

11.14 Recorder drawings

Plans

Making a recorder, for instance a copy after an historical instrument, requires that you must have a plan at your disposal: preferably an accurate drawing with comprehensive measurements, photos and a description. If you can't make such a plan yourself, you must find one. That is not so easy, there are only a few books and websites which might be useful for you. The most comprehensive list with plans is the 'Technical Drawings Menu' on the website of the CimCim, the International Committee of Musical Instrument Collections and Museums. See <http://network.icom.museum/cimcim/httpnetworkicomuseumcimcim/homepage/> and click on 'Resources' and 'Technical drawings'). But the list is not complete or up to date and several drawings are (or were) only available on microfiches. I have seen many of these fiches and I can tell you that the quality (resolution) of the drawings is also not great and printing from these microfiches (which is possible in some libraries) makes the outcome even more disappointing. You must see (and buy) the original drawings from the collections.

Publications with plans

- Fred Morgan: *The recorder collection of Frans Brügger*. Zen On, Tokyo 1981.
A portfolio with drawings (in a personal style, full of details, A3 size) of 17 baroque recorders (sopranino to tenor fourth flute) by makers as Bressan, Hotteterre, Denner, Haka, Steenbergen, Wijne. In the portfolio is a booklet with some information about the instruments, but not how Morgan did his measuring and no instructions for what is not so easy: how to interpret the data on the drawings. The photos in the booklet are not very useful.
- Darmstädter, Beatrice, and Adrian Brown: *Die Renaissanceblockflöten der Sammlung alter Musikinstrumente des Kunsthistorischen Museums [The Renaissance Recorders of the Kunsthistorisches Museum Vienna]*. Vol. Bd. 3. Sammlungskataloge des Kunsthistorischen Museums. Milan: Kunsthistorisches Museum Wien/Edition Skira (2006).
This book is a must for makers of renaissance type recorders, with comprehensive information of about forty instruments, with many details, graphs of the bore profiles and good photos of the instruments. There are, however, only restricted data of the windways and blocks. This because the blocks were not taken out for measurements, and there are no X-rays or CT-scans to substitute for these either.
- Rob van Acht, Vincent van den Ende & Hans Schimmel: *Niederländische Blockflöten des 18. Jahrhunderts - Dutch recorders of the 18th century*. Moeck Verlag, Celle 1991.
This book (A3 size) gives full measurements, photos and descriptions of 15 baroque recorders by Dutch makers. It takes some time to understand all the information, such as dimensions and positions of the fingerholes, or the shape of the windways.
- Inês de Avena Braga: "*Dolce Napoli?: Approaches for Performance – Recorders for the Neapolitan Baroque Repertoire, 1695-1759.*" Ph.D dissertation, Leiden: Leiden University. Academy of Creative and Performing Arts, 2015 (this dissertation can be downloaded from the internet). With drawings (by several authors) of baroque recorders by Italian makers as Anciuti, Palanca and Panormo. The drawings are not at 100% scale, and the number of measurements and the quality of the prints vary rather much. The information is especially useful for people who want to compare Italian recorders with

those of other European makers; some drawings are good enough to make a copy of and instrument.

- Thomas Lerch: *Vergleichende Untersuchung von Bohrungsprofilen historischen Blockflöten des Barock*. Berlin 1996. The aim of this study was to predict the sound character of baroque recorders by comparing their bore profiles. For that purpose Thomas Lerch listed detailed measurements of bore profiles, but also other data (positions and sizes of fingerholes, windways and labiums) of 61 baroque and early baroque recorders (by Bressan, Haka, Van Aardenberg, Hotteterre, Jakob and Johann Christoph Denner, Gahn, Heytz, Oberlender, Schell and Schuchart). But there are no drawings and pictures of (parts of) the instruments in this book.
- Jan Bouterse: *Dutch woodwind instruments and their makers, 1660-1760*; KVNMM, Utrecht, 2005. This is the English translation of my dissertation, with information of over 80 Dutch recorders. Concise measuring data are in Appendix C (descriptions in Dutch, with English summaries), with a lot of photos of the instruments. The data are not intended as a starting point for making copies of the recorders, but can be useful in comparing designs such as bore profiles and tone-hole positions.
- Canadian woodwind maker and researcher Jean-François Beaudin has made many nice plans of historical woodwind instruments. Several of them can be obtained by the collections (such as the museums in Paris and Berlin), but you can also order plans via his website (www.flutebeaudin.com/Home.html).

Interpreting the drawings and measurements, and important advice

No instrument plan is ever comprehensive or complete, there is always something that you need (or think you need) missing.

Interpreting the plans can be a challenge, especially when they are made in a very personal or artistic style (Morgan). Many details you can only understand by measuring (and copying) a recorder yourself. My advice: do what I did in my earlier years: investigating modern factory made instruments and also copies of old recorders. And make nice drawings of all the details, graphs of the bore profiles, etcetera.

