

COMPUTER UND MUSIK

GESCHICHTE DER ELEKTRONISCHEN MUSIKINSTRUMENTE

ARS ACUSTICA

5. JULI 2011

Musical Telegraph (1876)

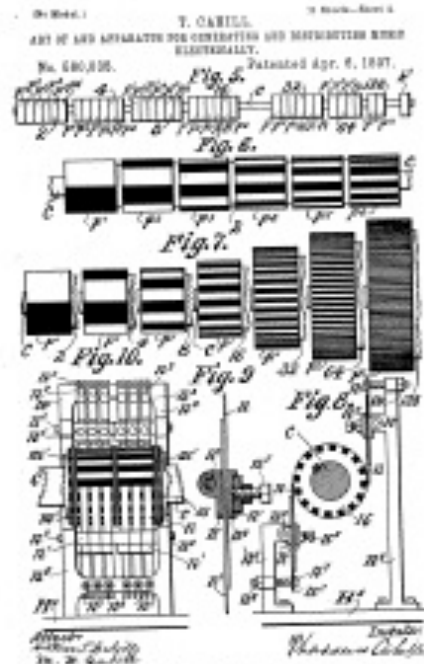


Elisha Gray



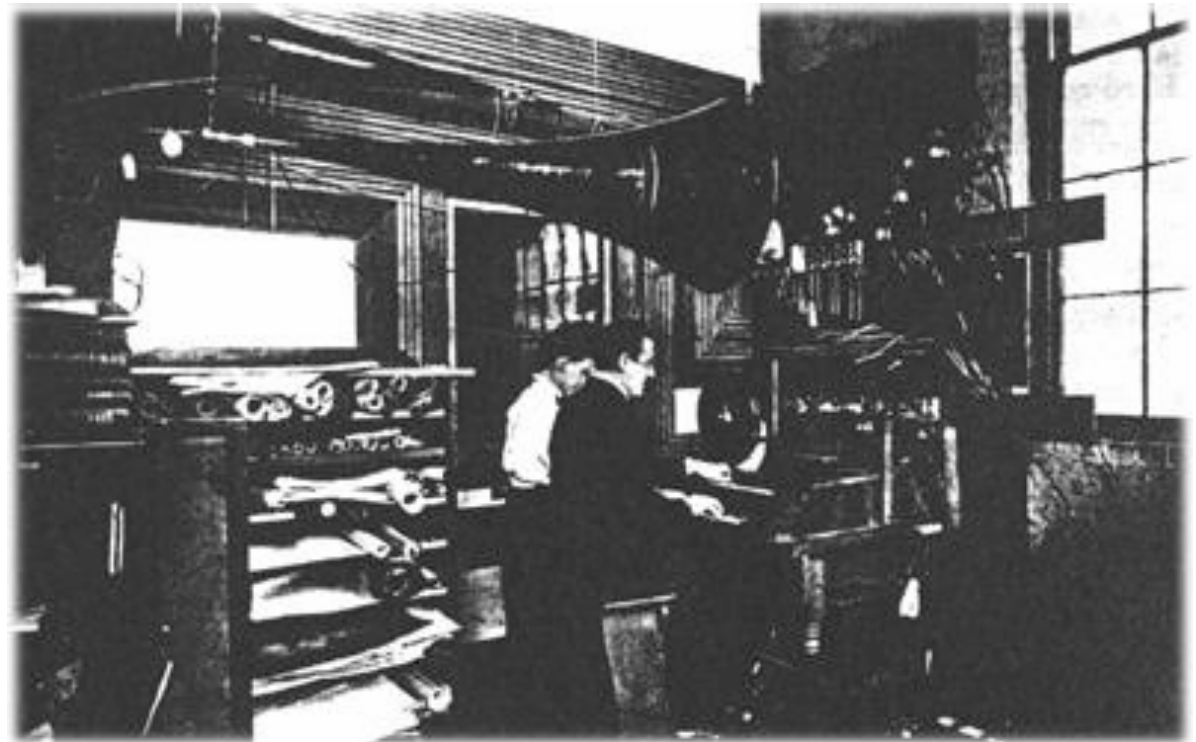


Thaddeus Cahill

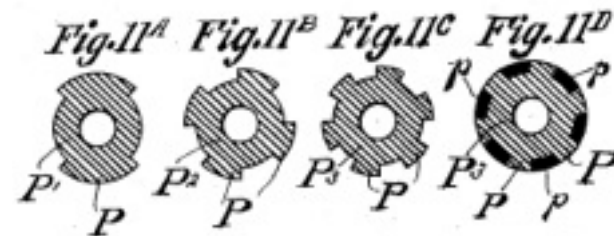


Rheotom

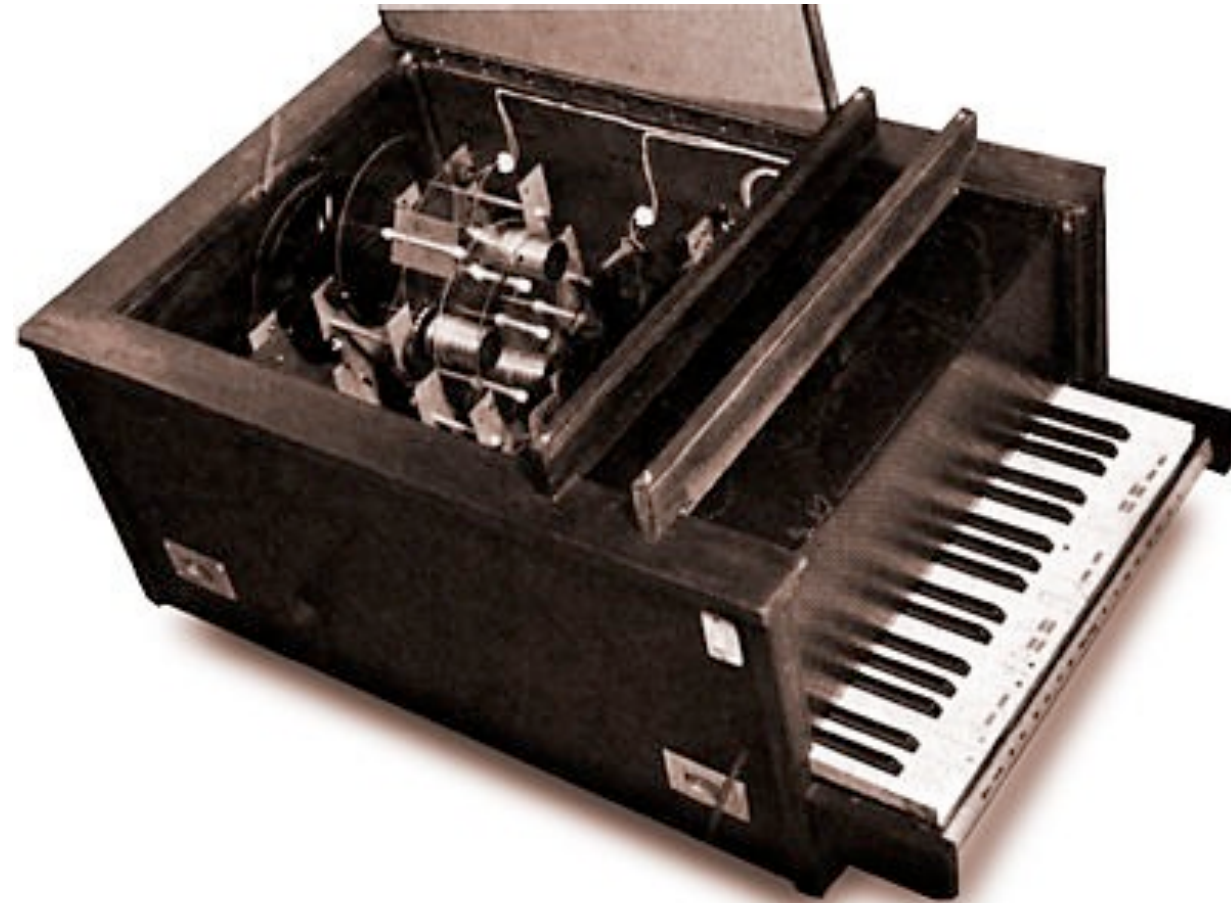
Telharmonium (1897)



60 Fuss, 200 t, \$200.000

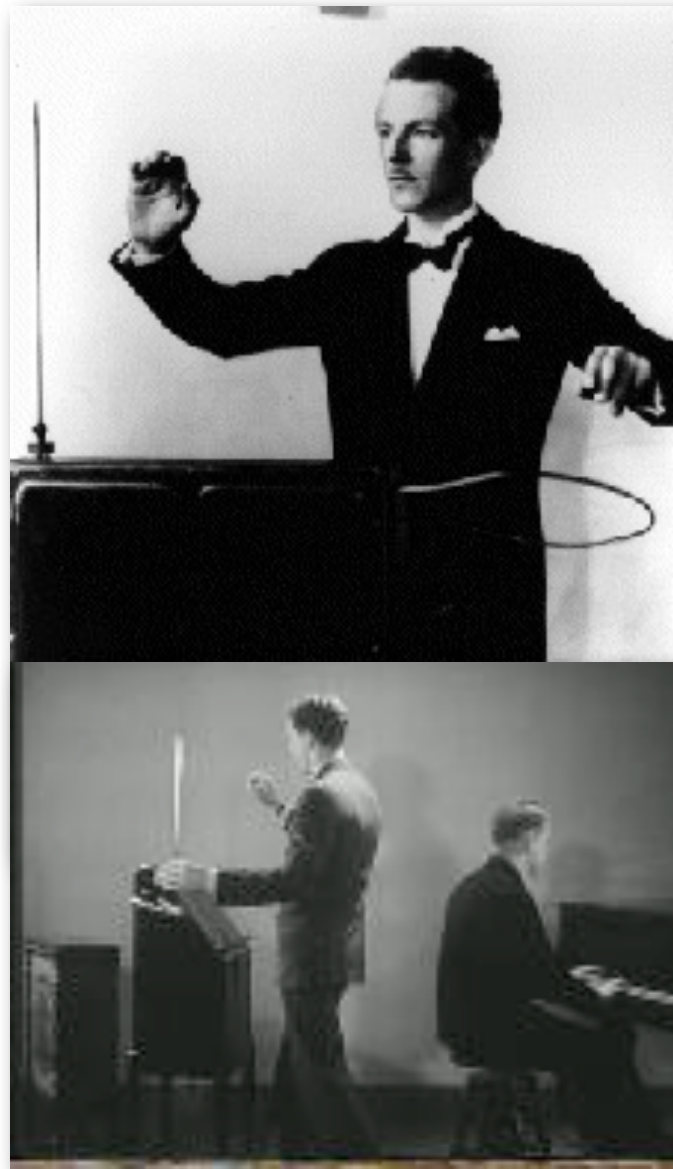


Optophonic Piano (1916)



