					_	_				
\vdash	A	В	C	D	Е	F	G	Н	I	J
	I. Bocal		Original bocal Ziegler2; bocal, probably not original		<u> </u>	1				Ziegler1
2	dia reed end		inside diameter of reed end of bocal			-	-			
	bocal string length (0, 1)		length of bocal inserted into receiver			-				
	metal bocal length top (0, 1) metal bocal length bot (0, 1)		meas. along top of bocal meas. along bottom of bocal			t -				
	dia wj end		inside diameter of bocal			L				
7	-									
8	bocal logic	2	if bocal logic = 0 => bocal is choke; if bocal logic = 1 =>choke in wing joint ca	lc; if bocal log	ic = 2	=> n	bocal			2
9										
10 11										
12										
	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 begin	ning of bore a	t botto	m 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	e as string len						25
	wing joint length	505	Ziegler2, reconstructed bocal reciever; total wing joint length, including tenon	and socket						500
	tenon length	39.5	tenon length[longer wing 39.3mm]		-	-				38.7
18	wj f2	240	dist tan of wing to whore tone halo enters have fact at the center of the tone h	olo1		-				222
20	wj e	240 299	dist top of wing to where tone hole enters bore [not at the center of the tone h	l l						233 297
	wj d	341								335
22										
23	Bore dia. Bottom of wing joint	15.5	Need to Average, usally oval; Ziegler2 yes							15.3
	Bore dia. top of boot joint small side	15.7								16
25 26	Bore dia. top of boot joint large side	23.6			-	-				24
	III. Boot Lengths									
28	bj logic	1	logic=> if bj logic = 0 => plug removed; if bj logic = 1 => plug cannot be rem	oved						1
29	bj c	104	dist from top of boot to where topmost tone hole enter bore [not at center of to		L	L				104
30	bj b	159								161
	bj a	203				\perp				205
32	historal (Mandad for both by 1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	43.4	total length of hoot, include as districted as a 100 miles		-	-	-			436
	bjstotal [Needed for both boot logics] bjltotal [Needed for both boot logics]	434 434	total length of boot, include socket, along the small bore side			1				436 436
	plug small [Need for logic 0 only]	0	total length of boot, include socket, along large bore side plug thickness, large bore side			t				0
36	plug large [Need for logic 0 only]	0	plug thickness, small bore side			L				0
37			Ziegler2; could remove small bore cork plug							
		389	hook length along s bore => bjs-septum length = boot - septum <= calc the s			1				387
39 40	bootl [Needed for both boot logics]	389	hook length along I bore => bjl-septum length = boot - septum <= calc the se	ptum		1		_		387
	boots bottom [Needed for both boot logics]	25	use hook, dist of bore [dist on stick plus 7mm, diff between hook and bot of sti	ck] 18,0 + 7	= 25	1				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]		Ľ					18.5
43										
	extreme bore [Needed for logic 1 only]	41	Outside dia of plug [measured] = small bore dia + large bore dia + the septur	n 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 be	orel						48
47	septum length calc - do not imput value	45	dist. From very bottom of boot to spetum [bjl - bootl]	do not imput	t value					49
48	septum length - do not imput value	45	if bj logic = 0 => septum = septum exp; if bj logic = 1 => septum = septum c							49
49										
50	sbore dia sep* [Needed for both boot logics]	18.4	septum small bore dia [assume = lbore dia sep]		22	1				18.3
	Ibore dia sep* [Needed for both boot logics]	18.8	septum large bore dia [assume = sbore dia sep] [mesure if cork can be remove septum width: direct measurement if remove plug	ea; for Logic (7]					18.7
	sep width exp [Need for logic 0 only] sep width calc - do not imput value	3.8	septum width; direct measurement if remove plug septum width; calc. => extreme bore - sbore - lbore	do not imput	t value		 			4.6
