INTRODUCTION

Juan-Pablo Cáceres

Network Musical Performance Workshop

Technical and Artistic Strategies to Perform Around the Globe

Center for Computer Research in Music and Acoustics (CCRMA)
Stanford University

Workshop Overview

https://ccrma.stanford.edu/workshops/nmp2010/

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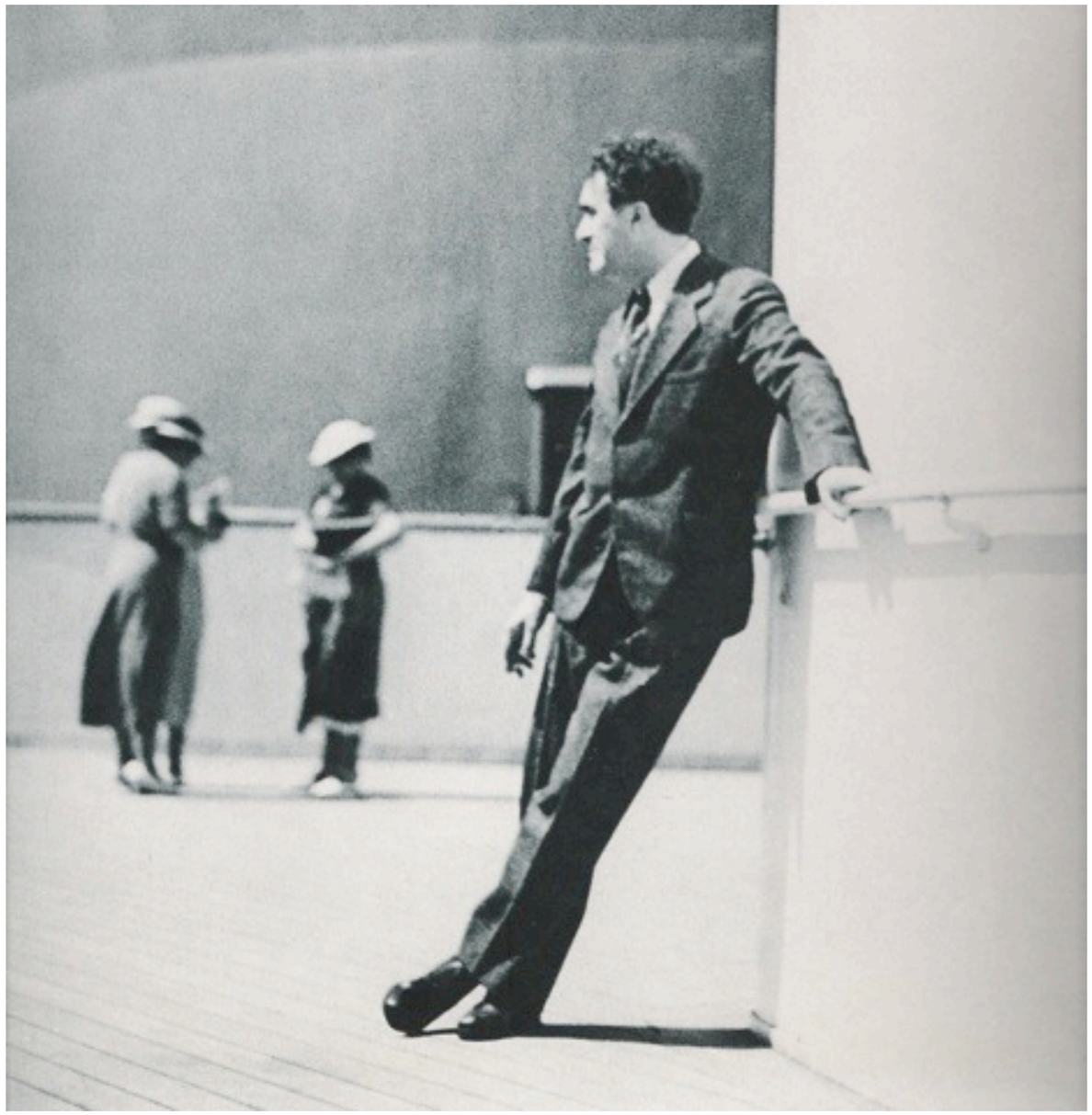
The Vision

"I dream of instruments obedient to my thought and which with their contribution of a whole new world of unsuspected sounds, will lend themselves to the exigencies of my inner rhythm."

Edgard Varèse (1917)



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Before the Computer

Ada Lovelace during her work with Babbage's difference engine:

"Supposing, for instance, that the fundamental relations of pitched sounds in the science of harmony and of musical composition were susceptible of such expression and adaptations, the engine might compose elaborate and scientific pieces of music of any degree of complexity or extent."

Ada Lovelace (1843)

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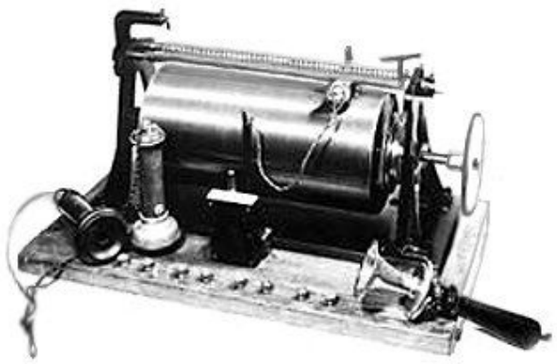
Beginnings of Electronic Music

Elisha Gray: “Musical Telegraph” (1876)

Thomas Edison: “Phonogram” (1877)



Valdemar Poulsen: “Telegraphone” (1898)

