The sampler
A historical, musicological and phenomenological study

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The sampler has been around for nearly 70 years; Among the probable inventors one can find Harry Chamberlin in 1946 in the U.S., closely followed by Pierre Schaeffer and Jacques Poullin who developed several *Phonogènes* between 1951 and 1958: these sound manipulation machines, based on the principle of a variable speed tape recorder, really seems like a sampler.

Nowadays, it is now probably one of the most used musical instruments: from serious electroacoustic music to popular electronic music, through music for audiovisual products (from TV series to video game sound design). Since Mac OSX Lion, Apple has even incorporated a sampler (AUSampler) within its operating system.

Yet this instrument remains unknown, mysterious, invisible in film credits, CD covers or concert programs; There has been very little musicological nor organological musicological studies done. In the literature, there are only a few items or practical manuals describing "how to use the instrument or how to sample a sound" [CANN, 2007a & b]. The present work is a first presentation of several years of research and data collection, allowing a better understanding of a complex situation.

First of all, the author proposes two short historical and musical overviews, aimed at making clear the richness of the instrument and its uses. The analysis of all these data shows six dimensions (nature of the sample or of the result, perception of the sample or of the result, type of instrumental gesture, intentions and *lutherie*) and allows designing a block diagram showing the complexity of the device (when compared to other musical instruments) and the magnitude of the musical revolution in progress.

1. A brief historical overview

The sampler appeared in the middle of the twentieth century in various parts of the world, under different names: Chamberlin in the USA (1946), *Phonogène* in France (1951), Special Purpose Tape Recorder in Canada (1955), Mellotron in Great Britain (1963)...

The generic name "sampler" only appears in the 80s, probably because of the competition between dozens of models. Thus it enables musicians to get it clear more easily.

Since 1946, it is possible to identify nearly 350 models of samplers, manufactured by nearly fifty brands (see Appendix Table 1).

2. A brief technological inventory

Further study of these 350 models shows that they can be classified into five families, according to the technological processes used to operate these machines:
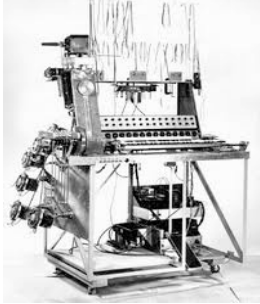- electromagnetic samplers based on magnetic tape (1946-1986),
- optical samplers (1971),
- analog electronic samplers designed with integrated analog electronic circuits (early 1980s, eg. DHM89),
- electronic digital samplers (based on microprocessors and programming) (1979-2005),
- software samplers or virtual instruments (from 1995 till now).

Figures 1 to 5 on the following pages show some examples of this evolution.

3. An organological instability

Organologically speaking, it is strange and probably unique that the same musical instrument has got four very different technological modes of operation.

■ **Picture 1 : 1st era, magnetic tape based samplers**

1946	1951	1955	1963
Chamberlin	Phonogène à clavier	Spécial Purpose Tape Recorder	Mellotron

■ **Picture 2 : interlude, optical and analog electronic sampler**

1971-76	1983
Optigan	DHM89

■ **Picture 3 : 2nd era, the first digital electronic samplers**

1978	1979	1980	1981
New England Digital Synclavier II	Fairlight CMI (Series I - III)	Linn Electronics LM-1 Drum Computer	E-mu Emulator

