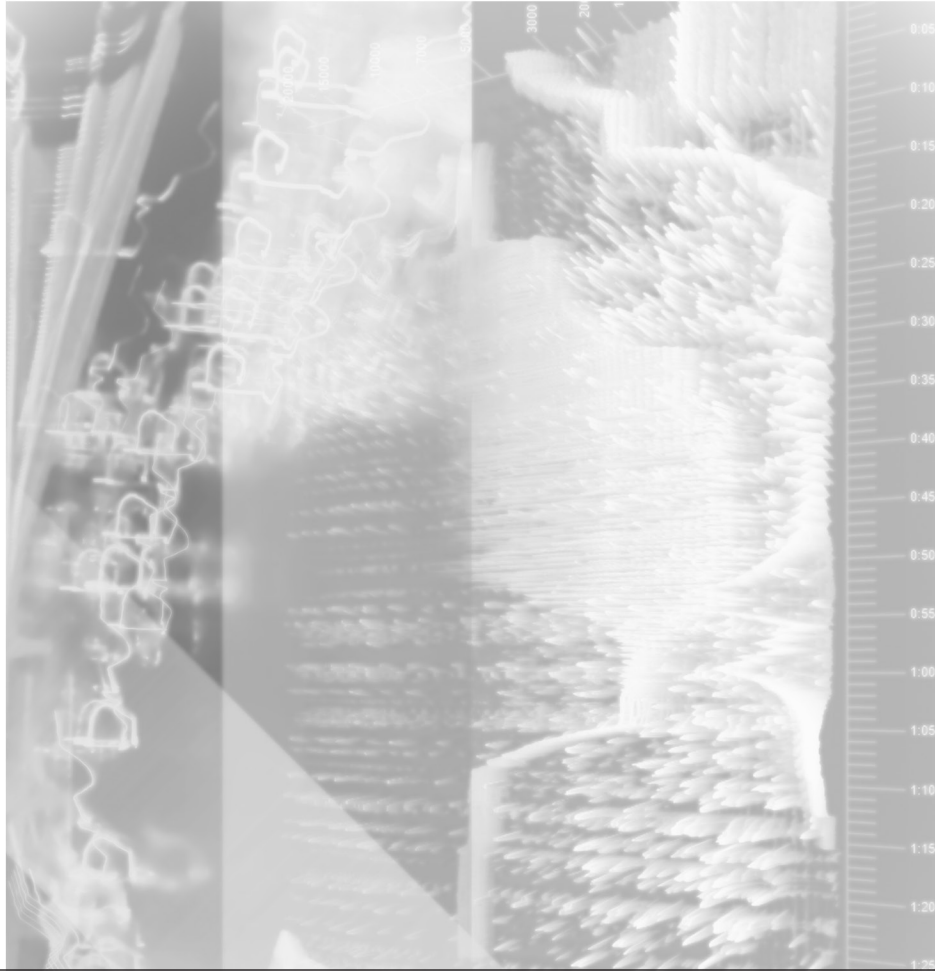


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## **Copying and Selling the Future's Past: Buchla/Arp Replicas and Intangible Sonic Practice**

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# COPYING AND SELLING THE FUTURE'S PAST: BUCHLA/ARP REPLICAS AND INTANGIBLE SONIC PRACTICE

## KEYWORDS

Electronic musical instruments; Preservation; Replication; Authenticity; Heritage studies; Intangible cultural heritage; Synthesizers; Buchla 100; ARP 2500

## ABSTRACT

This study investigates the role of replicas in the preservation and transmission of historically significant electronic musical instruments, focusing specifically on a DIY reconstruction of the Buchla 100 system and a mass-produced Eurorack reinterpretation of the ARP 2500 developed by Behringer. The inquiry is informed by fieldwork at the Willem Twee Studios in 's-Hertogenbosch, an institution notable for its commitment to maintaining rare synthesizers in an operational state and making them accessible to performers and the public. This approach foregrounds the tension between museological imperatives of conservation and the cultural value derived from continued sonic and performative engagement.

Replicas are here conceptualized as a form of *second-order preservation*, wherein the continuity of technical practice, sound production, and performance traditions is privileged over strict adherence to material authenticity. The LA67 Buchla 100 reconstruction exemplifies a fidelity-driven model of replication, seeking to reproduce the design and circuitry of the original 1960s system with minimal deviation. By contrast, Behringer's ARP 2500 modules embody a corporate, consumer accessibility-oriented approach, reconfiguring the instrument within the standardized Eurorack format while sacrificing systemic and historical specificity. These contrasting strategies raise critical questions regarding authenticity, authority, and the extent to which replication practices democratize or dilute historical experience.

Drawing upon scholarship in musicology, heritage studies, and the study of technology, this paper argues that replicas function simultaneously as material artifacts and as conduits for intangible heritage. Beyond preserving circuitry or physical design, they sustain traditions of practice, performance, and aesthetic engagement that would otherwise be rendered inaccessible. While replicas cannot fully reproduce the historical aura of original instruments, they operate as vital agents in maintaining cultural lineages of electronic sound synthesis, ensuring continuity between past innovations and present communities of musicians, scholars, and practitioners.

