ ƿ̇

$\mathfrak{m} \mathfrak{n} \mathfrak{j} \mathfrak{h} \mathfrak{l}$
 $\mathfrak{t} \mathfrak{t} \mathfrak{k} \mathfrak{r} \mathfrak{i} \mathfrak{I} \mathfrak{j} \mathfrak{R} \mathfrak{B} \mathfrak{v} \mathfrak{y} \mathfrak{A} \mathfrak{j} \mathfrak{L}$

t d s z n

t d s z n

â ê î ô û ŷ æ œ **ę** ą ń ǫ **đ** ě 3 **č** Ÿ **ı** **ő** **œ** **š** **ł** **Ÿ**

t d s z n

IPA diacritics, anchors required, all bases

The rows are combining marks that require an anchor for at least one base among it reanable combinations that are not precomposed. The columns are the bases formed by the union of all reasonable combinations with such marks. Of course, some of these combinations are not resonable, and this version of the document has not grayed them out. But the entire grid is still useful to see all marks across all bases.

Regular, Bases requiring anchors, Marks requiring anchors

[illegible]

Regular patched, Bases requiring anchors, Marks requiring anchors

[illegible]

Italic, Bases requiring anchors, Marks requiring anchors

[illegible]

Semibold, Bases requiring anchors, Marks requiring anchors

[illegible]

[illegible]

Regular

[illegible]

Patch superscript consonant anchors

Libertinus serif regular

h i j k l m n o p q r s t u v x y z æ ß γ δ

h f i j r r x w y x t s x t b k m p t u v x β γ δ

հիմնական տարրեր


h i j k l m n o p q r s t u v x y z æ ø ð

h h j r t u w y z 1 2 3 4 5 6 7 8 9 0 a b c d e f g h i j k l m n o p q r s t u v x y z

ñ ñ ĵ ř ŀ ŧ ſ ŵ ŷ Ź ź Ż ż Ž ſ ŭ ū ů Ű ű Ų ų Ŵ Ŷ Ÿ

Libertinus serif regular, patched

h'f'j'r'i'ɬ'w'y'x'l's'x'f'b'k'm'p't'u'v'ʔ'β'γ'δ'

h·fi·j·r·i·l·b·w·y·s·l·s·x·f·b·k·m·p·t·u·v··β·γ·δ·

h^hh^jr^rr^jŋ^wy^yl^sx^xb^km^pt^uv^uβ^γδ^δ

h ñ j r i ð ß w y ý l s x f b k m p t u v œ ß ý ð

h n j r i j b w y y l s x f b k m p t u v z b y d

h h j r r u b w y y l s x f b k m p t u v ♣ β γ δ

Gentium Plus

h' f' j' r' x' ʒ' b' w' y' ɣ' l' s' x' s' b' k' m' p' t' u' v' ʌ' β' γ' δ'

h·fi·j·r·x·j·k·w·y·x·l·s·x·s·b·k·m·p·t·u·v·z·β·γ·δ·

h⁷h⁷j⁷r⁷u⁷q⁷z⁷w⁷y⁷x⁷l⁷s⁷x⁷s⁷b⁷k⁷m⁷p⁷t⁷u⁷v⁷z⁷β⁷γ⁷δ⁷

h h j r i j k w y y l s x s b k m p t u v z ß γ δ

h h j r i j k w y x l s x s b k m p t u v z b y d

h h i r i j k w y x l s x s b k m p t u v x b y d

A^ˆB^ˆC^ˆD^ˆE^ˆF^ˆG^ˆH^ˆI^ˆJ^ˆK^ˆL^ˆM^ˆN^ˆO^ˆP^ˆQ^ˆR^ˆS^ˆT^ˆU^ˆV^ˆW^ˆX^ˆY^ˆZ^ˆa^ˆb^ˆc^ˆd^ˆe^ˆf^ˆg^ˆh^ˆi^ˆj^ˆk^ˆl^ˆm^ˆn^ˆo^ˆp^ˆq^ˆr^ˆs^ˆt^ˆu^ˆv^ˆw^ˆx^ˆy^ˆz^ˆÆ^ˆæ^ˆƆ^ˆœ^ˆø^ˆø^ˆð^ˆð^ˆþ^ˆþ^ˆß^ˆΓ^ˆÐ^ˆđ^ˆĦ^ˆħ^ˆı^ˆյ^ˆ Է^ˆԻ^ˆԵ^ˆԲ^ˆԵ^ˆ

À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ ß à á â ã ä å æ ç è é ê ë ì í î ï ð ñ ò ó ô õ ö ÷ ø ù ú û ü ý þ ß à á â ã ä å æ ç è é ê ë ì í î ï ð ñ ò ó ô õ ö ÷ ø ù ú û ü ý þ ß