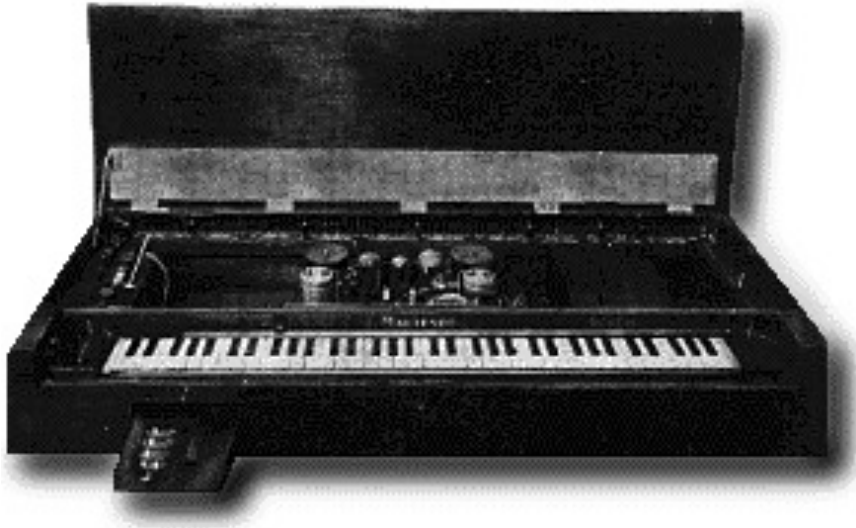
Vladimir Baranoff Rossiné

Theremin (1917)

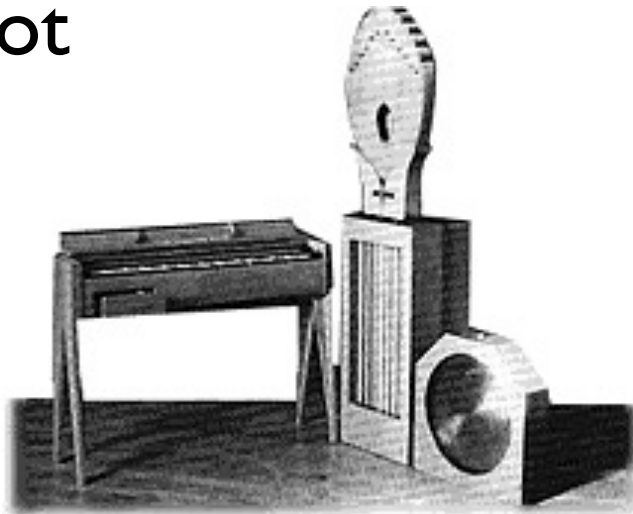


Lev Sergejewitsch Termen
(1896–1993)

Ondes Martenot (1928)

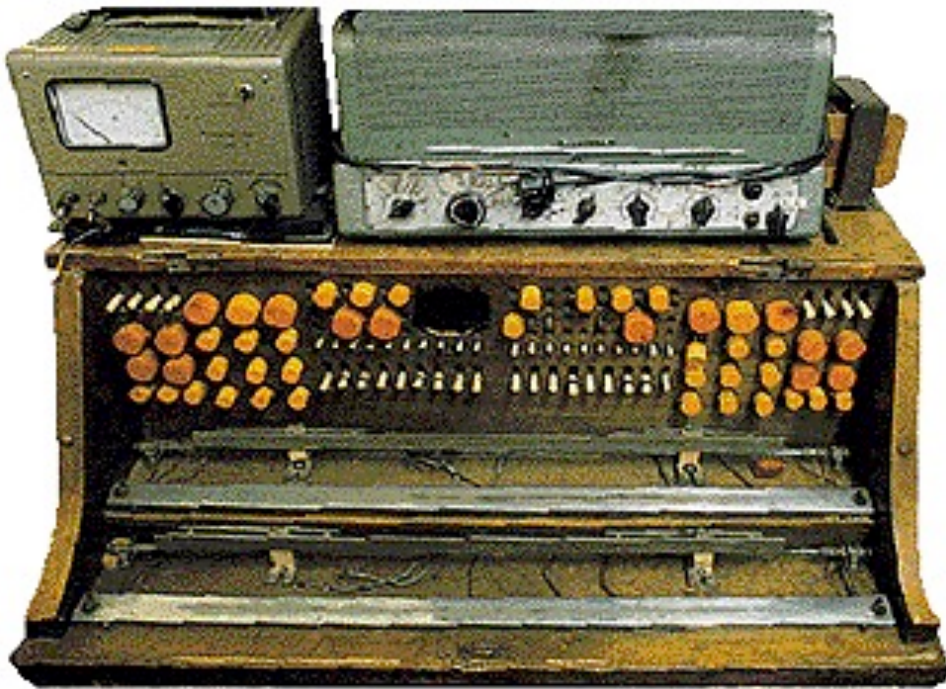


Maurice Martenot



Klangbeispiel: Messaien, Turungaîla Symphonie

Trautonium (ab 1930)



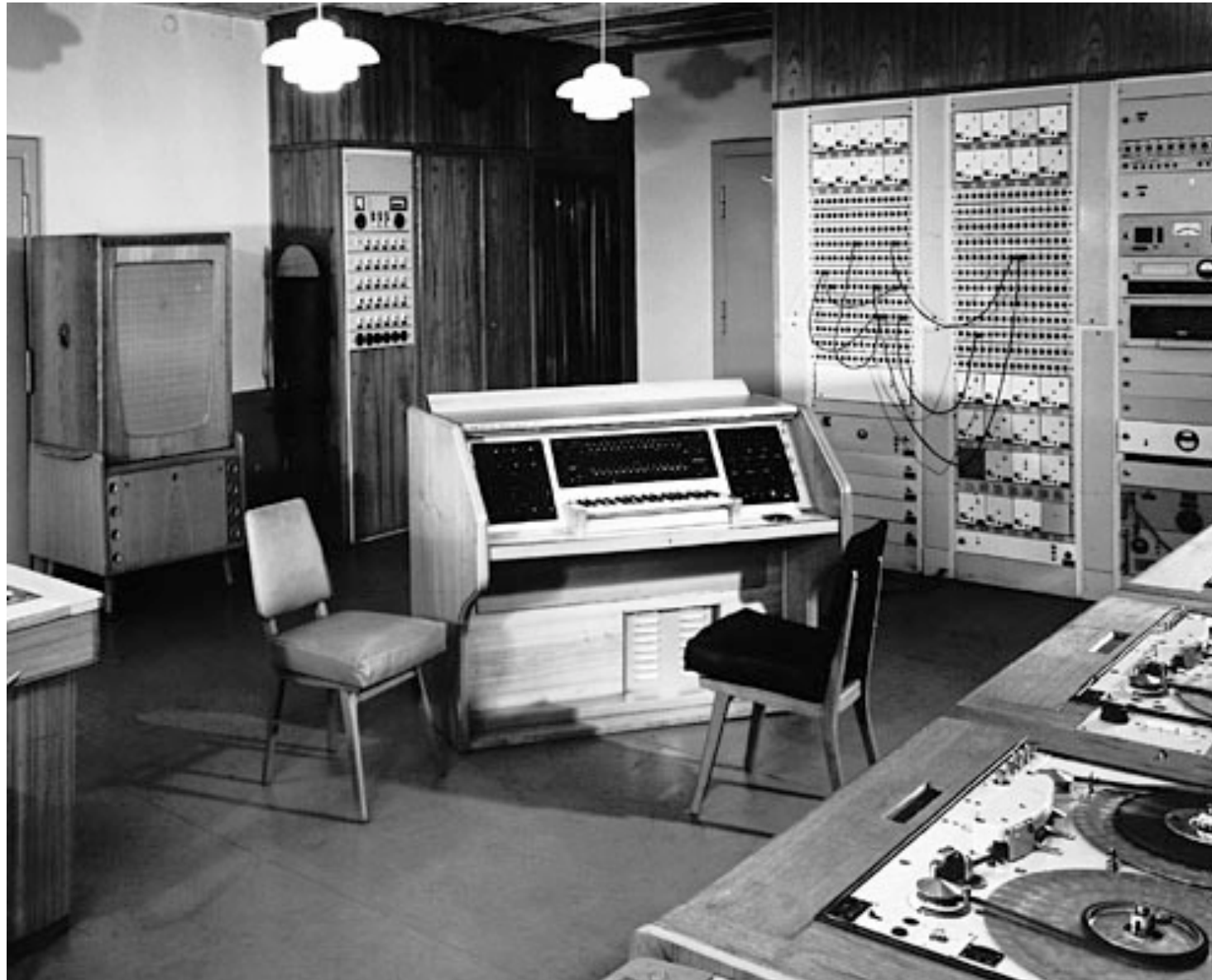
Friedrich Trautweins Trautonium



Oskar Salas
Mixturtrautonium

Klangbeispiel: Elektronische Impressionen Nr. 9

Subharchord (1963)



