

Skeleton measurement sheet

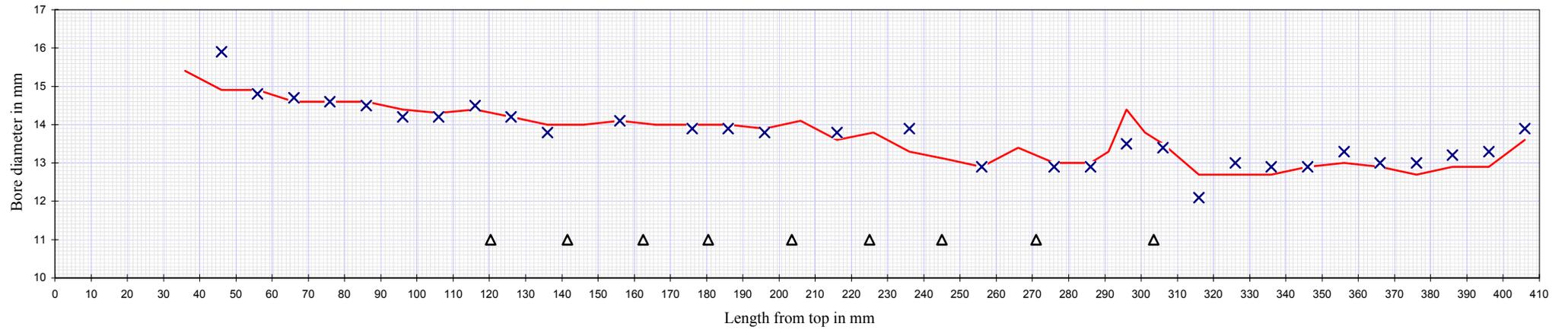
Location:	Frankfurt								
Inv. N°:	X2460								
Measured:	Adrian Brown								
Date:	10/04/2000								
	& 23/06/2006								
Pitch @ a=440hz:	c"# -								
Total length:	body: 404.8								
Speaking length:	269.5								
Windway length:	34								
Material:	Sycamore or maple, flamed								
mark:	♣ ♣								
									External diameters
	FINGERHOLES								
	length		diameter		direction		from top	Ø	
	<i>(from top)</i>	<i>(from bl)</i>	east/w	north/s	↑⇔↓⇐		tenon	37	
							bl	42.3	
X	120.3	86.3	6.0	6.6			hole X	42.3	
1	141.5	107.5	7.0	7.4			1	42.0	
2	162.5	128.5	7.0	7.3			2	42.0	
3	180.5	146.5	7.1	7.2			3	41.8	
4	203.5	169.5	9.2	9.5			4	42.0	
5	225	191	9.3	9.2			5	42.0	
6	245	211	9.1	9.5			6	42.0	
7 middle	271	237	8.0	8.3			7	42.0	
SL hole	303.5	269.5	circa 13				SL hole	42	
	Step:		Window width:	12.8			tenon	35.5	
	Edge thickness: c. 0.4		Cutup	4.8			bottom		
	Windway exit chamfers: up 1.1, flat		Ramp width north	13.5					
	down 0.8, 45°		south	15.5					
	W/W entrance: width 14.6		Ramp length: west	25.5	chamfer				
	height 1.5/2.0		east	25.5	chamfer				
			middle	28					
	Beak cut away:		chamfer also on north side						

NOTES: Three pieces, bell and cap probably later replacements
all metalwork except pins (gilded) to hold window cover, are replacements. (poor quality and no engraving)
Bore is offset, towards front, is not straight (east - west) with exterior. Bore possibly drilled after outside tuning. (marks of dead centre at south end.)
instrument plays well, (see tuning notes) lower part of bore below SL hole unnecessary for tuning, allows instrument to be played on table using plinth, as Paris and Brussels examples

Frankfurt X4260 Schratzenbach discant column flute.xls, Bore from top

Length	Ø↔	Ø↑↓		Length	Ø↔	Ø↑↓			
36	15.4			316	12.7	12.1			
46	14.9	15.9		326	12.7	13.0			
56	14.9	14.8		336	12.7	12.9			
66	14.6	14.7		346	12.9	12.9			
76	14.6	14.6		356	13.0	13.3			
86	14.6	14.5		366	12.9	13.0			
96	14.4	14.2		376	12.7	13.0			
106	14.3	14.2		386	12.9	13.2			
116	14.4	14.5		396	12.9	13.3			
126	14.2	14.2		406	13.6	13.9			
136	14.0	13.8							
146	14.0								
156	14.1	14.1							
166	14.0								
176	14.0	13.9							
186	14.0	13.9							
196	13.9	13.8							
206	14.1								
216	13.6	13.8							
226	13.8								
236	13.3	13.9							
246	13.1								
256	12.9	12.9							
266	13.4								
276	13.0	12.9							
286	13.0	12.9							
291	13.3								
296	14.4	13.5							
301	13.8								
306	13.5	13.4							

