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VARIABLE AREA:

HEARING AND SEEING SOUND IN STRUCTURAL CINEMA, 1966–1978

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While numerous individuals, institutions and experiences have influenced this dissertation, its spirit has been formed by the many years I've spent working in projection booths—feeling film as a physical material, a strip of images that I thread through the projector again and again. I've been in these small, dark spaces—thinking, watching, and listening to fragments of hundreds and hundreds of films. I have spent countless hours watching the refractions of images and streaks of light on the walls of the booth, and listening to the sounds of projector—the intermittent mechanism, spinning sprockets, hum of the lamphouse, and clatter of the film in the gate. One of the first things I learned as a projectionist is that problems can usually be heard before they are seen on screen, and it is exactly this sort of sensitive aural engagement with the cinema—one in which I was encouraged to actively, carefully *listen* to the sound of the projector—that lies at the core this project.

I came to the University of Chicago as an artist, uncertain how I fit into the world of academia. Tom Gunning has been my guide, advisor and mentor on this journey from the start. He encouraged me to develop my creativity and intellectual curiosity, and, most importantly, he is the person who helped me find my voice. His support has always been matched with insightful and precise critique, and his research, writing and teaching have shown me what it means to be a truly passionate scholar. I have the utmost respect and admiration for him as both a teacher and a friend. Jim Lastra's methodical historical and archival research, particularly his writing on early sound technologies, inscription and representation, have greatly influenced this project. His broad range of knowledge and thoughtful questions and comments have consistently

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Thank you to Robert Haller, Gerald O'Grady, Bruce Jenkins, Jay Sanders, and John Mhiripiri for providing research assistance at various stages of this project's development, as well as to Don Metz, Nancy Weekly and Tullis Johnson at the Burchfield Penney Art Center. Chapin Cutler was extremely patient and generous in explaining various shutter and intermittent configurations, and deserves thanks for this, as well as for giving me the opportunity to run one of his beautiful Century 35mm projectors for a week in the summer of 2011. Irma Nuñez Sless-Kitain, Laura Pearson and Carolyn Kaylor have been fantastic editors and helped to clarify my ideas as well as my writing. Special thanks to Andrew Ritchey for his perceptive suggestions on an early draft of this material, and for the opportunity to present and discuss a number of these films at the University of Iowa's Sound Research Seminar.

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INTRODUCTION

LISTEN

      Listen. Before flipping through the first pages of what you are now holding,

imagine that someone has rubber-stamped this word in black ink onto the back of your

hand. It is there not as a suggestion, but as a reminder—a reminder that this is what the

following text is asking you to do—to listen.

Figure 0.1: Max Neuhaus, "Listen" postcard (1979)
Courtesy of the Estate of Max Neuhaus

The "Listen" postcards that artist Max Neuhaus made in 1978 were an extension of his sound walk pieces, started in 1966, in which he gathered the audience of his concert/performance outside, stamped their hands with the word "Listen," and then led them on a walk—one designed to focus their attention on the sounds of their environment and, in Neuhaus's words, "refocus people's aural perspective."[1] On the first of these trips, Neuhaus met a group of friends on the corner of Avenue D and West Fourteenth Street in Manhattan, rubber-stamped "Listen" onto their hands, and led them on an aural walk that moved along Fourteenth Street toward the East River, past a power plant, across the FDR Drive, then through the Lower East Side back to Neuhaus's studio. A professionally trained percussionist who had performed with Pierre Boulez and Karlheinz Stockhausen, Neuhaus's initial inspiration for these pieces was connected to Edgard Varèse and Luigi Russolo's interest in bringing the sounds of everyday life into the concert hall and John Cage's practice of active listening to *all* sounds. Neuhaus called the postcard (pictured above) a "do-it-yourself version" of the piece, printed with a decal so that it could be placed in any location selected by its recipient.[2]

Why start here, in 1966, with this request, with *Listen*, with Neuhaus? Although this dissertation also takes the year 1966 as its historical starting point, this is not the reason I want to begin with Neuhaus's invitation. This project proposes, on the most basic level, that we refocus our perspective and think about cinema in aural, as well as

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[1] These works are variously referred to as *Sound Walks*, *Walks*, *Listen*, and *Listen: Field Trips Through Found Sound Environments* by Neuhaus and various critics and writers. Max Neuhaus, "Listen" (1988, 1990, 2004).
http://www.max-neuhaus.info/soundworks/vectors/walks/LISTEN/LISTEN.pdf
[2] Ibid.

visual, terms. Throughout the history of avant-garde cinema, sound has been a crucial component of investigation, play, and inquiry, yet analyses of sound have been virtually absent from historical, aesthetic, and theoretical texts on avant-garde film. This dissertation aims to fill in this gap, at least in part, by examining the sonic dimensions of avant-garde cinema—in particular the explorations of 16mm optical audio in the structural films of Coleen Fitzgibbon, Hollis Frampton, Richard Lerman, Robert Russett, Paul Sharits, and Barry Spinello.

Focusing on a group of films made between 1966 and 1978 that explicitly investigate both the visual and aural possibilities of the optical sound format, this project uses contemporaneous writings and sound art to contextualize these works, and to re-think the relationship of avant-garde cinema to avant-garde music. An analysis of sound in the films of Fitzgibbon, Frampton, Lerman, Russett, Sharits, and Spinello will enrich our understanding of avant-garde sound theory and practice, and contextualizing these films within the discourse on avant-garde sound will enhance our understanding of structural and avant-garde film practice in the late 1960s and '70s. This group of films can be gathered together under the historic rubric of structural or materialist cinema, yet I have found that while the works should certainly be considered in these contexts/formulations, they have as much, if not more, to offer us when analyzed in relationship to the avant-garde music, sound art, free improvisation, and performance that so defined the art being made in the late 1960s and early '70s. The influence of concurrent movements in art and music, such as Fluxus and minimalism—as well as John Cage's teachings and writings on silence, indeterminacy, and chance procedures; Steve Reich's work on phasing and writings on process and repetition; and the

explorations of harmonics, overtones, amplification, "just intonation," acoustic

architectures, drone, repetition, improvisation, and "ear tones," by artists such as

Maryanne Amacher, La Monte Young, Marian Zazeela and the Theater of Eternal

Music, Tony Conrad, Michael Snow, Charlemagne Palestine, David Tudor, Terry Riley,

Terry Jennings, Toshi Ichiyanagi, and Cornelius Cardew—should be considered a part

of the scene or conceptual space from which these films emerge. I consider this project

of integration to be critically important, and believe that lesser-known films by artists

such as Fitzgibbon, Lerman, Spinello, and Russett will continue to be overlooked unless

we turn a critical ear toward them and really *listen* to their sound.

  The primary goal of this dissertation is to focus our attention on the use of sound

in the specific films by Fitzgibbon, Frampton, Lerman, Russett, Sharits, and Spinello

studied in the following five chapters. I perform a detailed and critical analysis of each of

these works, with the dual intent of unearthing and reintroducing them to scholars of

avant-garde cinema and carefully listening to what they have to tell us. All the

filmmakers included in this dissertation made work that was informed by the avant-

garde music of the time, and, not surprisingly, were all working in a variety of media

other than film. Tracing out the connections between the concerns of, for example,

artists like Alvin Lucier and Paul Sharits, or Maryanne Amacher and Coleen Fitzgibbon,

or Cornelius Cardew and Richard Lerman, is one of the major aims of this project.

  Related to this sonic exploration is a more urgent, fervently voiced call to connect

the academy and the archive. This project started in the archive, and were it not for the

hours I spent talking with (well, mostly listening to) the archivists at Anthology Film

Archives and the Academy Film Archive, as well the directors of the irreplaceable

"accidental archives" of American avant-garde cinema—Canyon Cinema and the Film-makers' Cooperative—it would most certainly not have come to be. My life and work outside of this dissertation project has continually moved between the worlds of academia, filmmaking, professional film projection, programming/curation, and film preservation, and I feel extraordinarily lucky to have been able to experience and learn from all of these disparate facets of cinema. I strongly believe that the connections and relationships built between researchers and archivists are essential and invaluable, and have the potential to engender truly exhilarating collaborations. If, back in the earliest stages of this dissertation's development in 2007, I hadn't explained my ideas for the project to Andrew Lampert, then the archivist at Anthology Film Archives, I would likely have never seen Richard Lerman's *Sections for Screen, Performers and Audience* (1974) and Robert Russett's *Primary Stimulus* (1977), both of which are not in distribution and hadn't screened publicly for years.[3] If I hadn't explained the project at a later stage to Mark Toscano, film preservationist at the Academy Film Archive, he might have never contacted Robert Russett and started work on the stabilization and preservation of Russett's films. In the fall of 2009, I curated a screening (as an accompaniment to this dissertation) through the Outer Ear Festival of Sound at the Gene Siskel Film Center in Chicago that included Robert Russett's *Primary Stimulus*, Barry Spinello's *Soundtrack* (1969), Paul Sharits's *Ray Gun Virus* (1966), and a live performance screening of Richard Lerman's *Sections for Screen, Performers and Audience*. If these films aren't preserved and subsequently made available for research

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[3] While neither of these prints is available for rent from any of the major national or international distributors of experimental/art cinema, they can be borrowed directly from the filmmakers. *Sections for Screen, Performers and Audience* has screened occasionally in the last decade, but only with Lerman present to perform with the film.

and exhibition, screenings like this won't be possible in the future. Fitzgibbon, Lerman, Russett, and Spinello are left out of virtually all histories of avant-garde cinema, and their extraordinary contributions to the sounds of avant-garde cinema deserve to be reconsidered and revalued. There is so much work left to be done—work that requires collaborative intervention on behalf of both academics and archivists.

Because several of the filmmakers in this dissertation were a part of a "second wave" of structural film practice, their works often responded to, and challenged, the films of more recognized artists such as Tony Conrad, Joyce Wieland, Michael Snow, Ernie Gehr, George Landow, Hollis Frampton, and Paul Sharits. P. Adams Sitney's 1969 observations regarding the emergence of a "cinema of structure" focused on the manner in which the content of these films was "minimal and subsidiary to the outline," and stated that the structural film insisted on the primacy of its shape and form.[4] Characterized by formal aspects such as fixed camera positions, the use of flicker, loop printing, and rephotography, structural films, at their core, examined the essential nature of film as a medium.[5] Sitney, while carefully outlining the various visual methodologies of this practice, fails to take into consideration the importance of sound to these films and filmmakers. Structural cinema emphasized "film as material," yet critical discourse on the movement has tended to focus almost exclusively on the filmmakers' investigations of optics and the visual components of the cinematic apparatus.

While very little historical or critical work has been done on the use of sound in experimental and avant-garde cinema, recent scholarship by Branden Joseph, Juan Suárez, and Melissa Ragona has begun to address this absence. This project has been

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[4] P. Adams Sitney, "Structural Film," *Film Culture* 47 (Summer 1969): 1.
[5] Ibid.

inspired by their diverse critical and methodological approaches to the work of Tony

Conrad, Hollis Frampton, and Paul Sharits. Melissa Ragona's two essays on the films of

Hollis Frampton and Paul Sharits rethink these works through their use of sound and, in

Sharits's case, specifically through his writings and interest in Wittgenstein and the

avant-garde composer Iannis Xenakis.[6] Branden Joseph's *Beyond the Dream*

Syndicate: Tony Conrad and the Arts After Cage also greatly influenced the scope and

aims of this project. A "minor history" of Conrad's contributions to rock and avant-garde

music, art, and film, it examines his influences and position within the "post-Cagean

milieu of early 1960s New York where visual art, music, film, and performance

increasingly overlapped and hybridized."[7]

In particular, Juan Suárez's article, "Structural Film: Noise" has provided not only

inspiration, but a working model for this project and my attempt to contextualize the

work of these filmmakers within larger movements and concerns in avant-garde sound

practices.[8] Presenting an overview of the intersections between the first wave of

structural filmmakers (primarily Michael Snow, Paul Sharits, George Landow, and Ken

Jacobs) and the sonic and political use of noise in their films, Suárez effortlessly draws

connections between these filmmakers and the avant-garde music scene in New York

at the time. Primarily focusing on artists like Tony Conrad and Michael Snow, who were

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[6] See Melissa Ragona, "Hidden Noise: Strategies of Sound Montage in the Films of Hollis Frampton," *October* 109 (2004). and ———, "Paul Sharits's Cinematics of Sound," in *Lowering the Boom: Critical Studies in Film Sound*, ed. Jay Beck and Tony Grajeda (Urbana and Chicago: University of Illinois Press, 2008).
[7] Lynn Cooke, dust jacket quotation, Branden Wayne Joseph, *Beyond the Dream Syndicate: Tony Conrad and the Arts After Cage* (New York: Zone Books, 2008).
[8] See Juan A. Suárez, "Structural Film: Noise," in *Still Moving: Between Cinema and Photography*, ed. Karen Beckman and Jean Ma (Durham: Duke University Press, 2008).

fluidly moving between various avant-garde and underground music, art, performance, and film subcultures and scenes, Suárez traces broad and nuanced connections between these communities, and argues for a reevaluation of the political implications of noise.

While filmmakers such as Fitzgibbon, Frampton, Lerman, Russett, Sharits, and Spinello were actively carrying on the structuralist movement's attempts to define the parameters and possibilities of the medium, and to explore the physical materiality of celluloid film, their interest was not limited to the realm of the visual, and each considered sound to be an integral element of the medium. They used sound to interrogate the unity of cinematic representation, the assumption that sound is in service of an increased naturalism, as well as the presumably native state of synchronous audio and image recording. Giving equal valence to image and sound, these films call into question the avant-garde cinema's emphasis on vision and the purity of the image. All of these artists were actively interested in making sound visible (and audible), and I argue that they were working to reveal sound as something that is not abstract, but rather concrete and material.[9] While not denying the ephemeral and abstract qualities of the experience of sound, these filmmakers thought of sound as both "immersive and proximal" and as possessing the unique ability to surround, saturate and pass through

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[9] This is, in part, the argument that Christoph Cox makes to explain the undertheorization and lack of critical consideration of sound art. Cox writes that prevalent theoretical models privilege the textual and visual, and in so doing, fail to capture the "nature of the sonic." He argues against approaches based in representation and signification, and for an "alternative theoretical framework, a materialist account able to grasp the nature of sound and … enable analysis of the sonic arts." See Christoph Cox, "Beyond Representation and Signification: Toward a Sonic Materialism," *Journal of Visual Culture* 10 (2) (2011): 146.

the body.[10] This material use of sound highlights both its spatialization, as well as its ability to affect (and be affected by) the materials and space in which it is heard.

The films examined in this dissertation use sound and musical structures to question some of the most basic assumptions we have about cinematic representation and the relationship between sounds and images. At times tracing out what Sharits referred to in his essay "Hearing : Seeing" as the possibility for constructing "operational analogues" between ways of seeing and ways of hearing, these filmmakers were using sound to explore the essence of the medium of film and the presumed hierarchy of the senses, as well as complex ontological and phenomenological questions related to the nature of the cinematic.[11]

Rather than focusing exclusively on canonical works made during this period of time, my study moves back and forth between the more established filmmakers, Frampton and Sharits, and the less recognized work of Fitzgibbon, Lerman, Russett, and Spinello. All of these filmmakers thought of sounds and images as inextricably linked and interdependent aspects of the physical material of cinema, and the works considered in this dissertation make the claim that sound was something that drove, focused, scored, and mapped out the shape of the films that were being made during this time.

A secondary goal of this dissertation is to expose the myriad ways in which these filmmakers explored the technology and materials of cinema, specifically the mechanics of film projection and optical audio reproduction. In all of these films, sound is, in some way, made visible. In their examinations of the unique possibilities of the optical sound

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[10] Ibid., 148.
[11] Paul Sharits, "Hearing : Seeing," *Film Culture* 65-66 (1978): 70.

format, one that renders sound as a visual representation and is exclusive to the mediums of 16mm and 35mm film, these artists treat optical audio as a crucial visual, as well as sonic element of their work.[12] These films are the direct result of the parameters, constraints and possibilities of 16mm optical audio, and explore ways for writing sound both on- and offscreen.[13] They often explicitly address the mechanics of film projection and optical audio reproduction, which I argue is itself a modified form of projection.[14] Films by Fitzgibbon, Sharits, Russett, and Spinello reveal the technology of optical audio reproduction by both making it visible on screen and tracing out various ways in which the hidden process of audio reproduction mirrors the visible projection of images on-screen. While most critical analyses of structural film have focused on filmmakers who were interested in examining the frame and its physical characteristics and projection, in this analysis I look at filmmakers who focused on both the experience of projection and the material of film as a strip and physical object. These artists were interested in revealing the process by which sound film is made possible, examining film as an object and physical material, and making the unseen aspects of optical audio

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[12] Although uncommon, some 8mm film systems had the ability to record optical audio Fuji's ZS-400 CVR 8mm camera, introduced in late 1971, is one example.

[13] 16mm optical audio has an extremely limited frequency range (typically 50–7000Hz) and due to its size (approximately 2mm in width), proximity to the edge of the filmstrip, and limited dynamic range, optical audio tracks tend to be quite noisy and inadequate for the reproduction of very high and low frequencies.

[14] In 16mm optical sound reproduction, a beam of light from an exciter lamp in the projector is focused through the optical audio track and a light-sensitive photoelectric cell converts these light patterns into an electrical signal, which is reproduced as sound. Optical audio reproduction can be thought of as a modified analogue to image projection in that light is projected through visual representations of sound and transmitted through space onto the surface a lens. While the differences between image projection technology and optical audio reproduction are great, I believe that the similarities between the two technologies, in particular the manner in which light must pass through the filmstrip in order to activate both image and sound, is one of the aspects of projection that these filmmakers were exploring.

reproduction legible to the viewer. In much the same way that certain works of minimalist music have made their structure, or process, evident and audible, an understanding of the play between perceptible and imperceptible structures and technologies is central to an understanding of these films.[15]

Finally, I propose that in their examinations of the medium of film and the technology of projection, these filmmakers were not only exploring the materials of the medium, and the complex relationship between viewer/listener and the experience of the cinematic, but they were drawing out unusual and unexpected connections between the cinematic apparatus and the corporeal body. Linking the technology of projection to the physiology of the body, the filmmakers I focus on in this text were not only asking us to "listen in" to the sounds of the material of film, the machinery of projection, and the viewing body, but they were drawing parallels between mechanical/technological and bodily/cognitive processes.

In Chapter one, "Scores," I identify connections between the development and use of graphic scores in avant-garde music and various implementations of these scoring techniques in experimental cinema in the late 1960s and '70s. Focusing on the work of artist Richard Lerman, I examine the use of the graphic score in his sound piece *Travelon Gamelon* (1976–present) and his 1974 performance film *Sections for Screen, Performers and Audience*. I conclude with a brief overview of the various ways in which filmmakers during this period used the score as both a schematic map and sculptural object.

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[15] Kyle Gann's article "Minimal Music, Maximal Impact: Thankless Attempts at a Definition of Minimal Music," published in November 2001 on the New Music Box website, designates "audible structure" as one of the key characteristics of Minimalist music. http://www.newmusicbox.org/page.nmbx?id=31tp01

Chapter two, "Sprocket Holes," examines the structural imperative to isolate the essential qualities of the medium of film, and Hollis Frampton and Paul Sharits's use of noise generated by the sound of sprocket holes passing through the film projector. Sprocket holes functioned as a metaphor for the cinematic apparatus of projection, for movement and duration, and became an aggressive, rhythmic means of structuring Sharits's early films. I explore the sprocket as a mechanical device that creates the illusion of movement through the intermittent forward advance of images, and the sprocket hole as a source of rhythmic, sonic interruption. Attempting to get as close as possible to the sound of the material of celluloid film itself, Sharits was using sprocket holes to generate intermittent noise and pulsing phase shifts, and to create resonant sonic architectural spaces. This chapter explores his use of the sprocket hole as sonic punctuation in works like 1966's *Ray Gun Virus*, and its attempt to "allow vision to function in ways usually particular to hearing," and his more complex investigations into the mechanics and phenomenological effects of projection in works such as *Color Sound Frames* (1974) and *Synchronousoundtracks* (1973-74).[16]

In chapter three, "Instruments," I explore the direct soundtracks created by Barry Spinello and Robert Russett in their films *Soundtrack* (1969) and *Primary Stimulus* (1977). I argue that these filmmakers' movement past the parameters prescribed by the 16mm image area into the optical track was both an attempt to develop a new model for the filmstrip as a visual-material object, and a means of engaging a new form of perception through the simultaneous creation of images and sounds. Picking up Moholy-Nagy's 1928 proposal for an "acoustical alphabet of sound writing," in which one

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[16] Sharits, "Hearing : Seeing," 70.

would be able to write acoustical sequences on the film's optical track without having to record any "real" sound, and responding to John Cage's 1937 "The Future of Music: Credo," calling for a new form of music that didn't rely on the instruments of the past, I contextualize Russett and Spinello's films through earlier work done with direct audio in the 1920s, and argue that *Soundtrack* and *Primary Stimulus* are unique explorations of sound as a constructive, structural, and generative element inextricably linked to the materiality of celluloid film.

Chapter four, "Projections," examines two films: Paul Sharits's *Episodic Generation* (1978) and Coleen Fitzgibbon's *Internal System* (1974), and the manner in which they both perform and deconstruct the material of film through the act of projection. Rigorous and durational works, these films make optical audio into a visible part of the image projected on-screen and work to reveal the hidden, optical processes of film sound reproduction technology. Fitzgibbon's film draws out direct connections between the cinematic apparatus and the perceptive body—intersections between the technological and the embodied experience of film that carry over into the conclusion of this dissertation.

In the concluding chapter, "Listening to the Material, Listening Inside the Body," I begin by proposing points of resonance between filmmakers and sound artists who were working with the phenomenological effects of sounds and images on the body. I analyze Paul Sharits's locational work *Shutter Interface* (1975) and connect it to the work being done with alpha brain waves by Alvin Lucier in the 1970s. I link Fitzgibbon, Sharits, and Lucier's thinking about sound and architectural space, sound and the

apparatus of cinema, and the sound of the body to the idea of "listening *in*"—here,

listening *in* to the sounds of the cinematic body.

CHAPTER ONE
SCORES

"Notation and composition determine each other. Differentiate between creating a language in order to say *something* and evolving a language in which you can say anything. A musical notation is a language which determines what you can say, what you can say determines your language."[1]

—Cornelius Cardew

The desire to create new systems for scoring or notating sound stems from a desire for the composer to, as Cardew states, not be restricted by the boundaries and conventions of traditional musical notation. New ways of thinking about sound by avant-garde composers in the twentieth century, and the introduction of new kinds of instruments, demanded a new means for writing music that wasn't tied to the systems, structures, parameters, or instrumentation of the past. This chapter aims to connect the development and use of the graphic score in mid-century avant-garde music to the implementation of various aspects of graphic scoring techniques in experimental cinema during the late 1960s and '70s. Focusing on the work of artist, musician, and filmmaker Richard Lerman, I examine the schematic design of circuits as scores, the use of handmade electronics and the graphic score in his multiplatform sound piece *Travelon Gamelon* (1976–present), and the role of the score in his 1974 performance film *Sections for Screen, Performers and Audience*. I conclude with a brief overview of the

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[1] Edwin Prévost, ed., *Cornelius Cardew: A Reader* (Essex: Copula, 2006), 5-6.

various ways in which filmmakers during this period (including Peter Kubelka, Hollis

Frampton, Paul Sharits, and Bill Brand) used the score as a schematic, visual map for

the composition of their films and, finally, touch on Sharits's transformation of the

"frozen" film strip (as score) into sculptural object. By linking the development of radical

scoring techniques in music to the use of the score in experimental cinema, and in

Lerman's extraordinarily complex and under-considered film *Sections for Screen,*

Performers and Audience in particular, I suggest that the score provides a framework

for examining the complex questions posed by the translation of images into sounds.

Because graphic scores directly pose the question of how to represent sonic ideas in

images, examining their use by composers and filmmakers inevitably reveals significant

connections between the worlds of experimental music and cinema in the 1960s and

'70s. Underlying this chapter's passage from graphic scores in music to circuitry design

to Lerman's work in sound and film and, finally, to the use of graphic scores in cinema,

is a collective disruption of the linear movement of the traditional "communicative"

model of art production from artist/composer to performer to audience.

As early as the creation of Luigi Russolo and Ugo Piatti's *intonarumori* ("noise"

instruments) and the publication of Russolo's 1913 Futurist manifesto *The Art of Noises*

(*L'arte dei rumori*), in which he declared the need to "break out of [music's] limited circle

of sounds and conquer the infinite variety of noise-sounds," composers have been

working on new systems for scoring music that could reflect new, modern means for

making sound.[2] *Awakening of a City* (*Risveglio di una città*), Russolo's 1913-14

composition for his whistling, crackling, buzzing, bursting, howling, and booming

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[2] Luigi Russolo, "The Art of Noises: Futurist Manifesto," in *Audio Culture: Readings in Modern Music*, edited by Christoph Cox and Daniel Warner (New York: Continuum), 11.

intonarumori, is considered to be one of the first modern scores to "dispense with the more familiar aspects of conventional pitch/rhythm notation" in favor of a new, more expressive, form of musical representation.[3] While still employing notation conventions such as staves, clefs, and dynamic indicators, the sole remaining fragment of Russolo's score shows bold lines, rather than singular notes, over the staves to indicate the relative duration of each pitch.

Figure 1.1: Luigi Russolo, fragment of score for *Risveglio di una città* (1913)
Image courtesy of Valerio Saggini

Just as graphic scores reflect new ways of making, theorizing, and writing sound, they also represent a reevaluation of the relationship between composition and

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[3] Michael Nyman, *Experimental Music: Cage and Beyond*, 2nd ed. (Cambridge: Cambridge University Press, 1999), 43.

improvisation, and of composer to performer. Breaking from the restrictions of traditional

musical notation, graphic scores "no longer 'represent' sounds by means of the

specialized symbols… which are read by the performer who does his best to 'reproduce'

as accurately as possible the sounds the composer initially 'heard' and then stored."[4]

Rather, they "lead to a radical indeterminacy that pushes the traditional musical score to

its limit, beyond which composition gives way to free improvisation" and the role of the

musician is not merely to perform, or execute, the composer's art, but to engage in

creative interpretation and collaboration.[5] The use of graphic scores in experimental

music points to a desire to move away from strict reproductions of sound compositions

and toward a notation that could more accurately reflect the essence of the work being

created, at the same time that it pushes for a different, more collaborative relationship

between composer and performer. As musician and writer Michael Nyman writes on

Cornelius Cardew's relationship to notation and the performer, notation was not "an end

in itself" or a "means of unlocking sounds," but rather "a way of engaging the most

valuable resource of any music—people."[6]

 The release of control on the part of the composer and subsequent embrace of

what would come to be referred to as "chance procedures" and "indeterminacy" were

definitive and extraordinarily important aspects of the music being made during the mid-

twentieth century. While many scores such as Larry Austin's *Square* (1967) include an

explanatory component that provides the performers with instructions for how to

approach or interpret the score, others such as Earle Brown's *December 1952* (1952),

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[4] Nyman, *Experimental Music: Cage and Beyond*, 3-4.
[5] Christoph Cox and Daniel Warner, eds. *Audio Culture: Readings in Modern Music* (New York: Continuum, 2004), 187.
[6] Nyman, *Experimental Music: Cage and Beyond*, 115.

John Cage's *Fontana Mix* (1958), and George Cacioppo's *Cassiopeia* (1962) consist

solely of abstract imagery that the performer is free to interpret as he or she sees fit.

Cardew's *Treatise* (1963-67), perhaps the most famous "purely graphic" score,

expresses the composer's developing interest in free improvisation as well as his earlier

"preoccupation with problems of musical notation."[7] The 193-page score, which Cardew

developed over the course of four years, reflects, in part, his work with composer

Karlheinz Stockhausen and the visual work and ideas he was engaged in while

employed as a graphic designer at the publishing house Aldus Books. As Cardew writes

of this time, "…I came to be occupied more and more with designing diagrams and

charts and in the course of this work I became aware of the potential eloquence of

simple black lines in a diagram."[8] In addition to his design work, *Treatise* also reflects

Cardew's ongoing interest in Wittgenstein, specifically his *Tractatus Logico-*

Philosophicus (1921), which not only inspired the title of the composition but Cardew's

thinking about the relationship between form, language, "pictures," and representation.[9]

Employing a hard-edged and precise diagrammatic design sensibility, *Treatise*

combines bold graphic shapes with elements of traditional/standard musical notation

(such as bass and treble clefs, oblong note heads, note stems and flags, and barring)

and, occasionally, numbers. When Cardew began the score in 1963, it was based on

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[7] Cardew in a 1970 interview before a rebroadcast of a BBC performance of *Treatise* (pages 107-126 of the score) on its "Composer's Portrait" series. Prévost, *Cornelius Cardew: A Reader*, 113.
[8] Ibid.
[9] Wittgenstein's writing, specifically Tractatus Logico-Philosophicus also had a profound impact on Paul Sharits. See "-UR(i)N(ul)LS:TREAM:S:S:ECTION:S:SECTION:-
    S:S:ECTIONED(A)(lysis)JO:'1968-70'," *Film Culture* 65-66 (1978).

