	A	B	C	D	E	F	G	H	I
1	**I. Bocal**		Original bocal; GrenserH11 no bocal						GrenserH8
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**		GrenserH11 bocal receiver: yes from by wear]						
14	choke bore dia.	9.1	logic 1; bore diameter of choke; logic 0; either diameter bocal bottom or beginning of bore at bottom or receiver						8.7
15	receiver length (1, 0) (formally choke length)	34	logic 1; length of choke from top of wing joint; logic 0; length of receiver (same as string length)						45
16	wing joint length	516	total wing joint length, including tenon and socket						509
17	tenon length	38.9	tenon length[longer wing 39.3mm]						40
18									
19	wj f2	239	GrenserH11 vrfd longer; dist top of wing to where tone hole enters bore [not at the center of the tone hole]						232
20	wj e	295							292
21	wj d	340	GrenserH11; Tone hole not exactly drilled into center of bore						335
22									
23	Bore dia. Bottom of wing joint	15.5	Need to Average, usally oval; Grenser11, slightly OOR						14.9
24	Bore dia. top of boot joint small side	16.6	GrenserH11 vrfd difference between bores						16.5
25	Bore dia. top of boot joint large side	24.8							24.9
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	86	dist from top of boot to where topmost tone hole enter bore [not at center of tone hole]						88
30	bj b	139							145
31	bj a	188							191
32									
33	bjstotal [Needed for both boot logics]	423	total length of boot, include socket, along the small bore side, meas. With boot cap on						424
34	bjltotal [Needed for both boot logics]	423	total length of boot, include socket, along large bore side						424
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									
38	boots [Needed for both boot logics]	384	hook length along s bore => bjs-septum length = boot - septum <= calc the septum						385
39	bootl [Needed for both boot logics]	384	hook length along l bore => bjl-septum length = boot - septum <= calc the septum						385
40									
41	boots bottom [Needed for both boot logics]	18	use hook, dist of bore [dist on stick plus 7mm, diff between hook and bot of stick] 11 + 7 = 18						24
42	bootl bottom [Needed for both boot logics]	18	use hook, dist of bore [same as boots bot except tenon depth will be different]						24
43									
44	extreme bore [Needed for logic 1 only]	42	Outside dia of plug [measured] = small bore dia + large bore dia + the septum width						41.4
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]						0
47	septum length calc - do not imput value	39	dist. From very bottom of boot to spetum [bjl - bootl]	do not imput value					39
48	septum length - do not imput value	39	if bj logic = 0 => septum = septum exp; if bj logic = 1 => septum = septum calc	do not imput value					39
49									
50	sbore dia sep* [Needed for both boot logics]	18.2	septum small bore dia [assume = lbore dia sep]						18.1
51	lbore dia sep* [Needed for both boot logics]	19.2	septum large bore dia [assume = sbore dia sep] [mesure if cork can be removed; for Logic 0]						18.9
52	sep width exp [Need for logic 0 only]	0	septum width; direct measurement if remove plug						0
53	sep width calc - do not imput value	4.6	septum width; calc. => extreme bore - sbore - lbore	do not imput value					4.4
54	sep width - do not imput value	4.6	if bj logic = 0 => sep width = sep width exp; if bj logic = 1 => sep width = sep width ca	do not imput value					4.4
55									
56	bj g	328	dist from top of boot (socket) to where G hole enters bore [not at cent of tone hole]						326
57	bj f1	115	dist from top of boot (socket) to where F1 hole enters bore [not at cent of tone hole]						122
58									
59									
60									
61									
62									
63	**IV. Tone Hole Diameters**								
64	f2	5.1							5.3
65	e	5.5							5.5
66	d	5.5							5.2
67									
68	c	7.2							6.6
69	b	7.2							6.7
70	a	6.1							5.5
71	g	9							9
72	f1	10							9.5
73			GrenserH11 vrfd;Tone holes on long joint small						
74	e1	12.8	GrenserH11 oblong 12.5 x 13.6; e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually greater]						11.3
75	d1	10.8	d1 tone hole dia, on long joint [need to average NS and EW dias, NS usually greater]						10.5
76	c1	13.5	GrenserH11 oblong 13.0 x 13.9, c1 tone hole dia, on long joint [need to average NS and EW dias, NS usually greater]						12.5
77									
78									
79									
80									
81									
82	**V. Tone Hole Depths**								
83	f2	21							25.1
84	e	25							30.5
85	d	31.5	GrenserH11; Tone hole not exactly drilled into center of bore						32.7
86									
87	c	23.5							24
88	b	26							25.3
89	a	32.5	GrenserH11; Tone hole drilled at extreme angle						26.7
90	g	16.5	meas along bot tone hole wall [north wall, toward reed,tone hole usually at angle]						17
91	f1	22.5	meas along east side tone hole wall [north wall, toward reed, T hole usually at angle]						24
92									
93	e1	9.4	e1 tone hole depth;meas east/west with deapth gauge [at center, or shortest dist]						8.4
94	d1	7.7	d1 tone hole depth; meas east/west with deapth gauge [at center, or shortest dist]						7
