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The Heritage of the Future: Historical Keyboards, Technology, and Modernism

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The Heritage of the Future:

Historical Keyboards, Technology, and Modernism

by

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Abstract

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This dissertation examines modernist twentieth-century applications of the pipe organ and the carillon in the United States and in the Netherlands. These keyboard instruments, historically owned by religious or governmental entities, served an exceptionally diverse variety of political, technological, social, and urban planning functions. Their powerful simultaneous associations with historicism and innovation enabled those who built and played them to anchor the instruments' novel uses in the perceived authority of tradition, church, and state. This usage became particularly evident after World War II, when Philips Electronics and the engineers and musicians whose careers were shaped by the military-industrial complex and the Cold War used the organ and carillon to present alternative visions and performances of their research, knowledge, and services.

The organ served as a vehicle for innovation for early electronic music and sound synthesis pioneers in three ways. First, it provided a model for an efficient user interface for new synthesizer technologies that found both musical and military communications applications. Second, the pipe organ became the first instrument to be electronically simulated on a commercially viable basis. As a result, the first federal legal proceedings to define the successful simulation of musical sound centered on the electronic organ. Electronic organs also helped shape a historicist "neo-baroque" movement that was, in part, both a reaction to and an outgrowth of their commercial success. Third, inventors in the field of electronics, particularly military electronics, turned to organ building to satisfy a desire to connect with historicist ideas about craft and tradition. They became leaders of the Organ Reform Movement after World War II, dedicated to reviving aspects of Baroque organ building. I build on Richard Taruskin's critique of "historically informed performance" as itself a form of modernism in order to elucidate previously overlooked relationships between Reform organ building, organ recording artists, the military-industrial complex, and cold war politics.

The carillon served as a vehicle for international exchange after World War II, facilitating the sharing of soundscape and landscape design ideas between America and the Netherlands. In the 1950s, the people of the Netherlands donated a carillon to the United States as a sounding symbol of political harmony between the two allies. However, the resulting political squabbles and the disharmony and decay of its bells tolled the ineffectiveness of this instrument of diplomacy. In the following decade, Philips Electronics took inspiration from suburban American corporate research parks to construct a techno-cultural complex in Eindhoven, the Netherlands. This International Style park used the Dutch carillon's sonic and visual symbolism to re-center the perceived core of Eindhoven and of civic authority onto Philips' campus.

An important part of the broader history of postwar expansion and the military-industrial complex are the science-fiction, mystery, and filmic spinoffs and sonic imaginaries associated with these reinvented carillons and organs, and the way such narratives cross the boundaries between high art and popular culture. The institutions and donors that built carillons often justified them with utopian rhetoric about creating community, public music, and elevating general musical taste. However, a vein of dystopian fiction about bells in literature, opera, film, and television counterbalanced that discourse. The realm of fiction ties together this dissertation's overarching themes of historical revival, technological innovation, modernism, and military electronics research.

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Introduction

> "My organ pieces are written for synthesizer."[1]
> -Karlheinz Stockhausen

A talking organ for women telephone operators, countercultural youth screaming for the organ works of Bach, diplomats panicking on both sides of the Atlantic over guano-coated carillon bells, and a carillon lending Baroque gravitas to a museum of technology. It may seem peculiar to consider these sundry twentieth-century histories in America and the Netherlands together. Yet a look farther back into the history of the organ and carillon can reveal their shared origins and provide a basis for understanding the following four chapters.

In this dissertation, I argue that the organ and carillon in the twentieth century were powerfully shaped by the repercussions of the two world wars, and this because of their simultaneous appeal as ingenious technological devices and as cultural symbols of the European Baroque. As the most outwardly technologically advanced of musical instruments, the organ served as an interface for new sonic and vocal synthesis technologies. But its Baroque associations also served to hide an underlying relationship between the military-industrial complex and dramatic transformations in American organ building, which resulted in devices such as the early vocoder and the brilliant technological sheen of postwar neo-baroque organs. The carillon, on the other hand, became an instrument of cold war diplomacy between the United States and the Netherlands. As a civic and religious symbol of the Dutch Baroque, it provided a musical-architectural means of affirming the two countries' international relations. Its power to produce the soundscape of the Dutch city center also became a primary tool through which Philips Electronics displaced the symbolic center of its home city of Eindhoven, the Netherlands onto its new American-style suburban research campus on Eindhoven's periphery. Although initially successful, this combination of Dutch soundscape design and American urban planning proved problematic and thus short-lived.

These keyboard instruments shared something important besides their seemingly antiquated and churchly associations—they were both put to technological and modernist uses during the twentieth century because they are portrayed as at once perpetually old and yet perpetually new. They are indelibly associated with a European musical past, yet their size and complexity have led everyone from engineers to politicians to reinvent them to suit new electronic and social ideals. As a result, they have often been on the leading edge of music technology, from the nineteenth-century application of pneumatics to organ action to the preoccupation of early sound synthesis developers with simulating bell sounds. While this dissertation explores the reinventions of these instruments in the twentieth century, innovations have been ongoing since the sixteenth century, when they first co-existed in the Netherlands. From that time onward, carillons in the Netherlands called the faithful to church from towers, while organs led them in song once they filed inside. A church's organ, clock, and automatic carillon were the most advanced pieces of technology most people were likely to encounter. Organ builders were involved in the early design of carillon keyboards and actions and again became involved in the nineteenth century, and the organist-carillonneur became a

[1] Martin Herchenröder, "From Darmstadt to Stockholm: Tracing the Swedish Contribution to the Development of a New Organ Style," in *The Organ as a Mirror of its Time: North European Reflections, 1610-2000,* ed. Kerala Snyder (New York: Oxford University Press, 2002), 306.

standard church position during the Baroque period. For the seventeenth and early eighteenth centuries, the instruments were seen as complementary.

In the twentieth century, keyboards became the interface of choice for electronic music technologies developed for commercial production. Moreover, various experimental keyboards were developed to promote alternate temperaments, including R. H. M. Bosanquet's "generalized keyboard" (1875) and Adriaan Fokker's 31-tone organ (1950). Keyboards were the vehicle of both commercial technological experimentation and optimization and of rebellion against musical standardization, while simultaneously developing a kind of hegemony over the development of new electronic instruments and techniques for playing them. The rapid proliferation of keyboard designs during the twentieth century belies the fact that for much of their history, keyboards looked quite different from their modern counterparts, and this is where I locate the earliest links between the organ and carillon. Until the thirteenth century, they were mostly diatonic, admitting only a B♭ to accommodate Guido de Arezzo's hexachordal system. They accumulated chromatic keys over time. Some early organ keyboards were not played with the fingers, but with the fists, like carillon keyboards. These organ keyboards comprised large sliding levers, up to 12 cm in width and 70 to 90 cm in length.[2] Thus the appearance of organ and carillon keyboards, their playing technique, their architectural scale and the centrality of architectural resonance to their sound, their churchly associations, and their technological associations (frequently appearing at world's fairs during the nineteenth and twentieth centuries) have linked the two instruments since the Baroque period.

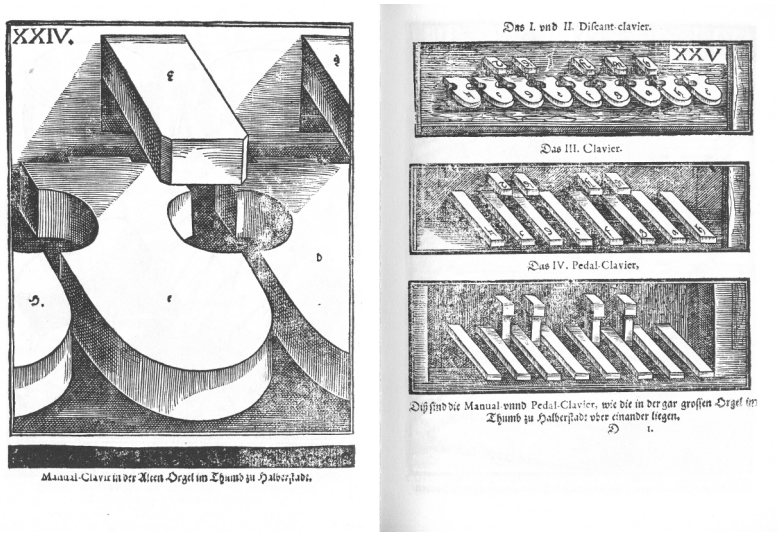

Figure 1. The keyboards and pedalboard of Nicholas Faber's Halberstadt organ, built in 1361 and enlarged in 1495, as illustrated in Praetorius' *Syntagma Musicum* (Wolfenbüttel, 1620).

"Historical keyboard building" and the technology and urban expansion race that followed World War II, although rarely linked in historical narratives, were mutually influential. They shared key players, instruments, concepts, and ideologies that I will highlight in terms of the perpetual redesigns and new uses to which the organ and carillon were put.[3] Richard Taruskin's critique of the Early Music movement will serve as a linchpin for my argument. His influential claim that

[2] Ferdinand J. De Hen, "Keyboard," in *The Organ: An Encyclopedia*, ed. Douglas Earl Bush and Richard Kassel (New York: Routledge, 2006), 288.

[3] Much could be written on the topic about harpsichords and clavichords as well.

"historically informed performance" is modernism in Baroque disguise also applies here to keyboard construction—to the materiality of instruments themselves. Many of the organs and carillons discussed in this dissertation, with their sometimes inventive nonmusical usages, were modernist inventions parading in Baroque garb.

Chapter 1 introduces the early twentieth-century electrical engineering perspective that the organ keyboard is the most efficient of all musical user interfaces, and traces its effect on the development of encrypted World War II communications devices and its role in shaping early sound synthesis technologies. While male organists continued to dominate the profession during the 1930s, female virtuosi recruited from the ranks of telephone operators pioneered the performance of electronic vocal synthesis using organ-like consoles. The Voder, as the instrument was called, became the prototype for vocoder technology that protected the highest levels of Allied communications. While the Voder was still being developed for demonstrations at major expositions, the Hammond Clock Company was defending itself in court against allegations from the Federal Trade Commission that its instruments were falsely claiming to emulate pipe organs. One of the first major battles over the ontology of electronic music was being carried out by a clock inventor, a physics professor, professional musicians plus a college English class subjected to blind listening tests, and legal professionals. Not until 1962 would composers and performers reverse the direction of emulation, as avant-garde composers Mauricio Kagel, György Ligeti, and Bengt Hambraeus found ways for organist Karl-Erik Welin to explore the electronic-sounding timbral possibilities of pipe organs (and blow a few fuses in the process).

The intersection of liturgical tradition and technological innovation in the organ shaped an American neo-baroque organ building style (an approach translated but distinct from a European Baroque revival movement called the *Orgelbewegung*) into a musical and interface aesthetic that is maligned today for "mistaking" a cold, inhuman technological aesthetic for Baroque sobriety. However, the boost that World War II gave to scientific and technological research and education, in tandem with its cultural diplomacy initiatives, brought Dutch and German *Orgelbewegung* ideas to America and gave them a distinctly technological character. Therefore, a European approach to Baroque historicism combined with a technology-smitten American building practice to produce instruments that combined Baroque stop lists with electronic sonic and visual aesthetics and machinery haptics under the ever-treacherous label of "historical authenticity." The counter-revolution, one might say, began with those who initially sought to join the neo-baroque ranks. From within the movement emerged its own backlash, an artisanal, craft-oriented building practice that paradoxically owed its very existence to the military-industrial complex.

Chapter 2 focuses on several of the most influential organ builders to pioneer an "anti-technology" return to the Baroque, who came of age in World War II research facilities or during European studies funded by cold war cultural diplomacy initiatives. The appeal of engineering a complex instrument is what drove electrical engineers to develop and improve on electronic organ sound and subsequently to explore the instrument's craftsman past, while in the process importing social structures and systems of research from the military-industrial complex into the organ shop. The chapter concludes that the approaches of celebrity organists E. Power Biggs and Virgil Fox to promoting historically informed and anti-historical technological versions of Bach organ performance, respectively, shared much more than their rivalry suggests.

Chapter 3 explores the use of the carillon in constructing suburban corporate space in Eindhoven, the Netherlands after World War II. On the outskirts of the city in which it had been

founded and which it had fundamentally shaped, Philips Electronics anchored its International Style suburban research park on a new carillon and UFO-shaped technology museum in 1966. As the quintessential sound marker of historic Dutch city centers and market squares, the carillon allowed Philips to symbolically de-center "downtown" Eindhoven (*het centrum*) onto its own American-style suburban research campus on the periphery of the city, and to ring out the company's *de facto* role as church and state there. This suburbanization of the carillon and museum was intended to recreate the massive public draw of the Philips Pavilion and its presentation of Edgard Varèse's *Poème Electronique* at the 1958 Brussels World's Fair. The complex attracted many visitors, but the historical pull of the carillon's symbolism and Dutch expectations for public music would eventually triumph. As Philips went global in the 1980s and left Eindhoven struggling to develop a post-company-town identity, the carillon was moved to a historic church in the city center.

Finally, chapter 4 recounts the story of how the Netherlands' postwar gift of a carillon to America to symbolize international harmony resulted in all kinds of discord—musical, political, social, and spatial—in and around the planned location of Washington, D.C., and thus how the use of a neo-baroque "instrument of diplomacy" proved ineffective. In fact, Washington's traditional and electronic carillons became soapboxes for cold war containment rhetoric rather than symbols of peace, despite the fact that the carillon had served as one of the grandest unrealized icons of peace after World War I. The Dutch effort to construct a democratic musical instrument to represent the full diversity of its people and businesses simply gave a sonic hearing to the impossibility of total representation within an instrument historically developed to amplify the institutional, regulatory messages of church and state.

Today's frequently used metaphors of taste and blend in discussing organ timbre have a legal precedent in the language that came to dominate the Federal Trade Commission's proceedings of 1936-7 against the Hammond Clock Company. "Much like an antipasto is a collection of bold delicious flavors that one would never food-process into a finished meal," organ historian Jonathan Ambrosino reflected in 1998, "so too it seems that in some recent eclectic organs, the trees seem larger than the forest, and the ensemble ends up as a come what may concatenation of disparate elements."[4] He characterized the sound of Romantic orchestral organs as "beefy" and neo-baroque organs as having slimmed down to "lean cuisine tonal design."[5] I hope that this dissertation offers material that is both tasty and bold, taking as its topic two instruments often considered by musicologists to be the province of hyperspecialists, and endeavoring to link them to broader histories as far-flung as military electronics, urban planning, cold war diplomacy, and atomic bomb research.

Unless otherwise noted, all translations are my own.

[4] Jonathan Ambrosino, "Present Imperfect: A Perspective on the Past Century of American Organbuilding," *The Tracker* 42, no. 3 (1998): 33-34.
[5] Ibid., 34.

Chapter 1: A Media Archaeology of Electronic Keyboards

In 1936, engineer and electronic organ inventor Benjamin Miessner of Miessner Inventions, Inc. gave a talk entitled "Electronic Music and Instruments" at a meeting of the Institute of Radio Engineers in America.[1] This lecture, which to today's readers may seem ahead of its time in taking spectral analysis and other electronic sound analysis methods for granted, extolled the keyboard-pedalboard combination and the stop-drawing system of the large pipe organ as key components of a musical interface that offers maximal "musical utility" in terms of frequency, amplitude, harmony, and most importantly, timbral variety. The organ's user interface, he argued, takes nearly full advantage of the musician's "physical limitations" as the player's four limbs "are worked to their utmost for manipulation of the various controls" to perform highly complex music with a minimum of manpower. Efficiency and utility were his highest ideals for an instrument. This widely shared progressive engineering attitude towards the organ, which Miessner prematurely believed had reached the late stage of a development that had begun in the late nineteenth century and already matured, would lead from the use of the pipe organ as simulator of other instruments, to the organ as low-bandwidth encrypted communications device, and full circle to the pipe organ as, paradoxically, simulator of the electronic synthesizer. The seeming irony of such an arc, in which an instrument becomes a preferred simulation of its simulacrum, points to the fundamentally ambiguous nature of the pipe organ as an "acoustic" instrument with an "original" form. In *Any Sound You Can Imagine* (1997), Paul Théberge discusses the ubiquity of electronic keyboards modeled and named after the organ, but he does not consider why the organ was preferred over other potential models such as the piano.

I argue that the organ has so often served as a namesake because it has always embodied the concepts of the electronic keyboard. First, starting with the Gothic Blockwerck, the organ's principles of timbral production and modification employed the same fundamental concepts on which additive sound synthesis would be based in the twentieth century. Second, the many layers of remove between the player's fingers and feet and the sounding pipes have invited elaborate mechanics and later, electronics, into the instrument's action, thereby detaching the organist's physical movements from actual sound production—a characteristic of the organ dating from the fifteenth century that is also implicit to electronic keyboards. Third, as synthesizers produce sound with the aid of electricity, the mechanism required to send air to organ pipes has always meant that organ sound was never the product of just one individual's exertions but rather a joint product with bellows treaders, and by the late nineteenth century had become the joint product of human and engine-driven force. Finally, the organ concept of a keyboard interface detached from specific sounds and thus able to actuate different musical colors invited the use of organ-like interfaces to control new electronic sound production technologies. The varied sounds of synthesizers could have been accessed via any number of interfaces (think of the short-lived Theremin), yet most inventors chose

1 Miessner's chosen audience suggests that radio as an institution supported the development of electronic instruments even before Pierre Schaeffer and Pierre Henry established the Groupe de Recherche de Musique Concrète at Radiodiffusion Française in 1951, following earlier experimentation.

to actuate them via keyboards.[2] The organ provided the model for twentieth-century synthesizers because the aforementioned four concepts were inherent to it.

This chapter will trace the use of the organ as interface through several twentieth-century moments of slippage between acoustic and electronic, many of which sparked impassioned outcries from those determined to police the liminal zone between pipe organs and electronic ones. I will examine the "scientific" values underlying Miessner's optimistic 1936 overview of electronic organ building, followed by the logic of organic synthesis underlying the portentous 1937 lawsuit brought by the Federal Trade Commission (FTC) against the Hammond Company over its right to brand its electronic keyboards "organs." Inventor Homer Dudley's Voder will offer a wartime interlude in which I consider his use of the organ interface for this watershed vocal synthesis device. The chapter will conclude in 1963 with the pivotal premiere of three avant-garde organ works commissioned by Radio Bremen from György Ligeti, Bengt Hambraeus, and Mauricio Kagel that use the organ like an electronic device. This belated compositional development in Europe may seem surprisingly distant for a meaningful conclusion, but it was late in coming because churches resisted radical musical change even while universities, radio stations, and other institutions had been enabling the avant-garde to flourish for decades.

The Organ and User Interface Optimization

Emily I. Dolan's article "Towards a Musicology of Interfaces" ably articulated the interface-centered approach I have been trying to develop for the history of the organ. She begins by examining Ernst Bloch's 1930s essay "Magic Rattle, Human Harp," in which he described a prehistoric time when the musical tone "was linked quite specifically with the instrument producing it… Thus the original rattle rattled as the thing it was; the rattling sound is merely its verb." However, humanity's invention of more elaborate instruments meant that "the ringing and tinkling broke loose from the ringing brass and tinkling bell,"[3] engendering a mediated relationship between note and object—one that positioned the human voice as primal and unique in its inseparability of sound from material. Dolan then questions the common assumption that music is an art whose medium is sound, for "in that idea lies a host of additional assumptions, practices, and conventions. We do not, for example, consider light the medium of painting (or of cinema)." Instead, she argues that this assumption

> stands in for the technologies that have been bypassed. Yet it would make just as much sense to talk about the media of music as consisting of the wood, metal, wires, reeds, pipes, valves, speakers, magnetic tape, vinyl, and circuits that we use to produce and record sounds. After all, sound is the effect produced by the battery of physical media. Much of the scholarship today that takes technology as its subject seeks to replace sound with the instruments and bodies that produce it….
>
> Can we speak of canons of instruments just as we speak of canons of musical works? …. What I want to do

[2] In 1940, G. T. Winch and A. M. Midgley argued in "Electronic Musical Instruments and the Development of the Pipeless Organ" that there were three main families of electronic instruments: monophonic instruments, percussive piano-like instruments, and organs. By 1964, in *Das Elektrium: Beiträge zur Klärung der Frage Orgel-Orgelimitation*, Jürgen Kuhl noted in "Wesen und Problematik der Elektrophone" that most electronic instruments that used non-keyboard interfaces, such as the Theremin, were never widely adopted (41).

[3] Emily Dolan, "Toward a Musicology of Interfaces," *Keyboard Perspectives* 5 (2012): 1.

> here is simply contemplate a few places that might serve as jumping off points for a deeper investigation, and to contemplate the paths of inquiry that open up when we think about various moments in the history of music from the perspective of interfaces. In particular, I am interested in the *keyboard interface* [italics added], which has endured and proliferated for centuries: what follows are some first steps towards exploring the ways in which the keyboard is imbricated with the very idea of Western Art Music.

The article proceeds to examine various musical innovations (realized and unrealized) with keyboards, from the minds of Berlioz to Bay Area instrument inventor Don Buchla, arguing that "the keyboard served to regulate the very idea of invention and innovation."[4] In accepting Dolan's invitation to inquiry, I turn to an influential new media studies work on interfaces from the same year, Alexander Galloway's *The Interface Effect* (2012). He conceptualizes interfaces not just as the physical components that Dolan brings to light, but also as cybernetic zones of creativity where flesh meets the synthetic, as charged zones that are expressive of ideologies, and as contact zones overlooked to the point of invisibility. His preface specifies that the book is about keyboards and other interfaces, "or rather, about none of these things in particular and all of them simultaneously."

> This is a book about thresholds, those mysterious zones of interaction that mediate between different realities. The goal of this book is twofold, to define the interface, but also to interpret it. Interfaces are not simply objects or boundary points. They are autonomous zones of activity. Interfaces are not things, but rather processes that effect a result of whatever kind. For this reason I will be speaking not so much about particular interface objects (screens, keyboards), but *interface effects.* And in speaking about them I will not be satisfied just to say an interface is defined in such and such a way, but to show how it exists that way for specific social and historical reasons. Interfaces themselves are effects…but at the same time interfaces are themselves effects of other things, and thus tell the story of the larger forces that engender them.[5]

This preface could easily introduce an article on keyboard instruments, and becomes even more suggestive when the author proposes the name "the control allegory" for his project.[6] As this chapter will show, the organ as interface was embraced by twentieth-century inventors for the specific way it offered control over sound color. Like Dolan, Galloway warns that "interfaces are [usually] assumed to be synonymous with media itself," and his theorization of interfaces helps us distinguish the organ's physical material from its sound. He proposes an alternative understanding of interfaces through "the *remediation* or *layer model* of media…wherein media are essentially nothing but formal containers housing other pieces of media." To give an example from music technology, computer users of the modular software music studio Reaktor can view the "back" of a virtual music equipment rack, and click and drag on a complex system of virtual patch cables to connect virtual effects units, even though the same reconfiguration tasks could be accomplished onscreen without all the vintage-looking visual clutter. Reaktor's vintage-fetishistic interface is a formal container for a previous media format that was once more familiar to users. "Like the layers of an onion," Galloway surmises, "one format encircles another, and it is media all the way down…it is a very short leap from there to the idea of the interface, for the interface becomes the point of transition between different mediatic layers within any nested system. The interface is an 'agitation' or generative friction between different formats."[7]

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[4] Dolan, 7.
[5] Alexander Galloway, *The Interface Effect* (Maiden, Mass.: Polity, 2012), vii.
[6] Ibid., ix.
[7] Ibid., 31.

The pipe organ interface is perfectly suited to remediation processes because the relationship between note and object is as distant as any Bloch described. *The Organ: An Encyclopedia* (2006) defines the *action* of an organ as "the technology by which the performer is able, by pressing a key, to activate a motion from the keyboard through the windchest to a now-open pipe, at which point the pipe sounds."[8] The article defines ten different kinds of actions on a gradient of increasing mediation, from mechanical to pneumatic to electrical. Invention of the latter types occasioned agitated protests because they divorced the organist's actions thoroughly from sound production. An electromagnetic action opens and closes the pipe's pallet according to the binary principle of "on" or "off"—the principle underlying computer circuits and code—without directly translating the player's movements to the pipe's gradual speech.[9] That divorce between fingertip or toe and sound, however, allowed inventors to place electronic sound production technologies at the terminus of the key signal, remediating the organ as an electronic instrument housing a simulacrum of the pipe organ inside familiar, user-friendly surfaces.

Galloway devotes a large part of his study to examining the ideologies of interfaces. "The interface is above all an allegorical device," he argues, "that will help us gain some perspective on culture in the age of information. For this reason, we now look to the 'deeper' realm of software, the realm below the screen, with an eye to the possible ideological construction of this hidden electronic kingdom."[10] He employs a *software studies* or *critical code studies* approach to read computer code for cultural meaning. Later, I will take an analogous sonic approach in my comparison of the similarities between the components of pipe organ sound and Hammond's additive synthesis in the age of Taylorism. First, however, the Taylorist ideology suggested by Miessner's idealization of the organ interface invites critical study.

The propitiously named Benjamin Franklin Miessner (1890-1976) was a radio engineer and prolific inventor. After graduating from the U.S. Naval Electrical School in Brooklyn, he worked at a naval radio station in Washington, D.C., where he invented the "cat whisker" detector for reception of radio waves. He left in 1911 to work with John Hays Hammond, Jr. and Fritz Lowenstein on wireless control of torpedoes, while also developing a superheterodyne radio system. After pursuing electrical engineering at Purdue University, he returned to the Navy in 1916 as Expert Radio Aid for Aviation. In the 1920s, he established an acoustical research laboratory and invented a new sound recording and reproduction system at the Brunswick Balke Collender Company. Later that decade, he founded Miessner Inventions, Inc. His career proved him a pioneer researcher in electronic musical instruments and receivers, phonography, radio dynamics, directional microphones for aircraft and submarines, and aircraft radio. The music industry remembers him best for his improvements to the Wurlitzer organ and electronic piano; he also worked with telecommunications giant Stromberg-Carlson on its electronic carillon. By the time he retired, he had been granted over two hundred patents in the U.S. and abroad.[11]

Miessner's impressive biography is not atypical for an electronic organ pioneer. An amateur musician, his collection of materials on electronic instruments, from patents to foreign

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[8] Lynn A. Dobson, Fredrick L. Mitchell, John E. Sperling, Richard Kassel, "Keyboard," in *The Organ: An Encyclopedia,* ed. Douglas Earl Bush and Richard Kassel (New York: Routledge, 2006), 8.

[9] The relay and switch system, an electrically based means of turning a toggle switch on or off, was used in the earliest computer systems. (Richard Kassel, "Relay and Switch Systems," *The Organ: An Encyclopedia*, 459).

[10] Galloway, 54.

[11] Purdue University Libraries, "Inventory To The Benjamin F. Miessner Collection, 1906-1978," 2008, http://collections.lib.purdue.edu/fa/pdf/msp2_miessner.pdf.

bibliographies, numbered in the thousands. His talk for the Institute of Radio Engineers denigrates all instruments at the expense of the organ: in the modern age, he held that only the organ interface's efficiency is an appropriate basis for innovation. He expresses bafflement that while the latest technologies improve the other arts and even everyday life, musicians insist on wresting sound from primitive inventions.

> One musician scrapes a horsehair bow across strings of gut, and the older his instrument is, the more he prizes it. Another blows lividly through a brass tube or a wooden pipe; another hammers on the drum of the aborigines. Another, sometimes with terrific physical exertion, pounds on a keyboard to rouse his audience through the physical vibrations of struck strings and huge soundboards through an elaborate system of levers. Another with aggregations exceeding 10,000 pipes, some as long and large as a forest log, and with hundreds of other complicated and bulky appurtenances, produces the sounds of the organ.[12]

Miessner argues that the principles of these sorry instruments have long been fully explored, as can be seen in instrument exhibits at the Metropolitan Museum of Art. His indirect museumization of non-western ("aboriginal") music highlights Ferdinand De Hen's observation that "keyboards with levers do not appear in original musical cultures other than Western"[13] as well as Dolan's call to explore "the ways in which the keyboard is imbricated with the very idea of Western Art Music" and perhaps even constitutes a "canon of instruments" exerting an interface-based hegemony of its own.

Determined to smash idols in the name of innovation, Miessner then argues that no instrument is "sacred" to music. Most instruments of the orchestra suffer "serious musical limitations" on their range of frequency, power, timbre, tonal characteristics, and musical texture.[14] By contrast, the organ offers a single individual control over all such parameters *and* polyphony, while the piano with its single keyboard and sound color is second best. By his standards, "the usefulness of a musical instrument resides in its *versatility* [italics original]" of timbre as an all-purpose sonic machine that minimizes human effort.[15] (Ironically, the emphasis on timbral variety reveals that his reference point for the organ was the Romantic orchestral type popularized by Ernest M. Skinner in the 1920s, with its seemingly endless color combinations and consoles of endless stops, evoking a past Romantic musical and mechanical sublime rather than a musical future.)

Admitting that his is a "scientific" perspective, Miessner suggests that "we, as scientific workers, may here well inquire as to what constitutes the musician's basis for a satisfactory musical instrument." And he inevitably finds his predetermined answer, quoting a Varèsian statement by Stokowski on his need for "any desired timbres and for new timbres; for creating any frequency, any duration, any intensity, any combination of counterpoint, of harmony, of rhythm."[16] In other words, modern musicians require electronic instruments (the sound generators of infinite possibility of which Edgard Varèse was still dreaming) to emancipate them from the limitations that arise from their instruments' primitively direct connection between human energy input, physical material, and sonic output.

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[12] Benjamin Miessner, "Electronic Musical Instruments," *Proceedings of the Institute of Radio Engineers* 24, no. 11 (November 1936): 1427-28.
[13] Ferdinand J. De Hen, "Keyboard," in *The Organ: An Encyclopedia*, 288.
[14] Miessner, 1429.
[15] Ibid., 1430.
[16] Ibid., 1430-31.

Yet even the organ needed serious modernization. It functioned inefficiently on "multiple quality generation" in which "individual generators consist of wind-blown organ pipes of differing output tone quality." Why build one pipe per note and color when a few electronic components could do the job?[17] Inventors like Oskar Vierling and Laurens Hammond were developing instruments that would slash such inefficiencies.

The sanguine Miessner saw the perfected organ of the future just a decade or two away:

> The ideal instrument is one which can make any sound, known, unknown, or conceivable; to do this we must provide a generator for periodic vibrations embracing the whole audio spectrum of frequencies. We must be able to select from this generator at will any desired single frequency, or many single frequencies simultaneously, whether harmonically or inharmonically related, or whether in narrow or wide continuous bands. We must further be able to emit these frequencies in any desired sound amplitudes and envelope shapes, even though, in a given sound, all the components require different shapes of envelope. *We must be able to control the emission of these sounds by some suitable playing technique and apparatus.* [italics added]
>
> With such an apparatus we shall be able to synthesize any possible sound, continuous, damped, transient, musical or nonmusical, for we have all the elements of sound, and means for putting together any desired combination of these elements in any desired time-amplitude relationship. Looking ahead ten or twenty years we are now at work on such an instrument.[18]

By "we," he is referring to his own company, and his prototype is, of course, an electronic organ (Figure 1). The multitude of sonic possibilities offered by the ideal modern instrument means that only the most efficient of interfaces, one that employs all limbs with a minimum of effort, one that relies on already highly developed musical skills, can constitute the creative contact zone in which modern man meets machine. Miessner's scientific opinion of the organ is that its "versatile" sonic concept is modern but its materially inefficient means of sound production must be updated with electronics, and that its interface already meets his strict Taylorist conditions of human efficiency while enabling access to the instrument's future expanded parameters. The organ interface must replace all other musical interfaces because it embodies the ultimate in efficiency and timbral control.

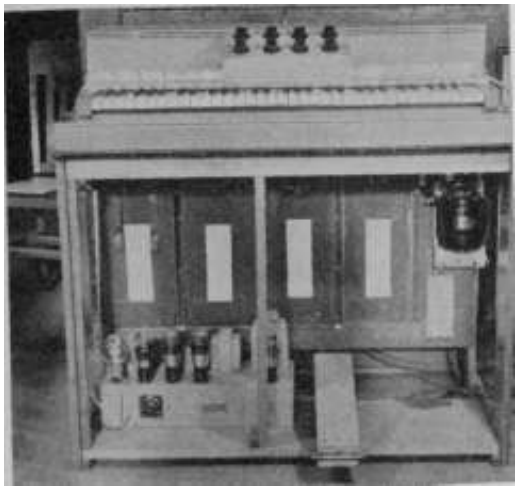

Figure 1. Miessner electronic organ with four banks of reeds and dual electrostatic pickup (Miessner, 1459).

[17] Ibid., 1436.
[18] Ibid., 1462.

Women Play Prototype Organs of War

In the years leading up to World War II, European organists, most of them male, were practicing for hours daily on pipe organs that would soon be imperiled by Axis bombardments or Nazi metals requisition. In America, three hundred women, enough to form a small battalion, were practicing three to four hours a day on organs that synthesized speech. In the employ of Bell Laboratories, these virtuosic former telephone operators were mastering the initial prototypes of an encrypted communications technology that would be co-refined with Alan Turing and prove key to the Allied victory. A former Navy man, Miessner must have considered it perfectly natural that this new talking machine's interface consisted of a small organ keyboard with pedals.

Electronic and acoustic engineer Homer W. Dudley developed the first electronic voice synthesizer by thinking about the human vocal tract as a radio station. The vocal cords transmit a steady carrier signal, and the mouth, throat, and sinuses modulate and shape that sound into speech.[19] Specifically, they shape the carrier sound into formants that we recognize as vowel sounds, which are then sculpted by plosives and glottal stops into recognizable words. His Bell Labs invention, the vocoder, performed analysis and synthesis. It divided a vocal signal into ten frequency bands, each of which was measured to determine the voltage required. This information was further reduced by a low-pass filter and transmitted, and the receiver used a fundamental pitch and an unvoiced noise signal to resynthesize the voice. He coined the term vocoder as a portmanteau of "voice" and "encoder."

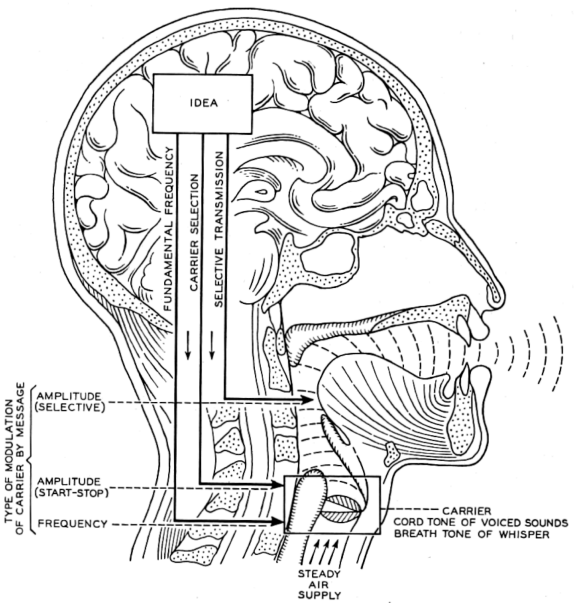

Figure 2. Homer Dudley's illustration of the vocal system as a carrier circuit, reprinted from his article "The Carrier Nature of Speech," *The Bell System Technical Journal* 19, no. 4 (October 1940): 497.

During initial public demonstrations, Dudley kept his anticipated commercial application a mysterious secret: by using a vocoder to transmit a skeleton specification of speech over the transatlantic cable, he planned to increase the undersea cable's bandwidth tenfold. Every home

[19] Dave Tompkins, *How to Wreck a Nice Beach: The Vocoder from World War II to Hip-Hop: The Machine Speaks* (Chicago: Stop Smiling, 2010), Kindle edition.

would have a vocoder. Dudley was not to become a household name, however, because satellites and fiber-optic cables would render increased transatlantic cable bandwidth moot. His concept of speech compression would reemerge in the communications arena with the advent of mobile phones, but without his name or the interfaces he developed for it.[20]

The history of organs for speech synthesis predated Dudley. But unlike previous talking machines that imitated biological forms such as mouths (Figure 3) or female heads (Joseph Faber's 1845 Euphonia) or the human vocal apparatus (like Dayton C. Miller's 1920 "talking organ pipes" that could say "mama" and "papa"),[21] his patent diagrams for the vocoder show that it bore no resemblance to the biological. How would the vocoder's various parts of speech be actuated and assembled into words by a human operator and given pitch inflections to convey contextual meaning? Dudley followed the lead of Faber, who had controlled Euphonia from a seventeen-key keyboard, and AT&T predecessor J. Q. Stewart, whom he cited as building the first electric speech keyboard in 1922: he placed Miessner's interface of choice, a small organ keyboard with pedals, between the operator and the machine. A player would be able to control the vocoder with fingers, arms, and feet, relocating vocal production from the throat to the extremities. Dudley named his talking machine the Voder, a portmanteau for "voice operation demonstrator."

Figure 3. Apparatus for imitating vowels, developed by Marage in Paris, consisting of artificial larynxes, mouths, and nasal cavities driven by a bellows and motor as lungs. Reprinted from Dayton C. Miller, *The Science of Musical Sounds* (New York: Macmillan Co., 1916), 244.

Newspapers described the Voder's organ interface with fascination (Figure 5). Attending an early demonstration in Philadelphia at the Franklin Institute (which shared its namesake with Miessner and stood not far from where Euphonia had debuted), Lawrence Davies wrote for a *New York Times* front page feature that the Voder was played from "a keyboard somewhat similar to an old-fashioned parlor organ," where "with the aid of a dexterous operator [using] organ-like keys and

[20] Dudley had a number of commercial applications in mind for this organ-controlled vocoder, which he called the Voder. He visited MGM Studies in Hollywood to market it as "a scientific aid to movie stars," one that might resuscitate thin-voiced silent film stars whose careers had nosedived with the advent of talkies. He offered the Voder to airbrush unattractive voices and help tone-deaf actors sing (like an early version of Auto-Tune, but one that provided a vocal stunt double rather than re-tuning an actor's actual voice). Although he failed to convince Hollywood, his postwar Sonovox vocoder would find some success there and on the radio. Bell Labs also hoped after the war that the Voder would be purchased to give injured soldiers new voices along with their prostheses. (Tompkins, chap. 10.) Indeed, surviving recordings of the Voder are reminiscent of the famed artificial voice of Stephen Hawkings, but more singsongy.

[21] Dayton C. Miller, *The Science of Musical Sounds* (New York: Macmillan Co., 1916), 252. Quoted in Henk Badings, "Electronische Muziek," *AO Reeks* no. 689 (13 December 1957): 13-14.

a foot pedal…the electrical device exercised its 'vocal cords'."[22] The *Chicago Daily Tribune* devoted an entire paragraph to technical explanation:

> The Voder resembles an oversize typewriter, with a pipe organ keyboard. Instead of musical notes the keys sound speech tones….The machine has 10 white keys which when pressed turn on vowel sounds. One other white key controls volume. Alongside the operator's right hand are three black keys which make the consonants, "k," "p," and "t." Under the left wrist is a key that changes the sound from consonants to vowels. The right foot presses a treadle for vocal inflections. A knob turns to the left for a masculine voice and to the right for a feminine voice. The operator modifies the sounds by pressing more than one key at a time, like the player of an organ.[23]

With all this hand activity, operators sometimes wore translucent sleeve protectors called "Cuff-Ettes."[24]

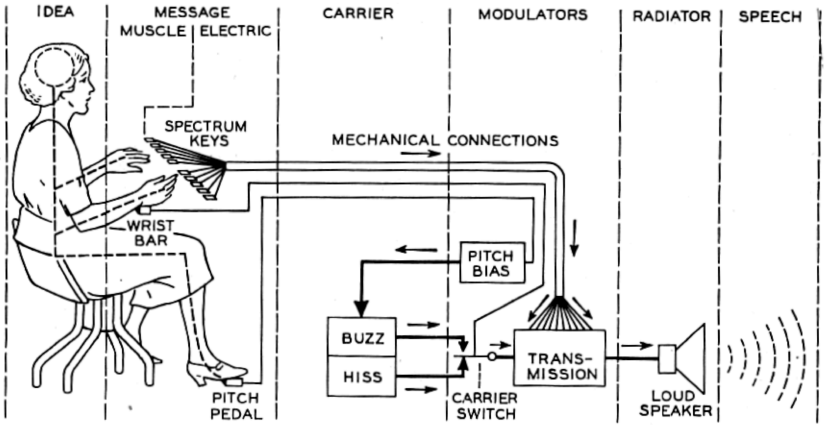

Figure 4. Homer Dudley's schematic circuit of the voder, reprinted from his article "The Carrier Nature of Speech," *The Bell System Technical Journal* 19, no. 4 (October 1940): 509.

Initially, Dudley utilized the Voder's musical-instrument-like appearance to lull his audience into familiarity the better to astonish them. As Jacob Smith summarizes in "Tearing Speech to Pieces: Voice Technologies of the 1940s,"

> The *Hopewell Herald* described how the audience was enjoying what they thought was a pipe organ playing 'The Bells of St. Mary's', when they suddenly 'sat bolt upright': 'Some dug at their ears, certain their hearing was playing them false. Others sat in puzzled wonder. For the pipe organ suddenly burst out singing the words of the chorus.' After making a musical instrument speak, Dudley next animated the sounds of industry: 'While the audience was still gasping, a recording of a locomotive just chugging out of the station obediently puffed out the words: "I'm – a – train. Watch – me – now. Here – I – go. Here – I – go. Here – I – go!" An electric power hum followed, chilling the audience with the high-pitched monotone "I am power. I light your houses. I run your street cars. I work for you. I am power!"[25]

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[22] Lawrence E. Davies, "Machine That Talks and Sings Has Tryout; Electrical Voder Will Speak at Fair Here," *New York Times,* January 6, 1939, 1.
[23] "Machine Talks in 23 Human Voice Sounds," *Chicago Daily Tribune*, January 6, 1939, 10.
[24] Tompkins, chap. 1.
[25] "Versatile Daddy of Pedro the Voder 'Goldarnedest Thing You Ever Heard'," *Hopewell Herald,* February 28, 1940, 3. Quoted in Jacob Smith, "Tearing Speech to Pieces: Voice Technologies of the 1940s," *Music, Sound & the Moving Image* 2, no. 2 (2008): 189.

The organ, an instrument whose church clients had in recent decades been overtaken by expositions, theaters, municipal venues, and concert halls and had thus come to be associated with popular entertainment, was now giving eerie voice and intelligence to the omnipresent inhuman force, electricity, that invisibly powered the modern age. The limitless versatility that Miessner had prophesied for the organ by ventriloquizing Stokowski now went beyond musical timbre to self-reflexively giving voice to machines. The female operators of these instruments used their self-taught modified organ skills to enunciate phrases in a male voice, at last realizing the ideal of the "*vox humana/voix humaine/voce umana*" stop as the timbre closest to the human voice.

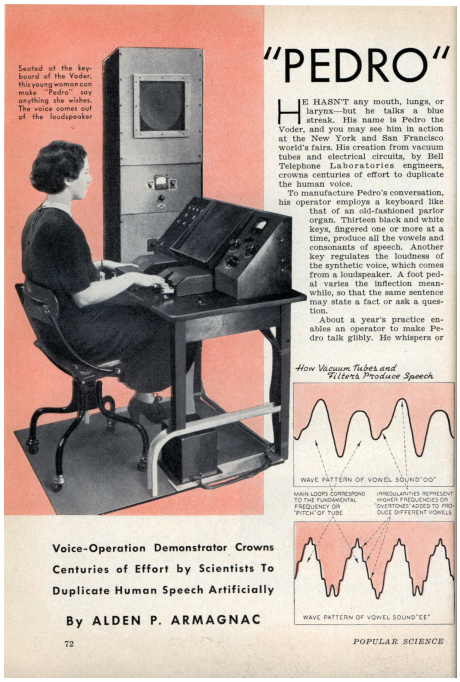
Dudley refocused later demonstrations away from keyboard performance to vocal performance. The next year's *New York Times* jokingly noted that the Voder "can also sing. The research experts have not seriously considered, however, the matter of developing it into a prima donna capable of attracting the notice of Edward Johnson, manager of the Metropolitan Opera. It takes a year or more to train an operator…To develop into a passably good singer would require an operator with a strong sense of musical tones and values."[26] As astute readers may have noted from the foregoing newspaper excerpts, the Voder's performers were rarely identified, and later demonstrations focused audience attention away from the keyboard to the synthesized voice. Who were these keyboardists and why was their labor, intelligence, and agency erased?

The speculation that the Voder could become a *prima donna* identifies gender as the issue at stake. Smith's article uses the Voder and its postwar successor, the Sonovox, to discuss the "erasure of female labour in the cultural industries."[27] Unlike the Euphonia, its passive female head pictured with a male keyboardist, these two forms of the vocoder were overwhelmingly operated by women, the Sonovox specifically for female audiences in 1940s woman's films. Smith argues that "these speech technologies were shaped by notions of gender at every point in their implementation," for although after the war, "overt simulation of the body was disappearing from [talking] devices themselves," it was nevertheless "returning in the gendered discourses and practices that surrounded them."[28] The Voder was gendered male with the name "Pedro," but it was controlled—and its apparent consciousness provided—by women.

As with any musical instrument, it could take a year and a half just to become adept at Voder performance, and no expert teachers were available to speed the learning process. Dudley deemed telephone operators the most coordinated candidates with the best-trained ears for the new profession of Voder virtuoso. Thus, women temporarily defied a gendered division within the musical labor force. Three hundred highly disciplined operators pioneered the skill of playing the Voder, and an elite group of twenty-four made the final cut to perform at coming world's fairs. The 1939 *Christian Science Monitor* was one of the few newspapers to focus on these women, publishing a photograph of them waving to the camera.[29] American organists, most of whom were male (Claire Coci's rise to fame that year was exceptional), were never seriously considered for playing the most modern organ of all, a job that went to women with extensive experience in multitasking, rapidly switching, comprehending hundreds of voices all day, and responding politely but efficiently to them. The operators practiced daily to develop a periodically changing repertoire including simple

[26] "Voder Talks for Experts: Sings, Drawls and Recites at Public Speaking Conference," *The New York Times*, April 20, 1941, 45.
[27] Smith, 184.
[28] Ibid., 203.
[29] "Going to Golden Gate Fair," *Christian Science Monitor,* February 4, 1939, 4.

salutations, nursery rhymes, renditions of Protestant hymns and swing tunes, the birthday song, and a nostalgic "Auld Lang Syne" for the closing day of the 1939-1940 New York World's Fair.



"PEDRO"

Seated at the keyboard of the Voder, this young woman can make "Pedro" say anything she wishes. The voice comes out of the loudspeaker

HE HASN'T any mouth, lungs, or larynx—but he talks a blue streak. His name is Pedro the Voder, and you may see him in action at the New York and San Francisco world's fairs. His creation from vacuum tubes and electrical circuits, by Bell Telephone Laboratories engineers, crowns centuries of effort to duplicate the human voice.

To manufacture Pedro's conversation, his operator employs a keyboard like that of an old-fashioned parlor organ. Thirteen black and white keys, fingered one or more at a time, produce all the vowels and consonants of speech. Another key regulates the loudness of the synthetic voice, which comes from a loudspeaker. A foot pedal varies the inflection meanwhile, so that the same sentence may state a fact or ask a question.

About a year's practice enables an operator to make Pedro talk glibly. He whispers or

How Vacuum Tubes and Filters Produce Speech

WAVE PATTERN OF VOWEL SOUND "OO"

MAIN LOOPS CORRESPOND TO THE FUNDAMENTAL FREQUENCY OR "PITCH" OF TUBE

IRREGULARITIES REPRESENT HIGHER FREQUENCIES OR "OVERTONES" ADDED TO PRODUCE DIFFERENT VOWELS

WAVE PATTERN OF VOWEL SOUND "EE"

Voice-Operation Demonstrator Crowns Centuries of Effort by Scientists To Duplicate Human Speech Artificially

By ALDEN P. ARMAGNAC

72

POPULAR SCIENCE

Figure 5. Article from *Popular Science* showing a woman at the Voder keyboard. Alden P. Armagnac, "Pedro," *Popular Science* 134, no. 4 (April 1939): 72.

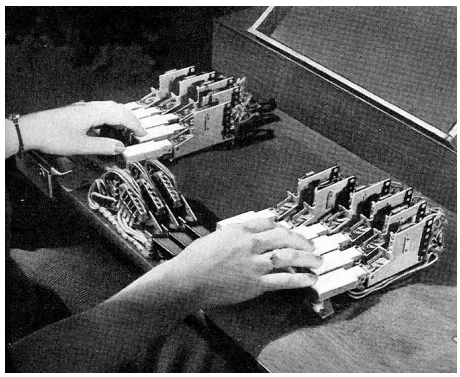


Figure 6. Image from same *Popular Science* article showing the keyboard.

Reports effaced the women even while highlighting the machine's male nickname. At the fair, the *New York Times* described in typical fashion "a young lady at the keyboard" with no name, but gave agency to "this actor, popularly known as Pedro the Voder, [who] will perform at intervals daily."[30] At the Eastern Public Speaking Conference in 1941, the *Times* named Dr. J. O. Perrine as the man explaining the Voder while "a young woman operator pushed the controlling keys" to make Pedro talk and sing "Home on the Range." Again, Pedro was assigned the nameless woman's agency

[30] "Preview is Given at Phone Exhibit: Guests of A. T. and T. Hear Voder, Artificial Man With a Voice, at the Fair," *New York Times*, April 28, 1939, 20.

and intelligence, for he himself "attended" the luncheon, and "sang, answered questions and spoke in Latin, French and Italian, as well as English," and gamely answered, "It's all Greek to me," when asked to explain the meaning of "his" words.[31] The operator's final phrase highlighted her relationship as puppeteer to the passive machine, but her pointed message eluded the reporter.

Unusually, Davies' lengthy front-page special did recognize the agency of the operator and the impressive amount of labor and discipline required of her, and even named and described operator Helen Amelia Harper. He included a photograph focused as much on her as on the interface (Figure 7). "Mrs. Harper's fingers moved across the keyboard and her foot worked a pedal to change the pitch," he recounted. "Even those operators who have been manipulating the keyboard for a year or more still spend three or four hours a day in practice. Two of them, seated at different keyboards, would find it possible to carry on an extended conversation." In describing this hypothetical Voder duet, Davies envisions women rather than machines communicating with each other. He did unquestioningly accept Bell Labs's gender assignments, according to which speech and music were ascribed to women and the sounds of machinery (which Dudley had performed at the Franklin Institute) and animals went to male performers. "With Mr. Watkins at the keyboard," his report continued, "Voder took a 'barnyard stroll,' reproducing domestic animal sounds; visited an airport and represented the noise of a motor warming up, and then mimicked a locomotive." Dudley himself was known for the merely semi-articulate "Greta Garble Effect," in which he alternated between English and Swedish with exaggerated pitch changes, "often landing on the last syllable with both feet."[32] Even when operating cutting-edge technology, women continued to be subject to sonic strictures on what was socially acceptable to articulate and in what manner, and to the expectations that domestic music making involved pleasant repertoire evocative of leisure rather than labor.[33]

In other rare reports that recognized some female agency, their skills were limited to attractiveness, social grace, and the appeal of domestic music making. The *Times* printed an article the day after Davies' predicting that "tens of thousands…will visit the World's Fair and stand transfixed as skillful girls play upon keys and make electrical circuits respond with pleasantries scarcely distinguishable from those that come from living lips."[34] Typically, as women developed their controlling skills, it was "Pedro" whose agency was described to be growing: "As the operators develop skill the voice becomes more human."[35] Although hidden from view, the digital dexterity, quick-witted responses, and acting skills of these telephone operators were key to drawing millions of curious visitors to the Voder, especially when compared to the awkward and disheveled Faber's disastrous Euphonia tour with P. T. Barnum. The Voder was hardly an attraction in itself; it was a Stephen-Hawking-sounding amplification device for the voices of twenty-four women.[36]

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[31] "Voder Talks for Experts: Sings, Drawls and Recites at Public Speaking Conference," *New York Times*, April 20, 1941, 45.

[32] Tompkins, chap. 1.

[33] Davies, 1.

[34] "My God, It Talks," *New York Times*, January 7, 1939, 7.

[35] "New Machine Creates Speech By Pressing Keys," *Los Angeles Times*, January 6, 1939.

[36] Completing the erasure of female labor, an AT&T television commercial from 2006 narrated AT&T's history of voice technology research using actual and fictional voice technologies as narration voice-overs. The hands playing the Voder in the opening shot, presumably creating the Voder voice-over, are the hands of a genderless automaton (Smith, 203). It appears that Pedro's giant two-dimensional New York World's Fair visage overshadows his women operators even today. The commercial may be watched at https://www.youtube.com/watch?v=IEp6ca9Ppks.

Figure 7. S. S. A. Watkins and Helen Amelia Harper give one of the first public demonstrations of the Voder at the Franklin Institute in Philadelphia on January 5, 1939. (Associated Press) ("Machine Talks in 23 Human Voice Sounds," *Chicago Daily Tribune*, January 6, 1939, 2).

The elision of female agency also enabled a singularly curious expression of xenophobia and Luddite anxiety in the *Washington Post.* The oft-repeated quip that Pedro had "a slight electrical accent" inspired one reporter to more-than-metaphorical fear of the exotic device. Pedro had been named smugly after Brazilian Emperor Dom Pedro II, whose allegedly ignorant reaction to receiving a telephone call for the first time at the Philadelphia Exposition of 1876 was said to be, "My God! It talks!" The *Post*'s article on "The Pedro Peril" beseeched the Bureau of Immigration to see to "deporting Pedro, or Voder, or whatever is the name of this latest and most fearful gadget to come out of Bell Telephone laboratories." Joining thoroughly in erasing the women operators, the alarmed journalist raved that "it can do [tricks with the spoken word] in any language known to exist. Pedro is neither man nor woman but it can whisper of love in accents of heavenly sweetness. Pedro has no soul but it can speak with the tongues of angels." He enumerates the intended advantages of the machine, but with the caveat that

> all this would be very nice, if we had guarantees that Pedro would be content with the role of docile household stooge. Consider, however, that Pedro can promise more than Hitler ever dreamed of promising, and can promise it more persuasively. He can outrant Mussolini, he can argue down Stalin, he can outshriek anybody…This latest enfant terrible of science comes close to being the perfect potential dictator, not merely of these United States, but of all of this much bedeviled universe."[37]

This McCarthyish paranoia about a "docile household" servant gone rampant in the global theater of war encapsulates an unintentional misogyny-by-proxy arising from conflation of the operators' apparently hypnotic rhetorical skills with the arrival of true artificial intelligence, today commonly known as AI. The organ had become the instrument of modern man—and woman—indeed.

[37] "The Pedro Peril," *The Washington Post,* January 9, 1939, 8.

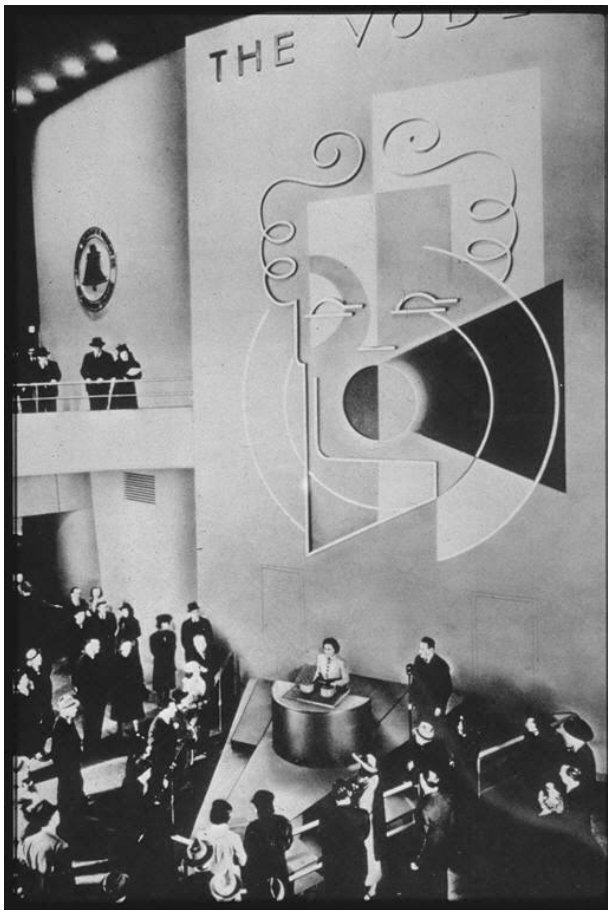

Figure 8. The Voder was personified as "Pedro" and given an abstract, two-dimensional gold face vocalizing visible sound waves at the 1939-1940 New York World's Fair. Its semi-embodied male identity dwarfed that of its female operator. (Manuscripts and Archives Division, The New York Public Library, "American Telephone & Telegraph Exhibit - The Voder," New York Public Library Digital Collections, accessed August 14, 2015, http://digitalcollections.nypl.org/items/5e66b3e8-9002-d471-e040-e00a180654d7)

The Voder was a central Bell Labs attraction at the "World of Tomorrow" exhibit at the New York World's Fair (near the Ford Pavilion's own futuristic electronic organ, the Hammond Novachord), and at the 1939 Golden Gate International Exposition. But although such bonanzas had purchase on the public's imagination of the future, the military had the means to materialize the future. To understand the vocoder another way, it took a coded message, scrambled it, and transmitted it to a receiving vocoder that reassembled the signal in the right order. In other words, it was a cryptography device.

During World War II, the vocoder was put to work scrambling classified government and military phone communications after the Germans cracked the A-3 Bell Labs scrambler. The National Defense Research Committee commissioned Bell and Westinghouse to develop an unbreakable phone system in November 1942, when eighty percent of the Bell Labs budget went to funding military research. In January 1943, Alan Turing arrived at Bell to work with Dudley on the vocoder, adding a random noise source to encrypt the signal. The first link for the meaninglessly-named SIGSALY (called Project X at Bell Labs) was established on July 15, 1943 between the Pentagon and the basement of Selfridges, to which Churchill's bunker was connected. A worldwide network of twelve SIGSALY terminals shuttled the highest level of classified messages across the

Earth between Roosevelt, Churchill, and other leaders. The terminals were gargantuan and expensive, the vocoder itself weighing forty tons. General Eisenhower was said to have seen one and grumbled, "You can make a whole lotta bullets with all that copper," viewing it as potential materiel just as the Nazis were eyeing organ pipes and bells.[38] Although the Third Reich did requisition many instruments, it was only the ghost of the organ interface that became materiel within the American military-industrial complex.

Random noise was the key to SIGSALY, and it came from twelve-minute SIGGRUV random noise disks. As the receiving terminal reassembled the signal, it also subtracted the noise. These disks had to be playing at all times during vocoded conversations in perfect synchrony on both ends, coordinated by crystal-controlled railroad clocks, otherwise the signal disintegrated into garble.[39] The Muzak Corporation recorded SIGGRUV disks throughout the war, making an initial press of over 1,500 records. Its slogan "Muzak fills the deadly silences" was eerily appropriate as it abandoned recording crooners in favor of excited electrons in vacuum tubes, although Dave Tompkins notes that, ironically, "the randomness of SIGGRUV opposed the nature of Muzak's ambience and repetition."[40] Muzak had gone from manufacturing regularity to manufacturing the unpredictable.

The *New York Times* had seen in the World's Fair Voder a triumph of industry over academia. "College professors who still cherish the wrong idea about industrial research[ers] look upon them as hirelings whose sole function it is to make money for their corporation employers," it gloated, "but here they are *hearing* [italics added] with a thoroughness and success never before even remotely matched."[41] In wartime, vocoder development joined an acoustic arms race that encompassed communication, radar, and weapons. An imprisoned Alexander Solzhenitsyn worked on vocoder research for the Kremlin at Marfino in 1949. Stalin's vocoder was ultimately cribbed from Bell Labs using equipment confiscated from European sound technology manufacturers like Philips, a Dutch company whose postwar keyboard building is the focus of chapter 3.[42]

Remarkably, German vocoder development shades seamlessly from and back into organ building (the musical kind). In the early 1930s, both Siemens and the Heinrich-Hertz-Institut für Schwingungsforschung, under the direction of Karl Willy Wagner, were developing vocoders. (The Institute's associated Staatliche Akademische Hochschule für Musik was where the Trautonium had been developed.) Wagner's employees included Fritz Sennheiser, founder of the famed audio equipment firm, and physicist Oskar Vierling. Vierling invented several significant keyboards at Hertz: the Electrochord electric piano in collaboration with Miessner (perhaps before Miessner concluded that the piano was only second best), and two electronic organs, including the three-manual *Kraft-durch-Freude-Grosston-Orgel*, which used vacuum tube oscillators (Figure 9).[43] This instrument was performed at the opening ceremony of the 1936 Berlin Olympics, where the large *Olympiaglocke* bearing the German imperial eagle clutching the Olympic rings (a bell that will

[38] Tompkins, chap. 2.
[39] Ibid.
[40] Tompkins also notes that another code name for SIGSALY was "the Green Hornet," after the radio serial whose Theremin theme used Rimsky-Korsakov's "Flight of the Bumblebee." Unintentionally, "the Green Hornet code name was actually a vocoder being called a theremin…the first and only double-crossing of the two devices."
[41] "My God, It Talks," *New York Times*, January 7, 1939, 7.
[42] Tompkins, chap. 3.
[43] *Kraft durch Freude* (Strength through Joy) was a large state leisure organization in Nazi Germany and became the world's largest tourism operator in the 1930s.

reappear in chapter 4) was also rung for the first time. In 1942, Vierling established his own classified Laboratory Feuerstein for speech privacy research. A week after Victory in Europe Day, Turing followed intercepts of vocoded test transmissions to Feuerstein, and the lab was later raided by the Allied Target Intelligence Committee (TICOM). TICOM allowed the lab to continue its research into vocoders, acoustic torpedoes, a Speech Stretcher, and the like, but Vierling was arrested in August.[44] Although his career would recover, his contributions to music history ended then.

Figure 9. Joseph Goebbels fingers Oskar Vierling's Kraft-durch-Freude-Grosston-Orgel at the 1936 Grossen Deutschen Rundfunkausstellung (Great German Radio Exhibition) (Source: "El día anterior…", *A quo delirio* [blog], April 13, 2013, http://www.orlansilva.com/2013_04_01_archive.html)

However, fellow Hertz scientist Harald Bode enjoyed a lengthy career spanning three generations of electronic music and claiming over thirty patents in Europe and North America. His Warbo Formant Organ (1937) foreshadowed later limited-polyphony synthesizers, and his touch-sensitive Melodium organ was showcased with the Berlin Philharmonic Orchestra. Adapting to the wartime shortage of materials, he disassembled his Melodium to build the Melochord organ (1947), which was featured regularly on Munich Radio; the Cologne Electronic Music Studio special-ordered one in 1953. Bode entered more conventional organ building in 1950 with a series of Polychord electronic organs, and upon his emigration to the U.S., he joined the famed Estey Organ Company for six years. His career culminated in influential work for Wurlitzer and Robert Moog.[45]

The acoustic arms race ended along with the war, but innovations on the vocoder took on a new significance in the entertainment industry. The wartime dissolution of the organ interface into massive SIGSALY terminals proved irreversible. Instead of producing speech from scratch, Dudley's next vocoder-based invention, the Sonovox, received and recreated human speech, and was thus actuated by vocal cords instead of keys. Dudley's demonstration at the 1939 Acoustical Society of America meeting included removing the pitch content of a singing voice. Vocal operation was returned from bodily extremities to the vocal tract, and musicality became just another optional speech parameter. This spelled the end of the careers of the female Voder virtuosi, and the organ interface was returned to the realm of men, even as women were advertised as the best behind-the-scenes precision manufacturers of pipe organs (Figure 10). Pioneering electronic musician Wendy Carlos (formerly Walter but, as a woman, able to have a closer link to her Voder predecessors), synthesizer inventor Robert Moog, and the band Kraftwerk would all develop innovations on

[44] Tompkins, chap. 8.
[45] Douglas E. Bush, "Bode, Harald (1909-1987)," in *The Organ: An Encyclopedia*, 70-71.

Dudley's artificial speech research. Today, the vocoder is best known as an accessory for electronic music—a musical instrument baptized by fire in the military-industrial complex.

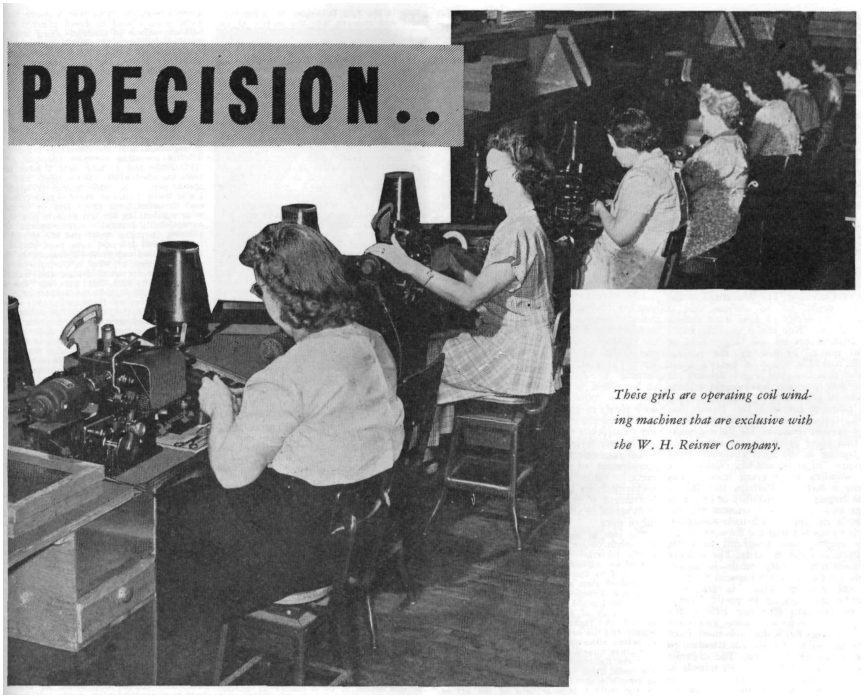

Figure 10. Excerpt from a full-page advertisement in the *Diapason* (September 1, 1951) for the W. H. Reisner Manufacturing Company, Inc. The advertisement declares that "through the years, the Reisner Company has sought to eliminate all possible human error in the manufacture of its electrical action parts for the pipe organ," seemingly implying that the women pictured are superhuman manufacturing automata.

