

*Equal Beating  
Meantone  
Temperaments*

*Juhan Puhm*

# *Equal Beating Meantone Temperaments*

In this day and age our task is made incredibly easy with all the resources available to us. We can tune with electronic tuners, change tunings and pitches on the fly with our electronic instruments and practically any piece of information we desire is somewhere at our fingertips. It is difficult to imagine how composers and theorists of the past would even begin tuning somewhat fanciful scales and temperaments, let alone the laborious calculations required to figure out the pitches and so on or even working without a universal pitch reference like cents. We just plug everything into our computer or our now outdated hand held calculator!

It is conjectured that in the past, before the utility of counting beats became to be understood and standard, the practice of tuning similar intervals the same size, say major thirds or perfect fifths, was done by listening to when the similar intervals all sounded the same. In other words, when they beat at the same rate they were thought to be the same size. This of course is incorrect. The higher the same interval is pitched the faster it beats.

Nevertheless this idea of similar or equal beating intervals across the range of an octave can lead us on an interesting theoretical journey. Much time and effort has gone into this chapter and the related “Equal Beating Temperaments” chapter, many sections of which have not yielded anything much of use as we shall see below. Yet the theory is sound and the results which are workable are stunning.

When a single interval of a chord beats at the same rate, no matter the scale degree the chord is built upon in the octave, the connection and smoothness of a progression of one chord or interval to the next is quite amazing. It is as if the ear, due to the equal beating doesn't have to readjust with every new chord and the chords just flow into one another. Of course the proof is in the listening and not in these written words.

It is no easy task to generate the required pitches so that a particular interval beats at the same rate on every degree in the octave. With any open ended meantone temperament we can actually set any interval to vibrate at any rate we arbitrarily choose. That though is precisely the problem. What beat rate shall we choose? Somewhere down the road this freedom of beat rate can be utilized to become an interesting acoustic property utilized in a composition, especially if the beat rate is chosen to be extreme!

Two Meantone Temperaments, namely subsets of 31Et and 43Et (which are almost identical to 1/4 and 1/5 Syntonic Comma Meantone) eliminate the need to arbitrarily set a beat rate. Since they are both Equal Temperaments they both loop back around to where they began. There will be only one possible beat rate for each temperament that will complete the loop back to the beginning or starting note. Both these possible Meantones are however no longer “Equal”. The perfect fifths are no longer equal in each of these meantones but vary throughout on every single degree. They can be classified as “Unequal Meantone Temperaments”. It is possible as well in each of these two Unequal Meantone Temperaments to choose which interval is equal beating. While any interval may be chosen, we will generate Equal Beating intervals only on the perfect fifth, major and minor thirds. These new temperaments (classed under Unequal Meantone Temperaments) will be named either “31 or 43 Equal Beating Meantone Temperaments” with a further suffix of (P5), (+3) or (-3) to show which interval is equal beating. For example; “43EBMT(P5) Equal Beating Meantone Temperament” for short or for long.

## Preliminary Observations

### - **31EBMT(P5)**

Right from the beginning we can see how a huge amount of work gives very little beneficial results. “1/4 Syntonic Comma Equal Meantone Temperament” (EMT) and 31Et EMT due to their pure or almost pure major thirds are wonderfully pure meantone temperaments best for mainly triadic major and minor harmony. By setting all the perfect fifths to beat equally the smallest perfect fifth is now -7.102 flat from Just which is even more than the already very flat 31Et fifth of -5.1808 cents. As well a number of major thirds are tuned flat from Just which produces what is called “harmonic waste”. Major thirds should always be tempered sharp from Just. The smallest major third is -2.009 cents flat and the largest major third is 2.697 cents sharp from Just. We can see how equal beating intervals now produce a varying range of interval sizes. In 31Et EMT the major third is 0.7831 cents sharp from Just and of course pure in 1/4 Syntonic Comma EMT. None of this is bad except 1/4 Syntonic Comma / 31Et EMT are already unbalanced enough as it is without having further flattened perfect fifths and major thirds.

### - **31EBMT(+3)**

As the thirds in 31Et EMT are almost pure to start with (0.7831 cents sharp) and therefore have a very slow beat rate, when all the thirds are set to vibrate at one beat rate the difference between 31EBMT(+3) and 31Et EMT is almost negligible. These two temperaments are indistinguishable from one another. The smallest major third is 0.561 cents sharp and the largest major third is 1.073 cents sharp from Just. Not much has changed here from the 0.7831 cents sharp major third of 31Et EMT.

### - **31EBMT(-3)**

Things get much worse here with the smallest perfect fifth being a huge -10.349 cents flat from Just and the smallest major third -3.805 cents flat from Just. Everything is wildly uneven. If this temperament is to be usable at all, usable triads have to be carefully selected. Even so, the minor thirds flow beautifully from one to another. If we limit ourselves to mainly minor thirds we have an interesting experimental temperament. The smallest minor third is -4.372 cents flat from Just and the largest minor third is -8.166 cents flat from Just. This range is perfectly normal and workable. Everything else though varies wildly!

### - **43EBMT(P5)**

Things completely change here and this temperament is stunning. The chords flow ultra-smoothly from one to the other. 43Et and its 43Et EMT subset are already the best temperaments to work in and this temperament is even better. I would nominate 43EBT(P5) Equal Beating Temperament” and its equal beating meantone subset 43EBMT(P5) as two of the best temperaments possible out of all possible temperaments.

We will give here a quick overview of 31Et, 12Et and 43Et. In 31Et the major third is almost pure though the perfect fifths are quite flat. Along with 1/4 Syntonic Comma EMT this temperament is excellent for major and minor triadic harmony because of the purity of its harmony. However, anything more complex like diminished triads, dominant sevenths, augmented triads etc have a sourness or out of tuneness to them. This is unpleasantly noticeable when pieces written in later temperaments like Well or Equal Temperament (12Et) are adapted to be

played in 31Et or its meantone subset. This temperament is just not able to support complex harmony say from the late Romantic period, atonality or jazz. Atonal music played in 31Et doesn't sound atonal, it just sounds out of tune. This is substantiated by the simple observation that music written in the Renaissance is rarely more complex harmony or sonority wise than simple major and minor triads. The question why more complex harmonies weren't utilized in the Renaissance is simply answered. It is because they sounded sour and out of tune and were rejected. We find this same sour or out of tuneness in contemporary writing for 31Et that attempts to experiment with extended harmonic complexes. Finally, pitches in a meantone temperament are their exact note name. For example G# is a completely different pitch than Ab, hence the reason for split keys on harpsichords and early organs. Later, with Well and Equal Temperaments all enharmonic notes are tempered to a single pitch (as well negating the need to split keys any more).

At the other end of the spectrum, the perfect fifths of 12Et are excellent but the major and minor thirds are incredibly sharp and flat. All the dissonance that was hidden away in the wolf intervals of meantone temperaments is now evenly spread around the whole scale. Everything in 12Et is somewhat out of tune which allows us to play complex harmonies. The complex harmonies are now no more out of tune than the major and minor triads. We seem to think that in 12Et we can play everything that came before it but that isn't so. There is no satisfaction playing Renaissance music or music with very open thirds in 12Et. The sound is incredibly grating and non-harmonious replete with harmonic distortion.

Between the almost pure major thirds of 31Et and the excellent perfect fifths of 12Et lies 43Et. In 43Et the fifth is tempered flat by almost the same amount as the major third is tempered sharp (-4.28 / +4.38 cents). I can't overstate how excellent 43Et and its meantone subsets are. It is very harmonious like 31Et but at the same time can support complex harmony like 12Et. It is one of the best temperaments and the amazing smoothness of 43EBMT(P5) as mentioned above is even better!

In 43EBMT(P5) the fifths have a range of -3.089 to -5.887 cents flat. The major thirds have a range of 2.019 to 5.953 cents sharp. The minor thirds have the greatest range from -10.149 to -6.421. These are excellent values overall! One might think there is some semblance of key colouring here due to the different size of major thirds. Possibly so, but the key colouring of Well Temperament is more uniform and produced in a different way.

#### **- 43EBMT(+3)**

43EBMT(+3) is also a somewhat workable temperament but the values have a much greater variance: P5 = -9.342 to +0.937 cents, +3 = 3.163 to 6.019 cents, -3 = -13.173 to -3.863 cents. This is a usable temperament for equal beating major thirds though the exaggerated interval ranges can introduce some unevenness, especially with some of the very flat perfect fifths.

#### **- 43EBMT(-3)**

As with 31EBMT(-3) the extreme fluctuation of range and unevenness of this temperament make it better suited for experimental purposes revolving around the minor third interval which has a very usable range of -6.358 to -11.883 cents.

## *Compendium Musica*

So while a huge amount of time and energy have gone into the charts of this and the “Equal Beating Temperaments” chapter, only one temperament stands out as amazing. The mixed results of the other temperaments range from barely any difference from Equal Meantone Temperaments, to very wide interval ranges making the temperament suitable only for experimental purposes, for example with equal beating minor thirds. Even so, creating new temperaments based upon practical and acoustic foundations is a very interesting pursuit. There is a lot we can do mathematically but in order to be constructive and useful the basis of new temperaments should always be acoustic and listenable!

**31EBMT(P5) Equal Beating Meantone Temperament**

-Equal Beating Perfect Fifths and Fourths ( C 0 to Cb 29 )

P4 below P5 beats at the same rate as the P5  
P4 above P5 beats at twice the rate of the P5

<b>A 23 to E 10 =</b>	<b>1.49632245</b>	<b>697.705</b>	<b>Cents</b>	<b>0.007355</b>	<b>A - 415</b>	<b>3.052366</b>	<b>A - 440</b>	<b>3.236244</b>
<b>D 5 to A 23 Beat Rate:</b>				<b>0.007355</b>				

<b>3/2 =</b>	<b>701.955</b>	<b>Cents</b>
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Note	Ratios	Cents	+/- 3/2	+/- 12ET
B# 30	1.170043	271.874	701.955	-28.126
	1.495300	696.522	-5.433	
E# 12	0.782481	775.352		-24.648
	1.496483	697.891	-4.064	
A# 25	1.045759	77.461		-22.539
	1.494744	695.878	-6.077	
D# 7	0.699624	581.583		-18.417
	1.496068	697.411	-4.544	
G# 20	0.935284	1084.172		-15.828
	1.494125	695.161	-6.794	
C# 2	1.251949	389.011		-10.989
	1.495607	696.877	-5.078	
F# 15	0.837084	892.134		-7.866
	1.496712	698.156	-3.799	
B 28	1.118564	193.978		-6.022
	1.495085	696.272	-5.683	
E 10	1.496322	697.705		-2.295
	1.496322	697.705	-4.250	
A 23	1	0		0
	1.494504	695.600	-6.355	
D 5	0.669118	504.400		4.400
	1.495889	697.204	-4.751	
G 18	0.894609	1007.196		7.196
	1.493859	694.853	-7.102	
C 0	1.197716	312.343		12.343
	1.495408	696.647	-5.308	
F 13	0.800929	815.695		15.695
	1.496564	697.985	-3.970	
Bb 26	1.070357	117.710		17.710
	1.494864	696.017	-5.938	
Eb 8	1.432046	621.693		21.693
	1.496158	697.515	-4.440	
Ab 21	0.957149	1124.179		24.179
	1.494259	695.316	-6.639	
Db 3	0.640551	428.863		28.863
	1.495706	696.992	-4.963	
Gb 16	1.713040	931.870		31.870
	1.496787	698.242	-3.713	
Cb 29	1.144478	233.628		33.628
	1.495195	696.401	-5.554	
Fb 11	0.765437	737.227		37.227

Beat Rate	Perf. Fifth
0.007355	B# 30
0.007355	E# 12
0.007355	A# 25
0.007355	D# 7
0.007355	G# 20
0.007355	C# 2
0.007355	F# 15
0.007355	B 28
0.007355	E 10
0.007355	A 23
0.007355	D 5
0.007355	G 18
0.007355	C 0
0.007355	F 13
0.007355	Bb 26
0.007355	Eb 8
0.007355	Ab 21
0.007355	Gb 16
0.007355	Cb 29
0.007355	Fb 11

	Root	P5	Ratio	Cents	+/- 3/2	+3rd	Pitch
					701.955		
4/25 Syn. C.							
	Cb 29	Gb 16	1.496787	698.242	-3.713	Eb 8	1.432046
1/6 Hold. C.	B 28	F# 15	1.496712	698.156	-3.799	D# 7	1.399249
	Bb 26	F 13	1.496564	697.985	-3.970	D 5	1.338236
	A# 25	E# 12	1.496483	697.891	-4.064	----	----
43Et	A 23	E 10	1.496322	697.705	-4.250	C# 2	1.251949
1/5 Syn. C.	Ab 21	Eb 8	1.496158	697.515	-4.440	C 0	1.197716
	G# 20	D# 7	1.496068	697.411	-4.544	B# 30	1.170043
1/5 Dit. C.	G 18	D 5	1.495889	697.204	-4.751	B 28	1.118564
2/9 Syn. C.	Gb 16	Db 3	1.495706	696.992	-4.963	Bb 26	1.070357
	F# 15	C# 2	1.495607	696.877	-5.078	A# 25	1.045759
31Et	F 13	C 0	1.495408	696.647	-5.308	A 23	1
1/4 Syn. C.	E# 12	B# 30	1.495300	696.522	-5.433	----	----
	Fb 11	Cb 29	1.495195	696.401	-5.554	Ab 21	0.957149
	E 10	B 28	1.495085	696.272	-5.683	G# 20	0.935284
Eq. Hrm. 2	Eb 8	Bb 26	1.494864	696.017	-5.938	G 18	0.894609
Eq. Hrm. 1	D# 7	A# 25	1.494744	695.878	-6.077	----	----
5/17 Syn. C.	D 5	A 23	1.494504	695.600	-6.355	F# 15	0.837084
	Db 3	Ab 21	1.494259	695.316	-6.639	F 13	0.800929
	C# 2	G# 20	1.494125	695.161	-6.794	E# 12	0.782481
	C 0	G 18	1.493859	694.853	-7.102	E 10	0.748161
1/3 Syn. C.	Average:		+ 1.495482	696.733	-5.2223		
			* 1.495482	696.732	-5.2226		
31ET EMT			1.495518	696.774	-5.1808		

<b>+3rd Ratio</b>	<b>Cents</b>	<b>+/- 5/4</b>	<b>Beat Rate</b>	<b>A - 415</b>	<b>A - 440</b>
Root to +3rd		386.314	Root to +3rd		
1.251266	<b>388.066</b>	1.752	0.005794	<b>2.404</b>	<b>2.549</b>
1.250933	<b>387.605</b>	1.292	0.004174	<b>1.732</b>	<b>1.837</b>
1.250271	<b>386.689</b>	0.376	0.001161	<b>0.482</b>	<b>0.511</b>
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1.251949	<b>389.011</b>	2.697	0.007796	<b>3.236</b>	<b>3.430</b>
1.251337	<b>388.164</b>	1.851	0.005118	<b>2.124</b>	<b>2.252</b>
1.251003	<b>387.702</b>	1.388	0.003752	<b>1.557</b>	<b>1.651</b>
1.250338	<b>386.782</b>	0.468	0.001210	<b>0.502</b>	<b>0.533</b>
1.249658	<b>385.840</b>	-0.473	-0.001171	<b>-0.486</b>	<b>-0.515</b>
1.249287	<b>385.327</b>	-0.987	-0.002386	<b>-0.990</b>	<b>-1.050</b>
1.248550	<b>384.305</b>	-2.009	-0.004645	<b>-1.928</b>	<b>-2.044</b>
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1.250461	<b>386.952</b>	0.638	0.001411	<b>0.585</b>	<b>0.621</b>
1.250111	<b>386.467</b>	0.153	0.000331	<b>0.137</b>	<b>0.146</b>
1.249414	<b>385.502</b>	-0.811	-0.001678	<b>-0.696</b>	<b>-0.738</b>
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1.251026	<b>387.734</b>	1.421	0.002747	<b>1.140</b>	<b>1.209</b>
1.250375	<b>386.833</b>	0.519	0.000960	<b>0.399</b>	<b>0.423</b>
1.250020	<b>386.341</b>	0.027	0.000049	<b>0.021</b>	<b>0.022</b>
1.249313	<b>385.362</b>	-0.951	-0.001645	<b>-0.683</b>	<b>-0.724</b>
1.250312	<b>386.746</b>	0.4327	0.001352	<b>0.561</b>	<b>0.595</b>
1.250312	<b>386.746</b>	0.4323			
<b>1.250566</b>	<b>387.097</b>	<b>0.7831</b>			

