

FoMRHI Quarterly

BULLETIN 154

Christopher Goodwin 2

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The next issue, Quarterly 154, will appear in October. Please send in Comms and announcements to the address below, to arrive by 1st October

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This is the second, Summer issue of the 2021 subscription year (nos. 153-156). If you have paid this year's subscription already, you will get the paper copy. If you have not, you will get this issue 'on the benefit of the doubt' as a PDF only, but you will need to subscribe by then to get the printed issue too, or to receive anything further from us.

Thank you as ever to the contributors, for another varied issue, with something to say about viols, bandoras, recorders, flutes, lutes, pianos and even mediaeval glue.

Note that the last of these I translated a paragraph at a time using Googletranslate from the original Danish, a language I do not even speak. But the author has checked it over. This new technology does seem to open up the prospect of being able to accept papers in more or less any language.

Another feature of modern times, however, is less encouraging. Alas, we live in an age of building walls, not bridges. Donald Trump's administration sharply raised USA postage rates, allegedly to discourage mail order imports from China; Britain's Royal Mail has started to insist that all parcels sent outside the country have customs declarations, and most seriously, the European Union has cancelled the 21 Euro minimum exemption for VAT ((IVA) on imported items. This is going to cause considerable inconvenience to European citizens who want to buy low value items, such as magazines, from outside the bloc—not because the VAT is likely to be very much, but because of the 'administrative charges' that will be probably be added on by your national postal service for the privilege of receiving your item.

We have a modest number of members in the EU. I *think* you won't be charged VAT on our Quarterlies, because it looks like an ordinary A5 letter in a manila envelope. ***Please let me know immediately if your national post office asks you to pay VAT / IVA on your FoMRHI Quarterly, and we will investigate measures to avoid this in future.***

Welcome to new members

We welcome just one new member this quarter: Laurence Libin, who has contributed the fascinating essay on a square piano.

Viol fingerboards, a response to Comm 2143

Thomas Munck's Comm 2143 on early 17th century viols makes very interesting claims about the shape of the fingerboard. Yet he doesn't mention Christopher Simpson's two explicit diagrams of the relative shapes of the curves of bridge, fingerboard, and nut which seem to contradict his claims. First the 1659 version which just deals with the fingerboard:

A String of thirty Arches from the Bridge (duly placed) to the Nutt. The Sound, quick, and sprightly, like a *Violin*; and *Viols* of that Shape (the Bellies being digged out of the Planck) do commonly render such a Sound. It must be accommodated with six Strings; and seven Frets, like those of a *Lute*, but something thicker. The Strings, a little bigger than those of a *Lyra-Viol*, which must be laid at the like nearness to the Finger-board, for ease and convenience of Stopping. The Bridge, as round as that of a *Consort-Basse*, that so each several String may be hit with a bolder touch of the Bow. The Plate or Finger-board, exactly smooth, and even. Its Length, full two parts of three from the Nutt to the Bridge. It must also be of a proportionate roundness to the Bridge, so that each String may lie at an equal nearness to it.

As for Example.



Let Viol-makers take notice hereof.

If the roundness of the Bridge be as the Arch *A. B.* then I would have the low end of the Finger-board, to be as *C. D.* and the top of it as *E. F.*

The Bow.

Then the 1665 version where Simpson adds in the bridge curve to make his point even clearer.

The Bridge, as round as that of a *Confort Bass*; that so each several String may be hit with a bolder touch of the Bow.

The Plate, or Finger-board, exactly smooth and even. Its length, full two parts of three, from the Nut to the Bridge. It must also be of a proportionate roundness to the Bridge; so, that each String may lye at an equal nearness to it. As for example: If the Roundness of the Bridge, be as the Arch *A. B.* then I would have the low end of the Finger-board to be as *C. D.* and the top of it, as *E. F.*

distinēte fidentique plectro absque ullā anxietate vibrari queant.

*Canon sit levis & æquabilis. Ejus longitudo duas tertias partes spatii occupet, quod inter ponticulum superioremq; Chordotomum interjacet. Ponticulum declivi utrimq; flexu æmuletur; ut chordæ singulæ manubrio, quemadmodum dictum est, æqualiter superemineant. Si Ponticuli curvatura fuerit ut Arcus *A. B.* Canonis ima pars sit ut *C. D.* summa, ut *E. F.**

Viol-makers may take notice hereof.



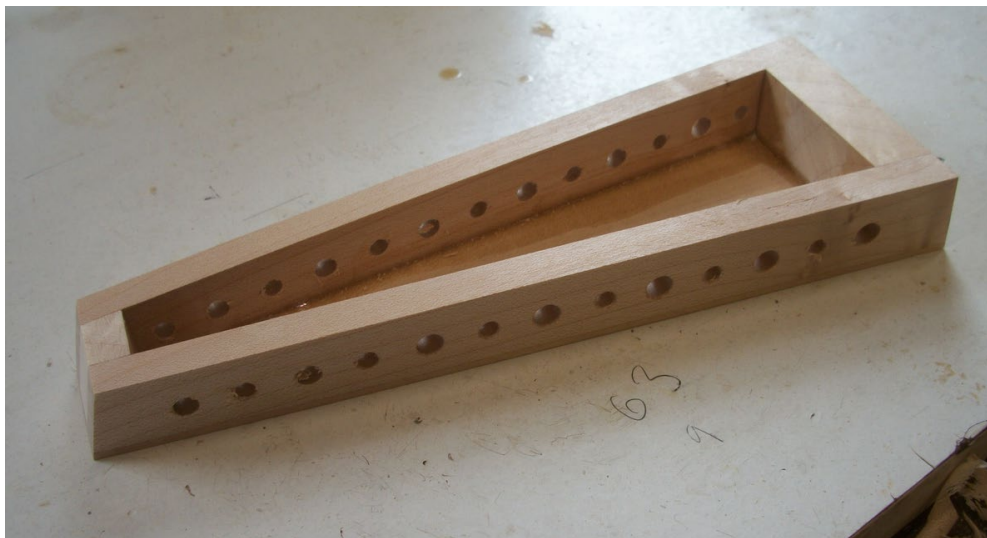
Hæc Chelyum fabricis proportio commendatur.

Thomas Munck's thesis seems to rest entirely on a conjectured shape of the top curve of the bridge and yet by his own account those which have survived can neither be linked to a specific instrument nor can be assumed to be unaltered. So I'm wondering exactly what was the basis for his observation; was it specific measurements of the 1619 Jaye bass fingerboard which he cites as having a demonstrably unaltered fingerboard shape? If so, I think we need chapter and verse.

His further point about the need for a slight concave curve through the length of the fingerboard for optimal low action is coincidentally confirmed by Peter Forrester's careful discussion of bandora fingerboards in Comm 2138. This is also routine for setting up modern guitar and violin family instruments and does not rest on any curious reverse conical shape of the string band. It is usually explained by the idea of allowing for the curvature of the string vibration amplitude. However more careful analysis of these matters has been done by Adrian Geisow, who I hope will submit his workings as a comm soon.

A Parametric Design Tool for Making a Family of Lute Pegboxes

Lute pegboxes come in a variety of sizes and angles to reflect the lutes they are attached to. There is some variation in style - and excluding extended neck lutes such as theorbos – a majority are a tapered box design, such as this 7 course example below which is quite typical:



Each pegbox is unique to that model of lute – the dimensions are more or less pre-determined by other dimensions and features of the instrument:

- Length of the pegbox – varies, determined by the number of pegs
- Width of pegbox cheeks – a fixed width, itself tapering from about 9mm to about 8mm
- Width at the top of the pegbox – a fixed width to allow adequate space to wind and adjust a string
- Width of pegbox – varies, determined by the specific pegbox slot cut into the neck

As a result of these constraints, each pegbox is unique and not simply scaled versions of each other. Traditionally, each pegbox is made as a one-off to fit each lute precisely, designed by hand to accommodate the above constraints, or to copy the dimensions of a specific historic model. You can do this on paper using a pencil and ruler to draw out the design and to empirically determine the pegbox taper angle which sets the overall geometry.

As a lute maker that also takes in a fair amount of repair and refurbishing work, I'm often making new pegboxes as part of a refurbishment. For example, many lutes still in circulation from the earlier days of the modern lute revival have a very chunky oversized open pegbox

design and I'm often replacing these with new ones that are lighter, more elegant and historically appropriate.

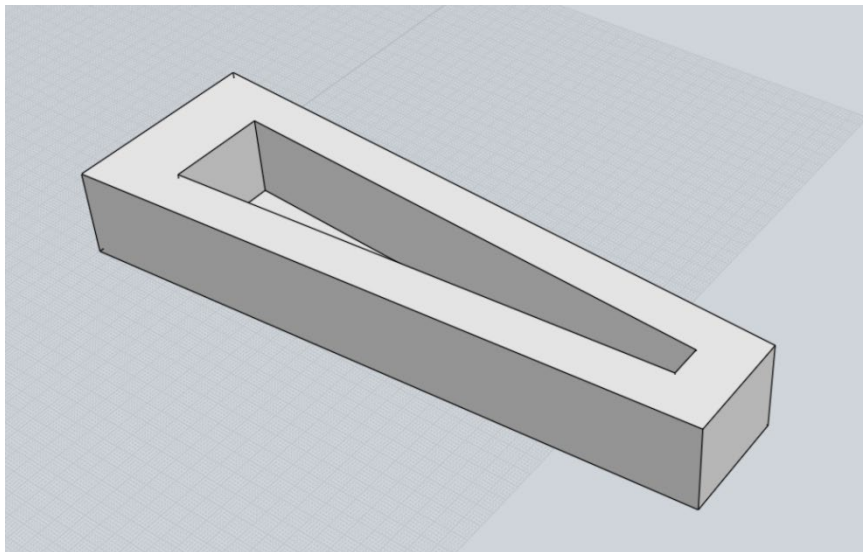
To assist this regular design work, I've been investigating whether it might be possible to use some CAD¹ tools to assist with the design of pegboxes. In particular, can we precisely determine the angle and dimensions of the pegbox blocks which defines the pegbox design?

Traditional CAD

If we wanted to build a standard CAD model of a pegbox blank, it would start from something like the following model. It is squarer than the final pegbox, which is achieved by planning the height and pegbox sides, as well as cutting the angle on the end where it meets the pegbox slot at around 80-85 degrees.

Most CAD processes involve the design of a specific element, based on dimensions that are known in advance. So once we know the final dimensions of your pegbox, we can build a CAD model (2D or 3D) to capture these.

But this design process it is quite laborious to build such a model since again it has to be designed as a one-off for the lute in front of you – you have to know all the dimensions in advance.



So this individual approach doesn't really save much time or energy compared to designing by hand. And when you come to the next pegbox, the work you did before cannot be reused.

What is really needed is some kind of pegbox designing system, where you can enter the primary design constraints (inner length of pegbox, outer width to match the neck slot, inner width at the top of the pegbox), and then the other dimensions are automatically

¹ Computer Aided Design

calculated. This would be a useful flexible design tool for a whole family of individual pegboxes.

Parametric CAD

Parametric CAD is based around the principle that some elements of the design are not fixed but may vary within a set of overall constraints and parameters. In this way it is closer to something like a spreadsheet, in which we can enter a formula in a cell that is calculated based on other numbers in the worksheet, which in turn may themselves have been calculated from other numbers. For example we might calculate a parts order as follows:

B	C	D	E	F	G	H
		quantity	unit price	cost		
	nuts	10	£0.15	£1.50		
	bolts	10	£0.10	£1.00		
	screws	55	£0.03	£1.65		
			Total	=SUM(F3:F5)		
				SUM(number1, [number2], ...)		

Such a worksheet is reusable for the next order, where the number of items required may be different, and also the unit price may vary over time. So a spreadsheet software package lets us design a reusable order calculation system for a wide variety of actual orders. We can also use a spreadsheet to “Goal seek” whereby we set the final price, then calculate how many items it would permit us to purchase – going backwards from an imposed constraint on the total cost

Parametric CAD is an extension of CAD that lets us take a similar approach for design. It is a feature of a number of high end industrial CAD tools such as *AutoDesk*². However such industrial grade tools are priced accordingly³ and not so easily justified for craft-based instrument designers and makers.

*SolveSpace*⁴ is a parametric 2D/3D CAD software application that works in a similar way for CAD designs. It is free and open source⁵ which makes it more accessible to designers who wouldn’t normally have access to higher end industrial design tools.

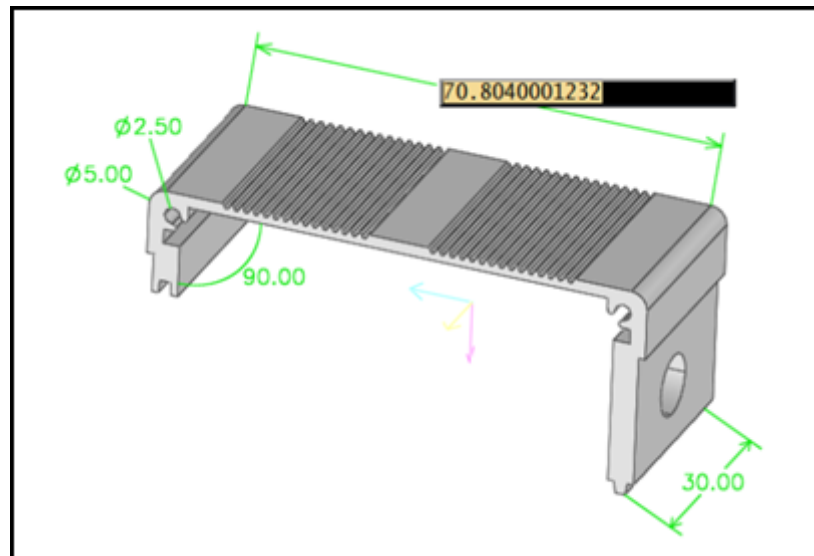
² <https://www.autodesk.co.uk>

³ At the time of writing, priced at £1,986 /year

⁴ <https://solvespace.com>

⁵ Gnu Public License version 3

In the example widget design screenshot, taken from the SolveSpace website, we can see a widget model in which the user can vary some parameters of the design – such as its length without that change affecting other parameters. So it is not simply scaling up the design.

