Eran's 29 tone Scale how to & fingering guide

***Introduction*:**
Playing in perfect pitch is a massive challenge of any instrumentalist in any piece. For me, as a saxophone player, it is now a question of proper preparatory work: I must be in good physical shape, being practiced specifically on the instrument I play in that concert, having a clear mind, having my instrument in top condition, a proper reed, and above all, to properly visualize in terms of dynamic, pitch, timbre and progression of each note before it actually happens.
Eran's 29 notes scale adds new challenges for the player: it asks to "break" the pre-set intonation of the saxophone, not only to smaller than semitones, but to make a "shift" of the fundamental tones.

Method:
to tackle this challenge, I started setting the grid of "tones" that emerge out of the 9/8 steps. This wasn't too hard to find, and I could shortly play a "true" Whole tone scale.

Alto saxophone - “circle” of 3/2 fifths

Fingering	“Greek” name	No. of 3/2 fifth	Eq. Name+ (diviation)	Hz
B+123456	D	1	D	350.8
125	G# Lema	2	A (+2)	526.2
12345+B	E	3	E (+4)	394.65
1	A# Lema	4	B (+6)	591.98
123 5 C#	F#	5	F# (+8)	443.98
(8) mid high	C Lema	6	C# (+10)	665.97
123G# Tf	G#	7	G# (+12)	499.48
C1 C4	D Apotome	8	D# (+14)	374.61
12 Ta G# / p / 1 5	A#	9	A# (+16)	561.91
1234Eb	E Apotome	10	F (+18)	421.44
2 ta	C	11	C (+20)	632.15
123 Tf “m.high	F# Apotome	12	G (+22)	474.11
C1 Tc G#	D Coma	13	D (+24)	711.17

After this short task, a few things became clear: first is that pitch correction with by ear is not an option, since it might work in the tonal systems which I am accustomed to, but this is a whole new beast which I genuinely do not know much about, the second thing is that as opposed to equal temperament, or other systems of tuning which make adjustments to be circular, this system does not "Like" corrections or "almost tuned" situations, meaning that to perform well - one has to really be totally accurate and study through all the note's duration; otherwise the effect is ruined or extended to many events instead of only one. Hence, finding a "proper fingering" can not be almost tuned or not responsive. If it is not a really good one - it will not work.

How to learn the 29 note scale?

1. Practice totally "flat" notes without any vibrato. A good app that I use almost daily is the "Tunable," which one can set to "advanced" and set the vibrato width on the minimum; if you can make the screen go totally green - you go it.
2. Find your own fingerings! My fingerings will be attached here, but they are "mine." other saxophone, mouthpiece, reed, or player - will need at least to adjust my fingerings.
3. Practice playing and singing the "new" intervals that are just beautiful! my experience is that it is a must to familiarize yourself with this unknown territory, at least up to the point the new intervals and fingering doesn't feel "strange" to you anymore.
4. Break some habits! To ask a perfect control over this system before playing the piece will be a wild exaggeration, but one must take into count that there are many things we do as habits of many years, other we worked pretty hard to acquire, but they will do us lousy service for this system and music. so if to speak shortly, take great care for throat auto-corrections and shaping of sound while playing.
5. Be patient! Finding proper fingerings took me about 20 hours of work for alto and then 20 hours more to the baritone, and still, each playing session reveals new corrections in fingering and throat position.
6. Some fingering uses the "shading technique," meaning that one covers partially open holes below the played note to lower the note. This technique is also known as "flatemant".
7. Some intervals are great fun to practice, regardless of "pinholes," and I suggest using Eran's app as an aid while practicing.
8. Good luck!