<b>-3rd Ratio</b>	<b>Cents</b>	<b>+/- 6/5</b>	<b>Beat Rate</b>	<b>A - 415</b>	<b>A - 440</b>
+3rd to P5		315.641	+3rd to P5		
1.196218	<b>310.177</b>	-5.465	0.027078	<b>11.237</b>	<b>11.914</b>
1.196477	<b>310.551</b>	-5.090	0.024649	<b>10.229</b>	<b>10.845</b>
1.196992	<b>311.296</b>	-4.346	0.020129	<b>8.354</b>	<b>8.857</b>
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1.195194	<b>308.694</b>	-6.947	0.030082	<b>12.484</b>	<b>13.236</b>
1.195648	<b>309.351</b>	-6.291	0.026065	<b>10.817</b>	<b>11.469</b>
1.195895	<b>309.709</b>	-5.932	0.024015	<b>9.966</b>	<b>10.567</b>
1.196388	<b>310.422</b>	-5.219	0.020203	<b>8.384</b>	<b>8.889</b>
1.196892	<b>311.152</b>	-4.489	0.016631	<b>6.902</b>	<b>7.318</b>
1.197168	<b>311.550</b>	-4.091	0.014809	<b>6.146</b>	<b>6.516</b>
1.197716	<b>312.343</b>	-3.298	0.011421	<b>4.740</b>	<b>5.025</b>
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1.195716	<b>309.449</b>	-6.192	0.020504	<b>8.509</b>	<b>9.022</b>
1.195962	<b>309.806</b>	-5.836	0.018884	<b>7.837</b>	<b>8.309</b>
1.196452	<b>310.515</b>	-5.127	0.015871	<b>6.587</b>	<b>6.983</b>
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1.194623	<b>307.866</b>	-7.775	0.022507	<b>9.340</b>	<b>9.903</b>
1.195049	<b>308.483</b>	-7.158	0.019828	<b>8.229</b>	<b>8.725</b>
1.195281	<b>308.820</b>	-6.821	0.018462	<b>7.662</b>	<b>8.123</b>
1.195744	<b>309.490</b>	-6.151	0.015921	<b>6.607</b>	<b>7.005</b>
1.196083	<b>309.981</b>	-5.6601	0.020415	<b>8.472</b>	<b>8.983</b>
1.196083	<b>309.981</b>	-5.6605			
<b>1.195873</b>	<b>309.677</b>	<b>-5.9639</b>			

<b>Harm. 7th</b>	<b>Pitch</b>
(x6th)	
<b>A 23</b>	<b>2</b>
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<b>G# 20</b>	<b>1.870569</b>
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<b>F# 15</b>	<b>1.674169</b>
----	----
<b>E# 12</b>	<b>1.564961</b>
<b>E 10</b>	<b>1.496322</b>
----	----
<b>D# 7</b>	<b>1.399249</b>
----	----
<b>D 5</b>	<b>1.338236</b>
----	----
<b>C# 2</b>	<b>1.251949</b>
----	----
<b>B# 30</b>	<b>1.170043</b>
<b>B 28</b>	<b>1.118564</b>
----	----
<b>A# 25</b>	<b>1.045759</b>

<b>H.7th Ratio</b>	<b>Cents</b>	<b>+/- 7/4</b>
Root to x6th		968.826
1.747521	<b>966.372</b>	-2.454
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1.747612	<b>966.462</b>	-2.364
----	----	----
----	----	----
1.749120	<b>967.955</b>	-0.870
----	----	----
1.749323	<b>968.156</b>	-0.669
1.746979	<b>965.835</b>	-2.991
----	----	----
1.747032	<b>965.888</b>	-2.938
----	----	----
1.748330	<b>967.173</b>	-1.653
----	----	----
1.748476	<b>967.318</b>	-1.508
----	----	----
1.748635	<b>967.475</b>	-1.351
1.746253	<b>965.115</b>	-3.711
----	----	----
1.746256	<b>965.118</b>	-3.708
1.747776	<b>966.625</b>	-2.2013
1.747776	<b>966.624</b>	-2.2016
<b>1.748905</b>	<b>967.742</b>	<b>-1.0840</b>

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<b>Bbb 24</b>	1.496405 1.023034	697.801	-4.154	39.426	0.007355	<b>Bbb 24</b>
<b>Ebb 6</b>	1.494627 1.368949	695.743	-6.212	543.683	0.007355	<b>Ebb 6</b>
<b>Abb 19</b>	1.495981 0.915085	697.310	-4.645	1046.372	0.007355	<b>Abb 19</b>
<b>Dbb 1</b>	1.493996 0.612508	695.011	-6.944	351.361	0.007355	<b>Dbb 1</b>
<b>Gbb 14</b>	1.225016 1.638258	696.766	-5.189	854.595	0.007355	<b>Gbb 14</b>
<b>Cbb 27</b>	1.495510 1.094624	698.073	-3.882	156.522	0.007355	<b>Cbb 27</b>
<b>Fbb Dx 9</b>	1.496640 0.732201	696.148	-5.807	660.374	0.007355	<b>Fbb Dx 9</b>
<b>Bbbb Gx 22</b>	1.494977 1.464402	697.613	-4.342	1162.761	0.007355	<b>Bbbb Gx 22</b>
<b>Cx 4</b>	1.496242 1.309863	695.462	-6.493	467.299	0.007355	<b>Cx 4</b>
<b>Fx 17</b>	1.494385 0.875694	697.101	-4.854	970.198	0.007355	<b>Fx 17</b>
<b>B# 30</b>	1.751387 1.496857	698.324	-3.631	271.874	0.007355	<b>B# 30</b>
	1.170043			-28.126		

(foldout)



+/- 3/2	701.955		+/- 5/4	+/- 6/5
			386.314	315.641
		<b>E 10</b>		
			-0.951	
	-4.250	<b>C 0</b>		
				-3.298
	-5.308	<b>A 23</b>		
			-2.009	
	-6.355	<b>F 13</b>		
				-4.346
	-3.970	<b>D 5</b>		
			0.376	
	-4.751	<b>Bb 26</b>		
				-5.127
	-5.938	<b>G 18</b>		
			-0.811	
	-7.102	<b>Eb 8</b>		
				-6.291
	-4.440	<b>C 0</b>		
			1.851	
	-5.308	<b>Ab 21</b>		
				-7.158
	-6.639	<b>F 13</b>		
			0.519	
	-3.970	<b>Db 3</b>		
				-4.489
	-4.963	<b>Bb 26</b>		
			-0.473	
	-5.938	<b>Gb 16</b>		
				-5.465
	-3.713	<b>Eb 8</b>		
			1.752	
	-4.440	<b>Cb 29</b>		
				-6.192
	-5.554	<b>Ab 21</b>		
			0.638	
	-6.639	<b>Fb 11</b>		
				-7.277
		<b>Db 3</b>		

(foldout)

+/- 3/2	701.955		+/- 5/4	+/- 6/5
			386.314	315.641
		<b>D# 7</b>		
				-5.932
	-4.544	<b>B# 30</b>		
				1.388
	-5.433	<b>G# 20</b>		
				-6.821
	-6.794	<b>E# 12</b>		
			0.027	
	-4.064	<b>C# 2</b>		
				-4.091
	-5.078	<b>A# 25</b>		
			-0.987	
	-6.077	<b>F# 15</b>		
				-5.090
	-3.799	<b>D# 7</b>		
			1.292	
	-4.544	<b>B 28</b>		
				-5.836
	-5.683	<b>G# 20</b>		
			0.153	
	-6.794	<b>E 10</b>		
				-6.947
	-4.250	<b>C# 2</b>		
			2.697	
	-5.078	<b>A 23</b>		
				-7.775
	-6.355	<b>F# 15</b>		
			1.421	
	-3.799	<b>D 5</b>		
				-5.219
	-4.751	<b>B 28</b>		
			0.468	
	-5.683	<b>G 18</b>		
				-6.151
	-7.102	<b>E 10</b>		
			-0.951	
		<b>C 0</b>		



Ratio	Cents	+/- 3/2	+3rd	Pitch	+3rd Ratio	Cents	+/- 5/4	Beat Rate	-3rd Ratio	Cents	+/- 6/5	Beat Rate	A - 415	A - 440	Harm. 7th	Pitch	H.7th Ratio	Cents	+/- 7/4
		701.955			Root to +3rd		386.314	Root to +3rd	+3rd to P5		315.641	+3rd to P5			(x6th)		Root to x6th		968.826
1.495228	696.438	-5.517	<b>Eb 8</b>	1.430155	1.250405	386.875	0.561	0.001854	1.195795	309.564	-6.078	0.030072	12.480	13.232	<b>A 23</b>	2	1.748629	967.470	-1.356
1.495344	696.573	-5.382	<b>D# 7</b>	1.398403	1.250415	386.888	0.574	0.001854	1.195879	309.685	-5.956	0.028817	11.959	12.679	----	----	----	----	----
1.495584	696.850	-5.105	<b>D 5</b>	1.337114	1.250434	386.914	0.600	0.001854	1.196052	309.936	-5.705	0.026394	10.953	11.613	<b>G# 20</b>	1.870881	1.749597	968.428	-0.398
1.495707	696.993	-4.962	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.495963	697.289	-4.666	<b>C# 2</b>	1.250464	1.250464	386.956	0.642	0.001854	1.196327	310.333	-5.308	0.022968	9.532	10.106	----	----	----	----	----
1.495271	696.488	-5.467	<b>C 0</b>	1.196028	1.250485	386.985	0.671	0.001854	1.195753	309.503	-6.138	0.025397	10.540	11.175	<b>F# 15</b>	1.672320	1.748462	967.304	-1.522
1.494914	696.075	-5.880	<b>B# 30</b>	1.169764	1.250496	387.000	0.686	0.001854	1.195457	309.075	-6.566	0.026569	11.026	11.691	----	----	----	----	----
1.495135	696.331	-5.624	<b>B 28</b>	1.118351	1.250518	387.032	0.718	0.001854	1.195612	309.299	-6.342	0.024537	10.183	10.796	<b>E# 12</b>	1.564007	1.748841	967.679	-1.147
1.495365	696.597	-5.358	<b>Bb 26</b>	1.069321	1.250542	387.064	0.751	0.001854	1.195773	309.533	-6.109	0.022598	9.378	9.943	<b>E 10</b>	1.495963	1.749489	968.320	-0.506
1.495483	696.734	-5.221	<b>A# 25</b>	1.045664	1.250554	387.081	0.768	0.001854	1.195856	309.653	-5.988	0.021664	8.991	9.532	----	----	----	----	----
1.495729	697.018	-4.937	<b>A 23</b>	1	1.250580	387.116	0.802	0.001854	1.196028	309.902	-5.739	0.019858	8.241	8.737	<b>D# 7</b>	1.398403	1.748814	967.652	-1.174
1.495855	697.165	-4.790	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.495511	696.766	-5.189	<b>Ab 21</b>	0.956452	1.250606	387.153	0.839	0.001854	1.195829	309.613	-6.028	0.019947	8.278	8.777	<b>D 5</b>	1.337114	1.748340	967.183	-1.643
1.495159	696.359	-5.596	<b>G# 20</b>	0.935440	1.250620	387.172	0.858	0.001854	1.195535	309.187	-6.454	0.020885	8.667	9.189	----	----	----	----	----
1.495392	696.628	-5.327	<b>G 18</b>	0.894310	1.250648	387.211	0.898	0.001854	1.195693	309.417	-6.225	0.019259	7.992	8.474	<b>C# 2</b>	1.250464	1.748711	967.550	-1.276
1.495511	696.767	-5.188	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.495758	697.053	-4.902	<b>F# 15</b>	0.836160	1.250693	387.274	0.960	0.001854	1.195943	309.779	-5.863	0.016960	7.039	7.463	<b>B# 30</b>	1.169764	1.749684	968.514	-0.312
1.496016	697.351	-4.604	<b>F 13</b>	0.799629	1.250725	387.318	1.004	0.001854	1.196119	310.033	-5.608	0.015516	6.439	6.827	<b>B 28</b>	1.118351	1.749248	968.082	-0.744
1.496150	697.505	-4.450	<b>E# 12</b>	0.782003	1.250741	387.340	1.027	0.001854	1.196210	310.165	-5.476	0.014818	6.150	6.520	----	----	----	----	----
1.495467	696.715	-5.240	<b>E 10</b>	0.747981	1.250775	387.387	1.073	0.001854	1.195632	309.328	-6.314	0.016337	6.780	7.188	<b>A# 25</b>	1.045664	1.748560	967.401	-1.425
1.495527	696.785	-5.1701			1.250571	387.104	0.7902	0.001854	1.195853	309.647	-5.9938	0.021917	9.096	9.644			1.748943	967.780	-1.0456
1.495527	696.785	-5.1702			1.250571	387.104	0.7902		1.195853	309.647	-5.9939						1.748943	967.780	-1.0457
1.495518	696.774	-5.1808			1.250566	387.097	0.7831		1.195873	309.677	-5.9639						1.748905	967.742	-1.0840
	<b>A - 415</b>	<b>A - 440</b>																	
0.007593	3.151	3.341																	

1/4 Syn. C.

