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What am I:  
I am a painter,  
I am a composer,  
I am a poet and writer,  
I am an inventor,  
I am a grotesque comedian,  
I am a philosopher.<sup>1</sup>

Harald Bode had many interests and talents, and he developed most of them to an extraordinary degree. His impressive range of abilities was paired with a self-image and self-presentation that Bode himself called "almost pretentious." Throughout his career, it remained a constant challenge "to reconcile all that!"<sup>2</sup> Several of his talents and activities are linked to the development of new electronic musical instruments and the search for new forms of acoustic expression. As early as 1940, Bode describes this as a central theme in his work: "With time, dreams of the future became reality; dreams which used to be little more than hunches, nowhere near concrete concepts. In this context, I think of electronic music in particular as a suitable means to conquer new territory in the realm of sounds. This is where I have created a field of work in which to apply my talents, both of the musical and of the technical kind."<sup>3</sup>

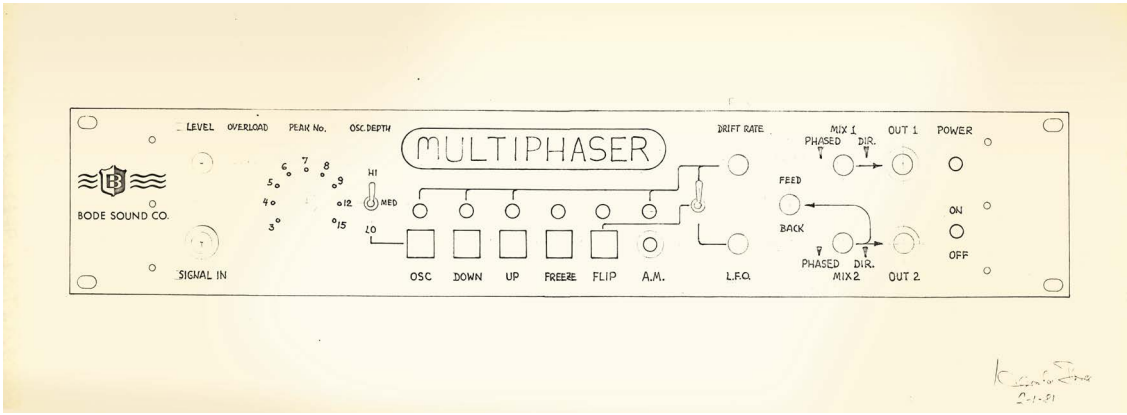
In great detail, the archive shows how the engineer, inventor, and musician Harald Bode worked to bring his dreams to fruition and discover previously unknowable sounds. Bode played a pivotal role in the history of sound generation in electronic music, which the present publication aims to document and appreciate. As such, it is both highly fortunate and perfectly logical that his archive was gifted to the ZKM in 2018.

It was certainly the friendship between media and video artists Peter Weibel, the late director of the ZKM, and Peer Bode,

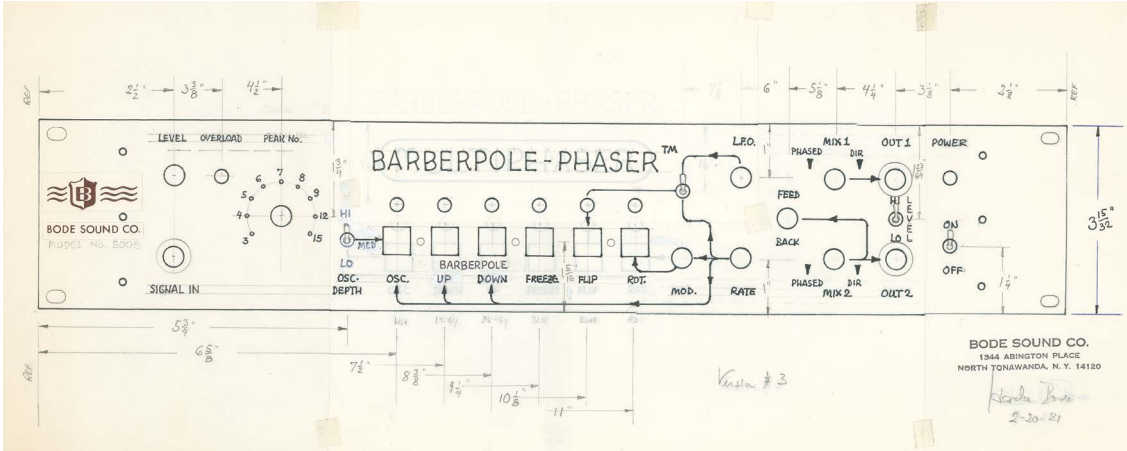
1 "Was bin ich:/Ich bin Maler,/Ich bin Komponist,/Ich bin Dichter und Schriftsteller,/Ich bin Erfinder,/Ich bin Grotesk-Komiker,/Ich bin Philosoph./Das klingt beinahe recht anmaßend. – Und das ist nun alles unter einen Hut zu bringen!/Und jetzt vergeude ich mich noch in der Zwangsjacke eines kümmerlichen Angestelltenlebens." Harald Bode, notebook 1976–1978, December 18, 1943, Harald Bode Archive, ZKM | Karlsruhe, ZKM-01-0136-02-00024.