■ **Picture 4 : 3rd era, democratization of digital electronic samplers**

1984	1986	1986	1992-94
Ensoniq Mirage	Roland TR505	Akai S900	Ensoniq ASR10

■ Picture 5 : 4th era, virtual samplers

1997	2010	2013
AudioWerk 8	Native Instrument Kontakt	Steinberg Halion 4

Apple Logic pro sound library

For non curious user, Logic Audio sampler can be summarized in this simple database of instrumental and electronic sounds. Just browse through folders, subfolders, and click once on the desired instrument and sounds are available.
It cannot be easier!
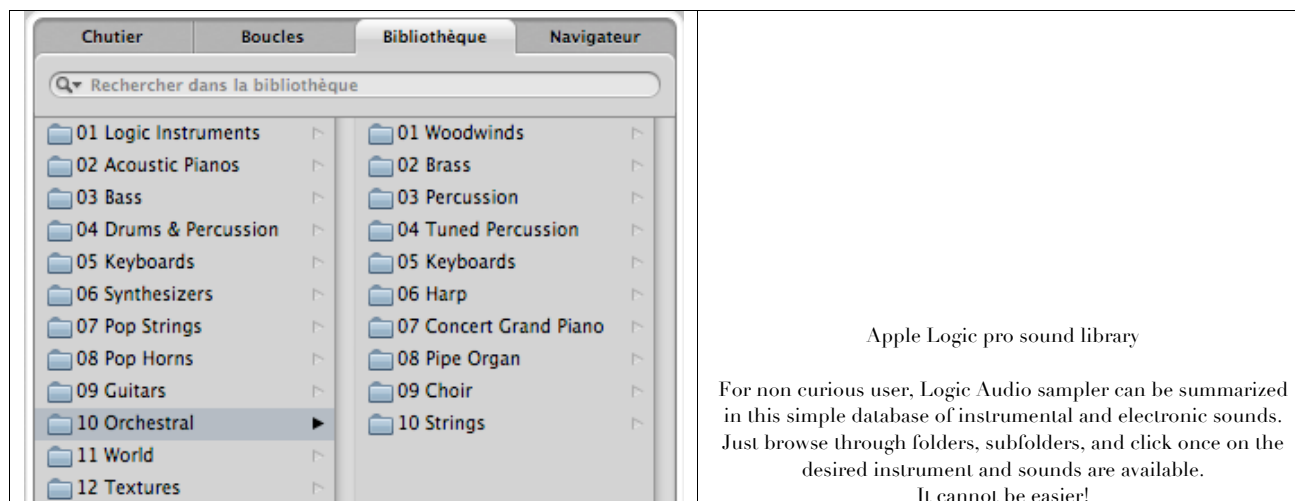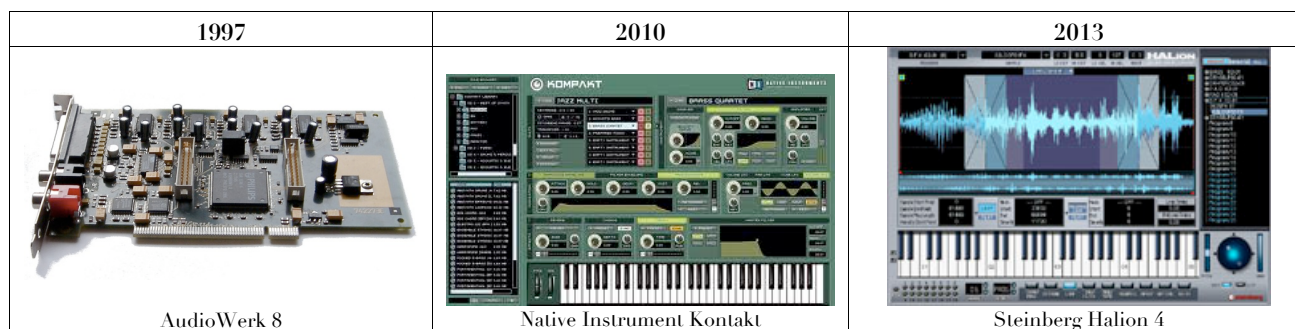
🎧 *Some listenings*

The Beatles – « Strawberry Fields Forever » (1967)
King Crimson – Album *In The Court Of The Crimson King* (1969)
Genesis – pratiquement tous les albums de 1970 à 2010
Art of Noise – « Peter Gunn », « Moments In Love » (1983)
Frank Zappa –album *Jazz From Hell* (1986)
Robert Normandeau – « Mémoires vives » (1989)
Heiner Goebbels – *Surrogate Cities* : Suite for sampler and orchestra (2000), *Ou Bien le Débarquement Désastreux* (1995)
François-Bernard Mâche, *L'estuaire du temps* (1993), *Braises*, *Andromède*, CD MFA-INA, 2000.
Stevie Wonder – *Journey Through the Secret Life of Plants* (1979)
Steve Reich – *City Life* (1995)
DJ Shadow – Album *Endtroducing.....* (1996)
Dr Dre – Album *Chronic 2001* (1999)
Slipknot – Album *Slipknot* (1999)
Bertrand Merlier, *4 Hands* (http://tc2.free.fr/merlier/4hands/, 2002)
ou *Labyrinthus* (http://labyrinthus.zz.mu/, 2013)
Xavier Garcia, album *Virtuel Meeting*, coll. Signature/ Radio-France, réf : SIG 11029, 2003.
Hans Zimmer – *Man of Steel* (2013)[1]

As for the exterior appearance of the device, it has evolved quite dramatically, as shown again in Figures 1 to 5.

