7-limit tuning

7-limit or **septimal** tunings and intervals are musical instrument tunings that have a limit of seven: the largest number contained in the interval ratios between pitches is a multiple of seven.

For example, the greater just minor seventh, 9:5 Play (help·info) is a 5-limit ratio, the harmonic seventh has the ratio 7:4 and is thus a septimal interval. Similarly, the septimal chromatic semitone, 21:20, is a septimal interval as 21÷7=3. The harmonic seventh is used in the barbershop seventh chord and music. (Play (help·info)) Compositions with septimal tunings include La Monte Young's *The Well-Tuned Piano*, Ben Johnston's String Quartet No. 4, and Lou Harrison's *Incidental Music for Corneille's Cinna*.

The Great Highland Bagpipe is tuned to a ten-note seven-limit scale:[3] 1:1, 9:8, 5:4, 4:3, **27:20**, 3:2, 5:3, **7:4**, 16:9, 9:5.

In the 2nd century Ptolemy described the septimal intervals: 7/4, 8/7, 7/6, 12/7, 7/5, and 10/7.[4] Those considering 7 to be consonant include Marin Mersenne,[5] Giuseppe Tartini, Leonhard Euler, François-Joseph Fétis, J. A. Serre, Moritz Hauptmann, Alexander John Ellis, Wilfred Perrett, Max Friedrich Meyer.[4] Those considering 7 to be dissonant include Gioseffo Zarlino, René Descartes, Jean-Philippe Rameau, Hermann von Helmholtz, A. J. von Öttingen, Hugo Riemann, Colin Brown, and Paul Hindemith ("chaos"[6]).[4]

Lattice and tonality diamond

The 7-limit tonality diamond:

This diamond contains four identities (1, 3, 5, 7 [P8, P5, M3, H7]). Similarly, the 2,3,5,7 pitch lattice contains four identities and thus 3-4 axes, but a potentially infinite number of pitches. LaMonte Young created a lattice containing only identities 3 and 7, thus requiring only two axes, for *The Well-Tuned Piano*.

Approximation using equal temperament

It is possible to approximate 7-limit music using equal temperament, for example 31-ET.

See also

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Sources

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2. ^ Fonville (1991), p.128.
3. ^ Benson, Dave (2007). *Music: A Mathematical Offering*, p.212. ISBN 9780521853873.
4. ^ ***a*** ***b*** ***c*** Partch, Harry (2009). *Genesis of a Music: An Account of a Creative Work, Its Roots, and Its Fulfillments*, p.90-1. ISBN 9780786751006.
5. ^ Shirlaw, Matthew (1900). *Theory of Harmony*, p.32. ISBN 978-1-4510-1534-8.
6. ^ Hindemith, Paul (1942). *Craft of Musical Composition*, v.1, p.38. ISBN 0901938300.