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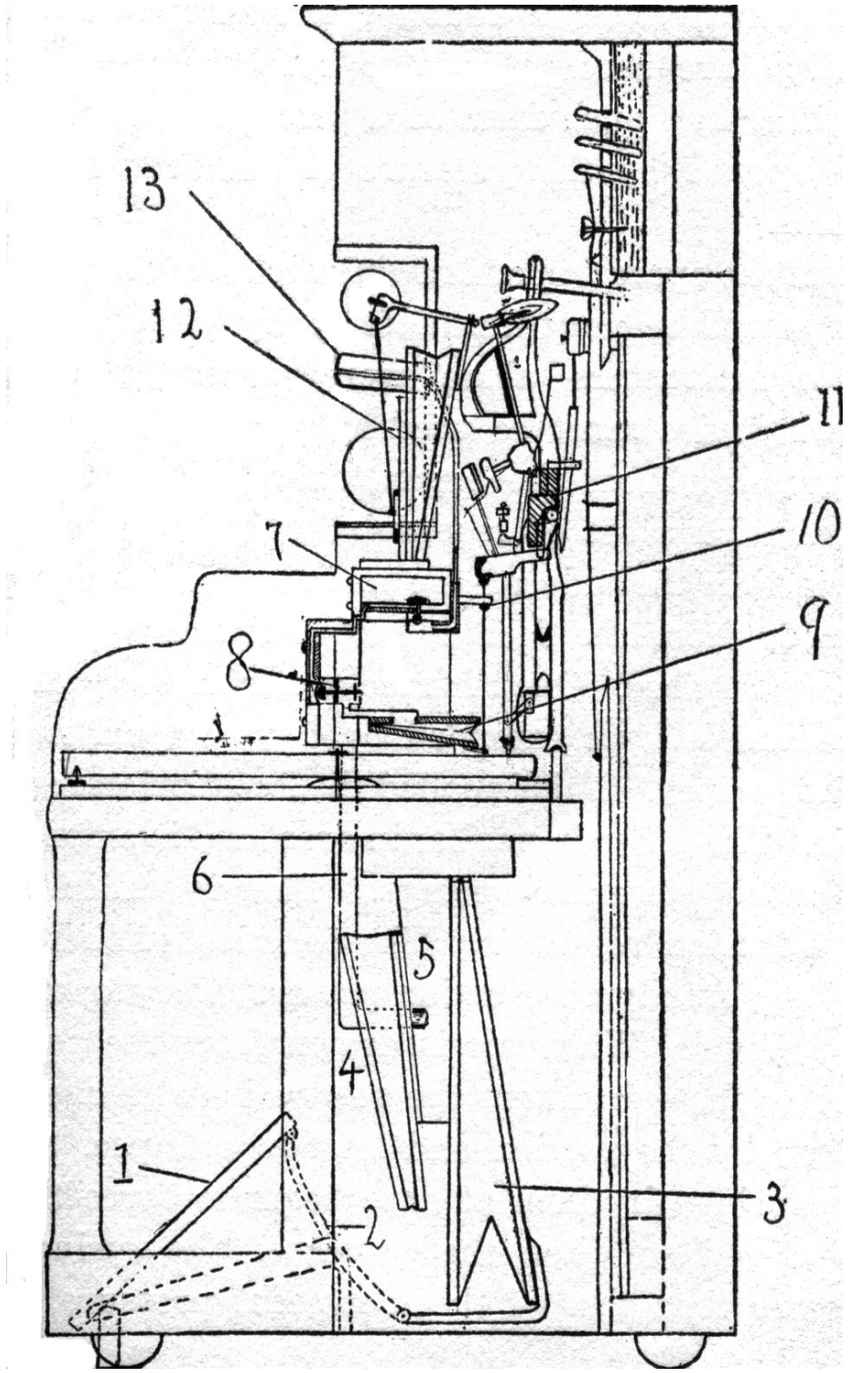
Player pianos (early 20th century)



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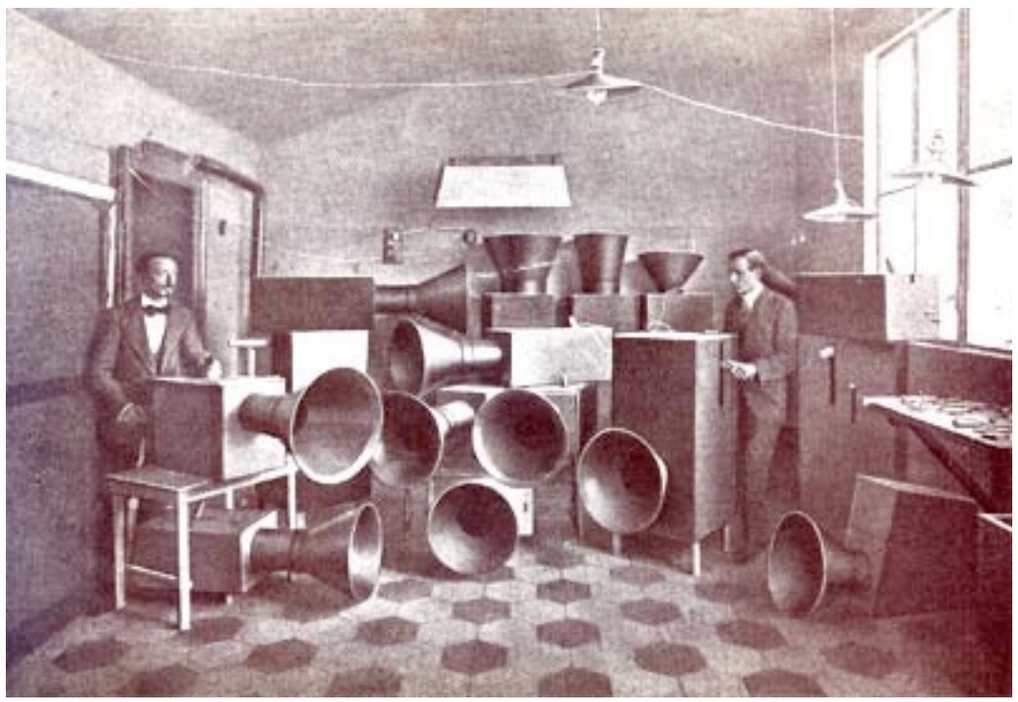
Ideas of Change

Ferruccio Busoni “Manifesto” (1907)



Luigi Russolo and the Futuristas (1913)

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First Instruments

Leon Theremin (1920)

Ondes Martenot (1928)

