

Ancient Metrology, Ibn al-Tahhan and the Maler and Frei Lutes – Part 2 (Cont.)

The 14th C oud described by Ibn al-Tahhan is a Type 5 ($R=8$) by definition but there are no surviving ouds of this geometric profile. On the other hand, the 16th C lutes made by Laux Maler and Hans Frei do appear to be of this same Type judging from measurements taken from full size drawings (on paper) of the following five examples:

- 1) Maler: No.M.1.54 Germanisches Nationalmuseum, Nurnberg. Width about 29.5 cm.
- 2) Maler: No. 65-1408E Prague National museum. Width 28.9 cm.
- 3) Maler: No 655 1931D Prague National Museum. Width 29.3 cm.
- 4) Frei: No. C34 Wien Kunsthistorisches Museum. Width 30 cm.
- 5) Frei: (Not designated) Wien Kunsthistorisches Museum. Width 30.1 cm.

To the above might be added the Frei lute No. 67/1965 Warwick County Museum if account is taken of the apparent slight distortion of the upper sound board. Width 31 cm. (including the additional thickness of a banding strip added, at a later date, to the outer ribs).

The sound board of Maler lute No. M.1.54, although incomplete, is of particular interest as there are traces of what may be the original bridge position about 6.4 cm from the bottom of the sound board.

The Maler M.1.54 Soundboard

A proposed geometry of the soundboard is shown in Fig 6 drawn to the same scale (in ‘finger’ units) as the Ibn al-Tahhan oud as well as in dimensionless basic units.

The maximum width of the sound board is divided into four equal basic units. A circle of radius R_1 equal to 2 units defines the bottom edge of the sound board Z and the center of the sound hole. The sound hole diameter is about one unit.

The front edge of the bridge is $\frac{1}{4}$ YZ or $\frac{4}{9}$ XZ from the bottom of the sound board.

The profile of the upper part of the sound board is described by a circular arc of radius $R = 8$ basic units.

The ‘flattened’ profile of the lower part of the sound board is created by blending together the three arcs of radius R, R_2 and R_3 with radius R_3 being $1\frac{1}{2}$ units in length or equal to the distance XY.

With the exception of the modified profile of the lower sound board, the upper sound board profile of the Maler lute is identical to the 14th C Ibn al-Tahhan oud.

The oud has a maximum sound board width of 16 ‘isba’ finger units with a circular arc of radius R equal to 32 ‘isba’ describing the profile of the upper sound board. Its overall length is 40 ‘isba’ with a neck length equal to 12 ‘isba’ and neck joint width of 2 ‘isba’. A width of 16 ‘isba’ is equivalent to 4 basic units so each unit is equal to 4 ‘isba’ and, therefore, $R = 8$ basic units.

The Maler sound board is about 29.5 cm. maximum width - assumed here to be the original size with little or no material loss at the edges.

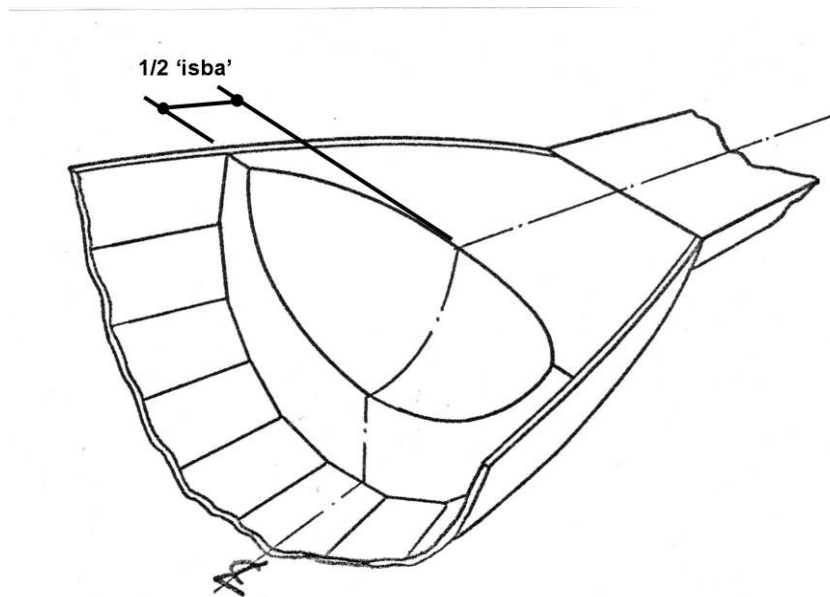
Livio C. Stecchini proposes two values for the ancient linear ‘finger’ unit of measure – a ‘trimmed’ unit equivalent to 1.85 cm and ‘natural’ unit equivalent to 1.875 cm. These give a soundboard width for the oud of 29.6 cm (‘trimmed’ unit) or 30 cm (‘natural’ unit).