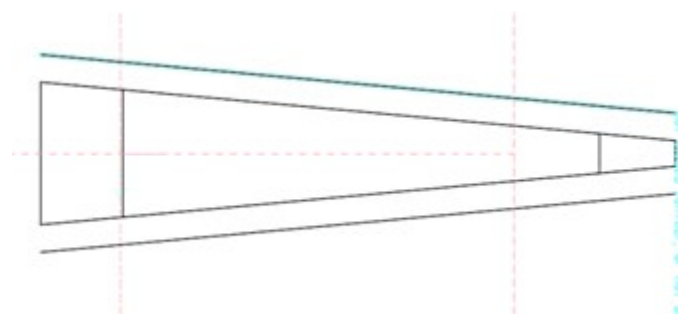


In building a parametric CAD model we can define a number of constraints between key dimensions, including:

- Two lengths or angles being equal
- A line or a point being a mirror reflection of another about some axis
- One line being at a fixed angle or length from another
- Fixed or varying hole or corner diameters

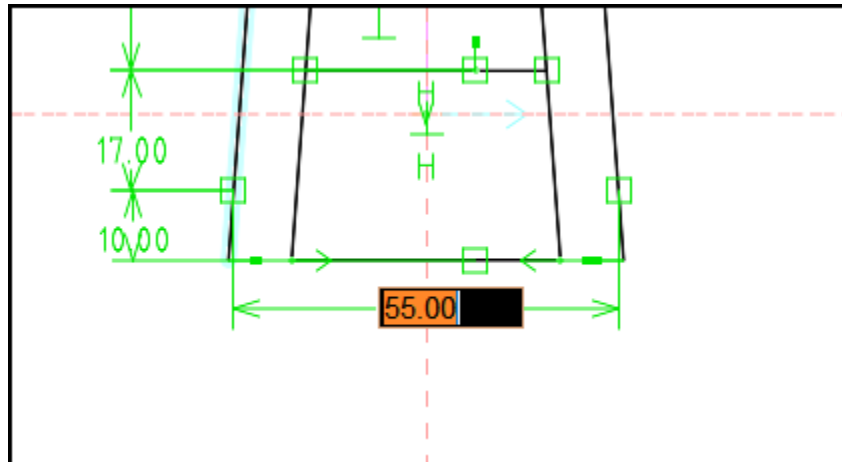
These constraints are the equivalent of the formulae in our spreadsheet example. The design process is somewhat different to traditional CAD, in that we have to conceptualise a design as a set of dependent parameters, rather than as absolute dimensions. The software uses a mathematical constraint solver to determine other dimensions, keeping the design within the overall constraints.

We can therefore use a parametric CAD approach within SolveSpace to build a parametric model of lute pegboxes, based on the following design elements of two end blocks and two pegbox sides.



In the following images we can see the constraints set on the model. For example, the total width of the Pegbox 1 at the lower block is 63mm and the inner height is 157mm. These constraints we shall vary per pegbox, whereas other constraints are fixed, such as the pegbox cheeks being set to 9mm, and the inner width at the top of the pegbox being 13mm.

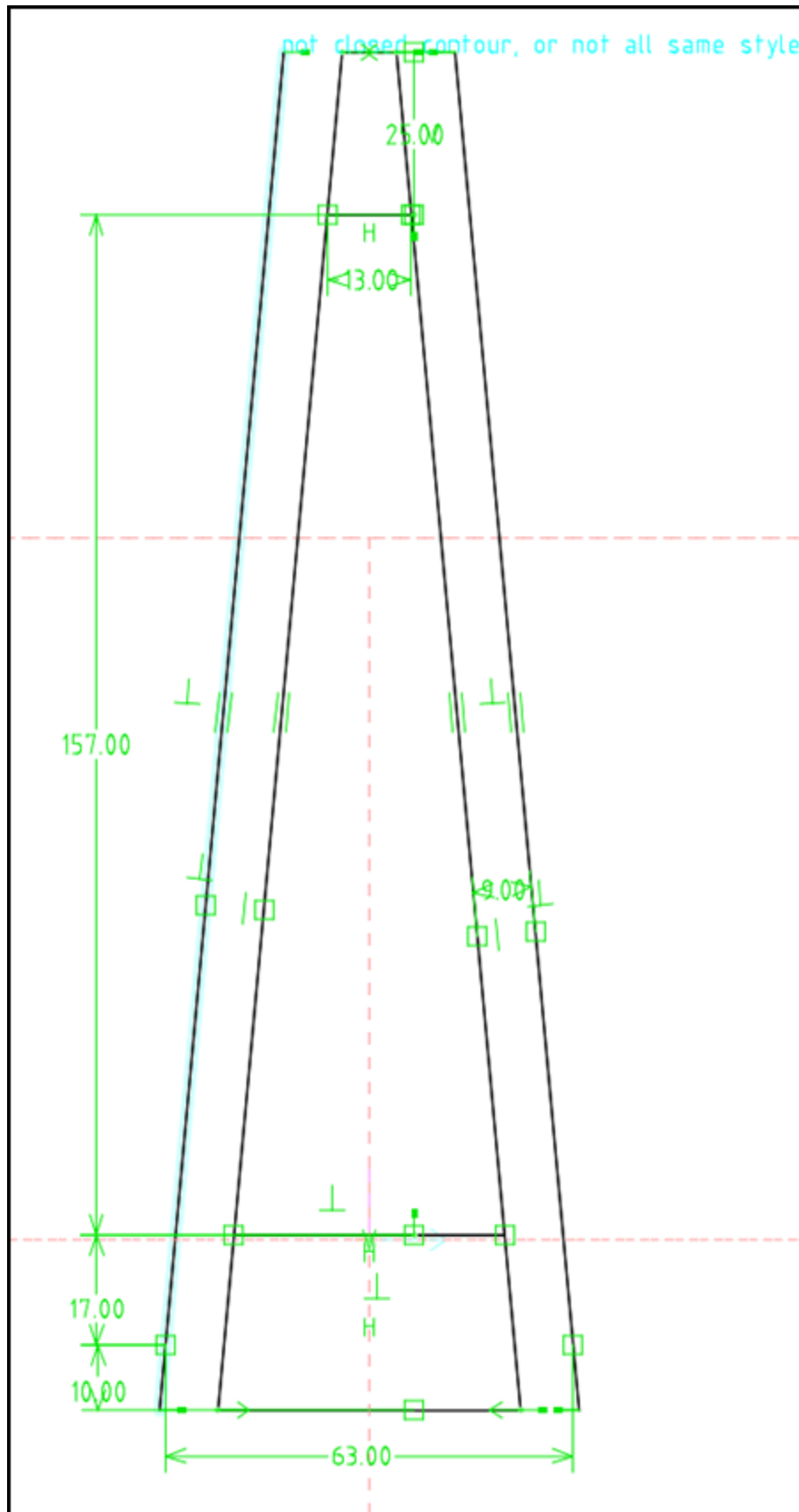
As a result the angle and dimensions of the blocks is determined by the constraint solver.



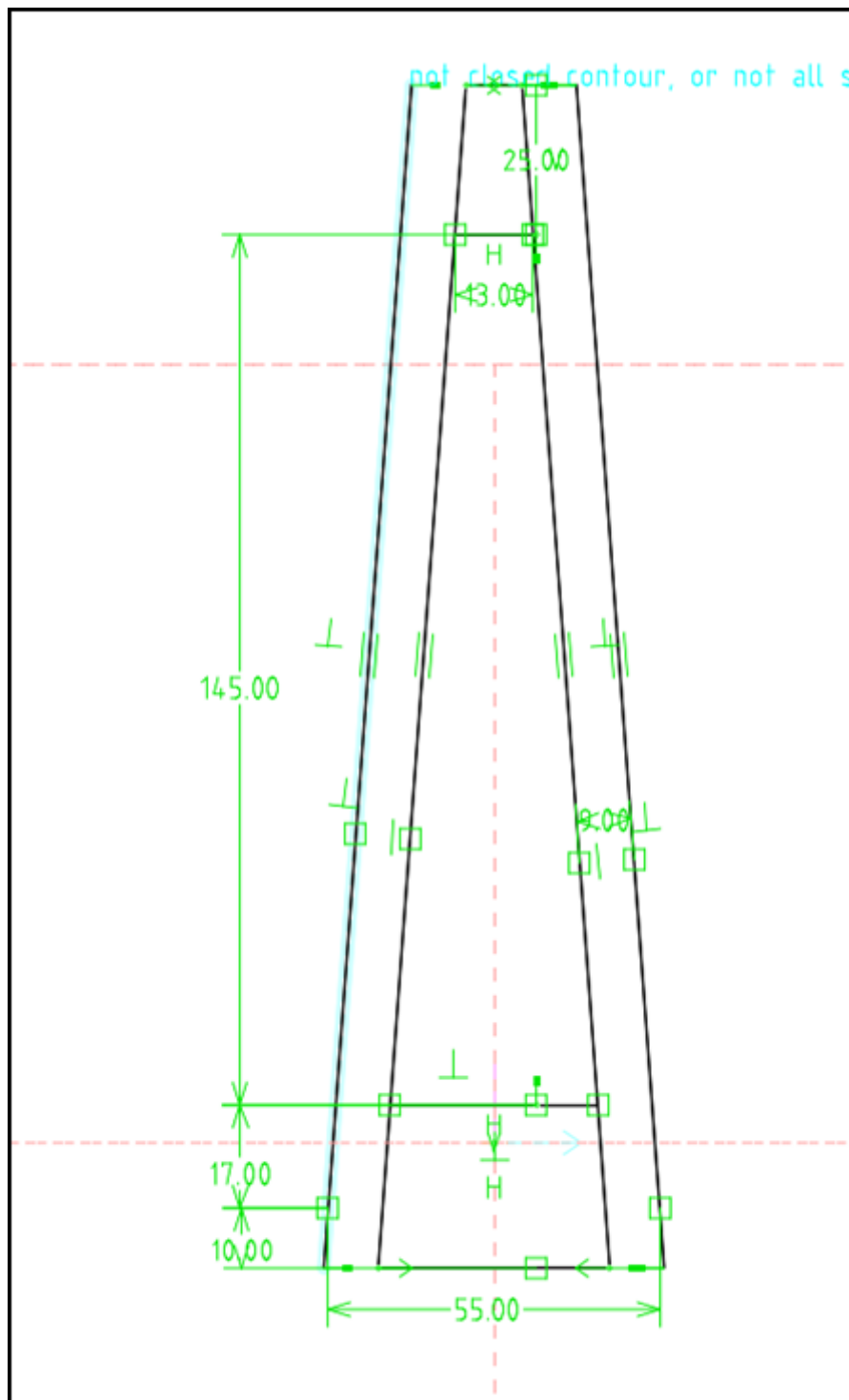
In Pegbox 2 we use the same model to derive a design for a pegbox for a 55mm slot and a 145mm inner length. Other dimensions are unaffected such as the length of the legbox blocks or the width of the pegbox cheeks.

In conclusion, I have found this to be a rewarding process to assist in design – it has simplified the steps needed to design any future lute pegbox of this style I may need to design – I can simply enter the parameters, the model adjusts itself and I can go straight to printing out the resultant design.

Pegbox 1: 63mm wide, inner length 157



Pegbox 2: 55mm wide, inner length 145mm



Query about a lime and cheese-based mediaeval glue recipe

Last year I started to attempt to make a renaissance cornett and as usual was hoping to experiment with historically-informed methods of construction. I made a plan of sorts and prepared my wood but my progress has been halted as my experiments with making a waterproof cheese-based casein glue have not been as successful as I would have liked.

I tried to follow the method described by Theophilus in his 12th century craft treatise 'On Divers Arts' (Translated by John G Hawthorn and C S Smith, University of Chicago Press, 1 Dec. 1963) I used full fat cottage cheese (apparently low fat would have been better) and I used Slaked lime (Calcium Hydroxide readily available for use in Aquariums) as I read that quicklime (Calcium Oxide) could be hazardous to use.

After thoroughly washing my cheese in hot water then using cold water to harden the cheese lumps following Theophilus method (Should I have used colder water?) I ended up with a small quantity of small white lumps of washed cheese which I slowly dried. I tried out some of the undried paste, mixing it with some. Slaked lime and water, on some scrap wood and was pleased to find it seemed to have worked well as an adhesive. I then decided to see how waterproof it was by immersing it in water. It held well at first but unfortunately after five or ten minutes the glue softened and the joint came apart.

Later I took some of the dried, washed cheese and rehydrated it and added a stronger mixture of slaked lime and water. As before, the resulting creamy paste set hard and glued my scrap wood well but when I put a lump of the dried glue in water it quickly softened. I suspect that this glue would not hold the two halves of a cornett together for long when subjected to the moisture from playing?

Would I get a more waterproof glue if I used quicklime? Any advice would be most welcome.

Best wishes,

Andrew Atkinson

Errata in comm 2138 The Bandora Today. Q 151, October 2020

I suspect that all those interested will have noticed or ignored my boob on page 26 where I should have glued the initial parchment layer - which strengthens the wood ply layer - to the soundboard's underside. The final disk of parchment is smaller and carries the detail. The correct arrangement can be seen indistinctly on page 27, so a detail from a cittern will be clearer. A detail from another cittern where the initial layer proved too small may be useful.



A Fragment of a Fake Franciolini lute

In recent months there was an auction of some instruments and workshop contents previously owned by Ephraim Segerman, who many readers will know as one of the founding members of FoMRHI¹ and who did much to further our collective knowledge of early stringed instruments, and to reinvigorate interest in making and playing on gut strings.

Some of the musical items were offered within a sale by Adam Partridge², including lutes, citterns, banjos and other musical miscellanea. Many of the items attracted a fair amount of bidding and exceeded their initial listing estimate.



As a bit of speculative punt, I bid and won one of the auction lots of unusual looking oddments and half made instruments that looked like they could perhaps be rescued back to playing condition with some TLC.

Once back home I started sifting through five very dusty boxes, allocating a fair few for the wood burning stove among a couple of potential “projects” for a rainy day. Perhaps I was going to have to accept it had been a bit of a goose chase after all!

¹ Fellowship of Makers and Researchers of Historical Instruments - <https://www.fomrhi.org/>

² <https://live.adampartridge.co.uk/m/view-auctions/catalog/id/226>



However in with the dusty banjo necks was something that caught my eye as a lute maker. It looked like a part of an extended neck lute – chopped off above the lower nut. But it was rather strange in design and execution – if it was from a lute, the decoration was not very nicely done, and the design wouldn't ever have withstood being strung up with a full set of strings. Just another item for the wood pile then?



It was obviously quite old but why had been retained by an eminent early music specialist? Looking at it, there were so many things wrong with this lute neck and pegbox that stood out immediately:

- pine construction with a mastic ebonisation
- ill fitting pegs with little sign of wear or use
- a weak open backed pegbox, with a strange pointed gothic arch at the top
- strange mother of pearl inlay pressed into the mastic of the neck
- an upper nut that leans out precariously
- some sort of crude “ivory” inlay around the pegbox and up the neck

My “fake lute” and “Franciolini?” alarm bells were ringing quite deafeningly by this stage, and Lynda Sayce who took a look at the photos confirmed the fragment is indeed very typical of his

work. Lynda Sayce's article³ summarises the sorry tale of how these counterfeit "lutes" were sold to unsuspecting 19th C and early 20th C collectors. Many have even ended up in museums whose curators seem reluctant or embarrassed to accept their item is not genuine. Chris Goodwin has spotted two more in a Venetian musical instrument museum⁴.