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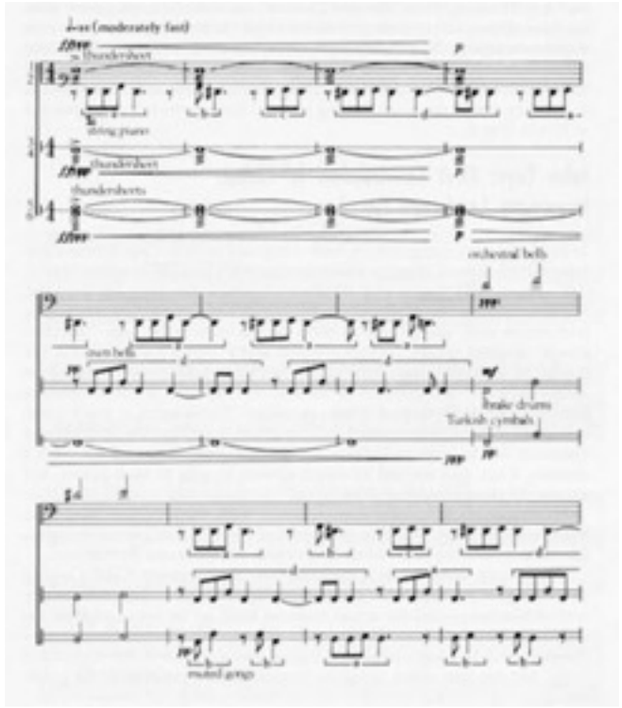
Aleatoric and Concrete Music



John Cage “Imaginary Landscape 1” (1939)

Pierre Schaeffer “Musique Concrète” (1949)

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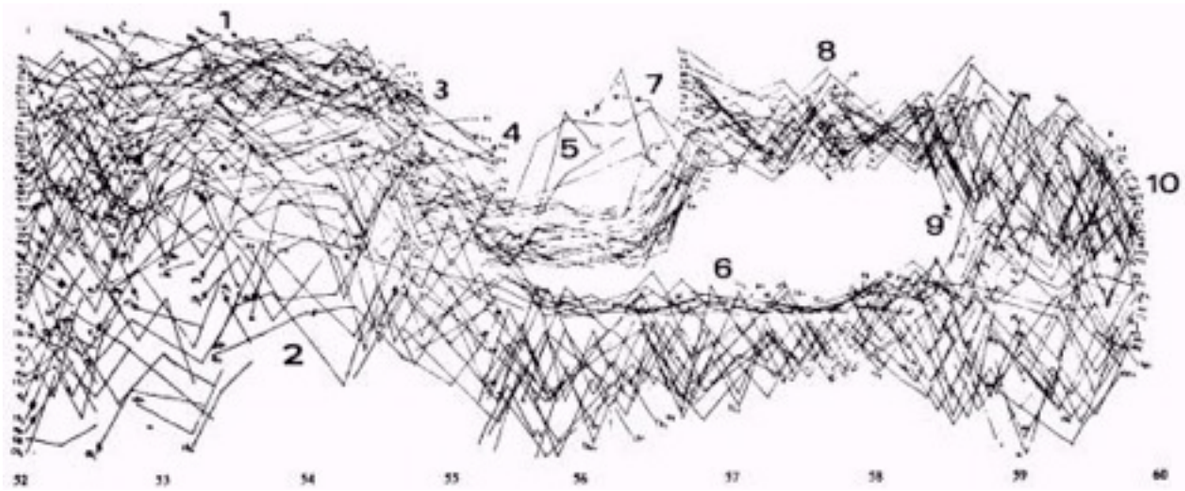
Stochastic Music, Multimedia

"Poeme Electronique" *425* speakers and video, Edgard Varese (1958)



Measures 52-60, "Pithoprakta", Iannis Xenakis (1956)