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## Introduction

In April of 2024 I had the opportunity to visit the Willem Twee Studio in the town of Hertogenbosch, 92 km south of Amsterdam. The Studio is unique in that it contains a literal treasure trove of vintage and rare electronic musical instruments, such as keyboard and modular synthesizers. The studio has one of the few fully working Arp 2500 synthesizers in existence and a dazzling studio for “test equipment” which was the basis for most electronic music in the 1950s and early 60s before the advent and adoption of voltage control synthesizers. What is particularly remarkable about the studio is that these expensive and, in some cases, irreplaceable instruments are not kept behind glass or hovered over by nervous technicians and archivists. Instead, they are made available as resources to be used by essentially anyone willing to make the trip down to Hertogenbosch, whether they be working musicians, curious academics or the public. The space itself has an air of functionality, meaning it is a space busy with people doing things with the masses of equipment tucked into almost every corner. Instruments that end up in the Willem Twee Studio do not go there to die or to be preserved in a museal limbo. Instead, they go there to continue their life as literal instruments for human expression and creativity.

My experience at the Twee studio brought to the forefront many issues and questions around the preservation of historical musical instruments, notably in terms of the ongoing tension between the rigours of preservation and cultural viability. Musical instruments have a unique cross temporal longevity in terms of their ability to maintain cultural and technical relevance across generations. A guitar or violin is as relevant today as they were in the 16th century and have been adapted, both materially and in terms of playing techniques, throughout history to remain current. The same cannot be said for many other historical artefacts that populate various museums around the world – from ancient weapons to steam powered locomotives. Musical instruments are also invested with deep and continuous layers of individual and social meaning and “are part of human history in depth that is equalled by few other types of objects” (Rognoni 2019, 403). As such, musical instruments have meaning primarily through their active use as opposed to their being static referential markers or indicators of past human practices and cultures. Indeed, during my visit, the comment was made that some of the instruments were “rescued” from state-run museums where they languished, albeit under ideal conditions, in museum basements and storage facilities.

In the context of museum preservation “sound is often the primary quality of an instrument in the outside world, but very rarely the reason for its acquisition in a museum” (Rognoni 2019, 407) given the preference, at least conventionally, for static displays of objects singled out for their historical and cultural importance. Arguably, this emphasis on ‘sound’ is what guides the approach taken by the Twee studio, if ‘sound’ is to be considered as part of the larger assemblage of musical instruments being used for creative purposes by independent actants. My aim, however, is to take things one

step further by asking the question of whether contemporary commercial replications of historically important electronic instruments can be considered as a viable means for preservation – notably preservation as realized through active and continued use of a musical/technical tradition, approach and skill/performance set and sound. One could consider this a type of ‘second order preservation’ that is willing to compromise authenticity for the sake of maintaining a continuity between past and present forms and practices of musical synthesis.

Accordingly, this study revolves around two types of replications, the first being a DIY project where, over the course of a few months, I built a replica of a Buchla 100 system, sometimes referred to as “Mort’s Barge” after the pioneering electronic music composer Morton Subotnick who used the system for his groundbreaking compositions.<sup>1</sup> The second engagement is with a mass produced replica of the very rare Arp 2500 modular synthesizer, originally sold by Arp in 1970 and today rendered as a Eurorack version by Behringer, a large corporation that manufactures a variety of musical instruments and studio equipment, including a growing inventory of vintage synthesizer replicas. The reason for selecting these two instruments stems first from their historical importance in terms of their contribution to the development of musical synthesis and secondly to them being essentially unobtainable due to their rarity. The two instruments also represent two poles of the replica spectrum. On the one hand there is the dedicated DIY community that maintains the legacy of the Buchla 100 through activities ranging from sharing knowledge to reproducing versions of the original system. On the other there is a large corporation that harnesses the powers of mass production to make highly affordable replicas of vintage electronic instruments. In either case, it could be argued that both instances preserve the sound of these instruments in the context of active use by a broad range of musicians that potentially serves as a “legitimate and fulfilling alternative to the use of the originals” (Rognoni 2019, 411). That said, things tend to get murky whether on the DIY level or in corporate boardrooms, where remaining ‘true’ to the original designs and maintaining historical accuracy are tempered by the pressures associated with quick solutions, a lack of resources/knowledge, personal agendas and short-term profits. As such there is the very real risk of the replicas becoming mere approximations of the originals and catering more to a type of techno nostalgia and the consumer-driven urge to own something that has the simulated aura of a rarified object. Issues around authenticity and historical accuracy are further complicated by the DIY/commercial divide, represented here by the Buchla 100 project and the Arp 2500 from Behringer. In the former case, the relatively small group of Buchla enthusiasts who engage in the building of their own systems to supplement those still produced by the Buchla company are actively concerned with historical accuracy and see their DIY activity as a means to responsibly engage with and maintain

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<sup>1</sup> For a general overview of Subotnick’s music and approach to synthesis, see Morton Subotnick. (2011, April). Morton Subotnick on the creation and legacy of Silver Apples of the Moon. ASCAP. Retrieved August 20, 2025, from <https://www.ascap.com/news-events/articles/2011/04/p-Morton-Subotnick-on-the-Creation-and-Legacy-of-Silver-Apples-of-the-Moon>.

the legacy of the early Buchla systems.<sup>2</sup> In the latter, Behringer is often criticized by the broader synthesizer and electronic music community for their perceived predatory actions in terms of churning out cheap versions of classic synthesizers (*Future Music*, 2020). However, such critiques are counterbalanced by an equally vocal group who see Behringer as a kind of democratic champion committed to making synthesizers 'for the people,' as opposed to just well-healed collectors or those with sufficient skills and time to build their own replicas.<sup>3</sup> While these issues will be further unpacked and explored below, it is worth noting at the outset how this tension between authenticity and access lies at the root of many discussions around how best to preserve historically important electronic instruments.