These lutes were being churned out by Franciolini's workshop and offered for sale as if they were genuine 17th C instruments. Franciolini eventually was convicted of fraud when one of his instruments was being sold on to a German buyer who did some due diligence and spotted they were a con.



So for now, it hangs as a 19th C curiosity in a quiet corner of my workshop, yet I'm still left with a number of open questions that may never have an answer: Where is the rest of the lute? Did the body and neck get repurposed into a separate lute by Segerman? Did anyone buy a lute in the same sale that has any unusual features such as a mandolin style end clasp? Can the top and bottom ever be re-united?

³ Lute News (No. 91, October 2009) "How to spot a fake lute, or Signor Franciolini's shop of horrors", by Lynda Sayce

⁴ Lute News (No. 124, December 2017) "Franciolini strikes again? Two 'archlutes' in a Venetian musical instrument collection", by Chris Goodwin

An Anonymous British Square Piano

In July 2020 I acquired from the harpsichord builder Willard Martin, of Bethlehem, Pennsylvania, an anonymous, 5-1/2-octave square piano dating from about 1796 to 1800, perhaps modeled after products of Longman & Broderip or George Astor & Company.



Martin had been given the piano around 1995 by a young man who had inherited it with other property of his deceased parents, residents of either Long Branch or Long Beach Island, New Jersey. The son had no interest in this instrument and knew nothing of its history. His and his parents' names have been forgotten.

Fortunately, the unrestored, unplayable piano preserves many original features. The following description, limited by equipment available during the Covid-19 pandemic, aims to provide diverse benchmarks which, through comparison with other, named examples, may point to the piano's unknown makers. Dimensions, approximate within normal woodworking tolerances, are given in English inches, with conversion to [millimeters] rounded to avoid the appearance of precision. "Left," "right," "front," and "back" refer to a player's viewpoint. Wood identifications are naked-eye impressions, Eastern white pine (*Pinus strobus*) being most tentative although some contemporary British instrument makers used this native North American wood, which had been imported in large quantity before the American Revolution.

The piano's nameboard originally held an inset ellipsoidal nameplate, typically of white milk glass or enamel, surrounded by a narrow metal frame witnessed by brad holes above and below the 4-1/8-inch-wide [105 mm] recess.



Such conspicuous framed nameplates, which by tradition claimed for Enlightenment instrument makers the elevated status of mechanics (higher than that of cabinetmakers), were common after the mid-1780s but became unfashionable in the early 1800s. Blobs of glue remain in and around the recess, which is centered in a conventional painted floral ornament depicting a morning glory, thornless cabbage roses and rose hips, sweet peas, probably a double anemone, a nondescript flower that might be an iris or lily with anomalous leaves, and various buds and stems.



A noteworthy characteristic, the nearly smooth oval outline of the blue morning glory has its interior delineated by light and dark streaks that do not radiate from the center.



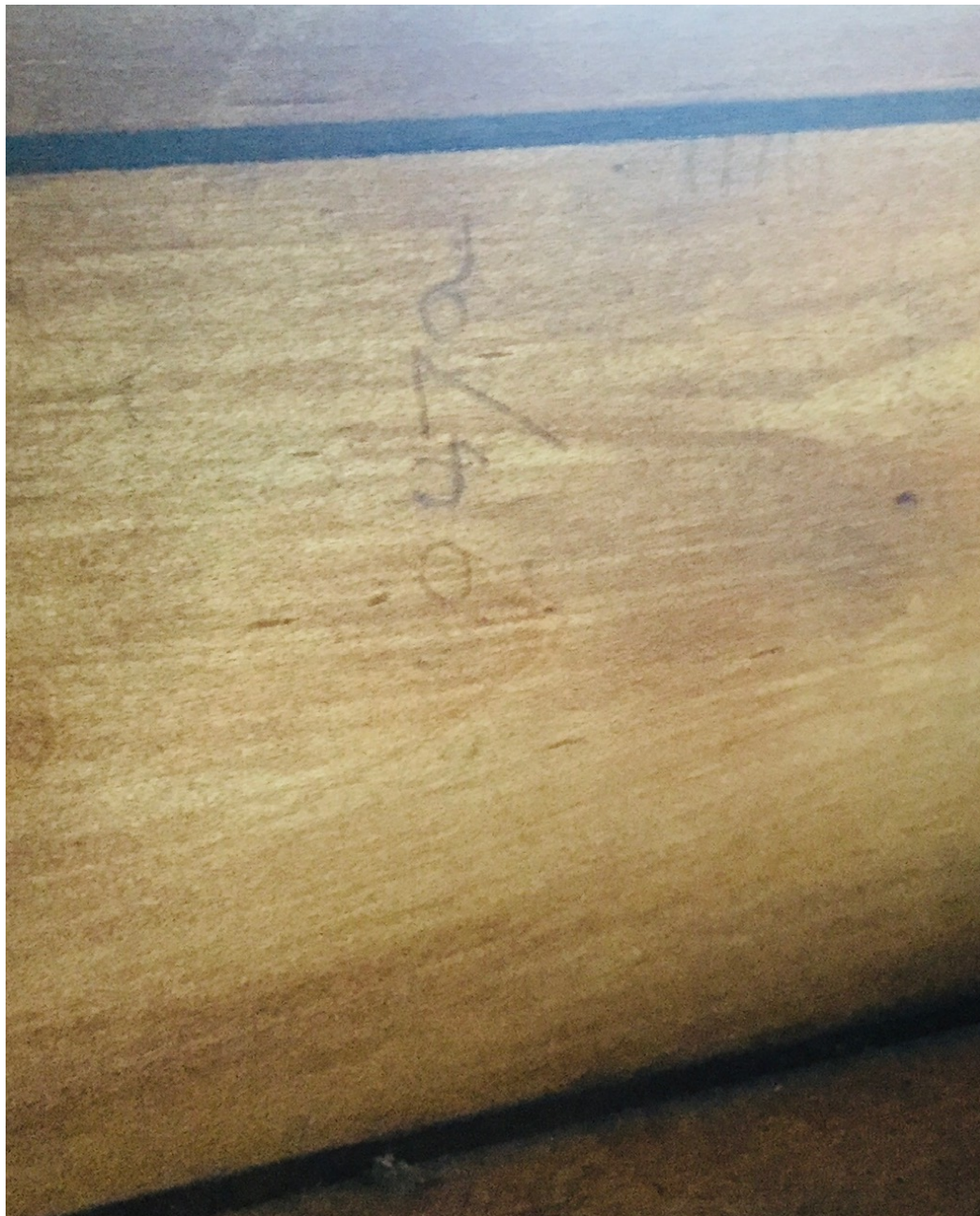
This facile decoration, surely less costly than the elegant Adamesque inlays on nameboards by Christopher Ganer, for example, should not be interpreted as floriography, which depends on unambiguous representations to convey specific meanings. Rather, it expresses the feminine nature of these domestic instruments, amply recorded in late Georgian literature and iconography, and evokes the senses of sight and smell, joining those of hearing and touch implicit in pianos, which after all are not merely inert pieces of furniture.

This painting's swift freehand style and limited, probably faded palette strikingly resemble nameboard decorations on a 1796 Longman & Broderip square piano, serial number 306 (musicroomworkshop.co.uk/lb306.html) and on a 1799 Longman Clementi & Co. square, number 1194 (musicroomworkshop.co.uk/lb1194.html), both of which also have framed ellipsoidal nameplates. Similar painting on some other Longman, Astor, William Rolfe, Geib (London), and others' contemporary nameboards suggests they may at times have employed the same decorators, perhaps female outworkers, who drew upon a limited, commonplace botanical vocabulary—unlike the richly varied, often exotic or symbolic soundboard painting of earlier Flemish and French harpsichords.

No serial number appears on this piano, so it probably was not produced by a large-scale manufacturer. Nearly illegible white (chalk?) letters on the top surface of the keybed might be read as [--] *Sehlert* or *Gehbert* and below this perhaps *Connor*, likely journeymen's names. In pencil nearby on the keybed, a different hand wrote *2 ft Wide & 32 Long*; these measurements do not refer to any dimensions of the piano.



Near the front of the surface of the open compartment to the left of the keyboard, a modern hand has faintly written *101,047a*. The same inscription, smaller and neater but much faded and probably older, runs vertically on the compartment's interior right side wall.



This could be a museum's accession number; the Smithsonian Institution and former Essex Museum, among other repositories in the United States, have used such sequential accession numbers, although normally these occur on outside surfaces, more readily visible. No companion *101,047b* has been found on the piano's matching apron stand.

Four slender, square-tapered, solid mahogany legs, 24-1/4 inches [616] tall, form the corners of the veneered softwood stand, or French frame. The legs terminate in tapered square-cup brass sockets holding brass swivel casters with slightly barrel-shaped wheels of 3/4-inch [19] maximum diameter and slightly narrower width. Even when these casters were new and smoothly turning, it would have been unsafe to roll the piano on them without lifting most of its weight; off its stand and with action and lid removed, the case weighs about 115 pounds [52 kg].

Woodworms had eaten into the billets from which the back legs were cut; both legs are oriented so the worm holes and exposed tunnels mostly face the rear or inward sides. In first-class work these flaws, though inconspicuous, would have caused the legs to be rejected. Small rectangular plugs on the inside corners of all four legs centered about 8-1/2 inches [216] below the top of the frame fill notches intended for front-to-back stretchers; these could have held a shelf with front recessed to accommodate a seated player's shins, as on the stand of a ca. 1805-10 Astor & Company square (Museum of Fine Arts [MFA], Boston, 63.3051). Why the stretchers were removed, if they had ever been installed, is unknown.

The legs are glued to the stand's side rails. Stringing along the top edge of these rails continues uninterrupted atop the legs (unlike the interrupted stringing across the front and back rails), so it must have been applied after the legs were permanently fastened to the side rails. Four 6-inch-long [152], slotted flat-head bed bolts, originally concealed by die-stamped circular brass covers, attach the side assemblies to the tenoned ends of the front and back rails; two matching covers decorated the fronts of the front legs. Only two covers, 1-3/4 inches [44] in diameter, of neoclassical patera design, survive, one detached, the other damaged but remaining in place on the left side. Old plugs fill the missing front covers' screw holes; screws alone remain in place on the right side, and the back left leg has an empty screw hole, suggesting a period of neglect. Small rectangular plugs in the rear-facing sides of the front and back rails conceal the four inset bed-bolt nuts.

The forward- and outward-facing sides of the legs have horizontal geometric banding toward the top beneath the rails, and light lengthwise stringing; these inlays match banding and stringing on the piano's lid and case. Like the piano's hardware, the banding and stringing were no doubt purchased from a specialized provider to the furniture trade. The banding, 9/32 inch [7] wide, consists of repetitions of three adjoining diagonal elements, of dark, lighter, and lightest-color wood, sandwiched between single light lines. Each diagonal element is a separate piece, all the same size. The mahogany-veneered sides and front of the stand have light stringing but no banding; the back rail is bare. Penciled on the rear of the back rail and inner side of the right side rail is the number 2, corresponding to that batch number written elsewhere on the piano. On the front and back rails a different hand has penciled #1, #2, #3, #4 respectively next to the tops of the legs, presumably to ensure correct placement of the removable side assemblies, which have corresponding numbers next to tall mortises in the legs that receive the front and back rail tenons. These mortise-and-tenon joints prevent back-and-forth motion of the legs while the bed bolts hold them tightly from the sides.

Long shallow brackets under the front and back rails next to the legs further buttress the stand against swaying; these brackets give the rails an appearance of being shaped to clear the player's knees and thighs, obviously unnecessary for the back rail. A second bracketed rail, grooved on the bottom and perhaps reused lumber, reinforces the front one from behind, doubling its thickness to match that of the one-piece back rail, about 1-7/8 inches [48]; the side rails are the same height as the bracketed ends of the front rails but are only about 1 inch [25] thick. Three wooden dowels protruding vertically from the stand, one centered in the front rail and one in either side rail, accurately position the case through worn holes in its bottom. The case skirting sits almost flush with the sides and front of the frame, which has no lip or molding around its perimeter; the back rail extends a bit behind the spine, but not enough to give clearance for the lid to be opened without its back edge scraping a wall directly behind. While the grain of the skirting and case walls is horizontal, that of the slightly browner frame veneer is vertical, thus catching light differently and contrasting subtly in color.

The mahogany case, 65-5/8 inches [1667] wide by 23-3/8 [594] deep not including skirting (internally 64-1/8 [1629] wide by 21-1/8 [537] deep) and 9-1/4 [235] tall, remains almost flat despite the strings having pulled the wrestplank slightly askew and lifted the back left corner of the hitchpin rail. The tops of the case walls are squared without molding. To the left of the keyboard the front wall is 6-1/4 [159] wide and to the right, 22-3/4 [578] wide, leaving the keywell 36-5/8 [930] wide. Thin cork strips added around the keywell edges take up some slight misfitting of the lid and lockboard. The area bounded by the soundboard-facing sides of the right wall, front wall, spine, and treble cheek (and its line extended to the spine) is nearly square, 21-1/8 [537] by 21-1/4 [540], and occupies very close to one-third the entire interior area of the case, but these dimensions seem not to arise from any underlying proportional scheme.

Interestingly, instead of being a single continuous board with the lockboard cut from it, the case front is partly composite. The wall to the left of the keyboard comprises two pieces: a short lower length integral with the board forming the rest of the front (except the lockboard) and including the geometric band that crosses in front of the keyboard, and a separate upper piece the same height as the lockboard. The upper piece has pulled slightly apart from the lower above its banding; the gap is perfectly straight and smooth with no tearing of wood fiber, and extends around the left corner just across the dovetail lap.



This upward separation, seen also in a John Geib square supposedly made before 1798 for Longman & Broderip (serial number 3801; Fort Wadsworth, Staten Island, New York), is associated with the attached bass cheek having lifted from the keybed. Such separation has occurred elsewhere in the case, perhaps brought about by glue failure caused by humidity swings and shrinkage across the keybed and bottomboard.

