	A	B	C	D	E	F	G
1	**I. Bocal**		Original bocal; Raingo2 no bocal				
2	dia reed end		inside diameter of reed end of bocal				
3	bocal string length (0, 1)		length of bocal inserted into receiver				
4	metal bocal length top (0, 1)		meas. along top of bocal				
5	metal bocal length bot (0, 1)		meas. along bottom of bocal				
6	dia wj end		inside diameter of bocal				
7							
8	bocal logic	2	if bocal logic = 0 => bocal is choke; if bocal logic = 1 =>choke in wing joint calc; if bocal logic = 2 => no bocal				
9							
10							
11							
12							
13	**II. Wing Joint Lengths**		bocal receiver: Raingo2 No				
14	choke bore dia.	9.2	logic 1; bore diameter of choke; logic 0; either diameter bocal bottom or beginning of bore at bottom or receiver				
15	receiver length (1, 0) (formally choke length)	53	logic 1; length of choke from top of wing joint; logic 0; length of receiver (same as string length)				
16	wing joint length	481	total wing joint length, including tenon and socket				
17	tenon length	46.7	tenon length				
18							
19	wj f2	192	dist top of wing to where tone hole enters bore [not at the center of the tone hole]				
20	wj e	251					
21	wj d	306	Raingo2 vrfd, short;				
22							
23	Bore dia. Bottom of wing joint	16	Raingo2 verified				
24	Bore dia. top of boot joint small side	15.5	Raingo2;verified; yes socket is smaller than tenon				
25	Bore dia. top of boot joint large side	22.8					
26							
27	**III. Boot Lengths**						
28	bj logic	1	logic=> if bj logic = 0 => plug removed; if bj logic = 1 => plug cannot be removed				
29	bj c	85	dist from top of boot to where topmost tone hole enter bore [not at center of tone hole]				
30	bj b	146					
31	bj a	195					
32			Raingo2 meas. With boot cap removed				
33	bjstotal [Needed for both boot logics]	436	total length of boot, include socket, along the small bore side,				
34	bjltotal [Needed for both boot logics]	436	total length of boot, include socket, along large bore side				
35	plug small [Need for logic 0 only]	0	plug thickness, large bore side				
36	plug large [Need for logic 0 only]	0	plug thickness, small bore side				
37							
38	boots [Needed for both boot logics]	396	hook length along s bore => bjs-septum length = boot - septum <= calc the septum				
39	bootl [Needed for both boot logics]	396	hook length along l bore => bjl-septum length = boot - septum <= calc the septum				
40							
41	boots bottom [Needed for both boot logics]	22	use hook, dist of bore [dist on stick plus 7mm, diff between hook and bot of stick]				
42	bootl bottom [Needed for both boot logics]	22	use hook, dist of bore [same as boots bot except tenon depth will be different] 15 + 7=22				
43							
44	extreme bore [Needed for logic 1 only]	44.5	Outside dia of plug [measured] = small bore dia + large bore dia + the septum width				
45							
46	septum length exp [Need for logic 0 only]	0	dist. from very bottom of boot to septum [point between the large and small bore]				
47	septum length calc - do not imput value	40	dist. From very bottom of boot to spetum [bjl - bootl]	do not imput value			
48	septum length - do not imput value	40	if bj logic = 0 => septum = septum exp; if bj logic = 1 => septum = septum calc	do not imput value			
49							
50	sbore dia sep* [Needed for both boot logics]	17.4	septum small bore dia [assume = lbore dia sep]				
51	lbore dia sep* [Needed for both boot logics]	17.9	Raingo2 Vrfd small; septum large bore dia [assume = sbore dia sep] [mesure if cork can be removed; for Logic 0]				
52	sep width exp [Need for logic 0 only]	0	septum width; direct measurement if remove plug				
53	sep width calc - do not imput value	9.2	septum width; calc. => extreme bore - sbore - lbore	do not imput value			
54	sep width - do not imput value	9.2	if bj logic = 0 => sep width = sep width exp; if bj logic = 1 => sep width = sep wi	do not imput value			
55							
56	bj g	349	dist from top of boot (socket) to where G hole enters bore [not at cent of tone hole]				
57	bj f1	153	dist from top of boot (socket) to where F1 hole enters bore [not at cent of tone hole]				
58							
59							
60							
61							
62							
63	**IV. Tone Hole Diameters**						
64	f2	5.4					
65	e	6.2	Raingo2 small finger holes				
66	d	5.4					
67							
68	c	7.1					
69	b	6.6					
70	a	6.4					
71	g	8.7					
72	f1	8.8					
73							
74	e1	9.7	Raingo2 9.4 NS x 9.9 EW; e1 tone hole dia, on long joint [need to average NS and EW dias]				
75	d1	8.4	d1 tone hole dia, on long joint [need to average NS and EW dias, NS usually greater]				
76	c1	13.3	c1 tone hole dia, on long joint [need to average NS and EW dias, NS usually greater]				
77							
78							
79							
80							
81							
82	**V. Tone Hole Depths**						
83	f2	31.5					
84	e	25.5					
85	d	31					
86							
87	c	30					
88	b	24.5					
89	a	25.8					
90	g	16.5	meas along bot tone hole wall [north wall, toward reed,tone hole usually at angle]				
91	f1	21	meas along east side tone hole wall [north wall, toward reed,t hole usually at angle]				
92							
93	e1	9.1	e1 tone hole depth;meas east/west with deapth gauge [at center, or shortest dist]				
94	d1	8.1	d1 tone hole depth; meas east/west with deapth gauge [at center, or shortest dist]				
