FoMRHI Comm. 2069 **Jan Bouterse**

Making woodwind instruments

9.9 Frans Brüggen, Hans Coolsma, J.S. Bach and a traverso by Stanesby Junior

This article was originally intended as an appendix to my communications about making a baroque traverso. But as it happened, I got the idea during the preparations that several aspects of instrument research seem to fit better into an introduction to the forthcoming chapters.

One of the problems in my first years (around 1980) as woodwind maker was finding measurements of historical specimens. I had to go to museums or private collections to take measurements of historical instruments myself and I also investigated copies wherever I could find them. But there was an additional problem: which instruments to choose for making a copy? That was especially difficult for the baroque traverso. I was interested in that instrument but, coming from the recorders, I had almost no experience in playing it. But then I stumbled on a particular traverso which looked (and sounded) very promising. The story: Frans Brüggen, who started his career as recorder player and ended as conductor, has also played baroque traverso (and sometimes modern flute as well). He was also the proud owner of some fine historical flutes, such as a pair by Godefroid-Adrien Rottenburgh (and not by I.H. Rottenburgh, which I wrote in 2014 in an obituary to the death of Frans Brüggen, see FoMRHI Comm. 2012). But he had another interesting traverso, made by Thomas Stanesby Junior (1692-1754). This instrument in tropical black wood with ivory rings and a silver key was played intensively by Frans Brüggen and - as I wrote in the aforementioned obituary - it was quite possible that it got one or more cracks during the recordings (in 1971/72) of the Bach cantata No. 8: 'Liebster Gott, wann werd ich sterben' ('Dearest God, when shall I die'). This cantata has among the most virtuoso and difficult parts which Bach wrote for the traverso, in the keys of A and E (three and four sharps), using the full compass of the instrument up to a3. The flute imitates in the opening choir of this cantata the sound of the death bells. Alfred Dürr wonders in his book *Die Kantaten von Johann Sebastian Bach* (Deutscher Taschenbuch Verlag, 1971) that this part might originally have been written for a high recorder (which then could have been a sixth flute in d - jan b.). At www.youtube.com/ watch?v=aRmqjW0rbq0 you can hear the original soundtrack with the Leonhardt Consort, the Choir of King's College Cambridge, conductor Gustav Leonhardt, and of course Frans Brüggen on traverso (Teldec 1971). And I think that he played the flute part in this cantata in the most brilliant way, especially in the bass aria. If Frans Brüggen may have shown any technical faults (nowadays traverso purists will surely recognise some), then these are blown away in this performance by his great musicality: Brüggen is here in my opinion unequalled by other and more experienced traverso players on later recordings.

There is, however, a twist to this story: the booklet accompanying the gramophone record mentions that Brüggen played a traverso of Stanesby Junior for the recording of this cantata. But there is also a photo of a recording session which can only be that of the opening chorus of cantata No. 8 (with two oboi d'amore and violins playing pizzicato, see photo next page). On this photo is Frans Brüggen clearly playing another instrument: a traverso in early French style. But which one, as most of these French traversos have a very low pitch, not the a-415 Hz from the recordings with Harnoncourt and Leonhardt?

And I had some more doubts, which occurred to me when I tried to play a copy of this Stanesby traverso. I will discuss that later on in this article.

Frans Brüggen and the other musicians during the recordings (or more likely: at a rehearsal) of Bach's cantata No. 8.

Hans Coolsma

Hans Coolsma, well known for his recorders, made (*c.*1970) a series of copies of Brüggen's Stanesby traverso. It was a one-off production; he never made traversos again. That was probably the reason he had no objections to giving me (in 1981) the bore measurements of the original instrument and to investigate a copy of the flute. Many years later I acquired one of these copies myself, giving me the chance to do more research.

