This is a specification to the CAD drawing of the chassis ver. 4 of the Forever Ambre keyboard, independent of the drawing. It can be used to check the current drawing, or to make a replica from scratch.

Ver. 4 is a refined version of ver. 1a. It is aimed at creating a more useful geometry, with a concise description, for the chassis.

Let holes of the keyboard's chassis are identified by their centers. A key (switch or cap) hole is denoted by K_{ij} where i is a row index and j is a column index, for example, K_{50}. A hole for a spacer is denoted by P_{ij} where indices i and j are from a nearby keyhole. A hole for a self-clinching standoff is denoted similarly, by Q_{ij}.
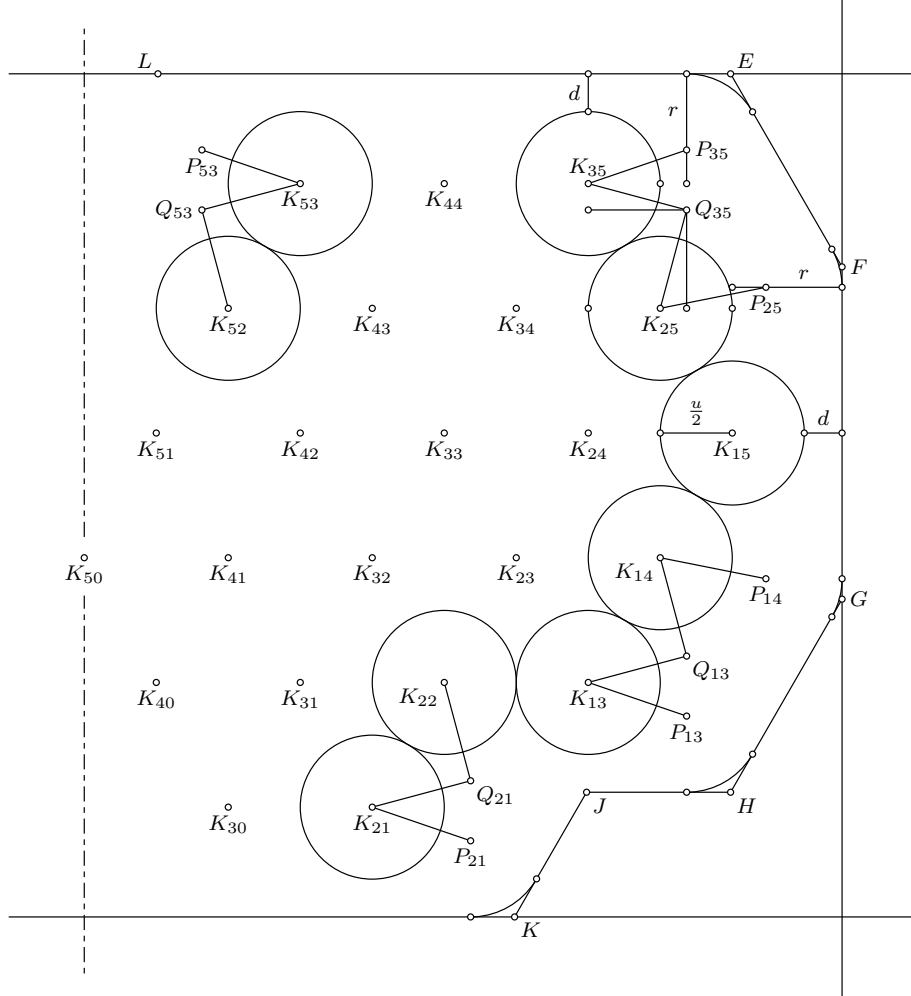
The chassis is defined by the following constraints:

(1) All K_{ij} are nodes of an equilateral triangular grid with pitch $u = 0.75''$.

(2) Q_{35} has the same distance to K_{35} and K_{25}, and the same distance to the horizontal line through K_{25} and the vertical line through K_{35}.

(3) The distance from P_{35} to the horizontal line through K_{35} equals to that from P_{25} to the vertical line through K_{15}.

(4) The straight line $P_{25}P_{35}$ is 120° oriented.

(5) The straight line $Q_{35}P_{35}$ is 90° oriented (i.e. vertical.)

(6) The distance between P_{35} and Q_{35} is $\frac{5u}{12}$.

(7) P_{53} is the mirror image of P_{35} in the same mirror that would give K_{53} from K_{35} (i.e. reflection across the vertical line through K_{44}.) Q_{53} is the mirror image of Q_{35} in that mirror. Similarly, P_{13}, Q_{13}, P_{14} is the mirror image of P_{35}, Q_{35}, P_{25}, respectively (i.e. via reflection across the horizontal line through K_{15}.) Likewise, P_{21}, Q_{21} is the shift image of P_{13}, Q_{13} respectively, via the same translation that would give K_{21} from K_{13}.

(8) The bounding rectangle of the middle plate is that of the keyspace, i.e. that of the set of all K_{ij} offsetted outwards by $\frac{u}{2}$.

(9) The bounding rectangle of the bottom and the top plate is that of the keyspace offsetted outwards by certain distance d, see note (2), so that the ratio of its length L per its width H is $\frac{L}{H} = \frac{16\sqrt{3}}{15}$.

NOTES.

(1) Specified are location and size of clearance zones around holes. The size of holes is unspecified.

(2) The following table lists some metrics that are derived from the specification. Here (relative) coordinates are within the coordinate system with x-axis being the horizontal line through K_{35} and the y-axis being the vertical line through K_{15}.

Description	Denotation	Value
Length of keyspace	l	$10u$
Width of keyspace	h	$u(1 + \frac{5\sqrt{3}}{2})$
Length of bezel	L	$l + 2d$
Width of bezel	H	$h + 2d$
Offset from keyspace to bezel	d	$\frac{u}{181}(40\sqrt{3} - 53)$
Radius of standoff zone	r_Q	$\frac{u}{4}$
Radius of spacer zone	r_P	$\frac{u}{6}$
Abscissa of Q_{35}	x_Q	$\frac{u}{4}(\sqrt{3} - 3)$
Ordinate of Q_{35}	y_Q	$\frac{u}{4}(1 - \sqrt{3})$
Abscissa of P_{35}	x_P	$\frac{u}{4}(\sqrt{3} - 3)$
Ordinate of P_{35}	y_P	$u(\frac{2}{3} - \frac{\sqrt{3}}{4})$
Abcissa of P_{25}	$x_{P'}$	$u(\frac{2}{3} - \frac{\sqrt{3}}{4})$
Ordinate of P_{25}	$y_{P'}$	$\frac{u}{3}(\frac{13}{2} - 5\sqrt{3})$