The string length of the Ibn al-Tahhan oud is 36 'isba' with a neck length of 12 'isba' (Note 3). Applying a 'trimmed' unit gives a string length of 66.6 cm (or 67.5 cm for a 'natural' finger unit) with the seventh fret position (Western equal temperament) at the neck joint.

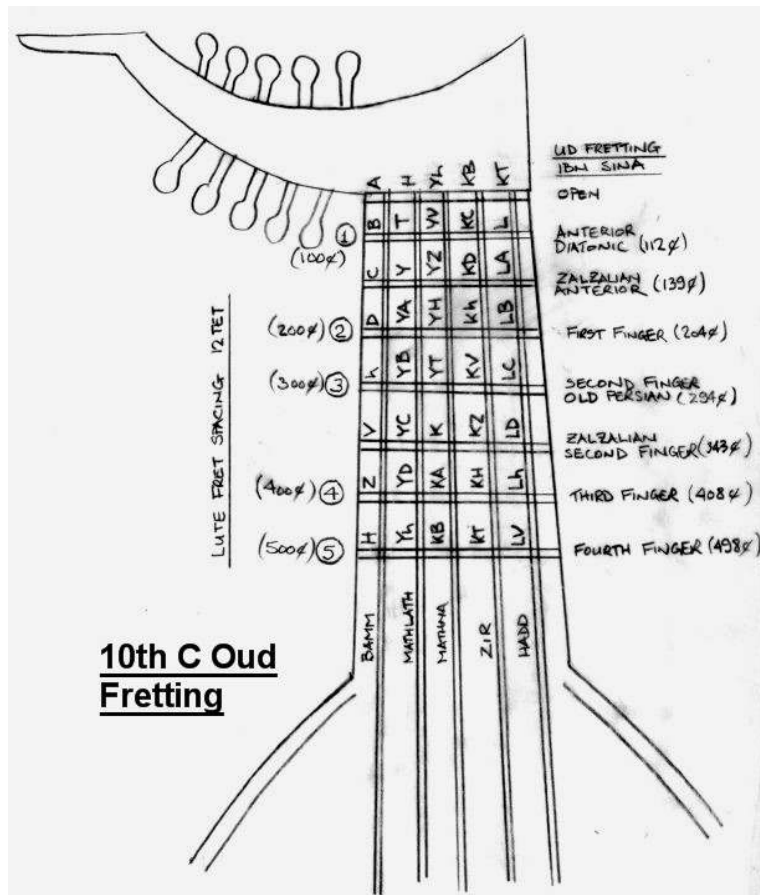
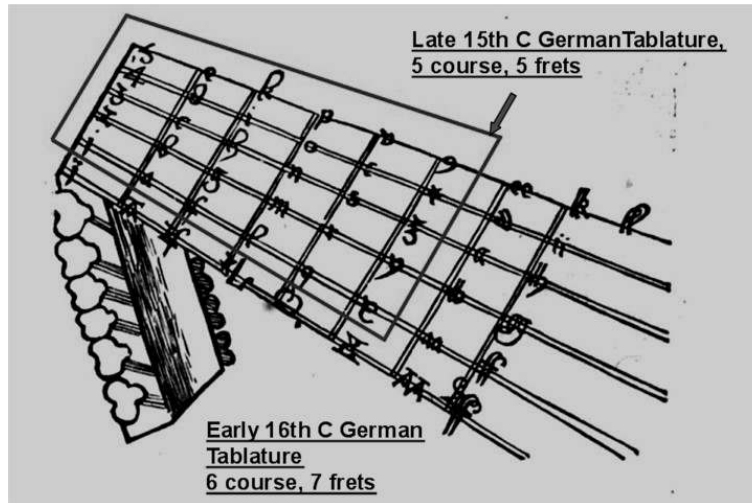
The bridge position on the Maler lute is positioned slightly lower than that of the Ibn al-Tahhan oud - $\frac{7}{8}$ basic unit from the bottom of the soundboard compared to one basic unit for the oud. So the lute bridge is lower by $\frac{1}{2}$ 'isba' or about 0.925 cm. (Note 1).

