

Skeleton measurement sheet

Location:	Accademia Filarmonica di Verona				
Inv. N°:	13242				
Measured:	Adrian Brown, Thijs van Baarsel and Marcello Gatti				
Date:	11/07/2003				
Pitch @ a=440hz:	F#				
Total length:	1821				
Speaking length:	1740.5				
Windway length:	80.5				
Material:	Maple				
mark:	!! !! below window and beneath bell				
FINGERHOLES					
	length		diameter		direction
	<i>(from top)</i>	<i>(from bl)</i>	east/w	north/s	↑⇒↓⇐
X	618.5	538	10.0	10.8	
1	665	584.5	10.8	11.7	
2	707.5	627	10.0	10.3	
3	742.5	662	9.4	9.4	↓
4	1030.5	950	12.6	13.6	
5	1076.3	995.8	10.0	10.8	
6	1117.5	1037	10.0	10.0	↓
7	1465.5	1385	23.7		
Step:	0.85?		Window width:		32.0
Edge thickness:	0.55		Cutup		10.8
Windway exit chamfers: up	1.2				
	60° steep		Ramp width north		33.2
down	1.0		south		34.0
	45°				
W/W entrance: width	34.5		Ramp length: west		47.7
height	2.0		east		47.7
			middle		53.6

NOTES:
 Block is very high and obscures the edge. Woodworm damage to block has been glued up and a worm hole right on exit chamfer does not help matters.
 Holes 3 and 6 are very heavily angled down as with 13243

Verona 13242 gt bass !!.xls: Cap, Fontanelle and External Diameters

Cap				External diameters	
Overall length	126.7			(east - west)	
internal Ø	76.2			distance	
depth	80.0		Upper joint	from top	Ø
largest external Ø	95.7		top	0	71.0
hole Ø	12.5		tenon end	66.5	77.0/84.0
tapered to c. 10mm dia			blockline	80.5	84.0
ring width	37.6			432	79
Ø	85.5			hole X	77.0
				1	76.0
Fontanelle				2	75.1
Overall length	307.0			3	74.4
				871	72.5
internal Ø south	93			4	70.8
internal Ø north	87			5	70.1
				6	70.2
largest external Ø	339		lower tenon	1225.5	70.4/54.2
	circum		bottom	1298	53.0
north ring width	37.8				
Ø	96.0		Foot		
			top	0	86.8
south ring width	37		hole 7	240	74.0/64.0
Ø	102		lower fontanelle support	288	92
			bead	316.5	85
rose Ø	41.5		below bead	320	67.2
holes	3			460	69.0
extra ring of 24 holes				530	79.5
+ extra set of 7 holes between each pattern				563	96
			bead	580	
			bell	590	145
			end	595.5	
			Foot Socket		
				internal Ø	55.3
				Length	70.5