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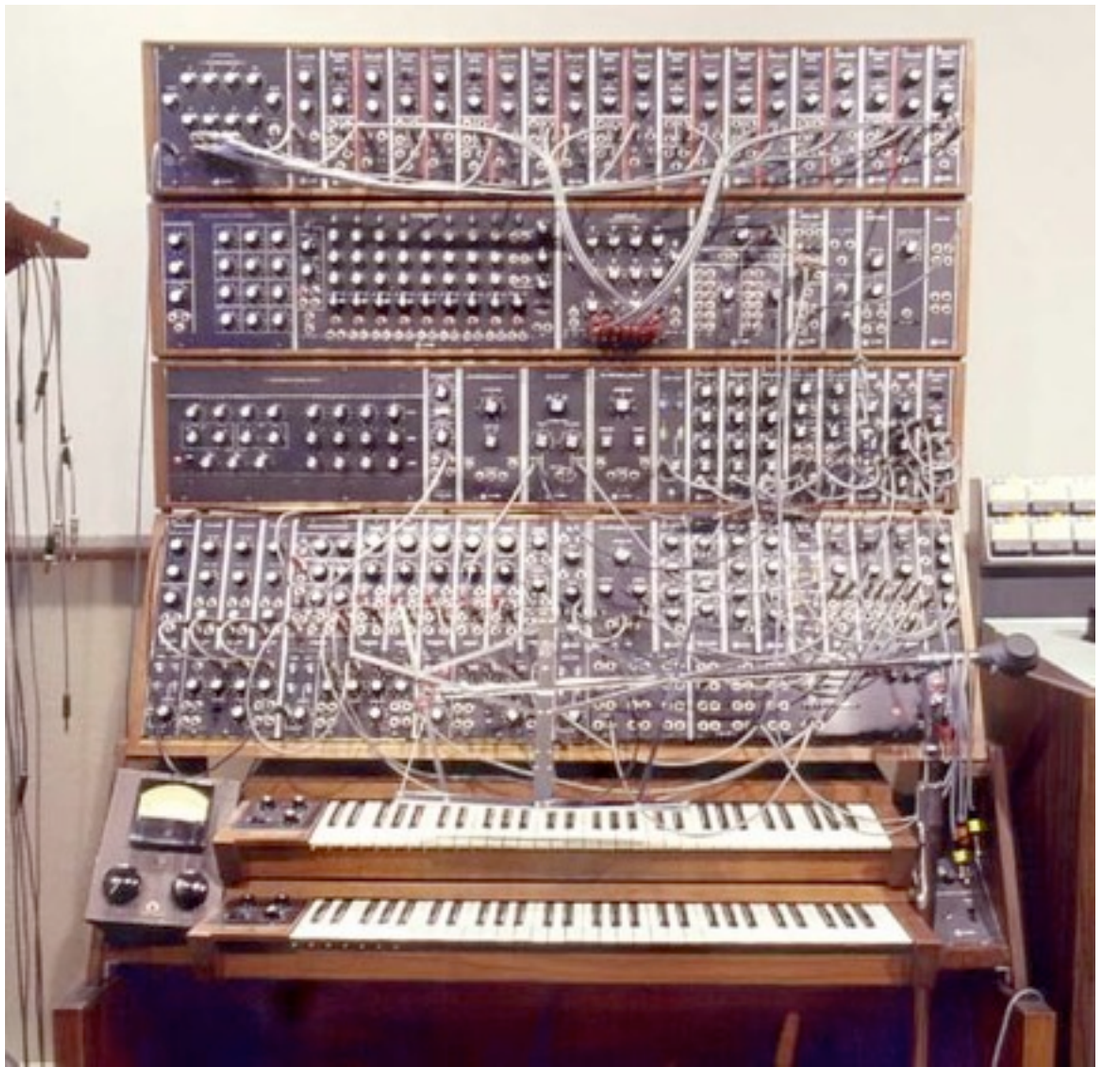
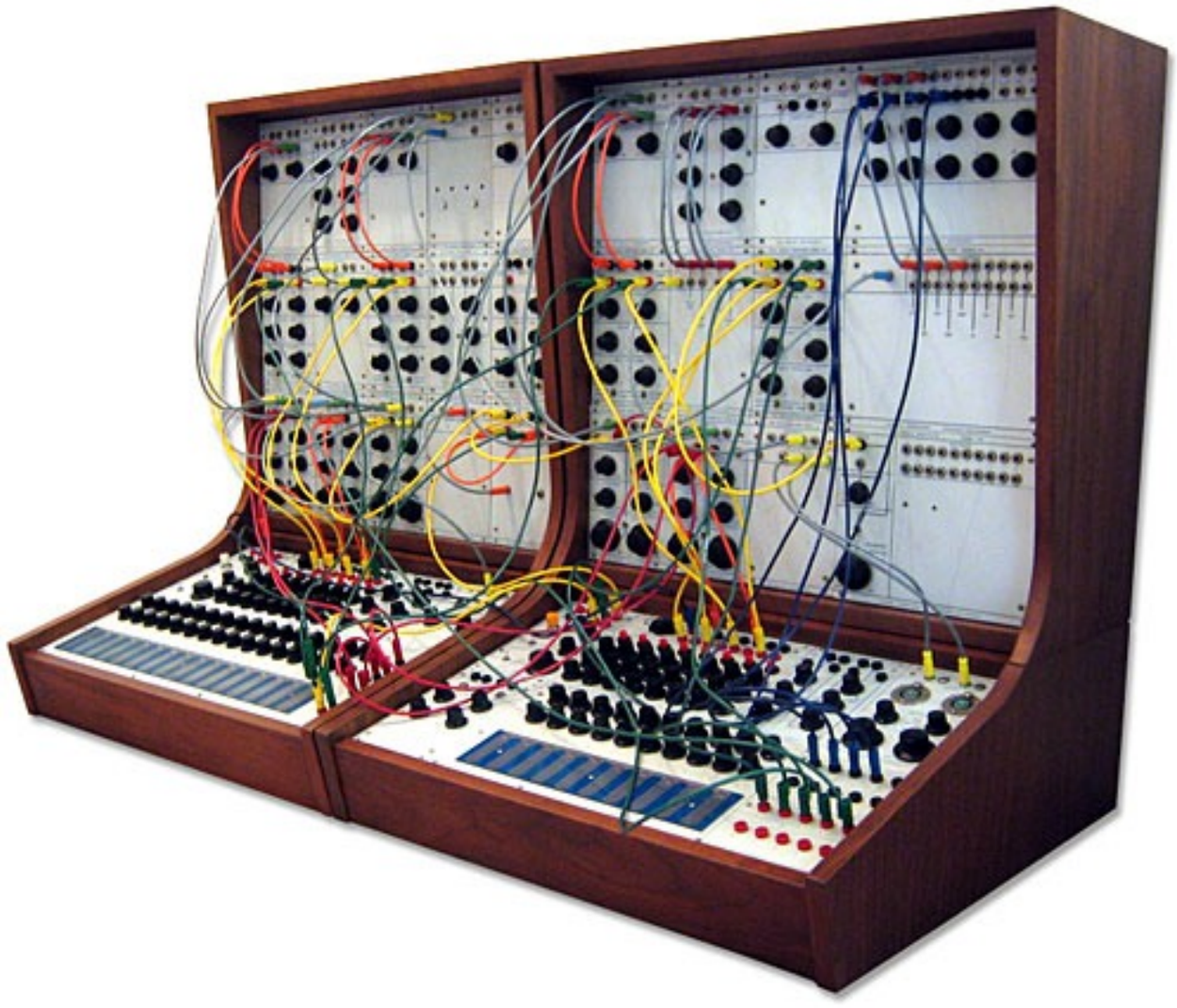
1964: VCO Synthetizers



