

# Intonation Markings in the music of William Copper

- ⊕ Tonic. The tonic and its fifth relations form a Pythagorean 'stack' of fifths.
- ↑ Pure fifth above tonic, sometimes second when tuned above fifth, occasionally sixth
- ↓ Fourth, tuned a pure fifth below tonic, sometimes lowered seventh a pure fifth below fourth. when tuned above second and used as secondary dominant.
- ▼ Tuned third, seventh, usually sixth, and often second. Tune to appropriate tonic, fifth, fourth (usually), and fifth below (often), respectively. Marked to indicate low tuning in relation to equal temperament. The third, 14 cents low; the seventh, 12 cents low; the sixth, when low, is 16 cents low; the second, when low, is 18 cents low. No attempt should be made to tune away from an equal tempered note; rather, a part with a tuned marking should identify and tune to the appropriate note in another voice.
- △ Minor third relation tuned high 16 cents relative to the minor third below.
- ▼ Third of secondary dominant to a sixth or third, 12 cents lower relative to that third or sixth.
- ▼ Rarely used third of a secondary dominant to an already lowered modal note. Two commas lower than the major third, three commas (66 cents) lower than the tonic and its fifth relations.

The intonation markings are relevant for melodic movement as well as harmonic relationships.

The entire contents, or set of pitches, for a musical passage may be envisioned as a lattice, with the tonic 'stack of fifths' in the center, the comma-low major thirds in a stack on one one side, the comma-high minor thirds in a stack to the other side. The two-comma low stack then will fall beyond the comma-low stack, providing as many thirds of secondary dominants as may be used in a passage (usually only a few), and, rarely, the triple-comma low notes and double-comma high notes fall further out, in each case a new stack of fifths a comma away from the neighboring stack.

In just intonation there are two rather different whole steps, large and small, both common.

There is a normal (large) half step, a chromatic half step, and small chromatic half step.

Bb, used as the seventh. There is just one correctly tuned major third, fourth, and fifth.

There is a tuned minor third, and a smaller, untunable minor third, as between, for example in F major, the tuned high second scale step (G) used in a dominant triad (C-E-G) and the fourth,

The diminished fifth, Bb down to E in F major, cannot be tuned by ear, but it consists of two normal half steps, one large whole step, and one small whole step. It is used occasionally in some music. The augmented fourth, the tritone, from F up to B natural in F major, is somewhat smaller, containing two large whole steps and one small whole step.

Whole steps:

Half steps: