

ECHO

THE IMAGES OF SOUND

The following artists took part in the group exhibition at The Apollotheater High Daven, Max Eastley, Richard Lemens, Jans, Takis, Jan Knap, Hans Kortbeek, Jan Kooze, Gerbrich-Widde, Hans, Geurt Oude, Theo Pijpers, Frank Goudaart, Leon van Noorden and Toop van Brunt.

HET APOLLOHUIS



1987

ELLEN FULLMAN

7.8.9.11.'84 Installation, The Vleeshal

9.11.'84 Concert, The Vleeshal

29.11-2.12.'84 Installation, The Apollohuis

30.11.'84 Concert, The Apollohuis

Ellen Fullman (USA 1958) is a composer and performance artist. She studied sculpture and sound technique. Her first works were static and kinetic sculptures, sound installations, multi-media performances and music compositions. She is also a trained singer. In the New Music America festival in 1980 she sang a blues from back to front and then the other way, accompanying herself by dancing dressed in a melodious metal skirt. She built a drum machine which is played by drops of water. In recent years she has been working on a long string installation, which she is all the time improving. The installation consists of a number of bronze or steel strings varying in length from 18 to 25 metres attached to a plywood resonator box. The instrument is played by stroking the strings with resined fingers. The strings have clamps fixed to them at various intervals so that a pure tuning is achieved. A complex structure of harmonic tones and overtones is created when the instrument is played. Ellen Fullman's long string installations were previously shown and heard at the Terminal New York Show in Brooklyn (1983) and the New Music America Festival 1984 in Hartford. The presentation of 'Longitudinal Vibration' in the ECHO Festival is a European première. P.P.



The Vleeshal (november 1984), photo: Wim Riemens.

The Apollohuis (november 1984), photo: Pieter Boersma.

The history of the Long String Instrument

ELLEN FULLMAN

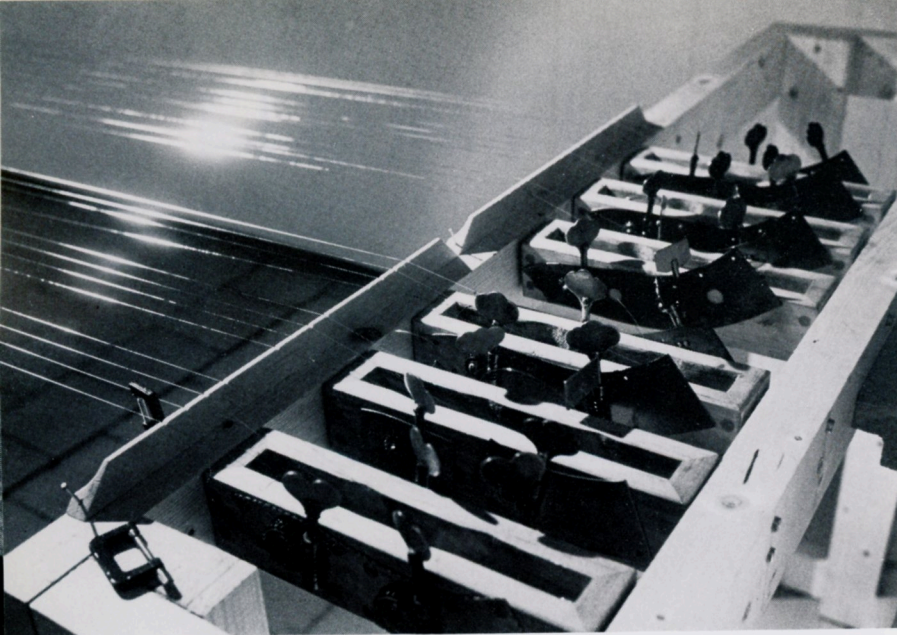
For the past several years I have been developing an installation, 'The Long String Instrument'. In 1981, in St. Paul, Minnesota, I was stretching long lengths of string using various materials and tying them to metal containers. The containers acted as resonators and were amplified with contact microphones. I bowed the strings and put some water in the containers, moving them and listening to the resonance change. One day I brushed against one of these strings and it made a loud clear sound. I began stroking it lengthwise with my hands. I sensed that what I discovered had a lot of potential but I needed to learn what was happening scientifically to be able to control

the sound produced. I was unable to find the kind of information I needed in Minnesota, although I'm sure it exists there. I saw evidence of there being more integration of art with technology in N.Y.C. and decided to move there.

For about a year in New York I took false steps in relation to the project. I wanted a warm low sound and to be able to tune the strings. I tried using a better contact microphone and tried to modify the sound by electronic filtering. I was now using very large containers of water and setting up the strings on the roof of my building, the only place large enough. At this time, my friend Matthew Wolff built a kind of wooden sail

that was meant to catch the sound. I amplified it, but it was not coupled directly to the strings and did not do much. One afternoon some people came over to look at it. Steve Cellum, an engineer, explained to me how the string was vibrating and suggested we attach it directly to the board. We drilled a hole, put the string through, tied it to a washer, then tightened it against the board. The string produces a very loud rich sound without amplification. Soon after, Phill Niblock let me use his loft for a month while he was away. I set up the project there and began building test resonator-boxes. At this time my friend Arnold Dreyblatt, a composer, brought his





The Apollohuis (november 1984), photo: Pieter Boersma.

friend Bob Bielecki, an engineer, over to look at what I was doing. Steve was also there and we tried several experiments which greatly clarified the procedure I was to take. In a physics handbook they found a formula which was to become my method of tuning. We also discovered that by using brass wire, I could lower the frequency produced. It seemed that the next step was to build a large box resonator that would sustain the sound longer than only a board. My next studio space was the Terminal New York Show which was to begin a month later. I spent the intervening time reading about musical acoustics, planning the box, and gathering materials. In the show I had a very large area to work in and built a large plywood box. I suspended the strings from this in clusters of four, tuning the groupings to equally tempered chords. I spent this period listening to different combinations of tones and thinking about the musical possibilities.

