No. 23 APRIL 1981

FOMRHI Quarterly

FELLOWSHIP OF MAKERS AND RESTORERS OF HISTORICAL INSTRUMENTS

7 Pickwick Road, Dulwich Village, London SE21 7JN, U.K.

FELLOWSHIP of MAKERS and RESTORERS of HISTORICAL INSTRUMENTS

Bulletin no.23 April, 1981

Sorry, we're a bit behind ourselves this quarter; my fault, I was away on a conference at just the wrong moment, and Easter isn't going to help.

FINANCIAL REPORT: The books have now been audited for last year. As I reported in the last issue, the accumulated surplus is over £1,000, £1245.83 to be precise, of which £625.06 carried forward from previous years, leaving a surplus for 1980 of £620.77. With continued inflation which hits us on printing and paper (you may have noticed that we have switched to a thinner paper in the previous issue; nobody has complained and it saves both on paper and on postage -- I did complain and the result I hope is that the outer sheet will be heavier and so sturdier) and with an unexpected, and large, increase in postal rates, a surplus is probably sensible. At least we may be able to hold the subscription rate for a while longer. The books are always here if anyone wants to check that I haven't been drinking their subscriptions!

SECRETARYSHIP: I shall be due for re-election (or otherwise) this autumn and I therefore wrote round to the Fellows last quarter to tell them that I have been invited to set up and run the National Museum of Musical Instruments in Jerusalem. Just when this will take effect, I'm not sure. I hoped at that stage that it would be this November, but at the moment there are two different schemes being argued about over there (one involves a new building, a couple of million dollars and three to five years before it happens; the other, which I'm still hoping will win, only completing an already-existing building, about £150,000 and could be in operation late this year) and I have no idea which will win. I asked them whether they would want a Secretary in Jerusalem (the main snag is the postal service; it takes three to five weeks to get an answer from London to Jerusalem and back to London), and so far the inclination seems to be that the majority think it should work all right. Voting on it will be next quarter, or rather on the post of Honorary Secretary. If any of you have views on this, let me know and I will put them to the Fellows. More important, if any of you want to stand (or to nominate anyone else, but in that case make sure that he or she is willing) as Secretary, let me know. A fair amount of work is involved (but see the next paragraph, which will remove about half of it) for letters come in most days which have to be answered and preparing the Bulletin takes a couple of days once a quarter, and longer in April since the List of Members itself takes most of two days. It is a satisfying job to do, though, for one is in friendly contact with colleagues all over the world, and when one has done a favour to one member one can ask a favour from another. Nominations should be here as soon as possible and certainly before the end of June. We are informal so you are welcome to nominate yourself; if you nominate anyone else it would be safest to enclose a note from him or her saying that they are willing.

HONORARY TREASURER: This is a job that I have combined with Secretary, but if I go to Jerusalem it will have to be done by someone else, and I think by someone in Britain. This for two reasons: 1) I can handle both jobs while writing books, lecturing and playing, but I could not hold down a full-time job in a museum and write books etc and do both jobs. 2) It would not be practicable to have money zipping (or rather crawling) to and fro from anywhere in the world to Jerusalem and back here to pay our bills. They have fairly strict controls about the export of money which could be got round (there are provisions for international finance) but which would take extra time and trouble. Also their banking system, while not as archaic as the American (my subscription to the American Musical Instrument Society was refused because they could not change a sterling cheque) is not as efficient as ours. Whatever we may say about this country going to the dogs, we are still a world financial centre and the banks will accept

cheques in any currency which is allowed to be exported, whether they are bank cheques or personal cheques, and cash in anything more exchangeable than cowrie shells.

So, we do need an Honorary Treasurer. For those unfamiliar with our terminology, Honorary means that you get nothing in return except the satisfaction of helping your mates. I charge all postage costs, of course, and long distance telephone calls, and the envelopes you get your Qs in are paid for. I'm too lazy to keep separate stocks of ordinary envelopes and paper, so I use my own and help myself to a FoMRHI one on the odd occasions I need a larger one. FoMRHI also pays for the carbon ribbons for the Bulletin, which I also use for my own Comms. Some other societies pay what is called an honorarium to their Honorary Offciers (it comes out at about £1,000 a year for each for one of them); if we did that, we would have to put up the subscription. This of course we could do, but it would have to be voted on, so initially at least we are looking for a volunteer who would do it for the love of it, plus expenses.

* I would stress that this is essential. If you want FoMRHI to continue, we *
* must have a Treasurer. Volunteers, and nominations of others (again with *
* a written consent to be nominated), to me by the end of June please. *

STOLEN INSTRUMENT: A very small saxophone was stolen from the Exhibition of Instruments by Sax in Paris. Please keep an eye out for it and if you see it, tell either the owner, Robert Vanlinthout of 145 rue du Midi, B-1000 Bruxelles, Belgium, or the organiser of the exhibition, F.de Lalle of the Centre Culturel de la Communauté Française de Belgique à Paris, 7 rue de Venise, 75004 Paris, France. The instrument is described as a sopranissimo saxophone in B flat, with a low B flat key, marked R. VL. The body is gold-lacquered and the keys are nickeled with white leather pads. The mouthpiece is ebonite, 5 cm long, with a silver-plated ligature and nickel cap. The overall height, without mouthpiece, is between 16 and 17cm, ie about 6½ inches. Since saxophones of this size are very rare, it should be easy to spot.

FURTHER TO: Comm.189 (review of Philip Macleod-Coupe's Lute Construction booklet). The review said that this cost £3.75 to non-members of the Lute Society, but Paul Reap says that the Early Music Shop quoted him £1.50.

Comm.249 and Bull.22 p.3: Tim Hobrough writes on this and Comms.251 & 286a:

Wterproofing hide glue; either Workshop Reciepts or Fortunes in Formulas , I believe both are turn-of-the-century and English, contained in one or the other are about6 or 7 recipies for waterproofing glue, and about a dozen or more for making it. My Father's lost his copy of one but I'll see if I can check in the other. Perhaps someone who spends time in libraries could track this down?

Comm.251:
Pricing and Selling to Trade; remember, when you give a shopkeeper a discount, you're paying them to deal with a lot of the "ooh-ah!" rubbernecking crazy tourists who can waste so much of your time. If it takes me up to two hours with a customer buying a £60 harp, and one"customer" in ten who walks in off the street is seriously interested, and it takes sometimes an hour to find out, it makes sense to have someone else deal with the casual trade and spend my time with people who take a little trouble to find me. So the shops earn the discount I give them (1/3)

Cobblers; being one I naturally feel that it's an honourable approach to instrument-building, provided you don't make rubbish, mis-label your products, or

over-charge. The shortage of good cheap instruments, wide availability of expensive mediocre instruments, andpredominance of artists over artisans in the building trade (and amateurs over professionals) (that's not a judgement on quality) leads to elitist snobbery on onehand and anti-elitist reverse snobbery on the other, both of which are detrimental to the Cause. On the other hand, if a musician hawks the familly silver to buy a coveted jewelled artisticinstrument that they've fallen in love with, chances are they'll play better music for it.

Comm.286a:
Re. plywood; there are two main things wrong with ply 1)you can't treat it as if it were solid wood & 2) most if not all of the easilly obtainable ply is rubbish, suited only to filling space. I also feel that ply is much costlier than solid wood, if you take into account the difficulties of working, machining, splintered -edge cleaning, and finishing.On larger instruments this may not apply.

Bull.21, p.5: Paul Kemner says another supplier of various models of the Router-Duplicator is Dupli-carver, 4004 West 10th Street, Indianapolis, Indiana 46222, USA.

Bull.21, p.7: Paul also says that regarding the V&A plans for viols that he asked for access to, he meant to hand-copy them. To my mind (jm writing) this is breach of copyright and should not be done. The V&A is not a FoMRHI member, but a number of plan publishers are members and we would welcome their views on this. You should bear in mind that if those who publish plans find that their customers are copying them, whether by hand or by machine, and passing them on, they will be less inclined to publish plans and we shall all be the losers. The music publishers are cutting back because they find that they sell one copy, which is then photocopied, instead of a number, and it ceases to be a commercial proposition to publish. We don't wnt plan publishers to find the same thing. You can copy and pass on FoMRHIQ because we don't claim copyright, but you can't do it to plans.

Bull.22 p.3: I was asked whether David Way could enlighten us on the survivability of British-made harpsichords in the USA. Dave can:

British-made harpsichords and clavichords at one time enjoyed a reputation (perhaps not altogether deserved) for self-destruction in the American climate, due to almost inevitable failure of glue bonds. Glues which work very well when the instrument is subjected to relative humidities of say 40 to 70 percent, which are not exceeded by the West Coast Littoral climate of Europe, fare very badly when subjected to prolonged periods of 90 percent humidity (in 1978 we had six unbroken weeks here in Stonington when the dew point did not fall below 20 degrees C.). For a large part of the year the easterehalf of the United States has a tropical climate, under the influence of the Bermuda high (the British Ambassador at Washington draws the extra allowance for duty in a tropical climate). Four or five times each winter we have extended periods of Polar highs, great masses of air from Canada and Siberia, very dry, and when heated to room temperature much drier than any desert can produce.

Those who insist on being 'authentic', using only animal glues, had best sell only to museums, or to people on the West Coast (instruments can be protected from the maddening Santa Ana winds of Southern California by throwing a plastic sheet over them for several days).

We have tried all the products that are readily available, and have settled on the yellow aliphatic glue (Titebond and Elmer's Cabinet-Maker's Glue are two brands widely distributed). Aliphatic glue made in Europe that I have seen was much too thick for anything but specialized industrial use; the glues I am familiar with can be thinned with a little water, but I do not know about the European glues. For us there is a disadvantage in that when frozen this glue becomes like farmer's cheese, so in the winter time we have to make a fair number of replacements. The glue that is made for us is supposed to have a shelf-life of over a year--but freezing and thawing can shorten this considerable. The glue should be used at a temperature (workshop and wood) above 20 degrees C., and its flow is improved by standing the bottle in a waterbath to make it warmer than that.

The aliphatic glue is not 'waterproof', but becomes nearly so after two or three months. I have heard objections from some builders that their instruments, if made with such glue, will be difficult to restore in 100 or 200 years. Alas, their instruments seem to require 'restoration' much sooner than that. Those who complain that only animal glue will give the correct sound to the instrument have ears far keener than mine.

Harpsichords built for the American market must be able to stand the maximum extremes of wetness and dryness. Nothing will prevent a soundboard from cracking in January throughout the Northeast and Middle West without humidification. Our experience is that soundboards installed at 45 percent relative humidity will best stand the extremes of this climate. Glues must not turn to jelly at 90 percent humidity, nor crack at 20 percent humidity.

Bull.22, p.3: John Rawson says that the HMSO Timber Bending Handbook has been reprinted by Woodcraft Supply Corp. and is in stock at Stobarts for £6.50. Though aimed at the furniture industry and the use of machinery, it has a lot of information in it and would be very useful to anyone who wants to bend wood. For instance it tells you which timbers bend and how much they will bend.

Tim Hobrough says: it is not a "how-to" book but useful up to a point on general techniques. He has a copy which anyone is welcome to come and read (new address in List herewith)....Important and tricky decisions are all referred to the experience of the technician. It's an industrial book.

Bull.22 p.7: I asked members to pass on lists of plans and Charlie Barker has done so. You will find elsewhere in this* issue: List of plans and of X-rays (either film or reversed light paper prints) from the Nürnberg Germanisches Nationalmuseum, who will also supply X-rays of other instruments on request at similar prices; the drawings are full size but they point out that they are prepared for organological study and that therefore some details which might be wanted by a maker are missing. If you order say why you want the X-rays -- if they are just for research, the price may be cheaper. Also a list of the Smithsonian Institution, Washington, plans; the same caveat on makers' details applies. Also a list of X-rays from the Kunsthistorisches Museum, Vienna; GF means large format (30x40cm) and KF means small format (10x40cm) and printsare available either on paper with reversed light (GF: 105 öS, KF: 55 öS) or on film (GF: 125 öS, KF: 65 öS - öS is Austrian Schilling); all are full size and when ordering you need to quote the whole line of text. He also sent a note from the Boston Museum of Fine Arts, who offer three plans: English guitar by Lucas (Bessaraboff 251) at $16 and a division viol (" a composite drawn after ideal proportions of this size of instrument") with instruction manual at $25, both drawn by Donald Warnock; a double manual harpsichord by Henry Hemsch, Paris, 1756, full size (11 feet by 5½) drawn by R.K.Lee at $25; all prices include mailing charges. Will other members please follow Charlie's example in this.

* Sorry, no room; you won't find them. We'll print them when we get a thin issue. - D.S.

Bull.22 pp.8/9: I mentioned that Bob Marvin had shown me the Korg Chromatic Tuner. I wrote to Hirotaka Watanabe, one of our Japanese members, and asked if he could get me one, which he very kindly did (he is also willing to help any other members who want things from Japan). The model number is WT-12, and it does seem to be a very useful and comparatively inexpensive gadget. It has a range of 5 octaves from low C# to high C natural, two levels of volume either through loud speaker or earphone or, instead of putting out a tone it will measure a tone put into it, either by line or through its own microphone. When emitting a sound the pitch can be adjusted a full 50 cents flat or sharp; when measuring it does so over the whole same range, though you have to set it to whichever note of the chromatic scale you think you are measuring. It can be calibrated from A-435 to A-445; once having done so, the machine then takes that pitch as its reference point so that if one were to wish to set a chromatic scale in equal temperament at, say, A-438, one would just have to tune so that the needle was at zero for each note. For other temperaments one does have to have one's cents tables to hand, of course, and if one wants a pitch centre between A-415 (transpose a semitone for that pitch) and 435, one has to do some calculations first and work out some tables for conversion. It is possible that it can also do other things (there is, for instance, a jack socket marked BYPASS) but the one snag with getting it from Japan is that the instruction book is in Japanese. In fact, if any of you happen to have one with an English-language instruction book, I'd be very grateful for a xerox. Power source is 4x1.5 volt batteries or a 6v mains adaptor. The dial has a light, when needed (I assume that this would run the batteries down fairly fast, but one doesn't often tune in the dark) and there is a little warning light to show that it is switched on (very necessary as it is easy to leave it on when it is in the measuring mode; one would hear it, of course, when set to emit a sound).

Bull.22, p.10: Maish Weisman says that Gildas Jaffrenou's book on Folk Harps is available from Robinson's Harp Shop, PO Box 161, Mount Laguna, CA 92048, USA (tel: (714) 473-8556) at $8, as is a Folk Harp Journal (a quarterly like us) which costs $8 a year in USA, $10 outside, airmail extra; back issues available @ $2.50. Maish says he is a mine of information on harps and has data sheets, etc, available. Maish also says that he has moved recently and started producing babies as well as instruments and welcomes any visitors - route map available from him. He hopes to be in London in June for a short while.

Book News in Q 22: John Downing writes that there are several references in Robert Bruce Armstrong's The Irish and Highland Harps to the stringing of early harps: "Harp strings were of brass wire in the bass", Giraldus Cambrensis, c.1188; Higden's Polychronicon, 13th c; Dante, 13thc; Good, 1566; Galilei, 1581; Stanyhurst, 1585; Lynch, 1680.
"and of thin steel wire in the treble" , Dante and Galilei
"Iron,bronze and silver strings for musical instruments were manufactured in Ireland at a remote period and are mentioned in a poem of the early part of the 12th century which O'Curry believed to be several centuries earlier — Lectures vol.iii pp.223-24"
"The Irish harp has mugh brass strings,...", Praetorius, 1619
"The Irish Harp...maketh a more resounding sound than a Bandora, Orpharion or Cittern, which have likewise wire strings...", Bacon, 1627.
John adds: "There is no reference to Irish harpers drawing their own strings (I think that they may have encountered some difficulty in doing so as they appear invariably to have been blind from birth by tradition!) but the references would indicate that the early Irish knew more about wire drawing than we or our forefathers of 16th century give them credit for!"
JM adds: I don't think there is any doubt about the skill of wire drawing going back into prehistoric times, at leastfor gold and silver jewellery. What I queried in the NRI Catalogue was that the players did this themselves, and the fact that they were blind, which I'd forgtten, adds force to the query.

If Eph and Djilda do have any supporting evidence for this, we would be grateful for a Comm. on it. The whole question of the extent to which players made their own instruments, or accessories, is one that has never really been investigated thoroughly.

Comm.318: Peter Mactaggart writes: Plane Scraping for profit and pleasure, by Marcel Glover. I quite agree one cannot produce a flat surface with a plane that has a curved base, or one that is in winding, but while a scraper may be an ideal way of finishing a large, unmanageable surface, it is quite possible to get a small engineer to surface grind a normal bench plane. The last one my local firm did for me was back the same afternoon, and cost, I think, three pounds. There is a further trap however. Most planes are too lightly built today, and it is easy to pull the base into a hollow with the lever cap. One can sometimes prevent this happening by slackening the main screw, but some planes are so weak that if this is done the blade is not held firmly enough. Another trouble I had recently was that the frog came loose because the screws holding it were too short. One way out of the difficulty of finding a good plane - apart from buying an antique, or one from Henley Optical - is to screw a 3/8" mild steel base onto a well-worn wooden jack or smoother, and get this surface ground after fitting. Make the base in two pieces which butt at the mouth. This means that the mouth can be filed out easily and can be made as fine as you want. I used to have a plane like this which worked beautifully but I stupidly let someone talk it out of me.

Comm.325: John Downing has provided a number of references to the number of guts in a gut string from Henry George Farmer's Studies in Oriental Musical Instruments, Civic Press, Glasgow, 1939 (JM's copy was also labelled Hinrichsen Edition, and copies may still be available from them, and adds that there are many other Arabic references to this matter):

p.91 - on the thickness of lute strings, Al-Kindi, c.874 or earlier:
There are four strings -- the lowest (bamm) is made of thin gut and made up of four strands (tabaqāt) twisted together and is of equal gauge throughout. The third string (mathlath) is made up of three strands. The second string (mathnā) is not so thick as the third and is made of two strands. It is however of silk but is of the same gauge as as if it were made of two strands of gut. The first string (zīr) is silk of the same gauge as if made of one strand of gut. Silk is used because it is stronger than gut and gives a finer tone.

p.92 - from the Ikhwān al-Ṣafā' of the 10th century:
The four strings are all of silk made up from the following number of individual strands: bamm - 64 threads (ṭāqāt), mathlath - 48 threads, mathnā - 36 threads, zīr - 27 threads.

p.95 - from the Kanz al-tuḥaf of the mid-14th century:
Strings are of silk or gut.... if silk, the bamm is made of 64 threads, the mathlath of 48 threads, the mathnā of 32, the zīr of 24, and the ḥād of 16.... If of gut, if the gut is fine, the bamm string is 3-ply, if the gut is coarse, it is of 2-ply. Some make the mathlath string similar but it should be less than the bamm string by one ply. The strings are stained with saffron or whitewash; silk strings are rubbed with a paste of gum and essence of saffron.

JM adds that this book of Farmer's (and others of his works) is full of lute making information, but warns that there has been a lot of doubt cast on the accuracy of his translations in various respects (chiefly on his attempts to prove that Persian and Arabic makers and musicians invented everything centuries before anyone else); he is probably safe enough on fairly simple facts such as the number of strings cited in a text, their material and the number of threads. Personally I'd be careful of his dimensions.

Book News in this issue: A firm called Insights, 41-1091 Broughton Street, Vancouver, B.C., Canada V6G 2A9, lists the Look of Music at $16.95 and also lists a tape (an audio guide to the exhibition) at $10 and a set of 40 slides at $30 which can also be bought in sets of 5 (general views; 3 sets of keyboards; 2 sets of string instruments; brass; woodwind; guitars and lutes — aren't these string instruments? —; and what they oddly call oddities) at $3.50 per set.

A Comm. in this issue: The Director of the Musikmuseet in Stockholm and Cary Karp have very kindly allowed us to print Cary's report on Devices for Measuring the Undercutting of Woodwind Toneholes. We are very grateful to them and would welcome the opportunity to circulate to our members other such technical papers. Please note that this report, unlike other Comms and FoMRHIQ as a whole is copyright and may not be reprinted without their permission. We are always happy to receive material that is copyright, but authors must mark it so, as I have done at the bottom of this Comm. We do prefer single-spacing, though; we've made an exception for this one as it is a 'first'.

Comm.323 (sorry, I've got out of order): Tim Hobrough writes:

Nomenclature; as you know, also a major problem with harp. One of the subjects of future comm. Identifying related instruments by translations of one name into various languages (harp, harfe, hearpe, clarsach. telyn, clarseach) is not acceptable. The German-method multiple-adjective-assemblege is preferable, though sometimes cumbersome. When I want to be precise and unequivocal I rarely use less than four words to name a harp. One-word geographical, national, and temporal expressions have been generally debased by innacurate generalizations, and their use as trade names. As you say, we need modern language terms, but I would add that they must be translatable exactly into other modern languages, without confusion. These terms can then be used as footnotes and sub-scripts to original expressions, if there is agreement on what the original expressions meant in their context.

The other side of the problem is the use of common, well-known instrument's names as generic names (lute, zither) The only way around this (aside fromadopting Latin)is a proliferation of generic names, based on wider considerations than best-known-modern-German-related-type. Drum and Harp workas generic names, with suitable prefixes. But a Koto, I would say, is a member of the Koto (widest - known example) or ? (earliest known name of instrument of closely similar structure and technique) rather than a Zither (closest modern German instrument).Certainly not, as I once saw,with a related instrument, "Chinese Harp."

Unfortunately, English is really only a perfect language for poets, lawyers, and con-men.

And from way back: Tim offered to compile a list of recommended books if members would send him titles, authors, etc of all those that they had found most useful. Response has been small and slow, but it seems to be trickling in. Most of what he has compiled so far has been from references in Qs. I should not be nagging you on this because I haven't sent him a list myself — I have too many books and find too many of them useful to have the time to typeout a list (and hesitate to recommend only the ones I write!). If you have suggestions, do please send them to him. He hopes to produce the first instalment shortly.

SUGGESTIONS: Tim suggests that a list of recommended suppliers would be useful, and also a list of brief technical tips; as he says, and as I'm sure we all find, it can be difficult to hunt back through a pile of FoMRHIQs for something that you know you read somewhere (hence, I must confess, my heading "And from way back" on the previous entry — I looked through half a dozen Bulletins without finding the original entry, and got fed up and couldn't be bothered to chase it back further). This brings us to Martyn Hodgson's suggestion:"... I very much like the layout, content, etc of the Quarterly as it stands; so no 'up marketing' please. Possibly the only improvement I would like to see is a subject index, updated in the same manner, perhaps, as the membership list. e.g.

Varnishes, oil: Bulletin 38 page 287
Bulletin 96 page 5623
....., etc.

This is, of course, not new, but I appreciate the work involved could be prohibitive. Possibly if various members were to undertake particular subject areas (I'd be willing to do Lutes) and to aim at a first approximation as it were, then the task might not be too massive."

So, what do you think? Would you find an Index useful? I replied to Martyn that this might be the time to prepare one; a) we are reasonably OK for money and b) 1975-80 is a nice round figure. However, I'm not sure that his idea of spreading it round various members would work, partly because so many subjects are marginal to more than one instrument (varnishes is a good example) and might either be duplicated, which is wasteful, or slip through the cracks between them. Anyway, someone would then have the job of correlating them all into alphabetical order, unless we did a number of separate indexes. Perhaps this is a job for one of our members with access to a computer (of whom we have several). Would one of them feed all the bits and pieces from the Bulletin, as well as a list of Comms, into a computer and get it to print out a subject index in a format that could go straight to the printer? If this were possible, we could produce a five-year index and then produce an annual up-date for five years, followed by a ten-year index, etc. We would perhaps have to charge you for the five-year one as a separate; it would depend on the printer's bill for producing it. I don't know what sizes of print-out paper are available; if members are going to keep the Index with their Qs it needs to finish up A5, but it could start out any size or shape (it could always be long-side uppermost if that works better) that could be cut/pasted/reduced/etc to finish that size.

Incidentally, I can always supply a list of contents, but this is only what you have on the front page of each issue. I do this each year so that new members can see what has appeared in the past. At the moment it's three sheets, one of them single sided. If you want them, let me know, but I think I ought to ask you the cost, since we don't reckon to go on distributing them after people have joined. I get them done locally (which costs more than the Qs) so it runs out at 50p plus postage.

MEDIÆVAL ICONOGRAPHY: Stratton McAllister sent me a copy of the December 1980 Cornell Alumni News (his old college) because it has an article in it on the mediæval manuscripts in the Cornell University Library; he thought that it's a small collection it might not be known. A number of illustrations to the article show instruments, including the frontispiece of the issue. The manuscript they are obviously most proud of is the Lombard Gradual (no call numbers or folio numbers are given in the article) from the mid-15th century. Two pages from that show long trumpets, lute and other instruments too small to identify (from the Mass for the Feast of St.Michael, September 29th) and a group of two fiddles, portative, lute and pipe & triangle (not tabor) in an unidentified capital G. A French 15th century prayer book shows at the beginning of Matins a string drum (? tromba marina), psaltery, harp, S-shaped horn, shawm and lute. For

further information, write to Cornell University Library, Ithaca, NY 14853, USA.

EXHIBITIONS: A final reminder to visit the Boston Early Music Festival & Exhibition, 26-31 May, which includes a number of concerts, lectures, discussions, etc, etc as well as the exhibition of makers et alii. Their office address is 25 Huntingdon Avenue, Boston, MA 02116; tel: (617) 262-1173.

A final reminder also to book your stand at the London Early Music Exhibition at the New Horticultural Hall, 1st-3rd October. I've just rung them up and there is still some spare space, and probably still will be by the time you get this, but I shouldn't leave it much longer than that. FoMRHI and I will have a stand and look forward to seeing you all there, whether you are also exhibiting or visiting. If you want to book and haven't yet, the address is The Early Music Shop, 28 Sunbridge Road, Bradford, West Yorkshire BD1 2AE; tel: 0274-393753.

COURSES: The Sommerakademie J.S.Bach, Ehrenhalde 14, D-7000 Stuttgart 1, is offering a number of courses in musicology and instrumental performance (flute, oboe, oboe d'amore, bassoon, horn, violin, violoncello and continuo) relevant to the performances this summer of Bach, Mozart and Haydn; they don't say whether the instruments are modern-type or early, but some of the repertoire suggests modern, except for the continuo. Dates: 19th July to 2nd August. Programme here if anyone wants to see it.

Walter Hermann Sallagar writes that they have a good Baroque programme now at Schloss Breiteneich, with Robert Woolley (harpsi chord), Reinhard von Nagel (tuning), Stephen Preston (traverso), Bernard Brauchli (clavichord), and instrument making with Alec Loretto (recorder) and Graham Lyndon Jones (bassoon). There are also making and playing courses for other periods and instruments, including wind ensemble playing on original instruments from Gerhard Stradner's collection. There are three courses: July 12-26 (medieval & renaissance ensemble), July 26-August 9 (wind chamber music) and August 9-23 (baroque ensenble) and instrument making runs alongside and through these periods. Further information from Walter.

The Early Music Centre is running a Conference on Pitch in Renaissance and Baroque Music on Saturday 16th and Sunday 17th May. Chairmen will be Denis Arnold, Jeremy Noble and Brian Trowell. Further information from the Centre.

MATERIALS: Giovanni Tafuro of V.G.Donizetti n.1, Pistoia 51100, Italy, writes to say that he supplies the majority of Italian makers with boxwood, Buxus sempervirens, and would be happy to supply others also. I have asked him for further details (prices, sizes, etc) but have had no reply.

Louis Benanto jr of 221 Bath St. Apt.21-A, Santa Barbara, CA 93101, USA, carves heads and peg-boxes for Peter Tourin and Daniel Foster and would be happy to do so for others. He charges $250 for a head and $150 for a peg-box. He is a professional sculptor with an interest in music and he has sent me a lot of xeroxes of photos of his work which are here if you want to see them.

OFFERS: Henry Tracy offers hospitality to any members passing through Oxford. If you forget to carry your List of Members (I'm always surprised how many do forget when they're travelling), you'll find him in the Yellow Pages under Piano Tuners.

Hospitality is usually available here, too. We have had the pleasure of several visitors already this year.

Ezra Jurmann of Priory Garden, Arundel, West Sussex would always be glad to help anyone with clockwork.

Victor Alexandrowitsh Frolkin, a new member in USSR, would be happy to send members materials from there, particularly in exchange for things that interest him. He is President of the Krasnodar Club of Early Music and

teaches harpsichord, recorder, lute and vihuela playing. His special interest is Spanish Renaissance Keyboard in all aspects. He can offer information on Spanish Renaissance performance practice, contact with museums in USSR and translation into (but not out of) Russian. Although he apologises for it, his English is pretty good and he would welcome any contacts.

REQUESTS: Peter Wallace asks if anyone could produce a Comm. on chalumeaux. He is not the first to ask for this — can anyone oblige?

Paul Kemner asks if anyone knows of sources for 17th or 18th century Salterio (hammered dulcimer) chromatic tunings; he understands that several surviving instruments have note names written under the strings, but he has not been able to find one.

Daniel Špička would like to get some measurements etc to make a tabor pipe. I've sent him the dimesnions of my Provençal and Basque ones, but he didn't say what place and time (or pitch) interested him. If anyone could help with anything more precise than the rough information I've sent, he'd be very grateful. If it's easier, David Owen would send things on to him.

Tim Hobrough would like to be in touch with anyone with information on the use of the harp in Scandinavia in the Middle Ages and Renaissance.

Tim also asks if anyone can help him to track down some of the musicians at the court of Christian IV of Denmark.