## Preservation and Replication

The preservation of historical musical instruments, whether acoustic or electronic, raises complex and compelling questions regarding the interplay between musical conservation, curatorial ethics, historical authenticity, musical functionality and cultural value. In the context of institutions, such as museums and archives, matters are made even more difficult because of the competing tensions between active use and protective preservations – should historical instruments be made available to be played and risk deterioration or be safely kept behind protective barriers? Added into the mix here are replicas, which are also fraught with a range of debates, notably those concerned with authenticity.

Many historical instruments are fragile pieces, whether made of organic materials such as wood, gut, hide, ivory or the inorganic insides of capacitors, transistors and resistors. In both cases, time and use take their toll, breaking down the integrity of these materials which in turn compromise the specific acoustic abilities and nuances of these instruments. Preservation strategies tend to prioritize stabilization, avoiding interventions that might render the instrument playable but compromise its historical authenticity (Bell 2007). Common preservation strategies include techniques such as the creation and maintenance of stable environments, restricted access and the use of inert display environments that minimize any inter-material reactions. While beneficial to keeping precious artefacts preserved, they also run the risk of silencing them by stripping the instruments' primary function and identity as a sonic object, notably in terms of artistic and creative use (Smith 2007). The rarer or more unique the instrument, the greater the tension between preservation and active use, which leads to the difficult task faced by curators of having to balance educational, access and outreach goals with the

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<sup>2</sup> There are many threads in the Modwiggler forum, which is mainly dedicated to modular synthesis in its myriad forms. See for example this thread where authenticity and clones are the main topic of conversation: <https://www.modwiggler.com/forum/viewtopic.php?p=3901611&hilit=authentic+buchla+clones#p3901611>.

<sup>3</sup> See for example, "Behringer Has Killed the Vintage Synth Market | It's over folks!" [https://www.youtube.com/watch?v=ooGjOblhtsc&ab\\_channel=I%27mEspanKraftandyou%27renot](https://www.youtube.com/watch?v=ooGjOblhtsc&ab_channel=I%27mEspanKraftandyou%27renot).

duties of custodianship (Barclay 1997). More recent scholarship, such as by Gabriele Rossi Rognoni (2019), challenges rigid preservationist stances and instead advocates for responsible, documented, and limited use, particularly as informed by research or historically informed performance contexts.

The use of replicas provides one route out of having to balance custodianship with wider access by allowing performers, researchers and the public an opportunity to engage with the design and sound world of historical instruments without risking damage to the originals. Yet the use of replicas is not without issue, with the central concern being that of authenticity. How authentic can a replica be if it lacks the age, patina, and context of an original instrument? As in the case of the Buchla and Arp replicas, makers face the challenge of approximating historical sounds by using modern materials or guesswork to fill in missing information (Beekman 2003) due to incomplete schematics, multiple versions or obsolete components. This leads to the argument that no replica can truly reproduce the timbre, resonance or performative nuances of the original due to the subtle and intangible differences caused by aging, craftsmanship and idiosyncrasies related to internal circuits, components and electrical flows. Others see such objections as overly rigid and linear, arguing instead that any such concerns are overridden by the educational and experiential value that replicas provide. "It is simply an empirical falsehood that replicas fail to excite or inspire us. If the effect is there, we should not worry about the nature of the cause" (Sandis 2016, 242). Informative here is the early music movement of the late 20th century where replicas were really the only realistic and accessible option for historically informed performances, as noted by Taruskin (1995) and Butt (2002), who argue that the increasing access to high quality reconstructions of Baroque and Classical instruments should be seen as enabling technologies that bridge historical scholarship and living performance.

Replicas also play a large role in the preservation of intangible cultural heritage. While a musical instrument itself is tangible, the knowledge of how it was played, tuned, or understood within its cultural context is either inaccessible or distorted. The use of replicas can assist in the revival and preservation of historical musical practices, techniques and performance styles and furthermore support associated cultural traditions and repertoires. The pursuit of authenticity, however, is elusive and the use of historical instruments, whether original or replicas, can lead to a kind of 'invented tradition' (Hobsbawn and Ranger 1983) where contemporary performances and techniques are informed, often unintentionally, by current sensibilities, aesthetics and approaches that project contemporary ideas onto the past. While purists may find such historical 'bleed' troubling, it can also be argued that musical heritage needs to be continually "performed to remain meaningful, which renders the intangible heritage central to how people relate to the world that surrounds them" (Howard 2022, 29). As interfaces between tangible and intangible cultural heritages, musical instruments are key to the materiality of music, "as part of the sensecape that links people to places, times and technologies" (Howard 2022, 27). The meaning of a musical instrument resides in its functionality and as an object that is meant to be used, often in ways that are not his-

torically static but responsive to shifts in cultural practice, aesthetics and contemporary contexts. Replicas are part of this shifting landscape and arguably inject further nuances within the mix of historical and contemporary musical practice.