Subharchord I (Holzgehäuse) im Studiolabor des RFZ, Agastr. 1963/64

Hammond Orgel (1935)

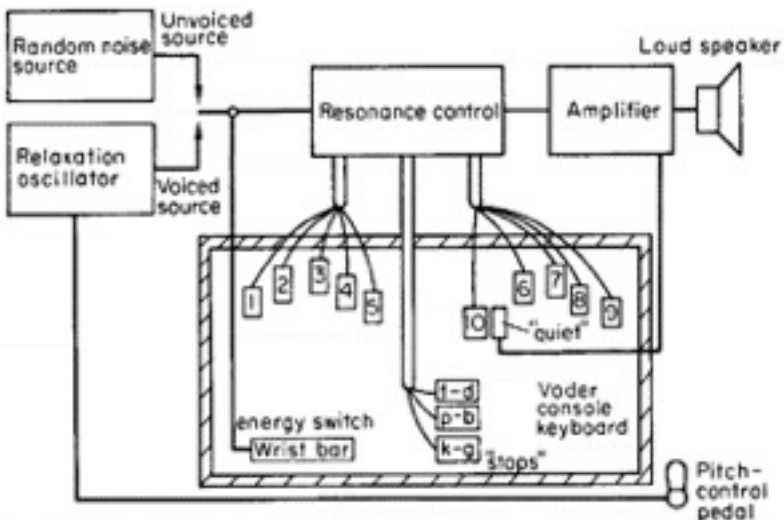
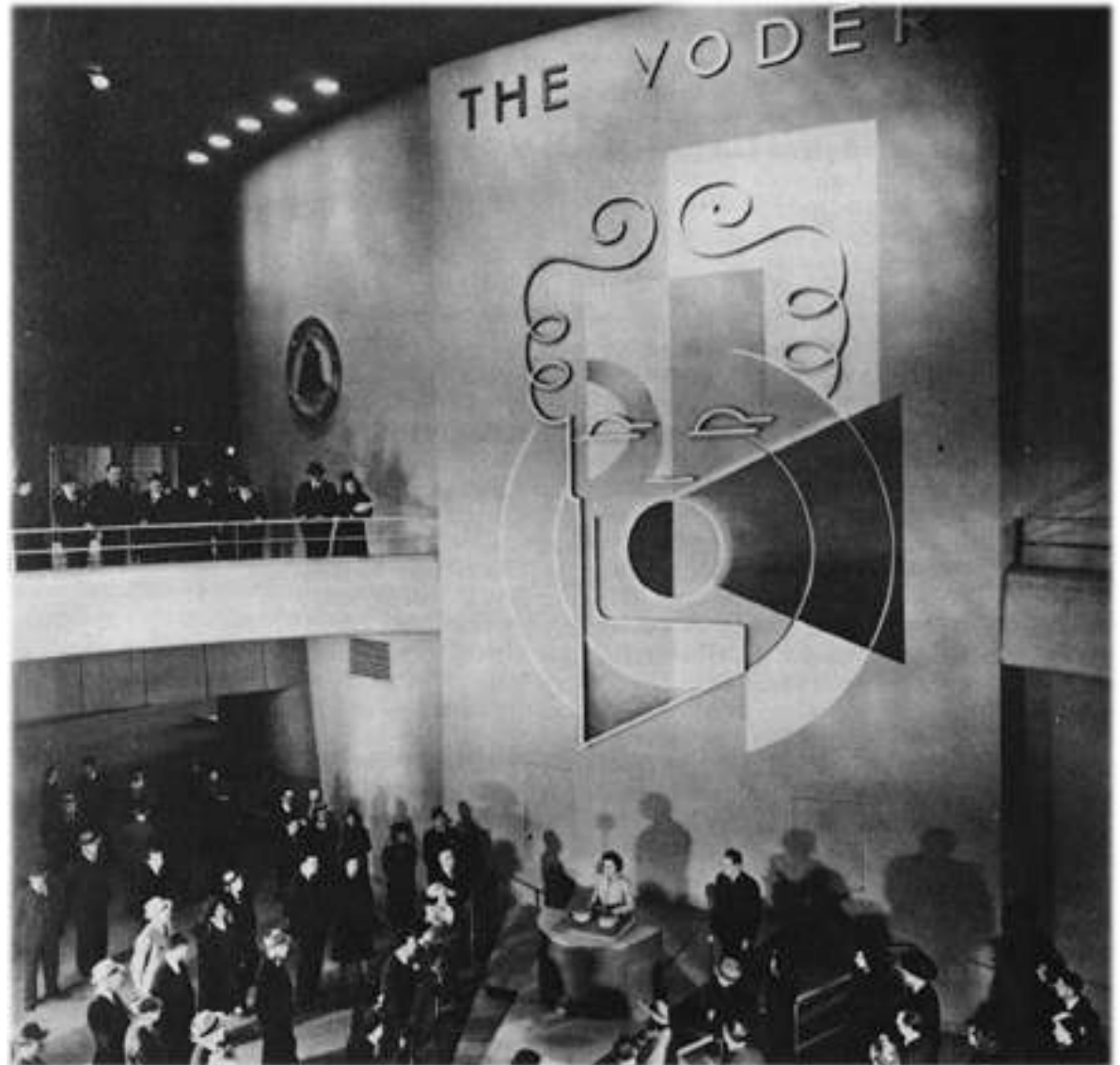


Laurens Hammond (1939)



Tonbeispiel: Procol Harum: A Whiter Shade of Pale, 1967

Voder (1939)