		3.8	if bj logic = 0 => sep width = sep width exp; if bj logic = 1 => sep width = sep							3
55										
	bj g	345	Ziegler2 there is an brass insert in G tone hole; dist from top of boot (socket) t		le enter	rs bor	e [not at	t cent of tone h	nole]	348
58	bj f1	132	dist from top of boot (socket) to where F1 hole enters bore [not at cent of tone	noie]	 		†			135
59										
60										
				1	1	<u> </u>	-			
61						1	i .	1		
62	IV. Tone Hole Diameters									
62	IV. Tone Hole Diameters	5.5								5.5
62 63 64 65		5.9								6
62 63 64 65 66			Ziegler2 drilled at extreme angle							
62 63 64 65 66		5.9 5	Ziegler2 drilled at extreme angle							6 5.7
62 63 64 65 66 67 68		5.9 5 8	Ziegler2 drilled at extreme angle							6 5.7 9
62 63 64 65 66 67 68		5.9 5 8 8.2	Ziegler2 drilled at extreme angle							6 5.7 9 8.8
62 63 64 65 66 67		5.9 5 8	Ziegler2 drilled at extreme angle							6 5.7 9
62 63 64 65 66 67 68 69	f2 e d c b a a	5.9 5 8 8.2 6.3	Ziegler2 drilled at extreme angle							6 5.7 9 8.8 6.5
62 63 64 65 66 67 68 69 70 71 72 73	f2 e d c b b a g	5.9 5 8 8.2 6.3 8.7 9.9	Ziegler2, long joint tone holes large	nteri						6 5.7 9 8.8 6.5 8.5
62 63 64 65 66 67 68 69 70 71 72 73	f2 e d d c c b a a q f1	5.9 5 8 8.2 6.3 8.7 9.9	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr	eater]						6 5.7 9 8.8 6.5 8.5 10
62 63 64 65 66 67 68 69 70 71 72 73 74 75	f2 e d d c c b a a q f1	5.9 5 8 8.2 6.3 8.7 9.9	Ziegler2, long joint tone holes large		ally gra	eater				6 5.7 9 8.8 6.5 8.5
62 63 64 65 66 67 68 69 70 71 72 73 74 75 76	f2 e d d d d d d d d d d d d d d d d d d	5.9 5 8 8.2 6.3 8.7 9.9 14.9 14.9	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint		ally gre	eater]				9 8.8 6.5 8.5 10 14.5 13.1
62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77	f2 e d d d d d d d d d d d d d d d d d d	5.9 5 8 8.2 6.3 8.7 9.9 14.9 14.9	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint		ially gre	eater)				9 8.8 6.5 8.5 10 14.5 13.1
62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78	f2 e d d d d d d d d d d d d d d d d d d	5.9 5 8 8.2 6.3 8.7 9.9 14.9 14.9	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint		ally gre	eater]				9 8.8 6.5 8.5 10 14.5 13.1
62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79	f2 e d d d d d d d d d d d d d d d d d d	5.9 5 8 8.2 6.3 8.7 9.9 14.9 14.9	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint		ally gre	eater]				9 8.8 6.5 8.5 10 14.5 13.1
62 63 64 65 66 67 70 71 72 73 74 75 76 77 78 80 81	f2 e d d d d d d d d d d d d d d d d d d	5.9 5 8 8.2 6.3 8.7 9.9 14.9 14.9	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint		ally gre	eater)				9 8.8 6.5 8.5 10 14.5 13.1
62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 80 81 82 83	f2 e d d c c b a a g f1 e1 dd c1 dd c1 dd c1 V. Tone Hole Depths	5.9 5 8 8.2 6.3 8.7 9.9 14.9 17.9	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint		ally gre	eater				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5
62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 80 81 82 83 84	f2 e d d c c b a a g f1 e1 dd c1 dd c1 dd c1 V. Tone Hole Depths	5.9 5 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint		ally gre	eater]				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5
62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 80 81 82 83 84 85	f2 e d d c c b a a g f1 e1 dd c1 dd c1 dd c1 V. Tone Hole Depths	5.9 5 8 8.2 6.3 8.7 9.9 14.9 17.9	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint		ally gre	eater)				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5
62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 80 81 82 83 84 85 86	f2 e d d c c b a a g f1 e1 dd c1 dd c1 dd c1 V. Tone Hole Depths	5.9 5 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint		ally gre	eater)				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5