## Processes of Replication

As noted, this study is based on two primary engagements with the actual material of the objects under consideration, which is to say, actively building an instrument and its case on the one hand, and purchasing pre-made components, which were then installed in a prefabricated Eurorack cabinet. The decision to engage with the study in this manner takes into consideration not only the technical accuracy behind the replicas but also their affective characteristics – bodily, emotional and sensory experiences which are often pre-conscious, non-verbal and visceral that occur before or beyond language. Vintage synthesizers – Buchla, Moog, Arp, Synthi, Oberheim, etc. – are more than tools or means to a musical end. They are deeply cultural and affective objects that provide multisensory experiences that are rich with imagined and historical resonance and often create feelings of reverence and nostalgia. I can attest to this in my visit to the Twee studio which was akin to entering into an exclusive, almost sacred space for synthesizer enthusiasts. Original instruments produce strong affective atmospheres where visual elements, patinas and even smell impact the pre-conscious sensations that are part of what Brian Massumi describes as the “non-conscious experience of intensity” associated with such machines (Shouse, E. 2005, n.p.). Added to the mix are cultural affects – what Ahmed calls “sticky” emotions where “emotions can move through the movement or circulation of objects” (Ahmed 2004, 11). Users often feel connected to musical lineages, such as the avant-garde works of Morton Subotnick in terms of the Buchla 100 and Elaine Radique’s work with the Arp 2500. Combined, these affective characteristics contribute to the continued appeal of these instruments and are integral to how they are constructed with respect to historical discourses. Indeed, the set of faceplates and circuit boards that I purchased from LA67 were sold under the banner of “Mort’s Barge,” and described as being “based on a configuration made famous by the composer/musician Morton Subotnick” (LA67 2025). Behringer also draws on iconic artists to support the sale of its Arp 2500 clone, proclaiming that the original was “used by artists like The Who, Jean Michel Jarre, Vangelis, Kraftwerk and so many more, giving us some of the greatest records and film soundtracks we’ve ever heard” (Behringer, *Oscillator Module*, 2025). Such references speak also to the mythologies associated with these vintage synthesizers where “tangible aspects such as functionality, playability and quality” (Sommer 2011, 574) are coupled with intangible associations – legends, “complex musical freedom” (Buchla USA, 2025) or as Behringer puts it for their version of the Arp 2600, where ownership is “like having your piece of history enabling you to re-create timeless classics or forge your own musical path” (Behringer, *Arp 2600*, 2025). The revival of vintage synthesizers then could be seen as what Roy Sommer identifies

as “metadesign,” which “creates not only myths of authenticity, but also contributes to the commercial recycling of cultural heritage (577). As such, the past not only sells but is deeply ingrained in the ongoing cultural constructions of the meaning and value of these devices. Recreating these synthesizers can thus be seen as an act of connection – connection with the past but also a connection with an established legacy of artistic and creative accomplishments and their corresponding mythologies. The Buchla 100 and Arp 2500 are heavily loaded objects which weigh on any perceived tensions between originals and copies and the extent to which either can be deployed in contemporary musical and creative production.

## Building the Buchla 100

At present, replicas of the Buchla 100 are limited to a small handful of DIY suppliers who have a limited range of printed circuit boards (PCBs) and panels available and in one case, the option of having a small system (Mort's Barge) built for you at considerable expense. Another option is to use online resources to produce your own PCBs and panels, either on your own or through manufacturers able and willing to do small batch production. Given my technical knowledge and abilities, I opted for the first option and ordered a set of PCBs and front panels for “Mort's Barge,” from LA67, with an additional oscillator (Model 158) and a touch-controlled voltage source (Model 114). As a whole, the system is composed of the following modules:

1. Two Dual Sine/Sawtooth Generators (Model 158)
2. Dual Control Gate (Model 110)
3. Dual Attack Generator (Model 180)
4. Timing Pulse Generator (Model 140)
5. Sequential Voltage Source (Model 123)
6. Touch Control Voltage Source (Model 114)

For each of the modules, online documentation in the form of a bill of materials (BOM), which listed the parts required for each module and basic build notes, were provided. Each BOM included a link for a prepopulated ‘basket’ of components from Mouser, one of the largest suppliers of electronic components for both consumers and industries. Additional components not available from Mouser were sourced from other suppliers, such as Tayda. Upon arrival, the components were sorted to correspond with the BOMs for the individual modules. The building process took place over the course of six months and involved the placing and soldering of over 500 components. As a form of quality assurance, each component was doubly confirmed from the BOM prior to being soldered in place. The modules were assembled one at a time, beginning with the two 158s and ending with the 114. For each build, the process was as follows:

1. Components were placed in the order of resistors, capacitors, diodes, transistors, switches, LEDs, input/output jacks and potentiometers.
2. The values for each component were matched to the specifications in the BOM and tested using a handheld component tester prior to being soldered in place.
3. Switches, LEDs, input/output jacks and potentiometers were mounted in the final stage, which involved fitting them to the panel board
4. Upon completion, each module was powered and subject to a basic test for functionality.

Visually, the assembled modules correspond to the aesthetics of the original which also used white panels, large 'Davies' knobs, red and black banana jacks and the non-standard 'tini-jax' (3.58mm) favoured by Buchla in contrast to the ubiquitous 3.5mm jacks found in most modular synthesizers. I did have the option of using 3.5mm jacks but as a gesture towards authenticity I decided to remain true to the tini-jax option.

Once all the modules were completed, the next step was to house them in an appropriate case. While pre-built options exist, I opted to make one myself in a style that matches the simple cases of the originals, which were essentially boxes with an open front and a recessed lip to screw the modules to. My woodworking skills are modest, so I decided on a straightforward rabbet joint to secure one board to the other. Once constructed, the boards were glued and nailed together, stained in dark walnut and an internal power supply, auxiliary power outlet (for the 114) and a switched socket for a standard AC line were added. Aesthetically, the completed synthesizer looks similar to photos of the original system, and the simple and unrefined cabinets have a suitably vintage 'vibe' to them.