The only common link between all these variants of the same device is the rendered service or the functionality. Thus it seems a better idea to define the sampler according to its functionality: instrumental play with a portion of previously recorded sound[2].

4. A brief inventory of users

An analysis of hundreds of musical productions of the last 40 or 50 years shows that the sampler is used in **all musical genres**:

• progressive rock bands of the years 1960 to 1980: The Beatles, Genesis, Gentle Giant, King Crimson, VDGG, Yes ...
• groups of more recent pop music: The Art of Noise, Frank Zappa ...
• composers of instrumental classical music: Jonathan Harvey, Francois-Bernard Mache, Steve Reich...

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[1] This looking like bombastic symphonic album was actually conducted by a team of 6 composers, 4 orchestrators, only 5 performers and 8 sound engineers and sound banks computer programmers.

[2] We will settle for this definition of the sampler, because it is difficult to find a correct definition. The author has found more than twenty different, very often incomplete and sometimes contradictory.

- composers and performers of instrumental music: Xavier Garcia, Bertrand Merlier, Michel Pascal...
- composers of fixed electroacoustic music (acousmatic): Francis Dhomont, Jean-Marc Duchenne Bertrand Merlier, Robert Normandeau...
- many singers and electro, Hip Hop, Rap, Techno music bands: DJ Shadow, Dr. Dre ...
- almost all composers for audiovisual movies, TV, video games... using orchestral sounds banks,
- any music school or choir or music ensemble of any style (see below in § 5.a).

For a "musical instrument", the list of users revealed many composers or creators. Possible reasons are:
- until the 2000s, the sampler required substantial efforts in making sounds or programming, such activities being associated with sound "creation" activities;
- in classical music (apart from a few exceptions), composers for sampler are their own performers; which allows them to access to a greater complexity;
- in popular music (apart from a few exceptions), the instrument is not usually mentioned on the CD cover. Tony Banks has been playing one or more samplers on almost all albums of Genesis, but is simply credited: *keyboards*, that is to say, "keyboard player".

5. A brief inventory of uses (1)

A second filtering of all the collected data highlights **5 uses of the sample**. The first two uses are rather in search of sonic realism in respect with the original sound material; the following two accept the loss of the sense of the original samples in favour of a research on timbre, structure, space...

a) imitation or substitution of acoustic instruments:
Many musicians play the sampler without even knowing it:
☞ digital piano or electronic drums: for reasons of cost and space,
☞ virtual Fender Rhodes, Wurlitzer piano and Hammond organ: for reasons of original now obsolescent,
☞ harpsichord, oboe...: for practical reasons: to complete the effective of an acoustic instrumental band,
☞ instrumental sound banks (like Vienna Symphonic Library): for reasons of cost, time, space and efficiency in the work: carried by only one person.

b) introducing noises into music:
Some other musicians wish to expand the sonic palette by playing with noise or sound material:
☞ introduction of voluntarily identifiable noises (or non-instrumental sounds) in music, in the sense of the Italian futurists, Art of Noise or *City Life* by Steve Reich...

c) sound design tool:
☞ work on timbre, creating incredible sounds (never heard before), in the sense of Pierre Schaeffer and acousmatic music; any sound material can be worked or played to the point of losing its meaning and / or causality.

d) sound transformation machine:
Another category of musicians is using the sampler as an effect machine, playing on the material or the structure:
☞ looper: looping sound in real time and accumulating several layers (i.e. Beatboxers who record themselves on stage and build their own rhythms and polyphony live)
☞ sound editing or recognizable musical excerpts citations. Eg: DJ Shadow, Dr. Dre...
☞ work on timbre (in the manner of a studio machine)[3].

e) tape recorder substitute:
☞ Finally, with the disappearance of tape recorders, some composers have been using (in concert) the sampler in order to reproduce a sound recording.

The first two uses are rather "instrument" like: a performer plays notes or "musicalized" sounds. The following three uses are rather "machine" like: a composer or a sound designer is editing or processing of sound material.

Some uses are very similar to the point that a simple change of perspective can shift from one category to another.
But let us point out that these four types of activities can take place either:
- live, in real time, led by virtuoso gestures, just as any musical instrument,
- or in the studio, delayed, driven by actions on wheels or a mouse, just as any machine studio.

It is important not to associate:
- instrument and real-time
- machine and deferred time.

The sampler reality is much richer than that, thanks to computer programming.