95	c1	9.2	c1 tone hole depth; meas east/west with deapth gauge [at center, or shortest dist]				

	A	B	C	D	E	F	G
96							
97							
98							
99							
100							
101	**VI. Long Joint**		Raingo2 a table along long joint				
102	lg_length	570	total length of long joint				
103	lg_tenon_bot	47.3	length bottom tenon on long joint [tenon going into boot joint]				
104	lj_bot_bore	23.8	Raingo2 slightly OOR; long joint bottom tenon bore diameter [tenon going into boot joint]				
105	lj_top_bore	32.6	Raingo2 OOR; long joint top tenon bore diameter [tenon going into bell]				
106	lg_tenon_top	42.8	length top tenon on long joint [tenon going into bell]				
107	e1 distance	56	dist long joint tenon to e1 [from bot of tenon to where tone hole enters bore]				
108	d1 distance	246	dist long joint tenon to d1 [from bot of tenon to where tone hole enters bore]				
109	c1 distance	440	dist long joint tenon to c1 [from bot of tenon to where tone hole enters bore]				
110							
111							
112							
113							
114							
115	**VII. Bore diameters at Tone Holes**						
116	f2	11.3					
117	e	11.9					
118	d	12.5					
119							
120	c	15.2					
121	b	15.7					
122	a	16.3					
123	g	18.8					
124	f1	21.1					
125							
126	e1	23.8	e1 tone hole bore diameter on long joint				
127	d1	26.7	d1 tone hole bore diameter on long joint				
128	c1	30.1	c1 tone hole bore diameter on long joint				
129							
130							
131							
132							
133							
134	**VIII. Bell**		Raingo2 no tone hole in the bell,				
135	bell logic	1	If bell_logic = 0 => normal conical bore; if bell_logic = 1 => inverted concial bore				
136	bell_length (0, 1, 2)	329	total length of bell [lines 141 + 144 = line 136]				
137	bell_bot_bore (0, 1, 2)	32.7	bore at the bottom of bell [end with socket]				
138	bell_top_bore 0, (1, 0, 2)	30.2	dia bore at the top of bell [where low Bb exits]				
139	bell_center_bore (only for logic 2)		dia bore at max center of expansion				
140	bell_wall (only for logic 2)		bell wall thickness, Just for David				
141	bell_bot_bore_expansion (only for logic 2)		dist of bottom to maxium of expansion [including bell socket length,if bell logic=0 =>100]				
142	Outside diameter of wood at expansion		Just for David				
143	bell_tenon (0, 1, 0, 2)	42.5	bell socket length				
144	bell_expansion_length (only for logic 2)		distance of maxium expansion to top of bell [where Bb exits]				
145	belflg	38.5					
146							
147							
148	**IX. PITCH**						
149	pitch	415	input the historical pitch of the bassoon, must input value, best guess				
150	freq_init	380	Initial frequency range variable				
151	Delta frequency	2	frequency increment parameter				
152	Number of frequencies	60	number of frequencies to scan for min chi sq				
153	Frequency adjust	1.05	frequency adjustment parameter				
154	**X. Title**						
155	title		Bassoon Calculation: Raingo2-O-BrusMIMJT0441				
156							
157			Notes on long joint bore: Raingo2 good				
158			Notes on boot joint bore: Raingo2 good				
159	**XI. Bore Diameter Locations**		Notes on wing joint bore: Raingo2 good				
160		21	Number of diameters				
161	**Bell Bore**	9.2	Initial bore diameter [do not include in line 160 counting]				
162	32.7mm dia. at socket	358	dist1; measured from the bottom of the wing joint- 10mm				1
163	32mm rod 73mm from socket	312	dist2; measured from the bottom of the wing joint- 11mm				1
164	31mm rod 125mm from socket	215	dist3; measured from the bottom of the wing joint- 12mm				1
165	31.5mm rod 152mm from socket	155	dist4; measured from the bottom of the wing joint- 13mm				1
166	30.2mm dia.at bell end	90	dist5; measured from the bottom of the wing joint- 14mm				1
167		28	dist6; measured from the bottom of the wing joint- 15mm	Bottom wing jt	16		1
168		165	dist7; measured from the top of the bootjoint - small bore side- 16mm	top boot small	15.5		2
169		215	dist8; measured from the top of the bootjoint - small bore side- 17mm	top boot large	22.8		2
170		0	dist9; measured from the top of the bootjoint - small bore side- 18mm				3
171		342	dist10; measured from the top of the bootjoint - large bore side- 19mm	sbore dia sep	17.4		3
172		250	dist11; measured from the top of the bootjoint - large bore side- 20mm	lbore dia sep	17.9		3
173		170	dist12; measured from the top of the bootjoint - large bore side- 21mm	Hook Length	396		3
174		100	dist13; measured from the top of the bootjoint - large bore side- 22mm				3
175		0	dist14; measured from the top of the bootjoint - large bore side- 23mm				4
176		495	dist15; measured from the top of the long joint- 24mm	lj_bot_bore	23.8		4
177		445	dist16; measured from the top of the long joint- 25mm				4
178		358	dist17; measured from the top of the long joint- 26mm				4
179		392	dist18; measured from the top of the long joint- 27mm				4
180		235	dist19; measured from the top of the long joint- 28mm				4
181		180	dist20; measured from the top of the long joint- 29mm				4
182		135	dist21; measured from the top of the long joint- 30mm				4
183		65	dist22; measured from the top of the long joint- 31mm				4
184		15	dist23; measured from the top of the long joint- 32mm	lj_top_bore	32.6		4