Robert Moog VCO Modular Synthesizer



Donald Buchla VCO Modular Synthesizer

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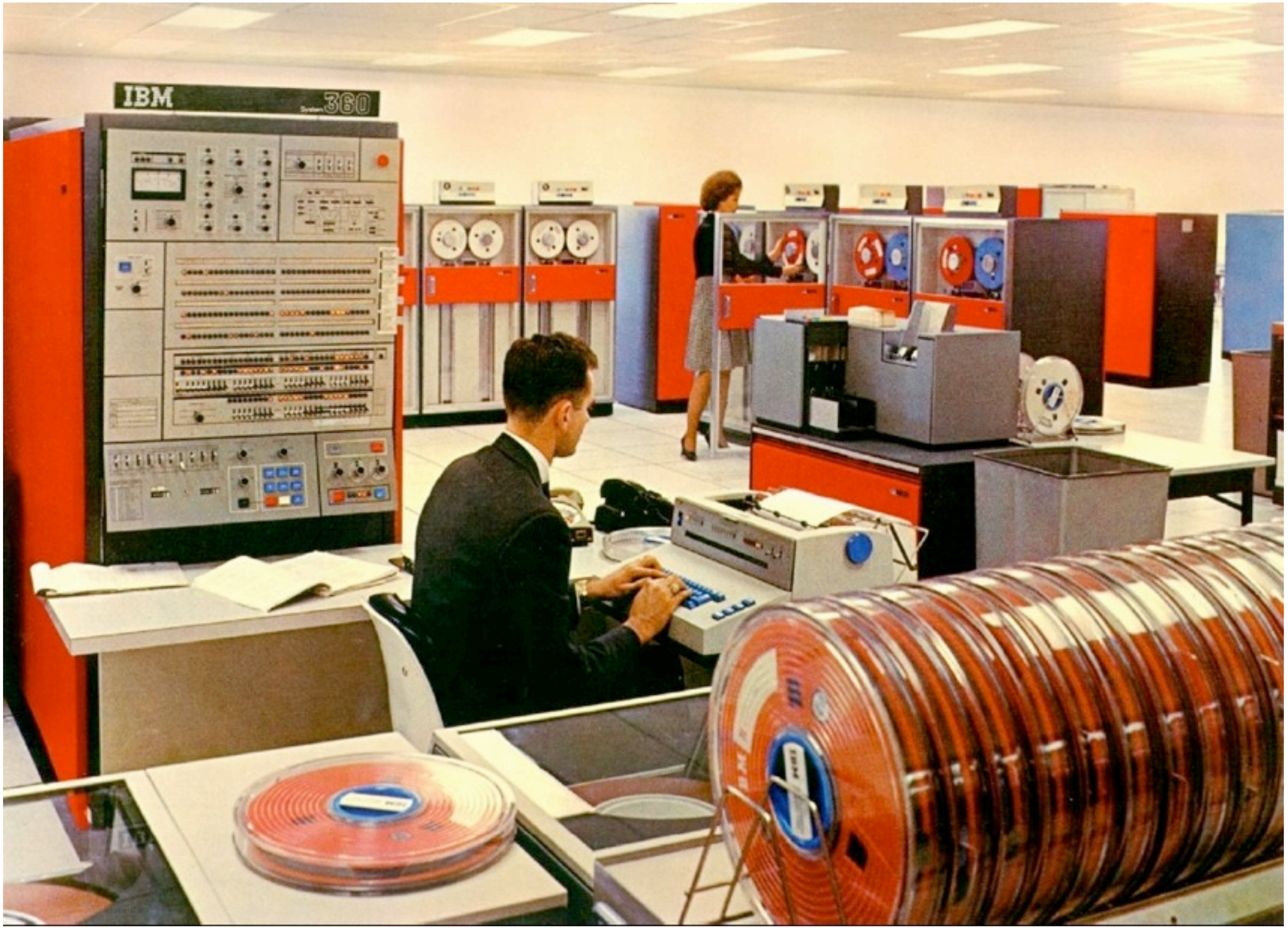
Computer Music Languages | Milestones



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MUSIC I - MUSIC N in Bell Labs

Max Mathews
The Father of Computer Music

1957: MUSIC I/MUSIC-N family:

Unit Generators (UGens) (atomic and predefined processing blocks)

UGens: Audio Input, Output, and Control Inputs

Examples: Oscillators, Filters, Amps, Envelope Generators

A Patch (instrument) is formed by connecting several UGens

An Orchestra is created through the connections of several Patches

A Score controls an Orchestra

Bicycle Built for Two" by Kelly, Lochbaum, and Matthews, 1961

MUSIC I - MUSIC N at Princeton and Stanford

Max Mathews handles a copy of MUSIC IV to John Chowning

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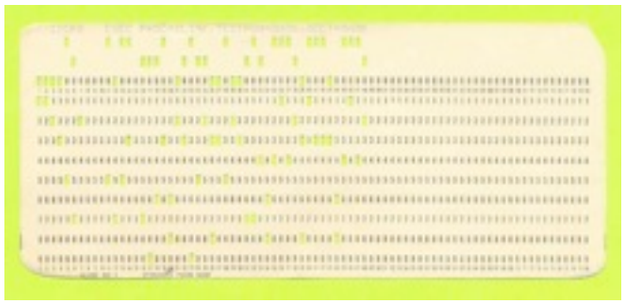
MUSIC 10 y SCORE, Stanford AI Lab