The all-white front of my Buchla, however, is interrupted by two red panels for the 158 oscillators, which is a nod to the infamous red panel coated with LSD, which when touched would lead to mind-expanding synth experiences during the counter-cultural movement of the 1960s "where electronic music and psychedelic drugs were intertwined" (Synthtopia 2019, n.p.). While the veracity of the story remained contestable for years, the existence of at least one LSD dosed red panel was confirmed by a repair technician who started tripping after dislodging a crystal-like substance from a vintage Buchla that he was restoring for Cal State University in East Bay, which apparently had been stored in a dark room since the 1960s. It is not clear when the panel was covered in LSD or if Buchla himself had anything to do with it. But facts are beside the point, as what matters here is how the red panel story contributes to the overall narrative and mystique of the Buchla synthesizer as an instrument that can transport one into unconventional places and states of mind. In my case, the red panels are just coated in ordinary paint and were produced by a small manufacturer in England using FTP files made available by LA67 on their website.

For the most part, the building process was straightforward given that all the components were through hole as opposed to surface mount and, given that the circuits were based on a design from the mid 1960s, did not involve any integrated circuits. The only instance where I needed to reach out to a forum where DIY Buchla builds are discussed was for the 114, where it was initially unclear on how to connect the pads for the touch controller to the main circuit board. The response was almost immediate and complete with images and detailed notes on how to proceed.

Externally, my Buchla 100 replica looks authentic enough with the only discernible 'tell' being that Buchla's name, CBS Musical Instruments, or that of the San Francisco Tape Music Center, are not indicated on the bottoms of the panels but instead bear the name of LA67 Musical Instruments. Internally, the differences are more obvious. The original, handmade circuit boards designed by Buchla are described as having "Rorschach test-like layouts that may well have been inspired by the incoming psychedelia of the period. You might see a mantis on the back of the Dual Square Wave Generator Model 144, or perhaps a muscular figure if you view it upside down" (Brown-Cáceres 2024 n.p.). In contrast, the PCBs from LA67 evoke no such associations, given that the circuit traces are not visible, and the layout of the components is decidedly ordered, reflecting the automated precision of contemporary PCB manufacturing. The individual components – the resistors, capacitors, transistors and so on – are also contemporary versions of the originals, with improved specifications, tolerances and stability. That said, LA67's 100 modules are generally considered to be highly authentic replicas amongst the general DIY community, with the circuit design taken directly from the original blueprints drawn up by Don Buchla and the mid 1960s for the San Francisco Tape Music Center.<sup>4</sup>

## Assembling the (B)Arp 2500<sup>5</sup>

The process of recreating a version of the Arp 2500 was a very different experience than that of the Buchla 100 for obvious reasons. I did not build the Arp 2500 clone, not even the case, which I did consider but abandoned due to time and cost but may return to at a later date. The Arp project involved a degree of archival work in terms of deciding what number of individual modules best replicated an original Arp, which essentially involved looking through old photographs, user manuals and consulting forums to guide my decisions on what to purchase. I also added two additional non-Behringer modules designed and built by Rob Keeble, who was one of the engineers working with Behringer on the design of the 2500 series. The first of these modules, the AM1047K, adds the missing keyboard percussion feature to the Behringer 1047 Multi Mode Filter

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<sup>4</sup> The high-water mark for Buchla restoration is the M.E.M.S. project, led by Chip Flynn and Mark Milanovich. The project reverse engineers Buchla 100 modules to make period accurate replicas in addition to restoring original instruments, notably the restoration of the Library of Congress's Buchla 100 system in March 2024. <https://www.memspjproject.info/>. See also Northrop 2004.

<sup>5</sup> The Behringer Arp 2500 modules are often collectively referred to as the (B)Arp 2500.

and allows percussive ringing tones to be generated from an attached CV and Gate keyboard or sequencer (AMS synths). The AM 1035 is part of the 'lost' series envisioned by Keeble, where he recreates modules for the Arp 2500 that never made it into production during the original run in the 1970s.<sup>6</sup> The 1035 is a Triple Modulator and Mixer that has three quadrant modulators that provide ring modulation, mixing and VCA capabilities, which adds a notable degree of flexibility to the Behringer Arp 2500. My completed (B) Arp 2500 is comprised of the following modules:

- B 1004 Oscillator Module (total of 4)
- AM 1047K Keyboard Percussion
- B 1047 Multimode Filter Resonator
- B 1006 Filter Amplifier
- B 1003 Envelope Generator
- B 1033 Envelope Generator
- B 1027 Clocked Sequential Control
- B 1050 Mix Sequencer
- B 1005 Mod Amp
- B 1016 Dual Noise/Random Voltage Generator
- B 1036 Sample and Hold/Random Voltage Generator
- AM 1035 Triple Modular

All modules are housed in a standard 2x140 HP Eurorack Case from Behringer.

Aesthetically, the Behringer Arp 2500 bears only a passing similarity to the original, mainly due to the shape and colours of the control knobs and the general layout of the individual modules. Missing is the large patching matrix and of course the size, given that the Behringer version is designed for Eurorack and thus more compact. There would be no mistaking the Behringer version for the original, not even at a distance. As far as the actual circuits go, Keeble noted how from the very beginning of the project, Uli Behringer's intention was to remain as true to the original as possible, using original schematics as the basis for the redesign and to keep any changes down to a minimum. Keeble does, however, acknowledge that there are notable differences – some of the LFOs are unable to go as slow as the original, the filter oscillation is not quite the same and sometimes the sound is not "as dark and moody as the original."<sup>7</sup> On the upside, the use of current components results in the remake being more stable than the 1970s version and given its Eurorack format, it is easier to integrate with contemporary work flows. While different in form factor, the sonic experience of the Behringer Arp 2500 modules is considered by many reviewers to be close enough to the real thing for most users, especially given the low price point.<sup>8</sup>

<sup>6</sup> For more information about these lost modules, see [https://www.amsynthstore.co.uk/browse/cat1461449\\_654544.aspx](https://www.amsynthstore.co.uk/browse/cat1461449_654544.aspx).