2 Ibid.

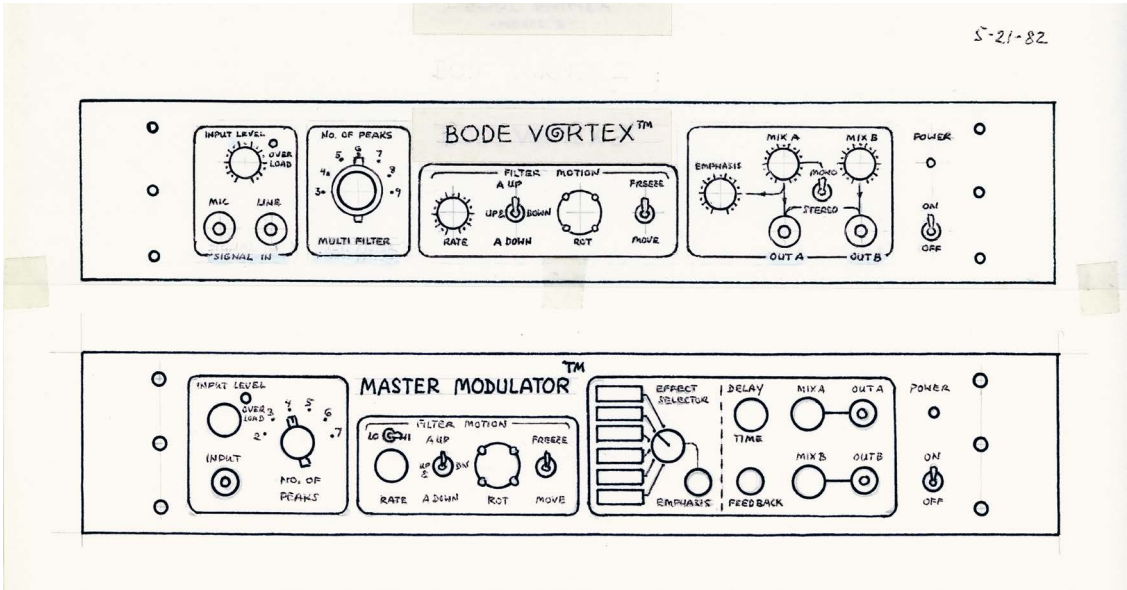
3 "So sind mit der Zeit Zukunftsträume zur Wirklichkeit geworden, von denen man einst nur Ahnungen, aber bei weitem keine konkrete Vorstellung in sich trug. Ich denke in diesem Zusammenhang besonders an die elektrische Musik als geeignetes Mittel, Neuland im Reich der Klänge zu erobern. Hier habe ich mir ein Betätigungsfeld geschaffen für meine Talente, die ich sowohl auf musikalischem wie auch technischem Gebiet besitze." Harald Bode, notebook, December 29, 1940, Harald Bode Archive, ZKM | Karlsruhe, ZKM-01-0136-02-00012.



Harald Bode, front panel layout with label "Multiphaser", February 1, 1981, technical drawing, ZKM-01-0136-02-01680



Harald Bode, front panel layout with label "Barberpole Phaser", February 20, 1981, technical drawing, ZKM-01-0136-02-01680



Harald Bode, front panel layouts with labels "Vortex" (as overlay) and "Master Modulator", May 21, 1982, technical drawing, ZKM-01-0136-02-01682

An early idea for a project including some key features of what would later become the Barberpole Phaser can be found in one of Bode's notebooks from 1974; the term he uses at this stage is "Bode Phasing Modulator."<sup>9</sup> This concept does not reappear until 1975, when Bode refers to it as "Super-Phaser" or "Infinite Flanger."<sup>10</sup> Although these notebooks do not specify the concept beyond the idea of an infinite phasing effect, there are some initial considerations about its implementation and Bode mentions experimental circuits.

There is little to no conceptual or experimental progress in this direction, until the "Infinite Phaser" project reappears in 1979–1980. Bode found crucial impulses by examining the Marshall Time Modulator, whose circuitry he studied in detail over an extended period – as a source of inspiration, as a competing product, and as a starting point for potential joint developments with Marshall.<sup>11</sup> Although Bode was in contact with Steve Marshall during this period, there was no concrete cooperation between the two. Between 1981 and 1984, he continuously worked on the Barberpole Phaser, producing a grand total of four complete circuit diagrams and numerous sketches for individual assemblies.

The entire development process for the device is characterized by a certain degree of indecisiveness and indeterminacy regarding its naming and details of its implementation. In late August of 1980, Harald Bode compiled a list of possible product designations for the "Infinite Phaser," which was updated in subsequent entries.<sup>12</sup> Bode used the names "Infinite Phaser," "Multiphaser," "Rotophaser," and "Digiphaser," apparently referring to the same project. Clearly, the naming of this project was far from final at this point. By March 1981, the term "Barberpole Phaser" began to solidify in the notebooks, and Bode even took out advertisements introducing the Barberpole Phaser as a product.<sup>13</sup> However, the project continued to evolve and never outgrew its indeterminate character. The 1981 product announcement, which also served as an advertisement, received several "Update Bulletins" starting from 1984 that described the "Bode Barberpole(r)" as an "ambience modulator, a rhythmic sound manipulator, a stereo synthesizer, a stereo panner, & multifilter with a variable number of peaks, and last

9 Harald Bode, notebook 1972–1974, February 24, 1974, Harald Bode Archive, ZKM|Karlsruhe, ZKM-01-0136-02-00058.

10 Harald Bode, notebook 1975–1976, e.g. October 8, 1975; November 2, 1975, Harald Bode Archive, ZKM|Karlsruhe, ZKM-01-0136-02-00046.

11 See Harald Bode, notebook 1979–1983, January 15, 1976, February 10, 1979, February 18, 1979, December 21, 1979, March 31, 1980, August 16, 1980, August 17, 1980, and September 18, 1981, Harald Bode Archive, ZKM|Karlsruhe, ZKM-01-0136-02-00047.

