FoMRHI Quarterly

BULLETIN 114

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The next issue, Quarterly 115, will appear in February 2010. Please send in Comms and announcements to the address below, to arrive by February 1st.

Fellowship of Makers and Researchers of Historical Instruments


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Everything takes longer than you think, as you no doubt are aware. We should by now have had a new bank account with Lloyds, so that we could supply IBAN and BIC/SWIFT codes to those who wanted to pay their subscriptions by bank transfer. Our experience with Alliance & Leicester has been pretty dispiriting; in spite of repeated requests to supply a plastic card which is necessary to pay in cheques over the counter (a paying-in book being deemed insufficient) we have still not been supplied with one, so cannot securely pay in cheques. And when we tried to change the name of the account to a more manageable ‘F.O.M.R.H.I.’ – not too difficult surely? – they could not even get that right, and have changed it to ‘F.M.R.H.I.’, missing out a letter. The correspondence telling us of this was addressed to a ‘Mr Batty’. Who, pray, is he?

Alas, so far Lloyds have been little better, simply losing the forms which John Rawson, the Treasurer, and I had painstakingly filled in. So now we have to fill them all in again . . .

One the website front there is a little more progress; we have now had good offers from reliable individuals to procure domain names, set up pages, and bulk-scan back issue Comms. So this should happen after the Christmas rush is over.

Many thanks to contributors of the Comms herein; it only remains to remind you yet again that the long winter evenings (in the Northern hemisphere at any rate) yield the perfect opportunity to mull over any organology questions you have had in your mind for a while that might be turned into a Comm. Only YOU can make FoMRHI continue to prosper.

Members’ announcements are always welcome – if using a computer, please send these as plain text emails, rather than attachments.

Keep those Comms coming!

Where are they now? Over six years our address database has got a bit out of date. Does anyone know the whereabouts of Steve Heavens, or Bernhard Folkestad? They paid their subscriptions along with everyone else, and are entitled to receive FoMRHI? recent correspondence has been returned by the Post Office. Many thanks to all of you who have given information so far, including news of those who have gone to mix their music with that of the angels.

Email addresses, please! If you haven’t received any emails from us this year, that means we don’t have your email address. It makes communication so much easier if we have it. We promise not to send out any spam, or pass it on to anyone else. Please send a brief message to Lutesoc@aol.com, and we can add you to our list.
STANDING CALL FOR PAPERS

The Fellowship of Makers and Researchers of Historical Instruments welcomes papers on all aspects of the history and making of historical musical instruments. Communications or ‘Comms’ as they are called, appeared unedited (please don’t be libellous or insulting to other contributors!), so please send them EXACTLY as you wish them to appear – in 12 point type, on A4 paper with a 25mm or 1 inch border all round, or to put it another way, if you are using non-European paper sizes, then the text area must be 160 x 246 mm (or at least no wider or longer than this). Our printers usually make a reasonably good job of scanning photos.

You can send contributions EITHER on paper, OR as a Word-compatible or PDF attachment. If you really do not have access to a word processor of any kind, we may be able to retype typed or handwritten submissions.

NOTE OUR NEW ADDRESS:

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Non-members will be given a year’s free subscription if they send in a Communication to the Quarterly.

If you ever sent in a paper (in the last 6 years) for the Quarterly, and it never appeared, please re-send it, to the new address.

There are plans to scan back issues of the Quarterly and make them downloadable from a website, to be set up; in the meantime you can obtain back issues for the princely sum of £3 per issue, including postage; send a cheque payable to FoMRHI, at the above address, or write with your credit card details.

If your interests have changed, and you don’t now want to be a member of FoMRHI, please let us know, to save postage costs.
MEMBERS ANNOUNCEMENTS

Low density, eccentric, reversed tapered, gouged bassoon cane, from David Rachor

In the next few weeks I will be offering Baroque bassoon cane with an eccentric historical gouge for sale. This low-density cane will have a reversed tapered gouge (what the French bassoonists call *contrepente*), starting about 1.3 mm thick at the stock, 1.0mm at the first wire to about .6 mm at the tip. The cane will have been density tested.

I am of the opinion that reed makers in the eighteenth century used softer cane to make their reeds than the cane we use today. For this reason, the reed makers of the past developed the reversed tapered gouge (see my article titled "The Importance of Cane Selection in Historical Bassoon Reed-Making" in the *Galpin Journal*, LVII, May 2004, for more information).

For all of you period reeds makers who have tried using a reversed tapered gouge with little success, using this cane enables you to make historical reeds without taking the time to learn how to gouge by hand.

I personally have used this tapered gouge for Baroque bassoon and bass and tenor dulcian reeds. A reed made with low-density cane and a reversed tapered gouge has flexible playing characteristics; such a reed is most likely not like any other historical reed that you might have played in the past. The price of each gouged piece of cane will be 2.85 Euros. If interested please contact me via email: djrachor@gmail.com
FoMRHI Comm. 1884

Taro Takeuchi

Additions to Comm 1876, some more English Guitars

Further to Jim Tyler's list of English guitars in the last Q, here is a list of instruments in my own collection. They can be viewed at: www.crane.gr.jp/~tarolute/english.htm I am grateful to Jim Tyler for pointing out that Thompson was the name of a music and instrument dealer, not a maker.

Preston, London: watch key, Tortoise-shell fingerboard, gilded rose, undated

Preston, London: watch key, Tortoise-shell fingerboard, gilded rose, undated

Preston, London: Peg tuning, ivory/wooden rose, undated

Preston, London /Thompson, London: interesting guittar with Preston/Thompson double name; also it has narrow fingerboard, maybe for a child? watch key, gilded rose, undated

Thompson, London: watch key, no rose (missing), undated

Perry, Dublin: Worm gear machine, ivory fingerboard, gilded rose, medium size (scale length 47cm), undated

Hoffmann, London, 1758: (I believe this is very same guitar that appears on Jim Tyler's list) lute back, Watch key, wooden rose(replaced?)

Gibson, Dublin, 1774: Large size (string length 52cm), ivory fingerboard, gilded rose, worm gear machine

Attributed to Zumpe: Lute back, peg tuning, gilded rose, tortoise-shell/mother of pearl fingerboard, exceptionally well-made guittar, undated

Appendix: the following two citzens may not be English guittars, however they still have 6 courses/10 strings, string length 43cm.

Swartson, 1792, Amsterdam: watch key, metal (silver?) rose, deep body

Anon (Germany? inscribed 1812): Peg tuning, no rose
An Early Lute Construction Technique – Further to Comm. 1836.

A reconstruction of a 14th C. oud (see Comm. 1819) is now well advanced. The method employed to assemble the bowl of the instrument – using glued paper strips – is essentially that outlined in the 15th C. manuscript written by Arnault de Zwolle. As the description in the manuscript is brief and lacking in some important detail, this Comm. presents a workable procedure, developed experimentally by trial and error.

For this project, the oud bowl has been made 'lute like' from 11 ribs of Ash, less than 1.5 mm in thickness, assembled on a bulkhead style mold with no inter rib purfling.

Assembly Procedure
The procedure in the manuscript is to assemble the ribs on a bulkhead style mold using glued strips of paper scorched in place with a hot iron (each rib being joined to its neighbour "with a long piece of paper coated with ordinary glue and with a rather warm iron"). Arnault de Zwolle goes on to explain that after assembly, the bowl is removed from the mold and the joints inside reinforced with parchment. The paper on the exterior of the bowl is then scraped off.

'Ordinary glue' is assumed to be hot hide glue.

The Hot Iron
The hot iron used for assembly of the joints is - for convenience - an electric, thermostatically controlled, miniature iron commercially available from hobby shop retailers - used for applying plastic film to model aircraft (see Fig 3). This 'Hobbico' brand iron, has a Teflon coated sole that prevents glue sticking to the iron. The thermostat setting, determined by trial and error, in this case is just above the mid-position on the dial.

A standard household electric iron would do just as well although it is less convenient in use as would a simple iron heated on a stove element.

The Paper Strips – Preparation.
The purpose of the paper strips is to hold the rib joint surfaces in close contact until the glue has cured and to secure the assembled bowl until the interior joints have been reinforced.

Trials with paper strips coated with hot hide glue confirmed that on drying the paper shrinks across the 'grain' (see Fig 1 – the dried paper sample has curled across the grain direction). Further tests confirmed that the shrinkage might be sufficient to be usefully employed in pulling the surfaces of a glued joint together.

The paper strips must be dry when the glue is applied. Paper saturated with water prior to application of glue has little mechanical strength and will stretch and tear without transferring any force due to shrinkage.

'Kraft' paper envelopes were the source of paper used in this investigation.