Evidently the case maker shaped the front board by sawing it horizontally from the left side to the treble cheek line, then down along both cheek lines to separate the lockboard and the upper left piece, rather than first sawing down along the cheek lines, then across only the width of the lockboard, leaving the left front wall intact but requiring a 90-degree turn of the saw to create the keywell opening. The former method requires heightening the separated upper piece or cutting it from another plank to compensate for height lost to the saw kerf, then gluing it to the lower piece before cutting the corner dovetails. Which method was more common begs investigation. Here, the lockboard differs from the neighboring walls in grain pattern, so it must have come from another plank; whether the upper left piece also did is unclear.

The left front and side walls and bass cheek abut the massive left side block, which at its rear buttresses the front of the hitchpin rail and its support block. These full-depth softwood blocks and the one supporting the straight diagonal wrestplank each comprise two thick layers with different grain orientation, one glued atop the other. The left side block, 5-1/2 inches [140] wide (but narrower where recessed to accommodate the bass cheek, which forms the lidless compartment) stands 4-1/16 inches [103] tall including a light wood (sycamore?) cap almost 1/4 inch [6.3] thick, toward the front of which is the mysterious inscription, *101,047a*.

Thin mahogany skirting with two light strings but no molding surrounds the 1-15/16-inch-thick [49] bottomboard except along the back, where the edge of the bottomboard is exposed. This board comprises two knotty pine planks joined side by side with grain parallel to the spine. Nailed atop the bottomboard within the case walls, a 15/16-inch-thick [24] joined board of Eastern white pine planks, with grain parallel to the strings, forms the keybed, which extends completely from side to side and front to back. Two large black marks resembling the number 2 appear under the bottomboard, and two old square-head bolts penetrate the bottom near its front right corner to anchor the bass end of the wrestplank support block (its treble end has separated from the keybed and spine). Dirt and discoloration have outlined the keyframe on the keybed; indentations along some of the outlined edges might have helped align the keyframe during construction. A line scribed on the keybed perpendicular to the front corresponds to the overhanging left edge of the soundboard; fainter scribe lines conform to the front of the hitchpin rail support block and facing sides of the left side block and bellyrail, suggesting the construction was laid out on the keybed.

The solid mahogany lid, 3/8 inch [9.5] thick with thumbnail-molded front and side edges, bears stringing and banding on top that match those on the case and legs. Two surface-mounted, rectangular brass butt hinges fastened the lid, now detached, to the spine. The main portion of the lid, comprising a 16-3/8-inch-wide [416] board butted to a 1-1/8-inch-wide [29] scantling along the back, has cracked entirely through along the grain due to shrinkage; only its banding and a few unbroken fibers precariously hold it together. Four small brass butt hinges attach the flap over the keyboard, and three matching hinges attach the adjoining underlapped flap covering the front of the soundboard. These flaps may have been cut from the same wide board as the main lid after their banding was inlaid. A shallow lengthwise groove all along the hinged edge of both flaps holds a barely visible mahogany inlay of obscure function; the filled groove had not been

intended to receive a tongue along the main lid, which lacks any inlay and shows no sign of a tongue having been planed off.



Altogether the lid measures 23-3/4 inches [603] front to back and 66-3/8 [1686] side to side, overlapping the front and sides of the case.

A detached, broken prop stick, which pivoted on a screw remaining inside the left case wall, fit into a notch under the lid (no prop stick was provided for the right side). Alternatively, the lid could have been held a bit more open by the elongated right leg of a collapsible music rack attached behind the nameboard, but that leg's notch has been filled. While supporting the lid, the leg also held the slender rack steady under the pressure of a heavy music book. The shelf to which the rack is attached and on which the music rested (see below) lies so far below the top of the nameboard—1-3/8 inches [35]—that it could be difficult to turn pages quickly without risk of tearing them; but if the shelf were much higher, the rack when folded would not fit under the closed lid.

Raking light discloses numerous writings along with many accidental scratches scattered on the top of the lid and flaps. The shallowly impressed writings include multiplication calculations ($2 \times 4 = 8$, $2 \times 6 = 12$, $2 \times 7 = 14$, etc.) and the name *Eric* printed twice, suggesting a careless boy used these surfaces as a desk, probably fairly recently judging from the handwriting style. Among these marks is 7/7/95 or 7/1/95, apparently a date, more likely 1995 (around the time Martin acquired the piano) than 1895.



Now detached, the lockboard, almost 3/4 inch [19] thick and not veneered, was fastened to the keyboard flap by three brass butt hinges, all twice repositioned with most of their earlier screw holes plugged. An inset lock, also detached, has been preserved; its worn keyhole lacks an escutcheon, and its hasp in front of the keyboard was long ago removed, replaced by a plug that crosses the slot for the missing key slip—an infelicitous repair. When opened and raised upright, the lockboard supported sheet music against a low triangular ledge screwed along the inside of its flap. Unlike in many contemporary square pianos, no swiveling arm was provided to hold the lockboard up. Its hinges are recessed into its edge, the outer two hinges placed so their leaves fold together like the covers of a closed book, flush with the edge and concealed by it when the lockboard is upright, while the middle hinge is recessed only the depth of one leaf, the other lying open and exposed on the flap, better to resist backward pressure on the upright lockboard. Several hinge screws had penetrated through the flap, marring its exterior. The hinges could have been stripped off by a heavy music book pressing too hard against the lockboard, or by yanking the flap upward if the lock had jammed; the latter occurrence could explain the absent hasp.

With the lockboard closed, its geometric banding completes a single rectangle across the front of the case; the sides' bandings also form rectangles. The banding elements change direction at the midpoints of the front and lid and of the vertical bands on the front, but a mistake occurred on the front: the color order reverses between the band to the right of center on the lockboard (as it were, 1, 2, 3 from left to right) and the adjacent band across the right front wall (3, 2, 1 from left to right). This discontinuity shows the banding was not inlaid all at once, and

the error either escaped attention or was thought not worth correcting—in either case a lapse in quality control.



The spine, of knotty pine 1-1/2 inches [38] thick, bears a 1/2-inch-tall [13] mahogany cap. On the back, aligned along a faint horizontal pencil line drawn between two tool marks, four flat-head screws penetrate the spine about 2-1/2 inches [63] below the top to secure the beech hitchpin rail; nevertheless, the rail has pulled away from the spine, which itself bends slightly inward behind the rail. In a row near the bottom, five deeply recessed nails angle downward into the keybed. A vertical scribe line of unknown significance crosses the back 36 inches [914] from the right wall edge; while such obscure marks may seem accidental, if they occur in corresponding places on other instruments, they may prove purposeful.

Three large half-blind (lapped) dovetails, visible from the bare back, join the spine and side walls; blind (double lapped) dovetails join the four front corners. The walls and cheeks are about 3/4 inch [19] thick including veneer. The interior sides bear light veneer with one horizontal line of black stringing near the top; the wall exteriors are not veneered, but the cheeks have veneer on both sides, their crossbanding (see below) next to the key levers pierced by several tiny metal pins presumably in aid of clamping.

Two tall, tapered hardwood brackets like those on some Astor squares, one screwed to the left wall behind the prop-stick pivot, the other at the back above the wrestplank,



supported a lost baffle, or shade (miscalled a dust cover), which would have rested also on a cut-down extension of the treble cheek behind the nameboard. Just before that cut-down part, the back end of the cheek angles inward to clear the lowest string.

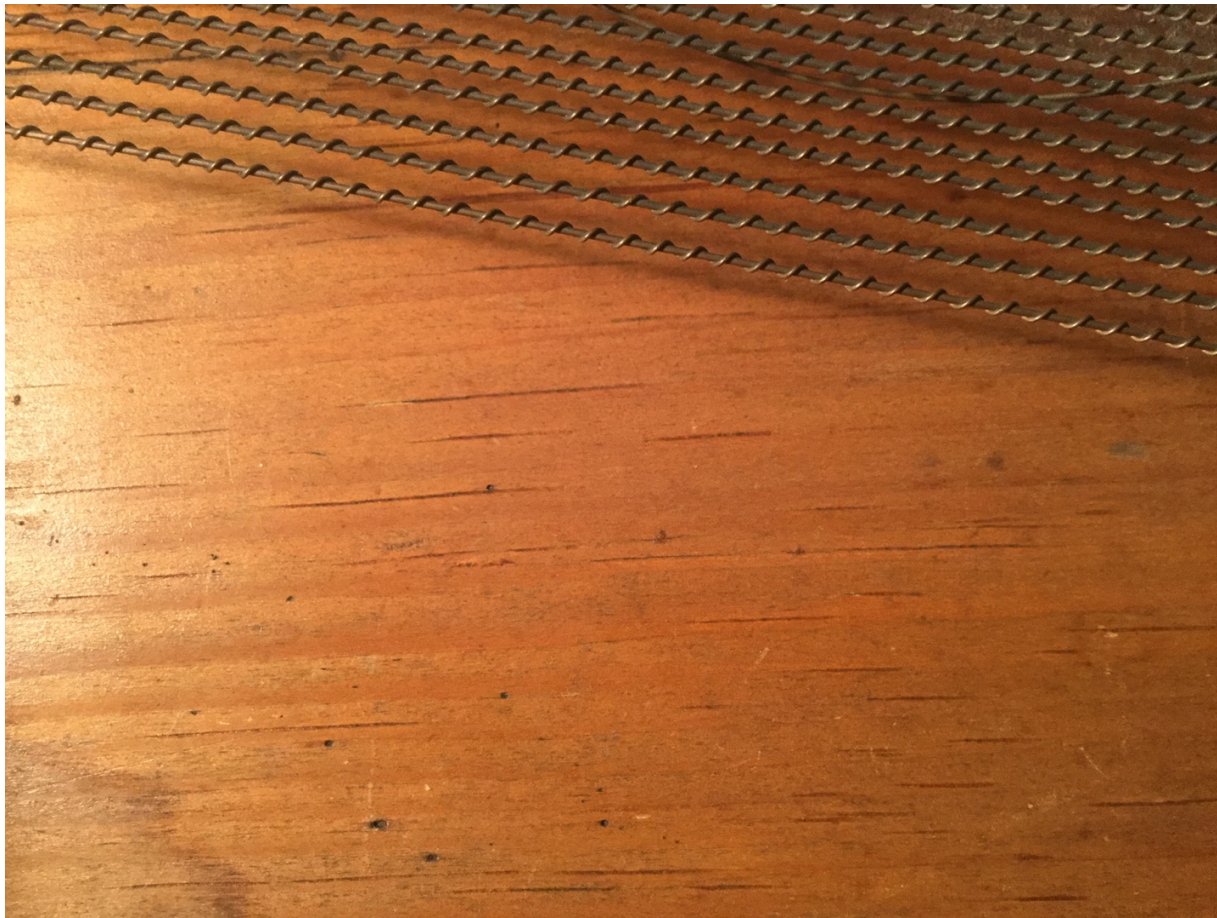
The nameboard, 4-7/8 inches [124] tall at the treble end and 4-13/16 [122] at the bass, of Eastern white pine, has a mahogany cap like the spine's. The cap protrudes at both ends over long integral tongues that slip into tapered vertical grooves in the bass and treble cheeks; the cap ends are squared, not mitered to the cheeks. No trace of glue exists along the bottom edge of the nameboard, where some pianos hold a strip of (added) felt. Unlike nameboards of the Longman & Broderip square 306 and Longman Clementi & Co. square 1194, this one lacks rectangular fretwork openings (inventor William Southwell's "Sonovents"). Instead, as a ground for its painted decoration and nameplate it bears a broad, continuous panel of light, plain veneer, maybe sycamore, separated by black and light stringing from top and (wider) bottom crossbands of darker color, a scheme continuing on the cheeks.

Being of inadequate length or perhaps damaged, the nameboard's lower crossband was pieced out at the treble end with veneer of lighter color, almost exactly the width of the highest

key. Other off-center seams visible on both crossbands may have been less apparent when the finish was fresh, but they evince woodwork of only average quality, consistent with the absence of frontal Sonovents and the nameboard's slight difference in height at treble and bass ends. This difference, evidently within a tolerable margin of error (unacceptable for the keyboard, string spacing, and other critical elements), partly accounts for the uneven height of the keyboard opening, 1-9/16 inches [40] above the keybed at the treble, 1-11/16 [43] at the bass. The lower opening at the treble leaves scarcely any space between the bottom of the nameboard and top surfaces of the highest natural keys' tails; depending on the thickness of the balance and backfall rail paddings when new, this scant clearance could have caused returning keys to click against the nameboard.

Screwed to the bare back of the nameboard, a thick triangular piece of pine, inscribed in pencil with what might be a script capital *N*, holds the three screw-pivoted legs of a sideways-collapsible mahogany music rack. Mahogany veneer covering the top surface, or shelf, of the triangle shows no wear from music resting on it. The same symbol or script letter *N*, maybe a workman's initial, and the numbers 2 (written twice, one partly concealed by the triangle) and 3 are separately penciled on the back of the nameboard. Another number 2 appears toward the keyboard-side rear of the bass cheek, which, unusually, extends a little more than 1 inch [26] behind the nameboard slot. This extension elongates the adjoining compartment, for no apparent reason since nothing seems to have been stored there.

The soundboard, of plain-sawn Eastern white pine with grain parallel to the spine, shows no sign of replacement or repair. The lightly finished top surface, surrounded along the case walls by slender mahogany molding, stands 4-3/8 inches [111] above the keybed at the treble cheek. Slightly depressed behind the bridge and bulging in front of it in the bass, the soundboard shows several cracks along the grain and bows downward toward the front left corner over the keyboard, where its exposed side is 5/32 inch [4] thick. The worst crack occurs near the spine where a narrow strip of soundboard glued to the liner remained immobile while the rest was pushed forward by the tilting wrestplank. Two other cracks flank a batten that supports the soundboard behind the treble cheek (see below). Seen from above, the soundboard appears to be a single unjointed panel, but UV light from below reveals a fine glue joint along a line that passes under the bridge where its treble curve begins; this joint clearly differentiates two boards, the narrower, toward the spine, about 3-7/8 inches [98] wide (including the edge beneath the molding) with grain approaching quartered. Along the front of the case the wider board also looks quartered or rift-sawn but toward the center, nearer the middle of the log, the annular rings, concave from the top, gradually assume a slab appearance. Many small but conspicuous resin pockets (like those more typical of *Pinus lambertiana*) evenly scattered across the soundboard match their distribution on the keybed.



A low, 1/2-inch-wide [13] batten reinforcing the soundboard's left edge from above is screwed down through it into a nearly 1-inch-wide [25] beech batten below. This lower batten is partially shaved down on the top inner side to allow the soundboard more vibrating area near the crook of the bridge, and is strengthened by a slender iron bracket screwed on along its outer side.



