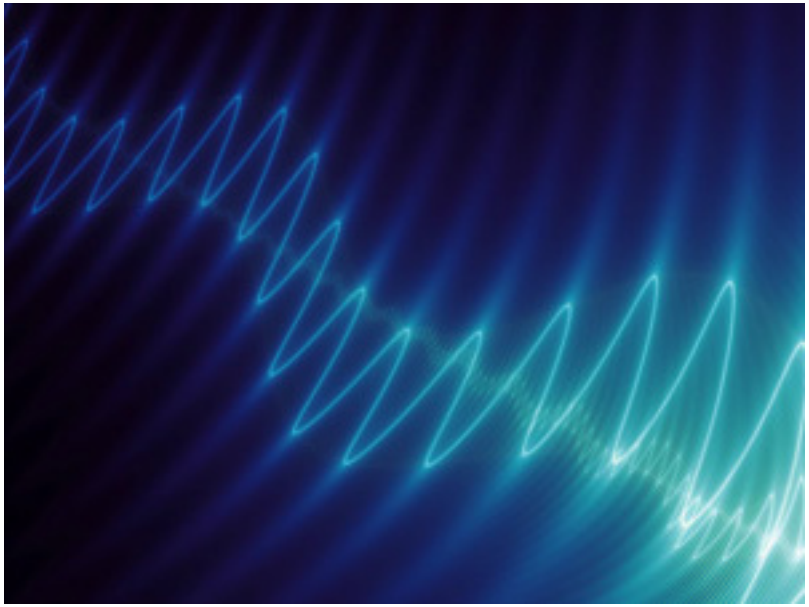


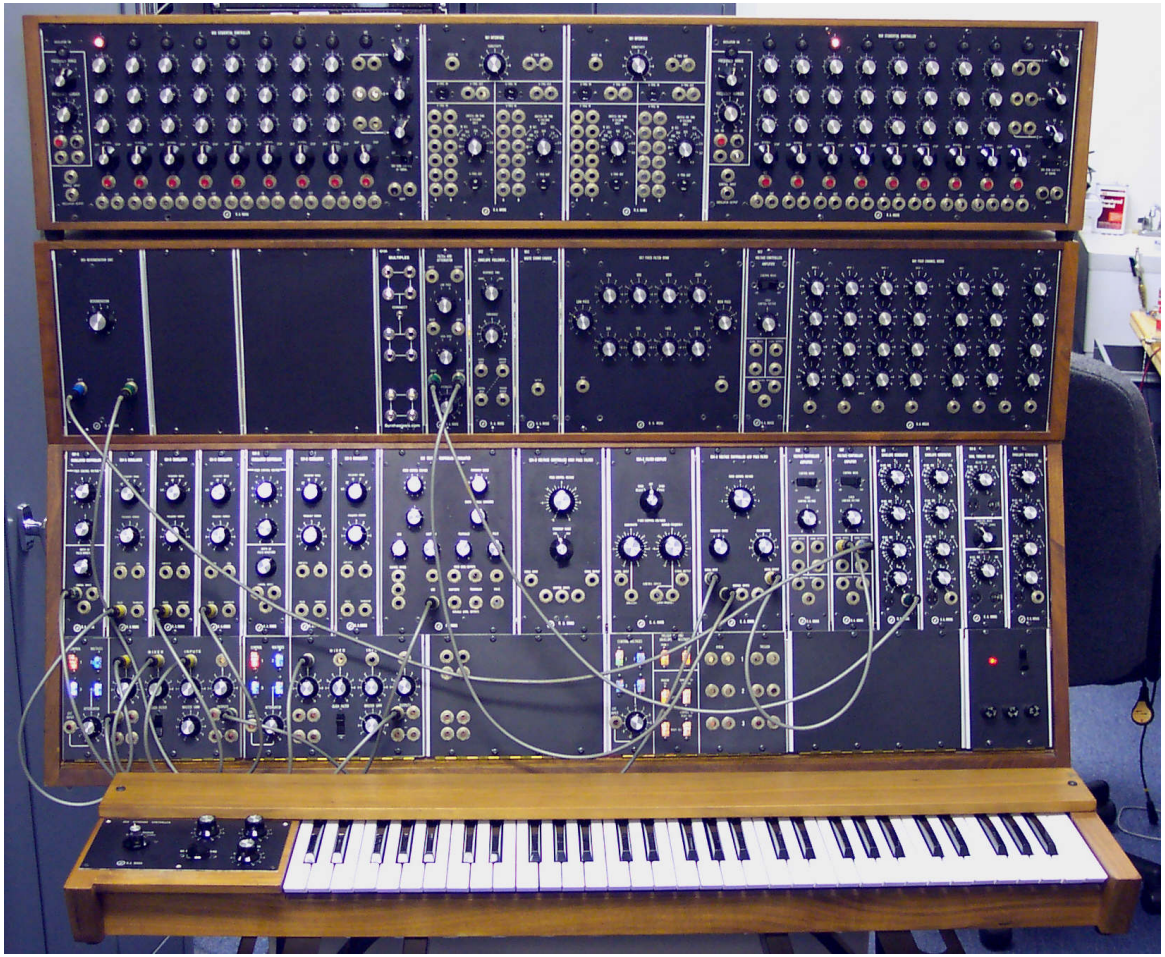
MUS421–571.1
Electroacoustic Music Composition