62 63 64 65 66 67 70 71 72 73 74 75 76 77 78 80 81 82 83 84 85 86 87 88	f2 e d d c c b a a g f1 e1 dd c1 dd c1 dd c1 V. Tone Hole Depths	5.9 5 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint		ially gre	eater)				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5
62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 80 81 82 83 84 85 86 87 88 88 88 88 88	f2 e d d c c b a a g f1 e1 dd c1 dd c1 dd c1 V. Tone Hole Depths	5.9 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 26	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW	/ dias, NS usu	ally gre	eater)				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4
62 63 64 65 66 67 70 71 72 73 74 75 76 81 82 83 84 85 86 87 88 89 90	f2 e d d c b a g fi1 e1 di1 c1 V. Tone Hole Depths f2 e d d c	5.9 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 26.5	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW meas along bot tone hole wall [north wall, toward reed,tone hole usually at ang	/ dias, NS usu	ially gre	eater)				6 5.7 9 8.8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4 28
62 63 64 65 66 67 78 72 73 74 75 76 77 80 81 82 83 84 85 86 87 88 89 90 91	f2 e d d c b a g fi1 e1 di1 c1 V. Tone Hole Depths f2 e d d c	5.9 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 26	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW meas along bot tone hole wall [north wall, toward reed,tone hole usually at ang meas along east side tone hole wall [north wall, toward reed,tone hole usually at ang meas along east side tone hole wall [north wall, toward reed,tone hole usually at ang	/ dias, NS usu	lally gre	eater)				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4
62 63 64 65 66 67 70 71 72 73 74 75 76 77 80 81 82 83 84 85 86 87 99 90 91	f2 e d d c b a g fi1 e1 di1 c1 V. Tone Hole Depths f2 e d d c	5.9 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 26 15.3 21	Ziegler2, long joint tone holes large et tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW Ziegler2, long joint tone hole wall [north wall, toward reed,tone hole usually at ang meas along east side tone hole wall [north wall, toward reed,t hole usually at ang meas along east side tone hole wall [north wall, toward reed,t hole usually at ang meas along east side tone hole long in length	/ dias, NS usu	lally gre	eater)				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4 28 15 20
62 63 64 65 66 67 70 71 72 73 74 77 78 80 81 82 83 84 85 88 89 90 91 92 93 94	f2 e d d c b a g f1 e1 d1 c1 v. Tone Hole Depths f2 e d d c b a g f1 f1 e1 d d c1 e1 f2 e d d c1 f2 e e d d c	5.9 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 26.5	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW meas along bot tone hole wall [north wall, toward reed,tone hole usually at ang meas along east side tone hole wall [north wall, toward reed,tone hole usually at ang meas along east side tone hole wall [north wall, toward reed,tone hole usually at ang	/ dias, NS usu	ally gre	eater				6 5.7 9 8.8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4 28
62 63 64 65 66 68 69 70 71 72 73 74 75 76 77 80 81 82 83 84 85 86 87 99 90 91 92 93 94 95	f2 e d d c b a g f1 e1 d1 c1 v. Tone Hole Depths f2 e d d c b a g f1 f1 e1 d d c1 e1 f2 e d d c1 f2 e e d d c	5.9 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 26 15.3 21	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW meas along bot tone hole wall [north wall, toward reed,tone hole usually at an meas along east side tone hole wall [north wall, toward reed,t hole usually at a Ziegler2, long joint tone hole long in length e1 tone hole depth;meas east/west with deapth gauge [at center, or shortest of the content o	/ dias, NS usu	lally gre	eater				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4 28 15 20
