THE EBONY HARPSICHORD ATTRIBUTED TO BARTOLOMEO CRISTOFORI

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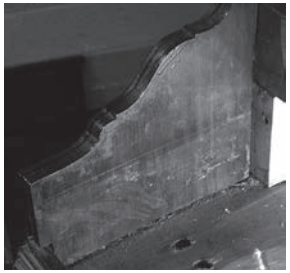
April 2009

SUMMERY OF THE CHANGES CARRIED OUT ON THE INSTRUMENT

1. The keyboard has been enlarged by two notes from the original 53 note compass to the present 55 note compass.
(published already in the museum's catalog in 2001)

The changes done on the keyframe when enlarged for the two extra notes in the treble, are easily to identify.

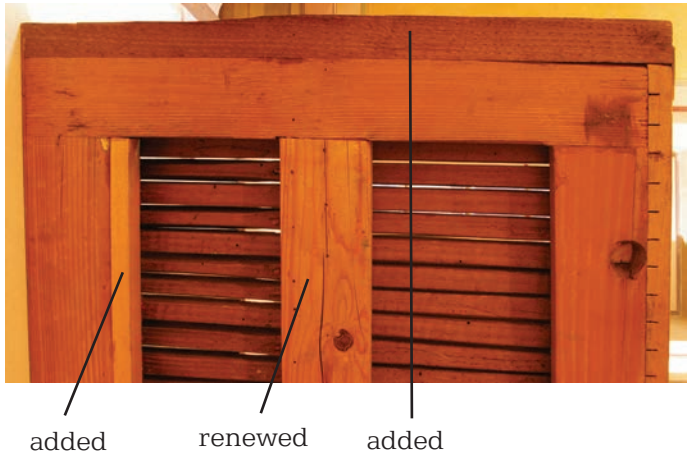


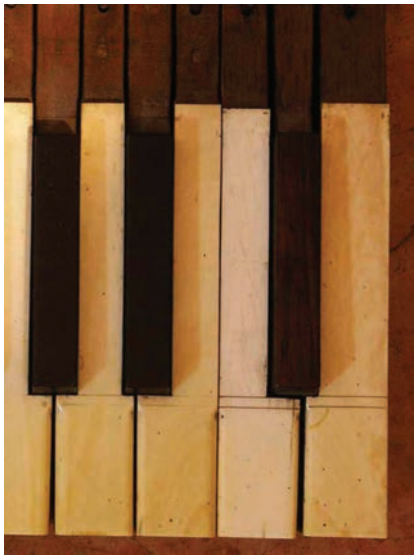
The whole keyboard has been shifted to the left by taking away the keyblocks on both sides.

At the **bass side** the keyframe has been cut away. The balance rail has been renewed and has been shifted further away from the keyboard.

The original balance pin holes have been filled and new pin holes have been drilled.

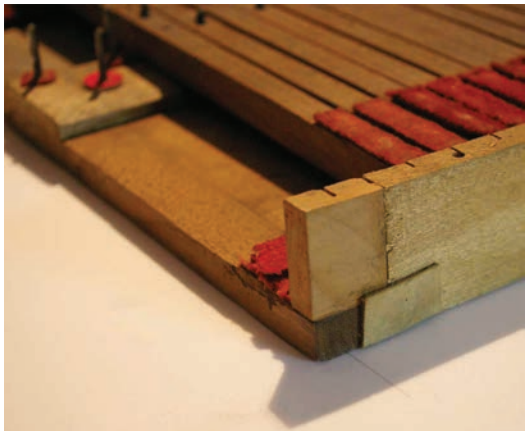
At the **treble** a strip of oak has been glued to the keyframe. The frame piece underneath the balance rail has been renewed. A piece has been added to the horizontal front part of the frame.





The original c^3 key became the new d^3.

The key for the last bass note GG has been cut away.