Suggested practice sessions	**Examples**		
whole tone by deviation from tone	D,E,F#,G#,A#,C,D…	D’,E’,F#’,G#’,A#’,C’, D’…	Dle,Ele,F#le, G#le,A#le,Cle…
chromatic scale and paterns	**D**,D’,Dle,Dap,’E,**E**,E’,Ele,Eap,’F#,**F#**,F#’,F#le,F#ap,’G#,**G#**,G#’,G#le,G#ap,’A#,**A#**,A#’,A#le,A#ap,’C,**C**,C’,Cle,Cap,D		
perfect fifths and forth	D-G#Le, E-A#le	D’-G#ap, F#’-Cap	D-F#le. G#-Cle
Pitagotian thirds	D-F#,	D’-F#’	Dle-F#le
Almost ferfect thirds m/M	D-Eap	D-‘f#	
Other nice intervals	D-‘G3 (near 7/5), D-A# (near 8/5), D-C (near 9/5), D-A#le/‘C		

calculation basis

Interval	**ratio**	**Cents**
Coma	1.01364326477051	23.46001
diesis	1.03931824834386	66.764985
lemma	1.05349794238683	90.224996
Apotoma	1.06787109375	113.685006
Coma to tone	1.10985791461329	180.449992
Tone	1.125	203.910002
Good calculator	http://www.sengpielaudio.com/calculator-centsratio.htm	

Calculation sheet for the saxophone

	Hz up to 0.00	Tone (equal) cent diviation	Pedal in Hz	New note Hz	Ratio from tonica	Ratio from ton	Cent diviation for tones	Cent diviatio from tonica	Cent diviation in ton
Fundamental	350.80								
D	350.80	0	350.8	350.8	1	1		1	
D'	355.59	0 (+23.4)	350.8	355.5860572814	1.01364326	1.01364326	0	23.46001	23.46001
D Lema	369.57	1/2 (-10)	350.8	369.5670781893	1.05349794	1.05349794	0	90.224996	90.224996
D Apotome	374.61	1/2 (+13)	350.8	374.6091796875	1.06787109	1.06787109	0	113.685006	113.685006
'E	389.34	1 (-19.6	350.8	389.3381564463	1.10985791	1.10985791	0	180.449992	180.449992
E	394.65	1 (+4)	350.8	394.65	1.125	1.125	0	203.910002	203.910002
E'	400.03	1 (27.4)	350.8	400.0343144168	1.14034867	1.01364326	203.910002	227.370012	23.46001
E Lema	415.76	1.5 (-6)	350.8	415.7629629629	1.18518518	1.05349794	203.910002	294.134998	90.224996
E Apotome	421.44	1.5 (+17)	350.8	421.4353271484	1.20135498	1.06787109	203.910002	317.595008	113.685006
'F#	438.01	2 (-15.6)	350.8	438.0054260021	1.24859015	1.10985791	203.910002	384.359994	180.449992
F#	443.98	2 (+8)	350.8	443.98125	1.265625	1.125	203.910002	407.820004	203.910002
F#'	450.04	2 (+30.4)	350.8	450.0386037468	1.28289225	1.01364326	407.820004	431.280014	23.46001
F# Lema	467.73	2.5 (-2)	350.8	467.7333333333	1.33333333	1.05349794	407.820004	498.045	90.224996
F# Apotome	474.11	2.5 (+21)	350.8	474.1147430419	1.35152435	1.06787109	407.820004	521.50501	113.685006
'G#	492.76	3 (-11.6)	350.8	492.7561042523	1.40466392	1.10985791	407.820004	588.269996	180.449992
G#	499.48	3 (+12)	350.8	499.47890625	1.42382812	1.125	407.820004	611.730006	203.910002
G#'	506.29	3 (+35.4)	350.8	506.2934292152	1.44325378	1.01364326	611.730006	635.190016	23.46001
G# Lema	526.20	3.5 (+2)	350.8	526.2	1.5	1.05349794	611.730006	701.955002	90.224996
G# Apotome	533.38	3.5 (25)	350.8	533.3790859222	1.52046489	1.06787109	611.730006	725.415012	113.685006
'A#	554.35	4 (-7.6)	350.8	554.3506172839	1.58024691	1.10985791	611.730006	792.179998	180.449992
A#	561.91	4 (+16)	350.8	561.9137695312	1.60180664	1.125	611.730006	815.640008	203.910002
A#'	569.58	4 (+30)	350.8	569.5801078671	1.62366051	1.01364326	815.640008	839.100018	23.46001
A# Lema	591.98	4.5 (+6)	350.8	591.975	1.6875	1.05349794	815.640008	905.865004	90.224996
A# Apotome	600.05	4.5 (30)	350.8	600.0514716625	1.71052300	1.06787109	815.640008	929.325014	113.685006
'C	623.64	5 (-3)	350.8	623.6444444444	1.77777777	1.10985791	815.640008	996.09	180.449992
C	632.15	5 (+20)	350.8	632.1529907226	1.80203247	1.125	815.640008	1019.55001	203.910002
C'	640.78	5 (+43)	350.8	640.7776213505	1.82661807	1.01364326	1019.55001	1043.01002	23.46001
C Lema	665.97	5.5 (+10)	350.8	665.971875	1.8984375	1.05349794	1019.55001	1109.77500	90.224996
C# Apotome	675.06	5.5 (+33)	350.8	675.0579056203	1.92433838	1.06787109	1019.55001	1133.23501	113.685006
D ('D)	701.60	6	350.8	701.5999999999	1.99999999	1.10985791	1019.55001	1200.00000	180.449992
D' (D)	711.17	6 (23.4)	350.8	711.1721145629	2.02728652	1.125	1019.55001	1223.46001	203.910002

