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Jan Bouterse: Three baroque soprano recorders by Richard Haka

1993

— On the Cover —

The cover was reproduced from an original photograph and features William Haynes standing in the aisle of the William S. Haynes Company.



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Three Baroque Haka Soprano Recorders

Instructions On How To Make A Copy

by Jan Bouterse

In this article the measurements of three Baroque soprano recorders made by Richard Haka are discussed. One of the suggestions are to see the relative importance of the pitch-measurements. In making a copy it is not always possible, nor a good idea, to transpose the dimensions of the historic recorder slavishly. The copy-maker must adapt some details after his or her own taste. Some instructions are given to make a proper copy.

Introduction

Richard Haka (1646-1705) was one of the first and most important woodwind makers in Amsterdam. Haka was born in London and came to Holland in 1652 with his parents.

Four soprano recorders with the Hak-stamp (R. HAKA in a scroll with a Fleur-de-Lys below), survived, to my knowledge. One instrument is not included here and is in the Edinburgh University Collection of Historic Instruments in Scotland. It is a one-piece ivory recorder, renaissance in style, with a slightly conical bore. 14.6 at the window to 11.5 at the narrowest point just before the end.

The pitch of this recorder is about A-440 Hz. I have seen this pitch on many early Dutch woodwind instruments. The labium of the recorder is partly broken out so the instrument can't be played well.

The Baroque Soprano Recorders

The other three soprano recorders by Haka are all made in two joints, with a top joint and a lower joint, no separate foot joint, in Baroque style, and with a more pronounced conical bore and lower pitch than the recorder in the Edinburgh collection.

The lowest fingerhole is drilled twice, left and right, to make the recorder playable with reverse hands. On all recorders the left hole was filled with wax.

The three Baroque sopranos all have a characteristic profile with a long windway and elegantly turned bulges (see drawings). Such profiles are not known of other Dutch recorder makers.

In recent years I have had the opportunity to see the three Haka recorders and take some measurements. I was also able to play shortly on the instruments. In this article I used mainly my own measurements but I used some information by Fred Morgan and Tom Lerch.

Jan Bouterse lives in the Netherlands; after a university study in ecology and nature conservation he started in 1980 making recorders and traversos, doing research in collections of historical instruments and giving courses in woodwind making. He was involved in publishing the book "Dutch Recorders of the 18th Century" (the catalogue of Dutch recorders in the collection of the "Haags Gemeentemuseum"). At the moment he is preparing a similar book about the Dutch Baroque Double Reed instruments for the Haags Gemeentemuseum. Further, Jan Bouterse is active in some committees and foundations in the field of nature conservation and wildlife management.

A Short Description Of The Recorders:

Recorder A:

Collection Frans Brüggen, Amsterdam, Netherlands. Soprano in a tropical hard blackwood, with three ivory rings. The windway surface is (in cross section) near the window almost flat, a chamfer is almost completely lacking. The sidewalls of the labium are rather low. The sound of the recorder is somewhat noisy but most tones are stable with an easy third register (b3 and up) and good fork fingered notes in the second register (g#3 and f#3).

Literature: Fred Morgan, *The Recorder Collection of Frans Brüggen*, Zen on Music Company, Tokyo (1981). In this book, written in English, are detailed drawings with useful information on 17 Baroque recorders from the Brüggen's collection.

Recorder B:

Collection Museum of Musical Instruments, University of Leipzig (formerly Karl Marx University), Germany. Catalogue number: 1115.

Soprano recorder in light brown coloured European boxwood, with 3 ivory rings. The turned details are a bit finer and sharper than on the other instruments. In the beginning of this century the old (broken?) labium was replaced by a new one. Also a new ivory ring was made on the socket bulge of the top joint. The block is also a replacement. The lower joint is curved and the tenon has warped into an oval shape.

The dimensions of the instrument are about the same as the other recorders of Frans Brüggen. I received permission to play only a few tones; I couldn't measure the bore of the head joint at the windway either. Herbert Heyde states in his book that the instrument has an open and strong sound. The fingerholes of recorder B are more undercut than the only moderately undercut holes of the other instruments.