If Maler did base his lute design on the Ibn al-Tahhan oud why did he find it necessary to lower the bridge position? The answer may be that Maler, requiring a wider neck joint sufficient to accommodate six courses (rather than four on the oud), cut down the neck block by $\frac{1}{2}$ 'isba' to give a neck joint width of 3 'isba' (equivalent to 5.6 cm) and compensated this modification by also lowering the bridge position by the same amount. If the overall length is maintained at 40 'isba' the neck length is then increased to $12 \frac{1}{2}$ 'isba' and the string length becomes $36 \frac{1}{2}$ 'isba' or 67.5 cm using 1.85 cm as the finger unit value (See Fig 7).

Furthermore, to maintain the structural integrity of the bowl, the neck block is kept at its original thickness by adding material of $\frac{1}{2}$ 'isba' thickness on the bridge side of the block. This in turn required a cut out in the top of the neck block to maintain the original vibrating length of the sound board – a feature found on both Maler and Frei lutes of this type (Note 2). Neck block 'cut outs' can also be found on some ouds made in the Turkish tradition.



A German lute during the late 15th C would have had 5 courses and fitted with 5 frets (Western equal temperament). The earliest lute tablature was designed for this configuration of lute - said to have been invented by blind German organist/lutenist Conrad Paumann during the 15th C but it is just another version of the type of oud tablature employed by the Arab and Persian theorists since the 10th C.



By the early 16th C a German lute would have had a neck fitted with seven rather than the eight frets that were to become standard by the second half of the century (Note 3) and fitted with five or six courses. This being the case, the original string length of the Maler lute likely would have been 67.5 cm. and strung with six courses as noted above - the slightly increased neck length conveniently allowing the seventh fret to be tied just before the neck joint – (Note 4).

The Ibn al-Tahhan Oud Soundhole Placement and Soundboard Barring.

We have no information on mediaeval oud soundboard barring or sound hole geometry.

However, if the correlation between the Maler lute and Ibn al-Tahhan oud geometries is valid then it is possible that the Maler soundboard barring and sound hole size and placement are also proportionally identical to those features on the Ibn al-Tahhan oud.

If the center of the sound hole of the oud is located in the same relative position as that of the lute then the distance from the neck joint of the oud to the center of the sound hole is equal to the distance from the bridge to the center of the sound hole which is – in turn – the length from the nut to the neck joint. These are the classical proportions still found on ouds to this day.

Fig 2 shows the proposed sound hole placement for the 14th C Ibn al-Tahhan oud for comparison with the proposed original Maler lute geometry shown in Fig 7.

Some Final Thoughts and Observations

The Maler and Frei lutes survive because of the legendary reputation of their makers and because they were sought after for modification into the style of lute popular during the late 17th and 18th C in France and Germany - a style that prevailed until the lute's final demise around the middle of the 18th C.

So this style of lute may represent a very successful design that had endured for over five centuries in the mediaeval oud then to survive for a further 250 years in the European lute tradition.

Notes

- 1) This is the same proportion found on the 10th C Ikhwan al-Safa and 15th C Kitab al-Adwar ouds.
- 2) For example the Frei lute #67/1965 in the Warwick County Museum and a recently discovered lute by Maler – see:
http://sinierderidder.free.fr/restaurations/lauxmaler_eng.html
- 3) “Now these frets of late years were but seven in number, as witnesseth Hans Gerle lutenist, citizen and lute maker of Nuremberg, (for so he stileth himself in his book of tablature printed 1533) and so the seventh fret rested upon the Diapente. Yet presently after there was added an eight fret: for myself was born but thirty years after Hans Gerle's book was printed, and all the lutes which I can remember used eight frets” Robert Dowland, ‘Varietie of Lute Lessons’, 1610.
- 4) Alternatively, if fitted with a neck extended in length to accommodate 8 frets the string length would have been around 70 cm. The wider lutes of Frei (measuring about 30 cm) would originally have had a slightly longer string length proportionally given the same relative bridge placement as the Maler lutes.

