	A	B	C	D	E	F	G	H	I	J
1	**I. Bocal**		Original bocal Ziegler2; bocal, probably not original							Ziegler1
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							2
9										
10										
11										
12										
13	**II. Wing Joint Lengths**		bocal receiver: Ziegler2, reconstructed bocal reciever							
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							8.8
15	receiver length (1, 0) (formally choke length)	65	logic 1; length of choke from top of wing joint; logic 0; length of receiver (same as string length)							25
16	wing joint length	505	Ziegler2, reconstructed bocal reciever; total wing joint length, including tenon and socket							500
17	tenon length	39.5	tenon length[longer wing 39.3mm]							38.7
18										
19	wj f2	240	dist top of wing to where tone hole enters bore [not at the center of the tone hole]							233
20	wj e	299								297
21	wj d	341								335
22										
23	Bore dia. Bottom of wing joint	15.5	Need to Average, usally oval; Ziegler2 yes							15.3
24	Bore dia. top of boot joint small side	15.7								16
25	Bore dia. top of boot joint large side	23.6								24
26										
27	**III. Boot Lengths**									
28	bj logic	1	logic=> if bj logic = 0 => plug removed; if bj logic = 1 => plug cannot be removed							1
29	bj c	104	dist from top of boot to where topmost tone hole enter bore [not at center of tone hole]							104
30	bj b	159								161
31	bj a	203								205
32										
33	bjstotal [Needed for both boot logics]	434	total length of boot, include socket, along the small bore side							436
34	bjltotal [Needed for both boot logics]	434	total length of boot, include socket, along large bore side							436
35	plug small [Need for logic 0 only]	0	plug thickness, large bore side							0
36	plug large [Need for logic 0 only]	0	plug thickness, small bore side							0
37			Ziegler2; could remove small bore cork plug							
38	boots [Needed for both boot logics]	389	hook length along s bore => bjs-septum length = boot - septum <= calc the septum							387
39	bootl [Needed for both boot logics]	389	hook length along l bore => bjl-septum length = boot - septum <= calc the septum							387
40										
41	boots bottom [Needed for both boot logics]	25	use hook, dist of bore [dist on stick plus 7mm, diff between hook and bot of stick] 18.0 + 7 = 25							18.5
42	bootl bottom [Needed for both boot logics]	25	use hook, dist of bore [same as boots bot except tenon depth will be different]							18.5
43										
44	extreme bore [Needed for logic 1 only]	41	Outside dia of plug [measured] = small bore dia + large bore dia + the septum width							40
45										
46	septum length exp [Need for logic 0 only]	44	dist. from very bottom of boot to septum [point between the large and small bore]							48
47	septum length calc - do not imput value	45	dist. From very bottom of boot to spetum [bjl - bootl]	do not imput value						49
48	septum length - do not imput value	45	if bj logic = 0 => septum = septum exp; if bj logic = 1 => septum = septum ca	do not imput value						49
49										
50	sbore dia sep* [Needed for both boot logics]	18.4	septum small bore dia [assume = lbore dia sep]							18.3
51	lbore dia sep* [Needed for both boot logics]	18.8	septum large bore dia [assume = sbore dia sep] [mesure if cork can be removed; for Logic 0]							18.7
52	sep width exp [Need for logic 0 only]	0	septum width; direct measurement if remove plug							4.6
53	sep width calc - do not imput value	3.8	septum width; calc. => extreme bore - sbore - lbore	do not imput value						3
54	sep width - do not imput value	3.8	if bj logic = 0 => sep width = sep width exp; if bj logic = 1 => sep width = sep	do not imput value						3
55										
56	bj g	345	Ziegler2 there is an brass insert in G tone hole; dist from top of boot (socket) to where G hole enters bore [not at cent of tone hole]							348
57	bj f1	132	dist from top of boot (socket) to where F1 hole enters bore [not at cent of tone hole]							135
58										
59										
60										
61										
62										
63	**IV. Tone Hole Diameters**									
64	f2	5.5								5.5
65	e	5.9								6
66	d	5	Ziegler2 drilled at extreme angle							5.7
67										
68	c	8								9
69	b	8.2								8.8
70	a	6.3								6.5
71	g	8.7								8.5
72	f1	9.9								10
73			Ziegler2, long joint tone holes large							
74	e1	14.9	e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually greater]							14.5
75	d1	14.9	Ziegler2 vrfd large; d1 tone hole dia, on long joint							13.1
76	c1	17.9	Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW dias, NS usually greater]							17.5
77										
78										
79										
80										
81										
82	**V. Tone Hole Depths**									
83	f2	22.3								28
84	e	27.2								34.5
85	d	30.5								33.5
86										
87	c	24								28.7
88	b	26.5								27.4
89	a	26								28
90	g	15.3	meas along bot tone hole wall [north wall, toward reed,tone hole usually at angle]							15
91	f1	21	meas along east side tone hole wall [north wall, toward reed,t hole usually at angle]							20
92			Ziegler2, long joint tone hole long in length							
93	e1	9.7	e1 tone hole depth;meas east/west with deapth gauge [at center, or shortest dist]							10.8
94	d1	10.5	d1 tone hole depth; meas east/west with deapth gauge							9.8
95	c1	11.3	c1 tone hole depth; meas east/west with deapth gauge [at center, or shortest dist]							11