There is another aspect of interpreting of measurements of historic recorders: how to deal with changes which have occurred to the instruments: crooked, warped and shrunken joints, cracks, and damage. On many plans there is not enough information for making a reconstruction of the instruments as it was when it was new. It is surely helpful to have plans by several people made of the same instrument, and also having plans of more comparable instruments by the same woodwind maker. At the other end of the scale, one good drawing of an excellent recorder (or other woodwind instrument) is sufficient for making a good copy. At the end it is not the plan, it is all about your skills (and quality of materials and tools).

Important advice: always make you own plan from the data on the drawings and tables made by other people. That helps very much in understanding all the information. And it may happen that you will discover some mistakes in the original drawings, such as misreadings on a caliper (for instance 22.7 mm instead of 27.7 mm).

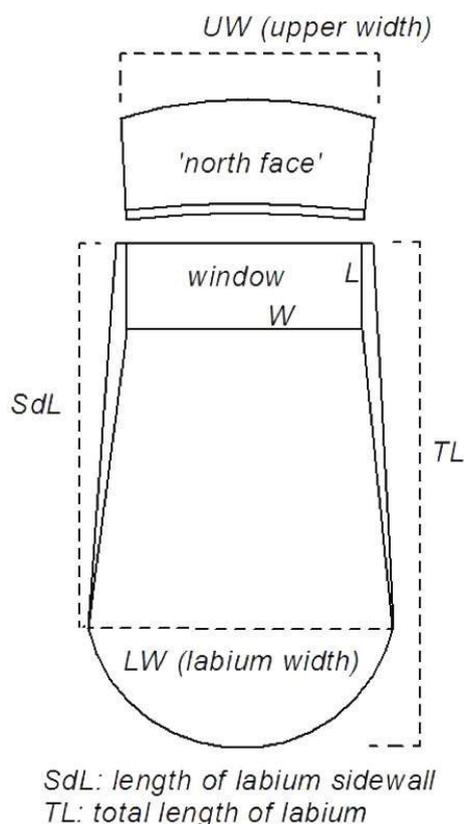
Preferences and complications

For this series of articles (or chapters) about making woodwinds, I had to make choices about the instruments whose plans I present. My idea was (and is) first to present some interesting recorders I have examined and measured myself. Some of these recorders are from private owners or from collections where access to the instruments is not easy.

Because of the copyrights, I can't present here full drawings which are sold by museums or private persons (like Jean-François Beaudin). But sometimes I have made adaptations to the recorders based on such plans, for instance to alter the pitch or the fingerings, for example: the alto recorder by Steenberg from the Frans Brügger collection of which I made a copy with a shorter middle joint. Or the soprano recorder by Terton, a formidable instrument, on which I had to make some changes because of irregularities in the bore profile (shrinking of the wood) or fingerholes which were enlarged in recent times. In these examples I do not give a full plan, but a summary of measurements of the original recorder, with addition of the alterations I have made.

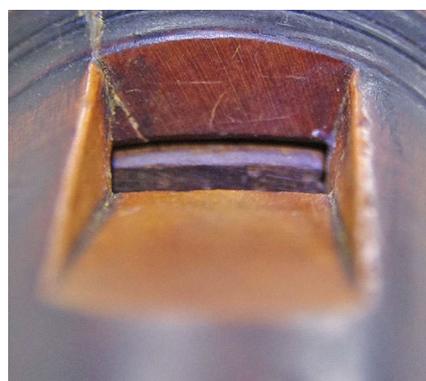
Thinking about my other recorders, I have to confess that they are seldom exact copies. For several reasons smaller or bigger alterations were made. Some of these were deliberately intended, but other changes can be seen as rescue operations, after having problems with the wood (or with my tools).

Conclusion: making woodwind instruments requires an attitude in which you have to work with great accuracy as well as with a sound amount of flexibility. Never forget that in the end it is all about playing music with satisfaction.



Labium, window and 'north face' with their dimensions (L = Length, W = Width).

Other symbols used in the drawings and tables:
 \emptyset = diameter, H = height, hor = horizontal
 ver = vertical, \emptyset -ext = diameter exterior



Alto recorder by Terton,
 Boers Collection,
 Rijksmuseum Amsterdam

Richard Haka, soprano recorder in f2.

Collection: Potsdam Museum (Abteilung Geschichte), Potsdam - Germany, Inventory number: 81/634V.