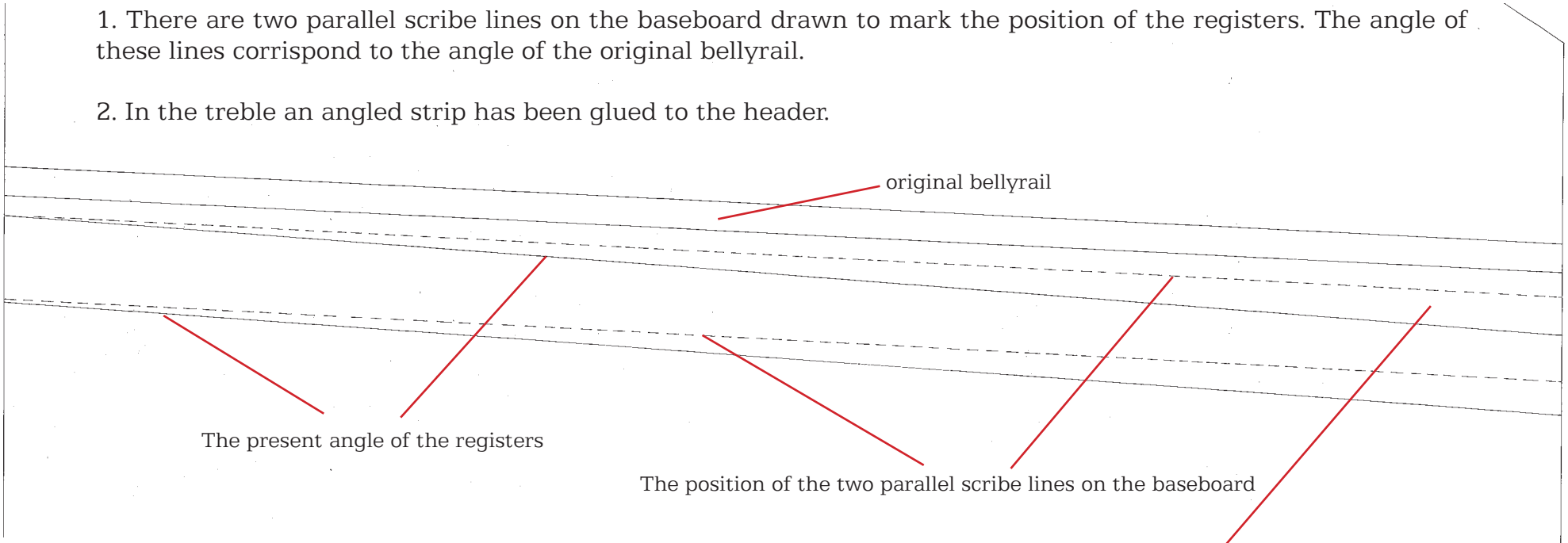


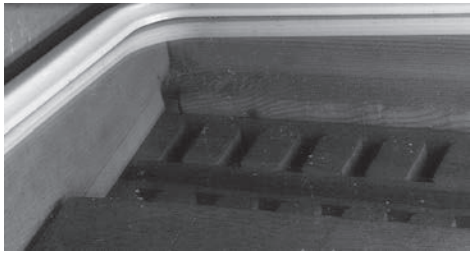
A little piece of wood has been added to the keygide.

2. The angle of the register has been changed. Clear indications for the change of the angle are:

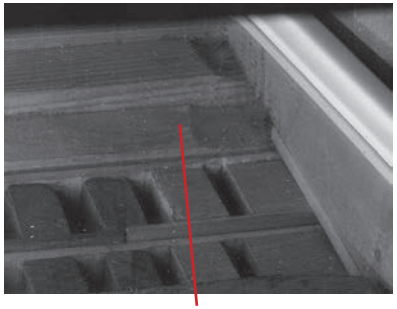
1. There are two parallel scribe lines on the baseboard drawn to mark the position of the registers. The angle of these lines corrispond to the angle of the original bellyrail.

2. In the treble an angled strip has been glued to the header.





In the bass the original header has been cut away.



The strip added to the header in the treble underneath the registers

The visible strip underneath the registers.

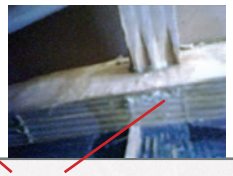
3. The consequence of the changed angle of the registers is the **change of the plucking points** and the shifting of the whole soundboard by 2cm towards the keyboard. That has **changed the length** of the **cheek side** and **the total length of the instrument.**

4. The string layout has been changed completely by putting in a **new bridge** and a **new nut** with cypress wood whereas originally they were of ebony. The new string lengths are shorter then the original ones (published already in the museum's catalog in 2001).

5. The wrestplank has been replaced (published already in the museum's catalog in 2001).

These photos show that the wrestplank is thicker than the support blocks would allow and that it has been crudely cut from underneath.

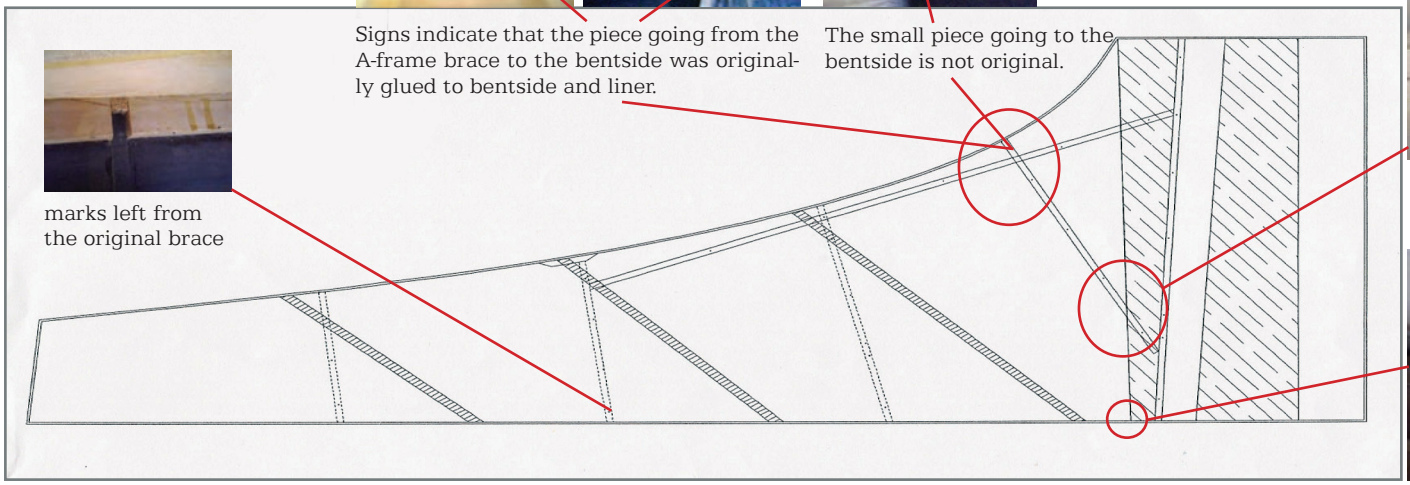
6. Three braces of the inner construction have been taken away and **been replaced** by three flying buttresses (already published in the museum's catalog in 2001). .