As the foregoing history has shown, the Voder was not so much a "wartime interlude" as a key episode in the development of the organ interface at the hands of engineers. The next chapter will survey organ builders who emerged from the military-industrial complex in the second half of the twentieth century, but for now it is best to return to another crucial organ building development of the 1930s.

The organ underwent dramatic transformations over the course of the twentieth century thanks to its conceptual basis as a sound generator interface that offers minute control over frequency and timbre. It thus became the first instrument to be mass-produced as an electronic synthesizer. The Hammond Clock Company began producing its eponymous electronic organs in 1935, and by 1936 claimed to have sold 567 organs to churches and funeral homes.[46] Total sales within the first three years numbered around five thousand. Instead of pipes, the organ used small rotating electromagnetic discs, one per note, and added higher overtones by "borrowing" other tone-wheels via drawbars; these overtones, whose volume could be controlled, were tempered and did not quite correspond to the natural harmonic series.[47]

[46] Advertisement by Hammond Clock Company in the *Diapason* (August, 1936).

[47] Thaddeus Cahill's Telharmonium (1906) also used rotating tone wheels, but each tone generator with its fundamental and seven overtones was as tall as a grown man. The entire instrument required thirty boxcars for transport. Its use of telephone wires, which were ill suited to carrying musical sound and needed to prioritize phone calls, to distribute its music also contributed to its failure. It is fascinating, however, that these early regular electronic organ broadcasts were

Two court cases tested the electronic organ. In Germany, Ahlborn-Orgeln successfully resisted demands that it rename its instrument from *Orgel* to *Elektrium*, but not without sustaining damage from the highly critical book *Das Elektrium: Beiträge zur Klärung der Frage Orgel-Orgelimitation* (1964), in which Wolfgang Adelung proposed that people were exceedingly protective of the pipe organ because it sounded like the human voice in church—in other words, like the soul—the most sacred of musical sounds.[48] (His comment was of course inspired by the *vox humana* and not by the Voder.) Decades earlier in America, the Federal Trade Commission sued Hammond in 1936 over its right to claim that its instrument equaled the musical capabilities of pipe organs for a fraction of the cost; the case hinged on a blind test where listeners were asked to distinguish between a Hammond organ and a pipe organ.[49] Remarkably, the very nature of the pipe organ as a kind of additive synthesizer allowed it to be manipulated during the test so that lay listeners could not tell the instruments apart. After serving as the prototype for early synthesizers, the pipe organ was quickly overcome by its own simulacrum, and the legal system was enlisted to patrol the resulting demilitarized zone. Alfred Reichling's essay "Kopie-Reproduktion-Imitation" for *Das Elektrium* even accused the electronic organ of carrying out an "illegal border crossing" (*eine unzulässige Grenzüberschreitung*).[50]

Figure 11. Advertisement (reprint) for the Hammond Organ in the *Diapason* (January 1937) (Source: Records of the Federal Trade Commission, "Respondent's Exhibits - 2930," Docketed Case Files 1915-43, box 2002, RG 122, National Archives)

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sent over a system designed for human voices, in light of the organ's long relationship to vocal sound. Cahill used keyboard master switches to connect the musician to telephone reproducers, basically setting up the organ interface in front of phone technology.

[48] "Aber auch ein Grund dafür, daß sich die Orgel über Jahrhunderte hindurch trotz mancher zeitweiliger Anfeindungen im kirchlichen Raum gehalten hat, ist die Ähnlichkeit ihrer Klangerzeugung mit der der menschlichen Stimme, die ja den obersten Rang In der gottesdienstlichen Musik einnimmt. Beider Klang entsteht durch (komprimierte) Luft, das πνεύμα (pneuma = Atem, Wind), mit dem Im übertragenen Sinne auch die menschliche Seele bezeichnet wird" (Wolfgang Adelung, "Das gegenwärtige Verhältnis der Orgel zu Ihren Imitationen (Elektrien)," in *Das Elektrium: Beiträge zur Klärung der Frage Orgel-Orgelimitation* [Berlin: Verlag Merseburger, 1964], 14).

[49] United States of America before Federal Trade Commission, Docket No. 2930 in the matter of: Hammond Clock Company: Complaint, Feb. 1937.

[50] Alfred Reichling, "Kopie-Reproduktion-Imitation," in *Das Elektrium*, 27.

On Trumped-Up Charges of "Reverse Simulation"

The Hammond Organ gained its renown at the hands of popular music keyboardists like Fats Waller, its first great jazz proponent, who used its apparent sonic faults to fashion a signature new jazz sound. The lineage continued with Count Basie, Ethel Smith, and Matthew Fisher in "A Whiter Shade of Pale" (1967) to Barbara Dennerlein's virtuoso MIDI-enhanced footwork; the instrument became central to jazz, R&B, rock, reggae, and even progressive rock. The Hammond was defined so well as an instrument in its own right that when its artifact "key click" onset was removed, popular demand led to its reintroduction; the Hammond started to remediate older versions of itself. Contrary to popular belief, however, the Hammond started not in bars or clubs at the hands of its early African-American innovators. It began its life in churches and homes, for mostly white musicians and listeners. The threat that its electric tone-wheels posed to pipe organs led in less than two years to a legal complaint filed against the Hammond Clock Company, as it was then known. Laurens Hammond, who had invented the instrument with John M. Hanert and consulting church organist W. L. Lahey, was summoned before the FTC to face charges that advertisements for his popular instrument were making false claims about its comparable quality and superior value relative to pipe organs.

Figure 12. Full-page advertisement for the Hammond Organ as a solution to "your organ problem" in the *Diapason* (September 1, 1936) (Source: Records of the Federal Trade Commission, "Respondent's Exhibits - 2930," Docketed Case Files 1915-43, box 2002, RG 122, National Archives)

The proceedings of this federal trial, held from 1936 to 1937, offer an exceptionally early outline of electronic music debates that continue to this day: musical elitism versus democratization, the relationship between empirical sonic data and subjective aesthetic judgment, and conflicting attitudes towards sound synthesis and simulation. A close reading of the trial briefs and exhibits, held at the National Archives and Records Administration (NARA) in Washington D.C., and an examination of Hammond's advertisements will show how federal judicial proceedings, as much as commercial demand, pushed the Hammond Model B Organ out of the spaces of institutions and domestic interiors, and into the vernacular spaces of popular music.

The court was deeply concerned with the meaning of sound "synthesis" as an "organic" process, and furthermore with the moral dimensions of electronic emulation. The proceedings lay a discursive basis for a legal conceptualization of electronic instruments that is based as much on

visualizing the physical measurements of sound as on hearing sound, that locates proof of aesthetic experience in empirical data, and that privileges the expert ear over the consumer's ear. However, the FTC's final ruling stopped just short of deciding the underlying question of whether synthesized instruments can (or theoretically might) fully emulate or replace their referents. And both sides seemed to miss the fundamental paradox of the pipe organ—that the FTC's critique of the Hammond could be applied to pipe organs themselves because the pipe organ provided the conceptual basis of additive synthesis.

On September 6, 1936, the Hammond Clock Company of Chicago was served a notice to appear on October 30 before the FTC in Washington. The company had achieved instant commercial success, selling 2,666 organs and generating $2.3 million in sales. Its customer base included an impressive variety of churches, mortuaries and cemeteries, universities, and private residences of automotive industry moguls, as well as the odd synagogue, U.S. battleship, and Indian Maharajah (Table 1). Its list of professional musician buyers was none too shoddy: George Gershwin, Max Steiner, Serge Koussevitsky (who was "delighted" with the Hammond's role in the Boston Symphony Orchestra's performance of Liszt's "Faust" Symphony),[51] and the London Royal Opera House, to name a few. The affordability of the Hammond had allowed it to achieve commercial success that began with churches but quickly expanded into the realm of entertainment: restaurants, skating rinks, radio stations, and Hollywood studios.

Table 1. Examples of Hammond Organ customers presented in respondent exhibit. A significant number of private residences with Hammonds belonged to Detroit automive industry moguls. (Source: "Memoradum Regarding Nature of Hammond Organ Customers," Records of the Federal Trade Commission, "Respondent's Exhibits - 2930," Docketed Case Files 1915-43, box 2002, RG 122, National Archives)

Examples of Hammond Organ buyers as of May 8, 1937
1,131 churches, including a 1200-seat Catholic church in Paris and 10 synagogues
272 mortuaries and cemeteries
108 schools and colleges, including the Cincinnati Conservatory of Music, the U.S. Naval Academy, Boston University College of Music, Waldenwoods School of Sacred Music, and Kobe College (Japan)
24 music teachers and conservatories, including Jesse Crawford (famed theater organist and later Hammond advocate)
6 opera houses and auditoriums, including the San Francisco Opera Association, Hollywood Bowl, and London Royal Opera House
51 radio stations
4 film producers: Paramount Pictures, MGM Studios, Columbia Pictures, Vitaphone Studios
8 composers, including Max Steiner, George Gershwin, and Sigmund Romberg
18 orchestra conductors, including Serge Koussevitsky
29 professional musicians and organists
14 theaters
71 hotels, restaurants, and ballrooms
21 skating rinks
23 hospitals
28 fraternal organizations
800 individuals for their private residences, including Mrs. Max Dreyfus (wife of arranger, songwriter, and president of Chappell & Co., then the world's largest music publishing firm), Errett Lobban Cord (American transport mogul), Mrs. Walter Ansel Strong (wife of former *Chicago Daily News* owner and publisher), Henry Haven Windsor, Jr. (editor of

[51] "Opinion testimony on a matter of art, especially of music, is an unreliable guide," Brief for Respondent, p. 85, RG 122, National Archives.

Popular Mechanics), Mrs. D. P. Hoover (wife of Hoover Company vice president), Sir Yeshwant Rao Holkar (Maharajah of Indore), and American automotive leaders and inventors Vincent Hugo Bendix, Carl Breer, Charles T. Fisher, Charles Franklin Kettering, William Knudsen, and M. L. Pulcher
3 military installations: The U.S.S. Saratoga, the U.S.S. Henderson, and the U.S. Submarine Base at Groton, Conn.

The FTC's complaint centered on Hammond's advertising. It accused Hammond of falsely claiming that the instrument superseded the pipe organ for a fraction of the cost (with its "infinite variety of tones" that produced "real organ music"), that this "deceptive, misleading and false" advertising hurt pipe organ builders engaged in interstate trade (hence the federal intervention), and that sorting out the truth of Hammond's claims was a matter of public interest. The FTC list of disputed claims included:

> the Hammond "produces the entire range of tone coloring necessary for the rendition, without sacrifice, of the great works of classical organ literature";
>
> "an infinite variety of tones, covering the flute, diapason, string, and reed families, are instantly available to the organist";
>
> "its introduction means that real organ music of unbelievably beautiful quality is now possible in any home at an expense no greater than that of a good piano";
>
> "many organists agree that it is comparable to pipe organs which cost as much as $10,000."[52]

Laurens Hammond (represented by Williams, Bradbury, McCaleb & Hinkle) adopted an initial legal strategy of arguing for an objective, scientific basis for his aesthetic claims. In doing so, he sealed his own fate. "The questions of artistic and esthetic opinion are supported and endorsed by a wide and typical variety of expert musicians [whose judgment] can be verified by scientific demonstration," he insisted, but his ill-chosen scientific proof consisted of using an oscilloscope to display the electrical current before it activated the tone-wheels. "The sound or tones had been short circuited in his pictures," the trial attorney criticized, and the silent demonstration of the organ's electrical input rather than its sonic output impressed no one.[53] In response, the Commission (represented by William T. Kelley, Chief Counsel, William T. Chantland, trial attorney, and Bryan A. Jacques, attorney) recruited a professor of physics and acoustics to measure and compare the overtones of pipe organs and Hammond organs. It was hoped that this scientific data would corroborate the subjective opinions of the witnesses called to testify against Hammond. Having proposed the use of empirical data as evidence instead of hewing to theoretical arguments, Hammond would find it increasingly difficult over the course of the trial to defend his advertising claims.

University of Texas at Austin physics professor Dr. Charles Paul Boner was the perfect expert witness. Having started playing organ at the University Baptist Church in 1921, he was conducting research on the physics of traditional and experimental organ pipes and with his students had constructed a large organ in the Physics Building, on which he gave popular recitals and recorded in theater organ style for local radio show "Organ Reveries." He developed a UT program in architectural acoustics and became internationally known for the acoustic design of auditoriums,

[52] Records of the Federal Trade Commission, "Docket No. 2930, in the matter of: Hammond Clock Company," Docketed Case Files 1915-43, box 1998, "Complaint," pp. 2-3, RG 122, National Archives.
[53] "The '30 Tests'," Brief of Attorneys for the Commission, p. 46, RG 122, National Archives.

consulting on some eight hundred buildings and the design of many organs. (During the upcoming war, his career would take on national importance, beginning with sonar research at the Harvard Underwater Sound Laboratory for which he won multiple military awards, establishing a UT Defense Research Laboratory for naval ordnance after the war, and advising Washington on Cold War atomic energy issues.)[54] His influence will return in chapter 2, for organ builder Otto Hofmann studied with Boner before igniting a new phase of the Organ Reform Movement.

Boner brought his newfangled "tonal analyzer" to produce the requested evidence. Much as the dial on a radio allowed one to tune in to different wavelengths, the dial on the tonal analyzer allowed one to tune in to a particular frequency in a signal and observe its amplitude. Thus one could isolate each overtone of a given pitch. By analyzing pipes made by Wicks (and later by Kimball and Reuter) and the corresponding Hammond sounds in the home of organ designer and former New Jersey Senator Emerson Lewis Richards, Boner found that organ pipes in the diapason, string, and reed families all contained significantly more overtones than the Hammond's corresponding stops (Figure 13). He elaborated on this finding repeatedly in his testimonies.

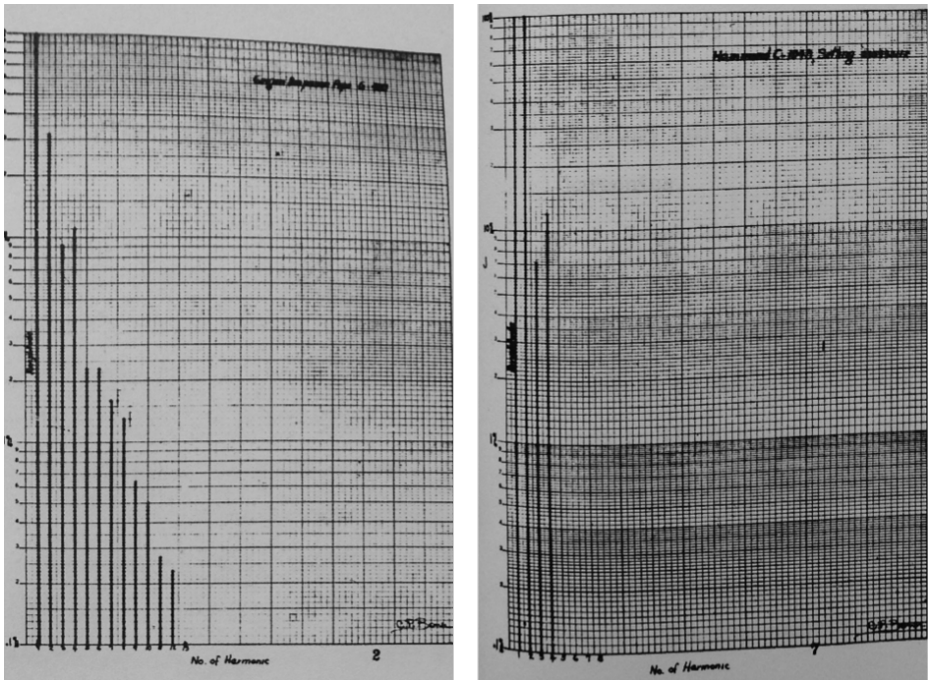

Figure 13. Charles Boner's charts comparing the spectra of an organ pipe's sound (left) and corresponding Hammond tone (right). Note that the pipe produced thirteen overtones measurable by Boner's tonal analyzer, while the Hammond spectrum displays only four frequencies. (Records of the Federal Trade Commission, Appendix No. 4, "Docket No. 2930, in the matter of: Hammond Clock Company," Docketed Case Files 1915-43, box 1998, RG 122, National Archives)

His result was hardly surprising. The Hammond Organ operated on the principle of what is now commonly known as *additive synthesis*: its seven tone-wheels generated sine waves at the frequency of the fundamental and first six partials. After the sixth, there was nothing more to measure. Boner became one of the rare critics of organ interfaces when he complained that "if [the

[54] Melvin Oakes, "In Memoriam: Charles Paul Boner," *University of Texas at Austin Physics Department History*, accessed 26 July 2015, https://web2.ph.utexas.edu/utphysicshistory/UTexas_Physics_History/Charles_P._Boner.html.

Hammond] had 30 or 40 drawbars nobody but an octopus could play it."[55] The Commission conceded that an organ's flute stops resembled sine tones, and therefore could be convincingly simulated by electronic means.[56] However, diapason and string stops were especially overtone-rich, and thus Hammond's sweeping claims that the product made "an infinite variety of tones, covering the flute, diapason, string, and reed families" were patently false.

The evidence produced by the tonal analyzer was purely visual, so Laurens Hammond changed his tune. His attorney argued that *listening* to the Hammond Organ could provide the only form of admissible evidence, while representations of sound were effectively illegible because human auditory perception was still poorly understood. Raw overtone data could not be interpreted meaningfully because of the ear's varying sensitivities to different frequencies. In a demonstration of the inadequacy of visual data, Boner was shown the overtone chart of an unspecified sound. He could not determine "whether it was a musical sound, a desirable sound, or not."[57] The defense trumpeted that "the professorial mind is undoubtedly prone to analyze a problem in such minute detail that it loses sight of the broad general principles… [Boner] has collected a mass of data which he admits he cannot interpret in terms of what the ear hears."[58] No amount of scientific evidence was sufficient to contradict sensory experience, and the machine ear of the tonal analyzer lacked the cognition processes that would link it to human perception.

Hammond's attorney extended this epistemological line of reasoning to argue that legislating aesthetic judgment, which was subjective and constantly changing, was absurd and no business for legal proceedings. To demonstrate the changeability of musical taste, he asked witness Mr. Burhman, a professional organist, "All organists say that the Bach Chorales are good music, don't they?"

"I would not say that they do, no," he replied.

"Then there is some disagreement on that point?"

"Some of them are too dumb to know," he responded in exasperation.

"All organists would accept Widor's Toccata as good music, would they not?"

"I would not. It is just a lot of noise to me."

"Well, you consider Handel's Concerto good music!"

"I would not, but other organists that are even at the top rank think they are fine. Marcel Dupré is playing one of the things today on his concert tour, but I would not listen to it…. I know a lot of [organists] would not put Widor's Toccata on their recitals today, although they would have done so fifteen years ago."

"So that it [sic] is a matter that changes with time!"

"Everything improves with time."[59]

What counted as "real," and what counted as "good," seemed murky at best. If beauty were to be legislated, it would limit future art to imitation. Reviewing the FTC brief today, one is struck by the colorful and seemingly arbitrary metaphors used by witnesses to describe the tonal color of

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[55] "Dr. Boner's Testimony in Rebuttal," Brief of Attorneys for the Commission, p. 85, RG 122, National Archives.

[56] A sine tone is a pure tone with a sinusoidal waveform that consists of a single frequency. Sine and cosine waves are the most basic building blocks of more complex waves. Pure sine waves are not found in nature, and the first one was created by Hermann von Helmholtz using the "Helmholtz siren."

[57] "The Evidence in This Case Divides Itself into Two General Categories, the Auditory Tests Furnish the Only Basis for a Correct Decision," Brief for Respondent, p. 29, RG 122, National Archives.

[58] Ibid., 33.

[59] "The registration used by Porter Heaps in playing the pipe organ during the Thirty Selection Test was a satisfactory registration," Brief for Respondent, p. 69-70, RG 122, National Archives.

organ stops: Humpty Dumpty, Cats and Dogs, Harmonics Screaming Disapproval, Muddying of the Waters, Falsely Prophetic, Lifeless Corpse, Burps, Icing on Cake, Like a Tomato, and mystifyingly, Onions.[60] The futility of basing a legal decision on such testimonies does give the trial a hint of the surreal.

Even as machine ears were disqualified from the proceedings, neither could all human ears command respect. The opposing sides sought to frame the debate in terms of elitism and democracy.[61] While Hammond argued that laypeople should provide testimony, the Commission argued for the sole use of expert musician witnesses. The trial attorney quoted prominent organ composer Leo Sowerby's critique of the "hooty, monotonous, and lifeless" instrument in *The American Organist* magazine:

> The danger to the supremacy of the organ…is the fact that many clergymen and members of the church music-committees have so little knowledge of music or of the organ itself as to be easily misled into thinking that this instrument is actually serviceable as an organ. I have heard it used to accompany services, particularly as an accompaniment for congregational singing. We have but little sense of what is fitting or consistent if we build beautiful churches, in which we make use of age-old liturgy, and adorn it with the music of the great masters, and then are content to attempt to assist in God's praise with such an instrument as this![62]

This unwitting flock did not know any better, and perhaps sang the worse for it. A similar critique in the magazine dismissed the validity of congregational approval of the "electrotone" organ.

> A man in defending himself for praising an electrotone instead of an organ for his church, replied, when taken to task for it: "We have made exhaustive investigation and find there are as many people willing to praise it as to condemn it." To which the proper reply is that we can also find as many people willing to praise beer as to praise the church. It is not the number of people consulted about any subject but their fitness to be consulted."[63]

The experts agreed: Electronics did not just simulate—they *dis*simulated.

The defense's rebuttal attacked antiquated organ elitism. His attorneys portrayed Laurens Hammond as an "inventive genius"[64] and paragon of the "old-fashioned individualism upon which this country was founded and upon which it achieved the most rapid progress known to the history of the world" as he strove to democratize an elitist art.[65] "The pipe organ is held in reverence as the 'King of Instruments'," he warned, highlighting the feudal nature of the nickname. "Due to the majestic tones which emanate from an organ, the organist obtains a superiority complex as to his art and as to his instrument. Pipe organs are traditionally the most high priced of musical

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[60] "Opinion testimony on a matter of art, especially of music, is an unreliable guide," Brief for Respondent, pp. 86-87, RG 122, National Archives.

[61] See Paul Théberge's incisive critique of the much-touted power of synthesizers to "democratize" music making in *Any Sound You Can Imagine* (72-73).

[62] Leo Sowerby, *The American Organist* (January 1936), quoted in "Argument: Expert Opinion Testimony," Brief of Attorneys for the Commission, pp. 51-52, RG 122, National Archives.

[63] *The American Organist* 22, no. 4, 1939, quoted in FTC.

[64] "Epilogue," Brief for Respondent, p. 127, RG 122, National Archives.

[65] Hammond's attorneys also recounted how the demonstration of the Hammond Organ at the U.S. Patent Office on April 24, 1934 created a "real furore of excitement and enthusiasm," attracting clerks, examiners, commissioners, and officials from throughout the building ("Foreward," Brief for Respondent, pp. 1-2, RG 122, National Archives).

instruments…organ music could be played only by the select few."[66] Why call on such delusionally biased experts bent on maintaining the Old World status quo, when 2,666 customers offered commonsense evidence of the Hammond's affordable emulation abilities? The defense was even able to quote a report from the Subcommittee on Technology to the National Resources Committee on "Technological Trends and National Policy," in which Congress was informed that the electronic organ was "a recent achievement of our electrical research laboratories" and "may mark the beginning of mechanization of many of our other musical instruments." In fact, "it has already revived interest to a very marked degree in [a] hitherto expensive, and one might almost say declining, branch of musical art."[67] The defense concluded that it was time to replace the sacred sublime of the church organ with the technological sublime of the Hammond:

> If any organist were to set up a different one of these 263,000,000 different possible combinations on the Hammond organ every five minutes and did this for eight hours every day throughout the year, it would take him about 7,500 years to try out all of the different combinations![68]

Yet the Commission pressed onward and upward from the authority of experts into the realm of Christian morality. Its rhetoric grew impassioned as it argued that the Hammond's imitative nature "debauched"[69] and even "prostituted"[70] a sacred instrument to unwitting "churchmen naturally incline[d] towards faith in their fellowman."[71] This equation of synthesis and simulation machines with female promiscuity, however, gave way to what would prove the trial's unusual central metaphor. The "synthesis" in "sound synthesis" came to be interpreted literally and organically, to the point that it was understood in terms of food and drink—and not just beer, cake, tomatoes, and pungent onions.

Richards, the former Senator who made a comfortable living as a lawyer, was a witness carefully selected to side with the FTC and subjected to nearly three days of cross-examination. He had designed the Atlantic City Convention Hall organ, the largest in the world based on number of pipes (about 33,112), built by the Midmer-Losh Organ Company from 1929 to 1932. When Hammond first attempted to produce scientific proof of his advertising claims, Richards dismissed physical measurements of sound as "largely a matter of baloney to us. We are interested in music; we are not interested in tearing the tone apart electrically to see what it is made of."[72] Employing a sausage metaphor, he argued that both synthesis and its lack were meaningless, and analysis merely did violence upon musical sound. But as the trial attorney coopted Hammond's evidentiary approach, the proceedings grew deeply concerned with defining musical sound in measurable terms. Explications of the physics of sound dominate the trial attorney's brief. He argued that an effectively

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[66] "The Testimony of Witnesses Was Biased for a Readily Explainable Reason," Brief for Respondent, p. 40, RG 122, National Archives.
[67] Subcommittee on Technology, "Technological Trends and National Policy," submitted at the Seventy-Fifth Congress, First Session, House Document no. 360 (June 1937), 320.
[68] "It Is True That With the Hammond Organ 'Any Tone That Is a Sustained Tone Can Be Produced On This Marvelous Instrument'," Brief for Respondent, p. 101, RG 122, National Archives.
[69] "Conclusion," Brief of Attorneys for the Commission, p. 96, RG 122, National Archives.
[70] "Effect of Rebuttal Testimony," Brief of Attorneys for the Commission, p. 90, RG 122, National Archives.
[71] "Sales Methods," Brief of Attorneys for the Commission, p. 92, RG 122, National Archives.
[72] "Professorial Scientists Frequently Fail to Understand the Meaning of an Innovation, or to Realize Its Economic and Sociological Effects," Brief for Respondent, p. 35, RG 122, National Archives. This distrust for the ivory tower and Boner's "pettifogging criticism" (38) compounded the image constructed of Laurens Hammond as a self-taught inventor.

synthesized sound must include all of the overtones of its referent sound, no matter how many. Perhaps because physics seemed too dry, food metaphors were served up to make it digestible. Richards about-faced from the baloney accusation and compared Hammond's tone-wheel synthesis to chemically analyzing a tomato, then assembling and mixing those elements to try to produce a tomato. "The elements simply do not synthesize," he concluded, as if Hammond were expecting an organ(ic) creature to slouch out of a sea of primordial frequency goop. The trial attorney extended this organic metaphor to drinking cocktails:

> If you wanted to drink a Martini cocktail, you would drink it as the bartender made it. You would not drink the gin first, the vermouth next, the melted ice next, and wind up by sucking the lemon peel last. That is just about what you are compelled to do with the Hammond, try to taste and swallow the various separate ingredients before they are mixed, i.e., take the ingredients separately into your music tasting apparatus, which is your sensitive hearing organs, and then, therein, try to make yourself believe that they are one fused tone. *In an organ pipe you receive into your ears a musical cocktail already completely blended from its various ingredients and harmonics*.[73] [italics added]

The "martini testimony" offered sound as a liquid solution, partials as liquors, and listening as a form of imbibing or consumption. It would indeed be unpleasant to consume a tomato or a martini in its component parts. Fortunately for Hammond, our vocabulary for isolating and describing component tastes is no better than it is for timbres. Hammond replied that "the cocktail analogy is excellent… the individual harmonic ingredients are *measured and mixed together electrically* and emerge from the instrument as one sound."[74] Summoning the metaphor of electrical currents and flows, he argued that "mixing" happened prior to perception.

But the food testimonies proved so effective in characterizing sound synthesis as failed alchemy (or at least as a terrible bartender) that the (frankly mediocre) defense attorneys had to struggle: the Hammond Clock Company "was not selling deleterious drugs; it was not making claims of impossible cures; it was not selling adulterated food,"[75] they insisted against continuing accusations that Hammond "was selling poison advertised and labeled as 'sugar'."[76] The trial attorneys had successfully coopted Hammond's recanted argument that a measurable reality undergirded his advertising claims, and then produced damning charts of discrete overtones. To top it off, they used a metaphor of liquid, taste, and healthy ingestion to reintroduce subjective judgment to the interpretation of this data. *Taste* was the arbiter of sound quality judgments—why, just as Hammond had said.

I would like to juxtapose this trial with Emily Thompson's work on the Edison Company's Tone Tests. These publicity events, staged from 1915 to 1924, challenged audiences to differentiate between a concealed live singer (almost always female) and a recording of that singer. Thompson's history reveals that changing definitions of audio "fidelity" and "real music" were constructed by the very technologies they purported to evaluate.[77] Similarly, the Hammond case hinged on blind listening tests to be carried out at the Riverbank Acoustical Laboratories directed by Walter Sabine, a

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[73] "Brief of Attorneys for the Commission," p. 15, RG 122, National Archives.
[74] "There Are Numerous Specific Misstatements in the Trial Attorney's Brief," Brief for Respondent, p. 113, RG 122, National Archives.
[75] "Foreward," Brief for Respondent, p. 4, RG 122, National Archives.
[76] "The Trial Attorney's Brief," Brief for Respondent, p. 109, RG 122, National Archives.
[77] Emily Thompson, "Machines, Music, and the Quest for Fidelity: Marketing the Edison Phonograph in America, 1877-1925," *The Musical Quarterly* 79, no. 1 (1995): 131-171, doi:10.1093/mq/79.1.131.

key player in Thompson's history of architectural acoustics and listening who had used organ pipes to do acoustic measurements.[78] At Hammond's audacious suggestion, his invention was instead pitted against the massive $70,000 Aeolian-Skinner organ at the University of Chicago's Rockefeller Chapel. This great American symphonic organ was renowned for orchestral stops like the string stops and French horn. He brought in organist Porter Warrington Heaps, a former pupil of Marcel Dupré, who had achieved fame—and notoriety—for being the first organist to systematically explore the Hammond's musical possibilities and publicly introduce the instrument in a New England church service on June 23, 1935. Heaps' career would continue to feature electronic organ spectacles, culminating in the 1949 Chicagoland Music Festival, where he gathered fifty-three electronic organs to perform together in Soldier Field.[79]

The "auditor-witnesses," all conductors or organists, heard Heaps perform fifteen brief selections on both the Skinner and the Hammond (Table 2). After hearing each selection twice, they guessed on which organ each had been performed. They chose correctly more often than not, casting doubt on Hammond's claims that the instruments were indistinguishable. Still, Hammond protested the results on two counts. First, as professional musicians, the witnesses detected certain "tip-offs, which are not of a musical character," such as the surround sound of the Skinner relative to the Hammond's loudspeakers, the variability of the Skinner's tremulants and out-of-tune pipes relative to the Hammond's precise tremulant and tuning, and the Hammond's quicker attack (part of the attack-decay-sustain-release or ADSR envelope model of a synthesized musical tone, in which the attack defines how quickly the sound reaches full volume after a key is depressed).[80] He claimed that neither spatialization, vibrato, tuning, nor envelope were elements of sound synthesis, a claim that the FTC would ultimately reject, citing attack and spatialization as key synthesis components.

[78] In making a larger argument about the development of acoustic architecture, Emily Thompson notes that Sabine worked with organ pipes. For the acoustic design of Boston Symphony Hall, he developed a formula that related expected reverberation to the total surface area of materials in a room. He did so by traveling to acoustically successful concert halls, analyzing their surfaces, and performing a series of reverberation tests with an organ pipe.

[79] Porter Heaps later claimed that he too had questioned Laurens Hammond's focus on marketing to churches. He recounted that when Laurens demanded that a Chicago radio station stop broadcasting performances of popular music on its Hammond Organ, he urged Hammond to make selling instruments his main objective, without regard to the repertoire being played on them. (James Welch, "Porter Heaps Versatile 20th-Century Organist," *The American Organist* 24, no. 6, June 1990: 84-86)

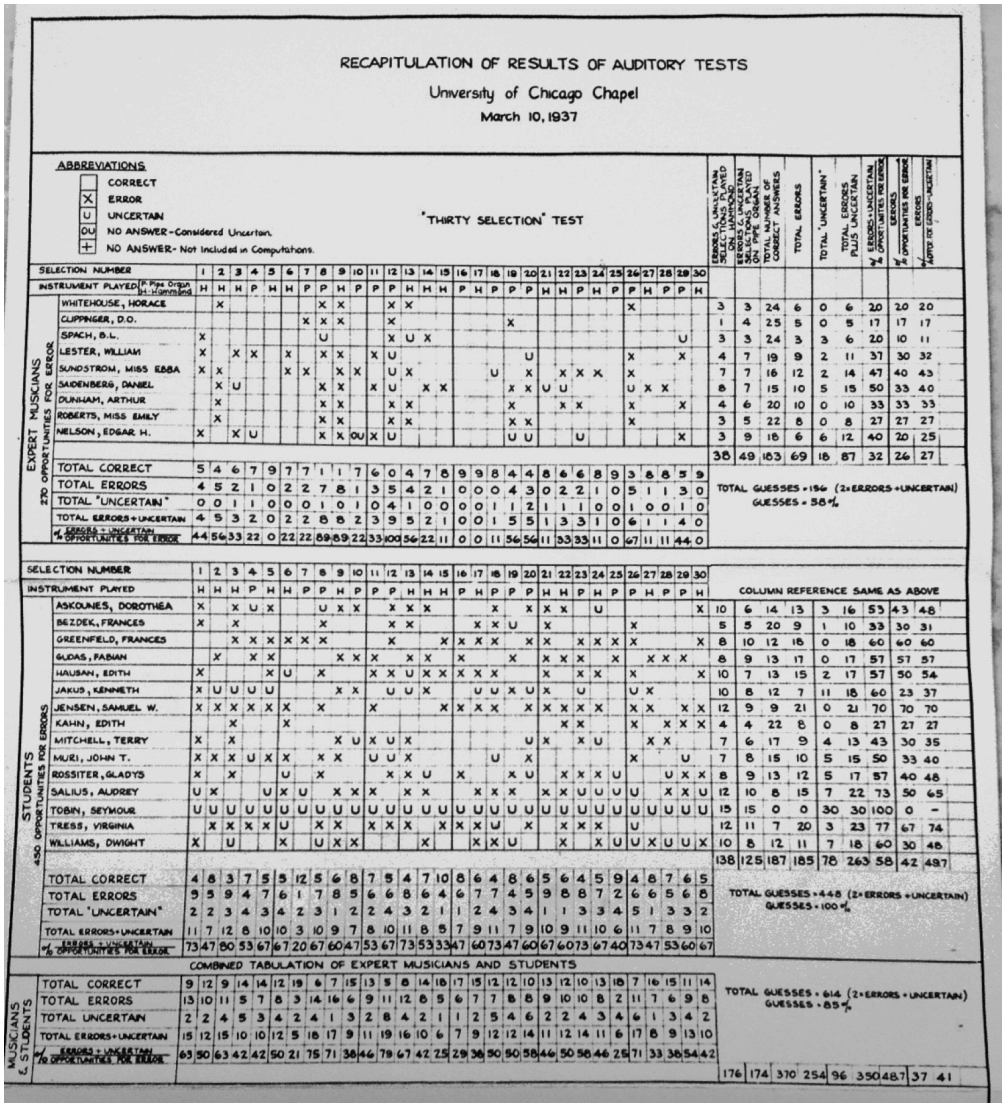
[80] "The 'Thirty Selection Test'," Brief for Respondent, p. 47, RG 122, National Archives.

Table 2. Repertoire examples from the auditory tests conducted at Rockefeller Chapel, the University of Chicago. (Source: Records of the Federal Trade Commission, Appendix Nos. 1 and 6, "Docket No. 2930, in the matter of: Hammond Clock Company," Docketed Case Files 1915-43, box 1998, RG 122, National Archives)

Combined repertoire from the blind listening tests, with titles given as printed in the FTC brief
Bach – Chorale 98
Demarest – Sunset
Mendelssohn – Sonata 2
Dvorak – Largo, *New World Symphony*
Hymn 411 – Alleluia
Mendelssohn – Wedding March
Hark the Herald Angels Sing
Tchaikovsky – Largo, 5th Symphony
Dubois – Grand Offertory
Schubert – Impromptu
Bossi – Chant du Soir
Mendelssohn – Nocturne
Borowski – Suite #1
Boëllmann – Chorale and Piere, *Suite Gothique*
Handel – Concerto
Widor – Andante, 4th Symphony
Borowski – Meditation, Suite #1
Mark Andrews – Sonata
Franck – Piece Heroique
Dubois – Grand Chorus
Schubert – Unfinished Symphony
Tchaikovsky – Andante, 6th Symphony
Wagner – Wedding March, *Lohengrin*

Secondly, Hammond objected, "if there is such 'public interest,' it certainly would have been proper to have representatives of the general public take the tests."[81] Emphasizing the nature of music as commercial entertainment subject to a separate set of aesthetic standards, he stated that "music is a commodity designed for the consumption primarily, not of experts (who simply manufacture the commodity), but of the great rank and file of the listening public."[82] A University of Chicago English class took the "Thirty Selection Test" the next evening. To his relief, their success rate was not much better than chance. (Figure 14)

[81] "The Real Meaning of the Results of the Thirty Selection Test," Brief for Respondent, p. 56, RG 122, National Archives.
[82] "Foreward," Brief for Respondent, p. 19, RG 122, National Archives.



RECAPITULATION OF RESULTS OF AUDITORY TESTS

University of Chicago Chapel

March 10, 1937

ABBREVIATIONS

CORRECT

X ERROR

U UNCERTAIN

OU NO ANSWER-Considered Uncertain.

+ NO ANSWER- Not Included in Computations.

"THIRTY SELECTION" TEST

EXPERT MUSICIANS 270 OPPORTUNITIES FOR ERROR

SELECTION NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
INSTRUMENT PLAYED (P. Pipe Organ In Hammond)	H	H	H	P	H	H	P	P	H	P	P	P	H	H	H	P	H	P	P	P	H	H	P	H	P	P	H	P	P	H
WHITEHOUSE, HORACE		X						X	X			X	X													X				
CLIPPINGER, D.O.						X	X	X				X							X											
SPACH, B.L.	X							U				X	U	X															U	
LESTER, WILLIAM	X		X	X		X		X	X		X	U							U						X		X		
SUNDSTROM, MISS EBBA	X	X				X	X		X	X		U	X				U		X			X	X	X	X					
SAIDENBERG, DANIEL		X	U					X	X		X	U		X	X				X	X	U	U			U	X	X			
DUNHAM, ARTHUR		X						X	X			X	X						X			X	X		X		X			
ROBERTS, MISS EMILY		X						X	X			X	X						X	X					X					
NELSON, EDGAR H.	X		X	U				X	X	OU	X	U							U	U			U					X		

TOTAL CORRECT	5	4	6	7	9	7	7	1	1	7	6	0	4	7	8	9	9	8	4	4	8	6	6	8	9	3	8	8	5	9
TOTAL ERRORS	4	5	2	1	0	2	2	7	8	1	3	5	4	2	1	0	0	0	4	3	0	2	2	1	0	5	1	1	3	0
TOTAL "UNCERTAIN"	0	0	1	1	0	0	0	1	0	1	0	4	1	0	0	0	0	1	1	2	1	1	1	0	0	1	0	0	1	0
TOTAL ERRORS+UNCERTAIN	4	5	3	2	0	2	2	8	8	2	3	9	5	2	1	0	0	1	5	5	1	3	3	1	0	6	1	1	4	0
% ERRORS+UNCERTAIN / % OPPORTUNITIES FOR ERROR	44	56	33	22	0	22	22	89	89	22	33	100	56	22	11	0	0	11	56	56	11	33	33	11	0	67	11	11	44	0

TOTAL GUESSES = 156 (2×ERRORS+UNCERTAIN)
GUESSES = 58%

STUDENTS 450 OPPORTUNITIES FOR ERRORS

SELECTION NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
INSTRUMENT PLAYED	H	H	H	P	H	H	P	P	H	P	P	P	H	H	H	P	H	P	P	P	H	H	P	H	P	P	H	P	P	H
ASKOUNES, DOROTHEA	X		X	U	X			U	X	X		X	X	X				X		X	X		U							X
BEZDEK, FRANCES	X		X					X				X	X				X	X	U		X					X				
GREENFIELD, FRANCES			X	X	X	X	X	X			X			X		X	X	X		X	X		X	X	X	X			X
GUDAS, FABIAN		X		X	X				X	X	X		X	X		X			X		X	X	X		X		X	X	X	
HAUSAN, EDITH	X				X	U		X			X	X	U	X	X	X	X	X			X		X	X		X				X
JAKUS, KENNETH	X	U	U	U	U				X	X		U	U	X			U	U	X	U	X		U			U	X			
JENSEN, SAMUEL W.	X	X	X	X	X	X		X			X				X	X	X	X		X	X	X	X	X		X	X		X	X
KAHN, EDITH			X			X																X	X			X		X	X	X
MITCHELL, TERRY	X		X						X	U	X	U	X							U	X		X	U			X	X		
MURI, JOHN T.	X	X	X	U	X	X		X	X		U	U	X					U		X						X			U	
ROSSITER, GLADYS	X		X			U		X				X	X	U		X			X	U			X	X	U			U	X	X
SALIUS, AUDREY	U	X			U	X	U		X	X	X		X	X			X	X	X		X	X	U	U	U	U		X	X	U
TOBIN, SEYMOUR	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
TRESS, VIRGINIA		X	X	X	X	U		X	X		X	X	X		X	X	U		X			X	X			U				
WILLIAMS, DWIGHT	X		U			X		U	X	X				X			X	X	U			X		X	U	U	X	U	U	X

TOTAL CORRECT	4	8	3	7	5	5	12	5	6	8	7	5	4	7	10	8	6	4	8	6	5	6	4	5	9	4	8	7	6	5
TOTAL ERRORS	9	5	9	4	7	6	1	7	8	5	6	6	8	6	4	6	7	7	4	5	9	8	8	7	2	6	6	5	6	8
TOTAL "UNCERTAIN"	2	2	3	4	3	4	2	3	1	2	2	4	3	2	1	1	2	4	3	4	1	1	3	3	4	5	1	3	3	2
TOTAL ERRORS+UNCERTAIN	11	7	12	8	10	10	3	10	9	7	8	10	11	8	5	7	9	11	7	9	10	9	11	10	6	11	7	8	9	10
% ERRORS+UNCERTAIN / % OPPORTUNITIES FOR ERROR	73	47	80	53	67	67	20	67	60	47	53	67	73	53	33	47	60	73	47	60	67	60	73	67	40	73	47	53	60	67

	138	125	187	185	78	263	58	42	487
COLUMN REFERENCE SAME AS ABOVE	10	6	14	13	3	16	53	43	48
	5	5	20	9	1	10	33	30	31
	8	10	12	16	0	18	60	60	60
	8	9	13	17	0	17	57	57	57
	10	7	13	15	2	17	57	50	54
	10	8	12	7	11	18	60	23	37
	12	9	9	21	0	21	70	70	70
	4	4	22	8	0	8	27	27	27
	7	6	17	9	4	13	43	30	35
	7	8	15	10	5	15	50	33	40
	8	9	13	12	5	17	57	40	48
	12	10	8	15	7	22	73	50	65
	15	15	0	0	30	30	100	0	-
	12	11	7	20	3	23	77	67	74
	10	8	12	11	7	18	60	30	48

TOTAL GUESSES = 448 (2×ERRORS+UNCERTAIN)
GUESSES = 100%

COMBINED TABULATION OF EXPERT MUSICIANS AND STUDENTS

MUSICIANS & STUDENTS

TOTAL CORRECT	9	12	9	14	14	12	19	6	7	15	13	5	8	14	18	17	15	12	12	10	13	12	10	13	18	7	16	15	11	14
TOTAL ERRORS	13	10	11	5	7	8	3	14	16	6	9	11	12	8	5	6	7	7	8	8	9	10	10	8	2	11	7	6	9	8
TOTAL UNCERTAIN	2	2	4	5	3	4	2	4	1	3	2	8	4	2	1	1	2	5	4	6	2	2	4	3	4	6	1	3	4	2
TOTAL ERRORS+UNCERTAIN	15	12	15	10	10	12	5	18	17	9	11	19	16	10	6	7	9	12	12	14	11	12	14	11	6	17	8	9	13	10
% ERRORS+UNCERTAIN / % OPPORTUNITIES FOR ERROR	63	50	63	42	42	50	21	75	71	38	46	79	67	42	25	29	36	50	50	58	46	50	58	46	25	71	33	38	54	42

	176	174	370	254	96	350	487	37	41

TOTAL GUESSES = 614 (2×ERRORS+UNCERTAIN)
GUESSES = 85%

Figure 14. Combined results of the auditory tests conducted on expert musicians and on University of Chicago students who were presumed to have a passing acquaintance with organ music through attendance at Rockefeller Chapel. (Records of the Federal Trade Commission, "Docket No. 2930, in the matter of: Hammond Clock Company," Docketed Case Files 1915-43, "Brief for Respondent," box 1998, RG 122, National Archives)

Unfazed, the trial attorney turned the "Thirty Test" into a question of simulation rather than identification. As in orchestration, the art of playing the organ involves knowing how to build traditional combinations of stops called "choruses." Heaps was accused of planning "perverted registration[s]" on the Skinner organ weeks in advance to render it unrecognizable, with witnesses citing the registrations given in specific editions of music to prove the organist's deception.[83] The trial attorney alleged that the "respondent's trick organist-employee" used the loud and tubby "Flauto mirabilis" flute stop on the Skinner to drown out the overtone-rich French horn, which was a difficult sound to synthesize, during the Andante of Tchaikovsky's Fifth Symphony.[84] Moreover, Heaps closed all three swell boxes during the Handel Organ Concerto, dimming the higher

[83] "The '30 Tests'," Brief of Attorneys for the Commission, p. 64, RG 122, National Archives.
[84] Ibid., 58-59 and 71.

frequencies of the mutations and reeds to resemble the frequency range of the Hammond, and anyway did not touch sixty-three of the Skinner's stops.[85] And the Hammond was played primarily with flutes, whose sine-wave-like nature was easiest to synthesize. That the respondent refused to have a chromatic scale played on the Hammond was seen as the final straw.

Back in the courtroom, trial examiner Horner questioned Richards, "Then you mean that the pipe organ simulated the Hammond organ, and not the Hammond organ reaching the qualities of the pipe organ?"

"This is correct, if your Honor please," he confirmed.[86]

It was this "reverse simulation" that the trial attorney framed as prostitution and debauchery. The results of the student listening test were meaningless and even immoral, because the sacred real and the commercial simulation had been swapped. Thompson observed that Tone Test performers were chosen who could consistently give performances that sounded like their own recordings. Therefore, the concept of high-fidelity recorded sound was a constructed one—the concept was constructed through the comparison that was supposed to prove its existence. Traversing the permeable boundary between vocal sound and organ sound, we see that Heaps similarly used the symphonic Skinner organ—designed to imitate the orchestra—to instead imitate an imitation of itself, the Hammond. Like Edison's new consumers, the college students had been taken in.

It was a risky call for the trial attorney to put imitation center stage. Although the mediocre defense never argued it this way, Hammond had demonstrated in Rockefeller Chapel that imitation was not a quality (or vice) inherent to his invention, but rather, inherent to the American orchestral organ itself. ("American orchestral organ" here refers to the symphonic instruments popular in the early twentieth century.) The Commission was already biased against the Hammond as a machine to be pigeonholed with phonographs and radios rather than instruments: its brief misquoted Hammond's advertising that "any sustained tone can be produced on this marvelous instrument" as "any sustained tone can be *re*produced [italics added] on this marvelous instrument."[87] (The respondent was quick to object that the Hammond did not reproduce, nor was it akin to phonographs and radios, and therefore was a "real" instrument.) Ironically, the Commission *also* criticized the Hammond renditions of the Skinner "viole d'orchestre" and French horn stops, failing to notice that Skinner and other American pipe organ builders had designed these stops to evoke "real" referents. "[Our] organ in the Capitol Theatre is designed to be a substitute for the orchestra in the truest sense," Ernest M. Skinner wrote in the early 1920s. "The French Horn, English Horn, Clarinet, 'Cello, Oboe are all exactly duplicated."[88] Today, a look at the Thirty Test shows that such orchestral imitations were necessary to much of the era's pipe organ repertoire: works by Dvorak, Tchaikovsky, Schubert, Wagner…all transcriptions, another type of copying. Consider that the *vox humana* stop had been prized for imitating the human voice since at least the late Renaissance. The organ is always already simulating, but Hammond's apparent crime was to offer a simulation once removed.

In fact, the pipe organ itself was the world's first device for additive synthesis, which builds sounds by adding together waveforms that are usually harmonically related. The Gothic organ was of

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[85] Ibid., 74.
[86] "Argument: Expert opinion testimony," Brief of Attorneys for the Commission, p. 36, RG 122, National Archives.
[87] "It Is True That With the Hammond Organ 'Any Tone That Is a Sustained Tone Can Be Produced On This Marvelous Instrument'," Brief for Respondent, p. 100, RG 122, National Archives.
[88] "Resources are as ample as those of the finest symphony orchestra": "The Capitol Theatre Organ, Boston, Mass.," *Stop, Open and Reed* 1, no. 4 (1922).

the Blockwerk type, composed of inseparable ranks of pipes. It had only one sound, the full or plenum sound popularly associated with the organ today, and lacked the stops that by the late fifteenth century would allow the organist to break the plenum into discreet sonorities and play them alone or in various combinations. Each key of the Blockwerk organ activated a fixed set of principal and flute stops at different pitch levels—fundamental, octave, fifth, and so on up, usually called eight-foot, four-foot, and two-foot stops in reference to the physical dimensions of the pipes. Hammond's method of stacking sine waves corresponding to the harmonic series neatly mirrored this method of plenum sound production.[89] Admittedly, each of the component ranks of a pipe organ's plenum had its own overtones, making its sound more rich and complex, but the conceptual basis was shared. The Hammond wasn't new—it was an electronic Blockwerk. However, Boner's charts and the trial attorney's seductive sensory language equating synthesis with flavor blinded the FTC to the similarity, leading to incorrect comparisons:

> How utterly the Hammond misses out on nearly one-half of the necessary harmonics, when compared with only the 8', 4' and 2' stops, which "a pipe organ of any size whatsoever always has."[90]

A further irony of the trial was its origin. Although not formally listed, one of the complainants that initiated the suit was Wicks Organ Company, inventor of the popular Direct-Electric Action and Direct-Electric Windchest—for which Boner worked as occasional consultant, and which claimed to have lost $200,000 of business to Hammond in less than two years.[91] Wicks' electrical actions eliminated the traditional limitations on wind pressure and arrangement of the pipes, but would eventually come in for critique in the increasingly historically informed 1950s for their "absence of intimate connection between player and organ, lack of control over pipe speech, and voicing problems caused by lack of tone channels," issues debated hotly in the pages of *The American Organist, The Diapason,* and *Organ Institute Quarterly.*[92] A company whose business it was to electrify the pipe organ was being defended against the electronic organ.

Victory belonged to the accusers. On July 9, 1938, the Federal Trade Commission issued a cease and desist order to the Hammond Clock Company forbidding it from making the advertising claims cited about variety of tone color, "real" organ music, and relative monetary value. The only successfully synthesized sound would be a sound that contained all overtones measurable in the acoustic referent, regardless of whether those overtones were within the range of human perception (in effect validating Boner's electronic ear). Crucial to the history of music technology, however, is that the FTC limited its remarkably farsighted complaint only to the present limits of science and technology:

> That a musical sound can be synthesized either electronically or by other means is a theory that has not been proven, nor has that result been achieved by any means yet known to science….Counsel is not wise enough to

[89] The Telharmonium was another early analog example of electronically driven additive synthesizers.
[90] "Argument: What the Tonal Analysis Tests Prove," Brief of Attorneys for the Commission, p. 27, RG 122, National Archives.
[91] "Public Interest and Injury to Competitors," Brief of Attorneys for the Commission, p. 95, RG 122, National Archives.
[92] John Sperling, "Windchest, Direct-Electric," *The Organ: An Encyclopedia*, 636.

> predict what its possibilities are for the future, nor is the Commission's complaint drawn on that basis. It has to do with representations made as to the instrument as the time the complaint was written.[93]

So the FTC chose to leave the elephant in the room—the legitimacy of electronic instruments was left to the market to decide, and if necessary, a future court could address the question when sound synthesis technology had fulfilled its potential. The Hammond Organ's status as a "musical instrument" and, more fundamentally, as an "organ," remained untouched, but Hammond would have to put its publicity department to work.

Although the ruling generated a murmur of negative press for the company, entrepreneurial Laurens Hammond transformed it into a triumphant vindication. On July 13, the *New York Times* reported the ruling and the reasoning behind it, but the next day, a *Times* article "Sees Use of 'Organ' Vindicated" quoted Laurens Hammond that the FTC had "vindicated the company in its designation of this instrument as an 'organ'." Semantics are, after all, the real basis of public outreach. The fact that Hammonds could be called organs, although never actually questioned in the first place, became a new promotional tool to sell the instruments based on ideas of authenticity—precisely what Hammond had been trying to do all along. Hammond in fact doubled down, changing his company's name to Hammond Instrument Co. and later to Hammond Organ Co. But the injunction to avoid certain marketing comparisons with pipe organs, as well as the increasing anxiety about protecting liturgical music from mechanization, encouraged Hammond to pursue another market: popular music.

Religious anxieties about electronic music were becoming increasingly inconvenient for Hammond. Even the trial attorney's concluding statement was rife with righteous indignation:

> When such sweeping claims are made, respondent assumes for its child the fullest obligation to enter the holy places alongside the organs of the great cathedrals and churches of the world in Europe and America, and there to produce the *Messiahs*, the *Hallelujah* choruses, the processionals and recessionals in all of their varied awe-inspiring original grandeur and solemnity. This instrument becomes a pretender to the kingly heritage of the most regal and most ancient of complete musical instruments…. No longer can or should respondent be left to foist upon church committees or others with uncertain musical attainments, under high pressure salesmanship this musical maverick, (suited, if for anything, chiefly for the jazz and night clubs), as an instrument capable of producing the classical pipe organ music of great composers without sacrifice of quality.[94]

Electronic music belonged not in high "holy places" but downtown in "jazz and night clubs," and he noted with alarm that Hammond was taking the hint. Hammond "fell from his high Olympus or Parnassus of devotion to the 'artistic and esthetic' in the musical art…into the mart of commercialism…He boasted of his instrument's fitness for night clubs and dancing, and added, 'And I am pursuing that course personally, to make money, I am betting on the forte attack as being more popular in the end'."[95] This prescient statement foreshadowed how that quick attack, the non-musical "tip-off," would become part of the signature Hammond sound.[96]

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[93] "Description of Instruments" and "The Mechanical Tonal Analysis Tests," Brief of Attorneys for the Commission, pp. 16 and 21, RG 122, National Archives.

[94] "Conclusion," Brief of Attorneys for the Commission, pp. 98-99, RG 122, National Archives.

[95] "Brief of Attorneys for the Commission," p. 5, RG 122, National Archives.

[96] Interestingly, the question of attack resurfaced nearly three decades later in the 1964 German case against Ahlborn-Orgeln, which argued that the electronic organ's fast attack was only suitable for dance music. The case against Ahlborn likewise noted its lack of comparable overtone richness relative to pipe organs; while flute tones resembled sine waves, principal stops had richer spectra that could not be convincingly synthesized (Adelung, 15). Adelung also described blind

So it was the FTC that helped push the Hammond organ from churches and homes into spaces as symbolically distant as jazz and funk, from the white and often female performers shown in its advertisements (Figure 15) to the diverse and mostly male keyboardists who would make the instrument famous in popular music venues. Although Laurens Hammond had claimed that the fast attack did not count as a musical quality, it was that very aspect of sound synthesis that he successfully "betted" would forge a new secular identity for his instrument because of its suitability for syncopation, rhythmic playing, and fast tempi. In its first fifty years, the company sold over two million instruments, fulfilling the fate that Miessner had predicted for it in the modern age.[97]

From *vox humana* to Voder, from Gothic additive synthesis to a Hammond simulating a pipe organ, the organ and its interface present a *mise-en-abyme* of simulation. The infinite loop ran some cycles of absurdity, as acoustician, engineer, and organ builder Lawrence Irving Phelps noted in a prominent 1969 critique. "It seems the electronic inventors are finding it hard to know what to do next," he mocked, championing the craft-based, Baroque-facing Organ Reform Movement. "In America, they are now adding 'pipes' to resonate the sound produced by loudspeakers. In recent issues of *Instrumentenbau-Zeitschrift*, I have seen articles about two electronic instruments with rather elaborate cases. Next, they will try tracker action, and maybe even real wind."[98] Organs continued to provide the interface of choice for electronic music, from Edwin Welte's contemporaneous *Lichtton-Orgel* (1934-6), to Pierre Schaeffer's diary sketch for an organ based on gramophone turntables (1948), to toy manufacturer Mattel's Optigan (c. 1970).[99] That ouroboros-like history has since been lost from the English language.[100] From the mid-1970s, the electronic organ and keyboard synthesizer became similar enough that today's organ-like electronic keyboards are no longer called organs. However, they were developed with organ interfaces before they were rebranded; Rocky Mount Instruments offered samples of theater organs in its RMI Keyboard Controller (1974), one of the earliest polyphonic synthesizers, opting to name the instrument directly after its interface and discard the churchly associations of its electronic parent company, the Allen Organ Company. The incredibly varied uses of electronic organs ranged from church, jazz and pop, and light entertainment, to domestic music making and amateur engineering through "do-it-yourself"

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listening tests in which non-musical "tip-offs" such as loudspeaker distortion gave the Ahlborn organ away even to layman listeners (18). Although history does repeat itself, this strikingly similar case probably resulted from the boom in electronic organ building following World War II, when many German organs needed to be replaced and materials were scarce.

[97] The Hammond Organ did not entirely part from highbrow music, as German observer Karl Bormann noted during his 1963 organ tour of the U.S.: "Legal contradictions can live in American souls. In the neighboring family home with a Hammond-Elektrium [sic] I found collections of hymns and folk songs, the multicolored books of technically sophisticated Karg-Elert compositions and all kinds of 'Charakterstücke' with exact registrations for the Elektrium…People spoke knowledgeably of early music." ("Reiseeindrücke aus den USA Chicago, 31. Mai 1963," in *Das Elektrium*, 59.)

[98] Lawrence Irving Phelps, "Thoughts on the Future of the Organ," *ISO-Information*, *Journal of the International Society of Organbuilders* 1 (February 1969).

[99] Hugh Davies, "A History of Sampling," *Organised Sound* 1, no. 1 (1996): 3-11.

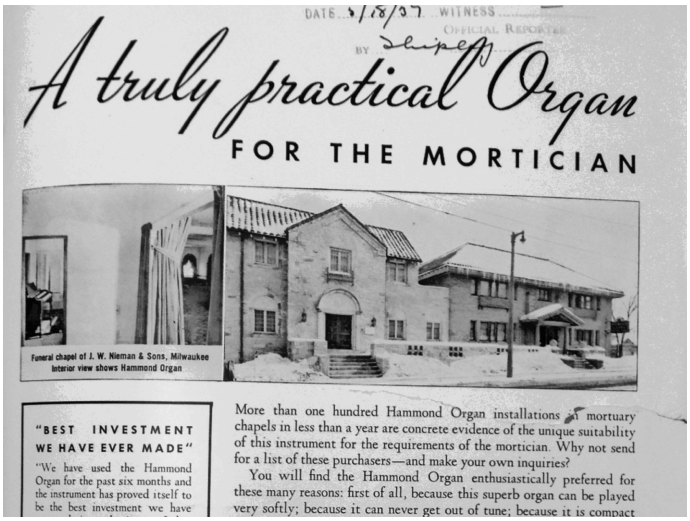
[100] Whether the organ has always imitated continued to be a question in Germany during the Ahlborn case. Walter Supper's chapter for *Das Elektrium*, "Mißverständnisse unserer Zeit," sought to refute claims based on the fifteenth-century writings of "der mißverstandene Praetorius" that the organ has always imitated: "Nicht selten wird das Elektrium als Imitation der Orgel damit verteidigt, daß selbst Michael Praetorius die Orgel als Imitation der andern lnstrumenta ausgegeben habe. Es sei an die oft zitierte Stelle seiner *Organographia* (1619) erinnert: 'Wiltu eine Trummel / Trummet / Posaun / Zinken ... etc. hören / so kannstu dieses alles ... haben: Also daß / wenn du dieses Instrument hast und hörest / du nicht anders denkest / du habest und hörest die andern lnstrumenta alle miteinander'." (*Das Elektrium*, 63)

assembly kits, appealing to home tinkerers from the 1930s to the present.[101] Even today's technology industry leaders, such as Microsoft Research scientist and composer Jaron Lanier and Dubai International Airport chief executive Paul Griffiths, are fascinated with their home organs as hybrid technical and musical manifestations of their interests.[102]

Figure 15. A young girl is shown playing the Hammond Organ in an unidentified magazine advertisement. (Records of the Federal Trade Commission, "Respondent's Exhibits - 2930," Docketed Case Files 1915-43, box 2002, RG 122, National Archives)

Some decades later, organist Virgil Fox would meet with withering disapproval from pipe organists for his massive electronic traveling organ, which he inaugurated at Berkeley High School's auditorium and which soon catapulted him to stardom. Today, simultaneous fascination and scorn amongst organists for Cameron Carpenter and his forty-loudspeaker International Touring Organ shows that the organ is still as sensitive an instrument as it was in Hammond's time. By the FTC's standards, the sampled sounds issuing from Carpenter's high-fidelity speakers count as legitimate equivalents to the organ. But in the end, this trial was never really about sound synthesis, and it never was about the law. It was about policing border crossings at the interfaces that Galloway termed "an 'agitation' or generative friction between different formats," ignoring the fact that "it is media all the way down."[103]

[101] An interesting direction for future research might be the relationship between organ, harpsichord, and clavichord DIY assembly kits and their relationship to other popular kits at the time, such as those for radios or for geodesic domes popular with the 1960s counterculture.
[102] Christine Negroni, "The Organist Behind Dubai Airport," *New York Times*, September 28, 2011, http://www.nytimes.com/2011/09/29/world/middleeast/the-musician-behind-dubai-airport.html.
[103] Galloway, 31.



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You will find the Hammond Organ enthusiastically preferred for these many reasons: first of all, because this superb organ can be played very softly; because it can never get out of tune; because it is compact

Figure 16. A typical full-page advertisement for the Hammond Organ, designed for publication in *Casket and Sunnyside* (May 1936) and *American Funeral Director* (June 1936). The FTC had tried to embalm the Hammond Organ as a liturgical dead end, but it was reincarnated in the realm of popular music. (Records of the Federal Trade Commission, "Respondent's Exhibits - 2930," Docketed Case Files 1915-43, box 2002, RG 122, National Archives)

PFEIFEN KLATSCHEN LACHEN: When the Avant-Garde "Burned the Organs"

Contemporary observers might have expected that electronic organs, like other well-remembered twentieth-century electronic instruments, would inspire new music from the avant-garde. In the *Journal of the Institute of Electrical Engineers*, G. T. Winch and A. M. Midgley wrote in "Electronic Musical Instruments and the Development of the Pipeless Organ" (1940) that "one of the most promising possibilities is the increased scope which will be offered to musicians in modes of expression. Present-day composers are striving to express new ideas, but with traditional musical instruments they are limited to the chromatic scale and the tone colours which are available and which have remained sensibly the same for many years."[104] They highlight the infinity of possible new tone colors and alternative temperaments possible with electronic organs, presenting R. H. M. Bosanquet's 1875 "generalized keyboard" enabling all temperaments as a model nearly five decades before Moog synthesizer pioneer Wendy Carlos would in *Computer Music Journal*.[105] Remarkably, Winch and Midgley believed that the limitations on new music for organ were purely an engineering problem, and that musicians were simply waiting to embrace these new technical features. They hardly imagined how firmly entrenched musical skills and sounds are against the adoption of new instruments, and how much resistance the church posed to experimental organ composition. Instead, observers had to wait until the fateful 1963 Radio Bremen concert for avant-garde composers to make pipe organs *sound* electronic—inventing a compositional style (inadvertently pioneered by Porter Heaps) that did not depend on the organ's style of construction at all.

[104]G. T. Winch and A. M. Midgley, "Electronic Musical Instruments and the Development of the Pipeless Organ," *Journal of the Institute of Electrical Engineers* 86, no. 522 (1940): 517-47. Research Laboratories at General Electric, Co. were used for preparation of the paper, showing how common the development of electronic organs was at electronics firms.

[105] Wendy Carlos, "At the Crossroads," *Computer Music Journal* 11, no. 1 (1987): 29-43.

The innovations of Darmstadt reached the organ slowly, sequestered as it was from experimentation in churches and homes, or busy with other innovations as it was in popular music.[106] By the 1960s, however, avant-garde composers were finally starting to explore the resemblance of the organ's sonic design and interface to additive synthesis and electronic keyboards, thereby completing the cycle of simulation. After decades of electronic instruments modeled after the organ, organ composition could now model the techniques of electronic music. In 1963, three groundbreaking organ works by Ligeti, Hambraeus, and Kagel were premiered—albeit as sound recordings broadcast by the Swedish Broadcasting Corporation.[107] Studying the watershed Bremen "concert" and its repercussions can deepen our understanding of the avant-garde's relationship to non-university-based new music institutions from radio stations to churches, the technical visual aesthetic of graphic scores, and how ideas about the body of the improvising organist clashed with the performance strictures of modernism and the disembodiment of sound synthesis.[108]

My analysis of Ligeti's *Volumina* will juxtapose its conceptual filtering basis with the performance of bodily effort and strain to understand how Ligeti used the organ to paradoxically reembody electronic music and to open an interpretive space for skilled keyboard improvisation within a precise visual score. As Martin Herchenröder fascinatingly recounts in "From Darmstadt to Stockholm: Tracing the Swedish Contribution to the Development of a New Organ Style," Ligeti's monumental first original organ work built on the additive synthesis and filtering concepts he had learned in the electronic music studio of Westdeutscher Rundfunk (WDR) and remediated with orchestral instruments in *Atmosphères* (1961). *Atmosphères* is scored for a large orchestra of eighty-eight players, each with a separate part. In the opening bars, marked *pp* and *dolcissimo*, each member of the fifty-six-person string section plays one note of a massive cluster traversing the space from E♭2 to C♯7. According to Richard Taruskin's description of the electronic music techniques underlying this non-electronic sound, the cluster

> is the closest equal-tempered approximation available to the electronic studio's white noise, the simultaneous sounding of the whole [audible] frequency spectrum. And Ligeti proceeds to modify the chord precisely the way (the only way) that white noise can be processed in the studio, by filtering it. Section by section the instruments drop out *morendo*, dying away by gradual decrescendo to silence, so as to avoid articulating the narrowing of the "bandwidth" until only the cellos and violas are left.[109]

A larger cluster arrives and then decays "into a kind of shimmer, in which all the instruments move from sustained tones to oscillations between two tones; but as the full cluster is maintained at all times, the apparent melodic activity produces no discernable change of pitch content. One is

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[106] See Hermann Busch and Martin Herchenröder's "The German-Speaking Lands" in *Twentieth-Century Organ Music* (2013), ed. Christopher S. Anderson, for a lengthier discussion of how the organ and organists remained isolated from experimental composers even after World War II.