31Et



$\pm 3/2$	701.955	$\pm 5/4$	$\pm 6/5$
		386.314	315.641
		<b>E 10</b>	
		1.073	
-4.666		<b>C 0</b>	-5.739
-4.937		<b>A 23</b>	
		0.802	
-4.902		<b>F 13</b>	
			-5.705
-5.105		<b>D 5</b>	
		0.600	
-5.624		<b>Bb 26</b>	
			-6.225
-5.327		<b>G 18</b>	
		0.898	
-5.240		<b>Eb 8</b>	
			-6.138
-5.467		<b>C 0</b>	
		0.671	
-4.937		<b>Ab 21</b>	
			-5.608
-4.604		<b>F 13</b>	
		1.004	
-5.105		<b>Db 3</b>	
			-6.109
-5.358		<b>Bb 26</b>	
		0.751	
-5.327		<b>Gb 16</b>	
			-6.078
-5.517		<b>Eb 8</b>	
		0.561	
-5.467		<b>Cb 29</b>	
			-6.028
-5.189		<b>Ab 21</b>	
		0.839	
-4.604		<b>Fb 11</b>	
			-5.443
		<b>Db 3</b>	

(foldout)

$\pm 3/2$	701.955	$\pm 5/4$	$\pm 6/5$
		386.314	315.641
		<b>D# 7</b>	
			-6.566
-5.880		<b>B# 30</b>	
		0.686	
-4.790		<b>G# 20</b>	
			-5.476
-4.450		<b>E# 12</b>	
		1.027	
-4.962		<b>C# 2</b>	
			-5.988
-5.221		<b>A# 25</b>	
		0.768	
-5.188		<b>F# 15</b>	
			-5.956
-5.382		<b>D# 7</b>	
		0.574	
-5.880		<b>B 28</b>	
			-6.454
-5.596		<b>G# 20</b>	
		0.858	
-4.450		<b>E 10</b>	
			-5.308
-4.666		<b>C# 2</b>	
		0.642	
-5.221		<b>A 23</b>	
			-5.863
-4.902		<b>F# 15</b>	
		0.960	
-5.382		<b>D 5</b>	
			-6.342
-5.624		<b>B 28</b>	
		0.718	
-5.596		<b>G 18</b>	
			-6.314
-5.240		<b>E 10</b>	
		1.073	
		<b>C 0</b>	

**31EBMT(-3) Equal Beating Meantone Temperament**

-Equal Beating -3rds and +6ths ( C 0 to Cb 29 )

+6th above -3rd beats at the same rate as the -3rd  
 +6th below -3rd beats at half the rate of the -3rd

<b>A 23 to C 0 =</b>	<b>1.19662154</b>	<b>310.760</b>	<b>Cents</b>	<b>0.016892</b>	<b>7.010296</b>	<b>7.432603</b>	<b>6/5 =</b>	<b>315.64129</b>	<b>Cents</b>
	<b>F# 15 to A 23 Beat Rate:</b>		<b>0.016892</b>						

Note	Ratios	Ratios	Ratios
Fb 11		0.762951	
Cb 29		1.194710 307.992 0.016892	1.142016
Gb 16	0.854135		1.196460 310.527 0.016892
Db 3	1.195272 308.807 0.016892	0.638608	1.277216
Ab 21			1.196834 311.068 0.016892
Eb 8	0.714594		1.195768 309.524 0.016892
Bb 26	1.194353 307.476 0.016892	1.067162	
F 13			1.196213 310.169 0.016892
C 0	1.196622	0.598311	1.194942 308.329 0.016892
G 18	1.196622 310.760 0.016892	0.892117	1.195473 309.097 0.016892
D 5			0.668005
A 23	1		1.196973 311.269 0.016892
E 10	1.195960 309.802 0.016892	0.746246	1.196379 310.409 0.016892
B 28			1.194592 307.821 0.016892
F# 15	0.836149		1.196379 310.409 0.016892
C# 2	1.195171 308.660 0.016892	1.249375	0.624687
G# 20			1.196764 310.966 0.016892
D# 7	0.699606	1.399212	1.195670 309.383 0.016892
A# 25	1.197110 311.466 0.016892	1.043961	0.780271
E# 12			1.196129 310.048 0.016892
B# 30	1.168825		1.194827

Cents	+/- 4/3	+/- 12ET
731.596	498.045	31.596
501.697	3.652	
229.899		29.899
502.856	4.811	
927.043		27.043
503.440	5.395	
423.604		23.604
504.232	6.187	
1119.372		19.372
501.136	3.091	
618.236		18.236
505.700	7.655	
112.536		12.536
502.688	4.643	
809.847		9.847
499.087	1.042	
310.760		10.760
508.394	10.349	
1002.366		2.366
500.849	2.804	
501.518	3.473	1.518
0		0
506.731	8.686	
693.269		-6.731
503.020	4.975	
190.249		-9.751
500.051	2.006	
890.198		-9.802
504.750	6.705	
385.448		-14.552
505.608	7.563	
1079.840		-20.160
498.303	0.258	
581.537		-18.463
507.056	9.011	
74.482		-25.518
504.025	5.980	
770.457		-29.543
500.385	2.340	
270.071		-29.929

Beat Rate	A - 415	A - 440
Perf. Fifth		
0.004823	2.001	2.122
0.009507	3.945	4.183
0.007972	3.308	3.508
0.006834	2.836	3.007
0.005107	2.120	2.247
0.009459	3.925	4.162
0.008575	3.559	3.773
0.001441	0.598	0.634
0.010698	4.440	4.707
0.004331	1.797	1.906
0.004016	1.667	1.767
0.015014	6.231	6.606
0.006424	2.666	2.827
0.003878	1.609	1.706
0.009696	4.024	4.266
0.008169	3.390	3.594
0.000416	0.173	0.183
0.010895	4.522	4.794
0.010800	4.482	4.752
0.003162	1.312	1.391

Root	P5	Ratio	Cents	
Cb 29	Gb 16	1.495838	697.144	
B 28	F# 15	1.498263	699.949	
Bb 26	F 13	1.495982	697.312	
A# 25	E# 12	1.494828	695.975	
A 23	E 10	1.492493	693.269	
Ab 21	Eb 8	1.497325	698.864	
G# 20	D# 7	1.499777	701.697	
G 18	D 5	1.497573	699.151	
Gb 16	Db 3	1.495333	696.560	
F# 15	C# 2	1.494202	695.250	
F 13	C 0	1.499098	700.913	
E# 12	B# 30	1.497974	699.615	
Fb 11	Cb 29	1.496839	698.303	
E 10	B 28	1.495696	696.980	
Eb 8	Bb 26	1.493382	694.300	
D# 7	A# 25	1.492213	692.944	
D 5	A 23	1.496994	698.482	
Db 3	Ab 21	1.494649	695.768	
C# 2	G# 20	1.493462	694.392	
C 0	G 18	1.491060	691.606	
Average:	+	1.495649	696.926	
		*	1.495647	696.924
31ET EMT		1.495518	696.774	
Average P5			A - 415	
Beat Rate		0.007061	2.930	

<b>+/- 3/2</b>	<b>-3rd</b>	<b>Pitch</b>	<b>-3rd Ratio</b>	<b>Cents</b>	<b>+/- 6/5</b>	<b>Beat Rate</b>	<b>+3rd Ratio</b>	<b>Cents</b>	<b>+/- 5/4</b>	<b>Beat Rate</b>	<b>A - 415</b>	<b>A - 440</b>	<b>Harm. 7th</b>	<b>Pitch</b>	<b>H.7th Ratio</b>	<b>Cents</b>	<b>+/- 7/4</b>
701.955			Root to -3rd		315.641	Root to -3rd	-3rd to P5		386.314	-3rd to P5			(x6th)		Root to x6th		968.826
-4.811	----	----	----	----	----	----	----	----	----	----	----	----	<b>A 23</b>	<b>2</b>	1.751290	<b>970.101</b>	1.275
-2.006	<b>D 5</b>	<b>1.336011</b>	1.196973	<b>311.269</b>	-4.372	0.016892	1.251710	<b>388.680</b>	2.366	0.009136	<b>3.791</b>	<b>4.020</b>	----	----	----	----	----
-4.643	<b>Db 3</b>	<b>1.277216</b>	1.196834	<b>311.068</b>	-4.573	0.016892	1.249949	<b>386.244</b>	-0.070	-0.000258	<b>-0.107</b>	<b>-0.114</b>	<b>G# 20</b>	<b>1.865893</b>	1.748463	<b>967.304</b>	-1.522
-5.980	<b>C# 2</b>	<b>1.249375</b>	1.196764	<b>310.966</b>	-4.675	0.016892	1.249058	<b>385.009</b>	-1.305	-0.004707	<b>-1.953</b>	<b>-2.071</b>	----	----	----	----	----
-8.686	<b>C 0</b>	<b>1.196622</b>	1.196622	<b>310.760</b>	-4.881	0.016892	1.247256	<b>382.509</b>	-3.805	-0.013136	<b>-5.451</b>	<b>-5.780</b>	----	----	----	----	----
-3.091	<b>Cb 29</b>	<b>1.142016</b>	1.196460	<b>310.527</b>	-5.114	0.016892	1.251462	<b>388.337</b>	2.023	0.006678	<b>2.771</b>	<b>2.938</b>	<b>F# 15</b>	<b>1.672297</b>	1.752023	<b>970.826</b>	2.000
-0.258	<b>B 28</b>	<b>1.116158</b>	1.196379	<b>310.409</b>	-5.232	0.016892	1.253597	<b>391.288</b>	4.975	0.016059	<b>6.665</b>	<b>7.066</b>	----	----	----	----	----
-2.804	<b>Bb 26</b>	<b>1.067162</b>	1.196213	<b>310.169</b>	-5.472	0.016892	1.251928	<b>388.982</b>	2.668	0.008231	<b>3.416</b>	<b>3.622</b>	<b>E# 12</b>	<b>1.560542</b>	1.749256	<b>968.090</b>	-0.736
-5.395	----	----	----	----	----	----	----	----	----	----	----	----	<b>E 10</b>	<b>1.492493</b>	1.747374	<b>966.226</b>	-2.600
-6.705	<b>A 23</b>	<b>1</b>	1.195960	<b>309.802</b>	-5.839	0.016892	1.249375	<b>385.448</b>	-0.866	-0.002500	<b>-1.038</b>	<b>-1.100</b>	----	----	----	----	----
-1.042	<b>Ab 21</b>	<b>0.954495</b>	1.195768	<b>309.524</b>	-6.117	0.016892	1.253670	<b>391.389</b>	5.075	0.014011	<b>5.815</b>	<b>6.165</b>	<b>D# 7</b>	<b>1.399212</b>	1.752898	<b>971.690</b>	2.864
-2.340	<b>G# 20</b>	<b>0.932947</b>	1.195670	<b>309.383</b>	-6.258	0.016892	1.252832	<b>390.231</b>	3.917	0.010567	<b>4.385</b>	<b>4.650</b>	----	----	----	----	----
-3.652	----	----	----	----	----	----	----	----	----	----	----	----	<b>D 5</b>	<b>1.336011</b>	1.751109	<b>969.922</b>	1.096
-4.975	<b>G 18</b>	<b>0.892117</b>	1.195473	<b>309.097</b>	-6.544	0.016892	1.251133	<b>387.882</b>	1.569	0.004044	<b>1.678</b>	<b>1.779</b>	----	----	----	----	----
-7.655	<b>Gb 16</b>	<b>0.854135</b>	1.195272	<b>308.807</b>	-6.834	0.016892	1.249407	<b>385.493</b>	-0.821	-0.002025	<b>-0.840</b>	<b>-0.891</b>	<b>C# 2</b>	<b>1.249375</b>	1.748369	<b>967.212</b>	-1.614
-9.011	<b>F# 15</b>	<b>0.836149</b>	1.195171	<b>308.660</b>	-6.981	0.016892	1.248535	<b>384.284</b>	-2.030	-0.004899	<b>-2.033</b>	<b>-2.155</b>	----	----	----	----	----
-3.473	<b>F 13</b>	<b>0.798228</b>	1.194942	<b>308.329</b>	-7.312	0.016892	1.252775	<b>390.153</b>	3.839	0.008860	<b>3.677</b>	<b>3.899</b>	<b>B# 30</b>	<b>1.168825</b>	1.749724	<b>968.553</b>	-0.273
-6.187	<b>Fb 11</b>	<b>0.762951</b>	1.194710	<b>307.992</b>	-7.649	0.016892	1.251056	<b>387.776</b>	1.462	0.003223	<b>1.338</b>	<b>1.418</b>	<b>B 28</b>	<b>1.116158</b>	1.747797	<b>966.645</b>	-2.181
-7.563	<b>E 10</b>	<b>0.746246</b>	1.194592	<b>307.821</b>	-7.820	0.016892	1.250186	<b>386.571</b>	0.257	0.000554	<b>0.230</b>	<b>0.244</b>	----	----	----	----	----
-10.349	<b>Eb 8</b>	<b>0.714594</b>	1.194353	<b>307.476</b>	-8.166	0.016892	1.248425	<b>384.130</b>	-2.183	-0.004503	<b>-1.869</b>	<b>-1.981</b>	<b>A# 25</b>	<b>1.043961</b>	1.744848	<b>963.721</b>	-5.105
-5.0291			1.195774	<b>309.533</b>	-6.1078	0.016892	1.250727	<b>387.320</b>	1.0061	0.002902	<b>1.204</b>	<b>1.277</b>			1.749377	<b>968.210</b>	-0.6162
-5.0312			1.195774	<b>309.533</b>	-6.1082		1.250725	<b>387.318</b>	1.0043						1.749376	<b>968.208</b>	-0.6176
-5.1808			<b>1.195873</b>	<b>309.677</b>	<b>-5.9639</b>		<b>1.250566</b>	<b>387.097</b>	<b>0.7831</b>						<b>1.748905</b>	<b>967.742</b>	<b>-1.0840</b>
<b>A - 440</b>																	
<b>3.107</b>																	

<b>Fx 17</b>	1.196541 <b>310.644</b> 0.016892	<b>0.872783</b>			<b>308.161</b> 0.016892	505.637 <b>964.434</b>	7.592			0.015344 <b>6.368</b> <b>6.751</b>			<b>Fx 17</b>
<b>Cx 4</b>	0.016892	1.195373 <b>308.953</b> 0.016892		<b>1.306082</b>	<b>0.653041</b>	502.139 <b>462.295</b>	4.094		<b>-35.566</b> <b>-37.705</b>	0.006184 <b>2.566</b> <b>2.721</b>			<b>Cx 4</b>
<b>Bbbb Gx 22</b>	<b>0.976836</b>	0.016892		1.196904 <b>311.169</b> 0.016892		502.868 <b>1159.427</b>	4.823		<b>-40.573</b>	0.005451 <b>2.262</b> <b>2.398</b>			<b>Bbbb Gx 22</b>
<b>Fbb Dx 9</b>	1.195864 <b>309.664</b> 0.016892	<b>0.730135</b>		0.016892		503.946 <b>655.481</b>	5.901		<b>-44.519</b>	0.009971 <b>4.138</b> <b>4.387</b>			<b>Fbb Dx 9</b>
<b>Cbb 27</b>		1.194473 <b>307.649</b> 0.016892		<b>1.091217</b>		504.355 <b>151.126</b>	6.310		<b>-48.874</b>	0.007969 <b>3.307</b> <b>3.506</b>			<b>Cbb 27</b>
<b>Gbb 14</b>	<b>0.816846</b>	0.016892		1.196296 <b>310.290</b> 0.016892		501.364 <b>849.763</b>	3.319		<b>49.763</b>	0.006269 <b>2.602</b> <b>2.758</b>			<b>Gbb 14</b>
<b>Dbb 1</b>	1.195057 <b>308.496</b> 0.016892	<b>0.611261</b>	<b>1.222522</b>	0.016892		501.931 <b>347.832</b>	3.886		<b>47.832</b>	0.005494 <b>2.280</b> <b>2.417</b>			<b>Dbb 1</b>
<b>Abb 19</b>			1.196693 <b>310.864</b> 0.016892	<b>0.912163</b>		506.995 <b>1040.837</b>	8.950		<b>40.837</b>	0.009456 <b>3.924</b> <b>4.161</b>			<b>Abb 19</b>
<b>Ebb 6</b>	<b>1.367040</b> <b>0.683520</b>		0.016892	1.195572 <b>309.241</b> 0.016892		499.570 <b>541.267</b>	1.525		<b>41.267</b>	0.002409 <b>1.000</b> <b>1.060</b>			<b>Ebb 6</b>
<b>Bbb 24</b>	1.197042 <b>311.368</b> 0.016892		<b>1.021583</b>	0.016892		504.298 <b>36.968</b>	6.253		<b>36.968</b>	0.007394 <b>3.068</b> <b>3.253</b>			<b>Bbb 24</b>
<b>Fb 11</b>	0.016892		1.196045 <b>309.925</b> 0.016892	<b>0.762951</b>		505.373 <b>731.596</b>	7.328		<b>31.596</b>	0.012945 <b>5.372</b> <b>5.696</b>			<b>Fb 11</b>
<b>Cb 29</b>	<b>1.142016</b>												<b>Cb 29</b>
<b>Gb 16</b>			<b>0.854135</b>										<b>Gb 16</b>

(foldout)