The Stanesby copy by Hans Coolsma (head by Jan Bouterse)

With the list of measurements, I got a copy of the prospectus which came with the traverso. It gives some detailed information about the instrument and how the copy was made:

The original for this copy, owned by Frans Brüggen, Amsterdam, and used daily by him, was chosen for the following reasons:

-a): it is in its original state, has not been altered in any way, and is in excellent condition;

-b): it is a beautiful instrument with a sonourous tone quality; its most noteworthy characteristics are a powerful e1 and a remarkably pure intonation;

-c): the original was easily and often available for measuring with the result that throughout the whole process of reconstruction the copy could be compared with the original at frequent intervals.

The copy only differs from the original - which is tuned at a1=415-419 Hz - in one respect: the embouchure is widened by 0.5 mm in order to sound the third register more readily. Frequent testing has proved that when the Coolsma copy of the head joint, incorporating the small improvement aforementioned, is used in connection with the original three joints by Stanesby the combination is even more satisfying.

- The original instrument is made of grenadilla with ivory mounts. The copy is of course also of grenadilla (Dalbergia melanoxylon). The ivory has not been bleached: it will gradually yellow in the course of time.
- The original silver key is not ornamented or engraved; this example has been respected.
- The acoustical proportions of the original were copied with extreme precision. It was with considerable pride that we found that both the timbre and the intonation of every individual tone and half-tone corresponds exactly to the original.
- This instrument is unquestionably the finest copy of a flauto traverso made since the reconstruction of baroque instruments was begun again in the present century.
- Each flauto traverso is sold complete with case, cork-grease and chamois leather cleaner. A fingering chart is added.

Additional information in the prospectus: length of the instrument: 620 mm, four pieces, cork joints, ivory fittings and silver key; the cork in the mouthpiece has been exactly adjusted. Base tone: d1. Old pitch: a1 = 415-419 Hz. All measures are original. Tested by Frans Brüggen and Hans Coolsma.

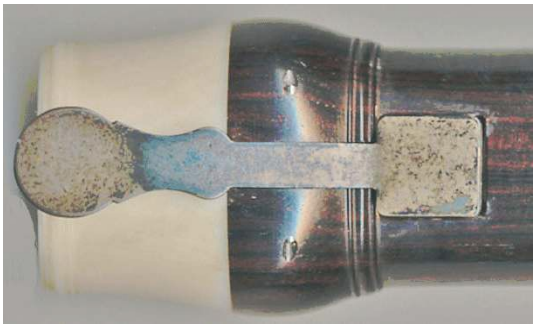
Thus far Hans Coolsma gives this jubilant description of his traverso project. He also told me in 1981 that he had copied the bores very precisely (with an accuracy of 0.01 mm), using a copy-reaming machine that was exclusively designed for this project.

Quite a number of players must have ordered one of these Stanesby copies - I am told that 200 have been sold by Coolsma - but I do not know how expensive the instrument was. There must, however, have been an issue with the instruments: I do not know any professional player who has played or used these copies for performances and recordings. And Brüggen sold his original Stanesby to Mashiro Arita in Japan. It is time to have a closer look at the copy by Hans Coolsma.

The Stanesby traverso

First impression: the copy is a sturdy looking and weighty instrument, luxuriously made in black tropical wood with thick ivory rings. Is the original flute indeed made from grenadilla (African blackwood)? I have always some doubts when other people are so sure to see the difference with the other option, which is ebony wood. During my study at the Wageningen University I have done some wood identification and I have seen samples of both species which

showed a considerable overlap in colour, structure and weight. Oiling the wood intensively makes it even more difficult to recognise its characteristics. You have to carry out a microscopic test to be sure which is the wood species in question. But such tests are destructive, because you have to cut off a sample of the wood.



The silver key looks in comparison small and is actually rather short, only 2 mm protruding over the socket ring. Noticeably, but found on most traversos by Stanesby Junior and some other English makers, is that the head joint has no socket, but a tenon which fits into the socket of the upper middle joint. Contemporary flute makers on the continent worked the other way around. The disadvantage of this design is that it is not ideal to make *corps de rechange*, extra joints for playing in other pitches. But as far as I know Stanesby didn't make such extra joints.