I would be very grateful for what John Cousen (who has been very generous in this respect) calls cosmetic instruments. As you saw on the first page, I've been asked to set up a Museum in Jerusalem. The nucleus will be my own collection, but there are a lot of gaps in it. If you have an instrument that has gone wrong and is not worth salvaging (eg a recorder that cracks at the wrong moment so that it looks like a recorder of a certain type but will never play and can't be repaired) but which could be exhibited to show the shape of the instrument, I'd be very grateful. John has given me a recorder of Virdung type, and the body of a bass flute; Tim Hobrough gave me a prototype gothic harp (the scale wasn't quite right, so it wouldn't work) in exchange for one of my books. I'd be in the market for anything like that, and in that way I could show types that I could not afford to buy proper examples of (and anyway it seems a waste to show instruments that could be played, even though I hope a good many of the instruments in the museum will be played). Obviously with a big instrument, if a part goes wrong it's worth taking it apart and fitting a new one, but with a number of small ones, particularly one-piece ones, it's either not worth it or not possible. Whether you are throwing them away (in my direction) or want to recoup the cost of materials otherwise wasted, I'd be equally grateful.

QUERIES: Tim Hobrough asks whether anyone has any idea when we started to have non-functional "art" music, particularly instrumental music? He expects that this is clouded by lack of records in the Middle Ages, but suggests that the harp appears to have developed suddenly at about the same time that rich people started to play music purely for pleasure and that the two may be related. Has anyone else any ideas on this?

Bob Marvin heard a lot about shakuhachis while he was in Japan, including the etymology of the name, which is shaku- a length of 10 "suns" and hachi- eight, the total length therefore being 18 'suns'. He says "Everybody seems to agree that a sun is 3.03cm and a shaku is thus 30.3cm, suspiciously close to an English foot, so close that one suspects that the original shaku was somewhat different and was Meijized into a convenient agreement with those magic rules that made railroad trains". One exception is the new Encyclopaedia Brittanica which gives the shaku as 25cm. He wonders whether that, or other sources, are in error, or whether we have here a

Japanese example of Bessaraboff and the Brunswick inches to the umpteenth decimal place. Particularly he'd like to know how the Japanese shaku came to be so close to the English foot. Has anyone any ideas?

LIST OF MEMBERS: The 1981 main list comes with this Q. Let me know of any errors oromissions please. And do use it. It's especially useful if you are travelling as it puts you in touch with colleagues and, in my experience, colleagues means friends.

MY MOVEMENTS: Except for the odd days here and there, I'm likely to be here through the summer and into the autumn and hope to see any of you who are passing through London. However, bear in mind that, quite apart from having to earn my living, FoMRHI is not the only thing I'm involved with, and it can be quite frustrating to be rung up by someone who'd like to see me but is only here for one more day, having been here for a couple of weeks, when that one more day is one that I'm fully committed on already.

CODA: (unless anything else crops up) This is going to be a big issue. Thank you for responding so well to the call in the last issue for more material. It may even be too big. We have some restrictions: a) the number of pages that can be stapled together in one fold; b) it must come out to an even four pages; c) it's sensible to try to keep within a postal weight bracket (with envelope), which means that it's a bit silly to go 10 or 20 grams into the next step when they go in 50 gram steps. So if Djilda decides to hold anything over to the next issue, will whoever sent it in please forgive her and wait for three months. It may all fit, I don't know; I've got quite a pile here and she mayhave more in Manchester.

DEADLINE FOR NEXT ISSUE: Monday, 29th June please. It would help to have any nominations for Secretary and Treasurer sooner than that. And do remember that we must have a Treasurer (see first and second pages).

Jeremy Montagu

FoMRHI Book News — Jeremy Montagu

Various books have come my way that I can't review here, either because I bought them or because I'm reviewing them elsewhere. Some may interest you.

E.de Briqueville, Notice sur la Vielle. A new and quite cheap edition, with typed text and glued in photographs. Published by La Flûte de Pan, 55 rue de Rome, Paris, 1980. Tony Bingham had a few copies.

J.H.van der Meer, Verzeichnis der Europäischen Musikinstrumente im Germanischen Nationalmuseum, Nürnberg, Band I: Hörner & Trompeten, Membranophone, Idiophone. This, of course, is very exciting, the first volume of the Nürnberg Museum catalogue. I have reviewed it for Early Music and full details will be found there (I hope in the April issue, though it may not be till July - I can't remember when I sent it in). Publisher is Heinrichshofen's Verlag, Wilhelmshaven, price 130DM, and the illustrations are superb, with many X-rays. For details of text etc, see Early Music.

Phillip T.Young, The Look of Music (the catalogue of the special exhibition of treasures at the Vancouver Museum which is just ending). I gather from Phillip (I tried to get a review copy) that it is out of print in Vancouver already, but Tony Bingham has some copies and the English agent (Canongate Publishing Ltd, 17 Jeffrey St, Edinburgh EH1 1DR) and other booksellers may have more. The price is high (£15.95) but if you want rather dark photos of the best instruments Phillip could gather together dating from 1500-1900, it's probably worth it. Every instrument is illustrated and with 8 Hotteterres and 11 Denners, to take just two examples, it does make a nice set of pictures. Without a review copy, that's all I'll say.

D.R.Widdess & R.F.Wolpert, Music and Tradition (a Festschrift for one of our Fellows, Laurence Picken) has one interesting article in it, Graeme

Lawson on 'An Anglo-Saxon harp and lyre of the 9th century', describing what can be seen and discovered on the sculpted column at Masham in Yorkshire. The other articles are equally, or even more, interesting for those who are willing to admit that music is not solely an European phenomenon; there are very important articles on Japanese, Korean, Chinese, Indian, Burmese and Central Asian music and instruments.

Galpin Journal 34 has arrived, with as always many important articles, including: Harpsichord physics, a Denner 3-key clarinet, the Bologna Accademia recorders, cornetts, cittern fretting, arched harps, mandores and colachons, mediaeval fiddles, and two articles on an instrument which has slipped by un-noticed: the tongue-duct flute, an instrument where the player's tongue, rather than a piece of wood etc, forms the block, as well as directing the air on to the lip.

Also just arrived, as a double volume, is the 1979 and 1980 AMIS Journal. They are still way behind; reviews cover books published from 1974 to 1978. There are articles on Paulus Paulirinus and two other earlyish texts, on the Meachams, who were instrument makers, and two on instruments themselves, one on the Greek lyra nd the other on 19th century improvements of the timpani.

Finally, one which will be reviewed here, I hope in the next issue, Hubert Henkel, Beiträge zum historischen Cembalobau, published by VEB Deutscher Verlag für Musik, Leipzig and available also through Das Musikinstrument, Frankfurt/Main. This is really a companion volume to the harpsichord catalogue of the Leipzig Museum by the same author, which I have reviewed here, but it's far too technical for me to do justice to, so it's been waiting till I can organise someone else to do it. It is clearly essential material for anyone working on harpsichords.

It wasn't final. There wasn't a report on the Huismusiek Bouwbrief in the last issue because one of our members who reads Dutch promised to do it instead of me. However, nothing has arrived. We'll have to leave that one out because I sent my copy of it up to Djilda as usual, but I'll do what I can with the latest one, no.20 of February. They have changed their format, which used to be A4 with a punched margin for filing, to FoMRHI size, though with full-size type rather than reduced, in two columns at that on each page, which makes a very short line, sometimes only three or four words. There is an interesting short note (1½pp) by Nelly van Ree Bernard on the Tetrachord, a supergebunden clavichord based on the wooden carving in the Rijksmuseum, Amsterdam by Adriaen van Wesel, c.1475 (see Keyboard Instruments, ed.Bi Ripin, plates 10a and 10b); a 5 page article on making the Baroque trumpet by Geert Jan van der Heide, of which he has sent us an English translation (see elsewhere in this issue); a translation of an article by Alec Loretto in Early Music 1/2, 1973, on recorder modifications; comments by André Klaassen on the article on hurdy-gurdy making in Bouwbrief 18 (3pp); 1½ pages on altrnative ways of making moulds for guitars and fiddles, by Will Etienne; and the first of another series of articles on hurdy-gurdy making, by Wouter Dekker (6pp).

The current issue of World Archaeology (February 1981) is a musical one, edited by Vincent Megaw. It includes articles on: An archaeo-organological survey of the Netherlands by Joan Rimmer, the archaeomusicology of Scandinavia by Cajsa Lund, archaeology and musical instruments in Poland by Tadeusz Malinowski, the conch in prehistory by me, prehistoric brass instruments by Peter Holmes and John Coles, music in ancient Mesopotamia and Egypt by Marcelle Duchesne-Guillemin, the reconstruction of the ancient Greek auloi by J.G.Landels, reconstructing the Greek tortoise-shell lyre by Helen Roberts, the archaeology of musical instruments in Germany during the Roman period by Maria Ginsberg-Klar, and the Australian didjeridu by Alice Moyle. Copies available (if not locally) from Routledge & Kegan Paul at £5.50 or $12.50, presumably plus postage.

TO STUDY THE EMBOUCHURE HOLE FORM OF BAROQUE FLUTE-TRAVERSO

In drafts of modern west masters, as a rule, the embouchure hole is characterised by two diameters by external edge and indications similar to "round very little undercut" or "more undercut" etc. Such information, in essence, gave no idea on one of essential flute details. Meanwhile, the embouchure hole fully yields to formalised description permitting to define (and to reproduce) strictly enough its principal parameters. Set forth below represents by itself the attempt to suggest some measures promoting to solve this problem.

In connection with stated problem I have collected the date by 13 instruments from the collection of the Leningradian Exhibition by LSITM&C. In particular from all embouchure holes of the flutes investigated the waxen replicas have been made. Later on the gypsum forms have been made from the replicas and they were cut by the planes of interest for me. The sections obtained by such method were photographed and printed with big enlargement (ca 1:10). These photographs permitted to obtain the date by the profiles.

The geometry of the head cross-section across the embouchure centre is defined by four dimensions: 1) external diameter of head D_o, 2) bore diameter D_i, 3) diameter of embouchure hole by external edge $\emptyset_o$, 4) diameter of embouchure hole in those places where it conjugates with the bore $\emptyset_i$, (in terms of Fig. 1 $D_o = 2ae$, $D_i = 2ab$, $\emptyset_o = de$, $\emptyset_i = cb$). In the table 1 the mean values in mm and quadratic deviations of these values obtained on the base of the study the above mentioned instruments are shown.

Table 1

x	29.15	18.96	8.91	11.82
o	0.63	0.58	0.35	0.81
	D_o	D_i	$\emptyset_o$	$\emptyset_i$

Judging by standard deviations, the variability of studied dimensions is low. In other words the dimensions of head determining the geometry of the embouchure highly unessentially change from the epoch to the epoch and from the master to the master, following some canon precisely enough.

The consideration of the correlation between the dimensions indicated in the table 1 permits to make an idea on this canon. Thus, the head diameter (D_o) relates to the bore diameter (D_i) as 1.54 which is very near to a simple proportion of 3:2. 35.6° of the circle formed by the external surface of the head falls on the embouchure hole which is very near to the value of $2\pi/10$. The internal exit of embouchure hole occupies 77.1° of circle formed by the bore which is also may be approximated by a simple ratio of $2\pi/5$. Such approximations are more than relevant by the existing confidential interval. As the result we may write down the following canon:

$$D_o/D_i = 3:2 \qquad (1a)$$

$$\arcsin \emptyset_o/D_i = 2\pi/10 \qquad (1b)$$

$$\arcsin \emptyset_i/D_i = 2\pi/5 \qquad (1c)$$

It seems to me that such results agree quite well with general spirit of physical-mathematical conscience of early epochs aiming in all to state the proportionality of the parts of the whole based on the simple numbers. The instrument building sources of these epochs teem of the examples of such proportioning - from the naive definitions concerning the description of stringed frame form to the refined graphic calculation methods of organ pipes dimensions.

The head cross-section across the centre of the embouchure hole demonstrates one of the most important elements of the oscillation flute mechanism - front wall profile. The Fig. 1 represents the geometrical scheme of the embouchure cross-section allows to define the principal concepts and to state preliminarily some important relations. The first of these concepts - the frontal angle (α) formed by external surface of the head and the embouchure frontal wall (angle bee Fig. 1). Let us call the angle formed by the frontal embouchure wall and the bore surface as the conjugate angle (β), (angle ebb Fig. 1). We call the angle between the frontal embouchure wall and embouchure axis (γ) as the angle of inclination (angle beb_1 Fig. 1). Fig. 1 allows to understand the below following definitions of these angles.

$$\alpha = \pi/2 - \arcsin \phi_o / D_o - \gamma \qquad (2)$$
$$\beta = \pi/2 + \arcsin \phi_1 / D_1 + \gamma \qquad (3)$$
$$\gamma = \operatorname{arctg} (\phi_1 - \phi_o) / (\sqrt{D_o^2 - \phi_o^2} - \sqrt{D_1^2 - \phi_1^2}) \qquad (4)$$

The diversity of possible decisions of these expressions is limited by actual state of affairs. The baroque flute is designed so that $D_1 > \phi_1 > \phi_o$. It follows from this that always $\gamma \geq \phi$. Specifically, if $\gamma = \phi$ (pure cylindrical embouchure) then

$$\alpha = \pi/2 - \arcsin \phi_o / D_o \qquad (2a)$$

These expressions are true only in that case if the frontal embouchure wall is the straight line. In spite of that that in fact the frontal wall has a more complicated form, such simplified representation is useful if only by that that it demonstrates rigid interrelationship of all form elements.

The expression 2a is practically useable because the embouchures with cylindrical or nearly cylindrical form in upper part are often met. At the same time the real embouchure never has an absolute sharp edge (in the vertex of frontal angle). Even in those cases when the embouchure is cut with the sharp edge, the wood doesn't allow to obtain the full sharpness. Besides, many masters deliberately blunt the embouchure edge, losing in timbre but gaining in lightness of soundproduce. Thus it is necessary to introduce one more characteristic - r, i.e. the radius of rounding of external embouchure edge.

Finally, the parabolic profiles of frontal wall are met. The most correctly is to describe then by corresponding parameter and characteristic. In this case the definitions of frontal angle and the conjunction angle prove to be more complex. Below I will indicate the tangent angles in conformable points.

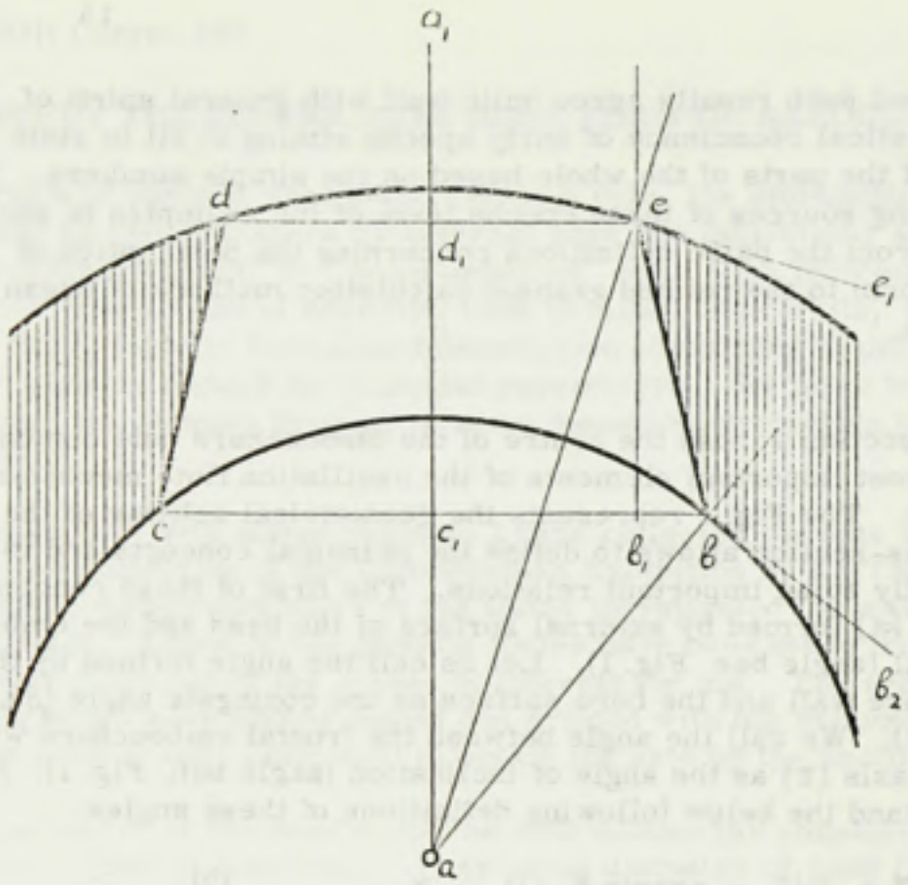


Fig. I

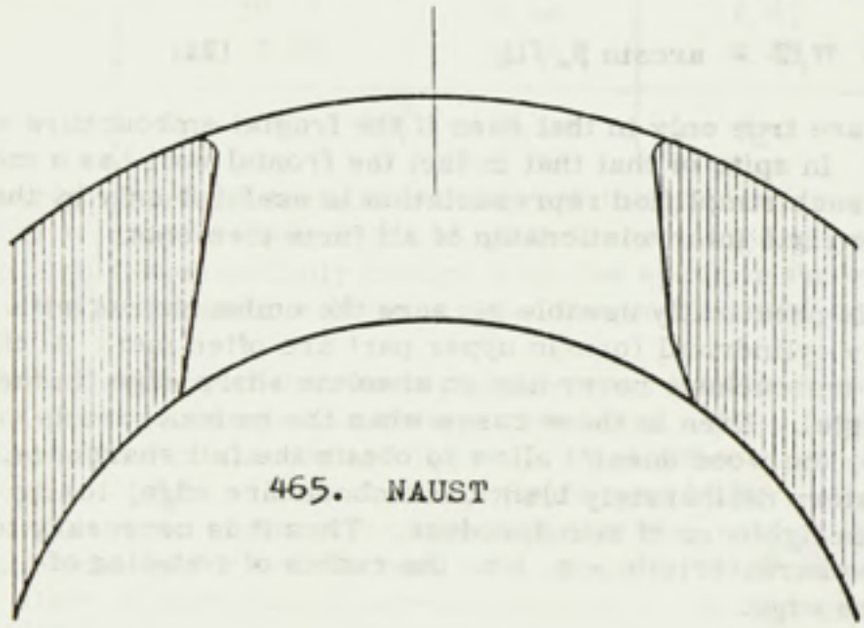
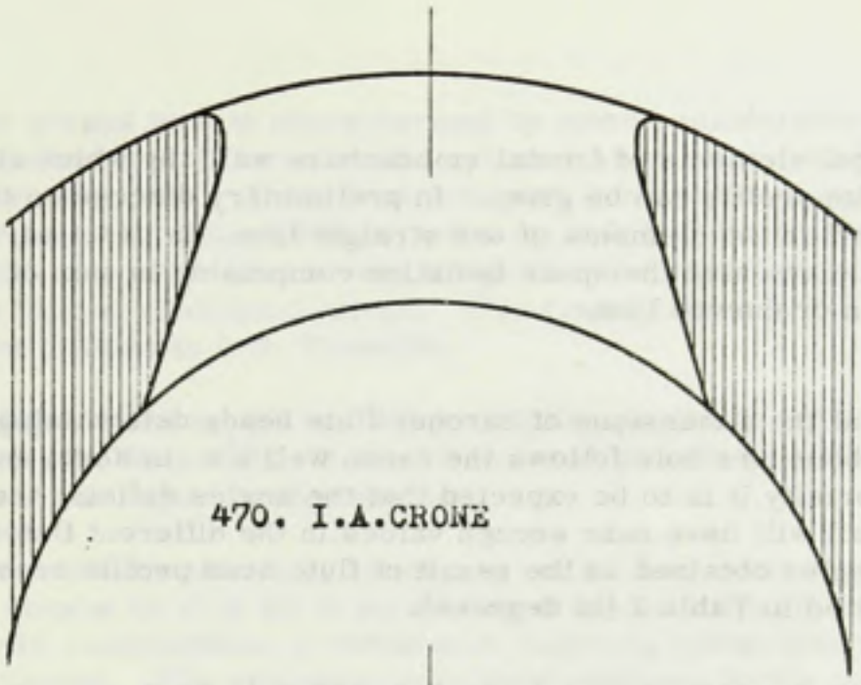
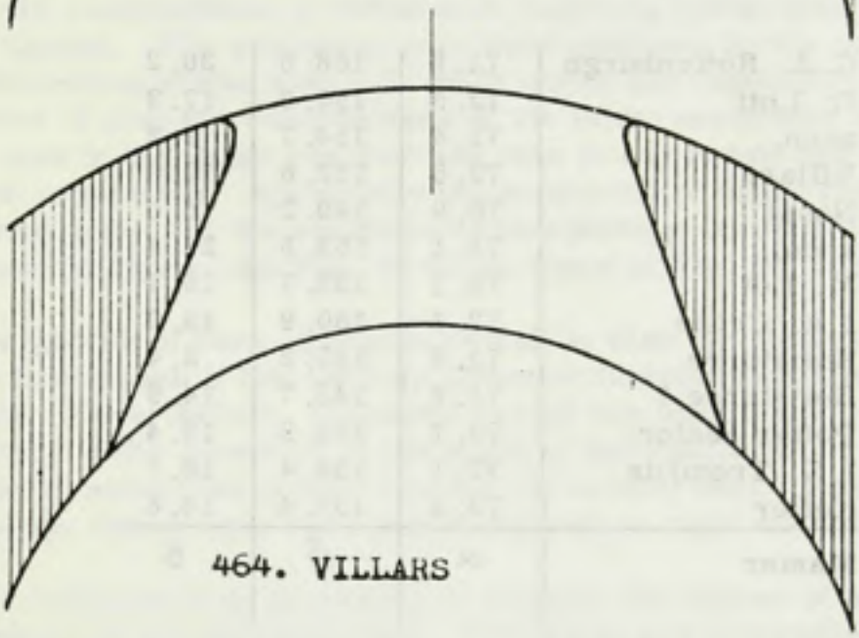


Fig. 2a



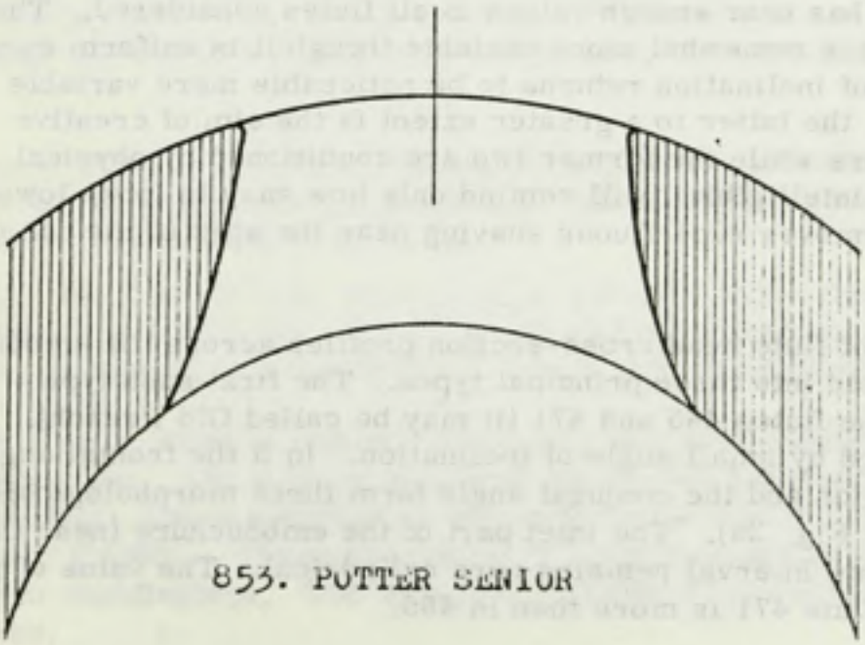
470. I.A.CRONE

Fig. 2b



464. VILLARS

Fig. 2c



853. POTTER SENIOR

Fig. 2d

Such are the principal elements of frontal embouchure wall, by which simply and quite minutely its profile can be given. In preliminary discussion they have been considered as the elements of one straight line. In practice, each of this elements receives also the space isolation comprising in sum of definite type the broken or curved line.

It was told above that the dimensions of baroque flute heads determining the geometry of the embouchure hole follows the canon well i. e. uniform enough. Easing on this uniformity it is to be expected that the angles defining the profile of frontal wall will have near enough values in the different flutes. The values of the angles obtained as the result of flute head profile cross-section study are cited in Table 2 (in degrees).

Table 2

460	G. A. Rottenburgh	71. 9	168. 6	20. 2
462	D. Lott	72. 5	150. 2	17. 3
463	anon.	71. 4	154. 7	9. 2
464	Villars	73. 5	152. 6	19. 0
465	Naust	70. 9	149. 2	6. 6
468	anon.	73. 1	153. 6	27. 4
469	M. Lot	72. 1	152. 7	16. 7
470	I. A. Crone	72. 0	150. 9	19. 0
471	Hotteterre	71. 0	145. 2	8. 4
472	Hotteterre ?	71. 2	143. 7	14. 9
853	Potter Senior	73. 7	155. 9	15. 4
855	I. G. Tromlitz	73. 1	158. 4	18. 7
1150	Keller	73. 5	155. 4	14. 8
No by the Catal.	Master	α	β	γ

It may be seen that the supposition made above fully justifies itself for the frontal angle which has near enough values in all flutes considered. The angle of conjunction is somewhat more variable though it is uniform enough. In return the angle of inclination returns to be noticeable more variable value. Apparently, the latter to a greater extent is the aim of creative search of the masters while the former two are conditioned by physical causes (to be more intelligible I will remind only how easy to loose lower tones if someone removes superfluous shaving near the apex of the conjunction angle).

The configurations of flute head cross-section profiles across the embouchure centre may be divided into three principal types. The first such type - early, typical for the flutes 465 and 471 (it may be called Old French). This type is characterised by small angle of inclination. In it the frontal angle, the angle of inclination and the conjugal angle form three morphologically separate zones (see Fig. 2a). The inlet part of the embouchure (near the frontal angle) at some interval remains pure cylindrical. The value of pure cylindrical part in flute 471 is more than in 465.

The second type is characterised by more considerable angle of inclination and also by that that after the cylindrical as before inlet part goes the straight generating line. The cylindrical part in seperate cases it proves to be more extensive (in flute 468 it occupies up to 2/5 of the frontal wall length) and in some cases occupies a very insignificant distance (see Fig. 2c). In Fig. 2b the typical situation is given. This type is found in all later instruments from Villars to I. G. Tromlitz.

The exclusion is 460 and 853 having the parabolic profile and forming the third type (Fig. 2d). It should be noted that the both flutes have the rich sound and light soundproduction.

The evolution technique of playing on the flute in the aspect of interest for us consist first of all in mastering of the upper register. This is testified by the confrontation of Hotteterre fingering tables with the tables of De Lusse or Quantz. The analogous conclusion appears by the comparison of f. ex. Hotteterres works with I. S. Bach works and especially Telemann's one. In order to play the compositions of the latter mentioned authors it is reliable to take in the upper register any note in any tempo and in the most diversified sequencies. Apparently the mastering of upper flute register has the consequence for the embouchure morphology accomplishing the transition from the type in the Fig. 2a to the types in Fig. 2b, 2c and 2d.

The profile of back embouchure wall is also the element of head cross-section though it has entirely different function than the profile of frontal wall. Nevertheless, it doesn't reveal any fundamental differences with the latter. (The exception is the angle of inclination which for the back wall usually somewhat larger than for the frontal one). Possibly it is due to that that the flutes were used in playing both in right and left positions.

In conclusion it is necessary to mention the degree of blunting of the upper edge of the embouchure hole. The flutes are diversified enough in this aspect, though I do not succeed in finding any evolution regularity. For example, Hotteterre's and Tromlitz' flutes have almost sharp edge, while Naust and Crone's flutes have the rounding with the radius of 0. 4 - 0. 5 mm.

I have described already the majority of flutes mentioned here in my previous works. However there are such about which I write for the first time. I would like to enumerate them.

460 - the flute of G. A. Rottenburgh, grenadil with ivory rings and head cover, the silver key. Later three keys have been placed on the flute - F (no duplicated), Gis and B flat. There is a crack going from the socket in the head.
463 - anon. flute of maple. The brass key with riveted spring - apparently a later one. The flute is decorated by carved representations with allegoric meaning. The inscription is cut on the head: "DUM VIXI TACUI, MORTUA VOCE CANO". There are letter "S" and the inscription "genever" on the upper middlepiece. The data of 1607 (1601 ?) is cut on the lower middlepiece.

470 - the flute of I. A. Crone, boxwood without ivory rings. The footpiece is alien. There is a crack in the head.
1150 - the flute of ivory with mark "Keller a Strassbourg". The silver key (later). The footpiece has repaired crack. The upper middlepiece has the upper tenon mounted at the thread. The head is divided by two large cracks at two longitudinal halves. There are also the other damages.

In spite of that I have conducted the investigations connected with given article with all carefulness accessible to me, I would not guarantee the complete precision of my data. Nevertheless the results obtained by me are interesting enough to permit the discussion. If such discussion will follow I will consider that the work attains the object.

Felix RAUDONIKAS.

FoMRHI Comm. 328 Jeremy Montagu

What was the Flauto d'Echo?

The introductory announcements of a recent broadcast of Brandenburg 4 by one of our members (he directed the performance but I doubt whether he was responsible for the text of the announcement), with its firm assumption that the flauto d'echo was a recorder, made me have another look at the score. And as my son pointed out to me, comparison between Brandenburg 4 and the keyboard version (BWV 1057 F major for cembalo, two flutes and strings) makes it perfectly clear that whatever flauti d'echo were, they were not ordinary recorders.