Sufficient paper to cover a single rib joint is prepared by coating with hot hide glue (the same glue that is used for gluing the ribs). After a minute or two, once the glue has gelled, the paper is cut into pieces measuring about 15 mm. square. The paper pieces or strips should be used within 10 to 15 minutes - before the glue has fully dried indicated by the paper curling. If the glue is
still liquid, the strips can be difficult to position over the rib joint – tending to slide around under the hot iron before the glue sets. Strips that have dried out and curled lack proper adhesion when ironed in place. Furthermore, strips that have dried out cannot be successfully reconstituted by soaking them in water as they tend to disintegrate when being ironed in place (see fig 2).

The grain direction of the paper is determined by gluing a test strip, allowing it to dry and noting the direction of curl (see Fig 1).

The Paper Strips – Application.
Once the paper strips have been prepared, the joint surface of the rib to be fitted is coated with hot hide glue (it is not necessary to apply glue to the joint surface of the adjacent rib already on the mold). Starting at the neck block, the rib is glued to the block and held in position with pins (see Fig 4). (Reference marks in pencil on both ribs facilitate correct positioning and alignment of the ribs).

Then, working along the joint from the neck block, little by little, the hot iron is applied to the joint liquefying the gelled glue and allowing the joint surfaces to be pressed together. With the joint surfaces held in close contact, a glued paper strip is ‘ironed’ over the joint to hold the joint together in place. The heat of the iron causes immediate adhesion of a strip allowing work to
proceed quickly along the remainder of the joint. Any surplus glue on the surface of the ribs is instantly turned into a friable deposit by the heat of the iron (aptly described by Thomas Mace in "Musick's Monument", 1676, as "hot enough to scorch the papers, and the superfluous Glew, into a crustiness"). At this stage, paper strips are spaced about 5 cm. or so apart allowing inspection of the joint as work proceeds. Once the 'tail end' of a rib has been pinned in place, the hot iron is again worked over the joint towards the neck block adding paper strips to fill the gaps left during the first pass. (see Fig 5)

![Fig 5](image1)

![Fig 6](image2)

This procedure was found to be straightforward and efficient. The result is a completed bowl securely covered in paper strips with all rib joints well fitted and tightly closed. (see Fig 6)

**The Paper Strips – Removal**

After removal of the assembled bowl from the mold, the inside joint surfaces were reinforced (in this case with strips of raw silk fabric – in place of parchment - glued in place with hot hide glue).

Removal of the exterior paper strips proved to be problematic. They were so firmly glued in place that removal by scraping (using a cabinet scraper blade) was difficult – very slow with a real danger of consequential potential damage to the rib surfaces.

The method proposed by Thomas Mace (Musick's Monument, 1676) for removing the glued papers is to "bemoisten those scorched papers and glew (with a rag moistened with water), often renewing the moisture (yet but a little at a time) and once in half an hour, they will be so soft that only with your fingernails lightly running them backwards upon it, it will all come off as you will have it". Sounds straightforward but the procedure was found to be slow, messy and generally unsatisfactory.

The best method for removing the paper strips is first to place a damp cloth over the strips - one or two at a time - followed by a quick application of the hot iron and immediate removal of the paper with a wooden spatula. The paper strips treated in this manner - before the glue has had time to reset – are readily lifted off leaving a light glue residue easily removed with a cabinet scraper. (see Fig 7)
Another Way.
The difficulty encountered in removal of the paper strips was unexpected. Perhaps the glue should have been diluted or a lighter gauge of paper used? Not having time to investigate these possibilities, Turkish luthier Dincer Dalkilic who uses a similar procedure to construct the bowls of his ouds, was consulted for advice.

Dincer's oud bowls have inter rib purfling fed into place at the same time as the rib joints are glued together. Interestingly, he does not use glued paper strips instead applies unglued pieces of newsprint paper over the joint. These are then ironed in place, one by one – there being sufficient surplus glue from the joint surfaces to allow the paper to adhere and hold the joint together. Once assembled in this manner and with the bowl still on the mold, the paper strips are removed with a cabinet scraper (no moistening of the paper required or tolerated). Before removal of the bowl from the mold the rib joints are temporarily supported with self-adhesive masking tape applied across the exterior surface of the bowl. This tape is later removed after the interior rib joints have been reinforced.
A KEYBOARD INSTRUMENT IN A PHOTOGRAPH.

A Reed Organ at the House of German Clergy in Jerusalem: Meditating on a Photograph from the late 1920s

Restorer's work is a kind of occupation that supposes full-time concentration and leaves little time for diffuse speculations. Sometimes, however, you are granted by this privilege. When restoring early keyboards, you often meet instruments from the reed organ family that are considered neither challenge nor charge. But suddenly you are interested in understanding why these beautiful and reliable instruments have completely disappeared from use... As a doctoral student at the Hebrew University of Jerusalem, over the last year I have studied European missionary activity in 19th century Palestine. Among the archive materials was an historic interior photograph from the house of German clergy in Jerusalem. In the left corner of the black-white copy I recognized something similar to a small organ with open pipes. A search for the 'readable' source took time. But finally it was found (see Pict. 1 below).

Pict. 1. The Luther room at the house of German clergy in Jerusalem

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After a short time, it was clear to me that the instrument was nothing but a foot-pump harmonium – one of the reed organs. The open pipes on its front were only for decoration, just an accessory of the luxury performance. No other function. My first impulse (as a restorer) was to find the reed organ from the photograph and restore it, if possible. This search, however, was accompanied by another search (that of a musicologist), i.e., a general look at reed organs as a disappearing type of keyboard instruments. The results of that study were so interesting that they formed the subject of the following pages. I would like to acknowledge Prof. Ruth Kark and Mr. Lavi Shay, historic geographers, as well as Mr. Gideon Shamir, organ builder, for their contribution to the work on this material.

INTRODUCTION

Jerusalem of the early 20th century: shadowed lanes, buildings with arches, the elements of different ages and cultures outside and inside... The city was a desired point for missionary activity, pilgrimage or just traveling for many Europeans. They sent letters; part of them wrote books. But there were people who photographed this city at that time. Who might nowadays—in age of digital photography—be amazed if somebody would bring from a journey some 15,000 photos? That’s almost normal. But in the early 20th century it was an extremely rare phenomenon. German traveler and photographer Paul Hommel (see Pict. 2 above)² made this number of photos in Palestine in the late 1920s. All these photos are now carefully stored at the Landkirchliches Archive in Stuttgart.

The house of German clergy (Deutsche Propstei) in Jerusalem was one of Hommel's focal points. Three interior photos from that building included two musical instruments: a Grand piano and a harmonium mentioned above. Within a few years, the latter changed its location. It can be recognized on two photos: in the Luther room and in the nearby dining room. The building functioned as a clergy house until World War II. Then it was particularly destroyed and later rebuilt. A technical school is presently located there. Since the 1920s, the interior of the building has been substantially changed. Of the musical instruments seen in photos, not one is left...

Reed organs: their origin, types and periods of producing

All reed organs originate from the ancient Chinese sheng – a mouth organ with bamboo pipes and freely vibrating reeds. Direct predecessor: regal – a reed organ with pipes (15th – 17th centuries). The modern reed organ originated in France (1810) and was called orgue expressif. Originally, reed organs worked on the principle of air compression, which gave a possibility of changing their dynamics by the speed—and, thence, the power—of pumping. However, the suction method, developed in France about 1835, was refined in the United States some 20 years later, and the ‘American organ’, or melodeon, became the dominant type, at least in North America. The upright foot-pump reed organs were presented after 1860. This type normally had a swell knee lever for changing the volume level. In North America and the United Kingdom, a reed organ with pressure bellows was referred to as a harmonium, whereas in Europe, any reed organ was called a harmonium regardless of whether it had pressure or suction bellows.³

Besides these differences, reed organs also differ by the types and sizes associated with their destination. The following groups of instruments can be distinguished by this point of view:

- church organ (with transposing keyboard);
- domestic organ (upright – big or small);
- street/military organ (transportable).

³ Information in this paragraph is mostly based on encyclopedia Web-sources such as Britannica online (http://www.britannica.com) and Canadian encyclopedia (http://www.thecanadianencyclopedia.com).
All these instruments were produced between 1810 and 1950. Hand-held instruments (accordion, concertina, Russian *bayan*, etc.) live their own life, separate from the mentioned above groups of foot-pump reed organs; they will not receive consideration in this essay as candidates to the Red Book of disappearing keyboard instruments.

To understand the reason for the relatively brief though intensely popular existence of harmoniums, one might consider the changes in musical esthetics in 19th century Europe, the development of musical instruments—first of all, of the piano—and some other aspects.