"an elaborate scheme involving 67 elements, some musical, some graphic."[10] The

shapes Cardew uses are mostly linear outlines, but midway through the score dense,

black shapes, mostly circular, begin to appear. Nyman describes these shapes as basic

geometrical forms (circles, lines, triangles, squares, ellipses) that are "'subjected in the

score to destruction and distortion' with impeccable draughtsmanship."[11]
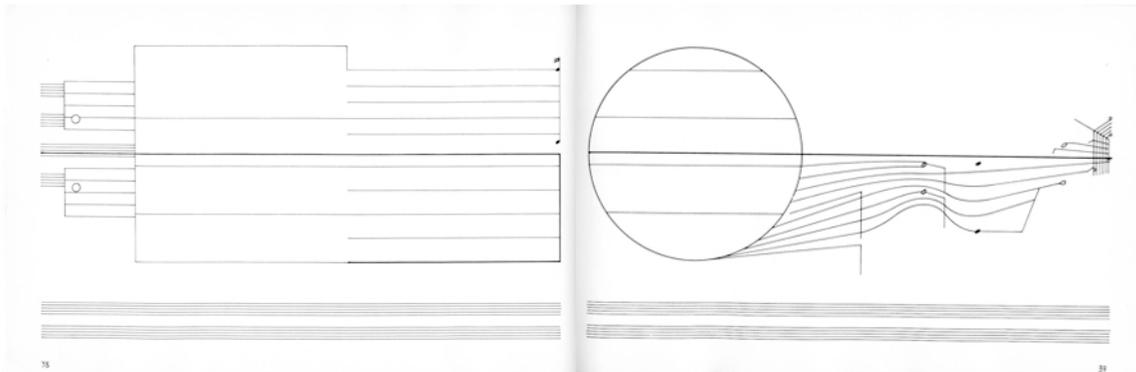
Figure 1.2: Cornelius Cardew, *Treatise,* 38-39
Image courtesy of John Tilbury, Peters Editions London

While the upper three-quarters of each page of the score is devoted to Cardew's

drawings, the bottom portion of the page contains two empty staves. These staves,

along with a horizontal line Cardew referred to as a "lifeline" that runs through almost

the entire score, combine with the abstract graphic shapes and occasional notation to

form "a long continuous drawing" whose form Cardew likened to a novel.[12]

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[10] Prévost, *Cornelius Cardew: A Reader*, 97.
[11] Nyman, *Experimental Music: Cage and Beyond*, 117.
[12] Prévost, *Cornelius Cardew: A Reader*, 117. Extensive analyses of *Treatise*, both as a composition and visual work, can be found in John Tilbury's exhaustive biography *Cornelius Cardew: A Life Unfinished*, Brian Dennis's essay "Cardew's *Treatise* (Mainly the Visual Aspects)," and Richard Barrett's "Cornelius Cardew." More recently, Adam Harper's personal reflections on *Treatise* in *The Wire*'s "Epiphanies" column provide evidence of the score's continued relevance and inspiration to contemporary experimental musicians and critics. See John Tilbury, *Cornelius Cardew: A Life*

While the score was "composed according to musical principles and is intended to serve as a score for musicians to play from," "indications of sounds, noises and musical relationships do not figure into the score … [and] each player interprets the score according to his own acumen and sensibility."[13] As Michael Nyman writes, "the richest potential of *Treatise* reveals itself when the performer(s) form some sort of non-representational relationship between sounds and materials and treatments."[14]
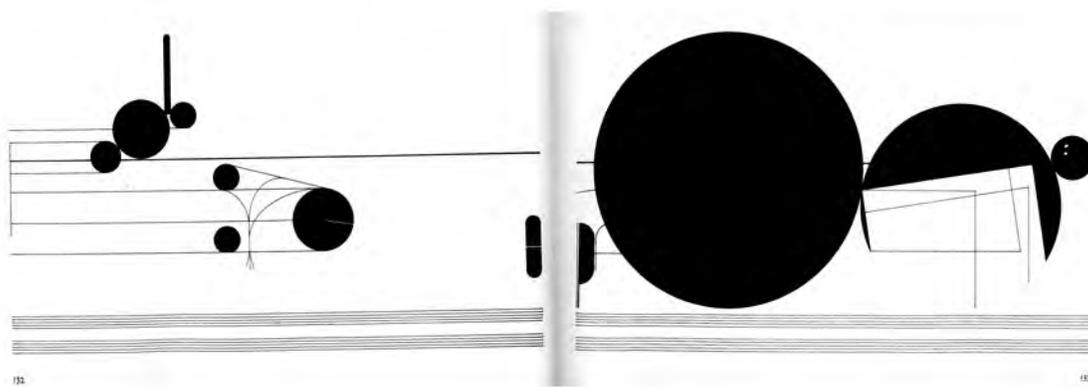
Figure 1.3: Cornelius Cardew, *Treatise*, 132-133
Image courtesy of John Tilbury, Peters Editions London

Treatise provides an architecture for its performers to situate themselves within, and with its elongated format (single pages are 7 x 10½" and become 21" in length when opened next to one another) reflects an expansive landscape of images that is almost close to a flat, drawn interpretation of the frame of widescreen cinema. During this period of his career, Cardew was not interested in translating images into sounds or the

Unfinished (Essex: Copula, 2008), Brian Dennis, "Cardew's *Treatise* (Mainly the Visual Aspects)," *Tempo* New Series, no. 177 (1991), Richard Barrett, "Cornelius Cardew," *New Music* 87 (1987), and Adam Harper, "Epiphanies," *The Wire* 2012.
[13] Prévost, *Cornelius Cardew: A Reader*, 117.
[14] Nyman, *Experimental Music: Cage and Beyond*, 118.

condition of synaesthesia (which he discusses in his 1976 critique of graphic music "Wiggly Lines and Wobbly Music"), but rather in the possibility of an abstract relationship between images and sounds. Cardew wrote that "…the very fact that the brain can *distinguish* visual from aural from tactile from olfactory stimuli implies that it can also *relate* them to one another."[15]

In the early 1950s, composers such as Earle Brown, Morton Feldman, and John Cage were creating "overtly visual" graphic scores that reflect both the close relationship between the experimental music and visual arts communities at the time, and a desire for graphic composition to no longer be conceived as solely "a means to an end but as an end in itself."[16] Cage, Feldman, and Christian Wolff were extremely influenced by abstract expressionism, and Feldman and Cage famously hung out at Greenwich Village's Cedar Tavern, a popular haunt for writers, poets, and painters (including Allen Ginsberg, Gregory Corso, Jack Kerouac, LeRoi Jones, Jackson Pollock, Mark Rothko, Franz Kline, and Willem de Kooning, among many others), every day for five years.[17] As Fluxus and, later, artists such as Max Neuhaus, Joseph Beuys, Vito Acconci, Lawrence Weiner, and Dennis Oppenheim started actively incorporating sound into their practice,

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[15] By the mid-1970s Cardew had turned against graphic music, denouncing his early work and that of Cage and Stockhausen (famously in his polemical 1974 book *Stockhausen Serves Imperialism*) in favor of collaborative free improvisation with the Scratch Orchestra—a group whose constitution and ideals reflected his Marxist-Communist political beliefs and activism. Prévost, *Cornelius Cardew: A Reader*, 250.

[16] Nyman, *Experimental Music: Cage and Beyond*, 73. Earle Brown's compositions were heavily influenced by the work of Alexander Calder and Jackson Pollock, which he first saw in 1948 or 1949 and describes in his essay "Transformations and Developments of a Radical Aesthetic." Brown's essay is reprinted in Cox and Warner, eds. *Audio Culture: Readings in Modern Music*.

[17] Feldman names "Barnett Newman, Mark Rothko, Larry Rivers, Jasper Johns, Willem de Kooning, Robert Motherwell, Robert Rauschenberg, Franz Kline, Jackson Pollock, and Philip Guston as personal acquaintances and influences." Alan Licht, *Sound Art: Beyond Music, Between Categories* (New York: Rizzoli, 2007), 137.

composers began thinking of their scores as not only maps, instructions, or guidelines

for performance, but also as visual works of art. In 1969, John Cage and Alison

Knowles published *Notations*, a collection of mid-twentieth-century music manuscripts

and reflections on notation, including text-, grid-, map-, and graphic-based scores, that

remains the definitive collection of nontraditional musical scores from this period.

Two years prior to the publication of *Notations*, Larry Austin and a number of the

performing members of the free improvisation group the New Music Ensemble began

distributing *Source: Music of the Avant-Garde*, a semiannual, meticulously produced

publication that ran from 1966 to 1973 and included essays, interviews, instrument and

circuit diagrams, LPs, and reproductions of new music scores. *Source* was founded with

the idea that the score, next to actual performance, was "the most reliable means of

circulating and evaluating new music," and the periodical provided a forum for

"transcribing" and distributing an extremely diverse selection of new avant-garde work.[18]

Source published the scores/notations/instructions for John Cage's *4'33"* (1961), Robert

Ashley's *The Wolfman* (1964), Anthony Braxton's *8KN-(J-6) | 1 | R^{10}* (1971), Pauline

Oliveros's *Sonic Meditations* (1971), and Steve Reich's *Four Organs* (1970) and

Pendulum Music (1968), among many other foundational works from the 1960s and

'70s. Every copy of 1969's issue 6, devoted to political and critical investigations of the

Vietnam War, is individually numbered and contains one page from the score to Dick

Higgins's *The Thousand Symphonies* (1968). Higgins made the score for *The Thousand

Symphonies* by "machine-gunning music paper with the standard ensemble indicated

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[18] Larry Austin and Douglas Kahn, eds. *Source: Music of the Avant-Garde, 1966-1973*
(Berkeley: University of California Press, 2011), 10-11.

on it."[19] One original page from the score was bound into each issue, rendering each

copy of *Source* a unique, editioned art object.[20]
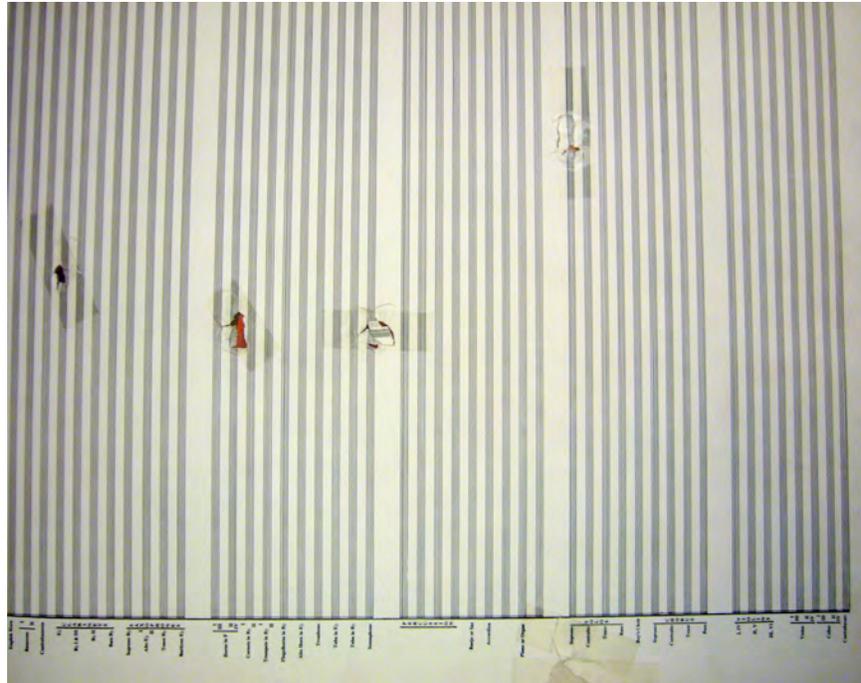
Figure 1.4: Dick Higgins's *The Thousand Symphonies* (1968), score page number 389
Source: Music of the Avant-Garde, no. 6 (1969)

With its large format (10¾ x 11½") and intricate details and inserts, *Source* more closely

resembles an artists' book than a music periodical.[21] As John Cage said, simply, of the

double issue (*Source* 7-8) he guest-edited in 1970, "it's beautiful."[22]

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[19] Austin and Kahn, eds. *Source: Music of the Avant-Garde, 1966-1973*, 204.

[20] The cover of issue 6 is a collage of a gun laid diagonally across a black-and-white photograph of rolls of Higgins's bullet-marked score in a trash can. The copy of *Source* that I looked at and picture here, owned by the University of Chicago library, contains a score page (numbered 389) with four bullet holes and one tear along the side, all of which have been covered with scotch tape.

[21] Selections from the original 11 issues of *Source* were republished in 2011 by Larry Austin, the publication's creative force and founding editor, and Douglas Kahn. This edited selection, while lacking the visual complexity of the original, provides long-overdue access to some of the most interesting written content from the rare periodical,

While Cardew's score for *Treatise* works through the complex and shifting

relationships between images and sounds toward a creative collaboration with the

musicians who respond to and interpret his graphic notations, scores like Nelson

Howe's *Fur Music* (a four part piece published in *Source* in 1971) attempted to create a

more direct relationship between seeing, hearing and feeling, and the visual, tactile, and

auditory experiences of their performers. Composed of strips of fake fur adhered to a

graphic score, *Fur Music* directs the performer to move their fingers across the fur in

various patterns and to "focus the mind in the fingers and listen intently" both to the fur,

and, in *Fur Music II*, to the individual colors printed adjacent to it.[23] The piece was

performed and installed at the Museum for Contemporary Crafts in New York, with the

score's quite large (13.5 x 36") original pages mounted on stands so that the performers

stood and looked down at them while their fingers moved across the soft fur patterns.

The smaller-scale reproduction that was subsequently printed in *Source* contains

horizontal strips of fur cut into various lengths, adhered in pieces on top of a black

horizontal band in *Fur Music I*, and in two longer and continuous strips in *Fur Music II*

and *Fur Music III*. All four of the *Fur Music* pieces also contain numbers, lines that

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and will hopefully focus critical attention on this extraordinary historical and artistic
document. I have been lucky enough to have access to original copies of all 11 issues,
and I can't emphasize enough how incredibly special it was to be able to page through
original copies of the publication. Each issue literally unfolds in completely unique and
unexpected ways. The intricacy, complexity, and meticulous detail of its design, printing,
and assembly are unparalleled. For example, John Cage's 1969 *Plexigram IV (Not
Wanting to Say Anything About Marcel)*, spiral bound into issue 7, is a series of hand-
silk-screened transparency sheets, and Jon Hassell's *MAP$_2$* (1969), published in issue
5, consists of a large square of magnetic tape affixed to the center of the page across
which the performer was instructed to move a playback head. Six 10" LP records were
also released with the journal, and were reissued in a three-disc set by Pogus in 2009.
[22] Austin and Kahn, eds. *Source: Music of the Avant-Garde, 1966-1973*, 6.
[23] Nelson Howe, "Fur Music," *Source: Music of the Avant-Garde* No. 9 (1971): 62.

indicate the movement and direction in which the score is to be performed, numbers

indicating the duration of the performer's activity, and symbols that represent the ideal

pressure of the performer's touch (hard, medium, medium soft, soft).
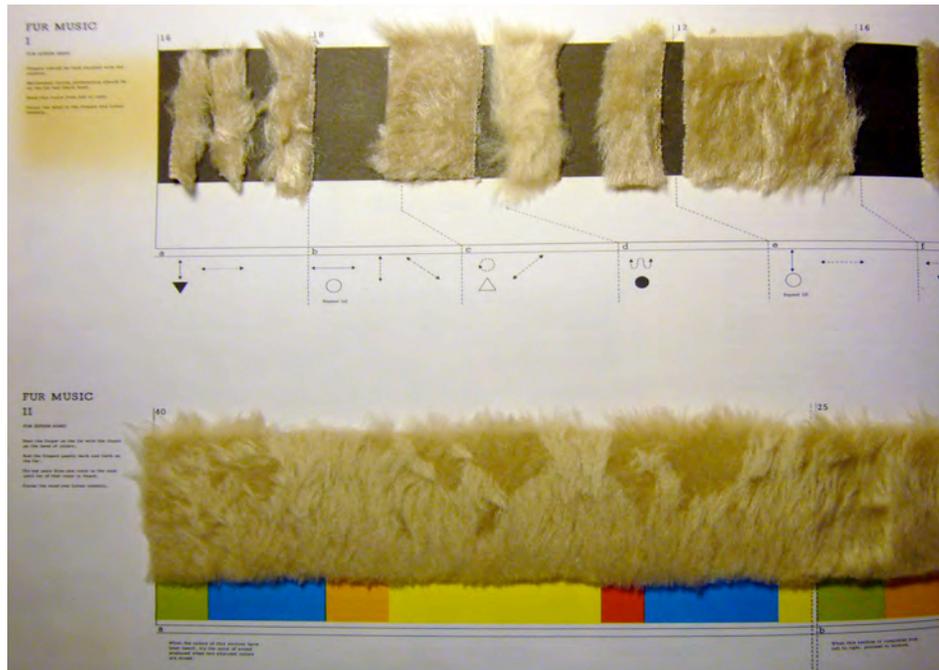
Figure 1.5: Nelson Howe, *Fur Music* (1971)
Source: Music of the Avant-Garde, no. 9 (1971): 62

Howe wanted the piece to "provide the participant with a situation where he may

translate his tactile sensations into patterns of sound," and if the performer was unable

to *hear* the tactile sensations provided by the piece, at least the fur could offer "solace

for those who do not hear music with their fingers."[24] While Howe was clearly pushing

the performer toward an experience akin to synaesthesia, or at the very least, to return

to Cardew, to one in which the senses are put into direct relationship with one another,

the pleasure of the piece comes from its humor and playful take on the form of the

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[24] Ibid., 61.

graphic score. Beyond this play with the senses and correspondences, *Fur Music* also

directly complicates the relationship between performer and audience in that Howe

intended for the participant to be simultaneously performer and audience. Challenging

the purpose of notation and the relationship between composer and performer, and

performer and audience, both Howe's and Cardew's scores reevaluate the role of the

artist/composer and the way in which sounds are both organized and received by the

audience.

Included in the same issue of *Source* in which Howe's *Fur Music* was originally

published (1971, issue 9) is a section titled "Circuit Book," which consists of a series of

circuit schematics. These include diagrams for building basic types of oscillators

(voltage controlled; sine and square wave; relaxation; square, pulse, and saw), a ring

modulator, and various, more unusual circuit designs by John Mizelle. But *Source* was

not the first publication to reproduce circuitry schematics as musical notation.
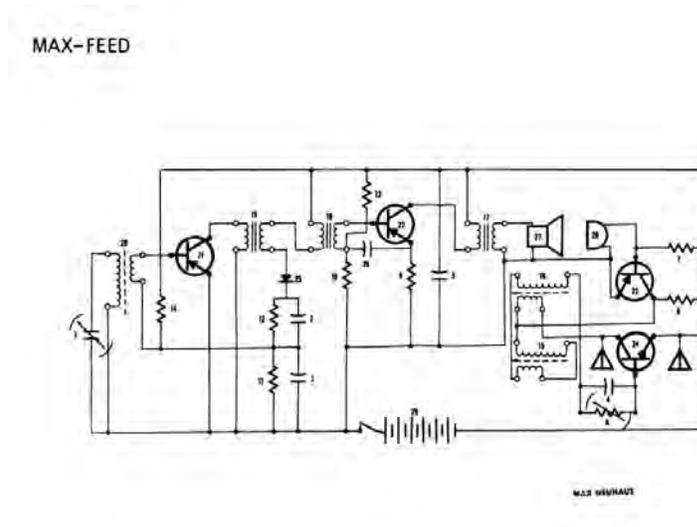
Figure 1.6: Max Neuhaus, score for *Max-Feed* (1966)
John Cage, *Notations* (New York, Something Else Press, 1966), n.p.

In *Notations,* Cage published Max Neuhaus's circuit diagram/schematic illustration for the portable "art object" and "avant-gardizer" *Max-Feed* (1966), a feedback device that when placed next to a stereo generated a wall of amplified noise, along with Gordon Mumma's circuit diagram (schematic 1 of 11) for the gate matrix used in *Mesa* (1966).[25] By including these circuit designs alongside graphic- and text-based scores, both *Notations* and *Source* helped move the design of electronics out of the realm of the purely technical and into that of artistic creation.

An exceptionally talented designer, Gordon Mumma viewed the creation of unique electronic equipment as an integral part of the work that he did as a composer and artist. Mumma had been designing his own circuitry and electronic instruments since the mid 1950s, formed the Cooperative Studio for Electronic Music in 1958 with Robert Ashley in Ann Arbor, Michigan, and was one of the original organizers of the ONCE festival (a showcase for new avant-garde and experimental composition, jazz, electronic music, dance, and multimedia events). Mumma worked with John Cage, John Tudor, and the Merce Cunningham Dance Company in the mid-1960s and, along with Robert Ashley, David Behrman, and Alvin Lucier, formed the touring group the Sonic Arts Union (1966-76). Mumma designed an electronic music system that was used in the Pepsi Pavilion at Expo '70 (the Japan World Exposition/World's Fair/Ōsaka Banpaku) in Osaka, Japan, and became known for designing electronics that would process conventional musical instruments (the French horn, Argentinean bandoneon, etc.) to render them "cybersonic." Mumma believed that designing his own, completely

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[25] Branden Wayne Joseph, "An Implication of an Implication," in *Max Neuhaus: Times Square, Time Piece Beacon*, eds. Lynne Cooke and Karen Kelly (New York: Dia Art Foundation, 2009), 69-70.

unique electronic equipment was an essential part of his creative process and composition. "My 'end product' is more than a package of electronic hardware, it is a performance of music… my designing and building of circuits is really 'composing.' I am simply employing electronic technology in the achievement of my art."[26]

Mumma's technical skills and incorporation of electronics into the process of composition, scoring, and creation had a strong influence on a young undergraduate student and composer he met in the electronic music studio at Brandeis University—Richard Lerman. While teaching music courses and running the chamber chorus at Brandeis in the early 1960s, Alvin Lucier brought Mumma, John Cage, David Behrman, David Tudor, and other like-minded artists and musicians to campus for talks, class visits, and performances at the Rose Art Museum. Lerman found a mentor in Tudor, who, like Mumma, made his own electronic equipment, believing that "new, object-specific, intrinsically electronic musical material and forms would emerge as each instrument took shape. 'I try to find what's out there—not to make it do what I want, but to release what's there. The object should tell you what it wants to hear.'"[27] With Tudor's encouragement, Lerman learned how to solder from Mumma and by the end of his junior year was teaching himself electronics—in part by reading catalogs to figure out how to create the equipment he envisioned. Lerman's connection to both Tudor and Mumma was based not only in their shared interest in electronic music, but in Lerman's

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[26] Nyman, *Experimental Music: Cage and Beyond*: 91. Liz Kotz has written a fascinating essay on circuitry and scores, see Liz Kotz, "Circuit and the Score" in *See This Sound: Promises in Sound and Vision* (Linz: Lentos Kunstmuseum, 2009), published in conjunction with the exhibition of the same name held at the Lentos Kunstmuseum in Linz from August 28, 2009–January 10, 2010.
[27] Nicolas Collins "Composers Inside Electronics: Music After David Tudor," *Leonardo Music Journal* no. 14 http://www.leonardo.info/lmj/collinslmj14intro.html (2004).

desire to work with nontraditional materials and to learn to build his own equipment. After completing his undergraduate degree, Lerman returned to Brandeis as a graduate student and ran the electronic music studio during his tenure in the music department.[28]

Mumma's interest in handmade circuitry, exploration of sonic environments through the circuitry and performance of his "cybersonic consoles," and creative use of electronic technology is reflected in Lerman's lifelong dedication to examinations of the score, sonic spaces, and handmade, hands-on electronics. These explorations have carried Lerman through various mediums—from tape, electronics, and amplification systems in sound to investigations of process, the score, and improvisation in film and performance. Lerman states that from early on in his studies he had been thinking of ways to create "analogs between sound techniques and film techniques," and some of his earliest pieces operate between the mediums of live performance, cinema, and sound art.[29] *Third Book of Exercises* (1967) offers a perfect example of this kind of intermedial practice: the film documents Lerman's performance of a sound piece with ¼" reel-to-reel tape and was designed to be screened in conjunction with a live presentation of the same work. The Lerman we see onscreen pulls loose audiotape out of a trash basket and feeds it into a tape player. The task, as he described it, was to try to feed the tangled tape (on which was recorded one of his compositions) through the player as best as he could—to smooth it out when it got tangled and to rip it and re-thread the machine if it got too knotted to pull apart. Because the film's sound is synchronous, we hear the playback of Lerman's composition and its various starts and

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[28] Lerman later switched to the Film/Theater Arts Department, which awarded his master's degree in 1970.

[29] Arthur and Corrine Cantrill, "An Interview with Richard Lerman, American Film/Sound Artist," *Cantrills Filmnotes* no. 51-52 (December 1986): 34.

stops as he attempts to feed it through the machine. When Lerman screened the film,

he would project it with the synchronous soundtrack audible and simultaneously perform

the original piece onstage for the audience using the same tape player, wastebasket,

and jumble of audiotape. Lerman's work to keep the two audio tracks in sync is part of

the fun of the piece, at the same time that it inevitably creates sync drifts not unlike the

phase shifting being explored by Steve Reich in his tape pieces *It's Gonna Rain* (1965)

and *Come Out* (1966).

Figure 1.7: Frame from Richard Lerman's *Third Book of Exercises* (1967)
Courtesy of Richard Lerman

While Lerman's work with handmade transducers is a part of a larger

investigation of the sounds of objects and the vibrations of materials and environments

that artists like Alvin Lucier and Takahiko Iimura were undertaking in the 1960s and

'70s, Lerman's pioneering work with transducers and piezoelectric disks has established

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him as one of the earliest and most important innovators of "piezo music."[30] Lerman has

been working with piezo disks for over 40 years, using them to build homemade

microphones and amplify everyday objects such as Slinkys, credit cards, floppy disks,

window screens, ribbons, copper sheeting, cactus thorns, wind harps, and spider

webs.[31] Piezo microphones operate on the same principle as contact microphones in

that they are capable of making audible sounds that are not audible to the human ear.

As opposed to standard microphones that pick up sounds in the air, contact and piezo

microphones are designed to act as transducers, extending our hearing by picking up

(through direct contact) the inaudible vibrations of objects and converting them into a

voltage signal that allows them to be heard.

      The piezo disks that Lerman works with are capable of what is known as

"reversible sound translation," meaning that they function as both sound receivers and

transmitters. Piezo microphones operate through the electrical properties of crystals, as

opposed to electromagnetism, and piezoelectric disks are traditionally created by

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[30] Nicholas Collins uses this term "piezo music" to classify a genre of work being made with piezoelectric disks by artists including Richard Lerman and Hugh Davies. Davies, a British artist who started working with piezo disks at around the same time as Lerman, designed piezo-amplified instruments that he would perform in both composed and improvised pieces. Collins goes on to discuss more recent work being made by artists like Otomo Yoshihide, Eric Leonardson, Adachi Tomomi, and Ivan Palacky with piezos, contact microphones, and turntable cartridges. Nicolas Collins, *Handmade Electronic Music*, 2nd ed. (New York: Routledge, 2009), 41.

[31] Richard Lerman, "Piezo Disks, Audio Schematics and a Condenser Mic." http://www.sonicjourneys.com/PDF%20Files/Audio%20Schematics2.pdf. Lerman is passionate about teaching children and adults how to make their own equipment in the hopes of bridging the worlds of science and art, and encouraging the development of people's "sonic creativity" through explorations of "acoustic ecology" and newer forms of music and sound art. He has published many of his piezo schematics and teaching methods on his website at http://www.sonicjourneys.com/. See, also, "A Guide for Working with Piezo Electric Disks to Introduce Children to Issues of Acoustic Ecology and Sonic Creativity," http://www.sonicjourneys.com/PDF%20Files/Children%20&%20Piezo%20disks.pdf.

coating a sheet of brass with a thin layer of crystal or ceramic.[32] Bending when they

receive and give out voltage, piezo microphones act as both a receiver and transmitter

of sound, an acoustic property that Lerman has explored in a variety of artworks from

the 1970s to the present. In addition to his work in sound, Lerman has used his self-built

transducers in numerous Super 8mm sound films, collected together as the *Transducer*

Series, an ongoing project that began in the early 1980s and continued until the last

Kodachrome processing run in 2010.

Figure 1.8: Frame from Richard Lerman's *Transducer Series 15: Neshkoro Pond* (1984)
Courtesy of Richard Lerman

The *Transducer Series* films use Lerman's "hand-built microphones as camera subject

and audio input," so that the viewer is able to see the transducers and hear the sound

that they produce.[33]

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[32] Collins, *Handmade Electronic Music*: 31.
[33] James Irwin, "8mm: Richard Lerman," *Spiral* no. 8 (1986): 45.

Perhaps the most recognized work Lerman has made using his handmade transducers is *Travelon Gamelon: Music for Bicycles* (1976–present), a collaborative, community-based performance work that uses amplified bicycles as instruments.[34] By the mid-'70s Lerman's audio work was heavily focused on the creative use of contact/piezo microphones and their capacity to amplify small or inaudible sounds through direct contact with physical materials. In an early tape music piece made in 1963 (and used in a production of Jean Genet's *The Maids* later that year), he had experimented with amplifying and recording the sound of bicycle spokes by "jamming a microphone against the frame."[35] The first versions of *Travelon Gamelon* utilized 81T phonograph pickup cartridges, inspired in part by conversations Lerman recalls having with David Tudor around 1963.[36] Tudor's compositions for live electronics and various performative and installation versions of *Rainforest* (*Rainforest*, 1968, and *Rainforest IV*, 1973, which used objects, as opposed to speakers, to conduct and transmit electronic signals) employed contact microphones and procedures of live mixing and sound redistribution that would prove extremely important to Lerman's work from the 1960s to the present. Tudor's investigations of the resonant sounds of performance spaces and the live feeding-back of electronic signals reflect a body of concerns found in Lerman's performative films and sound work.

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[34] Recordings of both the concert and promenade versions of *Travelon Gamelon: Music for Bicycles* were released on Folkways Records in 1982. The album was reissued as a part of the compilation *Music of Richard Lerman, 1964-1987: Featuring Travelon Gamelon (Music for Bicycles),* by EM Records (1063 CD) in 2006.

[35] Richard Lerman, liner notes to *Music of Richard Lerman, 1964-1987: Featuring Travelon Gamelon (Music for Bicycles)*, EM Records 1063 CD, 12.

[36] Ibid.

While Lerman ended up replacing the phonograph cartridges originally used in the first few concert performances of *Travelon Gamelon* with contact microphones made from piezo transducers, his initial appropriation and use of the cartridges as amplification devices reflects the influence of not only his work with Tudor but, of course, John Cage. Cage's *Cartridge Music* (1960), in which the performer inserted objects such as "toothpicks, matches, Slinkys, piano wires [and] feathers" into phonograph cartridges in lieu of the needle, is considered to be one of the first and most important experimental pieces to utilize indeterminacy in the live performance of electronics.[37] The graphic score for *Cartridge Music* consists of various shapes printed onto transparencies (a scoring technique Cage used in *Fontana Mix*, 1958) that indicate the activation of the cartridges and various objects amplified by contact microphones; the placement of objects into the phonograph cartridges; and the volume control of the various amplifications. Interested in "composition which was indeterminate of its performance" and in performance "indeterminate of itself," Cage sought to inject openness and aleatory practices into the world of electronic music by allowing, for example, the performers to turn down the amplification and make inaudible one another's actions.[38]

Travelon Gamelon exists in two forms—as a formal concert performed onstage in front of an audience, and as a roving street promenade performed by 25 bicyclists or more. In the concert version, six performers play the wheels of three bicycles placed upside-down on a stage, while one or more performers on electronics process and mix the sounds the bikes generate. The promenade version, which premiered in Boston in

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[37] Nyman, *Experimental Music: Cage and Beyond*, 90.
[38] Ibid., 91.

1978, is performed outdoors with bicycles outfitted with piezo microphones, battery-operated amplifiers, and small horn-type loudspeakers. The bicycles are amplified by transducers that are fixed to their axles, and the sounds made by their frames, spokes, and vibration are then amplified and broadcast through the attached speaker horns. The sounds that result recall the dense and shimmering music of a traditional Balinese gamelan performance, both in terms of tempo, pitch, and resonance, and in the way the rhythmic strikes of the spokes layer and stack into repetitive circles of tones.[39] This version of *Travelon Gamelon*, which evolved out of the concert version as a way to engage listeners who would not ordinarily seek out new or avant-garde music, has been performed hundreds of times by groups of bicyclists all over the world and was included in the Walker Art Center's "New Music America" festival in 1980.

Figure 1.9: Richard Lerman's *Travelon Gamelon*, performed in Amsterdam in 1982
Photographs courtesy of Richard Lerman

In the process of developing and experimenting with different pickup systems for *Travelon Gamelon* that would be durable, while increasing response and limiting

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[39] Gamelan instruments are commonly played in pairs in which each instrument is tuned slightly differently. The interference between the two similar, yet slightly different simultaneous tones results in what is known as a "beating" effect.

feedback, Lerman began a journey of investigation and experimentation that would come to define his career.

Travelon Gamelon reflects a broad range of concerns that have woven their way through all of Lerman's creative work, in particular his interest in live performance, audience and community participation, the engagement of environments and spaces, the amplification of objects, the extension of our capacity to hear, and improvisation. A promenade performance of Travelon Gamelon is nothing if not fun, and reveals Lerman's interest in infusing his work with elements of humor and play. The sheer spectacle of a large group of bicycles riding together and broadcasting the tinny, pinging sounds of their spokes is enough to capture the attention of most passersby. But Lerman also strives to make his work more directly accessible, and the promenade version of Travelon Gamelon not only captures the joy and free-spiritedness of childhood, it allows any person with the ability to ride or walk with a bicycle to become a musician. The piece is improvised, as it were, by its performers and the route they choose to ride; it is completely aleatory, indeterminate, and open to chance happenings. The performers, rather than the composer, are in control of the performance, both in terms of the quality and tempo of its sound and the physical location of its performance. The piece is political both in terms of the way that it occupies the city streets it is performed on, and in the way that it transfers power from the composer-author to the performers.