According to Schmieder (BWV p.586), the instruments in the keyboard version are: "Cembalo certato, due Fiauti à bec...." and in the Brandenburg (p.583): "Violino principale, due Fiauti d'Echo...", following the flutes in both cases with [Blockflöten] as his interpretation. The Neue Bach Ausgabe (Bärenreiter) full score has Violino, Flauto I, II on the title page of that concerto and, rather curiously, Flauto dolce (ie Flauto in roman type and dolce in italic) on the first page (p99) of score. The volume includes the alternative version of Concerto 1 but not, unfortunately, of Concerto 4, and the only score I have of that is the American reprint of Breitkopf und Härtel which, since it gives the instrumnts as Piano and Flute 1 and Flute 2, is hardly evidential of anything.

The important evidence is in the music itself. In the slow movement, in the Brandenburg, there are alternate bars, or pairs of bars, forte and piano; the first two bars are presumably forte, though unmarked; the next two are piano, the next two forte, the next two piano, the next one forte, the next one piano, and so on (to be absolutely exact the change of dynamic comes on the second crotchet of each bar). In each case, all three solo instruments, the violin and the two flauti, play the forte and the piano passages, making a definite contrast with the same notes first loud and then soft.

In the keyboard version things are very different. Here again we have the pairs of bars, and single bars, repeated first forte and then piano, but this time the flauti play in the first statement, the forte, of each phrase, but are silent for the piano repetition; the echo is played only by the cembalo, who has both what was the violin part, as it has throughout the concerto, and also the notes which originally belonged to the flauti.

The inescapable conclusion is that a flauto d'echo had some device which enabled it to make an echo, a device which the ordinary flauto à bec (to follow the original bilingual name) lacked.

As is well known, and indeed is painfully apparent when ordinary recorders are used in the Brandenburg, the recorder is capable of very little dynamic variation. Play more than slightly softer, and the notes come out flatter as well. This is a characteristic of all duct flutes, including organ pipes; a drop in air pressure leads to a drop in pitch. It does not happen with traversi, nor with notch flutes or end-blown flutes because, in all three cases, the player can move the embouchure slightly and increase its area (rolling it away from the lip in the case of the traverso and tipping the flute slightly downwards with the notch and end flutes) and thus raise the pitch enough to compensate for the inevitable flattening. Indeed, in some parts of the range, recorder players can do the same by using an alternative, and 'more open' fingering.

It seems inherently unlikely that the difference between fiauti à bec and fiauti d'echo was the use of different fingerings. If that were so, there would have been no need to rewrite the fiauto parts and give their notes to the cembalo. It looks much more as though when the Brandenburg was written Bach had, either under his own control or available at the Elector's court, two fiauti which were actually capable of playing an echo, instruments which were not available to him when he wrote and/or performed the keyboard version. (According to Schmieder, the Brandenburgs date from 1721 and were written at Köthen and the keyboard version dates from c.1730-1733 and was written in Leipzig. There is always a good deal of argument about whether Bach ever performed or heard the Brandenburgs himself; whether they were concertos he had in stock and just copied out nicely for the Elector, who probably never bothered tohave them played, or whether they were specially written. My own view, for what it's worth, is that they were specially written to show off the precise forces that the Elector had in his band, a view for which there seems to me to be a good deal of internal evidence).

What really interests us, however, is not whether fiauti d'echo were a special Brandenburg variety of flute, but what it was about them that enabled them to produce an echo effect which could not be produced on a normal recorder. What <u>was</u> the flauto d'echo?

There seem to me to be two possibilities. One is that they were notch flutes, and this seems to me to be inherently improbable; equally possible and improbable is the end-blown flute. Notch flutes are not common in Europe, in fact they hardly exist at all. End-blown flutes are very common in the Balkans, and in all parts of Europe which had been under the Turks, and thus it is just possible that there were a couple of kaval players available, though this seems very unlikely. It seems equally unlikely that fiauto d'echo was another name for traverso. The second possibility, and to my mind the only probability, is that the fiauto d'echo had some mechanical device such as an additional thumb or finger hole which would increase the area of open hole and thus sharpen the pitch just enough to compensate for the drop in air pressure of the piano passages.

It would be very interesting to hear from recorder makers whether they can devise anything which would have this effect. It would also be interesting to read any other theories, particularly any which, unlike this Comm, were supported by experiment. After all, it is arguable that we have, in the Brandenburgs, six of the greatest pieces of music of the baroque era and it is certain that, with the exception of Messiah, they are by far the most popular works of that period. It is intensely frustrating to have to admit that we have no idea what instruments one of them was written for.

So, what <u>was</u> the fiauto d'echo?

FoMRHI Comm 328 John Barnes.

Covered strings for clavichords and square pianos.

This communication was written as an appendix for a forthcoming book on clavichords by Richard Loucks and myself, and may be of interest to members.

Covered strings are not used on traditional harpsichords, virginals or spinets, but are common on clavichords after about 1750. If an old clavichord has lost its original covered strings, evidence for them may sometimes be found in marks made by trapping broken covered strings between the lid and the top edge of the case. Other possible evidence is the marking of gauge numbers for plain strings with no markings for a limited number of notes in the bass, or the provision for the same notes of tangents with thicker tops. Occasionally, marks of spiral windings can also be seen on the top of the bridge at the bass end.

Covered strings on old clavichords appear to have always been wound with an open spiral continuously from the hitch loop to the tuning pin, including the wrapped part, and close windings do not regularly appear until the pianos of about 1830. There may have been several reasons for this. Clavichord strings do not need heavy windings, so a close spiral would need to use very thin wire which not only makes the covering wire difficult to handle but also greatly increases the number of turns required for putting it on, making the use of a hand-driven machine very slow. There may also have been a prejudice that close windings would rattle, though this does not in fact occur because the core is stretched sufficiently to produce a minute gap between the windings even if they touched when they were wound. Also, in normal clavichords the bridge is continuous and brass is used for both the core of the covered strings and for the plain strings. At least for the upper notes of the covered section, therefore, the winding needs to be very light if the tone of the plain strings is to be matched, and this makes open windings obligatory. Open wound strings are potentially troublesome where they pass over the bridge, especially if it is double pinned, but no practical difficulties should be found if the winding is tight and the side-draft is not more than a few degrees.

A covered string winding machine is illustrated by Sprengel, Handwerk und Künste in Tabelen, 1773, (figure 1) and consists of a long shaft having two similar large toothed wheels, one at each end. Each toothed wheel is presumably meshed with a pinion, which cannot be seen, attached to a hook which is clearly visible. The two hooks face each other and keep in step so that when the shaft is rotated, by means of a handle at one end, a plain wire with a loop at each end and strung between the hooks rotates as a whole. The winding wire is shown somewhat schematically unwinding from a spool and forming an open spiral between the left hand hook and the point at which the winding meets the core.

Figure 1

The hooks for a string-winding machine should be made of wire about 2 mm diameter and can conveniently be driven by an electric motor at about 1400 revolutions per minute. An alternative to the rotating shaft with gearing at each end, is to attach flexible drive shafts to each end of a double-ended electric motor, put hooks in the two other ends and bend the shafts to make the hooks

face each other. The distance between the hooks can then be varied easily according to the required length of the covered strings.

The winding wire must be on a bobbin which can rotate easily with a small but constant amount of friction (mounted, for instance, on a vertical shaft with pointed ends held between two pieces of wood gently sprung together), and is looped round one of the hooks or through the eye of the loop at one end of the core wire (see figure 2). At this stage the winding wire runs from the bobbin to pass between the fingers of the right hand held about half a metre away from the loop.

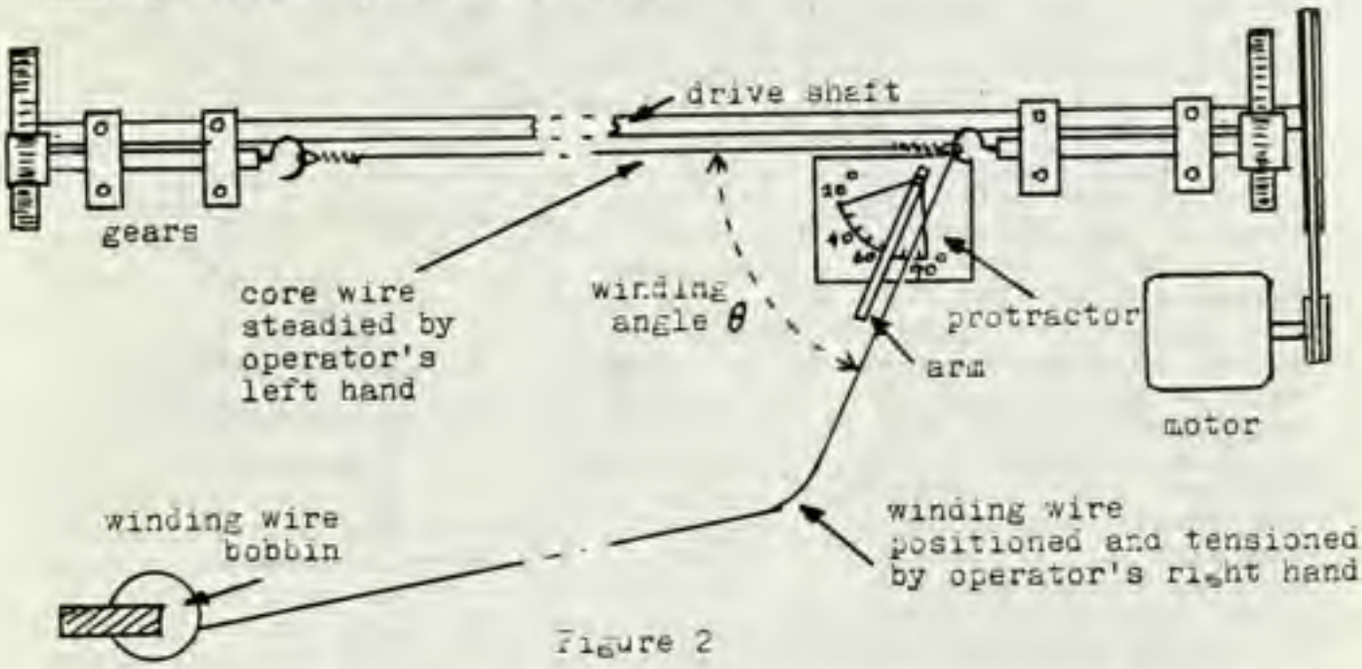


Figure 2

The fingers thus control the tension, and the position of the hand controls the angle between the straight run of winding wire to the loop and the core wire. This angle controls the pitch of the spiral which the winding wire will form on the core wire. The core wire should be taut but not under great tension. The motor is then started and the person holding the wire moves to keep the winding angle constant as the point where the winding wire joins the core moves along due to the formation of the spiral. When the required length of core is covered by the spiral, the motor is stopped and the wire cut loose. Since the left hand of the operator may have to steady the rotating core to prevent it vibrating in resonance with the rotating hooks, the starting and stopping of the motor is best controlled by the foot. The angle at which the winding begins can be standardised by mounting a specially drawn protractor below the hook at which the winding begins. Each angle will correspond approximately to a different pitch of the spiral. It takes a little practice to maintain the pitch of the spiral sufficiently constant from beginning to end for the string to sound well, but the necessary standard of uniformity is not very high. If the wire turns out fairly uniform but with the wrong spiral pitch, it can usually serve for a different note.

Occasionally the winding wire will wind along the loop but break at the end of the loop by coming into contact with the sharp end of the core wire. When this happens the short end of the winding wire should be removed and the winding started again.

A copper winding wire does not usually have any tendency to unravel, but the winding can be made really secure if the core is lightly tapped with a small hammer against a small piece of metal. This produces an irregular surface to grip the winding wire and is a useful technique to use near the end of the string which will be wound onto the tuning pin.

The free-hand method of controlling the winding angle is sufficiently accurate for most purposes and will produce windings with pitches between 8 mm and 0.5 mm. The closer spirals can, however, be made accurately and reproducably by using a spacer piece which travels along at the point where the winding wire meets the core, so that the winding wire is spaced accurately from its previous complete turn. Spacer pieces near in width to the diameter of the covering wire can be made simply as an L-shaped wire of the appropriate diameter, but wider spacers should use flattened wire. As shown in figure 3 the L-shaped wire, with legs about 15 mm long, should be held with its bent part firmly against the core and the already laid part of the spiral so that the winding wire is made to lay at exactly the right spot to produce a spiral of the required pitch. One leg of the spacer runs alongside the winding wire as it arrives at the winding point, while the other leg is passed downwards through a hole in a pad of leather about 20 mm square. This assumes that the direction of rotation of the core is away from the operator at the top. The leather can then be pressed upwards against the core and the horizontal leg held firmly downward between two or three fingers of the left hand while the right hand controls the winding tension and the winding angle. This angle now needs to be about 95°, so that the winding wire arrives at the core with a slight bias towards the spacer piece and the existing spiral. The procedure for starting the wire is to wind an open spiral free hand along the loop and about 20 mm on to the plain part of the core wire, to stop the machine, insert the spacer piece, readjust the winding angle to about 95° and then restart.

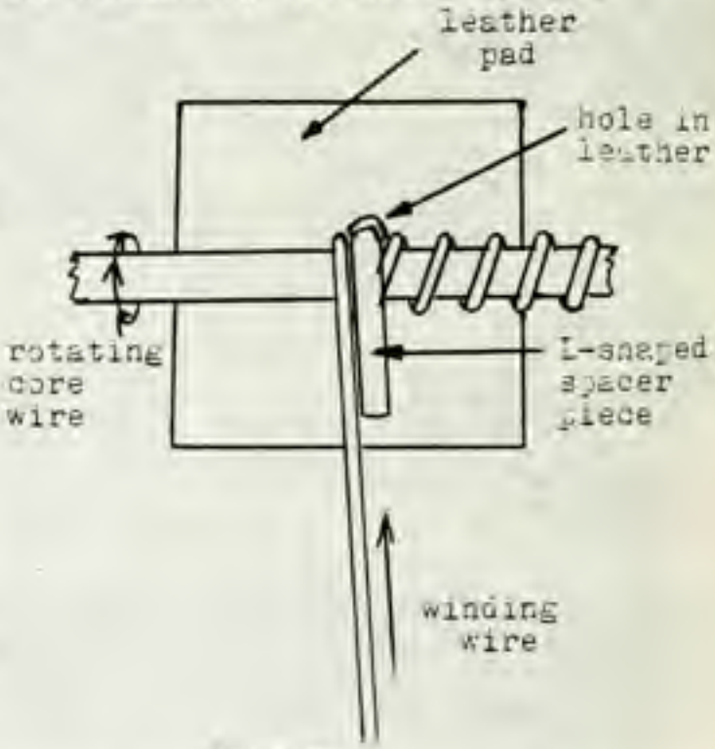


Figure 3

A technique intermediate between the free-hand method and the spacer method consists of beginning the spiral free-hand but applying a fold of leather to the winding point as soon as it is clear of the loop. If the leather is fairly hard but pliable and is under strong finger pressure the spiral will form grooves in the surface of the leather and these grooves will tend to maintain the same spacing even if the winding angle varies a few degrees. The leather pad also helps to prevent the core from vibrating too much and helps to get the winding tight without excessive tension

in the winding wire. I was informed by Kurt Wittmeyer that he had met an elderly man from the Viennese piano trade who could remember open-wound covered strings being made in this way.

Most traditional clavichords work well if the tension gradually increases downwards over the treble, alto and tenor registers and stays constant or decreases again in the bass. Satisfactory sizes for the plain strings should be established by trial to give the required touch characteristics, and the covered strings designed so that they match the plain strings.

The problem of matching the highest covered string to the lowest plain string can only be solved at a particular point on the keyboard. This is the point at which the string lengths have been reduced about 15% below the length they would have had if the treble scale had been maintained unaltered. Between the lowest of the fully-scaled strings and this point, the gauges of the plain wires should increase twice (assuming the usual increments of about 9%) for the lowest plain string to be approximately as taut as the lowest fully-scaled string. To allow for an <u>increase</u> of tension between these two points, however, (so that the tension increases as far as the bottom of the tenor register) the gauges should increase <u>three</u> times. The core of the highest covered string should be a gauge thinner than the lowest plain wire and the winding wire should be as thin and the pitch of winding as large as practicable. This will balance the mass per unit length of the adjacent covered and uncovered strings and therefore avoid large discontinuities in their tensions. The rest of the covered strings should be designed so that their tension stays constant or gradually decreases towards the bottom note, and if this is done it is clear that the core used for the top covered string will be strong enough for all the lower ones. There will, however, be a gradual increase in the winding density, achieved either by reducing the pitch or by increasing the winding wire diameter or a combination of both.

The formula for the frequency f of a string in terms of its sounding length ℓ, tension t and mass per unit length m is

$$f = \frac{1}{2\ell}\sqrt{\frac{t}{m}} \qquad \ldots\ldots (1)$$

and can be used for covered strings provided that the mass per unit length is the mass of the combined core and winding wire. If the tension is to be calculated, knowing the values of ℓ, f and m, the formula can be rewritten

$$t = 4\ell^2 f^2 m \qquad \ldots\ldots (2)$$

For a covered string, m is the sum of m_c, the mass per unit length of the core and m_w, the mass per unit length of the winding. m_c is simply calculated once ρ_c, the density of the core material and d_c, the diameter of the core are known, since

$$m_c = \frac{\pi}{4}\rho_c d_c^2 \qquad \ldots\ldots (3)$$

m_w is more complicated, since the winding forms a spiral whose length is dependent on p, the pitch or distance between one turn and the next and on both d_w, the diameter of the winding wire and d_c, the core diameter. If ρ_w is the density of the covering material,

$$m_w = \frac{\pi}{4}\rho_w d_w^2 \sqrt{1 + \frac{\pi^2}{p^2}(d_c + d_w)^2} \qquad \ldots\ldots (4)$$

Hubert's clavichord of 1784, the Russell Collection, Edinburgh University, (Boalch no 11) is theoretically scaled in the treble, with c^2 253 mm long, but the notes below c^1 have strings which are shorter than if they were fully-scaled.

If c^1 whose length ℓ = 506 mm is strung with brass wire of diameter d = 0.345 mm and density ρ = 0.0084 gms/mm and modern pitch is used, as the scaling allows, so that the frequency f = 262 cycles/sec,

$$\text{Then } t = 4\ell^2 f^2 m \quad \text{(from equation 2)}$$

$$= \pi\rho\ell^2 f^2 d^2 \quad \text{(from equation 3)}$$

$$= \pi \times 0.0084 \times 506^2 \times 262^2 \times 0.345^2 \text{ gm.mm.sec.}^{-2}$$

$$= 5.52 \times 10^7 \text{ gm.mm.sec}^{-2}$$

If this is divided by g, gravitational constant, this tension can be expressed more familiarly in terms of the weight of a gram mass. g = 9810 mm/sec², so that

$$t = \frac{5.52 \times 10^7}{9810} \text{ gm wt}$$

$$= 5630 \text{ gm wt}$$

$$= 5.63 \text{ kg wt.}$$

Hubert takes his plain strings down to note B, as is shown by the use of special thick-topped tangents for the 11 pairs of covered strings C - B♭. If note B had been fully-scaled the string length would have been 1072 mm but it is actually 906 mm long, a reduction of 15%. The frequency of note B is 123 cycles/sec. The use of brass wire three gauges thicker than 0.345 mm, i.e. 0.434 mm thick provides for a suitable increase of tension above that used for c :

$$t = \pi\rho\ell^2 f^2 d^2$$

$$= \pi \times 0.0084 \times 906^2 \times 123^2 \times 0.434^2 \text{ gm.mm.sec.}^{-2}$$

$$= 6.17 \times 10^7 \text{ gm.mm.sec.}^{-2}$$

$$= 6.29 \text{ kg. wt.}$$

The highest covered string, B♭, has a frequency of 116 cycles/sec, a string length of 928 mm and should have approximately the same tension as B. This enables us to calculate the value of m:

$$m = \frac{t}{4\ell^2 f^2} \quad \text{(equation 2 rearranged)}$$

$$= \frac{6.17 \times 10^7}{4 \times 928^2 \times 116^2} \text{ gm/mm}$$

$$= 0.001331 \text{ gm/mm.}$$

The size of m is easier to appreciate if given in gms/metre

Thus m = 1.331 gm/metre.

The wire used for B is 0.434 mm thick, so the core for B♭ should be one gauge lighter as discussed earlier, i.e. 0.402 mm, for which

$$m_c = \frac{\pi}{4}\rho_c d_c^2 \qquad \text{(equation 3)}$$

$$= \frac{\pi}{4} \times 0.0084 \times 0.402^2 \text{ gm/mm}$$

$$= 0.001066 \text{ gm/mm}$$

$$= 1.066 \text{ gm/metre}$$

The lightest practical open winding is of 0.254 mm copper wire with a pitch of about 6 mm. Copper has a density $\rho_w = 0.0089$ gms/mm. For this winding, using equation 4 :

$$m_w = \frac{\pi}{4} \times 0.0089 \times 0.254^2 \sqrt{1 + \frac{\pi^2}{6^2}(0.402 + 0.254)^2} \text{ gm/mm}$$

$$= 0.000477 \text{ gm/mm}$$

$$= 0.477 \text{ gm/metre}$$

This gives a total of 1.543 gm/metre when added to m_c, which is somewhat more than the 1.331 gm/metre which would give a tension equal to that of B. The resulting tension, in fact, is

$$t = 4\ell^2 f^2 m \qquad \text{(equation 2)}$$

$$= 4 \times 928^2 \times 116^2 \times 0.001543 \text{ gm.mm.sec}^{-2}$$

$$= 7.15 \times 10^7 \text{ gm.mm.sec}^{-2}$$

$$= 7.29 \text{ kg wt.}$$

which is not excessive. Remembering that the c^1 string was 0.345 mm thick and sustained a tension of 5.63 kg wt, the 0.402 mm core of the B♭ string will sustain a tension of

$$5.63 \times \frac{0.402^2}{0.345^2} \text{ kg wt}$$

$$= 7.64 \text{ kg wt}$$

with the same safety factor. Since this is a little more than the actual tension of B♭, the covered string will be suitable for any pitch which is possible for the treble strings.

The lowest covered string C, whose length is 1098 mm and whose frequency is 65 cycles per second should have approximately the same tension as B♭, i.e. 7.29 kg wt or 7.15×10^7 gm mm sec^{-2}.

$$m = \frac{t}{4\ell^2 f^2} \qquad \text{(equation 2 rearranged)}$$

$$= \frac{7.15 \times 10^7}{4 \times 1098^2 \times 65^2} \text{ gm/mm}$$

$$= .003509 \text{ gm/mm}$$

$$= 3.509 \text{ gm/metre}$$

As before, $m_c = 1.066$ gm/metre since the same size of core is used. Therefore

$$m_w = m - m_c = 2.443 \text{ gm/metre} = 0.00244 \text{ gm/mm}$$

If we choose a diameter of 0.373 mm for the winding wire, then we can calculate the appropriate pitch p for the spiral winding. For this, we must rearrange equation 4, giving:

$$p = \frac{\pi^2 \rho_w d_w^2 \ (d_c + d_w)}{\sqrt{16 m_w^2 - \pi^2 \rho_w^2 d_w^4}}$$

$$= \frac{\pi^2 \times 0.0089 \times 0.373^2 \ (0.402 + 0.373)}{16 \times 0.00244^2 - \pi^2 \times 0.0089^2 \times 0.373^4} \text{ mm}$$

$$= 1.06 \text{ mm.}$$

The winding angle can also be calculated since

$$\tan\theta = \frac{\pi}{p}(d_c + d_w) = \frac{\pi}{1.06}(0.402 + 0.373)$$

$$= 2.30$$

Therefore $\theta = 66^\circ$

If this string is to be made using the spacer method, the diameter of the required spacer is

$$p \sin\theta - d_w = 1.06 \times 0.914 - 0.373 \text{ mm} = 0.60 \text{ mm}$$

A wire of this size will sit more comfortably between two turns of 0.376 mm diameter if a flat surface is filed on it before it is made into a spacer (see figure 4).

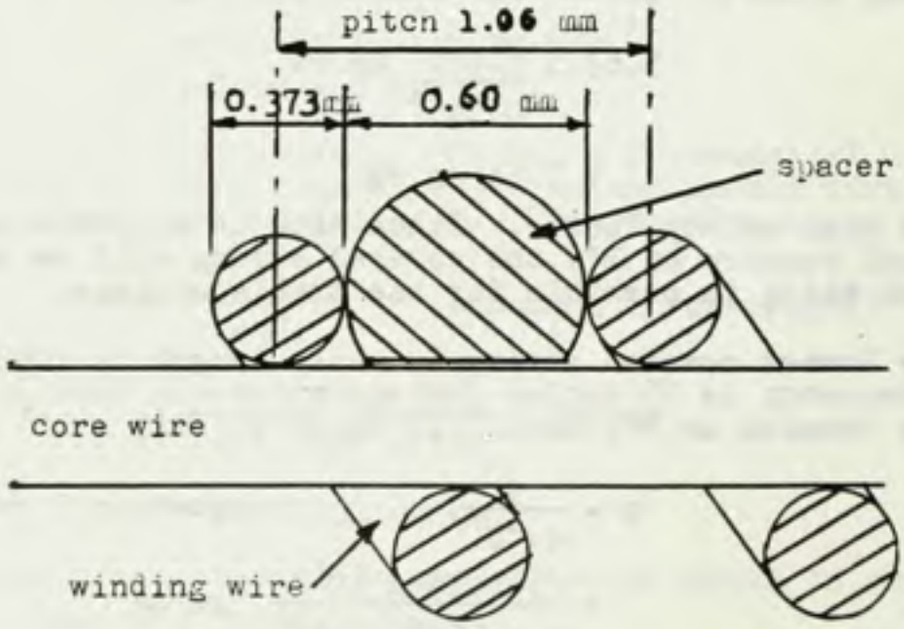


Figure 4

Covered strings for Hubert clavichord 1784, Boalch no 11

All strings are wound on á core of brass 0.402 mm diameter.

Note	m_w gm/mm	chosen value of d_w copper wire, mm	p mm	θ degrees	Set 1	Set 2	Set 3
B♭	.000477	0.254	6.0	19°	x	x	x
A	(.000585)	0.254	2.49	40°	x	x	x
G♯	(.000719)	0.254	1.66	51°	x	x	x
		or 0.274	2.27	43°			
		or 0.296	3.57	32°			
G	.000882	0.254	1.23	59°			
		or 0.274	1.57	53°	x		
		or 0.296	2.12	46°		x	
		or 0.319	3.09	36°			x
F♯	(.001029)	0.274	1.26	59°			
		or 0.296	1.62	53°	x	x	
		or 0.319	2.17	46°			x
F	(.001201)	0.274	1.03	64°			
		or 0.296	1.30	59°			
		or 0.319	1.67	54°	x		x
		or 0.345	2.25	46°		x	
E	(.001402)	0.296	1.07	64°			
		or 0.319	1.33	59°			x
		or 0.345	1.73	54°	x	x	
		or 0.373	2.35	46°			
E♭	.001636	0.319	1.09	64°			
		or 0.345	1.39	59°			
		or 0.373	1.80	53°	x	x	x
D	(.001870)	0.345	1.17	63°			
		or 0.373	1.48	58°	x	x	x
C♯	(.002137)	0.345	0.99	67°			
		or 0.373	1.24	63°	x	x	x
C	.002443	0.373	1.06	66°	x	x	x

In order to design a complete set of covered strings, the value of m_w should be established for each note. This can be done with reasonable accuracy by simply interpolating between 0.48 gm/metre for B♭ and 2.44 gm/metre for C a geometric series with a term for each of the strings between. If more accuracy is desired, m_w could be calculated for notes G and E♭ and the rest of the notes obtained by interpolation between the resulting four known values. The values of m_w in the table below were obtained in this way, interpolated values being shown in brackets. It should then be decided what winding wire diameter to use for each string, after which the pitch p and winding angle θ of the winding can be calculated in the same way as for note C in the above example. So that the effect of choosing different winding wire diameters may be seen, some of the notes are worked out with three or four alternative diameters. The pitch of the spiral compensates for changes in winding wire diameter, with a thicker wire needing a bigger pitch of spiral than a thinner wire.

The arm of the protractor on the winding machine under the right-hand hook is set to the required winding angle θ and the straight part of the winding wire from the right hand to the loop lined up with the protractor arm. The machine is then started and the right hand is moved towards the left to keep the winding angle constant. The distance occupied by ten turns in the finished spiral is then measured and checked against 10 x p.

Set 1 of the covered strings uses all 6 sizes of winding wire and keeps the pitch and winding angle nearly constant except for C, C♯, D, A and B♭. Set 2 uses more variety of values for p and θ but uses only winding wire of diameters 0.254, 0.296, 0.345 and 0.373 mm. Set 3 uses winding wires of only three different diameters, i.e. 0.254, 0.319 and 0.373.

FoMRHI Comm. 330

HOW TO MAKE A BAROQUE TRUMPET IN AN OLD-FASHIONED WAY.
(by Geert Jan van der Heide)

First of all, forgive me my continental school-English!

For about seven years I am making historical woodwind like shams, curtals etc; and from the baroque period recorders, traversi and oboes. But being an ex-trumpet player I could not resist the temptation to make a baroque trumpet myself. I would share my typical problems with the readers of FoMRHIQ.

I ordered a drawing of a trumpet by J.C.Kodisch (about 1700), from the Nuremberger Museum. When I made a study of it, the following questions arose:

1- what techniques in coppersmithing were used by that time
2- what wallthicknesses have the instrument?
3- up to which point does the dovetail seam of the bell-section go?
4- What kind of brass was used?