95	c1	6.9	c1 tone hole depth; meas east/west with deapth gauge [at center, or shortest dist]						6.8
96									
97									
98									
99									
100									
101	**VI. Long Joint**		GrenserH11 a table along long joint						
102	lg_length	607	total length of long joint						604
103	lg_tenon_bot	41.6	length bottom tenon on long joint [tenon going into boot joint]						42.3
104	lj_bot_bore	24.5	long joint bottom tenon bore diameter [tenon going into boot joint] Average out of round						23
105	lj_top_bore	32	long joint top tenon bore diameter [tenon going into bell]						30.7
106	lg_tenon_top	32.2	length top tenon on long joint [tenon going into bell]						30.6
107	e1_distance	55	dist long joint tenon to e1 [from bot of tenon to where tone hole enters bore]						52
108	d1_distance	261	dist long joint tenon to d1 [from bot of tenon to where tone hole enters bore]						252

	A	B	C	D	E	F	G	H	I
109	c1 distance	518	GrenserH11 vrfd; short; dist long joint tenon to c1 [from bot of tenon to where tone hole enters bore]						532
110									
111									
112									
113									
114									
115	**VII. Bore diameters at Tone Holes**								
116	f2	11.9							11.8
117	e	13							12.8
118	d	13.4							13.2
119									
120	c	16.9							16.7
121	b	17.5							17.3
122	a	17.6							17.4
123	g	20.1							20.1
124	f1	23.6							22.6
125									
126	e1	25.2	e1 tone hole bore diameter on long joint						24.2
127	d1	28.4	d1 tone hole bore diameter on long joint						27.8
128	c1	31.5	c1 tone hole bore diameter on long joint						30.9
129									
130									
131									
132									
133									
134	**VIII. Bell**		GrenserH11 There is a tone hole in the bell; GrenserH11, 4.5mm, 140mm from bell socket						
135	bell logic	0	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)	296	total length of bell [lines 141 + 144 = line 136]						296
137	bell_bot_bore (0, 1, 2)	31.8	GrenserH11 vrfd; dia bore at the bottom of bell [end with socket] OOR 33.2 x 33.5						32.2
138	bell_top_bore 0, (1, 0, 2)	32	GrenserH11 vrfd; dia bore at the top of bell [where low Bb exits]						33.5
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)	36	bell socket length						30.8
144	bell_expansion_length (only for logic 2)		distance of maxium expansion to top of bell [where Bb exits]						
145	belflg	44	Usually about 10mm more than line 138						40
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**								
155	title		Bassoon Calculation: GrenserH11-O-Leipzig1385-Wg1-WOB-DNM						
156									
157			Notes on long joint bore: GrenserH11 slightly OOR in places						
158			Notes on boot joint bore: GrenserH11 OOR in places but normal						
159	**XI. Bore Diameter Locations**		Notes on wing joint bore: GrenserH11 Normal						
160		21	Number of diameters						19
161	**Bell Bore**	9.1	Initial bore diameter [do not include in line 160 counting]						8.7
162	34.6mm dia. at socket	390	dist1; measured from the bottom of the wing joint- 10mm				1		377
163	34mm rod 50mm from socket	310	dist2; measured from the bottom of the wing joint- 11mm				1		320
164	33mm rod 70mm from socket	265	dist3; measured from the bottom of the wing joint- 12mm				1		265
165	32mm rod 110mm from socket	217	dist4; measured from the bottom of the wing joint- 13mm				1		200
166	31mm rod 140mm from socket	120	GrenserH11 vrfd; dist5; measured from the bottom of the wing joint- 14mm				1		125
167	30mm rod 170mm from socket	60	dist6; measured from the bottom of the wing joint- 15mm	Bottom wing jt	15.5		1		0
168	29mm rod 180mm from socket	0	dist7; measured from the top of the bootjoint - small bore side- 16mm	top boot small	16.6		2		0
169	28mm rod 230mm from socket	95	dist8; measured from the top of the bootjoint - small bore side- 17mm	top boot large	24.8		2		105
170	27mm rod 260mm from socket	270	GrenserH11; OOR 300 x 240; dist9; measured from the top of the bootjoint - small bore side- 18mm				2		345
171	26mm rod 290mm from socket	0	dist10; measured from the top of the bootjoint - large bore side- 19mm	sbore dia sep	18.2		3		370
172	25mm dia. at bell end	355	dist11; measured from the top of the bootjoint - large bore side- 20mm	lbore dia sep	19.2		3		343
173		285	dist12; measured from the top of the bootjoint - large bore side- 21mm	Hook Length	384		3		275
174		245	dist13; measured from the top of the bootjoint - large bore side- 22mm				3		225
175		160	GrenserH11 vrfd OOR; dist14; measured from the top of the bootjoint - large bore side- 23mm				3		90
176		101	dist15; measured from the top of the long joint- 24mm	lj_bot_bore	24.5		3		555
177		565	dist16; measured from the top of the long joint- 25mm				4		490
178		525	dist17; measured from the top of the long joint- 26mm				4		441
179		440	dist18; measured from the top of the long joint- 27mm;				4		395
180		370	dist19; measured from the top of the long joint- 28mm;				4		328
181		293	dist20; measured from the top of the long joint- 29mm				4		270
182		240	dist21; measured from the top of the long joint- 30mm				4		170
183		128	dist22; measured from the top of the long joint- 31mm;				4		0
184		60	dist23; measured from the top of the long joint- 32mm;	lj_top_bore	32		4		0