6. A brief inventory of uses (2)

If the present paragraph data is filtered according to another point of view; two main families of uses appear, which are now in the domain of aesthetic choice or musical intention:

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[3] This category is similar to the previous § 5.c category, with the nuance that Pierre Schaeffer only takes into account the result (in a reduced listening), while other musicians transform an A material to a B material: the transformation being a "composition act".

1) the exact reproduction of music or sound reality ("identical" or following an actual model)
   a) music reproduction: instrumental sound banks, digital piano...
   b) sound reproduction: adding "realistic" sounds (voice, mopeds, birds, horns...)

2) the transformation of sonic reality or the invention of unheard sounds
   In this case, there are many sub-categories according to the manipulated parameters:
   a) working with heights,
   b) working with temporality, rhythm,
   c) working with intensity, energy or morphology,
   d) working with timbre or material
   e) working with writing (composition, polyphony, structure, form, counterpoint, etc..)
   d) working with structure,
   ...
   h) musicalization of noise or conformation of noise to the instrumental field (e.g. Steve Reich: *City Life*, which is also belongs to 1b).

As shown in the picture just below, the creative uses of the sampler are many and varied; and far outweigh the only instrumental playing or the potential of an instrument.
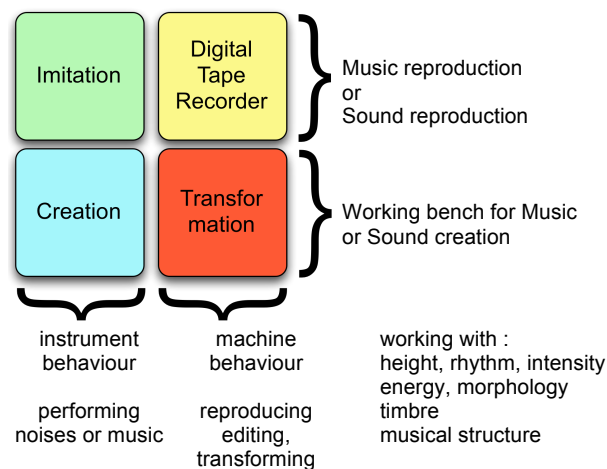
■ Picture 6 : Creative uses of the sampler

7. A complex and heterogeneous mixture

Like every topic related to sound, the greater ambiguity is present[4]. The two lists presented above (historical and technological) cheerfully mix:
• first of all, a causal approach,
• then, a purely perceptual approach,
• deferred time or real time,

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[4] See for example the excellent analysis *in*: CHION (Michel), *Le Son*, Paris : A. Colin, 2004.

• technological and *lutherie* issues,
• creation and interpretation problems,
• opposite wills: imitate reality or generate a new sound world,
• music and noise, noise who wants to becomes music...

Some uses are even of paradoxical nature or at least located in very different and unrelated dimensions. In the following paragraphs, we will clarify a little better some of the problems.

7.1.1. Nature of the sampled sound material

The list of uses highlights the diversity of sound materials:
• noise,
• structure of noises (recorded sequence),
• note,
• structure of notes (recorded musical phrase).

7.1.2. Performed sound / Perceived sound; cause and effect

Music can be seen as a process of communication between an emitter and a receiver: the instrument produces a sound that is received/perceived by the listener. In an acoustic instrument, the sound is intrinsic, i.e. tightly bound to the instrument fabrication. So the relation between cause and effect is unequivocal: a performer plays the violin; the listener perceives a violin sound.

In a sampler, the relationship between cause and effect is complex. Here are some (more or less imaginary) examples:
• a sampler performer plays a moped sound, transformed and transposed to treble; the listener may hear a violin sound!
• a sampler performer plays a violin sound transposed to the lower; the listener may hear a storm sound!

So, one should distinguish:
• the performed sound (called: the "original sound material")
• the perceived sound (called: the "sound reproduction perception").

7.1.3. Produced Music / Reproduced Music

Music generally consists of notes assembled into sentences; or more broadly: sound objects assembled in a sound construction.

Let us return to our previous example. In the acoustics instrumental world, a violin performer can play either a note or a musical phrase composed of a (melodic or harmonic) assembly of notes produced in real time.

In the sampler, there are two possibilities:

- if the sound sample is one violin note (or a short and simple sample), the sampler performer can then play (**produce**) a musical phrase of "violin notes";
- if the sample is already a recorded violin phrase (what I call a "musical structure") (or a longer and complex nature sample), in this case, pressing a single key on the keyboard will **reproduce** the complex musical structure.

When listening to these two examples, the perceived result will be the same; except that in the first case, the music is "produced" by a musician, and in the second case, music is only "reproduced" by an operator (like in the cinema where the projectionist is a simple operator in charge of the film diffusion or reproduction).