The answer to question 1 came after reading, talking with old copper- and silversmiths, etc. So the following techniques may be used:-hammering (out and in)-drawing cones, tubes and wires -spinning -embossing -engraving -casting -turning -soldering.

Most of these techniques shall be described further in the article.

After a phonecall to the Museum in Nuremberg, I got the answers to questions 2 and 3:- the wallthicknesses are for the tubing approx. 0,5 mm. For the bellsection from 0,15 to 0,3 mm! - the dovetail seam goes from bellrim to under the ball.

To get question 4 answered I sent a couple of letters around. It seemed that in the 17th century alloys were used with a copper percentage between 63% and 78%. The rest is mainly zinc, but many pollutions like lead, tin, silver,nickel, iron, etc. make build up the alloys of the 17th century. I used CuZn30 to make my first model. It is a mixture of 70% copper and 30% zinc. It is just like CuZn28 an alloy now-a-days in use to make brass instruments. It is possible to mix copper and zinc in different proporions. If the Cu percentage is more than 63% the material can be cold-transformed easily. By means of deformation brass hardens. After annealing it will become soft and pliable again. If the copper percentage is less than 58% annealing does not help to make the brass softer; it only can be warm-transformed.

The german baroque trumpet consists of the following parts, which are assembled (fg. 1):

I the bellsection (about 30 cm long)
II the conical tube(,, ,, ,,)
III two cilindrical tubes (each about 60 cm long)
IV two bows (each about 20 cm long)
V five garnishes (short and long)
VI the ball with two soldered garnishes
VII the garland with embossed rimwire for reinforcement and four casted angelheads
VIII the mouthpiece
IX the wooden block between the tubes
X the cords.

Ad I: The bell.
The bellsection is folded of brass sheet, with a seam over the entire length (± 30 cm). The wall-thickness after polishing is from 0,3mm at the smaller end to 0,15mm at the rim. After several attempts I finaly came to a correct development. The largest diameter is 118mm; the wall is there 0,15mm thick. So if I would start with 0,4mm brass sheet, fold it, making a diameter of 59mm and than hammer it to 118mm, I could without danger file and polish to get the correct wall-thickness. It is impossible to develop a sphere in a flat level. You can try it out by trample down a skin of an orange! The same impossibility appears when you try to make a development of a trumpet bell.

I devided the total section in five different straight cones, made a development of each and cut them outof cardboard. I shoved these pieces of cardboard, in deviding too much and too short of material equally. (see fg. 2) After that I made a flushing line, by connecting the outer points. The development you get this way looks an "exagerating" trupet bell (the effect of π).

To fold and solder, see fg. 3 and 5a.
The seam is a so-called dovetail (translated dutch).
The following steps are made in making this seam in coppersmithing: scratch a line at 2mm on both sides you want to connect. Hammer this small strip until it becomes about 4mm. File and sandpaper till the hammered part is flat and sharp. Make a division of 4x4mm (see fg. 4). Cut through the lines with a sharp chissel on a piece of hardwood, to form the teeth. After bending and folding the sheet, push the parts to be connected as shown in fgs. 5 and 5a. Then hammer the unsoldered seam with a planishing hammer to forge it as smooth as possible. Before soldering, use soft-iron binding wire to secure the seam where needed. Bind over the teeth, then it is easier to clean the seam afterwards. Make a paste of flux powder and water and spread it with a brush inside and outside on the dovetail. After drying for a while, rinse it with water-drups from the inside, to make the flux touch every part to be soldered.

An original trumpet by J.C.Kodisch and in possession of the museum of Brussels, was soldered with a reddish coloured solder. What kind could that be?? I used a silver solder with a melting point of 710° C and consisting of 30% Ag, 28% Cu, 27% Zn, and 21% Cd (cadmium). Its coluor is almost similar to that of brass. After soldering, it is a nearly flat bell, with one straight side (fg. 5).

To come to the correct shape, I turned some cones of hardwood, with different angles. By forcing them one by one in the flat bell, I opened it. The open end had a diameter of about 60mm (fg. 6). To draw out the end, I used a spherical hammer, a doming hammer, and hammered with it in the inside, supported by a rounded blok of hrdwood (see fg. 7).

Anneal after each round of hammering. When annealing, start with the torch opposite the seam. Let the material become cherry-red, then turn the piece slowly, until the red is about 20mm from the seam. Brass has to cool down slowly. Then it can be pickled with thinned sulphuric acid, to remove the oxide skin.

When the desired form almost is reached, I planished the bell as flat as possible on a metal mandrel, with the exact measurements of the inside of the bell. A good, very hrdwood like boxwood or lignum sanctum will do also. Because the "start" sheet was very thin (0,4mm) and is even stretched to about 0,2mm, planish very well; otherwise in filing and polishing you will get holes in the wall!

All hammertraces are filed away. In using each time abrassives in smaller grades, while the bell is placed on a lathe, it is rather easy (but time consuming) to get a smooth surface. Although the original instruments had still file scratches, I tried to remove them all!

Ad II The conical tube, or second part of the bellsection.

The next part is slightly conical over about 30 cm: from 11,0 to 13,0 mm. I made this part, by making a development (46,5x37,0x300mm) and folded it around a wooden stick of 10mm diameter; soldered the seam (a dovetail) and pressed it through a piece of lead (20mm thick) with a hole of 10,5mm in it, while a polished steel mandrel was put in the inside of the folded brass sheet of 0,4mm. Perhaps it was better to use tin instead of lead, a modern technique; tin costs much more then lead , that is why! The right way to work: 1) make a development, 2) hammer out the sides to be connected; scratch a line at 1,5mm and make it 3mm, 3) cut the dovetail as shown in fg. 8, 4) hammer round and forge the seam together, 5) rinse with flux, 6) solder with silver, 7) clean the seam and planish on a steel rod of 10,0mm diam., 8) hammer the smallest end as shown in fg. 9 round the top of this rod, 9)push the mandrel with the exact internal measurements in the piece, and than through the lead plate (se above). Grease the mandrel (vasaline). Use, to produce enough power a workbenchscrew or a lathe with a hollow headstock shaft (See fg. 10). Of course a drawbench can be used if availiable.

To get the mandrel out, push or tap from the reverse side.

Fit the both bellsection-parts together, with a overlap of about 8mm, the conical tube inside the front-bellsection. Solder with a "sparing" flame and a solder with a lower melting point.

Ad III Making tubes.

I started with 0,6mm brass sheet. First make the development: length x (diameter+wallthickness) x π . I used 37,0 x 600 mm. Anneal the material and let it cool down slowly. Hammer with a wooden mallet round a rod of 10 mm.

There are two possibilities to make the seam:
-with a dovetail,
-with the sides flat against each other.
I took the second manner because it works faster and both methodes are authentic.

After filling the seam with flux paste, braze with silver. The surplus of solder must be removed carefully. Grease a polished rod with a diameter of 11,1 mm. Tap this rod into the soldered irregular tube, but keep about 4 mm free at the end. Hammer this small rim round the end of the rod (see fg. 9). Push the rod and brass through a plate of steel (evt. iron) with a hole of 12,1mm in it, as described in Ad II. The steel plate must be min. 10 mm thick and the drawhole polished, otherwise the tube becomes warped and scratched. Because the beginning was with 0,6mm brass sheet and the difference between the rod and the drawhole is 2 x 0,5 mm, the brass stretches and hardens: the wallthickness becomes 0,5mm. To get the rod out, push from the otherside through a hole of 11,2 mm.

Polishing of the tube can be done on the lathe.

Ad IV The bows

Make tubes of about 220 mm length as described above. Annael short the part to be bended. Than fill the tube with molten lead. Now-a-days one uses Cerrobend for bending, a metal with a melting point of about 70°C: so it melts in boiling water!

To give the bow the right shape, a bend-mould must be used. The mould has to allow over-bending, because the tube becomes a little bit buoyant (see fg. 11). If wrinkles should appear, tap them out with a small doming hammer, with the bow still filled with lead. To remove the lead, plunge the bow into molten lead; thus keeping the temperature as low and the heating as short as possible.

By bending=transforming, the brass hardens; heating makes it softer again, and I tried to keep the brass as hard as possible.

Ad V The garnishes.

I made them of 1 mm brass sheet in the same way as the yards. I hammered them after annealing around a rod of 12,3 mm and pushed them through a hole of 14,3 mm. After that I turned a profile as found on a trumpet by J.C.Kodisch (museum Brussels)

Ad VI The ball with soldered garnishes.

The ball is casted. The garnishes are slightly conical, formed with a mallet of boxwood on the mandrel of the bell-section. The casting problems will be described later.

(to be continued)

(2A)

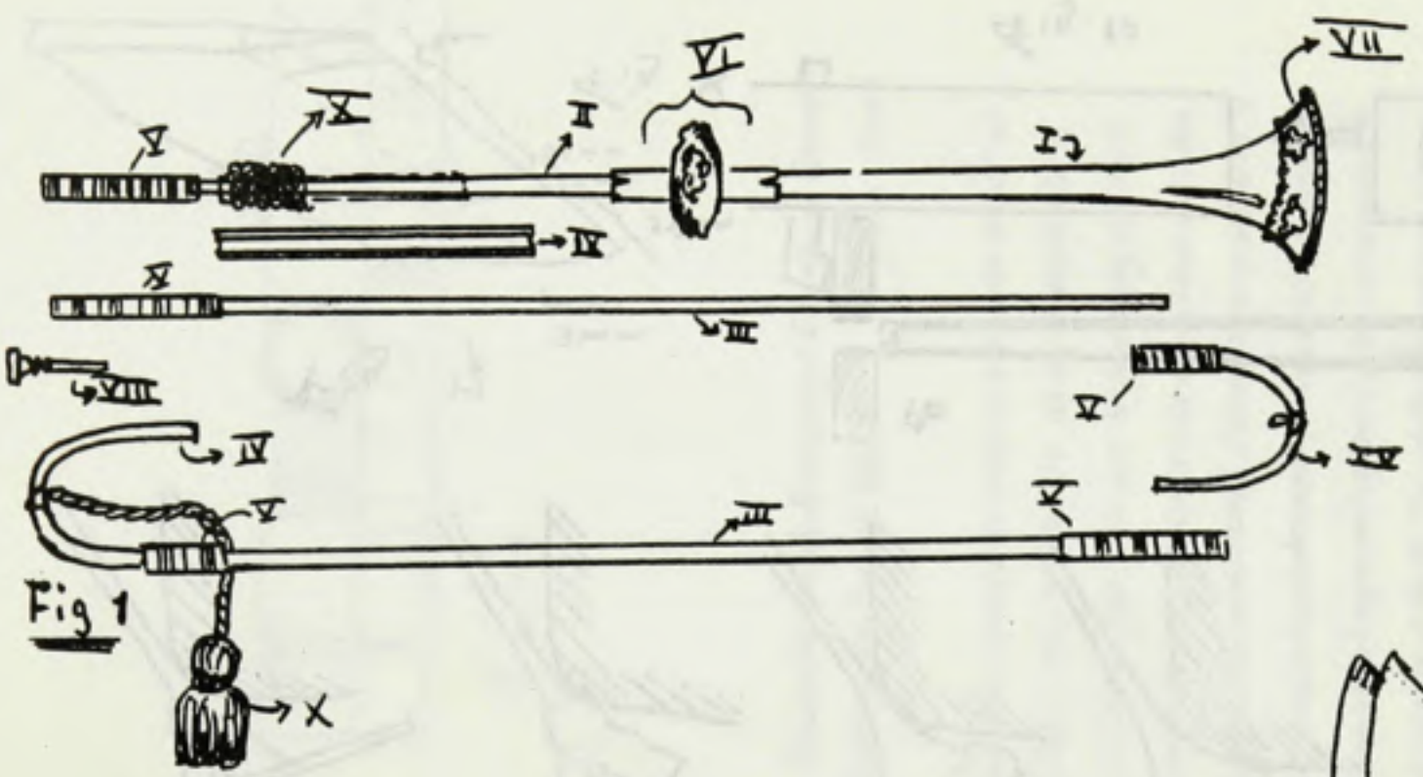


Fig 1

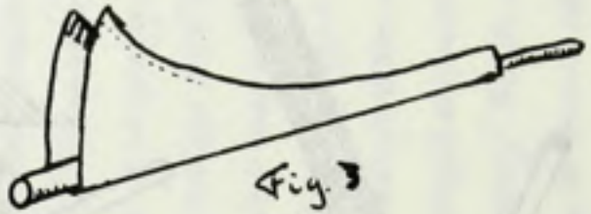


Fig. 3

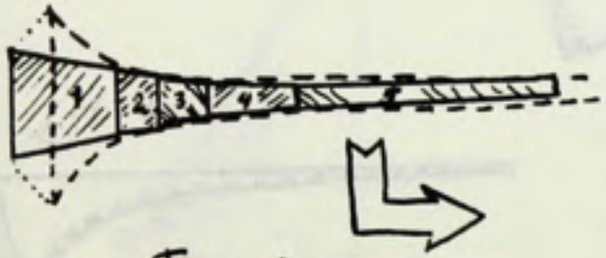
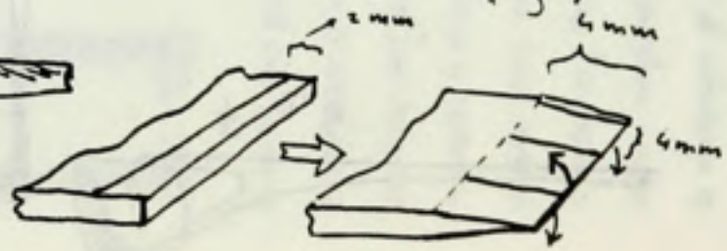


Fig. 2

Fig 4



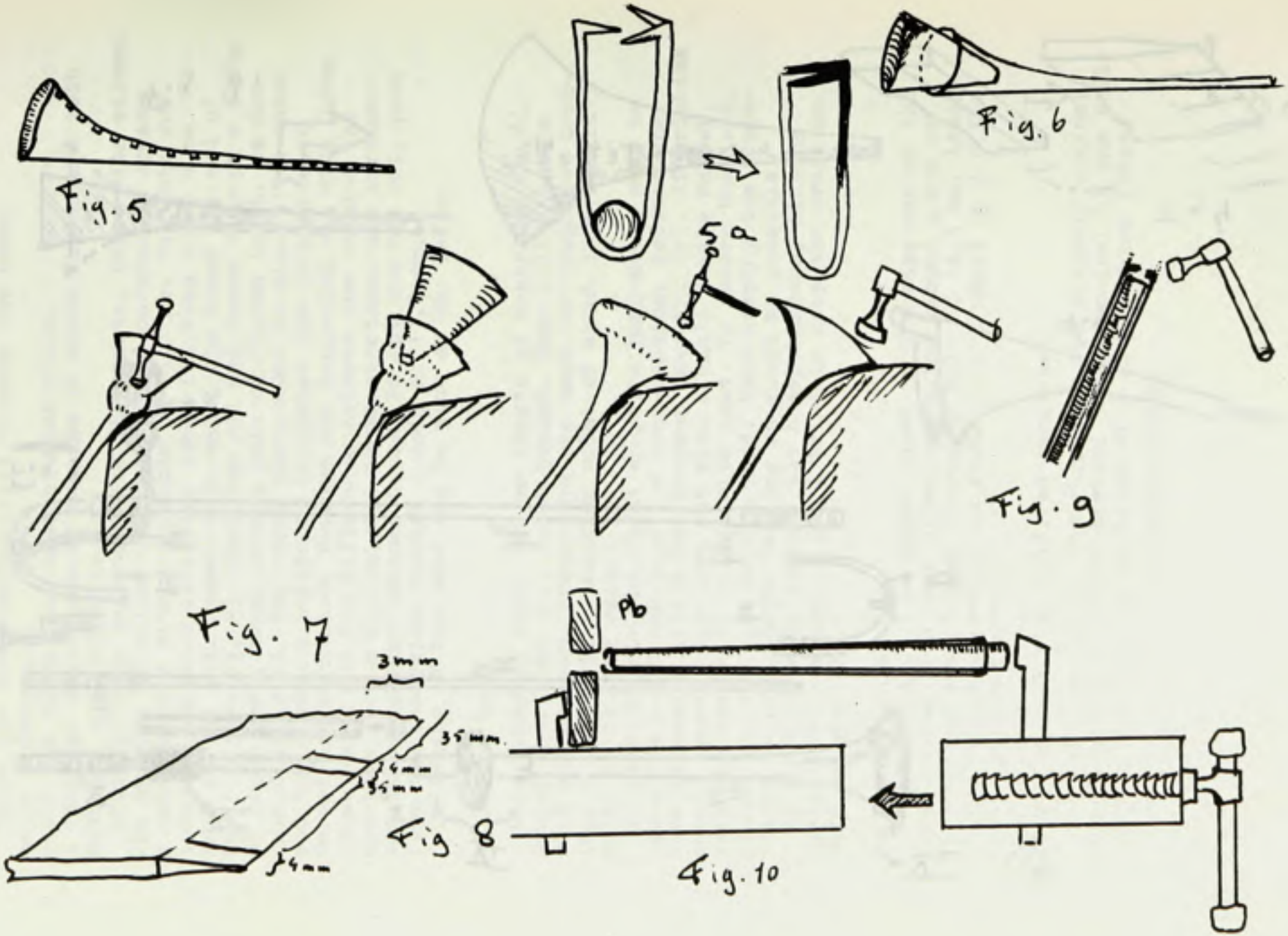


Fig. 5
Fig. 6
5a
Fig. 9
Fig. 7
3mm
35mm
4mm
35mm
4mm
Fig 8
Pb
Fig. 10

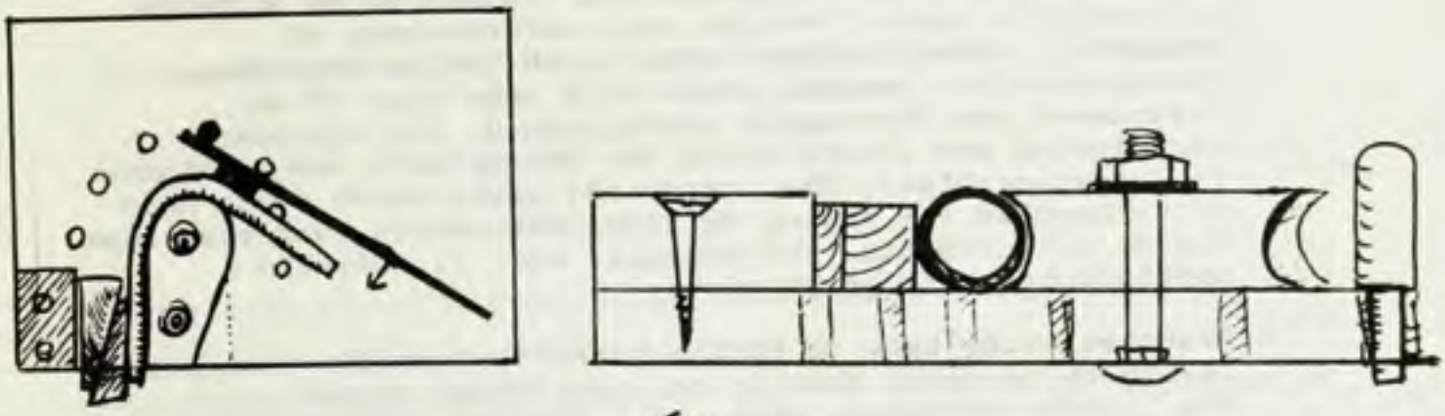
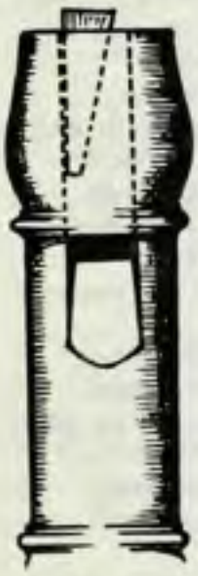


Fig. 11

FoMRHI Comm. 331

A Temporary Debarockant Mock-Renaissance Cuneiform Recorder Windway Modificatory Acoustic Device.

Julian Drake



While playing some renaissance music in a recorder consort at Michael Plaut's home, when we had to use an ill-matched set of instruments in which the upper voices were too penetrating and shrill (both descant and treble being the inexpensive neo-baroque don't-blow-too-hard-and-try-not-to-wobble kind), I invented (or re-invented?) a simple device to make these instruments produce a sort of renaissance sound. I rolled up a bit of paper and wedged it in the windway so as to fill most of the opening at the top. The results were surprisingly good. Volume, tone-quality and resistance could easily be controlled. More satisfactory than bits of paper is a wedge made of some soft wood that won't damage the recorder by swelling and jamming. A disadvantage is that higher notes become harder or even impossible to obtain, but this scarcely matters in renaissance music. There is a moral question here: can one, should one, tell one's audience about this indefensible piece of low charlatanry, this mountebankery? Purists will block their ears, the ignorant will become confused, there may be nervous titterings, and the blushing players will be in danger of swallowing their wedges. But they work.

FURTHER TO COMM.320: PHOTOGRAMMETRIC MEASUREMENT

On the subject of photogrammetry, brought up by M.Tiella in Comm 320. Aside from the ease and accuracy of measuring arched surfaces etc. which Tiella describes, photogrammetric methods could also mean that if an instrument was thoroughly photographed, and equipment for viewing and interpreting the photographs was available (no great problem), the instrument would never again need to be handled for taking outside measurments,(and even some inside measurements, thicknesses. etc. if suitable photographs could be obtained.)

Also, refering back to Philip Lourie's Comm 259 (bulletin 18) where he notes that on one particular dyline print the 1,000mm reference measured 1,005.5mm, and suggests that scaled photographs would enable him to correct for this: the obvious solution is plastic plans, but normal scaled photographs will not give any greater accuracy. In fact, I doubt if the average photo would yield the accuracy of his paper plans. The reason for this is that all lenses distort slightly, particularly around the edges (and many museum photos are taken with a slightly wide-angle lense, which makes things worse). Add to this the extreme difficulty of taking a photo precisely square-on to the object, which causes distortions due to parallax: any object photographed at an angle appears shorter than if photographed square on to its surface, or one of its axes.One of the products of photogrammetry is the orthophoto in which all points have been optically shifted about so they are in correct relation to all other points. These orthophotos can be used to take direct measurements, but since most musical instruments have many planes and three-dimensional surfaces of interest to reconstructors, their usefulness may not justify their expense(but has anyone tried large-quantity tests?)

Finally, Ishould point out that the greatest advantage of photogrammetric measurement by whatever means used, is that the decision about which points to measure is put off untill the very last minute, and even if a plan is drawn up additional measurements can be taken without recourse to the object in question:no further risk of damage.

Otherwise, take your measurements from the central 50% of your best photos, and hope for the best.After all, much of this accuracy is beyond the requirements of the average builder.

Tim Hobrough

FoMRHI Comm. 333

Devices for Measuring the Undercutting of Woodwind Toneholes

Cary Karp

The dimensions of the toneholes of a woodwind instrument are as important as those of the instrument's bore for purposes both of comparative typological research and the building of replicas of older instruments.

It is generally easy to obtain data describing the configuration of toneholes on the exterior surface of an instrument, and such information is consequently noted with satisfactory accuracy in most metric records. The configuration of toneholes on the surface of a bore, as well as the shapes of the tonehole cavities themselves, are however considerably more difficult to measure. Despite the great importance of this data it is therefore commonly excluded from even the most detailed lists of measurements, at best being replaced by a verbal description of the type, "tonehole bored diagonally upwards and slightly undercut all-round", and/or a speculative sketch of the longitudinal cross-section of the tonehole.

A large part of this problem arises from the lack of suitable measuring tools, there being no commercially available purpose-designed device. In conjunction with work on a longer paper dealing with the documentation of tonehole and key systems the present writer has come upon simple but accurate devices which can be used to good advantage both in measuring the shape of undercut toneholes, and in any subsequent manufacture of a reproduction of the instrument at hand. As publication of the above-mentioned paper is not impending, two of these devices are described below in the hope that they may be of immediate use to others.

One device consists of a narrow metal tube inside which a small incandescent lamp is placed. The light from this lamp shines through a very small hole drilled through the side of the tube close to one of its ends. The metal tube is inserted into the bore of the

instrument being examined so that the pinpoint of light is visible in one of the toneholes. The rod is pressed closely against the wall of the bore under the tonehole and is then moved to bring the light towards one of the edges of the tonehole. The light will be obscured by the body of the instrument when it is moved past this edge. The distance between the last edge of the pinhole to "disappear" and an external reference point can easily be determined. When considering the upper and lower edges of a tonehole this reference can be the end of the instrument from which the tool is inserted. The lateral edges of a tonehole are best measured both in reference to the end of the instrument and in terms of their angular separation.

The prototype was made from a 300 mm length of thin-walled 1/8" ID brass tubing. One end of the tube was spun down to leave a 2 mm diameter opening, and an 0.5 mm diameter hole was drilled through the side of the tube 4 mm from this end. The wall of the tube was filed as thin as possible near this hole. A 5V subminiature lamp, 6 mm long and 3 mm in diameter, was inserted into the tube and positioned with its filament opposite the 0.5 mm hole so as to give the brightest possible light through the hole.The partially closed aperture at the end of the tube was intended to provide a general inspection light. The leads of the lamp were left much longer than the metal tube, brought out through the end of the tube furthest removed from the lamp, and connected via a switch to a 4.5V battery. A metal plate was clipped to the tube so as to be movable along the length of the tube and to present a large flat surface perpendicular to the axis of the instrument. Fig 1 gives a schematic cross section of the device in position in an instrument, with x as the distance being measured.

The second device requires an impression or casting to be made of the toneholes. Several casting mediums can be used but the following technique assumes the use of cold-setting silicon rubber. The toneholes are sealed on the exterior of the instrument with a plastic foil or similar material held securely enough in place to prevent

the uncured silicon rubber from leaking through. Plastic based adhesive tapes can often be used although tests must be made to assure that the adhesive will easily and safely separate from the surface to which it is applied. Similar tests must, of course, also be made with the casting medium. The narrower end of the instrument is sealed with the plastic foil or a wax plug. The open end is extended with a piece of stiff paper formed into a "rubber-tight" tube. The uncured silicon rubber is then poured into the instrument which is held with the holes pointing downward. The rubber is allowed to fill the toneholes, care being taken to use no more material than is necessary to form a one-piece impression of a single row of toneholes. If opposing holes such as fingerholes and a thumbhole are to be cast it is necessary to perform the entire operation twice. After the rubber has run into place the paper funnel can be folded shut and the instrument left undisturbed in a suitably oriented position while the rubber cures.

Impressions made of the thumb and fingerholes of a Bressan recorder (Musikhistoriska Museet F173) are shown in Photo 1. Direct examination of these provides much useful information (all of which may not be obvious from the photographic reproduction). The holes all have the same basic shape, there being little evidence of asymmetrical adjustment for tuning (or whatever). All holes are more extremely undercut across rather than along the axis of the instrument, and are turned from this axis by about 15°. More detailed information can be gathered by examining the profiles of the individual holes in magnification. Photo 2 shows the first fingerhole of the Bressan instrument in this fashion. In common with the other holes the the uppermost portion of this hole is cylindrical,expanding then in a smooth cone through to the bore. The degree of uniformity with which all the holes display all these characteristics indicates that they may reveal some of Bressan's stylistic idiosyncracies. Similar examination of other instruments clearly suggests that freehand undercutting technique is at the very least as typical a "thumbprint" of a woodwind maker as is the style of exterior turning.

Tonehole castings can also be used to provide highly detailed numerical descriptions of the tonehole shapes. Aside from the obvious possibility of direct mechanical measurement, accurate photographic enlargements can be made of tonehole profiles in the following manner: An individual tonehole impression is bisected on a selected plane. Half of the impression is placed with its flat side against a piece of photographic film (lithographic material permits this to be done in a "well-lit" darkroom). Exposure of the film will provide a well-defined silhouette of that tonehole cross section. The processed film is then placed in contact with a millimeter (or similar) grid, placed in the negative carrier of an enlarger, and projected on the baseboard of the enlarger. The image of the grid can be brought to any degree of enlargement — conveniently 10X — and carefully adjusted for scale and rectilinearity. Either with or without the grid in place the enlarged image can then be copied onto photographic paper. (The use of plastic-based paper and film will assure dimensional stability throughout processing.) The two halves of the casting can be rejoined and the entire process repeated if several profiles are felt necessary to provide an accurate description of the tonehole shape. Photos 3 & 4 show two planes through the thumbhole of an unsigned ivory cornett (Musikhistoriska Museet MM549). Photo 3 shows the "major" plane of the thumbhole which, in this case, lies as nearly as possible (considering the curvature of the instrument) on a plane radial to the axis of the instrument's bore and perpendicular to the external facet of the cornett through which the hole runs. Photo 4 shows the "minor" plane of the thumbhole, perpendicular to the major plane along the plane indicated by the arrow in Photo 3. The reference grid shows millimeters (altough in reproduction here it may not be in perfect alignment). These two magnified cross sections will permit the tedious but straightforward numerical characterization of the tonehole's shape. With less regularly undercut toneholes more cross sections might be needed to the same end.

Photographic enlargements of the type shown in Photo 2 can be made in register with the profiles as shown in Photos 3 & 4 to permit the "contour mapping" of a tonehole on a level of detail likely to be adequte for most purposes.