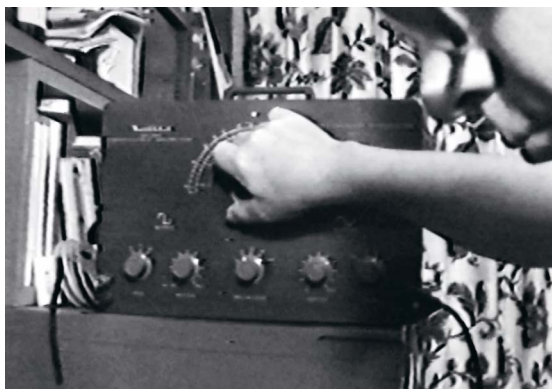
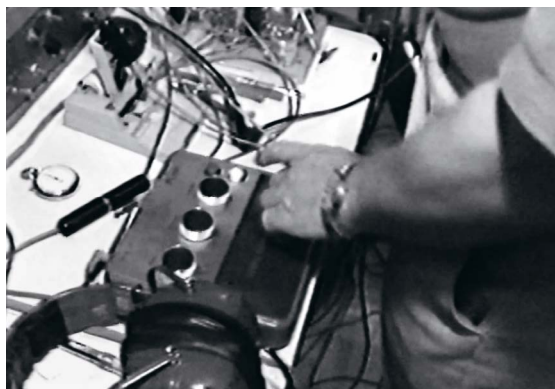
12 Harald Bode, notebook 1979–1983, August 27, 1980, September 3, 1980, and September 13, 1980, Harald Bode Archive, ZKM|Karlsruhe, ZKM-01-0136-02-00047.

13 Bode Sound Company, Barberpole Phaser, product leaflet, 1981, Harald Bode Archive, ZKM|Karlsruhe, ZKM-01-0136-02-01949. Reproduction in the present publication, 58.

Harald Bode, Master Board of the 8101, August 15, 1981, updated January 19, 1982, wiring diagram for the Barberpole Phaser, ZKM-01-0136-02-00807

MASTER BOARD OF 8101 *Wardell F. ...*  
 UPDATED 1-19-82 8-15-81

Harold Blue  
8-15-81



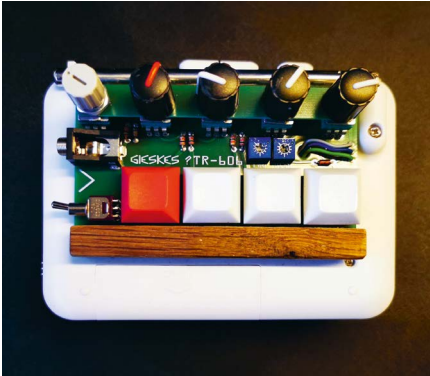
Harald Bode's performance setup in his private studio in North Tonawanda, NY, video stills from Ralf Bode, *Harald Bode Family 4th of July 1972*, 1972, video documentation, 58:33 min, ZKM-01-0136-02-01009



Juan Parra Cancino, first reconstruction of Bode's setup



Juan Parra Cancino, planning of the portable setup for the performance of *Phase 6*



Gieskes TR 606 CV-controlled Walkman



Juan Parra Cancino, portable setup for the performance of *Phase 6* at HfM Karlsruhe, April 25, 2025

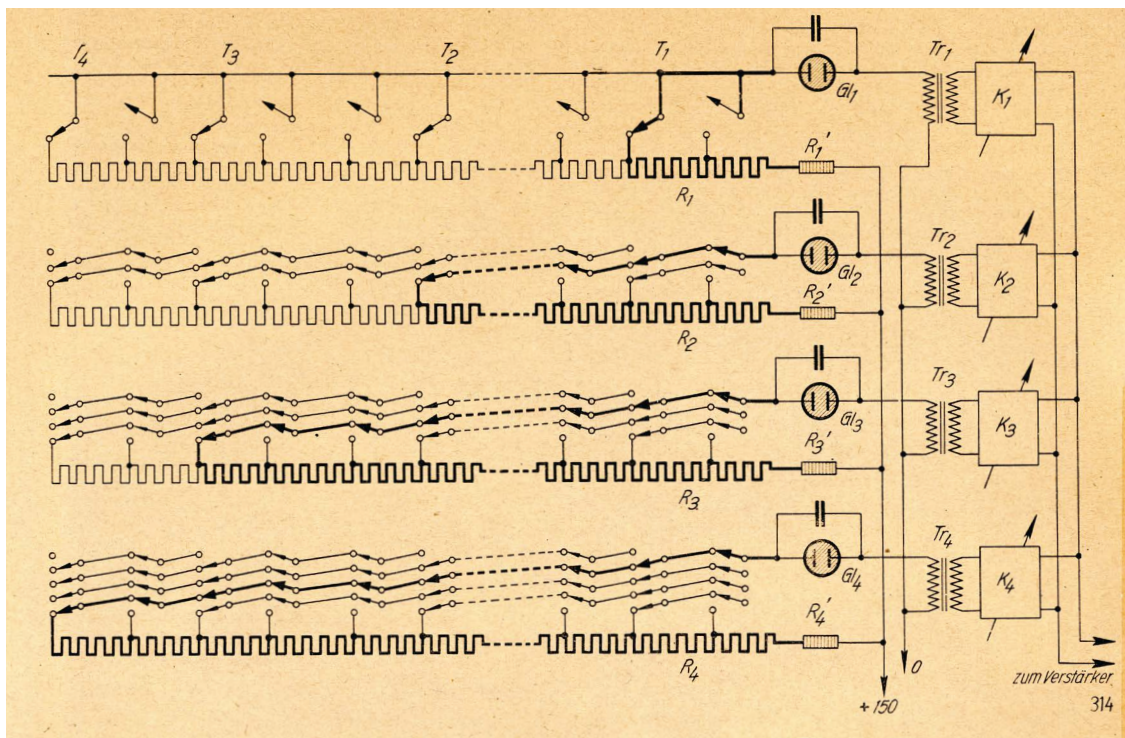
## Visionary Instrument Builder Before 1950

Robert Beyer's quote retraces precisely those lines of development whose restructuring around 1950 was so important: With "conventional instruments," he is most likely referring to the many well-known inventions of the 1920s and 1930s, such as the Ondes Martenot or the Trautonium, whose sound generation was accessed through a string-based playing interface, and perhaps also the Kurbelsphärophon [literally translated: cranked spherophone] developed by Jörg Mager. These examples represent a broad range of developments which adhered to that "ancestral embodied form of tools," which all seem to render sound generation as a function of playability, just like traditional instruments. This obviously holds true for developments such as the Hammond organ (patented in 1934), but also for perhaps the most famous example, the Theremin, whose spectacular contactless interface remains uniquely fascinating to this day.