**Musical Esthetics and Keyboard Instruments of the Period**

Whereas bow and wind instruments might gradually change their dynamics since early times, keyboards have retained two different principles for changing volume: regarding of touch (touch-response type) and regardless of touch: either (a) fixed dynamic levels—registering or (b) gradual volume changes adjusted by a lever or knob.

The main keyboards of the Baroque age—organ and harpsichord—were both of the fixed dynamic principle. The dynamic possibilities of wind and string instruments in the corresponding period were limited, and ‘imperfect’ keyboards might still supply a sufficient accompaniment. Esthetics of the period has still supposed terraced dynamics such as: *tutti* – *solo*, *f* – *p*, *Grand clavier* – *Petite clavier*. The micro-dynamics inside each level might be neglected by this point of view (although contemporary Baroque performers would hardly agree with this statement). The later development of the instruments themselves and appropriate musical esthetics already required the principle of touch response dynamics from keyboard instruments. The first one of that kind was a clavichord but its absolute dynamic level was so small that even ‘dramatic’ dynamic changes inside of its range (say, *ppppp* – *pp* by the contemporary scale) could be heard by only players themselves... The pianoforte—even in its earliest step—already had the touch-response principle as a built-in feature. The first reed organs, which worked on the pressure principle, can to a certain degree be comparable to the early square-piano but touch response of the latter was much more delicate and exact than the pedal-touch adjusted principle of *orgue expressif*. The later—suction—
type of foot-pump harmonium, although having a swell knee lever for quick and gradual changing of the dynamic level, was not comparable even to the first upright pianos whose shape was designed as a unified form for both household keyboards. Whereas Venice fortepianos had a left knee lever for ‘piano’ stop (felt strips between hammers and strings), the use of the later pattern of the left pedal (*una corda*) was far from widespread. However, both Grand and upright pianos still have this ‘rudimentary’ stop. A right pedal—a sustain pedal—was, in opposition, revolutionary in a sound palette: no other keyboard instrument had this feature. First—divided—sustain handles in British square pianos were exotic stops but in a short time there were no pianos without knee levers or foot pedals for this exclusively important feature of the new generation of keyboard instruments.

**TARGET WITH NO DESTINATION**

Upright keyboards of that period—both reed organs and pianos—were often produced by the same manufacturers and even looked alike. Cheaper, lighter and requiring less maintenance than pianos, reed organs were shipped overseas to support missionary efforts. Reed organs were preferable to pianos in tropical climates and regions of the world with poor transport infrastructure because they kept their tune regardless of temperature or humidity. Nevertheless, reed organs of the period 1870–1910 had less individuality of sound than pianos or pipe organs, and, thus, were not favored by professional musicians.

In general, reed organs served three branches of musical life: domestic, public (including new forms of entertainment such as cinema) and sacred (missionary work in remote regions⁴). Jewish *cantorate*⁵ used harmoniums for early studio recordings.⁶

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⁴ Organs were an important component of missionary activity in regions with non-European tune systems. Dalia Cohen’s PhD thesis (*The Hymns Singing of the Christian Orthodox Arabs and the Greek Catholics in Israel*, The Hebrew University of Jerusalem, 1967) as well as my recent research (Alexander Rosenblatt, *Music of the Eucharist Mass at three Episcopal (Anglican) Churches in Israel*, The Hebrew University of Jerusalem, 2009) show that the harmonic support of the organ helped to save European tunes with no changes, whereas unaccompanied singing supervised by local clergy led to substantial changes in hymn tunes towards the *maqamat*, a local tune system.

⁵ German Jews used church organs in Reform synagogues from the early 19th century until the 1930s. See, for example: Tina Frühaut, *The Organ and its Music in German-Jewish Culture*, Oxford, 2009.

⁶ The sound of harmonium as an accompanying instrument can be recognized on certain gramophone disks with voices of the great cantors, e.g., Gershon Sirota, Zabel Kwartin and Yossele Rosenblatt. As a descendant from cantor’s family, where disks of cantorial music were subject of collection, I remember that sound from my early childhood.
One might notice a junction of the two tendencies in Western music of the 19th century: esthetics of the musical Romanticism—stormy expression, delicate nuances and gradually changed dynamics—against a new stream of musical entertainment where one could neglect the individuality and quality of sound. Neither of those tendencies, however, gave a regarded place to harmoniums. Despite their popularity, there was no interest from composers to write for such an ‘unattractive’ instrument. A Small Mass by Rossini written for soloists, choir and three keyboards—two pianos and a harmonium—is a rare exception.

Missionary activity had been substantially reduced by the 1940s. The advent of new forms of music-making and entertainment such as the player piano (1901) and later the gramophone and radio led to a decline in the reed organ’s popularity. By the 1930s the larger builders switched to dealing exclusively in pianos or gramophones. Finally, reed organs became virtually obsolete by the mid-20th century when electronic substitutes became commercially available. The last reed organs were built in the 1950s...

Really last?

EPILOGUE

During the 19th century, the British army and missionaries took reed organs—both ‘military’ and ‘missionary’—to India. Hindus accepted this instrument and quickly adapted it to local music and even a form of sitting: the Hindu harmonium is the melodic instrument for playing with one hand while sitting on the floor. The player’s other hand pumps air with a handle-pump. The bourdon stop (for supplying the sustained bass) is an obligatory accessory of this instrument. Instruments of this kind are still in production. Another country that recently started building a ‘regular’ type of foot-pump harmonium is China, a country whose ancient instrument sheng—as we already told—was a predecessor of all reed organs, and whose contemporary generation of musicians-performers are of the most successful successors of classic European style. India and China. Countries of ancient cultures that know to adopt useful innovations.

I did not succeed in finding the reed organ from the photograph. The search for and around it, however, contributed to my knowledge about the instrument, five different members of whose family I have restored over recent years...
When a student of the recorder first encounters the instrument, there is little difficulty for him or her to play most of the notes of the first or lower octave. When the second octave is encountered however, a surprise awaits the student.

To reach these higher notes, it is necessary to open the thumb hole, but not too much. Suggestions have been made about the amount of aperture required for different notes. For one note it must be nine tenths and for another, seven tenths, the thumb nail must not be too long or too short and so on. An important point to note here is that if the thumb nail has been left too long, it is quite common to see a damaged hole.

The above 'measurements' are only a guide, and depend on the individual and his/her instrument. In short, to achieve these 'pinched' notes, one has to work at it until a satisfactory opening has been determined.

There is however, another solution.

Generally, the amount of opening required is about 1.0 to 1.5 mm\(^2\) in area. To test this and to determine what best suits a particular recorder, take a piece of adhesive tape about 15mm long and stick it across the thumb hole, leaving a small opening at the top of the hole; as if it were being 'pinched.'

Now play all the top notes which normally require the thumb hole to be pinched and adjust the aperture as necessary until all the top notes speak clearly. It will not take very long to determine this and you may even do so the first time you try.

When the opening size is correct, all the top notes will speak well, and within the limits of the quality of the recorder. In other words, they will sound better than they might if they were 'pinched' in the normal way.

This may be well and good, but some notes require that the thumb hole be completely open and this is now not possible without removing the tape.

All the other notes of the lower octave of course, require full closure of the hole, and this is easily done by covering the small hole, tape and all.

A keyed system could be used, but a simple, and very effective way, is to provide a permanent hole equal in area to that which has just been determined.

Purists comment that this is making unnecessary changes to the recorder. These same folk seem to forget that once upon a time, double (semi-tone) holes did not exist at the low end of the instrument.
The writer has employed this method very successfully to all recorders larger than the soprano, or descant, and offers his method as follows.

What are needed are two holes; one for normal playing and another small hole for the upper octave.

Referring to the alto recorder, the notes which require a totally open hole are the G, G# and F# and in order that these notes sound at pitch, the thumb hole must have a certain area. This also assumes that the present hole is in its correct position.

Before proceeding further, it is necessary to measure the thumb hole, calculate its area and note its position from the tenon.

It is now required that you drill out another, but larger hole in the same position as the original. For example, if the hole is 6mm in diameter, make the new hole about 12mm in diameter. Using a similar, or a different piece of timber from that of the instrument, turn it on the lathe so it fits the new hole precisely. Cut and shape this new piece, or plug, to fit the instrument both inside and out, leaving it a little proud for later finishing, then fit and glue it into place.

When the glue has set, smooth out to finish the fitting, polish as necessary and mark the centre of the plug - the position of the original hole.

As noted above, the total aperture required to produce the open notes must have a certain area. With two holes the sum of the area of the two holes must equal this value.

Example only:- Let us assume that the original hole was 7mm. in diameter. This gives us an area of 38.5mm$^2$. If the diameter of the octaving hole is to be 1.5mm, then its area will be 1.7mm$^2$. The difference between the two areas is 36.8mm$^2$ and to produce this area, the larger new hole will need to have a diameter of 6.8mm, not a lot less than the original.

