
 Zeta-24 JI tuning
 An offshoot of Kraig Grady's Centaur
 and Rod Poole's 17-note tuning
 Primes 2-3-7-11-13

Keyboard mapping

C*	Dp/C#2	D*	Ep/Eb*	E*	F*	Gp/F#2	G*	Ap/G#2	A*	Bp/Bb*	B*	C*
91/88	13/12	7/6	11/9	21/16	11/8	13/9	14/9	13/8	7/4	11/6	63/32	91/44
58	139	267	347	471	551	637	765	841	969	1049	1173	1258
22:21	14:13	22:21	189:176	22:21	104:99	14:13	117:112	14:13	22:21	189:176	104:99	
81	139	81	123	81	85	128	76	128	81	123	85	
C	C#1	D	Eb	E	F	F#1	G	G#1	A	Bb	B	C
1/1	14/13	9/8	13/11	14/11	4/3	56/39	3/2	21/13	22/13	16/9	21/11	2/1
0	128	204	289	418	498	626	702	830	911	996	1119	1200
14:13	117:112	104:99	14:13	22:21	14:13	117:112	14:13	22:21	104:99	189:176	22:21	
128	76	85	128	81	128	76	128	81	85	123	81	

In Zeta-24, while most of the steps are shared in common with Rod Poole's 17-note JI system which he designed together with Erv Wilson and Kraig Grady with Grady's Centaur as a starting point, the structure is a bit different.

Each 12-note manual has a chain of 11 fifths (at 3/2, 176/117, or 182/121, with the latter two ratios at 4.925 or 4.763 cents wide) -- but with different arrangements on each manual! Thus on the lower manual, the chain runs Eb-G#1 (13/11-21/13), while on the upper manual it might best be shown using some Persian notation, where a koron sign (in ASCII, "p" as a mirrored flat) lowers a step by about 1/3 tone: Gp-B (13/9-63/32).

In Persian music, for example, Dp on the upper manual at 13/12 is about 1/3 tone lower than unmodified D on the lower manual at 9/8, and about 2/3 tone higher than C at 1/1. While in different contexts, or for different tastes, either 13/12 or the lower 14/13 (C#1 on the lower manual) might serve as Dp, the division of a 9/8 tone into 13/12 and 27/26 (e.g. 1/1-13/12-9/8) is often favored by Ibn Sina, the great philosopher, physician, and music theorist (980-1037). He also notes that people sometimes use either 13:12 or 14:13 steps, with some musicians indiscriminately confusing the two intervals.

A main purpose of Zeta-24 is to provide a flexible and hopefully fruitful choice between these and other ratios. From one point of view, this design philosophy results in a kind of overlap between the two 12-note chains of fifths on each keyboard. While the keyboard diagram above shows this general situation, the following diagram shows the overlap in the two chains of fifths: dashed lines show pure 3:2 fifths within a chain, with dotted lines for virtually tempered fifths at 176:117 or 182:121. Note how the three "overlapping" pairs of steps differ by only 169:168 or 10.274 cents

637	139	841	347	1049	551	58	765	267	968	471	1173											
13/9	13/12	13/8	11/9	11/6	11/8	91/88	14/9	7/6	7/4	21/16	63/32											
F#2	--	C#2	--	G#2	..	Eb*	--	Bb*	--	F*	..	C*	..	G*	--	D*	--	A*	--	E*	--	B*

Eb	..	Bb	--	F	--	C	--	G	--	D	..	A	..	E	--	B	..	F#1	--	C#1	--	G#1	
13/11	16/9	4/3	1/1	3/2	9/8	22/13	14/11	21/11	56/39	14/13	21/13	289	996	498	0	702	204	911	418	1119	626	128	830

On either manual, what is called in European terms a chromatic semitone (e.g. F-F#1 on the lower manual) is at or around 14:13, while a diminished third (e.g. C#1-Eb on the lower manual) is at or around 169/154 (160.911 cents) or 208/189 (165.837 cents). The Gp-B mapping of the upper keyboard makes it especially easy to play certain modes, e.g. D-E-Gp-A-B-Dp-D at 1/1-9/8-26/21-4/3-3/2-27/16-13/7-2/1 as a current northern Syrian or possible historical Ottoman Rast.

In addition to honoring Rod Poole, Kraig Grady, and Erv Wilson, I would like to note the special contribution of George Secor in his 29-note High Tolerance Temperament (29-HTT) designed in 1978, who showed how it is possible to have ratios such as 13/8, 11/9, and 7/4 all represented in a system using only two chains of fifths. While his ingenious solution was to have all regular fifths tempered very slightly wide (703.579 cents, or 1.624 cents larger than pure), a system such as Zeta-24 mixes pure 3/2 fifths with some virtually tempered ones to arrive at the same result -- here, 15 pure 3/2 fifths plus 5 at 176/117 (706.880 cents) and 2 at 182/121 (706.718 cents).

It is on the shoulders of these medieval and recent musicians, ranging from al-Farabi and Ibn Sina to Poole, Wilson, Grady, and Secor, that Zeta-24 is poised, and who must be given credit for most of whatever merits this system may have, without in any way being held responsible for any flaws or infelicities on my part.

Margo Schullter
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 Corrected 31 December 2013 (thanks, Scott Thompson!)