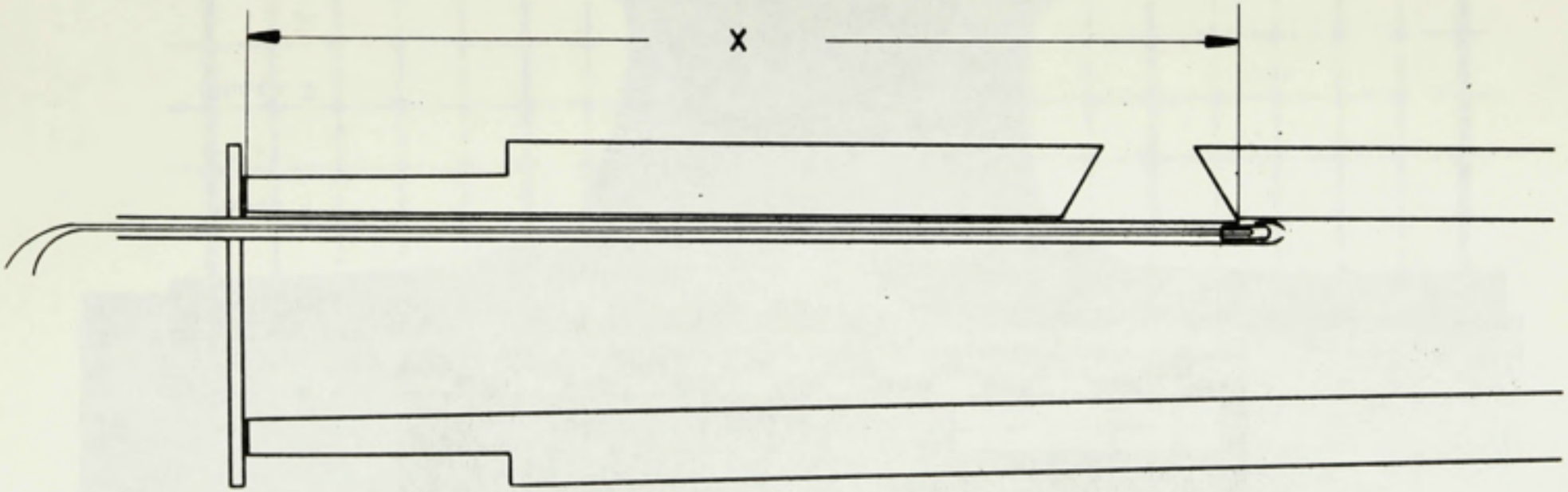


Fig. 1

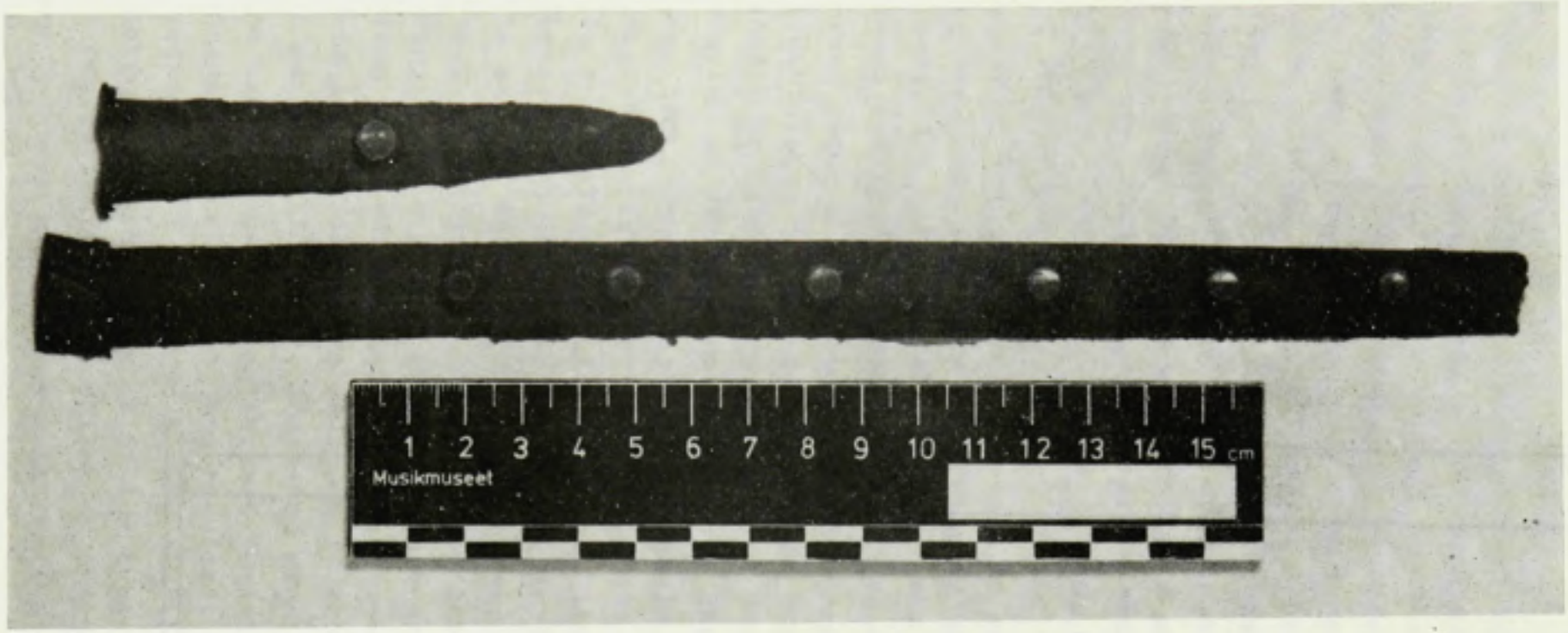
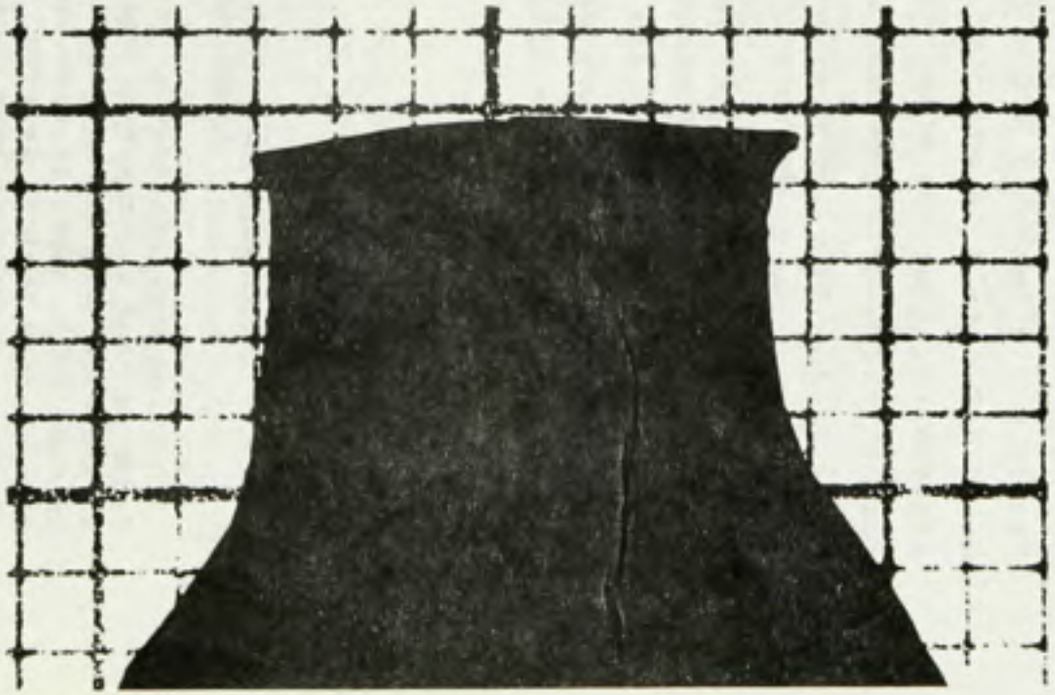


Photo 1

Photo 2

Photo 3

Photo 4



NOTE:

The opening of a tonehole on the exterior of an instrument usually establishes the limits to which the hole can be undercut. With the exception of a hole very near the end of a joint, no undercutting tool can be used which cannot either be inserted or manipulated through the hole itself. The two-halved members of the cornett family are a commonly encountered exception to this rule. Here the holes can easily be adjusted from both the in and outsides of the instrument. Thus the shape of an undercut tonehole on a two-halved cornett presumably can have a configuration judged far more nearly ideal by its maker than would an undercut tonehole on an instrument of any other type. In this light it is interesting to note the extremely long and even profile in Photo 3 (typical for all toneholes on that instrument). In an entirely different regard it may also be interesting to note that the bore of this instrument — one of the few known two-halved ivory cornetts — is polished to what could almost be described as a mirror finish.

FoMRHI Comm 334

'ENIGMATIC BARS' AND BELOW THE BRIDGE BARS
(Some Observations)

To communicate another view concerning the tiny bars found on some instruments, and placed in-between the main bars at the edge of the Lute soundboard (as mentioned by Bill Samson in Comm 300), mine, is that they were placed there for other reasons than that of locating the soundboards position prior to glueing. These tiny bars strengthen the edge of the soundboard I find, but with out adding unnecessary mass.

If one looks at the painting of 'The Singing Lute Player' in the National Gallery Room 19 Picture no.6347, one will see a Lute there painted with the edges of the sounboard well dipped in! So much in fact, that, in my opinion, considerable stress caused it. I believe the artist painted what he saw.

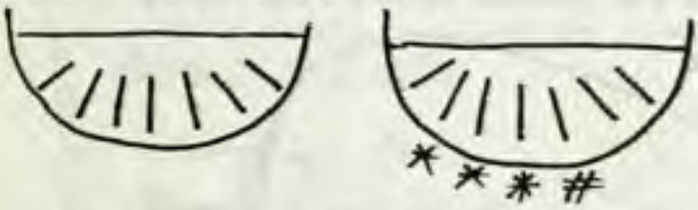
I had to strengthen the edge of a soundboard on one occasion because I could hear it clicking to smash! I remembered seeing the small bars in photos by F. Hellwig in GSJ and so removed the soundboard to put in tiny bars on these same lines. The Lute has been fine since. The soundboard in question was 1.5mm all over.

because they stiffen the soundboard and because of their sections (as with the well known treble bars below the bridge) they must enhance the treble responce (however slight) in that they prevent it flexing in sympathy more with the lower frequencys,-thinner plates being more responsive to low tones, (A bridge too wide for the body will kill the bass too.) As stated before in Comm 260, I found if the bar ends are thick, some bass was killed. It seems to me that only by experiment, (with edge flexibility) using different thicknessed soundboard edges and different sectioned bars, bars scolloping and these tiny bars, can one arrive at a suitable edge deflection for a given soundboards thickness and area.

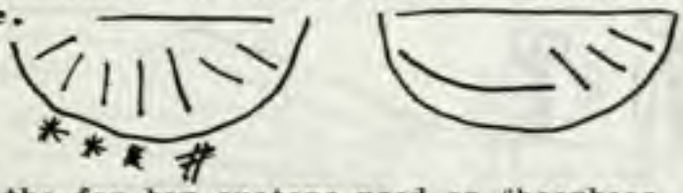
(Small sectioned bars under the rose are another enigma again for me as yet, as I continue to experiment. Their small sections must help the high harmonics, and their number and position must affect the air resonance at the rose. But,one thing at a time.)

BELOW THE BRIDGE BARS

Placing fan bars below the bridge, under the chantrells does bring out the treble responce, for as the soundboard is made harder in this vicinity its resonance periods here quicken. But placing bars likewise in the bass side helps the bass too! I barred a soundboard thus //|\\ on the lines of the Chitarrone by Sebastian Schelle, Nurenberg 1728 as shown in GSJ in effort to stiffen, but was troubled by the sound. The overwounds seamed louder than the trebles, and in particular the fifth course was rather dominant.



After putting up with the growl for long enough I decided to remove the soundboard and examine. I cut down the bars *** and put the soundboard back. The bass plum came back a little but the fifth course went even more dominant! (This could have been due to in phase resonances, but) however, I took off the soundboard again and cut away bar # practically deleating it altogether. The dominance lessend appreciably. From this I decided that the bass side in future was best left without fan bars below the bridge, and have deduced that the bar shaped ⌣ in the bass side in an instrument is best for what I think is Lute tone.



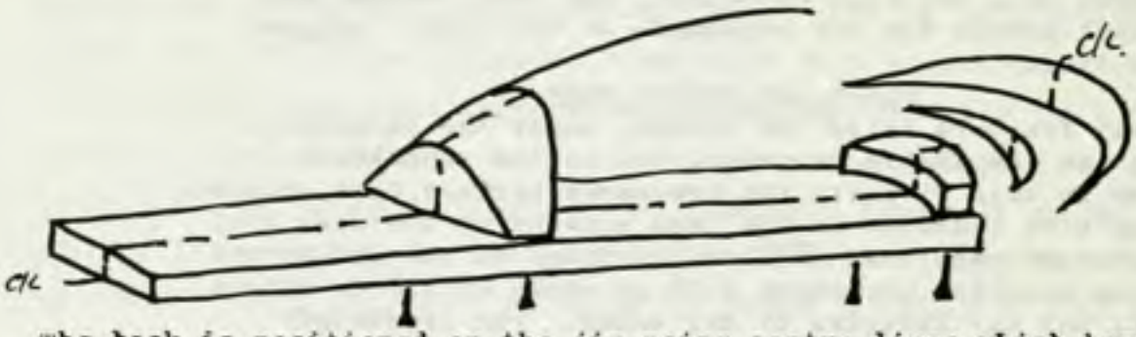
Concerning the fan bar systems used on Theorboes

As the Theorboes were apparently accompanying instruments in the main, I'm not surprised at their barrings and back shapes being different, for, any instrument,in my opinion only sounds its best when suitably accompanied by another's tone, and these instruments have a tone of their own, and I am of the opinion that the fan bars in the bass side are not there just for strength. A bass instrument in consort, makes things nice. Notice the bass recorder, being "subtracted" from play, and think of the combination tones-lost. Further experimenting with bars should turn up somthing as should flattening backs.

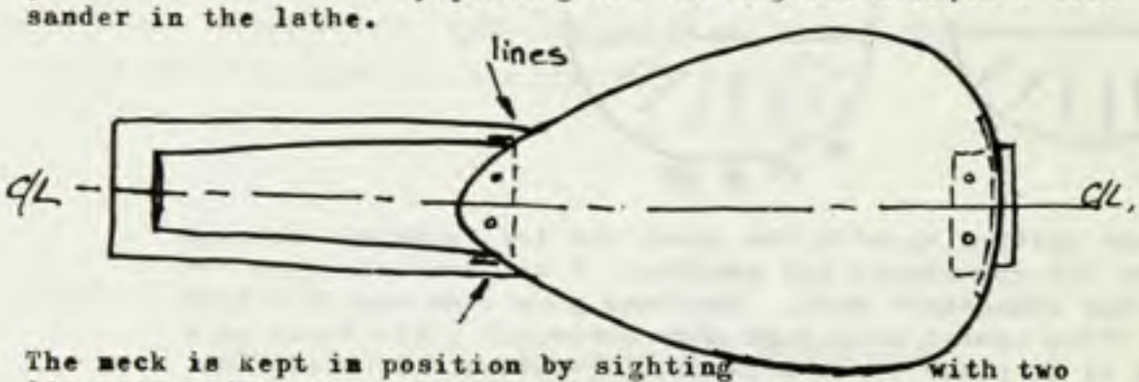
Geoff. Mather.

STRING TO SOUNDBOARD PROXIMITY AND ACTION. Geoff Mather.

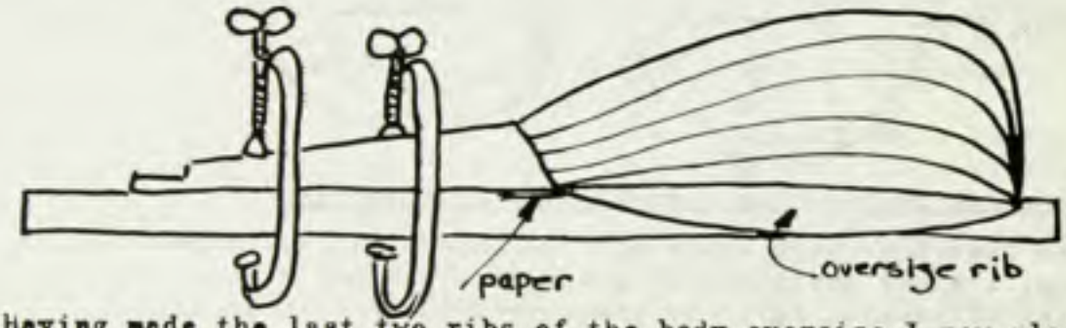
To add to Comm267(John Downing)and Comm 300(Bill Samson), I describe here a method I use to fit the neck to a lute body and make the action right on a board jig. The jig is a piece of flat hardwood 4"wide,and cut as long as the compleated lute is.It is drilled for screws to pass through it and into the lute neck block and removable bottom block.



The back is positioned on the jig using centre lines which have been previousley marked on the blocks,and screwed on. The neck joint is then fitted by planing and sanding the neck,on a disc sander in the lathe.

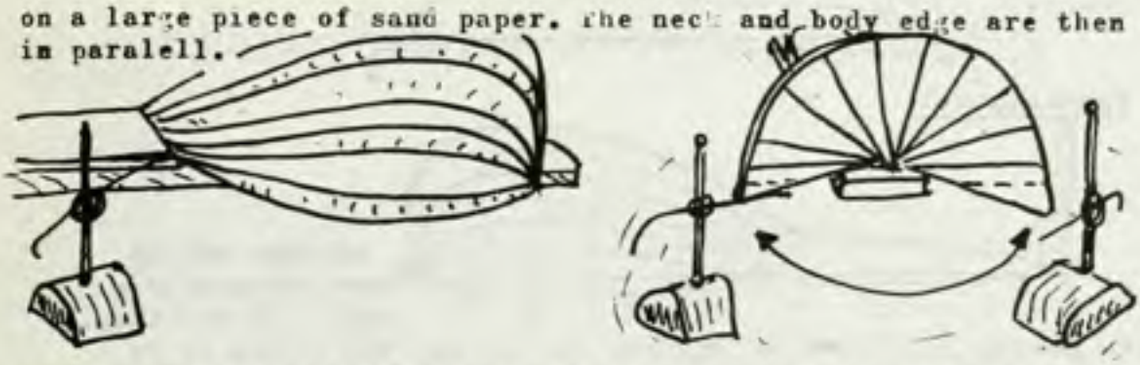


The neck is kept in position by sighting with two lines marked on the jig at the body/neck joint,and the jig centre line at the pegbox end.When the fit is good the neck and back are glued and clamped up with card paper underneath their joint to prevent them being glued to the jig.



Having made the last two ribs of the body oversize,I now place the jig and assembled parts on a good flat table and pick up the top of the jig with a scribing block striker and transfer this horizontal line right round the lute back so I can afterwards plane to this line,and then afterwards sand the whole joint face

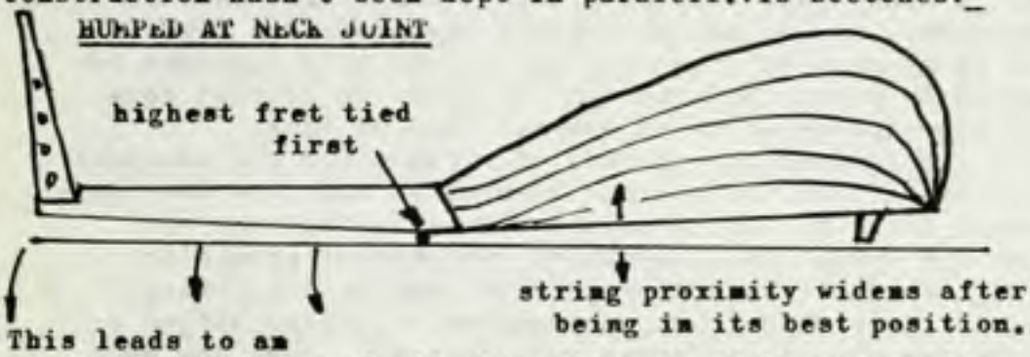
on a large piece of sand paper. The neck and body edge are then in paralell.



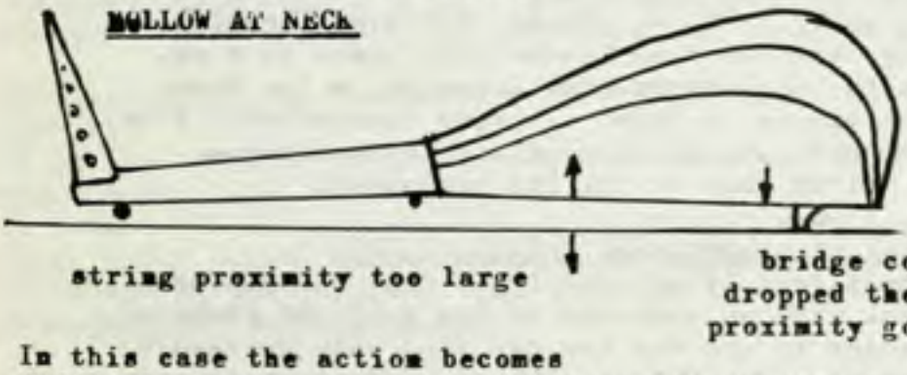
When first fitting the soundboard,its centre line joint, is lined up with the centre line mark,of the now assembled neck and body,which has been transfered on to these from the jig. The soundboard is then held in position by drawing pins which are pushed through that part of it which is to be cut away as waste,just above the neck block,and by scotch tape at the bottom end.The whole thing is then turned over,and the fingerboard placed in position so that the points or beards if any may be outlined on the front of the soundboard for cutting out.

ACTION

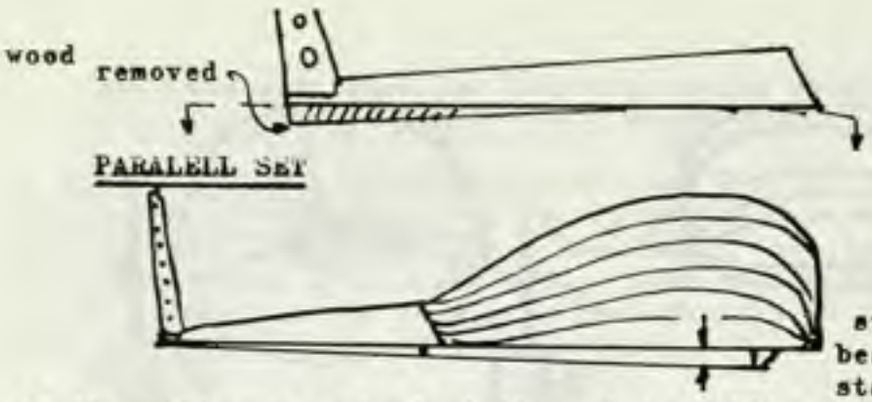
Difficulties arrise when fitting the frets Ive found,if the construction hasn't been kept in paralell.vis scetches:_



This leads to an unecessary lifting of all the action as each progressive fret is tied on to the neck.



In this case the action becomes difficult leading up to the octave position,being same as on a warped neck or one which has bent through string tension.This cam be corrected to some degree by removing the fingerboard and then paring away the neck, making it thinner at the pegbox end.



strings are in best proximity at start of fretting.

As the action is raised at the nut in fitting the frets,it is only raised ever so slightly in the vicinity of the rose.

The soundboard and fingerboard I find are best built in paralell,for the bridge height sometimes has to be made,or altered to corespond with the flexibility of the soundboard inbetween the bridges position and the upper bars.Too high a bridge results in a loss of total available volume,ie the amount of heard sound(regardless of its turning moment)!
Too great a turning moment here at the bridge front edge causes the soundboard to dip inwards in front of the bridge and can cause the rose to rise up and sometimes touch the strings. With poor glue this can cause bars to split away from under the soundboard. I found that too low a bridge can result in a loss of bass resonce. Regardless of whether one prefers a high or low action, in my opinion, there is an optimum best distance for the strings to be above the soundboard to give the loudest sound. The loss of bass for me means an overall loss of tone.

The air gap between the courses of strings and the soundboard gets its resonance from the strings themselves and from the flexing soundboard firstly, and in addition to this from the air resonance at the rose. This important fundamental Helmholtz volume of air resonance cannot be altered drastically (except by altering the body shape) but can however be filter sifted or fine tuned by the use of different rose designs. Just how much I suppose could be found out by further examinations using laboratory equipment, but two simple ways to see that the air is quite busy there are: 1) by placing different density cloths, with firstly more and then lesser hole areas in them, over the rose, plucking the courses and listening to the tones change, and 2) by placing a sheet of paper covered with fine sawdust on the soundboard and again plucking the courses — observing the dust driven away by the air resonance.

FRETTING WITH DIFFERENT THICKNESS NUTS

I tie the highest fret first (8th fret) next the 7th next the 6th and so on but with an increase in the fret cut diameter as the frets get nearer to the nut (so clearing each preceeding fret to give clearance). The NUT is shimmed underneath in this process to lift it as the cut diameter increases. When the fretting is finished a final correct thickness nut is fitted, and the action is usually perfect. This progressive increase in fret height approximates a curve more pronounced towards the nut which gives clearance for the strings deflection. It has been built into some instruments by scraping the fingerboard.

FoMRHI Comm. 336

EARLY DOUBLE-REEDS: PROSPECTUS FOR A SURVEY OF THE HISTORICAL EVIDENCE

Bruce Haynes

Readers may recall my request, together with Hansjürg Lange in the Galpin Society Journal for 1977, for information on any existing early double-reeds. I would like to widen the scope of this appeal by describing below my plans for a more ambitious project, namely a detailed survey of all the surviving evidence on double-reeds from roughly 1660-1830. Comments, criticisms, further ideas, and of course any leads for further information are welcomed.

As is clear to every oboe and bassoon player, the reed is of prime importance to the response, tone, projection, and intonation of the instrument. As a celebrated oboist of the early 19th century, Wilhelm Braun, put it:

> A good reed has such an influence on the beauty of tone and the assurance of musical execution, that I would less rather be without one than with a good instrument. (Tr. from the Allg. Mus. Zeitung, 1823)

It follows that quality of our present performances on early double-reed instruments depends in a large measure on the reeds being used. Although reed-making is determined by many personal factors, a general knowledge of dimensions and techniques used in the past (and in many cases specific bits of information) can be quite useful. It is surprising that up till now no systematic study of early oboe, bassoon and musette reeds has ever been made. Such a study seems definitely in order, and as the length of the attached lists indicates, there is a wealth of general material to work with.

The period under question bridges two important points of mutation in the history of the oboe and bassoon. 1660 is the approximate date of their original development, and 1830 is about one-half generation after the addition of a number of keys for the first time (these eliminated cross-fingerings, some questions of intonation, and altered the manner of overblowing.) As a result of the keys, reeds made after this period had a somewhat different function and therefore construction.

Material which can be used for this study falls into three general categories:
1) Written evidence from tutors, dictionaries, encyclopedias, general music books, etc. from the period.
2) Graphic depictions: paintings, etchings, drawings, tapestries, sculpture, title pages, trade cards, architectural ornaments, etc.
3) Surviving early reeds. When possible these should be drawn, measured, photographed, and described.

Reeds are extremely delicate, and are made of a perishable and easily breakable substance; they have therefore not survived in great numbers. As surviving reeds are often separated from the early instruments to which they once belonged, and have less obvious value and importance, many which might survive at this moment may soon be lost (I know of at least one which was thrown away within the last ten years.)

There is a great lack of written instructions on making reeds. It is not a subject which is easy to put on paper. Also, the oboe and bassoon, then

as now, were not really amateur instruments, so that "do-it-yourself" instruction books are few, and written late in the period. (The musette was so entirely an amateur instrument that few players probably ever saw their reeds.)

It goes without saying that different types of instruments require different sizes, shapes, and scrapes of reed, as well as staples and bocals. Oboes and bassoons during the period in question were much less standardized than today; also, the instruments went through a number of significant mutations during this 170 year period. The personal nature of reed making techniques compounds the possible variation. This study necessarily covers, therefore, a wide range of reed types. Precise delineation of reed types is not yet possible, because first there is not sufficient evidence on the reeds themselves, and second, we still lack a clear understanding of the dating and essential differences in national styles of instrument making. This study will hopefully provide a foundation for more specific dating and typing at a later stage, however.

In the next sections, I have included an outline of the material I intend to cover as well as lists of 1) early written refernces, 2) graphic depictions, and 3) locations of early reeds known to me. Because of the nature of this subject, a lot of important information is only available to one person or a few people; much of my "research" must be done by letters, phone calls, and visits. I hope in one form or another to bring the above remarks to as many of these people as possible. I would therefore like to ask everyone who reads this to either pass it along to others who may have access to the kind of historical evidence I am looking for, or to please communicate at their earliest convenience any information of which they may be aware, which does not appear on the attached lists. No matter how rough or vague such material may seem, there is a good chance that it can be used for this study in one way or other. I will be grateful for any communications on this subject, and I hope to be able to publish a completed study in the course of the next two years.