Quite a lot of traversos by Stanesby did survive, Phillip T. Young in his *4900 Historical Woodwind Instruments* (London, 1993) has listed about 40, of which 25 are made of ivory. I know of a drawing (by Fred Morgan) of one Stanesby traverso which was made in the other way, thus with a socket in the head joint. This flute (from an unknown private collection) is also made of a black tropical wood, has a much shorter lower centre joint and foot than the ex-Brüggen traverso (230.4 against 239 mm). The total sounding length (from the centre of the mouth hole to the lower end of the flute) is 569 mm, which is about 12 mm longer than the same distance of the Coolsma copy, and 17 mm longer than the original ex-Brüggen Stanesby traverso. This means that the acoustical design is different, the pitch is also lower, about 10 Cents under a-415 Hz.

The toneholes and their undercuttings

The toneholes on the Stanesby copy by Coolsma are all almost perfectly circular in diameter, with differences up to only 0.2 mm between minimum and maximum diameter. This seems to be also the case with the toneholes of other traversos by Stanesby Junior. It can be seen as a sign that Stanesby drilled the holes directly in the desired size, only leaving him with some undercutting. The sockets and tenons on the copy are all almost perfectly cylindrical, the internal diameters of the sockets don't change from the open end to the shoulder rim, I have not seen that often on historical woodwind instruments.

More weird, however, is one of the fingerholes on the Coolsma copy. On most baroque traversos we see the that hole 1 and 2 on the upper middle joint have about the same size, hole 3 is somewhat smaller; similarly hole 4 and 5 on the lower middle joint are again about equally sized with hole 6 being clearly smaller. But hole 4 on the Coolsma copy with a diameter of 5.0 mm is much smaller than usual and has about the same size as hole 6; the diameter of hole 5 is 6.2 mm.

This has repercussions for the pitch of some notes. A disadvantage on my copy is that a#2 (with 1. 3) is very flat and hardly usable, which is a problem for playing music with three or

more sharps (as on the aforementioned Bach cantata!). This a#2 is in baroque temperament always a bit flatter than the b-flat2 (fingered with 1 2 . 3 4 5 6 7), but surely not so much as on this instrument.

What was going on here? I was also wondering about the undercuttings of some of the toneholes, which looked to me only slightly done (holes 3, 4, 6 and 7). When I saw these features, I became more interested in the original instrument. I asked around and one of the members of the 'Bouwerskontakt' was so kind to send me a drawing of the Stanesby traverso, made by Jean-François Beaudin (after measurements and a sketch by Fred Morgan). And it became immediately clear to me that Coolsma had not only made changes to the mouth hole, but also to some other important elements of the flute. So was the upper middle joint about 5 mm longer and even more important: hole 4 was much bigger: Ø 5.9 instead of the 5.0 mm of the copy. The other toneholes on the Stanesby had about the same dimensions as on the copy, and were also almost perfectly circular in diameter.

The bore profile

It is time to look at the bore measurements of both instruments. The graph on the next page presents the bore profiles of the flute, as presented to me by Hans Coolsma. Only the bore of the head joint is taken from his copy, and so are the positions of the toneholes.

The bore profiles have a common pattern: the bore is in the head (I) cylindrical (Ø 19.2 to 19.3 mm), in both middle joints (II and III) narrowing from 18.8 to 15.5 and from 15.4 to 13.7 mm, in the foot (IV) narrowing from 13.7 to 13.2 mm and at the lower end widening again to 13.7 mm. There are at the connections between the joints no, or only minor, steps in the bore diameters. That can be conceived as a sign that there has not been fiddled with the instrument, such as shortening joints.