Signs indicate that the piece going from the A-frame brace to the bentside was originally glued to bentside and liner.

The small piece going to the bentside is not original.

marks left from the original brace



These two photos show the wide horizontal board glued perpendicular to the bellyrail

The photo underneath shows the three flying buttresses which have been put in by Ferrini.

Thanks to the bills which survived in the Florentine archive and which have been published we know that all the fundamental changes mentioned in this report were carried out in 1783 and 1784 by Giovanni and Filippo Ferrini. We can deduce that these were extensive interventions by comparing the price of 40 and 35 Lire ask by Giovanni and Filippo in 1783 and 1784 to the 12 Lire Giovanni Ferrrini asked for regulation work done in 1765.

It remains unclear why one year after the work done by Giovanni a new intervention was necessary. Also, it is difficult to see why the wrestplank should be changed or *"accomodato"* after the intervention of the keyboard extension. One would immagine that this work was done together with the change of the string scaling and the keyboard range.

These bills are otherwise very reliable since all the other work described in them, on the keyboard and the making of the new legs is confirmed by the present of the instrument.

1783, Giuseppe Ferrini: *"La Guardaroba Generale di S.A.R. deve dare ammè Giuseppe Ferrini qanto [sie] appresso Per avere accomodato un cimbalo intarsiato di ebano, e avorio consistente la detta accomodatura di averlo rincordato più della metà, rinpergniata di novo tutta la tastiera, e rassettati tutti i tasti, che ammotivo di essere stati i medes.mi anticamente impiombati, nel corso di molti anni si sono i detti piombi venuti a incalcinare, e a fatto si, che si erano venuti a rompere. Rifatte tutte le fasciature di pelle, e rimpannata del tutto, e rifatte diverse linguette a detti tasti, come ancora ai salterelli rimesse tutte le molle, e penne, e aggiuntovi due tasti ne soprani, Cisolfaut diesis, e Desolrrè, il tutto la somma il più ristretto L 40"*

1784, Filippo Ferrini: *"La Guardaroba generale di S.A.R. deve dare a me Filippo Ferrini quanto appo: Per avere accomodato un cimbalo con sponde d'ebano, ed accomodato il pancone, e rimesso tutte le corde, e rimpannato la tastiera, e rimpennato, e linguette ai saltarelli, e accomodato il leggio, e fatto fare i piedi novi fatto il di 14 Luglio L 35"*