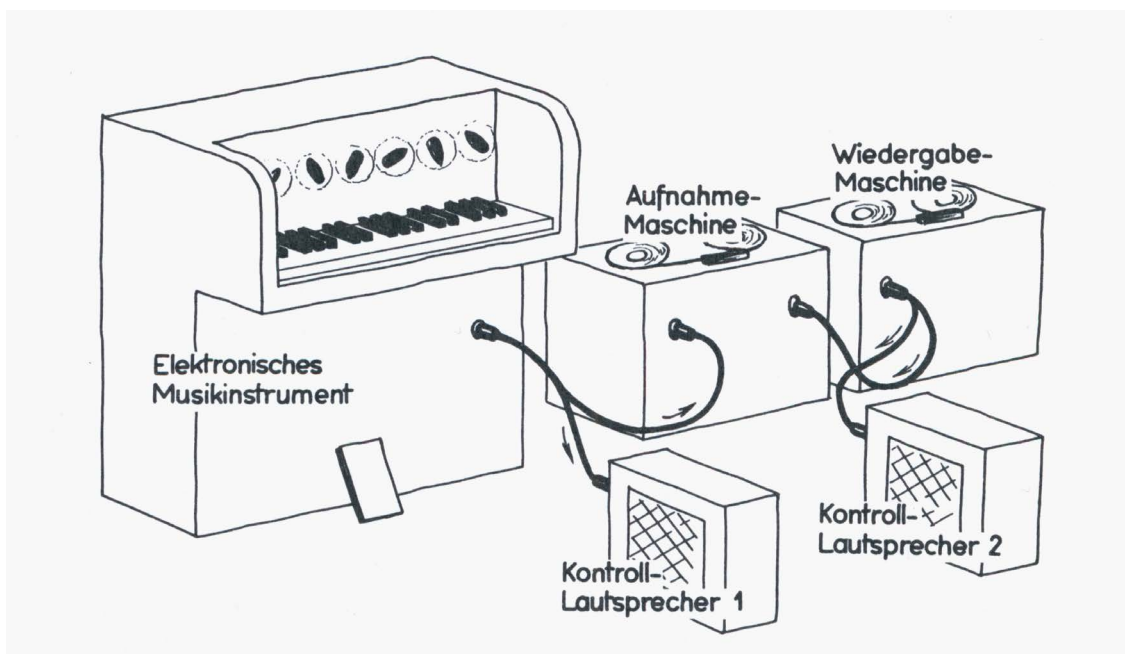
Harald Bode's contribution to the developments of his time is remarkable in several ways. With his Warbo Formant Organ<sup>2</sup> (created around 1937 in collaboration with musician Christian Warnke), Harald Bode took a fairly conservative stance in terms of the basic structure of his instruments. Its playing interface points to a traditional understanding of instruments: a chromatic keyboard is a logical choice for an organ. It should be noted that the family of keyed instruments and organs in particular are historically emblematic in for the mechanization and – shall we say – the formalization of sound generation. They represent the tendency to provide musicians with increasingly complex units of sound generation, which, in the case of more basic keyed instruments such as the Clavichord, are capable of polyphonic playing, and in the case of organs also offer a selection of specific timbres.

Bode's Formant Organ is a particularly interesting instrument for another reason. Its four-voice architecture made it one of the first instruments with fully electronic sound generation to allow truly polyphonic playing, and during its construction Harald Bode already explored questions that would become widely discussed decades later with the early polyphonic synthesizers, such as the Sequential Circuits Prophet-5. This is especially true regarding his musings on polyphonic voice allocation for his four-voice instrument, which would only be solved through digital means in the late 1970s for the first four- or five-voice synthesizers. Bode's ideas about voice architecture are equally astonishing, as they anticipate precursors to the envelope generators which would later become the standard.<sup>3</sup>

- 2 See Harald Bode, "Bekannte und neue Klänge durch elektrische Musikinstrumente," *FTM Funktechnische Monatshefte*, no. 5 (1940): 67–74, Harald Bode Archive, ZKM|Karlsruhe, ZKM-01-0136-01-0001; also Idis Hartmann, "Warbo Formant Organ," in the present publication, 242–244.
- 3 See Tom Rhea, "Harald Bode's Four Voice Assignment Keyboard (1937)," *Contemporary Keyboard* (December 1979): 89.