This engagement of the performer is, of course, an integral component of experimental and improvised music, and defines the work of artists as diverse as Cornelius Cardew, Toshi Ichiyanagi, and Christian Wolff. Travelon Gamelon, as

performed outside, engages in what composer Frederic Rzewski has called "created

space," resulting in truly collaborative, creative, and collective music-making in which

the performer and audience are liberated from tradition and the hierarchies of power

related to the creation and performance of musical work. In Rzewski's proposal for *Free

Soup* (1968), he writes:

> We are all 'musicians.' We are all 'creators.' Music is a creative process in which
> we can all share, and the closer we can come to each other in this process,
> abandoning esoteric categories and professional elitism, the closer we can all
> come to the ancient idea of music as a universal language. …We are trying to
> catalyze and sustain a musical process, moving in the direction of unity, towards
> a sense of communication and closeness among all the individuals present.
> …[The musician's] role is that of organizer and redistributor of energies: he
> draws upon the raw human resources at hand and reshapes them, combining
> loose random threads of sound into a solid web on which the unskilled person is
> able to stand, and then take flight.[40]

The promenade version of *Travelon Gamelon* is a participatory and very public

intervention, one that makes the space of performance both mobile and completely

unpredictable. By moving the performance out of the formal structure of the concert hall

and into the streets, Lerman is challenging the division of performers and audience

members. The performers are both musicians and audience; the audience, or

witnesses, on the street are constantly changing; and any sense of a fixed relationship

between the musician and the listener is called into question. Lerman's interest in

challenging the unidirectional movement of both sound and attention from performer to

audience member is a constant strain of inquiry in his work and, as this chapter will

explore, a central feature of his 1974 performance film *Sections for Screen, Performers

and Audience*.

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[40] Nyman, *Experimental Music: Cage and Beyond*, 130.

When *Travelon Gamelon* is performed in its concert version, the musicians use a graphic score that utilizes "two systems of notation: one of traditional music rhythmic values and the other, a graphic notation using bicycle wheels to notate visually how the spokes are to be struck through time."[41] Lerman says the score was "designed as a kind of musical joke" because its system of notation uses "symbols which suggested the relationship between bicycles and musical notation."[42] The performers work primarily with the bicycles' wheels and spokes, and Lerman's notational system draws parallels between the roundness of wheels and the traditional shape of notes, and the length and thin verticality of spokes and the lines of stems and staffs. The score opens with a visual lexicon that links the symbols used in the score to their corresponding actions.
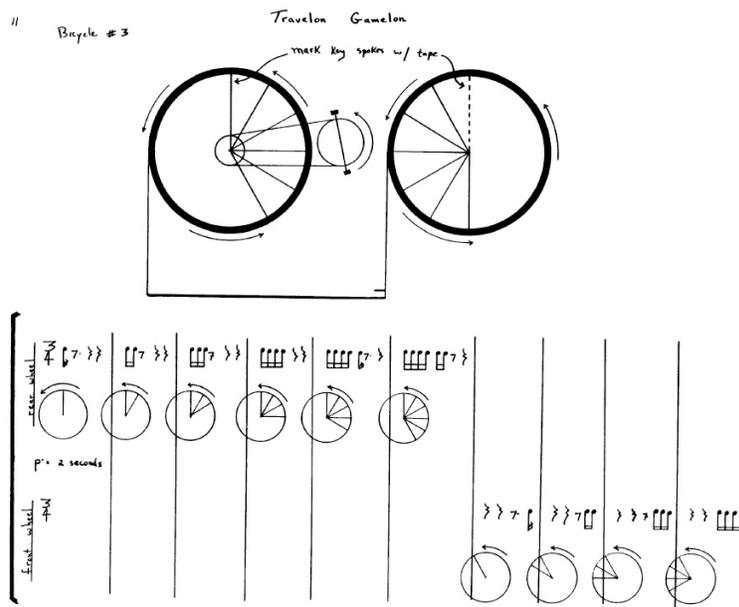
Figure 1.10: Richard Lerman, score for *Travelon Gamelon* concert version (1977), 4
Courtesy of Richard Lerman

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[41] Richard Lerman, liner notes to *Music of Richard Lerman, 1964-1987*, 14.
[42] Cantrill, "An Interview with Richard Lerman, American Film/Sound Artist," 34-35.

A symbol that looks like a triangular-shaped note with a stem designates that the performer should strike the frame and/or handlebars; a large open circle with a line coming off of its base directs the player to strike the tire; an open circle with arrows tracing a counterclockwise direction around its perimeter means that the performer should apply the brakes and stop the wheel from spinning; and a series of eight vertical lines connected with three horizontal bars on the bottom direct the performer to brush the spokes in a "long burst" while the wheel is spinning quickly.
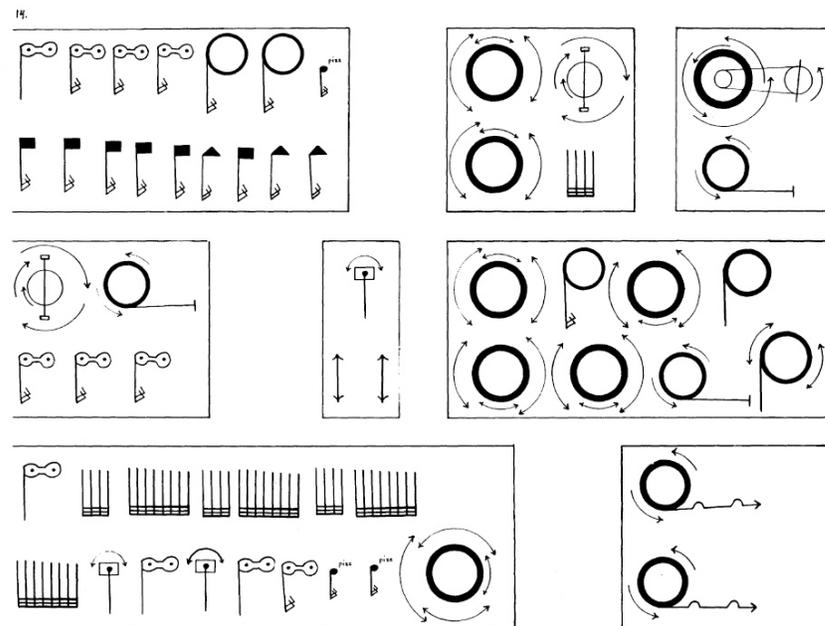
Figure 1.11: Richard Lerman, score for *Travelon Gamelon* concert version (1977), 14
Courtesy of Richard Lerman

In sections one and three of the score, this graphic notation is used in combination with musical notation that marks the rhythm, or frequency, of the performer's strikes. While these sections are carefully notated, the second, "free section" of the score directs the performers to improvise and "explore all the other

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sounds that are inherent to a bicycle: striking the handlebars, the rubber of the tire or the axles, spinning the pedals, applying the brakes, plucking the brake cables. They are told that their job is to listen to each other…"[43]

The two versions of *Travelon Gamelon* and their different explorations of the relationship between performer and audience and between the performance, or interpretation, of the graphic score and improvisation are closely connected to the principle concerns of Lerman's fascinating performance film *Sections for Screen, Performers and Audience* (1974). Reflecting Lerman's fluid movement between the mediums of film and sound, *Sections for Screen, Performers and Audience* was created as both a visual work and as a moving graphic score for live improvisation and performance by a group of musicians. Adding to the piece's complexity, Lerman used sound itself to help create the images that would make up the film's imagery and graphic score, feeding sounds he generated with an ARP synthesizer into an oscilloscope and then filming the results. The end product is utterly unique, simultaneously a film and a kinetic, graphic score for performance—perhaps the only moving, cinematic score of its kind.

Graphic scores, like more traditional forms of notation, function as a representation of sound, an inherently temporal experience, in a static (print) format that can only allude to the experience of time. Composers like Cage and Brown worked to develop systems for representing or notating time and duration that were not metric or rhythmic (as they are in traditional notation), but were instead based on relative and "flexible visual-temporal" relationships that moved beyond "the liberation of sound" to

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[43] Ibid., 35.

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the "liberation of time."[44] While Brown went so far as to create scores that were completely devoid of representations of time and rhythm, instead indicating "spaces" that could be "filled or represented by any type or combination of sounds, according to any chosen time scale," Lerman eliminated the problem of how to articulate temporal movement altogether by creating a score that literally moved and evolved in time.[45]

The 16mm film print of *Sections for Screen, Performers and Audience* reveals aspects of the experience of its performance, in much the same way that the score of a piece of music reveals various aspects of its composition. But instead of containing all of the elements of the final experience, the print of the film exists as one of many elements comprising the whole.
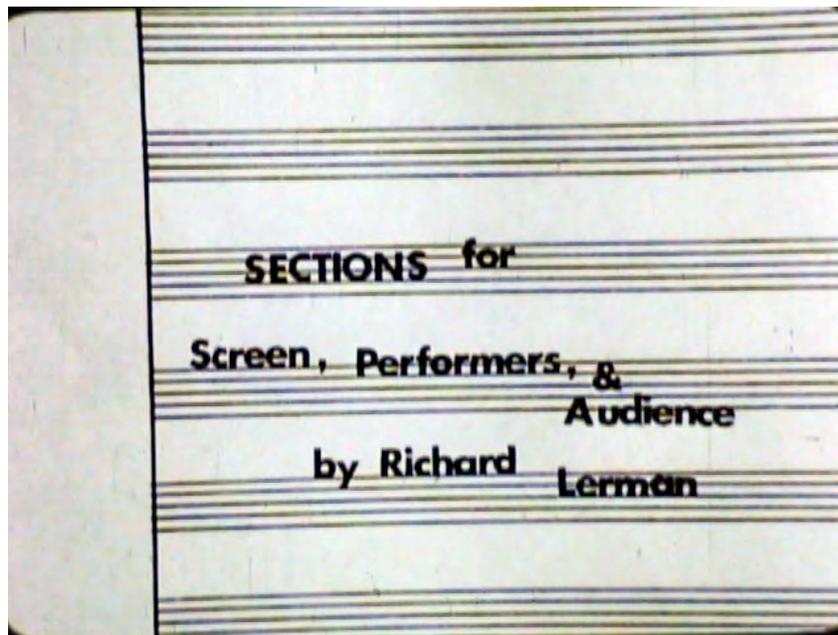
Figure 1.12: Frame from Richard Lerman's
Sections for Screen, Performers and Audience (1974)
Courtesy of Richard Lerman

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[44] Nyman, *Experimental Music: Cage and Beyond*, 57.
[45] Ibid., 58.

The film print is, at once, one of the visual components of the piece as well as the score for its sonic half, but itself includes no audio track. *Sections for Screen, Performers and Audience* was printed on 16mm reversal print stock with a blank soundtrack and is meant to be projected at 18 frames per second, or "silent speed" (most commercial 16mm projectors have only two set frame rates, 24fps and 18fps).

The film is a little over 9 minutes long when projected at 18fps and, following the opening title, primarily consists of two superimposed sets of images. The first layer of imagery is a series of high-contrast, black-and-white fields that depict passages of musical notation, the five-line musical staff, graphic notation, and abstract, line-drawn images that evoke the graphic scores used by experimental and avant-garde composers such as Morton Feldman, John Cage, Earle Brown, Cornelius Cardew, Philip Corner, and Karlheinz Stockhausen, among others. The second layer of images consists of abstract shapes and patterns that were created on the oscilloscope.

The film is divided into nine sections that are separated by 2-3 seconds of black. The partitioning of the film into these discrete sections was intended to add a "feeling of pause and phrasing" to the images.[46] Even though the imagery remains fairly consistent throughout the film, each section is marked by a unique manifestation of the notation or oscilloscope figures. Following the opening title, the first section begins in black, with two five-line white staves over which green oscilloscope shapes enter and exit the frame. The oscilloscope images hover over and vibrate across the staves, which—although they do not stay in the same location in the frame throughout the section—provide a ground upon which the oscilloscope images can fluidly move and shift. The

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[46] Richard Lerman, email message to the author, October 22, 2009.

first oscilloscope image is a fuzzy green dot of light that expands up and out into a

rectangle. The rectangle covers and crosses the upper staff lines, suddenly increases in

size, and then moves up, down, and out of the frame. This is followed by a green oval

shape bisected by a diagonal line that slowly moves into the frame from the upper-right

corner; scribbles of horizontal waves and fluctuating lines; and vibrating, zigzag-outlined

circular images that layer on top of one another. In the second section of the film, the

oscilloscope images begin as vertical lines of light that wipe horizontally across the

frame, shift into circles and corkscrews that move across the frame, and finally become

repeating circular and linear patterns that fill the frame top to bottom. The oscilloscope

images grow increasingly complex and multilayered, and appear red and blue in

subsequent sections of the film.
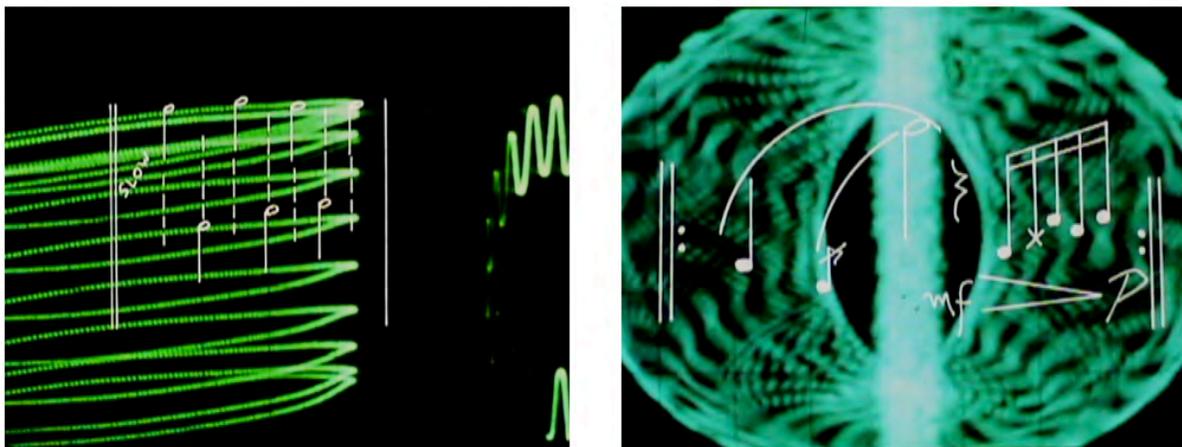
Figure 1.13: Frames from Richard Lerman's
Sections for Screen, Performers and Audience (1974)
Courtesy of Richard Lerman

The oscilloscope imagery was created in 1971, while Lerman was working on a

narrative film, *Think Tank*, and was given access to the ARP Electronic Music Company

facilities in Lexington, Massachusetts. He fed the signals created while playing an ARP

2500, the company's first modular synthesizer, into a Tektronix oscilloscope and

recorded the images created on the oscilloscope with a 16mm Bolex camera.[47] Two

years later, in 1973, Lerman hand-drew *Sections for Screen, Performers and*

Audience's black-and-white musical notation, including the empty staff's five bars; the

combinations of line drawings of circles and lines in sections two, four, and six; the

scattered half notes above the handwritten words "very slow"; and combinations of

whole notes, bridges, and the abbreviation for mezzo forte.
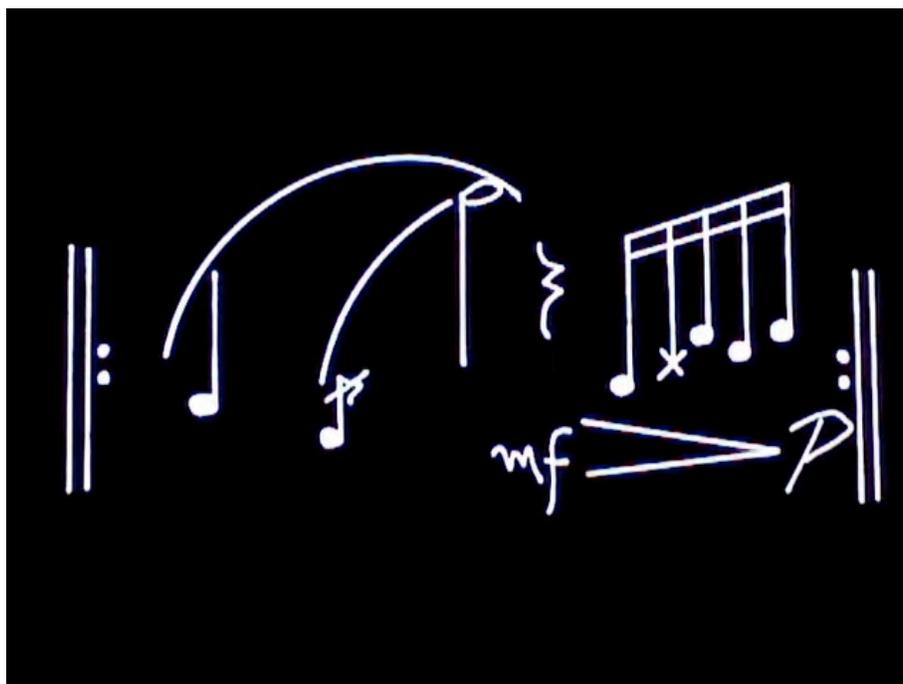
Figure 1.14: Frame from Richard Lerman's
Sections for Screen, Performers and Audience (1974)
Courtesy of Richard Lerman

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[47] He found this particular synthesizer to be particularly well-suited to making complex and spectacular images, and described the process of creating oscilloscope images as one in which he has learned to play various kinds of synthesizers in order to create interesting images rather than sounds.

Lerman then superimposed the oscilloscope imagery, which had been optically printed using red, green, and blue filters, over the notation.

Lerman's notation plays with some of the standards of conventional notation and direction, as well as "some of the things that musicians do when they improvise—play fast or slow, play a figure and then repeat it."[48] The fifth section of the film contains mandala-like oscilloscope images superimposed over a passage of notation that contains a note with an X in place of its head, which is typically interpreted as a percussive strike. In the third section of the film, the oscilloscope generates a mass of lines that come together into the outline of a half note. This oscilloscope note hovers between the third and fourth lines of the staff, surrounded by a mass of swirling lines.
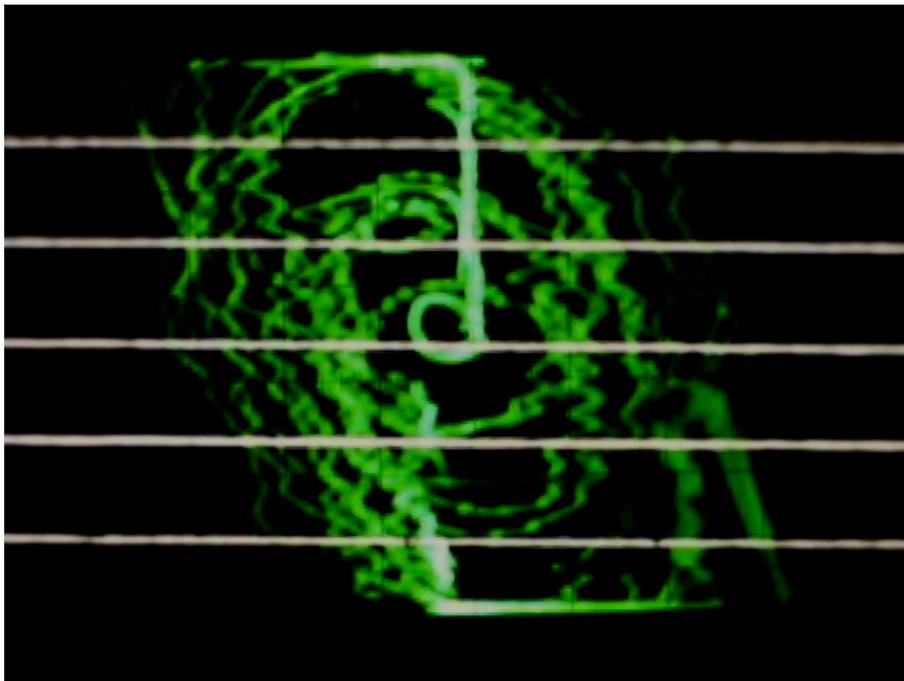

Figure 1.15: Frame from Richard Lerman's
Sections for Screen, Performers and Audience (1974)
Courtesy of Richard Lerman

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[48] Richard Lerman, interview with the author, Milwaukee, WI, November 27, 2010.

This brief moment points to the serendipitous way in which the two layers of images frequently come together in unusual and poignant relationships. The oscilloscope images and the graphic notation move on different planes and at different rates, working together as well as against one another at various points throughout the film.

The element of *Sections for Screen, Performers and Audience* that is missing from the physical print is, of course, its soundtrack. The 16mm film is just one element of the piece, which is intended to be projected with live musical accompaniment. Lerman has been present at most of the screening-performances of the film, often accompanying on electronics—both generating sounds and processing the sounds created by other musicians using both traditional and nontraditional instruments.[49] He describes the film as providing a "framework for improvisation" for any number of musical performers, and the screening experience as one in which the performers and audience view the film together, with the performers positioned in front of, and with their backs to, the audience so that they are facing the screen.[50]

Lerman's interest in projecting the musical score being played, or improvised to, reflects his desire to share with the audience the origin of the performer's actions. He describes the impulse as stemming from "the idea that whenever I went to a concert there was always that mystery of what were the performers looking at—we can't see the music. [*Sections for Screen, Performers and Audience*] was a way of revealing to the

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[49] At the film's performance on October 26, 1975, which was recorded and subsequently released on the EM Records reissue of Richard Lerman's music, the musicians included Basil Bova on piano, Earl Grant Lawrence on flute, George Cordiero on alto saxophone, and Lerman on Sho, "other instruments," and electronics.

[50] Richard Lerman, liner notes to *Music of Richard Lerman, 1964-1987: Featuring Travelon Gamelon (Music for Bicycles)*, 26.

audience what the performers were seeing. …The film was the score."[51] As teenager in Milwaukee, Lerman says he would go to the public library, check out records and their musical scores, and then follow along with the score as he listened to the music. "I was always fascinated by music scores and often imagined how concerts might be changed if performers were not hidden behind music on stands."[52]

Figure 1.16: Photograph from the performance of *Sections for Screen, Performers and Audience* at the Gene Siskel Film Center on November 12, 2009.
Pictured are Guillermo Gregorio on clarinet and Brian Labycz on electronics.

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[51] Cantrill, "An Interview with Richard Lerman, American Film/Sound Artist," 34.
[52] Richard Lerman quoted in the program notes for the screening "Variable Area: Hearing and Seeing Sound, 1966-1978," curated by the author and exhibited at the Gene Siskel Film Center on November 12, 2009 as a part of the Outer Ear Festival of Sound and the Conversations at the Edge film series. *Sections for Screen, Performers and Audience* was performed live by the artists Guillermo Gregorio, Brian Labycz, and Art Lange. The archived program notes are available on the Conversations at the Edge website: http://blogs.saic.edu/cate/variable-area-hearing-and-seeing-sound-1966%E2%80%9378/.

Recalling Noël Llinos's appeal in Cage's *Notations* to "tell the eye what the ear will hear" and "design scores that the audience can see too,"[54] Lerman's desire to reveal the symbols and cues the musicians follow as they improvise together works to connect visual experience with aural and to demystify one aspect of the musicians' process. *Sections for Screen, Performers and Audience* simultaneously creates a shared experience and bridge between the images on screen, the performers in front of the screen, and the audience seated in the theater. Because the oscilloscope imagery and graphic notation are relatively abstract, the viewer inevitably makes connections between the film as score and the sounds being generated by the musicians. The multiple layers of the film provide different levels of access into the images and, thus, different ways for the performers to interpret them. Lerman was interested in the various ways the musicians would respond to the cinematic conventions, such as pans and close-ups, and the three colors of oscilloscope imagery that appear in the layer of notation, asking "what do those colors mean in terms of improvisation and repetition—when something is blue and it reappears as red, how do you interpret that?"[55] In its function as a graphic score, *Sections for Screen, Performers and Audience* stimulates and guides the musicians' improvisation and creative responses to both the images and one another.

 Sections for Screen, Performers and Audience, in one way, works to create a more "total" kind of experience for the viewer by revealing a part of its process, in particular the score. This focus on both revealing process and making process a part of

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[54] John Cage, *Notations* (New York: Something Else Press, 1969), n.p. Noël Llinos is assumed to be a pseudonym for the composer Mildred Finck.
[55] Richard Lerman, interview with the author, Milwaukee, WI, November 27, 2010.

the work is one of the threads that connects art movements as seemingly different as Fluxus and minimalism to filmmakers and musicians such as Lerman, Michael Snow, and Steve Reich. As the live performance is happening, the audience is able to interpret the relationship between the images on screen and the sounds that are being generated by the musicians. In this sense, *Sections for Screen, Performers and Audience* is very much about transparency, visibility, and the demystification of musical performance. At the same time that it works to make its process transparent, it simultaneously breaks down the traditional relationship between the composer, performer, sound, audience, and the "stage ritual that has brought them together."[56]

Lerman describes the work as a kind of "feedback piece: sound generated the images for the score and performers created new sounds and a new piece from these images."[57] The film is completed when it is performed live in front of an audience, and when new and unexpected sounds are generated from images that had been created through the performance of sound. A feedback loop of sorts is generated in the work's performance—one in which Lerman, through his use of the oscilloscope, is translating sound into visual imagery, and then using those images to generate new, unpredictable, improvised sounds. Lerman describes this development as one in which he thought that "by putting sound *in* to make and create images, why wouldn't it be possible to then put

[56] In the preface to the first issue of *Source*, the editors used this phrase to describe the way in which the "new music" of the time was concerned with breaking down the "19th century relationship between the audience, the performer, the sound, and the stage ritual that has brought them together." Austin, *Source: Music of the Avant-Garde, 1966-1973*, 12.
[57] Richard Lerman, program notes for "Variable Area: Hearing and Seeing Sound, 1966-1978."

the image *out* to produce sound?"[58] The score is created by sound and, in turn, creates

new sound. *Sections for Screen, Performers and Audience* feeds sounds into images

and images back into sounds, at the same time that it works to make the process of

sonic creation material.

While Lerman's *Sections for Screen, Performers and Audience* is a completely

unique investigation and manifestation of the graphic score in cinema, other filmmakers

associated with the structural film movement in the 1960s and '70s were utilizing

techniques and styles associated with graphic scores in music for pragmatic purposes

in the planning and creation of their films. Hollis Frampton's *States* (1967, reshot in

1970 and finished in 1972) was created with what he called a "real score, or graphic

notation" that established the movement between the film's three image sources:

smoke, milk, and salt.[59] Peter Kubelka made a series of scores in the process of

working on *Adebar* (1956-57), *Schwechater* (1957-58), and *Arnulf Rainer* (1958-60),

including preliminary exercises for *Arnulf Rainer* that illustrated the "architecture in time

between light and darkness" and numerous plots of the film's four elements: black

frames, clear frames, silence, and "white noise" tone. In one of these early scores,

Kubelka marks the eight possible combinations of these four elements as a series of

typed letters ("m" and "x") in rows and columns.[60] Other scores for the film contain rows

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[58]Richard Lerman, interview with the author, Milwaukee, WI, November 27, 2010.
[59] Scott MacDonald, "Interview with Hollis Frampton: The Early Years," *October* 12 (Spring 1980): 110.
[60] Next to the columns and rows of "x" and "m" characters, Kubelka lists the combinations as: structure articulated by light; negative of light structure; structure articulated by sound; negative of sound structure; light structure meets sound structure; light structure meets negative of sound structure; negative of light structure meets sound structure; negative of light structure meets negative of sound structure.

of numbers and long columns of red and black "x" and "-" characters that designate the patterns of lightness, darkness, silence, and sound Kubelka employs in the film.

1) Structure articulated by light.

2) Negative of light structure.

3) Structure articulated by sound.

4) Negative of sound structure.

5) Light structure meets sound structure.

6) Light structure meets negative of sound structure.

7) Negative of light structure meets sound structure.

8) Negative of light structure meets negative of sound structure.
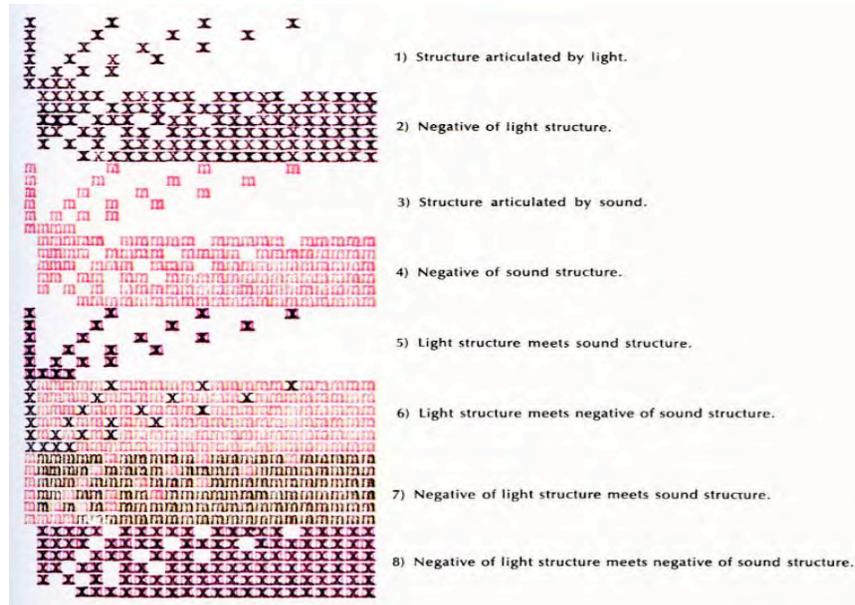
Figure 1.17: Preliminary score for *Arnulf Rainer*, 1960
Elena Pinto Simon, "The Films of Peter Kubelka," *ArtForum* 10, no. 8 (April 1972): 37

Kubelka considered these scores to be master, or primary, documents that would allow the film to exist far beyond the life span of its celluloid material. The scores defined the film "completely" and enabled it to be "remade by anyone without possible error."[61] The score thus functions as a kind of key, unlocking the structure of the film, at the same time that it asks to be a preservation document.

Bill Brand employed systems of scoring in the planning and shooting of his intricately constructed films *Moment* (1972) and *Angular Momentum* (1973).

