

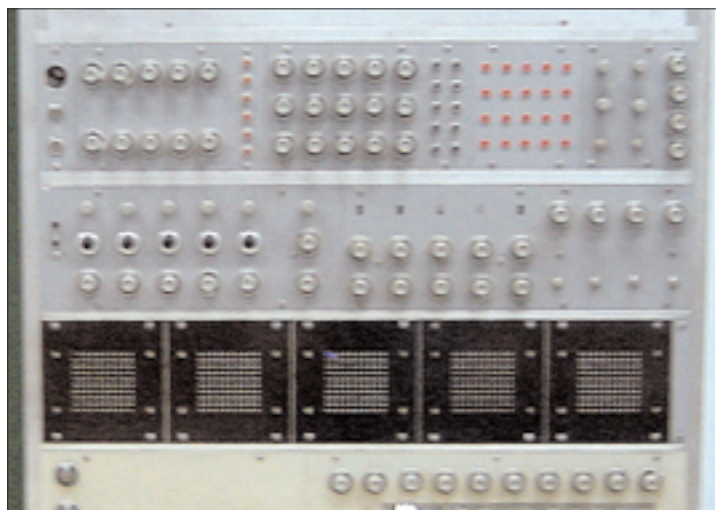
>> REEL23 DVD / NO 4. DATAFILE / 04 E >>  
>> DVD / NO 4. > AIKA & AINE <  
>> DATAFILE / 04 E > THE FUTURE IS NOT WHAT IT USED TO BE <  
  
>> PDF FILE > HISTORY OF DIMI INSTRUMENTS / BY ERKKI KURENNIEMI <

>> HISTORY OF DIMI INSTRUMENTS

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> This is a short summary of my music instrument activities in the sixties and early seventies.  
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> In 1961 or 1962 I was invited by prof. Erik Tawaststjerna to develop the electronic music studio for the Institute of Musicology, University of Helsinki. Erik Tawaststjerna, the late professor of musicology, is perhaps best known for his extensive and definite biography of Jean Sibelius.  
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> Seppo Heikinheimo had already ordered three Telefunken M24 portable "mini" studio tape recorders, "magnetophones." I bought transistors, resistors, capacitors, diodes, and Heathkit construction kits to build a tone generator, an oscilloscope, a spring echo, a ring modulator, and a filter. Later, the studio got two Studer tape recorders, one with an optional stereo head.  
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> The Moog synthesizer existed, and the electronic music technology was based on analog voltage control, a great invention of that time. VCO, VCA, VCF for Voltage Controlled Oscillator, Amplifier, or Filter. At the same time I was hired to the Institute of Nuclear Physics to program an analog computer for nuclear potential calculations.  
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> In 1963 I "improvised" my first and so far best electronic composition "ON/OFF" (12' 47"). Its name reflects the idea that in a distant future computer music studio the only control should be an ON/OFF switch.  
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> Now, when "files" are supplanted by "streams," even that switch is unnecessary.  
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> I began to construct a modular synthesizer, after Moog brochures and transistor circuit manuals. It was to consist of a Generator Unit, a Filter Unit, and a Mixer, all built into a sound studio console. In it, I tried to experiment with every possible analog and digital sound processing circuit. Integrated circuits were not yet available (all early production went into military and space applications). But Philips made a set of epoxy encapsulated logic circuits, gates and flip-flops. These were used in the Generator Unit, both in the audio range (square wave) and as digital control signals, all freely programmable with a 500-point pin crossbar matrix.  
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>> IMAGE INFORMATION > GENERATOR UNIT <

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> The Generator Unit was presented 1964 at the Jyväskylä Summer Festival, Nordic seminar for algorithmic music, with György Ligeti as the special guest.  
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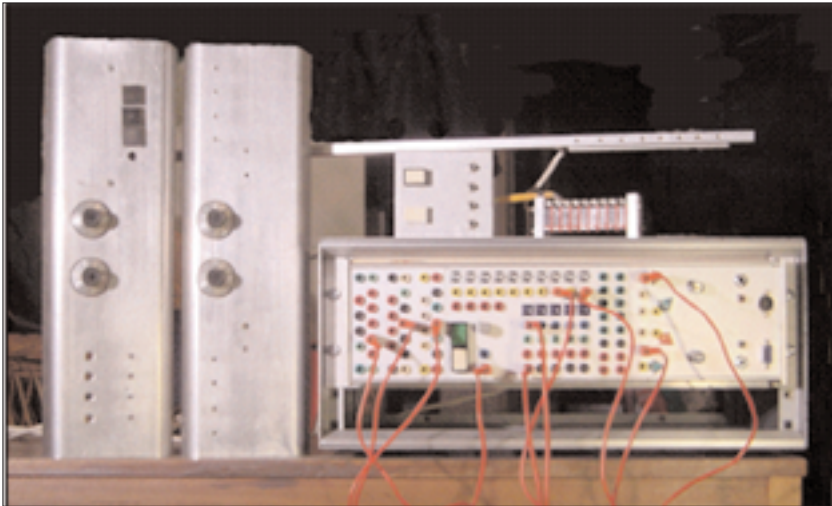
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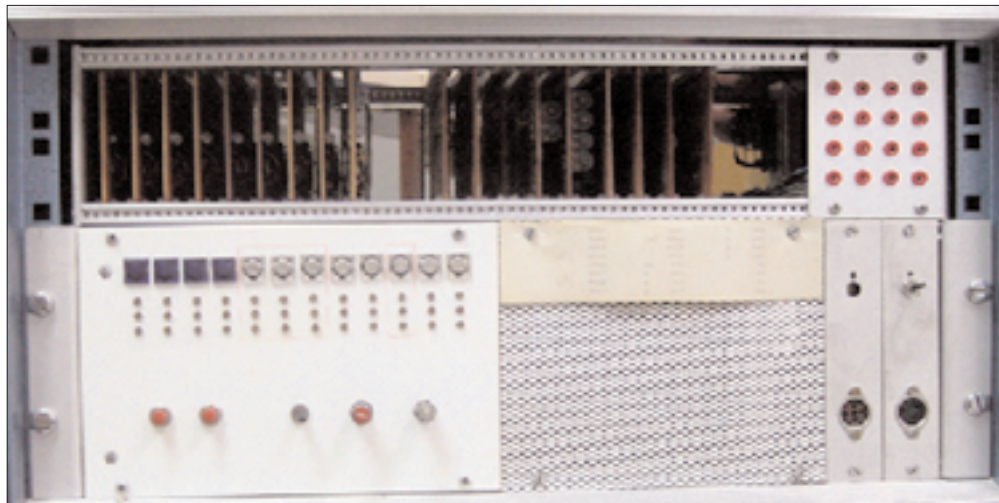
> Another instrument that used digital control was the "Electric Quartet," built by order for M. A. Numminen and his pre-underground band. With binary coded hand-held keyboards with push buttons and light-dependent resistors, for 4 players, and a sound-distorting channel for the vocalist, the philosophy of the Quartet was an instrument where the contributions of the five players would be combined in a non-linear fashion, instead of plain summation.