Frankfurt X4260 Schrattenbach discant column flute.xls, bore graph



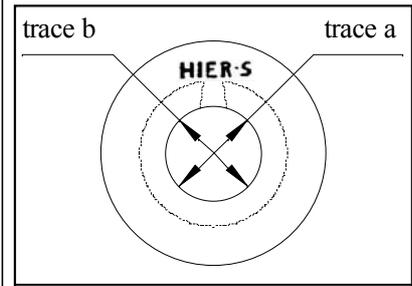
Frankfurt X4260 Schratzenbach discant column flute.xls Tuning

	from a- 440hz +50	Fingering, where different		Cents from a-440hz +50 cents	Fingering, where different
Note	cents		Note		
I	+ 10		VIII	+ 25	
II	- 15		IX	- 5	
III	- 5		X	- 10	
IV	+ 25		XI	+ 25	half 6
V	+ 15		XII	- 5	
VI	- 10		XIII	+ 5	(+567)
VII	0	(0 234)	XIV	- 40	(+67)
	-40	(01)	XV		

tuner set +50 cents sharp : therefore I = c", 60 cents sharp
instrument warm
sound is stable in pitch and clarity, a bit fluffy.
articulation slowish
intonation seems pretty meantone.
SL hole is bell, bottom bore can be covered without affecting pitch or
sound

KEY AND NOTES TO MEASUREMENT SHEETS

All attempts at measuring are necessarily subjective and the current survey was undertaken with some finite objectives: To undertake an inclusive study of ALL the recorders, using a skeleton format of the most important measurements and minimal intervention. The bores were measured from the bottom, using a strain gauge based digital internal caliper. This has the advantage that bores can be measured with the blocks in situ, thus preventing damage to this sensitive part. Normally, two traces were made, at approximately 90° from each other, avoiding the fingerholes where possible. Calculations were then made to give internal diameters from the top of the instruments, and allow bore traces to be plotted.



FIELD	TYPICAL VALUE	EXPLANATION
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Location:		Town, collection or both, where the instrument is currently located
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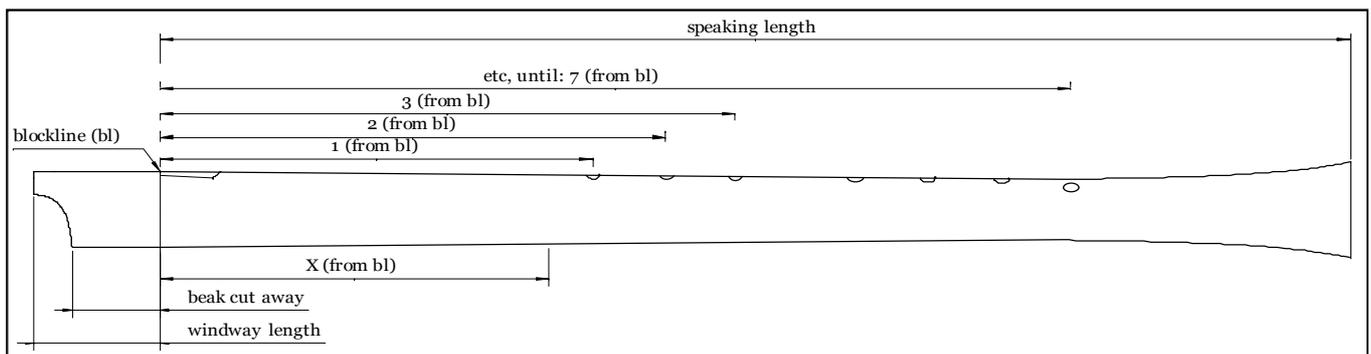
Inv. N°:		Inventory number of the instrument
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Measured:		Name of measurer
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Date:		Date of measurements, where known
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Pitch @ a=440hz:		Pitch in terms of lowest note, all holes covered, relative to modern pitch (a=440hz). + or - indicates a quarter tone step, relative to modern pitch
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Material:		Material from which the instrument is made
mark:		Mark or stamp visible on the instrument, branded or embossed by maker or owner