Bruce Haynes, Royal Conservatory, Juliana van Stolberglaan 1, 2595 CA
The Hague, Holland

Outline for Reed Study

A. General. Importance of the reed.
B. Reeds made by the player or purchased?
C. Materials
    1. Cane
    2. Staples
        a. Reeds without staple
    3. Thread
    4. Tools
D. Reed-making described
    1. Gouging
    2. Shaping
    3. Tying on
    4. Scraping
    5. General adjustments
        a. Use of wire
    6. Length of reed

E. How to judge the qualities of a reed
F. Care and preservation
G. Reeds for larger oboes
H. Reeds for beginners
J. Historical mutation of reeds, 1660-1830

Bibliography of Written Evidence (pre 1850)

Almenräder, C. 'Erhaltung der Fagottrohre, für Fagottisten sowohl, als auch für Oboisten und Clarinettisten,' Caecilia (1829) Band XI, Heft 41
Anon. 'The rise and progress of the hautboy,' Quarterly Musical Magazine and Review 9 (1827)
Bainbridge, W. Observations on the cause of imperfections in wind instruments, particularly in German flutes. Innes, 1823
Borjon, C.E. Traité de la musette. 1672
Braun, W. 'Bemerkungen über die richtige Behandlung und Blasart der Oboe,' Allg. Mus. Zeitung 25 (1823)
Brod, H. Méthode pour le hautbois. c.1826
Diderot, D. 'Hautbois' in Encyclopédie... 1756
Douwes, C. Grondig ondersoek van de Toonen der Musijk. 1699
(Fischer, J.C.)(I). The compleat tutor for the hautboy. c.1770 (W119)
--. (III) New and complete instructions for the oboe or hoboy. c.1780 (W142)
--. (IV) The compleat tutor for the hautboy. c.1790 (W167)
--. (V) New and complete instructions for the oboe or hoboy. c.1790 (W169)
Froelich, F.J. Vollständige theoretisch-praktische Musikschule. 1810-11
Furetière, A. Dictionnaire universel, vol. 3. Rotterdam 1690
Garnier, J.F. Méthode raisonnée pour le hautbois. c.1800 (W233)
Garsault, F.A.P. de. Notionaire ou mémorial raisonné. 1761
Haydn, F.J. Letter, 5 December 1776
Holyoke, S. The instrumental assistant... c.1800 (W234)
Hotteterre, J. Méthode pour la musette, op. 10, 1738 (W70)
--. Principes de la flûte... 1707 (W42)
Koch, H.C. Musikalisches lexikon, 1802
LaBorde, J.B. de. Essai sur la musique, I (1780)(W148)
Majer, J. Museum musicum, 1732 and 1741 (W117 and 119)
Malot, J.F. L'Art de bien faire une anche de clarinette. 1820
Morris, C. The diary of a west country physician (1684-1726)
North, R. Theory of sounds, c.1710-28
--. Musical grammarian
Ozi, E. Méthode nouvelle et raisonnée pour le basson, (1787)(W160)
--. Nouvelle méthode de basson, (1803)(W271)
I.P. 'On the oboe and bassoon,' Harmonicon part I, 1830
Parke, W.T. Musical memoirs, 1830
Quantz, J.J. Versuch..., 1752 (W85)
Sellner, J. Theoretisch praktische Oboe Schule... c.1825 (W414)
daSilva, P. Letter, 1773
Talbot, J. Oxford Christ Church Ms. 1187, c.1698 (W26)
Vanderhagen, A. Méthode nouvelle et raisonnée pour le hautbois, c.1790 (W175)
Vény, L.A. Méthode complète pour le hautbois, c.1828 (W428)
Vogt, A.G. Méthode pour hautbois, c.1813 (W335)
Walther, J.G. Musicalisches Lexicon, 1732
Whitely, W. The instrumental preceptor..., 1816 (W351)
Wragg, J. The oboe preceptor..., 1792 (W179)

Written Evidence (Post 1850)

Bate, P. The Oboe, 1975
Benade, A. Fundamentals of musical acoustics, 1976
Bleuzet, L. 'Hautbois' in Encyclopédie de la musique, Lavignac
Cocks, W.A. and J.F. Bryan. The Northumbrian bagpipes, 1967
Dudok van Heel, S.A.C. and M. Teutscher. 'Amsterdam als centrum van "Fluytenmakers" in de 17e en 18e eeuw,' in Historische blaasinstrumenten, NL:DHgm 1974
Evans, K.G. Instructional materials for the oboe, 1695-c.1800. UM 1963
Fitzpatrick, H. 'Jacob Denner's woodwinds for Göttweig Abbey,' GSJ XXI
Grush, J. A guide to the study of the classical oboe. UM 1972
Hailperin, P. 'Three oboes d'amore from the time of Bach,' GSJ XXVIII
Halfpenny, E. 'A Seventeenth-century oboe consort,' GSJ X
--. 'The French hautboy: a technical survey,' GSJ VI and VIII
--. 'The Christ Church trophies,' GSJ XXVIII
Hedrick, P. 'Henri Brod's Méthode pour le hautbois reconsidered,' in The Consort 30 (1974)
Hellyer, R. 'Some documents relating to Viennese wind-instrument purchases, 1779-1837,' GSJ XXVIII
Hubbard, F. Three centuries of harpsichord making. 1965
Langwill, L.G. The bassoon and contra-bassoon. 1965
--. Index of wind-instrument makers, 6th ed., 1980
Marx, J. 'The tone of the baroque oboe,' GSJ IV
Mirimonde, A.P. de. L'Iconographie musicale sous les rois Bourbons... 1975
Palmer, F.R. 'Reconstructing an eighteenth-century oboe reed,' unpubl. art., 1980
Post, N. 'The seventeenth-century oboe reed,' unpubl. art., 1978
Rendall, F.G. The clarinet, some notes on its history and construction. 1971
Robison, J. 'A guide to early 18th century oboe reeds,' unpubl. art., 1974
Schneider, C. 'Ein Oboisten-Portrait von 1767,' Tibia 3/80
Vas Dias, H. 'Rohrbau für Barock-Oboen,' Tibia 2/80
Warner, T. 'Two late 18th century instructions for making double reeds,' GSJ XV
Young, F. 2500 historical woodwind instruments. 1980

Graphic Depictions: Bibliography

Anon. I. (Ecole Française, debut du XVIIIe siècle). Sainte Cécile jouant de la harpe. Drawing. Louvre
Anon. II. (Beginning 18th C) Panneau d'instruments de musique. Boiserie sculptée. Versailles
Anon. III. Woodcarving on organ, dated 16--. Flentrop workshop, Holland. (per N. Post)
Anon. IV. Title p. to Saint Péravi's Le retour de Grétry dans sa patrie, 1783. (per N. Post)
Anon. V. (?French) Painting depicting playing oboist. W. Burger, Zürich
Anon. VI. Carving of double-reed quartet on bell of oboe attr. Beukers. London: Victoria and Albert Museum
Anon. VII. (German) Portrait of oboist. Staatl. Institut f. Musikforschung, Berlin
Anon. VIII. Title p. to The compleat flute-master, c.1695 (W18)
Anon. IX. (Early 18th C French) Drawing of woodwind instruments. Coll. E. Croft-Murray. GSJ XXXIII

Anon. X. (Italian) Portrait of the oboist and composer Sante Aguilar, (prob. 1767). Sala Bossi, Conservatory, Bologna
Artaria. Oboe fingering chart, c. 1785
Boode, C.G. Painting 'Hoboist der Hollandse Garde in garnizoen te Den Haag' 1760. Legermuseum, Leiden
Bonani, F. Gabinetto armonico. 1722
LeBrun, C. (after). Gobelins tapestry 'L'Air' (17th C) Mobilier National, Paris
Cluer, J. (publ.) Title p. to Handel's Alexander. 1726
Cotton, W. Trade card
Danchet, A. Le Festin Royal. Engraving of the Coronation of Louis XV, 1722. Houghton Library, Harvard
DelaTour, G. (after). Rixe de mendiants et de musiciens ambulants. Oil painting. Musée de Chambéry
Diderot, D. Encyclopédie... 1753-77. Planches VI, VIII, IX, X from 'Lutherie'
Eisel, J.P. Musicus autodidactus, oboe fingering chart. 1738 (W71)
(Fischer, J.C.) I. The compleat tutor... c.1770. (W119) Fing. chart
--. III. New and complete instructions... c.1780 (W142) Fing. chart
--. V. New and complete instructions... c.1790 (W169) Fing. chart
Garsault, F.A.P. de. See bibl.
Grove's Dictionary, 1927 ed. 'Oboe'
Hogarth, W. 'The enraged musician' Etching, 1741. London: Victoria and Albert Museum
Holme, R. Drawing, c.1688. GB:Lbl (Ms. Harl. 2034f 207b)
Holzhalb, J.R. Der Musiksaal nach dem 1725 erfolgten umbau, 1761. Munich: Bay. Staatsbibl.
Lairesse, G. de. Organ doors at the Westerkerk, Amsterdam, 1684. (per N. Post)
--. Title p. to Lully's Ouverture avec tous les airs de l'opera de Cadmus, 1682. Amsterdam: Rijksprentenkabinet (T106)(per N. Post)
--. Coelo musa beat. Etching. A'dam.: Rijkspr.kab. (per N. Post)
--. Casp. Bartholinus de tibiis veterum, 1679. A'dam.: Rijkspr.kab. (per N. Post)
Lairesse, Jan de. Title p. to Hendrik Anders' Trioos, allemande, courante, etc., 1696 (per N. Post)
Lebèvre, J. Gobelins tapestry 'Shepards dancing,' 1689-92. New York: Metropolitan Museum (per N. Post)
Lefebure. Gobelins tapestry 'L'Histoire de Psyché' Louvre
Levin, K. (after H. Kauffman) 'The clarionet player,' etching, 1883
Longhi, S. di P. 'Concerto,' painting. Venice: Ca' Rezzonico
Meares, R. (publ.) Title p. to G. Keller's A compleat method, 1717
--. St. Cecilia at the organ surrounded by trophées of instruments, 1717 GB:Lbl
Mignard, P. Sainte Cécile jouant de la harpe. Painting, 1691. Paris: Louvre (Inv. 6641)
--. Portrait of the Marquise Fouquières (?) as St. Cecilia, c. 1691, oil. Variant of above. Schloss Löwenberg
(Milton, John). Title p. to Paradise Lost, ed. publ. in Verona, 1742
Norman, B. Trade card in gamba dated 1700. (?)London: Vict. & Albert Mus.
North, R. Theory of sounds. See bibl.
Roberts, T. Stuccos on wall of Upper Library, Christ Church, Oxford, 1754
(Romain, J.)(after). Gobelins tapestry, "Amours de Psyché...", 1684. Paris: Louvre, Salle Cressent
Roussel, C. Title p. to Charpentier's Motets melêz de symphonie, 1709
Sanzio, R. Mural, Vatican
Schmidt, G.F. 'A chamber concert,' engraving. In Quantz' Versuch..., 1752

(Tardieu). Engraving of the Coronation of Louis XV, 1722. F:Pn
Teniers, D. (altered in 18th C). The painter and his family. Oil. Berlin: (formerly Staatl. Museen)
Thompson, P. Trade card
Vanderhagen, A. Méthode nouvelle... See bibl.
Vény, L.A. Méthode complète... See bibl.
Verbeeck, F.X. Concert in park, painting. Schloss Rychnov n. Kněžnou (Reichenau)
Verscheure-Reynvaan, J. Muzikaal kunst woordenboek. 1795
Vogt, A.G. Méthode pour hautbois. See bibl.
Walsh, J. (publ.) Frontispiece to D. Purcell's The psalms set full for the organ or harpsichord...1718
--. Ill. for Select preludes and vollentarys for the violin..., 1705 GB:En
Watteau, A. 'La marmotte,' painting. Leningrad: Hermitage
--. 'A young savoyard,' drawing. Paris: Palais des Beaux-Arts
--. Design for trophée. DHgm fiche
--. 'Savoyard avec murmeltier,' painting. Leningrad: Hermitage
--. 'Paris street musician,' sketch. Paris: Musée du Petit Palais
--. (after). Stylized trophée. DHgm fiche
Weigel, J.C. Musicalisches theatrum. pre-1725
Wilkie, D. 'Wind quintet with harpsichord,' painting.
Zoffany, J.J.'The oboe player,' painting. c.1770 Smith College, Mass. USA

Locations of surviving early double-reeds

Amsterdam: H. deVries
Aylesbury: Buckinghamshire County Museum
Basel: M. Piguet
Berlin: Staatl. Institut für Musikforschung
Broadway (Gloucestershire): Snowshill Manor
Chesham Bois: E. Hunt
Cincinnati: Art Museum
Copenhagen: Claudius Collection
Düren: J. Zimmermann Collection
(Derbyshire): Haddon Hall
Kremsmünster: Monastery
Linz: Museum
London: P. Bate Collection
Musashino (Japan): Music Academy, Instrument Museum
Napoli: Conservatory
Oxford: Bate Collection
--. Pitt-Rivers Museum
Paris: Conservatory Collection
Rome: Museo degli Strumenti Musicali
Twickenham (Sussex): Kneller Hall
Vienna: Zuleger Workshop
Waddesdon
Warwick County Museum
Washington, DC: Smithsonian Institute
Zürich: E. Zimmermann Collection

ENGLISH NOMENCLATURE OF EXTENDED LUTES ROBERT SPENCER

I would like to offer some suggestions in answer to Jeremy's appeal in Comm.323. Since there is still confusion (eg Comm.315 and rejoinders in Bull.22 p4), a précis of my article Chitarrone, Theorbo and Archlute (Early Music 4/4 pp407-23) will perhaps be useful; to the illustrations, pages and notes of which I shall refer.

First, the distinction between theorbo/chitarrone and archlute which still eludes Jeremy. It should be added that he is in multitudinous if not good company, as all books and museum catalogues of the last 200 years have been hazy on the topic (presumably because there were no living players to consult). The vital difference between illus.3 and 17 lies in the stopped string-length: 93.3cm on the theorbo/chitarrone and 67cm on the archlute. The first presupposes the re-entrant tuning on p410 while the second allows the tuning on p417 (with the first two courses at nominal renaissance lute pitch), both tunings confirmed for their respective instruments by Talbot c1700 and Sauveur 1701. As a rough guide I suggest an extended lute with a stopped string-length exceeding 69cm be called theorbo or chitarrone, and less than 69cm be called archlute (see Early Music 4/4 p497 last para.)

Answering Jeremy's second point, illus.15 and 16 do represent the same instrument, but I was recording that in its own day it was called by both names. In 1976 I was flying a rather new kite, and in presenting all the necessary documentation I probably confused all but the lute buff. In these five years I have heard of no disagreement with my conclusions, so a certain distillation seems to be called for. When attempting to identify an instrument it is essential to take into account its date, country of origin, and string distribution and length, so I have included these details with the nomenclature given to each instrument in its own day.

(1) ARCHLUTE For the two types I have rejected the nomenclature SMALL and LARGE in favour of SOLO and CONTINUO, which are more descriptive of their relative functions.

SOLO ARCHLUTE played c1610-c1650 see illus.13,14,15,16
normally 7 double stopped courses c59cm and 7 double basses c84cm tunings p416
named liuto attiorbato (Meli 1614) under which heading I have written an article in the New Grove, arciliuto (Piccinini 1623), liuto theorbato (Paris ms), Laute mit Abzügem (extension) oder Testudo Theorbata, Lautte mit eim langen Kragen (Praetorius 1619-20), Luth A double manche (Mersenne 1637)
THEORBOED-LUTE is a translation which should be rejected because it suggests a relationship to the THEORBO and would be confused with the TWO-HEADED LUTE.

CONTINUO ARCHLUTE played c1650-c1760 see illus.17 and p423
normally 6 double stopped courses c68cm and 7 single basses c145cm tuning p417
named arciliuto, arcileuto (Corelli 1681), Arch Lute (Talbot c1700), archiluth (Sauveur 1701), arch-lute (Weldon 1716)

(2) CHITARRONE played 1589-c1650 see illus.2 (the only contemporary illustration identifying a chitarrone by name),3,6
normally 6 double or single stopped courses c90cm and 8 single basses c170cm tunings pp409-10
named chitarone, chitarrone (Malvezzi 1591)
Cavalieri 1600, Agazzari 1606, Piccinini 1623 and Kapsberger 1640 all considered the chitarrone synonymous with the theorbo. I suggest we reserve CHITARRONE for triple-rose instruments (a distinction noted by Praetorius 1620) made before 1650 with

a stopped string-length exceeding 69cm. Praetorius also implied they were made in Rome only and that they were single strung, but neither assertion tallies with surviving instruments. If in doubt, call it a THEORBO !

(3) THEORBO There are four distinguishable types. A distinctive feature of all seems to be the single rose, in contrast to the triple-rose of the CHITARRONE.

SOLO THEORBO played c1600-c1730 see illus.4,5
normally 6 single or double stopped courses c76cm and 8 single basses c120-130cm tunings pp412, 414
named tiorba (Castaldi 1622), lesser French theorboe for lessons ie solos (Talbot c1700), Theorbe pour les Pièces ie solos (Sauveur 1701).

TIORBINO played c1620-30?
Castaldi wrote duets for the tiorba and the tiorbino tuned one one octave higher. The instrument IM 80 in the Geneva Musée des Instruments Anciens de Musique seems to be a TIORBINO. It was made by Hieber and Pfanzelt in Padua 1628, and has a single chanterelle and 5 double stopped courses 48.2cm and 8 single basses 75.3cm. There is a similar instrument in Vienna.

CONTINUO THEORBO played c1600-c1750 see illus.cover and note 69
normally 6-8 single or double stopped courses c80-100cm and 8-6 single basses c170cm tunings pp410,412
named tiorba (Schütz 1629), tuorbe (Mersenne 1637), theorbe (Bacilly 1668), French Theorbo (Talbot c1700), Théorbe d'accompagnement (La Borde 1780)

ENGLISH THEORBO played c1650?-c1700? see illus.9 and p407 tunings p412. Talbot c1700 measured an English Single Theorboe with 6 single stopped strings 88.5cm and 7 single basses at five different lengths up to 135.9cm. He also noted that the English Double Theorboe had a single chanterelle and five double stopped courses and 8 double basses. No instrument seems to have survived, but I said that about the two-headed lute five years ago!

(4) TWO-HEADED LUTE played c1630-80 see illus.19,20,21 tunings p418
normally single chanterelle and 7 double stopped courses c50-60cm and 4 double basses at 4 different lengths c54-82cm
named French lute (Mace 1676), English two headed lute (Talbot c1700). Comm.156 reported the survival of a two-headed lute by Mest of Piessen 1633. Its short string-length(50cm) would be suitable for the D minor tuning, but with the first string at b', as required for some of the consort pieces written up by Tim Crawford in Chelys vol.6 p61. This high tuning seems implied by the B natural B flat tuning instructions in the Burwell Tutor.

(5) ANGEL-LUTE played c1700? tuning Galpin Journal XIV p58
Talbot c1700 measured an Angelique or Angel-lute, describing it as having a second peg-box of the type adopted c1720 by the 13-course theorboed baroque lute. The two can be distinguished by the string lay-out: the angel-lute has 10 single stopped courses 66cm and 6 single basses 99cm.

(6) 13-COURSE BAROQUE LUTE played c1720-c1800 I originally baptised these two types German baroque lutes, developing Talbot's nomenclature for the French lute, but I now think it better to be more descriptive, if long-winded.

13-COURSE BAROQUE LUTE WITH BASS RIDER that is, an 11-course French lute with 2 extra bass courses housed in a mini peg-box. see note 66 tuning p418 3rd tuning single first and second courses and 9 double stopped courses c70-75cm and 2 double basses c80cm

13-COURSE THEORBOED BAROQUE LUTE see illus.22,23 tuning p418 3rd tuning. Single first and second courses and 6 double stopped courses c70-75cm and 5 double basses c100cm

FoMRHI Comm. 338

Criteria for the Naming of Instruments - A Response to Comm. 323.

E. Segerman

There seems to be three groups of people with quite different requirements for instrument names. The educator and entertainer wants familiar and memorable names for the public to easily accept. The systematic organologist wants unambiguous precise names for placing each instrument in an unique niche in a grand scheme (which he hopes might reflect evolutionary development). The functional organologist wants the names to be as close as possible to those used by the players so that he can relate them most directly to independent information about repertoire and social function.

Individual species of instruments provide much less difficulty than categories of instruments. Noone seems to mind specifying such a species by a string of qualifying words attached to a category name. The qualifying words could be geographical, temporal, functional or structural. The functional organologist is often forced to use these qualifiers because he needs to avoid ambiguity that the original players would not experience .

The real problems come in names for categories. The educator wants these to be simple names familiar to the public. The structural organologist has sometimes tried this as well, resulting in absurdities such as the violin being a type of lute and a crumorne a type of oboe. His invented general-category names such as 'chordophone' are quite useful, and he would be serving us better if for more specific categories he confined himself to other invented names or a general-category name associated with a string of qualifiers. Another possibility is to switch over to almost arbitrary latin names as are used in taxonomy. Since he aims at greater precision than other namers, he must demostrate this by providing a dictionary for translation between his language and others, and this dictionary should not make the user suffer from linguistic interference (learning a new partially-different meaning for an old word is more difficult then learning a new word).

The functional organologist often has difficulties with categories because authentic category names may mean different thing at different times or places, or the players may never have needed to coin a category name. He then must use either an obviously invented name or qualifiers associated with an existing name.

There is a fundamental difficulty with the requirements of the educator/entertainer in the historical-instruments field. Names of historical instruments are only familiar because the public has had some experience with historical literature. If these names are used in ways other than the way the functional organologist would, the public is bound to be misled since it expects truthful information as to what these names referred to in the literature. It can be tempting to tell 'white lies' to keep communication with novices simple. But this philosophy of education not only demostrates a lack of respect for the public's intelligence, but also may backfire, leading to loss of reputation when some articulate members of the public are more educated then expected. Also, if members of the public are stimulated into looking more deeply into the subject historically, the need for change in terminology can be a considerable obstacle.

In consequence I insist that for historical instruments at least, only the names of the systematic organologist (if he did his job properly) and the functional organologist will not mislead. The only approach to the needs of the educator / entertainer that honestly responds to the public's (perhaps naive) expectation of authenticity is to form an alliance with the functional organologist to invent attractive and information adjectives for the authentic names to make the distinctions wanted that the original players didn't make. The aesthetic simplicity of single names may just not be computable with historical accuracy.

And now down to the specifies of Jeremy's note in Bulletin 22 and Comm. 323 as examples:

Concerning the difference between the RCM chitarone and the Edinburgh arciliuto (archlute), Jeremy is not satisfied with size as a name-determining factor. Does he then not distinguish between a violin and a viola? He may worry about sizes inbetween. What is wrong with "either a large violin or a small viola" if we have not tested the fiddle's resonances to make out the maker's intention? There is a significant difference other than size between these two 'two-necked lutes'(a generic term I have borrowed from Mersenne to include all lengths of necks and which both reflects the construction and offers no terminological interference). This archlute has a larger open-string tuning range and so the first (or stopped) neck is relatively shorter so that with the highest string close to breaking, the lowest string is long enough to sound reasonably well.

Concerning the differences between the Paris liuto attiorbata and Mersenne's arciliuto, these are most probably not termnologically significant. Piccinini wrote that the terms were equivalent then and there is no contrary data to conflict with this. Jeremy was probably too impressed by Bob Spencer's scrupulous separation of names in different languages and different times. I believe that we can get away with just using English names, and this instrument can be called 'theorboed lute' (liuto attiorbata) or 'early archlute' (the 'early' to distinguish it from the 'late' archlute with the much longer second neck discussed above).

For some (and certainly not scholarly) reason, Jeremy wants one name to describe both the theorbo and late archlute and another for the theorboed lute (a name which continued after early archlutes were converted to late archlutes- for a mid eighteenth century examples see the lute label in Challen's article in E. M. 7/2 April 1979). He'd better forget it. If he finds a long second-necked one and can't tell the difference by size or other criteria, he will just have to say something like "theorbo or late archlute". If he insists on getting us all to agree to call the short second-necked one a 'theorbo' (which he won't, but assuming he could) he will be ending up misleading the poor innocent musician (amongst other people) who, for instance, sees "tiorbe" on an Italian score and wants to get the proper instrument to play it on.

There may be agreement amongst some early wind experts to use the flute to mean recorder and a flute to mean a traverso, but the public has not been educated in this special and restrictive use of prepositions and I doubt whether it ever can or will. This type of word usage is, I am sorry, not acceptable. Through most of the history of these instruments the name 'flute' has been associated with both instruments, so it is sensible to consider it as a generic or category name and use adjectives to specify when necessary. For before Handel's time, the term 'recorder' will do and afterwards 'common flute' is appropriate for that instrument. Because of modern distinctions, perhaps 'common flute (recorder)' would be clearer. 'Transverse flute' or 'traverso' will do for all times. As in the past, one can just use 'flute' if the context makes it clear which is meant or not clear if ambiguity is appropriate.

Big church organs and small chamber organs are all called 'organs' because they are played the same kind of way and make the same kind of sound by the same kind of process. The way the pipes are arranged or the shape of the beast has no effect on the name. A trained maker can make any type. Then why do so many people like Jeremy nowadays want to give different names to virginals when the strings go parallel or perpendicular or at an angle to the keyboard. I suspect that the reason is that the name 'harpsichord' seems to have usually refered to the perpendicular variety and so it seems tidy to use the names

'virginals' and 'spinet' which were used generically, to distinguish on the basis of shape or string angle. This would be poor practice since, once a musician learned this terminology, when seeing 'virginals' or 'spinet' specified by the composer, he could be led not to use a harpsichord when that would be most musically appropriate. Can we please let 'virginals' and 'spinet' retain their generic meaning and use adjectives such as 'rectangular', 'pentagonal', 'triangular' and 'mother and child' for specification. We can even use 'bentside virginals' for harpsichords before that term was used in English early in the seventeenth century.

The term 'extended lute' could imply extension in other ways than in total neck length relative to body length. But Mersenne's (and my) term 'two-necked lutes' is not immediately obvious since the second neck might seem to be continuous with the first. 'Extended-neck lutes' removes the problem with Jeremy's term but it could erroneously imply that there is one continuous neck. This is a difficult choice but not a serious problem.

I don't accept Jeremy's three categories. I have already discussed the long vs. short second neck. 'Theorboed lute' is adequate for both the straight and cranked short neck. But if Jeremy insists, 'Italian' for the straight and 'French' for the cranked will do. While we've at it, we can use 'Flemish' for the third neck type where the strings go around the end and around the back to a second pegbox next to the first (Spencer's Fig. 7 and 12).

There were two types of 'two headed luted'. If distinguishing is necessary, the one with both pegboxes bent back (Spencer's Fig. 1) can be called 'early' and the one with only the pegbox for the stopped strings bent back (Spencer's Fig. 19-21) can be called 'late'.

In conclusion, I suggest that Jeremy rethinks his approach towards historical instrument names with the knowledge that people other than organologists and instrument makers need to use them too. We need to respect the expectations of the literary and music historian, the musician and the public that the names we use correspond as closely as possible to these originally used.

FoMRHI Comm. 339

J. P. COUTRAIT
ON WATER-RESISTANT GLUES

Formulas of water-resistant glues, quoted from J. P. COUTRAIT, *Nouveaux trucs et procédés du bois*, Paris, s. d. (Editions Ch. Moreau, 8 rue de Prague, Paris 12e).

In the edition that I have, this book must date from the 1950's. The introduction states that it was first printed in 1920 and at one point the author gives a formula which he says he patented in 1907. The book is not much concerned with the 'authenticity' of the methods described. It deals with modern furniture making and includes a discussion of synthetic glues and varnishes, recommending their use. But it is obvious that J. P. Coutrait, "ancien élève de l'école Boulle", was trained in the best tradition of the French ébénisterie. He has confidence in the old methods, which he does not hesitate to present as practicable today, along with the modern ones.

It is so that Coutrait gives several formulas of water-resistant glues, all based on animal glue. He does not discuss whether these recipes were utilized in former times, and probably did not mind. Some at least may be ancient, especially among the ones described below as 'tanning glues'. The use of hay, in particular, is fascinating in its simplicity — I wonder whether it really works. The 'vulcanizing glues', based on the use of flowers of sulphur (that is, of sublimated sulphur), are presented by Coutrait as a recent discovery. They could nevertheless have been utilized in ancient times, I presume, as the ingredients were known.

The formulas are not always entirely clear. They certainly demand testing. I can take no responsibility as to their applicability to musical instruments. In this respect, it should be realized that gluings done with these glues would tend to become irreversible. In other words, one of the major advantages of animal glue, compared to synthetic glues, would be lost. Even though they are on basis of animal glue, these glues should not be utilized on historical instruments, unless in special circumstances. It should also be realized that the insolubility of the glue will increase with time, and may not be apparent from the beginning.

As the matter of water-resistant glues is spread over several pages of Coutrait's book, I will not merely translate. Rather, I will try to reorganize the material and to shorten it — without forgetting anything of importance, or so I hope. The formulas can

be distributed among three categories:

1. Siccative glues. The siccativity is increased by the addition of resins or oil to the glue.

2. Tanning glues. A product is added to the glue which will make the gelatine insoluble by coagulation of the albumins, in a process similar to that utilized for tanning skins. Suitable products include tannins, alum, bichromates, formaldehyde and its polymer the trioxymethylene. Coutrait's formulas are based mainly on formaldehyde; he is unfortunately not very informative on how to use the other products.

3. Vulcanizing glues. Flowers of sulfur heated in the glue free sulphurous acid, which combines with the carbon contained in the glue to form a compound similar to carbonic sulphur. This will slowly penetrate the mass of the wood and perform a kind of vulcanization. Besides, the sulphur remaining in suspension in the glue will prevent retractation while drying.

Before describing these formulas, I'll shortly quote what is said of the preparation of normal animal glue.

0. Preparation of animal glue

Animal glues are sold in plaques, in pearls or in powder, pure or mixed. They may be of varying quality. Bone glues are the hardest; they lack suppleness. Nerve glues are suppler. Hide glues are even suppler and more resistant, but more expensive.

The plaques must be broken into pieces before use. The glue is first put to soak in 110 to 300% water (in weight), depending on the desired viscosity. A glue of good quality should swell without dissolving. The soaking may last from one hour for powders to a night for plaques.