The placement of the smaller hole should be to the right of centre of the recorder when viewed from the back. This allows for a quick slide away to produce the 'pinched' notes. In any case, it does not take very long to become used to the new idea wherever you put the smaller hole.

The provision of two holes works on all sizes of recorder, but is not necessary for those which are smaller than the alto.

Making the plug for the new holes from hardwood, allows for accurate and clean drilling. The plug could be made from a contrasting colour. The writer has, instead of relying on a simply drilled smaller hole, fitted and glued in place, a brass tube 1.5mm or so in diameter. This gives excellent results.

This operation may not be for the faint hearted to try, but it is really worth doing if there is difficulty in producing 'pinched' notes.
Home-made tools for lute building

If you are not a professional (and probably if you are), one of the delights of building your own lutes can be designing and making those useful tools that would otherwise cost a fortune. Arthur Robb’s web page contains many good examples and a brief internet trawl led me to many rib benders; a brief chat with Din Ghani sent me in the direction of a suitable heat source and my first illustrations show what I came up with.

Rib bender
The body is a medium sized can – larger than standard supermarket cans – from a homebrew kit. I get through about two a month (the kit makes forty litres of beer and contains two cans) so I can supply examples if you need. To prevent the heat lamp overheating I drilled a ring of holes through the top each about 4mm diameter. (The strange device on top made from washers and aluminium bar was an unsuccessful attempt at adding a purfling bender). I pop-riveted three legs to bring the top of the can about 1cm above the top of the heater and to provide adequate air circulation.
The heat lamp is sold for keeping day old chicks warm and I bought mine from Countrywide Stores (formerly West Midland Farmers) at Melksham but any farm suppliers should do one and they might be available through the advert pages of smallholding magazines. The bulb holder needed minor adaptation to fit on to the mounting board which I clamp to the bench.

Purfling cutters
I filched the ideas for these from Robert Lundberg’s book ‘Historical Lute Construction’, adapting them to hardwood rather than metal and using easily available cutting materials.
The marker cuts a vertical groove around the edge of the soundboard and here I cut a slot in the block to take a Swan-Morton type 11 scalpel blade purchased from a local art shop. The blade is angled backwards and dug in to the block to hold this angle. A screw, probably from an electrical fitting, completes the clamping and by slightly undersizing the drill hole I have been able to self tap it into the wood.
To set the appropriate distance of cut from the soundboard edge I have planed the edge of the block to the correct width and glued a strip of wood as the guide.
I set the depth of cut by eye and clamp the blade with the screw.
The plane has a similar construction with the blade slot cut at 20° to the horizontal. This time the blade, which needs to be precisely the width of the purfling, sits tight against vertical edge guide and proud of the face that will cut the soundboard by a tiny amount, set, again, by eye. Two screws hold the blade tight against the lower edge of the slot. Here, these have distorted the plane a little and, before using it again, I will glue a strip of wood over the second long edge to prevent this recurring.
I haven’t been able to find tool grade steel for this blade but it might be possible to cut the blade end off a fine scribing chisel to do the job.

Eric Franklin, October 2009
Bassoon Reed-Making: Adapting the reed making technique to the material or forcing the material to the reed making technique?

This may seem like a philosophic question that has little or nothing to do with the technique of making bassoon reeds, but I hope to convince the reader that this question does in fact have many implications to the outcomes of the bassoon reed-making process. It concerns the basis of the reed-making methods used by bassoonists and reed-makers from about the first half of the 19th century and back into history versus the modern reed making technique as practiced by myself and other professional bassoonists and reeds makers. At this point I should to warn the reader that this is not a "how to" article on modern or historical bassoon reed making since I will discuss the reed-making process in rather broad terms. However, I will give some suggestions later in the article on how the modern reed-making method can be adapted to better use the material at hand.

Simply put, most modern reed makers purchase cane – the material – and with various machines and tools, make a reed with little regard to the qualities of the cane (except at the end of the process when the reed is finished). Conversely, a reed maker in 18th century France would obtain a piece of cane and using only hand tools make a reed. The use of only hand tools automatically adapts the technique to the material since hand tools react to the material and are not set to gouge, and/or scrape the same amount for each piece of cane. Up to this point, I have oversimplified a great deal but according to my research into the historical bassoon reed-making sources, and my experience as a reed maker of modern and historical bassoon reeds it can be summarized as just stated.

To be a bit more specific regarding the two different techniques, I will begin by describing the modern bassoon reed-making technique. (For sake of convenience I will call the techniques modern and historical.) As stated earlier, modern reed makers usually have several machines at their disposal to help make the reed-making process quicker and more consistent. These machines usually include - depending on where the reed-maker starts the process - a gouger, profiler, shaper, and a tip profiler. The process is roughly as follows: 1) the cane is first gouged to a certain thickness. This is where material is removed from the side of the cane away from the bark; 2) the gouged cane is then profiled to a certain thickness. This is where the cane it scraped down on the bark side of the cane; 3) the piece of cane is now shaped or formed. This is where the long piece of cane is narrowed by removing material to conform to a predetermined shape. At this point the gouged, profiled, and shaped piece of cane is formed into what one could recognize and a bassoon reed, including the wrapping at the stock. In America we call this un-clipped reed a blank. Many reed-makers now use a relatively recently developed machine called a tip profiler to further scrape the tip of the reed to a predetermined thickness. Please note that each of these four machines can be adjusted to the amount of material removed. After an optimal setting is found, they are
normally not changed and, therefore, set to remove material to a predetermined
degree.

Now let's examine in more detail what I call the historical approach of bassoon reed
making. In effect, the process contains the same steps as in the modern method,
except for the amount of cane removed in each step of the process, and the fact that
the entire reed-making process is accomplished only with hand tools. Here is the
historical method in more detail: 1) the cane is gouged with a hand gouger to a certain
thickness determined by the "feel" of the cane and reaction of the tool to the material.
In this gouging process, considerably more material is removed from the underside or
pith of the cane than in the modern method with the use of a gouging machine; 2) the
gouged cane is then profiled to a certain thickness using files and knives. Here less
material is removed than in the modern method because more cane was removed in
the gouging process; 3) the piece of cane is now shaped or formed either by hand
without the use of a shaping tool. When shaping by hand, the shape can be varied
according to the feel of the cane noted during the gouging and profiling processes. At
this point the gouged, profiled and shaped piece of cane is made into a reed and the
reed is adjusted by hand using a file, knife, or sandpaper but without the use of a tip
profiling machine.

One can see quite easily that in the historical method, the amount of material removed
is determined not by a setting on the machine but according to the "feel" of the
material. This "feel," or the reaction of the tool to the cane, is simply the hardness of
the cane. I must again simplify because much has been written on this subject of cane
hardness, and it is not necessary to rehash those writings here. But I can say that all
reed makers would agree that pieces of cane could be markedly different, whether one
calls it a question of stiffness, hardness, or flexibility.

Modern reed-makers have gained a quicker and more consistent reed-making process
by using machines, but they have lost a high level consistently of playable reeds. By
forcing each piece of cane, which we all agree can be very different, to the same
amount of material removal by the machines is the potential problem. For example, if
the machines used are adjusted to remove the amount of material best suited for soft
cane, it goes without saying that the machines would not scrape or remove enough
material on a hard piece of cane. In a recent discussion with Miller Marketing, a
double reed supplier in Wayne, Pennsylvania, about 40% of the bassoon cane sold is
gouged, shaped, and profiled. In my mind, this is a majority of the bassoon reed-
making process already completed with no regard to the material.

It is necessary to discuss in more detail the techniques as practiced by some
professional reed makers. I know several reed makers who use techniques to test the
hardness of the material and either adjust the technique to the material or use only
material that fit their reed-making methods. An example of the later is Ovidio Danzi of
Milan, Italy. In May of 2009, I was privileged to observe Mr. Danzi making reeds at his
shop. He does a simple twist test by hand to gauge the hardness of the piece of
gouged cane. I personally saw him reject many pieces of cane, which he found to be
too soft for his method of reed making. In fact, I saw a large trash basket half full of rejected pieces of gouged cane. James Kopp of Hoboken, New Jersey, also uses the twist test to gauge the hardness of his cane. However, Mr. Kopp rejects only the hardest and the softest cane but adjusts his reed-making techniques to the hardness of the remaining material. There is a third method used by some large reed-making firms that produce thousands of reeds annually. These large firms use the modern method with machines, but the cane is not tested for hardness. However, at the end of the process, the finished reed is play tested to determine its playing characteristics. Note that very little time is spent adjusting the finished reed by hand. The reeds are then labeled as hard, medium, medium soft, etc. to make the reeds sellable to a particular player requiring a certain type of reed. This is an example of absolutely no adjustment of technique to the material; only the material determines the final result, in this case, the playing properties of the reed.

