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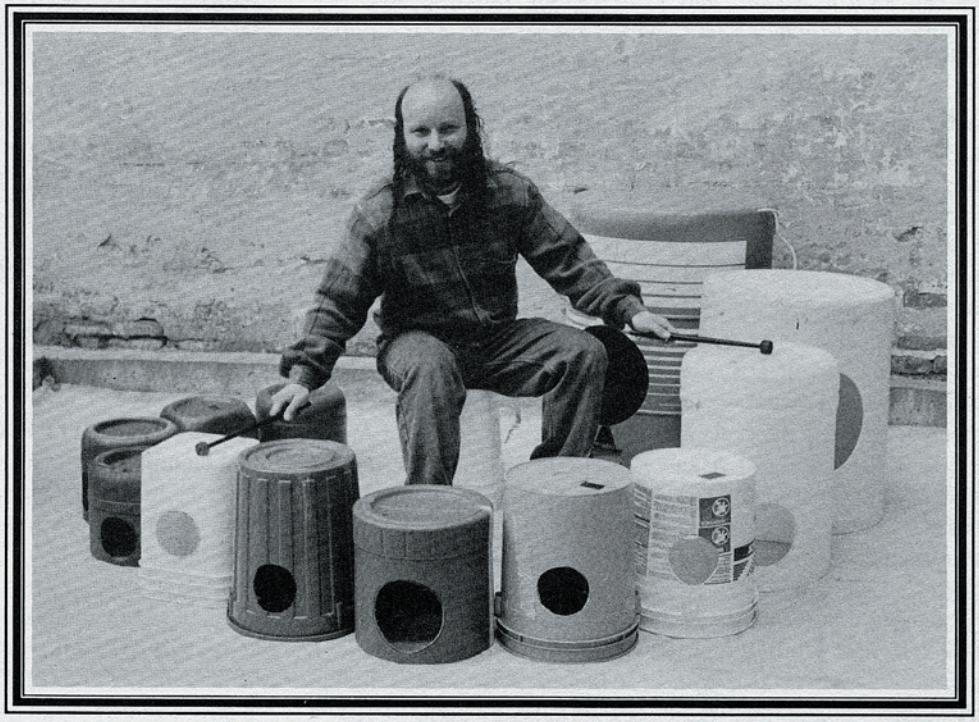
EXPERIMENTAL MUSICAL INSTRUMENTS

For the Design, Construction, and Enjoyment of Unusual Sound Sources

BIG AND LITTLE



Musical strings normally produce their sounds by transverse vibration — that is, by a side-to-side movement, which can easily be made to drive a soundboard and produce an audible sound. But other modes of vibration can occur in strings as well. One of them is the longitudinal mode, in which waves of compression reflect back and forth through the length of the string. Like transverse, longitudinal vibration can be used to drive a soundboard. But rare are musical strings designed to operate in this mode. Why? Because the frequency of longitudinal vibration for strings of reasonable length is so high that the resulting pitches turn out to be well above the musically useful ranges. To produce fundamental tones comparable to those of conventional instruments, you would need strings 40, 60, or 100 feet long. Who would ever build such an instrument?

Ellen Fullman would. You will find an article on her work in this issue of *Experimental Musical Instruments*.

Also in this issue we have a report from Michael Hearst on Hohner, the company primarily responsible for popularizing the harmonica — and, as well, for introducing the principle of the free reed into a century's worth of other improbable and inventive instrument forms. Ray Wilding-White, in another of this issue's articles, describes the Philips Pavilion of 1958, a building conceived as a musical instrument. We also have one article on drums made from plastic buckets, and another on string instruments made from pots and pans. We have a photo essay on sound sculptors in Hungary, and a look at how structureless form takes shape as a musical instrument ...

... And much more. So open, and read.

Photo above: Jody Kruskal with a tuned array of bucket drums. See the article starting on page 33.

