

Preserving Hardware History: Archiving the Studios at Columbia University

by *Seth Cluett*

Otto Luening and Vladimir Ussachevsky began their first academic experiments with studio electronic music in the United States in the early 1950s at Barnard College and Columbia University. Since that time, at what is now known as the Computer Music Center at Columbia University, storage closets and boxes filled with paper files, media artifacts, and numerous pieces of custom electronic equipment have accumulated, which are now in need of preservation and safekeeping. Interlinking histories of people, facilities, and technologies present complex challenges for conventional archival approaches, collection management, and storage. While personal papers of personnel, studio documentation, and audiovisual media fall within established practices for archival collections in the arts and music, the technological holdings—hardware devices unique to each studio—raise a complicated set of questions: What criteria do we use to determine what is kept? Is it important that the devices be in work-

ing condition? Should this equipment be refurbished, maintained, or preserved? The RCA Mark II synthesizer, which has been well-documented in the historical literature on electronic music, was just one technology among many participating in a 70-year history of engagement with electronic music at Columbia. By understanding the development and use of hardware assets, custom tools, and bespoke electronic devices, we hope to raise awareness and provide critical evidence for researchers and composers to understand the creative process and technological affordances associated with historical studio practices.

The first formal facility dedicated to sound experimentation on Columbia University's 116th-Street campus in the late 1940s was known as the Columbia Experimental Music Studio; with the acquisition of an Ampex 400 tape recorder in 1951 (Monroe, Mary 1996), it became the Columbia Tape Music Studio. After moving to 125th Street in the late 1950s, the facility grew substantially with the acquisition of the RCA Mark II and the founding of the Columbia-Princeton Electronic Music Center (CPEMC) in 1959 (Gluck 2007). When the collaboration with

Princeton ended in the late 1980s, it became the Electronic Music Center (EMC). In 1996, occupying the same footprint, the facility was renamed the Columbia University Computer Music Center (CMC). Because of the long history, changing locations, and expanding academic and cultural impact of multiple generations of electronic and experimental music facilities at Columbia, archival efforts have focused on saving at-risk paper records and audio and moving image media.

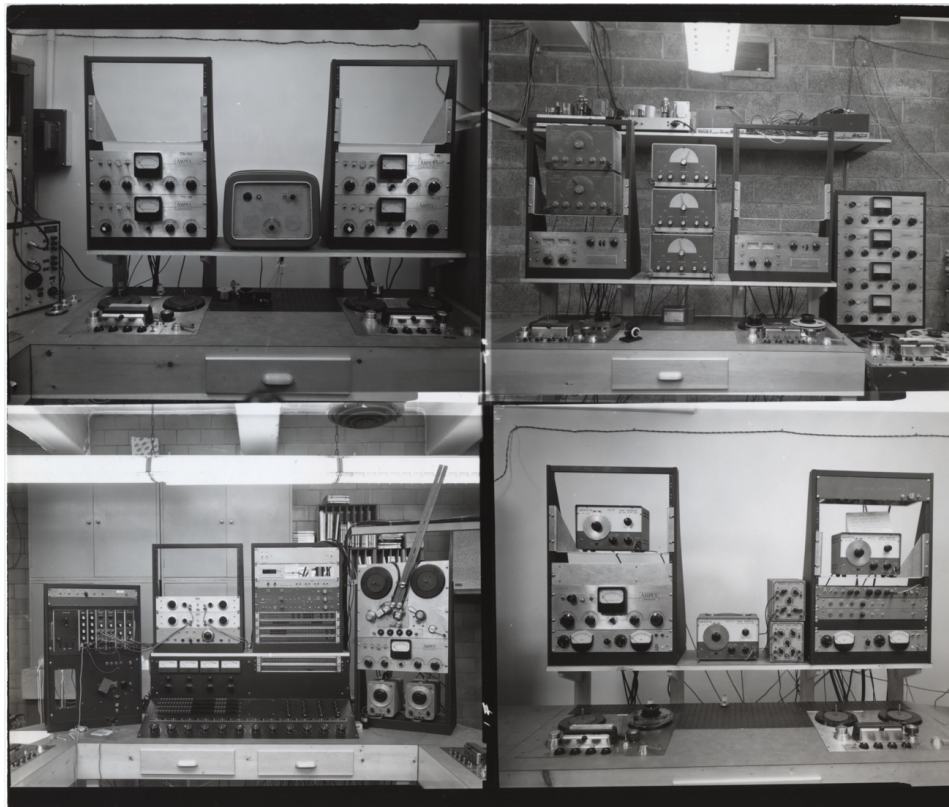
Until recently, the hardware history and documentation surrounding the technical infrastructure have remained largely unaddressed. In the past 10 years, significant work to consolidate archival materials related to the CMC's history have been made through the efforts of Brad Garton, Director, and Terry Pender, former Associate Director, of the CMC. We have worked closely with Elizabeth Davis and Nick Patterson from the Music & Arts Library at Columbia to assess holdings and safely store and transport materials to the Rare Books and Manuscripts Library (RBML) at Columbia's main Butler Library (Patterson 2011). The focus has been to centralize decades of historical materials from each of these facilities,