Having been trained using the modern method of bassoon reed making and later learned the historical method to make Baroque and Renaissance reeds, I totally understand why most professional bassoonists use the modern method. It takes much more effort to learn the historical method since it takes time to develop a sense for the feel of the cane. Also to note in passing, the historical approach involves more material removal at the gouging stage and this has a profound effect on the finished reed not desired by modern bassoonists. Again, much has been written on this subject, which is not an aim of this article. So what is a possible solution? It would be unreasonable to recommend that professional bassoonists learn the historical method of reed making; however, there are some relatively simple tests of the cane that can be done quickly without the use of expensive density testing machines. By testing the material, the core of the historical method – adapting the technique to the material – can be effectively used in the modern approach to reed making.

The suggestions that I will give all involve some type of hardness testing of the gouged piece of cane in which the simplest involves the "twist test" mentioned above. This test is quite easy to learn and, with as few as about ten pieces of gouged cane, one can quickly develop a feel for the hardness of the cane. The test is done simply by twisting the gouged cane while holding it by the thumb and index fingers of the two hands and then placing the pieces of cane in order of resistance that you feel as you twist them. Please note the following important points regarding the twist test: 1) test at least ten pieces of gouged cane to order to accurately obtain a sense of the hardness as you twist the cane; 2) the pieces of cane must be gouged to the same thickness; 3) either test when all the pieces are dry or all the pieces are wet.

After having accomplished the twist test and grading the cane, there are a few simple techniques to aid the modern reed-making process. One given to me by Ricardo Döringer of Proreeds in Munich is too use a wider shape for the harder cane and a more narrow shape for the softer cane. As he explained it, to span a wider river with a bridge you need a more rigid bridge than a narrower river. For example, one could use a Rieger #2 shaper for the hard cane and a Rieger #1A or #1 for the softer cane.
Another technique again suggested by James Kopp concerns the adjustment of the profiling machine. Many profilers used today have pins on the profiler easel that are slightly flattened in order to produce a spine on the profiled piece of cane. The spine is formed when the easel drops slightly as it rides on the flattened area of the pins. This is known as a "crowned" profile. Normally, these pins can be easily turned so that the pin, in effect, is totally round and does not let the easel drop to form a spine. This is known as an "uncrowned" profile. Use the "uncrowned" profile for the hard cane and the "crowned" profile for the softer cane.

Having spoken in length about this principle of adapting a material to a process as opposed adapting the process to the material, I believe many such examples can be found in the manufacture of instruments, especially in the manufacture of wooden instruments. It seems to me that in the pre-industrial age, more emphasis was placed on the selection of material, therefore, one can say that the process was adapted to the material. I only know this through anecdotal sources and what I have seen personally. Citing examples in my area of expertise, namely the modern bassoon and period woodwind instruments, many times I have heard Olivier Cottet, maker of historic and modern double reeds in Paris, France, comment on the quality of the wood for a particular instrument that he was making for me. I once heard Mr. Cottet speak in length about how overjoyed he was to obtain over 200 year old wood from the park at Versailles that was recently uprooted by the devastating hurricane that struck France in 2001. Likewise, I have personally heard Leslie Ross, bassoon maker in New York City; Marc Echord, historic double reed maker in Angoulême, France; and Robert Cronin, historic double reed maker in Menlo Park, California, make comments regarding the quality of the wood needed for their instruments. To cite an example of a modern woodwind instrument maker, in numerous visits to the Fox bassoon factory in South Whitley, Indiana, I have heard many comments regarding the process of bassoon making but not many relating to an individual piece of wood selected for a particular instrument. Fox Products has for many years experimented with different strains of maple for their bassoons, but since they make hundreds of bassoons a year, individual selection of wood for a particular instrument is not advantageous.

In closing, I would like to hear of other examples with regard to instruments where either one of the two broad techniques is the basis to their manufacture. Even though I have to admit that I am biased to adapting a technique to a material, there are examples, I am sure, where this approach is not the better of the two.

David Rachor
Inventing the Guihuela – a radical approach to instrument accessibility

...Wherein the author, posseffed of a sense of delyte of the qualities of the lute, poses a multitude of questions about the availability of gui instruments to learners and seeks a practical solution based on wydely available parts.

Introduction

I've been interested for some time in exploring possible mechanisms to increase accessibility of various aspects of the lute. As a true convert I believe more people should get the opportunity to get involved and play! My view is that we will only keep this fine instrument alive today by getting more people to experience and play it. But a key problem is the accessibility of instruments, particularly those that are seen as affordable to people starting out to explore their interest. The lute should not just be an elite instrument only available to a select few.

Many people seem to come to the lute from the guitar, and although it is possible to play tablature on the guitar, the effect is still a guitar-like sound and experience. Some of the lute’s unique sound comes from its construction – its shape, thin soundboard, close barring; some from the right hand technique related to its action and setup.

Without these aspects it is difficult to develop the correct technique and really discover what the instrument and repertoire has to offer. So some basic physical characteristics of the instrument are crucial.

Hiring a lute from the Lute Society is obviously one option, and this proves popular, however demand on these instruments is high and there is often a waiting list. Even if you manage to try one of these, you can still be left with the dilemma of how to progress to the next stage, and/or how to make a case for the serious outlay that is a "proper" instrument. If you really are serious, buying a quality instrument is a good investment. Most lutes are still hand made on an individual basis and this is reflected in their price. Good lutes do indeed hold their value, but it is still a significant investment that has to compete with other demands on your finances, particularly in these straitened times. And for most makers there is usually a long waiting list. Some makers offer “student” versions of their instruments. These are usually the same as their standard instruments with less decoration, but still quite expensive compared with student versions of other instruments.

There is a second hand market, but this is generally of high end instruments available for a couple of thousand euro/pounds/dollars. Sometimes affordable “student” instruments come up, but not very often.

In the early stages of developing an interest in taking up the lute, it must take a dedicated sense of purpose to continue when people discover that compared to most other instruments there is little available at the “bottom end” of the market that can be recommended to them. Some instruments are produced in Pakistan, for example The Early Music Shop sell such an instrument, but a common opinion I have heard is that the quality is variable - some instruments

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1 This document is a slightly extended version of an article shortly to appear in Lute News.
seem ok, but others have problems with their set-up and sound quality. There are some reports on the Internet of how such instruments can be “fixed” with the attentions of a maker though.

So how can we increase the availability of entry level instruments? Something for a new player or dabbler, who is starting to develop an interest but cannot justify the full investment yet.

And here is the heresy – What about something really affordable but good enough?

It occurred to me that as many come to the lute from the guitar, could there be some kind of stepping stone between the instruments for those exploring their interest? More crucially, could that stepping stone be an instrument that would allow the development of relevant playing skills and exploration of the repertoire?

**The historical record**

Historically there is a fully paid-up guitar shaped member of the lute family – the vihuela. This is an instrument that has double courses, played with the fingertips, light construction. Its tablature is interchangeable with lute tablature. If you play the lute the vihuela is a familiar instrument and vice versa. Perhaps purists will disagree, but to many intents and purposes a vihuela is a lute in a guitar shaped body. I’ve even heard it said that the popularity of the guitar shape of the vihuela was motivated by the Spanish disaffection with the "Arabic" form of the lute, but apparently this is a bit of a myth. Many professional lutenists are also expected to play baroque guitar as well.

We also know that in the historical record, lutes were much modified to suit the needs of the day. Renaissance lutes were rebarred to suit changing tastes. Bridges were changed, necks were chopped off and widened as the older instruments were “upgraded” to baroque lutes. Some theorbos were downgraded to simpler mandoras. So there is a long and venerable tradition of adapting existing instruments to suit players’ needs.

**Building your own**

When I started playing as a student, I could not afford to buy an instrument and so I started to build one following Ian Harwood’s chapter in the Charles Ford book and the Lute society leaflet by Philip MacLeod-Coupe. I learnt a lot from that experience and eventually finished it after a couple of years work, although by today’s standards it is too heavily constructed and not very resonant. Nowadays there is more comprehensive and detailed advice available – and I can personally recommend David Van Edwards’ summer school and CD course.

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3 Lute society booklet: *Lute Construction*, by Philip MacLeod-Coupe

4 [http://www.vanedwards.co.uk](http://www.vanedwards.co.uk)
Building your own lute from scratch is a rewarding experience but requires a considerable investment in time – probably about a year of weekends, and an understanding family willing to put up with sawdust and the smell of hide glue. Some specialist tools have to be built or purchased, particularly in the construction of the back which needs a mold and bending iron. Specialist woods have to be procured for every part of the instrument.