[107] Martin Herchenröder, "From Darmstadt to Stockholm: Tracing the Swedish Contribution to the Development of a New Organ Style," in *The Organ as a Mirror of its Time: North European Reflections, 1610-2000,* ed. Kerala Snyder (New York: Oxford University Press, 2002): 303-21.

[108] In the 1950s and 1960s, electronic music studios at radio stations such as Westdeutscher Rundfunk (WDR), Radiodiffusion Française (RDF), and the Japan Broadcasting Corporation (NHK) provided the primary space for research and composition. It is telling that Radio Bremen supported organ composition rather than an electronic studio, yet ultimately premiered three electronics-influenced compositions.

[109] Richard Taruskin, "Chapter 4: The Third Revolution," in *Music in the Late Twentieth Century* (New York: Oxford University Press, n.d.), accessed 20 July 2015, http://www.oxfordwesternmusic.com/view/Volume5/actrade-9780195384857-div1-004011.xml.

reminded of what chemists call Brownian motion." Subsequently, Ligeti employs his micropolyphony technique, "tiny close-spaced canons that cannot be heard as such because of the pitch saturation, but which guide the composer's hand toward fashioning a typically shimmering texture." At rehearsal K, he slowly "broadens the bandwidth" of a small cluster by adding enclosing semitones. Ultimately, the piece dies away in the glow of piano resonance.

It would be a challenge to predict this initial band-pass filtering technique or any of the other sonorities emulating electronic music processes simply by looking at the score, which employs traditional notation without revealing the conceptual use of that notation as analog filter. Departing radically from that score, Ligeti foregrounded the electronic concepts underlying *Volumina* sonically *and* visually with graphic notation, making the organ-as-machine a yet more explicit metaphor than the orchestra-as-machine. The clean lines and diagrams of *Volumina*'s score explicitly charted frequency against time under a title evoking mathematical space.[110] Reminiscent of *Atmosphères*, *Volumina*'s startling four-limbed opening cluster (this time marked *ffff*) extends across the entire manual range and the upper octave of the pedals, indicated by a completely blackened staff. At rehearsal 4, the frequencies in the manuals are gradually filtered down towards a notch at about middle C, to disappear over the unchanging pedal. The filtering is clearly visible from the tapering of the black notation. At the climax that begins at rehearsal 36, a highly distorted three-dimensional "warp and weft" of wavy lines across the entire range of the manuals and pedals guides the organist in performing "quick, continuous, aperiodic, very dense, labyrinthine movement in irregular rhythms, with both hands over the entire range of the manuals. Also clusters ad lib. (with palm, arm, elbow)," at *fff* using "very loud registration." The result is surreally familiar, as if a scientist had put an impossibly sensitive microphone to the excited particles of Ligeti's micropolyphony. This immensely amplified Brownian motion sounds less like a shimmer than an aural assault. The work "dies away in a long, seemingly never-ending diminuendo of a sustained cluster after the fan motor has already been turned off," as Herchenröder vividly describes, performing the inhumanity of the synthesizer's potentially never-ending tones.[111]

It seemed that Miessner's dreams of an electronic organ had finally been fulfilled in an instrument that had existed all along. The pipe organ itself fulfilled his description of "a generator for periodic vibrations embracing the whole audio spectrum of frequencies [from which we are] able to select … at will any desired single frequency, or many single frequencies simultaneously, whether harmonically or inharmonically related, or whether in narrow or wide continuous bands."[112]

By this time, graphic notation had revealed a paradox in the avant-garde's proclamations. By requiring new interpretive skills, graphic scores seemed to return creative agency to the performer. John Cage used new graphic notations to represent chance-based compositions that seemed to relinquish the composer's agency entirely to random factors. However, Douglas Kahn has incisively critiqued Cage's hypocrisy: his pieces eliminated the performer's *and* composer's habits and training,

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[110] I employ the important but often overlooked distinction between place as referring to a specific physical locale and space as referring to a potentially more abstract area that may or may not have a physical basis in the world. Holly Watkins' argument in *Metaphors of Depth in German Musical Thought* (2011) that mathematical space serves as a contemporary metaphor for music theory can be applied to two of Ligeti's four 1960s compositions for keyboard, entitled *Volumina* and *Continuum*. As if to complete his project, the latter piece for harpsichord realizes the fourth electronic technique that Ligeti employed in *Atmosphères.* In *Bewegungsfarbe*, discrete sound events occur so quickly that they merge into a continuous sound.

[111] Herchenröder, 303.

[112] Miessner, 1462.

as evidenced by his precisely specified, tightly controlled, and cliché-intolerant graphic scores.[113] Taruskin highlighted this modernist disdain for musicians' deeply ingrained style- and instrument-specific skills when he wryly noted that Leonard Bernstein opened his 1964 Cage concert "with four 'improvisations' by the orchestra that elicited mainly Kreutzer études from the strings, fanfares from the brass, and 'Rite-of-Spring' arpeggios from the winds," missing Cage's point entirely. Tradition, training, and the building blocks of musical form were relics of the past; the graphic score was meant to enforce unpatterned chance.

This was the atmosphere in which Ligeti, Hambraeus, and Kagel wrote for organ. Historical conventions that relied on keyboardists' skills had been banished by the avant-garde, be they the fluid time of Louis Couperin's unmeasured preludes, the figured bass and the ornaments that required embodied motor memory and pattern recognition, or the *notes inégales* that relied on expressive judgment *and* tactile knowledge of rhythmic convention. However, these three composers experimented with the intense physicality of manipulating the organ to achieve new sounds, exemplified by the two-forearm cluster that announces *Volumina*. They connected with the organ in the embodied ways that had characterized these earlier notations. And thus *their* notations ushered back some of the musical skills that modernists had exiled.

Take for example Ligeti's score at rehearsal 37, before the blower is famously turned off mid-cluster, with the shocking effect that the organ dies away in an eerie whistle. The passage begins with a chromatic cluster held by the feet in the lowest depths of the pedals, and gradually ascends into the manuals on the next page. Within the ascent are smaller left-and-right movements (up-and-down in frequency terms) on the pedals during which the feet subtly change the width and pitch center of the cluster. Ligeti's notation, a thick, wavy line that snakes across the staff, is a variable thickening and timbral enrichment of a physical monophony. His system indicates pitch relative to the dimensions and positioning in space of the instrumentalist's body.

The aforementioned "warp and weft" notation looks like a grid beset by three-dimensional turbulence. Beyond the usual *x*- and *y*-axes, the turbulence introduces a *z*-axis of visual depth that the organist physically translates into internal cluster movement, resulting in a dramatic frenzy of flying limbs that becomes one of the piece's most memorable live spectacles, different every time. Like the opening of *Atmosphères*, this passage cannot be mentally sight-read for its music, in this case because it notates only the movements that produce sound, not the sound itself. One must learn the score with one's body to find out how it sounds. Thus the performer's unique physicality (Swedish organist Karl-Erik Welin's, at the premiere) is heard in the music—the width of his hands, the length of his forearms, even his shoe size—all audible in a way that is different for each musician. Via the sheer physicality of extended organ technique, Ligeti reintroduced the individual into the music at a time when avant-garde notation demanded mechanistically slavish realizations.

Recounting his reasons for composing for organ, Ligeti described the organ as a "gigantic artificial limb" with which he wanted to "learn to walk again."[114] Emboldened by *Atmosphères*, his graphic score for *Volumina* illustrates his use of the pipe organ to simulate electronic synthesizers and to use the organist's physical movements as a proxy for pitch content, creating a kind of cyborg via the organ interface where flesh meets the synthetic.

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[113] Douglas Kahn, *Noise, Water, Meat: A History of Voice, Sound, and Aurality in the Arts* (Cambridge, Mass.: MIT Press, 1999).

[114] György Ligeti, "Die Orgel sprengt die Tradition," *Melos* 33 (1966): 311.

With a mathematical title, scientific-looking score, and electronic-sounding output, *Volumina*'s visual, textual, and sonic sheen of modernity prompted a *Time* magazine journalist to pair Gerhard Zacher's recording of the work with the International Style furniture developed by designers like Le Corbusier and Gerrit Rietveld and with the sleek spaceship interiors of Stanley Kubrick's 1968 film *2001: A Space Odyssey*.[115] The journalist had replaced *Atmosphères*, famously employed in the soundtrack in place of Alex North's original score, with its even more electronic-sounding successor.

Time's comparisons to interior design seem to domesticate Ligeti's transgressive work (Figure 17). But it was the overall metaphor of modern technological convenience that linked the two. In 1964, Walter Supper had already written regarding the value of the Elektrium that new inventions require time to be judged good or bad. "The present does not always change for the worse," he mused guardedly. Praising the "manpower"-saving qualities of "the housewife's helpful resources like food processors, refrigerators, [and] vacuum cleaners," he put noisy household appliances in dialogue with electronic organ music.[116] Kubrick's sets, designed by Tony Masters, Harry Lange, and Ernie Archer, represented consumer fantasies of an effortless automated future lifestyle, and the organ was perfectly compatible with these visions. As early as 1929, the *Los Angeles Times*' showcase house of the future, the Villa Aurora, had featured a pipe organ amongst its modern household conveniences.

Figure 17. Futuristic interior design at Space Station V in *2001: A Space Odyssey* (1968). The station featured a Howard Johnson's restaurant and Hilton Hotel.

In a similar fashion, Bengt Hambraeus's *Interferenzen* foregrounded its experimentation with perceptual acoustics in its title and graphic score, and used the organ's unique ability to sustain tones in order to emulate synthesized sounds. Yet the demands it placed on the organ's wind supply often resulted in a continual fluctuation between electronic emulation and mechanical revelation of the instrument's lung-like sound source, moments in which the lifelike machine threatened its own reembodiment and vocalization. *Interferenzen* opens with a cluster in the manuals, covering the tritone between B4 and F5. Played on the ghostly "gap" registration of 16', 4', and 2' flutes (without the expected 8' in between), the sonority pulsates and shimmers with beats (periodic variations in volume) enhanced by the fluttering of the tremulant. These beats result from summing together unison and harmonically related frequencies that are slightly out of tune, and thus depend on the inexact tuning of non-electronic "tone generators" like pipes. In the second system, an unpredictably alternating F♯4 and D♭5 sound like electronic blips on a spinning radar against this pulsating sonority, which by this point has been filtered down into an open fifth. Subsequent interludes of

[115] "Music: The Organ as Synthesizer," *Time*, June 8, 1970, accessed October 26, 2011, http://www.time.com/time/magazine/article/0,9171,909337,00.html.
[116] Supper, *Das Elektrium*, 60.

distinct pitches and passages requiring intense winding, such as the *tutti* clusters on the second system of page 10, remind the listener of traditional finger-based performance and of the organ's "breathing," respectively, both pointing to the human element of the electronic-like sound.

The most embodied approach of all, Kagel's graphic score for *Improvisation ajoutée* employed dance notation, under a self-deprecating title that pointed simultaneously back to the organ's history of virtuosic improvisers and forward to the status of sheet music as a technical instruction manual that encoded the body of the organist in its symbols of feet, hands, and vocalizing lips. No longer was the score presented as the locus of the work itself; like Andy Warhol's seven-painting *Dance Diagram* series (1962), it instead suggested absent bodies and improvised movement while also evoking the instructional materials of modern life, from home appliance manuals to airplane safety cards. The whistling, singing, coughing, talking, laughing, and shouting required of the organist and two registrants, along with several dancers, gave physical presence to a normally hidden instrument.[117] By notating the noise of the action without pipe speech, Kagel even reembodied the interface by sounding the machine itself. The use of passages from *Improvisation ajoutée* in Kagel's 1968 experimental film *Hallelujah*, produced by Westdeutsches Fernsehen of Cologne in the same year that *2001* was released, further emphasized the relationship between organs and bodies.

Kagel was so keenly aware of the ample space that his graphic score left for improvisation that he issued a new edition six years later specifying performers' actions more clearly. The original score calls for two registrants doubling as vocalists. They constantly push and pull stops with enough autonomy that sometimes the organists' part is not heard because no wind is going to certain ranks of pipes. In a sense, these "added" performers are the stars, and the keys depressed by the organist function as containers for the exploration of un-notatable timbres, the core of the piece.

Like Ligeti, Kagel notated movement, but as an artist practicing across music, film, and theater, he adapted techniques from other arts. His compositional sketches began with serialist-inspired tables of all the permutations of stop combinations, and next a list of ten unorthodox ways to play the manuals. Only afterward did he develop textures and figures. The primacy of gesture evident in his sketches loaned itself to dance notation. Movements are shown for the right hand, left hand, and feet in the appropriate octaves step by step (Figure 18). The typesetting in particular calls to mind the ballroom dance notation in commercial manuals of the 1930s and 1940s that Andy Warhol was returning to the spotlight.

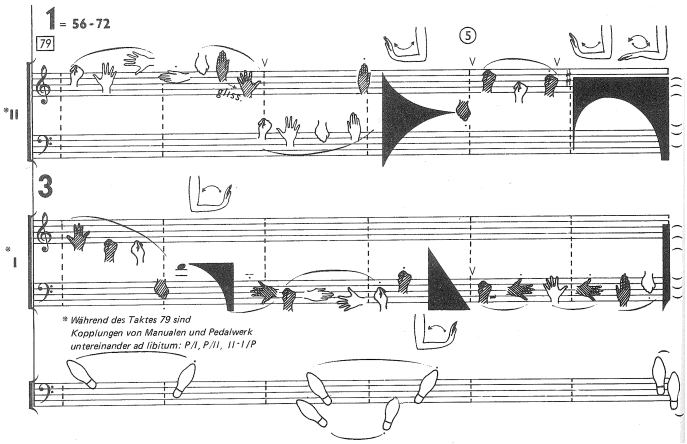

Figure 18. Measure 79 of Mauricio Kagel's *Improvisation ajoutée* (1968 revised edition).

[117] The organ keyboard and its player have traditionally been concealed in a loft in church or behind a partition.

Warhol painted his famous *Dance Diagram* series in early 1962, the same year that witnessed the Bremen premieres in May. Looking at these paintings is to experience incompleteness. Much as sculptor Patrick D. Wilson has argued for a category of furniture completed by the human body like the chair (one might even place musical instruments in this category), Warhol's paintings of numbered footsteps and movements outlined with arrows remind their viewers that dance notation is incomplete without moving bodies. I have watched museum visitors concentrate on these paintings and sheepishly shuffle their feet, unable to resist completing/performing the work. By taking instructional material as its content, the series seeks to undermine the idea of art for art's sake and to problematize the concept of notation itself, incomplete without a body to perform it. Kagel's score takes up that symbolism. However, his notations just as readily evoke the simplified illustrated aesthetic of contemporary technical manuals, eliding the body of the organist with the modern machine. Underlying every performance emphasizing human bodies is a conception of the organist as cyborg, using the organ to extend and enrich human vocalization and choreography.

Kagel further emphasized the primacy of the body through other media. *Improvisation ajoutée* is part of his 1969 television film *Hallelujah* with Gerhard Zacher at the organ (before *Time* associated Zacher with Kubrick). The film opens with an exposition of the human vocal mechanism that recalls the organ's windchest, and later realizes this parallel with choristers exerting their lungs to blow into organ pipes (Figure 19). Numerous bare feet play the pedals wildly in close-ups, and it is clear that the music is merely an outcome of movement rather than the goal that shapes movement. Finally, the hierarchy between registrants and organist is overturned as they forcefully use Zacher's arms to play. There is no score, only celluloid: vision and sound are the work itself. Because *Improvisation ajoutée* exists across multiple media, the score no longer has pride of place.[118] In its stead is the understanding that the breathing machine and human body are mirrors.

Figure 19. Performers blowing short, high-pitched organ pipes parade clockwise around a performer blowing a 4' pipe in Mauricio Kagel's experimental television film *Hallelujah* (1968). (Westdeutsches Fernsehen)

The subversion of such a staid old instrument made a rare avant-garde splash. On a spring day in 1962, Welin played a massive manual and pedal cluster on the Marcussen organ of the Göteborg Concert Hall. The opening of *Volumina* so strained the organ that multiple fuses blew, rendering the instrument unusable for the immediate future.

The Radio Bremen premiere concert, organized by the station's new music department, was just days away. The event had recently been expelled from its intended venue, Bremen Cathedral, because the church feared a scandal, and the plan to record in Göteborg and play back the recordings

[118] Schnebel quotes Kagel as writing in a letter that one of his intentions was "to destroy the conventional majesty of [all this] royal blah-blah" (Heile, 43).

for an audience in a room of the Swedish Broadcasting Corporation *qua* the world premiere had backfired when Welin pushed organ technology beyond its limits. Welin completed the recordings in two other Stockholm churches in time for the playback premiere, but rumors that "the avant-garde had made the organs burn" were flying.[119] Intensifying public interest, Welin performed the Bremen commissions repeatedly and made recordings. These works at last paved the way for other composers to experiment, and completed the twentieth-century cycle of pipe and electronic organs remediating each other. "My organ pieces are written for synthesizer," Karlheinz Stockhausen told Herchenröder with certainty.[120]

Radio Bremen's commissions used the organ to bring the body of the performer and the body of the machine together with the concepts, sounds, and illustrations of electronic innovation. In an odd convergence, practitioners of the Organ Reform Movement and historically informed performance came to speak of the best-crafted traditional tracker action keyboards as extensions of the keyboardist's fingers. The organ had passed from simulacrum to talking machine to a kind of living cyborg. I do not mean "cyborg" in its science fiction usage, but rather as Donna Haraway redefined it in "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century" (1991) when she observed that our use of electronics already made "cyborg" available as an identity for all who sought to fight social constraints on their self-definition—an invitation Walter Carlos had already taken in transitioning from a male to a female identity with her customized Moog synthesizer as her unchanging extension.[121]

[119] Herchenröder, 315.
[120] Ibid., 306.
[121] Donna Haraway, *Cyborgs and Women: The Reinvention of Nature* (New York: Routledge, 1991): 149-81.

Campanological Coda

At the outset of this chapter, I quoted one of Emily Dolan's proposed questions for a "musicology of interfaces": "Can we speak of canons of instruments just as we speak of canons of musical works?" The logic of reactionaries against electronic organs, who defend their selectively crafted canon of keyboard instruments, ignores the physical evidence that organs have throughout their history served as automata alongside playable instruments. The parallel history of the carillon brings this irony into sharp relief.

The engineers who sought to maximize human musical output by virtualizing the organ also took an avid interest in reducing the physical resources required for the carillon, that *other* keyboard instrument of architectural scale. The connection they saw has a history of several centuries. The earliest organ keyboards resembled and were played like carillon keyboards, and the earliest carillons were developed by clockmakers and organ builders in the Low Countries—the two main areas of expertise employed in inventing the Hammond at Hammond Clock Co. Influential French organ builder Aristide Cavaillé-Coll introduced the first carillon stop to his organ-building practice after 1878,[122] enabling organists to simulate automatic carillons in a genre of pieces appropriately named *Carillon*. And one of the standard demonstration passages for Hammond salesmen simulated bells (Figure 20).

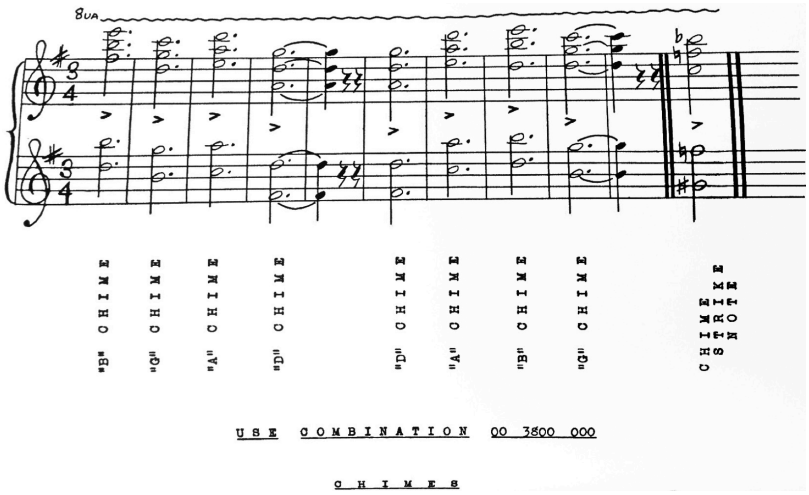

Figure 20. An arrangement of the Westminster Chimes for Hammond Organ in "Sales Instructions: Hammond Organ Percussion Effects," Bulletin No. 17 (Records of the Federal Trade Commission, "Respondent's Exhibits - 2930," Docketed Case Files 1915-43, box 2002, RG 122, National Archives)

[122] Cavaillé-Coll's carillon is a mixture stop found on secondary manuals (usually the Positif) that uses three wide-scaled ranks. Highly regarded examples may be found at St.-Ouen, Rouen and at St.-Etienne, Caen. Charles Mutin recommended that it be drawn with an 8' Bourdon and played staccato. (Jesse E. Eschbach, "Carillon," *The Organ: An Encyclopedia*, 93). Although Eschbach writes that it is "unclear" how Cavaillé-Coll would have encountered a concept of Dutch origin, the carillon was common in present-day northern France. Cavaillé-Coll visited French founder Amédée Bollée's carillon at 1878 Exposition Universelle in Paris and had a limited correspondence with him, but he had very likely encountered carillons long before. His travels in 1844 took him through Nijmegen, Haarlem, Utrecht, and Rotterdam in the Netherlands, all cities with fine Baroque Hemony and van den Gheyn carillons. When he arrived later in Birmingham, he described the action of the organ "as stiff as those made for carillons" (Douglass 187) to Callinet, but diplomatically elaborated to Utrecht organ builder Bätz that "the action is rather badly built and poorly installed" (188), so as not to insult his culture's main instrument of civic pride.

Miessner, having helped develop electronic carillons for Stromberg-Carlson, was perfectly aware that electronic keyboards existed along a continuum with mechanical ones, with no clean break. He carefully limited his article to a narrow definition of electronic instruments, excluding those that are electrically energized, "for then obviously we must discuss such well-known instruments as pipe organs with electromagnetic valve actions and electric blowers… organs with electric action, [and] carillons with electromagnetic hammers."[123] Some of those instruments, particularly electronic bells, had no keyboard and simply played themselves.

This chapter has argued that the distinction between pipe organs and electronic ones, though materially real, is in its discursive form largely a twentieth-century construction, and that the convergence that occurred during that century was implicit to the instrument. The circular historical relationships of the organ and carillon to musical automata are strikingly similar. Although electronic carillons were vociferously opposed by carillonneurs for taking away their rightful duty to give musically expressive human performances, the carillon actually originated as an automaton, and the "performances" of automatic drums to tell the time were often prioritized over human performances during the Baroque.[124] This type of mechanical recorded music produced live, not recorded, results, as Nick Seaver theorizes regarding the "re-enacting piano," Luc Rombouts regarding automatic carillons, and Jonathan Ambrosino regarding the player pipe organ.[125] It was the phonograph, Ambrosino argues, that changed the definition of recording to "an electronic reproduction of an encoded performance" heard through loudspeakers rather than from the instrument.[126] In that light, when the fully electric theater organ "took the qualities of the automatic barrel and band organs, tailored them to providing soundtracks for silent films, and put them back in the hands of live players,"[127] organ builders were mirroring the arc of the carillon's history in taking labor *away* from machines and assigning it to humans. In neither case could subsequent attempts at re-automation be accepted without a fight.

As grand instruments of the church, organs and carillons have suffered similar critiques when simulated, too. Adelung compared the Elektrium to electronic bells: "A similar case [is found in] the 'bell pealing' on tape. The cheapest imitation! – [sic]"[128] The Netherlands, proud ally in America's midcentury Organ Reform Movement and home of the non-electronic carillon, has itself boasted three major electronic organ makers: Eminent, Johannus, and Philips, maker of the discontinued Philicordia. Electronic composer Dick Raaijmakers developed the Philicordia at the Philips Lightbulb Factory in the 1960s, prototyping the AG7400 at Philips Natuurkundig Laboratorium (which also produced the first portable cassette recorder.) The Philicordia quickly took over sixty percent of the home organ market share and was sold in America at J.C. Penney department stores. It is to the Philips Lightbulb Factory and to Raaijmakers and his associates that we will turn in chapter 3.

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[123] Miessner, 1428-9.
[124] Luc Rombouts, *Singing Bronze: A History of Carillon Music* (Leuven, Belgium: Leuven University Press, 2014), 126-27.
[125] Nick Seaver, "'This Is Not a Copy': Mechanical Fidelity and the Re-enacting Piano," *differences: A Journal of Feminist Cultural Studies* 22, nos. 2-3 (2011): 54-73.
[126] Jonathan Ambrosino, "Player Pipe Organ," *The Organ: An Encyclopedia*, 418.
[127] Dobson et al, "Action," in *The Organ: An Encyclopedia*, 12.
[128] "Ein ähnlicher Fall wie bei den 'Glockengeläuten' auf Tonband. Das ist billigster Ersatz! –" (Adelung, 21).

Chapter 2. Techno-Temporal Convergence: The Electronic Neo-Baroque

"Finding organ pipes in an electronic organ factory is like finding birdshit in a cuckoo clock," Virgil Fox sneered in one of his famously colorful dismissals, evidently before he gained his widest renown as a flamboyant organ virtuoso by touring with electronic organs and massive loudspeaker arrays.[1] Despite the shortage of materials to build pipe organs after World War II, the backlash against electronic organs and even against earlier American styles of pipe organs was accelerating in the 1950s. The Federal Trade Commission had ruled in 1937 that the Hammond did not produce "real organ music," and highbrow-art musicians were judging carefully with their ears. Former enthusiast Serge Koussevitsky had praised the Hammond for its performance in Liszt's "Faust" Symphony, but by 1939, he had soured on the instrument, which did not offer enough power for his Tanglewood rendition of Saint-Saëns' "Organ" Symphony. "Koussevitzky was thoroughly disgusted with the electronic device," organist E. Power Biggs reflected in his notes, "and announced, 'Next year we shall give Beethoven's *Missa Solemnis and for that occasion I must have an organ*'."[2]

With Biggs' help, the two-manual Aeolian-Skinner organ Koussevitsky had installed in 1940 in the Tanglewood "Shed" featured a disposition that would have puzzled organists of the previous decade and quaintly bemused organists of the next. Its abundance of warm, sweet flutes and strings was reminiscent of Skinner's famous orchestral organs, perfect for the performance of orchestral transcriptions, but the timid presence of a cold, sparkling upperwork on every manual and pedal gestured towards the rendition of Baroque polyphony. (A single thirty-two-foot pipe on C3 was Koussevitsky's ticket for the Saint-Saëns, Strauss' *Also Sprach Zarathustra*, and other works needing an aisle-shaking organ rumble.) Aeolian-Skinner Opus 1002 was a transitional organ, awkwardly bridging the long nineteenth century and the blossoming of the postwar Early Music movement. By the 1960s, organists would demand austere "neo-baroque" instruments, light on fundamental and heavy on high mixtures and aggressive reeds, to perform Baroque music while scoffing at the weak-kneed orchestral frivolities of yesteryear. How did the pendulum swing to such an extreme? There is a frequently told origin story for the neo-baroque aesthetic and the so-called Organ Reform Movement that promoted it, and this chapter seeks to re-evaluate some of its underlying assumptions.

The usual narrative traces the ideas of the Organ Reform Movement to continental Europe, where Albert Schweitzer's impassioned advocacy of Bach's organ music helped spark the *Orgelbewegung*, which Richard Taruskin calls "one of the earliest harbingers of the twentieth-century 'early music' boom" and was already going strong in the 1920s.[3] British organ builder G. Donald Harrison is seen as a primary vector for the second stage, carrying the ideas of the *Orgelbewegung* to America and transforming organ building from the inside by taking over Ernest M. Skinner's company; the 1940 Tanglewood organ is a product of that takeover. Carl Weinrich and several other American organists promoted Bach performance during those interwar years. After World War II,

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[1] Craig R. Whitney, *All The Stops: The Glorious Pipe Organ and Its American Masters* (New York: Public Affairs, 2003), Kindle edition, 254.

[2] Biggs' notes, typewritten on his private letterhead, dated January 1977, in Biggs papers. Quoted in Whitney, 94.

[3] Richard Taruskin, "'Alte Musik' or 'Early Music'?" *Twentieth-Century Music* 8, no. 1 (2012): 20, doi:10.1017/S1478572211000260.

British-born E. Power Biggs sparked the American Organ Reform Movement as we know it, championing Baroque-style tracker-action organs after his revelatory visits to historical organs in Europe in the 1950s. Excellent accounts of these events already grace the literature, such as Uwe Pape's *The Tracker Organ Revival in America* (1977) and Orpha Ochse's *The History of the Organ in the United States* (1975).

However rich these narratives are, they frame the Organ Reform Movement as a relatively insular story from the pipe organ world. I have painted the usual sequence of events in the broadest of strokes because my goal is not to controvert it, but to broaden its context beyond churches and conservatories to the culture of wartime and postwar America at mid-century. Seen in this broader perspective, the movement was *also* driven in America by the technological cultural regime that began with World War II, by the spread of new structures of research and knowledge beyond the military-industrial complex, and by Cold War cultural diplomacy initiatives that transformed organ music at American universities. This context allows us to understand the organ world's postwar return to the Baroque as a modernist response to World War II, rejecting emotional Romantic excess. By bridging the worlds of the neo-baroque organ and Cold War technology, I also seek to deconstruct the exaggerated dichotomy between them, promoted by organists and organbuilders eager to differentiate their work from the electronic organs to which they were strangely similar, and by Biggs and his archrival Fox, from whose cult of nineteenth-century virtuosity Biggs sought to distance his own veiled Romanticism. Important for the practice of music, this broader contextualization also allows us to recover midcentury neo-baroque organs from the dustbin of history, re-evaluating them (as a recent issue of the Dutch journal *Het Orgel* has done for postwar *Orgelbewegung* instruments) on their own terms as products of a Cold War research culture, rather than trashing them for their historical inaccuracies—inaccuracies that today's Reform builders and leading organ teachers usually attribute to early ignorance rather than new scientific knowledge. At a moment when institutions like the University of California, Berkeley are replacing major neo-baroque instruments with tracker organs that meet today's exacting "historically informed" standards, I wish to point out that a significant proportion of today's much-championed Baroque organ craft is a product of the technoculture that neo-baroque organs exemplified, and thus a product of today.

This chapter builds, as many writings have, on Taruskin's trenchant critiques of the Early Music movement and historically informed performance (HIP), collected in *Text & Act* (1995). Taruskin argued that HIP is, despite its name, a modern creation premised on the novelty of unfamiliar historical instruments: "To put my thesis in a nut-shell, I hold that 'historical' performance today is not really historical; that a specious veneer of historicism clothes a performance style that is completely of our own time, and is in fact the most modern style around; and that the historical hardware has won its wide acceptance and above all its commercial viability precisely by virtue of its novelty, not its antiquity."[4] Anything labeled "historical" is still inevitably a product of its time, and the "historical hardware" represented by these synthesizer-like neo-baroque organs are postwar technologies that merit closer examination.

[4] Taruskin, "The Pastness Of The Present And The Presence Of The Past," in *Text & Act: Essays on Music and Performance* (New York: Oxford University Press, 1995), 102.

Engineering the Organ

"The organ appears to possess a fatal appeal to ingenious but not necessarily musical minds," Biggs groused in his documentary-style "talking dog record," *The Organ: An Aural and Visual Guide* (1958)—an interesting critique from someone who had left the British officers training corps in 1922 to embark on a promising career as a young electrical engineer.[5] The field of electrical engineering came into its own in 1882, when the Technische Universität Darmstadt founded the world's first electrical engineering department, followed in America by the University of Missouri, Cornell University, and the Georgia Institute of Technology. As the field grew in the early twentieth century, driven by developments in radio, the cathode ray tube, the magnetron, and by the 1940s, computers, so did the interest of engineers in organ building. The first patent in the U.S. for an electric action for the organ was taken in 1869 by Hilborne Lewis Roosevelt (a cousin of Theodore), a man widely recognized in his time amongst electricians for inventing crucial parts of the telephone, but known amongst organists as having built some of the country's largest organs to date with his brother Frank.

From the Telharmonium's telephone line broadcasts to the vocoder's encrypted wartime communications, the organ was thoroughly enmeshed with telephone engineering during the first half of the twentieth century, and Biggs was correct that such involvements could be dead ends. In the 1930s, organ building even occurred at the International Telephone and Telegraph Company (ITT). Its Paris office, probably the *Laboratoire International de Telephone et Telegraph*, developed an electronic organ using a radio-frequency beat system of tonal generation.[6] But ITT soon refocused on the defense industry in what would prove shadowy ways; its subsidiaries worked for the Third Reich and later with the CIA's machinations in Latin America.[7] In 2007, it became the first major defense contractor convicted for violating the U.S. Arms Export Control Act.[8] It had long ago abandoned organ research fulfill the even more "fatal" stereotypical image of a sinister global conglomerate.

Nonetheless, some of the "ingenious minds" drawn to the organ had a deep and lasting effect on the direction of the Organ Reform Movement. Engineers with a musical bent flocked to the organ and shaped its development as both a pipe and an electronic instrument. Otto Hofmann studied physics and music at the University of Texas at Austin and collaborated with physics professor and organ expert Charles P. Boner on acoustics research and the rebuilding of older organs. His first independently designed organ, built in 1956 for Matthews Memorial Presbyterian Church in Albany, Texas is generally cited as the first American-built postwar tracker organ, with pipes from Dutch organbuilder D. A. Flentrop.[9] His contemporary Lawrence Irving Phelps, also an engineer and acoustician, would gain even greater significance in the Organ Reform Movement as an

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[5] E. Power Biggs, "The Record: An Introduction," in *The Organ: An Aural and Visual Guide, compiled and discussed by E. Power Biggs with the sounds of many modern and historic organs,* Columbia Masterworks DL 5288, 1958, 33⅓ rpm.
[6] Benjamin Miessner, "Electronic Musical Instruments," *Proceedings of the Institute of Radio Engineers* 24, no. 11 (November 1936): 1452.
[7] Peter Kornbluh, *The Pinochet File: A Declassified Dossier on Atrocity and Accountability* (New York: New Press, 2003).
[8] "ITT Corporation to Pay $100 Million Penalty and Plead Guilty to Illegally Exporting Secret Military Data Overseas," U.S. Department of Justice, last modified March 27, 2007, http://www.justice.gov/archive/opa/pr/2007/March/07_nsd_192.html.
[9] Richard Kassel, *The Organ: An Encyclopedia,* ed. Douglas Earl Bush and Richard Kassel (New York: Routledge, 2006), s.v. "Hofmann, Otto (1918-2001)."

influential builder, spokesperson, and author. Phelps studied electronics at the Massachusetts Radio School and engineering at Northeastern University, and went to Holtkamp Organ Company in 1949 to work as a voicer. Predating Marshall McLuhan in deciding that the medium is the message, he viewed the organ as a physical medium that had to be engineered as carefully as its sound was designed. "Convinced that the organ was not an end in itself, but merely a means of musical communication," writes Robert Cavarra, "he became motivated by the precept that effectiveness and function were more important than the mere quality of sound." Applying a modern "form follows function" philosophy to studying historical organs, he became "convinced of the logic and efficiency of certain design principles" such as balance and clarity, values that the Romantic organ was seen as having failed to uphold. If balance, especially from bass to treble, and clarity of ensemble were central to musical artistry, they should likewise be applied to the engineering of the organ console and parts—the medium.[10]

Phelps' published writings were the first to introduce the concepts of the *Orgelbewegung* in English, alongside radical theories (now widely accepted) about the effects of windchest design on pipe speech. At the height of his career, he established a department for mechanical action organs at Casavant-Frères in 1960 and became president in 1971, marrying renowned organist Gillian Weir the next year. Espousing craft, he scorned electricity and sound synthesis, as conveyed in his 1969 article "Thoughts on the Future of the Organ":

> I often tell my young voicers, when they ask how they can tell if they are producing a good sound, that if they think it can be duplicated electronically, it is a bad sound and will not be acceptable. I have often warned organbuilders and amateurs who pick up the occasional contract by appealing to a certain reactionary element still to be found here and there in America, that the kind of [orchestral] sound they are producing is contributing to the myth that the sound of an organ can be imitated electronically because it is a sound that one does not really need pipes to produce. Strangely enough, thick, opaque [eight-foot-heavy] sound is still being produced with new pipes here and there in America. It is only to people to whom this type of tone is still acceptable that electronics seem an admirable substitute, and it is only to those who still produce this kind of tone that electronics offer serious competition.[11]

Noting that even the revolutionary technology underlying the Hammond and its competitors had been based on the Romantic, imitative American orchestral organ (against which it was directly pitted in the Federal Trade Commission's 1937 blind listening tests), Phelps warned that the public taste for electronic organs could only be extinguished by a return to the Baroque organ's disposition, which featured principal and mixture stops that did not simulate other referents—a precarious logic, considering that Baroque organs also featured dulcians, krummhorns, and other stops meant to evoke early reed instruments, not to mention flutes and vox humanas.

"My answer to modern technology and electronics is more modern technology and mechanical action," Phelps declared epigrammatically in 1969 before the International Organ Festival at St. Albans. "Mechanical-action instruments for musicians and electronic instruments for the rest. To this I say a hearty Amen!"[12] He must have elicited a cheer at the time, but because of his technical background, he could also come across as highly pragmatic about the limited production capacity of craft Reform workshops relative to demand:

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[10] Robert Cavarra, *The Organ: An Encyclopedia*, s.v. "Phelps, Lawrence I(rving) (1923-1999)."

[11] Lawrence Irving Phelps, "Thoughts on the Future of the Organ," ISO-Information, *Journal of the International Society of Organbuilders* 1 (February 1969).

[12] Ibid., "Trends in North American Organ Building" (lecture, International Organ Festival, St. Albans, June 28, 1969).

> The advent of the electronic so-called "organ" has been, in a way, a major blessing, for if we organbuilders had been required to provide instruments for those several thousand churches now using electronic substitutes, how ever would we have met this need? I have no idea how many churches have electronic instruments, but suppose, for sake of discussion, there are 5,000…[that] purchased them not so much because they were less expensive than a pipe organ but only because they were available immediately and as it seemed the modern thing to do… Where would the required 100,000 ranks of pipes come from? … Furthermore, in my own business, we obtain many more contracts to replace existing electronic instruments with new pipe organs than the number we lose in direct competition with electronic manufacturers. While this is to some extent related to the rapid, even planned, obsolescence of electronic instruments.[13]

Mechanical-action builders could count on churches to buy an electronic organ as "the modern thing to do," regret its rapid obsolescence, and send their next order for a Reform organ. Given his sometimes acerbic writings, it may seem a stunning about-face that in 1982, Phelps became director of custom organs for the electronic organ giant Allen Organ Company. But the proof was in the pudding: despite the cavernous divide constructed through discourse and oftentimes bitter business rivalry, some organ builders still circulated freely between the worlds of electronics and craft, which thanks to their engineering training were not so far apart.

Of the "ingenious minds" discussed in chapter 1—Harald Bode, Oskar Vierling, Benjamin Miessner, and Charles Boner—none became deeply involved in established pipe organ companies except for Bode, who straddled the worlds of electronic organ building and military electronics at Loewe-Opta in Berlin during the war before joining the American organ building business. Likewise, in the following decades, at least two men linked organ building with the Space Race, creating a broader context of defense research for the Organ Reform Movement's continued growth. Richard "Rick" Radcliffe was a senior technician with satellite technology company Space Systems Loral (SSL), which served government and commercial customers, before working for Schlicker, the first major American builder to produce tracker organs, and then going into business independently. And the high-profile career of Winston E. Kock spanned organ building to NASA electronics. A 2004 talk at Bletchley Park by Hans-Joachim Braun attempted to weigh his achievements:

> "From electronic organ designer to NASA chief of electronics" could be a popularised abstract of Kock's professional life. But a phrase like this might be misleading. It could insinuate that there was a spectacular development from something relatively simple – designing an electronic organ – to a prestigious high tech appointment, one of the most distinguished an electronic engineer in the United States could get. It has to be pointed out, however, that both fields, electronic organ design and NASA research, can be described as "high tech"; designing electronic organs in the late 1920s and early 1930s was no less demanding than NASA electronics in the 1960s.[14]

Kock's book *The Creative Engineer: The Art of Inventing*, published by Plenum Press in 1978, is part lucid engineering overview, part inspirational book for interdisciplinarians of the Cold War era, and part autobiography. It lavishes many pages, diagrams, and photographs on his contributions to electronic organ design, from his media-hyped electrical engineering thesis project at the University of Cincinnati, an organ that produced sound with tiny neon tubes, to his formant research, which had broad scientific applications and improved organ sound synthesis. After the war

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[13] Ibid.

[14] Hans-Joachim Braun, "Music Engineers: The Remarkable Career of Winston E. Kock, Electronic Organ Designer and NASA Chief of Electronics" (lecture, 2004 IEEE Conference on the History of Electronics), Engineering and Technology History Wiki, http://ethw.org/images/8/8e/Braun.pdf, 9.

made double-triode valves cheaply available, he replaced the neon tubes with valves, and his patented technology went into production by the Baldwin Piano Company, meeting with surprise acclaim in a 1947 issue of *The American Organist*.[15] Baldwin even funded his year at the Indian Institute of Music in Bangalore, where he researched instrumental timbre and acoustics. Like Miessner, the young engineer had developed a fascination with the organ as the greatest model of musical efficiency (via its interface) and inefficiency (the fact that each key-timbre combination required an individual pipe). For a creative engineer, the organ problem was irresistible: it held the greatest promise for building a multifaceted musical extension of man, to co-opt McLuhan's language again.

Kock presented himself as a thoroughly American organ builder and engineer. *The Creative Engineer* omitted that the *Kraft-durch-Freude-Grosston-Orgel* played at the 1936 Berlin Olympics was an improved version of the Kock-Vierling electronic organ he designed on the formant principle at the Heinrich Hertz Institute as a graduate student. He also omitted the electrically generated bell sounds he presented at the National Socialist Party Rally in Nuremberg.[16] Instead, he focused on his wartime radar and underwater sound research at Bell Labs, where he rose to Director of Acoustics Research in 1951. In the midst of his antisubmarine research at the Bendix Corporation, NASA recruited him in 1964 to direct its new Electronics Research Center, its brief venture into aerospace electronics necessitated by its fundamental dependence on electronics (a substantial portion of its purchases) and its need for internal expertise during the Apollo era. Kock was one of the elite to watch the launch of Apollo 11 from the John F. Kennedy Space Center in 1969, sending Neil Armstrong and Buzz Aldrin to the moon. In the meantime, a large number of organs were produced over three decades using his technology, and they rivaled the Hammond with their superior reed and string imitations until digital technology superseded analog. Although Kock's musical career had given way to defense acoustics and aeronautics, he continued to collect appreciable royalties from Baldwin, and in retirement he proudly reprinted a 1933 concert program in *The Creative Engineer* proving that he had performed Bach's Toccata and Fugue in D minor (BWV 565) at the Cincinnati College of Music.

Following in the fictional footsteps of Jules Verne's genius inventor-organist Captain Nemo, SSL and NASA men found cultivating the organ and especially Bach irresistible. Although Kock did not develop ties to the Organ Reform Movement, the movement's sense of urgency was driven partially by graduate research that ended up fueling defense and Baldwin Organ production alike. The interest of these engineer-organ builders in acoustics, sound production, and vocal synthesis framed the terms of organ building in alternative ways, away from training in craftsmanship towards scientific research and experimentation.

Men who were organ builders by trade responded with interest. The development of the reform was in fact partially shaped by an influential physics book. In the late 1920s, as young Walter Holtkamp realized that he would soon need to take over his father's organ building company in Cleveland, he turned not to redoubled apprentice duties in the shop, but rather to exacting study of Dayton C. Miller's *The Science of Musical Sounds* (1916). Miller was a physicist (chairing the physics department at Case School of Applied Science in Cleveland from 1893 to 1936), astronomer, acoustician, and flautist whose 1,700-item flute collection is now the pride of the Music Division at

[15] Rowland W. Dunham, "A Successful Electrotone," *The American Organist* 30 (May 1947): 158. "My prejudice against electrotones has been rather decided in the past," he wrote. "It did not seem possible that the sounds and playing details of an organ could be approached by such a method. This Cincinnati experience changed my opinion completely."
[16] Fred K. Prieberg, *Musik im NS-Staat* (Frankfurt-am-Main: Fischer Taschenbuch Verlag, 1982), 141.

the Library of Congress. The topics of his book ranged from waveform analysis of an excerpt from Donizetti's *Lucia di Lammermoor* to his experiments using wooden tibia organ pipes to synthesize vowels, eliciting "ma-ma" and "pa-pa" from his experimental instrument. According to Joseph Sittler, young Holtkamp's study of the behavior of sound waves contributed to his rejection of the Romantic organ chamber, which stored the pipes in an adjoining space, in favor of completely open and exposed pipework within the room in which it was to be heard.[17] This change was presented as an aid to the performance of Baroque polyphony, while simultaneously yielding the asymmetrical modernist architectural designs for which Holtkamp became famous.

As the single most influential organbuilder in the years after World War II thanks to prestigious institutional commissions from Oberlin College and Syracuse University, Holtkamp brought Miller's scientific, technological thought to the beginnings of the Organ Reform Movement. Sonja Petersen's article "Craftsmen-Turned-Scientists? The Circulation of Explicit and Working Knowledge in Musical-Instrument Making, 1880-1960" argues that during the second half of the nineteenth century, trained craftsmen such as piano makers published educational books "in hopes of establishing a fixed canon of explicit knowledge. This canon, elucidating physics and acoustics to an audience of craftsmen…was intended to replace the craftsmen's working knowledge."[18] As instrument making was transformed from a craft into an industry, such books allowed scientific methods and knowledge to circulate beyond the scientific community to musical instrument builders. Knowledge that was standardized, formalized, and explicit became necessary in an industrializing field, but still required complementation by working knowledge, which sociologist Douglas Harper defines as

> (1) learning by doing, mostly informally during childhood—for example, when playing with materials; (2) knowledge of materials, a sensory skill in understanding the characteristics of materials and how they react; and finally (3) kinesthetic sense, a specific ability to control the body while working with materials and tools.[19]

While such books represented the "scientification of a craft by a craftsman," the books by Miller and Kock represented a scientification that came directly from the scientific community rather than from a craftsman serving as its messenger.[20] Miller and Kock had to first gain working knowledge in order to reach their scientific conclusions, which then reached organ builders like Holtkamp and organ composers like Henk Badings.[21] Having gained an explicit theoretical understanding of the acoustic phenomena he had previously known from his craft, Holtkamp changed organbuilding in a way that directly affected what performers played, how they played it, and how they registered it. The direct, unmediated sound of Holtkamp organs and lack of dramatic swell capabilities virtually ruled out Romantic repertoire and Anglo-American playing technique, and they constructed the Baroque tonal aesthetic as bright and stark, driven by undampened buzzy reeds and aggressive tuttis, and varied through abruptly terraced dynamics. In now-unfashionable midcentury recordings of Holtkamps,

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[17] Joseph Sittler, "A Biographical Sketch of Walter Holtkamp's Evolving Tonal Philosophy," Holtkamp archives. Quoted in John Allen Ferguson, *Walter Holtkamp: American Organ Builder* (Kent, Ohio: Kent State University Press, 1979), 22.
[18] Sonja Petersen, "Craftsmen-Turned-Scientists? The Circulation of Explicit and Working Knowledge in Musical-Instrument Making, 1880-1960," *Osiris* 28, no. 1 (January 2013): 212.
[19] Ibid., 216.
[20] Ibid., 219.
[21] As late as 1957, Henk Badings published an organ photograph from Dayton Miller's *The Science of Musical Sounds* (1917) in the popular Dutch magazine *AO-Reeks* ("Elektronische Muziek" special issue, no. 689, 13 December 1957, p. 14) while working on electronic music at the Philips Natuurkundig Laboratorium in Eindhoven, the Netherlands.

one can hear the performative result of the mutually dependent relationship between organbuilders and the engineering community.

The technology-inspired approaches of neo-baroque builders are today often chalked up to ignorance and hypocrisy. In *The Organ: An Encyclopedia*, multiple articles present the use of electric action and electric blowers in neo-baroque organs as bemusingly ironic, when it can also be understood as a logical result of the scientification of organbuilding.[22] Electricity was systematically used because even artisanal craftsmen with engineering knowledge were driven by modernist values of optimization. Similarly, the neo-baroque tonal aesthetic is waved off today as an ignorant caricature of certain genuine Baroque organ characteristics, but as Jonathan Ambrosino argues, this impression arises from the misleading use of terms such as "Romantic," "Classic," and "neo-baroque" to describe twentieth-century styles of American organ building. "Everything about Walter Holtkamp's work was a revolt against what had come before; no facades, no case, Spartan consoles, fluorescent rather than incandescent voicing, and a strict emphasis, through inter-voice and inter-manual balance, on a certain period of organ literature, primarily that of Bach," he points out, proposing "anti-romantic" as a substitute for "neo-baroque" and "anti-heroic" to describe the style of playing it encouraged, no longer suited to César Franck's *Pièce héroïque* or Wagner transcriptions.[23] Dutch organist and harpsichordist Gustav Leonhardt, who taught many of the leaders of America's postwar Organ Reform Movement, similarly sought to clarify the terminology in a 1980 television interview by explaining HIP as "style-less" (*stijloze*):

> *Leonhardt*: [Earlier HIP] was also a style-less way, with another meaning for "style."
> *Interviewer*: You see it also as "style-less"?
> *Leonhardt*: Yes, it is diametrically opposed to the ideas of the Baroque people [*barokmens*] to have an attitude…but to free you of nineteenth- and twentieth-century musical ideas—concerning interpretation—was indeed perhaps a necessity. And the young generation today, that has already grown up without the impressions of the nineteenth century making so strong an impression…so that it's not that necessary anymore.[24]

To borrow Taruskin's phrasing, this so-called historically informed practice of building and playing was "the most modern style around." Holtkamp's use of ahistorical elements like electricity, circuitry, and other wartime innovations was the perfect embodiment of the postwar technological reworking of the Baroque.

Interestingly, this "anti-romantic" tonal aesthetic focused on the characteristics of organ tones that were central to the FTC proceedings against Hammond and that would anchor early discourse about sound synthesis. Ambrosino's characterization of the instruments by Holtkamp contemporary Joseph Whiteford, Harrison's successor at Aeolian-Skinner, provides a pithy summary. Whiteford's organs, like the Opus 1388 now in the Crystal Cathedral, are seen today as inconsequential

> collection[s] of those tonal features prized by the neo-classicists of the 1950s: chiff, thin-toned modified French reeds, the so-called Baroque reeds Aeolian-Skinner had introduced after World War II, disagreeably high-pitched mixtures, and tremendous reduction of fundamental tone… Chiff became an end in itself, often destroying the very clarity it was supposed to aid…high-pitched mixtures began to dominate the ensemble

[22] See Richard Kassel's article on "Bellows" (62) and Alfred F. Sefl's article on the "Blower" (71).
[23] Jonathan Ambrosino, "Present Imperfect: A Perspective on the Past Century of American Organbuilding," *The Tracker* 42, no. 3 (1998): 27 and 32.
[24] Gustav Leonhardt, interview, *Dubbelportret*, NOS, September 9, 1980. Transcribed in Dutch by Jed Wentz in e-mail message to author, October 14, 2012.

> without clarifying anything. The intense, thin chorus-reed tone was in its way just as opaque…the excessive blare and reduced fundamental made for great distortion in chord clusters without ever being melodic; the blare now obscured the notes.[25]

Like the key-click (inappropriate to orchestral transcriptions) that came to define the Hammond, chiff allowed anti-romantic organs to speak quickly at fast tempi, string-like legato be damned. While the orchestral organ delivered a deep, thick fundamental, having the anti-romantic center of gravity high in the treble register was like fully pulling out a drawbar on a Hammond to maximize its bright harmonics. And while Hammond struggled to convincingly synthesize non-flute stops such as reeds, Holtkamp and Whiteford substituted "high-decibel" for "convincing." None of this is to argue that the anti-romantic disposition was developed in response to the Hammond, but rather that it developed within the same discursive environment as electronic organs—a scientifically literate environment in which sound could be construed as an ADSR envelope, as a fundamental with carefully metered harmonics, and as a signal measured in decibels.

Holtkamp did come close to constructing the neo-baroque sound as a synthesized sound in 1940 when he laid out five principles for future organ building. Of interest is his fourth point, that "the central idea of the contemporary organ movement, as I see it, is the re-establishment of a series of related pipes or tones; in effect a more or less complete harmonic series for each key as the basis or unit of consideration."[26] In John Ferguson's summary, "the texture of organ tone must be enriched through reducing the number of fundamental or unison-tone registers and increasing the number of registers of overtone pitch."[27] Holtkamp conceptualized effective tonal design as the FTC conceptualized true sound synthesis, defined by the presence of the complete harmonic series. In a strange echo of the FTC proceedings, Holtkamp nicknamed his game-changing small practice organ the "Martini" in honor of the cocktail consumed at a 1948 dinner with Fenner Douglass, Arthur Poister, and Grigg Fountain at the Oberlin Inn.[28] Over thirty of these improved unit organs were being used at schools and a few churches by Holtkamp's death in 1962, training students even without an engineering background to hear this synthesizer-like emphasis on upper partials as central to organ tone.

By now, the "early" Early Music movement is widely understood as the jacket-and-tie-sporting—but still rebellious—wing of the 1960s counterculture, as elaborated in ethnographies by Kay Shelemay, Tamara Livingston, John Haines, and others.[29] I would like to put that perspective in dialogue with Fred Turner's book *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (2008). Turner's book reveals "a complex intertwining of two legacies: that of the military-industrial research culture, which first appeared during World War II and flourished across the cold war era, and that of the American counterculture." He points out that "since the 1960s scholarly and popular accounts alike have

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[25] Ambrosino, 31.
[26] Walter Holtkamp, "Present-Day Trends in Organ Building," *Proceedings of the Music Teachers National Association* (1940), 402.
[27] Ferguson, 46.
[28] Ibid., 60.
[29] Kay Kaufman Shelemay, "Toward an Ethnomusicology of the Early Music Movement: Thoughts on Bridging Disciplines and Musical Worlds," *Ethnomusicology* 45, no. 1 (2001): 1-29; Tamara E. Livingston, "Music Revivals: Towards a General Theory," *Ethnomusicology* 43, no. 1 (1999): 66-85; John Haines, "Antiquarian Nostalgia and the Institutionalization of Early Music," in *The Oxford Handbook of Music Revival*, ed. Caroline Bithell and Juniper Hill (New York: Oxford University Press, 2014): 73-93, doi:10.1093/oxfordhb/9780199765034.013.011.

described the counterculture in terms first expressed by its members—that is, as a culture antithetical to the technologies and social structures powering the cold war state and its defense industries."[30] However,

> contrary to the perceptions of many in the counterculture of the 1960s and of many scholars since, the two worlds had a great deal in common. They shared a celebration of intellectual work, of technology, and of collaborative work styles. Both reveled in the economic and technological abundance of post-World War II America. The research laboratories of World War II, and the military-industrial-academic bureaucracies that grew out of them, were far more flexible, entrepreneurial, and individualistic places than many remember today. By the same token, certain elements of the counterculture embraced the ideas, the social practices, and the machines that emerged inside the world of military research even as they vocally attacked cold war bureaucracies. Even as they sought to find new ways to live psychologically and socially integrated lives, some members of the counterculture turned toward the heart of technocracy itself in search of tools and models for their work.[31]

Turner pinpoints the publications of Stewart Brand, particularly the *Whole Earth Catalog*, as a widely influential means of sharing of ideas between the counterculture, particularly those he terms the New Communalists, and the "military-industrial-academic bureaucracies." Likewise, I am arguing that historically informed organ building, as a form of countercultural rebellion, also manifested the influence of the military-industrial-academic complex, a relationship that seen in this light does not invite the usual sense of irony. Individuals who helped shape the Organ Reform Movement from within or without came from strong engineering backgrounds or thought in ways shaped by the scientific texts of their day. The combination of organbuilding and engineering (all of which, at the time, was seen as having potential defense applications) was emblematic of its time, and surprising to us today mainly because of the discursive distinction constructed by those who have carried the Organ Reform Movement into the present tense.[32]

The Cold War Fulbright Effect

Dutch *Orgelbewegung* leader Flentrop Orgelbouw attributes the fact that the U.S. is its biggest foreign customer to the Fulbright Program, which began sending American students to the Netherlands in 1949. "Encouraged by Flentrop's assistance and famous hospitality," the company's centennial booklet *Flentrop in America* relates, "many eager young 'musical pilgrims' (organists, teachers and organ builders)…visited and investigated many old organs but also came to know the new Dutch organs."[33] As director Dirk "Dick" Andries Flentrop saw it, those bright-eyed

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[30] Fred Turner, *From Counterculture To Cyberculture: Stewart Brand, The Whole Earth Network, And The Rise Of Digital Utopianism* (Chicago: University of Chicago Press, 2006), 3.

[31] Ibid., 16.

[32] Even today, defense funding is a significant driver of computer music research at institutions such as Stanford's Center for Computer Research in Music and Acoustics (CCRMA) and the University of California, Berkeley, where the Center for New Music and Audio Technologies (CNMAT) receives research monies from the Department of Defense. Following a system begun during the cold war, such academic research centers are allowed to freely pursue their research with the understanding that the intellectual property can be claimed by the DOD. For more on CCRMA and cold war research, see Cyrus C. M. Mody and Andrew J. Nelson, "'A Towering Virtue of Necessity': Interdisciplinarity and the Rise of Computer Music at Vietnam-Era Stanford," *Osiris* 28, no. 1 (January 2013): 254-277, http://www.jstor.org/stable/10.1086/671380.

[33] *Flentrop in America: Flentrop Orgelbouw 100 jaar, 1903-2003*, introd. Cees van Oostenbrugge (Zaandaam, the Netherlands: Flentrop Orgelbouw B.V., 2003), 14.

Fulbrighters then turned away from American "large-scale industrial production" of organs, and instead imported Flentrops to galvanize American organbuilders into a more substantive return to the past than the still self-consciously modern styles of Holtkamp and his contemporaries.

Congress established the Fulbright program in 1946 at the instigation of Senator J. William Fulbright (D-AR) to facilitate cultural exchange between Americans and people from other countries. The Bureau of Educational and Cultural Affairs at the U.S. Department of State administered the expanding set of fellowships. Senator Fulbright himself was not a musician, only remarking once publicly on pipe organs. Although the Fulbright is still highly visible today as a prestigious grant for music and many other disciplines, it gained governmental traction at the time because it improved America's still-shaky international reputation for the arts and intellectualism. Perhaps because of the fellowship's importance in academia, musicologist Kailan Rubinoff is one of only a few scholars to contemplate that geopolitical facet of the Fulbright's history:

> For the United States, fostering technological developments and spreading American culture and values are understandable in light of Cold War politics: the Fulbright program, like the Marshall Plan, complemented military and foreign policy goals while promoting a favourable image of America abroad. In this regard, the Netherlands was designated a key strategic country …. Fulbright and other cultural exchanges between the USA and the Netherlands, including the sponsorship of touring artists, reached a peak in the 1960s, becoming an important form of cultural diplomacy. As the historian James C. Kennedy remarked, cultural exchange "would turn out to be a long-term commitment in the first decades of the Cold War, when the political and military ties of the Atlantic Alliance seemed to require parallel cultural ties."[34]

The Fulbright strategy used the arts and education to cement relations with American allies and to promote intellectual exchange between countries united against the Eastern Bloc. It was this diplomacy funding that provided the primary vector by which a vast institutional material change reached American universities and conservatories, and trickled down to churches, transforming organ education and liturgical practice. The change occurred quite rapidly. As early as the mid-1950s, Ambrosino notes, "organists now demanded something more like what they had experienced in studying with Hetimann, Walcha, and Heiller on the one hand, Dupré, Langlais, and Marchal on the other."[35] Between 1955 and 1988, fifteen Fulbrighters also traveled to the Netherlands to study with one teacher, Leonhardt, and untold others to seek instruction elsewhere. Many became prominent organists, harpsichordists, and early music specialists and scholars, including John Fesperman (1955-6), Alan Curtis (1957-8), and Anthony Newcomb (1962-3).[36] Imported Dutch examples of organ building further accelerated the demand for historically informed instruments. Journalist and organist Craig Whitney recounts that

> with Biggs's Harvard Flentrop organ fresh on their minds, churches imported 200 tracker-action organs by European builders in the 1960s. But by the end of the decade there were twenty-seven American builders like Noack, Fisk, and Schlicker producing tracker instruments—166 of them—over the same period. "Tracker enthusiasts cheered for the young organists studying in Europe on Fulbright grants, and absorbing the 'truth' about organ style," the organ historian Orpha Ochse wrote… "Established organ companies were pictured by

[34] Kailan R. Rubinoff, "'The Grand Guru of Baroque Music': Leonhardt's Antiquarianism in the Progressivist 1960s," *Early Music* 42, no. 1 (2014): 30, doi:10.1093/em/cau026. (Quote from James C. Kennedy: "Cultural Developments in the Dutch–American Relationship since 1945," in *Four Centuries of Dutch-American Relations* [Albany: SUNY Press, 2009], 935.)
[35] Ambrosino, 32.
[36] Ibid.

> the most extreme tracker backers as insensitive factories that built look-alike machines loaded with unnecessary accessories that only served to distract the performer and divert attention from the music itself."[37]

Although Biggs was past his student days in 1954 and recording in Europe on Columbia Records' dime, he too suddenly felt the need to stop playing in unquestioned Anglo-American ways, and to instead come to terms with the mass of European instruments and conduct a kind of media archaeology of the organ: "For the first time, I became aware of the enormous reservoir, the sum total, of the art of the organ in its building and tonal aspects from five or six centuries…Many things thus suddenly came into focus—the importance of tracker action, of articulate voicing, of the organ case, of the windchest, and so on and on; and particularly the complete interaction of playing action and pipe sound."[38] Organists now had to understand what lay behind the keyboard interface and have that hardware replicated in America.

Institutional change began with the Fulbrighters. As they took professorships and influential church posts, they replaced prominent American orchestral organs or early neo-baroque instruments with imported European tracker organs. Their own students, some also converted by Fulbright experiences, then brought about similar changes in churches. Organ builders took note, traveling to Europe and returning to build Baroque-style tracker organs. Performance halls in institutions across the country filled with organs producing a dramatically new "old sound." With Flentrop and others as tour guides and Leonhardt and others as teachers, Fulbrighters and others traveling to Europe institutionalized American organ culture in a new way, a way not shaped by the demands of church doctrine or the entertainment industry, but rather by academic and musicological knowledge. Ambrosino breezily traces the many historically conscious builders who emerged in the 1970s and 1980s to "two principal roots: Charles Fisk and the FAN Club of Fisk-Andover-Noack, on the one hand, and John Brombaugh, on the other."

Obviously, this new academicism was not welcomed by the builders and performers it discredited, and it evoked mixed feelings even in its leaders, like Fisk, who resented the burden of history and knowledge (that musicologists are ever hoping musicians will embrace). "We're afflicted with a love for antiquities…we know too much," he lamented at the 1980 Greensboro College Organ and Church Music Conference, in reference to the exacting requirements of different historical national styles. "If we could go back to being as naïve as we were twenty years ago, that would be very nice. We could still think that we could solve all these problems in one organ."[39] As a modernist at heart, Holtkamp was especially displeased with the academic, backwards-looking attitude occasioned by the postwar ease of study in Europe. After inaugurating a Holtkamp organ in Corpus Christi Church, New York in 1956, newly anointed Fulbrighter Leonard Raver was warned by Holtkamp "to remember that he was an American and to come back an American. 'We don't need to be converted,' was [Holtkamp's] admonition."[40]

Holtkamp's son and successor to the business became an outspoken opponent of the musicological investments American organ students developed at European instruments. Walter Holtkamp, Jr.'s 1995 retrospective article for *The American Organist*, "The Organist, the Organbuilder, and the Musicologist: The Human Imperative for Change" critiqued the relationship

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[37] Whitney, 219-220.
[38] Ibid., 163.
[39] Fenner Douglass, Owen Jander, Barbara Owen, and Charles B. Fisk, *Charles Brenton Fisk, Organ Builder*. (Easthampton, Mass: Westfield Center for Early Keyboard Studies, 1986), 2:157.
[40] Ferguson, 86-87.

between organists, organbuilders, and musicologists. Organists "have spent years perfecting their skills." Organbuilders live "a lifetime of unrelenting concentration, utterly idiotic attention to details, and an almost saint-like patience with the foibles of our collaborators—the organists." While these two professions have carried on a "creative love/hate relationship for about 500 years, these newcomers, the musicologists, have only been with us for the past 50…The musicologist is a product of our times and our preoccupation with the past."[41] This unwelcome third wheel comes in two categories, "those who root about in dusty tomes" and are ineffectual and harmless, and meddlesome "musicological activists [who] use their research and the extrapolations from that research to inform, perhaps even coerce, players how to play, and builders how to build." But he admitted that the musicologist "is a devil of our own making. In a world that has played the same for 50 years and more, the musicologist has promoted the changes in performance that have permitted us to continue playing that literature. Since the literature has not changed, the styles of playing that literature must change to feed our human need for variety."[42] And ultimately, the Fulbright was to blame, for "young American organists, fresh from Fulbrights in Europe, [had] tried to 'jump start' the American organ industry into mechanical key action by introducing the European mechanical instruments in our country…. [Then] the musicological activists arrived to propose period-specific instruments and even the outright copying of old instruments."[43]

For an Organ Reform Movement scion, Holtkamp, Jr. disdained history, or at least held it in great suspicion. "As organists fell in love with the past, most organists stopped composing," he rued, pleading with organists to compose new music again.[44] Organbuilders were suffering the same fate: "I am not sure I think the attempt in our country to reproduce old European instruments will finally be a rewarding endeavor….Copying is not a creative activity…What composer of any consequence is trying to write new Bach preludes and fugues?"[45] Yet his firm's big postwar break reveals an irony to his frustration, for his father owed his postwar importance to the prestige of his first major university commissions by Syracuse and Oberlin, and to a more limited degree, the influence of his correspondence with Dick Flentrop.