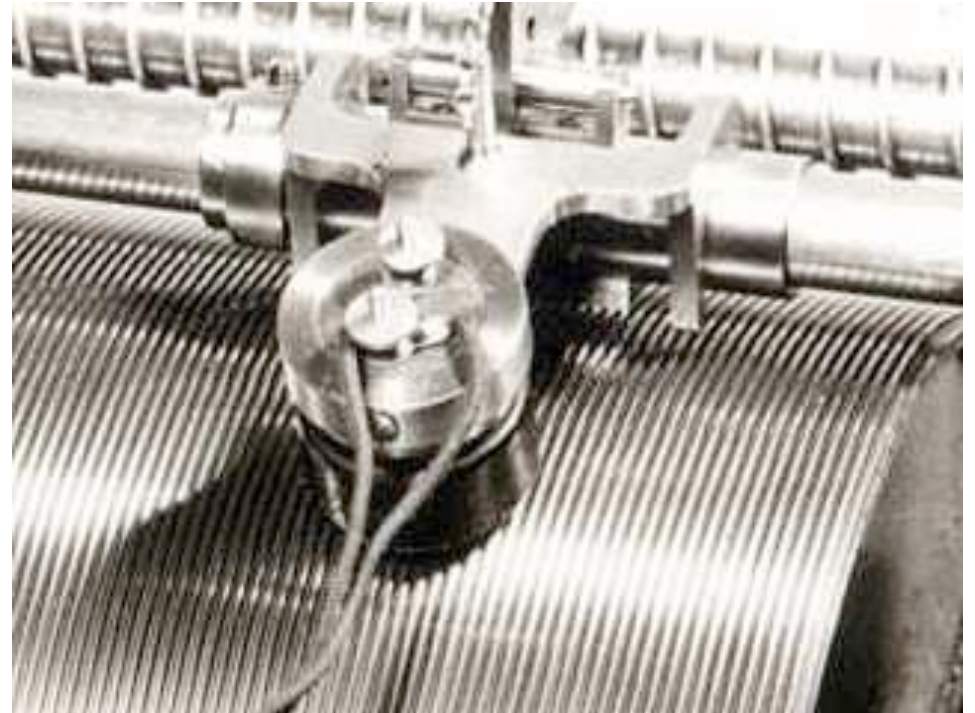
Klangbeispiel:Voder

Homer Dudleys Voder

Telegraphphone

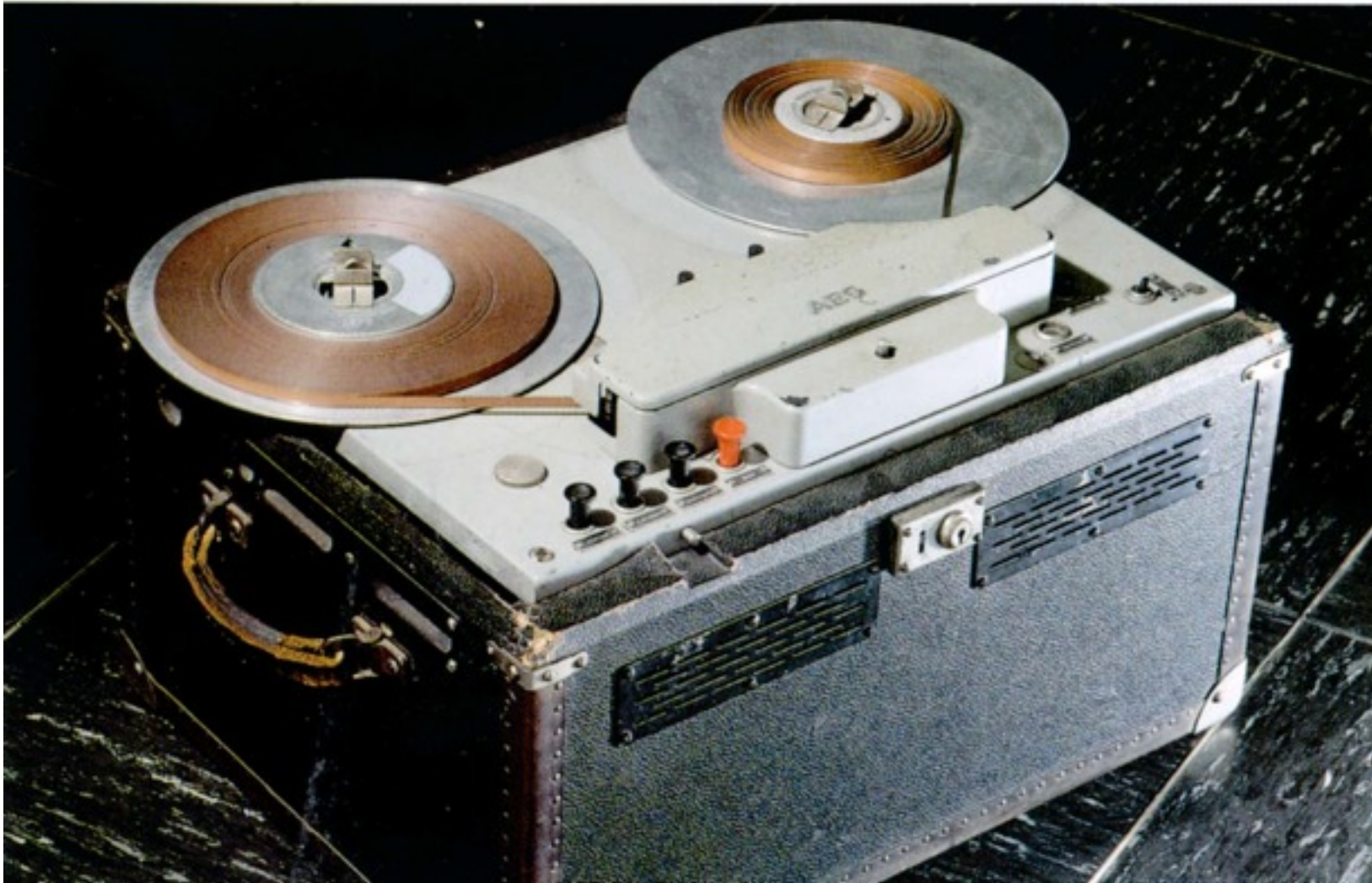


Valdemar Poulsen, 1898



Klangbeispiel: Kaiser Franz Joseph, 1900

Magnetophon



Telefunken Modell K2, 1935

AEG & BASF



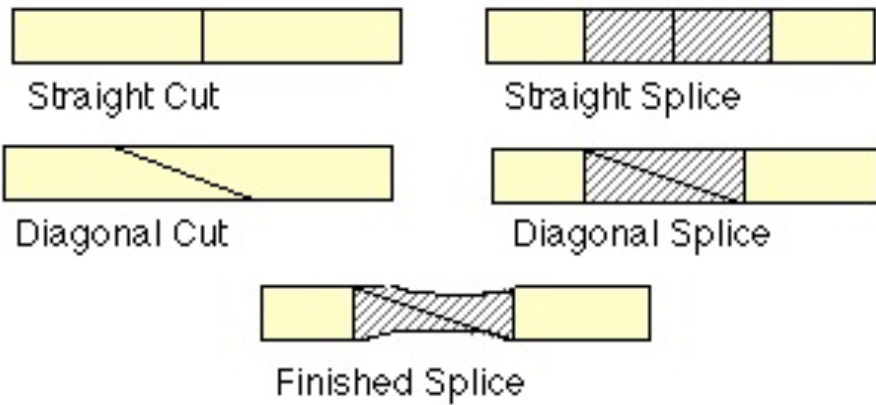
1935 AEG Magnetophon; BASF Bänder
1950 Low-Cost Produkte

Tonband Kasette

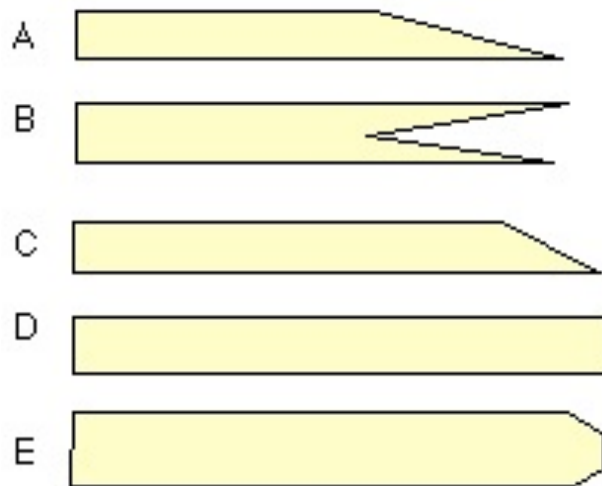


Philips, 1963

Musique Concrète



Bandmontage

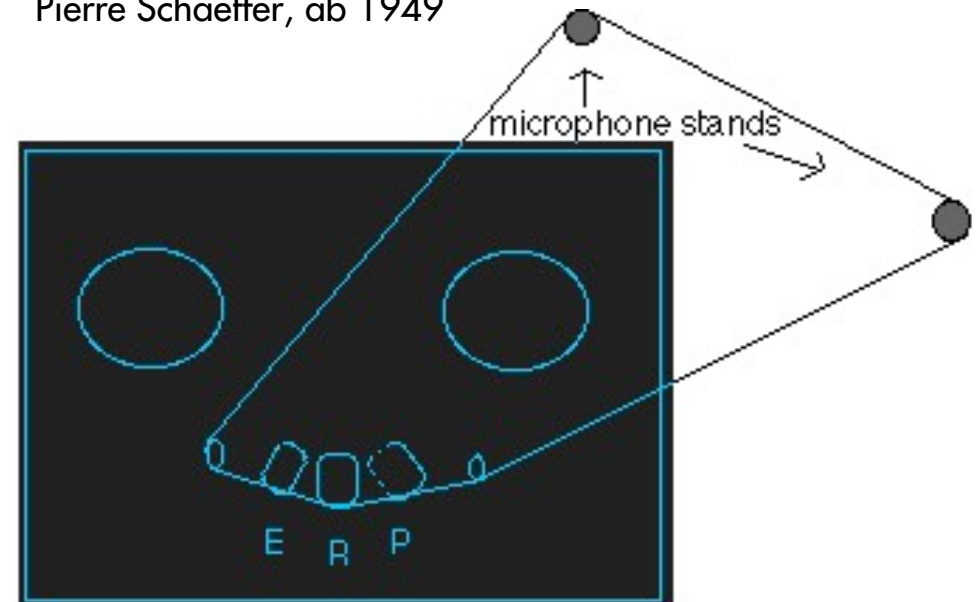


Bandanschnitte

Klangbeispiel: Pierre Schaeffer – Valse



Pierre Schaeffer, ab 1949



Bandschleifen

E-Musik

Elektronische Studios

Köln 1951

Mailand 1953

Brüssel 1958

Utrecht 1964

Freiburg 1971

Paris 1975

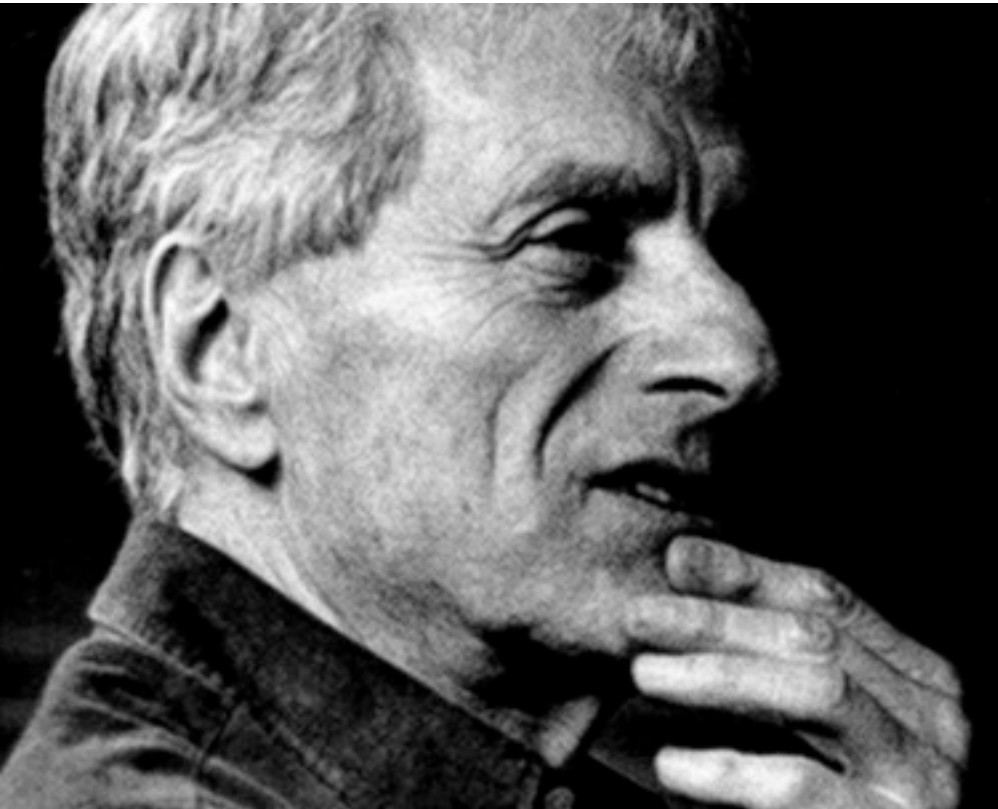


Studio für elektronische Musik, Köln

Hörbeispiel: John McGuire, Pulse Music I, 1976

Iannis Xenakis

(1922-2001)