Chowning y Andrew Moorer create MUSIC 10 and SCORE

Design



Audio

Very Slow Process

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1968: MUSIC V in FORTRAN

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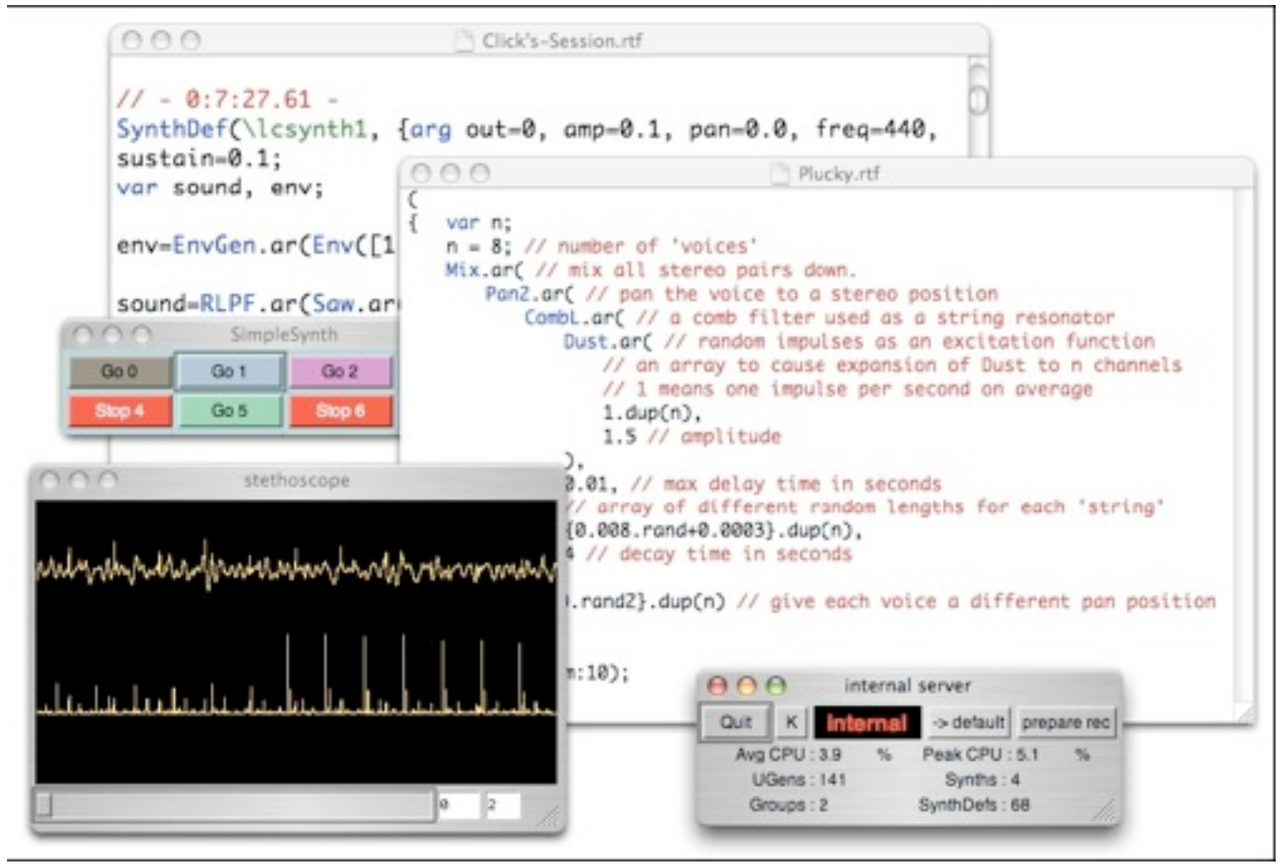
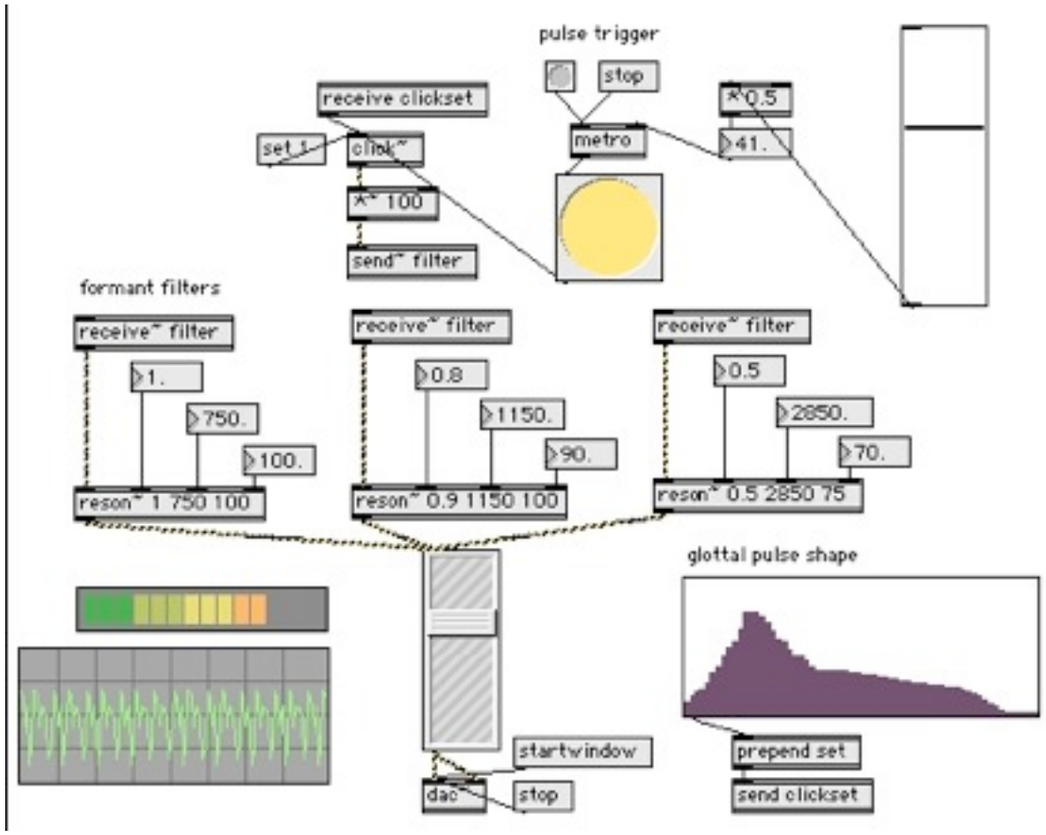
Real-Time Systems





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...Network Music

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Network Music Performance

Def:

"A network music performance (nmp) is a ***bi-directional***, ***dis-located*** and ***multi-modal*** set of interactions regardless of its synchronicity or asynchrony between participants."

Alain Renaud

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Where does it come from?

1876

Elisha Gray: “Musical Telegraph”