96										
97										
98										
99										
100										
101	**VI. Long Joint**		There is a table along long joint: Ziegler2 yes							
102	lg_length	581	total length of long joint							580
103	lg_tenon_bot	42	length bottom tenon on long joint [tenon going into boot joint]							41.7
104	lj_bot_bore	23.1	long joint bottom tenon bore diameter [tenon going into boot joint]							23.5
105	lj_top_bore	30.5	long joint top tenon bore diameter [tenon going into bell]							30.5
106	lg_tenon_top	32.5	length top tenon on long joint [tenon going into bell]							32.8

	A	B	C	D	E	F	G	H	I	J
107	e1 distance	49	dist long joint tenon to e1 [from bot of tenon to where tone hole enters bore]							50
108	d1 distance	242	Ziegler1 a white insert in low d tone hole; dist long joint tenon to d1 [tone hole enters bore]							238
109	c1 distance	519	dist long joint tenon to c1 [from bot of tenon to where tone hole enters bore]							519
110										
111										
112										
113										
114										
115	**VII. Bore diameters at Tone Holes**									
116	f2	11.9								11.9
117	e	12.7								12.7
118	d	13.4								13.3
119										
120	c	16.8								17
121	b	17.2								17.2
122	a	17.3								17.3
123	g	19.4								19
124	f1	22.2								22.2
125										
126	e1	24	e1 tone hole bore diameter on long joint							24
127	d1	26.9	d1 tone hole bore diameter on long joint							26.8
128	c1	30.5	c1 tone hole bore diameter on long joint							30.4
129										
130										
131										
132										
133										
134	**VIII. Bell**		Ziegler2 There is not a tone hole in the bell							
135	bell logic	1	If bell_logic = 0 => normal conical bore; if bell_logic = 1 => inverted concial bore; if bell_logic = 2 => bell expansion							0
136	bell_length (0, 1, 2)	327	Ziegler2 vrfd 327; total length of bell [lines 141 + 144 = line 136]							225
137	bell_bot_bore (0, 1, 2)	33.1	Ziegler2 33.2 x 32.9; dia bore at the bottom of bell [end with socket]							33.1
138	bell_top_bore 0, (1, 0, 2)	30	Ziegler2; 30mm at c.50mm down into bell, 84mm dia. at very top bell; dia bore at the top of bell [where low Bb exits]							36
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)	33.2	bell socket length							32.2
144	bell_expansion_length (only for logic 2)		distance of maxium expansion to top of bell [where Bb exits]							
145	belflg	92	Usually about 10mm more than line 138							91
146										
147										
148	**IX. PITCH**									
149	pitch	430	input the historical pitch of the bassoon, must input value, best guess							430
150	freq_init	380	Initial frequency range variable							380
151	Delta frequency	2	frequency increment parameter							2
152	Number of frequencies	60	number of frequencies to scan for min chi sq							60
153	Frequency adjust	1.05	frequency adjustment parameter							1.05
154	**X. Title**		Bassoon Calculation: Ziegler2-O-Leipzig1389-Wg1-WOB-DNM							
155	title									
156										
157			Notes on long joint bore: Ziegler2 normal out of round in places							
158			Notes on boot joint bore: Ziegler2 normal out of round in places							
159	**XI. Bore Diameter Locations**		Notes on wing joint bore: Ziegler2 good							
160		20	Number of diameters							20
161	**Bell Bore**	9.2	Initial bore diameter [do not include in line 160 counting]							8.8
162	33.1mm dia. at socket	360	dist1; measured from the bottom of the wing joint- 10mm				1			330
163	33mm rod 150mm from bell	315	dist2; measured from the bottom of the wing joint- 11mm				1			325
164	32mm rod 210mm from bell	255	dist3; measured from the bottom of the wing joint- 12mm				1			280
165	31mm rod 250mm from bell	183	dist4; measured from the bottom of the wing joint- 13mm				1			186
166	36mm dia. at bell end	127	dist5; measured from the bottom of the wing joint- 14mm				1			126
167		0	dist6; measured from the bottom of the wing joint- 15mm	Bottom wing	15.5		1			0
168		68	dist7; measured from the top of the bootjoint - small bore side- 16mm	top boot sma	15.7		2			73
169		120	dist8; measured from the top of the bootjoint - small bore side- 17mm	top boot larg	23.6		2			107
170		310	dist9; - small bore side- 18mm				2			320
171		387	dist10; measured from the top of the bootjoint - large bore side- 19mm	sbore dia sep	18.4		3			377
172		325	dist11; measured from the top of the bootjoint - large bore side- 20mm	lbore dia sep	18.8		3			325
173		240	dist12; measured from the top of the bootjoint - large bore side- 21mm	Hook Length	389		3			255
174		180	dist13; measured from the top of the bootjoint - large bore side- 22mm				3			195
175		100	dist14; measured from the top of the bootjoint - large bore side- 23mm				3			100
176		530	dist15; measured from the top of the long joint - 24mm	lj_bot_bore	23.1		4			530
177		492	dist16; measured from the top of the long joint- 25mm				4			495
178		370	Ziegler2, vrfd gap; dist17; measured from the top of the long joint- 26mm				4			360
179		335	dist18; measured from the top of the long joint- 27mm				4			325
180		280	dist19; measured from the top of the long joint- 28mm				4			280
181		170	Ziegler2, vrfd gap; dist20; measured from the top of the long joint- 29mm				4			170
182		110	dist21; measured from the top of the long joint- 30mm				4			100
183		0	dist22; measured from the top of the long joint- 31mm;				4			0
184		0	dist23; measured from the top of the long joint- 32mm;	lj_top_bore	30.5		4			0