>> IMAGE INFORMATION > ELECTRIC QUARTET <



> The next digital instrument, DICO (Digitally Controlled Oscillator), was order-built for Osmo Lindeman, the pioneer of electronic music in Finland, who started teaching electronic music at the Sibelius-Academy. DICO had a shift-register memory of 12 words of 10 bits each. Four bits controlled the pitch (12 tones selected from the subharmonic series), three bits the octave range (giving 8-octaves), two bits the duration (legato plus three "pizzicati"), and one bit the output channel.

>> IMAGE INFORMATION > DICO / Digitally Controlled Oscillator <



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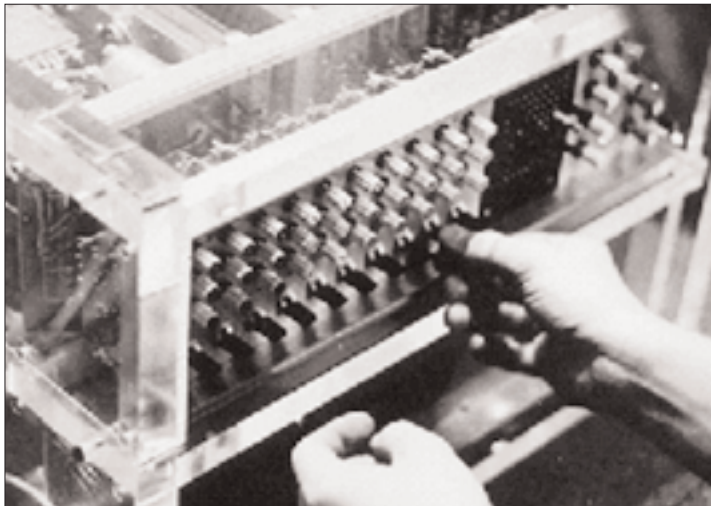
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The "Andromatic" instrument was ordered by Ralph Lundsten and Leo Nilson for their Andromeda electronic music studio, near Stockholm. It had 10 tone generators, some filters, and modulators. These were analog, but the controlling 10-stage sequencer had, for each stage separately, options for a "shift through" mode, or a "divide by 2" mode. If all stages were set for "shift through," the result would be a single variable tone of a sequence length of 10. If all stages were set for "divide by 2," the sequence length would be 1024, all 10 tones sounding at the last moment before silence. With other settings, many structural variants were available. This curious control system perhaps made Andromatic my most successful instrument, as measured by actual music output by Ralph Lundsten.

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>> IMAGE INFORMATION > ANDROMATIC <
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> Now the dilemma was: the Institute of Musicology could not afford a computer, not even a PDP-8. There was a rumour of a "microcomputer," a "computer-on-a-chip" coming. It sounded unbelievable. The first DIMI instrument was to be as powerful as a computer, but cheaper. There were two oscillators, octave dividers, digital attenuators, three modulators, and (as a compromise) two analog octave filter banks (giving 256 distinct spectra).

At that time, the idea of an "associative memory" was in fashion. Ordinary computer memories find stored data by their addresses. An associative memory finds data in memory locations by their contents.

Semiconductor RAMs (Random Access Memories) were not yet available. The memory of Dimi-A consisted of 16 serial MOS "bucket brigade" chips of 100 bits each. 8 bits of every memory word were the time code (16 bars of 16 beats each), the remaining 8 bits specified one of 16 parameters, and one of 16 values. This arrangement made it possible to use the memory efficiently for fast sound changes, while saving memory during periods of little activity.

Dimi-A thus means, "DIGital Music Instrument" - Associative memory.

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