1765 Giuseppe Ferrini: *"Un cimbalo tutto di ebano si è rimpennato, e rimesse le corde, e accomodata la tastiera L. 12"*

THE RECONSTRUCTION OF THE ORIGINAL STRING LAYOUT

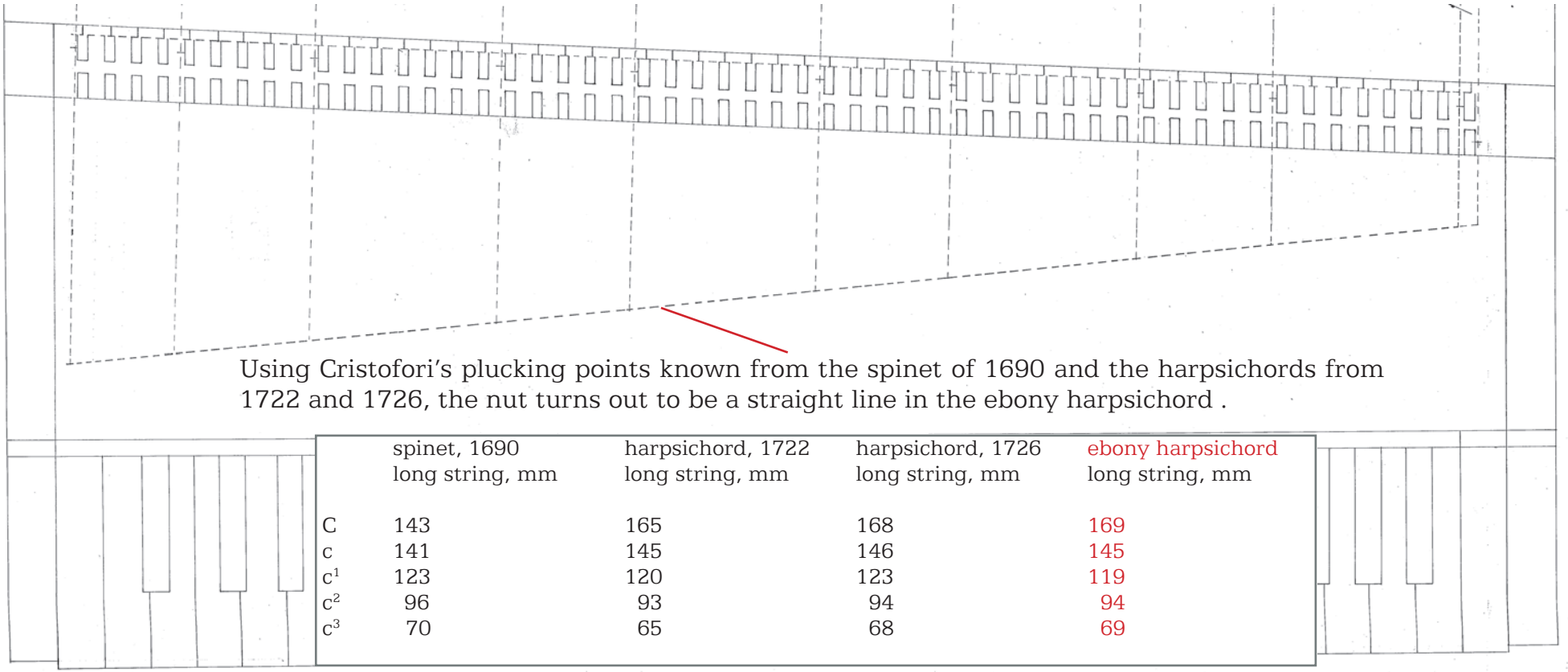
The starting points in planning the reconstruction are derived from 3 important facts:

- The bellyrail position is original. Underneath the baseboard the original nail heads are visible.
- The registers are original. The holes for the jacks corrispond to the original compass.
- The keyboard is original. The angle of the keyframe corrisponds to the angle of the bellyrail.

The holes for the extra two notes in the treble are added.

THE RECONSTRUCTION OF THE ORIGINAL NUT POSITION

The drawing shows the reconstruction of the original nut position. The registers and the keyboard have been centred inside the instrument leaving space for the blocks on both sides of the keyboard. Using the original angle of the registers, the jack holes turn out to be parallel to the case sides and at right angles to the front board.



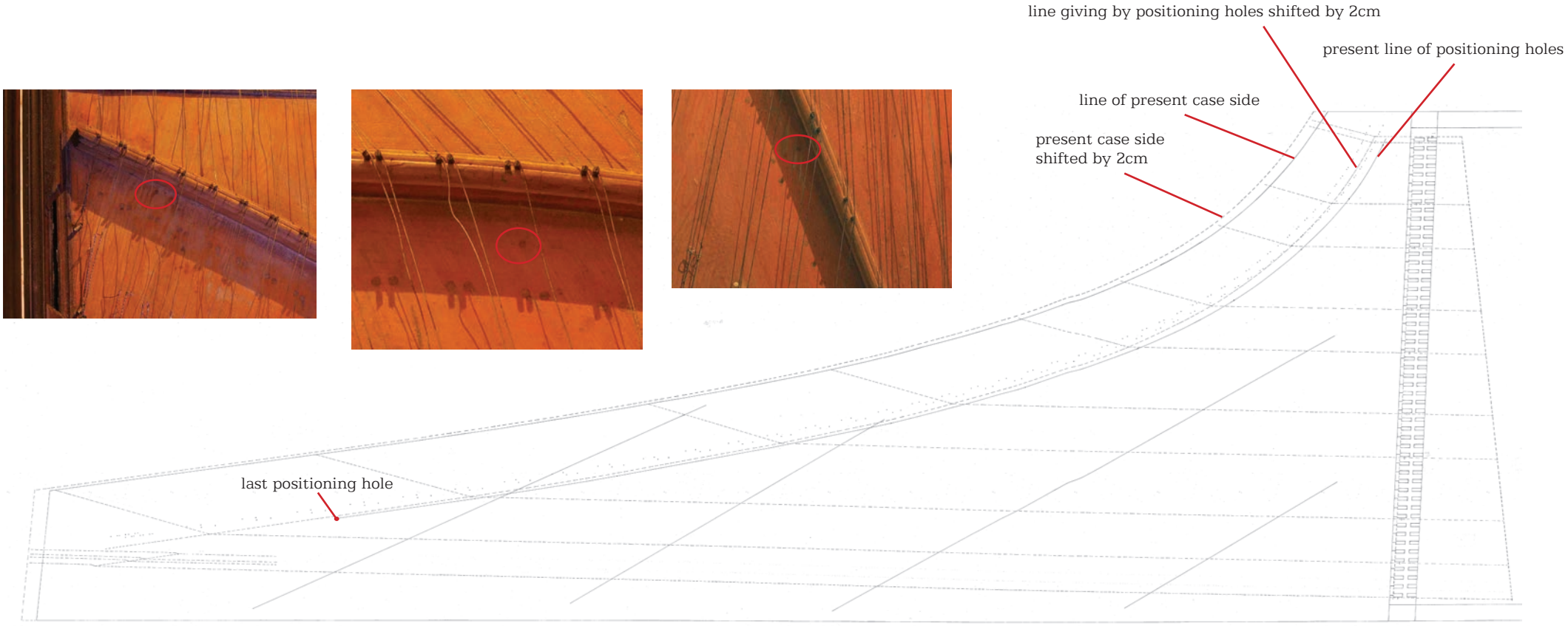
Using Cristofori's plucking points known from the spinet of 1690 and the harpsichords from 1722 and 1726, the nut turns out to be a straight line in the ebony harpsichord .