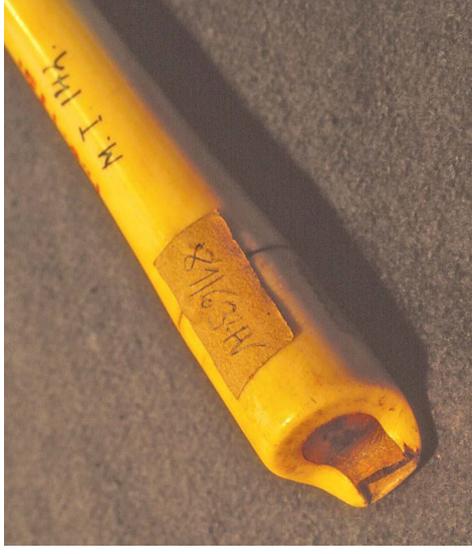
History: this instrument came from a private collection and before 1928 was on loan in the Germanisches National Museum in Nürnberg/ Neuremberg, Germany.

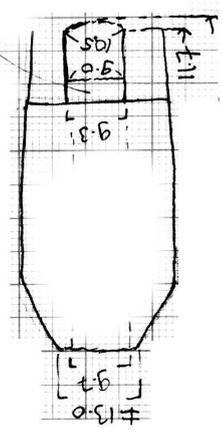
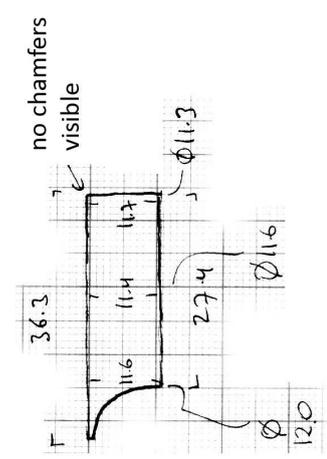
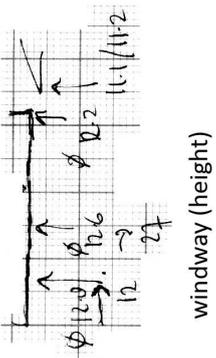
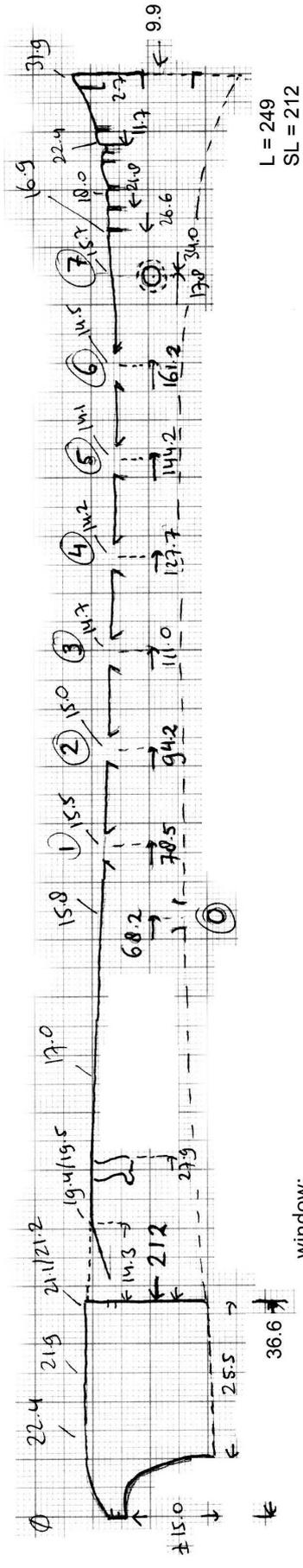
See M. Kirnbauer: Verzeichnis der Europäischen Musikinstrumente im Germanischen Nationalmuseum Nürnberg, Band 2: Flöten und Rohrblattinstrumente bis 1750 (Wilhelmshafen 1994), p. 19.



Ivory soprano recorder in one joint. The stamps: R.HAKA in a scroll, without a fleur de lis below. The foot section is flaring, and turned with several rings and grooves. There is only one lowest (7th) fingerhole, at the right side. The beak is old-fashioned short.

The instrument is rather well preserved, but the surface of the block has become very rough, with the result that the recorder is hardly playable. Several museum numbers and stickers disfigure the surface of the instrument. I have made a copy in wood of this recorder, and it plays well with baroque fingerings up into the third register, at a pitch close to a-440 Hz.





no chamfers visible

windway (height)

Window: L 2.8 to 3.0, W 8.8 to 9.0, UW 9.3;

Labium: TL 14.3, SdL 11.7. LW 10.5

Fingerholes (L from block line to centre hole, Ø WxL of hole)