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[61] Elena Pinto Simon, "The Films of Peter Kubelka," *ArtForum* 10 (April 1972): 36-37.
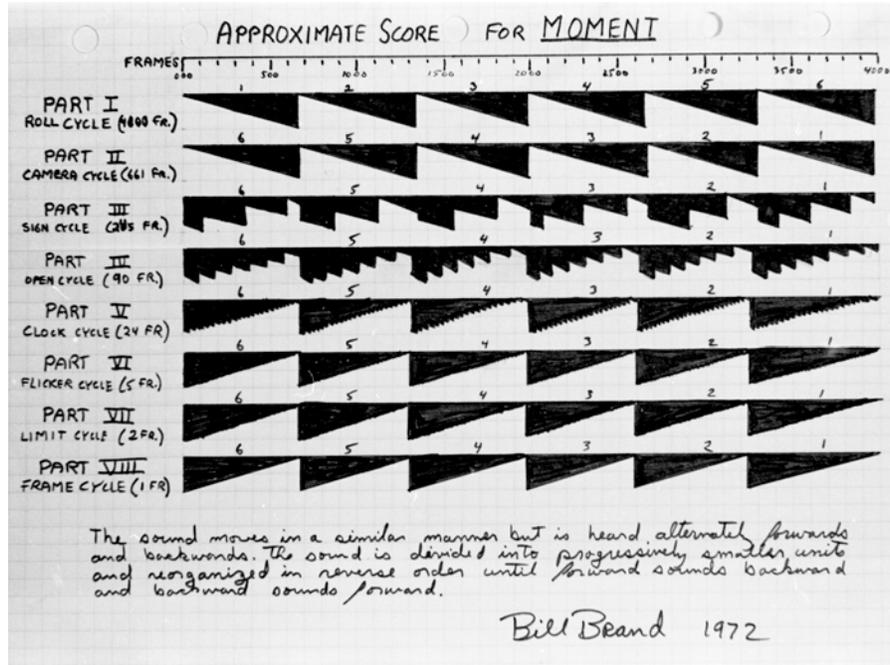
Figure 1.18: Score for *Moment*, Bill Brand, 1972
Courtesy of Bill Brand

Rate of Change (1972), the first part of his *Acts of Light* series (followed by *Angular Momentum* in 1973 and *Circles of Confusion* in 1974), was created with only one original image element, a "color timing score" that the laboratory used to generate—solely through the printing process—the film. This score designated progressive timing changes, one light level at a time, which the lab used to create a light-struck leader template for printing the film. The leader contained notches every two feet (a system that triggered the subtle and progressive one-step color timing shifts in the contact printer) and was used to create the film print of *Rate of Change*. A film made without a camera, and which Brand describes as having "no original, no frames, only slow

continuously shifting colors," *Rate of Change* uses the score not only as a compositional tool, but also as its original.[62]

Paul Sharits, with whom Brand studied and collaborated, created intricate and obsessively detailed visual scores for his films—from 1966's *Ray Gun Virus* through works like *Declarative Mode* (1976-77) and *Passare*, which consumed him from 1979 through the mid-1980s. Sharits used a music composition book to score the color movement in *Ray Gun Virus*, a decision that strikes me as extraordinarily important (and one that hasn't, to the best of my knowledge, ever been acknowledged). Sharits's notes and frame calculations are written on the staff lines and unfold as markers of variations in color patterns, rhythm, tempo—what Sharits calls the film's pulse.[63]
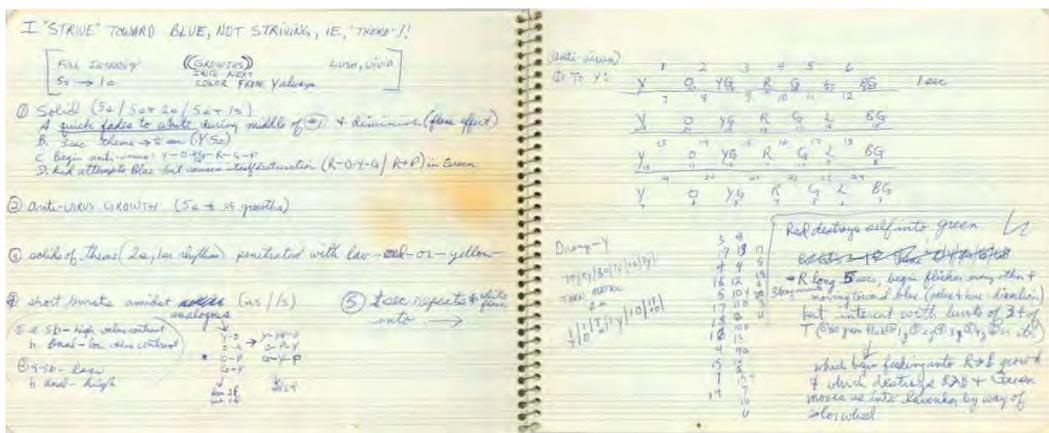
Figure 1.19: Paul Sharits, notebook for *Ray Gun Virus*
Courtesy of the Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY

Sharits continued using blank music paper for notational purposes, and a series of diagrams for the structure of *Declarative Mode* designates phrases, variations, and

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[62] Bill Brand, description of *Rate of Change* on his BB Optics website:
http://www.bboptics.com/early70.html
[63] Paul Sharits papers, *Ray Gun Virus* folder (39), Burchfield Penney Art Center, Buffalo, New York.

rhythms (all Sharits's terms) of color in lines and dashes across the staff lines. These scores make it clear that Sharits was thinking about color, and the rhythm of colors, in acoustic terms.[64]
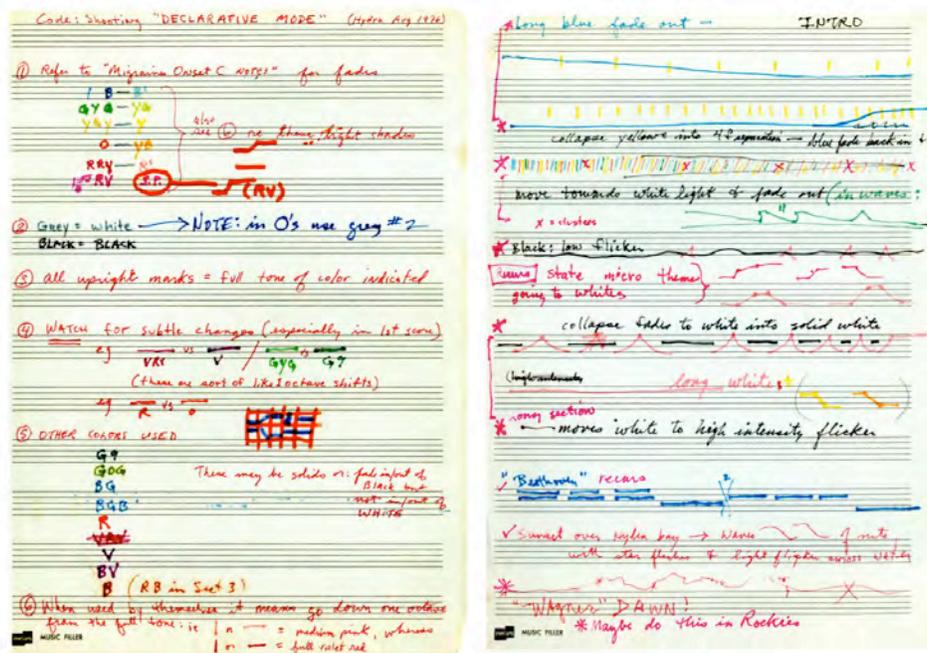
Figure 1.20: Paul Sharits, 2 pages from *Declarative Mode* score
Courtesy of the Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY

Sharits described his practice in painting, drawing, sculpture, and film as "all-at-once," and while working on his films he was simultaneously creating elaborate colored-marker drawings on graph paper—drawings that function both as scores for his films and as independent works of art.[65] These pieces were meant to be exhibited in the gallery space alongside his "locational" film installations and the *Frozen Film Frame* pieces that

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[64] One section of the score for *Declarative Mode* includes the phrases "'Beethoven recurs" and "'Wagner DAWN!" Paul Sharits papers, the Burchfield Penney Art Center archives.
[65] Paul Sharits, "Exhibition/Frozen Frames," *Film Culture* 65-66 (1978): 82.

were another manifestation of his work between still images, or scores, and the

constantly changing, temporal experience of film.[66]
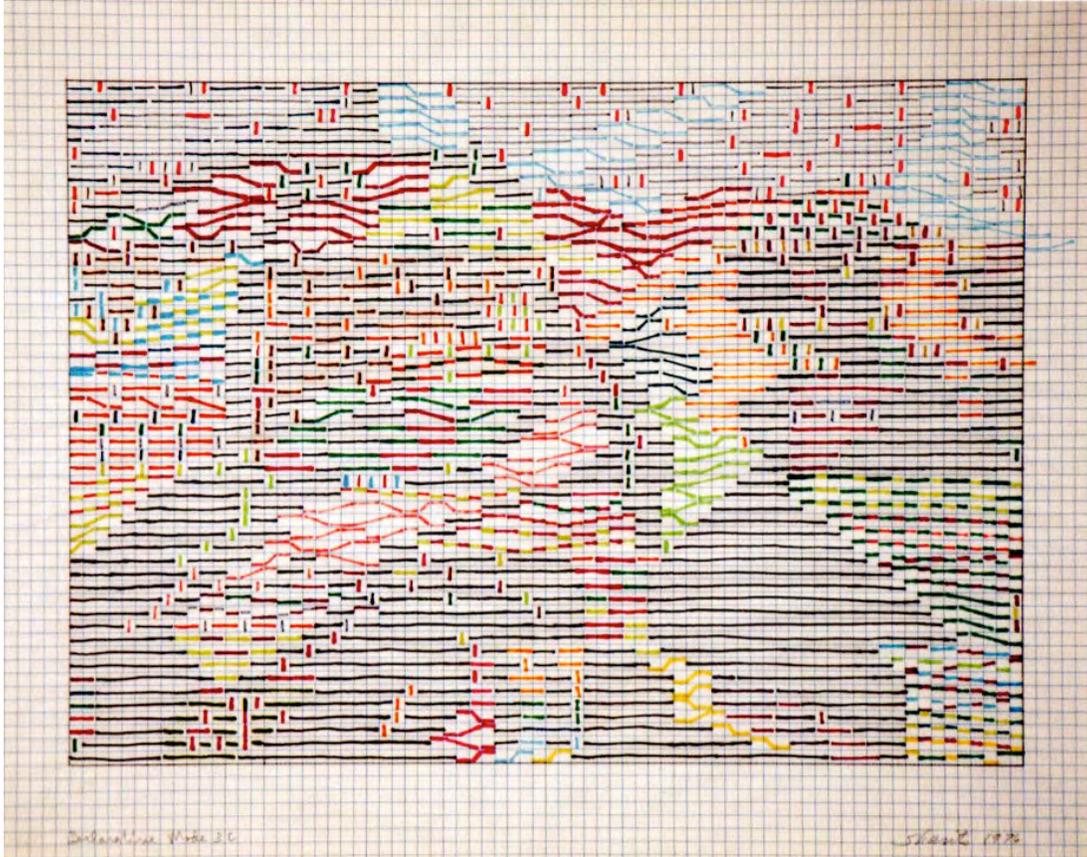
Figure 1.21: Paul Sharits, *Declarative Mode* drawing, 1976
Image courtesy of the Burchfield Penney Art Center, Buffalo, NY

Sharits writes that his frame study drawing-scores directly relate to their celluloid

counterparts and that each colored mark on the paper corresponds to one colored

frame in the film. He described his working method as one in which

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[66] The *Frozen Film Frame* pieces were shown at the Bykert Gallery (operated by Klaus Kertess and Jeff Byers from 1966-1975) in New York City, the Albright-Knox Art Gallery in Buffalo, and the Galerie Ricke in Cologne during the 1970s.

…this process of making, at the same time, both a temporal 'score' and an all-at-once drawing oscillates consciousness at a rate of change which propels one into wholly unexpected tributaries of the 'stream' of filmic consciousness… the scores are recordings of co-existing maps of intersected layers of 'pattern-consciousness' and maps of gestalted time zones…[67]

Moving fluidly between these various mediums and forms of expression, Sharits was also working on permutations of his films that he termed "spatial objects"—the *Frozen Film Frame* pieces.[68] These objects were developed in conjunction with the modular drawings and drawn graphic scores Sharits had been making since the mid-1960s. Sharits writes that after he began working on *Ray Gun Virus* in 1965, he started "mapping out my films in a way similar to musical scores and modular drawings," and these *Frozen Film Frame* pieces were comprised of strips of the films "serially arranged side by side from beginning to end, from right to left, between sheets of plexiglass."[69] They were designed to be "transparent to even the most naive viewer, thus enriching the understanding of a given work and emphasizing the basic structure and tangibility of film itself."[70] While the *Frozen Film Frame* pieces began as something akin to graphic scores or still representations of films that Sharits had made, Sharits considered them to be independent works, obviously connected to their moving image counterparts, but designed to allow the viewer a different point of entry into his process. Sharits wrote of the way in which sculpture "temporally unfolds in the observers' movements around/through it," and the *Frozen Film Frame* pieces reveal his interest in examining film as a strip of physical material and exploring alternative models of spatial and

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[67] Sharits, "Exhibition/Frozen Frames," 82.
[68] Ibid., 81.
[69] Ibid.
[70] Ibid., 81-82.

temporal engagement on behalf of the spectator.[71] The *Frozen Film Frame* pieces are

scores at the same time that they are objects—objects that capture and freeze the

ephemeral cinematic experience. These parallel investigations—into the material, or

objecthood, of film as a physical medium and the expansion of the experience of the

spectator—are crucial components of Sharits's work in the 1970s and are considered in

greater detail in the final chapters of this dissertation.

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[71] Ibid., 81.

CHAPTER TWO

SPROCKET HOLES

"*Maxwell's Demon*, as you remember, is also a sound film, and one reason I chose the sound I did—the sound of film perforations—just plain film perforations—was not only to increase the mass of some of the interspersed shots in the film, but also because I wanted to use the first sound that film ever made which is the sound of film itself. I wanted to use the most fundamental kind of sound I could think of…"[1]

—Hollis Frampton

Hollis Frampton's decision to use what he termed "the first sound that film ever made" as the only element of the soundtrack for his 1968 film *Maxwell's Demon* reflects, in part, his interest in examining the origins of cinema through his personal filmic practice, as well as his much larger and ongoing artistic effort "to reconstruct the history of films as it 'should have been.'"[2] The sound of film perforations, or sprocket holes, would also be used by Frampton's friend and contemporary Paul Sharits in works ranging from his single-screen color flicker film *Ray Gun Virus* (1966), completed two years prior to *Maxwell's Demon*, to *Color Sound Frames* (1974) and his locational film installation piece *Synchronousoundtracks* (1973-74). For both Frampton and Sharits, working with the sound of sprocket holes was deeply connected to their investigation of

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[1] Michael Snow, "Hollis Frampton Interviewed by Michael Snow," *Film Culture* 48-49 (Winter & Spring 1970): 10.
[2] Ibid., 11.

the materiality of film as a strip of discrete images and a physical object, and to the act and performance of projection.

It is projection that animates and brings to life a strip of film, and the sprocket hole is among the components essential to that process. Sprocket holes allow for regulated movement of the film through the projector, for precise registration of the film within the projector gate, and for the intermittent pause and forward propulsion of the film that creates the illusion of movement. In addition to the creation of the flexible celluloid base material that allowed significant lengths of film to move through the projector, the sprocket hole is among the vital technical developments that allowed strips of still images to create the illusion of movement.

By the early 1900s, the majority of 35mm films had rectangular-shaped sprocket holes located on either side of the filmstrip, and the location of the sprocket holes on the edges of the motion picture filmstrip has been fairly standard since the turn of the century.[3] 35mm film has been standardized to have four sprocket holes per frame, and

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[3] 35mm sprocket holes tended to be approximately the same size and distance from one another, enabling film prints to be shown on a variety of different projectors. But until the mid-1920s there was a great deal of experimentation with the width of the filmstrip and sprocket hole placement. Sprocket holes were round, they were square, and they were rectangular; there were multiple sprockets per frame and single sprockets per frame (some unusual formats like Pathé-Kok's 28mm stock had three perforations on one side of the filmstrip and one on the other); they were located on the edges of the filmstrip, to the side of the image, and in the middle of the filmstrip in between images. Kodak introduced rectangular-shaped sprocket holes with rounded corners for 35mm projection prints in 1924, and their size, shape, and location (the "Kodak Standard") have remained standard ever since. Paolo Cherchi Usai's books *Burning Passions: An Introduction to the Study of Silent Cinema* and *Silent Cinema: An Introduction*, which provided this information, include excellent descriptions and reproductions of some of these formats, as well as a thorough overview of the development and standardization of cellulose film stock. Paolo Cherchi Usai, *Burning Passions: An Introduction to the Study of Silent Cinema* (London: British Film Institute,

the analog optical soundtrack is located on the side of the filmstrip between the image and the sprocket holes.

Figure 2.1: 35mm analog soundtrack (double bilateral variable area tracks)

16mm sprocket holes are also located on the edge of the filmstrip, but are positioned directly at the frame line. 16mm film can have single or double perforations, meaning that sprocket holes can be located on either one or two sides of the filmstrip. Typically projection print stock has single perforations and camera stock has double perforations. 16mm projection print stock is almost always single perforation because on a single-perf filmstrip, the edge of the filmstrip without the sprocket holes is where the film's soundtrack is located. Thus, the only double-perf films that would ever run through a 16mm projector are films without soundtracks.

1994). ———, *Silent Cinema: An Introduction*, Rev. and expanded ed. (London: British Film Institute, 2000).
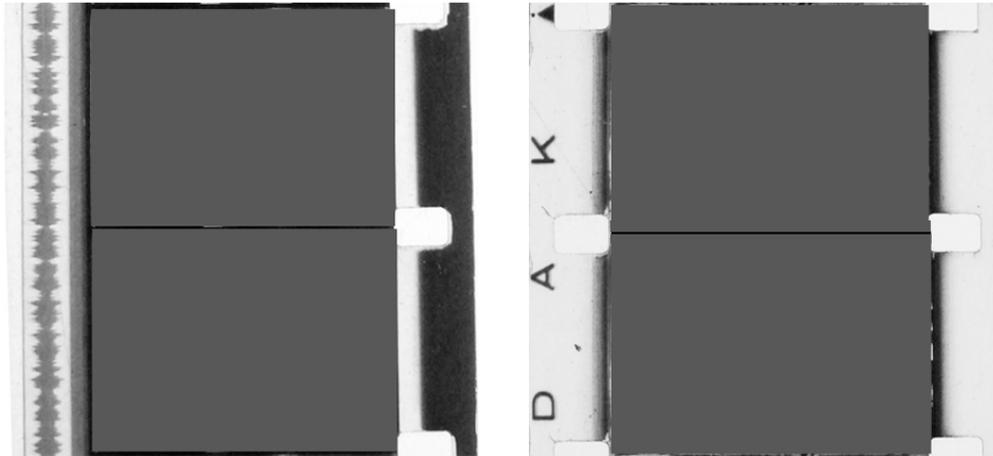
Figure 2.2: On the left is an image of a 16mm single-perf film with an optical soundtrack (bilateral variable area), and on the right is a 16mm double-perf (silent) filmstrip

The majority of inexpensive and portable 16mm projectors utilize a claw mechanism to intermittently advance the filmstrip and hold it in place in the projector gate.[4] The filmstrip is advanced through a feed sprocket and into the projector gate, where the intermittent claw mechanism hooks into the sprocket holes and pulls the film down frame by frame in a repeating cycle of movement and stillness, movement and stillness, movement and stillness. While the film is being pulled down (a process that takes 1/144th of a second), the rotating, three-bladed shutter momentarily covers the film and masks its movement. The shutter makes one complete rotation for every frame that is pulled down, which means that while the film is stationary in the projector gate, light passes through it in three flashes lasting 1/144th of a second each.[5] Without this

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[4] Less common professional projectors (such as the Eastman 16mm projector) utilize an intermittent Geneva movement mechanism for pull-down that has one set of sprocket teeth and is driven by a motor. The intermittent mechanisms used in 35mm projection have two sets of sprocket teeth.

[5] In 16mm claw pull-down projection, as well as with intermittent Powers movement and 35mm high-speed Simplex projectors (all of which use three-bladed shutters), the pattern is as follows: In the first 1/144th of a second the film is advanced or pulled down. In the second, fourth, and sixth 1/144[ths] of a second the film frame is held still and light

intermittent start and stop movement, and the repeated, exact registration of the

filmstrip in the projector gate, the resulting images would appear as an abstracted and

indiscernible blur.

     While the intermittent start and stop motion of the film in the projector gate is

necessary in order to create the visual illusion of continuous movement for the viewer,

film soundtracks, alternately, need to move continuously past the audio reader on the

projector at a smooth and steady pace. As a result, the soundtrack on a filmstrip is

displaced from its corresponding image (in 16mm film, the optical soundtrack is printed

twenty-six frames ahead of the image). In a typical 16mm projector, the sound head is

located below the projector gate, allowing for exactly twenty-six frames between the

gate aperture and the optical audio exciter lamp and photocell reader. As the film runs

through the projector, it passes through the gate via the process of intermittent pull-

down and then proceeds through a series of rollers, which help to smooth and steady its

movement, to the sound head. The film then wraps around a smooth drum that is

controlled by heavy flywheel in order to ensure smooth and continuous motion through

the sound reader. The optical audio track passes over a metal drum and a beam of light

from a small exciter lamp is focused through the audio track. A light-sensitive

photoelectric cell converts the variable light patterns printed on the optical audio track

into an electrical signal that is subsequently reproduced as sound.

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passes through it, and in the third and fifth 1/144^{ths} of a second the still film frame is covered with the shutter and light does not pass through it. This pattern is different in projectors that utilize two-bladed shutters and Geneva moment, where the film is covered by the shutter and pulled down in 1/96th of a second, illuminated for the second and fourth 1/96^{ths} of a second, and held still and covered by the shutter in the third 1/96th of a second.

While magnetic sound striping on 16mm film was in use for a brief period of time, optical audio has remained the most common type of soundtrack. Optical audio converts sounds into a visual pattern that, in its most common iteration, resembles a sonic waveform. This type of waveform optical soundtrack is referred to as a variable area soundtrack, and reflects amplitude through the height of the wave and pitch through its frequency.[6]

It is not uncommon for a double-perf silent film to be mistakenly projected with the optical lamp and sound amplification system turned on, an accident that results in the audience hearing the sound of the sprocket holes. These sprocket holes, located where the film's optical audio track would be if it had one, pass through the optical audio reader and are read by the projector as though they were an optical audio track. Because optical audio tracks are designed such that patterns of lightness and darkness correspond to sounds, when sprocket holes pass through the optical reader of the projector, the pattern of film and empty space created by the regularly spaced perforations generates a rhythmic pattern of rapidly alternating sound and silence. The sound of these sprocket holes can only be described as pure, rhythmically punctuated noise.

Focused on the use of sprocket hole sound in works by Hollis Frampton and Paul Sharits, this chapter draws connections between the structuralist desire to examine the essential qualities of the medium of film, and Frampton and Sharits's explorations of what the medium, itself, sounds like. Investigations of film as a physical material

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[6] In addition to variable area optical audio tracks, a second (and less common) method of optical audio production and printing exists called variable density optical audio. Variable density tracks do not look like waveforms, but are rather patterns of horizontal lines that vary in width (frequency) and density (opacity).

demand an examination of the sprocket hole—it regulates and marks the individual framed images on the film strip and is crucial to the act of projection. As Peter Kubelka states, "cinema is not movement," but rather provides the illusion of movement in its "quick projection of light impulses."[7] The film strip requires sprocket holes in order to move, to come to life, to become the thing that is cinema. Hearing sprocket holes is about as close as one can get to hearing film itself—it is, at once, hearing the material of perforated celluloid film, hearing the cinematic apparatus of projection, and hearing pure, mechanized movement at 24 frames per second.

Hollis Frampton's *Maxwell's Demon* uses the intermittent recorded sound of 8mm sprocket holes, "just plain film perforations," as the audio source material for the soundtrack of his homage to the physicist and mathematician James Clerk Maxwell.[8] While Maxwell is primarily known for his theoretical work on electromagnetism and thermodynamics, Frampton's interest was based on Maxwell's analytical work in color theory and optics, more precisely on his observation that "any color may be synthesized with only three monochrome colors—red, green, and blue."[9] In 1861, Maxwell presented the first demonstration of color photography using this three-color method during a lecture at the Royal Society in London. The demonstration, while used to illustrate

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[7] Jonas Mekas, "Jonas Mekas: An Interview with Peter Kubelka," *Film Culture* 44 (Spring 1967): 45.

[8] It is worth noting that Frampton's background in photography, physics, and mathematics, as well as his application of mathematical principles to film, is not unlike Maxwell's unique interest in science, mathematics, and the development of scientific principles via the arts. The connection between Maxwell's ideas and Frampton's later work at the Digital Arts Lab at SUNY Buffalo was noted by Michael Snow in his touching remembrance, "On Hollis Frampton," reprinted in *The Collected Writings of Michael Snow* (Waterloo: Wilfrid Laurier University Press, 1994), 246-248.

[9] Scott MacDonald, *A Critical Cinema: Interviews with Independent Filmmakers* (Berkeley: University of California Press, 1988), 35.

principles of human perception and optics rather than to showcase a new photographic technique, would come to form the theoretical basis for the widespread development of three-color photography. Frampton believed that all filmmakers owe Maxwell a "considerable debt" given that his work on color, vision, and optics contributed to the development of color photography and, in turn, color cinematography.[10]

While *Maxwell's Demon* was made in homage to James Clerk Maxwell, its title indicates that Frampton was also paying tribute to a "hypothetical demon."[11] Maxwell described this demon in his 1871 treatise on thermodynamics as a gatekeeper of sorts whose role was to regulate the flow of molecules between two chambers containing a gas. In Frampton's interpretation of Maxwell's formulation, as molecules of gas moved from one chamber to another, an inequity was created that forced the demon to work with increasing rapidity and fervor. Frampton was drawn to Maxwell's concept of the demon as a "being who worked entirely in forms of pure energy," a theoretical and scientific concept envisioned in the form of an animated demonic body.[12]

Maxwell's Demon combines appropriated imagery from a Canadian Air Force exercise film with regularly interspersed, one-second segments of "color frames" and "single-frame images of ocean waves."[13] Frampton shot the monochromatic frames and images of the ocean frame by frame, a process he described as animating "on-location," with six filters (corresponding to the six additive and subtractive primary colors), a white

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[10] Snow, "Hollis Frampton Interviewed by Michael Snow," 10.
[11] Ibid., 7.
[12] Ibid., 8.
[13] ———, "Interview with Hollis Frampton: The Early Years," *October* 12 (Spring 1980): 112.

card, and a score as his guide.[14] Frampton's single-frame images of the ocean vary—

some show the water gently rolling, and others were taken after the waves had broken

and were spilling toward the shore. While photographing ocean waves is certainly not

unconventional, the decision to capture them at the point at which the internal energy of

the water reaches the point of breaking certainly seems analogous to the chaotic

buildup of energy explained by Maxwell's theory.
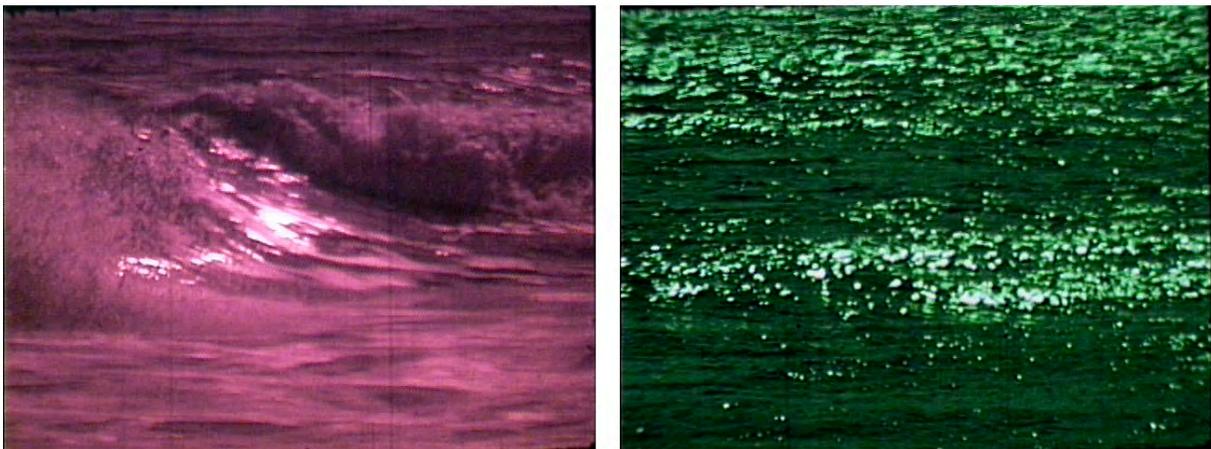
Figure 2.3: Film stills from Hollis Frampton's *Maxwell's Demon* (1968)

These rapidly flashing one-second color segments intersect the Canadian Air

Force exercise footage at regular intervals sixty-two times.[15] Each one-second color

segment consists of six discrete four-frame segments, and as the film progresses "the

single frames of the ocean are added in a series going from no frames of ocean to all

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[14] Ibid., 113.

[15] Frampton had originally intended for the film to contain sixty-four flashing color passages in between sixty-five passages of the Canadian Air Force exercise footage. He described the six parts as a six-bit binary number and said there were sixty-four "possibilities for organizing two kinds of things into groups of six." Frampton miscalculated; he says that he ended up with only sixty-three one-second color fragments and that "one six-bit binary number is missing." There are, in fact, only sixty-two of these color segments. Ibid.

frames of ocean."[16] The movements of the man in the exercise footage also gradually

increase in intensity as the film progresses, as Frampton describes, moving from

> relatively little activity to relatively great activity. The activities of the exercising
> man, which I took from an instructional film on Canadian Air Force exercises I'd
> bought for a buck on Canal Street, are graded to change from prone inertness to
> relatively violent scissoring movements. The one-second units perform a
> counting operation which follows the same general line: they go from less active
> to more active, but within the frame.[17]

As Scott MacDonald comments in his interview with Frampton, "even multiple

viewings of the film would not necessarily reveal that the one-second passages are

organized into six different color units and that the single frames of the ocean are added

in a series going from no frames of ocean to all frames of ocean."[18] Frampton responds

to this observation by explaining that he made *Maxwell's Demon* "a frame at a time as

physical material"[19] and acknowledges that there are details, such as the composition of

these one-second color flicker segments, that a viewer would not be entirely aware of

without a close examination of the film as a physical strip.

Frampton's choice of sound to accompany the interspersed segments of flashing

colors and ocean waves was clearly motivated by Sharits's *Ray Gun Virus*, with its

incorporation of color flicker and the "live" sound generated by 16mm sprocket holes

passing through the optical audio reader of the projector.[20] The soundtrack, he states

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[16] Scott MacDonald, "Interview with Hollis Frampton," 112-13.
[17] Ibid., 113
[18] MacDonald, *A Critical Cinema: Interviews with Independent Filmmakers*: 35.
[19] Ibid.
[20] In addition to Sharits's *Ray Gun Virus*, it is likely that Peter Kubelka's *Schwechater* (1958) was an influence on Frampton in the making of *Maxwell's Demon*. *Schwechater* uses an intermittent buzz tone that is synchronized to be heard only with the red-tinted passages in the film. In both films the colored passages and accompanying audio

parallels the water imagery; it also changes from silence to a continuous one second buzz, the buzz of sprocket holes. I used 8mm sprocket hole buzz because the pitch is an octave higher than 16mm, and the higher pitch reproduces better on most sound systems. I had seen *Ray Gun Virus* by that time, and the sound seemed weak to me.[21]

While the pitch of the 8mm sprocket hole sound in *Maxwell's Demon* is certainly a

higher frequency than the sound of sprocket holes heard in *Ray Gun Virus*,[22] it seems

unlikely that there is a clear, one octave difference. Whether or not this is an accurate

description on Frampton's part elides the more obvious and important differences

between the two films' use of sprocket hole sound. The buzzing of Frampton's 8mm

sprocket holes occurs only during the color flashing segments of the film, having the

effect of sonically marking the interruption of the flashing color segments. Even though

the shifts between colored monochromatic frames and the colored frames of the ocean

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increase in frequency as the films progress. Another potential influence (with some striking similarities) on the making of *Maxwell's Demon* is Michael Snow's *Wavelength* (1967). While the two films seem, on first glance, to be more different than they are similar, the still photograph of the gently rolling ocean at the end of *Wavelength* recalls the still images of breaking waves in *Maxwell's Demon*. Photographs of ocean waves are certainly ubiquitous, yet the photograph in *Wavelength* is so completely central to Snow's film that it is hard not to think of the use of water and the ocean in both as somehow connected. While Snow's image is of gently rolling water, and remains consistent throughout the film, Frampton's images are constantly changing (because they are single-frame animated) and are of ocean waves moving gently as well as at the point of their break and roll. Both *Maxwell's Demon* and *Wavelength* use flashing and flickering color as a form of interruption in the forward momentum of each film. While these are obviously two very different works, I don't think that it is overreaching to think of them as in conversation with one another. Frampton had definitely seen *Wavelength* months prior to making *Maxwell's Demon*, most likely at its first screening in May of 1967. Of course Frampton would have been in conversation with Snow during and after the making of *Wavelength*, given that Frampton was a part of the production—playing the role of the dying man in the film. Frampton and Snow were quite close as both friends and colleagues, and Frampton made *Maxwell's Demon* in the same year, 1968, that he made *Snowblind*, a short meditation on Snow's sculpture *Blind*.