Yet even this more enlightened postwar historicist movement could not, by definition, enact a true return to the past. The "enormous reservoir" of Baroque organ technology that Biggs encountered on his famous 1954 European tour was not as old as he assumed, and for that material mass to spread via government-funded fellows to universities and further via students to churches simply occasioned more twentieth-century organ building. In fact, Biggs' initial revelation of the "baroque" was a nineteenth-century sound.

"How magnificent are the sonorities of Sweelinck's music as heard in his own church!" he marveled at the Oude Kerk in Amsterdam. "One seems never to have heard the music before."[46] But the Oude Kerk instrument was a replacement installed in 1742 by Johann Caspar Müller and rebuilt in 1869 by Christian Gottlieb Friedrich Witte, long after Sweelinck's death in 1621. At the Hauptkirche St. Jacobi in Hamburg, Biggs played not the Arp Schnitger instrument Bach had

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[41] Actually, musicologists were intervening as early as 1909, when a meeting of the International Musicological Society in Vienna issued regulations for organ building based on historical models.

[42] Walter Holtkamp, Jr., "The Organist, the Organbuilder, and the Musicologist: The Human Imperative for Change," *The American Organist* 29 (July 1995): 34.

[43] Ibid., 35.

[44] Ibid., 36.

[45] Ibid., 37.

[46] Whitney, 161-62.

auditioned on in 1720, but one from which the Germans had requisitioned the largest pipes during World War I, and which had been removed in advance of the church's destruction in 1944, to be reconstructed by Emanuel Kemper according to then-current notions of Schnitger's style. Those were the sounds presented widely for the first time to the American public on Biggs' "talking dog" record as the European Baroque.

In just a few decades, a cold war diplomacy initiative helped transform the sound of the American organ and fostered a generation of organbuilders, teachers, and performers. Fittingly, it was a former Manhattan Project engineer, who came of age testing detonation devices for the atomic bomb, who led this second stage of the reform.

Charles Fisk: From the Manhattan Project to Organ Building

As a nine-year-old New England choirboy, Fisk was taking notes on Biggs' struggle to separate the pipe organ as a concert instrument from its audience-thinning churchly associations. The ambitious young Biggs wrote to himself in 1931 that "herein lies the great disability of the organ—it is a mere prostitute to the church—bought for so much to attract people to the orthodox teaching," seeing the instrument as a whore because it served a purpose and was not art for art's sake. (Perhaps the FTC's attorneys took their cue from him, although they took a pass on his language linking disability with religion.) Biggs was impatient with service to the church and aspired to a concert career, but even his concerts disgruntled him: "Organ recitals are still essentially church services," he underlined unhappily in the *Boston Evening Transcript* review of his Harvard recital.[47] When he failed to show up for work one day at Christ Church across from Harvard Yard, the boy Fisk scribbled in his diary, "Mr. Bigs wasnt [sic] there."[48] Shortly thereafter, Biggs was fired. But they would collaborate in Cambridge another three decades thence, this time to change history. As Ambrosino recounts, even rival organbuilders would quickly acknowledge the importance of the tracker instrument Biggs commissioned from Fisk to replace the 1932 Aeolian-Skinner organ at Harvard's Memorial Church, noting that "in 1967, Phelps—while still the artistic director of Casavant—call[ed] the Harvard Fisk the most important new organ project of its day."[49]

Fisk was born in Washington, D.C. in 1925 and raised in Cambridge. By high school, he had distinguished himself as a prodigy in electronics and physics. Late in World War II, the tender eighteen-year-old was drafted and sent to J. Robert Oppenheimer to work on the Manhattan Project as an electronics technician. He was then transferred to the bomb physics division of Los Alamos National Laboratory, where he did testing on the detonation device for the atomic bomb. Afterwards, he studied physics and engineering at Harvard, pursued cosmic ray research at Brookhaven National Laboratories, and started a Ph.D. in nuclear physics at Stanford University. To all appearances, he was destined for a brilliant career within the military-industrial complex.

After a few weeks at Stanford, however, Fisk had had enough. His childhood as a chorister who liked to tinker with hi-fi equipment haunted him, and he feared that his research into high-energy physics would haunt him for other reasons. So he transferred to the Graduate School of

[47] "Organ music, well played, can be as engrossing," *Boston Evening Transcript*, November 13, 1935, in Biggs papers. Quoted in Whitney, 86.
[48] Whitney, 86. From Biggs papers.
[49] Ambrosino, 31.

Music, doing coursework and studying organ with Herbert Nanney. "With his clear-framed glasses, tousled brown hair, and plaid shirts, Fisk looked like a university teaching assistant in physics who had somehow wandered onto the organ shop floor," was Whitney's endearing description.[50] Despite looking out of place, Fisk felt at home and chose a future building organs, not playing them.

Fisk's ascent in the organ world was as dynamic as his ascent in physics. He apprenticed at Holtkamp, which he called "the most avant-garde American organ builder at the time," and in 1955 became a partner in the young Andover Organ Company in Gloucester, Massachusetts.[51] By 1958, he had purchased the company and renamed it C. B. Fisk, Inc. "He collected a staff of people like himself," Whitney observed, "bright minds with a burning sense of curiosity about how a mechanical instrument could be brought to sound like a living, breathing organism."[52] His likeminded team of craftsmen, artists, and researchers had been assembled "often by asking prospective hires less about what they knew of organs than about whether they had ever taken a car apart."[53] Fisk loved cars for the same reason he loved organs, expressing "wonder that a thing made out of bolts et cetera can seem to be so truly alive."[54]

Fisk stayed true to his passion for electronics by rebuilding many electric actions in his company's early years. But as the market changed, driven by Fulbrighters and Biggs converts, he started making research trips to Europe and reached out to Flentrop. With Flentrop consulting, his firm built a two-manual tracker organ with Dutch tonal design for Mount Calvary Church, Baltimore in 1961.

While the New Communalists were adopting the open, flexible, collaborative structures of the military-industrial complex, Fisk was adapting the collaborative systems of research and knowledge from the national laboratories to his organ shop floor. Although he demanded much of his employees, he paid them little and redirected the company's earnings back into research for the production of new instruments. He ran the shop more like a research-intensive laboratory or a freewheeling interdisciplinary university research center fueled by federal funding, rather than a business supported by its earnings, and worked as if against time for a cause far greater than his personal livelihood or those of his employees (and indeed the enemy, Virgil Fox, was at the gate—literally, as he established himself in the late John Hays Hammond, Jr.'s nearby Hammond Castle Museum in 1975). Fisk's leadership approach even mirrored the collaborative relationships amongst his team of scientists at the Manhattan Project. He engaged his employees daily in "brainstorming," day-to-day discussions about how to improve organ building, and his style of teaching involved collaborative dialogue, not instruction.[55] Fisk was using the new—the postwar technoculture—to reanimate the old. Eventually, Fisk would come to regret his laser-like focus on research at the expense of his employees' personal welfare. In early 1983, forced to spend a month at Massachusetts General Hospital, he summoned project manager Steven Dieck to his bedside to confess his awareness that he underpaid his workers, and "apologized for spending the money instead on research and experimentation."[56]

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[50] Whitney, 223-24.
[51] Ibid., 225.
[52] Ibid., 223-24.
[53] Ibid., 233.
[54] Charles B. Fisk, "The Organ's Breath of Life," *The Diapason* 71 (1979): 18.
[55] Ibid., 228.
[56] Ibid., 232.

Despite such later regrets, Fisk's company built the first large American tracker organs since the nineteenth century, became the first American reform builder to gain international renown, served as a beacon for the first postwar generation of reformers, and pioneered a new reform stage of historical eclecticism. In 1964, his organ for King's Chapel in Boston was the first three-manual tracker organ built in the country this century, designed in English style for organist and composer Daniel Pinkham. At Biggs' recommendation, Harvard inaugurated his four-manual organ (breaking the previous record) with an Italian baroque positive division in 1967, training the ears of a new student generation with an ensemble of powerful 8' unison foundation stops that finally signaled the end of the strident, synthesizer-like early neo-baroque aesthetic. After an alliance with Flentrop, Biggs had by now became homegrown Fisk's greatest champion. In 1981, a daring North-German style tracker organ for Wellesley College flaunted its "uncompromising authenticity" with quarter-comma meantone temperament and split chromatic keys.[57]

But it was Fisk's 1979 instrument for House of Hope Presbyterian Church in St. Paul, Minnesota that was his magnum opus, and an intentional stylistic departure from the instruments just described. This organ, built beneath a historic carillon tower and again beating Fisk's Harvard record, pioneered a new historically-informed eclecticism that acknowledged the American expectation that organs play different styles of music, not just the styles to which the local old instrument had been suited for centuries, as in historic European churches. The organ combined deeply studied styles from the North German Baroque, French Classical (really a misnomer for French Baroque), and French Romantic, all tuned in a mildly unequal temperament Fisk developed to still allow the performance of nineteenth-century chromaticism.[58] The literalness to history that dogged Holtkamp, Jr. was no longer the law, even among reformers. Fisk's instruments, central to the educations of many organists, took the reform in a new, more creatively eclectic direction.

There is still one curious connection to be explored between Fisk and ideas emerging from the military-industrial complex. During the twentieth century, new electric blowers and regulators enabled a steady and unchanging organ tone, one more like the Hammond than the Baroque organs that had relied on human bellows treaders. Fisk championed freer wind supplies, and his influential essay "The Organ's Breath of Life" became a classic of the reform era.[59] As usual, his language emphasized that the miracle of the organ was that it was a machine that acted like a living organism, one that reacted and breathed and to which its human players should be able to connect seamlessly.

"The organ is nothing but a machine, whose machine-made sounds will always be without interest unless they can appear to be coming from a living organism. The organ has to seem to be alive," his article began, oblivious to the storm of responses he would occasion. "Some people think of the human body as a machine…For the organ, the ultimate source of life is of course the player." He argued that wind is one of the primary characteristics that "foster[s] the as-if-alive quality," and that the fashion for perfectly steady wind was in error. "The standard test for the wind system of an organ is to draw all the stops, hold a note in the treble, and repeat a thick chord in the bass," and if

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[57] Owen Jander, "Remembering Charles Fisk: During his Adventure with Opus 72—the Wellesley College Organ," C.B. Fisk, Inc., http://www.cbfisk.com/charles_fisk/memorials/jander1. Fisk and Jander developed the instrument over the course of a decade, with the help of two trips to Europe organized by organist Harald Vogel that focused on Friedrich Stellwagen's organ at the Jakobikirche in Lübeck and the Compenius organ at Frederiksborg Castle in Denmark. Dom Bédos de Celles' treatise *L'art du facteur d'orgue*s (1775) served as a primary reference.

[58] Fisk's historical models and sources for the House of Hope organ included Silbermann, Stellwagen, Cavaillé-Coll, the Scherers, and Dom Bédos de Celles.

[59] Fisk, "The Organ's Breath of Life," 18-19.

the sound does not flinch, the test is passed. "Yet, when we apply this test to the best instruments of ages other than our own, we find scarcely one that passes it." He pointed to the Schnitger organ at Steinkerchen in Germany, which "would positively tip over" during such a test. Yet "it seems alive. You even seem to hear it breathing," and the resulting negative and positive pulses that begin and end each note "*mark* [italics original] the comings and goings of an inner part [in polyphonic music], instead of simply masking it."

Fisk's crusade was to replace the standardized, utterly predictable behavior of the electricity-driven modern pipe organ with the unpredictability of an organic life form with which a player had to interact and negotiate. His musical rationale was that Baroque polyphony could finally be rendered with clarity, and he wrote with the righteousness of someone who knew he was on the right side of history, whose beliefs would "become canon."[60] To return to Turner's argument, while scientists and elements of the counterculture "began to imagine institutions as living organisms, social networks as webs of information," and embraced a "cybernetic vision of the world, one in which material reality could be imagined as an information system," Fisk was conceptualizing the organ and organist as a closed system that would finally generate authentic information—experiential and sonic—about Baroque performance practice.[61] It was as if Fisk could never again accept that postwar technology was antithetical to life, as if he was forever rejecting the apocalyptic terms of the Manhattan Project for the utopian terms of the benignly artistic man-machine.[62] The military-industrial complex provided an affirming intellectual context for some of his most influential ideas.

Having selected a likeminded team, Fisk established a legacy that continued beyond him. In 1992, architect I. M. Pei's new home for the Dallas Symphony Orchestra included a Fisk whose action was mostly mechanical, but with a servopneumatic device of the company's design. In Whitney's account, the device "made the organ not a machine but almost a living organism, an instrument that was subtly responsive to the player's every nuance of touch. Jean Guillou, a virtuoso French organist and composer, paid this new Fisk 'servomechanism' the ultimate tribute with a Gallic pun: It was a '*cerveau-mécanisme*,' a 'brain-mechanism,' he said, that brilliantly and precisely transmitted the organist's thought to the valves and the pipes that express it."[63] This cyborgian rhetoric was exemplary of the ideal of seamless man-machine hybrid that had come to characterize HIP organ (and carillon) discourse, thanks in part to Fisk. Phelps' early McLuhanesque reform notion of the organ as a medium, Holtkamp's efforts to rid the organ of the mediation of its

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[60] Charles Fisk to Mark Stansbury, 22 October 1971, C.B. Fisk, Inc., http://www.cbfisk.com/sites/default/files/cbf_writings/cbf_writings_03.pdf.

[61] Turner, 4-5. The idea of a closed system was articulated by Paul Edwards to explain cold war thought. Turner explains that during the cold war, "the planet was transformed into a closed informational system for purposes of military command and control. Cognitive psychologists in turn began to imagine that the brain was a form of digital hardware and its actions a form of software, that thinking was a type of computing and memory simply a matter of data retrieval. Together, such analogies supported what Edwards has called a 'closed world discourse'." (17)

[62] Fisk was not alone in his career switch from the military-industrial complex to the construction of public musical instruments. In 1988, young electrical engineer Keith Donovan joined Texas Instruments, Inc. to design night-vision systems for Abrams tanks. "I don't have any moral problems about what I was doing. I felt like I was helping save solders' lives," he told *IEEE Spectrum* in 2005. "But, you know, tanks kill people." Although he had no prior interest in carillons, in the mid-1990s he became the sole electrical engineer for the Verdin Company, building and installing electronics to automate the carillon company's bell and clock installations. (J. Kumagai, "Keith Donovan: The Tintinnabulator," *IEEE Spectrum* 42, no. 2 (February 2005): 32.)

[63] Whitney, 236.

chambers and cases to achieve a transparent International Style look and sound, had both given way to the absence of mediation—human and machine were simply one.

In a moment whose importance hearkens back to the Paris Wine Tasting of 1976, when Californian wines beat their French counterparts in a blind test, Lausanne Cathedral ordered an organ from Fisk in 2001. Echoing the FTC's fixation on food metaphors to malign Hammond, an offended Swiss organbuilder sniffed that the instrument would have "the flavor of hamburger." A Swiss official found himself defending the selection, telling *24 Heures* that "we were convinced not only by the quality of Fisk's organs, but also by the scientific spirit of the enterprise."[64] This new record—the first American pipe organ in a European cathedral—made it clear that the Organ Reform Movement's legacy could hold its own against that of the *Orgelbewegung*—through its historical expertise, and just as importantly, through its science.

As Ambrosino noted, the "F.A.N." club led by Fisk had its counterpart in the group led by John Brombaugh, who carries on the new eclecticism to this day. Brombaugh, born in 1937, did his graduate studies in electrical engineering and acoustics, as was the cold war fashion, at Cornell. Like Fisk, he used his engineering training thoroughly in his early career, spending a year at Baldwin working on the electronic organs Kock had pioneered. He received seven patents for his work on electronics between 1964 and 1968, including designs for delay lines and artificial reverberation for electronic organs, chiff generators to achieve speech "perfection in electronic organs" that was clearly defined by neo-baroque fashions, and a means of mounting percussive systems in such organs to simulate the theater-organ sounds of bells, bars, and plucked or struck strings at different rates of decay.[65] To his contemporaries, the young Brombaugh might have seemed more of a Winston Kock than a reformer. Even during his apprenticeship with Fisk (1966-7) and German builders Fritz Noack and Rudolf von Beckerath in historical building practices, he was being assigned electronic organ patents.

Pivotal to Brombaugh's reorientation was listening closely to Biggs's recordings on tracker instruments at home and abroad. Despite, or perhaps because of, his success in electronics, he commenced in the 1960s with leading the "second generation" of reformists, building tracker instruments that brought together German, French, and Italian Baroque stops, flexible winding, and unequal temperament (but initially with electric stop controls, as at Lorain). Born on the eve of World War II, Brombaugh was a product of the American science and engineering race, and it was thanks to the organ's engineering appeal that his new eclecticism is now an icon of historically informed organbuilding.

The "Fox Touch" and "Electric Power Biggs"

There is no entry for "Fox, Virgil" in *The Organ: An Encyclopedia*, where one would expect it to fall between "Fowkes, Bruce" and "Frame." Countless obscure organ terms and builders are lovingly defined in this expansive reference tome, yet not a sentence acknowledges Biggs' greatest and most colorful competitor. Why this historical lacuna? Should an organist be written out of history for defying the ideology of the Organ Reform Movement?

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[64] Ibid., 240.

[65] John B. Brombaugh. Electronic organ with chiff. US Patent 3,333,042, filed October 2, 1963, and issued July 25, 1967.

While esoteric debates about winding, pressures, actions, scalings, key measurements, dispositions, breaks in mixtures, and so on were being carried out in academic institutions, organ shops, conferences, and specialist journals, the rivalry between Biggs and Fox gave a public face to the Organ Reform Movement and its critics. For his voluminous contributions to the recording industry, Biggs became the only organist with a star on the Hollywood Walk of Fame. Fox counted his countercultural stardom at venues like the Fillmore East (as well as pop appearances on the *Ed Sullivan Show* and *Mike Douglas Show*, where he dueled with Liberace) as ample proof of his own cross-demographic celebrity status. For Whitney, "Virgil Fox was a polarizing figure, and at the opposite pole was his leading rival, E. Power Biggs. Their vividly contrasting artistic personalities would come to symbolize the radically different approaches to the instrument that also divided the leading organbuilders of the day." These archenemies embodied the "twentieth-century American struggle for the soul of the organ."[66]

My final argument in this chapter is that the seemingly immense divide between Fox and Biggs, like the divide between electronic organ building and the neo-baroque or between the counterculture and the military-industrial complex, was bridged by modernist attitudes that the two held in common. Whitney's summary is one of many that perpetuate a clear-cut dichotomy constructed by Fox and Biggs themselves—particularly by Fox, whose audience-rousing rejections of the score-worshipping HIP "purists" did much to publicize and caricature reform ideology and orthodoxy.

Ambrosino has issued one of the few critiques of the Biggs-Fox Baroque-Romantic dichotomy, which

> turns out to have been convenient and simplistic…Biggs was a romantic player who, at the end, had certainly mastered an anti-romantic clipped manner: the "hot-stove" style. But even in to the 1950s, Biggs' persistent legato in Bach, vocal phrasing and overall elegance was no more "authentic" than Landowska's Pleyel harpsichord…[He was] a musician who knew how to strike a public posture.

As for Fox, Ambrosino points to "his orchestral conducting counterpart – another organist, Leopold Stokowski" to suggest the tradition he epitomized. "If Biggs was a romantic player with classic attachments, Fox was an essentially romantic player with ultra-romantic attachments, with the American classic specification as his registrational point of departure."[67] While both were trained in an essentially Romantic style, their shared focus on Bach drove them to differentiate themselves through, for Biggs, leading a campaign for a more "historically informed" (essentially, more modernist) style of Bach performance, and for Fox, a campaign to bring Bach to life through the technological sublime. Contrary to popular belief, Biggs never quite left behind his Romantic style, and Fox could play Bach with as much detached articulation as he pleased.

Fox and Biggs were already alike in chafing at their field's nearly obligatory church organ duties, and both successfully sought career alternatives in the latest technological solutions.[68] Biggs became a prolific recording artist who, by insisting on being his own sound engineer and editor, applied the latest audio technology innovations to capture historic organ sounds and bring them to new generations for whom attending a live concert was merely one listening mode in a hi-fi world.

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[66] Whitney, introduction, n.p.

[67] Ambrosino, 33.

[68] The antagonistic series of letters between John D. Rockefeller, Jr. and Fox over his spotlight-stealing behavior while leading liturgical music at Riverside Church services is colorful reading in itself.

Later, Fox found his salvation from the church and its limitations on his performativity by touring with electronic organs, filling youth venues with walls of ear-splitting glorious organ sound where elderly church concertgoers would never dare set foot. Both organists made it their main crusade to bring Bach to the general public, to the point where Fox led congregational singing at some of his psychedelic "Heavy Organ" concerts.

The church responded to Fox's uncooperativeness in kind. In 1953, John D. Rockefeller, Jr. warned Fox in a letter against continuing to act like a rival soloist to the other musicians during services at the Riverside Church he had co-founded with preacher Harry Emerson Fosdick. "Suppose you tell your cook you want your eggs soft boiled and she persists in serving them to you hard boiled and when you speak to her about it, she tells you she knows how eggs should be cooked and in what form they are most appropriate for your table. Would you not feel that since you were paying her salary, you should have the eggs as you wanted them irrespective of her judgment in the matter?"[69] he demanded in frustration. Following on the legacy of the FTC, metaphorical food fights continued to break out over organ timbre and volume, all boiling down to whether the organ was a church or concert instrument.

Although both Fox and Biggs fled the church into the arms of technology, it was former engineer Biggs who became a master of technology even as he was hailed a master of the Baroque. "He is especially good at mathematics and science and, in my opinion, should do very well in this direction," Hurstpierpoint College headmaster A. H. Coombes had said of the young Biggs as he embarked on his short-lived electrical engineering career.[70] As an organist, Biggs put that mathematical mind to work with gusto. Previously, organs had sounded unsatisfactory on recordings and broadcasts because microphones could not capture their full frequency and dynamic range. Listeners missed the high and low extremes and dynamic contrasts that made the organ glorious rather than irritating, registrations that sounded balanced in the hall emerged unbalanced from loudspeakers, and tech-savvy organists had to turn *legato* into *staccato* passages for polyphony to be heard.[71] If the organ as an instrument includes the architectural space in which it resonates, then half the instrument was lost on dry recordings because microphones had to be placed close to the pipes. Biggs realized that the improved recording technologies available after World War II could solve those problems. Microphones could now capture a wider frequency and dynamic range, and just as importantly, could be placed far back from the organ pipes to capture a church's magnificent reverberant acoustics.[72] One might dub the man "Electric" Power Biggs to describe his galvanizing organ playing and the means by which he made it known.[73]

The young Biggs had prided himself on mastering a panoply of styles and championing edgy music from Charles Ives to Howard Hanson to Roy Harris. "I'm very anxious that these Bach

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[69] Quoted in Whitney, 141.

[70] E. Power Biggs Collection, American Guild of Organists Organ Library, Boston University School of Theology ("Biggs papers"), letter dated March 15, 1922. Quoted in Whitney, 81.

[71] Harry Ellingham, "Broadcasting Organ Recitals," *The Musical Times* 80, no. 1156 (June 1939): 417-19.

[72] Biggs wrote that "for about a thousand years organs have inhabited cathedrals and other spacious auditoriums, and with a consequent independence the instrument refuses to be thrust into the present day 'acoustically treated' studios. Resonance is the priceless ingredient which gives the organ and its music character and splendor. The measure in which this essential quality can be transferred to records is the measure of the records' excellence." (Barbara Owen, *E. Power Biggs, Concert Organist* [Bloomington: Indiana University Press, 1987], 90.)

[73] I thank Richard Taruskin for telling me about this nickname, which he heard used by Joel Newman at Columbia University.

recitals shall not label me a 'specialist.' I revel in all organ literature and play Sowerby, Vierne, Widor, Karg-Elert, etc. with as much gusto as J. S. B.," he wrote to *The American Organist* in 1937 while performing Bach's complete organ works on the Harvard Germanic Museum instrument (one of those awkward transitional neo-baroque Harrison organs) (Figure 1).[74] But as he reinvented himself as a Baroque performer, he also reinvented himself as a recording and broadcasting engineer and entrepreneur. "The organ has been thoroughly abused and discredited in its use on the radio. With the technical progress of broadcasting, as of recording, organ tone can now be transmitted faithfully, and the time seems ideal for a really striking series of organ concerts, covering the finest compositions of the very large repertoire," he wrote enterprisingly to Elizabeth Sprague Coolidge in 1941. He proposed that she sponsor a weekly radio program at the Germanic Museum organ. She graciously sponsored this and many more of Biggs' radio ventures.

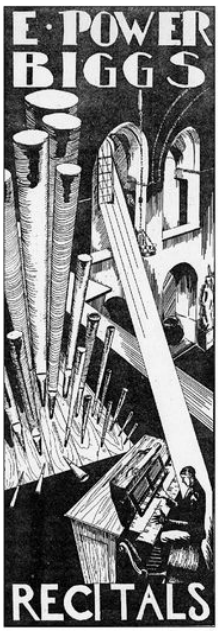

Figure 1. Expressionist poster engraved by Crawford Livingston for E. Power Biggs' twelve-concert series of Bach's complete organ works at the German Museum at Harvard University, 1937-1938. Biggs is illuminated in a shaft of light that draws more attention to the pipes than his figure.
(American Guild of Organists Organ Library)

On Sunday, September 20, 1942, Mr. Biggs decidedly "wasnt [sic] there" at church, for at 10 a.m. he was inaugurating his live WEEU-AM radio show with a Baroque program featuring Handel's Organ Concerto No. 2, Daquin's "The Cuckoo," Bach's Toccata and Fugue in D minor, and his own transcription of the aria "Sheep May Safely Graze" from Cantata No. 208. His well-loved series, especially welcome during the war, ran for sixteen years. In 1945, he broadcast the complete organ works of Bach, but also persuaded Charles Ives to dig out his organ scores from his barn. On July 4, 1948, Biggs introduced America to *Variations on America* and made it one of his signature pieces.[75] He was no Baroque "purist" yet, not even by the time he had achieved national fame.

[74] Owen, *E. Power Biggs, Concert Organist*, 42.
[75] Whitney, 103-4.

Biggs continued to advance as a sound engineer who used the newest technologies in the service of the past. In 1945, the *New York Times* marveled that "he is forever conducting experiments to achieve the best microphone pick-up and is now getting such good results that [radio] listeners throughout the nation, and the world for that matter, have written their appreciation."[76] The problem with organ concerts had not been with the ears of listeners, but with the technical ignorance of organists. Biggs' sound engineering could reach the level of obsession, as Whitney recounts.

> Better nothing at all, Biggs believed, than music that was not the real thing, as he made clear to Eastern Air Lines, United Airlines, and Delta Airlines in identical letters sent on April 17 of 1963. "May I please suggest that the canned music you inflict on your captive audience during the half hour or so of loading is really most unwelcome. As you must know, it's just musical drivel, from which, unfortunately, there's no escape," he fumed. "You really should have no music at all during the period."[77]

Accustomed to perfecting his own soundscapes in church, he sought to engineer the modern consumer airline soundscape to adhere to his ideals about attentive listening and music as autonomous art.

As important to the Organ Reform Movement as his Harvard broadcasts were Biggs' recordings of historic European organs, for which he again enlisted the newest technology. For his first recording tour to Europe in 1954, his producer at Columbia Records proposed that he bring a small tape recorder. He and his wife Margaret brought five hundred pounds of tape recorders, cables, microphones, and generators instead. In 1957, Flentrop accompanied them on their second tour and marveled at their enterprising attitude. This time, they had jammed a Volkswagen minibus with "178 reels of tape, two 28-pound Ampex speakers, a 29-pound Ampex 350 tape recorder, a Telefunken condenser, microphones, 500 feet of microphone cable, 200 pounds of power units, and much else."[78] Biggs was his own performer and his own roadie, although he rather came to regret it on that trip.

In 1974, he was still striving towards newer, better ways to reproduce the glory of organ sound on home stereos. He released a quadraphonic record of four Bach toccatas and fugues played simultaneously on the four separate organs in Freiburger Münster, which could be played together from a general console in the chancel.[79] For this singular effort, he as usual did much recording and editing himself, and the result is a massive, Frankenstein-like organ surround sound in which each note is doubled across multiple octaves and the thickened textures are positively chewy, requiring mostly staccato playing. In place of a Baroque organ record, Biggs gave his audiences a Romantic sublime produced from neo-baroque organs built in the 1960s. Sometimes, his technological zeal directly contradicted the logic of reform: to record Handel's organ concertos on an instrument from the composer's time, he had an underground power line laid to the Parish Church of St. James *and* had the pipes cut short to match the pitch of the London Philharmonic—essentially vandalizing a historical instrument for the sake of a historically-informed recording project.

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[76] T. R. Kennedy, Jr., "Triple Keyboard Expert," *New York Times*, August 5, 1945, 45.
[77] Whitney, 175-76.
[78] Ibid., 165-66.
[79] E. Power Biggs, *Bach: The Four "Great" Toccatas And Fugues / The Four Antiphonal Organs of the Cathedral of Freiburg Played Simultaneously By E. Power Biggs*, Columbia Masterworks MQ 32933, 1974, quadraphonic LP.

Figure 2. Album cover of Columbia Masterworks' quadraphonic LP *Bach: The Four "Great" Toccatas And Fugues / The Four Antiphonal Organs of the Cathedral of Freiburg Played Simultaneously By E. Power Biggs* (1974). The tower suggests timeless monumentality, while the inset photographs emphasize that the four-channel recording feeds the ear with four different organ signals simultaneously.

For several years, Biggs even aspired to film production to bring the organ beyond church to the masses. In 1945, he wrote to Walt Disney proposing an animated short for which he would play Christmas organ music. He was evidently inspired by Stokowski conducting his orchestral transcription of Bach's Toccata and Fugue in D minor for the opening sequence of *Fantasia* (1940), the first film to use surround sound after Disney took inspiration from research at Bell Labs. In 1950, Biggs sketched a film about Bach for the composer's bicentennial, recruiting the Reverend Phillips Endecott Osgood to write the script.[80] Neither venture succeeded, and Biggs stuck with the recording industry from then on. As if to one-up Stokowski, his 1955 album *Toccata in D Minor (A Hi-Fi Adventure)* repeated the famed work on fourteen different organs in Sweden, Germany, Denmark, the Netherlands, and England. This "High Fidelity survey of historic instruments as a Study in Organ Tone and Construction," as the back cover proclaimed, was sure to satisfy the geekiest of connoisseur listeners and hi-fi enthusiasts.[81]

In the twilight of his life, Biggs sought to engineer the impossible: in 1976, he sketched plans for a record that would combine his playing at St. Thomas Church in New York with the corresponding choir of the Thomaskirche in Leipzig, a "reverberation of 3,000 miles" that would allow consumers to listen to two continents via microphonic ears.[82] This techno-geographic fantasy of simultaneity was never realized, but the ailing Biggs could look back on a long and highly successful career pioneering the use of new media to promote the old medium of the organ through its technical, scholarly, and musical appeal.

I have already quoted from the LP that proved most important to the Organ Reform Movement, definitively titled *The Organ* and issued by Columbia Masterworks (DL 5288) in

[80] Rev. Phillips Endecott Osgood was rector of St. Mark's Church in Minneapolis, known for his fiery oratorical skills as well as his membership in the Minnesota Eugenics Society (Christine Rosen, *Preaching Eugenics: Religious Leaders and the American Eugenics Movement* [New York: Oxford University Press, 2004], 124).
[81] E. Power Biggs, *Toccata In D Minor (A Hi-Fi Adventure),* Columbia Masterworks ML 5032, 1955, LP.
[82] Whitney, 184.

1958.[83] This "aural and visual guide" featured Biggs' voice expounding on 125 excerpts played on historic and new organs. The Organ Reform Movement's conversation about organ tone, mechanics, registration, and performance technique was now accessible to the general public. The ideology of his manifesto was clear: he dismissed electronic organs as being "well adapted to nightclubs" but "inadequate for presentation of organ music." The best organs offered a tracker connection that made the keys "an extension of one's own fingers"—that hybrid man-machine analogy again. The deluxe production came packaged with a thirty-nine-page bound album featuring illustrated articles by Biggs, Flentrop, Metropolitan Museum of Art musical instrument curator Emanuel Winternitz, Biggs' producer John McClure, and a foreword by Albert Schweitzer, instigator of the *Orgelbewegung* himself. In 1969, Biggs issued another audiobook, *The Organ in Sight and Sound*, with another essay by Flentrop.[84]

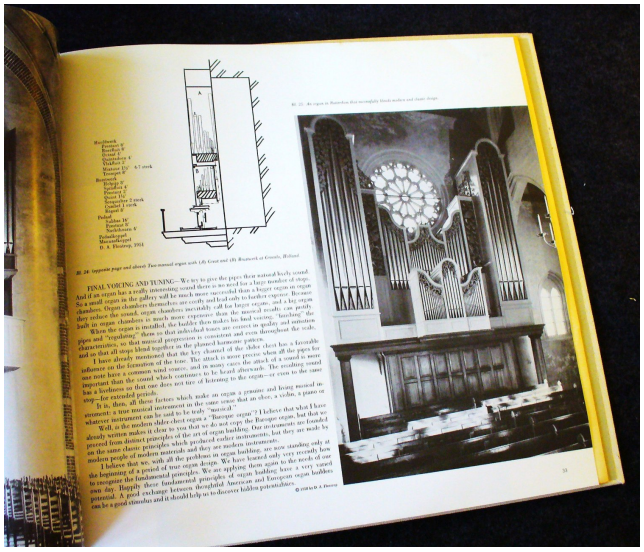

Figure 3. The illustrated book accompanying E. Power Biggs' LP *The Organ: An Aural and Visual Guide* (1958).

On a dime, Biggs could turn from being an engineer to a Luddite, even on his first audiobook. "The organ appears to possess a fatal appeal to ingenious but not necessarily musical minds," he wrote in his introduction. In the nineteenth century,

> the organ, previously as responsive as a harpsichord, was turned into something approaching a machine. Its measure came to be volume and number of stops. Voicing ideals were based largely on imitation of the orchestra. Pneumatic and electric actions provided the player with a set of telegraphic ivories instead of the sensitive keyboard of direct tracker action.

Attacking the twentieth-century mutual relationship between the organ and telecommunications innovations, Biggs shot down the concepts of "telegraphic" keys, orchestral simulation, and the organ as machine in favor of the Baroque organ as extension of man. Yet even the cyborg ideas he promulgated remained modernist and bound up with the technological and cybernetic ideas of his

[83] E. Power Biggs, *The Organ: An Aural and Visual Guide, compiled and discussed by E. Power Biggs with the sounds of many modern and historic organs.* Columbia Masterworks DL 5288, 1958, 33⅓ rpm. With articles by Biggs, Emanuel Winternitz, Dirk A. Flentrop, and John McClure, and foreword by Albert Schweitzer.
[84] E. Power Biggs, *The Organ in Sight and Sound*, Columbia Masterworks KS 7263, 1969, LP.

time. By denigrating the "fatal appeal" of the organ to the engineering mind, Biggs was erasing his own history.

There is no doubt that Biggs came to epitomize the straitlaced performance that characterized postwar constructions of HIP, but his style was not as resolutely anti-romantic as his rivalry with Fox portrayed him. He had trained to play in the dominant Anglo-American style, with overlapping legato and ample crescendos and decrescendos with the swell, and he relished nineteenth-century repertoire and new music alike. His signature renditions of Ives' *Variations on America* were zany and capricious. It was really after his European tours and resulting hit album releases that his articulation changed to fit HIP expectations. His touch became increasingly staccato. His formerly steady tempi became positively motoric—the famous opening of Bach's Toccata in D minor resembled a finger etude by 1971, and near-jauntiness replaced the drama of the Fugue.[85] The most shocking diminished harmonies of the Fantasia & Fugue in G minor (BWV 542) would arrive right on the beat, matter-of-factly and without fanfare, yet Biggs kept his touch surprisingly legato, revealing a continued allegiance to Romantic performance.[86]

It seems clear that he was aiming for the "style-less" style that Leonhardt would later articulate, oriented more towards the nineteenth century (in his attempt to reject it) than towards the Baroque (in his attempt to affirm it). His unrelenting use of plenum registrations on Bach albums tires the ears, and the *moto perpetuo* of his playing at times suggests the "organ as machine" metaphor that he despised. "Anti-romantic" goes farther in explaining this expressive performer's turn towards the "click-track Baroque," or even more disparagingly, the "sewing machine Baroque" that Fox considered the death of Bach performance.

Nevertheless, Biggs continued to revel in his pre-neo-baroque interests. He acted the theater organ showman in 1973, wowing audiences at the "mighty Wurlitzer" in Radio City Music Hall and wrapping up his concert with an over-the-top performance of John Philip Sousa's "The Stars and Stripes Forever" with ten pianos. Even when he looked the ultimate academician with his pedal harpsichord, the albums he released on it were of all things, two volumes of *E. Power Biggs Plays Scott Joplin* ("After 25 years with Columbia Records, E. Power Biggs is in Rags!" was a suggested advertising slogan).[87] Biggs was romantic, Biggs was popular, but most of all, Biggs promoted a modernist style of neo-baroque performance practice because it brought him the concert and recording career that the church could not.

While Biggs styled himself in the suits of an English gentleman, finished with a folded pocket square, Fox swished about in a luxurious red-lined cape and rhinestone-studded organ shoes. Biggs retained his British accent, while Fox used terms of endearment with everyone he met. Whitney encapsulated Fox's flamboyant comportment with an anecdote from the Riverside Church, where his celebrity demeanor was seen as a poor match for the sober services he was supposed to play:

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[85] E. Power Biggs, *Bach: Great Organ Favorites*, recorded between 1960 to 1971, CBS Masterworks MK 42644, 1989, CD.

[86] E. Power Biggs, *Bach: Toccata & Fugue, Passacaglia & Fugue, Pastorale,* recorded 1960, 1964, and 1971, Sony Classical SBK 46551, 1991, CD.

[87] Whitney, 180-81. The LP was released in 1973 by Columbia Masterworks (M 324950).

> Dr. Norris L. Tibbets, one of the most dignified senior ministers at Riverside, was once startled by a greeting from Fox at the organ console, "How good to see you, Honey!" Dr. Tibbets replied, offended, "I'm not your honey, and kindly never address me that way again!"[88]

Yet both organists were affecting European aristocracy through their sartorial branding, and the Illinois-born Fox was especially keen to emphasize his European musical pedigree. He studied at the Peabody Conservatory with Dutchman Louis Robert, former organist of the famed 1738 Christian Müller organ at the Grote of Sint-Bavokerk in Haarlem—albeit just for one year, during which the prodigy played five recitals by heart, completed his diploma requirements, and achieved the school's highest examination grades. He out-Dupréd Dupré in mastering detached playing even before his first lesson with the articulation-obsessed Paris Conservatoire teacher.[89] And he always cited Wilhelm Middelschulte, one of the world's leading Bach performers, as the single most important influence on his style, despite the fact that the German organist had taught him in high school in Chicago.[90] For the rest of his life, Fox publicly traced his lineage to the German Bach school, even as he sometimes used that authority to take liberties with his Bach interpretations. In 1975, he laid claim to the legacy of the early *Orgelbewegung* (kept at a safe distance from its American counterpart) as the first chairman of the Albert Schweitzer Music Award, established calculatingly by his closest associates.

Fox saw no use in cultivating a public profile as an HIP proponent when he could simply be a Bach champion. His opponents skewered his "inauthentic" Bach renditions, and he gladly encouraged this unwitting assistance with branding his "red-blooded Bach," which under his messianic slogan "Bach lives" brought the organ to life as Fisk aspired, albeit in a decidedly different manner (Figure 4). However, his recordings were rarely entirely Romantic in style, often demonstrating a knowledgeable investment in his contemporaries' anti-romantic performance practice ideas. Having already cemented his anti-HIP notoriety at Bill Graham's Fillmore East and Winterland Ballroom venues with electronic "Heavy Organ" concerts, he gave his stump speech to a screaming audience at his 1973 "Heavy Organ at Carnegie Hall" appearance. "I'm here to tell you that if the greatest music in the world is lined up on this side, and then Bach, still greater, on this side, he's not going to be under a dusty case in a museum next to a comb that some *dead queen* wore in her hair three thousand years ago. Not on your life!" Yet what followed this opening salvo against the "purists" who "*talk* about it and can't *do* it" was a steady, dignified performance of the chorale prelude on "Wir glauben all' an einen Gott" (BWV 680) with a top-heavy neo-baroque plenum, using a staccato detachment in the manuals (brought into even sharper relief against his legato pedalwork) that would have made a reformist's eyes water. His performance elicited screams and whistles, although it clearly made use of the "hot stove style" he had scathingly referenced. The subsequent chorale prelude on "Nun freut euch, lieben Christen" (BWV 734), though at breakneck speed, again reflected neo-baroque registration and staccato articulation. It was not until the third Bach selection, his transcription of the finale "Wir setzen uns mit Tränen nieder" from the *St Matthew Passion* (BWV 244), that he discarded HIP altogether.

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[88] Whitney, 140. Not all church authorities disliked Fox's demeanor, of course—having helped the Crystal Cathedral in southern California design its Ruffatti organ, Fox died a well-loved man in that megachurch. At a public celebration of his life there, televangelist Robert Schuller memorably opened his eulogy, "Well, Honey…" (213).
[89] Whitney, 125-26.
[90] Richard Torrence, "Organs on Broadway! Honoring Virgil Fox," *The American Organist* 39 (September 2005): 66-67.

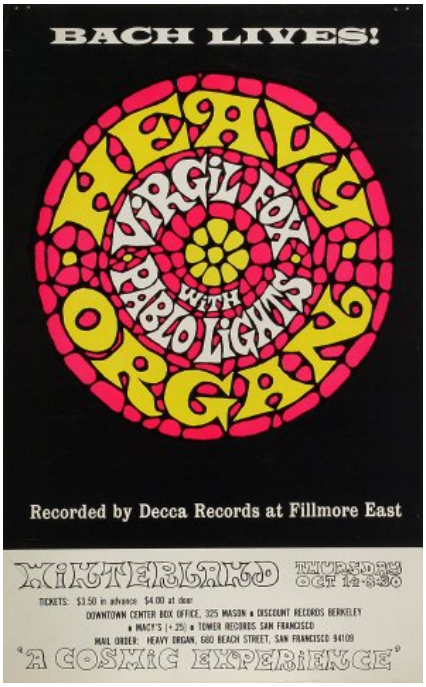

Figure 4. 1971 poster for "Heavy Organ" at Winterland, San Francisco. Pablo Lights provided lightshows for many of Fox's Rodgers Organ concerts until it was replaced by Revelation Lights in 1972. The poster cleverly combines psychedelic imagery with the design of a Gothic rose window.

Fox's ploddingly slow, legato performance, enlivened with a subtle tremulant, unabashed crescendos and decrescendos, orchestral colors, and frequent manual changes, brought a dramatic theater-organ sensibility to the *St Matthew Passion*. The theater organ also underlay his signature Bach showstopper, "Come Sweet Death" (every Bach program and record liner gave Bach's titles in English). In 1939, he had transcribed Stokowski's Philadelphia Orchestra arrangement of "Komm, süßer Tod, komm selge Ruh" (BWV 478) from the RCA Victor disc, and perfected otherworldly registrations for it on Philadelphia's gargantuan Wanamaker theater-style organ over the course of eight visits. The organ's 6,000-pipe string division "wraps its sound around you—and squeezes," a fan explained of the performance, which earned a standing ovation from the organists gathered for the American Guild of Organists convention.[91] The style that Fox was accused of foisting on Bach, now dismissed as ahistorical or as a Romantic affectation, was inspired by the more recent style of silent film accompaniment than by Chopin. The "hot stove" staccato touch and the connected legato that "squeezes" could coexist without special note on Fox's programs. In fact, some of his Bach performances might today be judged more historically "correct" than Biggs' in using more flexible ideas about tempi and registration to emphasize structural contrasts. Taking a postmodern approach, Fox employed either interpretive style as it suited him.

Although Fox did not align himself with HIP, he espoused the same *cause célèbre* as Biggs to bring forth Bach's organ works from the church to the general public. He verbally introduced each piece in concert, and his opening speech was usually to the effect of "I honestly believe that Sebastian Bach is glad you are here!", emphasizing the Lutheran German's familiarly Anglo *Rufname* as if he were alive. His pep talks used the same strategy that Early Music performers had adopted to educate

[91] Whitney, 126-27.

audiences to appreciate unfamiliar sounds.[92] Bach became as central to Fox's brand as his flamboyant outfits. Of the more than sixty records he released over the course of his career, many contained multiple Bach works. At his Heavy Organ concerts, psychedelic light shows were distinguished by "Bach's stern features popping up occasionally," as fellow electronic organist Carlo Curley recounted.[93] While Fox claimed to be diametrically opposed to the "purists," he was actually mainly opposed to limiting performance to a single style that located the work in the notated score, as he told his Heavy Organ audience:

> I am at open warfare with a gang of *creeps* who call themselves purists…These oddballs call [the Fugue in G Minor (BWV 578)] the "Little" Fugue. They put on an eight- and a two-foot stop; you don't know what that means, but it's just a *boop* on one end and a *boop* on the other, and they sit there playing their little typewriters like note-pushing nobodies during this piece.[94]

Fox used the metaphor of the typewriter to scornfully emphasize the importance Early Music practitioners placed on score studies and the interpretive limitations that such textual fidelity occasioned.[95] He sometimes respected those limitations, and sometimes ignored them in favor of showmanship. For him, the work of art was not in the text—mere mechanical encoding—but in personal interpretation and reception.

Like Biggs, Fox saw the church as a stuffy, irritating impediment to his concert career. And like Biggs, he turned to technology for a solution. But lacking his rival's technical expertise, Fox found his biggest career break in the production of a totally different kind of technological musical sublime. And he went a step further by extending his reach far beyond churchgoers to the youth counterculture, of which the Early Music movement was a bespectacled counterpart.

By this time, Hammond and Baldwin had ample competition in the electronic organ market. A major competitor arose from oscilloscope leader Tektronix, a company founded in 1946 during the postwar research boom. Founders C. Howard Vollum and Melvin J. Murdock introduced two major innovations, the first time-base triggered oscilloscope and later the plug-in oscilloscope. During a brief downturn in 1957, Tektronix invited its engineers to propose new products. Rodgers Jenkins (an organ enthusiast) and Fred Tinker (who knew little about organs until invited by his church as an electrical engineer to chair its electronic organ selection committee) proposed to build electronic organs. Although the board rejected the idea, Vollum, a theater organ enthusiast, and Murdock helped them start their own business. The Rodgers Organ Company became the second manufacturer of solid-state oscillator-based organs, completing their first instrument with vacuum-tube amplifiers in 1958. In 1962, Rodgers introduced solid-state amplifiers, producing the first all-transistor organ.

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[92] Fox did not trace his mini-lectures to the Early Music movement, of course. "I've always talked to my audiences," he told the *New York Times* in 1974. "Years ago I was playing a concert at a church in Augusta, Georgia. The third piece was the Fantasy in G minor of Bach, and I said to myself, 'My God, these 3,000 Georgia crackers won't have the slightest idea of what's going to happen. I have to tell them.' That was a milepost in my earth-existence. I even played much better. By talking, the artist can get rid of himself, get rid of his nerves." (Richard Dyer, "Who Is the World's Best Organist? Ask Virgil Fox," *New York Times*, September 29, 1974, 34.)

[93] Carlo Curley, *In the Pipeline: Memoirs of an International Concert Organist* (London, HarperCollins, 1998), 77.

[94] "Virgil Fox Heavy Organ," YouTube video, 9:42, from an early 1970s performance, posted by "ShandyHall," May 3, 2008, https://youtu.be/gIPCx3Te-BA.

[95] In "My Credo," *Music Journal* 25, no. 2 (February 1967), Fox elaborated on his opinion of score fidelity, "Art, literature, drama—they are all involved in a common set of changes which I call a preoccupation with the *letter* rather than with the *essence* of the law" (25).

It is little known that Fox shared Biggs' hatred for electronic organs, especially since he accepted invitations to concertize on Hammond Organs and even released *Virgil Fox Plays the Baldwin Organ* in 1966. But when the Rodgers Organ Company offered to pay him to tour with one of their models, he gamely loaned his brand name to the product and got on the road in 1966 with the three-manual "Virgil Fox Touring Organ" (or "Black Beauty," as he fondly called it) and light shows by David Snyder. He called the instrument a "Heinz 57 varieties" in the *New York Times* as if to flaunt its lack of good taste *and* its popular appeal.[96] "I do not cram down the throats of the concert-going public morsels of choice music that have been shrunken and dried by dull, lifeless, and colorless interpretations," he proclaimed in *Music Journal*.[97] The FTC's food metaphor was back with a vengeance. Fox accused the "purists" of determining that concertgoers were better off "eating their spinach" instead of serving up the "mashed potatoes" they actually liked.[98] He called Biggs' HIP style about as interesting as "dried owl shit": it wasn't even edible.[99]

Figure 5. Page from a 1970 Fillmore East program advertising Virgil Fox's upcoming "Heavy Organ" all-Bach concert "on the world's heaviest traveling cathedral organ" on December 1. Bill Graham was quoted by Herb Caen in the *San Francisco Chronicle* as quipping, "Maybe the kids are ready to move on from John Sebastian to Johann Sebastian." (Only the former appeared at Woodstock, though.) (Courtesy of Len Levasseur, http://www.virgilfoxlegacy.com/pressbook.html)

[96] Whitney, 191.
[97] Fox, "My Credo": 25.
[98] Whitney, introduction, n.p.
[99] Ibid., 192.

Fox used his newfound mobility to go after the youth counterculture that had risen during the 1960s, presenting a vision of Bach as a living, breathing technological spectacle. On December 1, 1970, he gave his first "Heavy Organ" psychedelic concert at Bill Graham's downtown New York rock venue, the Fillmore East (Figure 5). The "Church of Rock and Roll" was more accustomed to vibrating with the Grateful Dead and Jefferson Airplane than Bach. Yet Fox's all-Bach "clean trip" packed the house to its 2,650 capacity, and 600 more disappointed youths were turned away at the door.[100] The repeat show drew an audience of 2,000, including a fair number of non-hippies, since the already high prices had been raised. Each subversive in their own ways, Early Music listeners and countercultural youth collided in a marijuana-enfolded Bach festival. The audience encountered not a historical image of Bach, but Bach as audiovisual rock spectacle. Fox kept the volume at earsplitting levels with Black Beauty's 1,800-pound console, sixteen amplifiers, 134 loudspeakers in thirteen or fourteen cabinets and two bass cabinets.[101] Dry ice billowed out from beneath the pedalboard, and after the encore, smoke again engulfed Fox and his keyboard. It looked as if his virtuosity had actually brought the organ to life, short-circuiting the "machine" in the process, while inadvertently coopting the 1962 rumors that the avant-garde had "made the organs burn" in Sweden.[102] Not content to stop there, Fox upgraded in 1975 to a five-manual Rodgers touring organ, the "Royal V," with a complex interface that visually suggested the machine's endless possibilities. In 1977, he switched to a four-manual Allen touring organ that he dubbed "The Aristocrat." Its 150 stops, 12 computers, and 2,700 watts fed into about 600 loudspeakers, and he used it for the rest of his career.[103]

Figure 6. The record jacket of Virgil Fox's *Bach Live at Fillmore East* (MCA Records MCA-28, 1971) gives nearly equal visual emphasis to Fox, the Rodgers electronic organ controls, and the light show by Pablo Lights.

[100] The idea of offering Fillmore East audiences a "clean trip" was mostly the teetotaling Fox's own invention. His reaction on the first night, per Whitney: "'Is that marijuana?' he gasped, clapping a handkerchief over his face" (194). Fox was, however, well known to indulge in chocolate and ice cream.

[101] Even Fox's followers thought he set the Rodgers Organ's amplification too high. "It sounded ugly, loud, and definitely 'electronic.' Virgil was mostly to blame…It was like a hammer that bludgeoned," recalled Ted Alan Worth (Whitney, 188).

[102] Martin Herchenröder, "From Darmstadt to Stockholm: Tracing the Swedish Contribution to the Development of a New Organ Style," in *The Organ as a Mirror of its Time: North European Reflections, 1610-2000,* ed. Kerala Snyder (New York: Oxford University Press, 2002), 315.

[103] Carlo Curley was also touring at the time with a four-manual Allen Organ (1976) with 380 loudspeakers in fifty cabinets (*The Organ: An Encyclopedia*, s.v. "Electronic Organ").

The move to electronic organs firmly inscribed the binary between Fox and his electronics and Biggs and his tracker organs. Fox's association of lavishly expressive playing with personal flamboyance could particularly offend social conservatives, even those who subscribed to Biggs' semi-Romantic Bach style. A disturbing account by William F. Buckley, Jr. of the first night at Fillmore East recorded that "at one point during a prelude, I am tempted to rise solemnly, commandeer a shotgun, and advise Fox, preferably in imperious German, if only I could learn German in time to consummate the fantasy, that if he does not release the goddam vox humana, which is ooing-ahing-eeing the music where Bach clearly intended something closer to a bel canto, I shall simply have to blow his head off."[104] The *Boston Globe* critiqued the "spermy" lighting effects in this "mixture of showmanship, Bach, lights, slightly tattered virtuosity, [and] homoerotic fantasies,"[105] while the *New York Times* described his mini-talks as "homey-eccentric."[106]

The dominant organ discourse had switched from food to sexuality, an arena in which HIP's Biggs subscribers could quietly claim the higher ground.[107] Of course, the $5,000 rockstar-size concert fees that Fox now commanded, magnitudes more than any other classical organist, proved that plenty of listeners were buying into his "homey" performances. The Hell's Angels were amongst the 6,500 attendees at his 1973 Wolf Trap Farm concert in Virginia, simultaneously embodying American criminal masculinity and homoerotic appeal.[108] (In 1969, the gang had achieved musical notoriety in California for turning the Rolling Stones' Altamont Free Concert, intended as a "Woodstock West," into a fatally violent chaos.) As with Fox's easy adaptation of different musical styles, he also switched effortlessly between "homey" and churchy. His Heavy Organ concert at Carnegie Hall was a combination of religious revival, rock concert, party, and church choir rehearsal, in which he glorified God via the proxy of a Bach throwdown (with an invisible Biggs) and Bach celebrity worship. Fox even led his audience in singing Christmas carols, the most secularized of hymns—in vocal harmony, with all the verses, hinting that the counterculture and classical music fans had converged on the hall to engage in reverentially attentive listening to his surprisingly understated, steady-tempo interpretation of Bach's Passacaglia & Fugue in C minor (BWV 582).[109] Biggs had brought religious gravity to the Early Music crusade, and Fox was bringing religious righteousness to his conversion of young Bach fans.

Fox's final commercial recordings were two volumes of *The Fox Touch* (1977), recorded on the five-manual Ruffatti organ that he helped design for the Crystal Cathedral. Architect Philip Johnson designed the megachurch entirely in glass after tiring of the metallic orthodoxies of the International Style. By this point in his career, the "Fox touch" was almost entirely legato, and his

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[104] William F. Buckley, Jr., *Cruising Speed: A Documentary* (New York: G. P. Putnam's Sons, 1971), 51.
[105] Quoted in Richard Dyer, "Who Is the World's Best Organist? Ask Virgil Fox," *New York Times*, September 29, 1974, 19 and 34.
[106] John Rockwell, "Music: Virgil Fox Plays," *New York Times*, January 16, 1976, 21.
[107] However, the language of masculine sexuality has been applied to the organ since at least the first half of the twentieth century. In 1941, E. M. Skinner viewed changes to his orchestral organs as attempts to "sterilize" and "tonally castrate" them (Whitney, 73). Walter Holtkamp remade the neo-organ into what Ambrosino describes as "lean cuisine tonal design" (34)—he rejected the dandy for Howard Roark, the blended orchestra for the brassy clarity of his new polyphonic ensemble. In the contrast between Skinner and Holtkamp, one sees the change from the nineteenth-century gentleman of artistry and nonspecialist good breeding to the postwar scientist and modernist designer, from the tonal coloristic shimmers of Renoir's piano-playing girls to the austere clean lines and sober color palette of Edward Hopper's *Nighthawks* (1942).
[108] Whitney, 197.
[109] The Christmas carols sung were "The First Nowell" and "It Came Upon A Midnight Clear."

interpretations altogether idiosyncratic. His final artistic statement foregrounded an aggressively anti-historical style, acknowledging the essential modernism at the heart of all Bach performance, no matter how "historically informed." The neo-baroque organ had advanced through Phelps' idea of the medium as the message (the typewriter organ), to Holtkamp's ideology of unmediated sonic and visual transparency, to Fox's attempted erasure of the organ as medium. He presented his all-too-human interpretations as the *sole* message—despite the fact that his medium was the latest organ technology around. Perhaps he believed that he had at last completely differentiated himself from the recording-savvy organist whose career strategy, style, and Bach advocacy he had long shared, but Biggs and Fox still had it in common that they had remade Baroque performance in their own images.

Switching On Bach

Although the organ is stereotyped as a churchly instrument distant from secular life and resistant to the avant-garde, this chapter has shown the ways in which organbuilding and performance were driven in the 1950s and 1960s by secular postwar trends even as organists and builders drew on the Baroque past for aesthetic authority. Following the serialism promoted at Darmstadt (which would hardly have found a place in church), the neo-baroque embraced the alternate rationality exemplified by Bach's fugues. The shrill, chiffy neo-baroque aesthetic was based less on listening to surviving Baroque instruments than on a rejection of the American organs of the long nineteenth century, heavy on 8' fundamental and legato orchestral simulations.

Hence the neo-baroque construction of Bach's sonic aesthetics as those of the electronic synthesizer, exemplified by Walter Carlos' 1968 hit album *Switched-On Bach*. This record featured painstakingly orchestrated Bach arrangements for her (then his) customized Moog keyboard synthesizer and stayed in the Billboard Top 40 pop chart for seventeen weeks (Figure 7). (Like Fox's absence from *The Organ: An Encyclopedia*, little scholarship exists on Carlos' album relative to its tremendous impact.) Needless to say, Columbia Records' tongue-in-cheek follow-up release *Switched Off Bach* (1972), with the same track list played by Biggs, Zoltán Rozsnyai, Pablo Casals, and Glenn Gould, had fewer takers.[110]

Having ruffled the binary between the neo-baroque and modernism, and between Fox and Biggs, I now look briefly to their legacy in a present that perpetuates, and perhaps still economically depends on, that binary construction.

[110] Glenn Gould did, however, enthusiastically endorse Carlos' work: "Carlos's realization of the Fourth Brandenburg Concerto is, to put it bluntly, the finest performance of any of the Brandenburgs—live, canned, or intuited—I've ever heard." (Quoted on the record sleeve of Carlos' LP *The Well-Tempered Synthesizer* [1969].)

Figure 7. The cover of Wendy Carlos' album *Switched-On Bach* (1968), Columbia Masterworks MS 7194, depicts the master himself in a powdered wig using a Moog synthesizer.

The Associated Pipe Organ Builders of America (APOBA) officially "does not welcome membership of firms that build electronic organs or combination electronic/pipe organs," thus excluding some of the oldest and largest organ companies, including Austin, Wicks, Reuter, and Cornel Zimmer.[111] Yet even Fox was clever enough to do an about-face from deeming the combination of organ pipes and electronics as akin to "birdshit in a cuckoo clock."

Ambrosino put a fine point on the long-established blurring of "real" and "electronic" organs in 1998. "Even these three labels—tracker, electric, combination—must be considered suspect," he warned in *The American Organist*. "Even the term electronic now means many things where it merely used to imply the worst. The organ world has become as complex as modern life."[112] In reference to the growing dominance of MIDI technology in pipe organs, he pointed out that "MIDI, despite its nice clothes and good breeding, is merely the electronic organ in fashionable, flexible clothing."[113] The dependence on solid-state electronics was not even worth mentioning. He concluded (not without regret) that "twenty-seven percent of organs built in 1996 had some form of electronic augmentation… The issue is not whether we are winning the battle against electronic organs, but rather the moment at which we lost the battle. When the Allen Organ Company builds a third of the world's church organs, and at last count they had more than 600 employees and take in tens of millions of dollars a year—more than the entire American pipe organ industry put together—I am sorry, but the battle is lost."

This chapter has suggested that the battle was lost at the beginning of the twentieth century, when an influx of electrical engineers and telecommunications researchers championed the advancement of the organ as their cause. But I would also suggest that the battle was won long ago, because the organ has defined high technology since medieval times, and is continuing to fulfill that role through new tracker-based innovations such as the "hyperorgan," which Randall Harlow defines as "an organ with extended capabilities that seamlessly blend the electronic and acoustic worlds along

[111] Associated Pipe Organ Builders of America, "APOBA Principles Concerning the Use of Electronically Generated Sounds," adopted March 2000, http://apoba.com/downloads/apoba_position_regarding_electronic_sounds.pdf.
[112] Ambrosino, 23.
[113] Ibid., 35.

the lines of other hyper instruments developed by Tod Machover and researchers at the MIT Media Lab."[114]

In 2014, National Public Radio featured thirty-two-year-old Juilliard alumnus Cameron Carpenter's third album *If You Could Read My Mind* on *First Listen*, temporarily allowing listeners to stream the album online for free in advance of its release.[115] Carpenter's branding sells his homoerotic sex appeal, pale Mohawk-punk fashion sense (enlivened with deceptively childlike touches such as impossibly virtuosic pedalwork performances in dinosaur sneakers), and of course, his reincarnation of Fox's technological sublime. His custom International Touring Organ by Marshall & Ogletree, which he debuted at Alice Tully Hall enhanced with a dramatic light show, presents the spectacle of nine cabinets, each with four vertical speakers, and four large additional speakers looming in the background.[116] His music video of Bernstein's Overture to *Candide* uses extreme low-angle shots to emphasize the mass of technology that he controls with a touch of the fingertips or toes.[117]

By carrying out yet another "illegal border crossing" as the *Elektrium* was accused of doing in 1964, Carpenter may also be writing himself out of organ history and its reference works.[118] Mentions of him are studiously avoided in professional organist and organbuilding circles, except when a reason to chortle or groan is needed. Yet this very silence reveals a long-standing truth: the pipe organ is always already a machine, invented by "ingenious minds," and today's new eclectic style and its rebellious critics are all products of a moment of American history dominated as much by the military-industrial complex as by the counterculture that spun off the Early Music movement. In that light, I dare to act as one of the "musicological activists" Holtkamp, Jr. so resented, and voice a plea to preserve the elder Holtkamp's midcentury neo-baroque instruments. Those organs are irreplaceable representations of a cold war style in which scientific research collided with historical research. Unsatisfying as they sometimes are to play, they are not examples of a mistaken baroque, but of modernism through and through. The new historically informed organs that, in our search for a more direct connection to the past, are replacing those Holtkamps today, will themselves eventually be viewed as products of their time.

Promoting the preservation of these instruments will not be easy. Richard Kassel has noted the challenge posed by their lack of repertoire: "If the neoclassical aesthetic means taking older ideas and viewing them through new eyes to produce a new synthesis, then this term applies to these organs—but not the music associated with them. The best composers remained faithful to the sonorities they knew (Olivier Messiaen) or the liturgical setting they worked in (Hugo Distler); there was no major organ school that depended on the neoclassical organ per se."[119] Because those organs

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[114] Randall Harlow, "Recent Organ Design Innovations and the 21st-century 'Hyperorgan'," (doctoral thesis, Eastman School of Music, 2011), http://www.huygens-fokker.org/docs/Harlow%20-%20Recent%20Organ%20Design%20Innovations%20and%20the%2021st%20Century%20Hyperorgan.pdf.

[115] Tom Huizenga, "First Listen: Cameron Carpenter, 'If You Could Read My Mind'," NPR Music, 16 August 2014, http://www.npr.org/2014/08/16/339595914/first-listen-cameron-carpenter-if-you-could-read-my-mind.

[116] Anthony Tommasini, "Organist Introduces New Partner in Concert: Cameron Carpenter Performs on His Touring Instrument," *New York Times*, March 10, 2014, http://www.nytimes.com/2014/03/11/arts/music/cameron-carpenter-performs-on-his-touring-instrument.html?_r=0.

[117] Cameron Carpenter, "Cameron Carpenter – 'Candide': Overture," YouTube video, 5:39, produced by Sony Music Entertainment in 2014, posted by "cameroncarpenterVEVO," https://youtu.be/zq_cy-ztcHc.

[118] Alfred Reichling, "Kopie-Reproduktion-Imitation," in *Das Elektrium: Beiträge zur Klärung der Frage Orgel-Orgelimitation* (Berlin: Verlag Merseburger, 1964), 27.

[119] Richard Kassel, "Neoclassical Organ," in *The Organ: An Encyclopedia*, 366.

combined different national historical styles, organist-composers found it difficult to escape those separate traditions or combine them into a new aesthetic. While no repertoire calls for neo-baroque organs, we need those instruments to know what builders and players of that era wanted pipe organs to feel and sound like.