The above example shows that the nature of the gesture is also important; gesture can be used to build each note (or each sound), or simply used to reproduce a structure, or to control transformations.
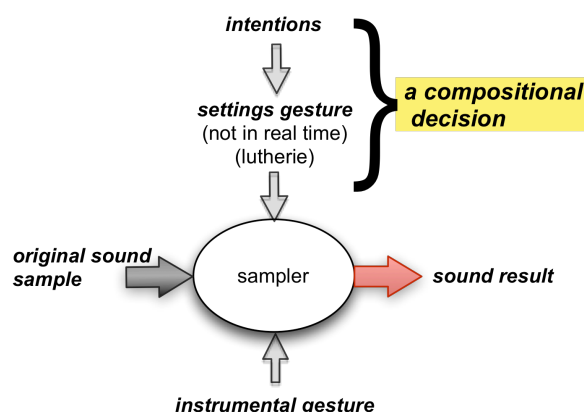
8. The 6 dimensions of the sampler

The diagram below (in Picture 7) includes all the above mentioned elements. It distinguishes between several categories:
- the original sound material (sample) and the produced sound result:

☞ its nature: noise or note or structure,
☞ its perception: sound or note or structure, meaningful, realistic, abstract or unheard;
- the gesture nature:
☞ *lutherie* gestures and underlying intentions,
☞ performing gestures: simple or complex (instrumental like or single trigger).

This scheme better reflects the reality and complexity of the sampler. Faced with hundreds of collected and analyzed musical examples, the situation becomes much clearer.

■ **Picture 7 : a simplified functional representation of the sampler**
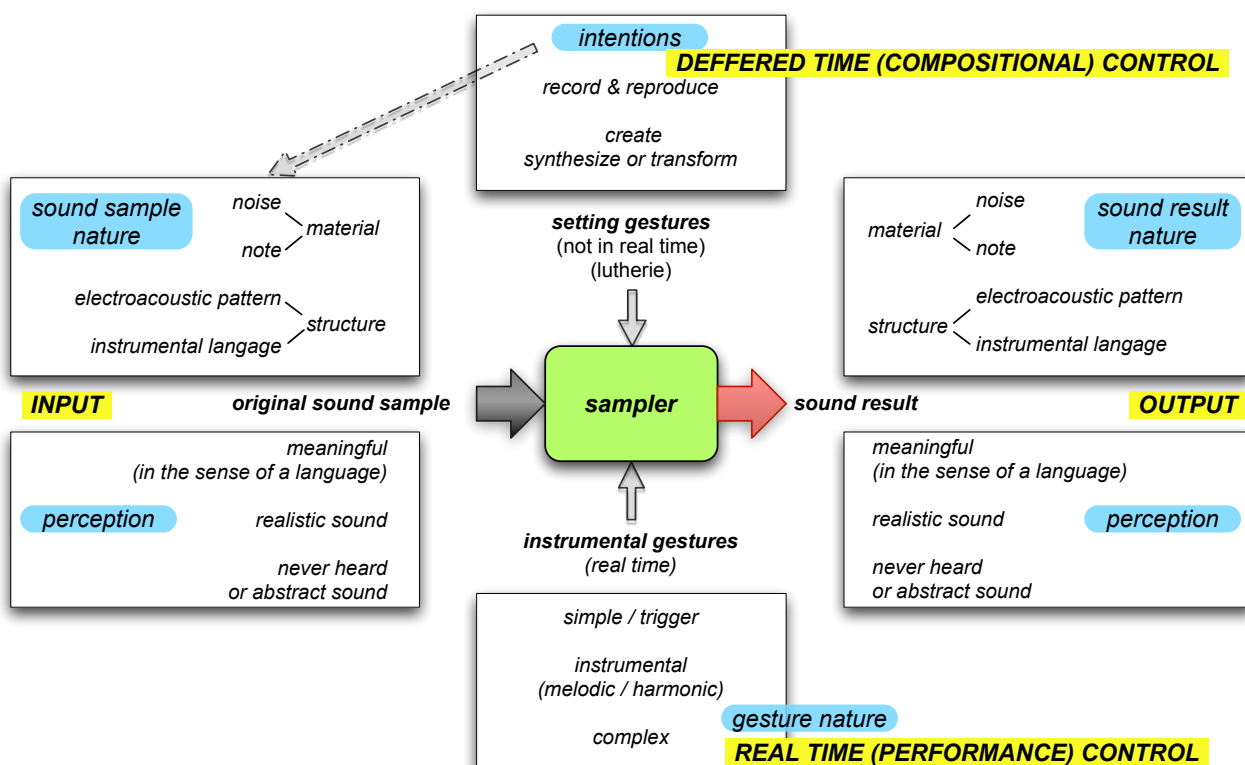
■ **Picture 8 : Phenomenological analysis of the sampler, showing 6 dimensions**

9. Conclusion: from machine to instrument

A fairly comprehensive study of the sampler history from its origins, of its technology, of its various musical uses highlights:
- a machine with complex and heterogeneous uses,
- the apparent lack of any musicological or organological analysis.