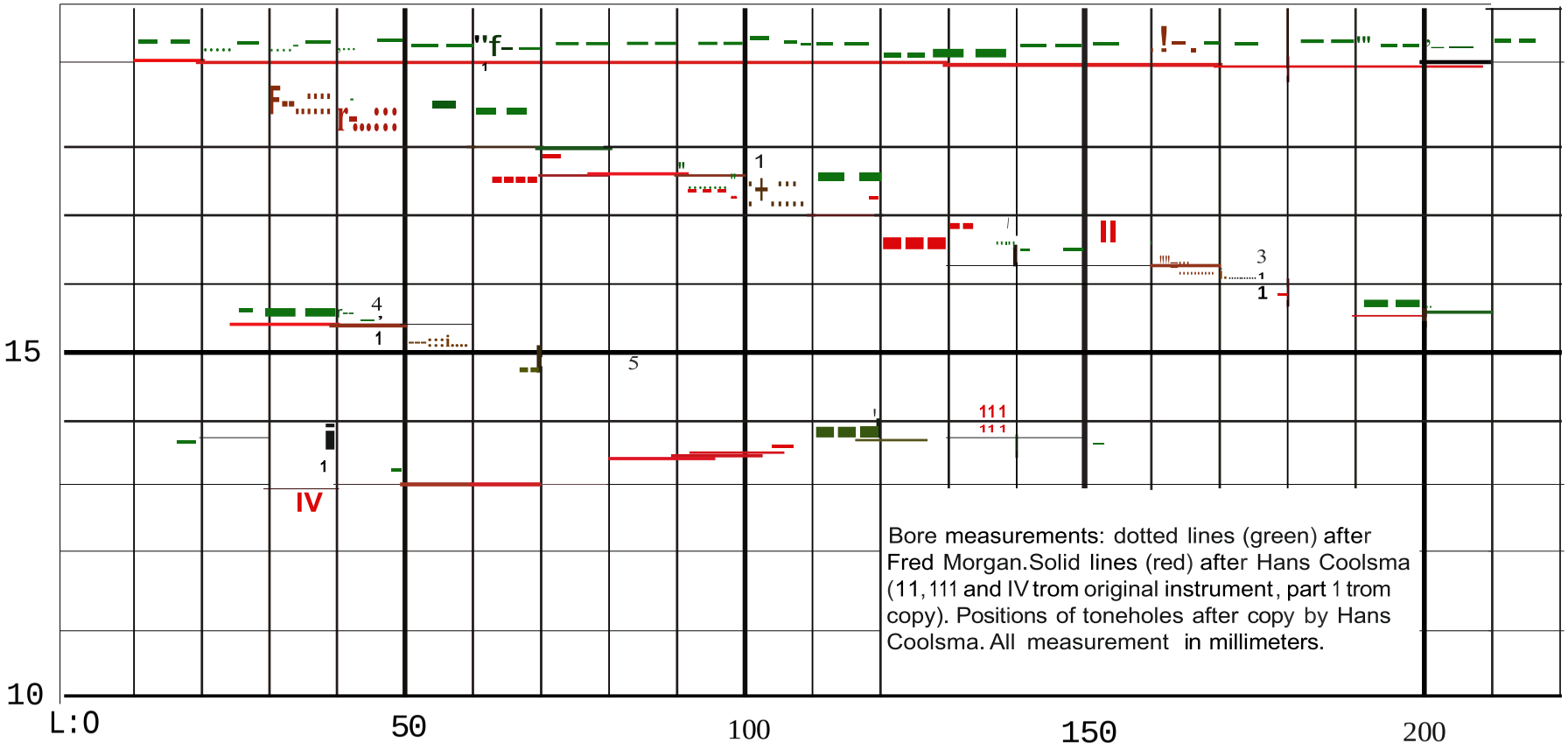
Remark: I have seen some very fine baroque traversos which for some reasons have rather wide steps in the bore between the parts, for instance resulting in a profile where the bore diameter at hole 4 is wider than at hole 3. I will discuss this phenomenon in a forthcoming article.

Characteristic for the Stanesby traverso is that the bore in the lower part of joint III is hardly tapering, it is almost cylindrical over a length af about 40 mm. And also that Stanesby probably used the same reamer from both ends of the foot (mirrored profile). The narrowest point of the bore of the flute is thus halfway along the foot, and not as I have seen on other instruments at hole 7 or even higher, at the connection of the lower middle joint and the foot.