In 2012, Allan Kozinn pointed out that performers of early music and electroacoustic music face the same problem: they require outdated technology that is difficult to obtain. For example,

> the characteristic sound of the Philip Glass Ensemble was the acrid whine of a Farfisa electric organ, a staple of 1960s garage bands. Mr. Glass adopted the Farfisa almost by accident. As he put it in a 1980 interview, he needed a portable keyboard and found some used Farfisas, "all in Queens, in knotty-pine basements, under stairwells."[120]

There are probably no mother lodes of Farfisa organs to be found anymore. Kozinn imagines a world in which recently outmoded instruments, victims of rapid obsolescence, are preserved:

> If I were a period-instrument maker looking for expansion ideas, I would keep an eye on this. I'd buy up and recondition old-fashioned metronomes, Farfisa organs, Buchla and Moog units, Atari computers and every generation of Mac I could find. I'd warehouse spare parts and archive hardware schematics and software code… Someday specialists in 20th- and 21st-century music may decide that the sampled sounds of antique technology just aren't good enough. And someone should be ready to supply the real thing.

Perhaps we could add neo-baroque American organs to Kozinn's list.

Figure 8. University Organist and musicology professor Lawrence Moe at Holtkamp's three-manual electropneumatic O'Neill Memorial Organ (1958) in Alfred Hertz Memorial Hall at the University of California, Berkeley. This organ, replaced by a Noack tracker organ in 2013, is in storage and for sale as of this writing. The photograph by Ansel Adams, which captures Holtkamp's famed modernist design, was made for the centennial of the University of California. (Ansel Adams Fiat Lux Collection UCR/California Museum of Photography, University of California, Riverside)

[120] Allan Kozinn, "Electronic Woe: The Short Lives of Instruments," *New York Times*, June 8, 2012, http://www.nytimes.com/2012/06/10/arts/music/new-music-works-with-surprising-problem-dated-instruments.html.

Chapter 3. The Philips Electronics Carillon: A Civic Symbol for Corporate Campanology

> On Friday, September 23 at approximately 4 p.m., work will be halted in all Philips branches, so that by all means necessary, ear-witness may be borne to a direct sonic reportage of the presentation of the festival gift in Eindhoven.
>
> "Also in Limburg, a festival for the 75-year-old Philips: Eindhoven a city of pleasure for two days," *Limburgs Dagblad*, May 13, 1966, 13[1]

September 23, 1966. It was a clear Friday afternoon when Philips Gloeilampenfabrieken (Lightbulb Factory) employees around the Netherlands leaned eagerly towards their office radio transceivers to hear the sound of bells.[2] In Jacob Oppenheimpark in Eindhoven, the southern city where Philips opened its doors in 1891, employee L. de Windt was signing over a new sixty-one-bell carillon in a stand-alone tower to the Philips Board of Directors in order to commemorate the company's seventy-fifth anniversary. The boldly modernist belfry housed the first five-octave carillon in the Netherlands, where the instrument had been developed four centuries previously. Each of the bells was lovingly emblazoned with a repeating Philips logo—a pair of four-point stars—and the first-person inscription, "Eijsbouts goot mij voor het Philips-personeel in Nederland" (Eijsbouts cast *me* [italics added] for Philips employees in the Netherlands). The 7,100-pound bass bell, which sounded B♭3, was further humanized with the name Gerard after co-founder Gerard Philips (1858-1942), and the next (a C3 because the typical European carillon's short octave omits B3 and C♯3) was named Anton, after his brother Anton Philips (1874-1951), responsible for the business's global growth (Figure 1).

Figure 1. The repeating Philips logo and the named bass bells Gerard and Anton in the Philips Carillon. (Photos: Tiffany Ng, 2012)

[1] "Op vrijdagmiddag 23 september plm. 16 uur zal het werk in alle Philips-vestigingen worden stil gelegd, opdat allen middels een rechstreekse geluidsreportage oorgetuige kunnen zijn van de aanbieding van het feestgeschenk in Eindhoven."

[2] At this time, Philips had over sixty branches employing approximately 80,000 workers, according to the *Limburgs Dagblad*, May 13, 1966, 13.

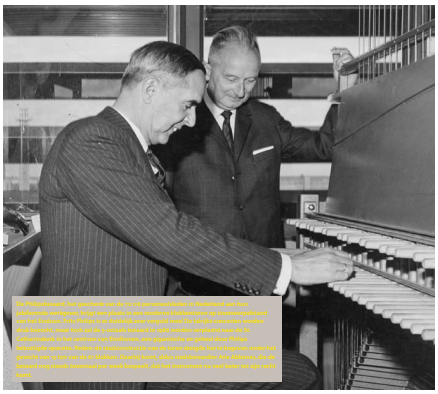

Figure 2. Frits Philips tries out the carillon keyboard. (Hendriks, 144)

Far from being financed by upper management, this impressive instrument of corporate self-congratulation was donated through a 0.2% voluntary salary contribution by 72,116 factory workers, now presumed to be listening raptly through the Philips PTT system.[3] After de Windt signed the carillon over to Director Frederik "Frits" Philips, an inaugural concert featured the premiere of Freek Schorer's Concerto for Carillon and Orchestra. In tandem with renowned carillonneur Leen 't Hart many stories above, Schorer conducted the employee brass band Philips Harmonie in their new scarlet parade uniforms at the foot of the tower (Figure 3). A hot-air balloon festival, torchlight procession, and "Chinese" fireworks display topped out the evening.

Figure 3. Leen 't Hart premires Freek Schorer's Concert for Carillon and Orchestra with the Philips Harmonie under the composer's baton on September 23, 1966.

Rising on a sprawling grassy field at the heart of Strijp, a largely Philips-owned industrial and residential district beginning in but extending mostly beyond the Eindhoven ring road, the modernist steel-and-concrete architecture of the Philips Carillon looks strangely out of place in the history of Dutch carillons (Figure 4). Its closest architectural relative is the Netherlands Carillon outside Arlington National Cemetery, a postwar Dutch gift to America covered in the next chapter.

[3] PTT was the abbreviation for the Dutch Postal, Telegraph and Telephone Company. The private Philips PTT system had been specially connected to a distant municipal audio switching center near Amsterdam (PTT Hilversum) in order to broadcast the occasion to all of its domestic offices.

Since the development of the carillon as a Dutch keyboard instrument during the seventeenth century, brought to its Baroque apex by bell founders Pieter and François Hemony, scholarly patrons like Jacob van Eyck, and organ builders and organist-carillonneurs, the carillon has become the most visible and audible symbol of church authority, civic authority, and public life in the Netherlands. It was and remains intrinsic to the time-honored and "traditional" experience of the Dutch urban soundscape. So what was it doing in a suburban corporate park?

Figure 4. The Philips Carillon and the Evoluon (*Strijps Weekblad*, April 26, 1973).

Sounding from Gothic towers, the carillon has long been associated more with the historic sonic architectures of bustling Dutch city centers than with their quiet, "modern" suburban peripheries. The carillon's main associations are, in the first place, with the principal town church from which it played sacred music, especially Psalms, and called the faithful to worship. Secondly, it has long provided a "commercial" soundtrack for the weekly bustle of buying and selling on market squares. Third, carillons often adorn city halls, from which they play secular music and would have communicated information from fire alarms to tax collection, depending on the city. At once evocative of church, market, and civic centers, each type of carillon served as a mass communication device intrinsic to the experience of a noisy urban soundscape.[4]

Ironically, Philips borrowed a neo-baroque signifier, the carillon, in order to engineer a consumer vision of a hypermodern technological future. For several reasons, a new suburban carillon could evoke the past for its listeners even as it evoked modernity. Surviving Baroque-era carillons are the primary means by which most Dutch people have heard an instrument in now-exotic mean-tone temperament.[5] Their imprecise automatic mechanisms play halting musical phrases as often as every quarter-hour, reminding the public of their centuries-old clock mechanisms. (Figure 5) Thanks to the historic architecture that houses them, carillons are often paired in the popular imagination with the Baroque, and occasionally with fin-de-siècle decadence and decline.[6] Thanks to Philips, an

[4] See historian of the senses Alain Corbin's *Village Bells: Sound and Meaning in the Nineteenth-Century French Countryside* (1998) for a fascinating account of the similar roles of non-carillon bells in the French countryside.

[5] Many Baroque carillons have been preserved because they were a point of civic pride and intercity rivalry in terms of architecture, tower height, number of bells, sophistication of automatic mechanism, and quality of condition. The carillon's centrality to civic pride and intercity rivalry in the Low Countries has driven and still motivates its proliferation there, except during the carillon's temporary nineteenth-century decline, when the value placed on pianistic virtuosity and expressive dynamic range as well as the decline of knowledge about bellfounding and carillon maintenance relegated the instrument to the status of primitive curiosity.

[6] The carillon's association with fin-de-siècle decadence and decline comes mainly from Low Countries literature, such as Georges Rodenbach's *Le Carillonneur* (1897) and *Bruges-la-Morte* (1892) upon which Erich Wolfgang Korngold's 1920

archetypal piece of seventeenth-century cultural patrimony now set the stage for a futuristic Philips "Evoluon" museum of science and technology, a sibling structure that opened across the street to even greater fanfare the next day. What use did Philips Electronics hear in a Baroque keyboard instrument for constructing the techno-utopian future that it wanted to sell to the world?[7]

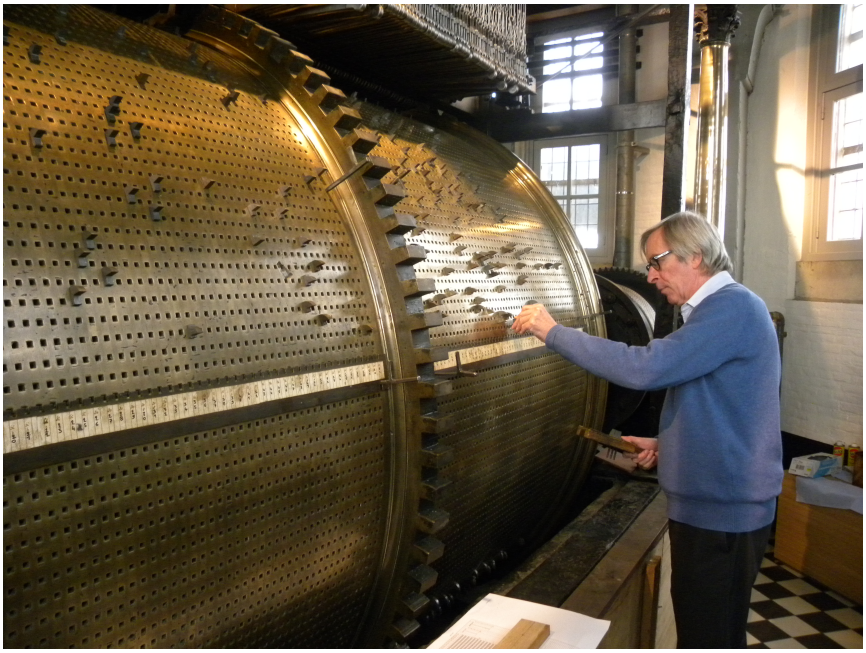

Figure 5. City carillonneur Frank Deleu reprograms or "pins" (*versteekt*) the automatic carillon drum, cast by Antoine de Hondt in the mid-eighteenth century, in Bruges (photo courtesy of Frank Deleu).

The carillon and Evoluon were complementary audiovisual icons on a rationalized landscape, reflecting and connecting the binaries of past/future and labor/corporation. Yet the idea of the carillon as a "grassroots" gift is misleadingly simplistic. At a calculated intersection of the Baroque and the modern, Philips used this gift strategically to design a parkland nexus of music-historical revival and techno-utopian publicity. Through music, architecture, and urban planning, the park combined the powerful historical meanings of the carillon and its music with a futuristic techno-cultural edifice in order to symbolically legitimate Philips' self-appointment as both church and state in Eindhoven. The city had been a "company town" par excellence since the turn of the century, and after devastating midcentury German bombardments, Philips had almost singlehandedly reconstructed it.[8] Its new techno-cultural edifices focused, rationalized, and humanized a city designed on the one hand to function as an efficient machine for industrial production, and on the other hand to project an image of what director Frits Philips termed *maatschappelijk verantwoord*

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opera *Die Tote Stadt* is based, and Harry Mulisch's 1956 novel about the last day of the world, *Het Zwarte Licht*. Although the latter is set on August 20, 1953, the protagonist's carillon concert symbolizes a glorious Dutch past, not the murky present. Mulisch took inspiration from his visit to the 1661/1662 Hemony carillon of St. Bavo Church in Haarlem.

[7] I have James Davies to thank for suggesting that the Philips Carillon and Evoluon be considered together.

[8] Eindhoven's late nineteenth- and early twentieth-century development was dominated by three industries: Philips, DAF Trucks, and the cigarette factory Karel I, all of which have left their traces on the architecture, cultural edifices, and urban planning of the city. Besides Philips, Karel I founder Henri Jacob van Abbe is responsible for the remaining highbrow cultural building in the city, the famed Van Abbemuseum, established in 1936.

ondernemen (corporate social responsibility) into the civic and religious realms of laborers' everyday lives.[9] Inspired by Frits' plan to build on the phenomenal success of the Philips Pavilion at the 1958 Brussels World's Fair, this futuristic park also obscured the inevitable outcome represented by the firm's adoption of the American corporate campus model—that Philips was decentering *itself* into a global capitalist corporation, and would abandon Eindhoven in the 1980s.

The history of the Philips Carillon demonstrates a continuing Dutch skepticism towards building these traditionally church and civic instruments on suburban corporate property, try as a company might to decenter the city onto its liminal parkland campus. In this chapter, I will explain the carillon in terms of Philips' cooptation of an instrument that served as a nationalist symbol of postwar Dutch reconstruction, the alternative political geographies and distributions of power that the company used it to foster, the neo-baroque performances that served it, and the eventual failure of its modernist designs to reshape urban cultures of listening. For a brief time, a musical yesterday and technological tomorrow came together in Eindhoven, marking a heyday for the company town. The novel placement of the carillon, its eventual dismantlement, and its ultimate relocation to the city center traces the postwar success, decline, and renewal of Eindhoven. The city would begin a precipitous downturn in the 1980s, but by 2008, it became "the most inventive city in the world" in terms of patent intensity.[10]

The Carillon and "Rebuilding Optimism"

Wederopbouwoptimisme (Rebuilding Optimism), the period that began some years after the war's end, numbered carillon building amongst its priorities. A boom in construction resulted in forty-three carillons from 1958 to 1966, a period of just eight years, and fifteen of those were heavy carillons, accounting for two-thirds of all new heavy carillons produced in the country between 1945 and 1990. According to the authors of *45 Years of Dutch Carillons, 1945-1990*, this extraordinary installation rate was driven by Eijsbouts' traveling carillon campaign (which allowed audiences to see the normally hidden performer and the bells, which were based on seventeenth-century Hemony models), by improvements to bell tuning and profile technologies that enabled ever expanding sounding ranges, and by the concerted efforts of the Dutch Carillon Guild's advisors to nurture small projects into large ones.[11] Community carillon groups, local boosters of a distinctly Dutch variety, often provided the catalyst to build. In the wake of the war's devastation, those involved in carillon campaigns felt a desire not just to restore, but also enlarge surviving instruments, and to replace lost carillons with greater ones. According to Luc Rombouts, the new instruments represented a loudly defiant nationalist answer to the German bell requisitions. Approximately 65,000 bells had been sent to Germany to be melted into artillery, historical bells of a certain age excepted. About 175,000 bells in total were seized throughout Europe, and only a small fraction

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[9] According to his son, Frits Philips elaborated on the concept of *maatschappelijk verantwoord ondernemen* in the policy document "Basic considerations for industrial policy," published in the 1960s. Quoted in Steef Hendriks' *Evoluon: 40 Jaar Boegbeeld van een Ambitieuze Regio* ('s-Hertogenbosch, the Netherlands: Heinen, 2006), 7.

[10] William Pentland, "World's 15 Most Inventive Cities," *Forbes*, July 9, 2013, http://www.forbes.com/sites/williampentland/2013/07/09/worlds-15-most-inventive-cities.

[11] Loek Boogert, André Lehr, and Jacques Maassen, *45 Years of Dutch Carillons, 1945-1990* (Asten, the Netherlands: Nederlandse Klokkenspel-Vereniging, 1992).

returned.[12] But in the end, the widespread rallying cry "Wie met klokken schiet, wint de oorlog niet" (Who shoots with bells wins not the war) had proven true.

A New Corporatocracy

Neither church nor state, Philips seemed an unlikely candidate to bring the final year of the carillon building boom to its culmination. The September 9 edition of the *Philips Kourier* company organ described its upcoming carillon inauguration with pride:

> At 3:45 p.m. on September 23, over five hundred guests are expected at the site at the Jacob Oppenheimstraat in Eindhoven, in order to witness the transfer of this sounding gift (*klinkend geschenk*) from the staff to the Philips Board of Directors. On the premises where the event takes place, three temporary grandstands are placed for guests. Should the weather be a spoilsport, a large tent will be erected in the immediate vicinity of the bell tower. The official part of the meeting will commence at about 5 p.m. with a ten-minute carillon concert and the premiere of celebratory music for carillon and band, composed for the Philips Jubilee by Freek Schorer. The carillon and Philips-Harmonie will premiere this work. After presenting an update to the invitees following the sparkling tones of the proud carillon, there will be an informal gathering.[13]

Moreover, the article revealed that the ceremony and nationwide broadcast would stage Philips as a quasi-governmental entity:

> Two Philips flags mark the entrance to the festival grounds. Around the clock tower flutter the Dutch flag and the eleven county flags to underline the national character of the ceremony. A sound system in the field will ensure that the course of events, not only in the stands but also outside, is shared, so thousands of interested people have a chance to tune in.

Philips would mark the inauguration of a techno-cultural complex (featuring an instrument that normally sacralized and officialized city centers) with a display of its company flag flying alongside provincial and national flags. With Prince Bernhard present to activate the opening sound and light show by entering a punch card, this banner spectacle represented the fungibility or even equivalency of company, province, and state in Eindhoven. The nationwide broadcast of the event, which temporarily linked public and private communication infrastructures, further confirmed the Evoluon's national importance as a symbol of Dutch progress and Philips' apparent leading role in serving the public good.

The city itself was thoroughly involved in the three-day anniversary celebrations. The people of Eindhoven contributed the two clock faces on the Evoluon's Technical Mast, perhaps already believing that the company that invented their city should have the trappings of government.[14] More impressively, the carillon and museum were anniversary gifts financed in part by Eindhoven taxpayers: the tract on which they were built, Jacob Oppenheimpark, was a gift from the city worth 350 million euros in today's currency.[15] Even the shops in the city center closed their doors at 4 p.m.

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[12] Carla Shapreau, "The Pillage of Europe's Bells," *Musicology Now* (blog), March 23, 2015. http://musicologynow.ams-net.org/2015/03/the-pillage-of-europes-bells.html.

[13] "Beiaard luidt feestvreugde in: Plechtigheid in veel bedrijven te beluisteren," *Philips Koerier*, September 9, 1966.

[14] Hendriks, 30.

[15] "On January 10, 1964 Mayor Witte (1909-1972) presented a beautifully situated 55,000 m^2 plot to Philips as a gift from the municipality on the occasion of the upcoming 75th anniversary. (A present then valued at 350,000 euros,

on the day of the Evoluon's inauguration "as an expression of gratitude to the industry, to which the shopkeepers owe their prosperity," as described in the *Eindhovens Dagblad*.[16] Two hundred shop windows were instead devoted to Philips products.

In contrast to such inaugural pomp and circumstance, an undated 8 mm amateur film by Theo Hagenberg shows the lifting of the bells by crane into the bell chamber as a day in the park for local families, who arrive on foot, bicycle, and car to watch proudly from their picnic blankets (Figure 6). The carillon indeed served local workers as a recreational destination, at least on days when it was not serving Philips' national concerns.

Figure 6. Locals watch as the bells of the Philips Carillon are lifted by crane into the belfry.

The dedication of the Evoluon took place one day after the consecration of the carillon. A jubilant employee parade to the inauguration grounds, with smiling participants sporting birthday hats and following a marching band, carried a portrait of Anton Philips and *two* portraits of Frits (Figure 7).[17] Visitors gaped at the Evoluon's otherwordly concrete dome, 253 feet in diameter and held in place by 105 miles of rebar. Behind it spread a circular reflection pool, mirroring the museum's geometrical form and doubling its horizontal footprint. Another Hagenberg film shows a festive parade on foot and truck to the site, a *kermis* fun fair, a marching band and color guard performance, rising hot air balloons bearing "75-jaar PHILIPS" (75 years of Philips) banners, and the momentary intrusion of a military aircraft, all interspersed with shots of the carillon tower.

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which in 2006 has increased to about 20 million.)" (Op 10 januari 1964 overhandigt burgemeester Witte (1909-1972) een fraai gelegen grondstuk van 55.000 m2 aan Philips als geschenk van de gemeente ter gelegenheid van het komende 75-jarig jubileum. [Een cadeautje met een toenmalige waarde van 350.000 euro, die anno 2006 is opgelopen tot zo'n 20 miljoen.]) (Hendriks, 15). In fact, Frits recalls that the mayor would have preferred "a new head office" on the plot instead (*45 Years With Philips*, 234). To its credit, Philips set aside 700,000 euros for a new ice rink and music center, but that was far less than the 14 million euros spent on the Evoluon.

[16] "Winkels in centrum sluiten op jubileumdag om vier uur: Tweehonderd Philips-etalages," *Eindhovens Dagblad*, September 10, 1966.

[17] "Philips 75 jaar (1966)," YouTube video, 2:06, from a Polygoon Hollands Nieuws broadcast on 16 May 1966, posted by Nederlands Instituut voor Beeld en Geluid, 15 May 2012, http://www.beeldengeluid.nl/media/5547/philips-75-jaar-1966.

Figure 7. Employees sporting a panoply of birthday hats parade with a marching band to the Evoluon inauguration grounds on September 24, 1966, carrying a portrait of Anton Philips and two of Frits Philips. (Polygoon Hollands Nieuws)

Frits Philips, Jr. described the Evoluon as a gift to Philips employees for helping make Philips a global company—ironically the very reason Philips would later abandon its Eindhoven manufacturing facilities.[18] He also described it as an opportunity to promote the Philips brand, save money that would otherwise have gone to exhibiting at World's Fairs, and allay the suspicions of the general public, including sixties youth, by demonstrating that business and science worked together for the greater benefit of humanity. Eindhoven University of Technology physics professor Jan Frederik Schouten, a former pitch perception researcher at Philips Natuurkundig Laboratorium, had proposed that the function of these exhibitions would be "the removal from men's minds of the fear of the irresistible march of technology, by putting the general public in touch with this technology and its development and by showing what a beneficial influence it has had and is still having on food, health, shelter, communications and education."[19] Frits had hoped that this propaganda, aimed at the average educational attainment level of a sixteen-year-old student, would help transform the counterculture's attitudes towards big technology firms.[20] Although I find it doubtful that countercultural youth were much impressed by the cultural complex at Jacob Oppenheimpark relative to how their American counterparts received Virgil Fox's technological Bach sublime, we will see later that Philips' electronic music and sound laboratory helped bring the musical avant-garde and popular tastes closer together in the Netherlands than in other countries.

One rationale for why Philips appropriated a neo-baroque musical symbol for its techno-futurist landscape may be found in the layout of Eindhoven itself and its relationship to the seventeenth-century Dutch city plan. From the time of its establishment in 1891, the burgeoning company transformed this sleepy village near the Belgian border into an industrial powerhouse. Over the course of the twentieth century, Philips literally shaped the Eindhoven cityscape. Early on, it sculpted neighborhoods, infrastructure, and even the family life of its employees. As the number of workers ballooned from 2,000 in 1914 to 20,000 in 1929, the company became a housing entity, building entire neighborhoods like the four-hundred-house Philipsdorp (Philips Village) where Edgard Varèse would live in 1957 and 1958 with his wife Louise at Gagelstraat 38. These were the

[18] Philips estimated that 100,000 employees lived within driving distance (Hendriks, 14). Furthermore, the site was directly adjacent to both the urban inner ring and at entrances and exits of the A2 motorway. (17)
[19] Frederik "Frits" Philips, *45 Years With Philips: An Industrialist's Life* (Poole: Blandford Press, 1978), 235.
[20] Hendriks, 5.

first houses outside the center city to be connected to the sewer and water supply networks, marking them as progressive and desirable.[21] Philips parks (like the Philips de Jonghpark in Strijp), schools, recreation centers, and parishes were built to accommodate the new residents and to quiet strife between Catholics and Protestants suddenly living and working in close proximity.

As Philips controlled worker housing, it likewise controlled and optimized the demographic makeup of its workforce. For example, families relocating from the less industrialized province of Drenthe were required to have at least three daughters older than fourteen years of age to meet Philips' demand for young female employees while maximizing the occupancy of worker housing. Through hiring and managing housing demand, Philips actively crafted the profile of Eindhoven's population. (Figure 8)

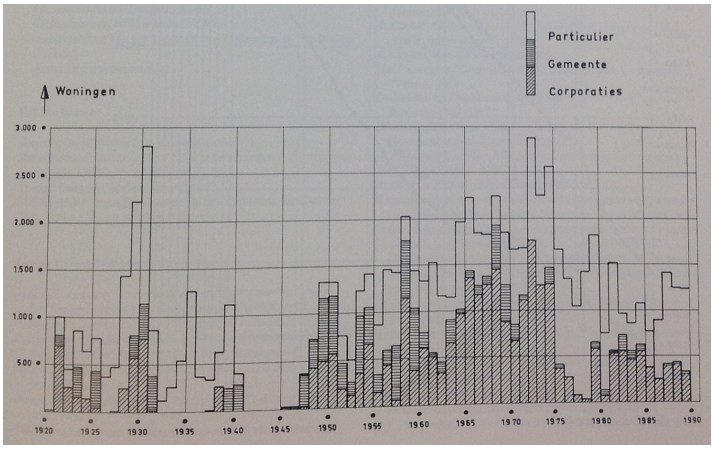

Figure 8. New construction in Eindhoven (1920-1990), differentiated by type of client (corporations, municipality, individuals) (Source: Ad Otten and Elisabeth Klijn, *Philips' Woningbouw 1900-1990: Fundament van Woningstichting Hertog Hendrik van Lotharingen* [Zaltbommel: Europese Bibliotheek, 1991], 243)

The shape of the Philips city is visible even today. Mila Davids has shown that Philips aggressively leveraged its economic power to finagle special infrastructural connections, discounts, and permit exemptions from the municipality. After struggling to reconfigure the old center city around its first factory, even covering parts of the river with concrete, Philips raised a new factory complex on the northwestern edge of town, Strijp, where the carillon would eventually stand. The Strijp complex represented a major departure from Philips' first attempt at reshaping an existing urban landscape to suit its manufacturing needs. (Figure 9) Roads, railways, and utility lines were designed from scratch to efficiently coordinate the workings of factory buildings, energy supplies, and the transport of laborers, materials, and products. Philips provided its own water supply, drainage, and paved its own roads to suit company purposes.[22]

[21] Mila Davids, "The Fabric of Production: The Philips Industrial Network," *History and Technology: An International Journal* 20, no. 3 (2004): 279, http://dx.doi.org/10.1080/0734151042000287005.
[22] Andries Heerding, *The History of N.V. Philips' Gloeilampenfabrieken* (Cambridge, UK: Cambridge University Press, 1986).

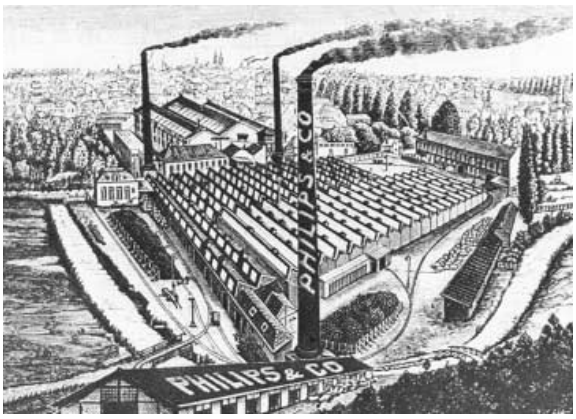

Figure 9. Drawing by E. Stoot of the new Philips complex (c. 1902). Note the contrast between Philips' organized manufacturing plants in the foreground and the organic depiction of the old city and bell towers in the background.

It was during the 1920s expansion that Philips became synonymous with innovations in sound as well as vision. Although it had made its name with incandescent lamps, its factories started to manufacture radios, amplifiers, gramophones, and sound film equipment as Philips expanded its product lines. Its first radio broadcast receiver, "het Roggebroodje" (the Rye Roll) model 2501, began production in 1927. Its separate plate-shaped loudspeaker, developed by engineer Roelof Vermeulen, became iconic of the first commercially available radios. As Philips branches opened around the country, it even optimized its own corporate transmission of sound via PTT and Telex communication systems.[23]

And that was merely the first stage of Philips' city-building. After the Germans bombarded Eindhoven during World War II to weaken Dutch manufacturing, the company rebuilt the city yet again in its own image, since the municipal government lacked the necessary resources to meet the urgent demand. When many previously unindustrialized regions of the Netherlands were being industrialized through national recovery initiatives, Philips took upon itself to remake Strijp into a suburban research park in the image of architect Eero Saarinen's sprawling Bell Labs in Holmdel, New Jersey, with its own electronic music studio predating Max Mathews' Acoustical and Behavioral Research Center by two years. Philips Natuurkundig Laboratorium, commonly called NatLab, had previously served as the Philips Physics Laboratory. After the war, when Strijp's focus shifted from manufacturing to research and development, "Room 306" became home to NatLab, where Dick Raaijmakers and Tom Dissevelt produced what was arguably the world's first commercially successful popular electronic music albums.

With Strijp's suburban research park so clearly distinguished from the dense urban center of Eindhoven, this American-style, suburban, compartmentalized landscape presented a novel instance of land use in the Netherlands. It mirrored the new French technopolises based on Silicon Valley models, such as Grenoble, Toulouse, and Sophia-Antipolis. Rosemary Wakeman has argued that each of these cities, with its "uniform composition, its rational analysis and arrangement of space,

[23] The Philips telephone exchange was fundamentally integrated into the national system, to the degree that Philips used private leased lines from the PTT, Philips started using Telex two years before PTT, and Philips employees even sorted, stamped, and delivered mail directly to PTT trains. By 1965, most Philips branches were connected by private Telex infrastructure; Mila Davids notes that "messages from, say, Philips-London or Paris to Philips-Japan or South America still passed through Eindhoven" (283), making the construction of two communications towers at Jacob Oppenheimpark for public education even more symbolic.

and its symbolic architectural form[,] located scientific practices within the cultural and territorial orbit of provincial utopia."[24] These alternative cities for a scientific elite—with their cafes, clubs, and concert halls—were designed to place science at the heart of a totalized mode of existence, which would prepare "a new culture that integrated the sciences, technology, and the arts in the spirit of enterprise."[25]

The carillon—traditionally an urban centering technology that marked civic, religious, and market life—now worked for Philips to decenter life to Eindhoven's high-tech periphery. In pursuit of this goal, the Evoluon's cafes and carillon concerts presented technology and business as the highest pursuit of the cultural elite—as well as of the manual laborers who supported their innovations. Philips had long shaped Eindhoven's urban fabric and daily rhythms. Now it usurped the carillon's historical symbolic power of regulating time, ordering space, and determining the music heard by its citizens to legitimate itself as church and state. Tellingly, not until 1969 did Eindhoven itself build a city hall with a much lighter carillon, as if struggling to catch up three years later with the de facto municipal leadership.[26]

The newly dedicated area of Jacob Oppenheimpark presented a remarkable vista of contrasts: a boldly horizontal museum and radio tower built by a corporate entity to educate the public while promoting the company; facing it, another feat of engineering *and* musical prowess, a "grassroots" carillon meant not to engender consumer desire, but to solidify through sound the unity of a community of laborers—the embodiment of hundreds of small individual sacrifices in working-class philanthropy. Unlike the mushroom-like Evoluon, reveling in its seemingly endless horizontal park space, the tower took on a medieval typology: vertical, compact in its footprint, and stretching upward as if to claim sonic authority over as much land as possible.

On one level, then, this dramatic visual dissonance between the Evoluon and the carillon might be interpreted to represent cooperation or submerged conflict between Philips and its workers. On another level, that dissonance merely symbolized harmonious cooperation in the sense that both structures were triumphs of engineering, and the Philips research-oriented model was mirrored by Eijsbouts' research into the use of technology to improve bellfounding. Yet the Evoluon kept its noise inside for paying visitors, while the carillon projected its sound outward "for free." The Philips internal document "Aantekeningen over het Evoluon" (Notes on the Evoluon, n.d.) describes the permeable interior sonic design of the museum:

> The bustle of the roads to the Evoluon, the sound of jet aircraft flying overhead, not to mention sometimes the music of the Carillon outside penetrates through the Evoluon in some places and influences the atmosphere.[27]

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[24] Rosemary Wakeman, "Dreaming the New Atlantis: Science and the Planning of Technopolis, 1955-1985," *Osiris* 18 (2003): 255. http://www.jstor.org/stable/3655295.

[25] Pierre Laffitte, "Célébrer les 20 ans de Sophia," *Symival* 14 (1989): 10, as quoted in Gian Franco Elia, "'Sophia-Antipolis: Quandla sagesse quittela grandeville,"' in "Technopoles et Métropoles," *Les Annales de la recherche urbaine* 46 (March-April 1990): 6. Quoted in Wakeman, 262.

[26] The Stadhuisbeiaard has forty-eight bells (four octaves), the lowest bell weighing just 1,000 kg. The carillon was also cast by Eijsbouts and inaugurated on September 18, 1969 during the opening of the new City Hall itself.

[27] "Het geroezemoes van de verkeerswegen om het Evoluon, het geluid van overvliegende straalvliegtuigen en niet te vergeten soms de muziek van het Carillon dringen van buitenaf op sommige plaatsen in het Evoluon door en bepalen mede de sfeer." (Philips Electronics, "Aantekeningen over het Evoluon," n.d., PDF document, p. 29, Evoluon Downloads, http://www.dse.nl/~evoluon/downld-e.html)

When considered sonically, the structures represent differing ideologies and intended audiences: one centered on the pleasure of providing public music with echoes of the sacred to local everyday life; the other centered on immersing one-time customers in an overwhelming visual, sonic, and interactive environment that prepared them to become even better consumers of technology. The sounds of airplanes and the carillon alike became part of this all-encompassing approach to lifestyle branding.

Even in this totalized environment, Philips did not exercise decision-making control over everything in the belfry. Carillon performances did not necessarily line up with the company's aims and objectives, and thus duplicated the loose historical relationship of municipally owned carillons to their church towers. During the seventeenth-century Protestant Reformation, cities had taken over unwanted church carillons and established them as islands of relative musical autonomy. The city nominally controlled the carillon but lacked reason or expertise to regulate the *stadsbeiaardier's* (city carillonneur's) programming. By installing an instrument whose traditional model gave so much artistic autonomy to one person, the workers initiated two decades of public music that had little to do with the Philips business, except perhaps marginally during the obligatory Muzikaal Spektakels (Musical Spectacles). During these biannual events "for the ears and the eyes" as Philips's first carillonneur Bertus Oomen described, the carillon and the Philips Harmonie were reunited for festivities and fireworks, and international competitions for carillon performance and composition (and even listening) were sometimes held to attract further public attention, funded by the Stichting Beiaadiersawardsfonds (Carillonneurs Awards Foundation). But even these events were about promoting the carillon as an embodiment of Dutch culture, not about promoting technology.

By constructing an essentially unregulated soundscape around the Evoluon, Philips employees undermined a standardized corporate culture. British exhibit designer James Gardner observed that standardization when he met Frits Philips in Eindhoven to be recognized for his work on the Evoluon.[28] "At Eindhoven they were corporation men," he recalled, "trained to operate in rectilinear buildings furnished with modular filing cabinets, lined up as at a military parade under numbers."[29] In linking modern isomorphic architecture directly to the *habitus* of white-collar managers, Gardner's description illustrates the regulated life into which carillon music introduced a sense of sonic unpredictability.

[28] Gardner was designing a company museum for Royal Dutch Shell when Louis Kalff invited him to design the exhibits for a museum "to shoehorn the people of the Netherlands into the twentieth century" (312). During the interwar period, he had worked as jewelry designer for Cartier, and during World War II he served as Chief Deception Officer at the British Camouflage Training School before embarking on the career in exhibition and museum design for which he is best known. ("The Art of War," The National Archives [United Kingdom], accessed June 15, 2015, http://www.nationalarchives.gov.uk/theartofwar/artists/gardner_james.htm)

[29] James Gardner, *James Gardner: The Artful Designer: Ideas Off The Drawing Board* (1993), 336.

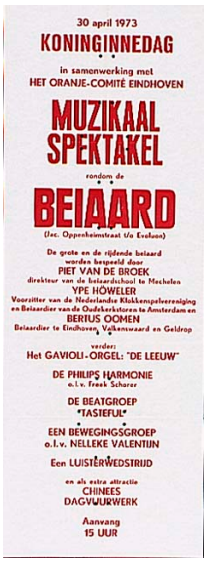

Figure 10. Program of the 1973 Musical Spectacle on Dutch Queen's Day featuring performances on the carillon and traveling carillon by Ype Höweler, Piet van den Broek, and Bertus Oomen, the Philips Harmonie, a Gavioli barrel organ, the group Tasteful, an exercise activity, a listening contest, and "Chinese" fireworks.

The pairing of the carillon and Evoluon were meant, nevertheless, to showcase Philips as a technology company. The museum name "Evoluon" evoked "evolution" as a *geleidelijke ontwikkeling* (gradual development). Its exhibits traced the "necessity" of technology across cultures from prehistoric times to the rosy present.[30] Philips offered "a picture of the evolution of science and technology and their impact on society," in part to address countercultural opposition to mechanized electronics corporations. The choice of the name "Evoluon" at once appropriated the countercultural desire to live according to its constructions of natural, instinctive human behavior, and framed Philips' products and business-driven research in terms of a natural, holistic teleology. The same year that Stewart Brand was campaigning in America for NASA to release its now-iconic satellite photo of the sphere of Earth seen from space, the museum enclosed a miniature "whole earth" of technological benefit within its flattened concrete sphere. NASA's "whole earth" image would become a countercultural icon, but the commercial angle of Philips' presentation of the globe limited its cultural effect.

The Evoluon's technology-driven teleology, a linear "progress"-oriented model of historical unfolding disguised as a loop, used the vertical carillon as a foil for the Evoluon's modernity. The museum welcomed the soundscape of the seventeenth-century city into its interior, where the ringing of bells was framed by the "evolution" of human communication culminating in Philips radios—the only exhibit expressed through the exterior form of the building, a thin mast. (Figure 11) An American-style Ham station "PE2EVO," which employed the world's only full-time amateur radio operator, transmitted on various bands, Morse code, and Telex from the museum's 61-meter Technical Mast—a slim, efficient version of the carillon tower, housed in the same concrete and steel

[30] The Evoluon exhibit "Measuring Time Then and Now" was donated to the National Carillon Museum in 1989, when the Evoluon closed its doors as a museum to become a conference center. The display included the sections "De onrust" (The unrest), "De stemvork" (The tuning fork), "Het kwartskristal" (The quartz crystal), "Dit is de juiste tijd" (This is the right time), as well as a water clock, a DCF77 atomic clock radio receiver, frequency counters, and a globe from the sextant display. Gardner designed the exhibit to demonstrate the progression of time-telling from "Pendulum to atomic" (Gardner, 329).

materials and inspired by the mast of an aircraft carrier.[31] (Figure 12) Thus the carillons of yesterday and tomorrow faced each other, one audible to the community and visitors and one audible to lone hobbyists worldwide; one a historical one-way communication system and one a modern two-way communication system. (Both types of operators were, incidentally, coded as male in popular culture—the amateur radio enthusiast and the Dutch carillonneur.[32])

Figure 11. Two kinds of communications towers under construction. (Source: Hendriks, 28-29.)

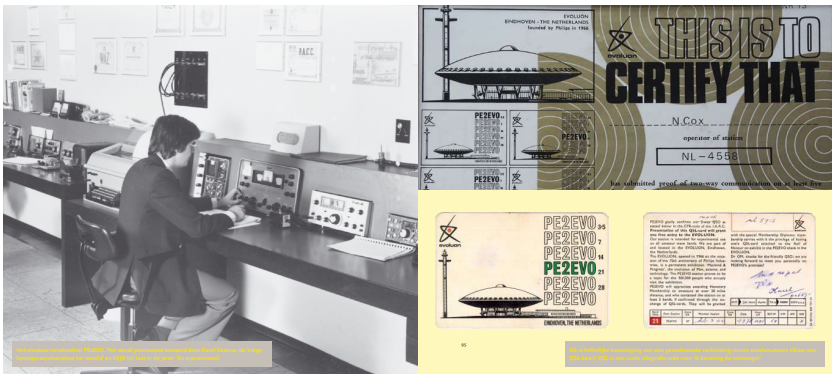

Figure 12. The world's only full-time amateur radio operator, Karel Geense, at PE2EVO (left). On right are QSL cards, written confirmations for ham operators who successfully made contact with PE2EVO. (Source: Hendriks, 94-95.)

This radiophonic metaphor for carillon sound was hardly new. Sammy Danna has described how the Eiffel Tower also served as a ham radio transmitter in 1908, when Lee DeForest set up his equipment and "amazed throngs of persons who heard the voice and lengthy phonograph music program reportedly from as far away as 500 miles."[33] The iron lattice tower had likewise been intended to house a carillon cast by the French foundry Paccard, but plans were changed when it was

[31] Hendriks, 10.
[32] The amateur radio station seemed most of all to transmit enthusiasm for American culture. It displayed a copy of a "Wouff Hong," which Wikipedia describes as "an object from the folklore of radio amateurs in the USA."
[33] Sammy Danna, "DeForest, Lee," in *The Guide to United States Popular Culture*, ed. Ray Browne and Pat Browne (Bowling Green, OH: Popular Press, 2001), 224.

deemed structurally unfit to support the weight of the bells—a lesson Philips would have to re-learn in the medium of steel.[34]

The Philips Carillon also served as a musical automaton, and in that capacity, it performed how corporate innovation could enrich cultural performance and the built environment, and even humanize it with dynamic expression. A carillon's automatic play was a tremendous source of seventeenth-century civic pride in the carillon-as-technology. Its massive pinned drum worked much like today's music boxes to play melodic phrases on the hour, half hour, or even quarter hour. The more complex and virtuosic its melodies and accompaniment and the smaller the subdivisions it was capable of executing, the better. In our interviews, retired Philips carillonneurs Bertus Oomen and Arie Abbenes emphasized the Philips automatic play's unprecedented expressive ability to sound the individual notes of the hour chimes either softly or loudly, a feature allegedly pioneered by Eijsbouts.[35] Adding to the harmony of technology with nature depicted in the Evoluon, the carillon depicted the harmony of technological research with musical progress.

As mentioned at the outset of this chapter, Philips' impressive instrument of corporate self-congratulation had been donated by its workers, not the upper management. However, the international Philips leadership did give its own campanological performance. As Frits Philips remembered in his biography *45 Years With Philips: An Industrialist's Life* (1978),

> The next day [after the Evoluon's inauguration], our family received a surprise present. We were told that all our managers outside Holland, 141 in all, had personally given it, and in the afternoon Sylvia and I with all our children stood in front of De Wielewaal to receive it. We had no inkling what it was to be, and our imaginations were running wild. A tractor appeared, towing a cart on which a carillon was mounted, which at once began to chime. It was given to us to be placed near our home. The names of all the donors were on the bells, and we were delighted with this present. Every day we enjoy it all over again, when it plays a tune every hour on the hour. And whenever we walk through the woods, the carillon in the distance has a magical effect.[36]

The carillon emerged in Eindhoven as an ideal corporate gift in the 1960s and 1970s, but within a distinct musical-mechanical hierarchy. Carillons for the people would be played by a musician. Private carillons for the benefit of company leadership would be played by automated mechanisms. Technology companies could be completely honest with themselves: Their carillons rang for the mechanized present, not the Baroque past of *stadsbeiaardiers* that Jef Denyn had revived in Belgium during the long nineteenth century.

From Pavilion to Parkland Carillon

The Evoluon's relationship to its musical-architectural predecessor highlights the message of the museum's intended global, not just local, impact. The 1966 carillon and Evoluon were direct successors to the Philips Pavilion at the 1958 Brussels World's Fair. Each installation continued the

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[34] Frits Philips considered the Eiffel Tower such an outdated symbol of the past that he insisted on the impossible from his engineers, who claimed that a concrete roof for the Evoluon was impossible: "I would have none of it. Philips would hardly create an up-to-date image by building in the style of the Eiffel Tower." (*45 Years With Philips*, 234-35.)
[35] Arie Abbenes (retired carillonneur, Philips), in discussion with the author, October 4, 2012; Bertus Oomen (retired inaugural carillonneur, Philips), in a Skype interview with the author, September 18, 2012.
[36] *45 Years With Philips*, 236-37.

company's strategy of producing musical-architectural spectacles to reinforce its image as an innovative electronics firm; each equated technology with the arts and social good.

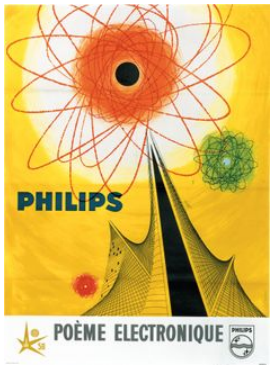

Figure 13. Atomic publicity poster for the Philips Pavilion and Edgard Varèse's "Poème Electronique" (1958) at the 1958 Brussels World's Fair. (Source: Sebastian Jordana, "Virtual Electronic Poem, Le Corbusier back from the past," February 28, 2009, *ArchDaily*, February 28, 2009, http://www.archdaily.com/15512/virtual-electronic-poem-le-corbusier-back-from-the-past.)

Like the Evoluon, the 1958 pavilion famously attracted visitors to the first major postwar world's fair with masses of concrete and curves and an immersive indoor multimedia installation (Figure 13). Nearly two million people entered its strikingly modern hyperbolic paraboloid form to hear more than four hundred spatially distributed Philips loudspeakers playing Varèse's landmark work *Poème Electronique* amidst a sea of projected images and colored lights. At the entrance and exit, they heard architect/composer Iannis Xenakis' *Concret PH*, a piece that manipulated the sound of burning charcoal, its name referencing *paraboloïdes hyperboliques* as well as the building's medium of reinforced concrete and the music's corresponding medium of *musique concrète*.

Figure 14. John Cage (supine), Mauricio Kagel, and Henk Badings with others at the Philips Pavilion in 1958. Each of those three composers has written pieces for carillon. (Source: Richard Taruskin. "Chapter 2: Indeterminacy," in *Music in the Late Twentieth Century*, New York: Oxford University Press. http://www.oxfordwesternmusic.com/view/Volume5/actrade-9780195384857-div1-002002.xml)

Varèse created his eight-minute piece at Philips NatLab (then under the direction of Henk Badings) with Dick Raaijmakers' technical assistance while living within earshot of bells in the Philips Village. The work opens with a sample of a deep, tolling bell, then combines "primitive" sounds and images with novel electronic ones. This progression used music and sound reproduction technology to establish the Evoluon's entire teleological sonic world in miniature, and sacralized that corporate mythology with a tolling bell.[37]

Visitors were then ushered back out into the Heysel Exhibition Park to hear, not just more bells, but a veritable war of bells. Two carillons—a traditional bronze Belgian carillon and an electronic Carillon Americana from the Schulmerich Company of Pennsylvania—rang out in competition with each other from inside the same Vatican Pavilion tower (Figure 15), while the Dutch Pavilion's traditional carillon played nearby, and automatic carillons rang from the simulated Belgian village Vrolijk België and from the dome of the French pavilion. The Carillon Americana offered an affordable solution to the postwar shortage of bronze by amplifying the sounds of tiny tubular bells into deeper bell-like sounds. Outraged Dutch, Belgian, and French carillonneurs signed a pledge not to play the new instrument despite the payment offered; instead, they demonstrated playing the Belgian bells for free. The two Vatican Pavilion instruments were deadlocked over how far the carillon could be taken as a marvel of technology before it no longer met the definition of a musical instrument. Meanwhile, Varèse's entirely virtual bell tolled on from all directions, *indoors*.

Figure 15. The Vatican Pavilion at the 1958 Brussels World's Fair, with the Schulmerich Carillon Americana's loudspeakers mounted above the traditional Belgian carillon such that both are visible.

Moreover, the conflicted design history of the Evoluon echoed that of its 1958 predecessor. Retired engineer Louis Christiaan Kalff, designer of the Roggebroodje radio and bowl-like loudspeaker, conceptualized the "mushroom"-like building, but the design of the Evoluon was executed by young architect Leo de Bever. The question of authorship grew murky between them,

[37] This confluence suggests ties between "autonomous" modernist music and corporate strategy. To analogize à la Fred Turner, writings about the Philips Pavilion mistake applied for autonomous art; they lionize Le Corbusier for insisting on Edgard Varèse to the consternation of corporate executives, but miss how the grand scale of the spectacle was a direct response to corporate directives to "demo" Philips products such as its loudspeakers and video projectors by creating "effects of sound in space, therefore of movement, of direction, of reverberation and echoes, which until now have never been used in electronic installations" (quoted in Taruskin, chapter 4). *Poème Electronique* is remembered as a maverick masterpiece incomprehensible to its funders, but functionally, it served them splendidly as a piece of large-scale advertising.

like the roles of renowned architect Le Corbusier and his project manager, Iannis Xenakis, in the design of the Philips Pavilion.[38] But the resemblance of the Evoluon's form to the Roggebroodje's loudspeaker certainly suggests that the inspiration came from Kalff.[39] Miniature plastic Evoluonradios, radios shaped like the museum, could even be bought off the shelves of the souvenir shop, which brought Kalff's design full circle. Philips radio production framed the rest of its products and innovations, even its buildings. (Figure 16) Frits Philips, Jr. quotes media theorist Marshall McLuhan's phrase "the medium is the message" to explain the Evoluon, a "flying saucer, ready to take off anytime yet still firmly 'grounded,' " as a playful yet pragmatic embodiment of Philips' history of innovative electronics.[40]

Figure 16. The Evoluonradio and Rye Radio, designs both inspired by Louis Kalff (Hendriks, 140)

Despite the phenomenal and storied success of the Philips Pavilion, the company decided never again to spend millions building and dismantling a temporary structure. Withdrawing from

[38] Frits Philips recounts that Kalff sketched three possibilities for him on the back of a menu: "a kind of flying saucer on legs, a cube balancing on one edge and a ball-shaped structure" (*45 Years with Philips*, 234). Leo de Bever, lacking an official title while working for his father's architectural firm, tells a different story: He "illustrated a futuristic exhibition park having a number of buildings, each in the form of a mathematical body. A cube at one point, a sphere, a cone, a pyramid…and also something strongly resembling a mushroom. Kalff immediately estimated that the realization of all the buildings would be too expensive, but he was enthusiastic about the idea. In particular, the well-defined ellipsoid spoke enormously to Kalff. Previously he himself had thought of such a shape, but as a box with a fairly flat bottom shell and upper shell, separated by a circumferential strip of glass several meters high. Two nearly identical ideas met and therefore the "click" happened quickly." (Hendriks, 15-20)

[39] Engineer Roelof Vermeulen actually developed the pancake-shaped "Meesterzanger" (Master Singer) loudspeaker that accompanied Kalff's "rye roll" radio. At NatLabs, Vermeulen encouraged Dick Raaijmakers and Tom Dissevelt to pursue electronic music composition.

[40] "…een schotel, klaar om elk moment te kunnen opstijgen, maar tegelijkertijd stevig 'geaard'. Marshall McLuhan's credo 'The medium is the message' bleek 'op het lijf geschreven' van dit aansprekende gebouw" (…a dish, ready to take off at any time yet still firmly "grounded." Marshall McLuhan's credo "The medium is the message" fits "like a glove" for this stunning building). Frits Philips, Jr., quoted in Hendriks, 6.

world's fairs altogether, it invited the world to Eindhoven instead. "Aantekeningen over het Evoluon" summarizes the rationale:

> Our company has competed several times at World Expositions and related events. Thereby the participation amounted to an expenditure of several million [guilders] [about 3 million euro], while after a few months, the exhibit was dismantled again. With the 75th anniversary in sight, our group has no longer participated in the years leading up to 1966 [Seattle, New York, and preparations for Montreal]. The capital thus saved was reserved. Engineer [Frits] J. Philips put forward the idea to open a permanent exhibition at the 75th anniversary. This idea was realized in the Evoluon.[41]

Even as Philips experimented with using the carillon to create a new suburban Dutch city center, it experimented with using its museum to bring people the world over to Eindhoven—an ambitious attempt to construct an alternative World's Fair destination.

Oomen's Sunday concert programs were regularly advertised in newspapers and on the radio. Despite the tower's unprecedentedly modern appearance, he told me in our telephone interview that his repertoire conformed to "what everyone was playing at the time." He performed a mix of classical music transcriptions (such as opera excerpts), folk and popular music arrangements, improvisations, Flemish Romantic compositions, and accessibly modernist Dutch music, thus replacing Varèse's austerely modernist bell of mythology with an accessible carillon potpourri.[42] Representative of his audience-friendly approach was his published composition *Tema con capitomboli* (1971) featuring a theme in descending pairs of perfect fourths (Figure 17) followed later, true to its name, by tumbling scalar passages. A not-to-scale maquette of the carillon made to publicize its design even featured a tiny version of Matthias van den Gheyn's (1721-1785) autograph manuscript of the *Preludia voor beiaard*, the most popular seventeenth-century music for carillon surviving today (Figure 18). In its Platonic form, the Philips Carillon remained a "Baroque" keyboard instrument, the sound of the city center.

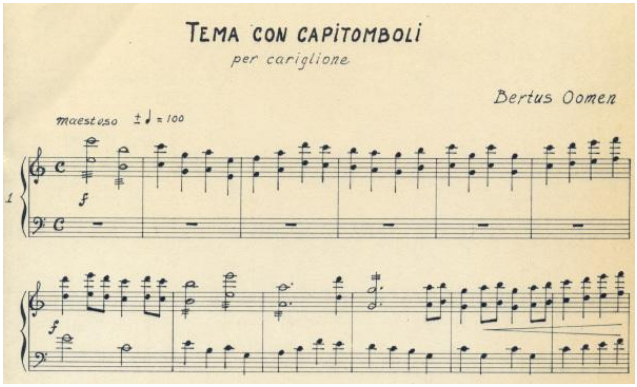

Figure 17. Bertus Oomen, *Tema con capitomboli* (1971) (Donemus)

[41] "Ons Concern heeft een aantal keren meegedaan aan de Wereldtentoonstellingen en verwante manifestaties. Daarbij betekende de deelname een uitgave van enige miljoenen, terwijl het getoonde na enkele maanden weer werd afgebroken. Met het 75-jarig jubileum voor ogen heeft ons Concern in de laatste jaren vóór 1966 hieraan niet meer meegedaan. Het zo bespaarde kapitaal werd gereserveerd. Ir. F.J. Philips heeft de gedachte naar voren gebracht om bij het 75-jarig bestaan een permanente tentoonstelling te openen. Deze gedachte werd in het Evoluon gerealiseerd." (PDF document, p. 3, Evoluon Downloads, http://www.dse.nl/~evoluon/downld-e.html)

[42] Bell Labs, "Daisy Bell," Varèse's bells, the Philips Carillon: (Dutch) futures always seem to begin with bells.

Figure 18. Maquette of Philips carillon and close-up of score on music stand. Currently on display in St. Catherine's Church, Eindhoven.

Attendance at the Evoluon far exceeded expectations. By the time it closed its doors in 1989, it had attracted ten million visitors, and gained many more televisual ones. Almost every British television viewer had seen some part of the film *Evoluon* by the "Carillon Film" company, because it was broadcast daily on the BBC from 1968 to 1972 as a trade test color film for people to adjust their color television sets.[43] Various websites claim that Philips commissioned this wordless short film from Academy Award-winning director Albert Haanstra, although he is uncredited. It features visitors interacting with different types of exhibits and foregrounds the Evoluon's futuristic soundscape, meant to immerse people in tomorrow's sounds. The film's emphasis on sound without words communicates the museum's experiential and interactive focus, and debunks what Gardner described dismissively as the typical museum experience of "silent, echoing halls; [a] sanctuary for artifacts of the past, hermetically sealed in glass cases."[44]

Jaap Hofland's space age pop soundtrack features a Latin percussion section, the close vocal harmonies of De Moonliners, and playful pastiches of big band jazz, funky jazz, and science-fiction music with a Theremin and novel musical effects, all constantly punctuated by onscreen diegetic museum sounds. Level two of the Evoluon was devoted to vibrations and sound, as well as light and lighting, so the final segment of the film features visitors playfully engaging with exhibits by, for example, vocalizing into oscilloscopes and trying out different types of organ pipes. (Figure 19) The Evoluon was presented as a fundamentally sonic environment, and yet the only sound missing from the film seems to have been the carillon, perhaps because only Low Countries audiences would understand the spatial significance of its music.

[43] Trade test color films were broadcast by BBC2 during intervals when no regular programming had been scheduled, to provide color broadcasting in these intervals for use by television shops and engineers to adjust their television sets. ("Trade test colour films," Wikipedia, access June 15, 2015, https://en.wikipedia.org/wiki/Trade_test_colour_films)
[44] Gardner, 313.

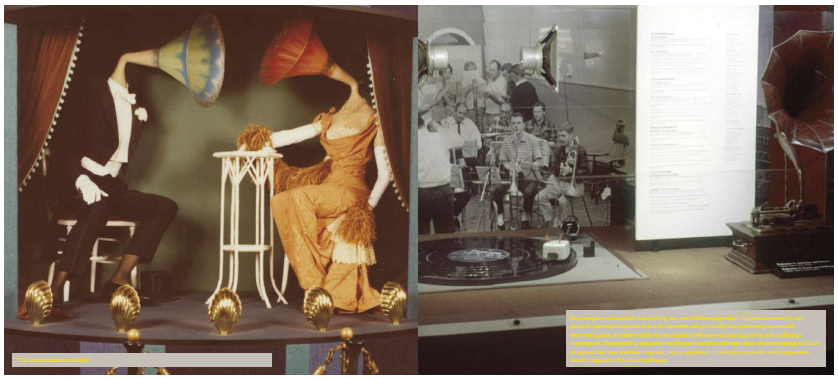

Figure 19. On the left is the Evoluon exhibit "The Grammophone People," which makes a humorous and creepy parallel between sound reproduction and human vocal production and advertises the gramophone as appropriate for high society. On the right is an exhibit explaining how the gramophone works. (Hendriks, 98-99)

A Labour Carillon?

Efficacious as the carillon proved for Philips strategy, as we have seen, it was loudly trumpeted as having come into being through the agency of 72,116 Philips workers. Furthering the parallel between Philips and the municipal government, the impetus to build came from the company's employees, as much as the civic *Wederopbouwoptimisme* impetus to build came from community carillon groups. Through the energies of employee L. de Windt and probably many others I am not yet able to identify, Philips employees learned of their proposed gift with the salary distribution of March 1965.[45] The campaign slogan proclaimed, "Let the festival bell of the Philips Employee Congratulatory Fund Foundation ring" (Laat de feestklok luiden van de Stichting Philips-personeel Felicitatiefonds). Posters, banners, publications, and broadcasts exhorted workers to donate by April 15. They did so in droves. Loyal employee rhetoric suffused newspaper coverage, best summarized by an inscription that would decorate the foot of the tower: "These bells are cast, this tower was built by Philips employees in the Netherlands, both as a gift and as a memorial—one that audibly and visibly expresses what can be achieved by joint endeavor—transferred in the jubilee year 1966 to the 75-year-old publicly held company."[46]

The tower was proudly designed in-house by Philips employees: A.L. de Haas and J. Noteboom of the Philips Architects- and Engineers-Bureau. On presentation day, work was halted around the country so that workers could bear "ear-witness to a direct sonic reportage," in the words of the *Limburgs Dagblad* quotation that introduces this chapter.[47] Young employee representatives Margriet Cokkelkoren and Bouke Zwerver presented Frits with a certificate to sign as witnesses stood proudly in the bleachers wearing their Sunday best (Figure 20.).[48] For the first time, the glorious sounds of carillon bells and the Philips Harmonie rang out from Philips loudspeakers across

[45] Such a gift would probably have been made earlier for the fiftieth anniversary, had World War II not brought Philips low, especially during the occupation of the Eindhoven factories.

[46] "Deze klokken zijn gegoten, deze toren is gebouwd in opdracht van Philips' medewerkers in Nederland, èn als geschenk èn als gedenkteken - dat hoorbaar en zichtbaar vertolkt wat door gezamenlijke inspanning kan worden bereikt - overgedragen in het jubileumjaar 1966 aan de 75-jarige N .V."

[47] *Limburgs Dagblad*, May 13, 1966, p. 13.

[48] "Philips. Op 23 september 1966 wordt ter gelegenheid van het 75 jarig bestaan van…", gahetNA, Nationaal Archief, http://proxy.handle.net/10648/68a03dc8-1ad9-102f-85b3-003048976d84.

the country in an extraordinary show of collective worker gratitude to the company that had apparently provided for their every need.

Figure 20. Employee representations Bouwke Zwerver and Margriet Cokkelkoren watch as Frits Philips signs a certificate accepting the gift of the carillon tower. (Collection Spaarnestad, National Archive of the Netherlands, http://proxy.handle.net/10648/6c63d302-1ad9-102f-a76c-003048944028)

Frustratingly, such rosy narratives were all Eindhoven's public and private archives yielded to my research in 2012. Philips promoted its policy of corporate social responsibility through the harmony of a well-tuned carillon and the Philips Harmonie, both managed by the Philip De Jonghe Ontspanningsfonds (Recreation Fund), and published reports dripped with the requisite sentimental idealism.

A single dissonant voice came from a newspaper called *De Waarheid* (*The Truth*, a name that arouses equal suspicion). This organ of the Communist Party of the Netherlands bitterly called out the hypocrisy of philanthropy at what the article alleged was an exploitative monopoly, "Three quarters of a century of 'social consciousness' from a monopolistic company" (Figure 21).[49] *De Waarheid* opened its report on the carillon by enumerating Philips' "many thousands of products, from vitamin tablets and insect repellant to electronic control devices for the Starfighters;[50] from Beethoven's Ninth Symphony (on gramophone record) to firing equipment for tanks and cannon, from naval appliances and refrigerators to engines for missiles and large vessels."[51] This damning list implicated Philips lifestyle and household products in the expansion of an amoral cold war military-industrial complex.

[49] "Driekwart eeuw 'sociale bewogenheid' van een monopoliebedrijf," *De Waarheid*, p. 5, May 20, 1966.
[50] The Starfighter was a U.S. Air Force combat aircraft, used from 1958 to 1969 during the Vietnam War.
[51] "…vele duizenden producten; vanaf vitaminetabletten en insektendodende middelen tot electronische besturingsapparaten voor de Starfighters; vanaf de negende symfonie van Beethoven (op grammofoonplaten) tot vuurleidingsapparatuur voor tanks en kanonnen; vanaf scheepsapparaten en koelkasten tot heteluchtmotoren voor raketten en ruimvaartuigen."

Driekwart eeuw „sociale bewogenheid"
van een monopoliebedrijf

1891 — PHILIPS — 1966

Leverancier van gloeilampen en ministers

Van gloeilampen via de „Negende symfonie van Beethoven" tot vuurleidingsapparatuur voor tanks en kanonnen

Waar de welvaartsprofiteurs te vinden zijn....

Unieke expositie

Figure 21. "Three quarters of a century of 'social consciousness' from a monopolistic company," *De Waarheid*, May 20, 1966, 5.

The article is headlined by an image of Philips' glazed International Style high-rise headquarters, labeled "Where the welfare profiteers are found…." *De Waarheid* accused Philips of faking the new postwar Dutch social contract between workers and companies by coercing workers to participate in a gesture of collective goodwill towards the Board of Directors. It asked if the management shouldn't have given something of value to the workers instead. Indeed, we might question today why Philips appeared to celebrate its workers, but celebrated itself by spending, as another newspaper estimated, nearly sixty million guilders on new buildings and a three-day festival.[52] *De Waarheid* insisted that Philips' rhetoric about "social conscience" and "caring for people" never seemed to reach higher levels than when it sought to squeeze workers for the greatest possible profits.[53] Philips was playing a game of "Listen to my words, but look not to my deeds!", a hypocrisy that tainted the carillon itself, just another Philips-branded amplifier for false messages of social harmony.

According to Kees Schuyt, Ed Taverne, and Klaas van Berkel, one of the most profound postwar shifts in Dutch society was in the relationship between capital and labor. The tension or antagonism between employers and employees was replaced with the "reason and harmony" of consensus-based deliberation, and a new *Stichting van de Arbeid* (Labor Foundation) embodied this relationship.[54] But one suspects that while Philips employees wished to celebrate this harmonious relationship with their employer, the fast-globalizing corporation viewed such a "social contract" as a barrier to productivity and international competitiveness in an international marketplace. Hence the Philips "gift" of a multilingual museum was made to Dutch and international consumers and not really for the benefit of the workers (as the article pointed out), while the employees gave the carillon to the Board of Directors and not, ironically, to the community. The carillon's function for the board was not musical (directors did not inhabit the nearby worker housing) so much as a symbolic

[52] "Philips-jubileum kost een kleine zestig miljoen," unidentified newspaper in an Eindhoven scrapbook, September 9, 1966 (Regionaal Historische Centrum Eindhoven).

[53] "Het moge zijn dat de Philipsleiders graag de mond vol hebben over 'sociale bewogenheid' en 'zorg for de mens'. Deze eigenschappen hebben bij hen echter nooit een hoger peil bereikt dan wat strikt noodzakelijk is om werkers tot de grootste mogelijke prestaties te bregen en maximale winsten uit hen te kunnen persen."

[54] Kees Schuyt, Ed Taverne, and Klaas van Berkel, *Dutch Culture in a European Perspective. 1950: Prosperity and Welfare* (Basingstoke, UK: Palgrave Macmillan, 2004), 86.

legitimization of Philips' status as church and state, by the people themselves. It was the Philips De Jonghe Ontspanningfonds and the carillonneur himself to whom the responsibility fell to make the carillon a community resource.

Was the carillon a tool whereby organized labor achieved cultural autonomy from a paternalistic company? Was Philips' top-down city-building opposed by a grassroots labor movement that used the ultimate history-laden symbol of Dutch authority, the carillon tower, to give labor a voice? The archives (themselves never neutral) do not corroborate quite so utopian a reading, but if the carillon symbolizes anything in modern society, it is the utopian fantasy of the tight-knit premodern and pre-corporate European village. Evoking a "glocal" corporate suburbia, this modernist heritage park shed its urban associations and substituted the global corporation for the village. The stylistic association of neo-baroque carillon repertoire with ideas of musical objectivity accorded with its International Style form.