Successive and rigorous sorting of all the collected data have revealed various interrelated layers to be taken into considerations. The main idea of this paper is to make use of the functional representations used in electronics or signal processing. So, the sampler becomes a black box with 3 inputs: the sample, the creative intention (linked to *lutherie* choices and decisions), the instrumental gestures; and one output: the sound result.

A simplified scheme is proposed in Picture 7 and a more complete diagram in Picture 8.

The sampler has a "schizophrenic" behaviour: between machines and instrument. Both features are available. It is to the user (the composer) to decide. Different intentions induce different *lutherie* programming actions and different sound production gestures.

Without any specific intention, it is easy to find the original tape operation mode (i.e a machine mode):

recording → support → *reproduction*

Play/Stop
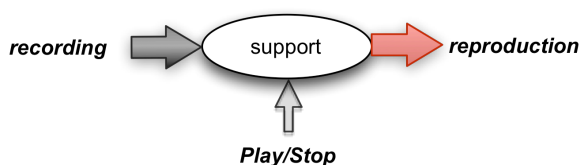
With an instrumental intention (or complex special needs), *lutherie* programming, settings and preparations, as well as instrumental gestures allow to provide this "tape machine" with a form of virtuosity: the real-time manipulation of all sound parameters (height, duration, intensity, timbre, space...) allowing to "simulate" an instrumental behaviour. But it is a sham, in the sense that there is no physical nor acoustic processes involved in the sound production, not even an (electric or electronic) oscillatory process as the one found in sound synthesis, not even any computer modeling of the above physical processes (in the sense that a MiniMoog continues to exist through the programming of its former analog operation mode).

The sampler is just a very sophisticated machine dedicated to recorded sound reproducing; and also a sound-processing machine (originally through the support manipulation). The "instrumental virtuosity" comes from editing techniques pushed to the extreme: cutting, sizing, shaping the sound reality... in real time, with a precision well below one millisecond and with instrumental like gestural access. The instrument only exists in the mind of the composer or of the listener.

Paraphrasing Hector Berlioz[5], any noise machine is likely to become a musical instrument, under the intention of a composer.

10. Short bibliography

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MANNING (Peter), *Electronic and Computer Music*, Oxford University Press, 2004, 502 p.

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[5] « Tout corps sonore mis en œuvre par le compositeur est un instrument de musique. » Introduction of: BERLIOZ (Hector), *Grand traité d'instrumentation et d'orchestration modernes*, Paris : Henry Lemoine, 1843.

■ Table 1 : (almost exhaustive) list of the 350 samplers produced since 1946

1946
Chamberlin

1950
The Laff Box

1951
Phonogène à clavier

1955
Special Purpose Tape Recorder

1963
Mellotron

1969
EMS Musys system,

1971
Optigan

1974-75
VAKO Orchestron

1976
Computer Music Melodian

1979
Fairlight CMI (Series I - III)

1980
Linn Electronics LM-1 Drum
Computer
Syntauri alphaSyntauri

1981
E-mu Emulator
Movement MCS Drum Computer MK1

1981-82
New England Digital Synclavier

1982
Linn Electronics LinnDrum

1983
E-mu Drumulator
Harmonizer Publison DHM89
Movement MCS Drum Computer MK2

1984
E-mu Emulator II
Ensoniq Mirage
Kurzweil K250
Linn Electronics Linn 9000
Oberheim Prommer

1985
Akai S612
Casio SK-1
E-mu SP-12
Korg DDM-110
Korg DDM-220
Roland TR-707 / TR-727
Sequential Circuits Prophet 2000

1986
Akai S900
Akai X3700
Akai X7000
Casio RZ-1
E-mu Emax
Korg DDD-1
Korg DSS-1
PPG Realizer
Roland S-10
Roland S-50
Roland TR-505
Yamaha RX5