I have wondered: could there be some kind of shortcut through some of this construction process for those with some modest woodworking skills? Is there something that could be easily built in a few weekends? A tall order you might say.

**A conversion job**

Out of this soup of speculation that I have been stirring for a while has come a realisation that the necessary elements are readily available to assemble an instrument that allows the correct development of technique and exploration of the repertoire. Over the last few months, I've been experimenting with the modest lutherie knowledge I have, to look at what it might take to convert an existing, mass produced, cheap instrument into something that plays like a lute/vihuela. My goal is something that plays like a lute/vihuela and can be relatively easily constructed.

A 3/4 size student guitar is about the right string length and approximately similar body size to a lute/vihuela in G. Their bodies are quite heavily built to withstand mistreatment. And with a thick plywood top there is little musical character to enjoy, but generally they are solidly made and reliably assembled in China.

The following photos shows a typical 3/4 size guitar alongside a 60cm 8 course g’ lute. As can be seen, the string length is similar and although the body volume is slightly less, it is not too dissimilar:

But best of all, most of the major work is done – the body is built and correctly aligned with the neck so major aspects of construction and alignment are already complete. The neck is about the right width to take six courses.
Most of the sound quality of a lute or vihuela comes from a high quality spruce soundboard that has been thinned to the right thickness (about 1.5mm) with a fairly compact barring pattern to bring out the higher frequencies and “sweet” tone.

Our student guitar has an unremarkable 3 mm plywood top with a micro thin veneer to look like solid wood. That is the main part that needs to be replaced with a decent spruce top.

So to scratch the itch I rolled up my sleeves and made a start...

I’ve named the invention the "Guihuela" to reflect its heritage, and I’ve built my first prototype over the weekends of the last 2 months. I’m pretty pleased with how it turned out and it already sounds surprisingly sweet given its hybrid construction. It has 6 courses in G with a 60cm string length and you can play it like a lute.

**Building the prototype**

Here is an illustrated story of my conversion process. The idea is that it can be quite easily created and is perhaps a more likely prospect for someone with modest woodworking skills to create compared to building a lute from scratch. The total cost of all materials including the student guitar and strings was about £100, but the main saving is in time. It took me about 6 weekends, which is much quicker than building a lute from scratch.

**Construction**

The tools needed are very much those found in most sheds: a good saw, chisel, plane and vice are at the centre of any woodworking project. Generally lutes are made with hide glue which means mistakes can be fixed and joints reassembled again. My glue pot is a baby’s bottle warmer picked up cheaply on eBay.

As the body is already assembled, you don’t need a bending iron or to build a mold. The only specialist tool you really cannot get by without is a violin peg reamer to make the tapered holes in the peg box. You can get specialist lutherie tools and woods from suppliers on the Internet.

Other materials I used were as follows:

- Good quality spruce top – ones intended for acoustic guitars are fine for our needs
- Pegs – violin pegs are cheap and widely available and will meet our needs.
- Some hard wood for the fingerboard. Historically this would have been ebony. I used oak as it is widely available.

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5 As noted above, due to this being an adapted version of an article for Lute News, the instrument building story is told from the perspective of explaining the process to someone with woodworking experience, but not an experienced instrument maker. As a result, some of the elements of the construction process may seem a little obvious to FoMRHI members.
• Strings – a set of normal lute strings for a 6 course instrument.
• Material for a nut – get a bone blank from luthier supplier.
• Other bits of miscellaneous wood to make the bridge and peg box. I was impatient and used 12mm plywood for these.
• Selotape or masking tape to help glue the soundboard back on
• A long screw
• Stain/varnish/danish oil as required

Assembly
First obtain your 3/4 size guitar. These are widely available as “student” guitars, designed for younger children who do not perhaps have adult sized hands. I got mine from a local high street music shop. I tried a couple and the one branded “Jose Ferrer” seemed the best quality, and had a body that was similar to that of a lute (see photo above).

Buying it new cost about £50, but you can also pick up 3/4 size guitars on eBay for much less.

This instrument has a body made of plywood, including a 3mm plywood top. Not surprisingly, it was pretty dead acoustically. It came with a dust cover, which I kept for the final instrument.

Next the fun part. After having removed and discarded the strings, nut and tuning pegs, rev up your Black and Decker™ jigsaw and set to work removing the top.

Trim back the remnants of the plywood soundboard with a chisel and clean up any spare frayed wood if any.

On a modern guitar, the fingerboard sits proud on top of the soundboard, but on our guiuhuela we want it to be flush as per a lute. However if we take off the fingerboard, the neck would be too thin. So I decided to cut of the neck and set it back, leaving the original fingerboard in place, and putting our own one on top. This is shown in the following diagram:

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6 However this approach is not going to work on some guitars. I tried this on a different make of guitar and managed to break the teeth of my saw, as it had a steel bar running through the neck and into the body. So beware of cutting the neck off in this way!
Since I am going to be reshaping the neck to some degree, I used a paint/varnish stripper to remove the existing finish. The guitar had a top layer that came off really easily, but had underneath a more stubborn waxy layer that took more encouragement and scraping.

The original peg box had a number of channels and holes in it to hold the original guitar peg mechanism. This didn’t seem to leave much room for new pegs, so I decided to cut it off and fashion a new peg box from a piece of 12mm plywood. The scalloping around the edge was done using the curved end of a belt sander.

However this made the joint with the neck somewhat tricky, and my first attempt came off rather dramatically during some enthusiastic stress testing by a flamenco guitar player and had to be reinforced later.

Reassembly

Now we can start to put it back together again.

In order to keep a sufficient thickness in the neck, I decided to leave the old fingerboard still attached to the neck and reassemble neck back onto the body. The neck joint was vertically offset so that the face of the neck (in fact the top of the old fingerboard) it is now flush with the body. This will have the advantage that the old fret slots cut in the guitar fingerboard will be hidden behind a new fingerboard going on top.

As with a lute neck joint it is reassembled using hot glue and a long screw through the block from the inside of the body into the neck.

Building the front of the instrument is where most of our energy goes. We are aiming for a good sound, and so we need a high quality piece of spruce planed to the correct thickness with an appropriate barring pattern.

Guitar soundboard fronts are relatively easy to get hold of. I chose a “medium” quality one – the best one I could justify buying considering the fact that the instrument is a prototype. There is little point in buying a very expensive one, if the rest of our instrument is made of plywood! But on the other hand this is one area where high quality will pay off later in terms of sound quality.
The soundboard comes in two pieces, book-matched. As per a lute construction process, I jointed it down the middle (this can take some time and patience to get it right).

Now we mark out the body, leaving about 5mm spare. The wood removed can be used for bars later, as seems to have been the practice with historical lutes.

Lute soundboards seem to be around 1.5mm thick, with some variation, so that seemed to be a reasonable reference thickness for our guihuela.

Next I planed the top down to 1.5 mm all round. I discovered that you can easily pick up a piece of ply or wood from craft shop already thicknessed to 1.5 mm to use as a reference thickness. If you lay it alongside your top you can plane the top down until it is the same size. Or if you have access to some thicknessing callipers, even better.7

Then I thinned a little more in the area where the rose will be, to ease carving. You can hold it up to a bright light to see relative thickness.

Based on the proportions of the original instrument and from looking at pictures of vihuelas and baroque guitars, I decided to carve the new rose pretty much where the original guitar sound hole was. I carved mine using a surgical scalpel. For your first one, I suggest to choose relatively simple design for your rose. Mine was a simplified design based on the Gerle design.

To cut it I used a scalpel, but with the blade reground on the edge of the belt sander to get a more “vertical chisel” tip. The design was then cut with a series of vertical push cuts to chop cleanly through the wood fibres.

I experimented a bit with barring schemes. I thought that I needed to give the instrument the best chance of being resonant given it still had its plywood body. So initially I chose a very simple light barring scheme primarily comprising two main bars between the bridge and the rose, and a single treble bar, based on some

7 These are still on my shopping list.
photos by Larry Brown documenting his construction of a renaissance guitar.\footnote{http://www.cincinnatiearlymusic.com/renaissance_guitar.html}

This meant that instrument was indeed quite resonant, but perhaps more like a baroque guitar than vihuela/lute sound with more of a bass response and not as much higher harmonic texture as a lute. This suggests that another variant of the instrument might be to bar it lightly and indeed string it as a 5 course baroque guitar.

I got some useful input from David Van Edwards who suggested to bar it more as a lute would be. That is to extend the above barring to have three bars between the bridge and rose, two bars above the rose and to add a bass bar to remove some of the bass end of its sound. I went for a simplified bass bar without a bend in it.