[21] Snow, "Interview with Hollis Frampton: The Early Years," 113.
[22] Due to the fact that the sprocket hole perforations are half the size in length as 16mm sprocket hole perforations.

waves might be difficult to discern while the film is being projected, the sprocket hole sound provides an aural cue to these patterns. In *Ray Gun Virus* the 16mm sprocket hole sound is heard consistently throughout the film, and in *Maxwell's Demon* the length and frequency of the buzzing sprocket hole sound is in direct correlation to the number of frames of ocean waves in each one-second color segment: the more ocean waves we see, the more buzzing we hear. Due to this correspondence, the buzz heard in the color segments is inconsistent over the course of the film. At the beginning, when there are less ocean frames and more color frames, the buzzing sound of the sprocket holes often pulses in and out a couple of times per second. Toward the end of the film, as the frames of ocean have increased in relation to the pure color frames, the buzz is heard more consistently in the one-second intervals. Alternately, the consistent sound of sprocket holes in *Ray Gun Virus* functions as a kind of audio blanket, remaining relatively consistent throughout the course of the film and positioned in direct contrast to the constantly shifting patterns and rhythms of the colors seen on screen. In *Maxwell's Demon*, the sound of the sprocket hole buzz jolts the viewer, it interrupts and disrupts the Canadian Air Force exercise footage, and it creates a stark contrast between the silent images of the man's body in motion and the jarring sonic interruptions of the color segments.

The other major difference between the exploration of sprocket hole sound in *Maxwell's Demon* and *Ray Gun Virus* is that Frampton's 8mm sprocket holes were recorded and Sharits's 16mm sprocket holes were played live. Frampton recorded the sound of 8mm sprocket holes passing over an optical sound head and then edited this recording with sections of silence in order to create the soundtrack for *Maxwell's*

Demon. Sharits's *Ray Gun Virus* has no printed soundtrack but is rather printed on double-perforation 16mm film stock and projected with the optical audio reader and amplification system turned on so that the viewer hears the noise of the sprocket holes passing through the projector. Because Frampton's sound is intermittent, and because its high-pitched buzz is more akin to the sound of an alarm clock than 16mm sprocket holes, his soundtrack is unmistakably a soundtrack. Sharits's soundtrack is the product of what is normally considered to be a mistake on the part of the projectionist (accidentally leaving the optical audio and amplification system on while projecting a double-perf silent film) and registers as the production of noise resulting from the filmstrip being read "improperly" by the projector. The "live-ness" and performative quality of his soundtrack (as well as the possibility that the viewer might interpret it as a mistake) reflect Sharits's ongoing involvement with Fluxus and the play and chance operations that so characterized the movement.

As scholar Melissa Ragona has observed, Frampton's film work prior to *Maxwell's Demon* was primarily silent and he was working at a "moment in avant-garde film history during which the status of the sound film was in question, both in terms of its political valence and its epistemological quest."[23] Prominent experimental filmmakers such as Stan Brakhage, Gregory Markopoulos, Robert Huot, and Andrew Noren, representative of an ethos Ragona terms the "poetics of silence,"[24] were making challenging silent works and arguing for the purity of visual representation in experimental and avant-garde film practice. In his 1960 essay "The Silent Sound

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[23] Melissa Ragona, "Hidden Noise: Strategies of Sound Montage in the Films of Hollis Frampton," *October* 109 (2004): 98.
[24] Ibid., 99.

Sense," Brakhage writes that "creativity with sound has been lost in the superficial complacency of the mechanical adjustment of actual sound to visual occurrence."[25] Brakhage believed that purely through the rhythm of image editing the filmmaker could evoke a "sound sense" that would make the inclusion of "actual sound superfluous. On this premise alone, one could disqualify almost every sound film from consideration as a work of art."[26] Brakhage, of course, made a number of remarkable sound films but maintained a position he described in a 1966 letter to Ronna Page as one in which he felt "no more absolute necessity for a soundtrack than a painter feels the need to exhibit a painting with a recorded musical background."[27] The desire to make "purely visual" films has remained a strong tendency in the avant-garde film community, and artists such as Nathaniel Dorsky (who has made intentionally silent films from the 1980s to the present), Peter Hutton, and Rose Lowder, to name just a few, continue to make silent work that emphasizes the primacy of the image.[28]

Prior to finishing *Maxwell's Demon* and *Surface Tension* in 1968, Frampton espoused the belief that film, if it were to be taken seriously as an artistic form, should be silent and "condemned all sound for movies."[29] While he acknowledged the existence of films that had utilized sound in ways that "advanced the internal motion or

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[25] Stan Brakhage, "The Silent Sound Sense," *Film Culture* 21 (Summer 1960): 67.
[26] Ibid.
[27] Stan Brakhage, "Film and Music," in *Essential Brakhage: Selected Writings on Filmmaking by Stan Brakhage*, ed. Bruce R. McPherson (Kingston: McPherson & Co., 2001), 79.
[28] For a more nuanced look at the use of sound and intentional silence in avant-garde cinema, see Fred Camper, "Sound and Silence in Narrative and Nonnarrative Cinema," in *Film Sound*, ed. Elisabeth Weis and John Belton (New York: Columbia University Press, 1985).
[29] Frampton states that he had previously "condemned all sound for movies" in his 1970 interview with Michael Snow. Snow, "Hollis Frampton Interviewed by Michael Snow," 9.

the formal development of the film," he believed that sound had "contributed to the

decline of film by ossifying the early talkies into a standard saleable product."[30]

Frampton was clearly speaking about the dominance of synchronous dialogue and

naturalistic sound, and the push away from experimentation toward an increased

naturalism as instigated by the introduction of synchronous sound technology in the

American studio system, but by 1970 he was softening the didacticism of his original

condemnation, saying that it was directed more at himself than at other filmmakers

(functioning perhaps more like a self-imposed set of artistic constraints than a general

prescription).[31]

By the mid-late 1960s, around the time that Frampton made *Maxwell's Demon*, a

number of filmmakers who had previously been making "purely visual" silent films began

to experiment with sound, in particular calling into question the relationship between

sound and image. At this moment there was a remarkable amount of cross-pollination

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[30] Ibid.

[31] Frampton's position on sound in this period echoes Sergei Eisenstein, Vsevolod Pudovkin, and Grigori Alexandrov's 1928 statement on the sound film in which they condemned the naturalization of sound and predominance of speech in the early sound period. In "A Statement," Eisenstein, Pudovkin and Alexandrov state that the synchronous recording of sound and image will result in an increased emphasis on the natural and realistic use of sound, and that the "adhesion" of sounds to images will increase their "interdependence" and "inertia." Rather than condemning the use of sound in cinema, Eisenstein, Pudovkin and Alexandrov write about the potential power of images and sounds in contrapuntal relation to one another, stating that "the first experimental work with sound must be directed along the line of its distinct nonsynchronization with the visual images." The kind of counterpoint and disjunction between sounds and images described in "A Statement," and later elaborated by Pudovkin in his 1929 "Asynchronism as a Principle of Sound Film" and Eisenstein in his 1929 "A Dialectical Approach to Film Form," would become one of Frampton's distinctive audio-visual strategies in works ranging from 1968's *Surface Tension* to the *Cadenza* and *Mindfall* sections of *Magellan* (incomplete, begun in 1972). "A Statement" is reprinted in Elisabeth Weis and John Belton, eds., *Film Sound: Theory and Practice* (New York: Columbia University Press, 1985).

between the circles of avant-garde music and film, and artists who would later be

recognized as some of the most influential figures working with film in the late 1960s

(Michael Snow and Tony Conrad, for example) were moving fluidly between the milieus

and mediums of sound and cinema.

In making *States* (1967, revised in 1970) Frampton created a "real score, or

graphic notation" for the film, and was using organizational procedures derived from

music—specifically the Pythagorean system for dividing and multiplying fundamental

tones—that were being explored in avant-garde music at the time. The manner in which

La Monte Young and Tony Conrad were "remanipulating the harmonic series" to

produce new, complex, and shifting tones based on the relationship between

fundamental frequencies and partials (harmonics and overtones) struck Frampton as a

particularly fascinating avenue of investigation, albeit one that he thought critics at the

time considered legitimate for musicians to explore yet an exercise in

overintellectualization for filmmakers.[32]

Frampton's interest in creating an unpredictable structure that moved between

periods of activity and inactivity, silence and sound, image and darkness, was clearly

influenced by Cage's practice and teachings. In discussing his use of passages of black

in *Heterodyne* and *States*, he says:

> I don't see why, just because you *can* be seeing something all the time, you *must* be seeing something all the time. I've called these passages silences; in doing so, I indicate a debt to Cage. Cage proposed that just because you could be hearing something all the time, didn't mean that you had to be. That struck me as a strategic option in film.[33]

[32] MacDonald, "Interview with Hollis Frampton: The Early Years," 110-11.
[33] ———, *A Critical Cinema: Interviews with Independent Filmmakers*, 34.

These sections of black, or silences, function rhythmically, yet irregularly, in both films, establishing "a sparse, tenuous structure" with "fairly regular clumps of distinct activity."[34] This means of achieving regulated unpredictability carried over into Frampton's use of silence and sonic disruption in *Maxwell's Demon*.

Frampton decided to use the sound of film perforations in order to "increase the mass" of the interspersed color segments, to break up the periods of silence marked by the Canadian Air Force exercise footage, and, more importantly, because he "wanted to use the first sound that film ever made which is the sound of film itself."[35] Frampton's investigation into the ontology of cinema would develop over the course of making *Hapax Legomena* (1971-72), but his interest in the nature and origins of projection and film as a medium was already apparent in *A Lecture* (1968), which he performed the same year that *Maxwell's Demon* was completed. In *A Lecture*, Frampton strips the cinematic experience down to its most basic components, describing film as quite simply "a narrow transparent ribbon… uniformly perforated with small holes along its edges so that it may be transported handily by sprocket wheels."[36] This desire to isolate the most basic, elemental aspects of the cinematic experience—screen, projector, light, and celluloid film—was carried forward through Frampton's larger metahistorical project, which he described as "an effort to reconstruct the history of films as it 'should have been.'"[37] Film is the material that, as Frampton points out, is the one thing that has

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[34] Ibid.
[35] Snow, "Interview with Hollis Frampton: The Early Years," 11.
[36] Hollis Frampton, "A Lecture," in *Circles of Confusion: Film, Photography, Video, Texts 1968-1980* (Rochester: Visual Studies Workshop Press, 1983), 196.
[37] Snow, "Hollis Frampton Interviewed by Michael Snow," 11.

"*always* been in the projector," and thus constitutes the basis of "what all films are about."[38]

The appreciation of the projector and sound of projection reflected in Frampton and Sharits's work can be traced back to the turn of the century, when an awareness of (and interest in the projector as an object) was very much a part of the experience of watching a film. Sharits described his early fascination with film and the projector as stemming from the "hundreds and hundreds of hours of home movies" he watched as a child with his large, extended family. Reflecting on this period of his youth in conversation with Frampton, Sharits said, "[F]ilm seemed to me a natural sort of thing… I was very pleased with the sound of the projector rattling away and the informality of it."[39] In his 1968 essay "Blank Definitions: Golden Cinema," Sharits references this experience again, saying, "[T]hat is my cinema: a noisy projector constantly breaking down."[40] Sharits explored this fascination with the projector in *Ray Gun Virus* and in his installation-based locational film pieces from the mid-1970s, which incorporated projectors into the works by positioning them inside the gallery space. Sprocket hole audio played a central role in *Ray Gun Virus*, but it would also be an integral component of the locational film work *Synchronousoundtracks* (1973-74) and its single-screen companion, *Color Sound Frames* (1974).[41]

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[38] Frampton, "A Lecture," 197.

[39] ———, "Interview with Paul Sharits," in *Buffalo Heads: Media Study, Media Practice, Media Pioneers, 1973-1990*, ed. Woody Vasulka and Peter Weibel (Cambridge: The MIT Press, 2008), 284.

[40] Paul Sharits, "Blank Definitions: Golden Cinema," *Film Culture* 48-49 (Winter & Spring 1970): 20.

[41] Curiously, the only films that I am aware of that use the sound of sprocket holes (those mentioned by Frampton and Sharits) pair this sound with projections of modulating color.

Paul Sharits's film work was deeply embedded in an artistic practice that included painting, drawing, visual design, performance, sculpture, and sound. A large part of Sharits's contribution to, and significance within, what is considered the structural film movement in the United States can be attributed to his explorations of color and sound as key formal and structural elements of the medium of film. Structural cinema was critically defined as a tendency within the avant-garde film community by P. Adams Sitney following *Film Culture*'s publication of his essay "Structural Film" in the summer of 1969. While Sitney described the three most characteristic tendencies of the structural film as the "fixed camera position (fixed *frame* from the viewer's perspective), the flicker effect, and loop printing (the immediate repetition of shots, exactly and without variation),"[42] Sharits's work would advocate for the importance of color (both color as a physical property of a filmstrip and the color of afterimages) and sound as elemental and essential aspects of the medium of film. In his film work from the mid-late 1960s through the 1970s, Sharits was compelled to explore visual and aural modes of perception, the intersections between shifting lateral and temporal fields of color and sound, the mechanics of film projection and optical sound reproduction, and what he referred to as the "operational analogues… constructed between ways of seeing and ways of hearing."[43]

While Sharits made it clear that he was not interested in synesthesia or in tracing out direct correspondences between specific colors and their sonic equivalents, he

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[42] Sitney would add a fourth defining characteristic, "rephotography off the screen," to this description before the publication of *Visionary Film: The American Avant-Garde 1943-1978* in 1979. P. Adams Sitney, "Structural Film," *Film Culture* 47 (Summer 1969): 1.

[43] Paul Sharits, "Hearing : Seeing," *Film Culture* 65-66 (1978): 70.

frequently played with musical analogies in both the planning (which he referred to as scoring) and physical experiences of his films. In his color flicker films and, in particular, the later multiple-projection locational film pieces, he frequently worked with musical concepts in order to create what he called "overtones of color," "major and minor tones of color," "color phrases," and "horizontal-temporal chords of color and sound."

Sharits came to filmmaking with formal training in visual design and painting, and he initially made a number of black-and-white, figurative, "pre-pure" films, most of which he destroyed.[44] But with the completion of *Ray Gun Virus* in 1966, Sharits had embarked on a new journey of investigation into deeper questions related to human perception and cognition. In his article "Cinema as Cognition," he writes that he was interested in "deeper questions concerning the grain particle, the frame and its duration, the shutter and its rotation, and other infrastructural units of information, signification, and meaning,"[45] and his work reflects a significant and extended examination of the various means by which cinema can both reflect and alter human cognition, emotions, and perception.

Ray Gun Virus consists of a series of rapidly and intermittently flickering fields of color frames that Sharits created by filming sheets of colored paper. The choice to use textured (sometimes dirty and poorly lit) sheets of paper rather than a pure representation of color seems to point to Sharits's interest in both the "suggestion of color" and the relationship between spectator and projection. As Regina Cornwell notes:

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[44] Woody Vasulka and Peter Weibel, eds., *Buffalo Heads: Media Study, Media Practice, Media Pioneers, 1973-1990* (Karlsruhe: ZKM/Center for Art and Media, 2008), 309.
[45] Paul Sharits, "Cinema as Cognition: Introductory Remarks," *Film Culture* 65-66 (1978): 78.

> *Ray Gun Virus* projects its chromatic and achromatic frames onto a flat screen to create its own illusions and illusions of illusions. The image on the screen is in itself an illusion, once removed from the strip of film in the projector, twice removed from the original print. …One does not know if he is perceiving the illusion of the real grain of the film strip itself or the illusion of the filmed paper.[46]

These rapidly alternating frames of color are accompanied by what I would term an "open system" soundtrack, one made possible by double-perforated 16mm film. The viewer hears the sound of sprocket holes passing through the optical sound head of the projector, generating a forceful and extremely rhythmic sonic reflection of our experience of film as something that moves, rapidly, 24 frames per second. As the sprocket holes pass over the sound drum of the projector and past the projector's optical reader, instead of reading the modulations of light and darkness that comprise an optical soundtrack and transforming these light patterns into an electrical signal, the optical reader takes the portion of the filmstrip that is between the sprocket holes—and the complete absence of material that is the sprocket hole itself—and turns it into an audible signal. Sharits described the soundtrack in his essay "Hearing : Seeing" as working toward "an accurate representation of technological modularity, framing—and thereby noting—the ultimate matrix of 16mm film's capability for visual re-presentation (there being one sprocket hole for each frame of image along the film strip)."[47] We are hearing the sound of what Sharits describes as the modularity or framing of the 16mm filmstrip, as well as the speed of projection at 24 frames per second. *Ray Gun Virus* allows the viewer to hear the strip of film as a physical material at the same time that it sonically marks the passage of time through film's re-presentation.

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[46] Regina Cornwell, "Paul Sharits: Illusion and Object," *ArtForum* X, no. 1 (1971): 57.
[47] Sharits, "Hearing : Seeing," 71.

The inescapable punctuated noise of the sprocket holes reinforces Sharits's stated intention to turn the projector into an "audio-visual pistol" and the retina screen into a target.[48] Meant to be played at full volume, the sound provides a constant tension and violent, aggressive rhythm. While the sound created by the sprocket holes is relatively consistent throughout the film, every screening of *Ray Gun Virus* generates a slightly different acoustical experience. All projectors, sound heads, amplifiers, speakers, and theatrical spaces are obviously not the same, and the way in which *Ray Gun Virus* passes through the projector can differ greatly from screening to screening. If the projectionist needs to compensate for a lost upper loop (which affects the registration of the image on screen), this is done by resetting the lower loop, an act that is heard as a noticeable alteration in the relative consistency of the soundtrack. Additionally, any splice or imperfection in the print itself is heard by the viewer. While Sharits would explicitly explore "lost loops" in a series of works in the 1970s (a procedure he referred to as one of "dis-framing"),[49] in *Ray Gun Virus* he approaches the sound of the filmstrip and projector as one that, while relatively consistent, is subject to all sorts of minor and accidental variations.

Sharits described his films as "filled with attempts to allow vision to function in ways usually particular to hearing" and engaged in an examination of "the way in which rapidly alternating color frames can generate, in vision, horizontal-temporal 'chords' (as well as the more expected 'melodic lines' and 'tonal centers')."[50] In his use of phrases such as "melodic lines" and "tonal centers," Sharits is referring to the way in which

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[48] ———, "Notes on Films/1966-1968," *Film Culture* 47 (1969): 14.
[49] ———, "Postscript as Preface," *Film Culture* 65-66 (1978): 6.
[50] ———, "Hearing : Seeing," 70-71.

specific colors can create a dominant, major, or recurring theme throughout the course

of a given film. "Horizontal-temporal chords" reflects his belief that complex

representations of color could be achieved onscreen through the rapid alteration of

individual frames such that, through their quick succession, temporal momentum, and

the spectator's experience of afterimages, we are privy to more than one tone at once.

This visual experience bears close parallels to the sonic experience of harmonics or

overtones. Sharits described major tones or notes of color as being the equivalent to

twenty-four frames of bright blue, and chords or overtones as the rapid alternation of

"two frames of blue, one frame of bright pink, two frames of blue, one frame of orange,

two frames of blue, back to the pink…" and so on.[51] Sharits articulated his basic thesis

with the question: "Can there exist a visual analogy of that quality found in a complex

aural tone, the mixture of the fundamental tone with its overtones?"[52]

Sharits would continue to explore the principles of fundamental frequencies,

overtones, and harmonics through a variety of different avenues, both aural and visual,

well into the 1970s. While almost all of his work from this period involves the use of both

sound and image, in (or around) 1970, Sharits made two discrete sound pieces that are

described as "Fluxus Sound Pieces" in the Burchfield-Penney's exhibition catalog *The

Filmic Art of Paul Sharits*.[53] Though very little information is available about these two

works, they seem to parallel contemporaneous explorations in performative sound art

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[51] Unpublished English translation of a transcript of Jean-Claude Lebensztejn's June 1983 interview with Paul Sharits. In the Sharits file at Anthology Film Archives.

[52] Sharits, "Hearing : Seeing," 71.

[53] Federico Windhausen briefly mentions these two sound pieces in his dissertation. See Federico Windhausen, "Syncretic Practices and the Idea of Didactic Cinema: The Significance of the Non-Cinematic Arts for the Work of Ken Jacobs, Hollis Frampton, and Paul Sharits" (Ph.D. dissertation, New York University, 2007).

(specifically those involving the use of water) by Fluxus artists such as George Brecht, Yoko Ono, and Mieko Shiomi;[54] the use of water and the loop in Michael Snow and Joyce Wieland's 1969 film *Dripping Water*; explorations of microphone movement, and the manipulation and live performance of feedback in pieces such as Steve Reich's *Pendulum Music* (1968); and Alvin Lucier's interest in the unique and particular resonances of closed environments and spaces.

The first of the two sound pieces is described as consisting of two microphones on wires, pulleys, and two speakers; the second, a bucket of water, a pump, a microphone, and a speaker. Sharits's instructions for the second piece specify that the microphone and speaker are to be placed next to the bucket of water. The pump makes a loop of water, and the microphone is positioned such that it picks up the sound of the continually circulating water. In Sharits's illustration for the piece, the word "loops" is written in a box to the side of his instructions. His highlighting of the word "loop" resonates both with his use of film loops in the locational film pieces made during this

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[54] Specifically, George Brecht's *Drip Music* (1959-62):
　　Drip Music (Drip Event)
　　For single or multiple performance.
　　A source of dripping water and an empty vessel are
　　arranged so that the water falls into the vessel.
　　Second version: Dripping.
Yoko Ono's *Waterdrop Painting* (1961) and *Water Piece* (1964), and Mieko Shiomi's *Water Music* (1964), which states instructs quite simply:
　　1. Give the water still form
　　2. Let the water lose its still form
See Douglas Kahn, *Noise, Water, Meat: A History of Sound in the Arts* (Cambridge, Mass.: MIT Press, 1999).

period, as well as with his use of repetition and water imagery in

S:TREAM:S:S:ECTION:S:ECTION:S:S:ECTIONED (1968-71).[55]
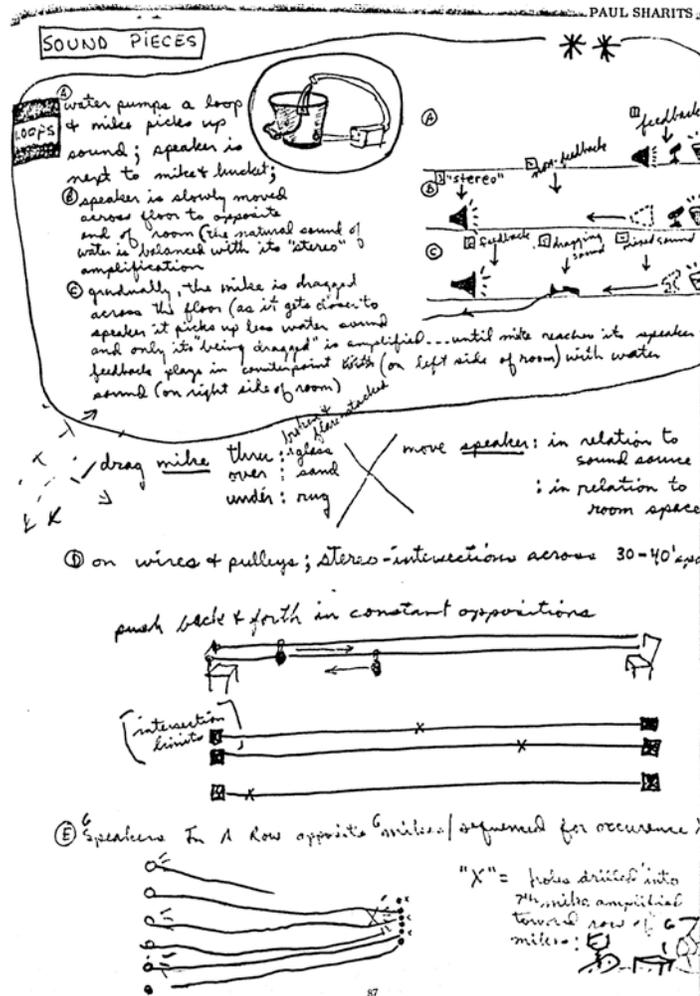
Figure 2.4: Paul Sharits, Sketch for *Sound Pieces* (1970)
Courtesy of the Poetry Collection Archive at the University of Buffalo, Buffalo, NY

The instructions state that the speaker is initially positioned next to the microphone and

bucket, and then is to be slowly moved across the floor to the opposite side of the room,

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[55] This film, a looped record (of sorts) of natural water flow, has always struck me as connected to Annea Lockwood's river recordings and sound installations, if only because still photos documenting Sharits shooting the footage that would be used in S:TREAM:S:S:ECTION:S:ECTION:S:S:ECTIONED and those of Lockwood recording on the banks of the Hudson River bear an uncanny resemblance.

resulting in what Sharits describes as "the natural sound of water… balanced with its 'stereo' amplification."[56] After the speaker has been moved to the side of the room opposite the bucket of water and microphone, Sharits instructs that the microphone should be gradually "dragged across the floor (as it gets closer to [the] speaker it picks up less water sound and only its 'being dragged' is amplified…) until mike reaches its speaker [and the] feedback plays in counterpoint (on left side of room) with water sound (on right side of room)." In addition to the drawings that illustrate the location of the speaker and microphone, Sharits notes at the bottom of the page: "move <u>speaker</u>: in relation to sound source/in relation to room space."[57]

This piece takes on concerns and procedures similar to those articulated by Steve Reich in his essay "Music as a Gradual Process" and in his performative sound piece *Pendulum Music*, both from 1968. Reich's desire to "hear the process happening through the sounding music" would come to define perhaps the most salient concern in Minimalist music and shares distinct similarities with structural film's interest in exposing the invisible aspects of the medium of film.[58] Reich's *Pendulum Music* is comprised of two or more microphones that are suspended by their cables such that they hang at an equal distance from the floor. The microphones are plugged into amplifiers that are positioned onstage close to the microphones. Performers pull back the suspended microphones, release them simultaneously, and then slowly turn up the corresponding amplifier "just to the point where feedback occurs when a mike swings directly over or

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[56] *The Filmic Art of Paul Sharits* (Buffalo, NY: Burchfield-Penney Art Center and Buffalo State College, 2000), 28.
[57] Ibid.
[58] Steve Reich, "Music as a Gradual Process" in *Writings on Music, 1965-2000* (Oxford: Oxford University Press, 2002), 34.

next to its speaker. Thus a series of feedback pulses are heard which will either be all in unison or not depending on the gradually changing phase relations of the different mike pendulums."[59] Feedback was the subject of a great number of pieces being made at this time, including work by artists such as Robert Ashley (most famously *The Wolfman* from 1964), David Behrman, Gordon Mumma, and Alvin Lucier. Lucier would explore the resonances of "room spaces" in works like *Vespers* (1968) and *I am sitting in a room* (1969), as well the kind of gradual, slowly unfolding process described by Steve Reich in "Music as a Gradual Process." These concerns are certainly evident in Sharits's two sound pieces and would find their way into the locational film works that would become his primary focus for the rest of the decade.

Sharits returned to working with pure color fields and sprocket hole audio in the mid-1970s with four pieces: *Color Sound Frames* (1974) and the locational film works *Synchronousoundtracks* (1973-74), *Vertical Contiguity* (1974), and *Divergent Intersecting Vectors* (1974). Unfortunately, all of these works remain unpreserved and can only be seen as badly faded prints or transfers. The three locational film works *Synchronousoundtracks*, *Vertical Contiguity*, and *Divergent Intersecting Vectors* have been unavailable for many years due to the poor condition and faded color of the existent prints, and it seems unlikely that they will be preserved or seen again as Sharits originally intended. The archivist at Anthology Film Archives, Andrew Lampert, explained that it was essentially impossible to preserve some of these films because

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[59] When *Pendulum Music* was performed at the Whitney Museum of American Art in May of 1969, the performers (in addition to Steve Reich) consisted of Bruce Nauman, Richard Serra, Michael Snow, and James Tenney, who together seem to perfectly represent the interconnectedness of the film, sound, and art communities in New York at the time. ———, "Pendulum Music," in *Writings on Music, 1965-2000* (Oxford: Oxford University Press, 2002), 31.

preservation elements would have to be made from Sharits's badly faded reversal prints (which were all generated from the same source footage). Sharits was shooting everything during this period on low-contrast camera reversal Kodak "ECO" (Ektachrome Commercial) 7252 stock, which, as a result of dye instabilities, rapidly faded to a bluish-purple tone.[60] Because Sharits's original elements for these works were created on this stock and are irreversibly faded, it is impossible to know their true or original color composition.[61] Considering that Sharits's use of color during this period was completely central to the works, and that he was undoubtedly one of the most

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[60] The prevalence of Kodak's Ektachrome Commercial ("ECO") 7252 reversal camera stock has greatly impacted the preservation of countless films made in the 1970s and '80s. Introduced in 1970 as a replacement for the 7255 Ektachrome commercial stock that had been in use since 1958, the reformulated 7252 ECO stock was geared toward high-quality duplication and widely used until the mid-1980s. ECO commercial stock was designed for printing (as opposed to noncommercial reversal stocks that were formulated to be shot, processed, and projected), meaning that prints struck from ECO originals achieved optimum contrast for projection and retained fine details. ECO was very low contrast, and because of its low ASA and ability to render sharp details, animators and artists working with the optical printer frequently used the stock. Stan Brakhage blew up all of his 8mm and Super-8mm films to ECO because it allowed his originals be enlarged to 16mm film without gaining an excess amount of grain or contrast. Films including *The Texas Chainsaw Massacre*, the Maysles's *Christo's Valley Curtain* and *Running Fence*, as well as numerous works by Chick Strand, John Whitney, Pat O'Neill, Morgan Fisher, Phil Solomon, Adam Beckett, Roberta Friedman and Grahame Weinbren, Robert Nelson, Peter Rose, and Fred Worden were all made on ECO commercial stock during this period of time. Kodak finally discontinued manufacturing 7252 ECO stock in 1985, but the results of its popularity and widespread use have proven to be disastrous for film archives. Many thanks to Mark Toscano, film preservationist at the Academy of Motion Picture Arts and Sciences Film Archive, for explaining the history and use of the stock, as well as the myriad difficulties it poses for preservation.
[61] Without being able to reference a print or negative that could reveal Sharits's original color palette in these films, preservation is rendered a guessing game.

sensitive filmmakers working with color film at this time, this situation is particularly

tragic.[62]

The footage used in *Color Sound Frames*, *Synchronousoundtracks*, *Vertical*

Contiguity, and *Divergent Intersecting Vectors* was all generated from a section of film,

titled *The Specimen*, that was originally created for the first part of Sharits's *Analytical*

Studies III: Color Frame Passages (1973-74).[63] Described by Sharits as consisting of

"three spectral cycles intersecting into a 'flicker' work,"[64] *The Specimen* would prove to

be extremely important to Sharits's output during this period; not only was it used to

create footage for a variety of different films, but it was also exhibited as a part of the

Frozen Film Frame series in 1974. In addition to being the source material for *Color*

Sound Frames, *Synchronousoundtracks*, *Vertical Contiguity*, and *Divergent Intersecting*

Vectors, *The Specimen* also served as the source material for the remaining six

sections of Sharits's *Analytical Studies III: Color Frame Passages*. In each of these six

sections, the *Specimen* strip was either superimposed with itself in various

configurations and rephotographed in an optical printer such that the two strips moved

independently of one another and at various speeds and directions, or was seen as an

image of a filmstrip within the actual filmstrip being manipulated in the printer. Each of

the six sections was organized by a unique logic such that, for example, in Section II:

Divergent Strip Vectors, the two strips were superimposed and shot "in real time," with

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[62] I had hoped to be able to work more closely on *Synchronousoundtracks* and *Color Sound Frames* for this dissertation but have been limited by the lack of availability of prints and materials. I am very grateful to Andy Lampert and Matt Cowan at Anthology Film Archives for providing access to (albeit faded) digital transfers of *Color Sound Frames* and *Vertical Contiguity*.
[63] This section of film was a reversal print, as noted above.
[64] ———, "Filmography," *Film Culture* 65-66 (1978): 118.

one strip moving upward and the other downward, creating "other colors" and "various

kinds of illusions," and in Section V: *Strip of Strip, A*, what we see is "a document of an

actual strip, moving upward, containing the image of another filmstrip, also moving

upward, blurring at various speeds in rephotography."[65] Sharits's interest in the filmstrip

as physical material is evident in both his display of it as a two-dimensional object in the

Frozen Film Frame wall pieces, as well in his play with it as an object with a unique

physicality beyond its ability to render a series of still images as movement via

projection.