- hole 0- 68.2 4.3 x 4.5 holes 1 to 6 strongly undercut
- hole 1- 78.5 4.7 x 5.0 holes 0 and 7 slightly undercut
- hole 2- 94.2 4.9 x 5.3
- hole 3- 111.0 4.9 x 5.3
- hole 4- 127.7 5.1 x 5.3
- hole 5- 144.2 5.2 x 5.5
- hole 6- 161.2 5.2 x 5.4
- hole 7- 178 4.4 x 4.4

bore (Ø- Lhor/ver or max, from upper end):
 12.0- 9 hor; 11.8- 20 hor; 11.6- 26 hor; 11.4- 42 hor;
 11.2- 89 hor/ 40 ver; 11.0- 134 hor/ 95 ver; 10.8- 142max;
 10.6- 152 max; 10.4- 161 max; 10.2- 187; 10.0- 208; 9.8- 217;
 9.7- 225; 9.6 through; 9.9/10.0 - end of bore

in windway area (Øver, L):
 12.8 - 12 ver; 12.6- 27 ver; 12.2- 36 ver; 11.1/11.2- under labium edge

R. Wijne: soprano recorder
Collection Frans Brügger, Amsterdam

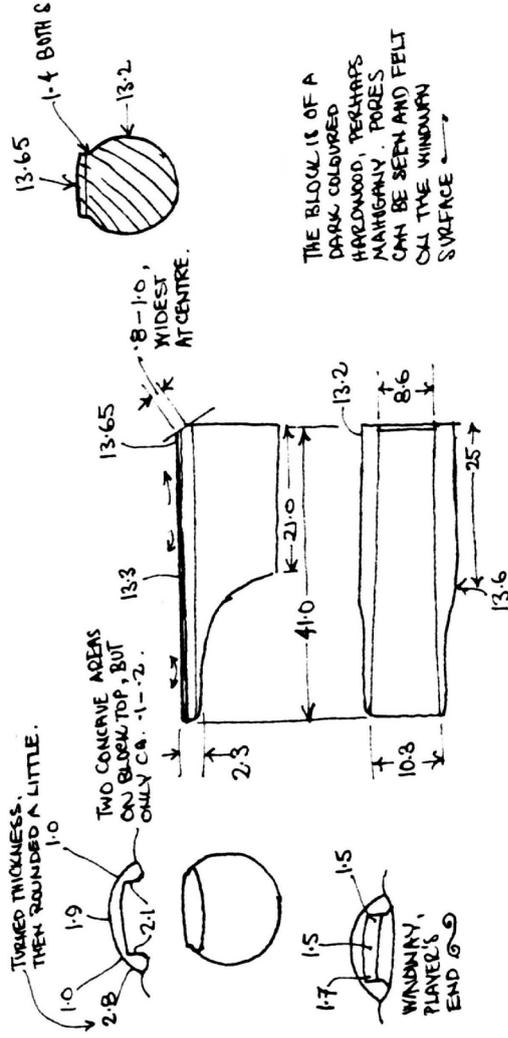
Boxwood soprano recorder in c2, in two parts. There is a drawing with all measurements by Fred Morgan (Zen On publishers, 1981), but I have also some measurements by Friedrich von Huene (who restored this instrument).

The recorder plays at about a-410 Hz (measurement Von Huene, but in my opinion quite a bit lower: 40 to 50 cents below a-415 Hz); I made a copy in three parts (middle joint and foot separate) with extra lower parts for playing in a-415 Hz.



R. Wijne -soprano recorder

Head: Lmax 134.5, SL 94.0; socket: L 21.0, Ømax 18.8; window (WxL): 8.9 x 3.4 (Morgan) and 8.8x3.3 (Von Huene),
 UW 10.6; labium: TL 18.2, SdL: 14.5/15.0; LW 12.1; windway: L 40.5, W 10.8 to 8.6
 bore (Ø, Lmax/min from upper end): 16- 13.6; 41- 13.6/13.2; 60- 13.6/13.3; 80- 13.4/13.2; 100- 13.3/13.1; 112- 13.2/13.0 (maximum diameters from Morgan measurements, minimum from Von Huene)
 Ø-ver at windway end: 14.75; under labium edge: 13.9; step: 0.85 (Morgan)



Lower part: L 222.5, SL 204.7 (tenon L 20.8)

From the drawing by Fred Morgan

fingerholes (L from upper shoulder to centre of hole; ØWxL; Øext at hole, - after Morgan):