Literature: Herbert Heyde, *Flöten*, VEB Deutscher Verlag für Musik, Leipzig. It is an interesting book but not an easy book, and there is not enough information in the book to make copies of the instruments. From the Museum, I obtained some measurements of the Haka-recorder, made by Tom Lerch (now working in Berlin).

Recorder C:

Collection Shrine to Music Museum, Vermillion, SD, USA. Catalogue number 4202.

Soprano in ebony with three ivory rings, in its original tooled leather-covered case. The block is made of a piece of hardwood. The labium is slightly damaged, and the window is from 3.5 to 3.8 mm longer than the labia on the other instruments. The socket bulges; the whole lower joint is some millimeters shorter resulting in a higher pitch. The recorder can be played, but is vulnerable because a piece of wood in the windway is broken out exposing the ivory ring above.

Literature: Jan Bouterse, "Historical Dutch Recorders in American Collections", in the *American Recorder*, September 1992. Also, Windy Powers: "Checklist of Historic Recorders in American Private and Public Collections", in the *American Recorder*, May 1989, with an update in March 1991. In these articles there are no measurements and only a few drawings and photos.

It is interesting to compare three recorders from one maker. What are the differences between the shortest instrument, C, and the other two? What influence have resulted from the choice of boxwood with the B recorder?



With the information in this article it will be possible to compare some, though not all, of the qualities of the instruments. It must also be possible for a woodwind maker with some experience to use this information to make a soprano-recorder in Haka-style. Anyone wanting to carryout detailed comparative research will have to see the instruments in person. The same applies to those who feel they must make a 100% exact duplicate of the instruments.

It is for these reasons that I have written this article. It can be confusing to see only one of the three instruments and not the other two. You may make an exact copy after viewing one recorder but you will copy the problems and faults of the original instrument as well. Perhaps this can be avoided with the information contained in this article.

The Results Of Playing The Recorders

Recorder A played by Fred Morgan, B and C by Jan Bouterse. The pitch measurements of another recorder are added (D). They are from a soprano recorder by Thomas Boekhout from the collection of the Metropolitan Museum of Art, New York, NY, USA.

For all measurements the tuner (for pitch registration) was set at a-415 Hz (equal temper). The differences are measured in cents, tone holes are numbered 1 to 7 of the holes on the front of the instrument. A point "." means that the tone hole is open, "h" after the tone hole means that this hole is only half or partly closed.



Some Remarks On The Table

1. In the table only the pitches of the most important notes are given; some extra fingerings, such as 0 . 2 3 for b2 are not possible on most old recorders.
2. The recorders are played in different conditions which could not been compared. It is also possible that differences of up to 20 Cents can be measured if one instrument is played by different players even under the same conditions. Some players try to play the bottom note rather strongly, (resulting in higher pitches), while the pitch differences in the top-register are not so obvious. There is no equipment, except perhaps in some recorder factories, whereby pitch can be measured in very controlled conditions regarding the breath-pressure of the player (a wind machine).
3. It is however possible to give an opinion about a recorder — if the instrument can be played in tune or not. An experienced player will quickly adjust his breath pressure, and even his fingerings, and will conclude that some instruments can be played easier in tune than others. In the case of the Haka sopranos, it was not possible to play recorder A in tune. There were no signs that the recorders were shortened or that the tone holes were enlarged in recent tuning operations.
4. You can't see from the table that some tones are more flexible than others. Every recorder player knows that the tones where only a few holes are covered, (for instance at b2, c3, and d2), are more sensitive for changes in breath pressure than tones where more holes are covered (d2, e2). Over-blown tones (a3, b3 and c4) are sometimes very responsive to thumb position as well. It would be better not to give one pitch for such tones, but rather a range with the lowest and highest pitch that can be measured in more or less normal conditions. (Fred Morgan literature has more information than I could give here).
5. There are more important questions such as noise, wolfnotes, etc. It is difficult to give such information in figures. I can only say that the three Haka recorders were good to reasonably playable over two octaves sometimes with some noise caused by dirty spots or small damages, or by a bad condition of the chamfers. The sound of the recorders was more or less open, with reasonably moderate breath resistance.