Alto saxophone - low Bb-high D

D = 350.8 (D is derived from its equal position if A=442Hz)				
Note	**Possition**	**Low**	**mid**	**High**
G##	**4lima**		B+123456	1 D
G##'	**4lima'**	Lowest possible	125	2 G# Lema
'A#	**'5**	Bend with lips+ no teeth	12345+B	3 E
A#	**5**	141/5 - Bb	1	4 A# Lema
A#'	**5'**	Bend with lips+ no teeth	123 5 C#	5 F#
A##	**Lema**	148.5 Hz = B	(8) mid high	6 C Lema
A##'	**Apotome**	Bend with lips+ no teeth	123G# Tf	7 G#
'C	**6**	156.4 Hz = C	C1 C4	8 D Apotome
C	**6**	Bend with lips+ no teeth	12 Ta G# / p / 1 5	9 A#
C'	**6'**	Bend with lips+ no teeth	1234Eb	10 E Apotome
C#	**Lema**	165.8 Hz = C#	2 ta	11 C
C#'	**Apotome**	Bend with lips+ no teeth	123 Tf "m.high	12 F# Apotome
D	**Ocatva**	123456 (Fast air)	B+123456	C1 (4)
D'	**1'**	123456 C# (High)	123456 m.high	C1 Tc G#
#D	**Lema**	123456 Eb B	C4 1	C2
'#D	**Apotome**	123456 Eb C# (V.High)	C1 C4	C1C2 5 Ta
'E	**'2**	123457	C1C2C5	C1 C3
E	**2**	12345 C#	12345+B	C1C2C3
E'	**2'**	12345 Eb C# (High)	12345+Eb	C4 Tc
E#	**Lema**	12347 C# (m.low)	12346Eb	C3C4 Tc
E#'	**Apotome**	S.T. 1234567 Bb Tf	1234Eb	C1C2C3C4 / C1C5
'F#	**3**	123 567 Eb	123 567Eb	C4C5
F#	**3**	123567 tf (bit low0	123 5 C#	C3C4C5
F#'	**3'**	123 56 Eb Tf	123 56 TF	X2 G# Ta / p C5
F##	**Lema**	123	123 C m.low	XP G# Ta
F##'	**Apotome**	123 TF (fast Air)	123 Tf "m.high	X / 1
'G#	**4**	123 G# Tf	123 (G#)	245
G#	**4**	S.T. 124567 B	123G# Tf	245 C#
G#'	**4'**	S.T. 124567 C#	1245 m.low	24 C# / 134 Tc
G##	**Lema**	12	125 Tf	45 (nice under tone)
G##'	**Apotome**	123456 B Eb Ta	12G#	45 Eb
'A#	**'5**	15	1245TA (67)	234567 Bb C1
A#	**5**	134Ta	12 Ta G# / p / 1 5	Tc
A#'	**5'**	1456 Ta Eb	12456Eb Ta m.low C#	C1 46 Bb
A##	**Lema**	13G# Ta	1	C1 Tc Ta
A##'	**Apotome**	234567 Eb Bb	1ta	C2 3
'C	**6**	2	24567 m.low	C1C2 Tc
C	**6**	234567 Eb TC	2 ta	C1 C3 Ta
C'	**6'**	234567	2 456Eb ta high	C1C2C3
C#	**Lema**	C1 2345	(8) mid high	C2C3C4
C#'	**Apotome**	C1 234 Tc Ta	Tcta	C2C3C4 Tc
D	**Ocatva / '7**	C1C2 1p	C1 (4)	X4C5
			C1 Tc Ta high	