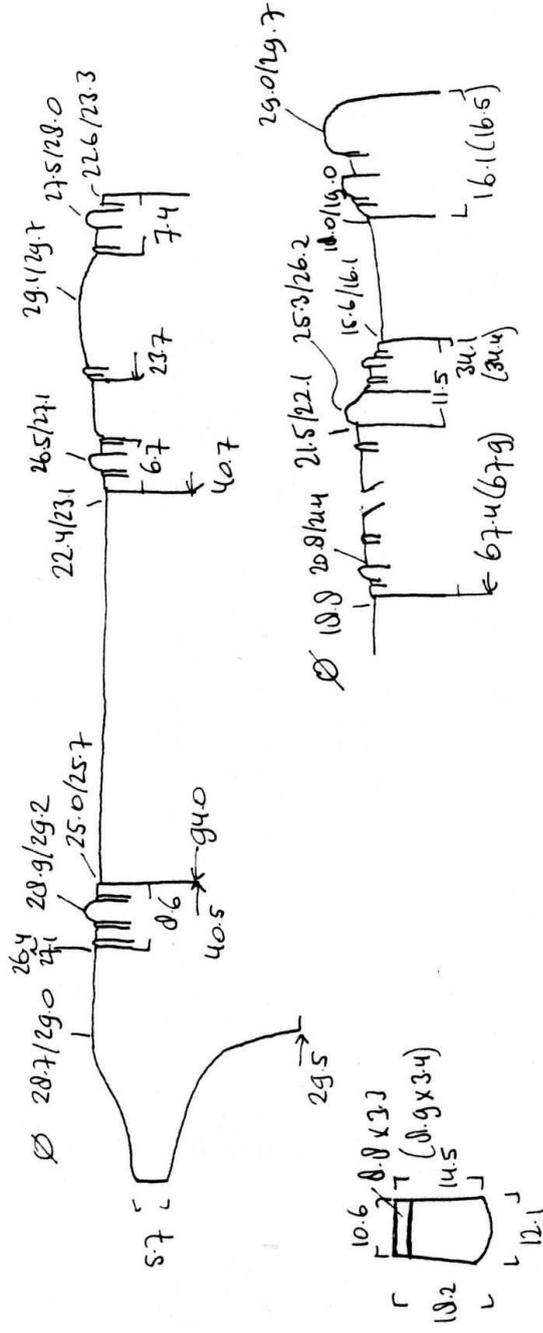
- hole 1- 11.0; 5.1 x 4.9; ca 20.8 hole 1- 24.4; 4.7 x 4.6; 20.3
- hole 2- 45.4; 5.4 x 5.3; 19.6 hole 3- 67.7; 5.2 x 5.0; 19.2
- hole 4- 91.3; 4.0 x 4.0*; 18.6 * this hole is possibly enlarged, and later filled in with wax
- hole 5- 112.1; 5.1 x 5.1; 18.5 hole 6- 132.2; 4.2 x 4.4; 18.2
- hole 7- 150.2; 4.2 x 4.0; c. 21.8 no measurements (or other information) of undercutting of the holes

Bore of lower part (L, Ø, after Von Huene)

- 0-13.2; 4-13.0; 6-12.8; 10-12.6; 15-12.4; 20-12.3; 25-12.2; 32-12.1; 46-11.8; 80-11.6; 88-11.5; 93-11.4; 98-11.3; 105-11.1; 110-10.9; 116-10.8; 119-10.6; 123-10.4; 136-10.2; 143-10.0; 146-9.9; 153-9.7; 159-9.5; 160-9.4; 167-9.2; 173-9.0; 177-8.9; 185-8.6; 188-8.4; 193-8.1; 196-8.0; 199-7.8; 202-7.6; 205-7.5; 226-7.3. Some additional measurements after Morgan (Ø, L): 13.3/13.4-0; 13.2- 2; 13.0- 6; 12.6-18; 12.2-31; 12.1- 40; 12.0-73; 11.9- 80; 11.6- 90; 11.2- 107; 10.8-119; 10.0-149; 9.0-179; 8.6-191; 8.2-196; 7.8-200; 7.6- 206; 7.4-208; 7.3- 212/216; 7.25 through; 7.4- 3 from lower end; 7.8- end.

Wijne soprano recorder

Comparison of the diameters of the turned profiles, by Fred Morgan and Peter van der Poel. Morgan measured maximum diameters, Van der Poel (also) the minimum outcomes.



About the copy in a-415 Hz

Middle part: L 159, SL 130.5; tenons: L 19.5 to head, L 9.0 to foot.

Fingerholes (L from upper shoulder to centre of hole; ØxL of hole, Ø-ext at hole):

hole 0: 6.5 - 4.5/4.7 - 20.0; hole 1: 14.5 - 4.1/4.4 - 19.7; hole 2: 35.5 - 4.4/5.0 - 19.0;

hole 3: 58.5 - 4.5/4.9 - 18.4; hole 4: 81 - 3.7/3.7 - 17.9; hole 5: 103 - 4.3/4.7 - 17.5; hole 6 - 123 - 3.8/3.9 - 17.3

Note: I tuned this copy with modern baroque fingerings, thus hole 5 is then clearly larger than hole 4.

Bore (Ø-L): 13.2 - 0; 13.0 - 2; 12.8 - 6; 12.6 - 9; 12.4 - 27; 12.2 - 36; 12.0 - 52; 11.8 - 64; 11.6 - 68; 11.4 - 95/105; 11.2 - 114; 11.0 - 123; 10.8 - 138; 10.6 - 144; 10.4 - 146; 10.2 - 149; 10.0 - 151; 9.8 - 155; 9.6 - 158; 9.4 - end.