Table 1

										A	B	C	D
c2	0	1	2	3	4	5	6	7	-30	-30	0	-15	
d2	0	1	2	3	4	5	6	.	-23		+25	-30	
e2	0	1	2	3	4	5	.	.	-25		+25	-10	
f2	0	1	2	3	4	.	6	7	-25		+25	+5	
f2	0	1	2	3	4	.	6	.	0				
f#2	0	1	2	3	.	5	6	.	+20		+60	+40	
f#2	0	1	2	3	.	5	6	7	-5				
g2	0	1	2	3	.	.	.	.	+10	-15	+60	+20	
a2	0	1	2	.	.	.	.	.	+10	-20	+40	+20	
b2	0	1	.	.	.	.	.	.	0		+30	+20	
c3	0	.	2	.	.	.	.	.	+30	-35	+40	+10	
d4	.	.	2	.	.	.	.	.	+25		+40	+5	
e3	0h	1	2	3	4	5	.	.	-5		+30	-5	
f3	0h	1	2	3	4	.	6	.	-10		+10	-10	
f#3	0h	1	2	3	.	5	.	.	+30		+50	+25	
g3	0h	1	2	3	.	.	.	.	+10	-25	+60	+10	
a3	0h		2	.	.	.	.	.	+10	-30	+40	-5	
b3	0h	1	2	.	4	5	.	.	+25		+40	-15	
c4	0h	1	.	.	4	5	.	.	+40		+50	-15	

Review Of The Pitch Measurements

The Most Obvious Points:

1. Recorder C sounds on all notes sharper than the two other instruments. That is because the lower joint of C is shorter (the joint is also thinner at most fingerholes!), but there is another reason. The window is 3.5 to 3.8 mm longer. This normally has a rising effect on the pitch.
 2. As I said before, it is not possible to play recorder A in tune. From f#2 up the tones are too sharp, in relation with the lower notes, even when you are closing the sixth hole for the f2 up to the d3 (as on the fingering chart of Hotteterre, in his *Principes de la Flûte*). Frans Brüggén suggested that the lower joint was perhaps shortened, but I don't think so. There is no evidence of any shorting operations. Pulling out the lower joint didn't make the tuning much better. On other recorders I experienced similar problems. For instance, the pitch measurements of recorder D as illustrated in the table. Here the top of the first register (f#2 up to d3), is too sharp, but the third register (b3 and c4) is better in tune with the lowest notes. The problems on recorder D can be caused by shrinking and warping of the wood at the upper end of the lower joint at the tenon.
- I can't actually say what could be the problems causing bad intonation in the Haka recorder A. There seems not to be so much shrinking of the wood; what else could have happened?

3. Modern factory recorders are usually tuned using Dolmetsch fingering, (after Dolmetsch, who rediscovered the recorder in the beginning of the 20th century). The most important characteristics of the Dolmetsch fingerings are (on soprano recorders):

f2: 0 1 2 3 4 • 6 7

f3: 0h 1 2 3 4 • 6 •

f#2: 0 1 2 3 • 5 6 •

f#3: 0h 1 2 3 • 5 • •

On most historic recorders fingerings are too flat for the f2 and f3, too sharp for f#2, and for f#3 too sharp or just good enough. Therefore we play the Hotteterre fingering on most old recorders.

f2: 0 1 2 3 4 • 6 •

f3: 0h 1 2 3 4 • 6h •

f#2: 0 1 2 3 • 5 6 7

f#3: 0h 1 2 3 • 5 • •

But I must say, these fingerings seldom work perfectly. The f2 sounds more sharp than with Dolmetsch fingering but is also often too sharp. The same applies with the Hotteterre fingering for f3. I also don't like half fingering the sixth hole and the alternative fingering with hole 6 uncovered and 7 covered is also usually too sharp.

The Hotteterre fingering for f#2 is seldom a problem. The fingering for f#3 sounds well but is sharp on some instruments. You may on f#3 close or shadow hole 6 as well, but I prefer not to do this.