The walls of the flute are fairly thick: at hole 2 about 4.1 mm, at hole 5 about. 5.3 mm (this difference between the wall thicknesses between the two joints can be seen on many more baroque traversos). For a traverso with the supposed pitch of a-415 Hz the bore is rather wide. But it looks to me as if this design of the bore profiles is well thought-out by Stanesby. There are some differences from the measurements (taken by Fred Morgan) of the original instrument:

- the bore of the head is with Ø 19.55 mm a bit wider (on the copy: Ø 19.2 to 19.3 mm)
- the bore of the upper middle joint is 0.2 to 0.4 mm wider
- the bore of the lower middle joint is only in some places a bit wider (0.2 mm)
- the bore of the foot is only in the upper section a bit wider (0.2 mm)

These differences are probably caused by another way of measuring. Morgan might have given the maximum diameters where the bore has come slightly oval in cross section. But the general pattern of the profiles is not so much different. However, I suspect that Coolsma has made the bore of the head joint on his copies deliberately narrower. I have no reason to think that, for instance, the bore of the copy did shrink so much.


15
10
L:0
50
100
150
200
II
IV
111
Bore measurements: dotted lines (green) after Fred Morgan.Solid lines (red) after Hans Coolsma (11, 111 and IV trom original instrument, part 1 trom copy). Positions of toneholes after copy by Hans Coolsma. All measurement in millimeters.

Relation between size and position of the toneholes

There is a general rule for the size and position of toneholes on a traverso. Because on these instruments all primary tones (the first harmonics) can be overblown into their octaves (the second harmonics), the position of the holes is established for a given bore profile.
For instance: placing a hole too low (in the direction of the foot) means that the octave interval which is tuned at that hole has the tendency to be too sharp. It means also: when you change the bore profile, you must inevitably adapt the position and/or size and undercuttings of the toneholes (and vice versa). This means also that it is very strange when on a copy a tonehole is much bigger or smaller than on the original instrument.

This brings me to the deviating size of hole 4 on the Stanesby copy. Hole 4 is important for tuning g1 (1 2 3), g2 (1 2 3), g3 (1 . 3) and d3 (as the third harmonic of the g1, with the fingering . 2 3 . . . 7, thus with the key pressed, which means that hole 7 is opened). Making this hole too big (or undercutting too much) destroys the balance between these tones, the intervals becoming too wide. The balance on the copy for these tones and intervals is all right, so hole 4 seems to have the right size and shape for this instrument. But making this hole bigger for a better a#2 (1 . 3), things will become worse for the other tones.
But what could Coolsma have brought to change the size of hole 4? He claimed that the original flute had ‘a remarkably pure intonation’. I already mentioned that Coolsma altered not only the size of the mouth hole, but made the second joint c. 5 mm longer.* The only reason for this can be to lower the pitch of the flute, I suppose to bring the pitch closer to a1=415 Hz. But that change in length can’t explain the alteration to hole 4, nor does that the difference in diameter of the head joint. I have made several *corps de rechange* for other traversos and have never met the need to make adaptations to the holes on the right hand joint.

* Coolsma added these 5 mm in the upper section of the second joint: the distances between the toneholes (from 1 to 6, or from 3 to 4) stayed almost the same. It was maybe better to move holes 1, 2 and 3 a little bit upwards. But even that can’t explain the events with hole 4.