1987
Akai S700
Alesis HR-16

Casio FZ-1
Casio FZ-10M / FZ-20M
E-mu Emulator III
E-mu SP-1200
Ensoniq ESQ-M
Hohner HS1
Korg DDD-5
Korg DSS-1
Oberheim DPX1
Roland D-50
Roland D-550
Roland MT-32
Roland S-220
Roland S-330
Roland S-550
Roland TR-626
Sequential Circuits Prophet 3000
Sequential Circuits Studio 440
Yamaha TX16W / TX1P

1988
Akai MPC60
Akai S950
Akai S1000
Akai S1000 KB / HD / PB
Ensoniq EPS
Ensoniq SQ-80
Kawai K1 / K1m / K1r
Korg M1 / M1r
Kurzweil K1000
Roland D-10 / D-20
Roland D-110
Roland U-110
Roland S-330
Simmons SDX

1989
Alesis HR-16B
SX16 .5 MEG SAMPLER
E-mu Emax II
E-mu Proteus 1
Ensoniq VFX
Ensoniq VFX-SD
Kawai K1ii / K1iir
Kawai K4 / K4r
Kawai XD-5
Korg M1R EX
Roland R-8
Roland S-770
Roland U-20
Roland U-220
Yamaha SY77 / SY99
Yamaha TG55 / TG77

1990
Akai S1100
Alesis SR-16
E-mu Proteus 2 Orchestral
Ensoniq EPS-16+
Ensoniq SD-1
Kawai PHm / PH50
Roland D-70
Yamaha SY22 / SY55
Yamaha TG33

1991
Akai MPC60 II
Alesis D4
E-mu Procussion
E-mu Proteus 3 World
Korg 01/W
Korg 01/Wfd
Korg 01/WproX
Korg 01R/W
Korg Wavestation A/D
Korg Wavestation EX

Kurzweil K2000
Kurzweil K2000rs
Roland JD-800
Roland S-750
Yamaha RY30
Yamaha SY99
Yamaha TG100

1992
Ensoniq ASR-10
Generalmusic (GEM) S2 / S3
Korg 01/Wpro
Korg 03R/W
Korg Wavestation SR
Roland JV-80
Roland JV-880
Roland JW-50
Roland R-70
Roland R-8 mkII
Yamaha SY35 / SY85
Yamaha TG500

1993
Akai S01
Alesis QuadraSynth
Alesis S4
E-mu IIIx
E-mu Vintage Keys
Ensoniq TS-10 / TS-12
Generalmusic (GEM) S2 Turbo
Generalmusic (GEM) S2R
Generalmusic (GEM) S3 Turbo
Korg 05R/W
Korg X3
Roland JD-990
Roland JV-35 / 50 / 90
Roland S-760
Yamaha TG300
Yamaha CBX-T3

1994
Akai MPC3000
E-mu ESI-32
E-mu Proteus FX
E-mu Vintage Keys Plus
Oberheim Echoplex Digital Pro
Roland JV-1080
Roland XP-10
Yamaha W5 / W7
Yamaha Mu5

1995
Akai S2000
Alesis QuadraSynth Plus
Alesis S4 Plus
Digidesign Samplecell
Korg Trinity
Korg X5D / X5DR
Quasimidi Technox
Roland XP-50
Yamaha QS300

1996
Akai S3000
Akai S3200
Alesis QS6
Alesis QS7
Alesis QS8
Alesis QSR
E-mu Orbit 9090
Kawai K5000 / S / R
Kurzweil K2500
Quasimidi Raven
Roland XP-60
Roland XP-80
Yamaha SU10

1997
Akai MPC2000
Akai MPC2000 XL
Akai S20
Alesis NanoBass
Alesis NanoPiano
Alesis NanoSynth
E-mu Carnaval
E-mu E4X
E-mu ESI-4000
E-mu Planet Phatt
Ensoniq ASR-X
Roland JV-2080

1998
BitHeadz Unity DS1
E-mu Audity 2000
Ensoniq ASR-X Pro
Ensoniq Fizmo
Ensoniq Fizmo Rack
Ensoniq ZR-76
FruityLoops VSTi Sampler
Koblo Stella 9000
Korg TR-Rack
NemeSys GigaSampler
Roland JX-305
Roland MC-505
Roland SP-808
Sound Blaster Live!
Yamaha EX5 / EX7
Yamaha SU700