Foot: L 67.7; sockete L 9.3, Ø 14.0; hole 7 at L 14.5, Ø 4.0, drilled a little downwards, Ø-ext at hole 7: 21.2

Bore of foot (Ø - L, from upper end): 9.3 - 11; 9.0 - 15; 8.8 - 16; 8.6 - 18; 8.4 - 19; 8.2 - 24; 8.0 - 26; 7.8 - 30; 7.7 - 35 and through.

From lower end: 9.6 - 0; 9.0 - 12; 8.5 - 14; 8.0 - 18; 7.8 - 23; 7.7 - through

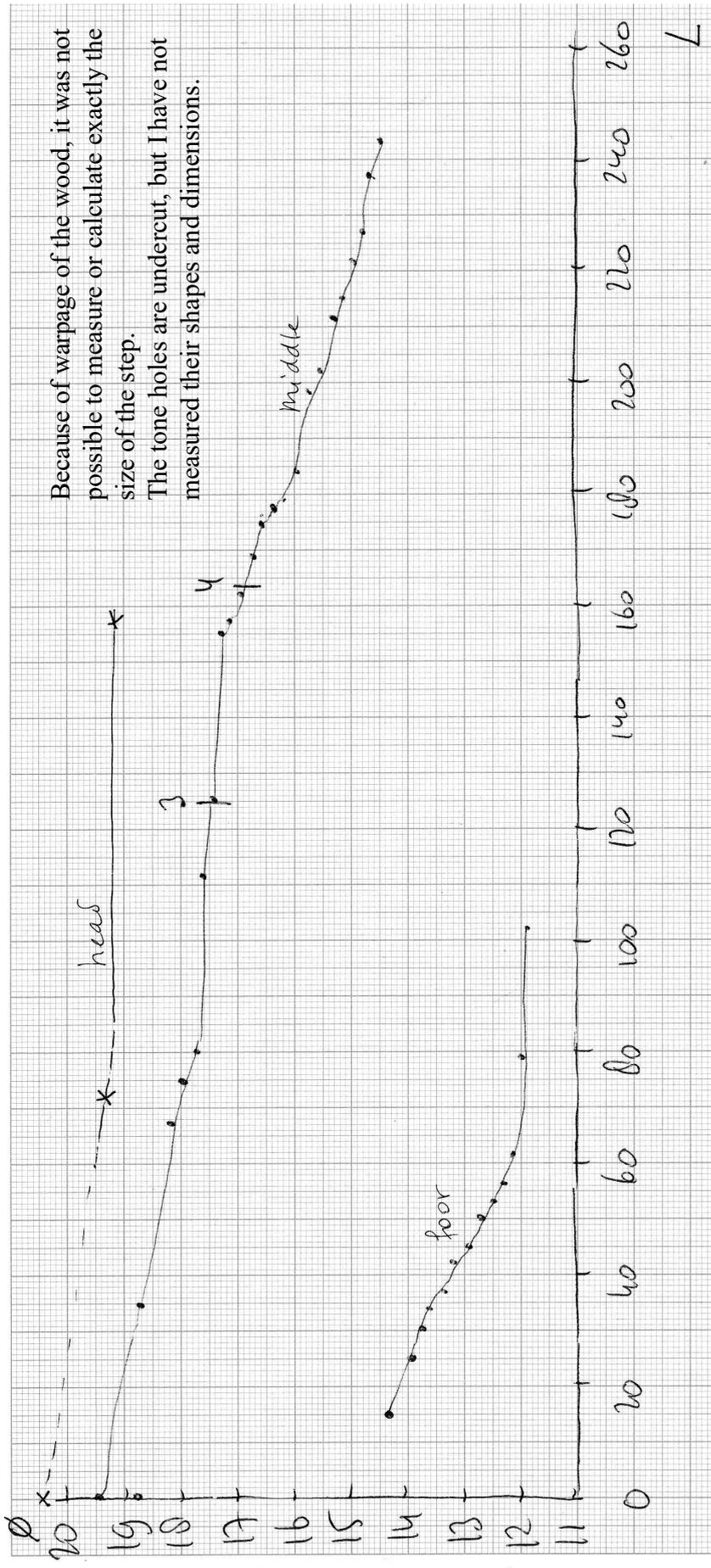
Stanesby Junior: alto recorder in f1

Collection: Private (USA?)

History: this instrument came from a private collection and was sold in 1996 at an auction in London.

Alto recorder in boxwood, in three parts. The window is with 13.0 x 4.7/4.8 very large for a baroque alto recorder, the labium with a TL of 29.5 very long. I made a copy with a window and windway with smaller dimensions (12.4 x 4.5) and used the smaller set of the head bore diameters. This copy played - just as the original recorder - very well at a-415 Hz.





