

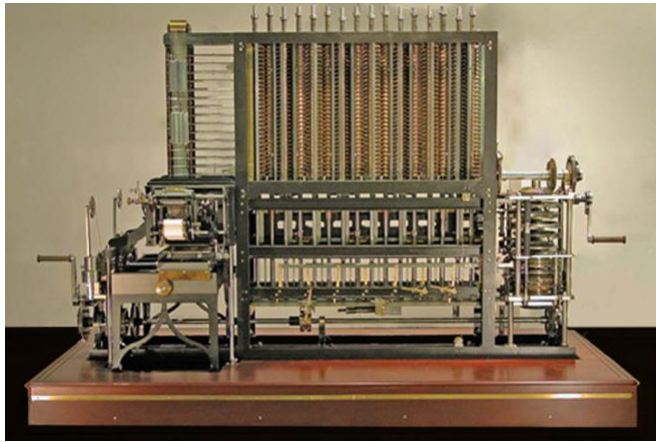
Input methods for music

MUSIC 253/CS 275A

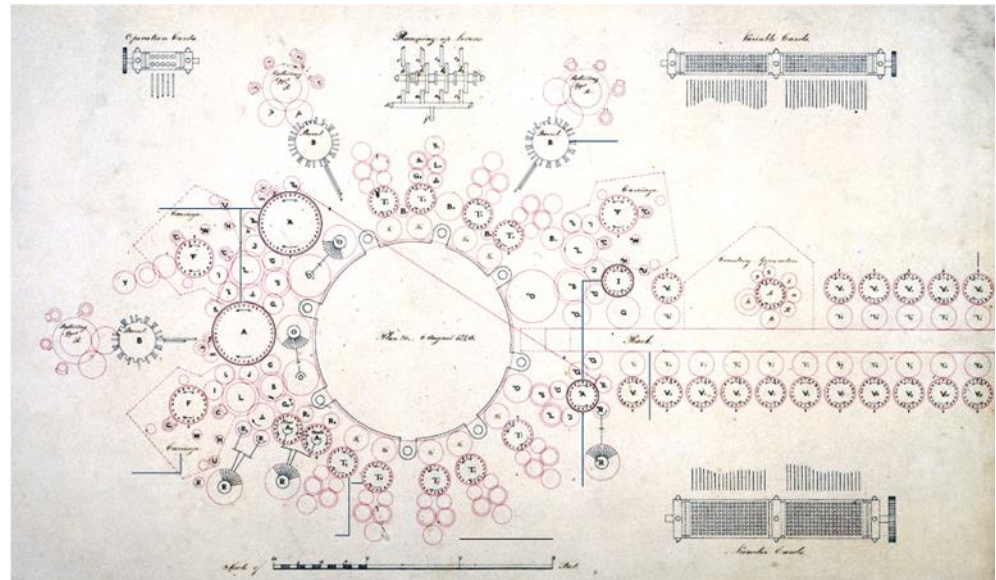
STANFORD UNIVERSITY

Translating (musical) sounds to symbols

From the “calculating machine” perspective



Babbage difference engine



Analytical Engine--CHM reconstruction (2008)

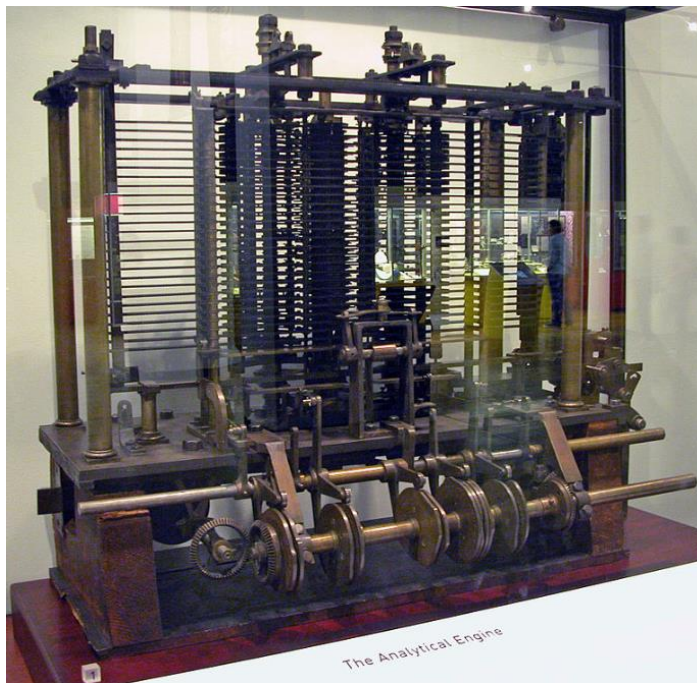
<https://www.youtube.com/watch?v=KBuJqUfO4-w>