At its front end the lower batten lap-joins a matching batten that runs under the front edge of the soundboard above the ten “additional” keys (to use Southwell’s term) to terminate behind the treble cheek. The iron bracket, about 7 inches [178] long and $\frac{3}{32}$ [2.4] thick, extends forward from the hitchpin rail’s support block to which it is fastened on an embedded circular brass foot, and crosses the slot for the additional keys’ hammers; a slight bend in the bracket where it crosses the slot may have been caused by pressure from the soundboard due to the tilting of the wrestplank. This iron-bracketed arrangement, like that in some similar pianos (e.g., by George Astor, serial number 1481, private possession), replaces the vertical wooden partition that commonly separates additional keys from those below and supports the soundboard overhang; no separation occurs here (see below).

To the right of the highest key, a shallow recess along the top of the 1-5/8-inch-thick [41] bellyrail allows a partial view of four diagonal soundboard ribs intersecting a deeper rib that runs behind and roughly parallel to the main line of the bridge beginning close to its treble end. A second deep rib runs some 4 inches [102] behind the first. At their visible ends all the ribs are let into the liner, batten, or deep rib that intersects them. Three small screws penetrate the soundboard overhang from below, one of them through a shallow rib, to secure the crook of the bridge; another screw fastens the bridge’s treble end above the bellyrail, and other screws may hold the bridge farther within the soundbox. Incidentally, the bellyrail, which aligns with the

treble cheek, has become detached from the keybed; probing the soundbox through the narrow separation finds no internal braces. Felt across its recess, the bellyrail has a smooth top surface along the keyboard side and a rough top along the soundbox side, suggesting it might be made up of two boards glued side by side.

The J-shaped, one-piece, carved beech bridge, intact and without cracks, has a normal profile with nearly vertical front, double-beveled top reducing in height bass to treble from $23/32$ inch [18.3] to $18/32$ [14.3], and sloping back; its width at the bottom remains constant at about $13/16$ [21]. The treble end descends concavely to the soundboard where it terminates in a point at the back of the bridge, while to avoid encumbering the soundboard, the bass end extends in a “shark’s mouth” shape, to use John R. Watson’s apposite term for a long cantilever above a triangular slot ending in a transverse hole above a short tapered foot.



This distinctive shape, seen also in the Geib square 3801 and in several pianos by Culliford Rolfe & Barrow (otherwise these pianos are quite dissimilar), allows the foot to flex with the soundboard—also the purpose behind the low, pointed termination of the treble end—while the hole resolves any imperfection in the meeting of the mouth cuts and inhibits formation of a crack there.

The narrow bevel before the bridge apex holds a single row of tin-plated brass pins filed flat on top and of varying diameters: thickest for the open-wound bass strings, thinner for the plain brass strings, thinner again for the iron strings approaching the treble, and thinnest from

where the bridge curve begins. After the curve, the pins for the highest ten notes stand in a practically straight line, but the long, nominally straight portion of the bridge actually curves slightly toward the wrestplank in the tenor register, gradually lengthening the scale there by as much as 1/4 inch [6]. This subtle curvature, much less than that in the MFA's Astor square, seems intentional; the securely attached bridge has not moved on the soundboard and its workmanship is meticulous.

A triangular fretwork Sonovent with original blue-green silk backing covers the back right corner cavity behind the wrestplank; not glued in, it rests on full-depth liners nailed to the spine and right side wall and on a small support behind the wrestplank, and is held by surrounding molding that matches the soundboard's. The curvaceous, essentially rococo fretwork pattern was confidently sawn with a fine blade, most likely along guidelines that might be revealed on the back if the silk were removed. Although asymmetrical at first glance, the distinctive design includes a small heart, a large hollow square with concave sides, a thick eight-pointed cross, and larger, nearly symmetrical branching elements like those normally seen in nameboard vents.



Like the nameboard painting, this delicate fretwork may have been outsourced to women working at home. Here, while visually pleasing, it seems incongruous with the neoclassical simplicity of the rest of the piano.

The wrestplank, of beech 1-3/16 inches [30] thick capped with 1/8-inch [3] light wood veneer, lies atop a full-depth, two-piece softwood block. As in the MFA's Astor square, a cut-away portion of the bottom of this block forms a low rectangular opening between the soundbox and the triangular cavity behind. (One of the piano's loose, unnumbered hammers and a contemporary pencil slid through this opening into the cavity.) A triangular block reinforces the angle between the bass end of the wrestplank and the right side wall; the top layer of this full-depth block is a piece of beech about the same thickness as the wrestplank and the hitchpin rail. A string loop and a metal pin lie trapped at the bottom of a gap between this block and the wrestplank, which have become unglued. The two bolts securing the bass end of the wrestplank support block to the bottomboard might be original or an early intervention to forestall further separation. The wrestplank's displacement at the treble end could have been mitigated by screwing it to the spine, as along the hitchpin rail, or by tenoning or buttressing it, but this problem was either not anticipated or not thought worth preempting. Square pianos were still relatively novel—at most about 40 years old—when this one was made, so some design flaws in recent models might not yet have become evident (similarly, so-called cheek disease, or cocking of the cheek-bentside corner, in many contemporary English harpsichords and grand pianos was not immediately manifested).

The piano is entirely double-strung with very old, perhaps original wire; several strings are missing except for their windings on the tuning pins, and a broken brass string remains in place. A brass hitchpin loop, expertly formed like all the rest, was recovered from the narrow gap between hitchpin rail and spine. The lowest 12 pairs of strings are of brass open-wound over yellow brass cores, then two pairs of plain, slightly reddish brass, ten pairs of yellow brass, and the rest of iron. A few iron strings are insufficiently coiled on their tuning pins and leave them too high, suggesting their loops broke and had to be re-twisted with the remaining string. Some winding wires look tinned, and under low magnification the reddish brass wire, only, shows lengthwise striations probably from the drawing process. Chief sounding lengths (longer string of each pair) are FF = 56-1/2 inches [1435]; C = 48-1/16 [1221]; c = 34-1/2 [876]; c1 = 21-11/16 [551]; c2 = 13-1/16 [332]; c3 = 5-1/4 [133]; c4 = 2-11/16 [68]. Allowing for reasonable margins of error in measurement, in construction, and due to structural distortion, these inch lengths could speculatively be rationalized as 56-1/2, 48, 34-1/2, 21-3/4, 13, 5-1/4, 2-3/4; any such small deviations between intended and actual lengths would be inaudible. Because the hammers are detached, striking points cannot be measured.

Hand-forged, unpierced iron tuning pins stand in the wrestplank cap in 15 rows of six, then ten rows of four, and finally two rows of three for the lowest three notes. The pins are now very tightly embedded; lacking a properly fitted wrench, no attempt has been made to turn them to relieve string tension. Note letters inked between each pair of pins use sharp signs to identify accidentals; pitches include A# and B, not B and H as in Germanic practice. Faint gauge numbers next to some pins ascend in the English manner, thinner to thicker, from 9 in the treble to 13 in the plain brass section, with 12B indicating the change to brass. An indistinct 0 may signal the first pair of wound strings. Leaving their tuning pins, the strings pass over a slender, cloth-padded softwood rail alongside the front edge of the wrestplank cap; this rail, taller in the bass than in the treble mirroring the slope of the bridge, limits the strings' downbearing and damps unwanted vibration. No separation occurs in the string band between the additional notes

and the rest, so no dummy strings were needed to conceal a gap in the band, which fans out at the treble.

Several adjacent panels of light wood veneer cover the long triangular hitchpin rail, which terminates at the right where it meets the soundboard. Six tall, sharply angled pins inserted between the nut pins and hitchpins for the lowest three pairs of strings direct these strings toward their hitchpins, which stand farther back on the rail than the rest.



All these pins are of plated brass, filed flat on top; except the intermediate pins, they are thicker in the bass than in the treble. The low, straight beechwood nut, lightly beveled along the front where its pins are inserted, curves downward behind the peak and widens toward the bass. The straight ranks of nut pins and hitchpins (except the lowest three pairs) diverge toward the bass, leaving more space between them for longer string loops.

The FF-c4 English single action has its highest ten keys extending beneath the soundboard to propel hammers striking through a slot along the spine. Unlike most 68-note square pianos, rather than having a separate keyframe for these additional keys, the whole keyboard rests on a single trapezoidal keyframe screwed to the keybed through the front (four screws, one relocated) and balance rails (three, one relocated) and right side rail (one). Marks on the front of the hitchpin rail's support block indicate recesses below that receive brass pins on the back of the backfall rail, holding it down; an angled iron nail protruding from the support block at the treble serves the same function. A large mark resembling a backward number 2 appears on top of the right side rail of the keyframe. The front rail, which stops the keys' descent, retains worn strips of leather padding along the fronts of the naturals' and accidentals' guide pins; these

strips were once covered by a layer of insect-damaged, green woven wool fabric like that padding the backfall and hammer rest rails, respectively three and two layers. In addition to remnants of one layer of green fabric, the balance rail also retains fragments of individual pads of the same cloth surrounding the pins.

The keyboard plank, made up of three butted boards, is 11/16 inch [18] thick at the front (not including key tops) thinning to 5/8 [16] at back in the bass, and 5/8 thinning to almost 9/16 [14] in the treble. The FF key, 17-5/16 inches [440] long, pivots 6-9/16 [167] from the front; the c4 key, 20-5/16 [516] long, pivots at 8-3/8 [213]. The additional keys' levers angle toward the left behind the nameboard, as do neighboring lower keys as far as f#3. Tapering slightly in width toward the bottom, each lever is chamfered across its bottom rear edge and slightly undercut along guidelines before and behind its balance point, leaving a small rounded bump that rocks on the balance rail padding. Plated brass balance pins extend through small circular countersunk holes in the bumps of the levers to rectangular unbushed mortises above. The front guide pins, also plated brass, enter identical rectangular mortises below larger circular holes covered beneath the ivory heads by inset cross-slips; these slips prevent holes from showing through the thin ivory tops and provide additional gluing surface. The larger diameter of the front holes accommodates the arc of the keys around their guide pins.

From one to five cylindrical or conical lead weights, all inserted in the levers from the right side behind the balance point, ensure prompt key return and firm damping; only three keys, accidentals in the bass, lack any weights. The individual weights' positions at varying distances before or behind the jack rods look random, but the static mass needed to depress the natural keys (with dampers removed) is remarkably consistent on average, ranging from about .71 ounce [20 gm] in the bass reducing to about .62 [17.5] in the treble. Therefore, the weights seem to have been carefully located, far enough from one another on each lever to reduce the likelihood of splitting the wood. Apparently, the weights were inserted after the jack rods were installed, otherwise a rod might have had to pass through a weight; however, the rod on one key was relocated to avoid a weight. A few weights have oxidized.

The natural keys, spanning 19-1/16 inches [484] over three octaves, have unscored two-piece ivory tops with heads 1-21/32 [42] long, 7/8 [22.2] wide, and 1/16 [1.6] thick, slightly rounded at the top along the sides and front corners and across the front top and bottom. In the middle range, only, the fronts are very slightly dished from playing, although most hide light scratches under covering dirt. Two detached ivory heads have been preserved, one retaining its cross-slip, both roughened on the underside to improve glue adhesion; all other heads remain in place. The ivory tails, all intact, vary irregularly in length and become thinner toward the rear end, where a positioning tool has left a pinhole atop their levers. As usual, their widths vary, with D tails uniformly widest at 9/16 inch [14.3]. From front of the head to the nameboard, the naturals' playing length measures about 5-1/8 inches [130].

Most of the molded and varnished key fronts, 1/4 inch [6] thick at the top and 11/16 [18] tall, are missing. Their neoclassical profile comprises, from top down, a 5/32 [4] fillet above a quirked ogee that descends straight (not as a cavetto or cyma reversa) to a narrow prominent bead over a 3/32 [2.4] fillet.



Combined with the overhanging ivory, the fronts form a miniature architectural crown molding. Slight variations of this Grecian pattern occur frequently, for example on the 1796 Broadwood & Son grand piano designed by Thomas Sheraton for Manuel de Godoy (MFA, 1985.924) and on some Culliford Rolfe & Barrow and Clementi squares. Whether the present fronts were molded by the keyboard maker or purchased like the banding from a specialized supplier is unknown.

The scarcely-worn ebony accidental blocks are $3\frac{3}{8}$ inches [86] long and $\frac{1}{2}$ [13] wide at the base, narrowing slightly toward the back. They taper upward to $3\frac{1}{8}$ [79] long and $\frac{9}{32}$ [7] wide on top, and stand $\frac{15}{32}$ [12] tall at the 63-degree slanted front, then slope slightly downward. The blocks overhang the levers beneath and are not all perfectly centered on them

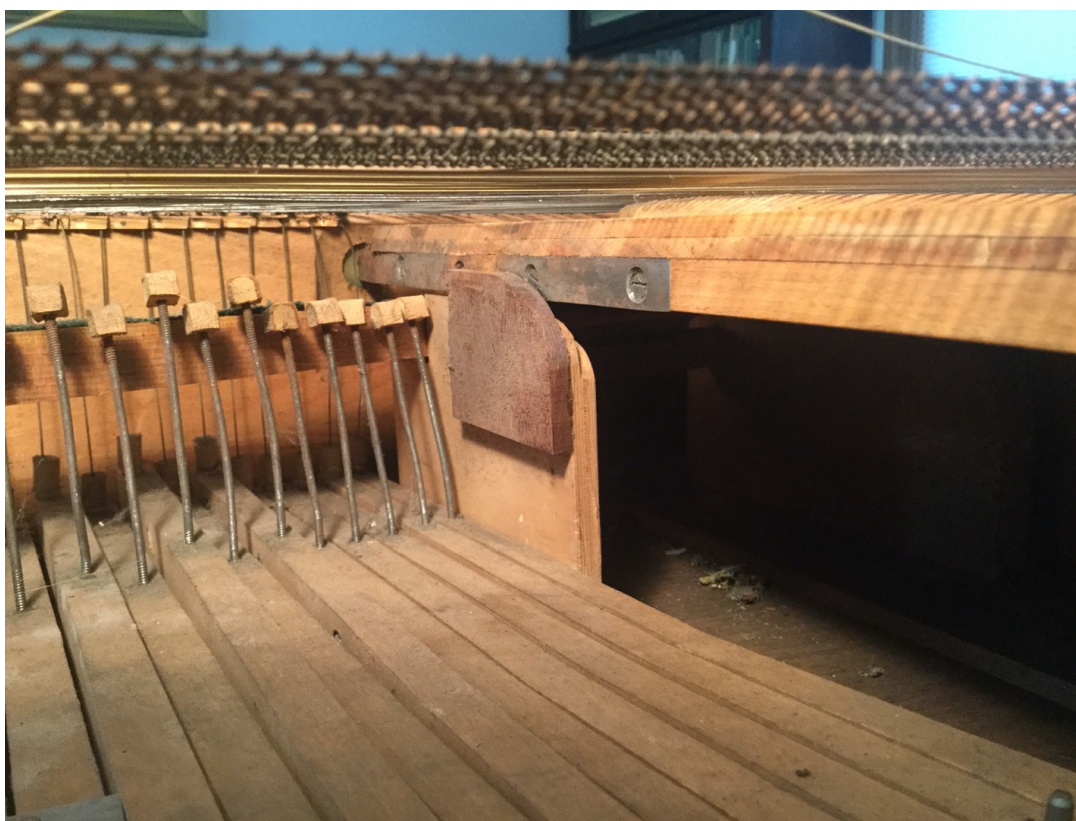
laterally. When first installed they might have been found slightly too long, as saw kerfs behind some blocks show they were trimmed in length after being glued atop their levers, which were then stained black for a short distance beneath the nameboard. The blocks have left pale “shadows” along the nameboard’s lower crossbanding; whether these discolorations arose from differential exposure to daylight and ambient air or some other cause is unclear.