FINGERHOLES	Tone, or fingerholes of the instrument
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length	(See drawing above)
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(from bl)	Sum of length from blockline and windway length
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(from top)	
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diameter	Fingerhole minimum diameter in an east to west direction
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east/w	Fingerhole minimum diameter in a north to south direction
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north/s	
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direction	Indicates if a fingerhole is bored obliquely, or undercut with an unusual bias, and in which direction
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↑ ⇒ ↓ ⇐	
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Step:	Difference between lower surface of edge (labium) and upper surface of windway ceiling. Typically, this measurement is a visual estimate, given that the blocks would not normally be removed
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Edge thickness:	Thickness of edge (labium). Measured by impression made in fine gum and compared using feeler gauges
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Windway exit chamfers: up	small, c. 0.6	Chamfer on upper surface of windway exit (on ceiling)
	flat	An estimate of its angle
down	2.0	Chamfer on lower surface of windway exit (on block)
	45°	An estimate of its angle

(These measurements have either been obtained by the same method as the edge thickness, or are a visual estimate)

W/W entrance: width
height

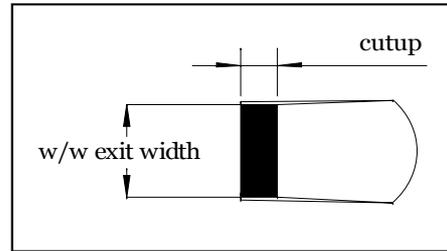
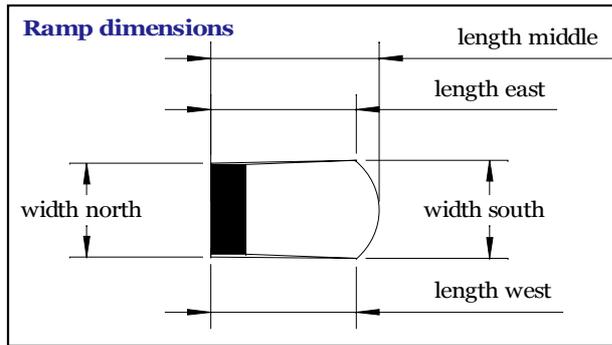
Width of windway entrance,
Height of windway entrance, distance between windway ceiling and block surface

External diameters
(east - west)

Diameter of the instrument's exterior
Measured at 90 degrees to the longitudinal plane of the fingerholes

distance from top

Distance from the north end of the instrument, at which measurement was taken. Note: On basses with fontanelles, the approximate measurements of beads and fontanelle supports were also included.



Cap		Measurements relative to cap
Overall length	99	Total length of the cap
internal Ø	57.6	Approximate internal diameter of cap recess
depth	73	Maximum depth of cap recess
largest external Ø	74.7	Maximum diameter of caps external turning
hole Ø	11.8	Diameter of crook hole, where appropriate
blow hole		Width and height of blowing hole, where appropriate
ring width	21.6	Width of brass strengthening ring
Ø	64	Diameter of brass strengthening ring
Fontanelle		Measurements relative to fontanelle
Overall length	151	Total length of fontanelle
internal Ø south	69.5	Approximate internal diameter of lower end
internal Ø north	64.3	Approximate internal diameter of upper end
largest external Ø	81.2	Maximum exterior diameter, typically scored with a line though the middle of the roses
north ring width	22.5	Width of upper brass strengthening ring
Ø	71.7	Diameter of upper brass strengthening ring
south ring width	22.9	Width of lower brass strengthening ring
Ø	78.5	Diameter of lower brass strengthening ring
rose Ø	28	Diameter of the largest ring of hole arrangement. Typically holes are arranged in three rings, with an extra hole in the centre.
holes	3	Diameter of the rose holes

For the exterior of the instruments, measurements were taken at strategic points, relative to the functionality of the instruments. Some decorative details, particularly with regard to the bass instruments, were also recorded to allow a faithful reproduction to be made.

Concerning the voicing of the instruments, only the most basic details such as those concerning the window and ramp, windway width could be recorded with any surety. Many of the blocks are badly damaged, missing or replacements and it was felt that little would be gained by miniscule examination of these areas. From instruments with an undamaged labium or chamfers, estimates were made to give instrument makers an idea of the sort of degree of voicing these recorders might have originally had.