CHM (2008)

Babbage Analytical Engine (1837)

Aim: to process data

Needs:



Data

Instructions



Two types of **punched cards** used to program the machine. Foreground: 'operational cards', for inputting **instructions**; background: 'variable cards', for inputting **data**

Possible sources of musical input

Symbolic data entry

Sound

Graphics construction sets

Optical recognition

Hybrid systems



Punched cards (1837-1964)

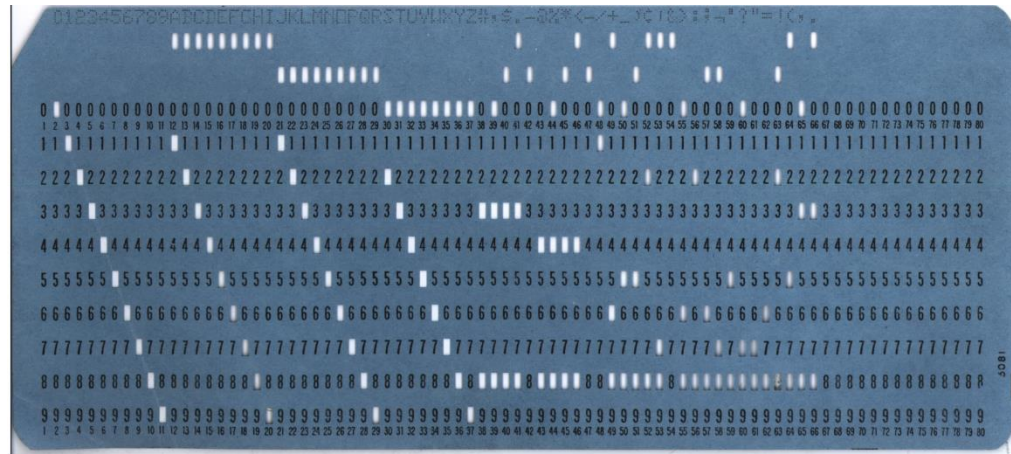
Aim: to process data

Needs:

- Instructions
- Data



Two types of punched cards used to program the machine. Foreground: 'operational cards', for inputting instructions; background: 'variable cards', for inputting data