<sup>7</sup> Rob Keeble, interview by Andreas Kitzmann, Zoom, September 24, 2024, 4:00 p.m. EST.

<sup>8</sup> For a detailed review of 1004, 1005 and 1047 (in German) see: <https://www.amazona.de/test-behringer-eurorack-module-1004-1005-1047-nach-arp-2500/?fbclid=IwY2xjawMG4hNleHRuA2FlbQIxMQBicmlkETFmZk9wZ0xORk91VG5vSG1UAR4YTY1TIWQacuwrw3U7KG49PCppmKA-u6idnQ3yddRPD->

Of course, online there is considerable dissent here, fuelled in part by critics of Behringer's business model and culture.

## Playing the Buchla 100

As noted, the form factor of the LA67 Buchla 100 replica is the same as the original, both in terms of layout and the various CV and patch points. For this reason, I was able to consult the original manual for the Buchla 100 as a starting point for my own explorations and to follow patch suggestions from online videos that feature performers using the few remaining Buchla 100 systems still in use, such as those at Mills College and The Library of Congress in the United States. Such factors contributed to a feeling of authentically engaging with a 'real' Buchla 100, notably in terms of the tactile experiences with respect to using the instrument. Missing, of course, were the affective experiences associated with playing an authentic historical instrument, especially those once used by pioneers and legendary performers. In that sense, I am 'not touching history' when I twist the knobs of my Buchla, as it is a brand-new object without the patina of past use. However, what I am doing is engaging with historical synthesis techniques in a manner that is the same as the original. There might be differences in sound due to the discrepancies between aging internal components and contemporary ones, but beyond that the 'playing' of the replica Buchla 100 modules and those of the original are identical. One effect here is the preservation of the performative and sonic experience of a historical instrument as opposed to the object itself. What could be considered authentic is the performative and technical acts associated with the Buchla 100 which essentially keeps alive the skill sets, conventions and aesthetic constructions associated with that instrument.

## Playing the Behringer Arp 2500

I am fortunate enough to have spent a few hours exploring the Arp 2500 that is part of the collection at the Twee Studios, which provides a tangible point of comparison with respect to my experience with the Behringer clone. The key difference between the two is of course the physical nature of the engagement. The original Arp 2500 is a very large instrument, housed in solid wooden cabinets whereas the Behringer version is significantly smaller and thus portable and far more diminutive than its monumental counterpart. Another key distinction is the use of sliding matrix switches in the original Arp to make connections between the various modules, whereas the Behringer version uses conventional patch cords, as is the custom for the Eurorack format. The matrix makes for a much 'cleaner' aesthetic than the patch cable version, where even a

relatively simple configuration can quickly turn into a tangle of cords that often get in the way of the knobs and switches of the individual modules. The cable-free nature of the original has the effect of reducing the visual complexity of the playing experience, which is not only less distracting but also conducive to an arguably more intimate and mindful engagement with the instrument, something that Elaine Radigue embraced in her decision to purchase her 2500 as opposed to other synthesizers available in 1970, such as the Buchla system (Holterbach, 2013, 30).

One of the key features of the original Arp 2500 was the complexity of its routing system, which allowed performers to mix the signals of the various modules in unusual and at times counterintuitive ways, such as “outputs to outputs.” The siding matrix systems is set up so that every module has “20 easily patched buses that multi-mix with up to 59 others,” which is akin to having “10-20 patch cords into one I/O point,” which while technically possible would result in a tangle of cords so deep that it would essentially obscure the panels entirely (KSS 2021).

Arguably then, what is missing from the Behringer remake is what one Modwigger commentator described as the “systemic virtues” of the original, which is more than just a collection of modules but rather a well-conceived and integrated ecosystem (KSS 2021). In contrast, the Behringer 2500 is indeed a collection of modules that for the most part replicates the design and sonic potentials of the original components but lacks the interoperability and seamless connectivity of the Arp 2500. The Behringer version is not conceived as a system per se, nor even marketed as such, given that one can purchase one or two of the modules to add a bit of Arp 2500 ‘flavour’ to an existing modular system. In terms of playability or workflow, the experience is fundamentally different. Even my short time with the Twee Studio Arp allowed me to appreciate the instrument as a kind of self-contained, deeply organic instrument made up of wide-ranging interconnectivity that could be attained via the simple sliding of a matrix switch. My far more extended time with my Behringer 2500 is completely different. While I have taken steps to create a self-contained Arp 2500 system, with generally the same types and number of modules that an original version might have (to the extent that is possible), the use of patch cables with physically smaller modules disrupts the performative flow to the point that it is far more static in nature. In other words, I connect a series of modules in a specific way and then stay with that patch for the duration of a particular session to fully explore the possibilities that might lie within it. While I can certainly make new connections or undo existing ones, there is a tendency, at least in my case, to resist doing so given the time and cognitive energy required for a particular configuration, especially a complex one.

As a way to get closer to the Arp 2500 experience with my collection of replicant modules, I incorporated a desktop matrix mixer from Erica Synths, which has a 16x16 grid of inputs and outputs, which allows for 256 connections.<sup>9</sup> This is far less from what is possible with the Arp 2500, given that it featured 20 rows of connections above

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<sup>9</sup> <https://www.ericasyths.lv/shop/standalone-instruments-1/desktop-matrix-mixer/>.

and below the modules, which means that each module could connect 20 rows to 20 columns, with each module being able to connect to any of the rows in either section, allowing for multiple inputs to be routed to the same inputs or outputs.