Harald Bode, schematic representation of voice allocation in the Warbo Formant Organ, 1940, technical illustration, ZKM-01-0136-01-0001



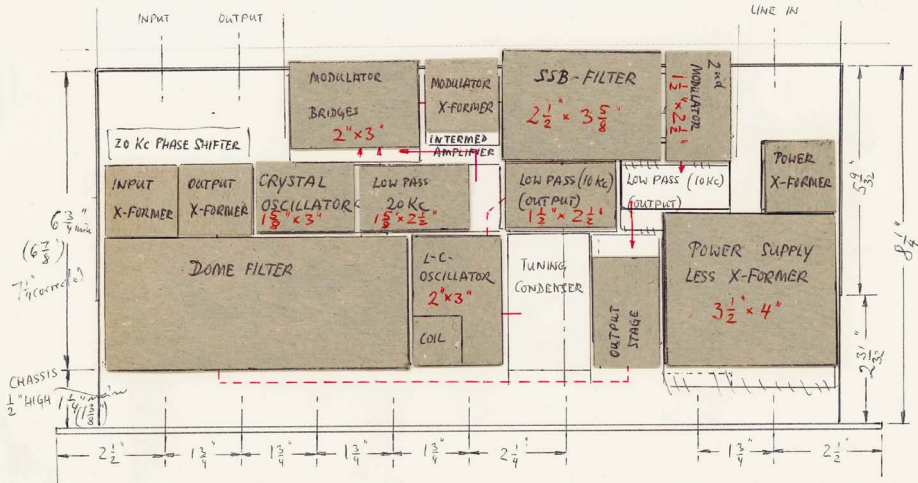
Werner Meyer-Eppler, working principle of the tape-based electronic studio, 1953, technical illustration, Akademie der Künste, Berlin, Werner-Meyer-Eppler-Archiv

8-30-63

LAYOUT OF THE "Klangumwandler"

- Page 17 -

Subassemblies  $3\frac{5}{16}$ " inside (height)  
 $16\frac{13}{16}$ " length inside



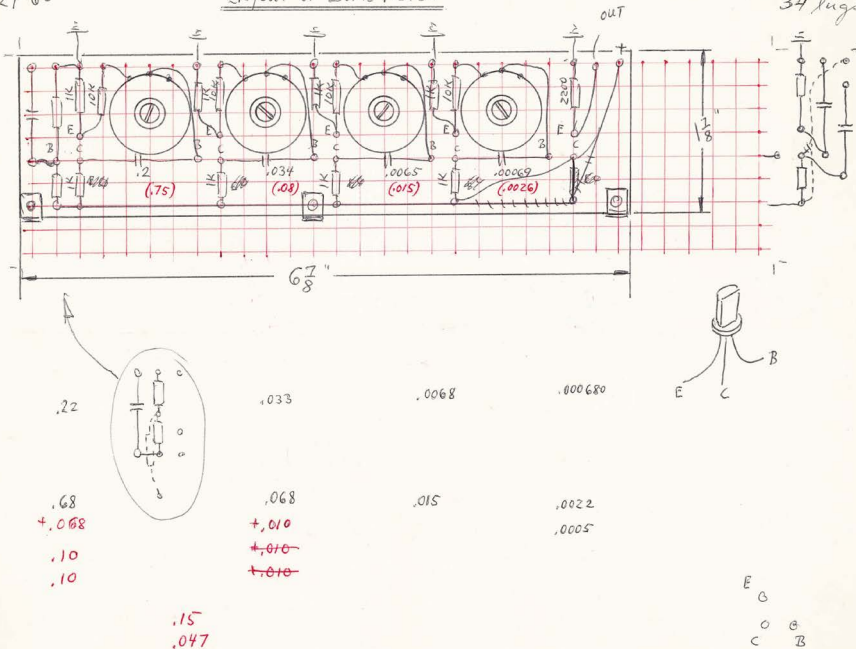
Harald Bode, Layout of the Klangumwandler, August 30, 1963, technical drawing, ZKM-01-0136-02-01979