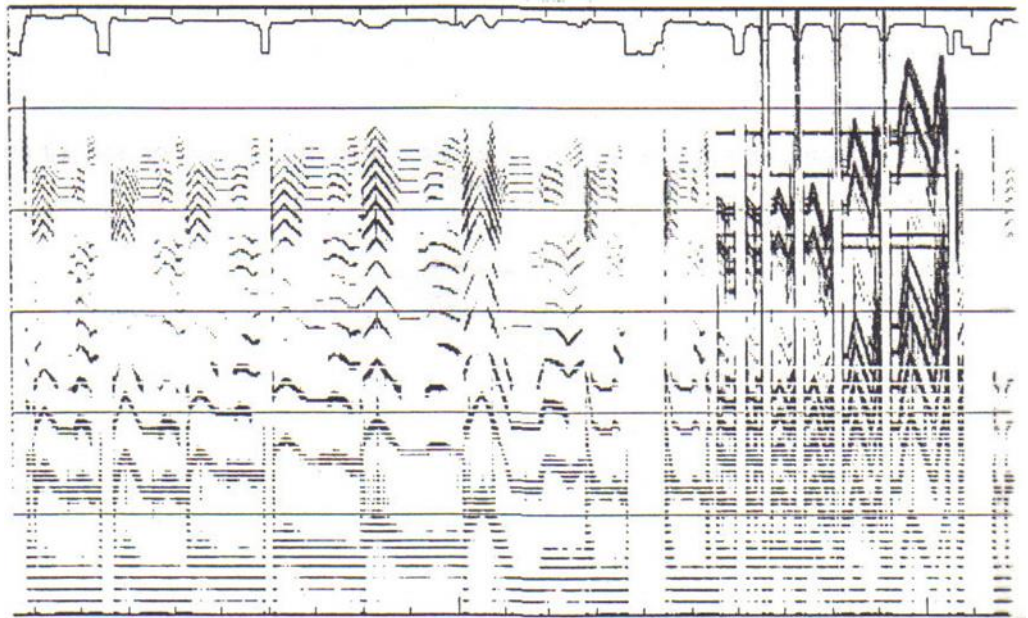
IBM Hollerith card, 1964

Sound capture

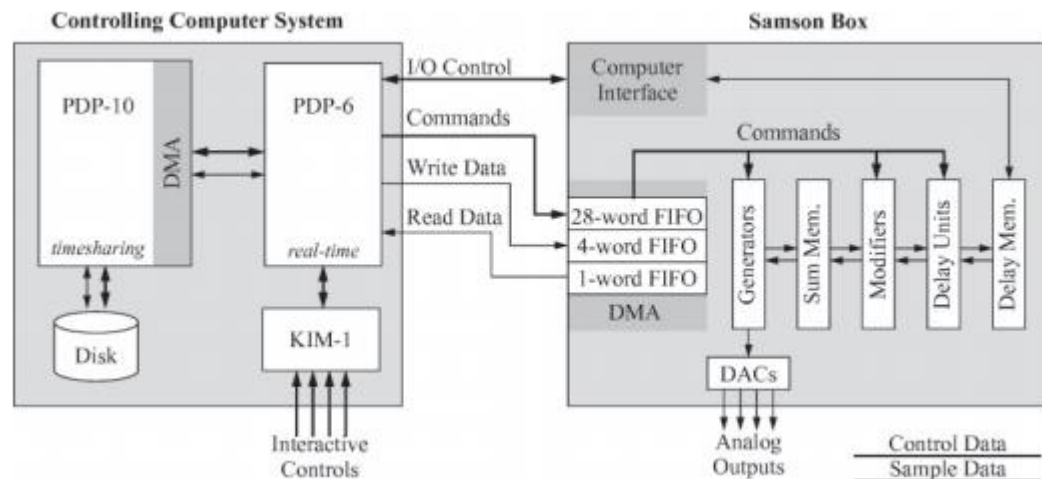
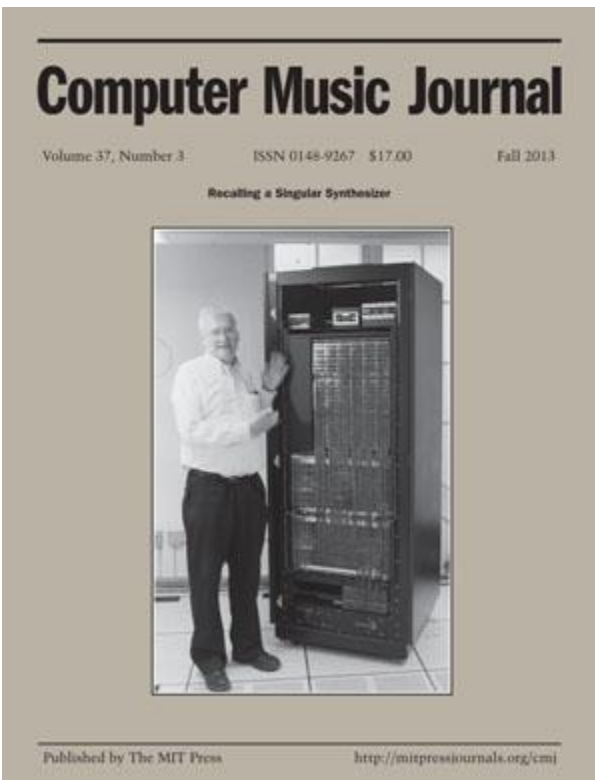
How can we make sound tangible?