The glue is then heated at about 60° C in a water bath. One may stir from time to time with a wooden spatula. A glue of good quality should tend to thicken while cooking; one of poor quality will keep its initial viscosity. Animal glues loose their quality under too high temperatures or too long cooking. Reheating should therefore be done in little pots containing no more than what is needed for one utilization. The prepared glue may be kept in enameled earthenware. An antiseptic (phenol, naphthol or sodium fluoride) may be added to make the glue imputrescible.

1. Siccative glues

a. Add the following solution to the glue prepared as usual:

Sandarac: 6 grams
Turpentine: 6 grams
Denatured alcool: 50 grams

This must be mixed hot, taking the water bath from the flame before adding the alcool. Coutrait does not say to what quantity of glue this mixture must be added.

b. Soak the unprepared glue in as little water as possible, without letting it loose its form. Put it then to dissolve in linseed oil, in a water bath on a very soft fire, until it sets like a jelly. The quantity of oil depends on the quantity of water utilized for softening the glue. The glue is applied on heated wood. Some say that gluings so done could be immerged in water without loosening.

2. Tanning glues

a. Make the wood wet with hay before gluing it with normal glue. Coutrait gives the following recipe (b) as better than this one.

b. Pass on the wood a solution of 50% formaldehyde in water; apply with a brush. As this will tend to raise the pores, further pouncing may be needed. The gluing is then done with normal glue. If the wood has to be treated with a bichromate (presumably for colouring), the formaldehyde is unneeded as the bichromate will have the same effect.

c. If the glue is to be utilized immediately, add to it 5% of formaldehyde. One should operate rather quickly and press without delay.

d. Add to the hot glue 10% of trioxymethylene and 5% of oxalic acid, the whole finely sifted; mix well while maintaining the glue hot. The glue so prepared can be utilized during four hours. The glue pot and the tools will have to be washed before the glue is dry, as it becomes hard and insoluble (this, by the way, is probably to be recommended for some of the other recipes as well).

3. Vulcanizing glues

a. To an ordinary glue maintained very hot, add slowly finely sifted sulphur, stirring continuously, until a rather thick pap of grayish yellow colour is obtained. The cooking may last a good half an hour during which the pap should be kept homogenous by constantly stirring. For use, the glue may be thinned with water.

b. The sulphur is added in the way just described to an oil glue prepared as described above (see 1b).

In both cases, the glue must be utilized very quickly and hot, as the sulphur stimulates a fast evaporation. This glue could be utilized on metal, provided it is rugged. It can also be utilized as a cement or mastic to fill cavities; it can be filed and polished after a month, and may notch metal tools after a year.

* * *

P.S. The above was written when I recently saw Coutrait's book on sale. The edition is now by R. Baudouin (successeur de Ch. Moreau), 10 rue de Nesles, Paris 6e. The book is protected by a copyright.

Also, I have read another formula of insoluble glue: add to 55 grams of gelatin 5 grams of alum and 5 grams of bichromate.

N. Meeùs

FoMRHI Comm. 340

On Shafts and Bearings for Hurdy Gurdies
Samuel Palmer

The shaft and bearings are arguably the most important feature of the Hurdy Gurdy. And as an engineering problem, their successful construction taxes the ingenuity, often defeating the first time maker and professional alike.
The main criteria for the shaft and bearings are:
A. FREE RUNNING-with no noticeable resistance, for ease of playing; especially important if the Hurdy Gurdy is fitted with a trompette.
B. QUIET RUNNING-grating, squeeks, hisses and knocking are annoying both to the player and the audience.
C. LONG TERM DURABILITY-the ability to stand up to wear and tear from hard or bad playing; climate; stress from string tension; dirt and oil, over a reasonable period of time.
D. COST-of both materials and time.
E. EASE OF CONSTRUCTION
The ideal running tolerance for all plain bearings should be as small as possible(around .0005) to provide effective lubrication and prevent noise.
Unfortunately the Hurdy Gurdy being made of wood and not rigid, changes its shape from the effects of string tension and from changes in relative humidity, which causes the wood to expand and contract.
This can often occur when the maker has just finished the instrument, the shaft and bearings run perfectly. But when the strings are put on the handle end of the instrument imperceptably folds forward and down so that the bearings are no longer in alignment and the shaft runs tight.
If played in this state the Hurdy Gurdy will eventually run in and probably prove satisfactory.
But for a more instant solution, the maker can remove the shaft and ream the bearings. The shaft may now run perfectly but when delivered to the customer, the problems may not be over.
If the customer happens to live in a damper climate than the workshop, the wood may expand, the bearings realign and the shaft consequently rattle and knock when played.
These are some of the problems. But before suggesting types of materials that can be used in the successful construction of shafts and bearings, I will first look at their history.
Traditionally the bearings were simply the holes drilled in the end block and keybox support strut in which the shaft runs. This system was used in French Hurdy Gurdies for at least 300 years.
The strut and end block was commonly made from spruce(occassionally mahogany or maple). The shaft was iron, forged by the local blacksmith. The wood for the wheel was maple.
The wheel was drilled in the centre and driven onto a tapered square section of the shaft. Or the shaft was sometimes heated hot enough to burn itself in. Alternatively the wheel was screwed onto a tapered threaded portion of the shaft, tight up to a flange.
Once on the shaft the wheel was turned on a lathe and then built into the Hurdy Gurdy before the soundboard was fitted.
This system had the advantage that it is relatively easy to manufacture and cheap.
A disadvantage of this system is that the Hurdy Gurdy will almost certainly distort when the soundboard is glued on, as the hot glue is a perfect lubricant and the joint tends to slide. This gives fitting and alignment problems.

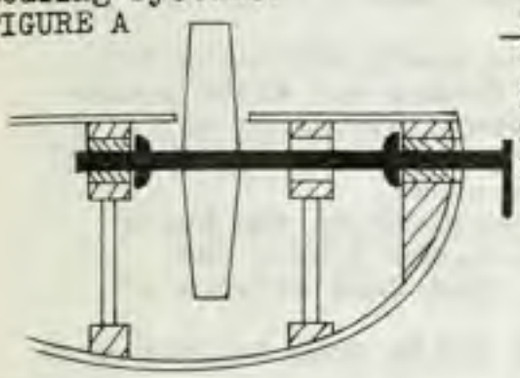
Unfortunately almost all old Hurdy Gurdies I have examined have suffered from a loose shaft,which brings into consideration durability.
There are several factors which may have caused this slack,for example the wood itself;rot caused by damp(moisture tends to condense on cold metal);acidic oil;lack of lubricantetc. or an inability for the wooden bearings to stand up to the playing it has received,which is hard to assess.
The few old Hurdy Gurdies that have good bearings this also holds true,in that it is hard to assess the treatment they have received.
Old Hurdy Gurdies with good bearings and instruments I had to repair,by rebushing with wood,have proved to have a very nice feel,both free running and quiet.The wood bearings having good vibration,dampening qualities and a little give.
For makers who wish to produce exact copies of old Hurdy Gurdies or for those with the attitude-what was good enough for past makers must be good enough now-this system of shaft and bearings is perhaps the only system one should use.
With the disadvantages of the traditional methods,it is worth considering redesigning the shaft system to include:
1)Removable wheel(old Hurdy Gurdies occasionally have oil sodden,badly warped wheels etc. which need replacing by major surgery).Removable shaft which could also give valuable internal access to the instrument for repairs.All removable wheel systems by design have some means of taking up lateral slack.Badly worn bearings could be cured by making the shaft larger by plating, building up etc.
2)Removable bushes which could provide almost complete adjustment of play.
3)Complete redesigning of the traditional method of the shaft and bearing system.
4)New materials for bearings.
The choice of materials for bearings used by present day Hurdy Gurdy makers include:
i)Bronze
ii)Brass
iii)Plastic
iv)Hard Woods
v)Roller Bearings
My experience of some of these materials is limited but I will attempt to be constructive on them all.
Bronze-an excellent material for bearings which have to carry high loads at medium speeds and gives good results if the metal in the shaft is not too soft.
Brass-can be excellent bearing material but only use brass specified as suitable for bearings!Any old brass'simply will not do.
Plastics-there are many different types suitable for use as bearing material,including Nylon,a polymer.There are many different types of nylons,all denoted by a number e.g.Type 6,6,6.8.All nylons are hygroscopic,that is they will absorb and lose moisture and change dimension depending on the relative humidity-this point should be borne in mind.The type containing molybenum disulphide (usually coloured black) is recommended for bearings.Nylon has good wear and frictional properties;is resiliant ; has a high resistance to chemical attack and is quiet and self lubricating.
PTFE(Polytetrafluoroethylene)-its well known trade name is 'Teflon'.It has the distinction of the lowest coefficient of friction of any solid material and also the greatest resistance of any plastic to chemical attack.Makes a quiet resiliant and self lubricating bearing.But very expensive.

Both Nylon and PTFE exhibits deformation under load so have some ability to compensate for misaligned bearings.
Hard Wood-a)Ebony-a very hard wearing wood needs to be well lubricated,good if metal in the shaft is not too soft.
b)Rosewood-is a very hard wearing wood,slightly self lubricating; takes on good polish;resiliant;makes a very quiet free running bearing.
c)Lignum Vitae-extremely hard wearing.Traditionally used for prop shaft bearings on old ships-was used on the Queen Mary.Metal of shaft must not be too soft.
Roller Bearings-the action of roller bearings is not rubbing but of rolling.Made from high grade steel to high quality.Costly. Difficult to fit elegantly.Will not tolerate any misalignment of shaft.Self aligning bearings could be used.If these difficulties can be sorted out and the bearings 'sealed for life',roller bearings will last longer than any other bearing without maintenance and should prove quiet and very easy running.It should be pointed out that the harder the bearing material, the louder the knocking from a sloppy shaft will be.
Finally on materials for bearings,never construct a shaft with bearings from the same metal.Cast iron stands alone as the only metal which will run with itself.And it is an excellent bearing probably due to the free graphite in its structure,which helps as a lubricant.
Incidentally,I have never seen an iron shaft and bearings used on a Hurdy Gurdy(an idea perhaps?).
Lubrication of Bearings:
Efficient lubrication plays such a vital part in the reduction of wear,that its importance cannot be overstressed.The object of lubricating bearings is to eliminate the solid friction between the surfaces and substitute a fluid or a material whose internal friction is much less.
When a bearing is properly lubricated,a thin film of oil seperates the two surfaces and the shaft actually floats on the film.There is not the wear and damage there would be if the surfaces were actually in contact.A thin oil(low viscosity) works the best but only if the bearings fit well.An oil film damps knocking from loose bearings.
Mineral oil is most effective for all metal bearimgs.'3 in 1' with added graphite should prove very effective.
Olive,Palm and Almond oils are very effective lubricants for wooden bearings.They may go gummy if used in warm conditions but can be freed by adding a drop of turps.
Graphite is a very effective dry lubricant for woods.A small amount can be mixed as a powder to the vegetable oils.
Graphite,suspended in a highly volatile liquid can be directly dripped into bearings and can be obtained from piano makers suppliers.
Warning-mineral oil can rot wood and should not be used on wooden bearings.
Teflon spray lubricant has recently come onto the market.It dries to leave a film of microscopic particles of teflon on the surface.Its makers claim that it can beneficially replace conventional oil,is non-corrosive,drives dirt and moisture away and provides a long lasting film.Perhaps the most free running of all lubricants but has very little damping effect.
I have had no experience of using teflon in Hurdy Gurdys.
All lubricants or their additives could do damage to glue,wood and the finish(keep well away from the wheel)and should be used sparingly.But never let the bearing run totally dry.
Finally some inferior brands of oils may turn slightly acidic. Free acid may corrode the shaft and bearings.The oil may be tested by wrapping a piece of string soaked in the oil,around

a highly polished bar of steel.Leave the string on for several weeks.If acid is present a permanent mark will be left on the bar when the string is removed.
Stainless steel and some other alloys,provide a high resistance to corrosion and could be used for shafts and bearings but are expensive.

Bearing Systems:

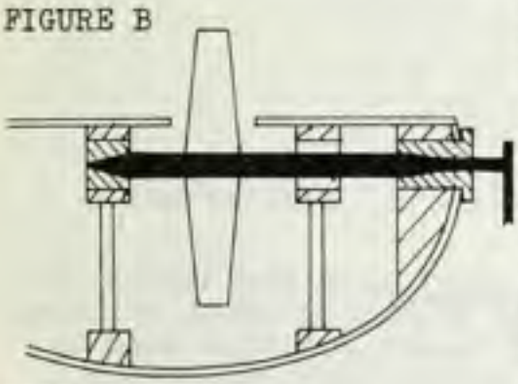
FIGURE A



Traditional Methods

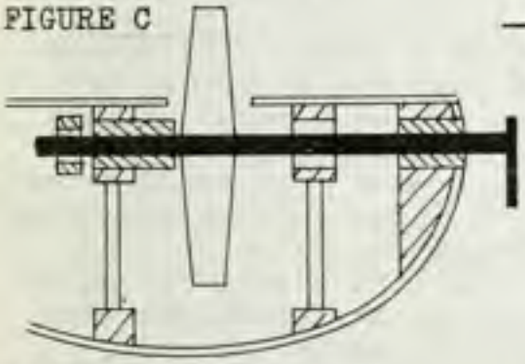
Shaft and wheel built in before soundboard is glued on.
Flanged ends of shaft to prevent lateral play(or ends of shaft turned down to form flanges [redacted]).

FIGURE B



Tapered end of shaft to prevent lateral play.
Bearings always formed from the wood of end block and strut.
Bushes of different materials could be used as indicated.End block bearing could be a removable bush which would provide adjustment of play in all directions and provide a possible means of removing shaft.

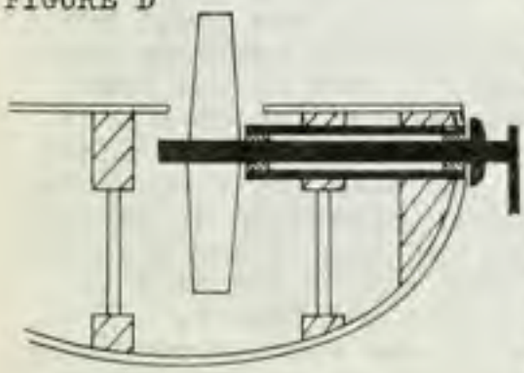
FIGURE C



Modern Methods

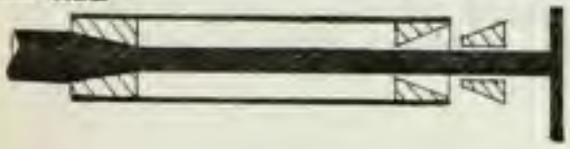
Shaft lateral movement fixed by keybox strut bearing.
Could have seperate bushes as indicated and removable set collar to provide lateral adjustment and removable shaft and wheel.

FIGURE D



Bearings fitted in ends of tube which is fixed in place in bridge strut and end block.
This system of bearings are fixed rigid in tube.Does not suffer from misalignment due to string tension, relative humidity etc.Roller bearings could easily be fitted in this system
Could be provided with tapered shaft at wheel bush and removable tapered set collar at handle end to provide complete adjustment of play if bushes solid.Removable wheel and shaft is easily provided for(see detail)
This system,having the shaft fixed between the bridge strut and end block,will almost certainly affect the traditional tone of the Hurdy Gurdy(for better or worse?)

DETAIL



Tips for correct shaft alignment:
In the traditional method all bearings must be made a perfect running fit.To help in maintaining alignment during soundboard gluing,the instrument could be supported by an external mould or restrained internally by removable bulkheads.
If the Hurdy Gurdy has separate bushes, these might be glued in oversized holes with long setting glue(shaft in place) just prior to gluing soundboard.
For Hurdy Gurdies with removable bushes/shaft,the holes for these might be drilled under size and reamed out after soundboard is glued and perhaps after temporary stringing up.
For Hurdy Gurdies with removable shafts but fixed bushes,drill holes for shaft under size and ream as above.
In conclusion the shaft and bearings peculiar to the Hurdy Gurdy is a complex and difficult problem.And I hope the potential maker and professional will find this article of some use.
NB-most of the information on bearings holds true for the knob of the handle.

FoMRHI Comm. 341

Jan Hermans

1. LEAD IN KEYBOARDS

Comm 98 (Bulletin Nb 10 Jan 78) might give the impression that corroded lead weights should always be replaced. When restoring the first principle of reversibility should be respected. If the corroded lead weights are replaced by new ones, we're doing something irreversible. If a key hasn't split (during it's 150 or more years of existence) it probably won't in future. One just has to remove the corroded parts (that are sticking out both sides of the key) with a sharp putty knife so that the keys can move freely. If a key is split, gently remove the corroded lead weight, taking extreme care not to cause further splitting of the keywood. Glue the key, remove the oxide from the weight and gently hammer it in till it's a snug fit again. Never try to pour melted lead (or tin or cerrobend) into the holes, cause you inevitably will scorch the wood, causing harm that's very hard to repair (if this method had been used when the keyboard was made, one would see scorch-marks - this isn't the case). Don't endanger your health by using methods which weren't used in the past anyway! If a lead weight has dissappeared (as sometimes also happens), use small pellets which you gently hammer in layer after layer. For people who make new instruments or copies: Renner Postfach 423, 7000 Stuttgart 1, Germany has the largest assortment of key weights: Ø 6mm - 7mm L. Ø 8mm - 6,9,10 and 11mm L. / Ø 10mm - 9,10 and 11mm L. Ø 11mm - 7 and 14mm L./ Ø 12mm - 9,10 and 12mm L.
In England one can also buy lead in rod form in hardware stores. This is a (cheap) solution if one can find the diameters one needs. Note: take care when removing the oxide, cause the white powdery stuff is even more dangerous than the fumes you get when melting. Wear a good painting mask!

2. A POSSIBLE SOUNDBOARD FINISH

In Comm 198 (Bulletin Nb 15 April 79) tempera painting (pure egg yolk without the sac plus eventually an equal amount of water) was suggested as a possible soundboard finish for keyboards. Tempera contains oil and that's one thing which shouldn't be used on soundboards of keyboards: the oil penetrates the wood to a very large extent altering the high-elasticity/low-density characteristics of the soundboard wood. It certainly wasn't used in the past!

3. TRADITIONAL KEYBOARD TUNING PINS

Comm 200 (Bulletin Nb 15 April 79) described an efficient method for making traditional style wrestpins. There's still one detail worth mentioning: the wrestpins of even the oldest fortepiano (circa 1776) which I restored, already had (irregular) threads and these could also be copied if a missing wrestpin should be replaced. With a tap and die wrench set you can more or less copy these threads, even if the wrestpins are tapered. The threads should be filed away a bit again, cause they're too sharp. Just put the pin in your electric drill in the drill stand and push the file against the bit. This will do nicely.

4. REQUESTS

A. The wrestpins of keyboards (made roughly before 1820) were treated with a brown substance to prevent them from rusting. This method was quite effective: only that part of the wrestpin which is inserted into the wrestpinblock and which was untreated is usually heavily rusted (because of the acids present in the wood). The other part is spared (the rust usually lies only in a small ring just above the wrestplank and can be very easily removed). I asked a chemical engineer to identify that substance, but he couldn't. On wrestpins of fortepianos made after 1820/30 blueing was applied (which is a fairly simple procedure). Can anyone help? I could send a few wrestpins if needed.

B. Could anyone get me the following books? I've been trying to get them for years, ordering in Belgium, England, Germany...

-"Preservation and Restoration of Musical Instruments" by BERNER, VAN DER MEER and THIBAULT, published by Evelyn, Adams and Macky 9 Fitzroy Square London W1

-"Making musical instruments" by Charles FORD Faber and Faber 1979

-"Die klanglichen Aspekte beim Restaurieren von Saitenklavieren"by Vera SCHWARZ Bericht der Internationalen Tagung von Restauratoren für besaitete Tasteninstrumente am Institut für Ausführungspraxis Graz 1971

FoMRHI Comm. 342

ORGAN PITCH Part I - PRAETORIUS

Dominic Gwynn

Between 1500 and 1700 the organ throughout Europe went through a period or expansion and evolution during which it was widely considered to be paramount amongst musical instruments and attracted the attention of the foremost natural philosophers of the day. Its development produced a rich diversity in the form of the instruments, and the passionate concern it evoked (fuelled, as it was, by sectarian controversy) resulted in some of the most exciting organs ever built. Its evolution parallelled the changes in musical expression, which can be traced especially in the variety of pitches and keyboard compasses used. This variety is more the result of changes in performance technique than in attempts to alter organbuilding practice, but attempts to sort out the history of pitch and compass involve a thorough knowledge or how organs were built if sense is to be made of the scattered and fragmentary sources that are left to us.

The evidence for pitch consists largely in the measurement of the lengths of organ pipes, either of those extant pipes that can be proved not to have been cut down at a later date, or where evidence of those lengths has been documented. In the latter case it is a matter of correct interpretation of the evidence available. In the former case the length of a pipe and its relation to the keyboard has to be pursued through research into an instruments history, by studying the archives, which are often full, and by examining the internal evidence, e.g. pipe markings and alterations to keyboard and windchest. Neither is likely to produce such an uncontroversial result as to be universally acceptable, but the continued additions to the evidence may eventually produce a convincing picture.

Although not without some ambiguity, Praetorius gives us the most complete documentary evidence we will ever get, in that he presents us in the diagram Pfeifflin Zur Chormass with the length of an actual pipe, rather than a merely theoretical length. Consideration of the plates 37 and 38 in the Sciagraphia, and the diagram Pfeifflin Zur Chormass has produced results from three investigators: Ellis (On the History of Musical Pitch, Frits Knuf), Bunjes (The Praetorius Organ, Concordia 1966) and Thomas & Rhodes (in Organ Yearbook 1971).

Ellis concluded his experiments with a pitch of a' = 424.2 Hz. He had a 1'C wooden pipe made from what he conceived to be the correct measurements for ½'C in the diagram, and arrived at this result by comparison with his tuning forks. Bunjes gives the following objections to his methods:-

1) that he doubled the line ab to obtain the length of the 1'C pipe from the length of the ½'C pipe given, not allowing for end correction.

2) that instead of doubling the line ac to give the circumference of the ½'C pipe, he took double one side of the representation of the square pipe to give one fourth of the circumference of his 1' pipe

3) that he used too high a wind pressure (3¼')

4) that he neglected to check his result against the pitches of the other pipe lengths given.

Had Ellis doubled double the line ac for his 1'C, instead of doubling one side of the square pipe for one side of his square pipe, he would have arrived at a circumference of about 105mm instead of 100.4mm, which does not make a gread deal of difference in the equivalent diameter. By doubling his diameter as well as his length he effectively removed most, though not all, of the need for an end correction (according to the Mersenne- Savart law). So it would not be surprising if Ellis's result was close to the correct one.

Wind pressure also does not make a significant difference. If Ellis had chosen the result on $2\frac{3}{4}$" wind instead of $3\frac{1}{4}$" his result would have been a' = 421.4 Hz. Bunjes wind pressure was 55mm, taken from Frederiksborg, which being an inflated house organ would also not have been typical of Praetorius' church organ.

Bunjes also used the method of making pipes from the measurements given by Praetorius; their pitch was measured electronically. He had examples made from all the pipes given in the Pfeifflin diagram and from all the pipes in the Plates. His conclusion was a pitch of a' = 445 Hz. But this pitch is a mean value obtained only from the pipes in the plates, and does not include his results for the diagram, despite the fact that he says at the beginning of the chapter that "inasmuch as he (Praetorius) was unable to measure and record frequency of vibration, all of his representations in this regard are more nearly qualitative approximations than quantitative definitions," which may be applied to the drawings in the plates, but not to the diagram. From his own results it is evident that in his interpretation of the diagram, Bunjes does not differ greatly from Ellis.

Bunjes measured an original copy of the Syntagma, which, using a similar multiplying factor for paper shrinkage, confirmed Ellis' measurements. He took the circumference of the pipes as twice the line ac for the $\frac{1}{2}$'C pipe, the mouth widths as $1/5$ the circumference and the cut ups were nowhere higher than those in the pipes in the plates. The circumference measurements were rounded off for the pipe maker. A 55mm wind pressure was used and the pitches of the thirteen pipes were measured electronically at a temperature of 30°C, so that they have to be converted for comparison with Ellis' and Thomas and Rhodes' results. His conclusion for the diagram pipes works out at a' = 430.1 Hz.

Thomas and Rhodes used acoustical formulae to convert their measurements from the copy of the Syntagma which Ellis used (also converted for paper shrinkage) into frequencies, and took a mean value from the thirteen pipes to give them a frequency for a'. In effect their methods and those of Ellis and Bunjes confirm each other, and reveal only one probable error on the part of Thomas and Rhodes which may explain the slight divergence. They consider the legend "a: ist die Weite zweimahl genommen" to refer to the diameter rather than the circumference. Bunjes' arguments for using circumference are:-

1) the extension of the line ac to twice its length
2) the representation of the circular pipe shows a circumference almost equal to twice the line ac
3) the circumference of the square pipe is the same as twice the line ac.

There are two further arguments in favour of using the circumference. It is known from marks on the pipes made by dividers that Schnitger transferred his measurements from a table showing half scales. And the scale for this rank is more credible if circumferences are used. A diameter scale would end up at about 8" for the 4' pipe (not 8' as Thomas and Rhodes suggest), whereas a circumference scale would produce a diameter of 5" for the 8' pipe. This gives a circumference: pitch length ratio of 1:6 which is a German standard of the classical period. The effect is to make Thomas and Rhodes' pipe longer than Bunjes', for what is added to the scale should be taken off the length.

I have repeated their calculations using the corrected measurements given by Bunjes. The formula for discovering the wavelength of a pipe is given in Thomas Rhodes:-

$$\tfrac{1}{2}\lambda = l + Kd$$

where λ is the wavelength
l is the length of the pipe
d is the diameter of the pipe
K is a constant value of the effect produced on the end correction by mouth width and height, wind pressure, etc.

The wavelength is converted to pitch by the formula

$$Hz = \frac{340700}{\lambda}$$

340700 is the speed of sound in millimetres per second at 15°C.

The range of value for K is only between 1.5 and 2.0; I have chosen 1.66 as a norm, not having had access to a copy of Ingerslev and Frobenius, whose data Thomas and Rhodes used. Its influence is not great when set against the other uncertainties ($^1/6$ of semitone at the most). Here is a table of the results from Pfeifflin diagram after Bunjes, Thomas and Rhodes, and myself:-

	Thomas & Rhodes	Bunjes	Gwynn
c^3	1025	1029	1036
cs^3	1028	1030	1043
d^3	1022	1025	1038
ds^3	1009	1020	1022
e^3	1035	1039	1051
f^3	1024	1031	1039
fs^3	1033	1043	1049
g^3	1018	1022	1037
gs^3	1020	1026	1038
a^3	1010	1022	1024
as^3	996	1017	1013
b^3	1011	1039	1033
c^4	1016	1031	1037

The pitches are converted to values for c^3. Thomas and Rhodes and my results are based on meantone. I converted Bunjes' results in the same way. I also had to convert Bunjes' results from pitches at 20°C to pitches at 15°C. And I converted Thomas and Rhodes' pitches for paper shrinkage individually, since the table they give is calculated from

the direct measurements.

The mean pitch values for c^3 are:-

Thomas & Rhodes:	c^3 = 1019 Hz	and	a' = 426 Hz
Bunjes :	c^3 = 1029 Hz	and	a' = 430.1 Hz
Gwynn :	c^3 = 1035.4 Hz	and	a' = 432.8 Hz
Ellis :	c^2 = 507.3 Hz	and	a' = 424.2 Hz

In conclusion I would say that the interpretation that Bunjes puts on the available evidence is correct, and that the calculations used by Thomas and Rhodes give a very passable result where it is impossible to reproduce the pipes (though their pitch is probably somewhat low, for the reason given above).

It is therefore unfortunate that Bunjes chose to base his conclusions on the model pipes he had made from the plates. His figures for the plates lead one to suppose that the drawings there are representational. Praetorius' object was to illustrate those parts of his text which describe the greatly increased variety of pipe forms which characterise the organ of his period and area of Europe. Why else would he have felt the need to make an addition to his book (the Pfeifflin diagram is evidently an afterthought) giving precise dimensions for pipes of his chosen pitch? There are further reasons for doubting the precision of the dimensions in the Plates:-

1) The 8' pipe would appear to illustrate a theoretical length, with the body 8' long and the foot 1½' long. In the same way the 4' pipe has a body 4' long and a foot 1' long. The scale would appear to be 1/12 full size, corresponding to a Brunswick foot of 285.36mm.

2) The various types have slightly exaggerated lengths in order to illustrate acoustical facts known to Praetorius (e.g. what is added to the diameter of a pipe is subtracted from the length; stopped pipes are shorter than one half the length of open pipes with the same pitch and diameter). Bunjes rejected his pitches for the stopped pipes and the pipes with variously shaped bodies for this reason.

3) Even the open cylindrical and conical pipes show a much greater difference in pitch than the diagram. Bunjes calculated the equivalent pitches for C for these pipes and found a range from 64.9 Hz to 67.5 Hz for the open cylindrical, and from 61.8 Hz to 70.8 Hz for the open conical pipes.

4) The diameters of the pipes do not agree precisely with the pattern that Praetorius gives in the text, nor with the rank given in the Pfeifflin, though at present I have no means of knowing which is the more likely to present his ideal.

5) Lastly, the pitch is uniformly higher than the mean pitch given by the diagram, which makes one think that Praetorius' organ-builders must have had to have made their pipes to a measurement longer than the theoretical one of 8'. It is possible that organ-builders of this period derived their pitch, and possibly their temperament by measurement, but this would only have been done to theoretical measurements if there had been no other pitch standard, which Praetorius' evidence leads us to assume there was. Measurement was a

mediaeval practice when no theoretical lengths existed, but that it was still used in the seventeenth century is indicated by the statement of Roger North concerning the 20' 6" pipe at Exeter Cathedral: "How it is tuned whether by measure or the beats, wee were not informed." Praetorius not only leads us to think that organ-builders measured their pipes, as Schlick did before him, but that theoretical lengths had less influence on the pitch than might be supposed. (It was assumed by Vente that, as Bedos suggests, the pipes were made to theoretical lengths and then cut down to the standard pitch).