baritone Saxophone low Bb-high D

D = 175.4 (D is derived from its equal position if A=442Hz)				
Note	**Possition**	**Low**	**mid**	**High**
D	**Ocatva / ‘7**	D (low)	D + Bb	D + C
D’	**1’**	(S.T) D + C#	D (mid high)	D + ta
#D	**1 lema**	(S.t, N.T) D# + B	D# + C,C#	C2 2
’#D	**1 apotome**	D# (v. High)	C1,C2,C3 tc g#	T. C1 C2 Tc G#
‘E	**2**	E + C+B	C1,C2,C3,C4	C3 45
E	**2**	E	E (low)	C3 C1
E’	**2’**	E + C#,Eb	E + Eb (C#)	C1,C2,C3, TC
E#	**2 lema**	F + C,B	F + 6,Eb,C#	C4 C3
E#’	**2 apotome**	F + Eb,C# / F + C,B	F + Eb,C#	X2 456
‘F#	**3**	G + 567,Eb / F# + C	G + 56,Eb / F# + C	C5,C3
F#	**3**	F + Eb,Tf,(C#)	G + 5 C#	C1,C2,C3,C4,C5 / X2 G# C5
F#’	**3’**	123 5 Tf Eb	123 56 tf	12 C5 TA ?
F##	**3 lema**	G + C (Low/456)	G (Low/456)	C5+1(Low)
F##’	**3 apotome**	G TF,Eb,C	G (High)	1 C5 G# (M.High)
‘G#	**4**	123.189	G + (G#)	25 + (1)
G#	**4**	G# (High)/ (S.T) 124567Bb	G#	2 5
G#’	**4’**	12356(7) TF	12356 TF	12 C5 Ta
G##	**4 lema**	A	A	34
G##’	**4 apotome**	A + 4567 A (Low)	A + G#	3456
‘A#	**‘5**	1p 3 g# tf	1234 tf ta	23456 eb c1
A#	**5**	14567 ta	12 Ta	123456 Bb
A#’	**5’**	1456 TA + C/B	1456 Ta	123456
A##	**5 lema**	TC + Eb + 1234567	1 Ta	C1 C2 (T+-)
A##’	**5 apotome**	1G#,TF,Eb (V.High) / 234567A+Eb (ST+LOW)	1 Ta Eb	T. C1 C2
‘C	**6**	C + 4	12 4567 + Tc	3 C3 C1
C	**6**	2 TC	T. 2 TA	
C’	**6’**	2 Tc Ta G# (High)	2 G# Ta Eb	C3,C2,2
C#	**6 lema**	C1 12 G#	T.	C2,3,4
C#’	**6 apotome**	C1 234 / (+ seliva key=cool MP)	T. P(only) tc ta	C1.C2.C3.C4
D	**Ocatva / ‘7**			X Tc