+/- 3/2	701.955		+/- 5/4	+/- 6/5
			386.314	315.641
		<b>E 10</b>		
	-8.686	<b>C 0</b>	-3.805	
				-4.881
-1.042		<b>A 23</b>		
	-3.473	<b>F 13</b>	3.839	
				-7.312
-4.643		<b>D 5</b>		
	-2.804	<b>Bb 26</b>	2.668	
				-5.472
-7.655		<b>G 18</b>		
	-10.349	<b>Eb 8</b>	-2.183	
				-8.166
-3.091		<b>C 0</b>		
	-1.042		5.075	
		<b>Ab 21</b>		-6.117
-6.187		<b>F 13</b>		
	-4.643	<b>Db 3</b>	-0.070	
				-4.573
-5.395		<b>Bb 26</b>		
	-7.655	<b>Gb 16</b>	-0.821	
				-6.834
-4.811		<b>Eb 8</b>		
	-3.091	<b>Cb 29</b>	2.023	
				-5.114
-3.652		<b>Ab 21</b>		
	-6.187	<b>Fb 11</b>	1.462	
				-7.649
		<b>Db 3</b>		

(foldout)

+/- 3/2	701.955		+/- 5/4	+/- 6/5
			386.314	315.641
		<b>D# 7</b>		
	-0.258	<b>B# 30</b>		-4.175
			3.917	
	-2.340	<b>G# 20</b>		
				-6.258
-7.563		<b>E# 12</b>		
			-1.305	
	-5.980	<b>C# 2</b>		
				-4.675
-6.705		<b>A# 25</b>		
			-2.030	
	-9.011	<b>F# 15</b>		
				-6.981
-2.006		<b>D# 7</b>		
			4.975	
	-0.258	<b>B 28</b>		-5.232
-4.975		<b>G# 20</b>		
			0.257	
	-7.563	<b>E 10</b>		-7.820
-8.686		<b>C# 2</b>		
			-0.866	
	-6.705	<b>A 23</b>		-5.839
-3.473		<b>F# 15</b>		
			2.366	
	-2.006	<b>D 5</b>		-4.372
-2.804		<b>B 28</b>		
			1.569	
	-4.975	<b>G 18</b>		-6.544
-10.349		<b>E 10</b>		
			-3.805	
		<b>C 0</b>		

**43EBMT(P5) Equal Beating Meantone Temperament**

-Equal Beating Perfect Fifths and Fourths ( C 0 to Cb 40 )

<b>A 32 to E 14</b> =	1.49695604	698.438	Cents	0.006088	<b>A - 415</b>	2.526487	<b>A - 440</b>	2.678685
<b>D 7 to A 32 Beat Rate:</b>				0.006088				

P4 below P5 beats at the same rate as the P5  
 P4 above P5 beats at twice the rate of the P5

<b>3/2 =</b>	<b>701.955</b>	<b>Cents</b>
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Note	Ratios	Cents	+/- 3/2	+/- 12ET
B# 42	1.175438	279.838	701.955	-20.162
E# 17	1.496126	697.478	-4.477	-17.640
A# 35	1.571309	782.360	698.604	-3.351
D# 10	1.497100	83.756	696.941	-5.014
G# 28	1.049569	586.815	698.204	-3.751
C# 3	1.495662	1088.610	696.344	-5.611
F# 21	0.701742	392.266	697.759	-4.196
B 39	1.403484	894.508	698.814	-3.141
E 14	1.496754	195.693	697.255	-4.700
A 32	0.937685	698.438	698.438	-3.517
D 7	1.495146	0	696.693	-5.262
G 25	0.627153	503.307	698.019	-3.936
C 0	1.254305	1005.288	696.068	-5.887
F 18	1.496369	309.220	697.553	-4.402
Bb 36	0.838233	811.667	698.661	-3.294
Eb 11	1.676466	113.007	697.025	-4.930
Ab 29	1.497281	615.982	698.267	-3.688
Db 4	1.119673	1117.715	696.437	-5.518
Gb 22	1.495933	421.277	697.828	-4.127
Cb 40	1.496956	923.449	698.866	-3.089
Fb 15	0.748478	224.582	697.333	-4.622
	1	727.250		27.250

Beat Rate	Perf. Fifth
0.006088	B# 42
0.006088	E# 17
0.006088	A# 35
0.006088	D# 10
0.006088	G# 28
0.006088	C# 3
0.006088	F# 21
0.006088	B 39
0.006088	E 14
0.006088	A 32
0.006088	D 7
0.006088	G 25
0.006088	C 0
0.006088	F 18
0.006088	Bb 36
0.006088	Eb 11
0.006088	Ab 29
0.006088	Db 4
0.006088	Gb 22
0.006088	Cb 40
0.006088	Fb 15

Root	P5	Ratio	Cents	+/- 3/2	+3rd	Pitch
				701.955		
12Et						
	Cb 40	Gb 22	1.497326	698.866	-3.089	Eb 11 1.427329
	B 39	F# 21	1.497281	698.814	-3.141	D# 10 1.403484
	Bb 36	F 18	1.497148	698.661	-3.294	D 7 1.337392
	A# 35	E# 17	1.497100	698.604	-3.351	----
4/25 Syn. C.						
	A 32	E 14	1.496956	698.438	-3.517	C# 3 1.254305
	Ab 29	Eb 11	1.496808	698.267	-3.688	C 0 1.195557
1/6 Hold. C.						
	G# 28	D# 10	1.496754	698.204	-3.751	B# 42 1.175438
	G 25	D 7	1.496594	698.019	-3.936	B 39 1.119673
	Gb 22	Db 4	1.496429	697.828	-4.127	Bb 36 1.067453
	F# 21	C# 3	1.496369	697.759	-4.196	A# 35 1.049569
43Et						
1/5 Syn. C.						
	F 18	C 0	1.496191	697.553	-4.402	A 32 1
	E# 17	B# 42	1.496126	697.478	-4.477	----
	Fb 15	Cb 40	1.496000	697.333	-4.622	Ab 29 0.953582
1/5 Dit. C.						
	E 14	B 39	1.495933	697.255	-4.700	G# 28 0.937685
2/9 Syn. C.						
	Eb 11	Bb 36	1.495735	697.025	-4.930	G 25 0.893624
	D# 10	A# 35	1.495662	696.941	-5.014	----
31Et						
1/4 Syn. C.						
	D 7	A 32	1.495448	696.693	-5.262	F# 21 0.838233
	Db 4	Ab 29	1.495227	696.437	-5.518	F 18 0.799068
	C# 3	G# 28	1.495146	696.344	-5.611	E# 17 0.785655
	C 0	G 25	1.494908	696.068	-5.887	E 14 0.748478
Eq. Hrm. 2						
	Average:	+	1.496257	697.630	-4.3254	
		*	1.496257	697.629	-4.3256	
	43ET EMT		1.496296	697.674	-4.2806	

+3rd Ratio	Cents	+/- 5/4	Beat Rate	A - 415	A - 440
Root to +3rd		386.314	Root to +3rd		
1.253677	<b>391.399</b>	5.085	0.016746	<b>6.950</b>	<b>7.368</b>
1.253476	<b>391.122</b>	4.808	0.015569	<b>6.461</b>	<b>6.850</b>
1.252882	<b>390.300</b>	3.987	0.012305	<b>5.107</b>	<b>5.414</b>
----	----	----	----	----	----
1.254305	<b>392.266</b>	5.953	0.017221	<b>7.147</b>	<b>7.577</b>
1.253754	<b>391.506</b>	5.192	0.014320	<b>5.943</b>	<b>6.301</b>
1.253553	<b>391.228</b>	4.914	0.013326	<b>5.530</b>	<b>5.864</b>
1.252957	<b>390.405</b>	4.091	0.010571	<b>4.387</b>	<b>4.651</b>
1.252345	<b>389.558</b>	3.244	0.007994	<b>3.317</b>	<b>3.517</b>
1.252121	<b>389.248</b>	2.935	0.007111	<b>2.951</b>	<b>3.129</b>
1.251459	<b>388.333</b>	2.019	0.004662	<b>1.935</b>	<b>2.051</b>
----	----	----	----	----	----
1.253001	<b>390.465</b>	4.151	0.009135	<b>3.791</b>	<b>4.019</b>
1.252789	<b>390.172</b>	3.858	0.008350	<b>3.465</b>	<b>3.674</b>
1.252163	<b>389.307</b>	2.993	0.006174	<b>2.562</b>	<b>2.717</b>
----	----	----	----	----	----
1.253533	<b>391.200</b>	4.887	0.009451	<b>3.922</b>	<b>4.158</b>
1.252947	<b>390.390</b>	4.077	0.007517	<b>3.120</b>	<b>3.308</b>
1.252733	<b>390.094</b>	3.780	0.006855	<b>2.845</b>	<b>3.016</b>
1.252099	<b>389.218</b>	2.904	0.005018	<b>2.083</b>	<b>2.208</b>
1.252929	<b>390.366</b>	4.0519	0.010137	<b>4.207</b>	<b>4.460</b>
1.252929	<b>390.365</b>	4.0516			
<b>1.253169</b>	<b>390.698</b>	<b>4.3840</b>			

-3rd Ratio	Cents	+/- 6/5	Beat Rate	A - 415	A - 440
+3rd to P5		315.641	+3rd to P5		
1.194348	<b>307.467</b>	-8.174	0.040339	<b>16.741</b>	<b>17.749</b>
1.194503	<b>307.693</b>	-7.948	0.038573	<b>16.008</b>	<b>16.972</b>
1.194964	<b>308.360</b>	-7.281	0.033677	<b>13.976</b>	<b>14.818</b>
----	----	----	----	----	----
1.193454	<b>306.172</b>	-9.469	0.041051	<b>17.036</b>	<b>18.063</b>
1.193861	<b>306.761</b>	-8.880	0.036700	<b>15.230</b>	<b>16.148</b>
1.194009	<b>306.977</b>	-8.665	0.035209	<b>14.612</b>	<b>15.492</b>
1.194449	<b>307.614</b>	-8.027	0.031077	<b>12.897</b>	<b>13.674</b>
1.194902	<b>308.270</b>	-7.371	0.027211	<b>11.292</b>	<b>11.973</b>
1.195067	<b>308.510</b>	-7.131	0.025886	<b>10.743</b>	<b>11.390</b>
1.195557	<b>309.220</b>	-6.421	0.022213	<b>9.218</b>	<b>9.774</b>
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1.193934	<b>306.868</b>	-8.774	0.028922	<b>12.003</b>	<b>12.726</b>
1.194082	<b>307.083</b>	-8.559	0.027745	<b>11.514</b>	<b>12.208</b>
1.194521	<b>307.719</b>	-7.923	0.024481	<b>10.160</b>	<b>10.772</b>
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1.192986	<b>305.492</b>	-10.149	0.029397	<b>12.200</b>	<b>12.935</b>
1.193368	<b>306.047</b>	-9.594	0.026496	<b>10.996</b>	<b>11.658</b>
1.193508	<b>306.250</b>	-9.391	0.025502	<b>10.583</b>	<b>11.221</b>
1.193922	<b>306.850</b>	-8.791	0.022747	<b>9.440</b>	<b>10.009</b>
1.194202	<b>307.256</b>	-8.3849	0.030425	<b>12.626</b>	<b>13.387</b>
1.194202	<b>307.256</b>	-8.3852			
<b>1.194009</b>	<b>306.977</b>	<b>-8.6645</b>			

Harm. 7th	Pitch
(x6th)	
<b>A 32</b>	<b>2</b>
----	----
<b>G# 28</b>	<b>1.875370</b>
----	----
<b>F# 21</b>	<b>1.676466</b>
----	----
<b>E# 17</b>	<b>1.571309</b>
<b>E 14</b>	<b>1.496956</b>
----	----
<b>D# 10</b>	<b>1.403484</b>
----	----
<b>D 7</b>	<b>1.337392</b>
----	----
<b>C# 3</b>	<b>1.254305</b>
----	----
<b>B# 42</b>	<b>1.175438</b>
<b>B 39</b>	<b>1.119673</b>
----	----
<b>A# 35</b>	<b>1.049569</b>

H.7th Ratio	Cents	+/- 7/4
Root to x6th		968.826
1.756676	<b>975.418</b>	6.592
----	----	----
1.756865	<b>975.604</b>	6.778
----	----	----
1.758072	<b>976.793</b>	7.967
----	----	----
1.758356	<b>977.072</b>	8.246
1.756241	<b>974.989</b>	6.163
----	----	----
1.756401	<b>975.147</b>	6.321
----	----	----
1.757325	<b>976.057</b>	7.231
----	----	----
1.757556	<b>976.285</b>	7.459
----	----	----
1.757806	<b>976.531</b>	7.705
1.755660	<b>974.416</b>	5.590
----	----	----
1.755781	<b>974.536</b>	5.710
1.756976	<b>975.714</b>	6.877
1.756976	<b>975.713</b>	6.874
<b>1.758022</b>	<b>976.744</b>	<b>7.9183</b>

		1.497006	698.496	-3.459		0.006088	
<b>Bbb 33</b>		<b>1.016747</b>	<b>28.754</b>		<b>28.754</b>		<b>Bbb 33</b>
		1.495523	696.780	-5.175		0.006088	
<b>Ebb 8</b>	<b>1.359722</b>	<b>0.679861</b>	<b>531.974</b>		<b>31.974</b>		<b>Ebb 8</b>
	1.496650		698.084	-3.871		0.006088	
<b>Abb 26</b>	<b>0.908511</b>		<b>1033.890</b>		<b>33.890</b>		<b>Abb 26</b>
	1.494991		696.164	-5.791		0.006088	
<b>Dbb 1</b>	<b>0.607703</b>	<b>1.215406</b>	<b>337.726</b>		<b>37.726</b>		<b>Dbb 1</b>
		1.496253	697.625	-4.330		0.006088	
<b>Gbb 19</b>	<b>1.624600</b>	<b>0.812300</b>	<b>840.101</b>		<b>40.101</b>		<b>Gbb 19</b>
	1.497195		698.714	-3.241		0.006088	
<b>Cbb 37</b>	<b>1.085096</b>		<b>141.387</b>		<b>41.387</b>		<b>Cbb 37</b>
	1.495804		697.105	-4.850		0.006088	
<b>Fbb 12</b>	<b>0.725427</b>	<b>1.450853</b>	<b>644.282</b>		<b>44.282</b>		<b>Fbb 12</b>
		1.496860	698.327	-3.628		0.006088	
<b>Bbbb 30</b>		<b>0.969265</b>	<b>1145.955</b>		<b>45.955</b>		<b>Bbbb 30</b>
		1.495304	696.527	-5.428		0.006088	
<b>Db↑ 5</b>	<b>1.296412</b>	<b>0.648206</b>	<b>449.429</b>		<b>49.429</b>		<b>Db↑ 5</b>
	1.496486		697.895	-4.060		0.006088	
<b>Gb↑ 23</b>	<b>0.866304</b>	<b>1.732608</b>	<b>951.534</b>		<b>-48.466</b>		<b>Gb↑ 23</b>
		1.497369	698.916	-3.039		0.006088	
<b>Cb↑ 41</b>		<b>1.157101</b>	<b>252.618</b>		<b>-47.382</b>		<b>Cb↑ 41</b>
		1.496064	697.407	-4.548		0.006088	
<b>Fb↑ 16</b>	<b>1.546860</b>	<b>0.773430</b>	<b>755.211</b>		<b>-44.789</b>		<b>Fb↑ 16</b>
	1.497054		698.552	-3.403		0.006088	
<b>Bbb↑ 34</b>	<b>1.033269</b>		<b>56.660</b>		<b>-43.340</b>		<b>Bbb↑ 34</b>
	1.495594		696.862	-5.093		0.006088	
<b>D#↓ 9</b>	<b>0.690875</b>	<b>1.381751</b>	<b>559.797</b>		<b>-40.203</b>		<b>D#↓ 9</b>
		1.496703	698.145	-3.810		0.006088	
<b>G#↓ 27</b>		<b>0.923197</b>	<b>1061.652</b>		<b>-38.348</b>		<b>G#↓ 27</b>
		1.495070	696.256	-5.699		0.006088	
<b>C#↓ 2</b>	<b>1.234987</b>	<b>0.617494</b>	<b>365.396</b>		<b>-34.604</b>		<b>C#↓ 2</b>
	1.496312		697.693	-4.262		0.006088	
<b>F#↓ 20</b>	<b>0.825354</b>	<b>1.650709</b>	<b>867.702</b>		<b>-32.298</b>		<b>F#↓ 20</b>
		1.497239	698.765	-3.190		0.006088	
<b>B↓ 38</b>		<b>1.102502</b>	<b>168.937</b>		<b>-31.063</b>		<b>B↓ 38</b>
		1.495870	697.182	-4.773		0.006088	
<b>Dx 13</b>	<b>1.474061</b>	<b>0.737030</b>	<b>671.755</b>		<b>-28.245</b>		<b>Dx 13</b>
	1.496909		698.384	-3.571		0.006088	
<b>Gx 31</b>	<b>0.984737</b>		<b>1173.372</b>		<b>-26.628</b>		<b>Gx 31</b>
	1.495378		696.612	-5.343		0.006088	
<b>Cx 6</b>	<b>0.658520</b>	<b>1.317041</b>	<b>476.760</b>		<b>-23.240</b>		<b>Cx 6</b>
		1.496541	697.958	-3.997		0.006088	
<b>Fx 24</b>	<b>1.760113</b>	<b>0.880056</b>	<b>978.801</b>		<b>-21.199</b>		<b>Fx 24</b>
	1.497410		698.964	-2.991		0.006088	
<b>B# 42</b>	<b>1.175438</b>		<b>279.838</b>		<b>-20.162</b>		<b>B# 42</b>