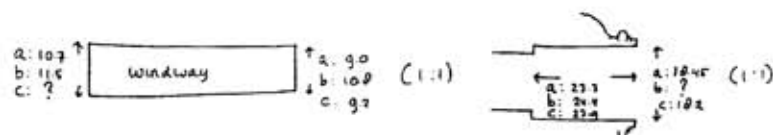
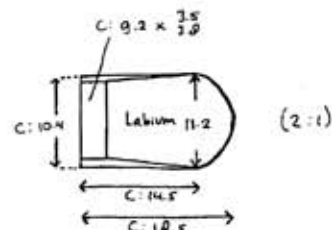
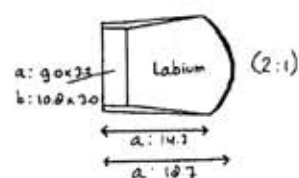
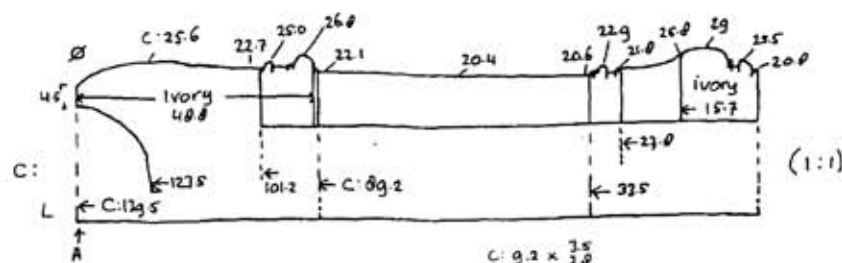
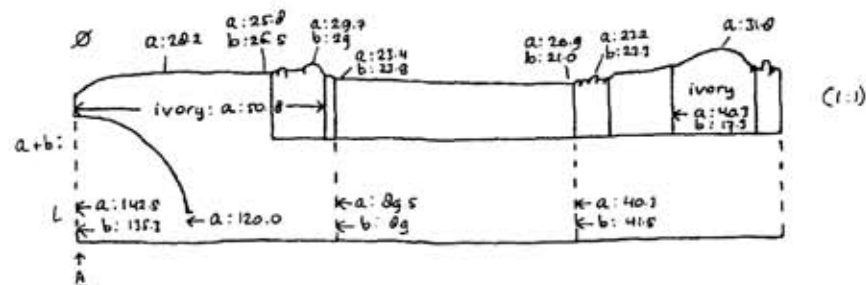
On most of my copies of old recorders I prefer to use Dolmetsch fingerings. Therefore you will have to change the size of the holes

4 and 5. The size of 5 must be bigger. The hole can be placed a few millimeters lower on the joint (in the direction of hole 6). The hole can be undercut more severely too. Hole 4 will be somewhat smaller than on the original instruments and is for the most part not as undercut as hole 5. It may be necessary to place this hole a little bit higher on the joint in the direction of hole 3. The undercutting of hole 4 has influence on the relationship between g3 and f#3 (and also g2 and f#2). Making fingerholes bigger and more undercut will raise the fork fingered tones (here the F#s) more than the main tones (the G's).

Reconstruction Of The Original Pitch Of The Haka Recorders

Reconstructing the original pitch of old recorders requires that we consider the following points:

1. Most old recorders did shrink, crook or warp towards an oval shape through the centuries. This results in smaller bores, never larger, and therefore raises the instrument's pitch. If you make a copy of an old recorder using the widest cross section and longest measurements, the pitch will probably be flatter than on the original recorder. Because the shrinking is never regular, some tones will be more out of tune than others.