Conclusion: Coolsma must have had another reason for to make the copy as it is. I had a discussion with Tanja Obalski - she is a professional soprano singer - who did a course in Stapleford in making a copy of a Stanesby traverso. Robert Bigio, who was the teacher at that course, told her that on several original Stanesby traversos he had played the notes g1 and g2 are very sharp. I asked him about that and he answered me:

> *I have played a number of Stanesby flutes. They are remarkably consistent, and they all have the same flaws (but I use the word 'flaws' advisedly): the G is indeed far too sharp, and the D is far too flat. My friend Helen Crown wrote her PhD thesis on Lewis Granom, an 18th-century London flute player who is known to have played a Stanesby flute. Helen tells me that Granom wrote some low C sharps in his music, which can only be played if the D is already very flat. One effect of the sharp G is that the only way to get C natural in tune is to finger it with the addition of two fingers in the right hand. Making it smaller allows you to play C natural with the standard fingering. Most players have found these aspects of the Stanesby to be impossible. I have cheated by making the G hole smaller and have shortened the footjoint to raise the D.*

It is quite possible that exactly these problems were the reason for Coolsma to make alterations to the copy: to lower the g in all registers. But doing so he had to cope with the problems to restore the balance with the other tones.

We also discussed the other qualities of the Stanesby copy. Has it indeed what Coolsma said, ‘a sonourous tone quality and a powerful e1'? And what exactly is ‘sonorous’? The dictionary says: ‘a deep and rich sound’. But my personal view on the instrument is that you must put a lot of energy into it to come a bit close to that type of sound. I feel quite much resistance, the response being rather slow. The sound is less free and more delicate than on several of my boxwood traversos, for me not at all corresponding with the weight and appearance of the flute. The e1 is not particulary powerful as well. I know very well that other (and much more experienced) players may have other opinions about the Stanesby copies by Coolsma. But my conclusion is - and Simon Polak, who is a professional Dutch traverso maker, agrees with me - is that there is something wrong with these copies. They are surely not exact copies of the original Stanesby traverso, and I doubt some of the statements by Coolsma about their qualities as well.

Now I asked Mashiro Arita about his opinion about the ex-Brüggen Stanesby,now his. He answered me (and made excuses for his very poor English):

So, I could to say that it is possible to play the instrument very good in tune from bottom (1st octave) of d' to the top of register with 18-19 and ca.1940's. without any trouble and we can make very deep sound, colorful and rich sound!!!

Also to say it is not necessary to arrange for tone -holes sizes, bore and shortened foot joint.etc..if we can have good condition's original old instruments!

I hope that you could imagine what's a problem on the flute playing is, on the old flute I think the pitch of original Stanesby black one is c.415 with on my playing and no retuning all tone-holes. ... And I believe that Brüggen played on original Stanesby for Cantata BWV 8 by Bach, that he told me in that time. He played super excellent!!!!

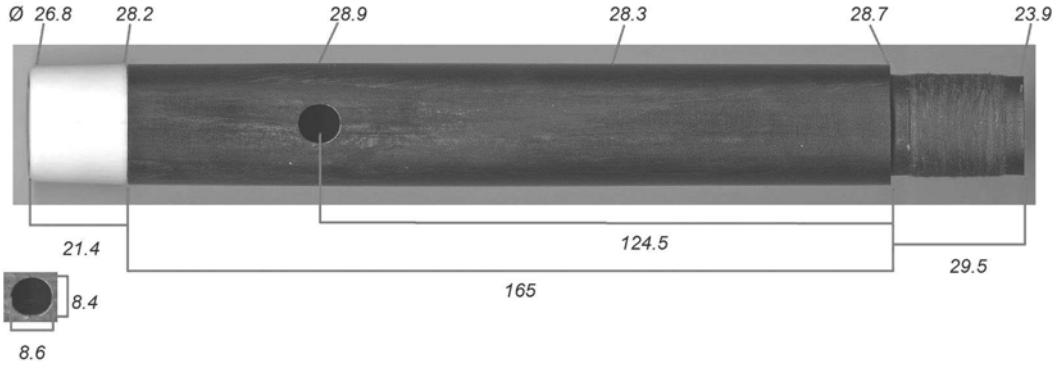
Three Stanesby traversos from the collection of Mashiro Arita.

Well, since everything Robert Bigio and Mashiro Arita assumed about the Stanesby traverso is true, what Frans Brüggen achieved playing this instrument in the Bach cantata is even more remarkable. He had, however, one advantage: because the three and four sharps he had mainly to play g# and not g, and the d1is completely absent in his parts.