Stanesby Junior alto recorder, bore measurements

head: (L, Ø-hor): 20 - 20.4; 40 - 19.9; 60 - 19.8; 65 - 19.7; 100 - 19.5; 140 - 19.4;

(L, Ø-ver): 20 - 20.6; 40 - 20.65; 60 - 20.7; 65 - 19.3; 100 - 19.2; 140 - 19.2 (ovally warped)

middle joint: (Ømin/max, L): 18.8/19.5 - 0; 18.5 - 53/hole 0; 18.2 - 66/hole 0; 18.0 - 75/hole 0; 17.8 - 67/80; 17.6 - 81/111; 17.4 - 110/125; 17.2 - 150/156; 16.8 - 169/hole 4; 16.6 - 174/hole; 16.4 - 173/176; 16.2 - 177/179; 16.0 - 184/189; 15.8 - 199/hole 5; 15.6 - 202/208; 15.4 - 212/214; 15.2 - 215/217; 15.0 - 221/hole 6; 14.8 - 226/hole 6; 14.6 - 237/241; 14.5 - 242/through

foot: (Ømin/max - L): 14.3 - 16; 14.2 - 20/25; 14.0 - 25/gat 7; 13.8 - 30; 13.6 - 34; 13.4 - 38; 13.2 - 42; 13.0 - 45; 12.8 - 50; 12.6 - 53;

12.4 - 57; 12.2 - 62; 12.0 - 72; 11.8 - just through - end.

Steenbergen, alto recorder

This ivory alto recorder came from a private collection in The Netherlands and was sold to the National Music Museum in Vermillion (SD), USA. It is the only Dutch baroque recorder with double holes on 6 and 7. The instrument is in fine condition, but the labium is likely warped, causing a step that is now too big. The pitch: 10 to 30 cents below a-415 Hz.



Steenbergen ivory alto recorder

head, bore (Ø, Lhor/ver, from upper end):

19.9- 26/ nm 19.6- 42/ nm (not measured); 19.4- 58.7 nm 20.5- nm/end of windway; 19.3- 95/ labium edge and 73
 19.2- 102/ labium edge and 65; 19.1- 110/110; 19.0- 112/129; 18.9- 140/134; 18.8- 150/150; 18.7- 150/150; 18.6- -> (through)
 the labium edge is apparently somewhat lowered: Øver is under the labium edge 19.1, at L65 19.2 and 19.3 at L73, and then narrowing towards
 the socket (19.1 at L110)

middle joint, bore (Ø, Lmin/max, from upper end):

18.5/18.6- 0; 18.3- 7/ 13; 18.2- 21/ 38; 18.0- 58/ hole 0; 17.8- 60/ 62; 17.6- 76/ 83; 17.4- 99/ hole 2; 17.2- 105/ 112; 17.0- 120/ 121;
 16.8- 132/138; 16.6- 140/142; 16.4- 146/ 154; 16.2- 154/ 159; 16.0- 167/171; 15.8- 173/175; 15.6- 183/ 185; 15.4- 189/ 190; 15.2- 193/196;
 15.0- 197; 14.8- 203/ 204; 14.6- 209; 14.4- 214; 14.2- 218/219; 14.0- 224; 13.8- 229/ 230; 13.6- 233/235; 13.4- 239/341;
 13.3- 241/ > (through); 13.2/13.3- lower end

foot bore (Ø, Lmax, from upper end):

13.3- 19; 12.9- 30; 12.7- 35; 12.5- 37; 12.3- 43; 12.1- 46; 11.9- 52; 11.7- 60; 11.5- 68; 11.3- 79; 11.25- 82; and through
 foto bore from lower end: 12.0- 0; 11.5- 9; 11.25- 20 and through

pitch measurements (tuner set at a=415 Hz and equal temperament, deviations in cents):

tone - fingerings - pitch			
f1 - 0 1 2 3 4 5 6 7: -10	f#1 - 0 1 2 3 4 5 6 7r: -10	g1 - 0 1 2 3 4 5 6: -10	b-flat1 - 0 1 2 3 4 . 6: -25/-20
g#1 - 0 1 2 3 4 5 6r: -30/-25	a1 - 0 1 2 3 4 5: -30/-25	b-flat1 - 0 1 2 3 4 . 6 7: -40	c#2 - 0 1 2 . 4 5 6r: -30
b1 - 0 1 2 3 . 5 6: -5	b1 - 0 1 2 3 . 5 6 7: -25/-20	c2 - 0 1 2 3: -25	f2 - 0 . 2: -30
d2 - 0 1 2: -40	e-flat2 - 0 1 . 3 4: -35/-30	e2 - 0 1: -40	g#2 - . . 2 3 4 5 6: -20
f#2 - . 1 2: -10	f#2 - 0: -40	g2 - . . 2: -20	b2 - 0h 1 2 3 . 5: 0
a2 - 0h 1 2 3 4 5: -25	b-flat2 - 0h 1 2 3 4 . 6: -25	b2 - 0h 1 2 3 . 5: 0	d3 - 0h 1 2 . 4 5: -25/-20
c3 - 0h 1 2 3: -20/-15	c#3 - 0h 1 2 . 4: -30/-25	d3 - 0h 1 2: -20/-15	e3 - 0h 1 2 . 4 5: -25/-20
f3 - 0h 1 . . 4 5: -10	g3 - plays well, but pitch not measured	h: hole partly covered	