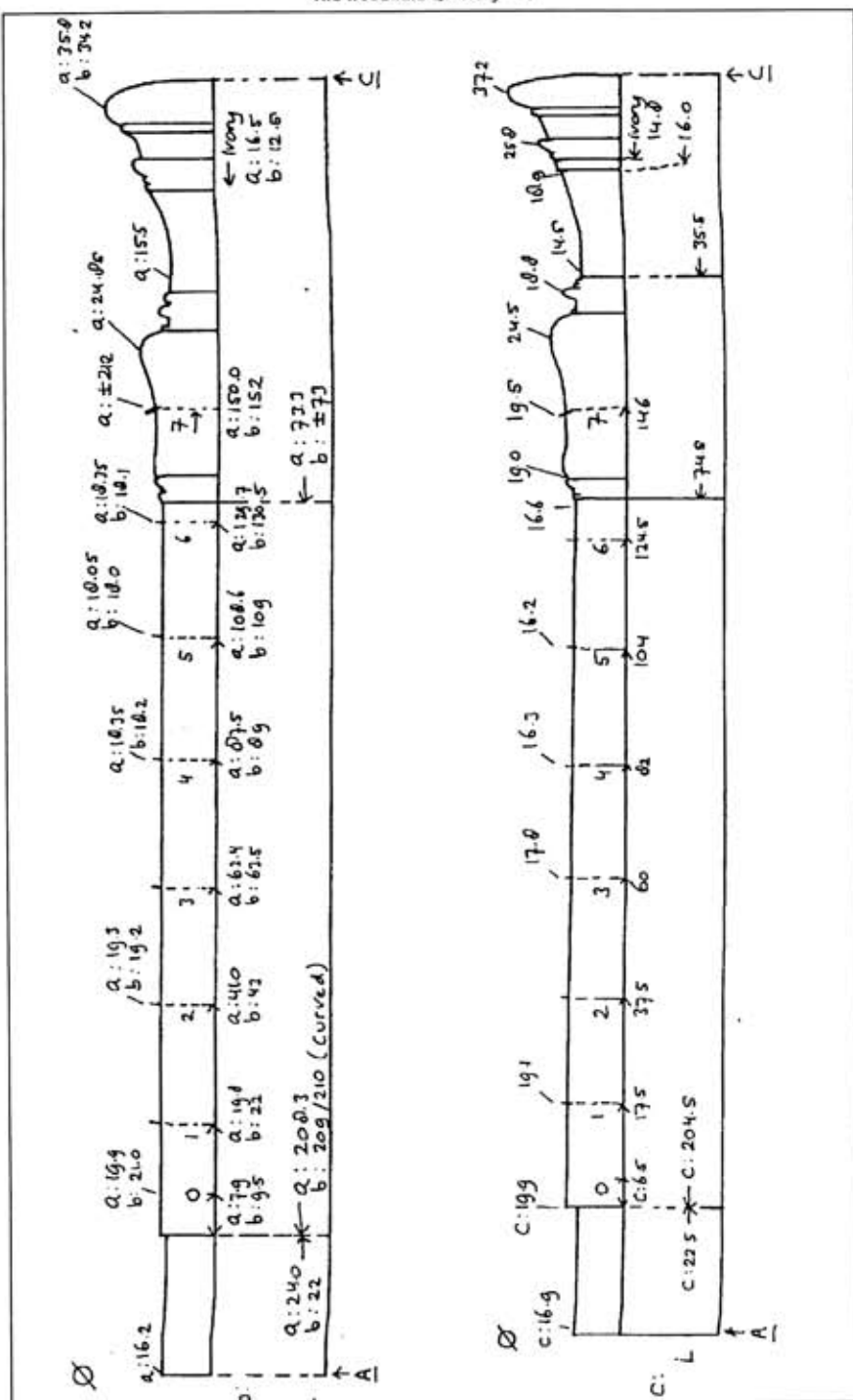


Instruments: a - Haka soprano recorder, collection Frans Brüggen, Amsterdam, Netherlands
b - Haka soprano recorder, Universitat Leipzig, Germany
c - Haka soprano recorder, Shrine to Music Museum, Vermillion SD, USA

Where does the wood on a recorder shrink the most? At the thinner tenons where the wood can be warped through the force of the wrapped thread against the inner wall where condensation collects. Also, most frequently in the head joint and in the foot bore. In these places the wood will be more unstable and can shrink more than in other places. Shrinking in the foot bore can be the cause of the relatively flat c2 on Haka recorder C.

As you make a copy you will start to reproduce the original bore measurements. It is easy to make a correction in the bore in the proper place raising the bottom note.

B - Flat octave intervals (e2-3, f2-3, g2-g3 and a2-a3) may be caused by shrinking of the wood in the topbore of the lower joint between the thumbhole and the top of the tenon. In this section you will find the nodes, air vibrations of the tones of the lower octave (e2,



f2, g2 and a2), and the anti-nodes of the same tones in the second register (e2, f3, g3 and a3).

Narrowing the bore on a node will result in a sharper pitch. Widening the bore has the opposite effect. Therefore widening the top bore of the middle joint of a recorder will result in sharper octaves. Knowing this, it surprised me that on recorder B with its strongly warped tenon the octave intervals were still so well in tune.