Carl Seashore

Sonogram (c1930)



Samson box (for “audio computation,” c1975-80)



Gareth Loy's full article (2013) at:

http://www.mitpressjournals.org/doi/pdf/10.1162/COMJ_a_00193

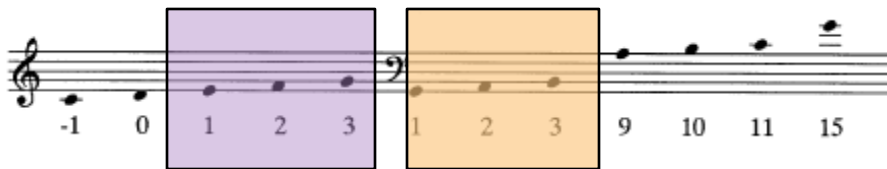
Alex Di Nunzio, “Samson Box,”

<http://www.musicainformatica.org/topics/samson-box.php>

Symbolic codes for music

1965-1985: hand encoding (type keyboard)

- **DARMS** (Digital Alternate Rep. of Music Scores)
- **MUSTRAN**, **IML-MIR** et al.



(“Great Society” encoding scheme)

- Designed for mainframes, card-readers
- Few printing possibilities
- Important for
 - the **thinking** that went into the task
 - **documentation**
 - **Implementation** (school music, esoteric repertoires)

DARMS Pioneers (1966--)

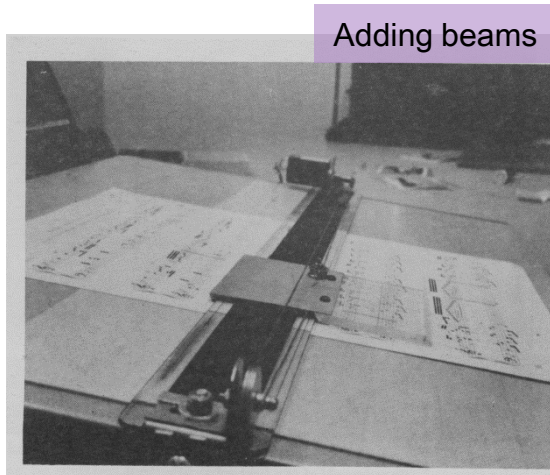
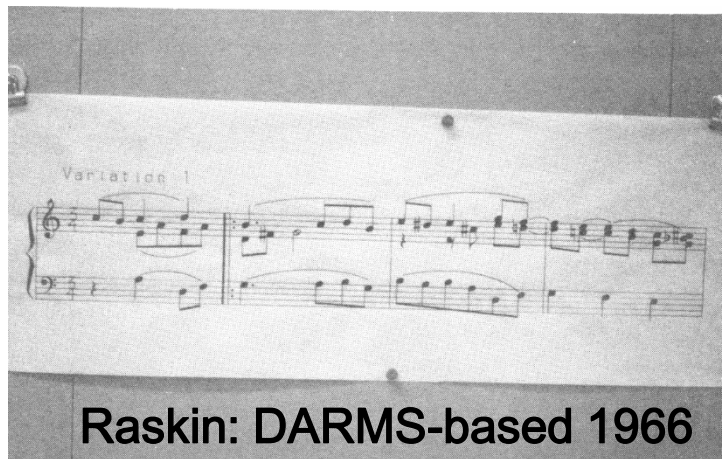
1. First system for encoding music notation

Stefan **Bauer-Mengelberg** (1927-1996)