ELLEN FULLMAN'S LONG STRING INSTRUMENT

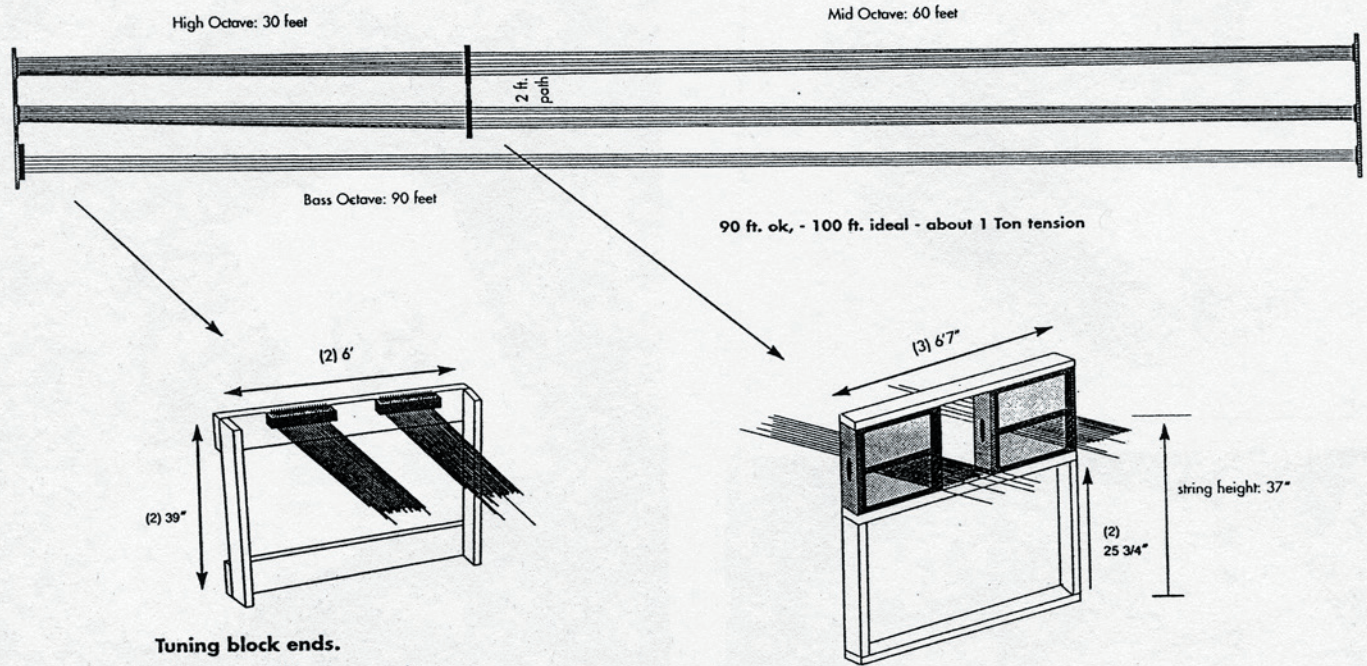
By Mike Hovancsek

Ellen Fullman is an artist who has devoted the last two decades of her life to sound-producing art. She was originally featured in the pages of *EMI* in Vol. 1 #2 (Aug. '85). Since then, Ellen has worked to refine her instruments, her compositions, and her playing style. Most recently, Periplum has released a CD of her work with The Deep Listening Band entitled *Suspended Music*.