Stochastische Musik,
ab 1954

Hörbeispiel: Concret PH

Illiac-Suite, 1957

Lejaren Hiller,
Leonard Isaacson

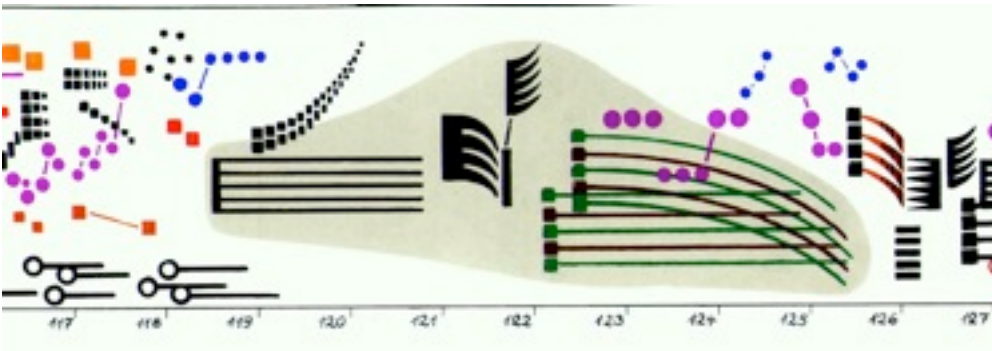
1. Generate
2. Modify
3. Select

Illiac 2, University of Illinois, 1955-56

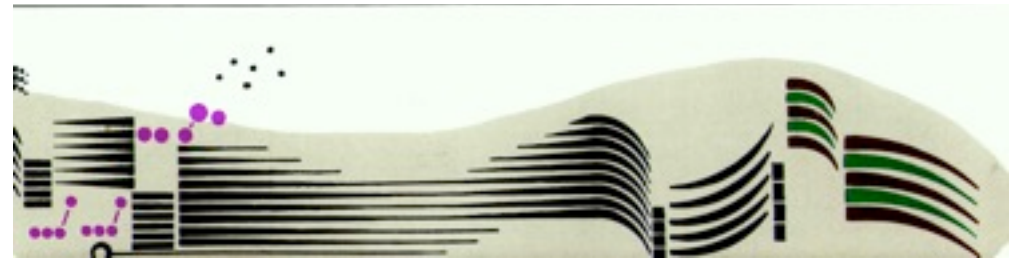


György Ligeti

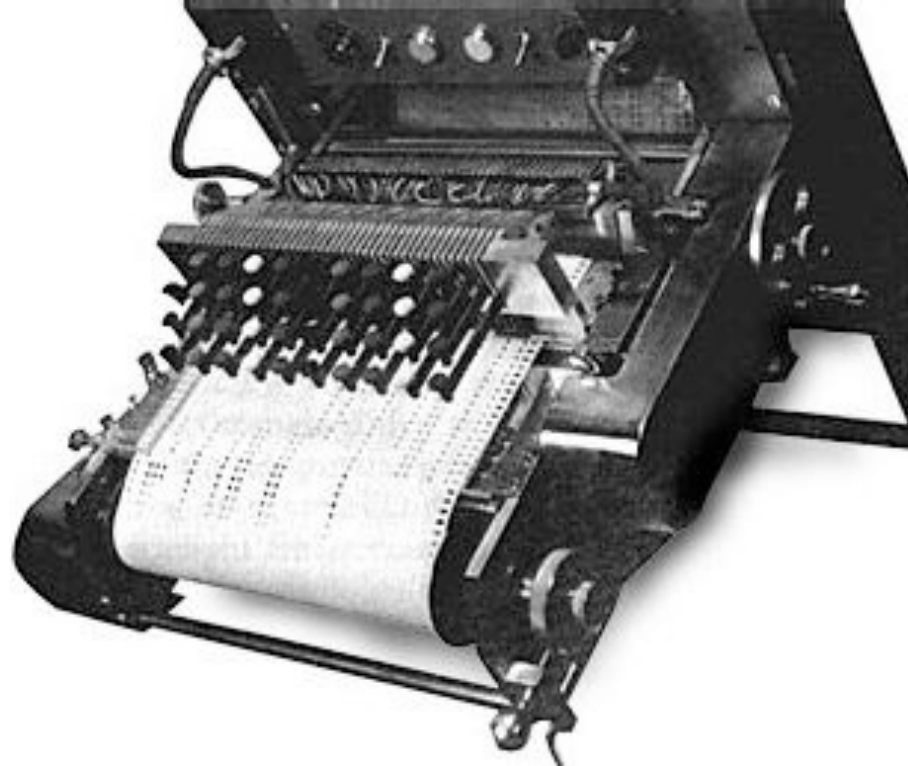
(1923-2006)



Artikulation-Hörpartitur von Rainer Wehinger



Hörbeispiel: Artikulation (1958)



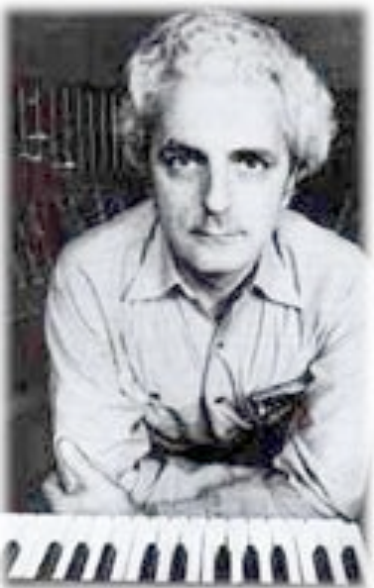
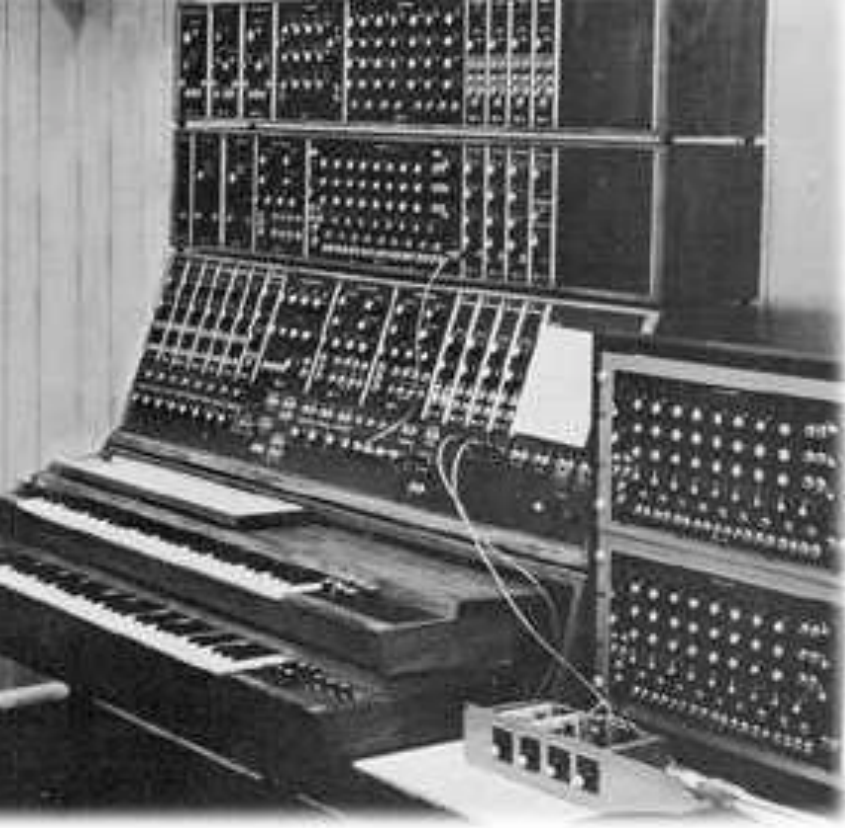
RCA-Synthesizer (ab 1951)

RCA MKII synthesizer am Colombia-Princeton Electronic
Music Centre, 1955



Klangbeispiel: Blue Skies

Moog (ab 1961)



