Early Synthesizers
RCA Mark II

- Acquired by the Columbia–Princeton Music Center in 1959
- Huge: took up a whole room - 750 vacuum tubes
- Difficult to control, information input via paper tape
- Used almost exclusively by Milton Babbitt

— Philomel 1963
1964: three men invented analog synthesizers in different parts of the world

• Robert Moog, New York
  – Moog synthesizer
• Donald Buchla, San Francisco
  – Buchla synthesizer
• Paul Ketoff, Rome
  – Synket synthesizer
Moog – the most traditional had piano size keys, much like modern synths
Buchla – touch sensitive control strip (non-moving keyboard)
early designs contained sequencers
Synket – miniature keys
each key could be wiggled sideways to bend pitch
Subtractive synthesis

• Method used by early synthesizers
• Begins with a harmonically rich sound
  – triangle, square, sawtooth
• Modified by using filters to subtract partials (overtones)
Early Synth Design

• Comprised of separate modules:
  • Oscillator (VCO)
    – different waveforms (triangle, square, sawtooth)
  • Filter (VCF)
    – used to subtract partials from the waveforms
  • Amplifier (VCA)
    – amplitude characteristics of a sound (ADSR)
  • Noise generator
    – white or pink noise
Connecting modules

• On early synths (Moog & Buchla), modules were interconnected by patch cables
• Later designs such as the MiniMoog featured switchable routing
MiniMoog
1968 - Moog came out with an analog sequencer

- Contained a bank of 24 analog pots (potentiometers)
  - each produced a control voltage that was patched to a VCO
  - a clock would step from one pot to the next
  - a repeating sequence of notes resulted
Moog Sequencer
Some examples of recordings featuring early synthesizers

• Morton Subotnick was the best known user of the Buchla synth, Silver Apples of the Moon (1967).
• Wendy Carlos’ Switched On Bach (1968) was the first commercially successful album of synthesized music.
• Keith Emerson of ELP used Moog synths extensively in his records - Lucky Man (1971)
• Herbie Hancock - Chameleon (1973) ARP synthesizer
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WENDY CARLOS PERFORMING ON THE MOOG SYNTHESIZER