	spinet, 1690 long string, mm	harpsichord, 1722 long string, mm	harpsichord, 1726 long string, mm	ebony harpsichord long string, mm
C	143	165	168	169
c	141	145	146	145
c^1	123	120	123	119
c^2	96	93	94	94
c^3	70	65	68	69

THE RECONSTRUCTION OF THE ORIGINAL CASE LENGTH AND THE ORIGINAL BRIDGE POSITION

The consequence of the changed angle of the registers is the shifting of the whole soundboard by 2cm. That has changed the length of the cheek side and the total length of the instrument.

The drawing shows the possible original position of the bridge, given by small positioning holes found near the present bridge which form an exact parallel line to the bentside at a distance of 105mm (solid line). In Cristofori's later harpsichords the distance between bridge and bentside measures 110mm. It is possible that 5mm has been planed off the bentside because the original hitch pin holes are now covered by the moulding (see also page 8)



The dotted lines in the drawing illustrate the presumed bridge position and the case sides before the instrument was shortened by 2cm. In this position the string lengths for the C's and F's corrispond exactly to Cristofori's other instruments (see table page 8).

STRING LENGTH mm

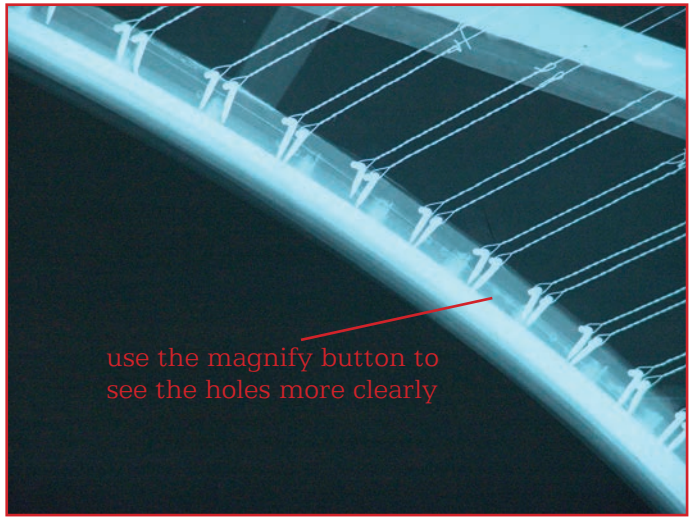
	spinet 1690 longer string	harpsichord 1722 longer string	piano 1722 longer string	harpsichord 1726 8′	piano 1726 longer string	Ebony harpsichord longer string reconstructed
GG						2270
C	1561	1982	1814	1857	1960	2038
F	1540	1621	1587	1621	1606	1607
c	1095	1132	1120	1130	1127	1107
f	851	850	849	857	840	840
c^1	564	569	566	571	569	563
f^1	426	427	420	428	420	427
c^2	287	285	280	287	281	287
f^2	217	214	211	215	215	217
c^3	143	143	142	144	142	143

CASE MEASURMENTS mm

	now	reconstructed
Total length (spine)	2497	2517
Cheek side length	454	474

For the reconstruction of the position of the hitch pins a 13° angle has been chosen as in Cristofori's later harpsichords.