(foldout)

+/- 3/2	701.955		+/- 5/4	+/- 6/5
			386.314	315.641
		<b>E 10</b>		
			2.904	
	-3.517	<b>C 0</b>		
				-6.421
	-4.402	<b>A 23</b>		
			2.019	
	-5.262	<b>F 13</b>		
				-7.281
	-3.294	<b>D 5</b>		
			3.987	
	-3.936	<b>Bb 26</b>		
				-7.923
	-4.930	<b>G 18</b>		
			2.993	
	-5.887	<b>Eb 8</b>		
				-8.880
	-3.688	<b>C 0</b>		
			5.192	
	-4.402	<b>Ab 21</b>		
				-9.594
	-5.518	<b>F 13</b>		
			4.077	
	-3.294	<b>Db 3</b>		
				-7.371
	-4.127	<b>Bb 26</b>		
			3.244	
	-4.930	<b>Gb 16</b>		
				-8.174
	-3.089	<b>Eb 8</b>		
			5.085	
	-3.688	<b>Cb 29</b>		
				-8.774
	-4.622	<b>Ab 21</b>		
			4.151	
	-5.518	<b>Fb 11</b>		
				-9.669
		<b>Db 3</b>		

(foldout)

+/- 3/2	701.955		+/- 5/4	+/- 6/5
			386.314	315.641
		<b>D# 7</b>		
				-8.665
	-3.751	<b>B# 30</b>		
			4.914	
	-4.477	<b>G# 20</b>		
				-9.391
	-5.611	<b>E# 12</b>		
			3.780	
	-3.351	<b>C# 2</b>		
				-7.131
	-4.196	<b>A# 25</b>		
			2.935	
	-5.014	<b>F# 15</b>		
				-7.948
	-3.141	<b>D# 7</b>		
			4.808	
	-3.751	<b>B 28</b>		
				-8.559
	-4.700	<b>G# 20</b>		
			3.858	
	-5.611	<b>E 10</b>		
				-9.469
	-3.517	<b>C# 2</b>		
			5.953	
	-4.196	<b>A 23</b>		
				-10.149
	-5.262	<b>F# 15</b>		
			4.887	
	-3.141	<b>D 5</b>		
				-8.027
	-3.936	<b>B 28</b>		
			4.091	
	-4.700	<b>G 18</b>		
				-8.791
	-5.887	<b>E 10</b>		
			2.904	
		<b>C 0</b>		

**43EBMT(+3) Equal Beating Meantone Temperament**

-Equal Beating +3rds and -6ths ( C 0 to Cb 40 )

-6th below +3rd beats at the same rate as the +3rd

-6th above +3rd beats at twice the rate of the +3rd

<b>A 32 to C# 3</b> = 1.25260275	389.915	Cents	0.010411	<b>Beat Rate</b>	<b>A - 415</b>	<b>A - 440</b>
					4.320557	4.580831
	<b>F 18 to A 32</b>	<b>Beat Rate:</b>	0.010411			

<b>5/4 =</b>	<b>386.31371</b>	<b>Cents</b>
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Note	Ratios	Ratios	Ratios	Ratios	Cents	+/- 3/2	+/- 12ET	Beat Rate	A - 415	A - 440	Root	P5
<b>B# 42</b>		1.177554			282.951	701.955	-17.049	Perf. Fifth			<b>B# 42</b>	
<b>E# 17</b>	0.785479	1.252769			700.977	-0.978		0.001331	0.552	0.586	<b>Cb 40</b>	<b>Gb 22</b>
<b>A# 35</b>	1.254156	390.144			781.975		-18.025	0.004839	2.008	2.129	<b>B 39</b>	<b>F# 21</b>
<b>D# 10</b>	392.060	0.010411		0.701177	699.291	-2.664		0.005693	2.362	2.505	<b>Bb 36</b>	<b>F 18</b>
<b>G# 28</b>	0.010411			1.402354	82.684		-17.316	0.015175	6.298	6.677	<b>A# 35</b>	<b>E# 17</b>
<b>C# 3</b>	1.252603	0.626301			697.263	-4.692		-0.001017	-0.422	-0.448	<b>D# 10</b>	<b>A 32</b>
<b>F# 21</b>	1.252603				585.420		-14.580	0.005953	2.471	2.619	<b>G# 28</b>	<b>E 14</b>
<b>B 39</b>	389.915				692.613	-9.342		0.011191	4.644	4.924	<b>A 32</b>	<b>E 14</b>
<b>E 14</b>	0.010411				1092.807	0.937	-7.193	0.011191	4.644	4.924	<b>G# 28</b>	<b>E 14</b>
<b>A 32</b>	1				702.892		-10.085	0.011191	4.644	4.924	<b>A 32</b>	<b>E 14</b>
<b>D 7</b>					389.915		-7.931	0.011191	4.644	4.924	<b>D 7</b>	<b>A 32</b>
<b>G 25</b>	1.253262				697.846	-4.109		0.011191	4.644	4.924	<b>G 25</b>	<b>A 32</b>
<b>C 0</b>	390.825				892.069		-7.931	0.011191	4.644	4.924	<b>C 0</b>	<b>A 32</b>
<b>F 18</b>	0.010411				696.178	-5.777		0.011191	4.644	4.924	<b>F 18</b>	<b>A 32</b>
<b>Bb 36</b>					195.890		-4.110	0.011191	4.644	4.924	<b>Bb 36</b>	<b>A 32</b>
<b>Eb 11</b>	1.254091				694.198	-7.757		0.011191	4.644	4.924	<b>Eb 11</b>	<b>A 32</b>
<b>Ab 29</b>	391.970				701.693		1.693	0.011191	4.644	4.924	<b>Ab 29</b>	<b>A 32</b>
<b>Db 4</b>	0.010411				0		0	0.011191	4.644	4.924	<b>Db 4</b>	<b>A 32</b>
<b>Gb 22</b>					699.637	-2.318		0.011191	4.644	4.924	<b>Gb 22</b>	<b>A 32</b>
<b>Cb 40</b>	1.252562				500.363		0.363	0.011191	4.644	4.924	<b>Cb 40</b>	<b>A 32</b>
<b>Fb 15</b>	389.858				694.815	-7.140		0.011191	4.644	4.924	<b>Fb 15</b>	<b>A 32</b>
	0.010411				1005.548		5.548	0.011191	4.644	4.924	<b>Fb 15</b>	<b>A 32</b>
					696.188	-5.767		0.011191	4.644	4.924	<b>Fb 15</b>	<b>A 32</b>
					309.360		9.360	0.011191	4.644	4.924	<b>Fb 15</b>	<b>A 32</b>
					700.185	-1.770		0.011191	4.644	4.924	<b>Fb 15</b>	<b>A 32</b>
					809.175		9.175	0.011191	4.644	4.924	<b>Fb 15</b>	<b>A 32</b>
					698.503	-3.452		0.011191	4.644	4.924	<b>Fb 15</b>	<b>A 32</b>
					110.672		10.672	0.011191	4.644	4.924	<b>Fb 15</b>	<b>A 32</b>
					696.486	-5.469		0.011191	4.644	4.924	<b>Fb 15</b>	<b>A 32</b>
					614.185		14.185	0.011191	4.644	4.924	<b>Fb 15</b>	<b>A 32</b>
					694.912	-7.043		0.011191	4.644	4.924	<b>Fb 15</b>	<b>A 32</b>
					1119.273		19.273	0.011191	4.644	4.924	<b>Fb 15</b>	<b>A 32</b>
					702.069	0.114		-0.000126	-0.052	-0.055	<b>Fb 15</b>	<b>A 32</b>
					417.204		17.204	0.007178	2.979	3.159	<b>Fb 15</b>	<b>A 32</b>
					697.079	-4.876		0.012875	5.343	5.665	<b>Fb 15</b>	<b>A 32</b>
					920.126		20.126	0.007218	2.995	3.176	<b>Fb 15</b>	<b>A 32</b>
					695.417	-6.538					<b>Fb 15</b>	<b>A 32</b>
					224.709		24.709				<b>Fb 15</b>	<b>A 32</b>
					696.476	-5.479					<b>Fb 15</b>	<b>A 32</b>
					728.232		28.232				<b>Fb 15</b>	<b>A 32</b>

Ratio	Cents	+/- 3/2	+3rd	Pitch	1/5 Dit. C.	+3rd Ratio	Cents	+/- 5/4	Beat Rate	-3rd Ratio	Cents	+/- 6/5	Beat Rate	A - 415	A - 440	Harm. 7th (x6th)	Pitch	H.7th Ratio Root to x6th	Cents	+/- 7/4	
		701.955				Root to +3rd		386.314	Root to +3rd	+3rd to P5		315.641	+3rd to P5								968.826
1.494346	695.417	-6.538	<b>Eb 11</b>	1.425849		1.252286	389.477	3.163	0.010411	1.193295	305.940	-9.701	0.047804	19.839	21.034	<b>A 32</b>	2	1.756548	975.291	6.466	
1.495003	696.178	-5.777	<b>D# 10</b>	1.402354		1.252324	389.530	3.216	0.010411	1.193783	306.649	-8.993	0.043593	18.091	19.181	----	----	----	----	----	
1.497012	698.503	-3.452	<b>D 7</b>	1.335120		1.252442	389.692	3.378	0.010411	1.195275	308.811	-6.830	0.031542	13.090	13.879	<b>G# 28</b>	1.879921	1.763506	982.135	13.309	
1.497694	699.291	-2.664	----	----		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
1.499773	701.693	-0.262	<b>C# 3</b>	1.252603		1.252603	389.915	3.601	0.010411	1.197325	311.778	-3.863	0.016752	6.952	7.371	----	----	----	----	----	
1.493910	694.912	-7.043	<b>C 0</b>	1.195654		1.252727	390.086	3.773	0.010411	1.192527	304.826	-10.816	0.044679	18.542	19.659	<b>F# 21</b>	1.674106	1.754017	972.795	3.970	
1.491928	692.613	-9.342	<b>B# 42</b>	1.177554		1.252769	390.144	3.831	0.010411	1.190904	302.469	-13.173	0.053554	22.225	23.564	----	----	----	----	----	
1.493827	694.815	-7.140	<b>B 39</b>	1.119801		1.252912	390.342	4.029	0.010411	1.192284	304.473	-11.168	0.043203	17.929	19.009	<b>E# 17</b>	1.570959	1.757700	976.427	7.601	
1.495781	697.079	-4.876	<b>Bb 36</b>	1.066014		1.253059	390.546	4.232	0.010411	1.193703	306.533	-9.108	0.033563	13.929	14.768	<b>E 14</b>	1.499773	1.762927	981.567	12.741	
1.496444	697.846	-4.109	<b>A# 35</b>	1.048919	1/5 Syn. C. 43Et	1.253109	390.615	4.301	0.010411	1.194185	307.231	-8.410	0.030499	12.657	13.420	----	----	----	----	----	
1.498467	700.185	-1.770	<b>A 32</b>	1		1.253262	390.825	4.512	0.010411	1.195654	309.360	-6.282	0.021731	9.018	9.562	<b>D# 10</b>	1.402354	1.757516	976.246	7.420	
1.499153	700.977	-0.978	----	----		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
1.495261	696.476	-5.479	<b>Ab 29</b>	0.954441		1.253418	391.041	4.727	0.010411	1.192947	305.435	-10.206	0.033661	13.969	14.811	<b>D 7</b>	1.335120	1.753345	972.131	3.305	
1.493294	694.198	-7.757	<b>G# 28</b>	0.939961		1.253471	391.114	4.800	0.010411	1.191327	303.083	-12.558	0.040761	16.916	17.935	----	----	----	----	----	
1.495269	696.486	-5.469	<b>G 25</b>	0.893758		1.253651	391.363	5.049	0.010411	1.192732	305.124	-10.518	0.032480	13.479	14.291	<b>C# 3</b>	1.252603	1.756992	975.729	6.903	
1.495941	697.263	-4.692	----	----		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
1.497993	699.637	-2.318	<b>F# 21</b>	0.837053		1.253899	391.705	5.392	0.010411	1.194668	307.931	-7.710	0.022317	9.262	9.819	<b>B# 42</b>	1.177554	1.763967	982.588	13.762	
1.500099	702.069	0.114	<b>F 18</b>	0.797918		1.254091	391.970	5.656	0.010411	1.196164	310.099	-5.543	0.015303	6.351	6.733	<b>B 39</b>	1.119801	1.759995	978.686	9.860	
1.500812	702.892	0.937	<b>E# 17</b>	0.785479		1.254156	392.060	5.746	0.010411	1.196671	310.832	-4.809	0.013073	5.425	5.752	----	----	----	----	----	
1.495012	696.188	-5.767	<b>E 14</b>	0.749886	1/6 Hold. C.	1.254354	392.333	6.019	0.010411	1.191858	303.855	-11.786	0.030527	12.669	13.432	<b>A# 35</b>	1.048919	1.754553	973.324	4.498	
1.496351	697.738	-4.2168				1.253208	390.751	4.4370	0.010411	1.193841	306.733	-8.9081	0.032650	13.550	14.366			1.758279	976.996	8.1705	
1.496349	697.736	-4.2190				1.253208	390.751	4.4368		1.193840	306.731	-8.9102						1.758275	976.993	8.1668	
1.496296	697.674	-4.2806				1.253169	390.698	4.3840		1.194009	306.977	-8.6645						1.758022	976.744	7.9183	
	<b>A - 415</b>	<b>A - 440</b>																			
0.006384	2.650	2.809																			





+/- 3/2	701.955		+/- 5/4	+/- 6/5
			386.314	315.641
		<b>E 10</b>		
			6.019	
	-0.262	<b>C 0</b>		
				-6.282
	-1.770	<b>A 23</b>	4.512	
		<b>F 13</b>		
	-2.318			-6.830
	-3.452	<b>D 5</b>		
			3.378	
	-7.140	<b>Bb 26</b>		
				-10.518
	-5.469	<b>G 18</b>	5.049	
		<b>Eb 8</b>		
	-5.767			-10.816
	-7.043	<b>C 0</b>		
			3.773	
	-1.770	<b>Ab 21</b>		
				-5.543
	0.114	<b>F 13</b>	5.656	
		<b>Db 3</b>		
	-3.452			-9.108
	-4.876	<b>Bb 26</b>	4.232	
		<b>Gb 16</b>		
	-5.469			-9.701
	-6.538	<b>Eb 8</b>	3.163	
		<b>Cb 29</b>		
	-7.043			-10.206
	-5.479	<b>Ab 21</b>	4.727	
		<b>Fb 11</b>		
	0.114			-4.614
		<b>Db 3</b>		