See Comm. 1569 in FoMRHI Q. 91 (April 1998) for a survey of all known alto recorders by Steenbergen and a drawing with measurements of one of his boxwood altos.

Jakob Denner, tenor recorder

Private collection, Germany (?)

This recorder was on sale at Sotheby's in 1996, but was apparently not sold.

Boxwood recorder in three parts, with a key for hole 7 on the foot. This instrument plays almost exactly at a-415 Hz, with a beautiful in the lower register, the higher notes were a little difficult, maybe caused by the block chamfer which was not in good condition. The head is rather curved, but the other parts are straight and are not or only little ovally warped. The (roof of the) windway is slightly sloping downwards. The fingerholes on the middle joint are situated on the tangential side of the wood.

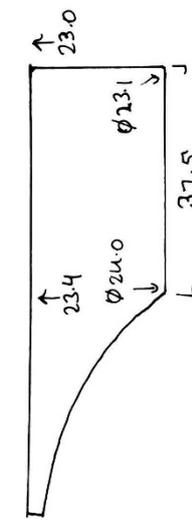
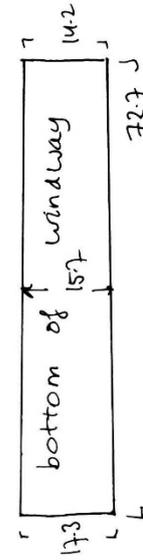
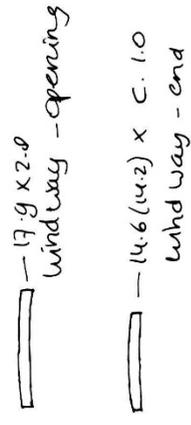
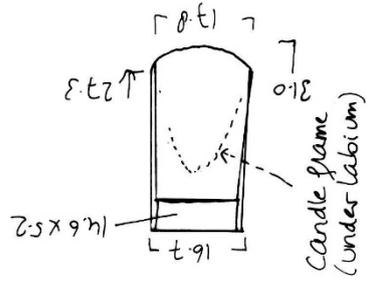
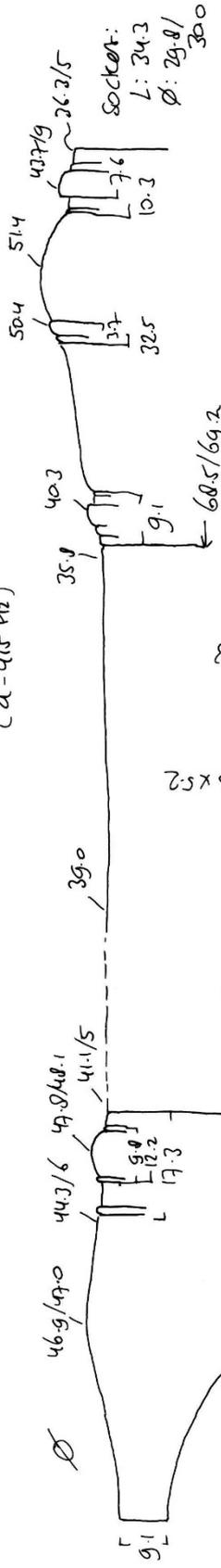




12-11-1996

boxwood + brass key

I. Denner
tenor-recorder in C
(A-415 Hz)



bore of head-joint

∅	L ←	→ L	↓
25.4			40
24.2			Labium
23.3	71		labium-corner
23.1	144		just through
22.9	208		

← top chamfer clean + sharp
← block chamfer ± round, vague

tuner at A-415 Hz deviations in cents

C1:	0	12	3	4	5	6	7	:	-5	/0
d1:	0	1	2	3	4	5	6	:	0	
e1:	0	1	2	3	4	5	:	-5		
f1:	0	1	2	3	4	5	6	:	+5	+10
f#1:	0	1	2	3	4	5	6	:	+20	
g1:	0	1	2	3	4	5	6	:	0	

g2:	0h	1	2	3	:	0			
g#2:	0h	1	2	3	4	:	-25		
a2:	0h	1	2	3	4	5	:	-5	-10
b2:	0h	1	2	3	4	5	:	+20	
c2:	0h	1	2	3	4	5	:	0	+15