1999
Akai S5000
Akai S6000
Alesis QS6.1
Alesis QS6.2
Alesis QS7.1
Alesis QS8.1
Alesis QS8.2
Creamware Pulsar STS 4000
E-mu B-3
E-mu ESI-2000
E-mu Proteus 2000
Korg KAOSS Pad (KP1)
Korg Triton
Kurzweil K2600
Kurzweil K2600R
Native Instruments Reaktor
Roland EG-101
Roland JV-1010
Roland SP-808 EX
Roland XP-30
Soundplant
Yamaha A4000
Yamaha CS2x
Yamaha CS6R / CS6x
Yamaha RM1x
Zoom ST-224 Sampletrak

2000
BOSS DR-202 Dr. Groove
BOSS SP-202 Dr. Sample
Buzz
Emagic EXS24
E-mu Mo'Phatt
E-mu Planet Earth
E-mu Virtuoso 2000
E-mu Xtreme Lead-1
Korg ElecTribe S (ES-1)
Korg Triton Rack
neXoft LoopAZoid
Native Instruments Absynth
Native Instruments Dynamo

Propellerhead Software Reason (NN-19 Digital Sampler)
Roland MC-307
Roland SP-808 EX
Roland VP-9000
Roland XV-3080
Roland XV-5080
Roland XV-88
Steinberg LM-4
TASCAM GigaStudio
Yamaha DJX-II / DJX-IIb
Yamaha S30
Yamaha S80
Yamaha SU200

2001
Bismark.BS-16
BOSS SP-303 Dr. Sample
E-mu MK-6 Mo'Phatt Keys
E-mu MP-7 Command Station
E-mu Orbit-3
E-mu PK-6 Proteus Keys
E-mu Proteus 2500
E-mu XK-6 Xtreme Keys
E-mu XL-7 Command Station
Electrix Pro Repeater
Elektron Machinedrum SPS-1
IK Multimedia SampleTank 2
Korg ElecTribe M (EM-1)
Korg KARMA
LinPlug CronoX
LiveUpdate LiveSynth Pro
Native Instruments Battery
Rgc:audio Sfz/Sfz+
Roland D2
Roland SH-32
Roland XV-5050
Steinberg HALion
Yamaha AN200
Yamaha DX200
Yamaha Motif
Yamaha RS7000

2002
Akai Z4 & Z8
Apple AU Audio File Player
Apple EXS24 MkII
BOSS SP-505
E-mu Proteus 1000
E-mu Vintage Pro
Ensoniq Halo
Jeskola XS1
Korg KAOSS Pad (KP2)
Korg Triton LE
Native Instruments Kontakt
Propellerhead Software NN-XT
Renoise
Roland MC 909
Steinberg LM-4 Mark II
Steinberg The Grand
Synapse Audio Orion Platinum Sampler

2003
Akai MPC1000
BitHeadz Unity Session
Cakewalk Project5
Creative Labs Vienna Soundfont Studio
Expert Sleepers Crossfade Loop Synth
Korg ElecTribe SX (ESX-1)
LinuxSampler
Native Instruments Absynth 2
Native Instruments Intakt
Native Instruments Kompakt

Native Instruments Vokator
Roland MC-909
Roland V-Synth
Speedsoft VSampler
Yamaha Motif ES

2004
Emulator X
Fantasize SoundFont Player
IK Multimedia Sonik Synth 2
MOTU Mach Five
MTSoftware TsampX
Native Instruments Absynth 3
Native Instruments Battery 2
Native Instruments Elektrik Piano
Vember Audio Shortcircuit
Wusik Station

2005
Alesis Fusion
Apple GarageBand
BOSS SP-404
Roland Juno-D
Roland V-Synth XT
Yamaha Motif MO

2006
Ableton Sampler / Simpler
BOSS SP-606
discoDSP HighLife
Image-Line DirectWave
Korg KAOSS Pad (KP3)

2007
Emulator X 2
Native Instruments Absynth 4
Roland Juno-G
SooperLooper
Yamaha Motif XS

2008
112dB Morgana
Emulator X 3
EVE 2, TDP and Knagalis
Muxer Instant Sampler
Phatmatik Pro
Roland Juno-Stage
Roland SP-555
UVI Workstation
Yellow Tools Independence Pro

2009
iRomplerMap
Miraton
Native Instruments Absynth 5
Roland Juno-Di
Roland VP-770
Spectrasonics Omnisphere

2010
One Small Clue Poise
Phenome
Realtime Music RMSampler
Specimen

2011
AVID Structure
Dave Smith Instruments Tempest
MOTU Mach Five 3

2012
Petri-foo
Steinberg HALion 5

2013
Native Instrument Kontakt 5