Robert Moog

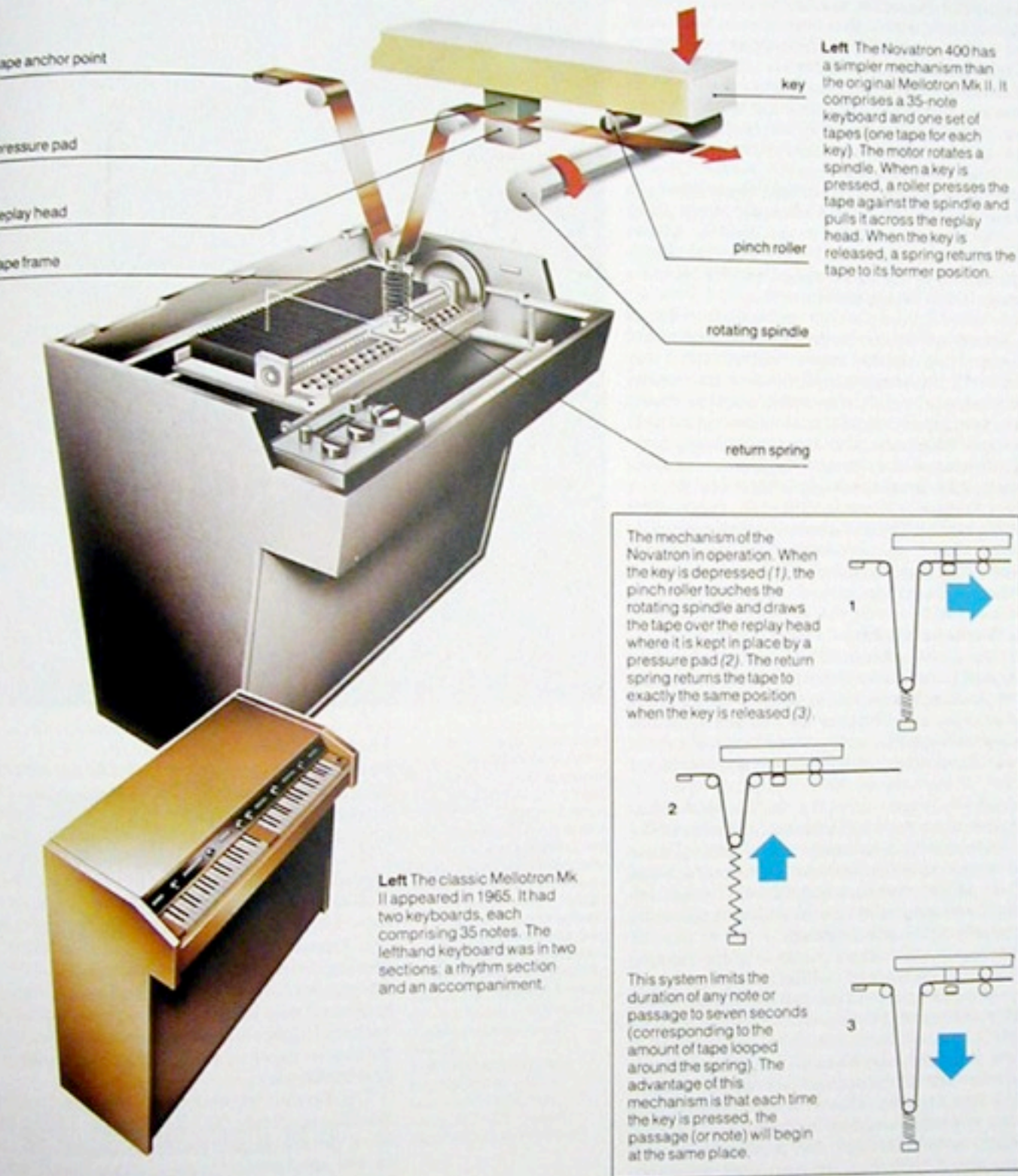
Modular Moog Synthesizer 1967



Minimoog

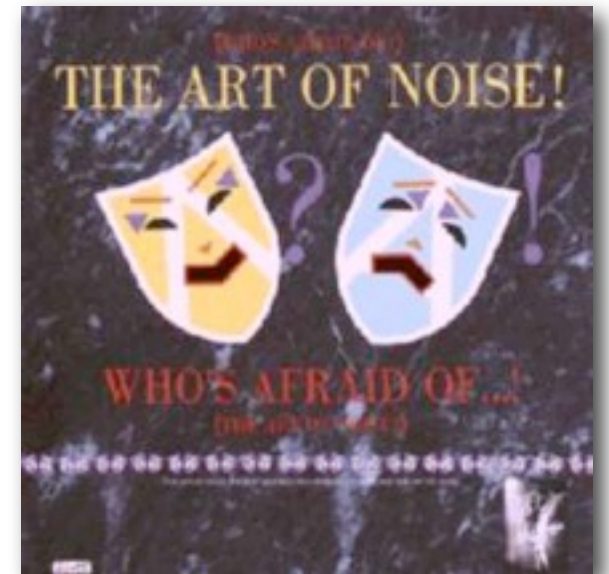


Mellotron (ab 1963)



Hörbeispiel
Genesis: Watcher of the Skies
(1972)

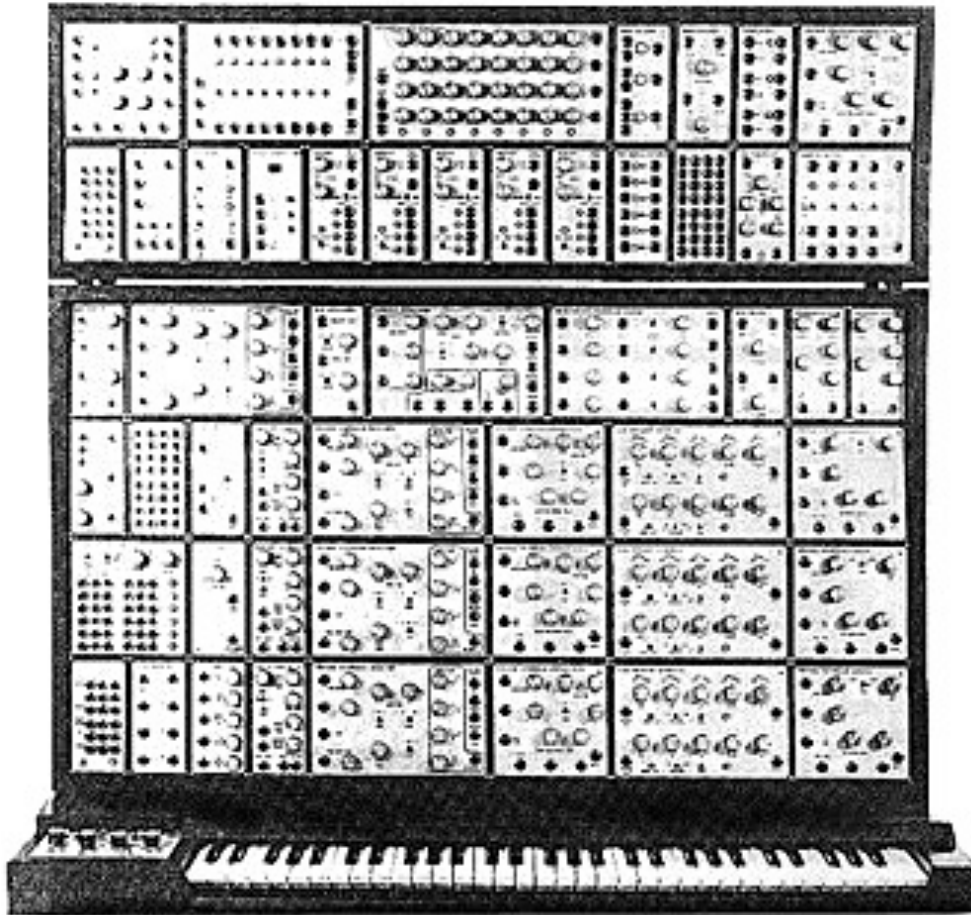
Fairlight (1979)



Peter Vogel and Kim Ryrie: Fairlight CMI IIx Synthesiser/Sampler

Klangbeispiel: Art Of Noise, How to Kill, 1983-84

Emu-lator (1980)



Emu Modular Synthesizer



C-64/SID (1982)

```
**** COMMODORE 64 BASIC V2 ****  
64K RAM SYSTEM 38911 BASIC BYTES FREE  
READY.
```

The screenshot displays the PlaySID software interface, which includes several windows for controlling and analyzing sound:

- Controls:** A window with a digital display showing '01:34', a 'Playing song:' field with '01 of 02' and 'PAL' format, and playback controls (stop, play, fast forward, fast reverse). It also features a 'Master Volume' slider and a 'Tempo' slider. Below these are fields for song metadata: Name (Elite), Author (David Dunn & Aidan Bell), Copyright (1985 Finebird), Songs (2 (Startsong: 1)), Init Addr. (\$B46F), Play Addr. (\$B4B4), Format (PlaySID one-file format (PSID)), Filesize (7183 bytes), and Status (No errors).
- Filter adjustment:** A window with three sliders for 'filter parameter 1', 'filter parameter 2', and 'filter parameter 3'. It includes a 'Default' button, a checked 'Filter enabled' checkbox, and a graph showing 'filter strength' vs 'cutoff frequency'.
- Mixer:** A window with checkboxes for 'Mixer enabled' and 'Save Fader Settings'. It contains four vertical faders for 'filter active' and 'Gain', each with a 'MUTE' and 'SOLO' button. Below the faders are 'Pan' and 'Mute' controls.
- SID registers:** A window displaying the current settings for three voices and the filter. The data is as follows:

Parameter	Voice 1	Voice 2	Voice 3
Frequency	\$18C3	\$151F	\$191E
Pulsewidth	\$0A00	\$0A00	\$0A00
Waveform	\$20	\$40	\$41
ADSR	\$3119	\$3119	\$045B
Filter cutoff	\$0300		
Resonance/Filter	F4		
Filtermode/Volume	F3F		
- Oscilloscope:** A window showing a real-time waveform of the sound output.
- Spectrum Analyzer:** A window showing the frequency spectrum of the sound output.

Sound Interface Device chip MOS 6581

Klangbeispiel: Huelsbeck: Giana Sisters (1987)

Yamaha

John Chowning, Stanford University, FM Synthese, 1967

$$f(t) = a_1 * \sin(2 * \text{PI} * f_1 * t + a_2 * \sin(2 * \text{PI} * f_2 * t))$$