Kirsten Volness – 11 Mar 2016

Synthesizers

- Robert Moog
  - Started building Theremins
  - Making new tools for Herb Deutsch
  - Modular components connected by patch cables
    - Voltage-controlled Oscillators (multiple wave forms)
    - Voltage-controlled Amplifiers
    - AM / FM capabilities
    - Filters
    - Envelope generator (ADSR)
    - Reverb unit
    - AMPEX tape recorder (2+ channels)
    - Microphones

Synthesizers



Synthesizers

- San Francisco Tape Music Center
  - Morton Subotnick and Ramon Sender
  - Donald Buchla – "Buchla Box"– 1965
    - Sequencer – Analog automation device that allows a composer to set and store a sequence of notes (or a sequence of sounds, or loudnesses, or other musical information) and play it back automatically
    - 16 stages (16 splices stored at once)
    - Pressure-sensitive keys
  - Subotnick receives commission from Nonesuch Records (*Silver Apples of the Moon, The Wild Bull, Touch)*

Buchla 200

Synthesizers

- CBS buys rights to manufacture Buchlas
- Popularity surges among electronic music studios, record companies, live performances
  - Wendy Carlos – *Switched-on Bach* (1968)
  - Emerson, Lake, and Palmer, Stevie Wonder, Mothers of Invention, Yes, Pink Floyd, Herbie Hancock, Chick Corea
  - 1968 Putney studio presents sold-out concert at Elizabeth Hall in London

Minimoog

- No more patch cables! (Still monophonic)

Polyphonic Synthesizers

- Polymoog
- Four Voice (Oberheim Electronics)
  - Each voice still patched separately
- Prophet-5
  - Dave Smith at Sequential Circuits
  - Fully programmable and polyphonic
- GROOVE (Generated Real-Time Operations on Voltage-Conrolled Equipment)
  - Max Mathews and F. Richard Moore (Bell Labs)
  - Computer interface between human input and synthesizer
  - Laurie Spiegel's *Appalachian Grove* (1974)

Going Digital

- Necessary to interface with computers
- Allowed for the development of software to be used with synthesizers
  - Buchla 500 at CalArts (early 1970s)
- Dartmouth Electronic Music Studio (1967)
  - Jon Appleton and Sydney Alonso
  - Synclavier – wide array of sampling capabilities
- University of Utrecht
  - Structured Sound Synthesis Project (1978)
    - Multitimbral – FM synthesis, waveshaping, additive synthesis

Real-Time Processing

- Giuseppe Di Giugno – Gruppo Electroacustica di Napoli
  - 4X – first digital signal processor (1981)
    - Pierre Boulez – *Répons*
      - Six soloists sounds transformed and routed through speakers
  - MAX
    - Miller Puckette – real-time scheduler with graphical user interface
      - Timing musical events independently of one another, measure by measure and beat by beat, so 4x could follow the flutist

Convolution Reverb

- Allows one to "record" the ambience of a particular room and apply it to other sounds
- Pattern of reflections recorded = Impulse Response
- Less customizable than algorithmic reverb

Granular Synthesis

- Sound is sampled and played back in 1–50 millisecond pieces (grains)
- Similar effect as severe time expansion that creates artifacts
- By varying the waveform, envelope, duration, spatial position, and density of the grains, many different sounds can be produced (timbre changes)
- Soundhack +bubbler (freeware)
- Pitch as a function of rhythm

Listening Examples

- Emerson, Lake and Palmer – *Lucky Man*
- Pierre Boulez – *Répons*
- Morton Subotnick – *Silver Apples of the Moon*
- Pat Metheny playing Synclavier
- Dan Tepfer's Rhythm / Pitch Duality