In Sharits's "Filmography," published in a 1978 edition of *Film Culture* devoted to

his work, he writes at length about the technical and conceptual strategies at work in

Color Sound Frames:

> In *Color Sound Frames* flicker is not the issue, but rather the relationship
> between the strip and the frame. The images are refilmed strips with sprocket
> holes and frame lines visible. The field of direction and force may be upward or
> downward. For one segment a strip was reshot backwards (from end or tail to
> beginning or head of strip), and two sections have superimposed images of one
> strip on top of one another. As it was being shot the film was traveling at various
> speeds. The synchronous sound of the sprocket holes is heard passing over the
> sound head… *Color Sound Frames* is a film about film and the kinds of illusions
> which can result as film's concrete properties create abstractions. Actual
> direction of movement becomes confused due to changes in speed. At high
> speeds the frame line is no longer visible. In the superimposed sections colors
> blur together, and form others and at certain speeds colors and sprocket holes
> seem to undulate.[66]

Color Sound Frames is divided into four distinct sections. Throughout the film, in each of

the four sections, the filmstrips have been rephotographed so that they are visible in

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[65] Ibid.
[66] Ibid., 119.

their entirety. Rather than showing only the "image area" of the filmstrip (the only portion of the filmstrip visible in projection), Sharits rephotographed the filmstrips zoomed-out, as it were,[67] so that we are able to see the sprocket holes and all of the (normally invisible) material on the filmstrip that typically remains in off-screen space. Rosalind Krauss described the use of the filmstrip in Sharits's work as "…about seeing what is never seen in the theater of our ordinary experience. The filmstrip—its separate frames distinct and visible, its sprocket holes flanking one of its edges—is the object with which the film-maker works as he edits."[68] Film is an object of study in *Color Sound Frames* and we see portions of the filmstrip that are not ever visible to the viewer in the theater but are, as Krauss points out, intimately familiar to the filmmaker and projectionist. These normally hidden elements—the sprocket holes that create the illusion of movement, the frame lines that divide each individual still image from the next, and the soundtrack that represents sound as a visual image—work to highlight film as a medium of representation.

Sharits used double-perf film stock (in which sprocket holes are present on both side of the filmstrip), so both sets of sprocket holes are visible in *Color Sound Frames*. When the filmstrip is still, the viewer is able to see more than one frame onscreen, as well as the frame lines that separate each individual cell. The frames themselves are of

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[67] I assume that Sharits was using a modified projector (since he made a synchronous recording of the sound of the filmstrip sprocket holes passing over the sound head) that was set up in a similar manner to an optical printer in order to reprint the *Specimen* sections for *Color Sound Frames*, *Vertical Contiguity*, and *Divergent Intersecting Vectors*.

[68] While Krauss was speaking specifically about Sharits's first locational piece, *Sound Strip/Film Strip* (1971), her observation can absolutely be applied to Sharits's *Frozen Film Frame* pieces, as well as to works like *Color Sound Frames, Episodic Generation*, *Synchronousoundtracks*, etc. Rosalind Krauss, "Paul Sharits," *Film Culture* 65-66 (1978): 93.

pure, solid color. Sometimes the same color will be printed for a few frames in succession, and sometimes the color will change with each individual frame. When the filmstrip begins to move, the frame lines start to move and blur, and the colors lose any distinctiveness and sharpness, blurring into a wash of rippling colored light. The images move at a variety of constantly changing speeds, almost giving the impression that Sharits was turning the printer/projector on and off. The image will speed up, slow down, sputter and stop, and then speed up faster than before—never remaining constant for longer than a moment. As the filmstrip begins to move quickly, the frames blur and become a soft-focus strip of pure and constantly shifting color; and the sprocket holes lose their sharpness and become blurry, open white expanses on the left and right sides of the frame. As the speed of the filmstrip increases, the sprocket holes begin to overlap and superimpose so that instead of appearing to be white squares of light, they become soft, long streaks of flickering white light framing the left and right sides of the shifting color images.

A title card at the beginning of the film describes the movement of the *Specimen* filmstrip(s) in each section. In the first section, "Vector A: Upward (forward)," the filmstrip appears to move upward and the frame lines travel downward. In the second section, "Vector B: Downward (forward)," the filmstrip appears to move down and the frame lines travel up. In the third section, "Confluent Superimposition: Vector A (forward) + Vector B (forward)," Sharits has superimposed two films strips that both move downward, and the frame lines appear to move down as well. In the fourth section, "Divergent Superimposition: Vector A (forward) + Vector B (forward)," the two superimposed filmstrips appear to move upward and downward, and the frame lines move up and

down as well. When the filmstrips speed up, the frame lines will start to blur and move up or down depending on the direction in which Sharits was moving the strip in the rephotography process. When the strips reach a certain speed, the movement of the frame lines appears to pause as they momentarily hover in one spot of the frame.

The sprockets we are seeing are representations of sprockets, images of them, reproductions—not the actual sprockets that are moving the film forward in the projector. As Rosalind Krauss states in her sensitive assessment of Sharits's work, "this image of emulsion is as well an image of recording, of film's condition as document. As document, seen through projection, it holds past and present in a strange synthetic relation to one another. We realize that the material support of Film is being shown to us from within the context of Time."[69] In *Color Sound Frames*, Sharits is playing with the speed of the movement of the strips, and when frame lines seem to move forward and then hover in a near-frozen state, and then move backward (an optical illusion or reverse-direction effect that is the result of the frame rate or speed at which the film moves through the projector and our ability to perceive motion), he is pushing us to recognize the relationship between the static material of the filmstrip and the machine that gives it movement and life, the projector.

As Sharits moved away from the kinds of perceptual experiments with flicker and discrete frames he was exploring in his late-'60s flicker films (*Ray Gun Virus*, *Piece Mandala/End War*, *N:O:T:H:I:N:G*, and *T,O,U,C,H,I,N,G*) and toward an examination of the way in which the filmstrip, as physical material, operates with the projector, his films began to directly address the way in which the projector and the static filmstrip come

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[69] Ibid., 92.

together to create the illusion of movement. In a letter to P. Adams Sitney dated May 1, 1970, he writes:

> the new work is still related to the old in that film is [the] subject and I am still preoccupied with non-illusionistic movement ("static motion"), that obvious aspect of cinema so related to the audio drone of the projector running (running nowhere) and to the visual drone of the spinning shutter.[70]

For Sharits, the exploration of what it *is* that constitutes the material basis of film itself—a pursuit that so defined the filmmakers who would come to be grouped together as structural filmmakers—was not solely dependent upon a breakdown of the specific elements that comprise film as a physical strip of discrete images. The essence of film, Sharits believed, must also be sought at the point where film as material met the projector as animator. Again Krauss, writing about her experience of Sharits's work in the early-mid '70s, pinpoints this preoccupation.

> This static object—the filmstrip—which we might be tempted to call the "real" film or the film-itself, in fact establishes its essential being only in relation to the intermittent time of projection, because only through projection does it gain the illusion of continuous movement. In this movement, the individual frames are erased as separate integers; they are subsumed within the conditions of continuity.[71]

At the same time that Sharits was exploring the filmstrip and its relationship to the projector, he began to subvert the means by which projection works to seamlessly create the illusion of movement for the viewer. By modifying the projector he was utilizing to rephotograph *The Specimen*—specifically by circumventing the pull-down

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[70] Sharits, letter to P. Adams Sitney, dated May 1, 1970, files of Anthology Film Archives.
[71] Krauss, "Paul Sharits," 93.

claw that registers the filmstrip in precisely the correct location to create a seamless

illusion of movement—Sharits rendered the projector a performative device. Jonathan

Walley has referred to this tendency in Sharits's work as one in which he was

"committing a kind of violence against the film projector."[72] This transgressive "mis-use"

of technology in the avant-garde was, by no means, exclusive to the work that Sharits

was producing at the time, as Peter Wollen pointed out in his 1978 survey of cinema

and technology,[73] but it was something he would continue to explore, in a variety of

ways, throughout the 1970s. Sharits described this approach as a means to

"simultaneously reveal both the frame and strip nature of film (both of which are

normally hidden due to the intermittent shutter system), by removing the gripper arm

and shutter mechanism from the projector."[74]

Even though in a film like *Color Sound Frames* Sharits is working to free the

filmstrip from consistent registration in the projector gate by pulling and advancing the

film at will, there are still two signifiers, visual and aural, that point to the way in which

film is supposed to be seen (registered properly between the trap and the gate of the

projector) and to their own typical invisibility. Frame lines and sprocket holes are, of

course, normally not visible to the viewer and, as I mentioned above, Sharits is utilizing

both as visual elements in *Color Sound Frames*. Sharits cleverly points to the fact that in

16mm film, the sprocket holes reside directly in the middle of the frame line, in perfect

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[72] Jonathan Walley, "The Material of Film and the Idea of Cinema: Contrasting Practices in Sixties and Seventies Avant-Garde Film," *October* 103 (2003): 19.
[73] Peter Wollen, "Cinema and Technology: A Historical Overview," in *The Cinematic Apparatus*, ed. Teresa de Lauretis and Stephen Heath (New York City: St. Martin's Press, 1980), 20.
[74] Sharits, "Postscript as Preface," 6.

alignment, so that for every frame line there is one corresponding sprocket hole.[75] What

we hear when *Color Sound Frames* is projected is the sound of sprocket holes passing

over a projector sound head, which Sharits recorded while he was rephotographing *The

Specimen*. In each of the four sections of the film, these sprocket holes create a

plodding, sputtering, almost motor-like aural equivalent to the sprocket holes we see on

screen. As the audio slows down we see the frame lines slow down, and the previously

blurring image starts to come into focus and slips into sharp clarity. As the image

increases in speed and the sprocket holes on either side of the frame start to blur into

streaking passages of light, the sound ramps up in direct equivalence until we hear a

pulsing staccato of sprocket holes. Because of this direct relationship between image

and sound, *Color Sound Frames* is a piece in which image cues sound and sound cues

image. Allowing the sprocket holes to be heard is, again, another way for Sharits to

subvert the original intentions of projection technology and make noticeable the parts of

the filmstrip that are not normally visible. Fred Camper, one of the few critics writing on

avant-garde cinema in the 1960s and '70s who acknowledged the central importance of

sound to these works, isolates the core of Sharits's investigation in *Color Sound

Frames*. In his 1976 review of a show of Sharits's work at the Collective for Living

Cinema, Camper writes:

> As the strip speeds up, it soon reverses direction, due to the strobe effect
> inherent in film projection. Sharits is again referring to several dualisms inherent
> in film. The sound that we hear actually comes from light shining through the
> soundtrack. Sharits here has synched sound to the visible, as if it were coming

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[75] As opposed to, for example, 35mm film, which has four sprocket holes per frame, none of which fall on the frame line separating the individual cells.

from the perfs of the visible strip. The strobe effect of projection can freeze actual motion, but that frozen illusion is itself created by a moving strip in the projector.[76]

Sharits would continue to play with the slippage of filmstrips and sprocket hole sound in his installation-based locational film pieces in the 1970s, introducing the variables of room size and acoustics into the works. Sharits had created multi-screen projection pieces as early as the double-projection *Razor Blades*, dated from 1965-68, but his first locational film piece, *Sound Strip/Film Strip* (1971), was made with the assistance of Bill Brand while Sharits was teaching at Antioch College. The piece consisted of four Super-8 loops projected sideways on a wall of the gallery so that they approximated the look of one long strip of film frames. The loops were created using an adapted projector that had the pull-down claw removed (the same technique Sharits used for *Color Sound Frames* and various other pieces generated from *The Specimen*), and on the magnetic track of each of the four film loops was a fragment of the word "miscellaneous."

Sharits continued this exploration of the spatialization and fragmentation of sound with his next locational film piece, *Synchronousoundtracks*, produced in 1973-74. *Synchronousoundtracks* exists in two forms: a double projection designed for rental in which each 16mm reel was 35 minutes long; and the installation/locational piece, which Sharits described as being of "infinite duration" and consisted of three projectors, three speakers, and three film loops with audio containing the sound of sprocket holes passing over the projector sound head.[77]

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[76] Fred Camper, "Paul Sharits," *Soho Weekly News*, April 22, 1976, 34.
[77] The first screening of the locational version was in 1974 at the Bykert Gallery in New York City. *Synchronousoundtracks* utilized Super-8 loop cartridges and projectors

The footage for *Synchronousoundtracks* is directly related to the footage Sharits used in *Color Sound Frames*, and each individual film loop operates in essentially the same way. The piece was set up so that there were three columns of about five feet high placed in the center of the gallery space. Projectors were positioned on top of the columns, and two front surface mirrors flipped the images ninety degrees so that three seven-by-nine-foot images were projected sideways onto the wall.
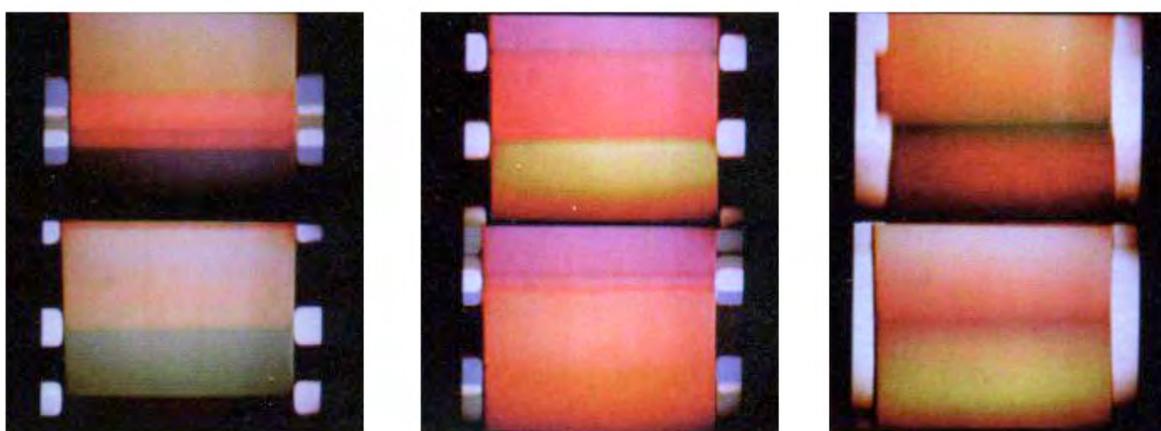
Figure 2.5: Film stills from Paul Sharits's *Synchronousoundtracks* (double projection,1973-74)

The projections spanned almost the entire height of the wall—reaching from a foot or two off of the floor to within a few inches of the ceiling. These projections were set up to show, in Sharits's words, "images of film strips moving at slow-fast-slow speeds. Each image shows footage moving right-to-left superimposed with similar footage moving left-to-right. Each frame of the original footage is different in color so that overlaps constantly create new color mixtures (at high speeds the colors tend to blur-oscillate).

(which Sharits had previously worked with in *Sound Strip/Film Strip*) when it was shown as a locational installation.

Opposing vectors give the impression of a back & forth lateral motion-oscillation."[78] On

the back wall there were three speakers positioned five feet high and five feet apart

from one another so that they were "in logical relation" to each of the three screens.[79]

Since it is unlikely that the piece will ever be presented again in this form, I would

like to quote at length from Annette Michelson's description of encountering the work in

the Walker Art Center's 1974 exhibition "Projected Images."

> One perceives, as one enters, three images of film strips, contiguous and moving
> at different and constantly varying speeds, producing, in the pulsation of
> superimposition at work within each separate strip, a constancy of change in
> color, vibrating, blurring, clearing, intensifying, pulsating in a movement of such
> constant shifts in speed and direction of lateral oscillation as to defy description
> and temporal location… From the three speakers arranged on the back wall, one
> hears the sound of sprockets passing over a projector sound head, with a
> frequency whose oscillation stands in direct relation with the sprocket hole
> images seen upon the screen. The dominant impression, then, is of a
> synchronicity whose terms are articulated with a definition that derives from a
> complex phasing, itself the product of a generative technique of recording and re-
> recording.[80]

The intermittent sound of the sprocket holes heard through the three speakers placed

along the rear wall of the gallery created an effect that, as Michelson points out, is

similar to the complex sonic phasing being explored in audio pieces ranging from Steve

Reich's *Pendulum Music* and the earlier tape pieces *It's Gonna* Rain and *Come Out* to

Tony Conrad's *Three Loops for Performers and Tape Recorders* (1961). Exploring the

acoustics of the gallery space as well the creation of new acoustic phenomena through

the overlapping of tones—in this case sounds created by the sprocket holes passing

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[78] Sharits, "Filmography," 121-22.
[79] Ibid., 121.
[80] Annette Michelson, "Paul Sharits and the Critique of Illusionism: An Introduction," *Film Culture* 65-66 (1978): 88.

over the projector's optical audio readers—*Synchronousoundtracks* continues the investigations of the film strip as visual and acoustic material that consumed Sharits for most of the 1970s. At various points in its development, Sharits referred to *Synchronousoundtracks* as *Variable Area Optical Soundtrack* and *Optical Soundtrack*, reflecting his interest in the uniquely visual nature of film sound printing. Sharits's interest in making the material of the *actual* film strip visible and audible, as well as his investigations into the mechanics and phenomenological effects of projection, culminate in his 1978 film and locational piece, *Episodic Generation*, which I examine at length in the fourth chapter of this dissertation.

CHAPTER THREE
INSTRUMENTS

"The sound film ought to enrich our acoustic experience by giving us new auditory values, just as the silent film has already begun to enrich our vision.… To develop creative possibilities of the sound film, the acoustic alphabet of sound writing will have to be mastered; in other words, we must learn to write acoustic sequences on the sound track without having to record real sound."[1]

—L. Moholy-Nagy

Beginning in 1922 with the publication of his essay "Production—Reproduction" ("Produktion—Reproduktion") in *De Stijl*, László Moholy-Nagy, the profoundly influential Bauhaus artist, designer, and teacher, was engaged in actively reevaluating the relationship between human artistic expression and perception, and subsequently proposed that the primary function of art should be a training, of sorts, of "man's functional apparatuses."[2] Writing initially about the potentials of the phonograph record and recording technology, Moholy-Nagy espoused the importance of creating new activities to "challenge the senses."[3] He believed that creative expression was most

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[1] László Moholy-Nagy, *Vision In Motion* (Chicago: P. Theobald, 1947), 276–77.
[2] Moholy-Nagy's importance cannot be adequately conveyed here, but it is worth mentioning that he would bring the art, aesthetics, and design theory and of the Bauhaus to America in 1937, founding the short-lived New Bauhaus school. This was followed in 1939 by the School of Design, which became the Institute of Design in 1944, and the Institute of Design became a part of the Illinois Institute of Technology in 1949. ———, "Production—Reproduction," in *Moholy-Nagy*, ed. Krisztina Passuth (London: Thames and Hudson, 1922), 289.
[3] Ibid.

useful in its capability to produce new and unexpected relations, and suggested that the

phonograph be used not for reproductive purposes, but rather to "create new, hitherto

unknown sounds and tonal relations."[4]

By the late 1920s, Moholy-Nagy had shifted his focus to the cinema and what he

termed the "Problems of the Modern Film." He believed that the sound film was one of

the most profound and significant inventions of the modern era, and although it was not

yet being used to its potential, it had the "capacity to enlarge the visual and acoustic

capacities of mankind," and, importantly, his "consciousness."[5] He argued against the

use of sound as a documentary record of reality and emphatically believed that sound

should not be used to underline or parallel images—rather, the two should be used

together as "mutually inter-dependent components of an indivisible whole."[6] He

asserted that

> it will not be possible to develop the creative possibilities of the talking film to the full until the acoustic alphabet of sound writing [is] mastered. Or in other words, until we can write acoustic sequences on the soundtrack without having to record any real sound. Once this is achieved the sound-film composer will be able to create music from a counterpoint of unheard or even nonexistent sound values, merely by means of opto-acoustic notation.[7]

In 1932, Moholy-Nagy presented these ideas throughout Germany in a series of

illustrated public lectures, advocating for further exploration and development of the vast

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[4] Ibid.

[5] László Moholy-Nagy, "Problems of the Modern Film," in *Moholy-Nagy*, ed. Krisztina Passuth (London: Thames and Hudson, 1928–30), 311.

[6] Ibid., 313.

[7] Ibid., 314.

potential in this new film "sound-script."[8] In conjunction with his presentation, Moholy-Nagy screened two films completed that year, Oskar Fischinger's *Ornament Sound* (sometimes screened under the name *Klingende Ornamente* or *Sounding Ornaments*) and Rudolph Pfenninger's *Sounding Handwriting* (*Tönende Handschrift*). In a published version of one of his lectures, he wrote:

> Sound-script makes possible acoustic phenomena which conjure up out of nothing audible music without the previous play of any musical instrument. We are in a position today to be able to play written sounds, music written by hand, without involving an orchestra, by the use of the apparatus of the sound film.[9]

Moholy-Nagy would end up realizing his own version of a completely synthetic soundtrack in 1933 with his *Sounding ABC* (*Tönendes ABC*), which he described as using "all types of signs, symbols, even the letters of the alphabet, and my own fingerprints," as well as facial profiles.[10] During the 1930s, artists all throughout Europe, the Soviet Union, and, later, the United States were experimenting with different methods for creating sounds from images.[11] Pfenninger had begun work as early as 1929, studying the visual patterns created on an oscilloscope and then isolating the

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[8] Thomas Levine's fascinating and meticulously researched essay on Rudolph Pfenninger is the primary source of my knowledge on the relationship between Pfenninger and Moholy-Nagy, and is an invaluable history of the development of synthetic sound techniques on film in the 1930s. See Thomas Y. Levine, "'Tones from out of Nowhere': Rudolph Pfenninger and the Archaeology of Synthetic Sound," *Grey Room* 12, Summer 2001 (2003).

[9] Ibid., 49–50.

[10] Moholy-Nagy, *Vision In Motion*: 277.

[11] Both Moholy-Nagy and Levine write about the various artists, composers, inventors and engineers who were working on the development of synthetic sound techniques in the 1930s. See Levine, "'Tones from out of Nowhere'" and Moholy-Nagy, *Vision in Motion*.

"unique graphic signature" produced by each tone being fed into the machine.[12] By the middle of the decade, animators, engineers, composers, musicians, and inventors—including E. A. Humphries in England; Arsenii Avraamov, Mikhail Tsekhanovskii, Evgenii Sholpo, Nikolai Voinov and Nikolai Zhilinski in the Soviet Union; and Rudolph Pfenninger and Oskar Fischinger in Germany—were all exploring various techniques for creating synthetic sound on film.[13]

Oskar Fischinger's "earlier work in nonobjective, abstract, or as he preferred to call it, 'absolute' film," which developed Viking Eggeling, Hans Richter and Walter Ruttmann's experiments in "cinematic synaesthesia"[14] led him to create one of the most complex systems of synthetic sound, a form of "opto-acoustic" notation in which patterned shapes were drawn onto large sound scrolls and rephotographed, reduced, and subsequently printed onto the film's optical soundtrack. His technique was so developed and precise that he was able to create a wide range of frequencies and tones, "complicated musical effects," and "ornamental configurations which produced unusual or 'a-musical' sounds."[15] Fischinger's work, part of a larger movement that can be traced back to the motion paintings of Léopold Survage, Bruno Corra and Arnaldo Ginna's color organ experiments, and Thomas Wilfred's clavilux system, reveals one facet of a widespread desire to create a kind of "visual music"—one in which painting would aspire to the rhythmic conditions of music, and in which image and sound would

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[12] Levine, "'Tones from out of Nowhere': Rudolph Pfenninger and the Archaeology of Synthetic Sound," 53.
[13] Ibid., 50.
[14] Ibid., 51.
[15] Robert Russett and Cecile Starr, eds., *Experimental Animation: An Illustrated Anthology* (New York: Van Nostrand Reinhold Company, 1976), 164.

merge to create the kind of expanded consciousness Moholy-Nagy theorized about in 1922.[16]

The work being done in synthetic sound at this time points to two different, yet interrelated goals: one, the desire to create new sounds without using traditional musical instruments; and two, the desire to either integrate these new sounds with their visual equivalents or to generate sound and image from the same original source. The desire of artists and filmmakers like Moholy-Nagy and Fischinger in the 1930s to create new sounds by using optical audio film technology—a technology equated to that of an electronic instrument that did not have to imitate the musical structures, styles, or compositions of the past—was mirrored in work and writings of avant-garde composers and musicians of the time, most notably John Cage. In his 1937 essay "The Future of Music: Credo," Cage writes:

> The special function of electronic instruments will be to provide complete control of the overtone structure of tones (as opposed to noises) and to make these tones available in any frequency, amplitude, and duration.… [This] will make available for musical purposes any and all sounds that can be heard. Photoelectric, film, and mechanical mediums for the synthetic production of music. It is now possible for composers to make work directly, without the assistance of intermediary performers. Any design repeated enough on a sound track is audible.… The composer (organizer of sound) will be faced with not only the entire field of sound but also the entire field of time. The "frame" or fraction of

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[16] In recent years, there have been a number of exhibitions and excellent publications devoted to visual music. Outstanding among them is *Visual Music: Synaesthesia in Art and Music since 1900* (London: Thames & Hudson, 2005), published in conjunction with the exhibition of the same name. Andrew Johnson's recent dissertation on abstract animation includes fascinating research on Thomas Wilfred. See Andrew R. Johnson, "Pulses of Abstraction: Episodes from a History of Animation" (Ph.D. dissertation, University of Chicago, 2011).

a second, following established film technique, will probably be the basic unit of measurement in time. No rhythm will be beyond the composer's reach.[17]

For Cage, the creative use of film sound, specifically optical audio technology, was comparable to the possibilities for creative experimentation latent in the new electronic instruments that were beginning to be developed in the early twentieth century. It is commonly believed that the introduction and popularity of magnetic tape halted these developments in the creative use of film's optical audio reproduction system (at least in the world of experimental and avant-garde music), but filmmakers have continued to experiment with manipulating the optical audio track through processes of rephotography, animation, direct painting and scratching, and various other techniques.[18] Norman McLaren, perhaps the most accomplished and recognized of these artists, is the individual who has, over the course of forty or so years of developing the possibilities of the optical audio format, explored it to its fullest potential. Initially, he drew directly onto the celluloid filmstrip, then later created complex card-based systems for indexing patterns and wave forms that were rephotographed, frame by frame, and printed onto the film's soundtrack.[19] We see these techniques in the early

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[17] John Cage, *Silence: Lectures and Writings*, 1st ed. (Middletown: Wesleyan University Press, 1961), 4–5.

[18] One of the most complex direct optical audio systems was created in 1941 by John and James Whitney, and generated the scores for their *Five Film Exercises* (1943–44). The Whitney brothers felt strongly that music created on traditional instruments would not work with their animated images, so they built this "sound producing apparatus—a "subsonic instrument [that] consisted of a series of pendulums linked mechanically to an optical wedge. The function of the optical wedge was the same as that of the typical light valve of standard optical motion picture sound recorders. No audible sound was generated by the instrument. Instead, an optical sound track of standard dimensions was synthetically exposed onto film which after processing could be played back with a standard motion picture projector." Russett and Starr, *Experimental Animation: An Illustrated Anthology*, 170.

[19] Ibid., 164.

films *Dots* and *Loops*, both from 1940, and in the *Animated Sound Test* experiment (late 1940s–early 1950s), we see patterned cards containing sine and bar waves, as well as masks that could be moved and manipulated to contour the sound.
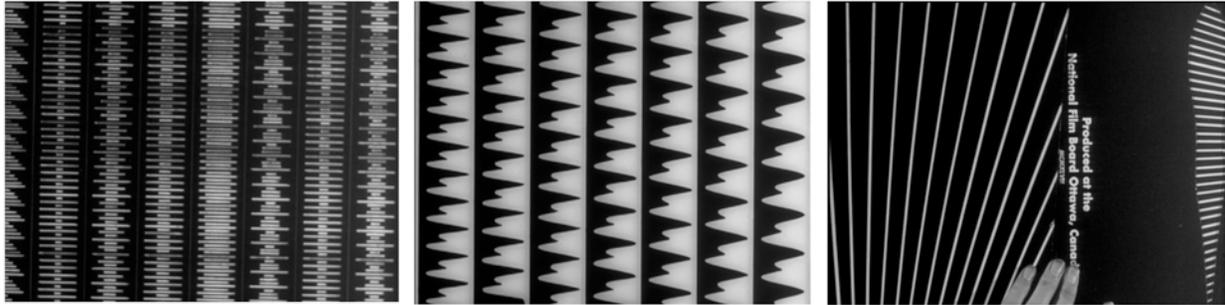
Figure 3.1: Frames from Norman McLaren's *Animated Sound Test* (late 1940s–early 1950s)

Images of drawn sound would make their way into American cartoons (Coleen Fitzgibbon remembers being enthralled by one of the behind-the-scenes segments on the *Woody Woodpecker Show*, in which Walter Lantz created a hand-drawn soundtrack that was both seen and heard), as well as the superbly bizarre and experimental Ernie Kovacs television specials broadcast on ABC in 1961.[20]

Figure 3.2: Frame from Ernie Kovacs ABC special broadcast (1961)
Lynn Spigel, *TV by Design*, 197

[20] See Lynn Spigel, *TV by Design* (Chicago: University of Chicago Press, 2008), chapter 5 "Silent TV: Ernie Kovacs and the Noise of Mass Culture."

Even more unusual, hand-drawn soundtracks became a visual metaphor for

scriptwriting in a commercial film production company's ad campaign, offering "the

complete integration of both the visual and audial elements of the film."[21]

Figure 3.3: Springer Pictures, Inc. advertisement (1944)
Business Screen: The National Magazine of Visual Aids to Industry and Education 1,
vol. 6 (1944): 36

In this chapter, I focus on two exemplary films that utilize animated, direct optical

audio techniques: Barry Spinello's *Soundtrack* (1969) and Robert Russett's *Primary*

Stimulus (1977). While their work and explorations of the potential of optical audio

couldn't be more different, I argue that Spinello's and Russett's movement past the

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[21] *Business Screen: The National Magazine of Visual Aids to Industry and Education* 1,
vol. 6 (1944): 36.

parameters of the 16mm image area into the optical track was both an attempt to

develop a new model for the filmstrip as a visual-material object, and a means of

exploring new forms for the creation and perception of sound-images. Both picking up

Moholy-Nagy's proposal for an "acoustical alphabet of sound writing"—in which one

would be able to write acoustical sequences on the film's optical track without having to

record any "real" sound—and responding to John Cage's call in "The Future of New

Music: Credo" for a new form of music that didn't rely on the instruments of the past, I

position Russett's and Spinello's films in relation to prior experimentation with direct

audio in the 1930s and claim their films as unique explorations of sound as a

constructive, structural, and generative element inextricably linked to the materiality of

celluloid film. While Spinello's and Russett's films may utilize similar techniques and

share some of the same desire to explore the interconnectedness of the senses and

stimulation of the viewer/listener's consciousness, *Soundtrack* and *Primary Stimulus*

should also be thought of in relationship to structural cinema's fundamental exploration

of film as material and examination of the technological and perceptual capabilities of

cinema, as well as concurrent developments in electronic and experimental music.

Similar to the cinematic investigations into the phenomenology of perception and flicker

in films by Peter Kubelka, Tony and Beverly Conrad, and Paul Sharits, and the

exploration of improvisation, drone, repetition, and noise by artists and groups such as

Cornelius Cardew's Scratch Orchestra and AMM, Robert Ashley, Ramon Sender, the

Theatre of Eternal Music, and the San Francisco Tape Music Center, Spinello's and

Russett's films mark a number of compelling connections between the communities of

avant-garde cinema and music, and their shared interest in pushing the limits of human perception.