From an experiential perspective, my interactions with the Behringer 2500 foregrounds the pursuit of the *sound* and *operations* of the Arp 2500 modules as opposed to the tactile and cognitive experience provided by the entirety of the original instrument. As it is not a one-to-one replica on a systemic level, the focus is arguably more on the individual modules and how they can be connected to maximize their respective abilities and their overall sonic potential. This potential can be pursued, as I have done, via a collection of modules that matches, for the most part, the same modules in the original system. In this case, Arp 2500 patches and techniques, such as those used by Radigue, can be replicated, albeit not with the flexibility and interoperability provided by the original sliding pin matrix. However, what is not being replicated, as previously noted, is the workflow of the original and its sheer physicality which effectively creates a type of second order replication where key elements are being copied as opposed to the entirety of the technical ecosystem.

## Conclusion

The two replicas being considered here can be positioned at either end of the preservationist spectrum. On the one side is the LA67 Buchla 100, which is intentionally designed as an exact replica in terms of remaining true to the original as much as possible, with no added features, no changes in format and maintaining the original circuit layouts and component types. The use of Buchla-specific voltages and jacks help to maintain it as an isolated technological ecosystem that remains within the technical limits of its historical period. Arguably the Buchla 100 is easier to replicate in its original form given its relatively simpler design parameters, unlike the Arp 2500. It is also situated within a community of Buchla enthusiasts, an admittedly niche group that has a vested interest in maintaining the technical and aesthetic integrity of the Buchla ecosystem. The efforts of small, often one person producers of Buchla circuit boards and faceplates, or complete systems, come under considerable scrutiny in forums such as Modwiggler, where technical specifications, component choices and circuit design are carefully compared to their original counterparts.

On the other end of the spectrum are Behringer's remakes of the Arp 2500 modules. Aimed at the mass market and the product of a large corporation with a vast supply chain, Behringer does not adhere to the purism of the Buchla DIY scene and instead privileges affordability and compatibility with contemporary modular synthesis. Unlike 'Mort's Barge,' Behringer's Arp 2500 is not conceived as a complete, isolated system, but rather as a series of independent modules that preserve many of the features of the originals. One can, as I did, purchase all the modules and house them in a specific case in an effort to recreate the majority of the Arp 2500's functionality, albeit without

the benefits of the patching matrix. However, one could also just acquire a selection of modules, such as filter or oscillator and incorporate them into an existing modular system made up of disparate modules, which effectively merges past and present with respect to synthesis technologies and aesthetics. As previously noted, Behringer aimed to create replicas of the original modules, with any changes being those required by the desire to maintain a low price point and to reconfigure the original format for Eurorack. The result is a collection of modules that, for the most part, are considered to be 'close enough' to the originals to warrant restrained respect from synthesists wanting to have their own version of an unattainable instrument from a bygone era.

The differences between the (B)Arp 2500 and the Buchla 100 replicas raise interesting questions about the historical preservation of musical instruments within the context of contemporary consumer culture and musical practitioners. Among these is the issue of whether the efforts of producers such as LA67 isolate the Buchla within a restricted zone of exclusionary musical practice where the preservation of past techniques takes precedence over contemporary and future advances in musical synthesis. A point of contrast here is the issue of the Buchla 200 system by Tiptop Audio, which in cooperation with Buchla has reproduced Don Buchla's 200 series and converted it to Eurorack standards.<sup>10</sup> As with Behringer's Arp 2500 remakes, the Tiptop modules can be made part of a mixed modular system, thereby combining Buchla-style synthesis with other approaches. Or as a counterpart, one could assemble a complete Tiptop Buchla system in order to maintain the integrity of the original system. Or, as a twist, connect that complete system to other modular rigs thanks to the Eurorack standard. Like the Behringer approach, Tiptop allows for a tangible crosstalk between historical and contemporary forms of electronic music technology, which arguably both preserves and advances the performance and compositional forms associated with these instruments. Another interesting take on the preservation of classic analog synthesis is taken by the aptly named UK-based firm Analogue Solutions, which describes itself as a company that specializes in "specializing in true analogue synthesizers, sequences and Eurorack modules" (Analogue Solutions 2025). Among their offerings is the TC500, which is a massive instrument that replicates the pin matrix, module layout and general form factor of the original Arp 2500, complete with the wooden cabinets and optional 'wings' that can be added to expand the core system. From a distance, the TC500 looks like the Arp that I encountered in the Twee Studio. However, as is pointed out on their website, it is not an Arp 2500 clone and the individual modules utilize circuits designed by Analogue Solutions. What is being replicated and preserved is the general experience of using the Arp 2500, notably in terms of the user interface (the pin matrix) which is identified as one of the key elements of the Arp experience, although the Arp used a matrix based on sliders whereas the TC5000 uses pins.