I suggest when you make a copy the first time, leave the bore in this place a bit too narrow. It is easy to increase the size when tuning the tones. You can find the places of the nodes and anti-nodes easily by putting a little roll of paper (or other material) in the bore and listening to the changing pitches of the tones while moving this artificial narrowing device through the bore.

C - Usually the lowest tones of the first register, with the exception of the lowest tone, the c2 on the soprano, and the tones of the third register are more reliable for getting an idea of the original pitch of a recorder. The three tones: e2, e3, b3 give, on a soprano, better information than for instance the a2 and a3. It is difficult to make a good playing copy of the e2, e3, b3 if the original instruments are collectively not in tune. Small deviations (up to 10 Cents) don't matter very much, because in most cases such deviations can be corrected by proper tuning.

I believe that originally the recorders A and B had a pitch of about 30 cents lower than a-415, C was pitched at about a-415.

Making A Usable Copy

Hints About Pitches And Tuning

Sometimes we know more about the characteristics of an old instrument after finishing a good copy. We may have a better impression of the pitch and tuning, qualities depending much on the size and design (bore, placement and size of fingerholes) of the instrument. The following are some hints on making a copy.

1. If you want to make a copy in a different pitch than the original instrument, don't start with scaling the measurements of the old recorder. First make an exact copy of the original instrument. After that you will have more reliable information to be successful in a scaling operation.

2. Never completely trust drawings and measurements made by other makers and researchers. Deviations up to 0.2 mm (diameter) and 0.5% (length) can occur caused by inaccurate measurements, poor quality tools, and variations in temperature and humidity during measuring. Make your own graphics from the table, and construct new work drawings. In doing so, I have found several mistakes in other drawings!

3. If you have prepared all joints of a new recorder you can start the tuning operation. This means sizing the tone holes (you drilled the holes before, but of course, a bit too small), and making any necessary small corrections to the bore. Tuning starts at the bottom note (c2 on a soprano recorder). If this recorder is your first copy of an old instrument, it is always a tense moment to hear the first tones and to discover what is or could be the actual pitch. My advice — don't be disappointed when the pitch is sharper or flatter than what you expected. Don't try to force the first tuned tones in the direction you properly intended. Forcing means making fingerholes much bigger, shorting joints, and making corrections in the bore. Don't do that, but give the tones a chance to come in their proper pitch that suits the instrument.

First tune the c2, then d2, after that e2 together with e3 and b3. After these tones you will have a good idea about the "possibilities of the pitch".

4. If you want to make a copy in exactly a-415 Hz, it is better to choose an original instrument that sounds somewhat sharper. It is possible that your copy is exactly a-415 or as the original recorder, a bit sharper. If so, it is easier to make a new lower or middle joint, slightly longer to get the correct pitch. It is always better and easier to make a longer joint for a sharp sounding instrument than a shorter joint for a flat sounding instrument! If you make a 415 Hz copy of one of the Haka soprano recorders, you would be advised to take **C** as the starting instrument.

Other Technical Hints And Instructions

The windway is for every woodwind maker the most difficult part of a recorder. It is also the most important part. I found on historic recorders that the windways were more or less crudely made with candle flames. (The candle flame is in the bore on the top joint the transition of the curve of the labium corner to the profile of the bore). My impression is that such crudely made windways have a tendency to have a flatter surface (in cross-section), left-right, also indicated as east-west than more carefully made windways. So, try to start with a windway that is somewhat curved in cross-section.

Most windways on modern recorders are made more or less parallel to the central axis of the instrument. On old Baroque recorders the direction of the windways is often going up slightly, so it seems that you are blowing the air not into the bore, but over the labium out of the recorder. Many old windways are more or less curved in length-section (north-south), for instance in the first half slightly rising, and in the second half more or less parallel to the axis. It is often difficult to measure the edge of the slope of the windway unless you have received rare permission to knock the block out, which can be a dangerous operation on old recorders! Sometimes the slope can be seen clearly with your eyes.

It is dangerous to make the windway with a north-south curve that is too strong because the moisture (caused by condensation of the water in your breath) can accumulate in small droplets in the top of that curve. That gives an unwanted noisy sound because the droplets can't effectively be blown away by the player's wind as it is directed too much underneath.