The truth, as usual, likely lies somewhere between these extreme representations. The fact that the Philips carillon was donated by employees rather than a civic group confirms that Philips itself *was* their city and that they took pride in it. In fact, some Eindhoven-based businesses today began as affordable stores for Philips workers, such as the bread factory that became the Philips Verbruiks Cooperatie that became the Etos international chain of drugstores, whose name stood for "Eendracht, Toewijding, Overleg, Samenwerking" (Unity, Devotion, Consultation, Cooperation). The intertwined legacies of worker cooperation and industriousness remain inscribed in the commercial landscape.

Within this 1966 "Philipsland," then, "laborer-citizens" constructed a carillon in their "town center"—the heart of Philips' suburban research campus—coopting the spirit of *Wederopbouwoptimisme* to demonstrate that the campus was *their* town. (For whom they built this instrument—themselves, tourists, their company as an abstract entity—remains an open question.) They made their donation to the Board of Directors, apparently, in the name of civic improvement and beautification. For its part, Philips strategically positioned the gift in such a way as to show the rest of the world that its campus, specifically the techno-cultural complex at its core, was Eindhoven's true town center. The only other private Dutch company to build a carillon before or since was N.V. Lips in Drunen (1954), but that carillon was donated directly to the main church on the town hall square.[55] As the factory was at the time casting Eijsbouts' largest bells, the Lips carillon likewise represented an attempt to renovate the city as commercial sonic territory.

However, the live internal carillon broadcast *did* empower workers to listen to the combined purchasing power of their own labor: their collective investment transformed into a record-setting sixty-one bronze bells. At four o'clock, they took over Philips' sprawling communications infrastructure (Figure 22) to listen to their own labor, musicalized. While the museum would inaugurate a technologically constituted consumer community with a global span, the carillon momentarily created an imagined Dutch community of labor sonically bound by the Netherlands' musical past, and affirmed a local company culture.[56]

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[55] Lips N.V. collaborated for a time with Eijsbouts, which cast its first heavy bells (those weighing over 650 pounds) at the Lips propeller factory. Company towns were nothing new by the turn of the century, and British businessman George Cadbury had sonified the small-town charm of his model village in Bourneville with a carillon in 1906. Sixty years before Philips, he had already embodied the harmony he sought to bring to his workers' lives through his generous social policies in the harmony of bells.

[56] Benedict Anderson discusses the idea of "imagined communities" formed through print and radio in *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (New York: Verso, 1991).

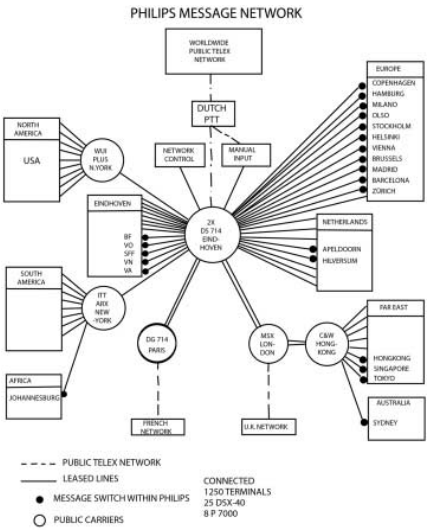

Figure 3 The Philips Message Network in the Early 1980s.
Redrawn from: E.J. Boutmy, Presentation on the Occasion of the Opening of the Communication Market in Eindhoven, October 5, 1983. PCA 728.374. Copyright Philips Company Archives.

Figure 22. Diagram of the Philips communication network (Mila Davids, "The Fabric of Production: The Philips Industrial Network," 280).

The repertoire played on the Philips Carillon further supports the perspective that, in everyday life, the carillonneur attempted to serve the workers rather than represent the corporation. Unlike other Philips employees, as noted earlier, the carillonneurs enjoyed artistic autonomy. In my interview with Philips' first carillonneur Bertus Oomen, I asked if he had been fully independent in his duties. "It was wonderful," he replied, "Philips said you could organize everything yourself." Independently, he decided to play to the workers. His audience mostly comprised people living in the surrounding Philips-owned neighborhoods, as well as some Evoluon visitors. On Sundays, two Philips staff members admitted a small crowd of visitors. Some came once, some returned many times and even gave feedback on his programs.

When I asked Oomen about his typical repertoire, he described his "Sunday concert programs [as] a mix of things: accessible music that was easy for the audience, and some difficult music." To him, "difficult" repertoire was simply music written for carillon which the audience had not heard before, as opposed to arrangements of familiar Baroque, Classical, and popular tunes, opera excepts, and familiar or lesser-known folk tunes. Oomen's sheet music anthology *Werken en Bewerkingen voor Beiaard van Bertus Oomen* (1986), published by the Netherlands Carillon School, contains arrangements of Baroque pieces by Jacob van Noordt and Johann Jakob de Neufville, eighteenth-century works by Matthew Camidge and James Hook, and his own *Kleine Triptiek* I and II, a piece based on fourths whose title evokes religious overtones. Dutch new music publisher Donemus published several of Oomen's compositions, accessibly tonal works in a contemporary idiom such as *Voorspel, Lied en Toccatine* (1966), built on broken diatonic chords, and *Sonatine* (completed 1967, published 1971), based on a diatonic five-note motif.[57] For original carillon music, he drew on Donemus' catalog of prominent modernist and neo-baroque composers like Henk Badings, Wim Franken, Jurriaan Andriessen, Albert de Klerk, and Sjef van Balkom, as well as Belgian composers Arthur Meulemans, Jef Rottiers, Staf Nees, and Jef Denyn, who composed in a Flemish Romantic style. Oomen knew that Badings was working nearby at NatLab and was one of

[57] Donemus was established in 1947 to support and document new music. It began publishing music in 1960 and has since been the Netherlands' largest publisher of new music for carillon.

the foremost carillon composers alive. But although they were among the few music employees of the same company, they never met, bringing Oomen's separation from Philips corporate culture into sharp focus. Even the most artistic of "corporation men" Gardner had observed were uncomfortable bedfellows with the history-minded carillon connoisseurs.

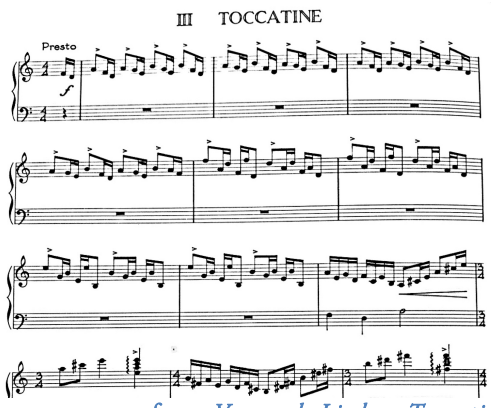

Figure 23. Bertus Oomen, excerpt from *Voorspel, Lied en Toccatine* (1966). (Donemus)

It is worth noting, however, that despite the lack of direct interaction, Dutch carillon composers associated with Donemus and Dutch electronic music pioneers at Philips worked according to similar populist principles that contrasted sharply with their American counterparts. Such trans-Atlantic composers as Easley Blackwood, Charles Wuorinen, and John Cage wrote far less approachable modernist carillon pieces in the 1960s.[58] By contrast, NatLab, under the direction of Badings from 1956 to 1963, developed early sound synthesis technologies that enabled Dick Raaijmakers and Tom Dissevelt (a.k.a. Kid Baltan) to release some of the world's earliest commercially successful electronic popular music on the Philips label. Bubbly radio hits like "Song of the Second Moon" (1957) featured catchy melodies, stylistic pastiches, and playful glissandos and sequences over a steady percussive beat. The hit single combined an awareness of German *Elektronische Musik* with jazz in a way that appealed broadly to Dutch listeners. By contrast, Badings remained academic. He composed acoustic works for carillon and organ, and in collaboration with physicist and musician Adriaan Fokker, wrote organ and violin pieces for experimental temperaments, pursuing the modernist goal of a "universal" music. For his NatLab duties, he wrote works thematizing the technological lifestyle, like "Dialogues for Man and Machine" (1958) for voice and electronic sounds.

Working in the employ of a corporate entity whose managers were housed in International Style towers, NatLab composers came to prominence doing sound research, writing popular electronic music, and composing carillon music as complementary activities in the service of the general public. Contrary to academic modernists, they embraced the carillon boom in the nationalist spirit of *Wederopbouwoptimisme* as a chance to bring modern music to the masses. Both Oomen and NatLab's composers hewed to a highly accessible version of musical modernism that would appeal to the Philips workers living within earshot in company housing, tourists visiting the Evoluon, and Philips consumers at large. NatLabs and the Philips Carillon thus allow us to reconceptualize

[58] Charles Wuorinen's piece "The Bells" (1966) in an early New Complexity style has in fact only been performed once due to its technical difficulty and inaccessibility even to professional carillonneurs.

"modernism" in music in the way modernist architecture was understood by Kalff and de Bever. The International Style—for them—was deemed an accessible, transparent modernist aesthetic.

Yet the use of the International Style for the carillon and museum again reveals the company and workers in conflict, and in fact reveals the degree to which the carillon's various meanings conflicted with each other. The structures were supposed to represent Dutch achievements, but by employing a culturally nonspecific architectural style (as suggested by its very name), presented the Netherlands as simultaneously everywhere and nowhere. Stefan de Bever, son of architect Leo de Bever, grew up with the Evoluon as the ultimate "day out with the car," and found the building special because so few exemplars of the International Style exist in the Netherlands. "When you're inside," he describes in Steef Hendriks' *Evoluon: 40 Jaar Boegbeeld van een Ambitieuze Regio* (2006), "You feel like you could be anywhere in the world. You feel 'international' there, if such a thing exists."[59] Likewise, the carillon was a quintessentially Dutch instrument, yet it was presented in an everywhere/nowhere external shell. Its localness was visually elided, and only by listening to its repertoire could one determine in which country or even continent it was located.

Designing the Neo-baroque

In retrospect, the technological tomorrows and musical yesterdays embodied by this flying saucer and bell tower were easily reconcilable in postwar Dutch culture. Wim Ros has explored how the *Orgelbewegung* and neo-baroque movements sought to recover Baroque organbuilding practices and optimize artisanship with modern Danish design.[60] Badings composed for machines, organists, *and* carillonneurs, and many Dutch early music pioneers were likewise involved in new music. Even as Eijsbouts president André Lehr developed the latest bellfounding technologies, he also conducted the most rigorous musicological research of his time into Baroque bellfounding history and published important studies like *De Klokkengieters François en Pieter Hemony* (1959) and *Een klokkengieter schrijft zijn opdrachtgever: De brieven van klokkengieter Pieter Hemony (Amsterdam) aan abt Antoine de Loose (Ename B.), 1658-1678* (2004).

On at least one occasion, Philips even advertised its household products as premodern tools through television advertising, commissioning Joop Gesink's Dollywood Studios for the puppet animation "The story with a beard" (Een verhaal met een baard) (1958), directed by Henk Kabos. In this playful narrated short film produced with versions in Dutch, English, German, French, and Spanish, the medieval prince of Barbery is cursed at birth by en evil fairy with an absurdly long white beard "which can't be plucked, nor shaved, nor sheared."[61] In the midst of their medieval castle, Gioachino Rossini's Barber of Seville himself arrives (anachronistically, but appropriately given his métier) singing the first two verses of Figaro's aria "Largo al factotum della città":

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[59] "De internationale stijl uit die tijd, inderdaad à la Philip Johnson, of Gio Ponti en Marcel Breuer—mijn vader heeft bij allebei gewerkt—bevalt me erg goed: als je in het gebouw staat, heb je steeds het gevoel overal op de wereld te kunnen zijn. Je voelt je er 'internationaal', als zoiets bestaat." (Hendriks, 25)

[60] Wim Ros, "Het Deense en het Nederlandse orgelfront," in *Orgels van de Wederopbouw: Het orgel van de Nicolaikerk in Utrecht en andere orgels van na 1945* (Zutphen: Walburg Pers, 2006): 101-148.

[61] Arie den Draak, Joop Gesink's Dollywoodm, accessed June 15, 2015, http://www.dutch-vintage-animation.org/index.php/nl/beeldarchief/animation-films/141-joop-geesink-dollywood-animated-movies-verhaal-met-een-baard.

Largo al factotum della città.	Make way for the factotum of the city,
Presto a bottega che l'alba è già.	Hurrying to his shop for it's already dawn.
Ah, che bel vivere, che bel piacere	Ah, what a fine life, what fine pleasure
per un barbiere di qualità! di qualità!	For a barber of quality!
Ah, bravo Figaro!	Ah, bravo Figaro!
Bravo, bravissimo!	Bravo, bravissimo!
Fortunatissimo per verità!	Most fortunate indeed!

Figaro shaves the cursed prince's beard off just long enough for a princess from a neighboring land to fall in love with him. Her father presents him with a Philips Philishave rotary-action electric razor, and he shaves successfully at last. As the clean-shaven prince and his bride joyfully take to their thrones, onscreen pealing bells declare a great feast throughout the kingdom over a Korngold-like orchestral soundtrack by Dolf van den Linden. The prince replaces the royal coat of arms with the Philips logo. Onscreen as in real life, the sonic horizon of Dutch bells mapped out the growing reach of Philips' techno-utopian empire.[62]

Figure 24. Figaro's aria (left) and bells declaring a great feast in Barbery (right) in *Een verhaal met een baard* (1958).

The real-life connection between historically informed keyboard building and modernist design is already established in organ scholarship. Wim Ros notes that Dutch neo-baroque organ design was heavily influenced by the Danish historical organ building movement, especially via Marcussen & Søn, and consequentially, by modern Danish furniture design. His delightful juxtapositions of images of modernist chairs with neo-baroque organ cases offer intriguing visual comparisons. Danish design was, after all, anchored in a revivalist appreciation for historical models and materials. Neo-baroque builders sought to create contemporary instruments, not Baroque imitations, that took advantage of transhistorical purviews. They paid close attention to historical models, but judiciously incorporated stops from different places and times. Although *Wederopbouwoptimisme* gave carillon and organ building a major boost as materials became available again, Ros laments that Dutch organ builders did not value collaborations with designers as in Denmark; the Dutch conceptualized rebuilding in terms of quantity and affordability rather than artisanship. By the time Dutch furniture designers achieved the prominence long enjoyed by their

[62] Alain Corbin coined the term *sonic horizon* in *Village Bells* (1998) to describe the geographical reach of the sound of bells.

Danish counterparts, they saw the neo-baroque organ as a mere historicist church ornament and not worth exploring.[63]

Instead, it was the stand-alone carillon tower that would provide meeting points for historical keyboards and modern design, as such instruments are not contained *inside* architecture like organs, but rather are in themselves (bells and tower taken together as a single resonant body) a towering visual style statement communicating traditionalism, modernity, or both simultaneously. Renowned designer and architect Gerrit Rietveld designed the University of Twente carillon tower in Enschede, co-designed the carillon tower for the Dutch Pavilion at the 1958 World's Fair, and sketched a tower for the Netherlands Carillon in Arlington, Virginia, which was not selected for construction. Ros points out that Rietveld worked in industry and took little interest in craft; therefore it is unsurprising that building carillon towers for corporations, research universities, or diplomatic gifts captured his attention.

Figure 25. The Netherlands Pavilion carillon at the 1958 World's Fair in Brussels (left) (Netherlands Architecture Institute, http://en.nai.nl/content/294202/the_dutch_pavilion_at_expo_58) and Gerrit Rietveld's Beugelstoel 1 (1927) in the collection of the Stedelijke Museum (http://www.stedelijk.nl/kunstwerk/11497-beugelstoel-1).

The Eijsbouts bellfoundry, just eighteen miles from Philips, combined the artisanal heritage of the Dutch bellfounding tradition with the sonic research laboratory model espoused by NatLab. Eijsbouts was the first bellfoundry to adapt a research-based paradigm for efficiently and cheaply casting and tuning carillon bells (including ones that match Baroque bell profiles), and to develop major-tierce bell profiles to suit new music and contemporary audiences.[64] Eijsbouts also collaborated on campanological research with the Eindhoven University of Technology. No more appropriate bellfoundry could have cast the Philips carillon.

Yet it was Philips' particular attempt to combine tradition with technology and modern design that led to its carillon's demise. Architect L. de Haas built industrial and office buildings for Philips, and his collaborator, J. Noteboom, was an engineer.[65] Haas' functionalist aesthetic employed metal throughout the tower (except for the wooden louvers)—an unprecedented decision—to support the country's first five-octave carillon.[66] Working with the Netherlands Carillon Guild's advisor and Eijsbouts to engineer a higher tower that could hold heavier bells, they visually

[63] Ros, 141.

[64] Traditional bells are inharmonic, producing a strong minor third overtone. Only computer-based modeling can achieve bell profiles that produce a major tierce. According to Lehr's research, the general public tends to prefer major tierce bells, while carillonneurs prefer traditional bells. I do not know of studies conducted outside of Eijsbouts confirming or disproving Lehr's findings.

[65] L. de Haas was sometime Gemeentearchitect (Municipal Architect) of Schiedam.

[66] The carillon's total weight has been quoted in different sources as 15,320 kg or, more often, 16,005 kg.

emphasized this technical achievement with the "form follows function" philosophy of the International Style. In other words, they eschewed centuries of proud civic usage of tower-as-communicative-ornament for tower-as-efficient-machine, cleansed of ornament. So the instrument and structure depended on each other's innovations: a heavier load-bearing frame and Eijsbouts' ability to cast bells across a broader frequency spectrum. As a form of modernist ornamentation and acoustic modification adapted from Flemish carillon towers, the wooden louvers created a stunning moiré "op art" effect. They truly made the belfry look like a novel machinery chamber, or better yet, a loudspeaker directing its amplified sound outwards.

Unfortunately, de Haas and Noteboom's application of the principles and materials of industrial design to a musical instrument proved unworkable: the steel frame did not resonate with bronze in a musically pleasing way, and vibrational stress compromised the tower's structural integrity over the years.[67] Selecting an industrial architect and engineer (without including, say, Philips' audio equipment engineers) to design a musical instrument resulted in a machinery-like housing that, despite the carillon's long history as a musical automaton, constructed the carillon as machine at the expense of musical performance.

Corporate Campanology

The Philips Carillon, as we have seen, introduced a new architectural typology to the Netherlands: a stand-alone corporate belfry. In the 1970s, Eindhoven's DAF Trucks N.V. performed a copycat feat. Its employees proudly donated an automatic thirty-three-bell chime to its campus just outside the Eindhoven ring road, commemorated today by an impressive bronze plaque in the nearby DAF Museum (Figure 26). As Philips modeled its suburban campus on American research parks, so DAF depended on the Netherlands to take the American car lifestyle as its model for nationwide reconstruction based on freeways rather than trains. The American government itself became a major customer, with DAF providing military vehicles like the Military DAF Pony and the DAF Porter ("marshland coolie") to the U.S. Army for the Vietnam War, even as Philips supplied the Air Force's Starfighters. In this sense, the very existence of DAF's bells depended on the Americanization of Dutch urban planning.

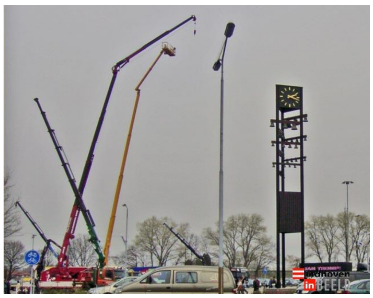

Figure 26. The DAF Trucks NV automatic chime on company terrain in 2006.
(Photo: Wil van Hout, http://www.eindhoveninbeeld.com/foto.php?foto=4095&sel=groep)

But the DAF chime tower was later moved onto restricted company grounds. During my visit on August 28, 2012, I could only glimpse it through two layers of chain-link fence. According

[67] The Evoluon's Technical Mast was made of concrete and steel, but these materials worked fine for radio transmissions.

to one online commentator, the neighbors no longer have to "suffer" from it, suggesting some found its automated music more annoying than artistic.[68] In its current location, the chimes are inaudible over the roar of two major thoroughfares, the Geldropseweg and the Eindhoven ring road. Its public silencing belies DAF's attempt to emulate the cultural, social, and urban predominance and authority of Philips, but in an environment that was openly acknowledged to be private.

The "company carillon" still being uncommon throughout the world, the existence of two in Eindhoven suggests how thoroughly the city was identified as a company town. However, the eventual relocation of both of these instruments demonstrates a certain Dutch skepticism towards locating bell towers outside of the city center, try as industries might to decenter the city onto their sprawling liminal complexes. While parkland carillons are common in the U.S., they have yet to find much traction in the Netherlands even today.

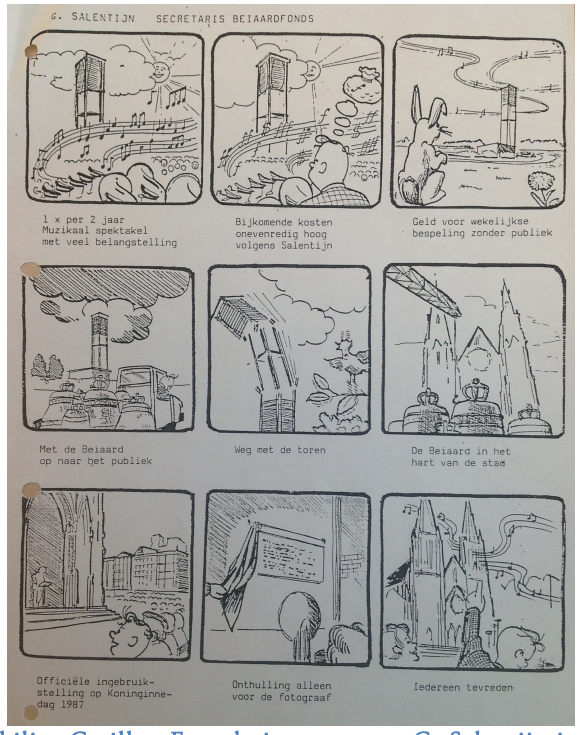

Figure 27. A comic strip by Philips Carillon Foundation secretary G. Salentijn justifies the move of the Philips carillon to St. Catherine's Church. The first two panels monetize the music of the carillon from Salentijn's concerned perspective. The third, captioned "money for weekly performances without a public," depicts carillonneur Arie Abbenes' sole listener as a rabbit. (Philips Archives)

While the chime tower may have originated as DAF's answer to its friendly Eindhoven cousin and as loyal employee rivalry, its construction revealed a key difference between DAF's and Philips' public outreach strategies. The inaccessible company chime and self-celebratory DAF Museum demonstrate the company's self-absorbed approach to publicity, as some of its most important products were not for general public consumption. The museum's informational film, which I watched there in 2012, devotes an inordinate amount of time to historical footage fêting the company founders with marching bands. By contrast, the Evoluon educated the public briefly about

[68] "Cadeau personeel DAF (2)," photograph, *Eindhoven in Beeld*, May 13, 2006, http://www.eindhoveninbeeld.com/foto.php?foto=4095. The caption reads, "The carillon amid parked cars, where it no longer stands and the neighbors do not suffer from it."

Philips, but focused on the broader history of technology (sound, light, matter, the electron, devices and systems, manufacturing and production), the growing world population and the alleged importance of science and technology for society (life, health, learning, relaxation, communication, traffic), while immersing visitors in the architectural and sonic aesthetics of the Philips Electronics brand.[69]

DAF's about-face in moving its automatic chime tower out of public earshot echoes the change of heart at Strijp in the 1980's. The Philips Carillon was also disassembled in 1987 due to its structural and acoustical problems, dwindling attendance, and even apparent local hostility expressed through gunshots fired at the playing cabin (no injuries reported).[70] That violent threat suggested growing hostility to the company brand and to the invasiveness of the carillon as a form of musical propaganda. These instruments proved unwelcome as tools to redraw the city's borders.

By the 1980s, the carillon and Evoluon had become cenotaphs that respectively memorialized and museumized Eindhoven in advance of Philips going global. New "Philips Towers" would rise in Amsterdam—the highest office towers in the city—with nary a bell in sight, while Eindhoven would lose 30,000 jobs in the 1980's, devastating its population of 200,000. As it turned out, Philips' combination of national, provincial, and company flags flying at the Evoluon inauguration had symbolized Philips' quasi-governmental power to not only build cities, but also to abandon them.

Perhaps the Communist newspaper *De Waarheid* spoke the truth. During Philips' postwar expansion, the company rejected the possibility of building in Rotterdam despite the city's status as major port. According to Mila Davids, "Philips found the more 'rebellious attitude' of labourers in Rotterdam and the strong unionism unattractive. Other production centres of Philips might be 'infected' by conflicts starting in Rotterdam."[71] Gifting a carillon was the opposite of unionizing. Just as Philips had once papered over religious conflicts amongst its workers, its workers now papered over its transformation from a socially conscious local firm into a decentralized global entity.

On an online forum about Eindhoven history, former Philips Architects- and Engineers Bureau employee Joep van de Laar recalled that every employee donation form was placed in a casket and buried beneath the foundations of the original tower.[72] He wondered if the casket was ignored and lost when the tower was dismantled. Having found no other mentions of said time capsule, I can only surmise that this object, be it fact or fiction, signals the disillusionment of Philips workers who no longer believe in the joint ownership of an instrument that, according to its original plaque, "audibly and visibly expresses what can be achieved by joint endeavor."

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[69] The Evoluon's "Ring 1" was devoted to "Philips, an international electronic industry," with sections on its products, history, people, and fourteen main industrial groupings.

[70] Arie Abbenes (retired Philips carillonneur) in conversation with the author, October 4, 2012.

[71] Davids, 279.

[72] "I remember the form that every employee of the time was asked to complete and submit in order to make a contribution. These forms were placed in a lead casket, and the casket was placed under the foundations of the tower. Maybe someone knows where that box has gone. I have never heard anything about it since; maybe it's passed me by. At the time of construction, I worked at the Philips AIB, so I had that information." Joep van de Laar, 4 Feburary 2007, comment on "Philips-beiaard" (photo), *Eindhoven in Beeld*, 12 December 2006, http://www.eindhoveninbeeld.com/foto.php?foto=7902.

The Heritage of the Future

At Los Angeles International Airport, the famous Theme Building, like the Evoluon, takes the form of a flying saucer (Figure 28). Contemplating the Theme Building, urbanism essayist D. J. Waldie described Los Angeles as a "future city" that surrealistically combines modernity with replicas of California's Spanish and Mexican past.

Figure 28. LAX Theme Building by Pereira & Luckman, Welton Becket & Associates, and Paul R. Williams. (Photo: "monkeytime | brachiator", April 29, 2007, https://commons.wikimedia.org/wiki/File:LAX_LA.jpg, Creative Commons Attribution-Share Alike 2.0 Generic license.)

The Villa Aurora, the *Los Angeles Time*'s showcase futuristic home completed in 1928, featured laborsaving household appliances alongside a pipe organ built by Artcraft Organ Company of Santa Monica (Figure 29), all under a Spanish Colonial Revival roof. Even more remarkably, the organ was no silent ornament, but an instrument of eight ranks and thirty-four stops played by Bruno Walter, Ernst Toch, Hanns Eisler, and Marta Feuchtwanger, who with her husband Lion fled the Nazis, bought the Villa Aurora in 1943, and turned it into a meeting place for artists and intellectuals.[73]

[73] The Villa Aurora now offers artist residencies in music composition, visual arts, film, and literature, as well as a Feuchtwanger Fellowship for writers and journalists whose freedom of expression is hampered in their native country. The house also serves as a memorial to the artists and intellectuals who fled Nazi persecution to southern California and shaped the region's cultural life. The organ was restored in 2010 and given a similar meaning—it was re-inaugurated by Christoph Bull, who played works by Erich Zeisl, Ernst Toch, and Kurt Weill, and accompanied Charlie Chaplin's silent film *The Immigrant* (1917).

Figure 29. Villa Aurora organ (Feuchtwanger Memorial Library, University of Southern California)

Waldie terms the Villa Aurora and LAX Theme Building *paleofutures*, "the past's unachieved tomorrows" that have "preservationists…worried that tomorrow is deteriorating too quickly to conserve." Philips understood the Evoluon's design by 1981 to a be a future of yesteryear, when it farcically leveraged the museum's UFO likeness in a television commercial by launching it into space with cheesy science-fiction sirens to advertise the museum's special exhibit on energy (Figure 30).[74] In Los Angeles and Eindhoven, the future looks dated, and has proven quite expensive to keep up. Much as an interwar American "future city" house near Hollywood needed an organ, a postwar Dutch "future city" in the Netherlands must have needed a carillon. But the weight of the bells' history was literally too heavy for their paleo-futurist shell, and the Philips Carillon fell victim to the nostalgic calculus of looking like tomorrow.

Figure 30. "Speciale tentoonstelling energie" television commercial for the Evoluon showing the dish suspended in midair (1981). ("Evoluon Commercial 1981," YouTube video, 0:22, posted by "acvt," 26 February 2007, https://youtu.be/xphmz4njjbU)

Philips' second carillonneur Arie Abbenes oversaw not only the dismantling of the tower in 1987, but also the relocation of the bells and keyboard to the neo-Gothic tower of St. Catherine's Church (Figure 31), steps away from City Hall in the heart of Eindhoven. If Philips had once

[74] "Evoluon Commercial 1981," YouTube video, 0:23, posted by "acvt" on February 26, 2007, https://youtu.be/xphmz4njjbU.

appropriated a historic instrument to temper its own newness, it now bowed to the very historical symbolism it had earlier repurposed to legitimize its modern peripheral research landscape. Tradition has had its revenge. No further suburban park carillons have ever been built in the Netherlands.[75]

Figure 31. St. Catherine's Church, Eindhoven.

In 2013, influential *Dezeen* design blog editor Marcus Fairs wrote: "I've seen the future and it's a small, ugly town in the south of Holland."[76] Apparently he saw the future in Eindhoven's people, in spite of its dilapidated paleofutures, its postindustrial architecture, and the uninspired postwar reconstruction of its commercial city center. The pull of the carillon's history has put it back where post-Philips Eindhoven, which in 2008 led the world in number of patents per capita, can hear it herald the city's post-industrial revival.

Current St. Catherine's carillonneur Rosemarie Seuntiens still collects a Philips paycheck. In fact, the Stichting Philips Beiaardfonds (Philips Carillon Foundation) paid for the carillon's transport and installation in St. Catherine's tower and still owns the instrument. Like the Dutch civic authorities that took ownership of church carillons during the Protestant Reformation and have employed their musicians ever since, Philips continues to simulate the role of the state in Eindhoven, if only by fulfilling municipal musical responsibilities.

This old-looking carillon tower offers new music. In 1987, the foundation commissioned Eindhovenaar René Pieper to compose a rededication piece, *Air II voor Beiaard*. Ironically, it was composed in modernist style, filled with diminished fourths and jagged melodic contours alternating with sparkling minimalist passages. In 1996, Abbenes worked with avant-garde composer Mauricio Kagel (both pictured in Figure 14) to perform several *Kagel en Klavieren* concerts featuring the carillon paired with a traveling carillon, including the world premiere of *Melodien* for two carillons. Thus the greatest irony of all came to pass: Released from its charge to impart "historical" neo-baroque legitimation to a new suburban space, the Philips Carillon finally became modern in sound, though not in sight. In its neo-Gothic tower, it provides the city's (mostly rebuilt) historical center with a sense of history.

[75] The 1967 Belgenmonument carillon in an Amersfoort park might be considered an exception, but it exists exclusively for student practice because of its isolation from urban areas.

[76] Marcus Fairs, "The future is a small, ugly town in the south of Holland," *Dezeen*, October 24, 2013, http://www.dezeen.com/2013/10/24/opinion-marcus-fairs-eindhoven-innovation-proeftuin-erfpacht.

Chapter 4. Ringing Diplomacy: Campanological Peace and Infighting on the Atlantic after World War II

The previous chapter noted that the only Dutch-designed carillon tower similar in style to Philips' was to be found in America. Postwar gifts of carillons between the Netherlands and the Americas carried out cultural or soft diplomacy and even containment through memorialization, performance, politically charged ritual and rhetoric, campanarian inscriptions, societal representation, and the circulation of musicians and recorded sound. The gifting of two carillons from the Netherlands across the Atlantic in the 1950's represents a brief period of what I term the country's "keyboard diplomacy" with the U.S. and Canada.[1] Much has been written about the cultural diplomacy carried out through musicians' concert tours during the twentieth century. Yet even Polish pianist and former prime minister Ignace Jan Paderewski, for whom musical fame opened diplomatic doors, lay buried in Arlington National Cemetery from 1941 until after the lifting of the Iron Curtain between two carillons, one of which is no longer even remembered at the cemetery. Scholarship has focused less on how the gifts of musical instruments themselves, particularly architectural-scale ones such as the carillon and organ, have served as diplomatic tools for centuries—probably because they proved ineffective.

This musical strategy to realize harmonious international relations after World War II foundered on its very dependence on the act of performance: musical monuments are only meaningful when regularly complemented by a human element, the musician, and appear neglected if left largely silent, which was the usual result of the American government's approach to the care of monuments. Only the Dutch and Belgian regimes were accustomed to maintaining architectural-scale memorials as musical instruments. Moreover, attempts at keyboard diplomacy stumbled on recurrent delays, lack of funds, political and corporate infighting, and most of all, the questionable concordances of poorly tuned bells, thus laying bare the contradictions inherent in the idea of the carillon as a populist instrument.[2] Could the carillon entirely symbolize democracy if Adolf Hitler had also planned to erect one to ring out his favorite Bruckner symphony theme?

Beginning with the first North American carillons in the early twentieth century, the instrument's power to evoke a universalized Old World heritage encouraged listeners to imagine themselves as members of an idealized community with a shared musical memory stored in its architecture, rather as Benedict Anderson argued that far-flung readers or listeners imagined themselves as a community through the mediums of print or radio.[3] Institutions such as universities, churches, and municipalities constructed belfries to project an Old World lineage by explicitly

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[1] Keyboard diplomacy is hardly a new phenomenon. Queen Elizabeth I commissioned Thomas Dallam to build and deliver a massive organ to sultan Mehmet III in Constantinople in 1600 (Davitt Moroney, "Promoting Harmony Between Nations: The Politics of Some Musical Embassies in the Sixteenth Century," lecture delivered at UC Berkeley, February 19, 2013). At the opposite end of the amplitude spectrum, Jesuit missionary Matteo Ricci introduced Western music to China the next year with his gift of a clavichord or harpsichord to Emperor Wanli (Ian Woodfield, "The Keyboard Recital in Oriental Diplomacy, 1520–1620," *Journal of the Royal Musical Association* 205 (1990): 33-62).

[2] Kimberly Schafer was the first scholar to question the assumption that carillon music is universally accessible in her talk, "The Carillon and Auditory Culture: Carillon Music in Louvain, Belgium in the late 18th century" at the June 2006 Congress of the Guild of Carillonneurs in North America.

[3] Benedict Anderson, *Imagined Communities: Reflections On The Origin And Spread Of Nationalism* (London: Verso, 1991), 137.

modeling them after European ones, even on college campuses where other buildings only evoked historical architectural styles.[4] This imagined universal heritage depended on a utopian campanarian discourse, particularly powerful during the early twentieth century, describing bells as the voice of the people, an instrument for community good and edification, and an egalitarian memorial. Campanology books, statements by carillon donors and host institutions, and newspapers and magazines equated community identity and vocality with tower bells.[5]

The Netherlands Carillon, a modernist visual and sonic marker between the iconic Marine Corps War Memorial (a.k.a. Iwo Jima statue) and Arlington National Cemetery, is positioned on axis with the National Mall in Washington, D.C. This controversial instrument illustrates the failure of the carillon to materialize *and* sound harmonious geopolitical relations. Presented by subscription "from the People of the Netherlands [*Nederlandse volk*] to the People of the United States" in gratitude for America's role in the Dutch liberation and the Marshall Plan, the diplomatic gift symbolizes national solidarity by uniting four octaves of bells from three Dutch foundries, each note symbolizing a Dutch province or segment of society. But the vehement protestations of partisan groups over the location of the instrument, combined with the disharmonious effect of amalgamating three different bell profiles, illustrates just how resistant the carillon proved to imagining political and social harmony.

The Dutch government provided the instrument, but no endowment for its performance or upkeep, expecting that the U.S. would take up that responsibility. By 1970, the carillon was making Dutch headlines as a national disgrace as it disappeared beneath layers of guano and silence. To this day, carillonneurs disparage the instrument, and the patriotic music regularly played on it sounds inadvertently satirical. This chapter develops my portrait of the Netherlands Carillon as the instrument that laid bare the problems of the carillon as universalizing, utopian monument to community goodwill—a role for which bells are still cast today.

The highly institutional architectural form of the carillon and the very materials from which it is made enable it both to serve as a monument for the public good and to slip into the symbolic vocabulary of fascism. The polysemous music of Dutch poet and composer Adrianus Valerius (c.1575-1625) as performed on carillon for Dutch, German, and American audiences will serve as a motif of this chapter. An unbuilt carillon will provide another motif; since 1919, every American carillon has been built in the imposing shadow of a carillon proposed as a memorial and monument to peace, to be built in Washington, D.C. from World War I shrapnel collected from around the world. By contrast, as Deyan Sudjic describes in *The Edifice Complex: How the Rich and Powerful—and Their Architects—Shape the World* (2005), Hitler's architect Hermann Giesler designed a master plan in 1945 for the Führer's hometown of Linz "with an oppressive scale and an axis from railway station to city center. Along the corridor were ranged a 35,000-seat concert hall and other cultural buildings…Overlooking the river was a 500-foot-high bell tower, with Hitler's parents entombed in a crypt at the base and a carillon playing Bruckner at regular intervals." Specifically, it would on certain days play a motif from Bruckner's Fourth Symphony that he found deeply touching and

[4] At Yale University, campus architect James Gamble Rogers designed collegiate Gothic buildings without exact referents, but modeled Harkness Tower in 1921 after St. Botolph-by-Bargate in England. At the University of California, Berkeley in 1917, John Galen Howard modeled Sather Tower, known as the Campanile, after St. Mark's Campanile in Venice.

[5] Tiffany Ng, "The Economy of Death and Memorialization in American Belfries," talk given at 3rd annual GSHA Conference, "Nostalgia and Amnesia: Avenues of Remembering and Forgetting," Claremont Graduate University, March 26, 2011.

suitable for bells.[6] That one instrument could serve both Allied and Axis constructions of so-called utopias should spur us to critically re-evaluate many of the world's carillons in their socioeconomic and political contexts. Developing our awareness of the carillon's historical role in fascism and even colonialism grows increasingly important as instruments continue to be built outside the Western world with utopian intentions and are ill received.

The Ghosts of Carillons Past

Wishing to beat swords into plowshares after the Great War, a National Carillon Association (NCA) dreamt of dissolving the deadly mass of wartime artillery into the ultimate sonic emblem of peace, the bell. Incorporated in 1917 and headquartered in the Colorado Building near the White House, the NCA's twenty-two-person Board of Trustees included conductor Walter Damrosch (who had conducted the premieres of Gershwin's Piano Concerto in F in 1925 and *An American in Paris* in 1928), Gilbert Grosvenor (first editor of *National Geographic Magazine*), Newbold Noyes, Sr. (associate editor of *The Washington Evening Star*), four distinguished botanists in the U.S. Department of Agriculture, Harvey Washington Wiley (first commissioner of the Food and Drug Administration, soon to receive burial in Arlington National Cemetery), federal judge Wendell Stafford, and seven women whose biographies are not readily available.[7] The strong representation of the Department of Agriculture is emblematic of the idea of the carillon as an element of landscaping for the public good.[8]

"Seeking to keep the chief emphasis on the esthetic and moral side rather than on that of physical triumph of armed force," the NCA's 1919 brochure by botanist James Marion Shull ambitiously proposed that "copper to the extent of 50,000 pound…would be derived from captured enemy war materials" for a peace carillon to be built between Union Station and the Capitol. It continued that "in the absence of bronze cannon among the American captures, this copper would be obtainable from 86,000 pounds of shell-cases, to be furnished by the War Department at the direction of Congress."[9] The project received a critical boost from the General Federation of Women's Clubs, which included the supportive District League of American Pen Women amongst its 47,000 clubs. The Dutch got wind of the project, and *De Tijd* ecstatically reported that the tower would be built from the rubble of Rheims, Dendermonde, Lueven, and Ypres.[10] The Association envisioned that all allied capitals would follow suit, so that "on the anniversary of that November day that marked the final triumph of Humanity, let there be rung from all the capitals a grand *Te Deum* of World Brotherhood."[11] Shrewdly, it also presented the carillon "as a business asset," which unlike trite triumphal arch-type memorials, would draw "many thousands of additional visitors to

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[6] Luc Rombouts, *Singing Bronze: A History of Carillon Music* (Leuven, Belgium: Leuven University Press, 2014), 266.
[7] Both *National Geographic Magazine* and the *Washington Evening Star* had or would publish articles about various carillons.
[8] The members employed at the U.S. Department of Agriculture were Erwin Frink Smith, James Marion Shull, William Edwin Safford, and Albert F. Woods.
[9] James Marion Shull, "The Washington peace carillon; a brochure issued by lovers of the bells and dedicated to others of their kind. Done in the interest of a greater Washington" (Washington, D.C.: W. M. Darling, 1919), http://hdl.handle.net/2027/loc.ark:/13960/t48p6gb76: 8.
[10] "Een echt-Amerikaansche Beiaard!" *De Tijd: Godsdienstig-Staatkundig Dagblad*, August 24, 1921.
[11] Shull, 7.

the capital" with its unique combination of art (such as ornamental sculpture) and music. Sure enough, the Smithsonian Institution hosted an exhibition of famous bell towers around the world in 1920 at the Natural History Museum and sent invitations to its 2,500-member mailing list, drawing attention and visitors.[12]

Another early brochure presented a sketch of a 350-foot Beaux-Arts tower by Paul P. Cret, architect of the Pan American Union Building, intended to rival the Washington Monument, the Capitol, and Washington Cathedral. Of its fifty-four bells, the lowest (E♭) would weigh over ten tons and bear the great name "The Bell of the Allies." The rest would be allotted to each state or territory "according to the number of casualties [it] suffered in the war," giving New York the next heaviest bell, followed by Pennsylvania, and ending with the Philippines (A♭), which ironically had resumed its vigorous independence drive after the war. The fact that this memorial could double as art and as a concert instrument "as precious as a violin by Stradivarius" was central to their vision (Figure 1): "As the best bells are now tuned to the accuracy of a single vibration this instrument will be worthy of the greatest masters and the weekly concerts will be events eagerly looked forward to and long to be remembered by visitors to the Nation's Capital." Besides regular concerts, these nobly representational bells would be used on special occasions to honor events in a particular musical key:

> The bells would ring on all great State occasions, and what could be more fitting in celebration say of the martyred Lincoln's birth than the rendering of his favorite hymns in the key of the State that gave him to the world, or ushering in the natal day of Washington with music in A-flat, the key-note of Virginia's bell? A subtle symbolism might thus be made to enter into every special concert with scarce a limit to the flight of the imagination. When the notables of other lands come visiting, the great Bell of the Allies would boom its sonorous welcome, and melodious rendering of their national airs would give them friendly greeting and bid them feel at home.

The Association made provision not just for a keyboard on which the "great bell-masters" would perform for "many thousands," but also an automatic play that would bring the salutary effects of tastefully curated public music to all within its sonic horizon, and even elevate the general level of American musical taste:

> Day in, day out, at morning, noon and eventide, the subtle influence of this great Peace Memorial should gently bear on all within the radius of its sound. By means of automatic play these sweet-toned bells will render snatches of the world's acknowledged master-pieces, its best loved melodies, and thus contribute greatly to that desired estate wherein good music shall be popular and popular music good.

The Association even dreamed that it might use the medium of radio to "broadcast upon the air" the sound of this carillon "in every park or quiet open space about the city, and even in the distant States" to elevate the tastes of all Americans. The campaign contacted the governors of every state, and in an appeal to American desires for equal state representation and remembrance, this brochure ended with a plea for individual donations "to join in seeing that your State maintains its place among the rest."

[12] Heather Ewing, "A National Peace Carillon for Washington, D.C.," *Bulletin of the Guild of Carillonneurs in North America* 45 (1996): 67.

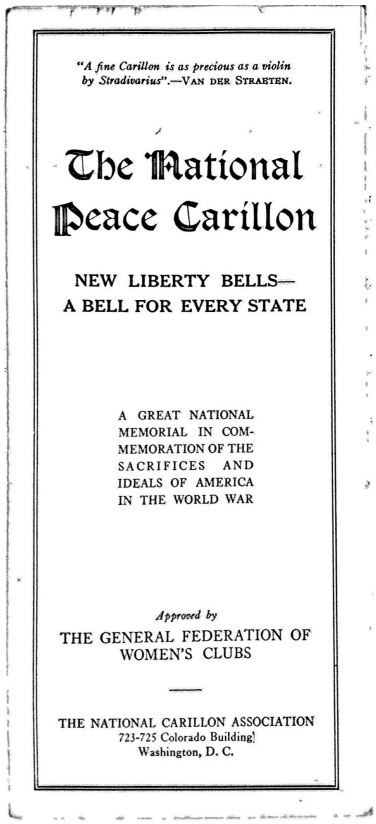

Figure 1. A National Carillon Association brochure compares the carillon to a Stradivarius violin (Records of the National Park Service, Regional Facility).

Luc Rombouts notes that during the Great War, the continued existence of Romantic ideals "had given Belgian carillons an aura of heroism and melancholy," and politician William Gorham Rice's books and articles in journals like the first volume of *The Musical Quarterly* and in *National Geographic Magazine* fed American impressions of misty evening concerts on nearly ruined European "singing towers."[13] Rice coined the term *memorial idea* to distinguish what drove carillon building in the New World from the practical and competitive civic pressures that had driven it in the Old. In Rombouts' summation, the memorial idea "found fertile ground in one of the deepest characteristics of the American psyche: the desire to be remembered after death. The fear of being forgotten was one of the driving forces behind American charity, just as charity was stimulated in the European Middle Ages by the fear of hell and purgatory." Thus, building the heaviest carillon in the world by far became one of America's grand postwar projects—one that would remain a pipe dream.

…or some other kind of dream. Shull's concluding essay for the 1919 pamphlet, "The First Concert: A Forecast," dramatized what the orgasmic inaugural performance by "the world's most famous master of the bells" would sound like:

> And from this basal structure, the soaring shaft, compact of grace and beauty, lithe yet strong, firm footed on the earth yet reaching heavenward, well typifies the spirit of the men who risked their all to save the world from slavery….Then twilight, stars, and a pale young moon, to play at hide and seek among the wisps of cloud

[13] William Gorham Rice, "Tower Music of Belgium and Holland," *The Musical Quarterly* 1, no. 2 (Apr., 1915): 198-215; William Gorham Rice, "The Singing Towers of Holland and Belgium," *National Geographic Magazine* 47, no. 3 (March 1923): 357-76; William Gorham Rice, "The Carillons of Belgium after the Great War," *Art and Archaeology* 12, no. 3 (August 1912): 51-73.

> whose silvery sheen betrays her hiding place….It is indeed the carillon's voice; the bells have come to life….now there comes a barcarolle….Instead of distant thunder there is now the booming sound of waves that beat themselves to spray against the rocks…at length the current leaps and bounds, in grand crescendo, irresistibly, and pours itself in one torrential rush of sheer descent, a veritable Niagara of sound that holds the audience spellbound in its grasp….The last vibration dies away and in its place a half reluctant murmur from the throng, as if they fain would leave the spell unbroken, now swells in volume and resolves itself into the myriad sounds of congregated life: a babel of voices full of wonderment that metals snatched from war's accouterments could ever speak like that.[14]

In 1930, Capt. E. N. Chisholm, Jr. of the National Capital Park and Planning Commission poured a cold dose of skepticism on these dreams. The Commission suggested sites including Arlington National Cemetery, but insisted that "this carillon should not be constructed anywhere near the Capitol. In fact, I am of the opinion that if it is built anywhere, it should be rather a long distance from the Capitol, and I suggest that the location be in the [U.S. National] Arboretum," over two miles northeast of Capitol Hill. The engineer's memos suggest that he considered carillons frivolous ornaments that detracted from a memorial's dignity.[15]

The association of bells with peace remained so compelling that the American Peace Society took up the torch. Through its efforts and those of C. P. Byrd of Atlanta, whose religious, civic, and political activities in Georgia merited her an importunate personal letter of introduction from the Governor, the idea reached the formal agenda of the National Capital Park and Planning Commission. It met from December 19-20, 1930 and drew up a fascinating list of potential sites in its report: "The site of the steel plant adjoining the Shepherd Parkway, Columbia Island, Lincoln Park, Arboretum area; St. Elizabeth's Hospital grounds; the end of East Capitol Street, or on the Mt. Vernon Memorial Parkway." This variety would never have been dreamt of in the Low Countries. The Commission's general consensus in fact reversed European views: "The Carillon Tower should not be located in any of the city parks…it should be located in an area somewhat removed from the inhabited sections; with ample open space about it for accommodation of those seeking to enjoy the Carillon, for the parking of a large number of automobiles without interference with the functions of the Carillon."

So over a decade after its genesis, the idea was still floating unmoored from the shrapnel it was supposed to melt. On February 26, 1931, sculptor James Bush-Brown, son of Association president H. K. Bush-Brown, submitted a sketch to Vice President Charles Curtis for a carillon to be located (still) at Union Station Plaza as "part of the artistic expression of the National Capital in carrying glad tidings to the people and through the use of the radio to all the people of the country."[16] The Commission's meeting from March 19-21, chaired by Charles W. Eliot, Jr. now included a son of famed landscape architect Frederick Law Olmsted and then-New York governor Franklin D. Roosevelt. Senator Henry Foss (R-WA) suggested the carillon be located on Mt. Vernon Boulevard or the George Washington Memorial Parkway (to which this story will later return), but no decisions were made.

The Commission, joined by Roosevelt's cousin, architect William Adams Delano, met again from May 21-23 and discussed locating the carillon on the Virginia hillside (Radnor Heights)

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[14] Shull, 10-14.

[15] E. N. Chisholm, Jr., National Capital Park and Planning Commission intra-office memorandum to Lieutenant-Colonel Ulysses S. Grant III, February 6, 1930, Records of the National Park Service, Regional Facility.

[16] H. K. Bush-Brown to Vice President Charles Curtis, February 26, 1931, National Park Service Archive, Regional Facility.

adjoining Arlington National Cemetery as part of a proposed memorial to Woodrow Wilson, the Wilson Memorial Terrace. Now the NCA's proposal was to erect a "*peace carillon*, containing a bell from every nation tuned to produce harmonious music."[17] The proposal went to the Commission of Fine Arts (CFA), a federal advisory board of painters, sculptors, architects, and landscape gardeners that had traditionally enforced the aesthetic of Washington planner Pierre Charles L'Enfant (1754-1825) of open spaces, long views, a horizontal construction scheme, and classical buildings. Although the design was preliminarily approved there, the project faded away. But the site was just a stone's throw away from where the Netherlands Carillon would come to stand, and the peace symbolism of this unbuilt instrument would resonate for the rest of the American century.

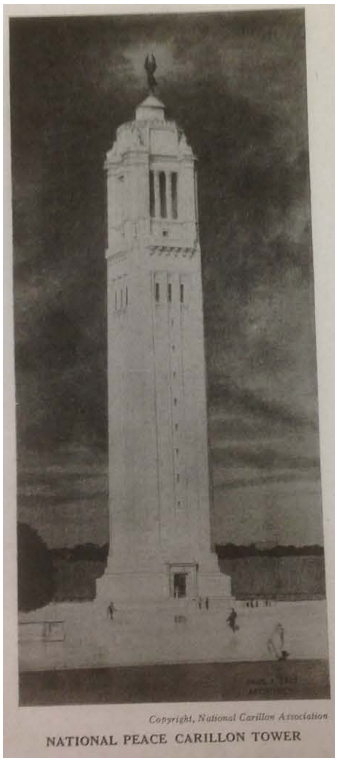

Figure 2. Image from the brochure "The National Peace Carillon: New Liberty Bells—A Bell For Every State" published by the National Carillon Association, n.d. (Records of the National Park Service, Regional Facility)

"Whoever shoots with bells wins not the war"

During World War II, bells became an even more precious symbolic resource to the Axis and the Allies than they had already been for centuries. The Nazis initially treasured bells for their perceived German nationalist sound, casting a large *Olympiaglocke* bearing the Reichsadler imperial eagle gripping the Olympic rings (in place of the usual swastika) for the 1936 Olympics, but copper and tin, the components of bell bronze, took precedence as the war wore on.[18] In *Singing Bronze: A*

[17] "Wilson Memorial Terrace: Report by Charles W. Eliot 2nd, Directory of Planning, National Capital Park & Planning Commission. May 21-22-23, 1931" (National Park Service Archive, Regional Facility).
[18] Luc Rombouts describes a Führer bell and the *Olympiaglocke* amongst other Nazi bell projects in *Singing Bronze* (2014). Oskar Vierling's electronic *Kraft-durch-Freude-Grosstonorgel* was also played at the Berlin Olympics.

History of Carillon Music (2014), Luc Rombouts recounts the Nazi metals requisition in detail. Germany required copper for ammunition and motor parts and tin for packaging and electrical appliances, yet found few such natural resources to extract domestically. The Soviet Union temporarily supplied metal, but when Germany attacked it on June 22, 1941, the Nazis proceeded to confiscate (conscript?) bells within their own borders with characteristically chilling administrative efficiency. The *Reichsstelle für Eisen und Metalle* inventoried and divided German bells into four classes:

> A: the least valuable bells, usually cast after 1918
> B: bells of greater value
> C: bells of still greater value
> D: the most important historical bells, i.e. bells from the Middle Ages and the three historical carillons of Berlin, Potsdam and Darmstadt[19]

On July 23, 1942, the requisition of bells in the occupied Netherlands was announced. Dutch tower bells were also scrawled with the letter A, B, or C, but "historical" bells were designated as protected monuments with a letter M. Dutch contracting firm J. P. Meulenberg carried out the bell seizures and in return received a Nazi bell with the thoroughly anti-peace inscription "1942-1943 / Metallmobilisering / Glocken kämpen mit für ein neues Europa" (Metal mobilization / Bells joining the fight for a new Europe). Thanks to German indecision about Belgium's fate and the staunch opposition of the Catholic Church, only Belgium's non-carillon bells were requisitioned.

Citizens of both countries sometimes found ingenious ways to save their bells, and failing that, painted protest slogans on doomed bells, such as the defiant "Wie met klokken schiet / Wint de oorlog niet" (Whoever shoots with bells / Wins not the war), and the pithily doleful "Klokken uit de toren / Oorlog verloren" (Bells from the tower / War lost). When bells were spared, it was often thanks to the polysemous potential of their music and the silver tongues of their players. Nazi soldiers enjoyed hearing the *Deutschlandlied* on the automatic drum in Steenokkerzeel, Belgium, when in fact Haydn's melody had been pinned as an Habsburg-Austrian hymn to suggest its 1854 lyrics, "Gott erhalte, Gott beschütze / Unsern Kaiser, unser Land!"[20] When an informant reported that Leen 't Hart, city carillonneur of Delft, was playing sixteenth-century Dutch hymns by Valerius that were hostile to Germany, 't Hart convinced a gratified Gestapo that Valerius' hymns glorified the Thousand Year Reich. The melody of "Wilt heden nu treden" (We gather together before God) (1597) was in fact sung at Nazi rallies as "Wir treten zum beten." But 't Hart failed to mention that Valerius had written the hymn to the folk tune "Wilder dan wilt, wie sal mij temmen" (Wilder than wild, who shall tame me) to celebrate the Dutch victory over the Spanish in the Battle of Turnhout. The political meanings of bell music hid in *plein air*, or rather sound, simultaneously heard as Dutch resistance and Nazi collaboration.

In September 1943, the requisition order was expanded to organ pipes, but the end of the war averted this stage of the Nazi destruction of musical heritage. All in all, about 6,500 Dutch bells and 5,000 Belgian bells had been transported to two Hamburg warehouses to be smashed, dropped from a great height, or crushed under another falling object prior to electrolysis. The occupying British forces would nickname these warehouses the "Belsen of Bells" in reference to the Bergen-Belsen concentration camp.

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[19] Rombouts, 256-57.
[20] Ibid., 252.

Figure 3. Frank Stokes (George Clooney), whose character was based on George Stout, reports to President Truman in *The Monuments Men* (2014). The photograph (U.S. National Archives and Records Administration) shows plundered bells on a dock in Hamburg, August 1945. (Columbia Pictures)

The 2014 film *The Monuments Men* (dir. George Clooney) dramatized the work of an Allied group from the Monuments, Fine Arts, and Archives program, which sought to rescue art and other cultural treasures from the Nazis. In its moving final scene, Frank Stokes (Clooney) reports to President Truman about the remarkable number of privately owned works recovered by the program overall, adding that it "found five thousand church bells, three hundred trolley cars, three million books, and thousands of Torahs. In all, the numbers are staggering. There were over five million pieces recovered" (Figure 3). The Nazi bell requisition is now widely if superficially known to the American public. But work had only just begun. What followed in the Netherlands upon the restitution of the bells and identifiable shards was a full decade of struggling to meet demand as the three Dutch bellfoundries, van Bergen, Eijsbouts, and especially Petit & Fritsen, recast the shards into new carillons.[21] Advances in bellfounding and tuning technology meant that the lost seventeenth-century art of the Hemony brothers had finally been recovered, and in fact improved upon (Figure 4). As described in the previous chapter, new Dutch carillons of record-setting size were built in the spirit of *Wederopbouwoptimisme*, because the carillon had become a more precious symbolic resource than ever in the Netherlands—a symbol of Dutch musical heritage, resourcefulness, defiance, recovery, and of course, Allied victory. Americans proudly extended their aid to Dutch culture. The small town of Lewes, Delaware donated $455 to the carillon committee in Hoorn, still in debt for its postwar carillon, because the founder of Lewes had been a Dutch seafarer.[22]

[21] Ibid., 270.
[22] "Een vereniging te Hoorn," *Algemeen Dagblad*, January 19, 1952.

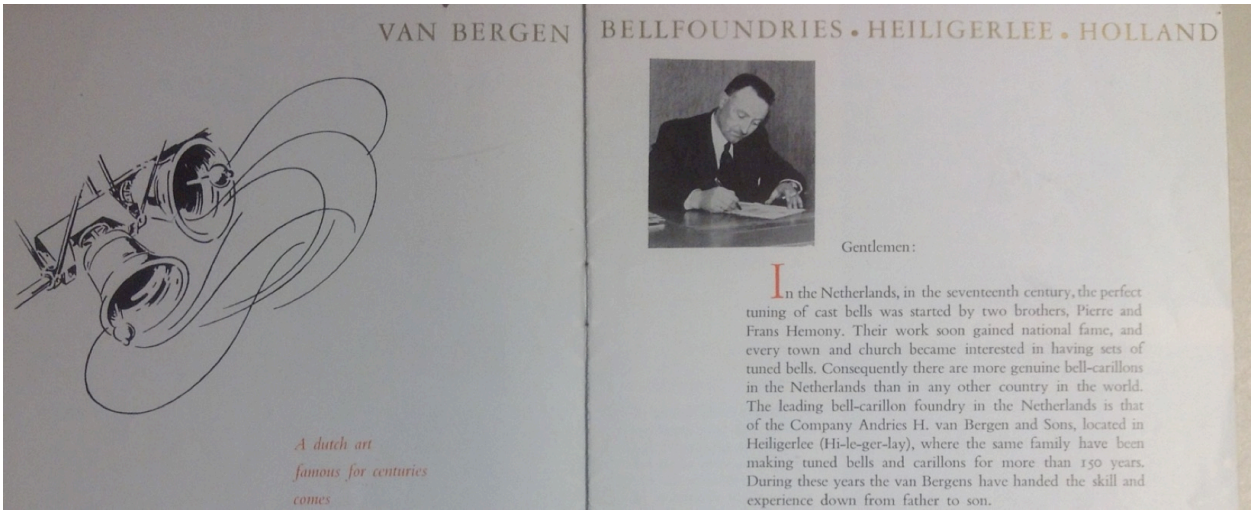

Figure 4. A 1950s publicity booklet by Royal van Bergen Bellfoundries, distributed by its American branch in Greenwood, S.C., highlights the Hemony brothers. (Files 436-437, Collection 387, L. G. Kortenhorst Papers, National Archives of the Netherlands)

"Bells for America"

The Netherlands assigned America and Canada a special place amongst its allies. American and British forces liberated the southern part of the Netherlands in June 1944, and after a tragic winter starvation in which fifteen thousand people died, fighting with the Germans was temporarily suspended so British and American bombers could airlift food and supplies. Full liberation was accomplished by the Canadian First Army, the American Ninth Army, the British Second Army, and the Polish 1st Armoured Division on May 5, 1945, known as *Bevrijdingsdag* (Liberation Day). Allied planes dropped lifesaving food and medicine to aid some 3,500,000 people that day. The U.S. then initiated the European Recovery Program, better known as the Marshall Plan, in which it gave $1,128 million in aid to the Netherlands between 1948-1951. The program's aims were not solely humanitarian; under President Truman, the emerging doctrine of containment viewed substantially aiding non-communist countries as essential to stemming the spread of Soviet influence.

As peace and prosperity returned, the Ministry of Economic Affairs circulated a memorandum asking what Queen Juliana might present to the American people in gratitude during her coming spring visit. One of the ministry's young officials in the Hague, Govert L. Verheul, heard dinner glasses clinking while helping his wife Elizabeth wash the dishes and, in that quotidian tone, experienced a revelation: A carillon could be a perfect peacetime gift for his country's American liberators. He set to work writing a proposal until 3 a.m.[23] So began the "Bells for America" (*Klokken voor Amerika*) campaign to present a carillon, the quintessential Dutch instrument, as an expression of gratitude for all the U.S. had done for the Dutch people. It would be an especially precious gift because copper and tin remained limited commodities after the war and domestic demand for carillons was high.

Time was short to ready such a monumental gesture. At 10:30 a.m. on Christmas Eve, 1951, seven politicians and prominent citizens (including one woman, J. Meihuizen-ter Braake, Chair of the Netherlands Household Council) met in the Cabinet of President of the House of

[23] "Carillon Symbolizes Dutch Amity and Imagination," *International Exchange News*, Summer 1974, 4.

Representatives Leonardus G. Kortenhorst. They formed a Working Committee under his leadership,[24] a Committee of Sponsors (Aanbeveling) chaired by President of the Senate Jan A. Jonkman, a Financial Committee, and a backup Guarantee Fund. On New Year's Eve, Kortenhorst addressed his country on the radio with a statement romanticizing the role of bells in their "thoughts and feelings":

> Can bells, in a carillon united, also perhaps interpret the feelings of all our people in the face of another, a peaceable and self-sacrificing friend? Feelings of gratitude and deep affection? It is this question that I want to submit to you…
>
> That gift will speak first and foremost to the families of those who gave their lives or their health in the people's struggle for our liberation. Our native land is watered by the blood of thousands of young men to whom we attribute the restoration of our independent national existence after years of oppression.
>
> We have not forgotten them and we will continue to remember them with deep emotion. Gratitude is indeed the memory of the heart, we do not ask for it, but we ourselves feel the obligation of gratitude to those who fell for our freedom, for our children and our children's children for many generations…
>
> The leaders of this initiative would wish that the necessary funds for this monument of gratitude and friendship (which derives its value less from its financial costliness than its inner meaning) could come in many small amounts rather than in some large.[25]

Like the NCA's interwar proposal for a carillon representing all states and territories, the Dutch committee resolved to assemble a carillon of bells representing its eleven provinces in its lowest octave, and to augment them into a full four-octave instrument with bells that represented people from all walks of life. The highest octave would represent the Dutch youth, with the smallest bell dedicated to little Princess Marijke in order to squeeze out sentimental donations—a clever combination of resolutely democratic representation and nostalgic affection for symbolic monarchy. Toward that end, the Working Committee exhorted local committees to be inclusive and recruit representatives from the following groups: "Women, workers, employers, shopkeepers, youth, and a representative of the teachers; possibly—and this applies especially to rural areas—a representative of agriculture i.e. horticulturalists, workers as well as entrepreneurs, and a representative of the local press."[26]

Much outreach focused on women's organizations, taking advantage of the newly independent and proud spirit Dutch women had gained during the war, strengthened by their social associations. For labor outreach, committee member Professor Barend C. Slotemaker de Bruïne contacted the Labor Foundation (*Stichting van de Arbeid*), which sent letters to the chairs of its affiliate organizations such as the Central Social Organization of Employers and the Netherlands Catholic Tradesmen Organization (*Middenstandsbond*), inviting them to join the Committee of Sponsors. Jonkman contacted Dutch territories as far-flung as the Netherlands Antilles and

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[24] The membership of the Werkcomité "Klokken voor Amerika" was as follows: L. G. Kortenhorst (Chairman), J.A. Baretta-de Bruyn (Secretary), W.H. Fockema Andreae (Treasurer), Arnold J. d'Ailly (mayor of Amsterdam), W.H. de Monchy (Director, Holland-Amerika Lijn), Rev. Prof. Albert Smijers (Rijksuniversiteit Utrecht), Lady C.W.I. Wttewaall [sic] van Stoetwegen (member of the House of Representatives from 1945-1971), Mrs. H.G. van Anrooy-de Kempenaer (President, Nationale Vrouwenraad), J. Meihuizen-ter Braake (Chairwoman, Nederlandse Huishoudraad), and D.J. Lambooy (General Editor, Algemeen Nederlands Persbureau).

[25] File 175, Archief van Mr. A.J. d'Ailly, 306, Stadsarchief Amsterdam (hereafter cited as d'Ailly Papers).

[26] Ministry of Internal Affairs to all burgomasters on January 25, 1952, d'Ailly Papers.