Verona 13242 gt bass !!.xls, Bore from top

Length	Ø↔	Ø↑↓		Length	Ø↔	Ø↑↓		Length	Ø↔	Ø↑↓		Length	Ø↔	Ø↑↓				
84	53.66	54.08		446	56.63	57.31		806	50.65	51.62		1166	45.89	46.00		210	43.38	43.77
96	53.65	54.13		456	56.54	56.95		816	50.47	51.43		1176	45.92	45.98		220	43.78	43.92
106	53.87	54.12		466	56.35	56.77		826	50.24	51.14		1186	45.90	45.85		230	43.99	44.06
116	53.96	54.24		476	56.05	56.73		836	50.04	50.80		1196	45.85	45.71		240	44.13	44.21
126	54.18	54.25		486	56.03	56.55		846	49.76	50.48		1206	45.72	45.51		250	44.54	44.28
136	54.33	54.51		496	56.09	56.33		856	49.36	50.08		1216	45.51	45.25		260	44.60	44.43
146	54.60	54.75		506	55.99	56.28		866	49.03	49.85		1226	45.32	44.95		270	44.75	44.55
156	54.80	54.93		516	55.93	56.24		876	48.84	49.60		1236	45.18	44.72		280	45.00	44.75
166	54.93	55.12		526	55.68	56.14		886	48.62	49.45		1246	44.96	44.44		290	45.36	44.95
176	55.07	55.35		536	55.26	56.06		896	48.38	49.19		1256	44.68	44.18		300	45.64	45.22
186	55.24	55.66		546	54.99	55.90		906	48.14	48.94		1266	44.40	43.86		310	45.64	45.29
196	55.38	55.76		556	54.80	56.05		916	47.88	48.69		1270	44.07	43.51		320	45.76	45.36
206	55.38	56.02		566	54.71	56.06		926	47.61	48.45		1286	43.91	43.67		330	46.40	45.81
216	55.60	56.15		576	54.61	55.90		936	47.39	48.20		1295	44.04	44.04		340	47.03	46.47
226	55.62	56.31		586	54.63	55.62		946	47.20	47.96		Foot joint from bottom of socket			350	47.74	47.35	
236	55.78	56.66		596	54.79	55.68		956	47.03	47.87		0	44.05	43.78		360	48.53	48.00
246	55.91	56.73		606	54.74	55.70		966	46.81	47.75		10	43.72	43.91		370	49.15	48.52
256	56.11	56.87		616	54.67	55.52		976	46.54	47.50		20	43.55	43.92		380	49.54	48.90
266	56.38	57.10		626	54.56	55.22		986	46.34	47.24		30	43.52	43.99		390	49.82	49.16
276	56.74	57.16		636	54.29	55.08		996	46.09	47.11		40	43.32	43.94		400	50.09	49.36
286	56.97	57.25		646	54.00	54.96		1006	46.10	46.88		50	43.22	43.94		410	50.33	49.60
296	57.02	57.35		656	53.90	54.63		1016	46.09	46.70		60	43.22	43.99		420	50.72	49.89
306	57.00	57.70		666	53.82	54.32		1026	46.00	46.53		70	43.35	43.94		430	50.92	50.23
316	57.59	57.99		676	53.69	54.12		1036	46.09	46.42		80	43.27	43.97		440	51.14	50.51
326	57.66	58.02		686	53.72	53.85		1046	45.85	46.30		90	43.30	43.76		450	51.31	50.79
336	57.78	58.24		696	53.66	53.59		1056	45.55	46.24		100	43.39	43.61		460	51.42	50.88
346	57.71	58.22		706	53.10	53.54		1066	45.36	46.04		110	43.59	43.54		470	51.50	50.92
356	57.90	58.15		716	52.84	53.35		1076	45.10	46.02		120	43.36	43.66		480	51.62	51.02
366	57.78	58.06		726	52.59	53.21		1086	44.88	45.84		130	43.21	44.28		490	51.68	51.08
376	57.51	57.94		736	52.51	53.31		1096	44.70	45.70		140	43.31	44.14		495	51.75	51.07
386	57.27	57.93		746	52.31	53.05		1106	44.75	45.67		150	43.33	43.98		510	51.81	51.01
396	57.06	57.92		756	52.00	52.77		1116	44.92	45.73		160	43.56	43.93		520	52.25	51.09
406	56.93	57.96		766	51.82	52.55		1126	45.10	45.80		170	43.61	43.59		521	52.43	51.17
416	56.87	57.83		776	51.64	52.32		1136	45.29	45.83		180	43.22	43.59				
426	56.90	57.72		786	51.33	52.09		1146	45.59	45.80		190	42.86	43.72				
436	56.78	57.44		796	51.05	51.84		1156	45.77	46.00		200	42.84	43.82				

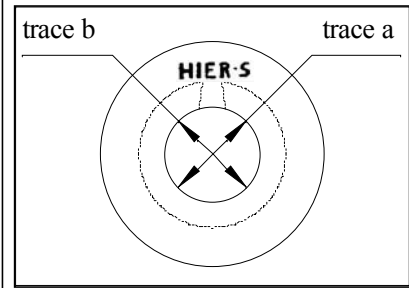
Tuning

	I = Tuner set to	F# 440			Temp. Humidity		
Note	Cents deflection from 0	Pressure mm H ₂ O	Fingering, where different	Note	Cents deflection from 0	Pressure mm H ₂ O	Fingering, where different
I				VIII			
II				IX			
III				X			
IV				XI			
V				XII			
VI				XIII			
VII				XIV			