including photographs, paper-based materials, and recorded media. While individual composer archives remain spread out between the New York Public Library for the Performing Arts (NYPL), the Library of Congress (LoC), and other repositories, archival collections related to the CMC facility are now housed at Columbia's RBML, whose music holdings are separate from the main Music Library.

While there are numerous commercial releases of work created at Columbia, these documents represent only a fraction of the work produced in the studios. Very little of the rich early audio history of the studios has been easily accessible, until, in May of 2018, the Columbia University Library was awarded a major Grammy Foundation grant to digitize approximately 400 hours of recorded electro-acoustic work curated from 1000 of the roughly 5500 reel-to-reel tapes in the studio archival holdings (Lovell, Abigail 2020). In July 2020, these recordings were made publicly available in the University's online catalog and published to the Library's Digital Libraries Collection. The recordings reveal hours of pathbreaking experimentation with technology, documenting

the creative process and practice of hardware exploration in the studio. In addition to these audio holdings, 312 linear feet of paper documents, ranging from equipment receipts, budget

ledgers, correspondence, manuals, and photographs, remain to be processed. With the highest-risk materials safely cared for, the CMC is now working towards gaining intellectual con-



Equipment racks, oscillators, custom tape machines, Room 324 Prentis Hall, Columbia-Princeton Electronic Music Center (c. 1960). Photographer: Unknown.

trol of the remaining technological holdings in storage in our facility.

In January 2018, I curated *Sounding Circuits: Audible Histories* at the New York Public Library for the Performing Arts at Lincoln Center (Cluett 2018). This exhibition explored the networks of composers and engineers—as well as the groundbreaking facilities and revolutionary technologies—that played a crucial role in the expansion of electronic sound from the 1950s to the present. Drawing together primary source materials, including personal correspondence, historical recordings, technical documentation, and musical sketches and scores from across the New York Public Library for the Performing Arts’ rich archival collections, this exhibition highlighted the significant contributions of pioneering composers like Otto Luening, Pauline Oliveros, Edgar Varèse, and Charles Dodge to the then newly-developing practices of electronic and computer music during the last century. These materials were placed in dialog with electronic sound processing equipment, oscillators, an early mixing console, a full-scale photographic reproduction of the Columbia-Princeton Electronic Music Center’s

RCA Mark II Synthesizer, drawn from the archives at Nokia Bell Labs and the CMC.

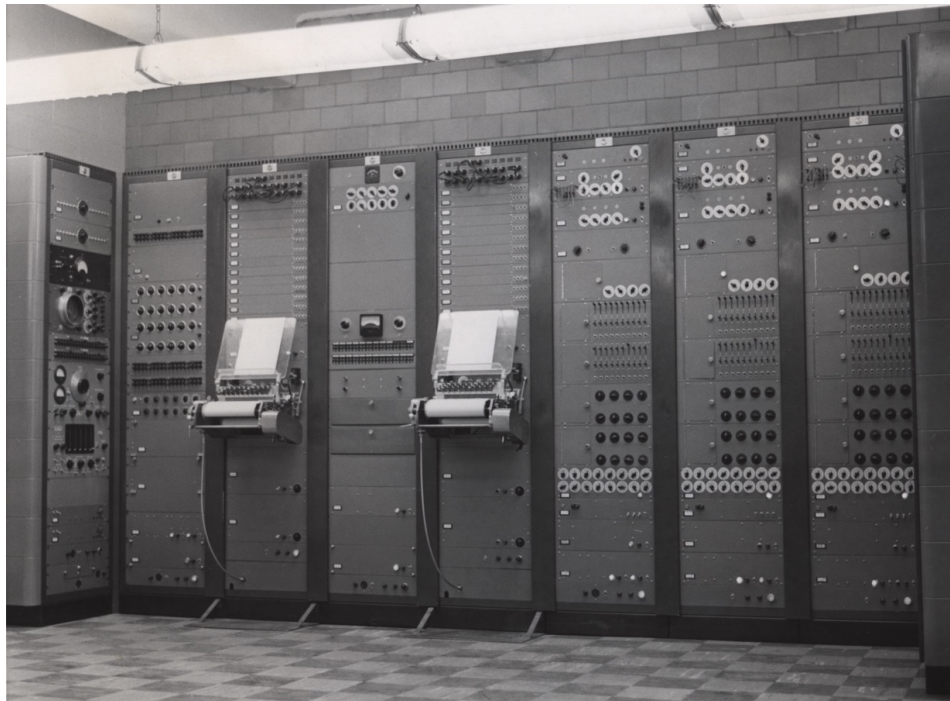
The wonder, curiosity, and passionate engagement of exhibition attendees encountering early sound experimentation technologies for the first time revealed the urgency of archiving, maintaining, and in some cases, renovating the extant historical equipment stored at the CMC. We have begun the process of stabilizing physical storage, creating an inventory, and assessing the operational viability of technologies ranging from custom mixers made in the early 1950s to one-of-a-kind and rare equalizers and delays from the 1960s and synthesizers and sound processing units from the 1970-1990s. While some devices have been in continuous operation and maintained since they were initially installed, many had been placed into long-term storage as each new incarnation of the facility adopted current, innovative technologies and expanded its resources for creative applications. The CMC is now cataloging, cleaning, and testing stored equipment with the long-term goal of creating technologies to integrate historical pieces into contemporary studio spaces for creative use and