(foldout)

+/- 3/2	701.955		+/- 5/4	+/- 6/5
			386.314	315.641
		<b>D# 7</b>		
				-13.173
	-9.342	<b>B# 30</b>	3.831	
		<b>G# 20</b>		
	-0.978			-4.809
	0.937	<b>E# 12</b>	5.746	
		<b>C# 2</b>		
	-2.664			-8.410
	-4.109	<b>A# 25</b>		
			4.301	
	-4.692	<b>F# 15</b>		
				-8.993
	-5.777	<b>D# 7</b>		
			3.216	
	-9.342	<b>B 28</b>		
				-12.558
	-7.757	<b>G# 20</b>	4.800	
		<b>E 10</b>		
	0.937			-3.863
	-0.262	<b>C# 2</b>		
			3.601	
	-4.109	<b>A 23</b>		
				-7.710
	-2.318	<b>F# 15</b>	5.392	
		<b>D 5</b>		
	-5.777			-11.168
	-7.140	<b>B 28</b>	4.029	
	-7.757	<b>G 18</b>		
				-11.786
	-5.767	<b>E 10</b>		
			6.019	
		<b>C 0</b>		

**43EBMT(-3) Equal Beating Meantone Temperament**

-Equal Beating -3rds and +6ths ( C 0 to Cb 40 )

+6th above -3rd beats at the same rate as the -3rd  
+6th below -3rd beats at half the rate of the -3rd

<b>A 32 to C 0 =</b> 1.19509497	308.550	Cents	<b>Beat Rate</b> 0.024525	<b>A - 415</b> 10.177937	<b>A - 440</b> 10.791066	<b>6/5 =</b> 315.64129	Cents
			<b>F# 21 to A 32 Beat Rate:</b> 0.024525				

Note	Ratios	Ratios	Ratios
Fb 15		0.756906	
Cb 40		1.192274 304.458 0.024525	1.133985
Gb 22	0.849677		1.194832 308.169 0.024525
Db 4	1.193112 305.676 0.024525	1.269686	0.634843
Ab 29		1.195382 308.966 0.024525	0.949075
Eb 11	0.712152		1.193830 306.717 0.024525
Bb 36	1.191791 303.758 0.024525	1.062159	
F 18		1.194484 307.665 0.024525	0.794983
C 0	1.195095	0.597547	1.192641 304.992 0.024525
G 25	1.195095 308.550 0.024525	0.889220	1.192641 304.992 0.024525
D 7		1.193417 306.118 0.024525	0.666574
A 32	1		1.195601 309.283 0.024525
E 14	1.194143 307.170 0.024525	0.745104	1.195601 309.283 0.024525
B 39		1.192152 304.282 0.024525	1.115044
F# 21	0.837421		1.194744 308.042 0.024525
C# 3	1.193012 305.531 0.024525	0.625008	1.250015
G# 28		1.195310 308.861 0.024525	0.933291
D# 10	0.701938	1.403876	1.193726 306.566 0.024525
A# 35		1.195822 309.603 0.024525	1.045767
E# 17		1.194398 307.540 0.024525	0.781830
B# 42	1.173985		1.192518

Cents	+/- 4/3	+/- 12ET
717.824	498.045	17.824
500.142	2.097	
217.682		17.682
499.698	1.653	
917.984		17.984
504.619	6.574	
413.366		13.366
503.853	5.808	
1109.513		9.513
497.205	-0.840	
612.308		12.308
507.909	9.864	
104.399		4.399
501.603	3.558	
802.796		2.796
494.246	-3.799	
308.550		8.550
511.816	13.771	
996.735		-3.265
498.931	0.886	
497.804		-2.196
497.804	-0.241	
0		0
509.383	11.338	
690.617		-9.383
502.096	4.051	
188.520		-11.480
495.691	-2.354	
892.830		-7.170
506.495	8.450	
386.335		-13.665
505.857	7.812	
1080.478		-19.522
493.179	-4.866	
587.299		-12.701
509.826	11.781	
77.474		-22.526
503.562	5.517	
773.912		-26.088
496.215	-1.830	
277.696		-22.304

Beat Rate	A - 415	A - 440
Perf. Fifth		
0.002749	1.141	1.209
0.003246	1.347	1.428
0.009661	4.009	4.251
0.006378	2.647	2.806
-0.001383	-0.574	-0.608
0.012138	5.037	5.341
0.006543	2.715	2.879
-0.005240	-2.174	-2.305
0.014203	5.894	6.249
0.001365	0.566	0.601
-0.000279	-0.116	-0.123
0.019584	8.127	8.617
0.005225	2.168	2.299
-0.004552	-1.889	-2.003
0.012232	5.076	5.382
0.008442	3.503	3.714
-0.007881	-3.271	-3.468
0.014281	5.927	6.284
0.009982	4.142	4.392
-0.002480	-1.029	-1.091

Root	P5	Ratio	Cents
Cb 40	Gb 22	1.498569	700.302
B 39	F# 21	1.502041	704.309
Bb 36	F 18	1.496920	698.397
A# 35	E# 17	1.495228	696.438
A 32	E 14	1.490208	690.617
Ab 29	Eb 11	1.500728	702.795
G# 28	D# 10	1.504222	706.821
G 25	D 7	1.499233	701.069
Gb 22	Db 4	1.494315	695.381
F# 21	C# 3	1.492697	693.505
F 18	C 0	1.503295	705.754
E# 17	B# 42	1.501586	703.785
Fb 15	Cb 40	1.498184	699.858
E 14	B 39	1.496494	697.904
Eb 11	Bb 36	1.491478	692.091
D# 10	A# 35	1.489828	690.174
D 7	A 32	1.500209	702.196
Db 4	Ab 29	1.494977	696.147
C# 3	G# 28	1.493247	694.143
C 0	G 25	1.488116	688.184
Average:	+	1.496579	698.002
	*	1.496572	697.994
43ET EMT		1.496296	697.674
Average P5			A - 415
Beat Rate		0.005211	2.162

+/- 3/2	-3rd	Pitch	-3rd Ratio	Cents	+/- 6/5	Beat Rate	+3rd Ratio	Cents	+/- 5/4	Beat Rate	A - 415	A - 440	Harm. 7th	Pitch	H.7th Ratio	Cents	+/- 7/4	
701.955			Root to -3rd		315.641	Root to -3rd	-3rd to P5		386.314	-3rd to P5			(x6th)		Root to x6th		968.826	
-1.653	----	----	----	----	----	----	----	----	----	----	----	----	<b>A 32</b>	<b>2</b>	1.763692	<b>982.318</b>	13.492	
2.354	<b>D 7</b>	<b>1.333147</b>	1.195601	<b>309.283</b>	-6.358	0.024525	1.256306	<b>395.026</b>	8.712	0.033629	<b>13.956</b>	<b>14.797</b>	----	----	----	----	----	
-3.558	<b>Db 4</b>	<b>1.269686</b>	1.195382	<b>308.966</b>	-6.675	0.024525	1.252252	<b>389.430</b>	3.117	0.011439	<b>4.747</b>	<b>5.033</b>	<b>G# 28</b>	<b>1.866581</b>	1.757347	<b>976.078</b>	7.253	
-5.517	<b>C# 3</b>	<b>1.250015</b>	1.195310	<b>308.861</b>	-6.780	0.024525	1.250912	<b>387.577</b>	1.263	0.004561	<b>1.893</b>	<b>2.007</b>	----	----	----	----	----	
-11.338	<b>C 0</b>	<b>1.195095</b>	1.195095	<b>308.550</b>	-7.091	0.024525	1.246937	<b>382.066</b>	-4.247	-0.014642	<b>-6.076</b>	<b>-6.442</b>	----	----	----	----	----	
0.840	<b>Cb 40</b>	<b>1.133985</b>	1.194832	<b>308.169</b>	-7.472	0.024525	1.256016	<b>394.626</b>	8.313	0.027290	<b>11.325</b>	<b>12.008</b>	<b>F# 21</b>	<b>1.674842</b>	1.764709	<b>983.317</b>	14.491	
4.866	<b>B 39</b>	<b>1.115044</b>	1.194744	<b>308.042</b>	-7.599	0.024525	1.259033	<b>398.779</b>	12.465	0.040287	<b>16.719</b>	<b>17.726</b>	----	----	----	----	----	
-0.886	<b>Bb 36</b>	<b>1.062159</b>	1.194484	<b>307.665</b>	-7.976	0.024525	1.255130	<b>393.404</b>	7.090	0.021795	<b>9.045</b>	<b>9.590</b>	<b>E# 17</b>	<b>1.563659</b>	1.758462	<b>977.177</b>	8.351	
-6.574	----	----	----	----	----	----	----	----	----	----	----	----	<b>E 14</b>	<b>1.490208</b>	1.753852	<b>972.632</b>	3.806	
-8.450	<b>A 32</b>	<b>1</b>	1.194143	<b>307.170</b>	-8.471	0.024525	1.250015	<b>386.335</b>	0.021	0.000061	<b>0.025</b>	<b>0.027</b>	----	----	----	----	----	
3.799	<b>Ab 29</b>	<b>0.949075</b>	1.193830	<b>306.717</b>	-8.924	0.024525	1.259221	<b>399.037</b>	12.724	0.035004	<b>14.527</b>	<b>15.402</b>	<b>D# 10</b>	<b>1.403876</b>	1.765919	<b>984.503</b>	15.677	
1.830	<b>G# 28</b>	<b>0.933291</b>	1.193726	<b>306.566</b>	-9.075	0.024525	1.257898	<b>397.218</b>	10.904	0.029485	<b>12.236</b>	<b>12.973</b>	----	----	----	----	----	
-2.097	----	----	----	----	----	----	----	----	----	----	----	----	<b>D 7</b>	<b>1.333147</b>	1.761311	<b>979.980</b>	11.154	
-4.051	<b>G 25</b>	<b>0.889220</b>	1.193417	<b>306.118</b>	-9.523	0.024525	1.253957	<b>391.786</b>	5.472	0.014075	<b>5.841</b>	<b>6.193</b>	----	----	----	----	----	
-9.864	<b>Gb 22</b>	<b>0.849677</b>	1.193112	<b>305.676</b>	-9.965	0.024525	1.250073	<b>386.415</b>	0.101	0.000249	<b>0.103</b>	<b>0.109</b>	<b>C# 3</b>	<b>1.250015</b>	1.755265	<b>974.026</b>	5.200	
-11.781	<b>F# 21</b>	<b>0.837421</b>	1.193012	<b>305.531</b>	-10.111	0.024525	1.248795	<b>384.644</b>	-1.670	-0.004037	<b>-1.675</b>	<b>-1.776</b>	----	----	----	----	----	
0.241	<b>F 18</b>	<b>0.794983</b>	1.192641	<b>304.992</b>	-10.649	0.024525	1.257888	<b>397.204</b>	10.890	0.025083	<b>10.409</b>	<b>11.036</b>	<b>B# 42</b>	<b>1.173985</b>	1.761222	<b>979.893</b>	11.067	
-5.808	<b>Fb 15</b>	<b>0.756906</b>	1.192274	<b>304.458</b>	-11.183	0.024525	1.253887	<b>391.689</b>	5.375	0.011769	<b>4.884</b>	<b>5.178</b>	<b>B 39</b>	<b>1.115044</b>	1.756409	<b>975.155</b>	6.329	
-7.812	<b>E 14</b>	<b>0.745104</b>	1.192152	<b>304.282</b>	-11.359	0.024525	1.252564	<b>389.861</b>	3.548	0.007642	<b>3.171</b>	<b>3.362</b>	----	----	----	----	----	
-13.771	<b>Eb 11</b>	<b>0.712152</b>	1.191791	<b>303.758</b>	-11.883	0.024525	1.248638	<b>384.426</b>	-1.888	-0.003880	<b>-1.610</b>	<b>-1.707</b>	<b>A# 35</b>	<b>1.045767</b>	1.750098	<b>968.923</b>	0.097	
-3.9532			1.193856	<b>306.754</b>	-8.8871	0.024525	1.253501	<b>391.156</b>	4.8426	0.014107	<b>5.854</b>	<b>6.207</b>			1.758935	<b>977.643</b>	8.8168	
-3.9614			1.193855	<b>306.753</b>	-8.8880		1.253496	<b>391.149</b>	4.8348						1.758929	<b>977.637</b>	8.8107	
-4.2806			<b>1.194009</b>	<b>306.977</b>	<b>-8.6645</b>		<b>1.253169</b>	<b>390.698</b>	<b>4.3840</b>						<b>1.758022</b>	<b>976.744</b>	<b>7.9183</b>	
<b>A - 440</b>																		
<b>2.293</b>																		

Fx 24	1.195007 308.423 0.024525		0.875560		304.814 0.024525	507.763 9.718			0.019714 8.181 8.674			Fx 24
Cx 6			1.193315 305.970 0.024525	1.311225	0.655612	969.933 500.836 2.791		-30.067	0.004231 1.756 1.861			Cx 6
Gx 31	0.982408			1.195528 309.177 0.024525		469.098 499.825 1.780		-30.727	0.002021 0.839 0.889			Gx 31
Dx 13	1.194038 307.019 0.024525		0.733721	1.194657 307.916 0.024525	1.096775	1169.273 505.309 7.264		-36.036	0.012341 5.121 5.430			Dx 13
B <sub>↓</sub> 38			1.192031 304.106 0.024525	1.096775		663.964 504.043 5.998		-40.079	0.007613 3.159 3.350			B <sub>↓</sub> 38
F# <sub>↓</sub> 20	0.822761			1.194657 307.916 0.024525		159.921 497.667 -0.378		-37.746	-0.000719 -0.299 -0.317			F# <sub>↓</sub> 20
C# <sub>↓</sub> 2	1.192888 305.351 0.024525	1.231043	0.615522	1.194657 307.916 0.024525		862.254 502.397 4.352		-40.143	0.006196 2.572 2.726			C# <sub>↓</sub> 2
G# <sub>↓</sub> 27		1.195238 308.757 0.024525		0.918066		359.857 507.853 9.808		-47.995	0.010432 4.329 4.590			G# <sub>↓</sub> 27
D# <sub>↓</sub> 9	1.379443 0.689722			1.193623 306.416 0.024525		1052.005 495.101 -2.944		-43.097	-0.004687 -1.945 -2.062			D# <sub>↓</sub> 9
Bbb <sub>↑</sub> 34	1.195748 309.496 0.024525	1.029957		0.769143		556.903 505.803 7.758		-48.900	0.009251 3.839 4.071			Bbb <sub>↑</sub> 34
Fb <sub>↑</sub> 16		1.194312 307.416 0.024525		1.192396 304.636 0.024525	1.290080	51.100 505.512 7.467		45.588	0.013299 5.519 5.851			Fb <sub>↑</sub> 16
Cb <sub>↑</sub> 41	1.153623			0.645040		745.588 498.181 0.136		47.407	0.000182 0.075 0.080			Cb <sub>↑</sub> 41
Gb <sub>↑</sub> 23	1.194919 308.296 0.024525	0.862385		1.192396 304.636 0.024525		247.407 503.722 5.677		43.684	0.011331 4.702 4.986			Gb <sub>↑</sub> 23
Db <sub>↑</sub> 5		1.193213 305.822 0.024525		1.290080		943.684 502.732 4.687		40.952	0.006995 2.903 3.078			Db <sub>↑</sub> 5
Bbbb 30	0.965440			1.195455 309.071 0.024525		440.952 501.841 3.796		39.111	0.004239 1.759 1.865			Bbbb 30
Fbb 12	1.193934 306.868 0.024525	0.722742		1.195455 309.071 0.024525		1139.111 501.249 3.204		37.862	0.005355 2.222 2.356			Fbb 12
Cbb 37		1.191911 303.932 0.024525		1.079154		637.862 505.981 7.936		31.881	0.009916 4.115 4.363			Cbb 37
Gbb 19	0.808621			1.194570 307.790 0.024525		131.881 499.638 1.593		32.243	0.002977 1.236 1.310			Gbb 19
Dbb 1	1.192765 305.171 0.024525	0.606372	1.212744	1.194570 307.790 0.024525		832.243 498.313 0.268		33.930	0.000375 0.156 0.165			Dbb 1
Abb 26				0.903383		333.930 509.840 11.795		24.091	0.012351 5.126 5.435			Abb 26
Ebb 8	0.677939	1.355877		1.193520 306.267 0.024525		1024.091 497.019 -1.026		27.072	-0.001606 -0.667 -0.707			Ebb 8
Bbb 33		1.195675 309.390 0.024525	1.014708	1.193520 306.267 0.024525		527.072 501.795 3.750		25.277	0.004400 1.826 1.936			Bbb 33
Fb 15		1.194227 307.293 0.024525		0.756906		25.277 507.453 9.408		17.824	0.016498 6.847 7.259			Fb 15
Cb 40	1.133985											Cb 40
Gb 22			0.849677									Gb 22