- **IBM** mathematician; **developer**
- Assistant **conductor** (to Leonard Bernstein) of NYSO
- Implemented system for making a computer transcribe a composition (by Stefan Volpe)
- Edited papers of the mathematician **Gödel**
- IP **lawyer**

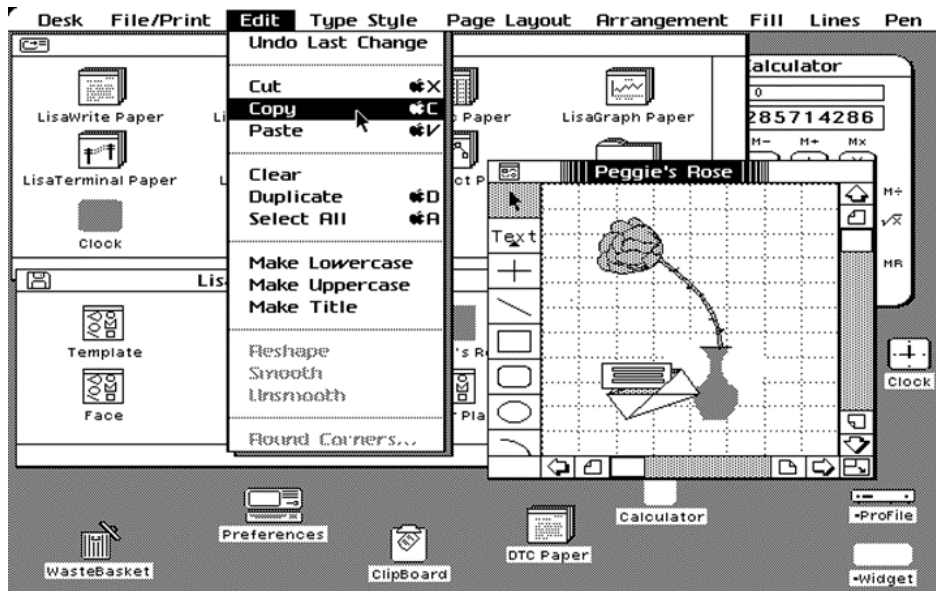
Jef **Raskin** (1942-2005)

- **Apple #4**
- co-dev (with Brian Howard, Apple #32) of Apple G&S (forerunner of *QuickTime*)
- Developed original **Mac interface**
- Composer
- First person to **implement** DARMS (1966)



Raskin system, 1967

Graphics assembly kits for scores



Lisa 1 (1984)



Apple Graphics & Sound:
Brian Howard, Jef Raskin

Hand-encoding pioneers (1970s, 1980s)

Raymond Erickson (DARMS)

Queens Univ., NY (open)

Tom Hall (DARMS)

A-R Editions, WI (proprietary)



Ray Erickson



Michael Kassler (IML/MIR)

Princeton, 1970s

Don Byrd (2000s-Nightingale)

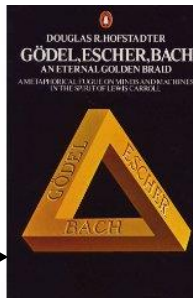
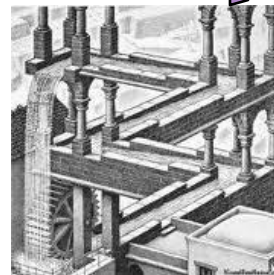
Princeton, 1980s

Indiana U., 1990s-2010



Don Byrd' music typesetting

Doug Hofstadter's text (1979)



Computer music-typesetting pioneers (mainframes, 1955-1975)

East Coast

Leuning, Ussachefsky et al.