LONGITUDINAL VIBRATION

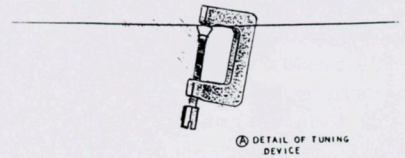
A MUSICAL INSTRUMENT COMPOSED OF BRASS, BRONZE AND IRON WIRES, 50 FT. IN LENGTH, COUPLED TO A PLYWOOD BOX RESONATOR

PLAYED BY COATING STRINGS WITH ROSIN AND STROKING WITH ROSIN-COVERED HANDS

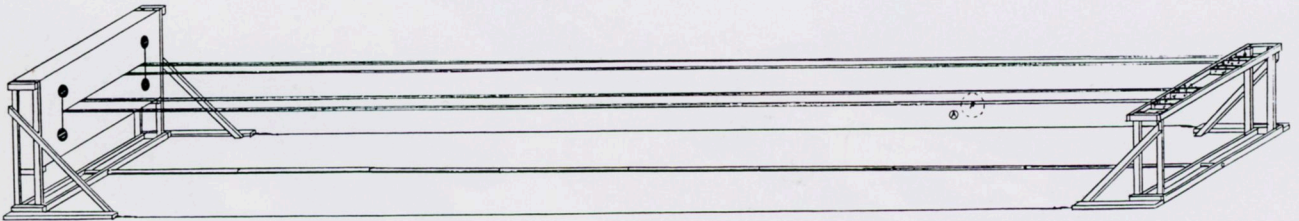
THE STRINGS VIBRATE LONGITUDINALLY, DIFFERING FROM MOST STRINGED INSTRUMENTS WHICH ARE BASED ON THE TRANSVERSE MODE OF VIBRATION

TUNING IS ACCOMPLISHED WITH C CLAMPS, STOPPING EACH WIRE AT A SPECIFIC POINT
THESE POINTS ARE LOCATED WITH THE FORMULA:

$$\frac{\text{THE VELOCITY OF LONGITUDINAL WAVE THROUGH THE MATERIAL}}{(\text{2}) \text{ LENGTH}} = \text{FREQUENCY OF VIBRATION}$$



Ⓐ DETAIL OF TUNING DEVICE



VELOCITY OF LONGITUDINAL WAVE THROUGH VARIOUS WIRES IN FT/SEC		LENGTHS AT WHICH WIRE SOUNDS THE PITCH 'A'	
.012 IRON (ZUCKERMAN)	22,421.52	440 Hz	25 FT 5 3/4 IN
.013 IRON "	22,256.96	440 Hz	25 FT 3 1/2 IN
.0135 IRON "	22,110.0	440 Hz	25 FT 1 1/2 IN
.0135 BRONZE "	11,513.48	220 Hz	26 FT 2 IN
.014 BRASS "	11,183.48	220 Hz	25 FT 5 IN
.014 BRASS (TUNER'S)	10,908.04	220 Hz	24 FT 9 1/2 IN
.013 BRASS "	10,972.5	110 Hz	49 FT 10 1/2 IN

0 — 2 1/2'

Ellen Fullmer, Dec 11, 1983

When the show was over my friends Matthew and Lori let me use their basement to work in.

The strings ran through a doorway and into another room with the bass section extending down a long hallway. At this time I met David Weinstein, a composer, and we began a series of sessions in which David taught me about just intonation. Just intonation is any tuning system based on the naturally occurring intervals. Since the overtones are so clearly present in this instrument, a system using these pure relationships seemed more appropriate and more interesting.

I tuned the instrument in various ways, listening to ancient systems and generating my own. I settled on a just 12 tone chromatic scale based on F.

Rather than in chromatic sequence, the strings were laid out in a pattern where each string has a simple harmonic relationship to its adjacent strings. This was done so that while playing one

string, others beside it could be touched also, adding a harmonic density. I added a second section of 12 strings in the same pattern of adjacencies but tuned in a perfect fifth relationship to the first section. David and I began playing long, sustained, slowly shifting tones. It was really random, as I didn't know much about musical intervals. Later I began learning more, laying out charts in which I could see the mathematical relationships in chord structures. I realized that, since the overtone series is swept through in each string as it is played, then if two or more strings are played at once, complex, shifting chordal relationship occur. I began building chord sequences where the same tones are played out from the box and returning, listening to the shifting of each chord to new chords. Now I'm interested in dealing with time in a more precise way than delineation by footsteps. The project has become for me my personal music school. It leads me to read and study, as

the information I seek gets put to use in very practical ways. The piece is like a microcosm of the history of music. The lessons I learn materialize in a very graphic form. There is the quality of its being a science project that displays principles of musical acoustics. I am an outsider to music, and it's as if now I am seeing the inner workings, the gears, pulleys and bricks that build music and it's my intention to affect the listener in this same way. Arnold, in rehearsing with me in Eindhoven, found himself becoming mesmerized by the sound, and would lose his place in the score. My interest in doing this work is in the experience of listening.

Ellen Fullman

The Apollohuis (november 1984), photo: Pieter Boersma.