scholarly study.

Many are not aware that the RCA Mark II Synthesizer is still installed at the CMC today. First assembled in Prentis Hall at the founding of the CPEMC in 1959 and in continuous use through the 1960s and 70s, the Mark II has been the subject of hundreds of pages of scholarly writing on electronic music. The Mark II was operational until 2015, when an electrical malfunction caused staff to discontinue its use. Last year, after more than 60 years in Prentis Hall, CMC staff received notice from Columbia University that we need to begin planning for the possibility of relocating the facility. While I am confident that the important work we are doing to gain intellectual control over the hardware history of the Center is valuable and indispensable, this plan would necessitate moving the Mark II - a process which will require additional careful planning, archival research into the operation and design of the technology, and scholarly engagement from electrical engineers, historians, and composers alike.

To that end, we have begun to identify useful materials about the Mark II from the CPEMC archives at

Columbia's RBML, including circuit schematics, photographs of modules taken before Columbia received shipment, as well as electronics textbooks and manuals from the time of its design and construction. We have started the process of reaching out to historically-important synthesizer designers, electrical engineers invested in the history of circuit design, former technical directors for the Center, and decades of graduate students who have completed research on the Mark II and its users. Peter Mauzey, who installed the Mark II in 1959 and was both a longstanding staff member of the CMC and on the faculty of Columbia's electrical engineering department, has agreed to participate in an oral history interview and engage our team in a dialog about the original installation, in hopes that his extensive experience might guide its renovation, disassembly, and reassembly. We plan to make all of these materials publicly available so that scholars, students, and practitioners can engage actively with the renovation process. By sharing schematics, images, design documents, and manuals, alongside conversations, annotations, and collaborative brainstorming, we aim



RCA Mark II Synthesizer, Room 317 Prentis Hall, Columbia-Princeton Electronic Music Center (1959). Photographer: Unknown.

to leverage the archival holdings of the Center as a catalyst for stimulating future engagement with the discipline. We hope that this process can serve as a model for linking the technological history of electronic and computer music with the paper,

audio, and moving image holdings so robustly represented in archival holdings for studios worldwide, to better understand the role played by material conditions on the formation of individual creative work and communities of practice.

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The Electro-Acoustic Music Mine Project (EAMM). Collecting, Archiving, Sharing, and Exploring *by Tae Hong Park*

Introduction

Electro-acoustic music (EAM) is a technology-driven genre of art music that began to develop during the 1950s. With the advent of the computer, the field of EAM has since grown significantly. EAM has established itself, in avant-garde and academic communities, as a significant field of artistic creativity, research, and intellectual inquiry that includes composers, performers, scholars, researchers, engineers, scientists, and music practitioners. Due to the very nature of this work – including its heavy reliance on new technologies, multi-format audio files, idiosyncratic scores, computer code, and schematics that describe complex performance setups – an appropriate and reliable method of preservation is needed. For EAM, there are currently no such preservation systems that can effectively preserve the musical works and the software systems, models, and knowledge that engendered those works. Although many of such works are presented, performed, and temporarily stored