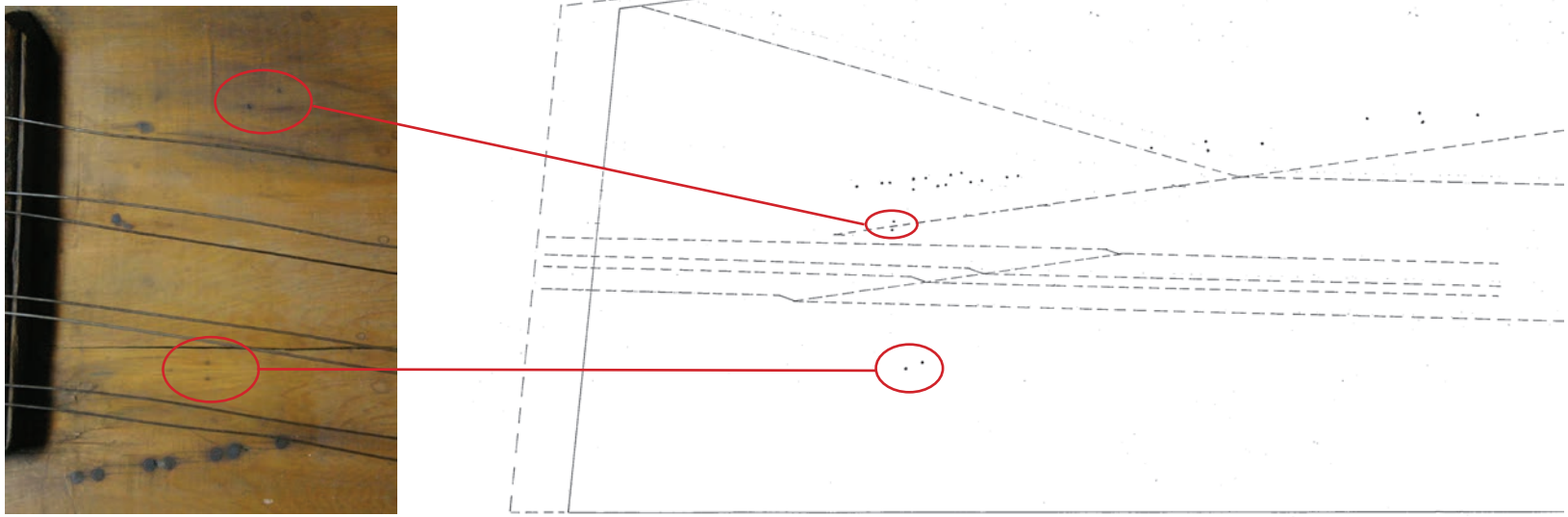
A few extra holes were found along the line of the present hitch pins.



More significant are the holes found in the x-ray along the bentside, invisible to the human eye because covered by the present moulding. Unfortunately the distortion in the x-ray does not allow an exact reconstruction of their position.

The strings of the last two notes GG and AA have to be put on a seperate bridge and the strings need double pinning so as not to interfere with the strings of the main bridge. Double pinning is very often used by Cristofori especially in the bass.

This photo shows two pairs of marks which could have been marks of former bridge pins. Whereas the upper one matches exactly the line of the reconstructed bridge, the one underneath is not in line with the reconstructed bridges in the bass.



The fact that both corners, the one at the tail and the cheek/bentside corner look very much reworked with is another indication of the possible change in total length of the instrument.

This shows the baseboard at the tail end.

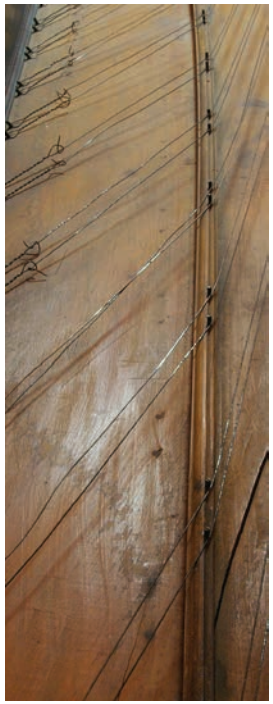
The inside of the tail. The frame is not original and must have been glued on when changing the length of the instrument.

corner cheek/ bentside

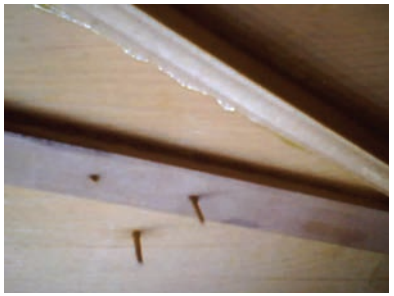
corner bentside/ tail

THE MYSTERIOUS PLUGGED HOLES IN THE SOUNDBOARD

At a distance of around 85mm from the bentside there are large (2,5mm) pluged holes in the soundboard. The number of holes corrispond to the original 53 note compass.



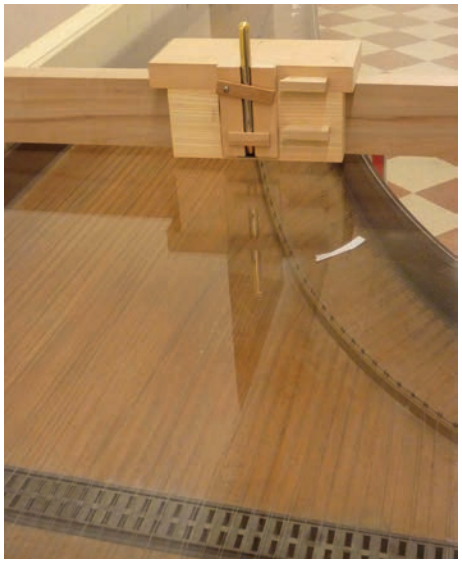
These holes in the past have been interpreted as the original bridge pins or as possible hitch pins.

