8bit-Concert

A computer-controlled sound installation

Arnold von Wedemeyer, 2003 - 04

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Additional material:
Video documentation and sound on DVD

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Description
The piece consists of eight sound objects, installed in a row on the wall, and a computer. The sound objects (“monopianos”, p. 2) were developed specially for the piece and are played by a computer. They are tuned to an 8-tone scale (p. 3).

The score for the concert is generated by the computer as it counts from 0 to 255, one number per second, with each number decoded and output as an 8-bit signal (e.g. the numeric number “147” corresponds to the 8-bit number “10010011”, p. 4). Each digit in the 8-digit binary number is assigned in sequence to one of the sound objects. When the digit for a given object is “1”, it sounds, when it is “0”, it remains silent. The number currently being played is displayed by the computer in both numeric and binary form.

In this way, the computer uses its own inherent binary mode of counting to run through all the possible sound combinations of the eight instruments. The result is a slow, mechanically monotonous, mostly dissonant “computer bolero”: in spite of recurring lulls, the drama of the piece builds up again and again, culminating in the moment when all eight instruments sound together.

The concert last 256 seconds [4:16 min].

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The monopiano

Dimensions of monopiano: 18 x 184 x 12 cm
Dimensions of resonator: 18 x 120 x 6 cm

The distance between the individual sound objects can be varied (depending on the space).

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Tuning

The eight instruments were tuned using an “8-tone scale”, with the octave divided into eight (instead of the usual twelve) logarithmically equal tone ranges. This means that every second tone in the 8-tone scale corresponds to every third semitone in the familiar 12-tone scale, whereas each of the remaining tones comprises 1/4-tone frequencies that lie exactly halfway between the two following semitones in the 12-tone scale.

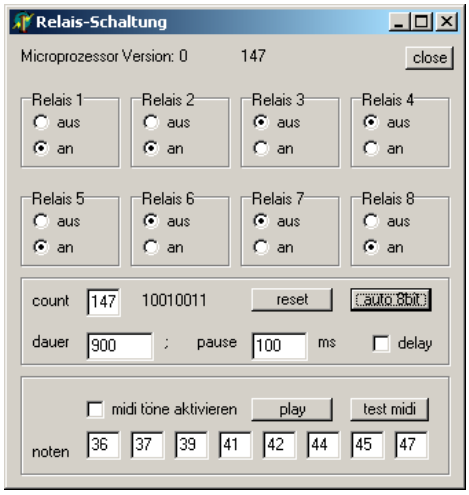
The tuning of the monopianos from left to right:

No.	Note	Frequency
1	A	110.00 Hz
2	B > ~ < H	119.96 Hz
3	c	130.81 Hz
4	c# > ~ < d	142.65 Hz
5	d#	155.56 Hz
6	e > ~ < f	169.64 Hz
7	f#	185.00 Hz
8	g > ~ < g#	201.74 Hz

Control

Using specially developed software, the computer sends commands to a relay board that switches the electromagnets attached to the sound objects on and off. The pull of the magnets causes the piano mechanism to strike the notes.

Visitors start the concert by pressing any key on the computer's keyboard. Once it has begun, it cannot be interrupted.



Control and development tool
[not visible to the viewer]

Screen display during the concert

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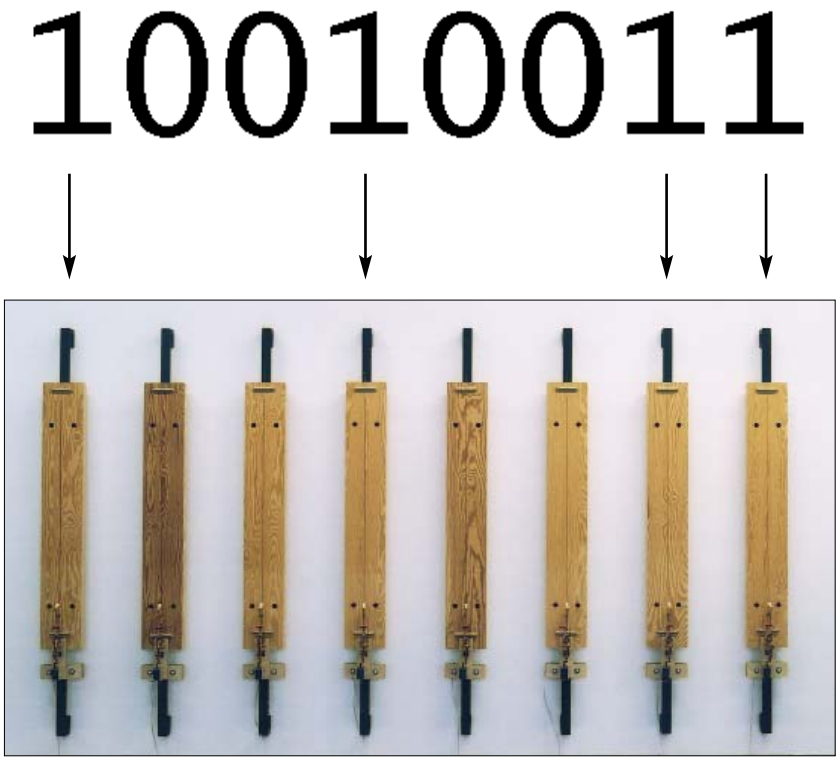
Score

The “notation” for the concert is generated in real time by the computer as it counts from 0 to 255 in binary form (8-bit).

An 8-bit number comprises eight digits that are either “0” or “1” and represents a unique value between 0 and 255 [e.g. 147 = 10010011], resulting in 256 possible states.

Each digit in the 8-bit number is assigned in sequence to one of the instruments on the wall (in reverse order). In any given state, all instruments whose digit in the binary number is “1” sound together for one second.

Example - the sound produced by the number 147:




```
  0 - 00000000
  1 - 00000001
  2 - 00000010
  3 - 00000011
  4 - 00000100
  5 - 00000101
  6 - 00000110
  7 - 00000111
  8 - 00001000
  9 - 00001001
 10 - 00001010
 11 - 00001011
 12 - 00001100
 13 - 00001101
 14 - 00001110
 15 - 00001111
 16 - 00010000
 17 - 00010001
 18 - 00010010
 19 - 00010011
 20 - 00010100
 21 - 00010101
 22 - 00010110
 23 - 00010111
 24 - 00011000
 25 - 00011001
 26 - 00011010
 27 - 00011011
 28 - 00011100
 29 - 00011101
 30 - 00011110
 31 - 00011111
 32 - 00100000

        :

 62 - 00111110
 63 - 00111111
 64 - 01000000
 65 - 01000001
 66 - 01000010

        :

126 - 01111110
127 - 01111111
128 - 10000000
129 - 10000001
130 - 10000010

        :

190 - 10111110
191 - 10111111
192 - 11000000
193 - 11000001
194 - 11000010

        :

222 - 11011110
223 - 11011111
224 - 11100000
225 - 11100001
226 - 11100010

        :

248 - 11111000
249 - 11111001
250 - 11111010
251 - 11111011
252 - 11111100
253 - 11111101
254 - 11111110
255 - 11111111
```