Suriname to participate in the popular subscription, which was reported in newspapers from Curaçao to Jakarta.[27] In fact, as the nearest territory to the U.S., the Netherlands Antilles would fund the largest bell, weighing 12,628 pounds and 6 feet high and emblazoned with the poem "Islands over the ocean / shining in the sun -- / your wishes, hope and wanting, Antilles / shall ring out on my voice." Presumably the colonized population was not highly represented. Instead, the bell's salient monetary value was likely representative of the colonial profits of using the islands first as trade centers and later to supply the Venezuelan oil industry. Finally, there was also talk of soliciting contributions from the Dutch living in America and Americans of Dutch descent.[28]

The *Handelsblad* reported on December 28 that a national radio contest would be held to select a delegation that was representative of "different professional and social classes" to accompany the Queen. The contest slogan, "to the United States for a quarter" (*voor een kwartje naar de Verenigde Staten*), promised that winners would pay but a quarter for the trip. This would represent a bold display of Dutch social equality in America, both in terms of free public music (the manufacture of which had given three businesses in three regions an equal share of the resulting publicity) and citizens openly described in class terms. However, no further mention of this delegation appears in the archives, leaving one to wonder if the hoped-for diversity arrived only in the form of symbolic bronze and symbolic repertoire such as folk music arrangements. The evanescence of this equalizing opportunity foreshadowed in miniature the failure of the carillon's overambitiously idealistic message of unity.

Figure 5. In the Buitenhof in the Hague, Leonardus G. Kortenhorst signals the beginning of the fundraising campaign with a traveling carillon. ("Carillon voor V.S. moet met Kerstmis gereed zijn: Dr Kortenhorst luidde de actie in," unlabeled newspaper probably published in February 1952 (Archief Nederlandse Klokkenspel-Vereniging).

[27] A Curaçao newspaper claimed that the lowest bell represented *both* the Netherlands Antilles and Suriname, although it is unclear if Suriname contributed a significant amount of money: "Dank van Nederlandse volk beierde over Washington: Grootste klok draagt de naam van de Nederlandse Antillen," *Amigoe di Curacao-weekblad voor de Curacaosche eilanden*, May 6, 1954, 1. In fact, Curaçao had already erected its own carillon in 1951 with bells "dedicated to Antillean resistance heroes who perished in the Second World War, like Boy Ecury, Charles Debrot, George Maduro, Jan Frederik Haayen and André de la Porte… Three bells have been named after the three ships of the CSM fleet that were lost in the Second World War due to enemy actions: the Leticia, the Lucrecia and the Rosalia." (Corine Havinga, "Our Cultural Heritage: A Joint Venture. Fifty years Carillon in Curaçao," National Archaeological Anthropological Memory Management, November 30, 2014, http://documents.naam.cw/en/_doc/Fifty+years+carillon+in+Curaçao).

[28] "Goodwill Binds Arkansas With The Netherlands" in the *Arkansas Democrat* (May 1954) recounts the mutual aid, unrelated to the war, sent between American and Dutch towns as an example of the two nations' friendships. It was one of several newspaper clippings sent by the Dutch Ambassador to the Dutch Ministry of Foreign Affairs.

Figure 6. "Bells For America" campaign publicity photo, February 15, 1952 in The Hague (Fotocollectie Elsevier, National Archives of the Netherlands).

The committee rolled traveling carillons—although some comprised only a few swinging bells—flying Dutch and American flags across the country for demonstrations (Figure 5). It further requested that all carillons be played or bells rung at noon on the February 16 fundraising deadline. Donations great and small were collected from ordinary citizens and businesses, and it was clearly and tastefully specified that donations would not be collected during the traveling carillon demonstrations.

On January 5, 1952, committee treasurer Willem Hendrik Fockema Andreae circulated a letter to Dutch businesses focusing on the economic rescue operation that the U.S. had conducted for their country, emphasizing that every business owner had benefited from American aid:

> Thanks to the joint effort of the Dutch people and the help of the United States, it has been possible to prevent the catastrophic decline of the economy that threatened Netherlands due to war. This did not only avert a collapse of the Dutch economy, but an increase in economic activity became possible.
>
> Now that the Marshall Plan will be terminated in July 1952, a group of Netherlanders discussed the possibility of offering a gift to the American people that would express the feelings of sincere gratitude of the Dutch people: a gesture in the spirit of that of the French people, who once donated the Statue of Liberty to America that acquired world fame….
>
> Even your company has directly or indirectly enjoyed the benefits of Marshall aid. Despite the fact that the equivalent value was paid in guilders for this aid, without that help it would not have been possible to restore our national commerce from war damages, to expand it or to modernize [it].

Fockema Andreae was asking the commercial sector to pledge to a Guarantee Fund that would only be used if the total cost of the carillon was not met through a general appeal to the Dutch population, who were also being reminded that the Marshall Plan had touched their lives by Jo Spier's darkly witty slogan, "Without Marshall help, your sandwich would not be dressed, nor your children."[29] Further popular outreach was done by Jaap Molenaar, who wrote a song with both Dutch and English lyrics to be sold and played on American radio and promised to donate a portion of the proceeds.[30]

On January 24, every Dutch mayor was sent an impassioned circular from the committee, and the Ministry of Internal Affairs sent another the following day.

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[29] "Zonder Marshall-hulp was Uw boterham niet aangekleed en Uw kinderen evenmin." ("Aan de jeugd van Utrecht," *Utrechts Nieuwsblad*, February 7, 1952.)

[30] "Klokken voor Amerika: Ook Suriname en Ned. Antillen doen mee," *Utrechts Nieuwsblad*, March 28, 1952, 5.

> The American people have—after the many sacrifices of human lives in the liberation of the Netherlands—also voluntarily made great sacrifices for the reconstruction of Western Europe, so also of the Netherlands, which has established a closer relationship of cooperation between the Netherlands and America, than existed in the past. (January 24, 1952)

Revisions to the campaign were sent on January 30, suggesting the great haste in which the committee found itself. The Ministry's letter had beseeched officials to act quickly to raise the money in time for Queen Juliana's visit around February 19, hence the eleventh-hour fundraising goal of February 16. The committee's January 28 minutes indicate that a staggering 50,000 cards designed by Nelly ten Have were approved for printing, 1 million pins, 30,000 bands for collection tins, and 10,000 window bills and propaganda cards (Figure 7). Willem Hugo de Monchy, director of the Holland-Amerika Lijn and representing Dutch shipping on the committee, pledged free transportation of the bells and installation engineers to Washington.

Figure 7. One of four sides of the propaganda cards "Klokken voor Amerika" campaign showing their distinctive handwritten Gothic script and rubrication. Nelly ten Have designed the cards in her signature nostalgic style.

Luckily, the Queen's visit was pushed back considerably. Minutes from the March 25 meeting indicate that the bellfounders had "after much wrangling" (*na veel geharrewar*) signed a preliminary contract, and the order could finally be placed. The foundries had agreed to offer a discount in January, but apparently that collaborative spirit evaporated when they tried to collaborate with their competitors.[31]

By the end of March, 844 out of about 1,000 municipalities had held street collections, bringing in over ₣174,000 in addition to larger private donations.[32] But even the most successful fundraising campaign could not have materialized a massive set of precisely tuned bronze bells from midair. The U.S. would have to receive something symbolic in the meantime, and van Bergen had just the thing: an extant set of carillon bells. On April 4 at 3 p.m. in Meridian Hill Park, one mile directly north of the White House, a "Program of Exercises Attending the Presentation a Carillon by Her Majesty the Queen of the Netherlands" began with a concert by the U.S. Marine Band (Figure

[31] Minutes of the Comité "Klokken voor Amerika, January 6, 1952, d'Ailly Papers.
[32] "Klokken voor Amerika: Ook Suriname en Ned. Antillen doen mee," *Utrechts Nieuwsblad*, March 28, 1952, 5.

8). After an invocation, the Queen presented President Truman with a symbolic little silver bell. She delivered a moving speech on the importance of small bells and small voices, as well as a paean to the representational ideology of the coming carillon:

> The Netherlands people from all strata have contributed to this gift, and the bells which are to follow come from various groups of the population: seamen, miners, farmers, flower-growers, fishermen, the armed services, teachers and scientists, financiers and shopkeepers, businessmen and drivers, pressmen, artists, women's organizations, sportsmen and civil servants, resistance people who cooperated with your troops, students, boys and girls and little children. Each of the Dutch provinces wishes that one of the bells shall bear its name as well. The Antilles, the territories in the Caribbean, join in this present. And Surinam too wants to express its gratitude in its own way to the people of the United States.
>
> ….To achieve real harmony, justice should be done also to the small and tiny voices, which are not supported by the might of their weight. Mankind could learn from this. So many voices in our troubled world are still unheard. Let that be an incentive for all of us when we hear the bells ringing.

Adapting the long-standing metaphor of bells as the voice of the community, the Queen offered a pocket-sized bell to symbolize the voices of the weak and disempowered.

Kamiel Lefévere, transplanted Flemish carillonneur of the Riverside Church in New York City, performed Valerius' "Merck toch hoe sterck" (Mark yet how strong) on the temporary 32-bell van Bergen carillon.[33] This song, like "Wilt heden nu treden" also published in *Neder-landtsche gedenck-clanck* (1626), was an Italian dance melody with a text by Valerius that had become one of the Netherlands' most famous *geuzenliederen* ("beggar's songs" for the rebels who called themselves *geuzen*). It became the "anthem of Bergen-op-Zoom" for marking the town's victory after a three-month Spanish siege in 1622, and during the Boer Wars (1880-1902) also became the *Boerenkrijgslied* (Peasants' War Song) among Afrikaners. The song gained such importance in twentieth-century Dutch culture that it was set by Staf Nees in 1929 for carillon, Cor Kee in the 1940s for organ, and Henk Badings in 1978 for choir—all composers known for writing carillon works. Why Lefévere selected a nationalistic and militaristic song for the gift of a peace carillon can probably be explained less by the song's specific meanings than by his being accustomed to it being appropriate repertoire in Flanders—in fact, having taught alongside Nees at the Royal Carillon School in Mechelen, he probably performed Nees' arrangement after the Queen's speech or in his recital after the ceremony.

[33] Kamiel Lefévere became so prominent in the New York soundscape that he played the carillon for ABC's New York police drama series *Naked City* in the 1958 episode "The Other Face of Goodness." In the climactic chase scene, police detectives pursue an attempted murderer up the Riverside Church carillon tower.

Figure 8. Queen Juliana (center) and the U.S. Marine Band in front of the temporary 32-bell van Bergen carillon in Meridian Hill Park on April 4, 1952. From a publicity booklet of the Royal van Bergen Bellfounders in Greenwood, S.C. (L. G. Kortenhorst Papers).

After Truman gave his acceptance speech, Lefévere performed the national anthems of both countries and a recital, punctuated by a benediction. At some point in the day, a group of children from the "Dutch colony" in America and children of the Embassy staff sang similar songs for the two leaders under the direction of temporary conductor Dr. R. L. Beukenkamp, the Embassy agricultural attaché. They provided small voices, though not disempowered ones.

Starting on Memorial Day, carillon concerts were given every Sunday evening from 5 to 6 p.m. by Art Drown, sponsored by the Radio Station WVDC in cooperation with National Capital Parks.[34]

This was only the first of three forms the Netherlands Carillon would take in America. On January 20, 1954, Representative Wesley D'Ewart (R-MT) introduced House Joint Resolution 356, which proposed that "the Government of the Netherlands is authorized to erect a memorial carillon tower and install carillon bells on public ground under the administration of the Secretary of the Interior" and that "the United States shall be put to no expense in or by the erection of this memorial." (Nobody was thinking ahead to performance or maintenance of a musical instrument.) The Congressional Record of June 7 shows that the resolution was passed with amendments, but ominously, "a motion to reconsider was laid on the table." The Senate passed companion resolution 139, and on August 23, the President approved Public Law 628 enacting the authorization.

Now funds were needed for a permanent tower, and an appropriately symbolic and acoustically favorable site had to be found. On August 12, 1952, the committee met with William Haussmann (Chief Architect of National Capital Parks, Department of the Interior), who was

[34] Herman Jan Friedericy, Counselor for Press and Cultural Affairs at the Netherlands Embassy in Washington, to Percival Price, September 10, 1952, file 24959, Ministerie van Buitenlandse Zaken: Code-archief 1945-1954, 2.05.117, National Archives of the Netherlands.

accompanying his wife on her trip to the Netherlands. To the committee's pleasure, he presented several potential Washington park sites. Further, he insisted that he would not design the tower. A Dutch architect must do so, so that it would not be a tower as people in America are accustomed to: "A gift from the Dutch, carried out entirely by the Dutch."[35] Perhaps he was envisioning a quaint windmill instead of the International Style so familiar in the U.S.

Spirits ran high in the committee, as pledges and potential donors (such as Mr. de Kanter of the Metalworkers' Union and Mr. Twijnstra, president of the Netherlands Federal Employers) had already been identified for the sum of ₣5,000, such that "there is every reason to believe that the Guarantee Fund need not even be used." (Interestingly, the participation of major donors contradicts the portrayal of the carillon as a product of small donations.) A contract was being drawn up with the bellfounders, which would be arbitrated by a Professor Cleveringa (unbeknownst to him at present). "The Committee is unanimous in the view that everything has gone well above expectations," the minutes exulted.

Poet Ben van Eijsselsteijn had drafted the campanarian inscriptions, and designs for the bells by Eijsbouts artist Genia van der Grinten-Lücker had elicited everyone's admiration. Kortenhorst explained to Haussman that "nowhere in the world exists so great and decorative a carillon as this will be" (*er nergens ter wereld zo'n groots en decoratief carillon bestaat als dit worden zal*). The one sour note arose over Louis Meijs' design of the "*Vrouwenklok*" (Women's Bell). Female members Meihuizen-ter Braake, van Anrooy-de Kempenaer, and Wttewaall van Stoetwegen stated that they "would like to see a stronger impression of woman as she fulfills roles in all possible offices and functions in contemporary society, and do not want to see ethereal nymphs in paradisal robes [*etherische nymfen in paradijsachtige gewaden*] as the only symbol on the 'Vrouwenklok.'" Meijs pledged to create a new design.

In the meantime, Dutch carillon art seemed to be triumphant. By December, the combined bells from all three foundries were set up behind the Museum Boijmans van Beuningen for modern art in Rotterdam for inspection and so that the Dutch public could visit its national gift (*nationaal geschenk*). The inspection committee, consisting of Rotterdam city carillonneur Ferdinand Timmermans, musicology professor Albert Smijers, and Dr. W. van der Elst[36] (the last two from the *Rijkscommissie van Advies voor Klokken en Klokkenspelen*), reported on January 30, 1954 that this was the first time such extraordinary cooperation had resulted in a collaborative carillon that was entirely matched and in tune, except for the bass bells, which were appropriately darker in timbre because they were intended for swinging as well as keyboard playing.[37] The inspectors had been so confident in the forthcoming success of the venture, in fact, that their report declared that "all three founders have good [tuning equipment] and they have mastered the art of tuning to become the best in the world, so that their foundries (especially after the last war) produced beautiful carillons." Therefore "it is no wonder that a whole has been created by these favorable conditions" for a unified set of

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[35] Minutes of the Comité "Klokken voor Amerika," August 12, 1952, d'Ailly Papers.

[36] I cannot locate W. van der Elst's full first name, but he was involved in the cataloging and protection of carillons and organs during the Second World War, was highly active in the Dutch Carillon Guild leadership, and was involved in the inspection of various carillon installations.

[37] Interestingly, the passing of KLM president Albert Plesman was also marked at the handover ceremony, perhaps because the event occurred in Rotterdam, a major port city. "[Kortenhorst] called the day of the transfer a joyful day, which was, however, eclipsed by the death of Dr Plesman. He dedicated some words to this great Dutchman and he asked Mr Timmermans to perform a chorale in commemoration." ("Carillon voor Amerika werd overgedragen," *Algemeen Handelsblad*, January 6, 1954.)

bells. In fact, "the inspection committee cherished the legitimate expectation that this work (though not at once, but nevertheless finally) *had* to give a good result….The epic nature of this modern Hemony carillon may be an image of the tough perseverance of our industrious nation."[38] Recovering a seventeenth-century process was a modern Dutch achievement.

The forty-nine bells were loaded aboard the Holland-Amerika Lijn freighter Blommersdyk, and arrived in Baltimore to be trucked to the second (and more central) temporary home of the Netherlands Carillon: the polo grounds of West Potomac Park, on the Potomac River between the Lincoln and Jefferson Memorials. Each bellfoundry sent representatives to assist the Department of the Interior in setting up the temporary tower, 45 feet high and 30 feet wide.

On the ninth anniversary of *Bevrijdingsdag*, when hastily reconnected bells had rung freedom back into the Netherlands, the second ceremony of acceptance took place. Saving the pomp and circumstance for the dedication of the permanent tower, Envoy Jacobus Gijsbertus de Beus recommended keeping the event a "simple ceremony."[39] As before, it began with the U.S. Marine Band and an invocation. Kortenhorst, who had earlier visited President Eisenhower at the White House to thank him for being "a symbol of freedom" during the war years, gave a speech, followed by Speaker of the House Joseph Martin (R-MA). Brought over from Rotterdam, Timmermans performed "free improvisations" and Lefévere played three hymns. The band performed both nations' national anthems, and a benediction led into Timmermans' recital.

About a thousand people attended on that clear day. Over twenty Congress members, including Representative Gerald Ford (R-MI), Senator John F. Kennedy (D-MA) and several of Dutch descent, were amongst the invitees. Fockema Andreae had proposed at a planning meeting that representatives of the diverse groups that had contributed should be invited, such as "Dutch military personnel, students, a captain of a merchant ship, etc." K. L. Pool from the Ministry of Foreign Affairs said he would undertake to provide such transport, but further mentions of the effort are nowhere to be found.[40] The bells were given by Dutch people "from all walks of life," as Martin described them, but only in name—recalling how the populist "to the United States for a quarter" contest had also faded from view.

As Speaker of the House, Martin held the equivalent of Kortenhorst's position in the Netherlands, and the carillon as an instrument held some personal significance for him. The first legislation he ever introduced to Congress was a 1925 bill "to remit duties on a carillon imported by the Church of Notre Dame de Lourdes in Fall River." Listening to the "advice of older men that a young fellow should not make too much noise when he came to Congress," he had let the bells make noise for him as his first significant political move in Congress.[41]

Both Kortenhorst and Martin's speeches emphasized the protection of democracy and the traditionally Dutch, handcrafted nature of the musical instrument. Kortenhorst reminded the audience that the Queen had presented a token 32-bell carillon two years before, and "the long and

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[38] Reprinted by Klokkengieterij nv Petit & Fritsen in a letter to Frans-Joseph van Thiel (member of the House of Representatives) on November 22, 1971, file 9359, Ministerie van Buitenlandse Zaken: Code-archief 1965-1974, 2.05.313, National Archives of the Netherlands.

[39] Jacobus G. de Beus, Envoy Extraordinary and Minister Plenipotentiary, Embassy of the Netherlands in Washington, D.C., to Edward Kelly, February 18, 1954, Files 436-437, Collection 387, L. G. Kortenhorst Papers, National Archives of the Netherlands (hereafter cited as Kortenhorst Papers).

[40] Minutes of the Comité "Klokken voor America," February 13, 1953, file 189, Collectie 299 J.A. Jonkman, 2.21.298, National Archives of the Netherlands.

[41] Joseph W. Martin and Robert J. Donovan, *My First Fifty Years In Politics* (New York: McGraw-Hill, 1960).

delicate process of the casting of this perfectly tuned ensemble of 49 bells is now finished." Although reporters seemed to be subconsciously noticing the bells' mismatched tuning, he went on,

> The voices of this carillon wish to speak first of all of the relations of those who during the struggle of nations, gave their lives or their health for our liberation. Our national soil is drenched with the blood of thousands of young soldiers to whom the people of the Netherlands owe their reborn independence after many years of oppression. We will never forget them and we will remember them with deep emotion. Mothers and fathers of war victims, every ring of these bells means a token of our gratitude to your sons and of our sympathy with you. This gratitude is not asked for by you, but we feel it as a priceless treasure and as a permanent homage towards those who gave their lives for our liberty and for the liberty of our children and grandchildren. How I wish I could show you the flower-covered graves of your dear ones, tended by our boys and girls who consider this a gesture of piety as if they were tending their own brothers and sisters.

His explanation of the sectors of the Dutch economy represented by the bells included the moralistic introduction of the sector of "finance (if you own money, it obeys and follows you; if money owns you, obey it and it will swallow you)," echoing his New Year's Eve radio address that that intangible value of the high number of small contributions to the carillon outweighed the actual monetary value of the large donations.

According to the *New York Times*, "Washington's ears were ringing" thanks to Timmermans and Lefévere.[42] The reception of Timmermans' dedicatory recital differed widely. On May 18, *National Geographic*, having published a major article on the carillon in 1923, now published a press release recounting this dedication. The United States Information Service in The Hague reported in a press release that "it is of great importance that this event coincides with National Music Week, wherein attention is paid across the country to the power of music in the cultural life of Americans. Through the generosity of the Dutch people, we now have a different kind of music in the parks. Although Americans are not as familiar with this type of music as with others, we will undoubtedly love much of this kind of music."[43] Dutch confidence ran high that Americans would embrace this gift "not asked for."

By contrast, Joseph Byrnes of *The Washington Evening Star* was much impressed with the instrument but less so with the concert: "Mr. Timmermans, a portly gentleman in his early 60s, wearing a hearing aid, stripped off his suit coat to bang the wooden pegs that actuate the clappers." He preferred Lefévere, "dean of American carillonneurs," who played "Onward Christian Soldiers," "A Mighty Fortress is Our God," and "Our God, Our Help in Ages Past."[44] Inauspiciously, Don May of *The Washington News* published a photograph of a little boy miserably covering his ears during Timmermans' concert, in "That Tintinnabulation Was Timmermans: Bells Bells Bells Bells" (Figure 9). He described the carillonneur as "a man given not as much to speaking as to aggressive action" who during his improvisation "sweated…looked fierce…looked ecstatic. He waggled his head with the music. After 10 minutes he took off his shirt and played in his undershirt." Accustomed to giving invisible concerts in Dutch towers, Timmermans may have been preoccupied with emphasizing the surprising physical strength and expenditure required to play, not realizing the

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[42] "Washington's ears were ringing," *New York Times*, May 6, 1954, 31. Interestingly, Dutch documents incorrectly indicate that the bells were transported from Baltimore to Washington, D.C. via train.

[43] United States Information Service, press release, May 6, 1954, file 1908, Ministerie van Buitenlandse Zaken: Code-archief 1945-1954, 2.05.117, National Archives of the Netherlands.

[44] Joseph Byrnes, "Dedication of Dutch Carillon Rings Out Thanks for War Aid," *The Washington Evening Star*, May 6, 1954.

impression it would make on the Americans solemnly gathered to hear a carillon for perhaps the first time and sobered by the speakers' reflections on American wartime losses.


BELLS, BELLS, BELLS, BELLS

That Tintinnabulation Was Timmermans

—News Staff Photo by Wellner Streets.

The bells apparently were a little too loud for Jeft Cheek, lower left, aged 4, of 809 Highland-st, Arlington.

Figure 9. Don May, "That Tintinnabluation Was Timmermans," *The News*, May 6, 1952. The captain reads "The bells apparently were a little too loud for Jeft Cheek, lower left, aged 4." (Photo: Wellner Streets)

The day after the ceremony, Representative Ford read Kortenhorst's and Martin's speeches into the Congressional Record, a gesture that "in addition to the publicity in the press and on radio and television," de Beus "considered a gratifying confirmation of the appreciation which I have been able to observe in Congress circles for the gift of our people to the American people."[45] Anticipating Philips' use of the carillon as a legitimizing Baroque symbol, Kortenhorst's speech presented the carillon as an appropriate political gift because it was a Baroque revival, and the Netherlands was recovering and flourishing again. "The greatest bell-founders of the world, François and Pierre Hemony, were Dutchmen," he said, who "worked in the seventeenth century…During the following centuries this noble craft was neglected, but at the present time it has come into its own again." Martin duly echoed his praise of the Hemony brothers, and hence the names of two seventeenth-century Franco-Dutch bellfounders entered the Congressional Record—certainly not an everyday event.

At the dedication, Ambassador to the United States Jan Herman van Roijen presented a thousand azaleas as a gift of his people. Those flowers were probably gone by the time the Netherlands Carillon was completed in 1960.

Forty-Nine Bells in Search of a Tower

Celebrations were premature. The *New York Times* demonstrated greater foresight than did lawmakers in noting that "raising by popular subscription about $125,000 for the tower" was still required, and further that an "endowment or an annual appropriation will be needed to give the

[45] Envoy Jacobus G. de Beus to Minister of Foreign Affairs Joseph Luns, May 11, 1954, file 1908, Ministerie van Buitenlandse Zaken: Code-archief 1945-1954, 2.05.117, National Archives of the Netherlands.

great bells a carillonneur." The Dutch people and American government were to neglect the latter. In the third place, a site in a city rapidly filling with monuments had to be secured against competing interests.

Yet the Dutch were sanguine. On the day of the carillon dedication, Ambassador van Roijen wrote to Minister of Foreign Affairs Joseph Luns (later the longest-serving Secretary General of NATO) nominating four men for decoration: Conrad Louis Wirth (Director, National Park Service) should be knighted Commander in the Order of Orange-Nassau, Edward Kelly (Superintendent, National Capital Parks) and Harry Thompson (Associate Superintent, National Capital Parks) be awarded an Officer's Cross, and Haussmann the grade of Knight for their roles in realizing the Netherlands Carillon project.[46] His request wound its way through a maze of bureaucracy, and one astonished functionary wrung his hands over the possibility of a negative reaction "since the men obviously must get a decoration" whether there was a consensus or not, and fretted that the nominating parties might "sink into a morass of misunderstanding."[47]

Van Roijen's nomination highlighted Thompson not only for his financial support of the temporary carillon, but for his "long and tough battle on our behalf against some elements in the consultative but influential 'Fine Art Commission,' who were opposed to designating the 'Nevius Tract' as a place for the carillon." Indeed, the 25.4-acre Nevius Tract in Arlington, Virginia lies directly on axis with the Capitol, the Washington Monument, and the Lincoln Memorial, and offers panoramic views of the nation's capital. Part of the George Washington Memorial Parkway and an extension of the National Mall, it was already intended to house the Iwo Jima Memorial. It was also already proving the greatest bone of contention on the American side of the carillon project. Other proposed sites, including the Washington Monument, Post Office tower on Pennsylvania Avenue, the Dome of the Capitol, and the Naval Hospital in Bethesda, Maryland had been nixed.

The Nevius Tract had earlier been desired for a Veterans Administration Hospital and later for a church memorial for the Military Chaplains Association, for a giant fringe parking lot for commuters, by Senator Absalom Willis Robertson (D-VA) for recreational facilities, and by Arlington County citizens who wanted to divert it to private ownership to raise tax revenue.[48] A week after the enactment of Public Law 628 authorizing the Netherlands to construct a carillon in an unspecified location to be approved solely by the Secretary of the Interior despite demands from the CFA that its authority also be written into the law, Public Law 742 was passed creating a National Monument Commission to construct on the Nevius Tract "an international shrine and a continuing memorial to the principles of the five freedoms (speech, religion, press, assembly, and petition) and to all peoples and nations who have contributed to the establishment, promotion, and defense of those principles in the preservation of democracy throughout the world." The landscape design by former CFA Chairman Gilmore Clarke would station the monument between the Iwo Jima Memorial and the carillon (Figure 10).[49] Despite widespread official support, the proposal

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[46] During World War II, the Order of Orange-Nassau was bestowed upon both members of the Netherlands military and members of foreign services who had helped liberate the Netherlands from German occupation, and those who helped liberate the former Dutch colonies.

[47] Memorandum from "DWH/NA," May 20, 1954, file 1908, Ministerie van Buitenlandse Zaken: Code-archief 1945-1954, 2.05.117, National Archives of the Netherlands.

[48] "Truman Assigns Nevius Tract As Extension to Park Area," *The Washington Post*, January 20, 1953.

[49] New York-based Clarke designed the landscape architecture of the 1939 New York World's Fair, and he and his firm of Clarke & Rapuano were also involved in the design of the 1964 New York World's Fair. He had worked closely at times with Robert Moses.

caused a firestorm to burn even into 1960, as the $24 million National Freedom Shrine was shot down by vocal public opposition. An Emily Dickinson-like letter to President Eisenhower from private citizen Ruth Gibson asked, "Is Freedom *dead* that we should erect a *Monument*, and such an uninspired one, to her?"[50]

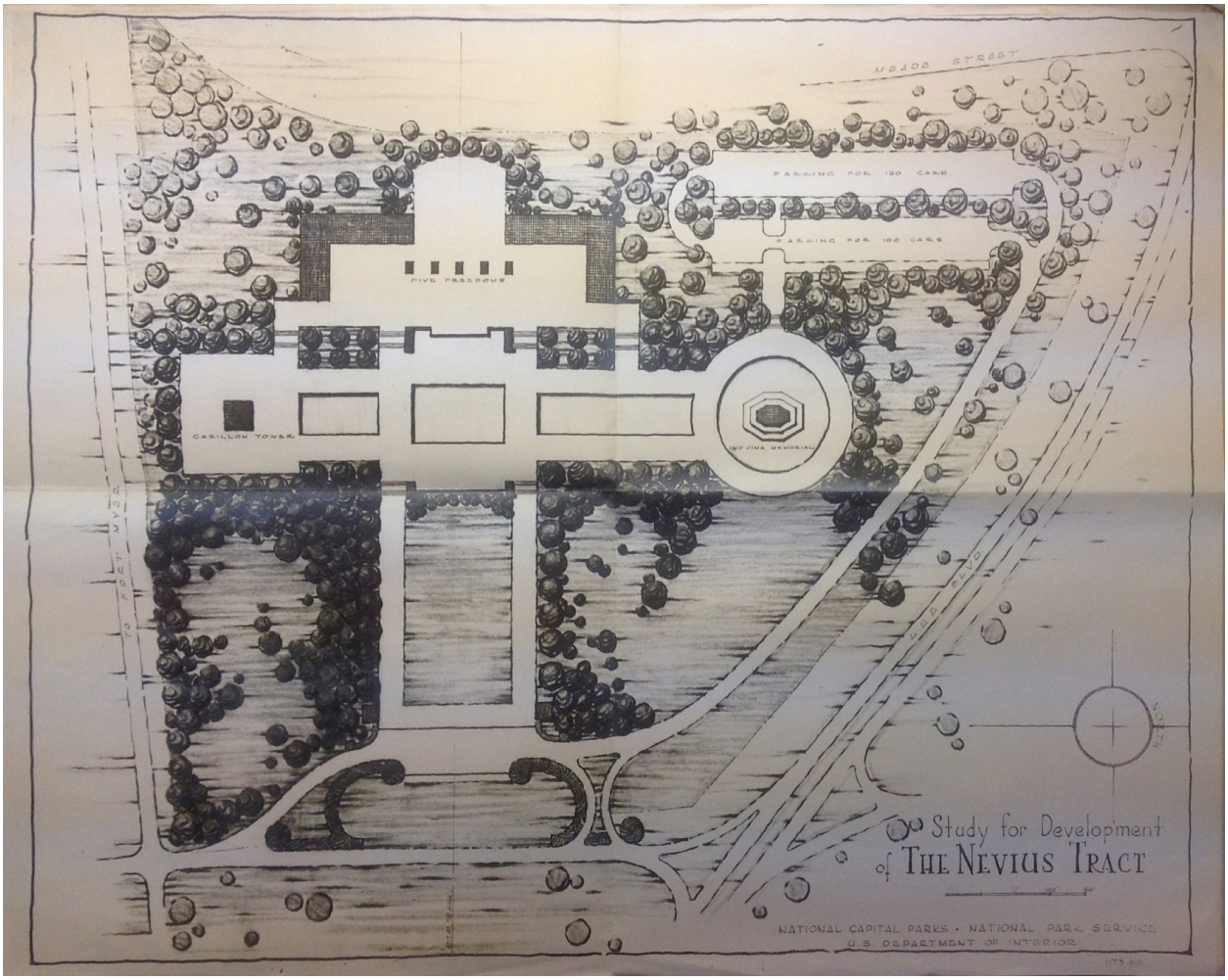
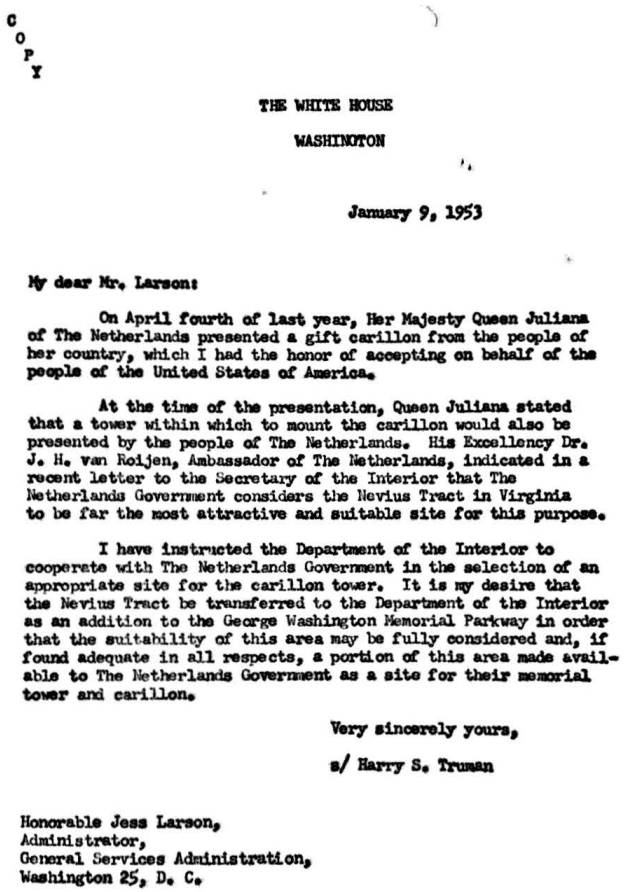


Figure 10. Study by National Capital Parks for the development of the Nevius Tract in Arlington, Virginia. The carillon is at far left, the "Five Freedoms" monument at upper center, and the Marine Corps War Memorial on the right. (Kortenhorst Papers)

President Truman himself had taken steps in 1953 to ensure that the Dutch government would gain permission to build on the contested land. At the recommendation of Secretary of the Interior Oscar Chapman, who was advised by Wirth and National Capital Planning Commission member Albert P. Greensfelder, Truman acted under the authority of the Federal Property and Administrative Services Act of 1949 to transfer the Nevius Tract to the Department of the Interior as an addition to the George Washington Memorial Parkway—just before leaving office (Figure 11).

[50] Ruth A. Gibson to President Eisenhower, n.d. (Records of the National Park Service, Regional Facility).



C
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THE WHITE HOUSE

WASHINGTON

January 9, 1953

My dear Mr. Larson:

On April fourth of last year, Her Majesty Queen Juliana of The Netherlands presented a gift carillon from the people of her country, which I had the honor of accepting on behalf of the people of the United States of America.

At the time of the presentation, Queen Juliana stated that a tower within which to mount the carillon would also be presented by the people of The Netherlands. His Excellency Dr. J. H. van Roijen, Ambassador of The Netherlands, indicated in a recent letter to the Secretary of the Interior that The Netherlands Government considers the Nevius Tract in Virginia to be far the most attractive and suitable site for this purpose.

I have instructed the Department of the Interior to cooperate with The Netherlands Government in the selection of an appropriate site for the carillon tower. It is my desire that the Nevius Tract be transferred to the Department of the Interior as an addition to the George Washington Memorial Parkway in order that the suitability of this area may be fully considered and, if found adequate in all respects, a portion of this area made available to The Netherlands Government as a site for their memorial tower and carillon.

Very sincerely yours,

s/ Harry S. Truman

Honorable Jess Larson,
Administrator,
General Services Administration,
Washington 25, D. C.

Figure 11. Letter from President Harry Truman to Jess Larson (General Services Administration) on January 9, 1953 requesting transfer of the Nevius Tract from the General Services Administration to the Department of the Interior because "the Netherlands Government considers [it] to be [by] far the most attractive and suitable site." Larson formalized the transfer in writing on January 16.

Although a home had finally been found and secured against competing interests, the clock was ticking for the "Bells for America" committee. Their site came with an expiry date, and the Nevius Tract could not even house the temporary carillon because it was still under intense scrutiny. Public Law 628 specified construction had to begin within five years, and furthermore could only commence after funds had been judged sufficient by the Secretary of the Interior.[51]

For all the political hubbub, the temporary carillon was not standing in silence, either. The most fascinating concert was Chapman's performance on December 20, 1956 for the "Pageant Of Peace," when Eisenhower threw the light switch signaling the beginning of tree-lighting ceremonies at American embassies and military bases worldwide. Because the carillon was a mile away from the ceremony, the *Cincinnati Enquirer* reported that "an audio-telephone cable will pipe the concert in over a public address system. The special cable will broadcast the chimes played by Carillonneur Charles T. Chapman."[52] This article was forwarded to the director of the Nederlandsche Snelpersenfabriek in Amsterdam by his associate, prominent Cincinnati businessman L. W. Scott

[51] The Department of the Interior described the proviso as "establishing a definite period of statutory authority whereby memorial projects which lack sufficient impetus to meet time and financial requirements no longer have congressional recognition." Report of Fred G. Aandahl, Assistant Secretary of the Interior, on House J.R. 356 (April 28, 1954).
[52] "Dutch Carillon Gift To Hail Yuletide," *The Cincinnati Enquirer*, December 16, 1956.

Alter, with the warm note, "As one person and his family to another person and his family, I want to thank you for this lovely and thoughtful expression of good will between our nations."[53] Americans took it as par for the course that carillon music was grand enough for Presidential ceremonies *and* that it could be "piped" around town, as the NCA had dreamed ecstatically three decades ago.

Five years was slipping by quickly. On April 14, 1959, the Robert A. Taft Foundation had already completed the Robert A. Taft Memorial and Carillon north of the Capitol building, a hundred-foot tower housing a twenty-seven-bell carillon by French bellfoundry Paccard that was played automatically or from an electronic keyboard. The memorial was funded by popular subscription from every state, again conforming to the "democratic representation" model of the Netherlands Carillon. Former president Herbert Hoover dedicated its music as "a summons to integrity and courage" and Princeton University Bellmaster Arthur Lynds Bigelow played the dedication recital as designer of the instrument. This memorial, authorized by Congress in July 1955, had been realized in just four years, yet the Dutch bells still waited in their temporary frame.

Campanological Discord

The idea of carillon bells cooperating in noble harmony meant that the central ideology of the gift, including the method of its creation (the value of which Kortenhorst had stated was greater than its monetary value in his 1951 radio address), was fundamentally inclusive. The *Christian Science Monitor* reported that "the total carillon in harmony symbolizes the whole Dutch population."[54] Building a populist carillon meant including everyone from male and female politicians to numerous women leaders on the committee, it meant symbolizing various members of the Dutch populace, and it meant hiring every established carillon bellfounder. This idealistic misapprehension by politicians and diplomats of the nature of carillon bells, which are physically forced after casting into nearly identical spectral profiles via a destructive tuning process, as democratic representations of different parties working in harmony, is what led to social, political, and musical disharmony in the creation, execution, and reception of the Dutch gift. The involvement of two cultures ensured that neither nation fully understood the other's priorities or foresaw the many potential pitfalls across the Atlantic.

Every part of the process was fraught with squabbling, beginning with the lead-up to the campaign in late 1951. Because the eleventh-hour press conference in The Hague was held on a weekend, the Binnenhof was unavailable and the meeting was moved by committee member D. J. Lambooy, Algemeen Nederlands Persbureau (ANP) General Editor, to the ANP building, which "some American representatives…considered… the home of the competitor…and therefore decided not to appear." Worse, "the desire to deliver a scoop" led to publication of erroneous information in the *New York Times*.[55] Before President Truman had even received the State Department's memo, the *Times* had leaked details to the public, creating an "unpleasant situation" (*een onaangename situatie*) that also reduced the effect of the congressional announcement. Even before the official campaign had begun, petty rivalry between the American and Dutch press affected diplomatic

[53] L. W. Scott Alter, quoted in a letter from W. L[ouis?] v.d. Wal, Jr. to Amsterdam Actie-Comité "Klokken voor Amerika" on January 31, 1957 (Kortenhorst Papers).
[54] "Washington's Dutch Bells Toll Thanks for Freedom," *Christian Science Monitor*, May 11, 1954.
[55] Confidential memorandum by H. B. Verwayen in the Hague, circa late December 1951.

relations. The Dutch condemned the Americans and determined not to leak the news. It was released on schedule in the Netherlands and to the Associated Press, but by then the news was no longer new.

In 1952, the temporary van Bergen carillon joined sculptures of Joan of Arc and Dante in Meridian Hill Park, not without discomfort. The Queen had intended to present the President with the children's *Kleuterklokje* inscribed "I am the smallest, the purest" (*Ik kleinste, het reinste*) in honor of her youngest daughter, Princess Marijke.[56] *Chicago Daily Tribune* reporter Norma Lee Browning squinted in vain to see the little bell changing hands. Apparently it was in the President's pocket all along, some said later, revealing their unfamiliarity with the heft of even small carillon bells. Browning ridiculed the ceremony, suggesting that "the audience was slightly confused and some even wondered if the Dutch have bells in their belfry."[57] An editorial on February 28 claimed that Dutch people were happy to accept American aid without contributing to the meager fundraising campaign. The scathing words were reprinted in Dutch newspapers (including the next day's *Limburgsch Dagblad* front page feature); soon a connection was made to Dutch resentment over its former colony of Indonesia. The *Tribune* reported on March 12 that Dutch newspapers were agreeing with the Chicago editorial:

> The Conservative *Nieuwe Haagsche Courant* carried an article saying that "*The Chicago Tribune* is right in declaring that the Dutch are eager to receive American dollars but too miserly to pay for the gift of the carillon" because "they 'lost everything when they lost Indonesia'…Many Dutch people blame the United States for the loss of Indonesia. This view is frequently made privately. It is now made openly by the former Dutch attorney general, Dr. H.W. Massink. Writing for the Hague newspaper, *Het Vanderland* [sic], the lawyer advised Dutch people not to give a dime to the fund. 'The carillon would be the death bell of the Dutch people,' he wrote. 'Yet it would be delivered and paid for by the Dutch people who can thank the United States for their present pauperism.'"[58]

Indeed, a portion of American aid for the Netherlands went towards economic recovery in the Dutch East Indies. However, the U.S. suspended this aid in January 1949 when the Dutch government sought to restore colonial rule during the Indonesian National Revolution, and implicitly threatened to suspend Marshall aid if the Dutch government continued to oppose Indonesian independence. Once again, the representational ideology of the carillon construction process as inclusive had brought Dutch colonial tensions and inequalities to the fore. The so-called "Voice of the Netherlands" did not speak for *everybody*, just everybody who had not sought independence from them.[59] Not that the Dutch were uniquely hypocritical—the carillon's neighbor-to-be, Arlington National Cemetery, had remained strictly segregated since its beginnings as the plantation home of Robert E. Lee, even after soldiers from across social classes and ethnicities

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[56] As the smallest bells were given by the youth of the Netherlands, the bell was handed over by two young representatives, Ria Schagen and Rob Veenstra, whose families had suffered losses during the war. Princess Marijke apparently enjoyed the "handover" of the bell immensely, commenting, "Now we each have a bell, Mommy and me... I put it in my room so I can wake [my sister] Margriet, who's such a sleepyhead..." ("Prinses Marijke bidet kleuterklokje aan de Koningen aan," *Algemeen Handelsblad*, February 14, 1952).

[57] Norma Lee Browning, "Queen Presents Gift Bell That Can't Be Found," *Chicago Daily Tribune*, April 5, 1952.

[58] "Dutch stirred by editorial in Chicago Tribune: Carillon Fund Raising Arouses Comment," *The Chicago Daily Tribune*, March 12, 1952.

[59] The carillon was referred to as the "Stem van Nederland" (Voice of the Netherlands) in one of the circulars sent to Dutch mayors on January 24, 1952 (d'Ailly Papers).

discovered during World War II that they had more in common than they expected.[60] It would take Truman's Executive Order 9981 calling for "equality of treatment and opportunity for all persons in the armed services without regard to race, color, religion, or national origin" to end segregated burials there.

The three rival foundries bickered too, even over minor details. (What color should the steel frame at West Potomac Park be painted: grey or green?) Everyone seemed to have a different idea of the installation schedule. Installer Leonardus Joannes van der Aa wrote to Eijsbouts on March 29 that he had learned from the Dutch Embassy of a commitment to finish the carillon within twenty-five days. "This was not told to us before we left, and in either case I must inform you that [fellow installers from the other foundries] Misters [Bernardus] Munnike and [Hendrik] Beekmans are with me that this is not possible." Eijsbouts hurriedly wrote back that "such an agreement does not exist."

The involvement of so many politicians meant that political agendas clashed even over bell bronze. On April 9, 1952, Working Committee member Arnold d'Ailly, mayor of Amsterdam, exhorted Kortenhorst to consider Amsterdam-based N.V. IJzergieteij & Machinefabriek Jos. Zimmer & Zonen, which had recently decided to focus on bellfounding. Zimmer himself sent publicity materials claiming that their bells exemplified the "Hemony model" and "Hemony timbre." This was "a matter of honor" for them, and an Amsterdam foundry ought to be included as the city had donated substantially to the campaign.

On April 18, d'Ailly wrote again angrily asking Kortenhorst how seriously his suggestion had been considered, and adding that "I take this opportunity to ask [that] the Committee members be informed about the deplorable state of affairs in the symbolic transfer of the carillon in Washington." The committee had met with the country's three established carillon bellfounders van Bergen, Eijsbouts, and Petit & Fritsen. To hire a fourth foundry with no experience casting full carillons was an unreasonable request, but even this tempest in a teapot foreshadowed the carillon's Frankenstein-like nature: hiring three was already hiring two too many.

The prime location that the Dutch envisioned for the carillon's final home was one borne of gratitude and even ambition to outdo the French gift of the Statue of Liberty. However, the committee did not seem to comprehend the symbolic expense of fulfilling of its request, or to imagine that Americans might not imbue the instrument with equal significance. The ardent circular sent on January 24, 1952 urged the mayors to imagine an American capital that listened daily to Dutch musical tradition:

> A group of Dutch discussed the possibility of offering a gift the American people to that will express the feelings of gratitude of the Dutch people: a gesture in the spirit of that of the French people, who once gave the Statue of Liberty to America that gained world fame. The idea is to give a carillon to the American people, to be placed as close as possible to the Capitol in Washington, the building where the seat of government is located and where the U.S. House of Representatives holds its meetings….After all, a carillon is a symbol of the solidarity of a nation—a very special meaning. All the bells of a carillon must be played in order to get a sonorous whole, while such a gift as the "Voice of the Netherlands" will be heard daily over Washington, the heart of America.

Truman's last-minute transfer had in effect awarded the Dutch the prize they sought—any monument built on the Nevius Tract would be visible from the steps of the Capitol along with the

[60] Robert Poole, *On Hallowed Ground: The Story Of Arlington National Cemetery* (New York: Walker & Co., 2009), 184-85, 191.

Washington Monument and Lincoln Memorial, although carillon music would not project that far. Yet a seemingly endless list of parties still wanted to build on the tract or exercise authority over what to build. Jostling for power over the national landscape commenced with Congress's first actions to find a home for the tower, and the Commission of Fine Arts proved particularly obstreperous. In 1954, it asked that the House and Senate resolutions be amended to explicitly specify its authority over the carillon approval process, although Executive Order No. 3524 already specified that the Department of the Interior would seek its design advice.[61] Companion bill Senate Joint Resolution 139 unsuccessfully attempted to re-introduce the National Capital Planning Commission into the approval process as well.[62] Even after avoiding these hurdles, Envoy de Beus wrote listlessly to Foreign Affairs Minister Luns on August 2 that "as [the Senate] will recess in just *one* day and *before* that time wants to deal with a large number of legislative proposals, as well as lengthy deliberations requiring motions, such as Senators [Ralph] Flanders against [Joseph] McCarthy, it is not certain whether the above draft resolution will take effect in this Congress session."[63] Domestic witch-hunts would have to come before international diplomacy.

In fact, the saber-rattling CFA had already resolved to block the intended placement of the carillon. Its chairman David Finley had called Thompson on March 11 making it clear "that his Commission was *not* going to approve the erection of a Tower on the Nevius Tract" and threatened to "create a political and international row."[64] Unfazed, Thompson recorded that "it would be bad taste if not bad manners for our National Commission of Fine Arts to insist upon approving a gift from the Netherlands and particularly would be distressing to find that they disapproved the use of the Nevius Tract since the Ambassador of the Netherlands and the Secretary of the Interior have agreed that this would be an appropriate site." As the steward of the nation's most symbolic undeveloped landscape, Thompson found himself as much a diplomat as any ambassador—and one caught in a sensitive internal dispute.

On August 11, a frazzled de Beus wrote again to Luns that the unexpected death of Senator Hugh Butler, chair of the Senate Committee on Interior and Insular Affairs and co-sponsor of the draft resolution, had further slowed the approval process. After the measure cleared both houses and was awaiting President Truman's signature, his headaches really began. He now had two important questions to address; first and foremost, the financial one. He had no information about "whether definitive commitments for contributions have already been made on the part of businesses" and hoped that the Council of Ministers had "finally agreed to pay half of the construction costs, if businesses could not be brought together sufficiently."

De Beus' second concern was over the design of the tower, as the American stance as of May 6, 1952 was for a belltower of "pure Dutch design" (*zuivere Nederlandse ontwerp).* The former

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[61] Fred Aandahl's report from the Committee on Interior and Insular Affairs on Senate Joint Resolution 139, April 28, 1954.

[62] Jacobus de Beus to Minister of Foreign Affairs Joseph Luns, June 2, 1954, file 1908, Ministerie van Buitenlandse Zaken: Code-archief 1945-1954, 2.05.117, National Archives of the Netherlands.

[63] Jacobus de Beus to Joseph Luns, August 2, 1954, file 1908, Ministerie van Buitenlandse Zaken: Code-archief 1945-1954, 2.05.117, National Archives of the Netherlands. Senator Ralph Flanders' (R-VT) resolution to censure Joseph McCarthy for distracting Americans with domestic wild goose chases instead of stemming the tide of Communism abroad meant, ironically, that Congress was effectively debating the fates of suspected Communists at home like Aaron Copland, Leonard Bernstein, and Alan Lomax rather than solidifying ties with a European democracy.

[64] Confidential letter from Harry Thompson to Colin Wirth, March 16, 1954, Records of the National Park Service, Regional Facility.

Ambassador had proposed three options: (a) a commission from a prominent Dutch architect, (b) a competition for Dutch architects, and (c) a replica of a historic Dutch edifice. Unfortunately,

> regarding all these opportunities, it should not be forgotten that the tower must comply with regulations set by the "Fine Arts Commission" [sic] and the Interior Department. These rules are aesthetic as well as technical. The third possibility, a copy of a famous Dutch tower, although in Dutch eyes not very original and therefore maybe less acceptable, is considered the most attractive here. At least it raises the advantage that the Fine Arts Commission will have few complaints. Whichever direction is taken, it is important in this regard to publish plans as soon as possible, both to be ready in time, and also to keep up interest in the United States.

He recommended a competition to stimulate renewed interest in the Netherlands, "of which a beneficial effect might be the willingness of businesses to contribute to the costs." For option (a), he would only recommend commissioning a renowned architect such as Willem Dudok, a modernist who had drawn up plans for the postwar rebuilding of the Hague. Furthermore, the tower "should not only be representative of the Netherlands and [of] Dutch architecture, but must also fit into the environment. This applies all the more so now that the tower will form the closure of the Capitol - Washington monument - Lincoln monument axis."

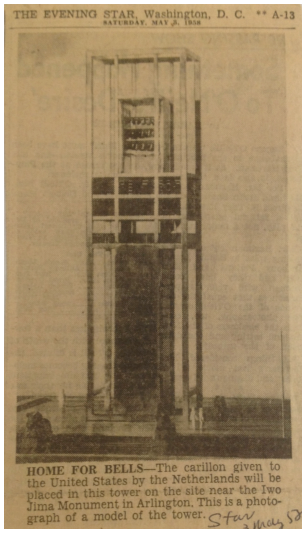
Ambassador van Roijen wrote to the Ministry on September 27, 1954 that option (c) was off the table because National Capital Parks, in particular Haussmann, had decided that the unity of style of the monument complex would be interrupted by a traditional Dutch edifice. Contacted by famed architect Walter Gropius' group the Architects Collaborative (TAC), which would prove one of the most notable firms in postwar modernism, and by other concrete and brick companies proffering their own architect recommendations, van Roijen found himself walking a tightrope between multiple industry conversations on both sides of the Atlantic with different committee members like Fockema Andreae, commercial pressures to proceed, and keeping the Ministry informed. But where was the money?

Dr. Hendrik Boon, Secretary-General of the Ministry of Foreign Affairs, stated during an early meeting with the Committee on July 17, 1952 that "a structure as a gift from the Netherlands [that] will probably find a place in a national American project for centuries" was so important that the Dutch government should be approached to provide half the cost of the tower.[65] But a minor recession and floods delayed plans, as van Roijen repeatedly offered by way of explanation. As late as 1957, an official received a letter from an impatient local "Bells for America" committee director bemoaning that "the drama of the Netherlands Carillon's bell tower is to me a thorn in the eye, a lump in the throat and a pang in my heart."[66] Eventually, a Netherlands Bell Tower Committee of mostly businessmen under the direction of Jan F. van Hengel, chairman of the Netherlands Chamber of Commerce in New York, raised ₣500,000, and the government contributed the other half. Boon had correctly anticipated that the government would chip in, but his aspirations for "centuries" of monumental grandeur would not come to pass.

The Dutch finally elected option (a), a commission. In May 1956, modernist designer and architect Gerrit Rietveld was brought on board to design a spiraling tower. The Netherlands Bell Tower Committee was delighted with the idea of using the money it had raised to hire a world-

[65] "Conclusions from the meeting on 17 July 1952 concerning the carillon for America," file 24959, Ministerie van Buitenlandse Zaken: Code-archief 1945-1954, 2.05.117, National Archives of the Netherlands.
[66] Unsigned letter to Jhr Ch. F. van Nispen tot Sevenaer on November 20, 1957, Kortenhorst Papers.

renowned Dutch industrial designer, as were the American authorities.[67] However, time was running out—the five years that Congress had allotted for submitting the definitive design and funds were nearly up. On June 23, the Ministry of Education, Arts and Sciences recommended several architects, including influential J. J. P. Oud,[68] but all were passed over in favor of the lesser-known Rotterdam architect Joost W. C. Boks, who had recently collaborated with Rietveld and Van den Broek & Bakema on the 1958 Netherlands Pavilion discussed in the previous chapter. He designed an open steel structure covered with galvanized steel plates with a bronze baked enamel finish, standing on a quartzite plaza and guarded by two bronze lions by sculptor Paul Konig (Figure 12). The components were shipped by the Holland-Amerika Lijn on the Kamperdijk. But much as the open International Style would serve the Philips Carillon poorly, here it would turn the tower into a foul-smelling haven for pigeons nesting amongst the thirteen largest bells below the playing cabin.


THE EVENING STAR, Washington, D. C. ** A-13
SATURDAY, MAY 3, 1952

HOME FOR BELLS—The carillon given to the United States by the Netherlands will be placed in this tower on the site near the Iwo Jima Monument in Arlington. This is a photograph of a model of the tower. Star staff photo

Figure 12. Drawing of Joost W.C. Boks' carillon tower, reproduced in John Giles, "Dutch to Build Tower To House Gift Carillon," *The Evening Star*, May 3, 1952: A-13.

[67] Letter from Minister without Portfolio Joseph Luns to the Minister of Education, Arts and Sciences on May 15, 1956, file 748, Afdeling Kunsten en taakvoorgangers van het Ministerie van Onderwijs, Kunsten en Wetenschappen over de periode 1945-1965 (hereafter cited as Afdeling Kunsten), 2.14.69, National Archives of the Netherlands.
[68] J. F. M. J. Jansen (acting head of the Arts Department) to Jhr. J. Q. Bas Backer, Western Hemisphere Department of the Ministry of Foreign Affairs on June 23, 1956 (Afdeling Kunsten).

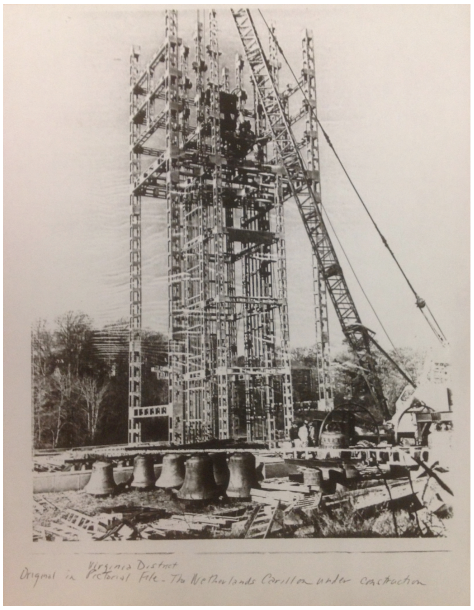


Figure 13. Construction of steel frame for Netherlands Carillon. (Records of the National Park Service, "Netherlands Carillon-NECA. Interpretation & Information. History: General" folder.)

Once construction began, contention sparked anew, this time over competition for its national sonic space—and the reverent listening audience the carillon site shared with neighboring Arlington National Cemetery. On December 21, 1949, an electronic AMVETS carillon by Schulmerich—the very first of nearly a hundred such AMVETS "living memorials"—had been dedicated by President Truman in the Memorial Amphitheater and Tomb of the Unknowns with the words "as these bells ring…honored dead rest…freedom lives" (Figure 14).[69] In a sacralized soundscape where ritual sounds such as "Taps," two minutes of silence, and even the meticulously practiced footsteps and heel clicks of the Tomb Guards were imbued daily with tremendous emotional and patriotic significance,[70] the "National Evening Hymn Memorial Carillon" played automatically at noon and 5 p.m. daily, and accompanied momentous occasions such as the burial of the Unknown Soldier.

[69] Following the passage of H.R. 6259, the Senate approved a companion bill on October 17, 1949 authorizing the U.S. Army to accept an offer from AMVETS to install an electronic carillon in the Amphitheater (Public Law 388) ("Carillon for War II Dead," *The Washington Post*, October 18, 1949).

[70] The Tomb Guards practice their twenty-one-step walk to a metronome. They are billeted a few hundred feet from the Unknowns and work twenty-four-hour shifts. (Poole, 264)

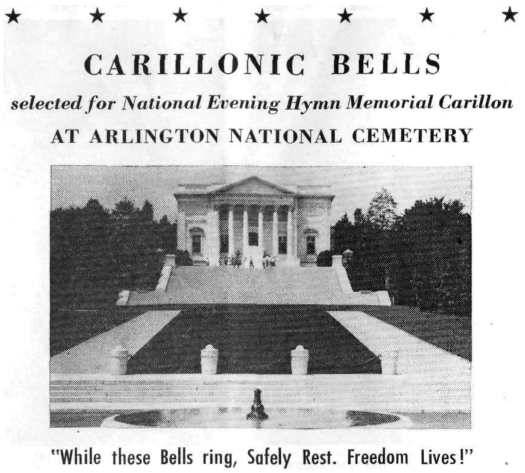


Figure 14. Patriotic advertisement by Schulmerich Electronics featuring its AMVETS carillon in Arlington National Cemetery (*The Diapason*, March 1, 1950, 18).

Presentation -(continued)

3. Mr. Harold Russell, National Commander of AMVETS*
4. President Harry S. Truman
5. Carillon - "Nearer My God To Thee"-Lowell Mason
(Dr. Arthur Bigelow, Bellmaster Princeton University)
6. His Excellency, Wilhelm Munthe De Morgenstierne
(Ambassador from Norway)
7. Carillon - "Taps"
(Dr. Bigelow)

3. POSTLUDE

1. Introduction Distinguished Guests
(Comdr. Russell)
2. Carillon
A. "Swing Low Sweet Chariot" (Spiritual)
B. "Abide With Me" (Monk)
C. "Rock of Ages" (Mooz Tsur) Chanukah Hymn - Synagogical
D. Chorus from "Finlandia" (Sibelius)

3. ACKNOWLEDGMENTS:
(Comdr. Russell)
4. CLOSE - "America the Beautiful" (Samuel Ward)
(Dr. Bigelow)

Figure 15. Part of the dedication program of the AMVETS Carillon in the Amphitheater of Arlington National Cemetery (December 21, 1949). The $25,000 instrument contained two "stops": "English chimes" and "Flemish bells." It was played by Princeton Bellmaster Arthur Bigelow and accepted by President Truman on behalf of the American people. (Arlington National Cemetery Archives)

Schulmerich and AMVETS voiced their protest over the placement of a traditional carillon on their doorstep as early as August 1958. Arguments dominated correspondence and meetings, and Assistant Secretary of the Interior Roger Ernst even found himself answerable to Senator Harry F. Byrd, Jr. (D-VA) on the question.[71] Haussmann too found himself defending the site because "it would be extremely awkward to retreat from the position we have taken."[72] Representative George Shuford (D-NC) introduced a bill to halt the newly begun construction. George J. Schulmerich wrote to former President Truman himself that this one of their over 5,000 installations must be

[71] Assistant Secretary of the Interior Roger Ernst to Senator Harry F. Byrd, Jr., August 26, 1958 (Records of the National Parks Service, Regional Facility).
[72] William Haussmann, Chief Architect, to Harry Thompson on February 26, 1956 (NPS).

protected (from bronze carillons) or cause "considerable antagonism to the Dutch."[73] After AMVETS Commander Winston Burdine took the liberty of sending a telegram to Queen Juliana warning of "potentially tragic results," the Queen herself had Ambassador van Roijen convey "Her Majesty's express wish for a timely coordination of programmes satisfactory to all parties" and her satisfaction that American authorities had taken steps to "prevent a possible mutual interference."[74] Schulmerich's telegram, which also indicated that annexation of the Nevius Tract into the cemetery (as desired by yet other contentious parties) "would result in two carillons in our National Cemetery," must have struck the bemused royal as odd, accustomed as she was to a soundscape cluttered with bell towers and to whom having more carillons was a sure sign of cultural prestige. Schulmerich probably feared "interference" far less than the opportunity for listeners to make an unfavorable comparison between the instruments.

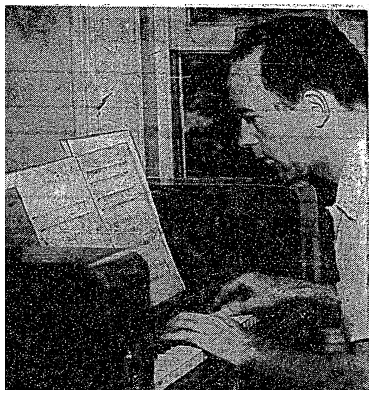


Figure 16. James Lawson gingerly pokes out a forty-minute concert on the AMVETS carillon keyboard at Arlington National Cemetery following the changing of the guard at the Tomb of the Unknowns. Lawson was the only veteran to use the G.I. Bill to study at the Royal Carillon School 'Jef Denyn' in Belgium. He spent a summer playing this instrument before taking up the University Carillonneur position at the University of Chicago. (Paul Hume, "Sound of True Bells Peals From Arlington's Carillon," *The Washington Post*, August 30, 1953: C6)

The AMVETS instrument did in fact join the martial soundscape of the cemetery. In 1954 when President Eisenhower led a ceremony and in 1958 when the Unknowns were enshrined, Princeton's Bellmaster Bigelow concertized on it. At the latter event, high-decibel sounds periodically punctured a quiet backdrop. As the caskets of the Unknowns were borne by horse from the Capitol to the Amphitheater, an artillery battery at the Washington Monument boomed salutes every minute as silent crowds watched from sidewalks. Twenty screaming fighter jets and bombers flew the missing man formation once the procession entered the cemetery. President Eisenhower's presentation of Medals of Honor to each Unknown was followed by a twenty-one-gun salute and a three-part volley, finishing with Taps.[75] Later, the AMVETS carillon would also accompany anniversary pilgrimages to John F. Kennedy's grave. Leen 't Hart wrote a "Prelude Solennel" for traditional carillon in memory of the slain president and premiered it there, earning a letter of thanks from Jacqueline Kennedy. (At the National Shrine of the Immaculate Conception, Lefévere would

[73] George J. Schulmerich to former President Harry Truman, October 19, 1954 (NPS).
[74] Telegram from Dr. Winston E. Burdine, AMVETS Commander from 1958-1959, to Queen Juliana, December 18, 1958. Letter from Ambassador Jan Herman van Roijen to Burdine, January 6, 1959 (NPS).
[75] Poole, 202-3.

premiere his own memorial work.[76]) But by 1963, the electronic carillon seems to have been overshadowed as a live instrument. Like a music box, it only plays automatic tunes today.

Unfortunately, as the carillon proved a poor instrument of diplomacy, the Netherlands' musical "diplomat" himself proved uncooperative and distrusting of Americans. Timmermans enlisted the Embassy, the Committee of Netherland Music at the Consul General in New York, and the Guild of Carillonneurs in North America (GCNA) to organize an American concert tour for him following the dedication. All GCNA members received notices in early February 1954 of the upcoming dedication in West Potomac Park and that Timmermans would be available. Yet on March 31, Dr. Herman J. Friedericy had to write sternly from the Embassy that the lack of immediate response did not mean that the GCNA was not interested, and that his expectation that the Embassy would organize and publicize his tour was unorthodox at best.[77] He advised Timmermans to accept the assistance of University of Chicago carillonneur James Lawson, whom the GCNA had asked to act as a "clearing agent" for his concerts.[78] Other communications had to be circulated assuring Dutch officials that Timmermans' tour was his own responsibility.

Even Dutch representatives in America grew competitive over the greatest symbol of their "unity." A confidential telegram from van Roijen to the Ministry of Foreign Affairs on February 26, 1954 noted the refusal of a Dutch office in New York to participate:

> I have observed that the Netherlands Tourist Office New York (ANVV) has never provided any publicity regarding the carillon or the plans for it, nor does it intend to do anything at this point. The rumor about that might arise from the fact that van der Laan campaigned for establishment of a Dutch carillon in New York some years ago.

It seemed that everyone was at war over bells meant to keep the peace.

The Bells

The carillon bells were realized according to the original vision, each dedicated "to that group from Dutch society or that part of Dutch territory which has donated it," as detailed lovingly in photographic the booklet *Description of the bells of the carillon: Presented to the people of the United States as a token of gratitude by the people of the Netherlands* (1960) produced in two runs for the dedication of the carillon.[79] Although Dutch representatives such as the Queen, Kortenhorst, and in 1995, Prime Minister Wim Kok hewed to expressions of gratitude and friendship and pointedly eschewed talk of politics when presenting the various stages of this gift, the bells themselves conveyed a remarkably diverse variety of messages, from messages of peace, even from the Dutch Army, to the Dutch Navy's militaristic and colonial rhetoric. (Table 1)

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[76] Helen Dewar, "Kennedy Assassination Observances Set Sunday," *The Washington Post*, November 19, 1964, A33.