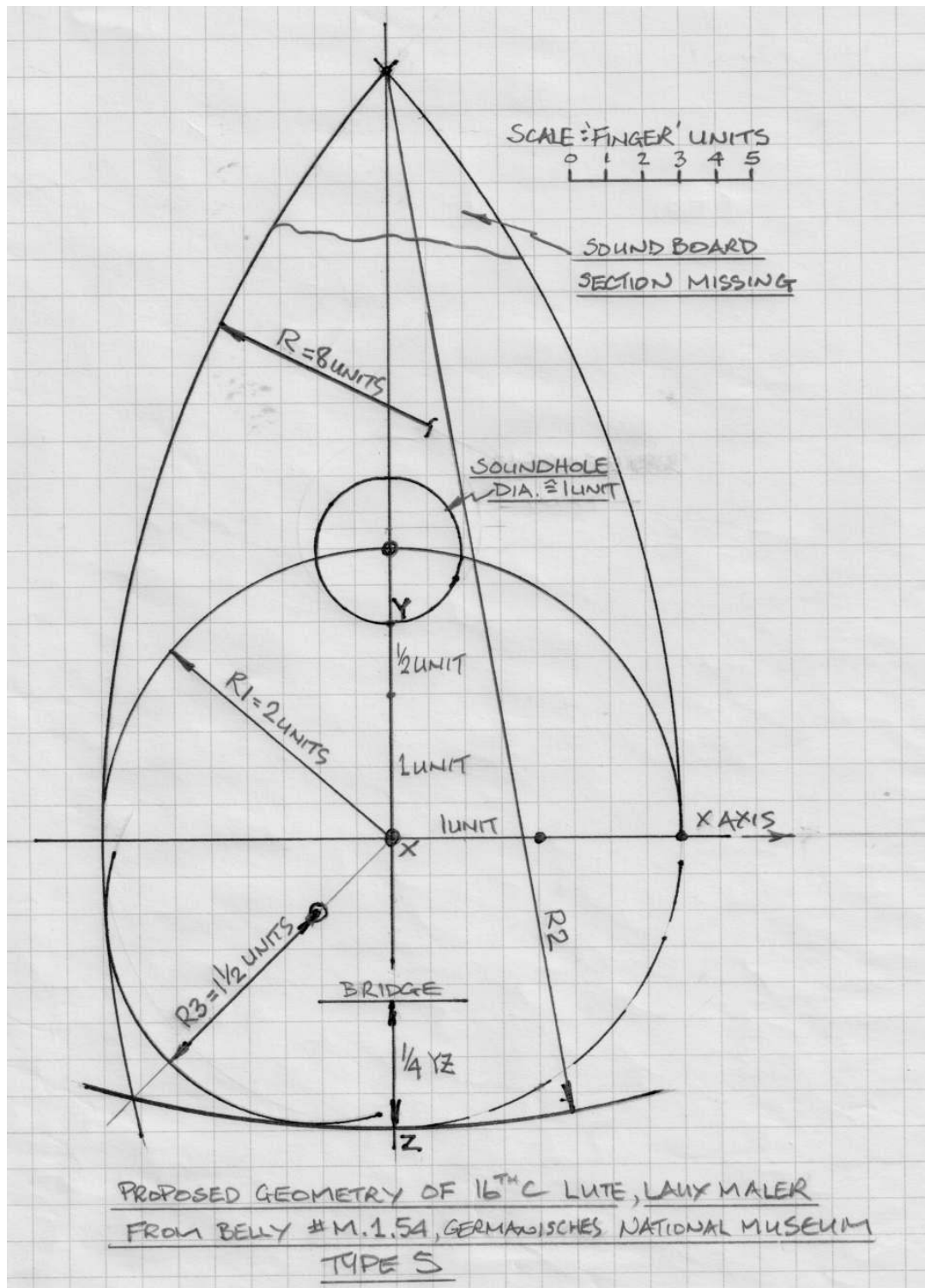


Fig 6

