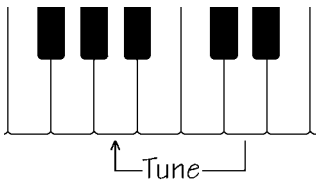
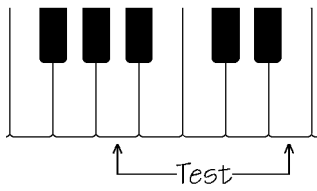
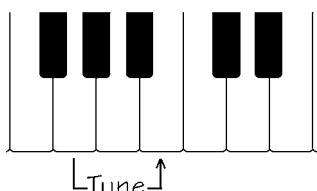
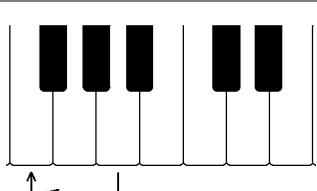


From Robert Chuckrow, *Historical Tuning of Keyboard Instruments: Theory and Practice*, Rising Mist Publications, Briarcliff Manor, NY, 1999, 2006, pp. 43–46.

### 7.3. Tuning the Naturals of the Temperament Octave in Meantone

The meantone naturals are tuned by tempered fifths and perfect thirds according to the scheme shown in Fig. 7.4. For the beat rates indicated, the superscripts *n* and *w* stand for *narrow* and *wide*, respectively.

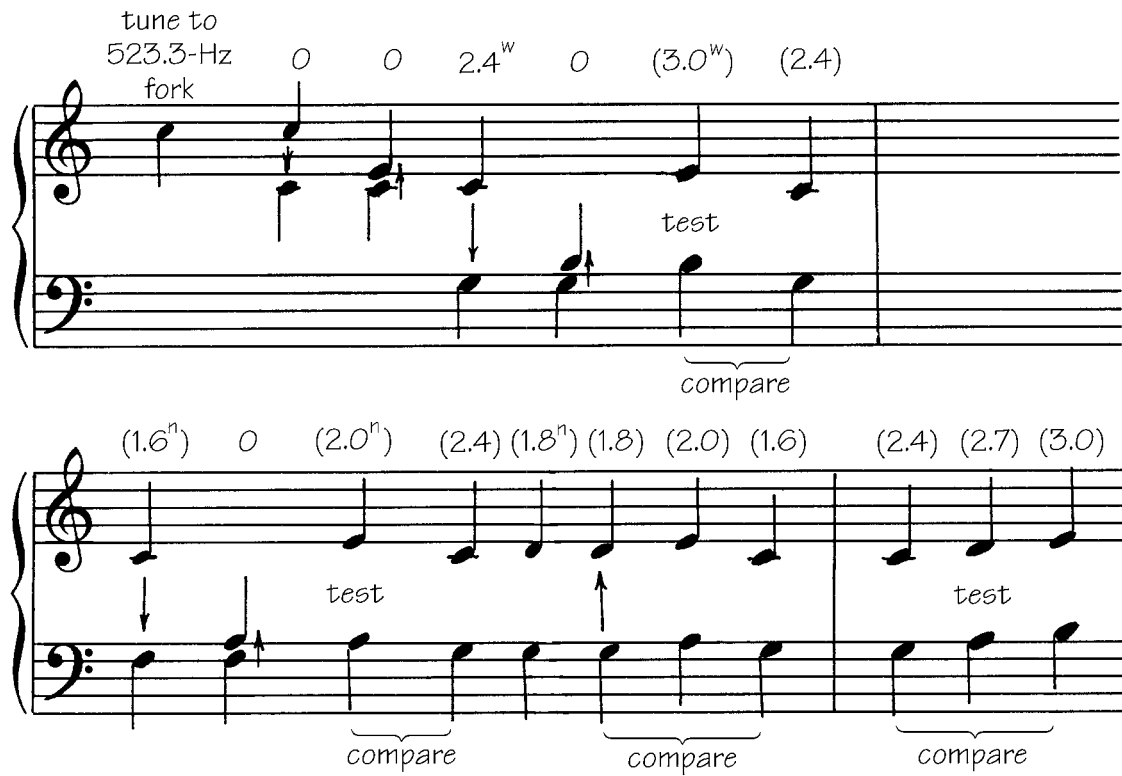
A Scheme for Tuning the Temperament Octave in the 1/4-Syntonic-Comma Meantone Temperament			
Step	View	Beat Rate (Hz)	Comments
1		zero	Tune the C above middle C to a 523.3-Hz tuning fork.
2		$1.6^n$	Tune middle C to the C above middle C. This note is tuned sharp by 1.6 beats to achieve the A440-Hz standard.
3		zero	Tune the E above middle C to middle C so that C—E is a perfect (beatless) third.
4		$2.4^w$	Tune the G below middle C to middle C so that G—C is a widened fourth.
5		$1.8^n$	Tune the D above middle C to the G below middle C so that G—D is a narrowed fifth.