No numbers or alignment marks appear on the keys, though the back-angled, lightly threaded iron jack rods, with leather-covered, 1/4-inch [6], rounded wooden tops, stand on a faint diagonal scribed line. Faint guidelines also located the chromatically staggered balance pin mortises and the damper posts. Since the posts are off center toward the left on their levers (see below), the keyboard seems slightly displaced toward the right, allowing allow space for the vertical bracket that supports the left ends of the main hammer and rest rails; this slender bracket is screwed onto the side of bass-end rail of the keyframe. To compensate for this sideways displacement, the c4 key is 1/8 inch [3] narrower than the others and the FF key is almost 3/16 [5] wider, its extra width disguised by a narrow strip of dark veneer to the left of the ivory; some keyboards fill this space with a thin end block or forward extension of the support bracket.



The main hammer rail and one of its two elevating rods are missing, perhaps removed in a failed attempt to extract the action. The brass rods, threaded at both ends, were screwed on penciled guidelines into the leftmost two of three intermediate slats connecting the balance and back rails of the keyframe; the rods then rose to the hammer rail past recesses in the sides of neighboring keys. Adjustable nuts at the tops of the rods held the thin, two-piece mahogany rail at its proper height. The thicker, stiffer hammer rest rail needs no such intermediate support.

A vertical bracket screwed on top of the keyframe's third, rightmost intermediate slat rises between the main and additional keys. This partition supports the left ends of the additional keys' hammer and rest rails and the right end of the main hammers' rest rail. An added, higher sidepiece held the right end of the main hammer rail; this sidepiece rises next to the soundboard overhang.



Screwed atop the treble side rail of the keyframe, another vertical bracket supports the right ends of the additional hammer and rest rails, the additional key levers angling leftward past it. The main rest rail and both hammer rails are, or were, screwed down at both ends to their supporting brackets, while the additional hammer rest rail is tenoned into the sides of its brackets.

The main hammers, now detached, were held by white (sheep?) skin hinges sandwiched between the hammer rail slats; three hammers are missing. The flat, tapered shanks of light wood have no guidepins; they were cut from a thin board made up of at least three pieces distinguishable by glue joints running along two shanks. A modern hand has numbered the undersides of the shanks in purple ink from treble to bass; shank number 42 also bears the number 46 penciled on the opposite side, and a few other shanks also have faint numbers on the upper side. Three shanks, presumably overlooked, lack modern numbers. On the bottom at their

wider end the shanks receive their hinges in a very shallow rabbet, covered by a small, sloping slip of wood glued on below; skin pads, some insect-holed, cover these slips where the jacks contact them. A few mismatching hinges and pads are old repairs.

The main hammer heads, glued atop their shanks, consist of short wooden cores of graduated size, gently rounded on top, and covered by four to six layers of alternating white and dark skin; the outermost, white and soft layer and one or two below were skived thin to wrap entirely around core and shank.



Striking surfaces, jack pads, and jack tops show moderate wear. When arranged in numerical order (except those three without numbers) the hammers vary irregularly in length; this inconsistency shows the hammers were not all numbered in their originally intended order.

The additional keys' hammers retain their separate rail, positioned lower than the main rail to clear the soundboard overhang, and remain attached to it except for the loose c4 hammer. Each of their shanks, cut from a two-piece mahogany board and thinner than the main shanks,

terminates in a short cylindrical tip glued through a hole near the bottom of a tall rectangular head. Two layers of white skin cover the heads' enlarged, rounded tops. None of the additional hammers has jack padding. All are numbered in pencil on the heads, from 1 (d#3) to 10 (c4), not in the same hand or sequence as on the main hammers.

The ten additional notes are undamped; the rest have dolly ("Irish") dampers held on thin brass wires. Graduated in three thicknesses, the dolly heads become heavier toward the bass except for the lowest one, a replacement on thicker, tinned brass wire. The wires, glued in grooves up one side of the dollies, penetrate them at a right angle near the top. Holes in a thin, sawtooth-front rail, covered by red morocco leather and fastened by tiny screws and pins to the front of the hitchpin rail, guide the wires' motion. Their finely threaded lower ends screw into 3/8-inch-tall [9.5] cylindrical posts flexibly connected to the key levers by white skin pads; a small depression on the top of each post helps guide its wire into its hole. These posts stand toward the left side of the levers, not centered on them, to compensate for the keyboard being offset toward the right (see above). Remnants of two layers of damper cloth remain: a white layer beneath a woven red layer glued onto the inverted V-shaped bottom of the dolly. In contrast, the replacement dolly has an angular or faceted head, not rounded like the others, and its bottom is shaped like a shallow W, with the ascending center forming a rectangular slot rather than a pointed peak and the outer arms only slightly angled upward—a shape associated with Babcock and related Boston makers about 1820 but also used by Geib in New York (Thomas Strange and John R. Watson provided this information).



The row of dollies describes a gentle curve forward from midrange to bass. No damper-lifting mechanism or other tone-altering device was ever provided.

Overall, the piano exhibits professional workmanship. Despite its 68-note range, however, with its modest appearance, single action with inexpensive dolly dampers, plain-sawn pine soundboard, absence of nameboard Sonovents, and lack of tone-altering devices, this instrument was neither luxurious nor musically sophisticated but rather economical, likely costing in the range of 15 guineas. Some shortcomings may be due to repairs or effects of age, and to different hands performing more or less exacting operations; piano manufacture and maintenance involved workers with varied levels of skill, from masters and itinerant journeymen to apprentices and specialized outworkers who served multiple employers. While in many aspects this piano resembles squares sold by George Astor & Company, Longman & Broderip, or a related firm, certain features including its lack of a serial number hint at a separate origin, conceivably even along the American Mid-Atlantic Coast, where immigrant piano makers such as John Geib were active before 1800; Geib, incidentally, had been a major contributor to Longman & Broderip's output, but his own designs bear little resemblance to this instrument.

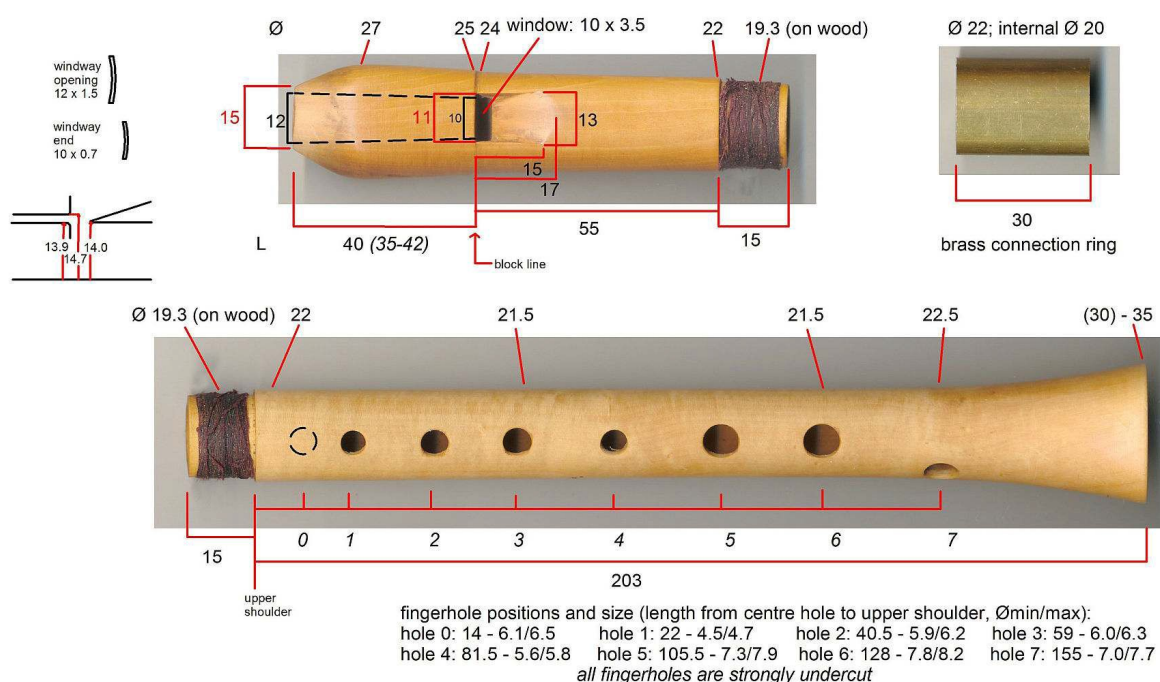
Copies of English square pianos were made in North America; examples include a convincing copy of a Clementi square by Pérez de Lara of Mexico City in 1823 (Arizona Historical Museum, Tucson). But a British origin for the present piano, perhaps made by one of Astor's or Longman & Broderip's contractors shortly after the latter firm's bankruptcy, in 1795, is most likely. Many similar pianos were exported for sale in America after the Revolution (ended in 1783) despite imposition of federal import tariffs in 1789; many more arrived as personal property of British immigrants, and some were brought over by furniture dealers and antique collectors in the late nineteenth and twentieth centuries. (Some of these pianos bear deceptive makers' names; for example, a square of questionable authenticity in the Smithsonian Institution's National Museum of American History, accession number 23866, bears the suspect nameboard inscription "Longman & Broadrip".) While the present instrument has almost no history, the shape of its replacement damper dolly hints at American repair work. More thorough examination of the piano may provide further clues to its makers and provenance.

Two recorders in g

Last year I was asked to participate in a Christmas celebration with older people from our church congregation. Because there was no opportunity to practice with other people, I chose a solo piece from *Der Fluyten Lusthof* by Jacob van Eyck: 'O Heyligh zaligh Bethlehem'. That piece is in the key of g, but the song with the same melody can also be found in one of our hymnals, and then a fourth lower in the key of g. That led me to build a recorder in the style of the 'handfluit' (a soprano in c) of Van Eyck, but pitched a fourth lower, with a g as the lowest note, so the people could also sing the hymn with recorder accompaniment.

I had once made a recorder in g, long ago on a course with Alec Loretto, but that was a so-called Ganassi recorder that has different fingerings than the recorder I am used to for playing Van Eyck's music. That is why I have now designed a new model, based on my soprano recorder with a cylindrical bore (Ø 14 mm), which instrument in turn was based on a model by Alec Loretto. The reason for changing my soprano version slightly was that I had a different size brass tube available; it was narrower, so I had to reduce the wall thickness of my soprano (from about 5.5 to 4 mm). That has some consequences for the size and sometimes also the position of the finger holes, but these things are difficult to calculate and can only be determined experimentally. But the result was a fine instrument, playable with modern baroque ('Dolmetsch') fingerings.

Soprano recorder in c2 (a1 = 440 Hz) with cylindrical bore and baroque (English) fingerings



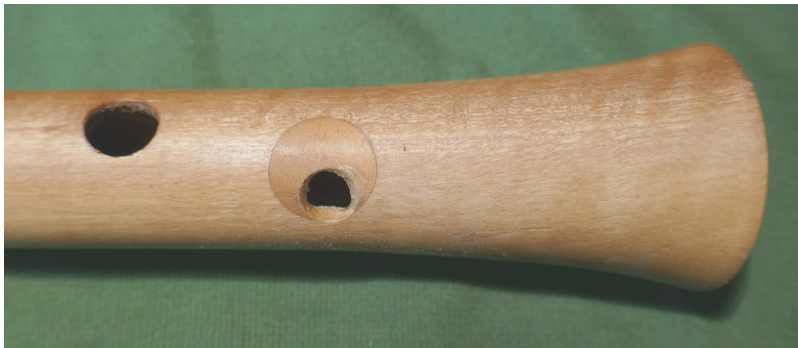
Bore of head joint: from Ø 15 at upper end to Ø 14 at block line; Ø 14 from block line to lower end; bore of the lower joint 14 over the whole length. All measurements in millimeters.

For a recorder in g I first scaled up all length measurements of the soprano by 4:3 (= 1.33 or 33%), the factor for the interval of a fourth. However, a different magnification factor applies to the bore and associated width dimensions. Organ builders are well acquainted with this: within a register an organ pipe that sounds an octave lower than another will be about twice as

long, but to get a comparable sound it should not be twice as wide, but about 1.68x (Töpfersche Normalmensur). I have therefore calculated the bore of the G recorder as follows: 68% of 33% = 22%, 14.0 mm + 22% of 14 = 17.08 mm. That is quite a lot narrower than the average 19.0 mm of my Ganassi in g!

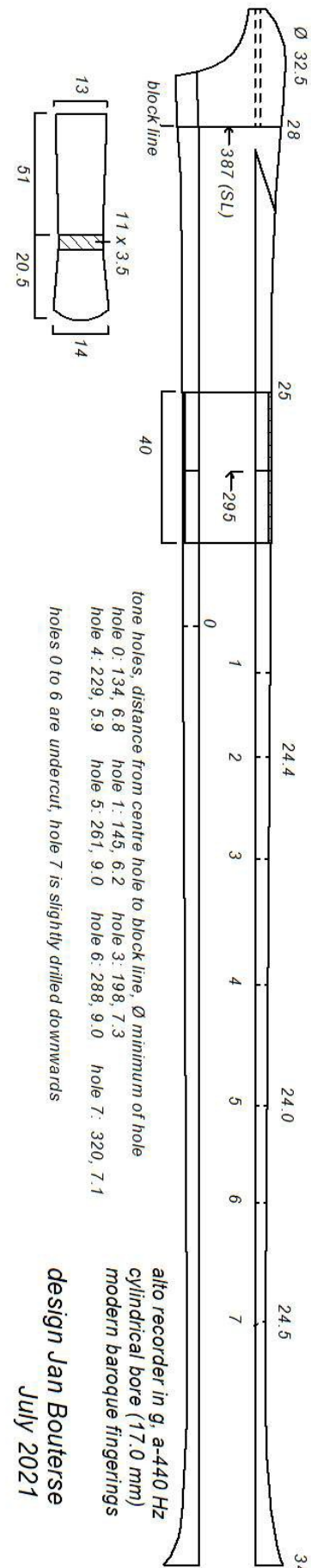
I initially drilled my first prototype a bit narrower, 16.7 mm. The recorder sounded clearly too high, so I reamed the bore further to 17.0 mm. That gave a clear improvement, but just not enough. That's why I made prototype no. 2 a little (about 5 mm) longer. Don't forget: only after drilling (and under-cutting) all holes, can you establish the pitch of the lowest tone of the instrument. A recorder or flute without holes sounds always sharper (up to 50 cents) than with its holes (of course covered by your fingers). That's because the volume of the holes adds up to the volume of the bore.