Before putting the top on, don’t forget to put your maker’s label in!

The bowl needs to have a slight hollow carved into it. Lutes have this, usually about 3-4mm at the rose. This means the action is deep enough to allow the player to “dig in” and develop a good right hand technique.

The soundboard goes on with hide glue. This is a joint you want to be able to easily undo in case repairs or adjustments are ever needed. The fingerboard is simply a piece of oak the same thickness as the soundboard.

In terms of finishing, there is not a lot of work to do – the back of the body is already finished, and the soundboard should not have any varnish on it. I chose to stain the back of the neck and pegbox, as the underlying wood was quite pale (probably made of tulip wood).

The nut was a piece of Corian\footnote{A material by Dupont originally invented for kitchen worktops and chopping boards, but used by luthiers as a material for nuts}, but a bone luthiers nut blank could have been used instead.

The frets are tied on using fret gut as per a lute.

The strings were a standard set of Aquila Nylgut lute strings for the 60 cm string length.

The peg box is similar to that on a baroque guitar or ukulele, set back at a slight angle with the pegs coming through from the back. My design used a simple scallop outline. You could attach a lute style peg box, but then would not fit in a guitar carrying case, and it would look less like a historic instrument and more of a weird pastiche.

The pegs are standard violin pegs. This simplifies the process of building a peg box, which is a single piece of wood with the pegs reamed from the rear\footnote{This pegbox style is used on historical plucked instruments such as vihuelas and baroque guitars.}.
As it all comes together an instrument emerged that looks similar in shape and general dimensions to the “Chambure” vihuela in Paris\textsuperscript{11} – without, of course, its fluted back.

**Early experiences and feedback**

As you can imagine the excitement of putting the strings on and bringing your own instrument up to pitch is almost overwhelming. It is such a rewarding experience to build your own instrument – however it turns out.

Lutes tend to sound pretty dull when they are first strung, and the guihuela was no different. For some reason, an instrument tends to settle in and brighten up over the first month or so – perhaps it is to do with the glue completely drying out.

The instrument turned out much better than I expected. I’ve not been aiming to win any aesthetic awards - my first priority was to create an instrument that was first and foremost playable and had the right lute like “feel” under the left and right hand. However I was surprised at the pleasantness of the tone – certainly it is an instrument that enjoys being played. Its sound is somewhere between a lute and baroque guitar. Playing renaissance repertoire on it sounds good.

Initial feedback from pretty much everyone I have shown it to so far has been positive, ranging from mild amusement right up to wild enthusiasm. The most positive responses have been from those looking at it as an instrument that could be used for teaching purposes for students getting

\textsuperscript{11} Anonymous vihuela *E.0748*, Cite de la Musique, Paris
started. Other possible uses include using it as a "knockabout" instrument for more serious players who don't want to take their lute on holiday. I've also received some useful technical feedback and hope to experiment further with subsequent models.

**Follow up and next steps**

My main aims in this project have been to show another route through the problem of providing affordable instruments to new learners. The approach has been to show how it is possible to adapt a mass-produced instrument into something that is a meaningful stepping stone into the world of the lute and yet allows development of correct playing technique. In this regard I view it as a success.

Hopefully I have also shown that the conversion process is fairly straightforward, and so perhaps others can also feel inspired to pick up a saw and give it a try.

Since I completed the instrument, as a player I've been forcing myself to exclusively play my guiuhuela exclusively (at the expense of my lute which currently languishes in the corner) for a while so I can try to evaluate the instrument more from the perspective of a player. I think it is absolutely crucial that any instrument design choices we select must be those that make the instrument actually more playable or improves the sound. However at the same time I have tried to stick close enough to a design concept that has some historical precedent. My view is that the guiuhuela should be seen as a new shoot on the lute family tree rather than as a completely new instrument altogether.

Another interesting part of the project has been the fact that all the materials are low cost and widely available. It is much easier to experiment with designs and ideas when you know that there you are only working with low cost materials. If it goes wrong, throw it away and start again.

My next steps are to build some more guiuhuelas and further develop the overall approach. I aim to experiment further with design options for the head to neck joint and with barring. Although the barring pattern I settled on for this first instrument is quite compact, in talking with other makers I have learned that vihuelas and baroque guitars were often barred in a much lighter way. Not having the rounded back of a lute probably means the acoustic profile is naturally more slanted towards the higher frequencies anyway. So a lighter barring might open the instrument up further.

I'd be interested in any thoughts or input from other FoMRHI members. In particular I would appreciate if anyone could point me at previous FoMRHI communications about lute, guitar and vihuela barring and the effect on instrument sound based on different barring approaches.

I welcome any feedback and I'll write up more details and post some colour photos on my website at:

http://www.marmaladefoo.com/docs/projects/inventing-the-guihuela

On an Often Misunderstood Picture of a Medieval Fiddle


The 3-stringed instrument has the mixed visual characteristics of the round lyre and the fiddle, like the Welsh crwth. What is unusual about it is the high flat bridge and the bow located below the bridge. Some researchers of medieval instrument pictures have found the bowing on the 'wrong' side of the bridge to be a hilarious example of how artists of the time made careless mistakes in depicting instruments. I belong to the school of scholars that will only consider the possibility of a mistake in the evidence if there is a reasonably probable mechanism for how the mistake was made, supported by evidence of other related mistakes. My bias is to accept that the evidence is true, and to try to interpret it. Very strong evidence that this was not a mistake is that it is seen on several pictures showing bowing between two bridges (from the string's perspective, the tail fixing on this King David picture is equivalent to a second bridge).

An example was discussed in Comm 2, where A. Rooley, with the help of M. Sprake and N. Hansford, reproduced a 1524 engraving by Lucas van Leyden showing a 3-string fiddle being fingered and bowed on different sides of a bridge. They suggested that if the initial conditions were right, just pressing strings down with the fingers could increase the tension enough to considerably vary the bowed pitch. Their experiments indicated that the pitch range could be a fourth or fifth with gut, and they suggested that it could be considerably greater with metal stringing. The bridge needs to be high enough for the neck not to get in the way of the string stretching by the finger.

A likely tuning for a 3-string fiddle is for the lowest string to be an octave lower than the highest, with the middle-pitched string a fourth or fifth from either. For the same pitch rise on pressing fingers (with equal low tension), the lowest string needs to be stretched a quarter of the amount on the highest string, and the middle string needs to be stretched about half that amount. The King David picture could easily have played in this way, and with care, it is possible that it could have played parallel organum as well as melody plus drones. With the string vibrating between two hard places, the sound would last for some time if the bow is lifted after the stroke. A possible alternative for variety is that the strings were hit by the bow stick. Another variant would be to bow on the other (usual) side of the bridge, where the strings would sound a fourth lower.

In summary, this King David picture depicts a viable but not main-stream way of playing a medieval fiddle.
The lost art of declamation in music performance

Amongst the many things that I’ve learned from John Cousen over the years is that early organs and recorders had a decided ‘chuff’ at the beginning of notes. In modern times makers and players do their best to minimise that ‘chuff’ in pursuit of a more ‘pure’ sound. I think that this tendency comes from the bel canto vocal style (starting in the late baroque) in which vocal tone is displayed in singing vowels, and consonants are reduced to a minimum in performance. Instrumental copying of vocal sound was as prevalent in the Renaissance and baroque as nowadays, but the vocal sound ideal was different then: to imitate the declamation of a good orator. That involved emphasising the consonants for verbal clarity. In the middle of the 18th century, the French were still keeping the old declamatory style, while the Italians had changed. When Quantz compared them, he wrote ‘The French manner of singing [has]... a spoken rather than a singing quality. They require a facility of the tongue, for pronouncing the words, more than dexterity of the throat’. Most words start with consonants, so the ‘chuffs’, and variety amongst them, were necessary for expression then, a component of what was then called ‘good taste’ (and is now called ‘musicality’).

The ‘chuff’ is an example of what acousticians call a starting transient. It usually occurs when one first energises a resonator (like a tube of air or a string). A wide range of frequencies are generated before the competition between them is settled as the proper resonant behaviour dominates. The transient can be greatly reduced by carefully controlling the conditions of the energisation, either by the maker (as with the organ) or by the player. On bowed instruments, it can be practically eliminated by controlling the acceleration of the bow and the bow pressure on the string. On wind instruments, that would involve the air flow acceleration and the air pressure. Modern players learn to start notes with a minimum of starting transient because that appears to be what is expected. It is an indication that one has learned how to control the instrument.