(foldout)

+/- 3/2	701.955		+/- 5/4	+/- 6/5
			386.314	315.641
		<b>E 10</b>		
	-11.338	<b>C 0</b>	-4.247	
	3.799	<b>A 23</b>		-7.091
	0.241	<b>F 13</b>	10.890	
	-3.558	<b>D 5</b>		-10.649
	-0.886	<b>Bb 26</b>	7.090	
	-9.864	<b>G 18</b>		-7.976
	-13.771	<b>Eb 8</b>	-1.888	
	0.840	<b>C 0</b>		-11.883
	3.799	<b>Ab 21</b>	12.724	
	-5.808	<b>F 13</b>		-8.924
	-3.558	<b>Db 3</b>	3.117	
	-6.574	<b>Bb 26</b>		-6.675
	-9.864	<b>Gb 16</b>	0.101	
	-1.653	<b>Eb 8</b>		-9.965
	0.840	<b>Cb 29</b>	8.313	
	-2.097	<b>Ab 21</b>		-7.472
	-5.808	<b>Fb 11</b>	5.375	
		<b>Db 3</b>		-11.183

(foldout)

+/- 3/2	701.955		+/- 5/4	+/- 6/5
			386.314	315.641
		<b>D# 7</b>		
	4.866	<b>B# 30</b>		-6.038
	1.830	<b>G# 20</b>	10.904	
	-7.812	<b>E# 12</b>		-9.075
	-5.517	<b>C# 2</b>	1.263	
	-8.450	<b>A# 25</b>		-6.780
	-11.781	<b>F# 15</b>	-1.670	
	2.354	<b>D# 7</b>		-10.111
	4.866	<b>B 28</b>	12.465	
	-4.051	<b>G# 20</b>		-7.599
	-7.812	<b>E 10</b>	3.548	
	-11.338	<b>C# 2</b>		-11.359
	-8.450	<b>A 23</b>	0.021	
	0.241	<b>F# 15</b>		-8.471
	2.354	<b>D 5</b>	8.712	
	-0.886	<b>B 28</b>		-6.358
	-4.051	<b>G 18</b>	5.472	
	-13.771	<b>E 10</b>		-9.523
		<b>C 0</b>	-4.247	

### 1/4 Syntonic Comma Equal Meantone Temperament

Jorgensen Chapters 11,12

Fifth =  $(3/2) / (81/80)^{1/4} = 1.495348781 = 696.5784$  Cents

Note	Ratio	Cents	+/- from 12ET
B#	1.168241	269.21	-30.79
E#	1.562500	772.63	-27.37
A#	1.044907	76.05	-23.95
D#	1.397542	579.47	-20.53
G#	1.869186	1082.89	-17.11
C#	1.250000	386.31	-13.69
F#	1.671851	889.74	-10.26
B	1.118034	193.16	-6.84
E	1.495349	696.58	-3.42
A	1.000000	0.00	0.00
D	1.337481	503.42	3.42
G	1.788854	1006.84	6.84
C	1.196279	310.26	10.26
F	1.600000	813.69	13.69
Bb	1.069984	117.11	17.11
Eb	1.431084	620.53	20.53
Ab	1.914046	1123.95	23.95
Db	1.280000	427.37	27.37
Gb	1.711975	930.79	30.79
Cb	1.144867	234.22	34.22
Fb	1.531237	737.64	37.64

		Wolf +/-
		from Just
wolf o8	1123.95	35.68
+7	<b>1082.89</b>	
-7	<b>1006.84</b>	
wolf x6	965.78	-30.31
wolf o7	930.79	46.44
+6	<b>889.74</b>	
-6	<b>813.69</b>	
wolf x5	772.63	-41.06
wolf o6	737.64	35.68
P5	<b>696.58</b>	
o5	620.53	
x4	579.47	
P4	<b>503.42</b>	
wolf x3	462.36	-35.68
wolf o4	427.37	41.06
+3	<b>386.31</b>	
-3	<b>310.26</b>	
wolf x2	269.21	-46.44
wolf o3	234.22	30.31
+2	<b>193.16</b>	
-2	<b>117.11</b>	
wolf x1	76.05	-35.68

-Pure Major Thirds and Minor Sixths

-Equal Beating 1st Inversion Minor Triads (P4, +6)

-Minor Sevenths beat almost twice as fast as Minor Seconds

Beat Rates from A		A	A
		415	440
8(Ab)-15(A)	0.312372	129.634181	137.443469
<b>15(A)-8(G#)</b>	<b>0.046512</b>	<b>19.302558</b>	<b>20.465363</b>
<b>9(G)-16(A)</b>	<b>0.099689</b>	<b>41.371117</b>	<b>43.863353</b>
16(A)-9(Fx)	0.277647	115.223519	122.164695
3(Gb)-5(A)	0.135926	56.409100	59.807239
<b>3(F#)-5(A)</b>	<b>0.015552</b>	<b>6.454199</b>	<b>6.843006</b>
<b>8(A)-5(F)</b>	<b>0</b>	<b>0</b>	<b>0</b>
8(A)-5(E#)	0.187500	77.812500	82.500000
2(Fb)-3(A)	0.062474	25.926836	27.488694
<b>3(A)-2(E)</b>	<b>0.009302</b>	<b>3.860512</b>	<b>4.093073</b>
5(Eb)-7(A)	0.155418	64.498274	68.383712
10(A)-7(D#)	0.217203	90.139078	95.569143
<b>3(D)-4(A)</b>	<b>0.012442</b>	<b>5.163359</b>	<b>5.474405</b>
4(A)-3(Cx)	0.081600	33.863907	35.903901
4(Db)-5(A)	0.120000	49.800000	52.800000
<b>4(C#)-5(A)</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>6(A)-5(C)</b>	<b>0.018605</b>	<b>7.721023</b>	<b>8.186145</b>
6(A)-5(B#)	0.158794	65.899437	69.869282
8(Cb)-9(A)	0.158934	65.957791	69.931152
<b>9(A)-8(B)</b>	<b>0.055728</b>	<b>23.127157</b>	<b>24.520360</b>
<b>15(Bb)-16(A)</b>	<b>0.049767</b>	<b>20.653438</b>	<b>21.897621</b>
16(A)-15(A#)	0.326399	135.455627	143.615605

A-440 Avg. Beat Rate for +/-3/6, P4/5 4.10

Avg. Deviation from Mean 2.74

Beat Rates	
Major Triads	
2nd Inversion	
2X	0.000000
Z	0.023256
2Y	0.018605
1st Inversion	
2Y	0.018605
2X	0.000000
Z	0.023256
Root Position	
Z	0.023256
Y	0.009302
X	0.000000
Minor Triads	
2nd Inversion	
2X	0.037210
2Z	0.000000
2Y	0.018605
1st Inversion	
2Y	0.018605
X	0.018605
Z	0.000000
Root Position	
Z	0.000000
Y	0.009302
X	0.018605

### 31ET Equal Meantone Temperament

Jorgensen Chapters 28,29

Fifth =  $2^{1/31} = 1.495517882 = 696.7742$  Cents

Note	Ratio	Cents	+/- from 12ET
B#	1.169431	270.97	-29.03
E#	1.563914	774.19	-25.81
A#	1.045734	77.42	-22.58
D#	1.398491	580.65	-19.35
G#	1.870243	1083.87	-16.13
C#	1.250566	387.10	-12.90
F#	1.672418	890.32	-9.68
B	1.118287	193.55	-6.45
E	1.495518	696.77	-3.23
A	1.000000	0.00	0.00
D	1.337329	503.23	3.23
G	1.788450	1006.45	6.45
C	1.195873	309.68	9.68
F	1.599276	812.90	12.90
Bb	1.069380	116.13	16.13
Eb	1.430113	619.35	19.35
Ab	1.912532	1122.58	22.58
Db	1.278843	425.81	25.81
Gb	1.710234	929.03	29.03
Cb	1.143573	232.26	32.26
Fb	1.529334	735.48	35.48

		Wolf +/-
		from Just
wolf o8	1122.58	34.31
+7	<b>1083.87</b>	
-7	<b>1006.45</b>	
wolf x6	967.74	-28.35
wolf o7	929.03	44.67
+6	<b>890.32</b>	
-6	<b>812.90</b>	
wolf x5	774.19	-39.49
wolf o6	735.48	33.53
P5	<b>696.77</b>	
o5	619.35	
x4	580.65	
P4	<b>503.23</b>	
wolf x3	464.52	-33.53
wolf o4	425.81	39.49
+3	<b>387.10</b>	
-3	<b>309.68</b>	
wolf x2	270.97	-44.67
wolf o3	232.26	28.35
+2	<b>193.55</b>	
-2	<b>116.13</b>	
wolf x1	77.42	-34.31

-Almost Identical to 1/4 Syntonic Comma Equal Meantone Temperament

Beat Rates from A		A	A
		415	440
8(Ab)-15(A)	0.300256	124.606170	132.112566
<b>15(A)-8(G#)</b>	<b>0.038055</b>	<b>15.792916</b>	<b>16.744296</b>
<b>9(G)-16(A)</b>	<b>0.096049</b>	<b>39.860251</b>	<b>42.261471</b>
16(A)-9(Fx)	0.259858	107.841236	114.337696
3(Gb)-5(A)	0.130701	54.241057	57.508591
<b>3(F#)-5(A)</b>	<b>0.017254</b>	<b>7.160421</b>	<b>7.591772</b>
<b>8(A)-5(F)</b>	<b>0.003618</b>	<b>1.501341</b>	<b>1.591783</b>
8(A)-5(E#)	0.180429	74.878203	79.388939
2(Fb)-3(A)	0.058667	24.346962	25.813646
<b>3(A)-2(E)</b>	<b>0.008964</b>	<b>3.720158</b>	<b>3.944264</b>
5(Eb)-7(A)	0.150564	62.484242	66.248353
10(A)-7(D#)	0.210563	87.383650	92.647725
<b>3(D)-4(A)</b>	<b>0.011988</b>	<b>4.975076</b>	<b>5.274779</b>
4(A)-3(Cx)	0.076723	31.839960	33.758030
4(Db)-5(A)	0.115370	47.878718	50.762978
<b>4(C#)-5(A)</b>	<b>0.002262</b>	<b>0.938763</b>	<b>0.995315</b>
<b>6(A)-5(C)</b>	<b>0.020634</b>	<b>8.562956</b>	<b>9.078797</b>
6(A)-5(B#)	0.152846	63.431161	67.252316
8(Cb)-9(A)	0.148584	61.662160	65.376748
<b>9(A)-8(B)</b>	<b>0.053705</b>	<b>22.287598</b>	<b>23.630224</b>
<b>15(Bb)-16(A)</b>	<b>0.040695</b>	<b>16.888624</b>	<b>17.906011</b>
16(A)-15(A#)	0.313988	130.304927	138.154622

A-440 Avg. Beat Rate for +/-3/6, P4/5 4.75

Avg. Deviation from Mean 2.57

Beat Rates	
Major Triads	
2nd Inversion	
2X	0.004524
Z	0.025804
2Y	0.017928
1st Inversion	
2Y	0.017928
2X	0.004524
Z	0.025804
Root Position	
Z	0.025804
Y	0.008964
X	0.002262
Minor Triads	
2nd Inversion	
2X	0.041267
2Z	0.005410
2Y	0.017928
1st Inversion	
2Y	0.017928
X	0.020634
Z	0.002705
Root Position	
Z	0.002705
Y	0.008964
X	0.020634



**Almost 1/5 Syntonic Comma Equal Meantone Temperament**

Jorgensen Chapters 35.36

Fifth =  $4^3 \times X^4 - 3^2 \times X^3 = 10$        $X = 1.496279720$       = **697.6559 Cents**

Note	Ratio	Cents	+/- from 12ET
B#	1.174803	278.90	-21.10
E#	1.570299	781.25	-18.75
A#	1.049469	83.59	-16.41
D#	1.402771	585.94	-14.06
G#	1.875012	1088.28	-11.72
C#	1.253116	390.62	-9.38
F#	1.674975	892.97	-7.03
B	1.119427	195.31	-4.69
E	1.496280	697.66	-2.34
A	1.000000	0.00	0.00
D	1.336648	502.34	2.34
G	1.786629	1004.69	4.69
C	1.194048	307.03	7.03
F	1.596022	809.38	9.38
Bb	1.066660	111.72	11.72
Eb	1.425750	614.06	14.06
Ab	1.905726	1116.41	16.41
Db	1.273643	418.75	18.75
Gb	1.702413	921.10	21.10
Cb	1.137764	223.44	23.44
Fb	1.520790	725.79	25.79

		Wolf +/-
		from Just
wolf o8	1116.41	28.14
+7	<b>1088.28</b>	
-7	<b>1004.69</b>	
wolf x6	976.56	-19.53
wolf o7	921.10	36.74
+6	<b>892.97</b>	
-6	<b>809.38</b>	
wolf x5	781.25	-32.44
wolf o6	725.79	23.83
P5	<b>697.66</b>	
o5	614.06	
x4	585.94	
P4	<b>502.34</b>	
wolf x3	474.21	-23.83
wolf o4	418.75	32.44
+3	<b>390.62</b>	
-3	<b>307.03</b>	
wolf x2	278.90	-36.74
wolf o3	223.44	19.53
+2	<b>195.31</b>	
-2	<b>111.72</b>	
wolf x1	83.59	-28.14

-Equal Beating 1st Inversion Minor Triads (+3, P4)

-Major Sixths beat twice as fast as Major Thirds

-(1/5 Syntonic Comma Fifth = 1.496277870 = 697.6537 cents)