6		2.7 <sup>w</sup>	Tune the A below middle C to the D above middle C so that A—D is a widened fourth.
7		2.0 <sup>n</sup>	The fifth A—E should be 2.0 b/s narrow. If not so, adjust the tuning in steps 4–6 above.
8		zero	Tune the B below middle C to the G below middle C so that G—B is a perfect (beatless) third.
9		zero	Tune the F below middle C to the A below middle C so that F—A is a perfect (beatless) third.

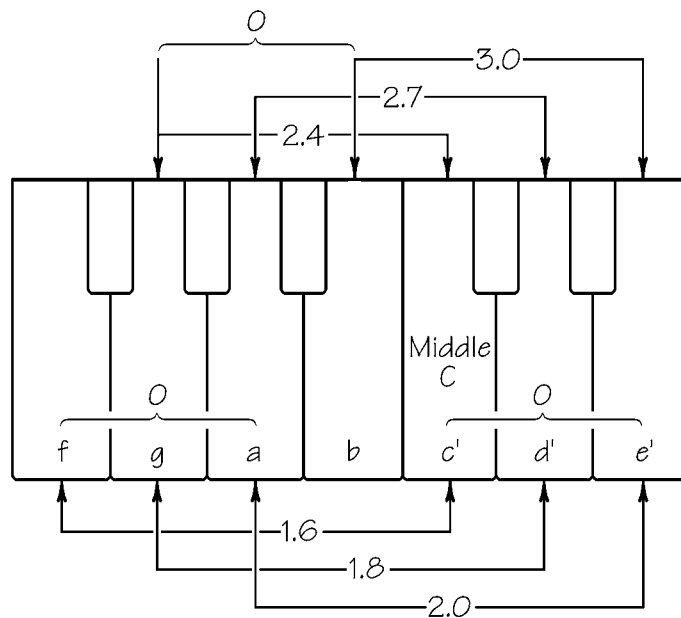
**Fig 7.4.** The tuning of the meantone naturals of the temperament octave using tempered fifths and perfect thirds.

Interval	Beat Rate	Test(s)
$c' \rightarrow e'$	zero	
$g \leftarrow c'$	2.4 <sup>w</sup>	
$g \rightarrow b$	zero	compare $b—e'$ (3.0 <sup>w</sup> ) > $c'—g$ (2.4)
$c' \leftarrow f$	1.6 <sup>n</sup>	
$f \rightarrow a$	zero	compare $a—e'$ (2.0 <sup>n</sup> ) < $c'—g$ (2.4)
$g \rightarrow d'$	1.8 <sup>n</sup>	compare $g—d'$ (1.8 <sup>n</sup> ) > $a—e'$ (2.0) and $g—d'$ (1.8 <sup>n</sup> ) < $f—c'$ (1.6)
<b>Final Tests</b>		compare $a—d'$ (2.7 <sup>w</sup> ) < $b—e'$ (3.0) and $a—d'$ (2.7 <sup>w</sup> ) > $g—c'$ (2.4)

**Table 7.1.** Testing the meantone naturals. Beat rates are in parentheses, and the superscripts *n* and *w* refer to intervals that are narrow and wide, respectively. The above information is portrayed in musical notation in Fig. 7.5, and the beat rates for all intervals are summarized in Fig. 7.6.



**Fig. 7.5.** Tuning of the meantone naturals of the temperament octave. The superscripts *w* and *n* above the numbers refer to wide and narrow, respectively, and the numbers are the beat rates of the intervals. The beat rates of the intervals used as tests are in parentheses.



**Fig. 7.6.** The beat rates in Hz of all intervals involving the meantone naturals.

#### 7.4. Tuning the Meantone Sharps and Flats

The meantone sharps are tuned by perfect thirds according to the scheme shown in Fig. 7.7. The frequencies of the meantone scale for which C<sub>4</sub> has a frequency of 261.626 are shown in Table 7.2.

Meantone Sharps		Meantone Flats	
Tune up a perfect third from:	to obtain	Tune down a perfect third from:	to obtain
D	F <sup>#</sup>	D	B <sup>b</sup>
A	C <sup>#</sup>	G	E <sup>b</sup>
E	G <sup>#</sup>	C	A <sup>b</sup>
B	D <sup>#</sup>	F	D <sup>b</sup>
F <sup>#</sup>	A <sup>#</sup>	B <sup>b</sup>	G <sup>b</sup>

**Fig. 7.7.** *Tuning of the meantone sharps and flats. The sharps are all tuned up a perfect third from the associated natural, and the flats are all tuned down a perfect third from the associated natural.*

After completing a meantone tuning in which the notes G<sup>#</sup><sub>3</sub> and E<sup>b</sup><sub>4</sub> occur, it is telling to play the wolf interval G<sup>#</sup><sub>3</sub>—E<sup>b</sup><sub>4</sub> and note its sour sound.