There were some other problems. The first prototype was made of olive wood, which with a rather pale appearance was lacking the interesting colour which this wood normally has. I had problems with covering hole 7, I had drilled so close to the centre line. So I decided to move the hole a bit more to the side, plugging the old hole with a piece of wood (much larger than the original hole, and drilling a new hole in it (see photo below).



I made prototype 2 of Rio palissander (Brazilian rosewood), a wood that is nowadays on the red Cites list of protected species. So I can't sell the instrument, but for my own use I can still make instruments of it. The wood is hard, has a medium-to-coarse texture with medium-sized open pores. I usually work in European boxwood which has a much finer texture. Working in a different type of wood means that I have to adjust and pay close attention to how the wood reacts to my tools. Something went wrong when cutting out the labium: a small piece at the rim broke out. I wasn't able to fix it, and the rim has now a slightly irregular shape, but that doesn't harm the sound at all.

The drawing of the g-recorder only contains basic information; total length of the instrument: 438 mm.





From left to right: third flute in a after Robbert Wijne; Ganassi recorder in g; recorder in g in olive wood (prototype 1); recorder in g in Rio palissander (prototype 2); soprano in c (boxwood).



Prototype 2: the problem with the labium rim is clearly visible. Also that this wood (Rio palissander or Brazilian rosewood) has not such a fine grain as for instance boxwood. It is very hard, but also more brittle.

About the sound of both G-recorders: prototype 1 in olive wood has a full sound in the lower register, but some of the higher notes do not speak easily. Prototype 2 has a better balance, easy top notes, the lower register perhaps not as full as the other recorder, it comes in its character close to a baroque recorder. Is that what I wanted to achieve?

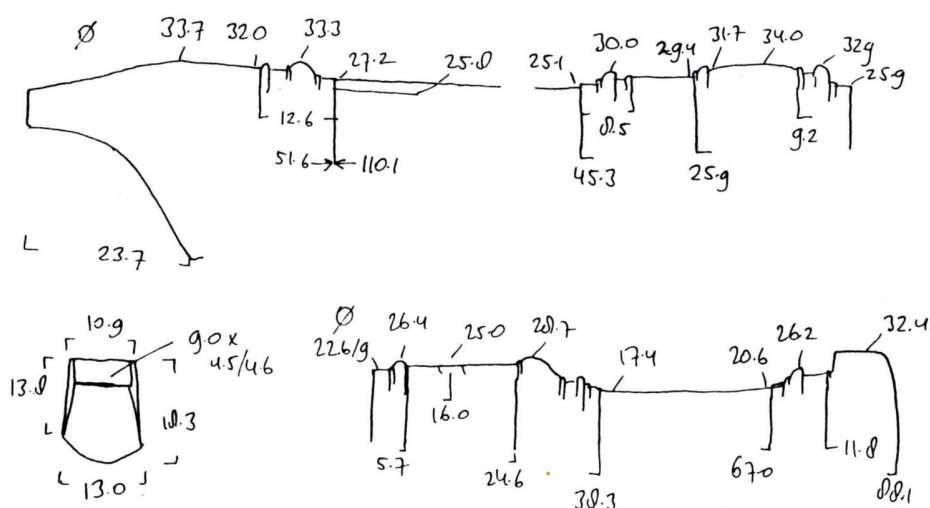
There are two problems I couldn't solve. On baroque recorders there is always one note which is always left out when tuning the instrument: that is (on an alto in f) the g# in the second register, with the fingering . . 2 3 4 5 6 . This tone has no tuning hole on its own; tuning can be done on hole 7, but the first and more important note that it tuned from hole 7 is the low g (again: related to an alto recorder in f). What is happening is that the g# is from an acoustical point of view a false (too sharp) overblown g. By opening hole 0 and 1 it is on most baroque recorders pushed up to a perfect g#. But that didn't work for my cylindrical recorder in g: the corresponding tone, the a#, is staying too low, only one alternative fingering (. . 2 . 4 5 6 .) seems to work. But as this note occurs in Van Eyck's piece, I have to practise it all over again.

There is perhaps a solution to solve the problem: moving hole 7 a few millimeters further downwards. That could make the overblown tone a bit sharper. But then another problem arises: I had some problems on both prototypes with the lowest note, the fundamental g. It didn't speak fast enough, so I tried everything on the instrument to solve that (changing small things at the block and so on). But the cause of the problem turned out to be my fingers: they had trouble covering the large and widely spaced holes properly. Positioning hole 7 further (which also means that it becomes bigger) would only add to this finger problem. In the past, I used not to have such a problem with it, but as I am getting older now I have to deal with oncoming osteoarthritis, in my knees and unfortunately also in my fingers, some of them becoming stiffer and more crooked. That's why I am not continuing in making this type of recorders. There is one positive thing: the lowest note doesn't turn up in this piece by Van Eyck. And I had some time to practise a bit longer: because of the corona restrictions, the Christmas service in December 2020 was cancelled. But I have been asked again this year, and I will play Van Eyck on recorder No. 2: an instrument made of a noble wood, with a noble sound.

The other recorder in g

My most recently made instrument was again a recorder in g, a copy after an instrument of Robbert (or Robert) Wijne (or Wyne). However, the original instrument was probably not made as such, it is supposedly a *third flute* in a, but in the low French baroque pitch (a- 392 Hz). Which means that it can also be used as a recorder in g, in the modern pitch standard of a-440 Hz.

The recorder is in the collection of the former Gemeentemuseum (now 'Kunstmuseum') in The Hague and is described and measured in 'Dutch recorders of the 18th century', the catalogue from 1991 (Moeck, Celle) .



To the pictures: photo of the whole instrument is from the catalogue, the other photos (taken under different light conditions) and the drawing are by the author.



Measurements, summarised from the catalogue (1991) and published in my dissertation 'Dutch woodwind instruments and their makers, 1660-1760', Appendix C (2005):

head (I): L 161.7; SL 110.1; socket: L max 21.5, \varnothing max 20.9; window (WxL): 9.0/9.15 x 4.55/4.65; \varnothing ext-max at window: 27.2; labium L 18.5, Wmax 13.0; block surface: L 50.6, W 10.5 - 9.0;

bore (\varnothing - Lmax, from upper end):

17.1- 22	16.8- 35	16.3- 51	16.2- 58
16.1- 63	16.0- 131	15.8- 136	15.6- ->

middle joint (II): L 204.0; SL 171.5; upper tenon: L 21.0; lower tenon: L 11.5; \varnothing ext of shoulders: 24.2 and 20.6;

finger-holes (L from upper shoulder to centre of hole; \varnothing WxL; \varnothing ext):

hole 0-	11.9;	5.0 x 5.3;	23.8
hole 1-	26.6;	4.8 x 5.0;	23.3
hole 2-	53.1;	5.2 x 5.3;	22.6
hole 3-	81.0;	5.2 x 5.4;	22.1
hole 4-	112.3;	5.1 x 5.3;	21.5
hole 5-	138.8;	5.0 x 5.2;	20.4
hole 6-	163.8;	4.6 x 4.7;	20.5

bore (\varnothing , Lmax, from upper end):

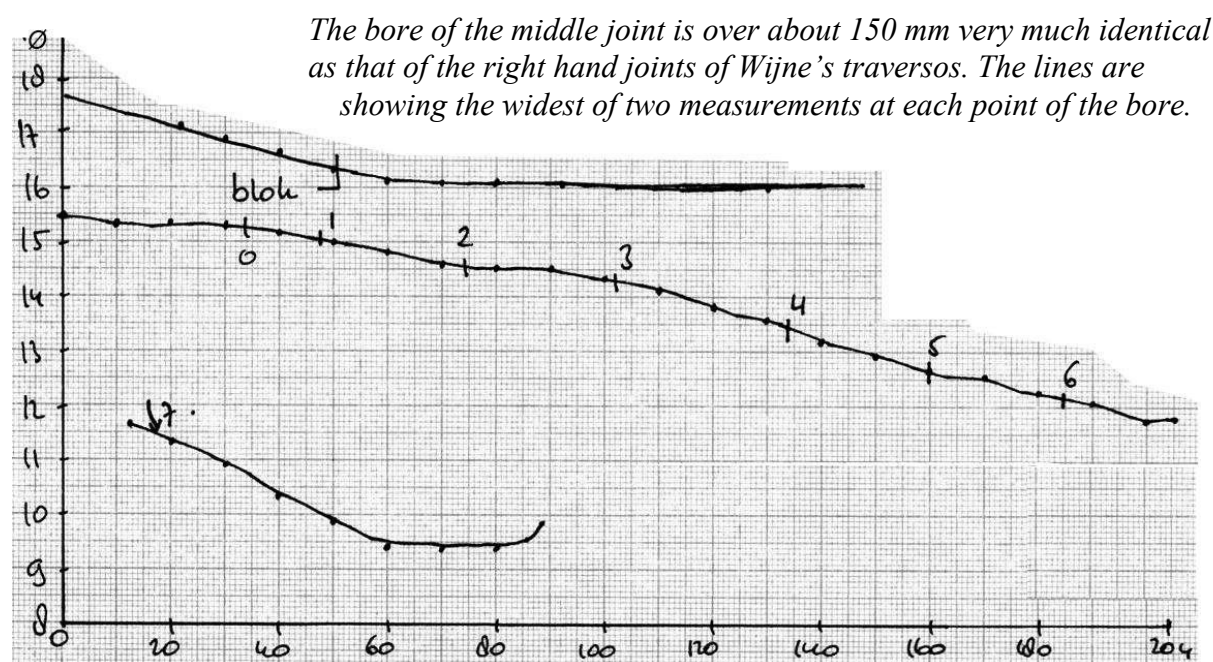
15.5- 0	15.3- 29	15.0- 52	14.6- 72	14.5- 89
14.4- 98	14.2- 108	13.8- 122	13.2- 140	13.0- 148
12.6- 168	12.2- 180	12.0- 192	11.7- 202	11.8- end

foot (III): L 88.1; socket: Lmax 11.8; \varnothing max 17.1; hole 7 at L 16, \varnothing 4.5 x 4.6;

bore (\varnothing , Lmax, from upper end):

11.6- 12	11.3- 20	10.4- 39	9.8- 50	9.4- 60
9.3- 66	9.4- 70	9.5- 74	9.7- 82	9.8- end

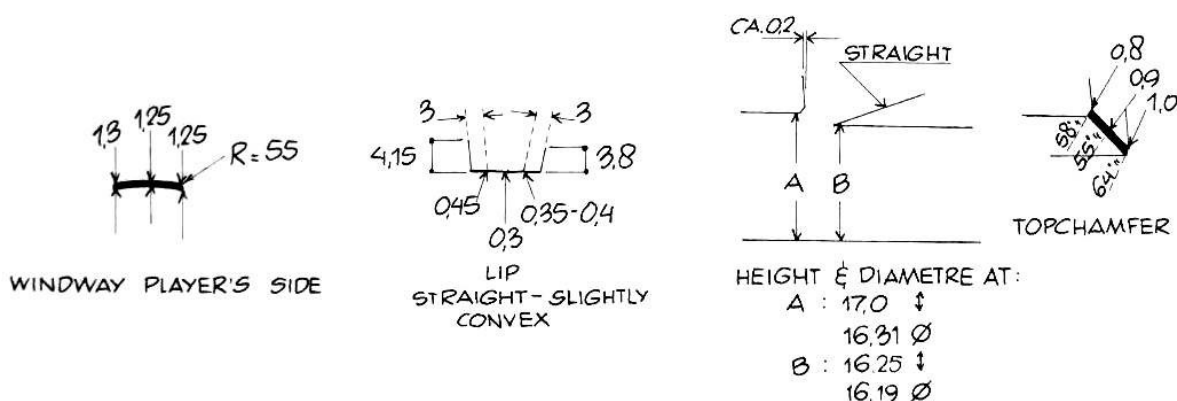
Bore profiles of the three parts of the Wijne recorder, with positions of the block ('blok') and the tone holes, based on the measurements above:



Wijne's recorder is preserved very well. The bore of all other parts is on cross section hardly warped (apart from the upper 30 mm of the middle joint), the windway is in nice condition. Remarkable is the very long window: with in average 4.6 mm longer than on most baroque alto recorders in f. A bit strange: the lower footring is rather thick (length) and small (diameter). It looks original, but is different from the only other surviving foot, that of the soprano recorder by Wijne in the Brüggen collection (it is actually the foot section of the combined lower part of the instrument: middle joint + foot, see photo right).



About the windway of the third flute: in cross section slightly curved, whereas the lip (labium rim) is almost flat. But there might have been some warpage there.



Both the block surface and the roof of the window are longitudinally almost straight, no vaulting or curves to be seen. That makes copying of the windway relatively easy. From the measurements (by Hans Schimmel) I have calculated the angle of the windway: in the roof slightly going down, on the block slightly upwards. But there are some questions. In the drawing above, the height at point A from bottom to roof of the windway is 17.0 mm. The height of the block is 16.65 mm, which is rather more than the height under the labium (B on the drawing, 16.25 mm) and what means that there is only 0.35 mm left for the wind going through. That is very narrow and is maybe the cause that the high notes on the recorder do not speak very well. I have described that in the catalogue as follows: 'Both windway and block are in good condition, although the centre and left side of the block are too high at the window end. Only the right side of the window edge is visible.' And about the sound: 'The recorder has a very individual tone, accompanied by a slight noise. It is stable at the bottom and has an initial speech characteristic (comparable to the 'chiff' of organ pipes) in the higher registers. The third register, however, speaks only with difficulty.'