Thomas and Rhodes calculated the pitch of the pipes in the Plates separately, and arrived at a mean pitch of a' = 435 Hz, which is somewhat lower than Bunjes' conclusion of a' = 445 Hz. This discrepancy can be partly explained by their respective interpretations of the error in the rule at the bottom of Plate 37, which it is essential to explain before arriving at accurate measurements of the pipes (which may still prove useful in respect of the scaling, though not perhaps as useful as the proportions). Thomas and Rhodes assume that the total length of the scale is correct, but that it has been wrongly divided into 19 rather than 20 parts. Bunjes finds the inch calibrations to be correct and that an extra half inch has been interpolated. (Thomas and Rhodes's interpretation divides the scale into 20 parts rather than 19 which would make their pipes seem longer, thus explaining the lower pitch). Bunjes is the more likely to be correct for the following reasons:-

1) The size of the inches on the Plate 38 scale are almost the same as those on the Plate 37 scale. Bunjes had the Octav 4' pipe made to the Plate 37 scale inch and the Offenfloit 4' pipe made to the Plate 38 scale and they are fairly close in pitch (closer at any rate than with the other interpretation).

2) The 8' pipe on Plate 37 corresponds closely in its body to 8" and in its foot to 1½", which may supply the cause of the artist's error in the calibrations. In other words, the scale was laid against the 8' pipe and the error was allowed to stand because it did not militate against making sense of the measurement for the 8' pipe. On neither interpretation is the pitch of the Theatrum pipes brought into line with the pitch of the Pfeifflin diagram.

Although I am still vague about some of the finer details of the Thomas and Rhodes acoustical formulae they are obviously valuable enough in calculating close approximations, despite the little that Mendel says against it in 'Pitch in the 16th and early 17th centuries'. I have found that on my own pipes calculation from measurements produces a pitch consistently somewhat higher than the actual pitch which may be partly explained by my value for K (my wind pressure for instance is lower than accounted for in that value) but which may be partly explained by assumptions in the equation. However, accurate values can only be obtained where all the factors are known, that is, very seldom, and an early seventeenth century pitch which can be given with a tolerance of 5 Hz either side is not a bad basis to work from. After all, although Bunjes made pipes from the diagram which produced a pitch of a' = 430 Hz at 15°C, even Esaias Compenius must have found it difficult to tune his pipes at exactly that temperature and at exactly that pitch, let alone

convert the values for differently scaled pipes. The diagram may well have arisen more out of theoretical discussion amongst Praetorius' cronies than out of performance problems, though the preamble does make clear that other instrumentalists and singers would have expected to be able to take their pitch from the main organ of their town. It may well be that Praetorius' advocacy of a single chamber/church pitch at a fixed level has more significance as a step in the evolution towards modern attitudes to pitch than as a guide to the correct performance of the musical canon.

FoMRHI Comm. 343

A String Diameter on Mersenne's Bass Viol

M. Namreges

Abstract

In Comm. 325, Segerman's analysis relating to the number of guts in a string (as mentioned by French authors at various times) to string diameter was inconclusive with respect to Mersenne's information. Yet he stated final conclusions, most of which are unwarranted and probably false. He missed a crucial point which makes his judgement of what Mersenne was referring to on page 17/3 (English translation/French original) when using the term 'great theorbo'/'grands Tuorbes' probably wrong. I shall present an argument involving the number of guts in a racquet string in the 17th and 19th centuries which points to the error that made Segerman's analysis inconclusive. When this error is corrected the rest of the information fits together well, and we can conclude that Mersenne's bass viol 6th string probably had a diameter of 2.0 mm and was at a tension of about $4\frac{3}{4}$Kg.

Analysis

It is rather perverse for Segerman to assume that Mersenne mistook an archlute for a theorbo on p 79/51 but meant a real theorbo when using the term earlier in the book on p 17/3. If, as Segerman assumed, Mersenne meant a real Roman theorbo, the tuning of which he gave on p 116/88, then the pitch of its 10th string would be D, identical to that of the bass viol 6th (assuming the same pitch standard). On p 17/3, Mersenne stated that these two strings had the same diameter . From Praetorious's drawing and surviving Roman theorboes, we know that the vibrating length of the 10th string was about double that of a bass viol. If all of this is true, then the tension on the theorbo string would be about four times that of the bass viol string. This is ridiculous since theorbo bridges would rip off of bellies at four times any conceivable bass viol string tension. Therefore Segerman must be wrong and Mersenne was probably referring to an archlute. Then the calculation that Segerman made and rejected, namely that the string in question had a diameter of 2.0mm (leading to a tension of $4\frac{3}{4}$ Kg for the 87cm string stop), may well be correct.

Va bene, ma come fa una corda da 2 mm a dare 3 di delle??

Segerman did not mention that Maugin and Maigne, the 19th century writers, besides writing about strings for musical instruments, also wrote about racquet strings. On p 197 they reported that 2, 3, or 4 guts, depending on their size, were used for racquet strings. Comparing this with Mersenne ' s statement that 7 to 12 guts went into a racquet string, and assuming that racquets used the same string diameters in the 17th and 19th centuries, we can deduce that one Maugin-and-Maigne sheep's gut equals about three Mersenne's sheep's guts. It is immaterial whether the sheep were different or, more likely, the information Mersenne got from his string maker about the number of guts in a racquet string was wrong (in Comm. 199, Segerman pointed out that the compositions of Mersenne's silver and gold were most probably similarly wrong). Using this conversion factor, Segerman's calculation of Mersenne's string diameter using Maugin and Maigne's area per string would be too large by a factor of $\sqrt{3}$. The diameter of the string in question having an averate of 53 guts in it would then be 3. 6mm divided by $\sqrt{3}$, or 2. 1mm. This figure is remarkably close to the figure of 2. 0mm calculated from Mersenne's archlute and lute data, thus lending credence to the various assumptions made in arriving at these figures.

In conclusion, it seems clear that Mersenne gave no information about string tensions on real theorboes and that the string tensions on Mersenne's bass viol were lower than modern standards, not higher as Segerman indicated. Segerman's higher-than-modern conclusion about string tensions is only valid for the early 17th century violin in France.

Parenthetically, it may be of interest to present the speculation that Mersenne's mistaking the archlute for a theorbo before his p 116/88 may have been the basis for much of the later confusion of those terms in France (e. g. in the drawings included in the Encyclopédie) and in England (e. g. Pepys using the terms theorbo and lute interchangeably). His correction of the error at the end of the book could have been easily missed by most readers.

FoMRHI Comm 344 Ambiguity in Mersenne's Use of "Grosseur", Harmonic Proportions for String Parameters and his Law of String Vibration.

E. Segerman

As to Namreges's Comm , ouch. I deserved it.

While we are at it, I might as well correct an over-interpretation of Mersenne's comments on string scaling in Comm. 325. There I mentioned Mersenne's rule (Fourth Book, Proposition I) that the string tension and cross-sectional area are proportional to string length in a well proportioned family of instruments. Actually, Mersenne wrote that the string length (i. e. stop) and 'grosseur' should both be in harmonic proportions. Harmonic proportion means that it is proportional to the inverse of frequency (i. e. doubles for every octave down). Since 'grosseur' and string stop are both harmonic, they must be proportional to each other. Harmonic proportion of string stop was echoed later by Mace (p. 246 of Musick's Monument). My above statement would be true only if we assume that 'grosseur' meant cross-sectional area, and then algebraically combined this with harmonic proportion of string stop plus Mersenne's famous Law to deduce that tension is proportional to string stop. Perhaps we should consider this latter proportionality as a corollary to Mersenne's harmonic proportions of 'grosseur' if 'grosseur' meant cross-sectional area, as it should have.

After carefully reading the various passages where Mersenne used the word 'grosseur', it is quite clear to me that the concept of cross-sectional area never entered his head! To him 'grosseur' was that bulk property of a string independent of length, tension and density which strongly affected pitch. He did not realize that he was lumping two different properties into one.

The clearest exposition of his muddle is in the Third Book Proposition VIII where he explains why five different ways of possibly meas uring the relative 'grosseur' of different strings (of the same length and material) are impractical or imprecise so that the sixth way -pitch- is the best. The first way is by using a compass, so here 'grosseur' should be proportional to diameter. The second is by feel, which presumably also involves diameter. The third is by finding which holes in a wire-makers die plate the strings just pass through (this doesn't work, he wrote, because one doesn't know the relative 'grosseur' of the different holes) but it is not clear what property of these holes he was concerned with. The fourth is measuring the volume of water dispaced by the strings, so here 'grosseur' should be proportional to cross-sectional area. The fifth is weighing the strings, which also involves cross-sectional area.

In the next Proposition (IX), after outlining how to measure the diameter of a string (he here used 'diametre') by close-winding onto a cylinder to an easily measureable width and dividing by the number of turns, he then elaborated on the fourth method for measuring 'grosseur' in the previous Proposition. One immerses the string completely in water and measures the rise in level, determining volume. Then, "having found the base or diameter (la base ou le diametre) of the cylinder of water of height equal to the length of the string, one will have the 'grosseur' of the string". The base of the cylinder is the string's cross-section. Mersenne here came very close to realizing the significance of the area of this cross-section, but seems not to have.

In Proposition XI, when discussing the effect of humidity on gut strings, Mersenne stated that unless the absorption of water was enough to affect the density, the length decreases by the same proportion as the 'grosseur' increases. Since volume does not change, this statement would be quantitatively true if 'grosseur' was cross-sectioned area. In Proposition XII when discussing the ratio of 'grosseur' to length of a string, it is clear that Mersenne used 'grosseur' and 'diametre' interchangeably. It seems that to Mersenne, 'grosseur' was a qualitative property of a string that could express itself quantitatively in different ways in different circumstances.

In Proposition VI of the same Book, Mersenne was more specific than elsewhere in what he meant by 'grosseur'. He used the word 'diametre' but this was not 'grosseur'. He seems to have realized that the length of a line from one side of the string to the other was an inadequate measure of the relevant property. The measure had to encompass all of the material in the string when the effect of length is removed . According to this 'logic' he infortunately picked ' tour ' or circumference as his measure of ' grosseur'. The calculated tables of recommended diameters for spinet strings which follow are consequently nonsensical. Mersenne complained that spinet players deviated strongly from his recommendations. The problem here is not only that he used the wrong measure of 'grosseur'. The spinet players would have disagreed (but not so wildly) with his tables if he used cross-sectional area for 'grosseur'. The reason is that a spinet is neither a well proportioned family of instruments (where harmonic proportion of cross-sectional area works) nor a fingerboard instrument with all strings at the same length and tension (where harmonic proportion of diameter or circumference is a direct consequence of Mersenne's Law). Harmonic proportion of string stop works reasonably well on spinets but the instrument's particular acoustics makes neither of these types of harmonic proportion work well. Mersenne thought he had a general rule of harmonic proportion in 'grosseur' that worked in all cases, but such a rule

does not exist.

Let us now consider how Mersenne expressed his famous Law itself. As we know it today,

$$\text{frequency (f)} = \frac{1}{2\text{x}\text{length (l)}} \times \sqrt{\frac{\text{tension (T)}}{\text{mass per unit length } (M_1)}}$$

In Mersenne's day only uniform strings of only one material were used, so:

$$M_1 = \text{density}(\rho) \times \text{cross-sectional area (A)}$$
$$= \rho \times \frac{\pi \times (\text{diameter(d)})^2}{4}$$

The Law can then be stated as

$$= \frac{1}{2l}\sqrt{\frac{T}{\rho A}} \qquad \text{or} \qquad = \frac{1}{l\,d}\sqrt{\frac{T}{\pi \rho}}$$

In Proposition Vll of the Third Book Mersenne expressed his Law in terms of Nine Rules comparing two strings. The first eight rules assume that the kind of string is the same, so density is a constant factor. The first rule states that if the two strings have the same length and 'grosseur' the ratio of tensions is equal to the square of the ratio of frequencies. The second rule states that a correction factor of a sixteenth ($6\frac{1}{4}$%) needs to be added to the tension, presumably to account for friction in his apparatus. The third rule states that if they have the same frequency and 'grosseur' the ratio of tensions is equal to the square of the ratio of lengths. The fourth rule states that if they had the same frequency and length the ratio of tensions is equal to the ratio of 'grosseurs'. The fifth rule states that if they had the same frequency, the ratio of tensions is the product (he erroneously calculated the sum) of the ratio of 'grosseurs' and the square of the ratio of lengths. The sixth rule states that if they had the same lengths, the ratio of tensions is the product of the ratio of 'grosseurs' and the square of the ratio of frequencies. The seventh rule states that the ratio of tensions is the product of the square of the ratio of frequencies the square of the ratio of lengths and the ratio of 'grosseurs'. The eighth rule states that the inverse ratios which lower tension are handled the same way as the ratios which increase tension (he gives an exception that I don't quite understand but suspect is wrong). The ninth rule gives an empirical method for taking different materials into account without Mersenne specifically realizing that tension is proportional to density or specific gravity

The specific statements with respect to 'grosseur' in rules 4, 5 and 6 (rule 7 builds on rule 5 and is not an independant statement about 'grosseur') could only be true if 'grosseur' was measured by one of his methods which led to cross-sectional area. If 'grosseur' was diameter of circumference, the square of the ratio of 'grosseurs' would have had to be stated in these rules.

Following the nine rules, there are four tables called "Harmonic tablature for the deaf" to help calculation for all diatonic intervals of frequency. The eight entries for each give appropriate numbers for each diatonic interval. Table I gives tensions which are proportional to the square of frequency ratio (interval) with the added correction factor. Table II gives 'grosseurs' expressed in units of length which are inversely proportional to the frequency ratio. This is either a redefinition of 'grosseur' to be proportional to diameter or a mistake in the transfer of proportions for calculating tension ratio in the rules to proportions for calculating frequency ratio in the Table. Table III gives lengths inversely proportional to frequency ratio. Table IV gives tensions inversely proportional to frequency ratio. Mersenne explains that Table IV is used instead of Table I when the strings are unequal in 'grosseur', length and tension and one is combining their proportions to calculate frequency ratio. It doesn't work. If Table IV were inverted so that tension was directly proportional to frequency ratio, then if the tension ratio just happened to be equal to the 'grosseur' ratio (as in the subsequent example given by Mersenne) one gets the right answer, but only because these proportions cancel out and this use of tension compensates for the anomalous 'grosseur'. In that subsequent example, Mersenne's statements are valid only if 'grosseur' were proportional to cross-sectional area.

It seems likely that the error in Table II was because Mersenne expected 'grosseur' both to have harmonic proportions and be proportional to diameter. Diameter does have harmonic proportions with constant length, tension and density, but it is not the relevant 'grosseur' for his Law. The Law does not lead to harmonic proportions of cross-sectional area. This is an independant criterion which just happens to work on families of instrument. The reasons for it working are complex and I hope to explore them in a subsequent paper.

I hope that the reader who has suffered his way through this paper will agree with me that it is worth our while to try to understand the confusions of early writers as well as trying to understand the positive information they offer us. Fully evaluating the latter can well depend on understanding the former.

Not to be outdone by Namreges, I will also conclude with a parenthetical speculation about how the appearance of Mersenne's book could have effected the history of musical instruments. Mersenne stated (Fourth Book, Prop I and IV) that the middle three members of the standard 5-piece violon band were tuned in unison though they had different sizes. In Proposition IV he noted that the largest size of these, called 'taille' by ordinary musicians and 'quinte' in the royal band, was half a Parisian foot larger than the treble. This is the same size as the normal Italian tenor viola (body length about 45cm and string stop about 40cm). Considering the range of the music played on this instrument, which is generally at least an octave lower than the treble, Mersenne recommended (in Proposition I) that, following harmonic proportions, it should be twice the size of the treble and tuned an octave lower. This was good advice and it seems that French musicians, for once, took it.

The result is illustrated in a drawing from Denis Gaultier's "Rhetorique des Dieux' (c. 1650) reproduced as Plate 32 in Boyden's 'The History of Violin Playing' . The largest middle part violon is twice the size of the treble . The French probably just adopted the usual Italian bassa viola da braccio of the time for this purpose. This is supported by Bossard in 1703 who wrote that the violoncello (a name which included this size amongst others then in Italy) "is properly our Quinte de Violon, or a small Basse de Violon of five or six strings" (translation by M. M. Smith). The mentioning of six strings gives us an indication as to what might have happened to the redundant tenor viol which was about the same size as the bassa viola da braccio. It is likely that it was either of these instruments, played with the back against the right shoulder (as in the Gaultier print mentioned above), which was the 'viola da spalla' mentioned in Italy and Germany from late in the 17th to early in the 19th centuries.

FoMRHI Comm. 345

WARNING!

Foreign makers travelling to London to exhibit instruments at the Horticultural Hall in October would do well to watch out for Her Majesty's Customs and Excise. I remember John Hanchet's describing the "nightmare" he went through last time because of a mix-up of import documents.

Basically the point is that if you say you're bringing the instruments in for exhibition purposes only then you mustn't sell them. The lads can, and do, check up on this.

You should consult your local customs office at home, and/or the British consulate. They will give you an impressive stack of forms to fill in/out. You should do all this well in advance. Don't make the mistake of thinking that "all's well now because of the Common Market."

I offer this warning with the once-bitten emotions of one who has on occasion been asked by customs-officers to play instruments at the border, as proof that they were for use in a concert and not for sale. I now keep receipts (for the instrument and, more importantly, for import-duty) permanently in the case with each instrument. It is enough trouble having to account for the length of my hair.

If you want to smuggle, good luck, but you should be aware of the dangers.

Presumably all this applies to the exhibitions in Bruges and Boston too.

Paul Gretton

FoMRHI Comm. 346 Jeremy Montagu

Review of: The Syntagma Musicum of Michael Praetorius, Volume two, De Organographia, first and second parts, in an English translation by Harold Blumenfeld, Da Capo Press, New York, 1980, 83pp, 42 woodcuts (reduced in size), $16.50.

This translation will be very useful for those of us who do not read German, but please handle it with care (with great care) and always and without fail check it against the original German text. There are many slips, even in the lists of instrument names where what one might think were Praetorius's terms in the left column (with English in the right column) are not in fact what Praetorius wrote. Nor are the translations in fact accurate in all cases. For example, flute is not really a translation of flauti (not unless you already know what sort of flute flauti meant at this period), nor does Alt mean alto.

I could go on at great length about all the superb details of these catalogues, but it seems sufficient to say that these are going to be the classic catalogues of our time, that all other catalogues are going to be judged by the standard they set, a standard that I fear very few of us are going to be able to achieve, and that no organological library can afford to be without them. Obviously anyone who is interested in brass instruments and in plucked keyboards is going to have to buy them, just as anyone concerned with flutes must buy Band 1 (Comm.193), and the prices are remarkably reasonable, even when the DDR Mark is translated one-for-one into the Deutschmark, as usually happens, but I would also urge all readers to acquire them, if only to see what a catalogue can and should be. One hears of many books, not just in our field which 'no library should be without'; sometimes it is true, and it is true with these catalogues.

FoMRHI Comm. 347 Philip Bate

Review of: Adam Carse (1878-1958), Musical Wind Instruments, a Da Capo paperback, Da Capo Press, New York, 1975. 381pp, 30 plates. $4.95 (also available hard-back at $12.20).

There must be many members of FoMRHI whose interest in wind musical instruments was first stimulated by Adam Carse's book; my own copy is practically out of its binding through use! Equally it remains the first reference point in Wind History for those whose main concern is with strings or keyboards.

The product of long and scholarly research, and illuminated by the insight of a practical musician and composer, the book was first published by Macmillan of London in 1939 and went through a number of editions until 1965 when an American edition was brought out by the Da Capo Press Inc. of New York. For this issue a new and additional Introduction was written by Professor Hymie Voxman of the University of Iowa, reviewing Carse's work in the context of the rapidly growing instrumental literature of that time, and commenting on the author's somewhat specialised viewpoint in certain matters and phases of Music in general.

The book opens with a general classification of wind instruments, followed by chapters on practical acoustics (somewhat over simplified perhaps), and on the structural mechanics of woodwind and brass instruments respectively. Chapters nine to twenty are devoted to individual instruments both current and obsolete, and trace their development from origins, where known, to their final forms. There is a large bibliography, reproductions of fingering charts, and thirty admirable photographic plates covering the whole contents of the book.

In 1975 a paperback facsimile of the original version and incorporating Voxman's introduction was issued, again by the Da Capo Press, but unfortunately this edition was limited in availability to the United States, Canada, and the Philippines. The restriction seems now to have been withdrawn since a review copy has reached FoMRHI, and it is to be hoped that the book will be generally at the service of students and scholars. The opportunity to pay some tribute to the work of a friend from whom I received nothing but help and kindness over many years is deeply appreciated.

(Retyped, unaltered, by JM who adds: the review copy reached us direct from New York; there is therefore no guarantee that the restriction referred to has been lifted).

There does not seem to be a lot of point in picking up every detail that I can find, as I have done for other books in the past. If one regards this as not a substitute for the facsimile of the original (available from Bärenreiter and through any of the usual sources) but as a crib to help one read the original, with any luck one will be safe enough. With the facsimile in front of one, and this translation to hand to help one read the German, the things that are most often wrong in the translation are those which we, as instrument people, can cope with in the German; we do know what flauti means, and we do know that kleine Alt Bombarten means small high ones.

As I said at the beginning, the translation is a great help on the bulk of the text; just use it with care in terminology and detail, and never, never use it as a substitute for the original.

FoMRHI Comm. 348 (see Comm.193) Jeremy Montagu

Review of: Musikinstrumenten-Museum der Karl-Marx-Universität Leipzig:
Katalog Band 2: Hubert Henkel, Kiel-Instrumente
Katalog Band 3: Herbert Heyde, Trompeten, Posaunen, Tuben
Deutsche Verlag für Musik, 1979 & 1980, 184 & 264pp, 96 & 48 plates, numerous figures and diagrams in both, DDR 45 & 55 M.

It is quite clear that this series of catalogues is going to stand, as Mahillon's Brussels catalogues did a century ago, head and shoulders above all its contemporaries. I have just reviewed, in very favourable terms, the first volume of the catalogue of another museum, covering brass and percussion instruments (forthcoming in Early Music; since they did not send FoMRHI a copy for review, I can't really mention it here, though it might be worth a glance at Book News in this issue), and there is quite simply no comparison between the two. The other is well got-up, large in format, with many illustrations, but the amount of detail, great as it seemed when I read it, is almost nothing compared with what we have here in the Leipzig catalogues.

Not only is every instrument described in enormous detail, but every detail of every instrument, both functional and decorative, is also described and illustrated. There are drawings of all types of valve linkage, tubing stay, bell-rim formation, mouthpiece cross-section, decorative engraving and a schematic illustration of every joint in the tubing (male/female and in which direction, and butt) of the brass instruments, and of all mouldings, key-fronts, cheek-pieces, etc, etc among the harpsichords. Not every instrument in either volume is illustrated, but the vast majority are, and in the case of the keyboards there are both vertical and oblique views of every instrument which is illustrated (and often other views as well). Both volumes include as much detail as is available (quite a lot in some cases) for instruments which were lost in the war; it is always possible that some may have been looted, rather than destroyed, and may eventually be recovered, and it is possible that there is sufficient detail here for some to be identified.

Review of: Daniel Speer, Grundrichter Unterricht der musikalischen Kunst oder Vierfaches musikalisches Kleeblatt, facsimile of 1697 edition, Peters, Leipzig, 1974, 55 M.

This is one of a series of facsimiles produced by Peters Edition in conjunction with our member, the Sächsischen Landesbibliothek of Dresden. Speer's book was one of the first general compendia on music, a complete do-it-yourself tutor for the amateur. The first leaf of the clover (is a four-leaf clover as rare in Germany as here?) is a singing manual, the second a treatise on keyboard and general-bass playing,the third on the rest of the instruments, and the fourth on composition, both vocal and instrumental. There is the usual flowery introduction and a brief but comprehensive guide to reading music in all clefs, followed by some good solid interval work for singers and then straight into canons. The keyboard instruction starts with cadencing and then proceeds to show how to figure basses but, to our modern minds unfortunately, never shows how to fill out the figures. There are 130 pages of music for top and bottom lines, but never anything in the four parts implied, which considering our continual controversies on how figured basses should be played, is continually frustrating. The instrumental section begins with the treble violin and, typically of the period, never actually tells you how to play it; the tuning is given and the range of each string and so on (3rd leger line E is the highest note) and he then goes straight into some quite tricky pieces for three violins, without bass. The viola section is similar, save that the pieces are for two viole with bass. The gamba and the Bass-Violon get no pieces. The gamba is a bass (lowest note D below the stave) and its highest note is D on the top line of the soprano clef; the lower five strings are all written in bass clef but the sixth string starts in tenor clef for two notes, goes into alto for three, and finishes in soprano for the last three. He really uses all clefs (see Denis Stevens' letter on p.281 of the new issue, April 1981, of Early Music; how right he is — nobody working in early music can manage unless they can read C clefs on every line). The Bass-Violon is also a six-stringer, from G below the 3rd leger line through C, F, A, d and g (Speer's capitals and lower case), ie a great-bass viol; highest note is d above the 1st leger line and all is in bass clef. There are brief descriptions of viola d'amore, viola picola and others.

Being a trumpeter himself, he gives that instrument more space, with two Aufzüge for six trumpets and four pieces for two clarini. Highest note is 2nd line C. Timpani get less space, though with some interesting information. Trombones (tenor and alto) get rather more, with a couple of trios for alto, tenor and bass (low Ds in the bass part) with the bass part figured. Cornett gets a full fingering chart (from A to c, 2 octaves plus higher) and three longish pieces for two cornetts and trombone. The Bass-Fagott has 7 holes on one side and 3 on the other, with no mention of keys; the lowest note is C and it looks suspiciously as though his bassoon is still a curtal. He gives two quite elaborate sonatas for three such instruments, with the bass part figured. He winds up with a fingering chart for Quart flöten (lowest note C, highest c 2 octavs above) nad for flageolet with four finger- and two thumb-holes (D to c an octave and a 7th) but no music for either. The composition treatise is basically a simple harmony treatise in two parts figured. Obviously reading a figured bass part was so much part of the culture that there was no need to teach how to do it, even in a basic instruction book like this one.

This is followed by a half-size facsimile of an earlier edition of 1687 which is shorter but has rather more instruction.

If you're interested in this period, this is well worth having, however brief the information on any one instrument may be. It is also worth asking Dresden for a list of their facsimiles, which include a lot of manuscript music in their library (see Book News in the last issue, p.13).

FoMRHI Comm. 350 Jeremy Montagu
(see Comms.171, 190, 210, 245, 261, 281, 298, 310)

Review of: Will Jansen, The Bassoon, parts VIII & IX.

Part VIII opens with 'Biographical data on the less-known or unknown bassoon composers', a section that includes such less-known or unknown figures as Johann Sebastian Bach, Ludwig van Beethoven and many others, among them some who actually are less-known; for these latter it will doubtless be of use.

It is then followed by a massive bibliography of music for and including bassoons, the index to which was briefly described in the previous review (Comm.310). Part VIII concludes with the concerti for one or more bassoons and orchestra; part IX includes much of the chamber music for bassoon and all sorts of other combinations, with bassoon and brass instruments still to come in part X. Part IX begins with duets, going on through trios, quartets, quintets (including a number of bogus-looking arrangements which are, I suppose,of interest to those who play in quintets and have run out of music originally written for that combination), and so on upwards for wind instruments only. The octet section is of course very useful for the wind band enthusiast, though it is by no means complete; very few of the arrangements of popular operas are included, even of those which are, and have been for some years, available from such firms as Musica Rara. Curiously, the 13 wind instrument section includes neither Mozart nor Strauss.

We then go on to mixed wind and string. The section for 'flute(s), oboe(s), bassoon(s), horn(s) with accompaniment' includes a fair number of works which are in fact orchestral (one could describe a good number of symphonies in this way). Without knowing the full repertoire, one suspects that this and other sections include a fair number of anomalies such as: "Mozart, W.A., 'Concerto in G major for 2 fl, 2 ob, 2 bsn, 2 hrn and str.orch.' KV 320", which is presumably just the slow movement from the Posthorn Serenade. An even more extraordinary entry is Brandenburg Concerto no.1 in the section headed 'oboe(s), clarinet(s), bassoon(s) and accompaniment' -- did someone actually arrange the Brandenburg for this combination or has the author got really confused?

There is a section for a mixed bag of various instruments, which includes the Schubert Octet and the Spohr Septet, but not the Beethoven Septet nor the Spohr Nonet (the Beethoven is in the section for 'clarinet(s), bassoon(s), horn(s) and accompaniment', from which the second violin part presumably excludes the Schubert, and the Spohr, perhaps logically, is with 'standard wind quintets with accompaniment'.

Provided that you know what you are looking for, or provided that you are curious as to who wrote any of the various types of chamber music, and in both cases provided that you have endless patience, these lists may well prove useful. The most useful of them, of course, is that in Part VIII which includes the concerti, of which there are far more than I for one had ever thought possible.

As in Comm.310, it is only those who are as, or preferably even more, knowledgeable than Mr.Jansen who can tell us how complete these lists are or, and much more seriously, how accurately proof-read they are. I must confess to not having read every word, and I have not spotted any obvious errors such as those which disfigured the earlier parts of this magnum opus. It may well be that a great deal more care has been taken in this section which needs such greater care.