8-27-63

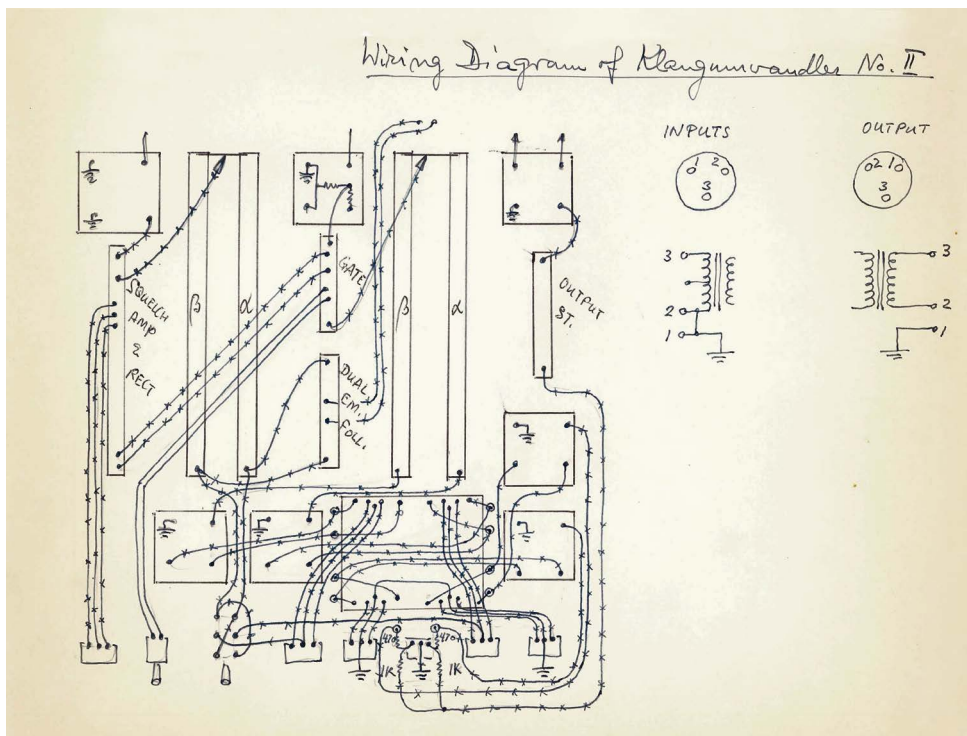
SUBASSEMBLIES OF KLANGUMWANDLER  
LAYOUT OF DOME FILTER

- Page 2 -

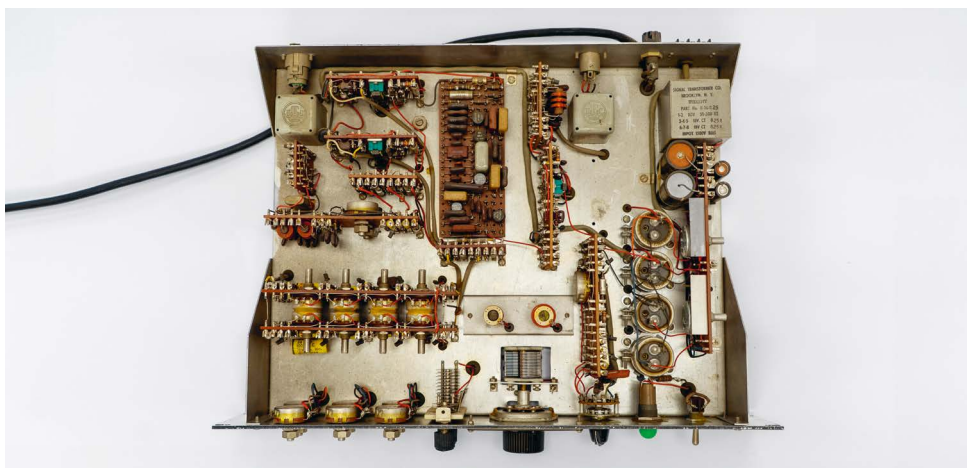
34 lugs



Harald Bode, Subassemblies of Klangumwandler, Layout of Dome Filter, August 27, 1963, technical drawing, ZKM-01-0136-02-01981



Harald Bode, Wiring Diagram of Klangumwandler No. II, no date, technical drawing, ZKM-01-0136-02-02226



Harald Bode, Bode Frequency Shifter for Columbia University, c. 1963, Columbia University Computer Music Center



Harald Bode playing the Melochord at Radio München, Munich, c. 1948, photographs, ZKM-01-0136-02-01893, ZKM-01-0136-02-01883, ZKM-01-0136-02-01935, ZKM-01-0136-02-01890, ZKM-01-0136-02-01939, ZKM-01-0136-02-01938

|                            |                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1949                       | Bode built the first Polychord for the German radio Bayrischer Rundfunk, Munich. The organ was later manufactured by the German company Apparatwerk Bayern (AWB) as the AWB Organ.                                                                                                                                                                       |
| 1951–<br>December 31, 1952 | Bode worked as sales and production manager for Apparatwerk Bayern (AWB).                                                                                                                                                                                                                                                                                |
| 1951                       | Bode developed the Cembaphon, an electrified harpsichord, for Vogelsang Munich.                                                                                                                                                                                                                                                                          |
| 1952                       | Peer Bode was born in Rosenheim. He later became a media artist and video arts professor. In the late 1970s Harald Bode designed and built a nine-channel light sensor instrument for his son, the Bode Light Sensor. <sup>9</sup>                                                                                                                       |
| 1953                       | The Bode Organ and Polychord III were developed by Bode at Apparatwerk Bayern (AWB).                                                                                                                                                                                                                                                                     |
| 1953                       | Bode left AWB and joined the Jörgensen Electronic company from Düsseldorf. He developed the Tuttivox and the Clavioline for Jörgensen.                                                                                                                                                                                                                   |
| May 14, 1954               | Bode had been seeking a position in the United States. The Bode family moved from Germany to America, settling in Brattleboro, Vermont.                                                                                                                                                                                                                  |
| May 1954–<br>February 1960 | Bode worked as chief engineer and later as vice-president for Estey Organ Corporation in Brattleboro, Vermont. Among other things, he was responsible for the development of the Estey AS1 Electronic Organ. He transferred to Torrance, California in April 1959. He resigned with effect from October 31, 1959 and moved back to Brattleboro, Vermont. |
| March 1960–1963            | Bode moved with his family to Corinth, Mississippi, and worked as chief research engineer for musical products for the Rudolf Wurlitzer Company, in charge of the electric pianos.                                                                                                                                                                       |
| October 11, 1960           | Bode presented the first modular synthesizer, his Audio System Synthesizer at the Audio Engineering Society (AES) convention as "A New Tool for the Exploration of Unknown Electronic Music Instrument Performances." <sup>10</sup> He has been working on this device in his own workshop since the late 1950s.                                         |

9 See Peer Bode, "Mind/Matter, Matter/Mind – Harald Bode, Independent Media Artist ...," in the present publication, 179–196.

10 Published as Harald Bode, "A New Tool for the Exploration of Unknown Electronic Music Instrument Performances," *Journal of the Audio Engineering Society* 9, no. 4 (1961): 264–266.