It is important to know what the size of the step of a recorder is. The step is the difference in height between the labium corner and the top of the windway. It is also difficult to measure the step accurately. On many historic recorders I saw that the labium corner had sunk down some tenths of a millimeter. See for instance Haka recorder **B** where the vertical bore measurements in the top joint indicate that the labium has come down. It is also possible that the wood at the top (ceiling) of the windway itself was unstable and came down somewhat.

You can't trust the measurements of steps of old instruments and you have to make your own decision about the size of the step on your copy. On alto recorders I prefer a step of about 0.8 to 0.9 mm. I think that the steps on my soprano recorders are about the same height. You have to size your step according to your own taste or to your way of playing. The same applies for the height of the windway opening.

Height of the Block: It is my opinion that I see the labium corner looking through the windway. If the block is too high I have always had problems playing the top notes (c4) on both historic instruments or my own copies.

Chamfers: The chamfer is on the block and on the end of the top of the windway. It is important for the sound of the recorder. It is however difficult to give instructions about the size and shape of a chamfer that would be valid for every instrument. On old instruments I have seen a great variation in chamfers even on recorders from one maker.

Another problem is - which chamfers are original and which are revoiced? The top chamfer of a Haka recorder is very flat, hardly visible at the side of the window. But why?

For the copy maker you will start your voicing operation with no chamfer or a slight chamfer. The sound of the recorder will yet be soft and perhaps a bit noisy. Then you will increase in small steps the size of the chamfers until the sound is clear and well defined. With too big a chamfer, the sound may lose intensity and the recorder may be irreparably damaged. Be careful.

The Bore: Haka used a pair of reamers for the lower section of his Baroque soprano recorders. One long reamer about 160 mm and another reamer about 160 to 200 mm and perhaps another reamer for reaming the "counter bore" from the lower end of the foot back to the narrowest point. It is good for the copy maker to work in the same way using a pair of reamers as Haka did.

The Window: Recorders have two dimensions; length and width. On organs there seems to be a relationship between length and width but on historic recorders I could find only a relation between the width of the window and the diameter of the wood on the outside of the window. Thick joints with a diameter of 34.0 or more on some Terton alto recorders did correspond with relatively broad windways (12.0 and more). Thinner wood of 33.0 or less did correspond with narrower windows, 11.5 and less on some Van Heerde alto recorders. There are some exceptions to this rule. The thickness of the wood at the window may have influence on the pitch and the stability of the sound of the lower notes. (Compare the effect of beards on an organ pipe).

The length of the window (organ makers use here the term "height") can vary between the instruments. On Haka recorder **B** the length is perhaps not original after a repair. On recorder **C** the window may be longer than in earlier days because of damage. Therefore making a copy you can start with a relatively short window (3.0) and enlarge as much as you want but not longer than about 3.5 mm. With the length of the window and also with the thickness of the labium corner (difficult to measure!) you can influence the sound properties of the recorder. The catchwords are soft or loud, round or sharp, slow or fast (speaking).

Thickness of the Wood: In the lower joint at the lower tone holes the Haka recorder **C** is thinner at that section than recorders **A** and **B**. Why did he do that? Thicker outside diameters with the same bore dimensions involve larger fingerholes and change intonation. One of my friends is leaving the wood around the tone hole 6 thicker to get a flatter octave interval (e2-e3).

Length of the Foot Section: If the lower joint of your reproduction sounds flat in the third register you may trim the foot section some millimeters shorter. This will effect the higher notes more than the lower notes. It makes no difference for the sound of the recorder to make the lower joint in one or two sections.

Conclusions

It is perhaps not easy to draw conclusions about the comparison of the three Haka soprano recorders using less than complete drawings and measurements. For good comparative research it would be better to bring the instruments together and take measurements under identical conditions.

So I can only draw a few conclusions. **C** is clearly shorter than the other recorders and has some differences in design. **A** and **B** have only small differences.

Pitches: I couldn't discover why recorder **A** is more out of tune than **B**. It is therefore necessary to make copies of the instruments' change joint and then measure the effects.

For anyone who wants to make a copy of an a-415 soprano recorder, **C** from the Shine to Music Museum in Vermillion could be the most interesting model.