62 63 64 65 66 67 70 71 72 73 74 75 76 77 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96	f2 e e d d c b a g f1 e1 dd1 c1 V. Tone Hole Depths f2 e d d c b a g f1 f1	5.9 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 26 15.3 21 9.7 10.5	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW meas along bot tone hole wall [north wall, toward reed,tone hole usually at an meas along east side tone hole wall [north wall, toward reed,tone hole usually at a Ziegler2, long joint tone hole long in length e1 tone hole depth; meas east/west with deapth gauge [at center, or shortest of d1 tone hole depth; meas east/west with deapth gauge	/ dias, NS usu	lally gre	eater)				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4 28 15 20
62 63 64 65 66 67 71 72 73 74 75 76 80 81 82 83 89 90 90 91 92 93 94 95 97	f2 e e d d c b a g f1 e1 dd1 c1 V. Tone Hole Depths f2 e d d c b a g f1 f1	5.9 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 26 15.3 21 9.7 10.5	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW meas along bot tone hole wall [north wall, toward reed,tone hole usually at an meas along east side tone hole wall [north wall, toward reed,tone hole usually at a Ziegler2, long joint tone hole long in length e1 tone hole depth; meas east/west with deapth gauge [at center, or shortest of d1 tone hole depth; meas east/west with deapth gauge	/ dias, NS usu	ally gre	eater)				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4 28 15 20
62 63 64 65 66 67 70 71 72 73 74 75 76 76 81 82 83 84 85 87 88 89 90 91 92 93 94 95 96 97 98	f2 e e d d c b a g f1 e1 dd1 c1 V. Tone Hole Depths f2 e d d c b a g f1 f1	5.9 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 26 15.3 21 9.7 10.5	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW meas along bot tone hole wall [north wall, toward reed,tone hole usually at an meas along east side tone hole wall [north wall, toward reed,tone hole usually at a Ziegler2, long joint tone hole long in length e1 tone hole depth; meas east/west with deapth gauge [at center, or shortest of d1 tone hole depth; meas east/west with deapth gauge	/ dias, NS usu	aally gree	eater]				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4 28 15 20
62 63 64 65 66 70 70 71 72 73 74 75 76 77 80 81 82 83 84 85 86 87 90 91 92 93 94 95 96 97 98 99	f2 e e d c b a g fi e1 di c1 v. Tone Hole Depths f2 e d d c b a g fi fi e1 di c1 c1 c1 c1 di c1 c1 c2 e d d c	5.9 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 26 15.3 21 9.7 10.5	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW meas along bot tone hole wall [north wall, toward reed,tone hole usually at an meas along east side tone hole wall [north wall, toward reed,tone hole usually at a Ziegler2, long joint tone hole long in length e1 tone hole depth; meas east/west with deapth gauge [at center, or shortest of d1 tone hole depth; meas east/west with deapth gauge	/ dias, NS usu	ially gre	eater				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4 28 15 20
62 63 64 65 66 70 71 72 73 74 75 76 81 82 83 84 85 86 99 91 91 92 93 94 95 96 97 98 99 99 100	f2 e d d c b a g f1 e1 dd1 c1 V. Tone Hole Depths f2 e d d c b a g f1 f1 VI. Long Joint	5.9 8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 15.3 21 9.7 10.5 11.3	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW meas along bot tone hole wall [north wall, toward reed,tone hole usually at an meas along east side tone hole wall [north wall, toward reed,tone hole usually at an Ziegler2, long joint tone hole long in length e1 tone hole depth; meas east/west with deapth gauge [at center, or shortest of I tone hole depth; meas east/west with deapth gauge [at center, or shortest There is a table along long joint: Ziegler2 yes	/ dias, NS usu	lally gre	eater)				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 22.7 27.4 28 15 20
62 63 64 65 66 67 70 71 72 73 74 75 76 77 78 80 81 82 83 84 85 86 87 90 91 92 93 94 95 96 97 98 99 90 91 90 91 91 91 91 91 91 91 91 91 91 91 91 91	f2 e d d c b a g f1 e1 d1 c1 v. Tone Hole Depths f2 e d d c b a g f1	5.9 5.9 5.8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 26 15.3 21 9.7 10.5 11.3	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; c1 tone hole dia, on long joint Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW meas along bot tone hole wall [north wall, toward reed,tone hole usually at any meas along east side tone hole wall [north wall, toward reed,t hole usually at a Ziegler2, long joint tone hole long in length e1 tone hole depth; meas east/west with deapth gauge [at center, or shortest of d1 tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with de	/ dias, NS usu	lally gre	eater				6 5.7 9 8.8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4 28 15 20
62 63 64 65 66 67 70 71 72 73 74 75 76 81 82 83 84 85 86 88 90 91 92 93 94 95 96 97 97 98 99 100 110 110 120 120 120 120 120 120 120	f2 e d d c b a g f1 e1 d1 c1 V. Tone Hole Depths f2 e d d C b b a g f1 f1 VI. Long Joint [g length]	5.9 5.9 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 26 15.3 21 9.7 10.5 11.3	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW meas along bot tone hole wall [north wall, toward reed,tone hole usually at ang meas along east side tone hole wall [north wall, toward reed,tone hole usually at ang meas along east side tone hole wall [north wall, toward reed,tone hole usually at ang meas along east side tone hole wall [north wall, toward reed,tone hole usually at ang ziegler2, long joint tone hole long in length e1 tone hole depth; meas east/west with deapth gauge [at center, or shortest d1 tone hole depth; meas east/west with deapth gauge [at center, or shortest c1 tone hole depth; meas east/west with deapth gauge [at center, or shortest There is a table along long joint: Ziegler2 yes total length of long joint length bottom tenon on long joint [tenon going into boot joint]	/ dias, NS usu	ally gre	eater				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4 28 15 20 10.8 9.8 11
62 63 64 65 66 67 70 71 73 74 75 76 80 81 82 83 84 85 89 90 90 101 102 103	f2 e d d c b a g f1 e1 d1 c1 v. Tone Hole Depths f2 e d d c b b a g f1 V. Tone Hole Depths f2 e d d v. Tone Hole Depths f2 e d d f1	5.9 5.9 5.8 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 26.5 26.5 26.5 26.5 26.5 27.5 28.7 29.9 21.1 21.1 22.3 27.2 27.2 28.7 29.9 20.9 2	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; c1 tone hole dia, on long joint Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW Ziegler2 long joint tone hole wall [north wall, toward reed, thole usually at an meas along east side tone hole wall [north wall, toward reed, thole usually at a Ziegler2, long joint tone hole long in length e1 tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with deapth gauge [at center, or shortest of tone hole depth; meas east/west with de	/ dias, NS usu	lally gree	eater)				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 27.4 28 15 20 10.8 9.8 9.8 11
62 63 64 65 66 67 70 71 72 73 74 75 76 77 78 80 81 82 83 88 89 90 91 92 93 94 95 96 99 100 101 102 103 104 105 105 105 105 105 105 105 105 105 105	f2 e d d c b a g f1 e1 d1 c1 V. Tone Hole Depths f2 e d d C b b a g f1 f1 VI. Long Joint [g length]	5.9 5.9 8.2 6.3 8.7 9.9 14.9 17.9 22.3 27.2 30.5 24 26.5 26 15.3 21 9.7 10.5 11.3	Ziegler2, long joint tone holes large e1 tone hole dia, on long joint [need to average NS and EW dias, NS usually gr Ziegler2 vrfd large; d1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW Ziegler2 vrfd large; c1 tone hole dia, on long joint [need to average NS and EW meas along bot tone hole wall [north wall, toward reed,tone hole usually at ang meas along east side tone hole wall [north wall, toward reed,tone hole usually at ang meas along east side tone hole wall [north