Evidence that the starting transient was not suppressed by early viol players (as it is by modern viol players) was published in 1978 by J. Hsu (Early Music 6/4, 526). He pointed out that Mersenne (1636) wrote that viols ‘have a percussive and resonant sound like the spinet’, and that Le Blanc (1740) wrote that ‘viol bow strokes are simple, with the bow striking the viol string as the jacks pluck the harpsichord strings, and not complex like those of the Italians, where the bow, by the use of smooth and well-connected up- and down-bows whose changes are imperceptible, produce endless chains of notes ...’. The basic viol bow stroke was called ‘coup de poignet’ meaning ‘blow of the wrist’. The English were no different, as Purcell’s description of how to sound the different instruments in the celebration of Queen Mary’s birthday included ‘strike the viol’. Hsu was not as revolutionary as his paper was, and he speculated, without any supporting evidence, that English viol consort music was played in a ‘more lyrical way’. If viol players took notice of Hsu’s paper at all, they apparently interpreted it as a subtle variation on how they had already been bowing.

When I was still playing viol, I had the privilege of playing tenor in consorts with John Cousen playing bass. The ‘chuffs’ at the beginning of his notes gave a vitality and rhythmic clarity to his playing that is rarely heard in viol playing today. There is nothing subtle about the difference.

Le Blanc’s description of Italian bowing (‘endless chains of notes’ with imperceptible changes in bow strokes) was the probable origin of the modern fashion in phrasing, which strives to sustain a smooth shape of dynamics through a line of text or what can be sung in one breath. That it is quite modern is shown in a 1886 quote by C. Engel: ‘A phrase extends over about two bars, and usually contains two or more motives, but sometimes only one’. A motive is equivalent to what was called a ‘point’ in the baroque. The early phrase was verbal, and it usually contained one or two points. One reason why modern performers avoid strong starting transients and unwritten decoration on notes is that it interrupts the smoothness of modern phrasing.
What types of fiddles were the Charles IX Andrea Amati instruments when made?

The surviving Andrea Amati instruments decorated with the arms of Charles IX of France (who died in 1574) have been discussed from the point of view of the types of modern instruments they currently most resemble. The concern here is to consider what functions they may have originally performed in the fiddle bands at the time they were made.

There was an Italian fiddle band as well as a French fiddle band at the Court of Charles IX. From Jambe de Fer\(^1\), we would expect that the tunings in the French fiddle band were g d” a’ e” for the treble (dessus), c g d’ a’ for the alto and tenor sizes (hautcontre and taille) and BB” F c g for the bass (basse). There is some uncertainty about what pitch level these stated pitches related to. It is possible that there was no standard pitch that the level adhered to, and the stated pitches just governed where the fingers would be placed when reading music. Yet, in a royal music establishment, we might expect occasions when members of the fiddle band might be asked to contribute to a vocal performance, so a consistency with the normal choir pitch level would have been useful. That consistency could have been provided by transposition, with the easy ones of a fourth or a fifth being the most likely, as was common with viols.

Half a century later, Praetorius wrote that ‘choir pitch [Chorthon] among our ancestors was about a tone lower than it is today’. The current choir pitch he was referring to was less than half of a semitone below modern a’=440 Hz (the same as his Cammerthon), and the ‘ancestors’ were in all of Europe that he knew about. The evidence from France or Italy is consistent with this statement. No changes in French or Italian pitch standards were reported before the 18\(^{th}\) century. Mersenne’s choir pitch (ton de chapelle) was about 2½ semitones below modern, so we have reason to expect this to be the pitch level. Measurements of French fiddles in paintings of this period are consistent with Jambe de Fer’s pitches, Mersenne’s pitch level and the ranges of gut strings derived from Praetorius’s data. This suggests that transposition by a fourth or fifth was not necessary.

Fiddles shown in Italian paintings of the period had shorter vibrating string lengths than those in French paintings. There is no doubt that sets of Renaissance fiddles were first developed in Italy, and were soon adopted in France\(^2\). It seems that the French subsequently increased their sizes, the bass by a greater factor than the others. This is apparently why the French called them ‘violons’, where the ‘on’ ending implied largeness (as it did in Italy). The tunings in the Italian fiddle band given by Zacconi\(^3\) were (c’) g’ d” a” for the treble (soprano), (f) c’ g’ d” for the alto and tenor (contralto and tenore), and Bb’f c’ g’ for the bass (basso), where the pitches here are an octave higher than what Zacconi actually wrote (to fit the sizes, implying that the players normally played an octave higher than the music they read from), and the pitches in parenthesis are for 4\(^{th}\) strings often added towards the end of the century. The expected pitch level is about the same as in France, called corista in Italy, the usual choir pitch, also used by most stringed instruments.

The longest vibrating string length (that results in the maximum tolerable rate of string breakage) for a given pitch for gut strings deduced from Praetorius gives the frequency in Hertz multiplied by the vibrating string length in metres to be no more than 210. The shortest string length of a bowed instrument (that results in the maximum tolerable inharmonicity in the sound) for a given pitch is found from assuming that the lowest string of the viola bastarda (with string length of 72.9 cm and

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\(^1\) P. Jambe de Fer, *Eptome musical* (Lyons, 1556).

\(^2\) see the woodcut of famous personages reproduced as Fig 1 in D. D. Boyden’s *The history of violin playing* (OUP 1965).

\(^3\) L. Zacconi, *Prattica di musica* (Venice, 1592); for the analysis countering Boyden’s reading, see Comm. 1738.
frequency of 53.7 Hz) was at that limit. It is extrapolated to other values by the frequency (in Hz) multiplied by the string length (in metres) to the 5/4th power being no less than 35.5. It is expected that the lowest string of the viola bastarda was a catlin (of rope construction), and if the lowest string was just a high-twist plain gut string, the limiting frequency would be a fourth higher.

Using the above criteria, assuming a high-twist lowest string (usual for that time), the likely string length ranges of the French fiddles were 37-37 cm for the treble, 53-56 cm for the middle sizes and 101-126 cm for the bass. The likely string lengths of the Italian fiddles were 21-28 cm for the 3-string treble, 29-42 cm for the 3-string middle sizes and 56-62 cm for the 4-string bass.

The surviving Charles IX Amati instruments have been updated. That includes replacing the neck, so the original string length information is lost. What we know most about their original sizes is their body lengths. In all of the 16th century Italian and French fiddles in pictures I've seen, the string lengths were greater than the body lengths. Compared to the baroque, the neck lengths were usually longer and the bridge position was usually lower on the soundboard. According to Witten, the body length of Amati's 'small violins' is 34.2 cm, and of the 'large violins' is 35.4 cm. According to the above, they could then have originally been made to be French trebles or Italian altos. The only uncut Amati Charles IX 'viola' has a body length of 47 cm. It would have then originally been a French tenor or an Italian bass.

There are no uncut 'cellos' in the Amati set, but Witten estimated the original body length to be 79.5 cm. If they were originally made for the French royal band, they could have originally been examples of the basse de violon that was of the later size that used a roped gut 4th. That instrument then had a string-length range of 78 to 126 cm. The roped-gut 4th had limited availability at high expense from Barcelona before the 3rd quarter of the 16th century, and there is evidence that French kings were willing to buy the most expensive strings. The only way that this could have been made for the Italian fiddle band would have been if the preference of the French for large basses led the band to use an octave bass tuned like the basse de violon. It is possible that for that band, Amati invented the 5-string large basso that Praetorius illustrated (perhaps with a longer neck) by using the roped-gut lowest string that the king could afford. There is evidence on one of the surviving 'cellos' that it had 5 strings some time in its history.

The violino was most probably an Italian adoption of the French treble. It appeared as a soloistic fiddle around ¾ through the 16th century, competing with (and quickly replacing) the rebec for that function. With a roped-gut 4th, it could either have lower pitches, or the neck could be shortened for more playing agility. In the 17th century, it joined the standard fiddle band (viole da braccio), replacing the original treble (which survived as the violino piccolo) when the lower members also used roped gut 4ths and tuned lower.

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5 L. Wright (private communication) noticed that in the financial records of the French court, 4 viols were bought for Henry II in 1543 for 180 Livre tournoise at the same time that a set of strings for one viol was bought for 9 Livre tournoise. A set of 5 gut strings costing 1/5 the price of an average viol fit for a king is indeed expensive.
Around 1771, l’Abbe Carpentier specified the types of stringing on the 8-course ‘Cystre’ or ‘Guitthare Allemande’. The tuning he gave was D E A d e a c# e’. A few of the lower courses were usually on an extended neck, so it can be called an archcittern. I was recently asked about stringing a 12-course instrument of this type. I had no information on its tuning and guessed, following late Renaissance lute practice, that the added 4 courses diatonically filled in the gaps, adding an F#, G#, B and c#. I was wrong. A member of cittern.ning.com sent me the following picture showing that the late baroque way was to add range in the bass, adding GG# AA BB and C#.