[77] "…doch dat het bepaaldelijk niet op de weg van de Nederlandse overheidsinstanties ligt een tournee te organiseren en propageren."

[78] Harvey Spencer, GCNA President, to James Lawson on February 24, 1954, file 1908, Ministerie van Buitenlandse Zaken: Code-archief 1945-1954, 2.05.117, National Archives of the Netherlands.

[79] *Description of the bells of the carillon: Presented to the people of the United States as a token of gratitude by the people of the Netherlands* (Utrecht: N.V. Drukkerij v.h. L.E. Bosch & Zn, 1960).

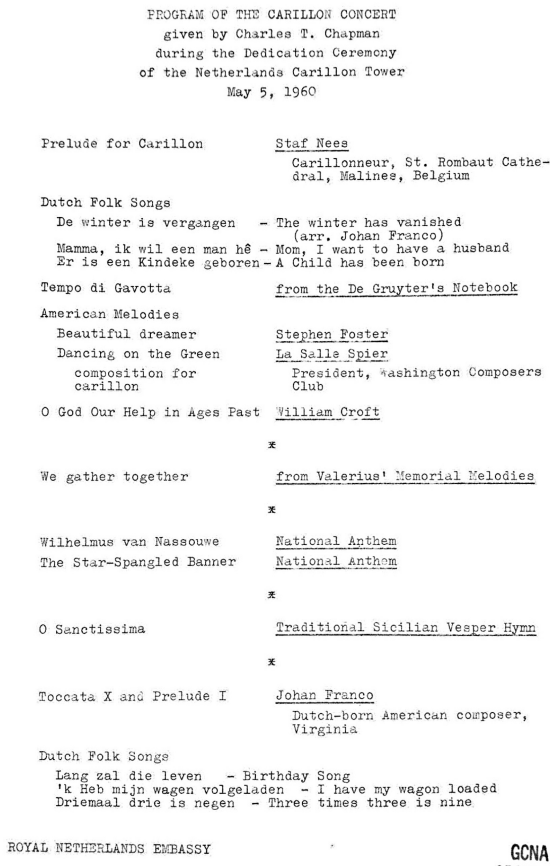
Table 1. The fifty bells of the Netherlands Carillon as of 1995. Data on the first forty-nine bells is taken from *Description of the bells of the carillon* (1960), including the English translations. This instrument transposes three half steps. Note that the lowest bells form a traditional carillon short octave so that the pedalboard begins with B♭2-C3-D3, followed by the remaining bells in chromatic sequence. Pieter Hemony published a treatise arguing that C♯3 and even D♯3 were unnecessary for carillons (in the meantone temperament of the time) in *De on-noodsakelijkheid en ondienstigheid van cis en dis in de bassen der klokken : vertoont uyt verscheyde advysen van ervaren organisten ende klokken-speelders* (1678). However, the short octave was not widely adopted in the United States, which only began building carillons in the twentieth century.

Pitch	Dedicatee, followed by selected inscription excerpts in parentheses
G2 (connected to B♭2 pedal and key)	Netherlands Antilles
A2 (connected to C3 pedal and key)	Province of South Holland ("We are with you, free America"
B2 (connected to D3 pedal and key)	Province of North Holland ("My bell / tolls the gratitude / of free Holland")
C3	Province of Overijssel ("unity is built on harmony")
C♯3	Province of Gelderland ("With all our might / we shall defend our freedom)
D3	Province of North Brabant ("freedom can be suppressed / but it will rise again")
E♭3	Province of Groningen
E3	Province of Utrecht ("we fought / to free the seat of Holland's unity") [Utrecht is viewed as a seat of unity because the provinces united there in 1579 against Spain]
F3	Province of Limburg
F♯3	Province of Friesland
G3	Province of Zeeland
A♭3	Province of Drenthe
A3	The Mining Industry
B♭3	Commerce ("Be moderate; / Investment comes before profits")
B3	Industry
C4	Merchant Marine
C♯4	Finance ("If you own money, it obeys and follows you / If money owns you: Obey it and it will swallow you.")
D4	Aviation ("Holland is prepared / for new times")
E♭4	The Navy ("From the days of Admiral De Ruyter to the present time: / -- We still roam the seas as the lion the jungle.") ["Zij lopen door de woeste zee, als door het bos de leeuw" is from *Waar dat men zich al keert* (Wherever you look) (1616) by Adriaen Valerius, another patriotic *geuzenlied* from the war against the Spanish.]
E4	The Army ("If possible / hoist the flag / in peace. / If it has to be / do your work well / and resist bravely.")
F4	The Air Force ("Keep tyrants from our borders")
F♯4	Civil Servants ("Army of peace")
G4	Women's Organizations ("Free women, / help us build / a better world in a new age")
A♭4	Roosteren, a village in Limburg on the front line
A4	Transport ("Time and distance vanish, / mankind goes ever faster; / but if this does not bring peace / it does not help us.")
B♭4	The Middle Class (commentary: "one of the pillars of Dutch society")
B4	The Trades
C5	Communications ("may nations and peoples meet because of your flight.")
C♯5	The Fishermen
D5	The Farmers
E♭5	Horticulture
E5	The Arts ("The breath of God is in their work and shows us, / how they create for us out of

	nothing.")
F5	The Sciences
F♯5	Education
G5	The Commercial Arts
A♭5	Sport ("The same purpose makes us a unity: / It is the game which unites us.")
A5	The Students ("The future works with both head and hands / for the common wealth of all free nations.")
B♭5 (highest original octave dedicated to the youth)	"We twelve are jubilant in swift and joyful tones: / the high voices of the youth of the Netherlands."
B5	Princess Margriet, born to Queen Juliana in exile in Canada
C6	All Youth ("Suffer less than we do, / do better than we did: / Bring peace!")
C♯6	Youth
D6	Youth
E♭6	Youth
E6	Youth ("Both of these you will learn: / to blossom, and to defend yourself.")
F6	Small Children
F♯6	Small Children
G6	Small Children
G♯6	Princess Marijke ("I am the smallest, / the purest.")
A6	Added in 1995 ("1945-1995 / Freedom – Friendship / The Netherlands – The United States")

1960: Conclusion without Resolution

On May 5, 1960, a full eight years after Verheul's dishwashing revelation that the Netherlands should offer a "sounding gift" to the U.S., and exactly fifteen years after the liberation, the Netherlands Carillon Tower was finally dedicated. Its modern frame rose over the George Washington Memorial Parkway in Arlington, Virginia, just over the Potomac River from the National Mall. Charles T. Chapman, carillonneur of the Singing Tower in Luray, Virginia inaugurated the 49-bell instrument with a program that opened with a virtuosic Flemish Romantic work by Staf Nees and then featured Dutch folk songs, plus a few American pieces, including two by Dutch-born American contemporary composer Johan Franco (Figure 17). The press highlighted Valerius's hymn "Wilt heden nu treden" because of its association in America with Thanksgiving Day and thus its reinforcement of the message of Dutch gratitude. Remarkably, this was the polysemous hymn that had allowed 't Hart to remind his countrymen of the Dutch war for liberation against the Spanish while assuring the Gestapo that he was heralding the Thousand Year Reich, and whose American meaning now allowed it to be taken as a sign of cross-cultural friendship. Secretary of the Interior Fred Seaton accepted the extraordinary gift of 61,403 pounds of bell bronze and a tower of 230 tons that "signif[y] the high level of harmony between the peoples of the Netherlands and the United States of America."



PROGRAM OF THE CARILLON CONCERT
given by Charles T. Chapman
during the Dedication Ceremony
of the Netherlands Carillon Tower
May 5, 1960

Prelude for Carillon — Staf Nees
Carillonneur, St. Rombaut Cathedral, Malines, Belgium

Dutch Folk Songs
De winter is vergangen - The winter has vanished (arr. Johan Franco)
Mamma, ik wil een man hê - Mom, I want to have a husband
Er is een Kindeke geboren - A Child has been born

Tempo di Gavotta — from the De Gruyter's Notebook

American Melodies
Beautiful dreamer — Stephen Foster
Dancing on the Green — La Salle Spier
composition for carillon
President, Washington Composers Club

O God Our Help in Ages Past — William Croft

*

We gather together — from Valerius' Memorial Melodies

*

Wilhelmus van Nassouwe — National Anthem
The Star-Spangled Banner — National Anthem

*

O Sanctissima — Traditional Sicilian Vesper Hymn

*

Toccata X and Prelude I — Johan Franco
Dutch-born American composer, Virginia

Dutch Folk Songs
Lang zal die leven - Birthday Song
'k Heb mijn wagen volgeladen - I have my wagon loaded
Driemaal drie is negen - Three times three is nine

ROYAL NETHERLANDS EMBASSY

GCNA

Figure 17. Charles Chapman's program at the Dedication Ceremony, May 5, 1960 (GCNA Archives)

Chapman's selection of Dutch folk songs seemed less calculated to convey momentous meaning, or in fact any meaning at all. "De winter is vergangen" is a song about two lovers in spring. Of fifteenth-century Dutch origin, it is still popular in the Low Countries but mostly known abroad as a German lied. The Christmas song "Er is een kindeke geboren" probably struck the Dutch attendees as curiously out of season. "Mamma, 'k wil een man hê!" is a humorous song (*minneliedjie*) in dialogue form, in which a girl insists to her mother than she wants a young Boer for a husband, not a French, German, Spanish, or English man. While sometimes presumed to be a song from the Netherlands, it is an Afrikaans song, and was thus inadvertently another reminder from the Americans to the Dutch of the colonial territories they had lost.[80] The popular labeling of the song as Dutch reminds us today of the colonial erasure of South African authorship, ringing out that day over a cemetery that had only recently stopped segregating its burials.

Rhetorical Moves

Politicized rhetoric inevitably surrounded the Netherlands Carillon like a halo, or perhaps more like a miasma. The bells themselves proclaimed the most idealistic message, as "spoken" by the inscription of the province of North Holland (which includes Amsterdam): "You brought

[80] S. P. E. Boshoff and L. J. du Plessis, "15. Mama, 'k wil een man, hê!" in *Afrikaanse volksliedjies. Deel 2. Minneliedjies*. Pretoria, Amsterdam: J.H. de Bussy, 1921, http://www.dbnl.org/tekst/bosh002afri02_01/bosh002afri02_01_0020.php.

deliverance / after the fearful dark / of hunger, pain and shame: / My bell / tolls the gratitude / of free Holland." The Atlantic geographical imaginary of freedom represented by the tower was even inscribed by maps on the smallest bell showing the location of Amsterdam in the Netherlands and of New York City—formerly New Amsterdam—in America. In a similar vein, Queen Juliana's widely quoted 1952 dedication speech offered a humanitarian vision of empowering the weak through music: "To achieve real harmony, justice should be done also to the small and tiny voices, which are not supported by the might of their weight…So many voices in our troubled world are still unheard. Let that be an incentive for all of us when we hear the bells ringing." Truman responded that "no gift could be a better symbol of [our] harmonious relations," but these were words that journalist Ed Bruske would later label "the hollow tolling of diplomacy."[81] Unlike the Queen, Truman heard politics in the bells: "The Netherlands is an important member of the North Atlantic Treaty Organization. And now Dutch armed forces are preparing to enter into the European Defense Community. It is only through this kind of effort, it is only through unity with other nations, that any one of the free nations can make itself secure against the threat of war in the future."

Speaker Martin gently reinterpreted the West Potomac Park carillon: "When we consider the motives which prompted the Netherlands people to make us the gift of this carillon, we understand more readily why one of these bells is dedicated to peace. While I would not want in any way to detract from the harmony of the bells, which is the secret of the perfection of this carillon, I do hope that it will be the sound of this bell of peace which will ring the loudest." Like Truman, he presented the instrument as a tool of musical containment propaganda, declaring that the carillon "will ring out a constant reminder to the American people that…their aspirations for the free future of mankind are shared by their Netherlands brothers." He then played metaphorically on the word "instrument." "By virtue of having been the first nation to deposit their instrument of ratification of the treaty establishing the European Defense Community, [the Netherlands] are in the forefront of the nations pressing for a stronger foundation for the common defense of western civilization. As we listen to the harmony of these bells, let us not forget the harmony of purpose and striving which links our two great peoples," he declared, broaching cold war military-political issues and the protection of "western civilization," never once mentioned in Dutch correspondence regarding the carillon. Thus America heard an enharmonic respelling of the international harmony the Dutch had wanted both nations to hear in the carillon's performances.

The United States Information Service in the Hague reinforced the political rather than emotional symbolism of the carillon with its May 4 advance news release for the 1954 dedication: "It is believed that ultimately a tower will be built as a lasting arrangement with the goal of a monument that 'symbolizes for the United States and the world the democratic ideals as embodied in the five freedoms.'" In official propaganda, the rhetoric of the unbuilt National Freedom Shrine accidentally became elided with the Dutch gift.

But the most strident political rhetoric came from Truman, using the cemetery's AMVETS electronic carillon as a pulpit. The *Los Angeles Times* report on the 1949 dedication, "Truman Asserts World Peace Split by Reds," summed up the real content of the ceremony. "Until the captive peoples of the world emerge from darkness," he warned, "they cannot see the hand we hold out in friendship. While they are made to respond to our handclasp with a mailed fist, we have no choice

[81] Ed Bruske, "Budget Knell May Toll for The Gift Bells: Devoted Carillonneur Rings Changes To Preserve Gift of The Netherlands," *The Washington Post*, March 6, 1981, B1-B2.

but the stand ready in self-defense." Although far out of earshot of the amplified instrument, the Soviet Union received a clear warning in his ominous syllogism, "Much as we trust in God, while He is rejected by so many in the world we must trust also in ourselves."[82]

A few Americans did write letters to their newspapers perceiving harmonious international relations in the Netherlands Carillon. In the *Dallas Morning News* on July 25, 1954, a proud commentator noted that the Dutch were not criticizing America for its ulterior motives but had instead given "a mighty carillon as a token of their thanks":

> The Netherlands did not say that America really was serving only America when our troops came to drive the hordes of Hitler out of Holland. The Dutch did not say that we were overlate in coming and probably made a good profit out of the whole business. They did not indulge in envy that Dutch cities were in ruins, whereas no American soil was harmed by bomb or cannon fire. And they could have said these things as others are saying them now….God be thanked that the Dutch, at least, do not hate us. And, God willing, the bells shall have such a house as shall let all the world know how deeply we appreciate a brave and gracious friend.

A Memorial Forgotten Under Piles of Pigeon Poop

The aforementioned musicologist Smijers, also Chairman of the State Commission for Bells (*Rijkscommissie voor Klokken en Klokkenspelen*), told the Committee in early January 1952 that sending a carillonneur to America was "completely superfluous" (*volmaakt overbodig*).[83] So it was the bell experts themselves who failed to understand the need in America to demonstrate this little-understood instrument. Unfortunately, he was also the one who recommended the prickly Timmermans at the February 13, 1953 meeting.

So after the triumphant inauguration of the Netherlands Carillon following a nine-year saga, it went silent. Very occasionally, its music heralded important state and other occasions. During the West Potomac Park phrase, Chapman provided a "fanfare of bells" for the inauguration of Eisenhower's second term, after he took his oath (Figure 18).[84] Lawson performed on the completed carillon for the 1961 Regional Convention of the American Guild of Organists. Chapman gave a concert on Veterans Day in 1963, a few hours after Kennedy led the wreath-laying ceremony at the Tomb of the Unknowns.

Yet if not for a certain Frank Péchin Law, the carillon might have gone directly into decay and become unplayable not long after its inauguration in 1960. Only in 1963 did Law obtain National Park Service (NPS) approval for himself and some twenty other carillonneurs to give concerts for a modest $100 honorarium, including his student Frances Rodgers, first woman to play that carillon. By 1970, they were able to perform forty-five concerts per year, less than one per week, following Law's standard language that "all recitals *must* include some music familiar to the general public" and his suggestion that the programs commence with the Dutch anthem and end with the American one. He sent summer concert schedules to Queen Juliana every year, and received over

[82] "Truman Asserts World Peace Split by Reds," *Los Angeles Times*, Dec 22, 1949, 1.
[83] Werk-Comité "Klokken voor Amerika" secretary H. B. Verwayen to the committee, January 6, 1952 (d'Ailly Papers).
[84] "Capitol Carillons to Announce The Moment of Inauguration," *New York Times*, January 13, 1957.

10,000 tulip bulbs in 1964 to plant around the tower.[85] Impressively, with so few resources, he had been able to attract hundreds and sometimes thousands of listeners to summer Sunday and holiday concerts. Starting in 1969, he also played during the warm months (probably at his own expense) to a total of 20,000 to 30,000 people on Tuesdays before the sunset review by the U.S. Marine Band at the Iwo Jima Memorial. He closed each time with the Marine Hymn, "Eternal Father Strong to Save," which had been heard from the Coast Guard Band at Kennedy's 1964 funeral before the lighting of the eternal flame that still burns within the sonic horizon of the bells today.

Law was uniquely qualified as a carillonneur and veteran to advocate for the Netherlands Carillon. During World War II, he was stationed in England with the Eighth Air Force as a bombardier on a B-24 Liberator heavy bomber. On missions to Germany, he often flew over the Netherlands and saw firsthand the "utter devastation of Dutch cities, towns and villages—a most sickening sight that I shall carry with me forever." To explain his outrage over the American government's neglect of the carillon, he often described his "feeling of compassion and utter sorrow…for the people of Holland" during those missions.[86]

"Tragically speaking, Arlington Cemetery has now been filled with graves right to the edge of the tower. We have a moral obligation of the greatest magnitude to keep this carillon played on a regular schedule," he wrote, elevating the carillon's importance via its neighbor. Law served as carillonneur of a similarly liminal instrument in Valley Forge, Pennsylvania, where he faced the classic carillonneur's dilemma of performing for multiple audiences and authorities. There, he played the Washington Memorial National Carillon in a private denominational church entirely within a public park that became a National Historical Park in 1976. The question of the carillonneur's role has long been a complex and fraught issue. From the seventeenth-century Reformation to the present day, Dutch carillonneurs were employed by a secular municipality and yet played in prominent church towers. Many present-day American carillonneurs struggle to persuade their institutions to support concerts for a public considerably broader than the specific population their institution aims to serve. Employed by the NPS in Arlington, Law sounded the Netherlands Carillon not just across parkland, but also across the dual political and tourist landscape of national memorials and a national cemetery. He skillfully balanced these contrasting, even contradictory, responsibilities in Arlington and Valley Forge.

Law found supporters for the Netherlands Carillon from a surprising variety of sectors. The strong support he found in the Arlington Ministerial Association came from his yearly performances for the Easter Sunrise Service of his own arrangements (a half hour prelude, an antiphon during the ceremony, and a half-hour postlude with open tower visits) as well as his own piety. (He claimed for the rest of his life that these services, starting in 1962, were the only performances on the carillon at that time, although this contradicts the historical record.) Keen to avoid the appearance of commercialism, he graciously accepted low-key corporate sponsorship for the concerts from Isuzu, Mitsubishi, and Televizier over the years.

Yet Law could not stem the carillon's decay from neglect. In 1969, he delivered a painstakingly handwritten twelve-page report on the "most harrowing experience I have had with the

[85] Tulips would form an increasingly important part of the landscape symbolism. In 1973, the Netherlands Carillon Gardens were dedicated around the tower, with each of forty-nine tulip beds representing each bell and its segment of society.

[86] Frank Law to (probably) the National Park Service, July 5, 1969, Records of the National Park Service, Congressional Communications, "Netherlands Carillon-NECA Administration. Law, Frank [Director Carillonneur]" folder.

Netherlands Carillon since its activation in 1962," when he had to stop mid-recital because the return spring on the lowest bell had broken. The letter recounted his long involvement with the instrument: After the carillon went silent, he could not "properly recall the number of letters I wrote to the Department of the Interior and [my] Pennsylvania Congressmen telling of the disrespectful neglect of this instrument." Representative Richard Schweiker (R-PA) finally arranged for Law's formal appointment in 1962. An article by Paul Hume, music critic of *The Washington Post*, asked "What good are bells if they aren't jingled?" and misrepresented the carillon as totally unplayed.[87] Senator Hubert Humphrey (D-MN), future Vice President under Lyndon B. Johnson, read Hume's article into the Congressional Record and helped Law increase the number of concerts. In a statement to the press, Humphrey focused on the lack of a deliberate, planned soundscape for the cemetery: "To pass up the opportunity of adding the sound of carillon to the sights and memories of Arlington Cemetery is to slight a rich opportunity," especially as millions would visit Kennedy's grave in the coming years.[88]

Figure 18. Netherlands Embassy press secretary A. de Vries (left) with Charles T. Chapman during his December 5 rehearsal for the inauguration of Eisenhower and Nixon's second term (United Press).

In 1970, Law found an especially crucial ally in journalist Hark Burchard, who wrote humorous yet scathing articles about his efforts to resuscitate the dying instrument: "Law went 12 rounds with the bells of the Netherlands Carillon yesterday afternoon. He won eight, drew three and lost one, and called it his best match of the summer with the balky bells. He also drew an unusually heavy crowd of about 600 persons, some of whom may have come to see whether the huge, rusty belltower would collapse during the tolling of such heavy numbers as the 'Battle Hymn of the Republic.'"[89] Astutely, Burchard made the case that, even in its forlorn state, the carillon still

[87] Paul Hume, "What Good Are Bells If They Aren't Jingled?", *The Washington Post*, December 29, 1963, G6. Frank Law took strenuous issue with Hume's implication that the carillon was not played at all, as he was indeed playing occasional concerts, but a closer reading suggests that he wanted to dismiss the article because it proposed that the Department of the Interior hire Washington Cathedral carillonneur Ronald Barnes to play weekly concerts. In total, Hume wrote four articles on the carillon for the *Post* between 1953-1964, one of which was musically relatively substantive.

[88] "Senator Would Awaken Silent Arlington Carillon," *The Washington Post*, December 31, 1963, B4.

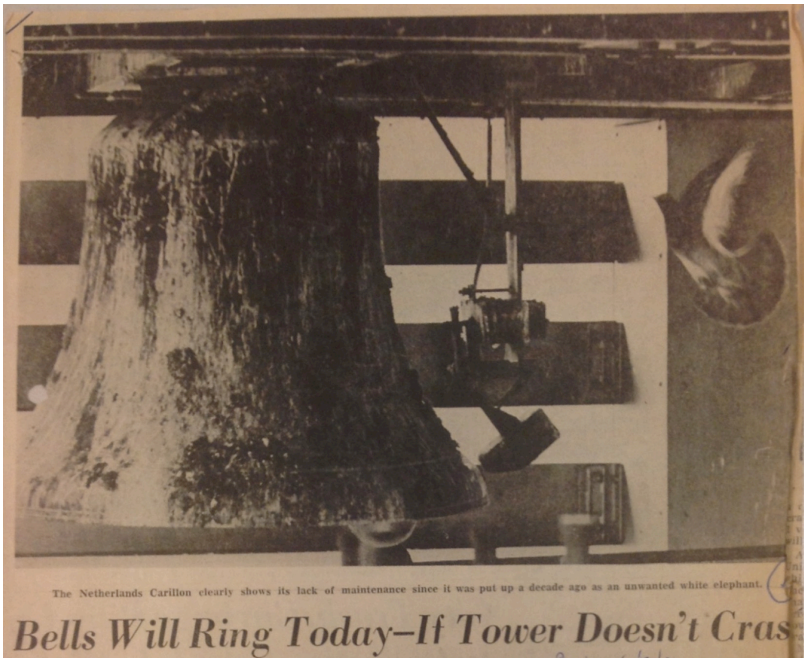
[89] Hank Burchard, "Arlington Bells Toll Grudgingly for Carillonneur," *The Washington Post*, July 5, 1970, C1 and C3. The article's passage on guano is also memorable: "Pity the people who were downwind when Law's efforts dislodged a

attracted die-hard fans: "When the [Battle Hymn] ended, the tower still stood, as did—barely—the small group standing by in the cabin to give Law moral support. These few had by then developed the camaraderie shared by those who have faced death together."

His voice proved central to Law's rescue operation. Starting on September 6, his first sensational article on the topic in the Sunday *Washington Post* caused an uproar with its image of a bell encrusted in guano (Figure 19). His opening salvo aimed directly at the government:

> Carillonneur Frank P. Law will attempt to give a concert…it is not modesty that leads the Valley Forge, Pa., musician to describe it as an 'attempt,' but long and sad experience. He expects the carillon's control mechanism to break down, as it often does, and he is not entirely confident that the 127-foot tower itself won't fall down. To put it bluntly, the carillon…is a gift…that has been treated as an unwanted white elephant by the government of the United States.

To emphasize the instrument's absurdly makeshift operation, he narrated that "Law went to the carillon yesterday with tape, oil, coathangers, bandages, glue and chewing gum, trying to patch up the worn-out clavier (keyboard) and other controls."


The Netherlands Carillon clearly shows its lack of maintenance since it was put up a decade ago as an unwanted white elephant.

Bells Will Ring Today–If Tower Doesn't Cras

Figure 19. "Besides being unsightly, the pigeon droppings distort the sound and eventually the uric acid they contain will permanently damage the bells." (Hank Burchard, "Bells Will Ring Today—If Tower Doesn't Crash," *The Washington Post*, September 6, 1970, C1 and C3.)

Burchard also sought to embarrass the government with Law's colorful remarks, recording that the carillonneur's

> inspection was punctuated by the following remarks, among others: "This thing is terribly neglected…It is certainly no credit to our government…this is a national disgrace…huge mass of unplayable metal…what must

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cloud of dried pigeon droppings from the bottom rack of bells. It was the more unfortunate that most of them were looking up at the tower when the cascade came down." He also had choice words for the tower's cladding plates, "which are of a color and condition reminiscent of those knocked-out Panzer tanks that have been sitting as monuments in the village squares of Europe these past 25 years."

> the Dutch think of us…this pigeon dung is incredible…it something isn't done soon, the carillon will be beyond repair." While carillonneurs acknowledge themselves to be a breed apart, fussy and somewhat given to eccentricity, it should not be thought that Law was exaggerating. His assessment…is supported not only by fellow members of the Guild of Carillonneurs in North America, but by engineers, representatives of the Royal Netherlands Embassy, and the National Capital Park Service.

The article was quickly sent by alarmed Embassy *chargé d'affairs* Jacques E. Schaap, counselor for cultural affairs, along with two others and a sobering five-page report by Leen 't Hart, now Director of the Netherlands Carillon School, to Minister Luns. It was 't Hart who finally informed the Dutch authorities that the bells were badly out of tune precisely because they had been "cooperatively" cast. His report enumerated a full seventeen problems, including the clappers, which "because of their poor quality [are] unusable for good tone production. They themselves cause damage to the bells." Schaap grieved that "because a very large number of visitors to the National Cemetery must endure the dilapidated state of the belfry, the carillon threatens to lose entirely its significance as a symbol of the gratitude of the Dutch people to the United States. More painful is that many visitors find themselves of the opinion that the neglect of the monument is due to indifference on the Dutch side…. I would urgently recommend an initiative on the Dutch side to rectify the defects of the carillon and bell tower as much as possible."[90] Fanning his concerns, the *Post* published a follow-up editorial that "the way in which the Netherlands Carillon has been treated—graphically told by Hank Burchard on Sunday—comes close to being a national scandal….The rudest thing a country can do is to ignore a gift that comes from the hearts of another people."[91]

Like the Philips Carillon, the modern shell constructed for a Hemony-style new Baroque masterpiece failed. Before NPS refurbishments, the acoustics were so poor that Law claimed that "not even an amateur architect would have permitted such a foolish design."[92] The enameled steel plates covering the 127-foot tower had not stood up to Washington's polluted, corrosive atmosphere; "the enamel has bleached from bronze to gray and is blistering and peeling everywhere."[93] Of the 15,000 bolts, untold numbers threatened to loosen due to the corrosion around them. Carillonneurs avoided playing the lowest three bells (which could also be swung electrically) from fear of endangering life and limb.

George Washington Memorial Parkway Superintendent Floyd B. Taylor had nearly secured an appropriation for a major renovation in 1969, but President Nixon's order to halt all "non-essential" civilian construction spending had dashed those hopes. Meanwhile, the Embassy had received "countless letters" from Dutch visitors expressing their dismay, and even the Dutch government was "acutely embarrassed….because of the uneven quality of the bells."[94] Schaap went on record that "in their zeal to cast the finest possible bells, the foundries seem to have competed rather than cooperated." Burchard quoted Hume that the situation was "a scandal, an insult to the

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[90] *Chargé d'affaires* Jacques E. Schaap of the Netherlands Embassy in Washington to the Netherlands Ministry of Foreign Affairs, September 10, 1970, file 9359, Ministerie van Buitenlandse Zaken: Code-archief 1965-1974, 2.05.313, National Archives of the Netherlands.

[91] "It Tolls for Thee," *Washington Post*, September 7, 1970.

[92] Frank Law to (probably) the National Park Service, July 5, 1969 (Records of the National Park Service, Congressional Communications, "Netherlands Carillon-NECA Administration. Law, Frank [Director Carillonneur]" folder).

[93] Hank Burchard, "Bells Will Ring Out Today—If Tower Doesn't Collapse," *The Washington Post*, June 8, 1970, C1-C3.

[94] Ibid.

people of the Netherlands and this country. This neglect is unspeakably callous." Only Queen Juliana was spared from the storm; although Law wrote every year about the scheduled performances, he tactfully refrained from explaining "how they have been received."[95] His respect for what the Netherlands Carillon stood for outweighed the prospect of disillusioning her. But through Burchard, his press humiliation campaign worked where all other efforts had failed.

Nothing sparks action as quickly as bad publicity and the need to do damage control. The next day, Schaap wrote again to Luns, informing him that the NPS had raised its hoped-for allocation to $300,000 for a complete restoration of the tower and also assuring him that the *Post* article quoting 't Hart that forty bells needed to be recast was incorrect ('t Hart had stated that "a number of bells" needed recasting, but American carillonneurs and technicians have since insisted that only a complete recasting can redeem the instrument). Less than a week later, Eijsbouts was writing to the Ministry defensively protesting 't Hart's alleged recommendation. The press catchphrase "tons of pigeon dung" ricocheted through administrative circles, as did the idea that "the bells cast by three foundries in the Netherlands have never formed a harmonizing whole due to the lack of correct tuning and timbre." By September 21, the order was given to draw up a comprehensive restoration plan to be undertaken over five years, with emphasis being placed on the restoration as a "joint Dutch-American action" and that the U.S. would commit to providing "the necessary resources for regular maintenance."[96] Schaap continued to respond to letters of concern regarding 't Hart's supposed recommendation. Meanwhile, the Dutch press was becoming an echo chamber for the scandal; the *Gelderlander* published an article "Netherlands carillon in Arlington is close to collapsing" on September 9 with sensational subheadings like "Shame" (*Schande*), "Recasting," which repeated the misquoted recommendation, and "Nightmare."

Burchard got his big break, too. On September 11, he published the triumphant headline "Carillon Repair Is Slated," reporting that National Capital Parks had announced a $300,000 project to save the carillon that would get underway before the end of September. The announcement "came in response to inquiries from House Minority Leader Gerald R. Ford and two fellow Republican representatives from Western Michigan, all of whose districts have large numbers of voters of Dutch descent. The congressmen learned of the carillon's dilapidated state from Sunday's editions of *The Washington Post*."[97] Representative Jackson Betts (R-OH) would also write to the NPS, piling onto the concerned political voices. On September 10, *De Telegraaf* had already scooped the *Post*, publishing "Americans won't let our carillon crack (*barsten*): Minister withdraws Ƒ1.8 million for restoration." But alarms continued to go off; even in April 1971, a reprint of Burchard's articles in the UC Riverside quarterly carillon newsletter *Randschriften* sent the Minister of Culture, Recreation, and Social Work scurrying to Minister Luns with concerns that critiques of the bells would be interpreted as the Dutch government admitting shortcomings in its carillon industry, and that the public was being led to believe that the government would undertake the tremendous expense of a total recasting.[98]

One day before the anniversary of Kortenhorst's "Bells for America" New Year's Eve address in 1951, the carillon again became an urgent concern at some of the highest levels of government.

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[95] Ibid.

[96] Memorandum from Hr. Jonker to "Chef DCV via DCV/VM," September 21, 1970, file 9359, Ministerie van Buitenlandse Zaken: Code-archief 1965-1974, 2.05.313, National Archives of the Netherlands.

[97] Hank Burchard, "Carillon Repair Is Slated," *The Washington Post*, September 11, 1970, B1 and B9.

[98] Minister of Culture, Recreation and Social Work C. G. Eckhart to Minister Joseph Luns, April 28, 1971, file 9359, Ministerie van Buitenlandse Zaken: Code-archief 1965-1974, 2.05.313, National Archives of the Netherlands.

On December 30, Luns wrote to the Minister of Culture, Recreation and Social Work requesting that a technical specialist be sent to evaluate the work needed for the carillon. Luns received encouraging news of the improvements (especially with regards to pigeons) in mid-March. But then the opportunity for squabbling presented itself again amongst the bellfounders. Andries Heero van Bergen wrote to Luns pointing out that Smijers, van der Elst, and Timmermans had inspected and approved the bells in 1954. He had warned Smijers that the sharply differing timbres of the three sets of bells would draw criticism, but Smijers nevertheless insisted on dividing up the job. Illogically, van Bergen then argued that the government "take on *not one bellfounder*, but *all three founders in consultation with each other* to undertake the present necessary restoration of the neglected carillon."[99] The Embassy had meanwhile received his brother Harmannus Tjapko van Bergen's letter zealously defending his fellow bellfounder's work in capitalized words.[100] Everyone still wanted a piece of the pie.

To Law's relief, the tower was cleaned and repainted and the large bells screened off from roosting pigeons in 1972, and in 1973 the carillon and transmission were refurbished and the cheap keyboard replaced. The out-of-tune instrument would be performed regularly thanks to Law's persistence, although its troubles were not over.

Dutch correspondence and press repeatedly indicated awareness that Americans lacked a strong carillon culture, hence the provision of automatic playing capabilities for the Netherlands Carillon (Figure 20) that clanged out melodies ranging from the patriotic "Wij willen Holland houen" (H. W. van der Mey and Adr. P. Hamers), "Wij leven vrij," and the Star Spangled Banner, to an arrangement of "Au clair de lune," a profusion of Christian hymns and songs, and multicultural fare including a few African American spirituals, the Mexican song "Cielito Lindo," and "El Cuando," perhaps Argentinian.[101] In Timmerman's report on his American tour for the Dutch Carillon Guild newsletter, he recounted that "the carillon in the U.S. has a major competitor in the so-called electronic carillon, which is as much a carillon as a Hammond Organ is an organ."[102] While correct, he failed to understand some of the motives for building electronic instruments. Law had promoted the playback of carillon tape recordings made by Memorial Chimes from towers too small to house real carillons to increase general public awareness,[103] and even tried to transform Schulmerich from the inside by playing its Arlington installation, helping it acquire a real demonstration carillon for its foundry, and publishing Schulmerich's *For Bells Only: Musical*

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[99] A. H. van Bergen to Minister Joseph Luns, March 31, 1971, file 9359, Ministerie van Buitenlandse Zaken: Code-archief 1965-1974, 2.05.313, National Archives of the Netherlands.

[100] Harmannus van Bergen established his foundry in Greenwood, South Carolina after exhibiting two carillons at the 1939-1940 New York World's Fair and finding himself unable to return after the outbreak of World War II.

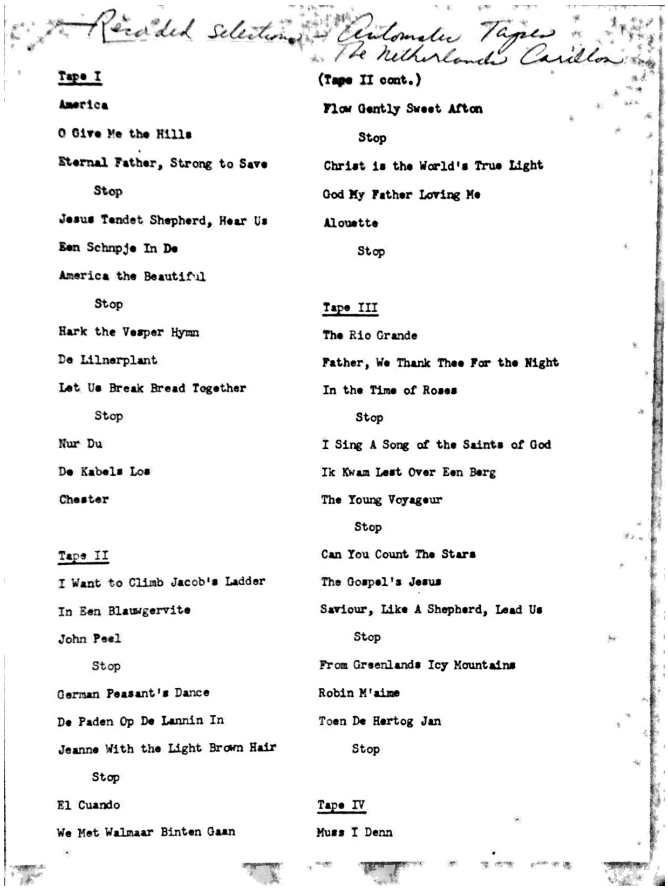
[101] The automatic play was partially electric. A hard plastic band with holes moved over pegs on a rotating cylinder, and the pegs touched an electrical device that actuated hammers to strike the outer rims of the bells. ("Netherlands Carillon Tower To Be Dedicated In Washington, D.C., On May 5, 1960. For release at 1 p.m. on April 8, 1960," The Netherlands Information Service [Anton Brees Carillon Library]).

[102] Timmermans contradicted himself, however, by reporting that "the position of the American carillonneur is different from that in the Netherlands. His playing is considered an art…. The churchgoers listen before or after the church service in their cars or in the park." ("Enige indrukken over klokkenspelen in Amerika door F. Timmermans," *Mededelingen: Nederlandse Klokkenspel-Vereniging* 6 [1952]: 15-18.)

[103] Frank Law to "All Members of the Guild of Carillonneurs in North America," July 8, 1961 (The Guild of Carillonneurs in North America Archives).

Selections for Carillons & Handbells (1982) to address the generally overlooked needs of two-octave carillons.

Law's attitude towards the promotion of the carillon profession was unflinchingly pragmatic and free of artistic posing or attitudes of superiority common amongst his colleagues. His invitations to play in Arlington emphasized that "I am not asking anyone to 'play down' to the public, but I am asking that you take your audience into consideration. No concert is to include totally unfamiliar fare [only]." Adapting one's repertoire and adjusting one's attitude towards carillon simulacra were equally important to Law for public outreach. Timmermans seemed to have forgotten that fake carillons had played a crucial role in the Low Countries in saving bells from Nazi requisition. For example, carillon recordings were blared from a belfry in Ath, Belgium to fool the Germans into believing that the various bells hastily gathered into a single tower formed a carillon, which thus held protected status.



Recorded selections – Automatic Tapes
The Netherlands Carillon

Tape I
America
O Give Me the Hills
Eternal Father, Strong to Save
Stop
Jesus Tendst Shepherd, Hear Us
Een Schnpje In De
America the Beautiful
Stop
Hark the Vesper Hymn
De Lilnerplant
Let Us Break Bread Together
Stop
Nur Du
De Kabels Los
Chester

Tape II
I Want to Climb Jacob's Ladder
In Een Blauwgervite
John Peel
Stop
German Peasant's Dance
De Paden Op De Lannin In
Jeanne With the Light Brown Hair
Stop
El Cuando
We Met Walmaar Binten Gaan

(Tape II cont.)
Flow Gently Sweet Afton
Stop
Christ is the World's True Light
God My Father Loving Me
Alouette
Stop

Tape III
The Rio Grande
Father, We Thank Thee For the Night
In the Time of Roses
Stop
I Sing A Song of the Saints of God
Ik Kwam Last Over Een Berg
The Young Voyageur
Stop
Can You Count The Stars
The Gospel's Jesus
Saviour, Like A Shepherd, Lead Us
Stop
From Greenlands Icy Mountains
Robin M'aime
Toen De Hertog Jan
Stop

Tape IV
Muss I Denn

Figure 20. "Recorded selections – Automatic Tapes" (Records of the National Park Service, "Netherlands Carillon-NECA. Interpretation & Information. History: General" folder).

Over the years, Law fiercely protected the Netherlands Carillon against continued hazards. After funding for the 1981 recital series was cancelled, Law went on the warpath and did an interview with Charles Kuralt for CBS News. Two foundations were established to support the carillon, one under the leadership of architect Joost Bok's son. Law continued to make ardent supporters during the two-hour "open tower" recitals, played by himself and others, even enticing visitors with complimentary hot cider to his "Festival of Carols" Christmas concert. His fans

included a couple that lived in a nearby apartment building and "listened to every single recital,"[104] and support came from local ministers, businesses, and Dutch radio and television magazine Televizier/Avrobode. In one of the highlights of his career, Queen Beatrix, Prince Klaus, and their party visited the playing cabin during his recital for them on April 19, 1982.

The Netherlands Carillon reached its present state in 1995, when Prime Minister Wim Kok presented a fiftieth bell to President Bill Clinton at a White House ceremony on February 28 to mark the fiftieth anniversary of the liberation. This token enlargement was part of the larger retuning of the carillon, sponsored by the Stichting Nederlands Carillon Washington D.C. 1956-1995, a foundation led by the Netherlands Chamber of Commerce in the U.S. and supported by Dutch business leaders, the Netherland-America Foundation (which also supports Fulbright scholarships), and the Dutch government. Clinton received the bell as a post-cold war symbol in his acceptance speech. "The Prime Minister comes here at a very important time," he said eagerly, "when we are seeking to work together to meet the challenges of the post-cold war era," amongst which he listed "a more integrated, more secure Europe" that included "a democratic Russia," the "indefinite extension of the Nuclear Nonproliferation Treaty," and expanding trade between their nations. In one sense, the carillon's containment function had been fulfilled, but in another sense, none of Clinton's issues pertained to the anniversary bell. The Dutch proved themselves again uninterested in making geopolitical statements using the carillon. Kok responded, perhaps in an underhanded rebuke, "You said three words about this bell—indeed, this is one of the smallest ones we have. But it's number 50—number 50 in a row. And this symbolizes—with the words 'Freedom' and 'Friendship' on it, it symbolizes how grateful we still are and have remained."[105]

On May 4 (Memorial Day in the Netherlands), Ambassador Adriaan Jacobovits de Szeged led a delegation to Arlington National Cemetery to lay a wreath at the Tomb of the Unknown Soldier (flowers were also laid on graves of Dutch soldiers interred there after World War II); this was televised on AVRO Televizier, which had taken part in the campaign. The next day, the fiftieth *Bevrijdingsdag*, the retuned and expanded fifty-bell carillon was inaugurated with a concert by American Ed Nassor and Dutchman Jacques Maassen, as well as by the American Choir and U.S. Military Band. A day-long "The Bells of Freedom" celebration marked the "close political, economic, social and cultural ties" between the countries and honored American veterans who participated in the liberation,[106] culminating in an eponymous musical by Dutch composer Edwin Schimscheimer performed by a Dutch and American cast at the National Theater.[107]

As for the historical record of this instrument, perhaps because the bellfounders' collaboration proved so disastrous, there is no trace of their records to prove or disprove their efforts to coordinate with each other. All three foundries were required to turn over their company archives on the "Bells for America" project to the government, but an inquiry with the Koninklijk Huisarchief at which a listing showed those materials led nowhere. False rumors abound in the U.S. that the foundries retuned cast-off bells for the diplomatic gift, and the mysterious loss of their

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[104] Frank Law to John Byrne, Superintendent of the Department of the Interior, April 20, 1981, Records of the National Park Service, Congressional Communications, "Netherlands Carillon-NECA Administration. Law, Frank (Director Carillonneur)" folder.

[105] "The Bells of Freedom: U.S. Holland Liberation Celebration," *HollandUSA* 11 (1995), published by the Netherlands Chamber of Commerce in the United States: 1-8.

[106] Ibid, 3.

[107] Edwin Schimscheimer had distinguished himself by that time through three selections in Eurovision and the Dutch award for best film score in 1994.

records affords little reassurance about their contributions. One rumor is correct, however—only the total recasting of the complete set of bells could make this carillon sound like a unified whole "Voice of the Netherlands."

Figure 21. Getting re-involved with its aesthetic carillon sibling, Philips Electronics chimed in on the celebration of transatlantic democracy as a corporate sponsor by replacing the original Philips Lightbulb Factory floodlighting on the tower (*HollandUSA*, vol. 11, 1995, published by The Netherlands Chamber of Commerce in the United States, 16, National Park Service Archive).

The Nevius Tract remains contested real estate. In 1999, a turf war broke out amongst Marine Corps veterans and politicians over the proposal of a stainless steel Air Force Memorial with a star-shaped floor plan to be built between the carillon and Iwo Jima Memorial. Detractors roared that such an incursion onto what the Corps held to be sacred Marine space would occur "over my dead body."[108] (It was built elsewhere.) The Iwo Jima Memorial, the Washington Monument, the Lincoln Memorial… all these monuments and many more stand tall and silent in Washington, D.C. For much of its mottled history, the Netherlands Carillon has teetered on the brink of silence too. And when it *has* sounded, it has rung out a distinctly dissonant transatlantic geographical imaginary.

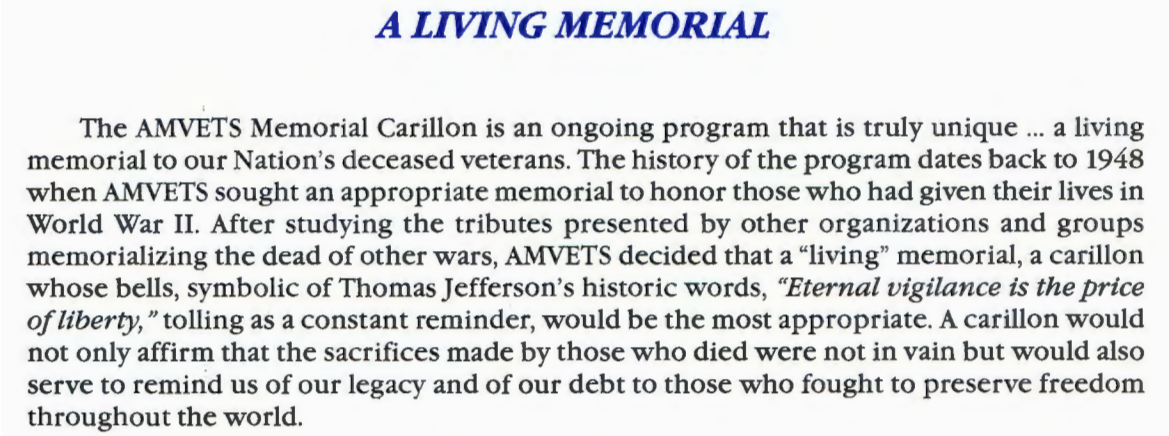
[108] Larry van Dyne, "Over My Dead Body," *The Washington Magazine* (November 1999): 149-51.

Figure 22. The Marine Corps War Memorial and the Netherlands Carillon. Behind the carillon is Arlington National Cemetery. (Photo: Tiffany Ng, 2013)

Although I mentioned at the outset of this chapter that two carillons were presented in North America as Dutch gifts—the other to Victoria, British Columbia—the exchange was not entirely one-way. Very belatedly, the U.S. shipped a "carillon" as a World War II memorial to Margraten, the Netherlands. On this U.S.-administered land near the Dutch-German border, AMVETS proved Dutch stereotypes right regarding the American preoccupation with convenient, affordable electronic carillons by dedicating an electronic carillon in the Netherlands American Cemetery and Memorial on September 12, 1994.[109] During my visit in August 2015, I watched Dutch visitors pause in surprise when the softly tinkling Westminster Quarters marking the hour were followed by several short arrangements such as the hymn "Eternal Father, Strong to Save." After peering up at the tower and seeing no bells, they quickly moved on. This considerably less

[109] According to the AMVETS website, "AMVETS and the The Robert R. McCormick Foundation have installed and dedicated carillons in Europe and North Africa as follows: Normandy American Cemetery, Colleville-sur Mer, France; Epinal American Cemetery, Epinal, France; Manila American Cemetery, Republic of the Philippines; Netherlands American Cemetery, Margraten, The Netherlands; Somme American Cemetery, Bony, France; Meuse-Argonne American Cemetery, Romagne-sous-Montfaucon, France; North Africa American Cemetery, Carthage, Tunisia; Oise-Aisne American Cemetery, Seringes-et-Nesles, France; Cambridge American Cemetery, Cambridge, England; Brookwood American Cemetery, Surrey, England; Aisne-Marne American Cemetery, Belleau, France; Florence American Cemetery, Florence, Italy; Henri-Chapelle American Cemetery, Hombourg, Belgium; Brittany American Cemetery, St. James, France; Lorraine American Cemetery, St. Avold, France; Saint Mihiel American Cemetery, Thiaucourt, France; Ardennes American Cemetery, Neuville-en-Condroz, Belgium; Flanders Field American Cemetery, Waregem, Belgium; Nettuno, Italy and Suresnes American Cemetery, Suresnes, France." (AMVETS, "Carillon Program," accessed June 25, 2015, http://amvetsnsf.org/carillon).

substantial gift showed a lack of understanding of Low Countries carillon culture and its history by unintentionally sneaking the postwar *Amerikaanse gevaar* (American threat) into Dutch borders. The dedicatory performance by Capt. Mark E. Dodds, USAF, was followed by the Mechels Vocal Ensemble and the Band of the United States Air Forces in Europe, as well as a flyby. Americans could hardly have made a less fitting campanological gift to the Dutch to memorialize the fallen of the Second World War, but of course the Dutch participants said nothing.



A LIVING MEMORIAL

The AMVETS Memorial Carillon is an ongoing program that is truly unique ... a living memorial to our Nation's deceased veterans. The history of the program dates back to 1948 when AMVETS sought an appropriate memorial to honor those who had given their lives in World War II. After studying the tributes presented by other organizations and groups memorializing the dead of other wars, AMVETS decided that a "living" memorial, a carillon whose bells, symbolic of Thomas Jefferson's historic words, *"Eternal vigilance is the price of liberty,"* tolling as a constant reminder, would be the most appropriate. A carillon would not only affirm that the sacrifices made by those who died were not in vain but would also serve to remind us of our legacy and of our debt to those who fought to preserve freedom throughout the world.

Figure 23. Excerpt from the program booklet of the inauguration of the AMVETS carillon at the Netherlands American Cemetery in Margraten, the Netherlands (September 14, 1994).

A Modern Musical Antidote

The reception of the Philips Carillon changed dramatically between 1966 and the end of the cold war, and the decades after World War II in America can also be characterized by their changing soundscape as recorded in the meanings that listeners perceived in bells. In a *New York Times* editorial on March 10, 1960, a nameless writer—probably contracted by Schulmerich—explained that the announcement of plans for an AMVETS Pearl Harbor carillon

> adds another note to our growing awareness of the sounds of civilization…We hear the disappearance of familiar noises and the appearance of strange, new ones. We read regularly about the pros and cons of efforts to utilize the sound waves to soothe office workers, of the effect of music to calm jittery dental patients, of the neuroses that can be traced directly to the increasing clangor that permeates everyday living. Then there are the "sounds and sweet airs that give delight, and hurt not," which have become an increasingly important part of the sound stage we know as Earth. We learn of this in the great increases in the numbers of concertgoers and operagoers, of those playing musical instruments, of hi-fi and stereo addicts. And now the news about the set of bells to be installed at Pearl Harbor on next Memorial Day is a reminder that the carillon, giving forth sounds that we associate with *yesterday*, is making an appearance in many buildings devoted to many varied pursuits of *today* [italics added]….
>
> Perhaps in our modern day and age the electronic carillon may become an antidote to the nerve-racking [sic] sounds of traffic, the blasts of jet flights, the swoosh of rockets, the clatter of construction, the blaring of radio and television sets and the general hubbub and din of our daily activities. And perhaps, as the voice of the bells is heard throughout the land, tensions will ease, jumpy nerves will be soothed and serenity replace neurosis as the national characteristic.

With the delivery of the Netherlands Carillon, the Dutch had reached America with an Old-World soundscape of "yesterday" for which it was finally ready "today," but it was already too late. The postwar bronze shortage had ensured that Americans were already enamored with an electronic soundscape of bells no longer meant to memorialize the dead, as after the Great War, but to serve Americans as a modern medical cure for the noise of booming postwar society. Thanks to Bigelow's help, Schulmerich even released an Arlington® model of carillonic bells, spreading the Dutch gift of gratitude across America in a medium that Verheul and the *Nederlandse volk* would never have anticipated.

Figure 24. Dutch bellfoundry Petit & Fritsen markets Gothic carillons to the New World (Kortenhorst Papers).

Conclusion: The Altitude of Dystopia

As the U.S. and the Netherlands constructed the carillon as a utopian musical embodiment of democracy, the American mass media began replaying early modern anxieties about belfries as vertiginous realms of violence and the supernatural. The reinvention of the carillon as a technology of Allied diplomacy and urban planning inadvertently revived its other primary association: death. As the carillon failed to embody Dutch-American friendship in Washington and to create a lasting postwar city center on the outskirts of Eindhoven, the threat of violence in the belfry dominated depictions of the carillon in popular culture.

Every utopia suggests its dystopia. Utopian discourses of community unity and ownership have driven carillon and organ construction in America since the early twentieth century, but the yet older trope of bells and organs as instruments of fear and death resurfaced in American popular culture as a counterpoint. Although musicological discussions of concerts and public life usually center on concert halls, twentieth-century urban and suburban soundscapes served as broader territories for the use of music to serve the public good. Thus, this concluding rumination focuses on the carillon, even though the indoor organ had its own frightful symbols, from the 1925 silent film *The Phantom of the Opera* to the 1970 animated *Josie and the Pussycats* episode "The Nemo's a No-No Affair," in which a villainous descendent of Jules Verne's fictional Captain Nemo nefariously controls his submarine and weapons from a pipe organ. (The association of organ playing with villains arises, perhaps, from the instrument's association with powerful institutions such as the church.)

As we have seen, America proved fertile ground for the continuation of the *Orgelbewegung*. In the New World, the promise of historical, Old World authenticity seemed all the more attractive for its power to legitimate and historicize the indoor spaces and liturgical traditions of churches. Bells, redolent of devout, church-centered European towns, performed a similar function for public soundscapes. The early American carillon's power to evoke an imagined pan-European heritage allowed listeners to imagine themselves members of a utopian community with a shared musical memory stored in its architecture, even if they had never visited Europe.

The carillon grew in popularity in America though its idealization of European community building. Albany politician William Gorham Rice sparked the carillon boom by publishing books with evocatively romantic titles like *Carillon Music and Singing Towers of the Old World and the New* (1930), and by promoting carillons as musical romantic ruins in popular media such as *National Geographic Magazine*. One of his first projects, the carillon of Albany City Hall (1927) in New York, drew 50,000 listeners to its inauguration. So many people attended the first concert series that traffic patterns had to be changed on recital days. Carillonneurs from the Low Countries were recruited to play new American instruments, and their European repertoire dominated American soundscapes well past midcentury. Furthermore, the desire of institutions to suggest a European lineage may be read in their architecture; carillon towers are often explicitly modeled after European belfries, especially in countries with no prior carillon tradition. In other words, Rice's writings reveal the kind of sonic cultural capital the carillon represented for American cities. Carillons brought a pan-European symbol of culture and history into domestic localities for effortless touristic consumption. Their portrayal of the bell tower as a one-stop-shopping cultural artifact entailing minimum travel

and maximal return is one of the reasons why Americans turned out in the thousands for concerts by European carillonneurs.

It was actually the function of carillon towers as highly audible, visible memorials for wealthy benefactors and their families that primarily drove their construction in an American society that long ago ceased to require their time-telling function. Yet the carillon's role of memorializing those in power remained hidden behind music and discourse. The imagined universal European heritage of campanological soundscapes strengthened and was strengthened by a utopian discourse describing bells as the voice of the people, music for the people, an instrument for community good and edification, and an egalitarian memorial to the people. Such utopias equating community identity with community vocality appear in books about bells, statements by carillon donors and host institutions, and newspaper and op-ed articles.

But bells have always carried murkier associations. Before modern warfare, bronze circulated materially and economically through the deafening forms of bell and cannon. From the angelus to the tax bell to artillery, they regulated time and bodies, whether those bodies were willing or not. Sixteenth-century scholar and military engineer Girolamo Maggi wrote two treatises while imprisoned in Constantinople for defending Famagusta against the Ottoman Turks, *De Tintinnabulis* on bells and *De Equuleo* on torture devices (Figure 1). His efforts to dedicate the treatises to potential liberators got him killed by his captors, and the books were published posthumously in 1608 and 1609, sometimes bound together as in the 1689 Amsterdam printing.

Figure 1. Illustration by Franciscus Sweertius of bells being used in torture from Girolamo Maggi's *De Tintinnabulis Liber Postumus* (Hanoviae, 1608).

Even as the Romantics rhapsodized about the nostalgic sound of bells, they also taught their audiences to fear bells and those who played them, like Victor Hugo's grossly deformed Hunchback of Notre-Dame. Two novels by Symbolist Georges Rodenbach and an opera by Erich Wolfgang Korngold cast bells as tormentors with the powerful sonic agency to drive victims to insanity and murder in *Bruges-la-Morte* (1892), *Le Carillonneur* (1897), and *Die Tote Stadt* (1920), respectively. The trend continued with Richard Thorpe's 1933 B movie *Murder on the Campus*, which begins with detectives inspecting the carillon keyboard where a carillon-playing collegiate football player was killed.[1]

[1] The carillon tower is a thinly disguised representation of the Campanile at UC Berkeley, but the campus remained unnamed in the movie as it did in the novel upon which it was based, *The Campanile Murders* (1933) by Whitman Chambers.

[2] In an early instance of carillon symbolism, Vonnegut's *Player Piano* (1952) employs the eponymous musical

Later Classical Hollywood films including Henry Hathaway's *Niagara* (1953) and Alfred Hitchcock's *Vertigo* (1958) confirmed death in the belfry as a pop culture trope, as glamorous female leads met their tragic demises in belfries. The seemingly unlikely return during the cold war of the carillon as Maggi's instrument of torture suggests that cultural producers were fascinated by ancient associations lurking in the shadows of the Allied rhetoric of bells and peace. *Niagara* dismantled this campanological utopia by first casting the Rainbow Tower Carillon at Niagara Falls as a romantic and healing influence on Marilyn Monroe's character Rose, then reversing its symbolism to that of the death knell, and finally revealing the keyboard as Rose's literal dead end. Paralleling the revelation of her outwardly blissful but doomed marriage, the carillon's role as deadly prison is concealed by classical Hollywood soundtrack tropes of romantic bell music until the violent dénouement.

Figure 2. In *Niagara* (1953), Rose Loomis (Marilyn Monroe) is pursued up to the Rainbow Tower carillon keyboard by her husband George (Joseph Cotton). (Twentieth Century Fox)

The belfry also became a Hollywood favorite for noisy showdowns between male heroes and their antagonists, as in *Silver Lode* (1954) and *Last Embrace* (1979), whose climax was filmed at the Princeton University carillon, where bells ring along with Miklós Rózsa's score. ABC's police drama series *Naked City* provided a televisual counterpart in its 1958 episode "The Other Face of Goodness," and Buffy the Vampire Slayer alleviated the gender imbalance in her belfry showdown with voice-stealing monsters in "Hush," broadcast in 1999. Recently, Martin McDonagh's 2008 dark comedy *In Bruges* caricatured the Romantic ruins image of Belgium's most-visited town as a sinister veneer hiding a crime-ridden underworld ("Shoot first. Sightsee later," went the publicity slogan). Beyond fiction, the national trauma of the 1966 murder of fourteen people by sniper Charles Whitman shooting from the bell tower of the University of Texas, Austin demonstrates what happens when the solitude of the belfry and its paradoxical sonic and visual access to the entire community combines with real-life insanity. Even today, UT carillonneurs must sign out tower keys from the campus police to play their daily recitals, a constant reminder of how dangerous the carillon tower can be.

A similar dystopian trend may be found in twentieth-century literature, where carillon music heralds everything from the end of the world to postapocalyptic closed societies to an internationally outsourced military-industrial-academic-prison complex, not to mention the usual murder mystery climaxes like Dorothy L. Sayers' *The Nine Tailors* (1934), Hodges Soileau's *The Haunted Clock Tower Mystery* (The Boxcar Children #84) (2001), Rupert Holmes' *Swing: A Mystery* (2006), Pamela

Thomas-Graham's *Blue Blood* (1999), Steven L. Carter's *New England White* (2007), and Richard North Patterson's *The Spire* (2009). The latter three mystery novels, which visit the carillons of Yale and UC Berkeley, use the instrument to symbolize the evil that institutional authority can foster. But the authors with the broadest cultural significance to depict carillons are Harry Mulisch, Neal Stephenson, and Kurt Vonnegut.[2] Mulisch's classic *Het Zwarte Licht* (1956) rings in the apocalypse with the most breathtakingly beautiful carillon concert ever performed. In Stephenson's bestselling speculative fiction novel *Anathem* (2008), monumental carillons beat at the musical heart of an academia that literally sequestered itself into ivory tower compounds (*concents*) after a global apocalyptic event centuries past. While blue-collar workers lead impoverished lives in the noisy and dangerous *extramuros,* these complex automatic carillons enrich the walled-in sonic environs of academics only, symbolizing the intellectual community's self-imposed isolation within a narrative that obliquely critiques the postwar retreat of universities into research unconcerned with public accessibility and popular relevance. As in those campus mystery novels, Stephenson's carillons symbolize institutional hegemony and the danger of locking knowledge behind closed doors. The early twentieth-century question of "What shall the carillon play?" has become "Who cares if you listen to our carillon?"[3] (Not that everyone has a choice.)

Whitman's long shadow connects UT Austin to the present-day closure of the Rainbow Tower Carillon (site of Rose's murder in *Niagara*) for fear of tower terrorism at the Canadian border checkpoint and further to Vonnegut's first novel completed after the close of the cold war.[4] In *Hocus Pocus* (1990), carillonneur Eugene Debs Hartke unwillingly finds himself at the heart of a military-industrial-academic-prison complex in a dystopian 2001 and aids a school-principal-turned-tower-sniper battling a mass jailbreak.[5] Although Hartke had taken refuge in playing the carillon while working as an ivory tower professor, he ultimately cannot escape the truth that this artistic pursuit is inextricable from the asymmetrical power relations that sustain class conflict, prejudice, and the myth of upward mobility that upholds the American dream.[6] In the twenty-first century, as awareness increases that the carillon is not inherently a universal symbol of democracy, has this most public of instruments become synonymous with intellectual elitism and the secrecy of the military-industrial-academic-prison complex?

Through literature and screen media, popular culture amplified dystopian constructions of the carillon at a time when the instrument was being put to new, misleadingly optimistic purposes. The specter of death linked both constructions: the *exterior* of carillon towers were an opulent commodity form in an economy of death and memorialization envoiced by bell music, and the *interior* of belfries were imaginary spaces of the supernatural, irrationality, and death, all concepts invoked by the New World's touristic and nostalgic association of carillons with the Old World.

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[2] In an early instance of carillon symbolism, Vonnegut's *Player Piano* (1952) employs the eponymous musical automaton, which sounds like "cracked carillons," as a musical metaphor to lampoon the automation and socioeconomic reification of American society. Kurt Vonnegut, *Player Piano* (New York: Avon, 1972), 37.

[3] Jef Denyn, *Wat zal de Beiaard spelen?*, (Mechelen, Belgium: L. Godenne), 1922; Milton Babbitt, "Who Cares if You Listen?" *High Fidelity* 8, no. 2 (February 1958): 38-40.

[4] Perhaps the Niagara Falls Bridge Commission officials have been reading too many bell tower murder mysteries.

[5] Vonnegut's antihero shares part of his name with the famed Socialist Eugene V. Debs (1855-1926). The school and carillon were based on Cornell University.

[6] Vonnegut thematizes the impossibility of upward mobility most clearly with the fictional deterministic computer program GRIOT, which can accurately predict a person's life story from four inputs: age, race, education, and drug abuse.

In my final example, Stephenson's other novel featuring bells, *The Diamond Age* (1995), opens and closes with the distant sound of a carillon. In this cyberpunk classic, an American inventor is hired by a wealthy father to remediate the European fairytale book archetype into a sophisticated interactive narrative game meant to shape his young daughter into a lady. However, the game is pirated in China and used to raise an unstoppable army of Chinese orphan girls, taught to think for and defend themselves yet also inculcated in Chinese ideals of collective good. The carillon's first appearance marks the twilight of the West, and its second, the rise of China to global dominance. Having written this dissertation, I no longer find the novel's sonic framework coincidental. By the time the carillon was introduced to America in the early twentieth century, its primary purpose of telling time was anachronistic. Yet nearly two hundred were constructed over the course of the century because carillons and amplified bell simulacra remediated a mythical European soundscape into the sound of American modernity. Thus the carillon helped the New World symbolically encompass and surpass the soundscape of the Old. Today, China's construction on a massive scale of concert halls with large pipe organs, and the potential construction of the country's first carillon, suggest that it is using architectural-scale Western cultural capital in its ongoing efforts to surpass the West.

If the carillon gained popularity in America as a sonic and visual symbol of nostalgia for an imaginary universal Old World heritage (already an institutionalized form of symbolic omission for listeners of non-European heritage), the obverse of this Old World coin is fear of outcasts, of vertigo, of noise, of bells as voices of the dead—in other words, terror of the premodern evoked by bells. To the present day, the carillon remains a vertiginous realm of dystopia as much as it stands as a positive centerpiece of public life. I hope to enrich and critique the histories of the carillon and organ through future examination of their fictional representations.

Figure 3. A 1995 issue of *The American Organist* reprinted a 1915 tidbit from *The Diapason* (August 1915, p. 2), which reported that Dr. Susan A. Price read a paper on July 12, 1915 for the annual meeting of "alienists and neurologists" in Chicago. "Insanity prevails among the church organists," she told them. "I do not know what the cause is, but figures show that in nearly all institutions for the insane many patients are organists." (*The American Organist*, July 1995, p. 128)