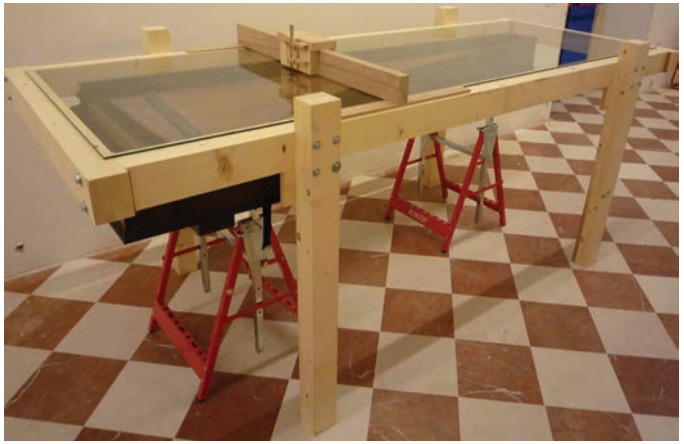


Underneath these holes there is a strip (probably service wood) of around 15mm x 5mm. The wooden pegs have not been cut away.

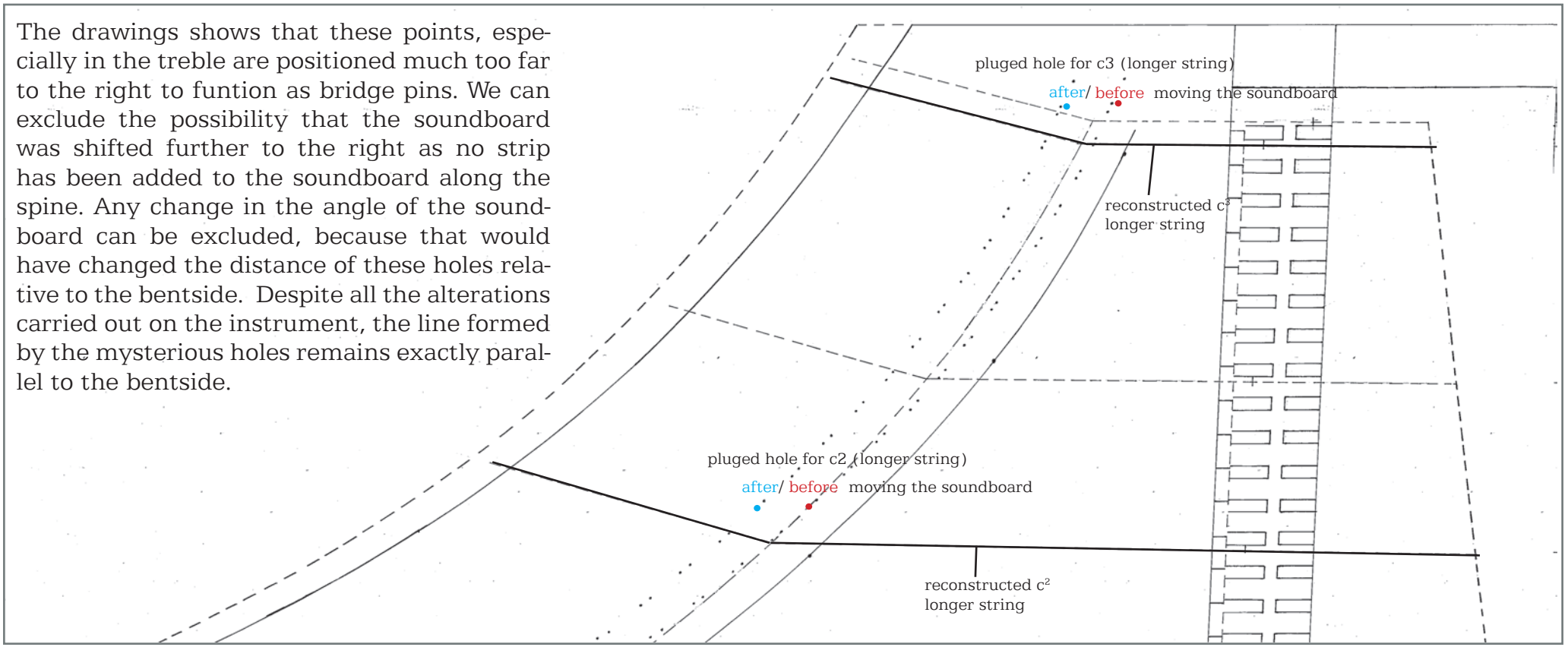
Thanks to the 1:1 drawing of the present plan of the instrument these points and their position inside the instrument have been studied carefully.

The photos on the right show the table with the laser pointer used to draw the plan of the case and the position of the pluged holes.