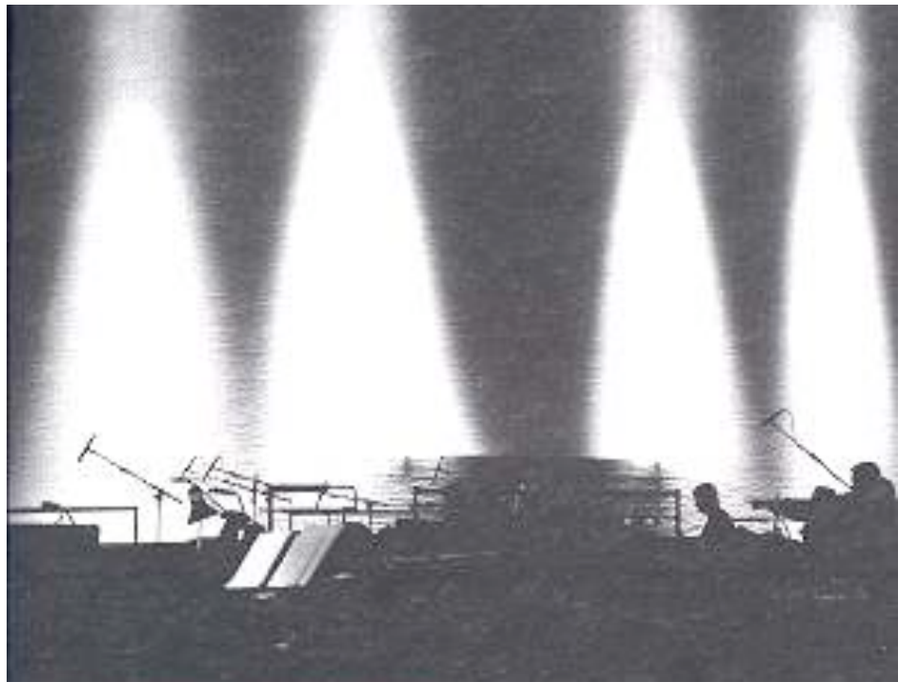
1929

Der Lindberghflug

Paul Hindemith / Kurt Weill / Bertolt Brecht

→ Radio Broadcast + Listener at Home

1950's



John Cage's "Transistor Radio"
Pieces

1966 - Public Supply - Neuhaus

© Max Neuhaus

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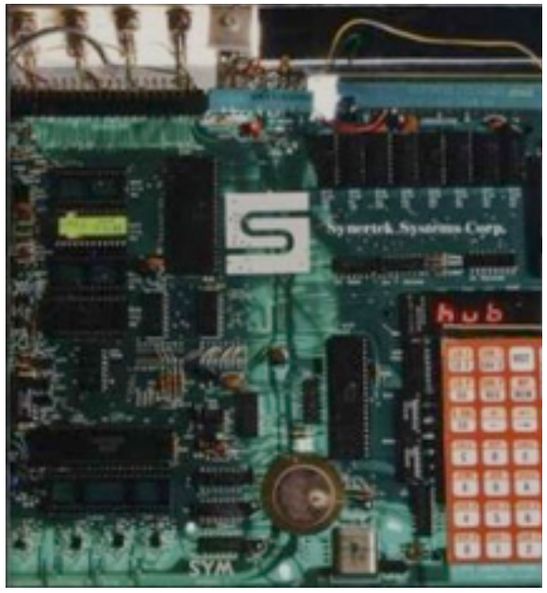
Late 1970's

The Hub

A computer music network band



The League of Automatic Music Composers 1978- 1983

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1988 - Françoise Legrand - Satellite Symphony: Beethoven and One Woman's Dream

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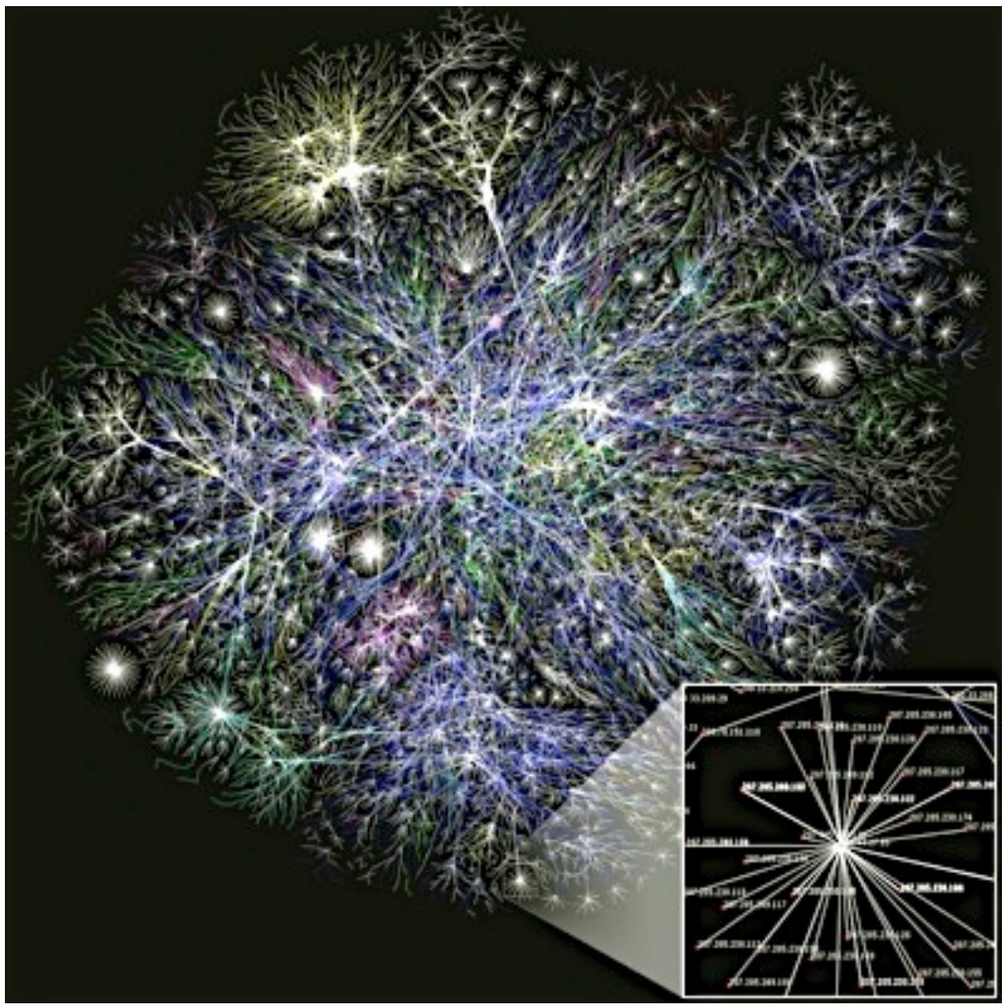
Digital Networks