On the flip side, of course, is that such hybrid systems run the risk of erasing historical forms of musical practice which, if left to run its course, will effectively leave us with

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<sup>10</sup> <https://tiptopaudio.com/buchla/>.

mutant forms of classic synthesizers with the originals kept behind glass in museums and private collections. Some accuse Behringer of messing with the synthesis gene pool, with their ongoing remakes of classic synthesizers which while very affordable, are considered pale imitations of the originals. Indeed, a common lament is that the practices of companies such as Behringer will eventually obliterate the market for others who seek to preserve the features and quality of vintage electronic instruments. While there is some merit to this argument it is equally valid to state that affordable remakes, such as the (B)Arp 2500, allows, at least in part, for the continuation of historical forms of synthesis within mainstream consumer and popular culture. Accessing, let alone owning an Arp 2500, is basically impossible, which means that the creative and performance practices associated with that instrument remain almost entirely out of reach. And getting closer with the TC5000, in terms of UI, comes with a \$45,560 CAD price tag. However, with the (B)Arp 2500, at least some of those techniques and practices can be preserved and integrated with contemporary forms of synthesis that are within reach of the public. The same or more can be said of the Buchla 100 reproductions, which tend to be more committed to maintaining historical accuracy and systemic integrity, with the exception of Tiptop Audio which while keeping to the user interface of the Buchla 200 system, has converted it to Eurorack standards, with the added effect of making it much more affordable than the original Buchla format.

The preservation of past musical forms and practices as related to accessing historical musical instruments is complex and rife with conflicting assertions. The use of original historical instruments, electronic or otherwise, runs the real risk of degradation and damage to the point where they are no longer viable for continued musical use. However, preserving these instruments in vaults or glass cases similarly nullifies their use value as they are effectively rendered silent and stripped of their relevance as cultural objects. Using replicas is one way to enact a kind of second order restoration in terms of maintaining a continuity of technical and performance practice both in terms of preserving historically informed reproductions and integrating historical synthesis with contemporary technologies and workflows. Among the risks is the temptation to forgo historical accuracy for the sake of expediency, cost and consumer appeal, which is something that Behringer is often criticized for. While DIY and small-scale producers, such as those associated with the Buchla 100 replicas may appear to be more committed to maintaining authenticity, similar factors of cost, lack of knowledge/expertise and restricted time frames may result in a host of compromises and design changes. Both the Behringer Arp 2500 modules and the LA67 Buchla 100 system (Mort's Barge), are considered to be historically informed reproductions with the Behringer making the most compromises given their redesign of the Arp 2500 as a Eurorack-compatible collection of modules. Together they exemplify two similar yet divergent approaches to the preservation of historical forms of synthesis. On the one hand there is the Behringer Arp 2500, which recreates the individual modules of an impossibly rare synthesizer where cross talk between past and present forms of synthesis are made possible by virtue of the adaptation into the Eurorack standard. The Buchla 100 remake, on the other hand,

maintains the systemic integrity and exclusivity of the original in the form of a one-to-one replica that preserves a clear line between past and present. While replicas cannot reproduce the aura or singularity of historical objects, they serve as bridges between past and present, allowing musicians, scholars, and enthusiasts to engage directly with the legacies of electronic sound synthesis. In this sense, replicas extend the cultural life of instruments beyond the boundaries of museum vitrines, reinforcing the notion that preservation must encompass both objects and the living practices that animate them.

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**COPYING AND SELLING THE FUTURE'S PAST:  
BUCHLA/ARP REPLICAS AND INTANGIBLE SONIC PRACTICE  
(summary)**

The preservation of historical electronic musical instruments has long been marked by a tension between museological imperatives of conservation and the cultural value of keeping instruments available for use. This study explores this tension by focusing on replicas and reconstructions as viable alternatives to conventional preservation. The inquiry is grounded in reflections on a visit to the Willem Twee Studios in 's-Hertogenbosch, an institution that exemplifies a distinctive model of preservation. Unlike museums that often remove delicate instruments from circulation, Willem Twee maintains a collection of rare synthesizers in working order and makes them accessible to musicians, researchers, and the public. This approach underscores the idea that the cultural significance of instruments resides not only in their physical form but also in their sonic and performative activation.

Within this context, replicas can be understood as a form of *second-order preservation*. Rather than safeguarding only the original materials, replicas allow for the con-

tinuity of sound, technique, and performance practices across generations. Two case studies illustrate contrasting approaches to replication: a DIY reconstruction of the Buchla 100 synthesizer and the Behringer Eurorack remake of the ARP 2500. The LA67 Buchla 100 project embodies a fidelity-driven strategy, closely following the circuitry, panel design, and functional layout of Don Buchla's 1960s instrument. By recreating the instrument's architecture with minimal compromise, this model of replication emphasizes historical accuracy and the preservation of specific design logics that shaped early modular synthesis.

By contrast, Behringer's ARP 2500 modules represent a mass-market reinterpretation, designed for affordability and compatibility with the ubiquitous Eurorack format. While this democratizes access by enabling a wider community of musicians to engage with sounds inspired by the ARP 2500, it also entails a reconfiguration that departs from the systemic design and performative logic of the original instrument. This tension raises important questions about authenticity: to what extent does replication serve as preservation when historical and technical integrity is altered for accessibility?

Drawing on scholarship in musicology, heritage studies, and the study of technology, this study argues that replicas function as both material and affective artifacts. They embody not only circuitry and design but also the intangible cultural practices surrounding early electronic music: techniques of patching, performative gestures, and aesthetic values. The act of engaging with a replica can sustain traditions of knowledge and practice that would otherwise be lost to obsolescence or confined to archival silence.

Ultimately, the study contends that replicas do not diminish the value of original instruments but rather complement their preservation by ensuring that practices associated with them remain active. While replicas cannot reproduce the aura or singularity of historical objects, they serve as bridges between past and present, allowing musicians, scholars, and enthusiasts to engage directly with the legacies of electronic sound synthesis. In this sense, replicas extend the cultural life of instruments beyond the boundaries of museum vitrines, reinforcing the notion that preservation must encompass both objects and the living practices that animate them.