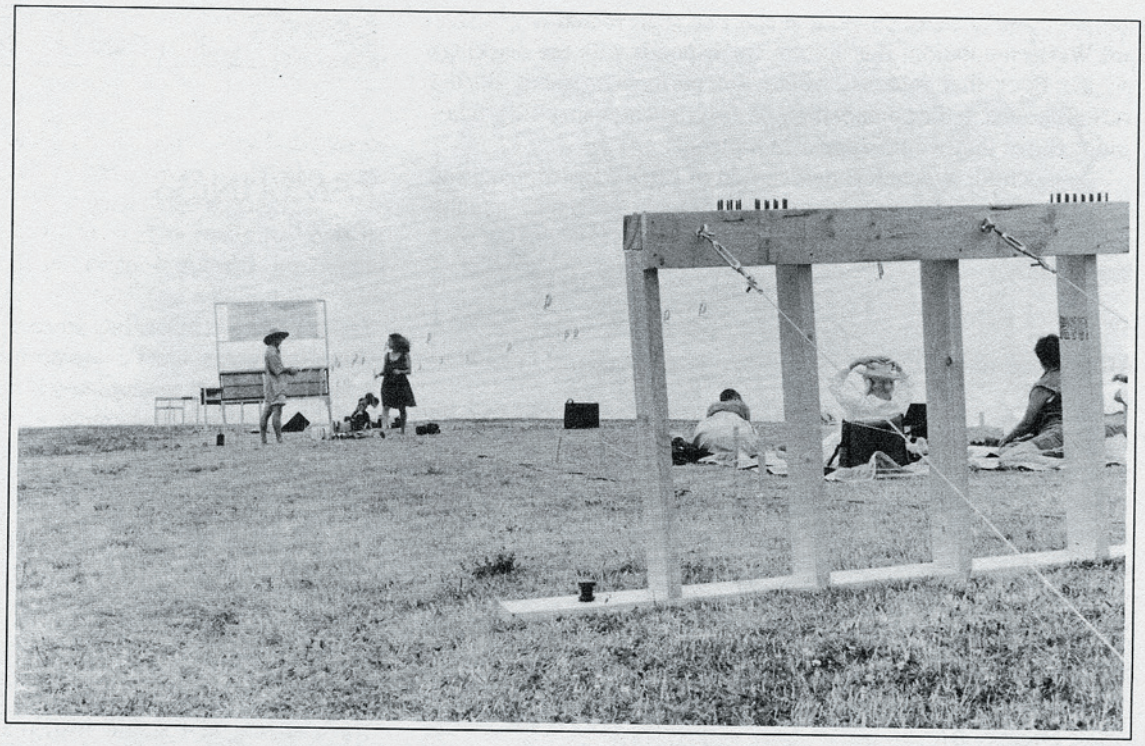
Ellen began experimenting with sound art when she created her metal skirt. This particular piece is a skirt made of metal that has guitar strings stretching from the edge of the skirt to the tip and heel of the wearer's shoes. Contact mics attached to this unique outfit amplify the sounds on a small amp that is carried like a purse. When the wearer struggles to walk in the restrictive instrument, a cacophony of sounds is produced.

Following this experiment, Ellen began developing her Long String Instrument. Unlike conventional string instruments on which sound is produced with side-to-side vibration of the string, the Long String Instrument produces sound with vibrations that travel from end to end of the string. These vibrations travel far faster in the material of the strings than side-to-side vibrations do. As a result, the tones produced are very high in frequency, making them inaudible, unless the string is extremely long.

The Long String Instrument was designed with the help of assorted engineers, musicians, and instrument builders who lent their respective skills in order to make the instrument maximally



INSTALLATION DIAGRAM FOR THE LONG STRING INSTRUMENT



RIGHT: A view of the entire Long String Instrument installation for Pat Graney's "Movement Meditation Project," Magnuson Park, Seattle, July 1996.