Columbia-Princeton tape-music
collaboration (from 1954)

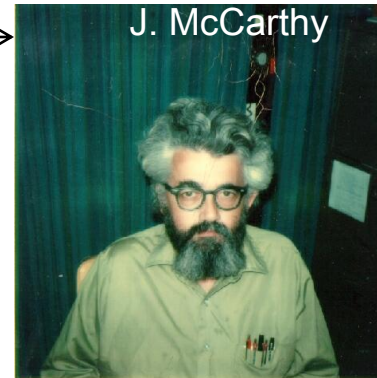
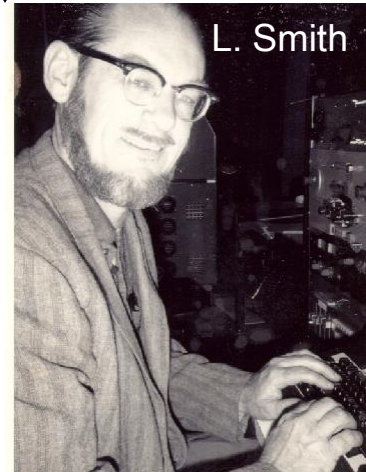
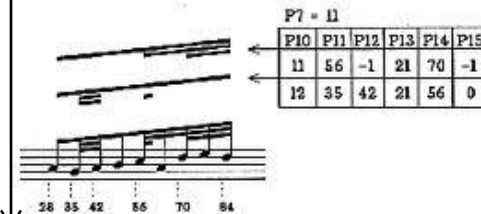


West Coast

Leland Smith (SCORE, 1974-2013)

Prof. of composition

Stanford AI lab



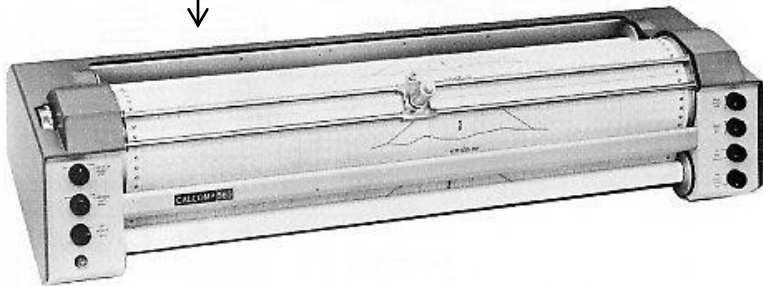
2. MIDI-assisted/personal computer era (1985-2005)

Machine and hand input

- Point-and-click palettes (graphic assembly with mouse)
- Many problems with MIDI timing resolution
- Cross-hatched systems (part MIDI, part by hand)

Printing options kept changing

- 1970s: **plotters** (SCORE)
- 1980s: **dot-matrix** printers (MuseData)
- 1990s: **laser** printers, PostScript
- 1985-2005: high-end **phototypesetting** shops



3. Sound/phonographic input

Thomas Edison (from 1889, but not initially musical)

Transcription tools (graphics)

Recording horns (sound, 1910)

Video capture (no synch with sound)

Sound/video synchronization (after 1940)



Edison's recording violin



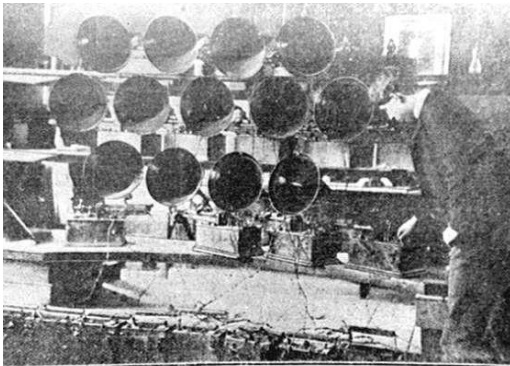
Amberol (1877)



Edison recording studio (1905)