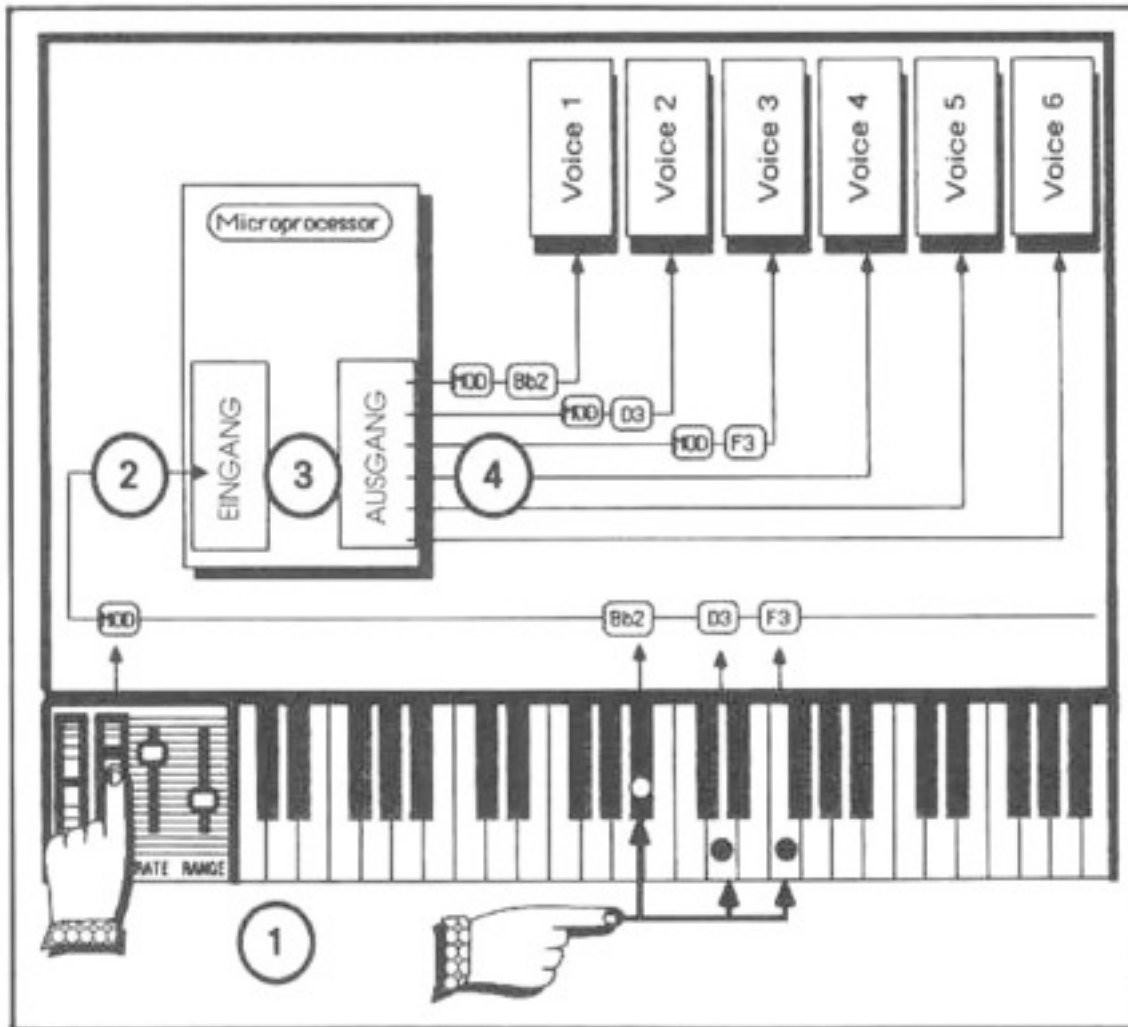


Yamaha DX-7 (1983)

Bass

E-Piano

MIDI



MIDI Kanal-Voice-Messages		
STATUSWORT	Datenwort 1	Datenwort 2
NOTE ON 1 0 0 1 1 1 1 1 1 1 Identifiziert Kanal # 1—16 Wird auch benutzt für NOTE OFF mit Attack-Velocity=0	Tasten-Nummer 0 1 1 1 1 1 1 1 1 1 Identifiziert Taste # 0—127 60 = mittleres C	Attack Velocity 0 1 1 1 1 1 1 1 1 1 Identifiziert Attack-Velocity 0—127 127 = ff 64 = mf (wird bei nicht-dynam. Keyboards gesendet) 0 = NOTE OFF
NOTE OFF 1 0 0 0 1 1 1 1 1 1 Identifiziert Kanal # 1—16 Wird im allgemeinen nur von Inst. genutzt, die Release Velocity-Daten übertragen.	Tasten-Nummer 0 1 1 1 1 1 1 1 1 1 Identifiziert Taste # 0—127 60 = mittleres C	Release Velocity 0 1 1 1 1 1 1 1 1 1 Identifiziert Release-Velocity 0—127 (wird ignoriert bei nicht-dynamischen Geräten)
PITCH BENDER CHANGE 1 1 1 0 1 1 1 1 1 1 Identifiziert Kanal # 1—16	Bender Position 0 1 1 1 1 1 1 1 1 1 127 = Maximum 64 = zentriert 0 = Minimum	Bender Position 2 0 1 1 1 1 1 1 1 1 1 Hier können feinere Zwischenwerte gesetzt werden.
CONTROL CHANGE 1 0 1 1 1 1 1 1 1 1 Identifiziert Kanal # 1—16	Controller Number 0 1 1 1 1 1 1 1 1 1 0-31 = Regelbare Contr. 64-95 = Switch-Control 122-127 = Kanal-Mode-Messages	Controller Position 0 1 1 1 1 1 1 1 1 1 127 = Max. oder EIN 0 = Min. oder AUS
POLYPHONIC KEY PRESSURE 1 0 1 0 1 1 1 1 1 1 Identifiziert Kanal # 1—16	Key Number 0 1 1 1 1 1 1 1 1 1 Identifiziert Taste # 0—127 60 = mittleres C	After Touch 0 1 1 1 1 1 1 1 1 1 127 = Max. 0 = Min. Anschlagsdruck pro Taste
CHANNEL PRESSURE 1 1 0 1 1 1 1 1 1 1 Identifiziert Kanal # 1—16	After Touch 0 1 1 1 1 1 1 1 1 1 127 = Max. 0 = Min. Gleicher Wert für alle Töne	
PROGRAM CHANGE 1 1 0 0 1 1 1 1 1 1 Identifiziert Kanal # 1—16	Preset Number 0 1 1 1 1 1 1 1 1 1 Identifiziert einen von 128 Presets	

Scriabin Etude Op. 8 No. 2

1

MIDI



Alexander Scriabin,
Études Opus 8, Nr. 2
(ca. 150 Noten)

Midi Datei (8 KB)

Vladimir Horowitz (1 MB)

Notations-Software



1. Erste Eingabe
2. Überarbeitung
3. Druck



Musicware, Nightingale, 1990

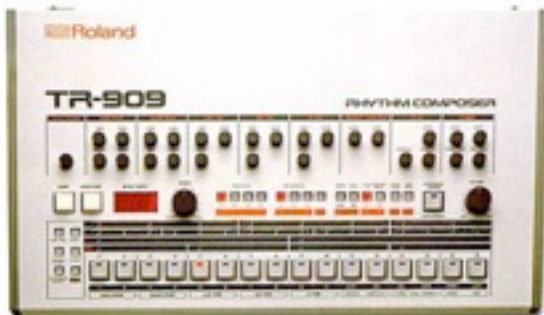
Acid House



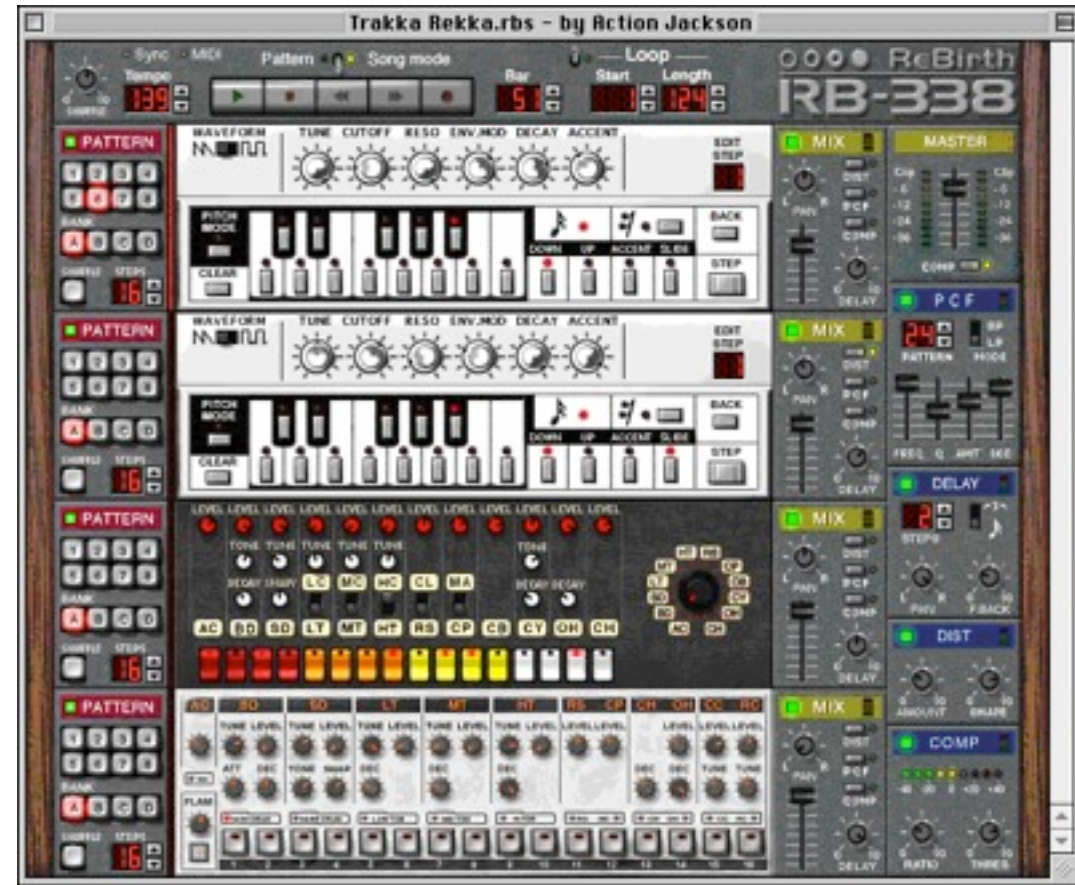
Roland TB 303 (1982-84)



Roland TR 808 (1980)



Roland TR 808 (1984)



Propellerhead Rebirth

Hörbeispiel: TG Virus *KiloMix* (1998)