In Barry Spinello's "Notes on *Soundtrack*"—a text that was first published in *Source: Music of the Avant-Garde* in 1970, and subsequently reprinted in a chapter devoted to "Experimenters in animated Sound" in Robert Russett and Cecile Starr's *Experimental Animation*—Spinello describes *Soundtrack* as a film-painting (a term he continues to use to this day) that explores "the relationship between sound and sight" in film.[22] He writes about Cage's visionary ideas regarding the possibilities of the "photoelectric cell optical-sound process used in film," in which Cage envisioned the frame, or 1/24th fraction of a second, as a new unit of temporal measurement. Although not included in Spinello's "Notes on *Soundtrack*," Cage finished his proposal by stating that "No rhythm will be beyond the composer's reach."[23]

One of the things that attracted Spinello to animated sound was precisely this ability for the medium to reach beyond the capacity of the human body and create sounds and rhythms in units much smaller than a second. In a letter written in 1968 describing the film *Sonata for Pen, Brush and Ruler* (1968), made just prior to *Soundtrack*, Spinello explains his experimentation with passing different shapes and symbols through the optical audio reader of the 16mm projector as a process in which the artist was able to make electronic music "composed and drawn directly on the film."[24] Spinello continues on to say that it is possible to generate rhythms on film that

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22 Russett and Starr, *Experimental Animation: An Illustrated Anthology*, 175.
23 Cage, *Silence: Lectures and Writings*, 5.
24 Scott MacDonald, *Canyon Cinema: The Life and Times of an Independent Film Distributor* (Berkeley: University of California Press, 2008), 107.

are more complicated than those that can be made by humans.[25] Spinello is clearly

interested in the projected filmstrip's capacity as a new electronic instrument able to

create sounds and rhythms that are beyond the capabilities of the human body, and

believed the film, as a unified sound-image piece, had the potential to truly expand the

limitations of our capacity to see and hear.

In "Notes on *Soundtrack*," Spinello aligns his theoretical interests and practice

most closely with Moholy-Nagy's belief that "only the interrelated use of both sight and

sound as mutually interdependent components of a purposeful entity can result in a

qualitative enrichment or lead to an entirely new vehicle of expression."[26] Spinello sees

the unrealized development of sound-on-film audio experimentation as directly resulting

from the development of magnetic recording tape, and writes:

> We are at a point where film and music have gone their separate ways, so that
> the only conciliation of the two seems to be some form of "synchronization"; that
> is, music will be composed for an existing film or vice versa. This is really
> choreography of one art form (technology, or thought sequence) to another; but
> to my mind it's not what true audio-visuality can be. The synchronization process
> is analogous to two people collaborating on one story, one person providing the
> verbs and the other the nouns. Why not produce an audio-visual mix that is
> conceptually a unit?[27]

Spinello emphatically believes that the interconnectivity between seeing and hearing,

rather than the synching of one sense to the other, is what needs to be explored in the

creation of truly audio-visual work. In an essay from 2007 titled "On Sound and Image

as a Single Entity," he proposed various possibilities for creating sound and image from

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[25] Ibid.
[26] Russett and Starr, *Experimental Animation: An Illustrated Anthology*, 176.
[27] Ibid.

the same process—a process through which the artist could develop a practice that treats sound and image as completely integrated.[28] Spinello's project is based on his belief that the mind does not separate sensory information neatly into discrete categories, and he is loathe to have his work discussed in terms of synaesthesia.[29] Rather, he believes that the interaction of our senses is a part of a "common self-model … embodied in our nervous systems … drawn out of a common pool of feeling, a common pool of highly integrated and interacting neurons in an ever self-differentiating and self-elaborating nervous system."[30]

Soundtrack is an ideal case study of Spinello's attempts to eliminate what he sees as the artificial distinction between sound and image. As with his previous *Sonata for Pen, Brush and Ruler*, Spinello writes that he has "tried to make, as directly as possible, a film that utilizes sight, sound, and verbal meaning in a totally integrated way."[31] *Soundtrack* is eleven minutes of pure, kinetic, rhythmic movement. It is a truly exhilarating, unpredictable, and, at times, outright funny film. While I wouldn't call it a flicker film, it certainly explores the perceptual phenomenon of flicker fusion and makes

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[28] Barry Spinello, "On Sound and Image as a Single Entity," *Offscreen* 11, no. 8–9 (2007): 4. Online at: http://www.offscreen.com/Sound_Issue/spinello_sound_image.pdf
[29] On consideration of his work in relation to ideas about synaesthesia, Spinello writes "I ESPECIALLY do not like any comparison to the above [synaesthesia]. My work is exactly the opposite—sounds and picture being combined as a struggled forging, a hammering together…. My deep suspicion of the "avant-garde" is that is uses technology in too easy a way—pressing a button on one side of an algorithm and having the sound or picture automatically continuing until the other side. It's just not interesting." Barry Spinello, email message to the author, May 1, 2012.
[30] Barry Spinello to iota Center mailing list, June 28, 2003, http://groups.yahoo.com/group/iotacenter/message/4128. Spinello's post was subsequently published on W. Shawn Gray's AuzGnosis website, http://www.auzgnosis.com/pgs/intoactn.htm
[31] MacDonald, *Canyon Cinema: The Life and Times of an Independent Film Distributor*: 107.

almost constant use of a strobing flicker effect in the form of rapidly alternating black-and-white images, shapes, and frames.

Soundtrack begins with the gradual appearance of a series of black ink-drawn lines of various, and constantly changing, widths that move vertically, horizontally, and then finally wipe diagonally through the frame. Initially, we only hear the crackling hiss and occasional pop of what seem to be an empty optical audio track.
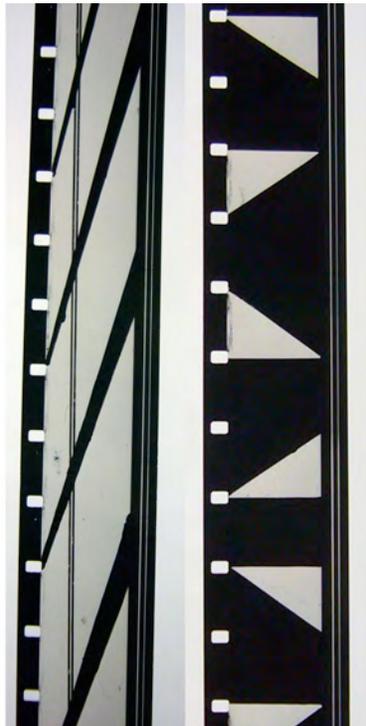
Figure 3.4: Filmstrips from Barry Spinello's Soundtrack (1969)
Courtesy of Barry Spinello

When the inked lines begin to move more fluidly and aggressively, and appear to push beyond the right side or boundary of the image frame, we hear a fluttering, intermittent noise that seems to be a sound generated directly by the inked lines. A series of split, alternating black-and-white frames appear in rapid succession, causing the optical illusion of a flickering frame that has been divided diagonally into four rapidly flashing

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black-and-white triangles. A black inked frame with a circular shape in the middle appears over the triangular shapes. The circle decreases in size and the black inked image gradually fills the frame, swallowing up the flashing shapes.

This opening sequence is followed by a series of words—the film's opening titles—that are made from transfer-type black lettering and are set into white rectangles in the middle of the frame. The titles were animated frame by frame so that they move and vibrate, perfectly capturing the kinetic energy of the film. These read, in succession, "A FILM PAINTING BY Barry Spinello." Barry Spinello's name, rather than being written in the all-capital transfer lettering, is hand-drawn. Circles begin to appear: one, two, four, six, and finally eight partially visible inked circles fill the frame. The film's title, *Soundtrack*, appears on the far right side of the frame—the words "sound" and "track" rapidly alternating and flashing back and forth on the side of the image.
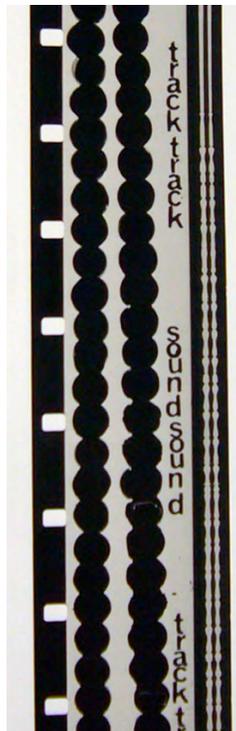
Figure 3.5: Filmstrip from Barry Spinello's *Soundtrack* (1969)
Courtesy of Barry Spinello

The words disappear and one of the rows of four black ink blobs moves out of the frame to the right, at which point we hear the first low frequency, intense buzzing noise—a sonic marker of the crazy, frenetic, playful experience that is to come.

We see and hear more images, configurations, and drawings than are possible to describe without going into great (and tedious) detail, but some of the most common are inked circles, fluidly shifting vertical and horizontal lines, dashes and linear shapes, and bars and rows of circular blobs of black ink into which Spinello has scratched (or scribed) neat and even lines, revealing the film's clear base.
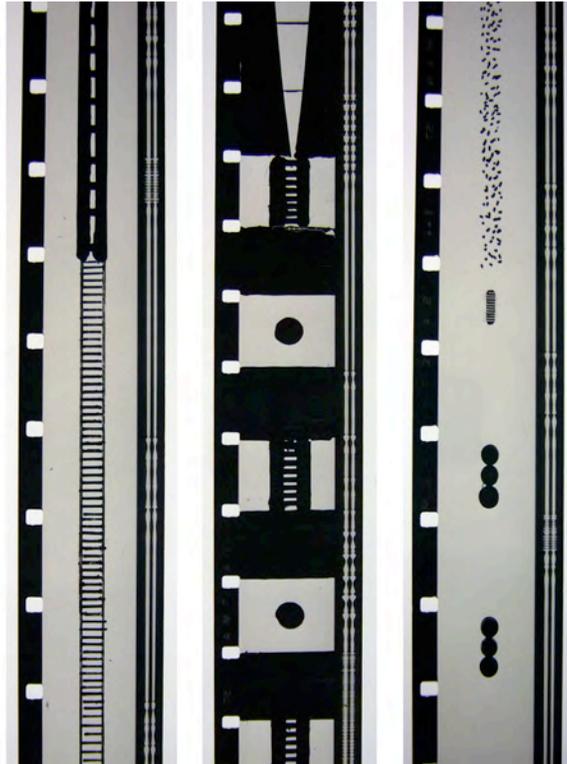
Figure 3.6: Filmstrips from Barry Spinello's *Soundtrack* (1969)
Courtesy of Barry Spinello

We hear tones, buzzes, screeches, pulses, rhythmic beats—all constantly changing and, while not always representing a direct relationship between the sound we hear and the image we see, these noises work to create what Spinello described as a unified

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experience of image and sound. The second half of the film makes use of "acetate self-adhesive screens and tapes (Zip-o-tone and Micro-tape being two brand names) … [that] are cut to fit the soundtrack [and] yield controlled pitch for any duration in as many different timbres as there are patterns."[32]
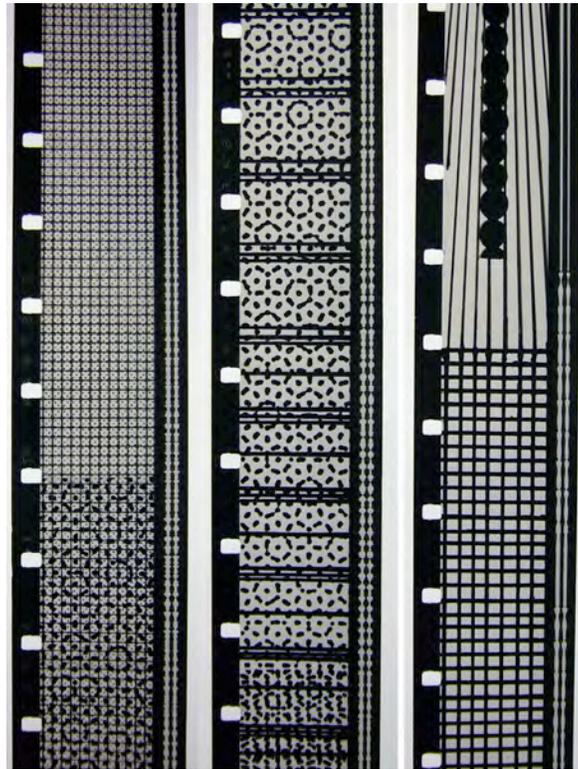
Figure 3.7: Filmstrips from Barry Spinello's *Soundtrack* (1969)
Courtesy of Barry Spinello

As the film progresses, the images get more varied and complex in their relationship to one another, and Spinello begins to introduce short flashes of color, words, letters, and phrases, including "their hairs touched it," "do it then," "under your

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[32] Russett and Starr, *Experimental Animation: An Illustrated Anthology*, 176.

seat," "smell," "taste," and, toward the end, a flicker of the word "tit" followed by "reach for it."[33] Did I mention that the film was funny?
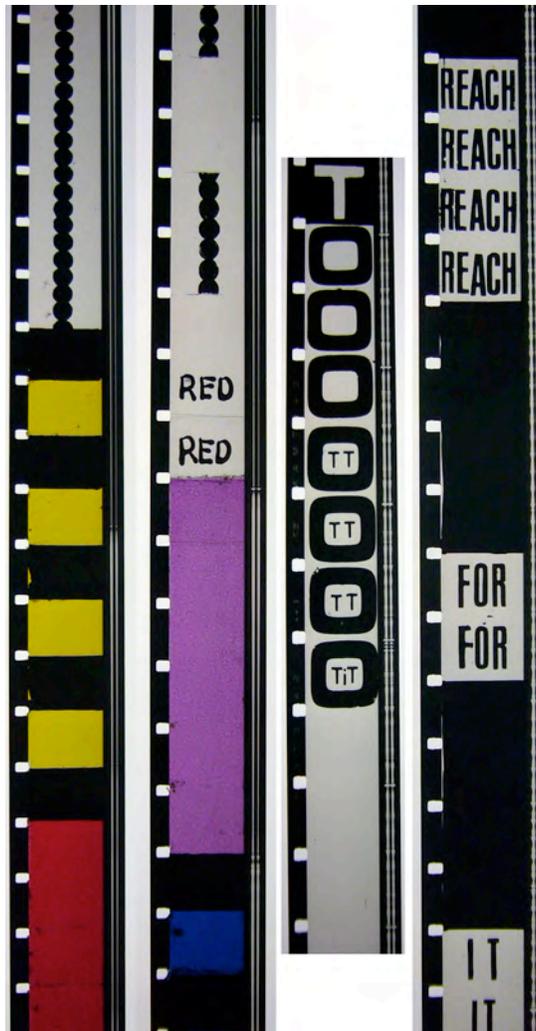
Figure 3.8: Filmstrips from Barry Spinello's *Soundtrack* (1969)
Courtesy of Barry Spinello

Possessing none of the seriousness of Peter Kubelka's *Arnulf Rainer*, perhaps a little of

the humor found in some of Sharits's early flicker films, and certainly some of the

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[33] Each of the release prints that Spinello made is unique. The prints have all been made on black and white stock, and Spinello hand painted these sections of color in slightly different locations onto each of the prints. I have had the opportunity to compare two of these prints, one from Canyon Cinema and the other from the Film-Makers' Cooperative in New York.

playfulness and joy of Tony Conrad's *Straight and Narrow* (1970), Spinello's film is about as far as one can get from being a technical exercise or illustration of the direct translation of image into sound. The film is constantly changing and continually introduces new and unexpected elements: the letters of the alphabet, flashes of color, and directives like "do it then."

In practical terms, the film was made without a camera or sound recording equipment, and is completely handmade. Sound and image were created simultaneously, with the images often drawn first in the clear leader, and then subsequently redrawn in the soundtrack area. Spinello constructed an easel that illuminated the strips as he was working (similar to a traditional lightbox) and marked out the 26 frames between sound and image so that he could, "when drawing a particular image-frame, move down the easel 26 frames and draw the corresponding sound."[34] Spinello has described his work as not only handmade, but "subject to human choice at every frame."[35] Mirroring a number of the beliefs and proposals made in the "Hand-made Film Manifesto" by the "Australian Undependents" (reprinted alongside Spinello's 1986 letter to John Schofil in Scott MacDonald's edited collection of documents and letters from the archives of Canyon Cinema), including their call to make camera-less films by any means possible (scratching, drawing, pissing on, puncturing, chewing, etc.) and rejection of performed music in favor of "music created directly on the film by any

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[34] Barry Spinello, email message to the author, May 11, 2012.
[35] Barry Spinello, email message to the author, May 1, 2012.

technique of scratching or drawing ... imaginable," Spinello's work absolutely reveals the

hand of its maker in every handmade frame.[36]

While Spinello has never seen himself as "in tune with the established avant-

garde,"[37] after he completed *Soundtrack* in 1969, he was one of the featured artists in

issue number seven of *Source: Music of the Avant-Garde*, which was published in 1970

as a double issue, reverse-bound with issue eight.
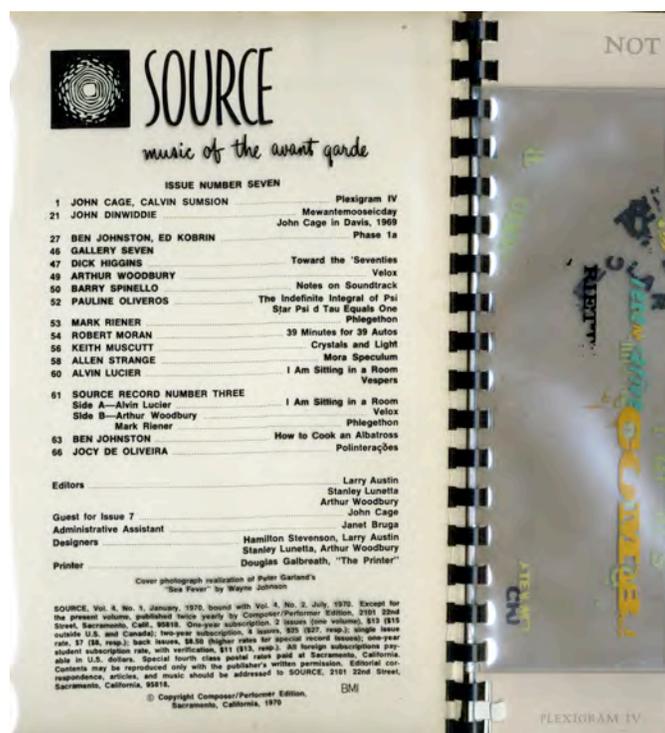
Figure 3.9: Silkscreened table of contents page on the left, and portion of John Cage and Calvin Sumison's 8-page silkscreened transparency score visible on the right, *Plexigram IV: Not Wanting to Say Anything About Marcel* (1969), *Source: Music of the Avant-Garde*, no. 7 (1970)

As I mentioned in chapter one, this double issue of *Source* was guest edited by John

Cage and featured two reverse (one on each side) table of contents pages silkscreened

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[36] MacDonald, *Canyon Cinema: The Life and Times of an Independent Film Distributor*: 106.
[37] Barry Spinello, email message to the author, May 1, 2012.

onto transparency sheets, as well as a series of eight hand-silkscreened transparency sheets containing the score for John Cage and Calvin Sumsion's *Plexigram IV: Not Wanting to Say Anything About Marcel* (1969). This double issue is particularly complex and intricately designed and, as I claim in the first chapter, much more of an artist's book than a music periodical. It also includes two ten-inch records—in issue seven, *Source* record number three features Alvin Lucier's *I am sitting in a room* on side A, and Arthur Woodbury's *Velox* and Mark Riener's *Phlegethon* on side B; in issue eight, *Source* record number four contains Larry Austin's *Caritas* on side A and Stanley Lunetta's *moosack machine* on side B. Tucked in-between Dick Higgins's essay "Towards the '70s," a reflection on the last decade that focuses on the proliferation of "intermedia" in the 1960s (specifically concrete poetry and happenings), Arthur Woodbury's description of his composition *Velox*, and Pauline Oliveros's instructional score for "The Indefinite Integral of Psi Star Psi d Tau Equals One"—are two pages devoted to Barry Spinello. On those two pages appear his essay "Notes on *Soundtrack*," a graphic drawing, a reproduction of ten long filmstrips from *Soundtrack,* and an image of Spinello bent over his work table applying one of the sequences of letters that appear in the second half of the film.

While I was initially surprised to see Spinello and his description of the central concerns and technical means by which he created the film's synthetic soundtrack in *Source* (to my knowledge his is the only work on 16mm film that was ever reprinted in the publication), the reproduction of the long strips of film illustrating his graphic technique certainly align with the idea of the filmstrip as a graphic score that I explore in chapter one.
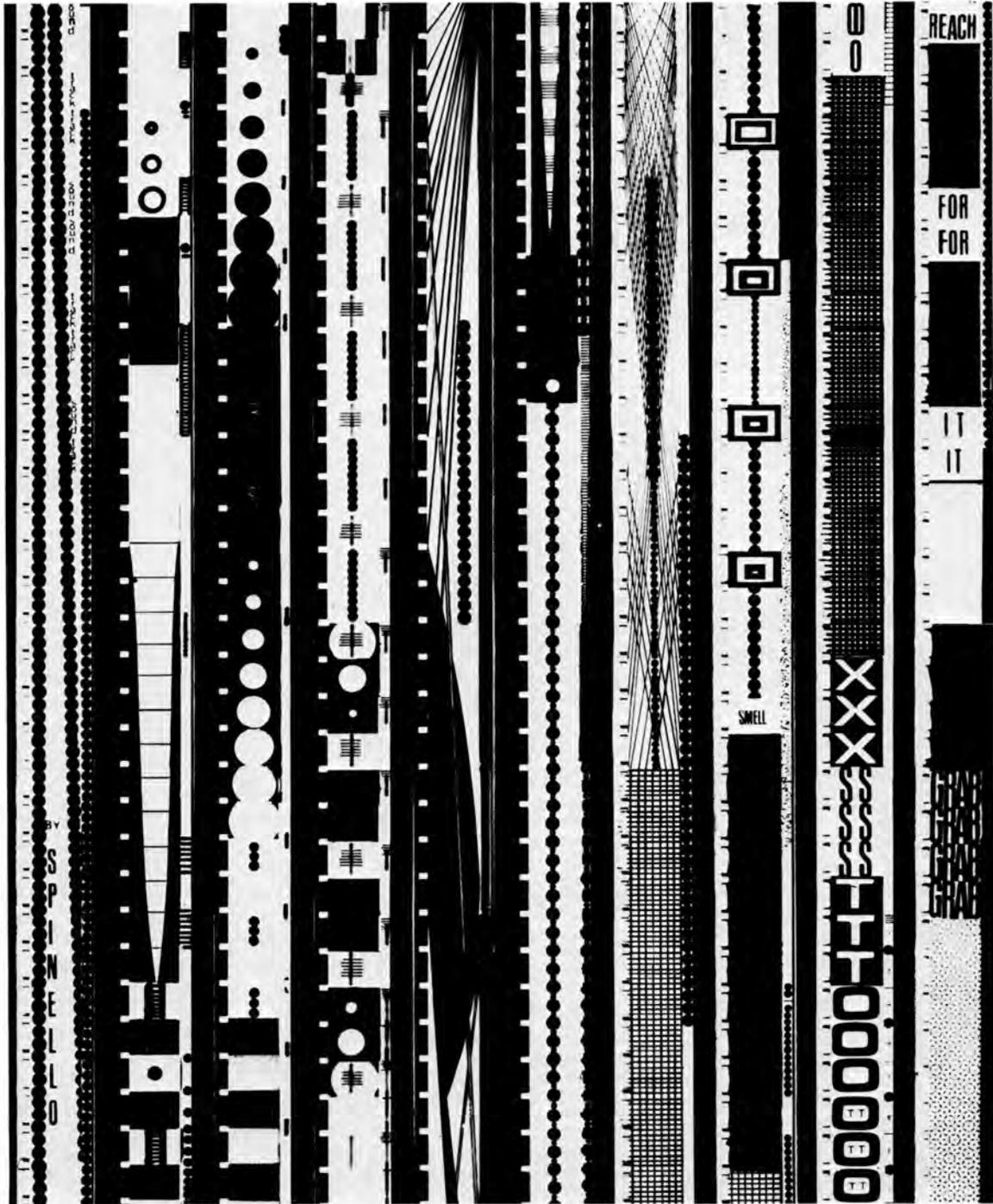
Figure 3.10: Barry Spinello, 10 filmstrips from *Soundtrack*
Reprinted in *Source: Music of the Avant-Garde*, no. 7 (1970)
Courtesy of Barry Spinello

Given Cage's interest in the potential of film's optical audio technology and the unit of

the frame mentioned earlier, Spinello's inclusion suggests that Cage was still excited by

these ideas. By freezing these filmstrips, stopping them from their movement through the projector, and effectively extracting them from the temporal experience we have in the theater, *Source* suggests that the film can be read in much the same way as Paul Sharits's *Frozen Film Frame* pieces or Peter Kubelka's gallery installations of *Schwechater* and *Arnulf Rainer*: as both an object worthy of study on the level of the frame and a frozen signifier of the object-film that is set into motion by the projector.

That said, the question remains: why was Spinello the only filmmaker working with animated or synthetic sound to appear in *Source*? How did this come to be? While on one hand I think that it is possible to answer, at least in part, these questions with the reasons I propose above, it still strikes me as curious that someone who has considered himself to be so outside of the avant-garde ended up in a double issue guest edited by John Cage, alongside the composers Alvin Lucier, Pauline Oliveros, Lowell Cross, David Tudor, Morton Feldman, and Stanley Lunetta. In a series of exchanges with Spinello, I asked him about this but didn't receive a direct answer. He did respond with an anecdote, however, that is equally charming and compelling, and speaks volumes about his, and Cage's, personalities and artistic motivations at the time.

> …I consider John Cage important, but I do not actually listen to his music! Do you? In 1969 (I think), I was contacted, out of the blue, by Cage. I think he had seen the *Source* magazine article. He said that he was visiting the west coast to prepare for a concert he was to give at UC Davis in a few days, and would like to drive to my studio in Oakland to see my films. I was very excited. He arrived for lunch and we served chicken soup. When he learned that my wife was Canadian he related a tremendous interest he had in Canadian Moose. He was very entertaining. After lunch we retired to my basement studio and I screened *Sonata for Pen, Brush and Ruler* and *Soundtrack*. He liked them very much and said that he wanted to use them in his upcoming Davis show in a few weeks. I was very moved by this as you can imagine. Of course, "yes," I replied. But then he said he intended to screen the films together—at the same time. I was puzzled and

said "okay," and he left. He had left a phone number and I phoned him a few days later describing that I could not in good conscience let my films be screened that way—by "randomizing" them and making them "indeterminate" it answered to his aesthetic but totally defeated the aesthetic I was trying to get at. He was very polite, but said that, for two reasons, I was making a mistake: one, he was counting on using my films that week and two, a single word, grants. I withdrew my films. I drove with my wife to the Davis concert, but did not have the courage to go inside. That was that.[38]

In 1976, Robert Russett and Cecile Starr published *Experimental Animation: An Illustrated Anthology*, which to this day remains the most comprehensive study of alternative and experimental animation practices and makers. As mentioned previously, the book includes a section titled "Experimenters in Animated Sound" that focuses on the work of Norman McLaren, John Whitney (specifically the pendulum system used in the *Five Film Exercises*), and Barry Spinello. Both Russett and Starr are animators, and while the book is an outstanding introduction to the history of abstract and experimental animation in Europe and North America, the editors' unique understanding of the medium and knowledge of the work of young and yet-to-be-discovered animators in the early 1970s makes it an extraordinarily special document. Russett is included in the first chapter of the book, "A Rising Generation of Independent Animators," along with Adam Beckett, Caroline Leaf, Frank Mouris, and John Stehura, among others. By the time of the book's publication, Russett, formally trained as a painter and printmaker, had made two 16mm films, *Neuron* (1972) and *Brain Field* (1974), both of which explored the phenomenological effects of color flicker and combined "the visual elements of abstract

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[38] Barry Spinello, email message to the author, May 1, 2012.

painting with the visceral kind of rhythmic and temporal tension found in music."[39]

Russett wrote of these early films:

> I have found that certain optical systems when mechanically diagrammed in time can produce unique color structures. These color structures have their own synthetic quality—a luminous appearance—which cannot be produced in other art forms. Basically, I use two techniques to achieve these effects: (1) color after-image, an illusion produced from animated black and white patterns, and (2) optical color mixture, a form of temporal pointillism.[40]

Russett has said that this desire to begin working in moving color was greatly inspired by an exhibition of abstract paintings that he saw at the Houston Museum of Fine Art in the 1970s featuring works by Morris Louis, Frank Stella, and Larry Poons. The exhibition caused him to "consider the kinetic possibilities of color field imagery and triggered a change in [his] approach to filmmaking." After this point, turning his attention almost exclusively to filmmaking for the next decade, Russett concentrated on new ways of thinking about abstract animation as an art form and looked for "new ways to work with color and shape in time."[41]

The first of these films, *Neuron*, is composed from a complex and constantly vibrating base of imagery that includes rapidly alternating shapes, graphic patterns, spinning dots, rotating combinations of four and six circles and squares in the frame that are each filled with moving lines, and pure color frames—all of which flicker back and forth between different color combinations, creating a madly vibrant assault on the viewer. When critics speak of a film like *Ray Gun Virus* (in which Sharits described the

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[39] Laurence Kardish, "Robert Russett and the Plastic Nature of Actuality," in *Robert Russett: A Retrospective Survey*, ed. Herman Mhire (Lafayette: University of Southwestern Louisiana, 1989), 14.
[40] Russett and Starr, *Experimental Animation: An Illustrated Anthology*, 26.
[41] Kardish, "Robert Russett and the Plastic Nature of Actuality," 13–14.

projector as a pistol) as an "audio-visual assault," as they so often do, I can only think that *Neuron* takes *Ray Gun Virus* as a point of departure, and then intensifies tenfold the experience of complete perceptual overload. As the film's title suggests, Russett wanted to stimulate a neurological reaction in the viewer, and the movement of shapes within frames in conjunction with the rapid alternation of incredibly saturated colors most certainly does.
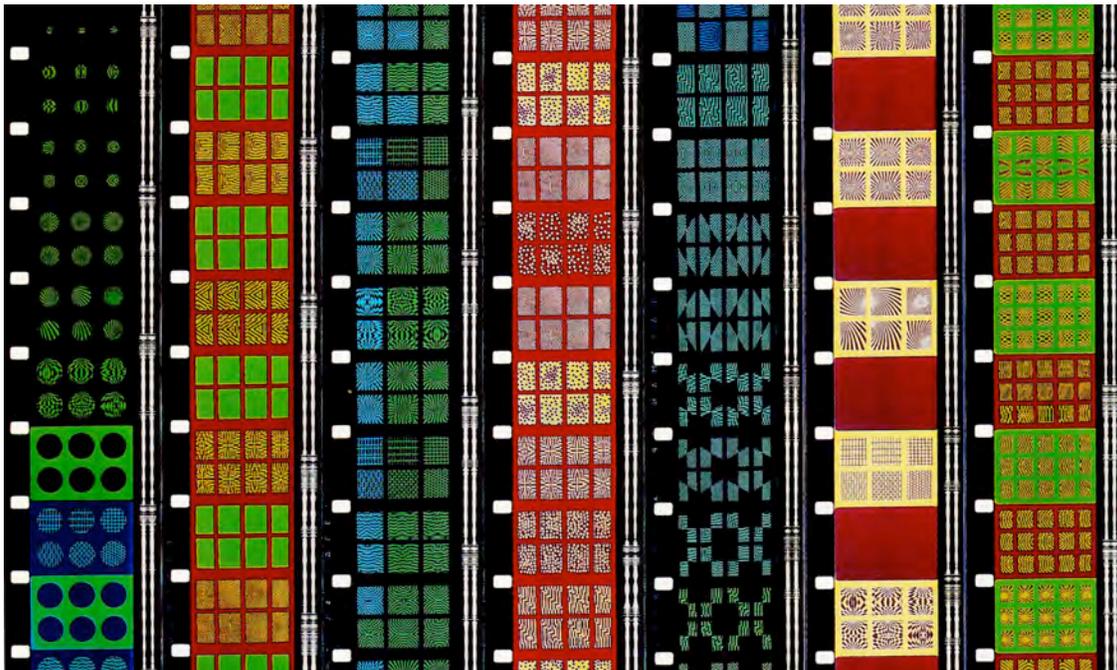
Figure 3.11: Film Strips from Robert Russett's *Neuron* (1972)
Courtesy of Robert Russett

The soundtrack was made from graphically manipulated patterns composed of varying densities of equally spaced lines, resulting in the shifting pitch, or frequency, of the repeated rhythm heard throughout the film. Russett writes that this change of pitch is the result of a "purely visual modification and does not originate from a sonic or

acoustical source."[42] When the film was completed, the soundtrack made from these

patterns was converted into a variable area optical track for the purpose of striking

release or screening prints, but at the end of the 16mm soundtrack printing negative,

Russett made one final direct manipulation of the film's soundtrack. He applied strips of

"Zip-o-tone patterns," the same type of material used by Spinello in the last portion of

Soundtrack, over the variable area optical master in one small section at the very end of

the film. These small applications of patterned lines positioned across the variable area

track cause an interruption of sorts in the soundtrack; although we still hear the original

soundtrack, it is layered with a few jarring buzzes of pure noise.
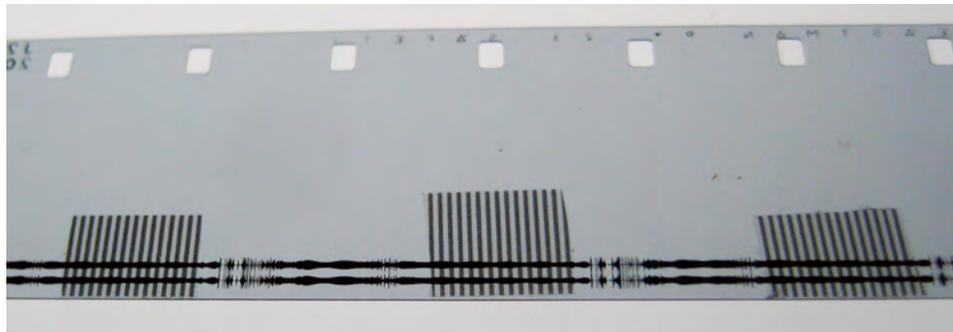
Figure 3.12: Frames from Robert Russett's *Neuron* (1972), optical track negative
Photograph by Mark Toscano, Academy Film Archive
Courtesy of Robert Russett

While Spinello's and Russett's shared interest in exploring direct audio and

rethinking the relationship of images to sounds connects the films they were making at

this time, their practical methodologies could not have been more different. Both artists

were originally painters, and Russett studied printmaking, specifically etching and

engraving, at Stanley Hayter's Atelier 17 in Paris in the early 1960s. Spinello studied

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[42] Robert Russett, "Notes About Selected Works," in *Robert Russett: A Retrospective Survey*, ed. Herman Mhire (Lafayette: University of Southwestern Louisiana, 1989), 84.

music and later architecture as a graduate student at Columbia University, and then moved into painting and drawing. Spinello's films are a clear extension of his background and continued work in painting and drawing, and his style, while precise and exacting in its creation, has a feel about it that is loose, improvisatory, and free-spirited. *Soundtrack* seemingly uses every technique, image, and design that Spinello created, and one of the incredible things about the film is the way in which all of these disparate styles come together and create a unified whole. The film's success as such reflects Spinello's belief that the simultaneous creation of image and sound will engender a work that is a single entity of complete audio-visual integration.