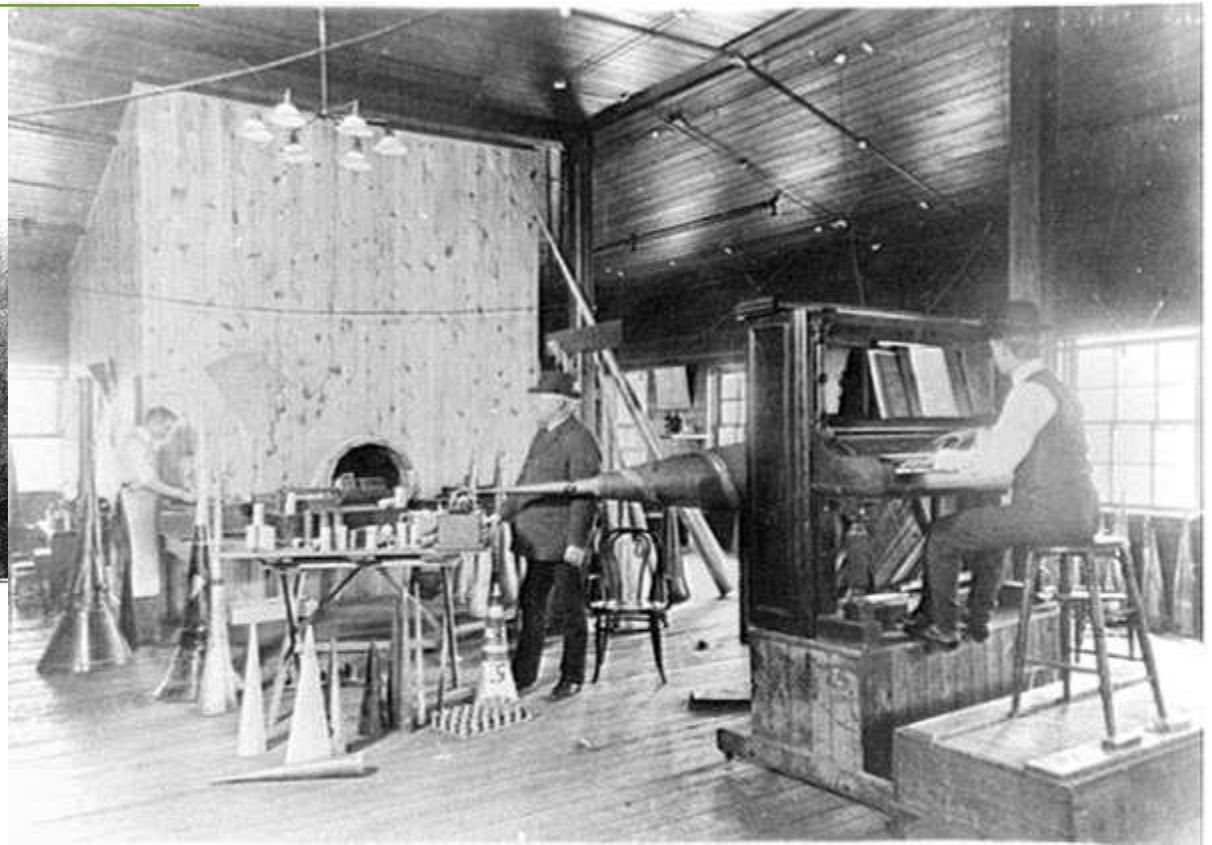
<http://www.tinfoil.com/record.htm>

West Orange, NJ



MAKING A BAND RECORD, WITH THIRTEEN RECORDING HORNS.

Setup for band
recording



Sound/video synchronization



Edison's Black Maria (1892-1910)

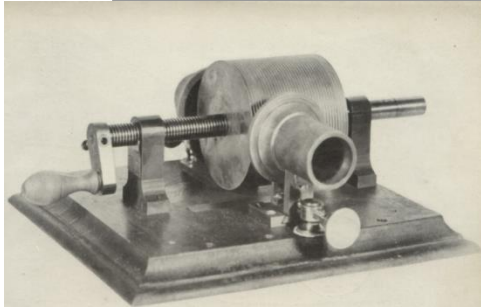
See <https://en.wikipedia.org/wiki/Kinetoscope#/media/File:Hapci-fr.gif>

Turntable for altering
light/shadow

Films were “narrated” by
live music (piano, organ)
until c. 1930

Film and audio were not
synchronized until c. 1946.

Reproducing music: Early recording technology



Edison Amberol c. 1908