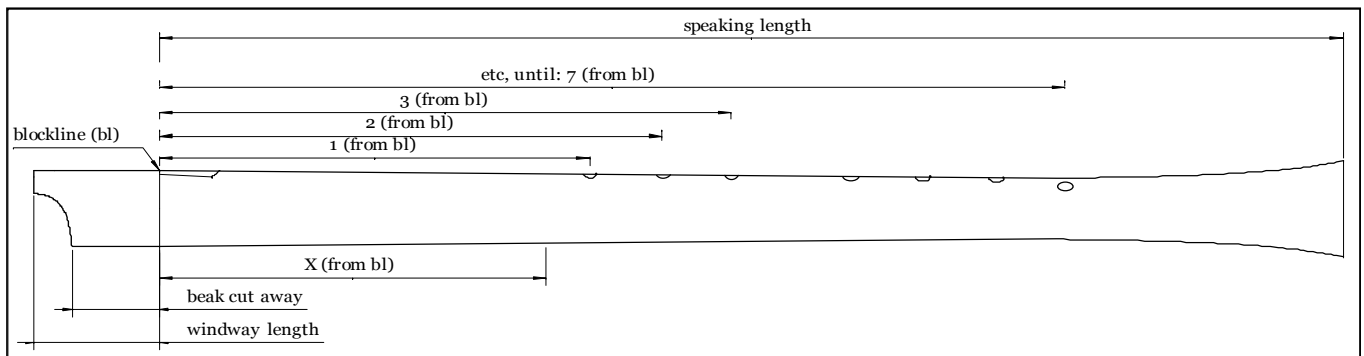
General tuning around -10cents Not possible to play octaves. But V seems low compared with III and I. Very slow articulation.

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
Location:		Town, collection or both, where the instrument is currently located
Inv. N°:		Inventory number of the instrument
Measured:		Name of measurer
Date:		Date of measurements, where known
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
Material:		Material from which the instrument is made
mark:		Mark or stamp visible on the instrument, branded or embossed by maker or owner



<p>FINGERHOLES length (from bl) (from top)</p>		<p>Tone, or fingerholes of the instrument</p> <p>(See drawing above)</p> <p>Sum of length from blockline and windway length</p>
<p>diameter east/w north/s</p>		<p>Fingerhole minimum diameter in an east to west direction</p> <p>Fingerhole minimum diameter in a north to south direction</p>
<p>direction ↑ ⇌ ↓ ⇌</p>		<p>Indicates if a fingerhole is bored obliquely, or undercut with an unusual bias, and in which direction</p>
<p>Step:</p>		<p>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</p>
<p>Edge thickness:</p>		<p>Thickness of edge (labium). Measured by impression made in fine gum and compared using feeler gauges</p>
<p>Windway exit chamfers: up</p>	<p>small, c. 0.6</p>	<p>Chamfer on upper surface of windway exit (on ceiling)</p>
	<p>flat</p>	<p>An estimate of its angle</p>
<p>down</p>	<p>2.0</p>	<p>Chamfer on lower surface of windway exit (on block)</p>
	<p>45°</p>	<p>An estimate of its angle</p>

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

W/W entrance: width
height

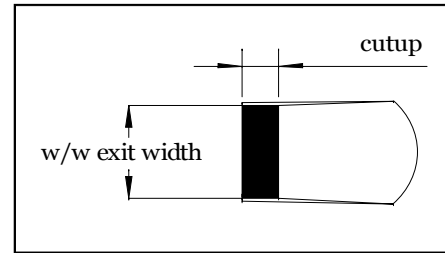
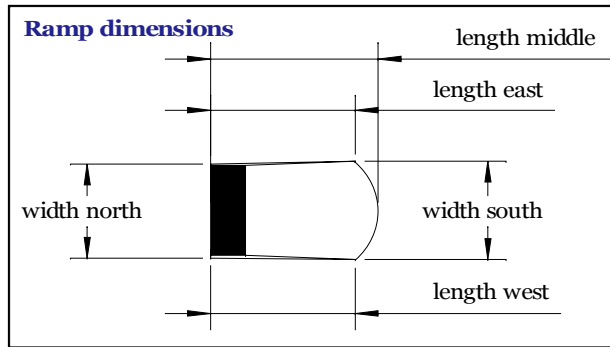
Width of windway entrance,
Height of windway entrance, distance between windway ceiling and block surface

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.