How To Defy Dead Germans

By Kyle Gann

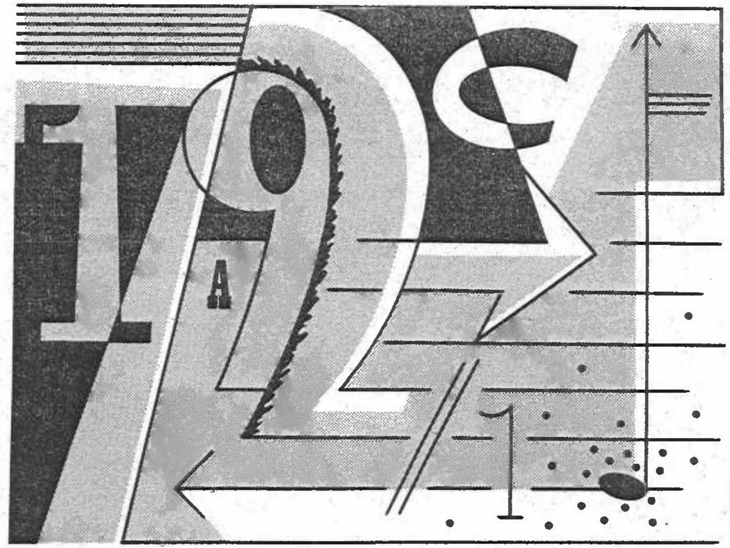
Tuning

Tuning is politics. Centuries ago that was better understood than it is today. In his *L'antica musica* of 1555, Nicola Vicentino complained about Europe's 12-pitch scale: "One can write no French, German, Spanish, Hungarian, Turkish, Hebrew songs, nor one in another language, because the steps and skips of all the nations of the world do not proceed according to their maternal pronunciation exclusively through the intervals of whole tones and semitones." Vicentino claimed that the 31-pitch-to-the-octave harpsichord he had invented accommodated all the world's musics. Multicultural before the term was invented, he foresaw that Europe, by setting the 12-pitch octave, threatened to impose intonational homogeneity around the globe.

The seven-white/five-black keyboard (originally with colors reversed) was introduced in 1361 at Halberstadt, Germany, and its inexorable spread committed us to a 12-pitch octave. That scale is a filter through which jazz, gamelan, and many other musics don't smoothly pass. That's why it's so exciting that our digital era has *re*-transformed the keyboard. Before the 1980s, if you wanted to explore other tunings, you probably needed some carpentry skills to alter your instruments, plus a damned fine ear to judge the results. Now, with tunable digital keyboards, the process takes an easier, backward route from theory to audibility. You can figure a tuning you'd like to hear, plug in the numbers, and train yourself to hear distinctions.

I've never considered mine a terribly acute ear for pitch—when people complain about a performance being out of tune, I pretend to have noticed. But I have a Yamaha DX7 II-FD in which I've installed Harry Partch's 43-tone scale, a wonderfully flexible scale for teaching yourself differences between close intervals. Recently when La Monte Young played me a tape of his Forever Bad Blues Band, I recognized that the tonic chord had a 7/6 minor third in it, a third of a half-step flatter than you'd expect; it's not just a number but a quality, a pungent, sexually intense tonality. I couldn't have caught that color without a retunable digital keyboard to tinker with.

Digital keyboards make exploration easy, but not always flexible or convenient. The rock-instrument industry provides tuning options as a novelty, with little imagination and less insight. Their preset tunings are usually Baroque, as though your goal in life is going to be playing



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Switched-On Couperin. From the ancient Greeks on, pure-tuning musicians have thought in fractions; 2/1 is the ratio between frequencies of an octave, 3/2 of a perfect fifth (C to G). Digital keyboard builders think like scientists, in logarithmic divisions of a scale. You can get keyboards that divide the octave into anywhere from 200 to 1200 equal divisions, the more the better. A beautiful guide to tunable keyboards and alternate scales is Scott R. Wilkinson's *Tuning In* (Hal Leonard Books). It came out in 1988, but a recent tour through Sam Ash Music (courtesy of salesman Bob Chapin) suggested that it hasn't been greatly superceded.

Perceptually, intervals are measured in *cents*, which equal 1/100 of a half-step or 1/1200 of an octave. I can tune a pitch by ear within about five cents (not exceptional), and my piano tuner can do it within two. The Yamaha DX7 II-FD gives you 1024 possible pitches per octave, a resolution of about 1.17 cents. The Ensoniq EPS has a resolution of one cent (an impressive 1200 pitches per octave), but the Ensoniq Mirage only 4.69 cents (256 per octave). The formula for calculating an interval on a synthesizer (math phobes skip to the next paragraph) is: divide the possible number of pitches per octave by the logarithm of two, then multiply that by the logarithm of the ratio you want.

Other synthesizers, including the Korg M1 and 01W, Synclavier, and Kurzweil, tune all octaves to the same scale; you can tune to one cent accuracy, but you're locked in to 12 pitches. Well-tuned samplers are rarer. The popular Akai S-950 allows you to tune notes only within six cents, not nearly accurate enough for subtle harmonies. With all the amazingly detailed changes the Akai lets you make in sampled sounds, it's a shame you can't be as precise with the intervals.

For understanding what tuning is all about, we badly need a sampler or synth that thinks in fractions; that will allow you to set one pitch as the fundamental, and enter the others as ratios, with a numerator and denominator. Then the machine can do the hard math internally, and give you a more exact interval. For example, the readout could ask what pitch will be 1/1, you answer G, then for B-flat you enter 7 slash 6, and you'll have a 7/6 third. Seems simple enough, but at present, only the little-known Rayna synthesizer—available not in stores, but from its inventor David Rayna—fills the bill. It's accurate to within one beat a *year*, and it's what Young is using to explore prime-numbered overtones in the 1792 to 2304 range. Otherwise, as Chapin told me, inquiries about tunability are infrequent and idly curious, and there's little commercial pressure to refine the systems.

That's sad, for tuning is no academic fetish (most profs are afraid to touch it), nor is microtonality the "fringe," as a funder recently told pitch-bender Johnny Reinhard. It's a subconscious political force, and ought to be as crucial to pop performers as to avant-gardists. Billie Holiday sang seventh and 11th overtones inaccessible to the piano, while Balinese music uses pitch distinctions as small as 55/54, beyond even Vicentino's harpsichord. It doesn't matter whether you're doing blues, reggae, process pieces, or free improv: every time you acquiesce to the same old 12 pitches, you let a bunch of dead Germans limit what your music can express. And now, defying them is so easy. ■