CALCULATION OF EFFECT OF KEY OPENINGS ON THE PITCH OF D1 ON AN ALTO SAX

Alto Sax D1 = Concert F3

Venting through low C tonehole 30 mm diameter

Formula: F = V/L Frequency = Velocity of sound (345 m/s)/Wavelength

Data taken from plotted graph p.65 AAWI Nederveen 1998

Calculated using Benade's equation computing the added length correction of a disk hanging h mm above a hole of diameter dH on p.64 AAWI

Wavelength = geometric length X 2

Key Opening (mm)	Key Opening % of Tonehole Diameter	(Delta ld x 2) Added Length Correction (cm)	Wavelength (cm)	Frequency (hz)	Difference (hz)	Cumulative Difference (hz)	(1 Hz = 10.2 C) Cumulative Diff. (cents)
> 10	>33%	0	174.61	197.6	-	0.00	0
10	33%	0.3	174.91	197.2	0.34	0.34	3.5
7	23%	0.6	175.51	196.6	0.67	1.01	10.3
5	17%	1	176.51	195.5	1.11	2.13	21.7
4	13%	1.2	177.71	194.1	1.32	3.45	35.2
3	10%	1.6	179.31	192.4	1.73	5.18	52.8
2	7%	2.4	181.71	189.9	2.54	7.72	78.7
1	3%	3.6	185.31	186.2	3.69	11.41	116.4

Since Benade's formula did not take into consideration the effect of frequency on the added length correction, if the results were graphed for the effects upon D2, the Delta ld would be multiplied by 4 and the wavelength by 2 giving an identical percentage change in pitch for the note an octave higher.