# Clavioline, Tuttivox, and Combichord

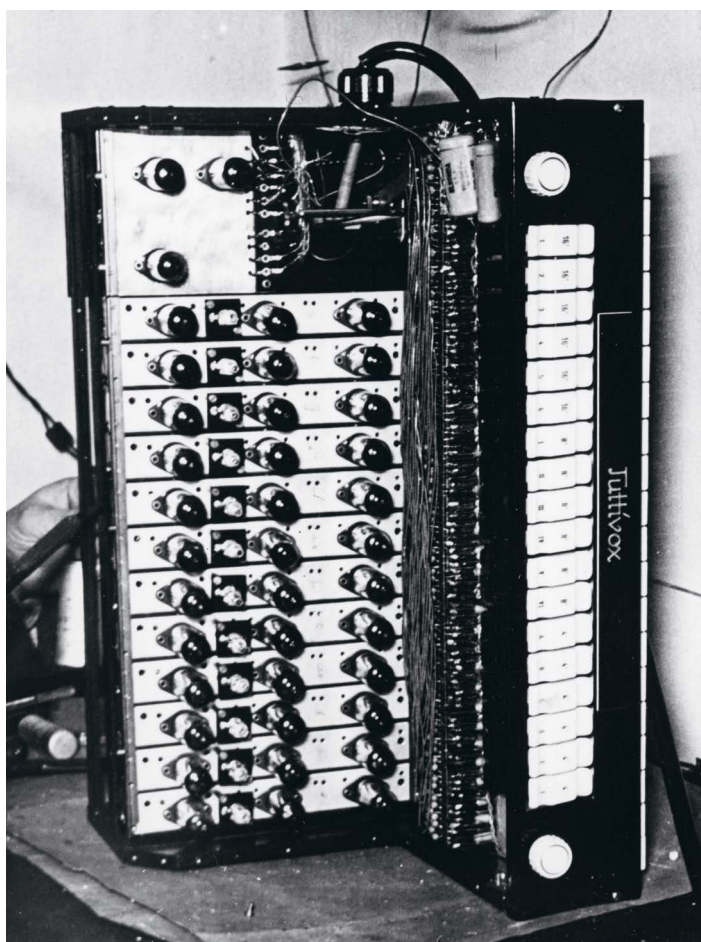
Text: Felix Mittelberger



Harald Bode, Clavioline,  
no date, audio example,  
ZKM-01-0136-02-01017



Harald Bode, Tuttivox,  
no date, audio example,  
ZKM-01-0136-02-01018



Harald Bode, Tuttivox, c. 1954, photograph, ZKM-01-0136-02-01552

The Clavioline was originally invented in 1947 by Constant Martin, who licensed his patents to numerous manufacturers across Europe—including Selmer in London and Jörgensen-Electronic in Düsseldorf. Throughout the 1950s and 1960s, the Clavioline was a widely used keyed instrument manufactured by multiple companies at the same time. After his departure from Apparatewerk Bayern (AWB) around 1953, Harald Bode began working on an extended version of this instrument in his private studio. His version featured two additional octaves, which added a lower bass register to its range. Bode dubbed this creation the “Concert Clavioline.”

The Clavioline could be mounted directly below the keyboard of a piano using screws and metal brackets. However, the kinship between the Clavioline and a piano is purely formal: “Once a pianist has hit a key, he can no longer influence the volume and timbre of the note played. By contrast, the claviolinist’s work begins where that of

the pianist ends: after the attack! The vivid dynamics and tonal coloration controlled using the knee lever are the first and greatest secret to playing the Clavioline!”<sup>1</sup>

In his home studio, Bode used the Clavioline as a cornerstone of his own compositions for many years. The compact instrument developed for the European market was dubbed the “Synthesizer of the 1960s” by Gordon Reid and brought novel sounds into the world of rock music.<sup>2</sup> Bode was also involved in the development of the Selmer Clavioline, which was used by bands such as The Tornados, The Beatles, and many more during the 1960s. On July 17, 1954, Christian Warnke conducted the first electronic orchestra comprising six so-called “claviolinists” at the Sea Fishermen’s Garden Festival in Hamburg’s inner-city park Planten un Blomen.<sup>3</sup>

Together with French instrument builder René Seybold, Bode developed also a polyphonic version of the Clavioline for Jörgensen-Electronic in 1954: the Tuttivox.



"The first electronic orchestra of the world performed in Hamburg," Martin Warnke on stage with six claviolinists and Bode Organ, July 17, 1954, newspaper clipping, no date, ZKM-01-0136-02-01876



The birth of the Tuttivox: Irmgard and Harald Bode fitting felt strips to prevent the keys from rattling, no date, photographs, ZKM-01-0136-02-01656

A Jörgensen catalog described it as "the world's smallest church organ," and the instrument was especially successful in the Netherlands. The Tuttivox featured a keyboard covering just under three octaves (pedal F to top E), making it significantly smaller than a conventional organ or a harmonium. Its tonal range covered five octaves – thanks to 16-foot, 8-foot, and 4-foot stops that could each be played using six different character settings. The corresponding sound generators were based on sawtooth oscillators. Jörgensen mar-

keted the Tuttivox as both a church organ and a cinema and jazz organ. Its key advantages were its compact form factor and low weight, which made it generally more portable than competing instruments.

A two-manual combination of the Clavioline and Tuttivox for melody and accompaniment was sold under the name Combi-chord. Bode provided the technical specifications for this instrument and took on a consulting role for Jörgensen-Electronic after his move to the United States.

- 1 Jörgensen-Electronic, *Tuttivox – die kleinste Orgel der Welt*, no date, product leaflet, Harald Bode Archive, ZKM|Karlsruhe, ZKM-01-0136-02-01960.
- 2 Gordon Reid, "The Story of the Clavioline," *Sound on Sound* (March 2007), <https://www.soundonsound.com/reviews/story-clavioline>.
- 3 "8 Uhr-Blatt am Lautsprecher," *8 Uhr-Blatt* (July 24, 1954), Harald Bode Archive, ZKM|Karlsruhe, ZKM-01-0136-02-01875.

# Audio System Synthesizer

Text: Christoph Seibert



Harald Bode, Audio System Synthesizer,  
no date, audio example,  
ZKM-01-0136-02-02209



Harald Bode, *Audition Tape Number One for the  
Audio System Synthesizer*, no date (c. 1960), audio  
example, ZKM-01-0136-02-02028



Harald Bode, Audio System Synthesizer with tape deck at top, tape-loop reverberation below, and plug-in modules at bottom, 1960, exhib. view, *Harald Bode: Tone Color – Known and Unknown Sounds*, Burchfield Penney Art Center, Buffalo State College, Buffalo, NY, 2011.