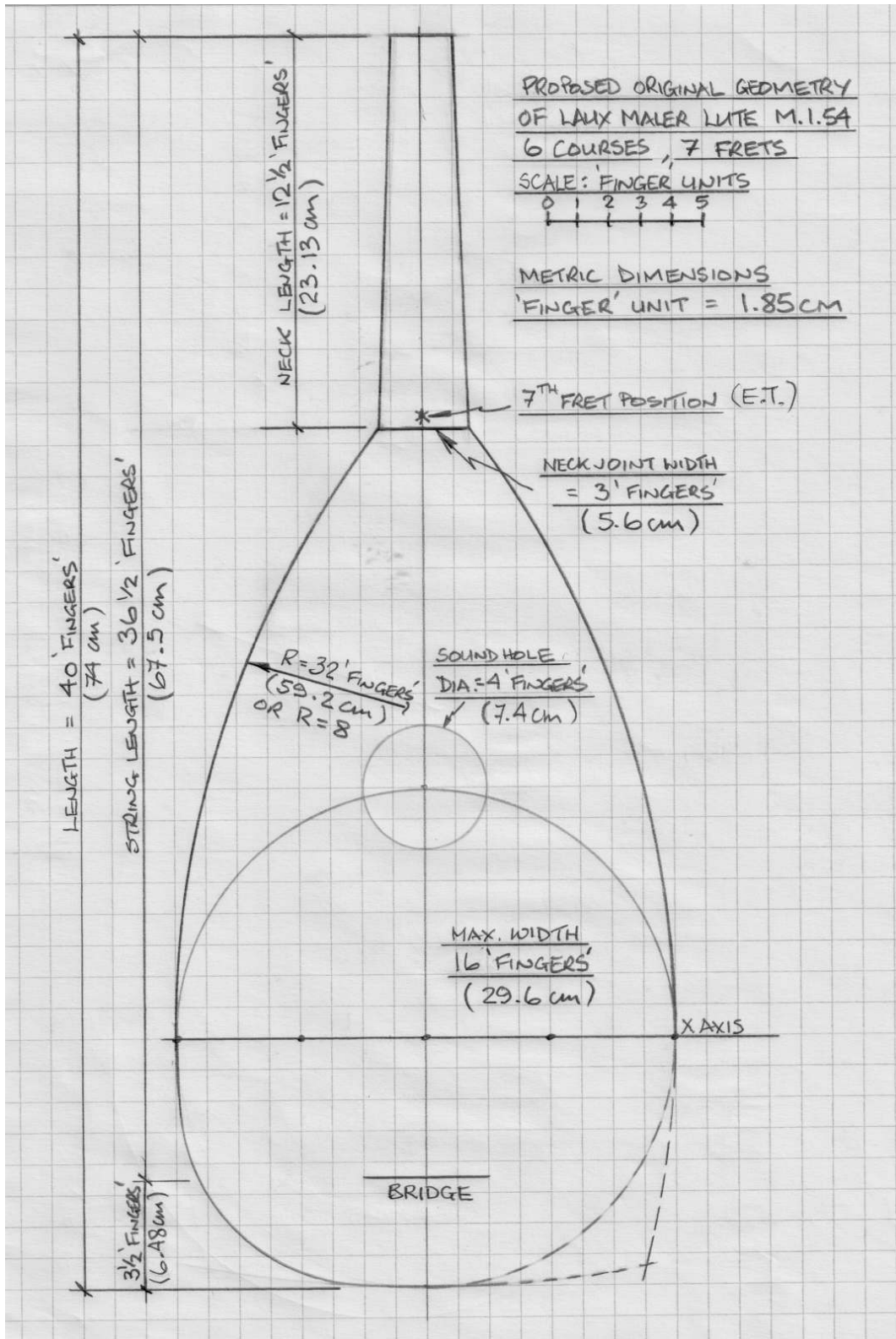


Fig 7