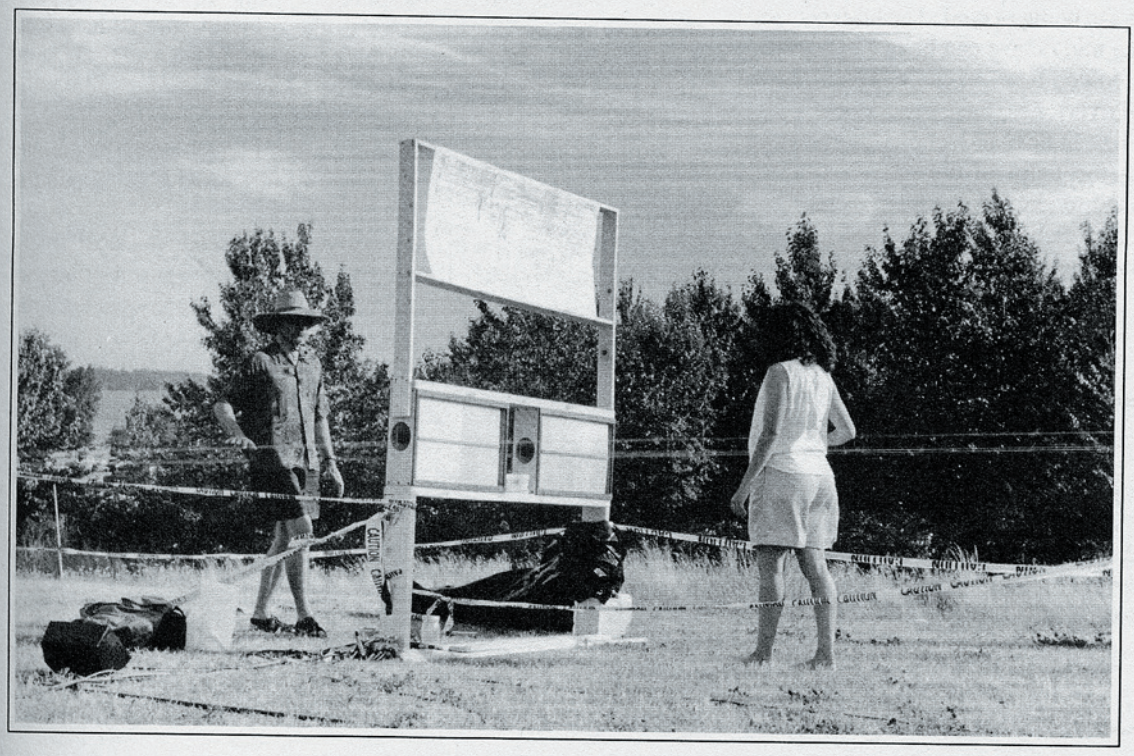
Photos by Ellen Fullman

effective in producing sound. The most recent version is made up of 120 80-foot-long strings that are suspended at waist height, stretching from a wall to a large resonator box. Since length (but not tension) of each string determines the pitch, a C clamp is attached to each string for tuning purposes. (The mass of the clamp is enough to define an end point to the effective vibrating length of the string segment, so tuning can be done by attaching the clamp at different points.)

Ellen and her musicians play the instrument by rubbing rosined fingers along the length of the strings in much the same way that a person plays wine glasses by rubbing the edge of the glass. Because of the length of the strings, long tones can be produced without interruption. As soon as the friction ceases, so does the tone. Multiple musicians can play the instrument at one time, numbered lines on the floor indicating where each performer needs to walk at various points in any given composition.

The Long String Instrument is tuned in just intonation because of its resonant qualities. Proportionate ratios in the string lengths and resulting frequencies (2:1, 3:2, 4:3, 5:4, etc...) produce a wide range of secondary pitches, the overtones creating a complex, multi-layered harmonic texture.

The notation system used for Ellen's Long-String Instrument evolved over the years as the instrument itself evolved. Reflecting



LEFT: Nigel Jacobs and Elise Gould perform on the double-sided resonators. The score is mounted above.

numerous qualities of sound that can't be represented with standard Western notation, this system corresponds with the markings on the floor that indicate where the performer stands during various points in the composition. It also indicates specific pitches and textures that would appear in a piece.

So much for a technical description of Ellen's instruments and compositions. To give readers an idea of what her music actually *sounds* like, I will quote from a short interview I conducted with her recently:

Mike Hovancsek: How do you describe your music?

Ellen Fullman: All I can describe is what I am interested in, which may not be a description of the music itself. In other words, the music is an artifact left over from the journey; the search. What I have been interested in in recent pieces is to be in a landscape — a mood — and to explore the moods of various pitch relationships in just intonation. It is important to me to listen on different levels, to make sound with depth — multiple layers of things to listen to and to become aware of — by listening in different ways.

Lately, I have been restringing and tuning my instrument down from the Key of C to the key of A. A is the key for the female voice in Indian music. I have been studying North Indian vocal music for the past four years. I plan to make a piece using the instrument as a sound source on tape to sing with. I will produce all the sound myself — layering tracks — and explore digital editing as an instrument in and of itself.

MH: Describe how your long string instrument is played and what it sounds like.

EF: My studio is a warehouse filled with about 150 strings running wall to wall. These are arranged with aisles in which performers walk, playing with both hands, strings on either side. The strings are played with rosin-coated fingers, rubbing the wires lengthwise, the performers' hands becoming the "bow." The sound-associations with traditional instruments vary, depending on which octave and on how many strings are being played. The high octave can sound like a harmonica. The mid octave can have a cello-like sound. The bass octave, like a bowed bass.

With such a rich presence of overtones, the overall effect with three performers is pipe organ-like in its massiveness. Percussive rhythmic playing is done with the palm of the hand brushing against groupings of strings tuned to chords. Another method of sound production uses rosin-coated fishing line, wrapped around the string and dragged along the length. This produces an almost mandolin-like rapid plucking.

Ellen Fullman's music can be found on Body Music *(XI: P.O. Box 1754, Canal St. Station, New York, NY. 10013) and* Suspended Music *(Periplum: P.O. Box 95678, Seattle, WA 98145).* Change of Direction *will also be available soon from New Albion. Ellen can be reached at PO Box 23347, Seattle, WA 98102*