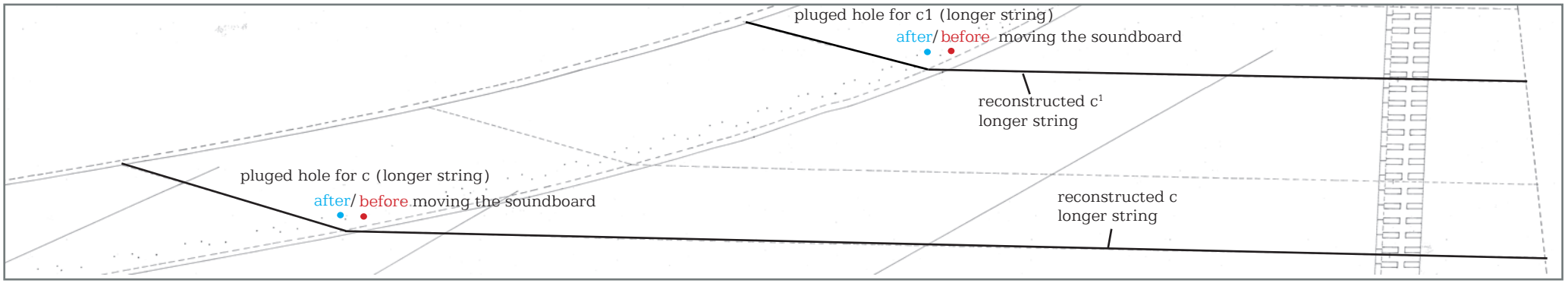




The drawings shows that these points, especially in the treble are positioned much too far to the right to funtion as bridge pins. We can exclude the possibility that the soundboard was shifted further to the right as no strip has been added to the soundboard along the spine. Any change in the angle of the soundboard can be excluded, because that would have changed the distance of these holes relative to the bentside. Despite all the alterations carried out on the instrument, the line formed by the mysterious holes remains exactly parallel to the bentside.

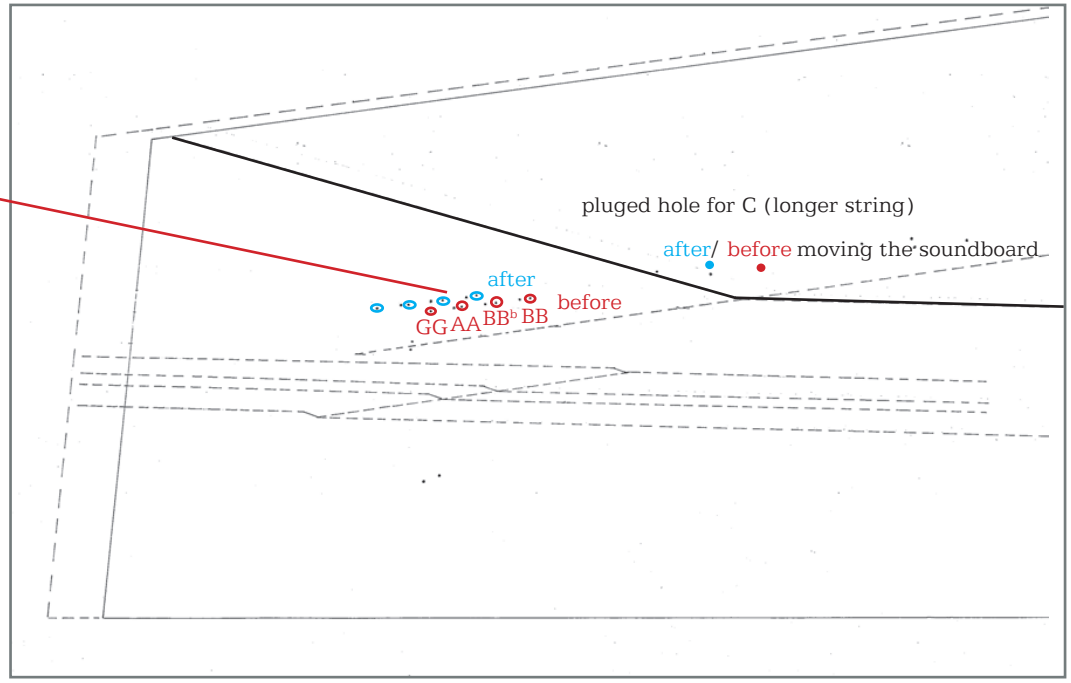


The large diameter of these holes makes it unlikely that they were bridge pins.



The line formed by the large pluged holes is situated at 15mm from the line of the pluged positioning holes. If the holes were hitch pins the strings would have had an afterlength of only around 30mm! To function as ordinary hitch pins either the bridge was in a completely different position and the string length were much shorter or the angle of the strings around the bridge pins was very steep, both unlikey possibilities.

Another important point should be mentioned: the angle at which the wooden plugs were inserted indicate that the original pins must have been pointing towards the front of the instrument, the opposite of conventional hitch pins which point backwards to prevent the strings slipping off. This angle could only be explained if they were hooks rather than pins.



The last bass strings from BB - GG could not possibly be bridge pins because the strings would touch each other. Interpreting them as hitch pins would mean that all the bass strings would be fixed in a little corner of 5cm! Underneath these pluged holes there is the small strip of 5mm thickness that could hardly bear all the force of the bass strings.

For now the function of these pluged holes remains a mistery.

THE RIBS

The ribs shown in the drawing underneath seem to be original. They seem to be made of the same wood as the rest of the inner construction (*abete bianco*). The first long rib has been cut out for the strip underneath the mysterious pluged holes. The other ribs do not have any cut outs.