Kraftwerk

e-music

1979 Industrial

1981 Electronic Body Music

1982 Electro

1985 Chicago House

1985 Detroit Techno

1987 Acid

1988 New Beat

1990 Techno

1991 Hardcore

1992 Rave

1993 Trance

1994 Jungle

1999 Schranz



Frankie Knuckles im Warehouse, Chicago



Juan Atkins, Detroit

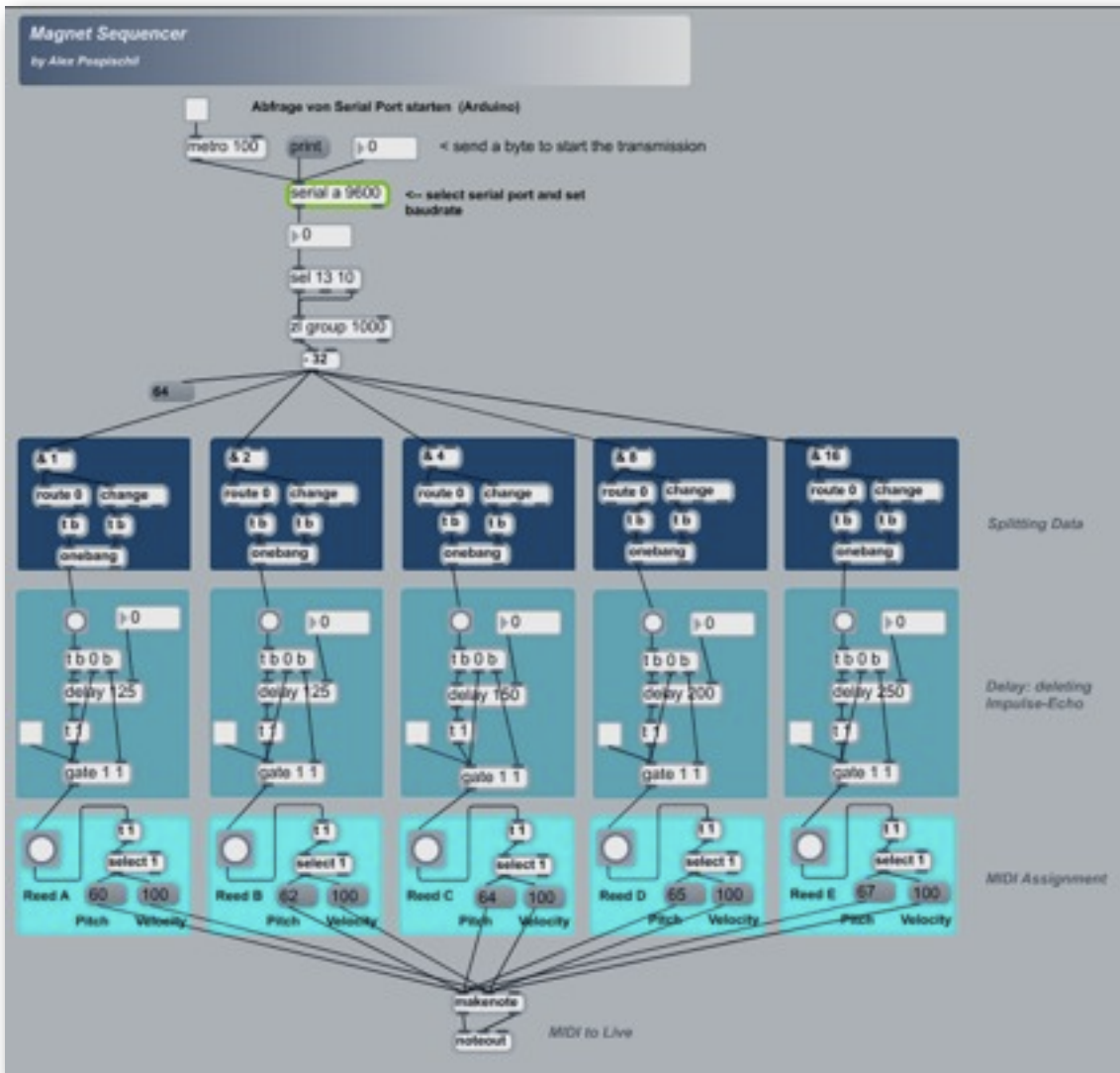
Hörbeispiel: Music Instructor, *Hymn* (1995)

Virtuelle Instrumente



Native Instruments Reaktor 5

Max / MSP

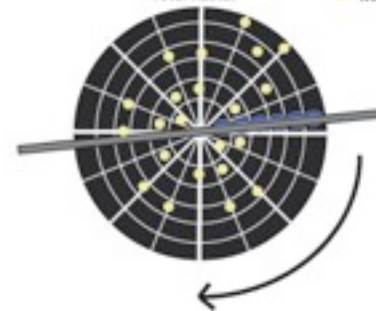


Der Magnet-Sequencer

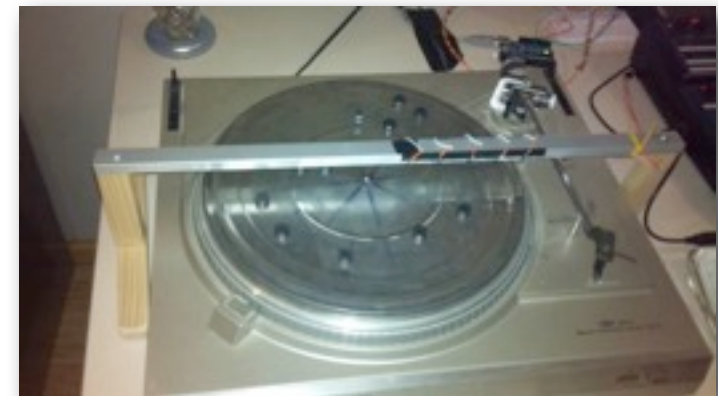
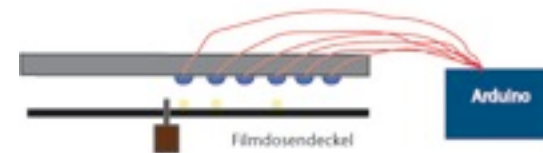
Ein Projekt von Alexander Pospischil

Schallplatte mit aufgetragenem
160el-Flaster

Reed-Kontakt
Magnet

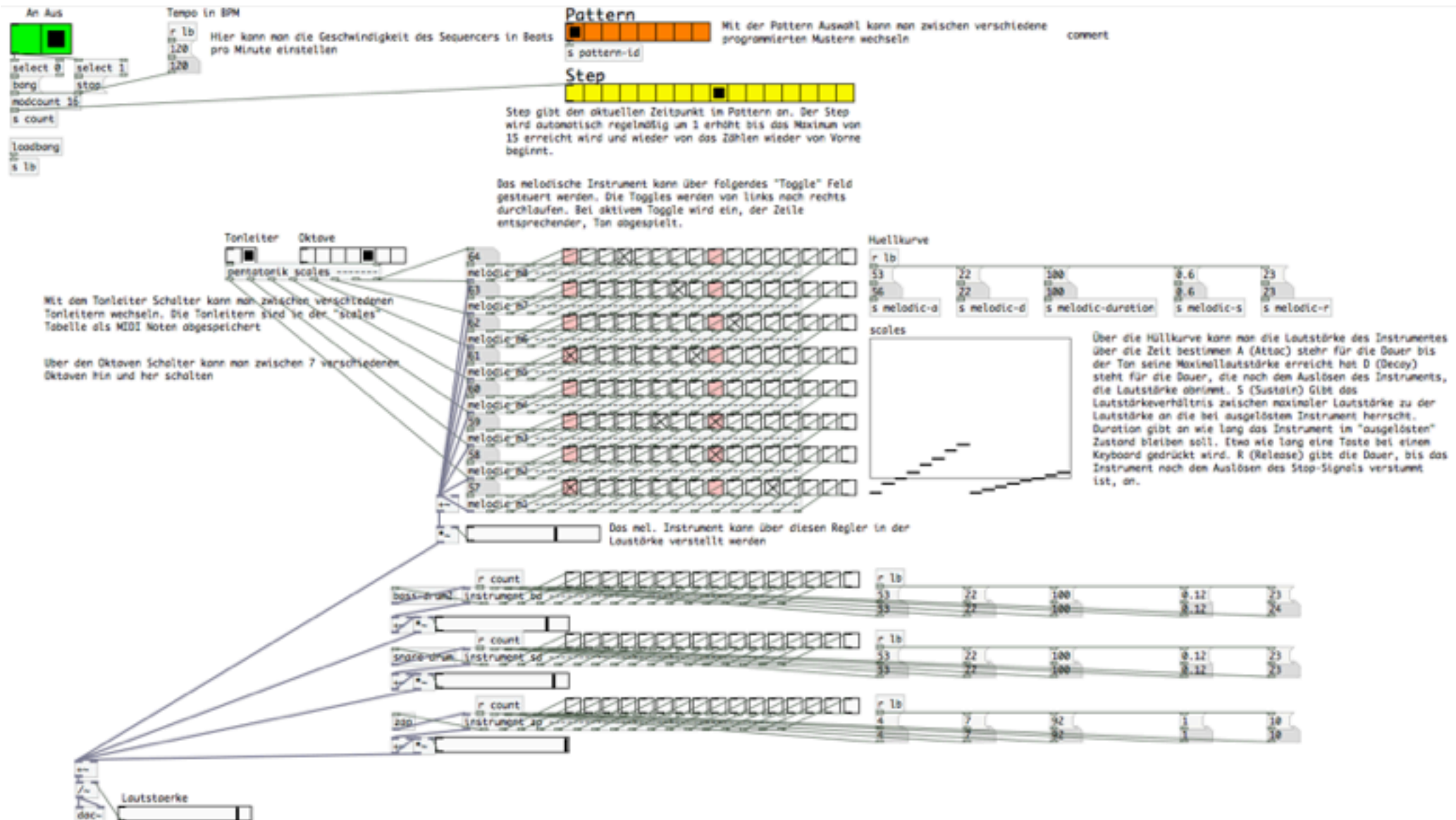


Die Reed-Kontakte senden einen Impuls, wenn sie unter sich einen Magnet erkennen. Der Impuls wird per Arduino in der Software Max/MSP/jitter als Trigger für eine MIDI-Note verwendet.



<http://vimeo.com/23931283>

Pure Data



DJ-Culture



DJ Qbert Freestyle Scratch DMC World Championships

Vielen Dank