At the end of this quest I should do one job: to make an exact copy of the Stanesby flute. Two new middle joints should be enough to prove what Bigio told me. But I am a bit reluctant to make them; what to do with an instrument which is of no use to me?

Drawings and measurements of traverso's by Stanesby Junior

I have made a drawing of the copy by Hans Coolsma of the Stanesby Junior traverso (ex-Brüggen, now Arita). I added measurements to scans and photos of the instrument parts, see example below. I can send members of the FoMRHI a digital copy in colour of the full drawings (email me: info -at- mcjbouterse.nl).



There are various plans with measurements of several other traversos by Stanesby Junior in circulation. Some of them are published by the collections, it is even possible to download some of the drawings from the corresponding websites.

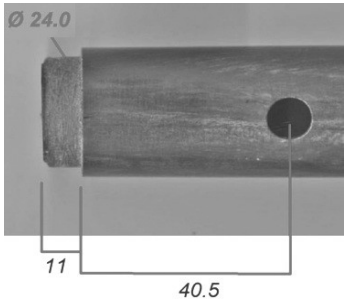
See http://www.flute-beaudin.com/Plans.htm for the list of drawings you can order from Jean-François Beaudin. No. 15 on this list is the ex-Brüggen traverso, now in the collection of Masahiro Arita in Japan. No. 104 is in the Dayton C. Miller Collection in the Library of Congress in Washington DC (USA), inv. no. DCM 1125. There is a plan of this instrument (also by Jean-François Beaudin), and downloadable on line at www.loc.gov/collections/dayton-c-miller-collection/?q=stanesby+flutes. There are several more Stanesby traversos in this collection (some of them damaged, or with later added keys).

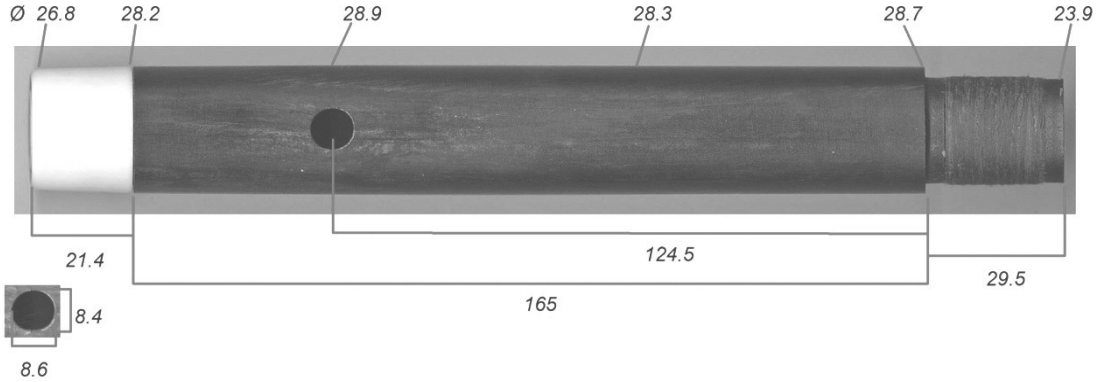
Another traverso by Stanesby Junior is in the Musée de la Musique in Paris, a drawing (again by Beaudin) is available, see http://collectionsdumusee.philharmoniedeparis.fr/doc/MUSEE/0162306 for pictures and more information.

