

ELECTRONIC MUSICAL INSTRUMENTS

The so called »electronic« or in the broadest sense »electro-acoustic« musical instruments all need electricity to produce sounds or music. As simple as this statement seems to be, the numberless constructions are very different on closer inspection. Not only the casing-construction, but also the design of the wave generation can be very diverse and reflects best available technology respectively. The *Clavessin Électrique* built by the Jesuit padre Jean-Baptiste Delaborde (1730–1777) in 1759 for example is presumed to be the first electro-acoustic instrument, although it actually is a carillon, that strikes it's bells by means of electrostatic forces.

Shortly before the turn to the 20th century, the US citizen Thaddeus Cahill (1867–1934) constructed his Telharmonium, the first milestone in the field of electro-technical sound generation. Some years later, he already could set up his instrument, which he then called Dynamophone, in a hotel in New York City. With its total weight of around 200 metric tons it had to be transported in several railway wagons. The console is evocative of an organ's console, the actual instrument was located in a large hall in the hotel's basement. Technical progress soon surpassed Cahill's monstrous construction. However Ferruccio Busoni (1866–1924), who lived in Berlin since 1894, mentioned it in his script *Sketch of a New Aesthetic of Music* (1907). Busoni was fascinated by the instrument's ability to leave the established tonal system and it's subdivision in semi tones and to enter the so called microtonal system, with its third- and even sixth-tones. From today's perspective the significance of Cahill's invention is recognizable in connection with the Hammond-organ and it's dissemination from the mid-1930s on, because it uses the same idea for generating sound as the Telharmonium or Dynamophone.

With the appearance of the electronic tube in 1906 the development of artificial sound-synthesis gained momentum. In Leningrad the young physician and amateur musician Lev Termen (1896–1993) worked on an alarm system since 1919 when he had the idea of transforming that system into a musical instrument. Thus the Theremin emerged, which is played without contact with conducting-like movements of both arms close to two antennas. In performing actively throughout Europe and the USA, Lev Termen triggered an explosion of constructions. In the beginning 1920s, Maurice Martenot began the development of his Ondes Martenot in Paris. Almost at the same time, Jörg Mager built his first instruments in Berlin, which he called Elektrophon, Sphärophon or Partiturophon.

At that time Berlin already has turned into one of the world's hot spots for new music technology and media. In 1928 the so called Rundfunkversuchsstelle (Radio-Experiment-Laboratory) was opened at the former Hochschule für Musik Berlin-Charlottenburg, today the University of Arts. Under the artistic supervision of the Professor for composition, Paul Hindemith (1895–1963), one of the most famous electronic musical instruments emerged: the Trautonium (Kat.-Nr. 5264). It is named after it's developer Friedrich Trautwein



Trautonium, cat. no. 5264 © MIM, photo: SchnepfRenou

(1888–1956), who was an electrical engineer and hobby organist. His assistant Oskar Sala (1910–2002) attended to further develop the instrument as well as to play on it professionally. He started his active concert career in summer 1930 with the first public presentation of the Trautonium. After the Second World War kept himself busy with the development of the instrument and finally constructed the Mixturtrautonium. He increasingly focused on the production of film- and radio-scores. The sounds produced for Alfred Hitchcock's »The Birds« are among his most famous works. In the late 1980s professors and students at the University of Applied Sciences of the Deutsche Bundespost developed a replica of the Mixturtrautonium on the field of semiconductor technology. They baptized the instrument »Mixturtrautonium after Oskar Sala« (cat. no. 5834) and placed it at Sala's disposal. The Trautonium as well as the today almost forgotten constructions by Jörg Mager are distinguished examples for the multifaceted effort of constructing electronic musical instruments in the late 1920s and 1930s in Berlin.



After the Second World War electronic musical instruments throughout Europe were of little interest. Already existing models like the already mentioned Mixtur-Trautonium but also the Multimonica (cat. no. 5151) were further developed. This instrument was constructed by Harald Bode in the early 1940s as a hybrid instrument. On the lower manual a common accordion is played, but the upper manual an electronic sound generator. In the late 1940s serial production was resumed. In turn the Clavioline (Kat.-Nr. 5234) is an exemplary development of that time, because it was a small, cheap construction as well as designated for very specific demands. The French Constant Martin developed this instrument in 1947 in the city of Versailles to support dance-music bands with new timbres. It's curious design is determined by the idea to place it underneath the keyboard of a piano therefore giving the pianist the opportunity to use additional timbres. Around 1950 large sound studios were formed around the world, centralizing but also limiting the access to technical equipment for musical composition. In a counter movement small instrumental constructions



EMS VCS 3 MK II, 1972, cat. no. 5253
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Already in the mid-1950s another process took its course. The development of computers has been initiated, so Max Matthews was able to design the software »Music 1«. It was the first successful and up until today continued software for composing at the computer, triggering the new genre of computer music. The fast technological development led to the introduction of sound cards in the beginning 1980s. Those were interfaces, especially designed for the purpose of processing and generating audio signals. The same company, which introduced sound cards for the very first time, also was to expedite the smart-phone-technology after the turn to the 21st century. Therefore today we are able by means of apps to emulate musical instruments on our smart-phones. One result of this technological evolution – next to others – is the change of music into an everyday (consumption-) product, applying to both sides, to the perception as well as to the composition. In future this might lead to the necessity to redefine terms like composition or opus.



»Mixturtrautonium after Oskar Sala«, cat. no. 5834
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for stage and private use emerged. Robert Moog developed his famous Moog-Synthesizer in the early 1960s in the USA. Those instruments were successful to such an extent that countless further models followed, of which the so called Mini-Moog turned out to be one of the most popular ones. The instruments of the Moog-family were used by a lot of musicians predominantly in the fields of Jazz and popular music, as for example Stevie Wonder or the band *Pink Floyd* as well as the band *Kraftwerk*. One example of those synthesizers is the EMS VCS 3 MK II (cat. no. 5253) from the year 1972, built by the London Electronic Music Studios.

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Author: Benedikt Brilmayer
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