1990's

Speedup of the Internet

Firsts bidirectional, "real-time" music exchanges

Real-time → 30 to 0.5 seconds

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Year 2000

CCRMA SOUNDWire
Sound Waves on the Internet from Real-time Echoes

http://ccrma.stanford.edu/groups/soundwire/

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Some Examples

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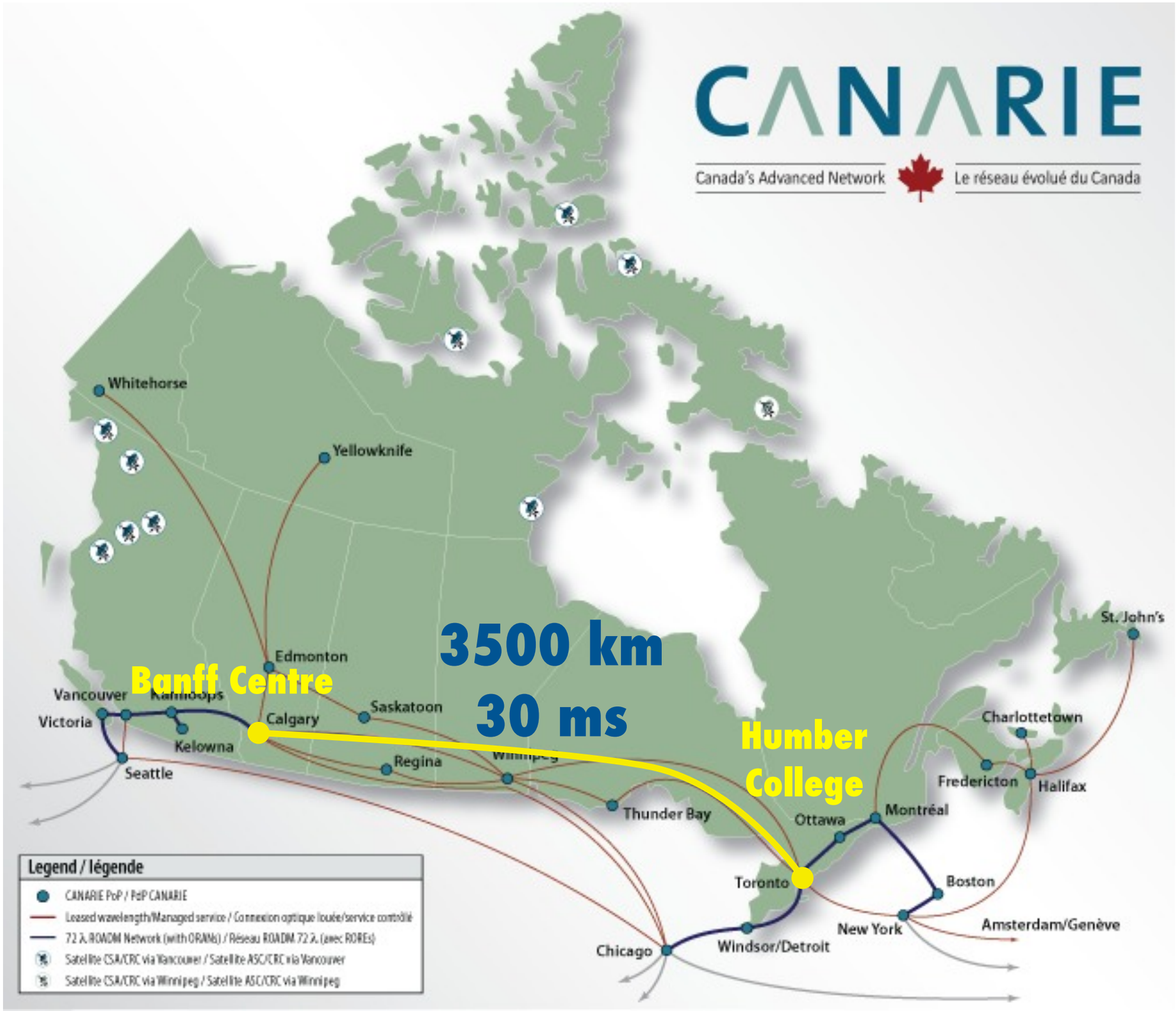
TeleJazz



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TeleJazz - 16 channels | 48kHz | 16 bits

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Banff

Toronto

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Terry Riley's *In C* - Stanford/Beijing
April 2008

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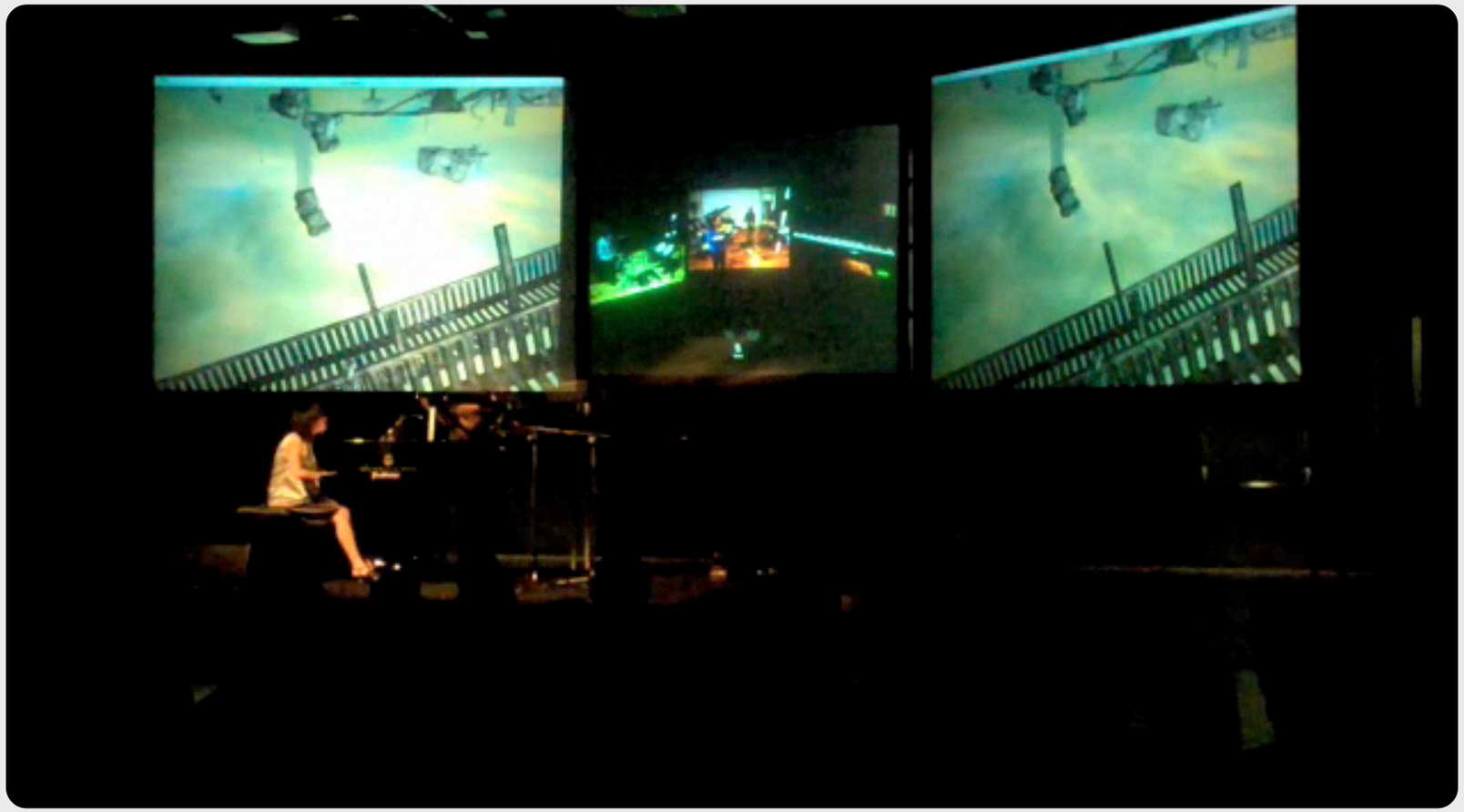

Credits

History of Computer Music

- Joel Chadabe, *"Electric Sound: The Past and Promise of Electronic Music"*

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