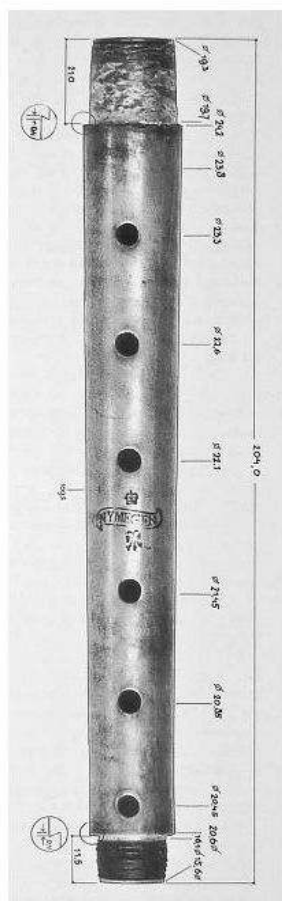
On my copy, I have given more room for the wind, not by lowering the block, but by making the roof higher. The third register speaks fine, with some (but very light) chiff, and there is a slight noise, especially in the lower tones. My overall impression of the copy: a gentle, elegant (my wife says: warm) sounding instrument, not so loud. It doesn't like to be forced.

So far, so good. But I have not discovered all secrets of this recorder. What happened was what I always do: drilling the tone holes initially too small, and making them larger in the process of tuning. I had few problems with that tuning process, the only thing was that I had to ream the bore in the upper section of the middle joint a bit wider to get better octave intervals.



I tuned the notes according to historic fingerings, but made a second middle joint to play the recorder with modern baroque ('Dolmetsch') fingerings: making hole 4 a bit smaller, and hole 5 a bit wider. That worked very well, giving better ('easier') fork-fingered notes in the second register. But then the discovery: I checked the size of the tone holes on both parts with the original instrument and was surprised to discover that my holes were clearly smaller. But why? The bore was exactly enough copied (rather a bit too wide than too narrow).

Also different is the turned profile of the foot. As I didn't like that of the original recorder, I made a new one, more elegant and in my opinion more in line with the sound of the instrument. But did I capture the original sound when I played the instrument (over) 30 years ago? With the large window and tone holes, you might expect a bigger sound.



Why have I made this instrument?

There was a question from Jem Berry, he is planning to make a copy and he knew that I have a lot of information about this maker and his instruments. So I became inspired to make a copy as well, from a recorder which I have seen for the last time over 30 years ago. Robbert Wijne, who lived in Nijmegen, from 1698 to 1774, was the first Dutch woodwind maker whose instruments I discovered (the other one was F.G.A. Kirst from Potsdam, Germany). Further research about Wijne's relation with other makers resulted in writing a dissertation about all (perhaps too many...) aspects of Dutch woodwind making. But in the end I have not found answers to the question where Robbert Wijne received his education as maker of musical instruments, nor how his third flute. is related to recorders of other makers. Was it a one-off instrument, was it completely his own design?

Conclusion: I am not disappointed with my copy of the Wijne recorder. It is a nice instrument, plays well and it proves that it is not too difficult to achieve a satisfying result with the measurements from the catalogue as a starting point and with some basic knowledge of the rules of woodwind making. It is not an exact copy and therefore not perfect; as a musical instrument it is a piece to cherish.

A Bøhm flute from Aarhus?

When you mention the name Bøhm flute to flautists, they think of the beautiful transverse flute, which was developed around 1747 by the German flute virtuoso, composer and inventor Theobald Böhm. But the Bøhm and the flute discussed here are two completely different things, though they might have something to do with each other.

Our Bøhm, more precisely Gotfried Böhm, became organist at The Church of Our Lady in Aarhus probably after Anders Orgemester, mentioned on 21st May 1665. We do not know where or when Gotfried Böhm was born, but he must have held the office from the late 1660s until his death on 8th May 1677. Neither the organ playing job at Our Lady's Church nor at the Cathedral were at all lucrative jobs and both offices were merged some years after Böhm's death, and even then, as appears from the Diocesan Office's copy book of March 20, 1792, it was a problem to live on the wages:

"It is quite probable that the Aarhus Churches have for a long time had little fortune, for both together have only been able to give sufficient Entertainment and Remuneration to one Organist for His Business in Public Worship [...]"

But Böhm made the most of his musical talent and in 1669 was also given royal privilege to play for small parties at "sit Positiv, Symphonia och huis anden hand lært hafuer", which meant that on his little portable organ, his clavichord and other instruments he could play upon, he in fact got permission to compete the city musician Henrich Bertelsen Kloch at weddings and other civic feast. It was an unusual permit which went beyond what Kloch would have earned.

From Böhm's post mortem sale inventory of June 12, 1678, we get more precise information about his instruments.

Instrümenter,

1 Possitio med 4 Positiv	60 Rdl
1 stor viol de Gamba	15 Rdl
1 smaa Descant violin	5 Rdl
1 Bändor	3 Rdl
1 Cytrinchen	3 Rdl
1 Trompet Marin	4 Rdl
1 Ivalforn boms fløjt med guld bånd	1 Rdl 2 Mk
2 smaa Bøsbombs fløjt	2 Rdl 1 Mk
2 quart fløjt 2-3 Mk	1 Rdl 2 Mk

1 Possitio with 4 votes, and a small yellow box with fittings	60 Rdl
1 large viola da Gamba	15 Rdl
1 small Descant violin	5 Rdl
1 Bändor	3 Rdl
1 Cytrinchen (small citterns)	3 Rdl
1 Tromba marina	4 Rdl
1 Ivory Flute with case	1 Rdl 2 Mk
2 small Bøsbombsfløjter (boxwood flutes)	2 Rdl 1 Mk
2 quart flutes of 3 Mk	1 Rdl 2 Mk

All the instruments together were valued at 94 rigsdaler and 5 shillings, a nice sum at that time. The small portable organ, the positive or 'Possitio' as it is called here, was naturally enough the most valuable and one of the instruments Böhm was allowed to use around and about for little gatherings. On the other hand, we do not find the Symphonia he was also permitted to play. But it appears to be his widow Dorthe Poulsdatter Kramer, daughter of postmaster Poul Reinhardt Kramer in Aarhus, who remarried after Böhm's death, this time to his successor in office Jens Hansen, who inherited Böhm's clavichord, for in her own post mortem sale inventory or 28 August 1682 we find three keyboard instruments

1 Symphony, with strings, to 10 Rdl
 1 gl. Covcordium 4 Rdl
 1 ditto with strings, 3 Rdl

If you compare the instruments and the prices from Böhm's auction, it immediately seems as if it was a mistake that the ivory flute was valued lower than, for example, the Tromba Marina, a single-string instrument with a triangular body built of spruce or pine. This 'Ivory Flute with case' must have been an instrument of the recorder type when taking the date in consideration. In 1677, the baroque traverso was brand new and had hardly come to Denmark yet, and very few Renaissance transverse flutes were made of ivory. Now we do not know how long Böhm had had the instrument; but it is precisely in the years before his death, that this transitional recorder, between renaissance and baroque occurs. We know it from today the depiction in Jacob van Eyck's *Der Fluyten Lust-hof* of 1648/49, and through the 30 specimens found today around museums and in private collections, of which there are two made from narwhal horns from Christian IV's time, located at Rosenborg Castle.

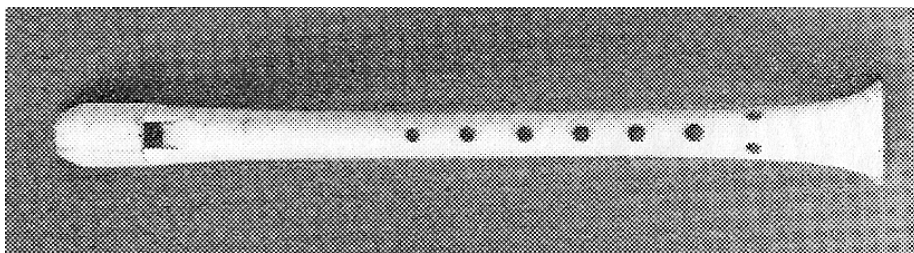


A few years ago, a soprano recorder of this transitional type came to light in the Silkeborg area, unfortunately without information concerning provenance. It is now in the Danish Music Museum in Copenhagen. It is 28.2 cm long, and is made of ivory in one piece and has a leather case. It fits in material, type and date, and in having its leather case, with the instrument mentioned in the Böhm sale inventory. The instrument is not in playing condition. The labium is damaged and the instrument has at the upper end a long and old crack that might well be from Böhm's time. These essential defects would provide a reasonable justification for a valuation of 1 Rdl. for a useless recorder, but which nonetheless was of ivory. So this might be Böhm's flute.



Ivory recorder from approx. 1650-60 found in the Silkeborg area, Danish Music Museum, Copenhagen

Now, a builder's name is not specified in either the sale inventory or on the instrument. And for Böhm's instrument only an original deed of commission or sale or the like could document this. But in the case of the (re)discovered flute, we have the opportunity to compare it with the other known copies of the type. And here there is especially an instrument in Edinburgh that catches the eye: An ivory soprano built by the Dutch instrument maker Richard Haka around 1680. The shape of the two instruments is more or less identical except that Haka's flute is tuned in c, whereas the anonymous recorder is tuned a minor third higher, in *E^b*.



Haka recorder in Edinburgh



The 'Böhm' recorder

Böhm's instrumentarium differs from that of ordinary organists in including woodwinds and strings. It is more reminiscent of city musicians, but Böhm also had the licence of a town musician.

What did he play then on his little ivory flute? Did he wander around the cemetery as the evening fell playing variations on familiar tunes, as van Eyck did at St. John's churchyard in Utrecht at the same period? Well, the sources do not report anything about this, but via Böhm's inventory, we get an idea of what music the flute and his other instruments was used for.

1	Voigtländer's German songs in Folio	33
2	Petzel's Musikalische Arbeit 5 parts in folio	13
3	Rosenmiller's Sonaten 5 parts in folio	13
4	Petzel's Exercitationum Musicarum in folio 2d.	13
5	Voigtländer's German songs in folio	33
6	Voigtländer's German songs in folio	33
7	Voigtländer's German songs in folio	33
8	Voigtländer's German songs in folio	33
9	Voigtländer's German songs in folio	33
10	Voigtländer's German songs in folio	33
11	Griean Heptacordium Panicum in 4to	33
12	Voigtländer's German songs in folio	33
13	Voigtländer's German songs in folio	33
14	Voigtländer's German songs in folio	33
15	Voigtländer's German songs in folio	33
16	Voigtländer's German songs in folio	33
17	Voigtländer's German songs in folio	33
18	Voigtländer's German songs in folio	33
19	Voigtländer's German songs in folio	33
20	Voigtländer's German songs in folio	33
21	Nomen stat. lat. Franc. Italianus in 4to	33
22	Voigtländer's German songs in folio	33
23	Voigtländer's German songs in folio	33
24	Voigtländer's German songs in folio	33
25	Voigtländer's German songs in folio	33
26	Voigtländer's German songs in folio	33
27	Voigtländer's German songs in folio	33

1. Viogtender's German songs in Folio.

Gabriel Voigtländer 1596-1643. *Erster Theil Allerhand Oden vnnd Lieder, Welche auf allerley als Italianische, Frantzösische, Englische, vnd anderer Teutschen guten Componisten, Melodien vnd Arien gerichtet, Hohen vnd Nieder Stands Persohnen zu sonderlicher Ergetzlichkeit, in vornehmen conviviis vnd Zusammenkunfftten, bey Clavi Cimbalen, Lauten, Tiorben, Pandorn, Violen di Gamba gantz bequemlich zu gebrauchen, vnd zu singen, Gestellet vnd in Truck gegeben, Durch Gabrieln Voigtländer. Ihrer Hoch-Printzlicher Durchleuchtigkeit zu Dennemarck vnd Norwegen, etc. Wolbestelten Hoff-Feld Trommetern vnd Musico. Sohra (Sorø) Gedrucht auff der Königl: Adelichen Academy von Henrich Krusen, Bestalten Buchdrucker daselbst. Im Jahr 1642.* Voigtländer was employed amongst other things as court trumpeter by Prince Christian at Nykøbing Falster.

2. Beicher's Musikalische Frühling 6 parts in folio.

Dietrich Becker 1623-1679. *Musikalische Frühlingsfrüchte* 1668.

3. Petzel's Musikalische Arbeit 5 parts in folio.

Johan Christoph Pezel (eller Petzel, Pecelius m.fl.) 1639-1699.

Musicalische Arbeit zum Ab-blasen eller Hora decima musicorum Lipsiensium. Sonater f. 2 zinker og 3 basuner. Leipzig 8. Februar 1670.

4. Rosenmiller's Sonatas 5 parts in folio.

Johann Rosenmüller 1619-1684. *Kunne være Sonate da camera cioe Sinfonie Alemande...con cinque stromenti da arco, et altri ca. 1671.*

5. Reltz Exercitationum Mussicarum in folio.

Mathias Kelz ?-ca. 1694. Exercitationum musicarum 1669.

6. Johan Jacob Löwen's Sonatas 4 parts.

Johann Jakob Löwe von Eisenach 1629-1703. Could be from the Düben collection for 3, 4, 5, or 6 from 1665.

7. Gertram Muller's Lieder.

[unidentified]

8. Frederik's Zuber's Sing Spiel.

Johann Friedrich Zuber -1693. 21 songs from G.H. Webers Sing- u. Spiel-Arien 1665.

9. Casper Horn's Parergon Musicum in 4te udi tuinde lange Parter.

Johann Caspar Horn 1630-1685. Parergon musicum consists of 6 publications from the period 1664-76 of a total of 284 4-5-part dances

10. Hammerschmidt's Musikalischer Andachten 6 parts in 4to.

Andreas Hammerschmidt 1611-1675. Musichalischen Andachten, The devotional music in 5 parts came out between 1639 and 1653. Part 2 1641 and Part 4 1646 are the only ones containing 6-parts pieces.

11. Corvian Heptacordum Danicum in 4to.

Hans Mikkelsen Ravn 1610-1663. Heptacordum Danicum 1646.

12. Andreas Herbst Musica Practica in 4to.

Johann Andreas Herbst 1588-1666. Musica Practica Sive Instructio pro , Das ist: Eine kurtze Anleitung, wie die Knaben [...] auff Jetzige Italienische Manier [...] Können informiret [...] werden. Deßgleichen denen anfahenden Instrumentisten. Nürnberg 1642.

Whether Böhm around 1670 played Hammerschmidt and Pezel on his ivory recorder, we will probably never know. Böhm had an ivory flute. The ivory flute found today fits the description of his, but whether it really was his, perhaps the little figure in the attic above the Church of our Lady, where Böhm worked and was buried, sitting and staring out as if awaiting the final proof, is the only one who really knows.

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