wall, toward reed,tone hole usually at ang meas along east side tone hole wall [north wall, toward reed,tone hole usually at ang ziegler2, long joint tone hole long in length e1 tone hole depth; meas east/west with deapth gauge [at center, or shortest d1 tone hole depth; meas east/west with deapth gauge [at center, or shortest c1 tone hole depth; meas east/west with deapth gauge [at center, or shortest There is a table along long joint: Ziegler2 yes total length of long joint length bottom tenon on long joint [tenon going into boot joint]	/ dias, NS usu	lally gre	eater)				6 5.7 9 8.8 6.5 8.5 10 14.5 13.1 17.5 28 34.5 33.5 28.7 27.4 28 15 20 10.8 9.8 11

	A	В	ŗ	D	Е	Е	G	ш	T	1
107	e1 distance	49	dist long joint tenon to e1 [from bot of tenon to where tone hole enters bore]		-	_	٦	- ''		50
108	d1 distance	242	Ziegler1 a white insert in low d tone hole; dist long joint tenon to d1 [tone hole	enters bore1						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										
	VII. Bore diameters at Tone Holes									
116	f2	11.9								11.9
117	<u>e</u>	12.7								12.7
	d	13.4								13.3
119 120	_	16.0								17
121	c h	16.8 17.2								17.2
122	D	17.3								17.2
123	8	19.4								19
124	9 f1	22.2								22.2
125	11	22.2								22.2
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 bo	ore; if bell_lo	gic = 2 :	=> b	ell expans	sion		0
136	bell_length (0, 1, 2)	327	Ziegler2 vrfd 327; total length of bell [lines 141 + 144 = line 136]							225 33.1
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]				L			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 [w	here	low Bb e	xits]		36
	bell_center_bore (only for logic 2)		dia bore at max center of expansion	-						
	bell_wall (only for logic 2)		bell wall thickness, Just for David							\vdash
141	bell_bot_bore_expansion (only for logic 2)		dist of bottom to maxium of expansion [including bell socket length,if bell logic=	=U =>100]			-			
142	Outside diameter of wood at expansion	22.2	Just for David	-			-			22.2
143	bell_tenon (0, 1, 0, 2)	33.2	bell socket length			_				32.2
144	bell_expansion_length (only for logic 2)	92	distance of maxium expansion to top of bell [where Bb exits]	 						91
145	belfig	92	Usually about 10mm more than line 138				1			91
147										
	IX. PITCH									
	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
	Frequency adjust	1.05	frequency adjustment parameter							1.05
154	X. Title		Bassoon Calculation: Ziegler2-O-Leipzig1389-Wg1-WOB-DNM							
155	title									
156	<u> </u>									
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							
	XI. Bore Diameter Locations		Notes on wing joint bore: Ziegler2 good		\vdash					
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
163 164	33mm rod 150mm from bell	315	dist2; measured from the bottom of the wing joint- 11mm	 			1			325 280
165	32mm rod 210mm from bell 31mm rod 250mm from bell	255 183	dist3; measured from the bottom of the wing joint- 12mm dist4; measured from the bottom of the wing joint- 13mm	1			1			186
166	31mm rod 250mm from bell 36mm dia. at bell end	183	dist5; measured from the bottom of the wing joint- 13mm dist5; measured from the bottom of the wing joint- 14mm	 		-	1			126
167	John dia, at Dell Cliu	0	dist6; measured from the bottom of the wing joint- 14mm 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 sing	23.6		2			107
170		310	dist9; - small bore side- 18mm	. p 2 500 larg			2			320
171		387	dist10; measured from the top of the bootjoint - large bore side- 19mm	sbore dia se	18.4		3			377
172		325	dist11; measured from the top of the bootjoint - large bore side- 20mm	Ibore 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	<u> </u>	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;		25 -		4			0
184		0	dist23; measured from the top of the long joint- 32mm;	lj top bore	30.5		4			0