Beat Rates from A		A 415	A 440
8(Ab)-15(A)	0.245808	102.010191	108.155384
<b>8(G#)-15(A)</b>	<b>0.000093</b>	<b>0.038489</b>	<b>0.040807</b>
<b>9(G)-16(A)</b>	<b>0.079662</b>	<b>33.059820</b>	<b>35.051375</b>
16(A)-9(Fx)	0.179492	74.489126	78.976422
3(Gb)-5(A)	0.107238	44.503890	47.184847
<b>3(F#)-5(A)</b>	<b>0.024926</b>	<b>10.344087</b>	<b>10.967225</b>
<b>8(A)-5(F)</b>	<b>0.019891</b>	<b>8.254696</b>	<b>8.751967</b>
8(A)-5(E#)	0.148505	61.629718	65.342352
2(Fb)-3(A)	0.041580	17.255801	18.295307
<b>3(A)-2(E)</b>	<b>0.007441</b>	<b>3.087832</b>	<b>3.273846</b>
5(Eb)-7(A)	0.128748	53.430324	56.649018
10(A)-7(D#)	0.180604	74.950505	79.465595
<b>3(D)-4(A)</b>	<b>0.009945</b>	<b>4.127346</b>	<b>4.375982</b>
4(A)-3(Cx)	0.054682	22.693205	24.060265
4(Db)-5(A)	0.094571	39.247125	41.611409
<b>4(C#)-5(A)</b>	<b>0.012463</b>	<b>5.172044</b>	<b>5.483613</b>
<b>6(A)-5(C)</b>	<b>0.029762</b>	<b>12.351332</b>	<b>13.095388</b>
6(A)-5(B#)	0.125984	52.283313	55.432911
8(Cb)-9(A)	0.102110	42.375512	44.928254
<b>9(A)-8(B)</b>	<b>0.044588</b>	<b>18.504019</b>	<b>19.618719</b>
<b>16(A)-15(Bb)</b>	<b>0.000099</b>	<b>0.041054</b>	<b>0.043527</b>
16(A)-15(A#)	0.257968	107.056516	113.505704

A-440 Avg.  
Beat Rate for +/-3/6, P4/5  
7.66  
  
Avg. Deviation from Mean  
3.28

Beat Rates	
Major Triads	
2nd Inversion	
2X	0.024926
Z	0.037296
2Y	0.014881
1st Inversion	
2Y	0.014881
2X	0.024926
Z	0.037296
Root Position	
Z	0.037296
Y	0.007441
X	0.012463
Minor Triads	
2nd Inversion	
2X	0.059524
2Z	0.029762
2Y	0.014881
1st Inversion	
2Y	0.014881
X	0.029762
Z	0.014881
Root Position	
Z	0.014881
Y	0.007441
X	0.029762

**43ET Equal Meantone Temperament**

Fifth =  $2^{25/43}$       = **1.496295739**      = **697.6744 Cents**

Note	Ratio	Cents	+/- from 12ET
B#	1.174916	279.07	-20.93
E#	1.570433	781.40	-18.60
A#	1.049547	83.72	-16.28
D#	1.402861	586.05	-13.95
G#	1.875112	1088.37	-11.63
C#	1.253169	390.70	-9.30
F#	1.675029	893.02	-6.98
B	1.119450	195.35	-4.65
E	1.496296	697.67	-2.33
A	1.000000	0.00	0.00
D	1.336634	502.33	2.33
G	1.786591	1004.65	4.65
C	1.194009	306.98	6.98
F	1.595953	809.30	9.30
Bb	1.066603	111.63	11.63
Eb	1.425658	613.95	13.95
Ab	1.905583	1116.28	16.28
Db	1.273534	418.60	18.60
Gb	1.702249	920.93	20.93
Cb	1.137642	223.26	23.26
Fb	1.520611	725.58	25.58

		Wolf +/-
		from Just
wolf o8	1116.28	28.01
+7	<b>1088.37</b>	
-7	<b>1004.65</b>	
wolf x6	976.74	-19.35
wolf o7	920.93	36.57
+6	<b>893.02</b>	
-6	<b>809.30</b>	
wolf x5	781.40	-32.29
wolf o6	725.58	23.63
P5	<b>697.67</b>	
o5	613.95	
x4	586.05	
P4	<b>502.33</b>	
wolf x3	474.42	-23.63
wolf o4	418.60	32.29
+3	<b>390.70</b>	
-3	<b>306.98</b>	
wolf x2	279.07	-36.57
wolf o3	223.26	19.35
+2	<b>195.35</b>	
-2	<b>111.63</b>	
wolf x1	83.72	-28.01

-Almost Identical to 1/5 Syntonic Comma Equal Meantone Temperament

Beat Rates from A		A 415	A 440
8(Ab)-15(A)	0.244665	101.536044	107.652673
<b>8(G#)-15(A)</b>	<b>0.000896</b>	<b>0.371729</b>	<b>0.394122</b>
<b>9(G)-16(A)</b>	<b>0.079318</b>	<b>32.916936</b>	<b>34.899884</b>
16(A)-9(Fx)	0.177798	73.786174	78.231124
3(Gb)-5(A)	0.106746	44.299674	46.968329
<b>3(F#)-5(A)</b>	<b>0.025087</b>	<b>10.411066</b>	<b>11.038239</b>
<b>8(A)-5(F)</b>	<b>0.020233</b>	<b>8.396517</b>	<b>8.902331</b>
8(A)-5(E#)	0.147833	61.350629	65.046450
2(Fb)-3(A)	0.041222	17.107156	18.137708
<b>3(A)-2(E)</b>	<b>0.007409</b>	<b>3.074536</b>	<b>3.259749</b>
5(Eb)-7(A)	0.128290	53.240290	56.447536
10(A)-7(D#)	0.179973	74.688728	79.188049
<b>3(D)-4(A)</b>	<b>0.009902</b>	<b>4.109530</b>	<b>4.357092</b>
4(A)-3(Cx)	0.054218	22.500371	23.855815
4(Db)-5(A)	0.094135	39.066049	41.419425
<b>4(C#)-5(A)</b>	<b>0.012677</b>	<b>5.261129</b>	<b>5.578064</b>
<b>6(A)-5(C)</b>	<b>0.029954</b>	<b>12.430909</b>	<b>13.179759</b>
6(A)-5(B#)	0.125418	52.048415	55.183862
8(Cb)-9(A)	0.101135	41.971122	44.499503
<b>9(A)-8(B)</b>	<b>0.044396</b>	<b>18.424440</b>	<b>19.534346</b>
<b>16(A)-15(Bb)</b>	<b>0.000955</b>	<b>0.396487</b>	<b>0.420372</b>
16(A)-15(A#)	0.256788	106.566899	112.986592

A-440 Avg.  
Beat Rate for +/-3/6, P4/5  
7.72  
  
Avg. Deviation from Mean  
3.32

Beat Rates	
Major Triads	
2nd Inversion	
2X	0.025355
Z	0.037537
2Y	0.014817
1st Inversion	
2Y	0.014817
2X	0.025355
Z	0.037537
Root Position	
Z	0.037537
Y	0.007409
X	0.012677
Minor Triads	
2nd Inversion	
2X	0.059908
2Z	0.030274
2Y	0.014817
1st Inversion	
2Y	0.014817
X	0.029954
Z	0.015137
Root Position	
Z	0.015137
Y	0.007409
X	0.029954





Equal Meantone Temperament Average Deviations

Equal Meantone Temperaments
Enharmonic Pythagorean Just Fifth
Pythagorean Just Fifth
12ET
4/25 Syntonic Comma
1/6 Holdrian Comma
43ET
Almost 1/5 Syntonic Comma
Almost 1/5 Ditonic Comma
Almost 2/9 Syntonic Comma
31ET
1/4 Syntonic Comma
Equal Harmony 2 <small>(Almost 50ET)</small>
Equal Harmony 1 <small>(Almost 2/7 Syntonic Comma)</small>
Almost 5/17 Syntonic Comma
1/3 Syntonic Comma
19ET

Fifths		(cents)	Deviation from Just
1.5	=	701.9550	0
1.5	=	701.9550	0
1.498307	=	700	-1.9550
1.497021556	=	698.5140	-3.4410
1.496733999	=	698.1814	-3.7736
1.496295739	=	697.6744	-4.2806
1.496279720	=	697.6559	-4.2991
1.495953506	=	697.2784	-4.6766
1.495865822	=	697.1769	-4.7781
1.495517882	=	696.7742	-5.1808
1.495348781	=	696.5784	-5.3766
1.494830501	=	695.9783	-5.9767
1.494684827	=	695.8096	-6.1454
1.494530181	=	695.6304	-6.3246
1.493801582	=	694.7862	-7.1688
1.493758962	=	694.7368	-7.2182

Average Deviations from Just (cents)			
5 Limit	7 Limit	11 Limit	13 Limit
1.40	21.89	19.96	24.31
15.36	27.75	19.96	24.31
10.61	29.22	36.34	34.52
7.00	16.96	29.73	25.02
6.52	14.22	28.21	23.43
6.16	10.03	26.20	21.01
6.15	9.88	26.16	20.92
6.41	6.77	25.30	19.12
6.49	5.93	25.15	18.63
6.77	4.08	25.04	16.71
6.91	4.03	24.98	15.78
8.03	5.42	24.81	12.62
8.34	6.13	24.76	12.17
8.67	6.89	24.71	11.75
10.24	13.79	24.46	10.66
10.38	14.20	24.41	10.70

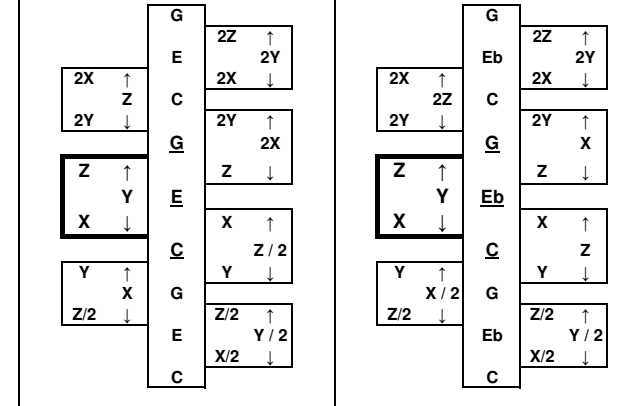
Average Beat Rate	(hertz)	Avg. Dev. from Mean
1.99		1.32
21.84		14.56
15.39		9.10
10.49		5.16
9.39		4.43
7.72		3.32
7.66		3.28
6.41		2.69
6.08		2.63
4.75		2.57
4.10		2.74
4.76		0.68
4.95		0.87
5.14		1.29
6.08		4.26
6.27		4.30

Interval Beat Rates

Comparative Beat Rates of Tempered Inverted Intervals

P5	G	X	P4	C	2X	+3	E	X	-6	C	2X	+6	C	X	-3	E $\flat$	2X
	C	X	P5	G	X	-6	C	X	+3	E	X	-3	E $\flat$	X	+6	C	X
P4	G	X	P5	C	X		E	X		C	X		E $\flat$	X		C	X

Comparative Beat Rates of Tempered Major and Minor Triad Inversions



Interval Beat Rate Formulas

X, Y, Z = Beat Rates in hertz  
C, Eb, E, G = Pitches in hertz

$\begin{matrix} Z & G & \uparrow \\ X & E & Y \\ & C & \downarrow \end{matrix}$	$\begin{matrix} Z & C & \uparrow \\ X & G & Y \\ & E & \downarrow \end{matrix}$	$\begin{matrix} Z & E & \uparrow \\ X & C & Y \\ & G & \downarrow \end{matrix}$	$\begin{matrix} Z & G & \uparrow \\ X & E\flat & Y \\ & C & \downarrow \end{matrix}$	$\begin{matrix} Z & C & \uparrow \\ X & G & Y \\ & E\flat & \downarrow \end{matrix}$	$\begin{matrix} Z & E\flat & \uparrow \\ X & C & Y \\ & G & \downarrow \end{matrix}$
$\begin{matrix} C E \uparrow \\ C E \downarrow \end{matrix} \left\{ \begin{array}{l} X = 4E - 5C \\ E = (5C + X) / 4 \\ X = 5C - 4E \\ E = (5C - X) / 4 \end{array} \right.$	$\begin{matrix} E G \downarrow \\ E G \uparrow \end{matrix} \left\{ \begin{array}{l} X = 6E - 5G \\ G = (6E - X) / 5 \\ X = 5G - 6E \\ G = (6E + X) / 5 \end{array} \right.$	$\begin{matrix} G C \uparrow \\ G C \downarrow \end{matrix} \left\{ \begin{array}{l} X = 3C - 4G \\ C = (4G + X) / 3 \\ X = 4G - 3C \\ C = (4G - X) / 3 \end{array} \right.$	$\begin{matrix} C E\flat \downarrow \\ C E\flat \uparrow \end{matrix} \left\{ \begin{array}{l} X = 6C - 5E\flat \\ E\flat = (6C - X) / 5 \\ X = 5E\flat - 6C \\ E\flat = (6C + X) / 5 \end{array} \right.$	$\begin{matrix} E\flat G \uparrow \\ E\flat G \downarrow \end{matrix} \left\{ \begin{array}{l} X = 4G - 5E\flat \\ G = (5E\flat + X) / 4 \\ X = 5E\flat - 4G \\ G = (5E\flat - X) / 4 \end{array} \right.$	$\begin{matrix} G C \uparrow \\ G C \downarrow \end{matrix} \left\{ \begin{array}{l} X = 3C - 4G \\ C = (4G + X) / 3 \\ X = 4G - 3C \\ C = (4G - X) / 3 \end{array} \right.$
$\begin{matrix} C G \downarrow \\ C G \uparrow \end{matrix} \left\{ \begin{array}{l} Y = 3C - 2G \\ G = (3C - Y) / 2 \\ Y = 2G - 3C \\ G = (3C + Y) / 2 \end{array} \right.$	$\begin{matrix} E C \downarrow \\ E C \uparrow \end{matrix} \left\{ \begin{array}{l} Y = 8E - 5C \\ C = (8E - Y) / 5 \\ Y = 5C - 8E \\ C = (8E + Y) / 5 \end{array} \right.$	$\begin{matrix} G E \uparrow \\ G E \downarrow \end{matrix} \left\{ \begin{array}{l} Y = 3E - 5G \\ E = (5G + Y) / 3 \\ Y = 5G - 3E \\ E = (5G - Y) / 3 \end{array} \right.$	$\begin{matrix} C G \downarrow \\ C G \uparrow \end{matrix} \left\{ \begin{array}{l} Y = 3C - 2G \\ G = (3C - Y) / 2 \\ Y = 2G - 3C \\ G = (3C + Y) / 2 \end{array} \right.$	$\begin{matrix} E\flat C \uparrow \\ E\flat C \downarrow \end{matrix} \left\{ \begin{array}{l} Y = 3C - 5E\flat \\ C = (5E\flat + Y) / 3 \\ Y = 5E\flat - 3C \\ C = (5E\flat - Y) / 3 \end{array} \right.$	$\begin{matrix} G E\flat \downarrow \\ G E\flat \uparrow \end{matrix} \left\{ \begin{array}{l} Y = 8G - 5E\flat \\ E\flat = (8G - Y) / 5 \\ Y = 5E\flat - 8G \\ E\flat = (8G + Y) / 5 \end{array} \right.$
$\begin{matrix} E G \downarrow \\ E G \uparrow \end{matrix} \left\{ \begin{array}{l} Z = 6E - 5G \\ Z = 5G - 6E \end{array} \right.$	$\begin{matrix} G C \uparrow \\ G C \downarrow \end{matrix} \left\{ \begin{array}{l} Z = 3C - 4G \\ Z = 4G - 3C \end{array} \right.$	$\begin{matrix} C E \uparrow \\ C E \downarrow \end{matrix} \left\{ \begin{array}{l} Z = 4E - 5C \\ Z = 5C - 4E \end{array} \right.$	$\begin{matrix} E\flat G \uparrow \\ E\flat G \downarrow \end{matrix} \left\{ \begin{array}{l} Z = 4G - 5E\flat \\ Z = 5E\flat - 4G \end{array} \right.$	$\begin{matrix} G C \uparrow \\ G C \downarrow \end{matrix} \left\{ \begin{array}{l} Z = 3C - 4G \\ Z = 4G - 3C \end{array} \right.$	$\begin{matrix} C E\flat \downarrow \\ C E\flat \uparrow \end{matrix} \left\{ \begin{array}{l} Z = 6C - 5E\flat \\ Z = 5E\flat - 6C \end{array} \right.$