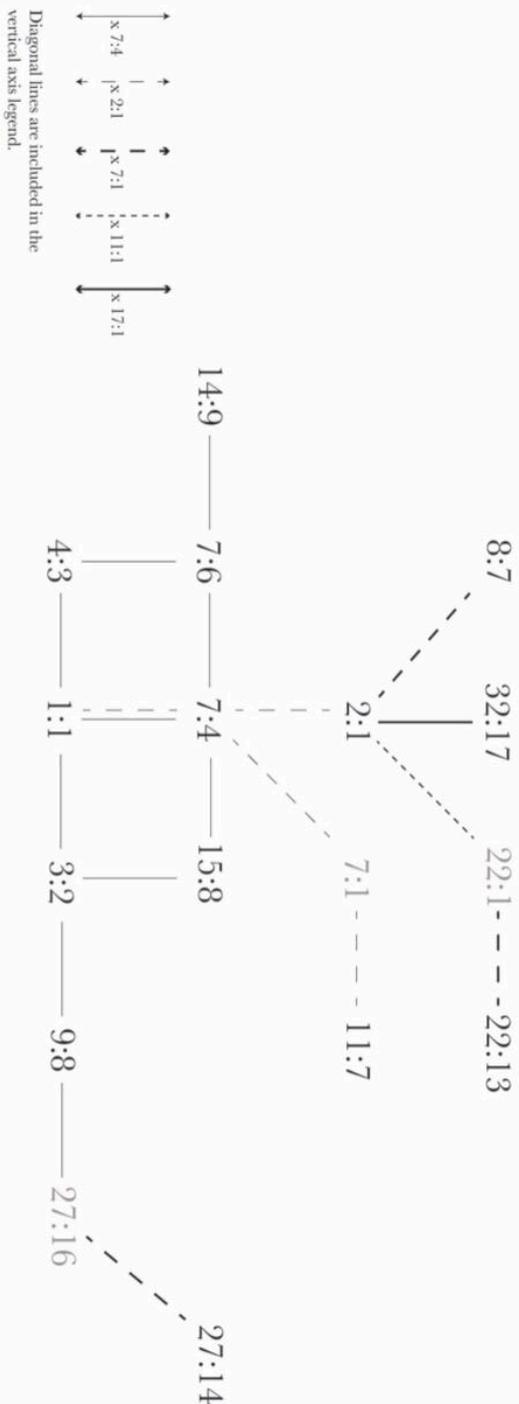
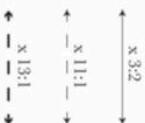


Dreams of the Forty Whales of the Harmonic Reed System Tuning



Several of the higher prime limits are developed through octave extensions not shown such as 22:13, 11:7, 8:7, 7:1, and 32:17, often by a factor of 2:1 or more. 27:14 is found through 3:1 extensions, a 1:7 reduction, and a 1:2 reduction.



Exact calculations of selected intervals:
 $27:14 - (1:2) \times (3:1)^5 \times (1:7)$
 $22:13 - (2:1) \times (1:1) \times (1:13)$
 $32:17 - 2^5 \times (1:17)$
 $11:7 - (1:7) \times (1:1)$
 $8:7 - 2^2 \times (1:7)$

About just intonation:

Just intonation is a tuning system that allows one to create pure harmonic relationships between notes based on the use of whole-number ratios. This contrasts our current system in much of Western classical music of equal temperament, where all notes are equally slightly out of tune in order to allow one to play with any other tempered instrument (often fixed-pitch) in any key without having to retune or change instruments. Just intonation selects a fundamental tonic and uses this frequency to calculate the tunings for all other notes in the scale based on the location of that note in the harmonic series. Therefore, to play in a different key on a just intoned instrument would sound quite out of tune. Common prime numbers of the overtone and undertone series are used to calculate basic relationships, with 2, 3 and 5 being the most common and accessible, and 7, 11, 13, and 17 yielding more note possibilities that explore sweeter, richer, neutral, or near-tempered notes. Different intervals can yield new and unique interference beats, and some can all but eliminate them to produce only pure harmonic waves. Just intonation was commonly used in early monophonic and polyphonic music (Pythagorean tuning), and was revived in the 20th century by pioneers such as Harry Partch and La Monte Young, the latter of whom is well known for his 5-7 hour durational piano work, *The Well-Tuned Piano*, which many acclaim as prophetic in its exploration of the primes of 2, 3 and 7, eliminating the use of 5:4 triadic harmony. Surrounding La Monte's work were other artists to explore JI such as Tony Conrad (who, it is said, introduced it to La Monte), Terry Riley, Michael Harrison, and Catherine Christer Hennix, amongst many others. In many regions of the world, rich forms of folk and classical music can be found in variations of just intonation and microtonal systems such as Indian Classical gayaki (vocal music); the systems of Persian dastgah, Arabic maqamat, Azerbaijani mugham; music of the Great Highland bagpipes; and forms of Javanese Gamelan (and notably American Gamelan pioneers such as Lou Harrison, Daniel Schmidt, David Doty, Jarrad Powell all used sets tuned in just intonation); amongst others.

About the tuning of the composition:

The shruti boxes are primarily tuned using a combination of the primes of 2, 3, 5, and 7, with the 17-limit shruti box containing primarily primes of 11 and 13, with one 17-limit interval (32:17, small septendecimal major 7th). I selected a 17-limit major 7th in order to have 3 unique and very close together major 7ths to play together, allowing their harmonics to interact. A selection of the intervals are related directly to their pure parent harmonics (i.e 7:1, 13:1, 11:1, etc), in contrast to their common interval within the harmonic series (i.e. 7:4, 13:8, etc) to attempt to explore higher harmonic relationships.

The tuning for each box is as follows (*only notes used in the composition are included*):

The Gray Whales (7-limit shruti)
 1:1, 8:7, 7:6, 4:3, 3:2, 14:9, 7:4, 27:14, 2:1

The Bowhead Whales (17-limit shruti)
 1:1, 3:2, 11:7, 22:13, 7:4, 32:17, 2:1

The Humpback Whales (7-limit shruti)
 1:1, 8:7, 7:6, 4:3, 3:2, 14:9, 2:1, 7:3

The Blue Whales (7-limit harmonium with octave extensions)
 1:1, 3:2, 2:1, 9:4 [9:8 oct], 8:3 [4:3 oct], 3:1 [3:2 oct], 28:9 [14:9 oct], 7:2 [7:4 oct], 15:4 [15:8 oct], 32:7 [8:7 2nd oct], 14:3 [7:6 2nd oct]