At the twelfth Annual Convention of the Audio Engineering Society in New York on October 11, 1960, Harald Bode presented an invention which he referred to as a "modular tone and envelope shaping and modifying device."<sup>1</sup> This device consisted of several modules which could be combined to form complex assemblies using cables and switches. In his notebooks and on the first demo tape, Bode referred to this system as "Novelty Sound Studio."<sup>2</sup> In 1960, Bode filed a US patent for his "Modular Sound Modification System with Tape Repeater."<sup>3</sup> He would later settle on the name "Audio System Synthesizer,"<sup>4</sup> under which the device is known today.

The device presented at the AES Convention and described in the corresponding proceedings comprised the following modules, mounted on two 7" x 19" rack panels:

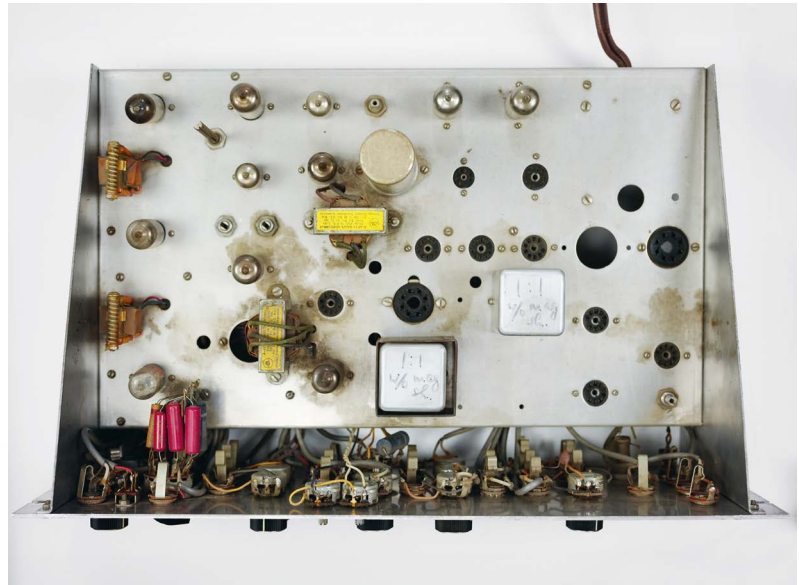
"1. A dual channel filter, each channel comprising a low pass, a high pass, a tunable formant filter and a mixer capable of blending the low pass or high pass with the formant filter performance; 2. A ring bridge modulator; 3. An audio controlled or triggered gate and percussion unit; 4. A

fundamental frequency selector; 5. A squaring circuit; 6. A binary divider; 7. A pre-amplifier; 8. A mixer; 9. A distributor; and 10. A tape loop repetition unit with several reproducing heads correlated to selective outputs and capable of creating rhythmic effects with alternating timbre patterns."<sup>5</sup>

The setup also included a tape recording device, meaning that sounds could not only be heard in real time but also recorded and processed. Bode emphasized that the main innovation did not lie in the individual modules themselves, but in the possibility of combining them to create "unusual systems with interesting functions."<sup>6</sup> In his article, he discusses examples for its application, including the simple use of a ring modulator, the use of a bongo drum as a control signal and an electronic organ as the input signal for the envelope shaping module, and even a similar setup featuring the tape loop repetition unit for generating alternating rhythm patterns. By integrating external sound sources and effect processors, the system's inherent creative possibilities could be extended even further.

In light of the sheer infinite possibilities of creating new electronic sounds, the Audio System Synthesizer was Bode's attempt—shaped at least in part by economic considerations—at developing tools that would enable “a maximum of functions with a minimum of hardware.”<sup>77</sup> On a conceptual level, its development was motivated by Bode's distinction between intermediate and immediate processing methods for the production of new sounds and musical effects: “Some methods of intermediate processing may include punched tapes for control of the parameters of a sound synthesizer, and may also include such tape recording proce-

dures as reversal, pitch-through-speed changes, editing and dubbing. Because of the time differential between production and performance when using the intermediate process, the composer-performer cannot immediately hear or judge his performance, therefore corrections can be made only after some lapse of time. Immediate processing techniques presents [sic] no such problems. Methods of immediate processing include spectrum and envelope shaping, change of pitch, change of overtone structure including modification from harmonic to nonharmonic overtone relations, application of periodic modulation effects, reverberation,



Harald Bode, Audio System Synthesizer, no date, photographs

# FUNK



15. DEZEMBER 1940

HEFT 24

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Harald Bode wrote numerous technical articles for academic journals and magazines on audio technology and music electronics. These texts dealt with circuit designs, the construction and development of new and original instruments or their components, or provided historical and aesthetic perspectives on electronic sound and electronic music. About a half of the articles he produced were published in journals such as *Funk: die Zeitschrift des Funkwesens*, *Funktechnische Monatsblätter*, and *Funkschau* between 1940 and 1952. Later, he published several articles in the *Journal of the Audio Engineering Society* mainly based on papers he had presented at the society's conventions. He wrote about his own developments and adaptations, such as his Audio System Synthesizer or Frequency Shifters and later also on the history of music and history of musical instruments, focusing on the evolution of electronic sound generation. In between, he also

contributed regularly to other magazines and journals like *Electronics*, *Electronic Music Review* or *db The Sound Engineering Magazine*. In two cases, he also collaborated with Robert Moog. For the article on "The Multiplier-Type Ring Modulator," published in *Electronic Music Review* in 1967, Moog contributed an introduction. "A High-Accuracy Frequency Shifter for Professional Audio Applications," published in the *Journal of the Audio Engineering Society* in 1972 was co-authored by Robert A. Moog. The last text he wrote, "History of Electronic Sound Modification," provides a historical perspective on practices and devices for sound generation and modification, whilst also featuring Bode's own inventions. Due to its outstanding significance, it is reprinted in the present publication. Publications with ZKM archival signature are available at the Harald Bode Archive, ZKM | Karlsruhe.

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