The recorders were mouth blown and measurements taken with a Korg tuner calibrated in equal temperament at $a=440\text{hz}$, Readings were taken as cents deflection from this two pitch standard. The pressure measurements were read in millimetres of water column, using an Appleby and Ireland pressure gauge with the range 0 to 100 mm/H₂O.

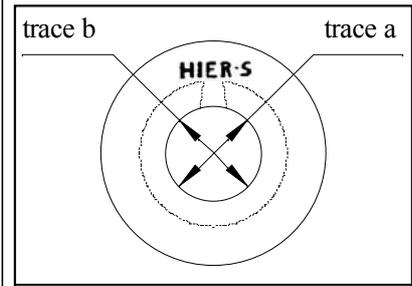
Each instrument was blown to find the centre of the sound and the pressure and pitch recorded. Where fingerings other than the st The following fingerings were tested.

Note	Fingering
I	1234567
II	0123456-
III	012345--
IV	01234-5-
V	0123----
VI	012-----
VII	01-----
VIII	0-2-----
IX	-----
X	0/12345--
XI	Not recorded
XII	0/123----
XIII	0/12-----
XIV	Various
XV	Various

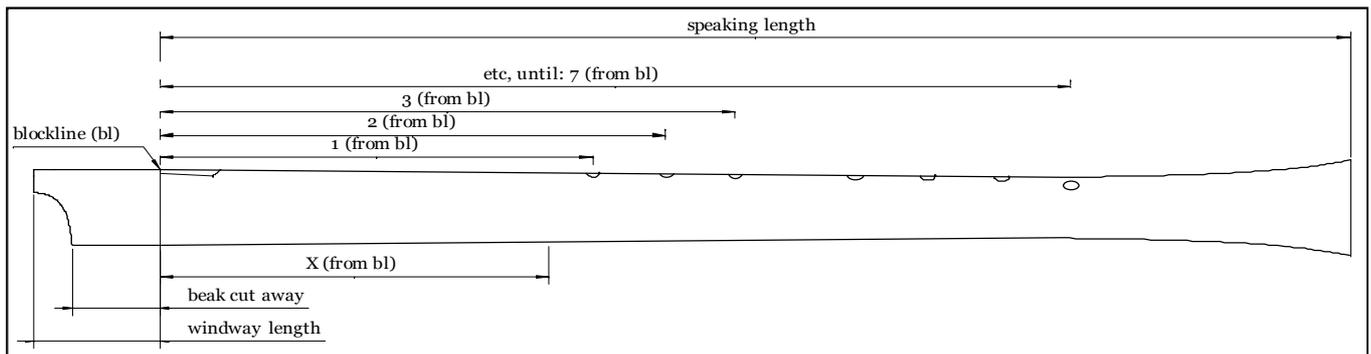
It was not deemed necessary to take readings for note XI due to different half holing of hole 6. All recorders were tried for Jambe de Fer and Ganassi fingerings and where this was successful, the fingerings were recorded.

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length		(See drawing above)
(from bl)		Sum of length from blockline and windway length
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diameter		Fingerhole minimum diameter in an east to west direction
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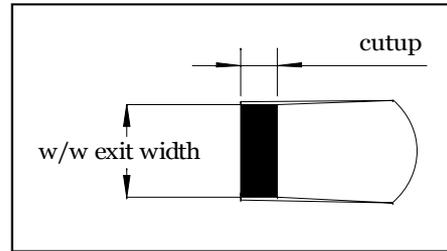
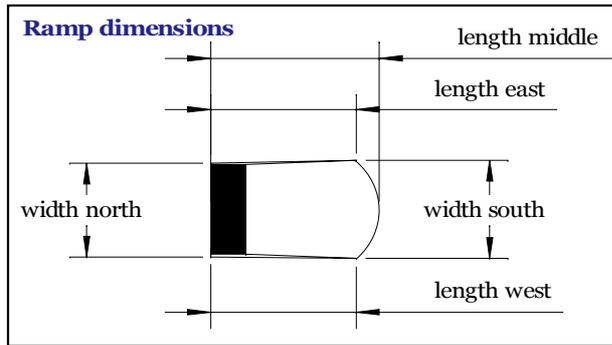
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