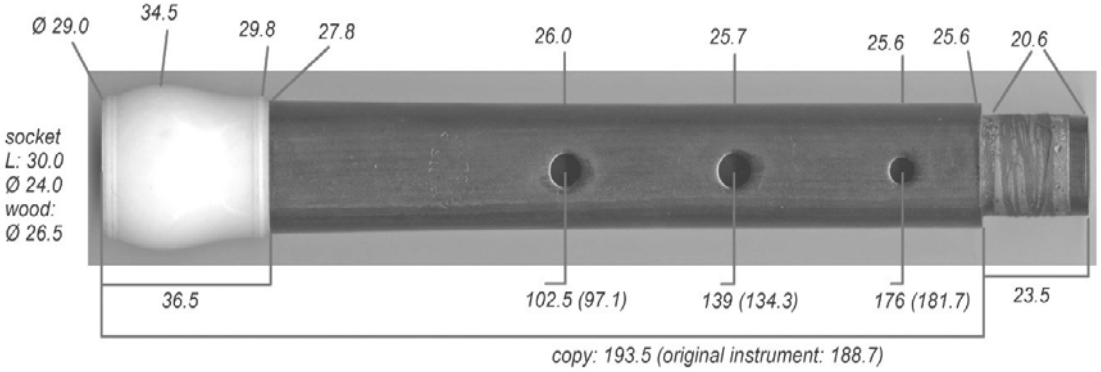
Epilogue

A last word about Frans Brüggen and the flute he played on the photo. I did some research and found that Friedrich von Huene made a traverso after an instrument by Chevalier (in the Museum of Fine Arts in Boston), which he sold in two versions, one at the original pitch of a1=410 Hz, and the other in a1-415 Hz. See picture below, from a prospectus by Friedrich von Huene (I am not sure if the Von Huene workshop still makes this flute). See www.mfa.org/collections/object/flute-50386 for a picture and more information about the original traverso by Chavalier.

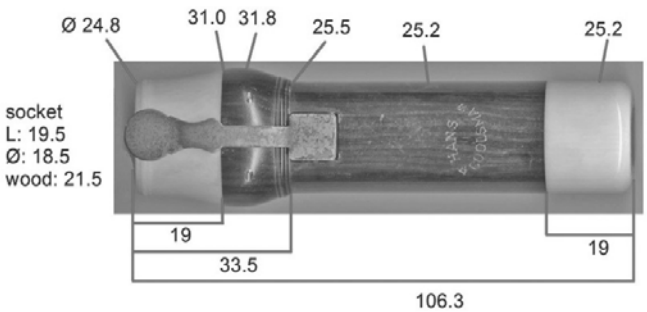
I am pretty sure that Brüggen played this Chavalier copy during the session on the photo (see second page of this article), but as I have to believe Mr. Arita, he did not so at the definitive recording. But if he had played that instrument, it would actually not have been a bad choice. It is said that a French flutist (Buffardin) has inspired Bach to write some of finest works for the flauto traverso when he was visiting Germany.

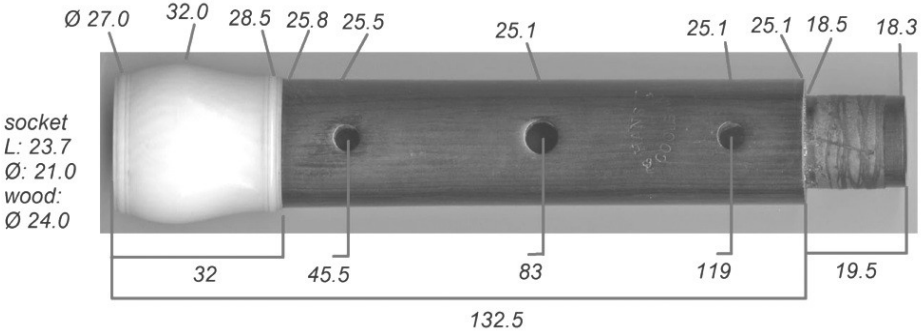






	size	undercut (L)		size	undercut (L)
hole 1	6.7x6.7	10	hole 4	5.0x5.0	6
hole 2	6.9x6.9	10	(on original instrument: 5.9x5.9)		
hole 3	5.2x5.2	6	hole 5	6.2x6.2	8.5
			hole 6	5.0x5.0	5.5





hole 7 at L 37.5, Ø 5.7x5.7, undercut to L 6

Stanesby Junior - traverso, copy by Hans Coolsma
from instrument in collection Frans Brüggen (now Arita)
measurements in millimeters, by Jan Bouterse