Russett, while interested in a similar kind of holistic approach to the creation of sounds and images, employed a much more structured method in making *Primary Stimulus*.

Figure 3.13: Robert Russett, frame structure for *Primary Stimulus* (1977)
Courtesy of Robert Russett

Unlike *Soundtrack*, the film was created from a set of limited, pre-determined variables that were meticulously scored in a series of numeric and graphic "frame structures"—scores that have some faint resonance with the look of early computer programming code.[43]
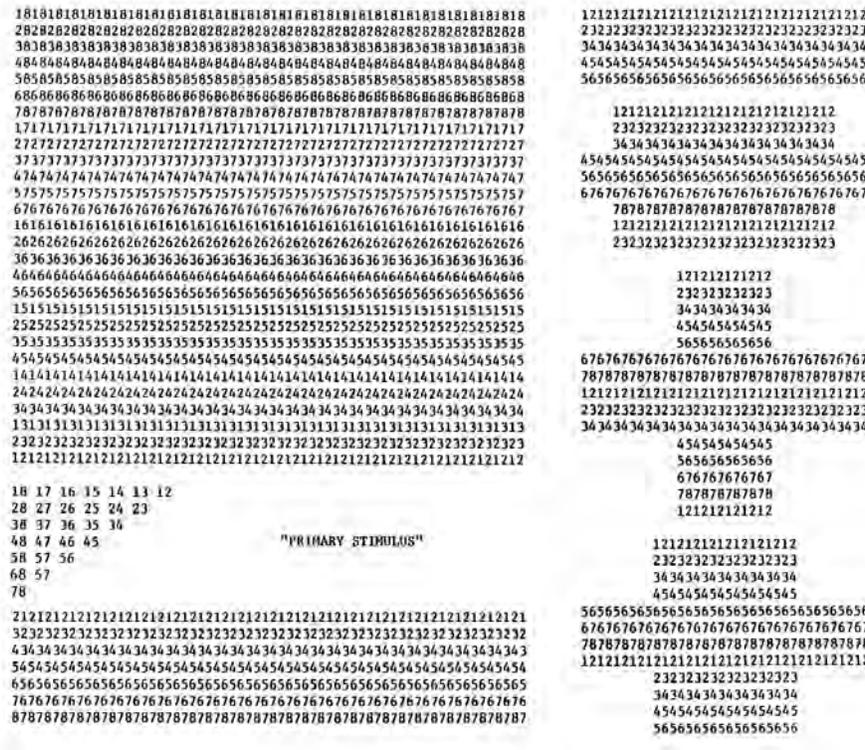
Figure 3.14: Robert Russett, frame structure for *Primary Stimulus* (1977)
Courtesy of Robert Russett

Primary Stimulus was created on an animation stand equipped with a camera that Russett had modified by filing out its aperture plate. By opening up the aperture plate (located in the gate of the camera where the film is exposed), Russett was able to simultaneously expose image and sound. He created a series of sixteen "grate

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[43] Russett has always been fascinated with technology, and after working in 16mm film, moved to video, video processing (he spent time in residency at the Experimental Television Center in Owego, NY), and has been creating new work with digital technology since the 1990s.

patterns"—essentially sixteen different patterns of horizontal lines that varied in their width and distance from one another.
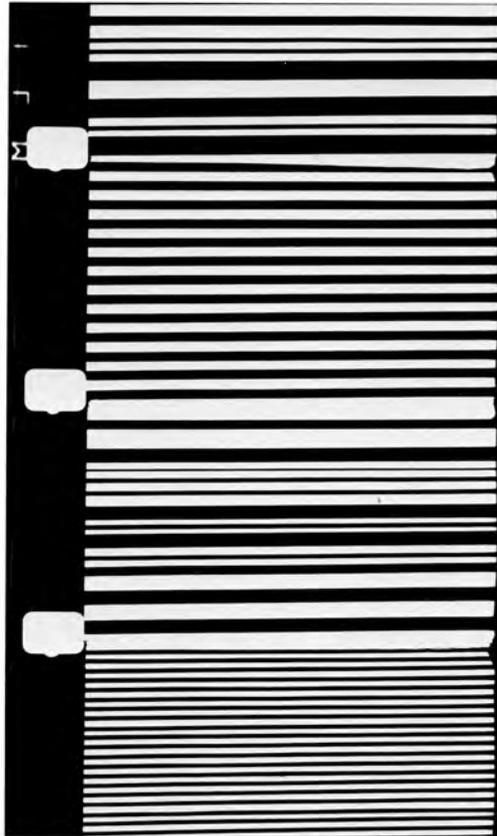
Figure 3.15: Filmstrip, original print Robert Russett's *Primary Stimulus* (1977)
Courtesy of Robert Russett

Because of the modification Russett made to the camera, when he shot these patterns frame-by-frame onto high-contrast film stock, the patterns extended across the image area of the filmstrip and into the portion reserved for the optical audio track.[44]

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[44] The image seen on this page of *Primary Stimulus* is made from the camera original print of the film. As you can see, the horizontal line patterns are printed directly across the filmstrip into the optical soundtrack area. When release and projection prints were made, Russett had to run the original reversal print through the contact printer twice, once with a twenty-six frame offset, so that sound could be printed twenty-six frames ahead of its corresponding image in order for the images and sound to remain in sync in projection.

When the film is projected, the black-and-white horizontal line grate patterns printed in the soundtrack convert into specific tones and frequencies. The film starts by alternating back and forth between grates in which the patterns and widths of horizontal lines do not vary greatly, which causes minor fluctuations in tone and vibrations—or a kind of back-and-forth flutter—in the black-and-white lines seen on-screen. At times, Russett leaves a pattern up long enough so that we are able to recognize the sound of the image we are seeing, but generally we see and hear dense combinations of the sixteen different grate patterns he was animating. The sounds heard are far from pure noise; they are clean, distinct, electronic tones. As Russett introduces thinner lines that are closer together, the tones become higher in frequency, reaching an almost painfully high pitch. Because he is constantly alternating between the sixteen grate patterns— shooting, for example, two frames of one pattern followed by two frames of another— the tones that we hear are always fluttering and vibrating between frequencies.

When Russett begins moving between grates with thick lines and thin lines, we hear an almost chordal combination of electronic tones. Because he is usually working in increments ranging from one to three frames in some of these sections, the tones begin to overlap and combine, creating not only new combinations of frequencies but also a kind of sustained sonic residue—overtones that resonate and remain as the film progresses rapidly forward. In some sections, *Primary Stimulus* moves progressively from thick to thin lines, creating the sound of an ascending scale of notes, or conversely, from thin lines to thick, creating a descent from high pitched frequencies to low. Russett combines these patterns in a variety of different rhythms so that the film's tempo and the speed of the tonal shifts are constantly changing. When he starts to

really mix up the grate patterns, the tones jumble and overlap, generating an almost

anxiety-inducing sense of confusion—a cacophonous jumble of pure noise. Because

the sounds are so uniquely electronic in nature (as opposed to Spinello's relatively

messy, hand-drawn noise patterns), they recall, at points, the beeping of early electronic

video games.
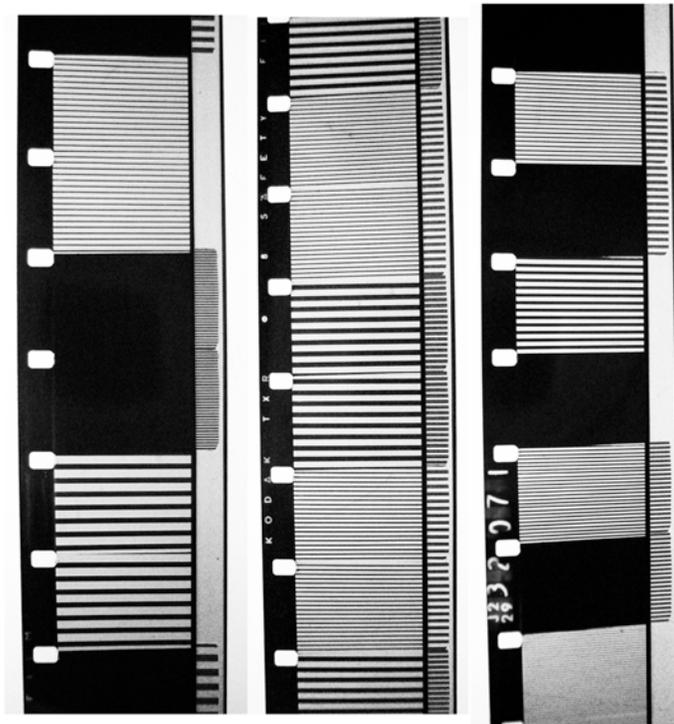
Figure 3.16: 3 filmstrips from release print of Robert Russett's *Primary Stimulus* (1977)
with 26 frame off-set visible. Courtesy of Robert Russett

Later in the film, Russett begins to introduce frames of pure black—usually only one,

two, or three frames at a time—which causes an intense visual flicker and a deep,

vibrating sonic rhythm. As Russett writes, "the varying spatial frequencies were

designed to produce a matrix of rhythms and sensory impressions. The principle of

photic stimulation—the repetition of high-amplitude, short-duration flashes of modified

light—was employed to animate these grating patterns and to shape the identity of sound as image."[45]

Russett wanted the rapid, flickering modulation of these images to create a visual phenomena he likened to an after-image, one that could include "subtle but luminous color changes, mobile dots and dashes, and other secondary perceptual effects."[46] These visual effects are mirrored in the sonic vibrations and fluctuation that we hear, creating a visual and aural phenomenological experience that reflects Russett's desire for the film to be "seen with our bodies and with our nervous systems as well as with our eyes."[47] In close connection to Spinello's desire to create a completely integrated single-entity of audio-vision—in both production and perception—Russett was working towards the creation of a viewing experience in which the body would perceive sound and image as a unified whole. He wrote:

> My aim in *Primary Stimulus*, however, was not merely to create the effect of "seeing sound," but rather, in a larger sense, to further develop the cinematic potential of non-objective light as a free and viable tool for audio-visual action. By using the film frame as a consolidated unit, sound and image issue from a single center and interpenetrate in a way which is not limited by structural conventions of music or pictorial form. It was, therefore, my intention in *Primary Stimulus* to exploit the freedom of this holistic cinematic concept, and to create an expressive animated work based on the frame-by-frame articulation of sight and sound relationships.[48]

Russett wanted the experience of the film to be one of complete immersion and "integration," and for this reason chose to not include titles at either the head or tail of

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[45] Russett, "Notes About Selected Works," 85.
[46] Ibid.
[47] Kardish, "Robert Russett and the Plastic Nature of Actuality," 14.
[48] Russett, "Notes About Selected Works," 85.

the film.[49] Russett continued working with these ideas and the original material for the film, and, between 1979 and 1982, developed two installations that expanded upon the film's form and original content. The installations were never realized and, in Russett's words, "exist mostly in the form of highly detailed proposals, drawings and photographs."
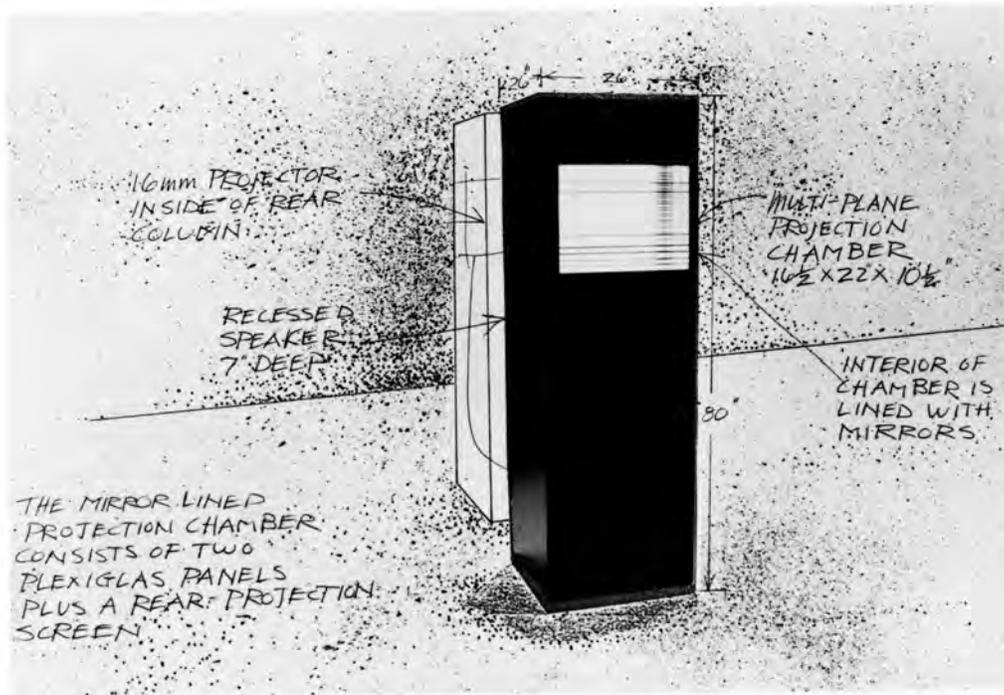
Figure 3.17: Robert Russett, diagrammatic illustration of the prototype multiplex chamber constructed for *Primary Stimulus: Installation #2*. Courtesy of Robert Russett

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[49] I don't know when Russett decided to name the film *Primary Stimulus*—the three prints I studied all have the name *Sounder* written in the lab printing leader. This shift from *Sounder* to *Primary Stimulus* seems to imply that Russett was initially focused on the film as a sound piece and then moved toward thinking of it as a work in which the primary goal was to impact, stimulate and activate the viewer. The prints I examined were two of Russett's personal copies, as well as a print held in the collection at Anthology Film Archives. The version of the film that Russett describes in his exhibition catalog and loans for screenings, as well as the copy that is at Anthology, are both thirteen minutes long. He also made a shorter, nine-minute version of the film, as well as a completely different iteration—a color experiment that was never publicly screened and is titled *Primary Stimulus: Red Hits Green*. Both the nine-minute version of *Primary Stimulus* and the color experiment are now being stored at the Academy Film Archive.

The proposals themselves, when read, are complex and quite difficult to envision, but entail the installation of multiple projections of an edited version of *Primary Stimulus*: one, a multi-screen rear-projection of three images onto plexiglass panels printed with versions of the grate pattern used to create the film's original sounds and images; and the other, a series of projection chamber columns installed in a gallery space that allow the viewer to "move through the piece and observe the imagery in various sequences and combinations."[50]
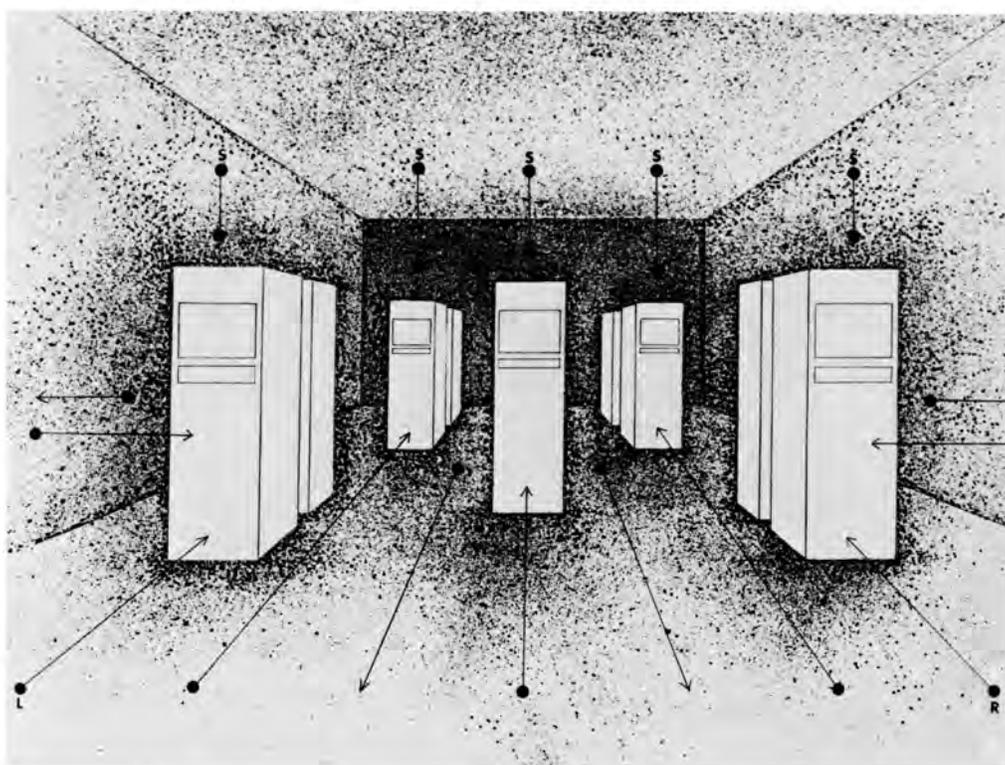
Figure 3.18: Robert Russett, proposal drawing showing the configuration of multiplane projection chambers used in *Primary Stimulus #2*. Courtesy of Robert Russett

Russett describes the sound in the proposal for *Primary Stimulus Installation #2* as the result of loop-printing five identical prints of the film, thus "creating a polyphonic delay"

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[50] Russett, "Notes About Selected Works," 86–87.

when the projectors are turned on, "one after the other, at ten-second intervals." Thus, "This staggered combination of looped sounds would produce a composition of overlapping and repeated rhythms—in effect a close-textured and complicated canonic structure."[51] While I can only imagine the wild overtones and harmonics that this staggered layering of the film's soundtrack would produce, given the intense tonal shifts already present when hearing one print of the film, I am certain that five simultaneous versions of this soundtrack would fill the gallery with intense and overwhelming noise.

Russett's interest in creating a space filled with a multiplicity of moving images and intensely overlapping harmonics—one in which the viewer is free to move around and experience the work from a variety of different perspectives—certainly mirrors ideas and concerns similar to those that preoccupied Paul Sharits during the 1970s. While Spinello's and Russett's films *Soundtrack* and *Primary Stimulus* explore a shared interest in perceptual phenomena and the integration of sensory experience, it is Russett's movement of these concerns into resonant, architectural space that links him to Sharits in the chapters to come.

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[51] Ibid., 87.

CHAPTER FOUR
PROJECTIONS

"*The projector is turned on*. So and so many watts of energy, spread over a few square yards of featureless white screen in the shape of a carefully standardized rectangle, three units high by four units wide. The performance is flawless. The performer is a precision machine. It sits behind us, out of sight usually…. It reads, so to speak, from a score that is both the notation and the substance of the piece…. Only one thing has *always* been in the projector. Film. That is what we have seen. Then that is what all films are about."[1]

—Hollis Frampton

Hollis Frampton's 1968 projector performance piece, *A Lecture*, is an extraordinarily elegant, complex, and poetic reflection on the nature of cinema, the theater, the projected frame, the machinery of projection, and the experience of film viewing. The ideological implications of the cinematic apparatus and the position of the spectator would be theorized extensively in the years that followed Frampton's performance by critics and philosophers as varied as Jean-Louis Baudry, Jean François Leotard, Teresa de Lauretis, Peter Wollen, and Mary Ann Doane, but the radical significance of Frampton's work lies precisely in its simple explorations of, and experimentation with, the machine—the projector—itself. A text written by Frampton,

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[1] Excerpted from Hollis Frampton's 1968 projector performance piece, *A Lecture*. Hollis Frampton, "A Lecture." *Circles of Confusion* (Rochester: Visual Studies Workshop Press, 1983), 194–197. *A Lecture* was first performed on October 30, 1968, at Hunter College.

and then read and recorded by Michael Snow, set the length of the performance at about 25 minutes. The text, or the lecture, played from a tape recorder that was placed onstage underneath the projection screen. From the back of the room, Frampton performed actions dictated by the lecture text on an "empty variable speed projector" that was positioned to fill the screen and "turned down to its slowest rate to produce a distinct flicker."[2] At various moments over the course of the recorded lecture, Frampton, the performer, was directed to place a red filter in front of the lens, insert a pipe cleaner into the gate, and block the passage of light through the lens by covering it with his hand. The lecture itself, as the excerpts quoted at the beginning of this chapter attest, questions what it is that constitutes "film itself." Is film the mere modulation of a light source, the acceleration of "small, still pictures into movement"? Is it evidence of the filmmaker's quest for "self-expression"?[3] Or is it that white, flattened rectangle of light projected through a dark space? While Frampton's *A Lecture*, as well as projector performance works like Takehisa Kosugi's *Film & Film #4* (1965) and Nam June Paik's *Zen for Film* (1962–64), imagines a cinematic experience that can consist, at its most basic, of only two elements, light and time, I contend that it is the film projector itself (albeit absent of film) that renders these works cinematic.

From Paul Sharits's request for the projectionist to not attach any tail leader onto the print of *Ray Gun Virus* in order for the film to "run all the way out of [the] projector at [the] end"—effectively affirming both the "projector operation" and "projector light beam"—to his use of projectors in the gallery spaces that screened his 1970s locational

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[2] Editor's introduction to *A Lecture* in P. Adams Sitney, *The Avant-garde Film: A Reader of Theory and Criticism* (New York: Anthology Film Archives, 1987), 275.
[3] Hollis Frampton, "A Lecture," in *The Avant-Garde Film: A Reader of Theory and Criticism*, ed. P. Adams Sitney (New York: Anthology Film Archives, 1968), 278-80.

works, the film projector and its flickering light beam were central preoccupations for most of his career.[4] Fred Camper, in writing about a show of Sharits's works at the Collective for Living Cinema in 1976—including *Word Movie / Fluxfilm 29* (1966), *Color Sound Frames*, and *Analytical Studies I: The Film Frame* (1972–76)—states that his films are "in some ways, the most firmly referential form of cinema possible," because "like the work of only a few other filmmakers, they refer directly and primarily to the projector and the strip of film running through it…".[5] Camper continues to write that Sharits may be trying to

> create a cinema in which films do not achieve their meaning only via their optical effect on the viewer, but rather demand that the relationship between screen, image, projector, film, and viewer be considered. The schematic ways in which his films are structured and the ways they refer to [the] film strip and projection should encourage the viewer to consider these things rather than looking passively at the screen.[6]

The two films examined in this chapter, Paul Sharits's *Episodic Generation* (1978) and Coleen Fitzgibbon's *Internal System* (1974), investigate, explore, and ultimately deconstruct the material of film through the act of projection. Both works are rigorous and demanding in form, and expand the experience of projection such that materials normally kept silent and offscreen are seen and heard. In both of these strikingly different pieces, optical audio is made into a visible element of the work and projected as an image on-screen. A part of the physical material of celluloid film, the optical track—like the filmstrip's sprocket holes—is an essential element to the medium of the sound film, but one that is normally never seen or (visually) acknowledged by the

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[4] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Ray Gun Virus" folder, elements 30 & 34.
[5] Fred Camper, "Paul Sharits," *Soho Weekly News* April 22, 1976.
[6] Ibid.

viewer. Both *Episodic Generation* and *Internal System* are structured in four distinct movements and, through each of their four sections, explore gradual shifts and temporal changes in speed, motion, planarity, and dimensionality. In projecting sound as image, what do they reveal about the material of film, the technology of projection, or the experience of cinema?

Like many of Sharits's works from the 1970s, including those discussed in the previous chapter, *Episodic Generation* exists in two forms: one, a single-screen version meant to be projected in a theatrical setting, and the other, a locational four-screen installation piece.[7] *Episodic Generation* was also exhibited as a *Frozen Film Frame* piece, and, as with *Color Sound Frames*, *Synchronousoundtracks*, *Vertical Contiguity*, and *Divergent Intersecting Vectors*, originated with footage Sharits termed the "specimen." Multiple "specimens" were used in the creation of these multi-platform pieces from the 1970s. In a series of notes on the use of this footage in *Episodic Generation*, Sharits writes: "I call these initial filmstrip subjects 'specimens' because I regard the rephotographing of them for the final installation footage an analytical process."[8] He explains that the films that originated with the "specimen" as source footage all utilize different manifestations of the film due to the different color, tonal, and rhythmic qualities he wanted to emphasize in each piece. As previously discussed,

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[7] The film is generally noted as being completed in 1977–78, although based on Sharits's notes and correspondence, he was working on the project as early as 1974. In collaboration with Christopher Cooper, an undergraduate student at Carnegie Mellon University, and the University's Computer Sciences Center, Sharits was working on completing the film's soundtrack in the fall of 1974. A drawing illustrating the four-screen installation of the piece dates from 1975.

[8] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, elements 30 & 34.

Sharits's films from this period were, to use his terms, "pre-planned" through the creation of "color-coded 'scores,'" and then an additional "score"—the "specimen"—was created as a "pure color roll, usually 90–200 feet in length" on 16mm film. Thus, a specimen film score was used to create the film *Episodic Generation* through a multi-stage process of rephotography, and then exhibited with the installation version of the piece in its *Frozen Film Frame* form.

Although the experiences of the single-screen and four-projector installation versions of *Episodic Generation* are, for obvious reasons, completely different, Sharits originally conceived of the film as existing in both of these two discrete forms. His interest in making films for both theatrical screenings and gallery installation undoubtedly reflects the enormous economic disparity between the compensation and funding support received by experimental filmmakers (who chose to exhibit their works as projections in theatrical spaces) and artists working with film (who exhibited in galleries or museums). In his correspondence during this period of time, Sharits makes it very clear that he is completely discouraged and defeated by the lack of funding for experimental filmmakers. Faced by overwhelmingly serious financial difficulties for most of his career, Sharits continually struggled to make the work that he wanted to make because of these economic restrictions.[9] In a 1978 conversation with Steina and Woody Vasulka, Sharits plainly says, "I'm sick of film. I'm so broke. I can't experiment. I feel bummed out."[10] He continues:

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[9] Evidenced in numerous correspondences found at Anthology Film Archives and the Paul Sharits Archive files at the Burchfield Penney Art Center.

[10] Woody Vasulka and Peter Weibel, eds., *Buffalo Heads: Media Study, Media Practice, Media Pioneers, 1973-1990* (Karlsruhe: ZKM/Center for Art and Media, 2008), 365.

First of all the investment that goes into it is so disproportionate to the financial stresses it causes. It's absolutely outrageous that a painter might—let's say he's going to make a big canvas he might spend 100 dollars on the canvas—the acrylics and everything and he sells it for 5,000 dollars. It's exactly the opposite in film you spend 5 to 30 thousand dollars to make something and then sell the print for 100 dollars. These crazy things I've been doing in gallery situations trying to create filmic environments. This last film I'm going to do it's going to be a single screen film in four parts so you could sit down and watch it and it would be forty minutes long. But also it will be a four-screen format in a gallery—four separate soundtracks—one of these locational film installations.[11]

Taking into account his financial struggles and limited resources, the multi-functionality of a work like *Episodic Generation* can certainly be seen as representative of Sharits's attempt to move into the more financially lucrative gallery scene. While I think it would be hard to argue that money had nothing to do with Sharits's interest in making work that could be seen as cinema in the theater, as well as art in the gallery, locational installation pieces like *Episodic Generation*—and the earlier *Sound Strip/Film Strip* (1971-72), *Synchronousoundtracks* (1973-74), *Shutter Interface* (1975), *Dream Displacement* (1975–76), and *Epileptic Seizure Comparison* (1976)—should be viewed as reflections of Sharits's ongoing interest in exploring sonic environments, perceptual and acoustic phenomena, and the projector apparatus. As he states in his conversation with Steina, these pieces were made as attempts to create filmic environments that reflected on the materiality of film, and he considered *Episodic Generation* to be the summation of his work on the "physicality" of film—"film as film, or film about film."[12]

The single-screen version of *Episodic Generation* is divided into four consecutive sections, each lasting about seven minutes and twenty seconds in length. Following the

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[11] Ibid.

[12] Ibid.

three opening title cards—the first of which specifies that this is the single-screen

version of a four-screen locational installation piece—the first image appears onscreen:

a rephotographed filmstrip containing sections of black and pure, solid color frames.

Sprocket holes are visible on the right side of the frame, and a variable area bilateral

optical soundtrack is visible on the left. As Sharits explains in his text on the film, what is

seen is a rephotographed image of *Specimen IV*, originally part of *Analytical Studies IV:*

Blank Color Frames (1975–76). Sharits had originally intended to use *Specimen II*,

which appears in the first section of *Analytical Studies IV: Blank Color Frames*, for

making *Episodic Generation*, but he did not find it "adequate for its intended purpose" in

this new manifestation.[13] As Sharits describes in a note detailing the different sections

of *Analytical Studies IV*, this particular "specimen" is, in part, a document of Steve

Osborn, Claude Kerven, and Sharits shooting film "superimposed within an image of

what [they] are shooting" so that the viewer sees the "apparatus of rephotography and

how [the] synch soundtrack of [the] image and sprocket holes [were] obtained."[14]
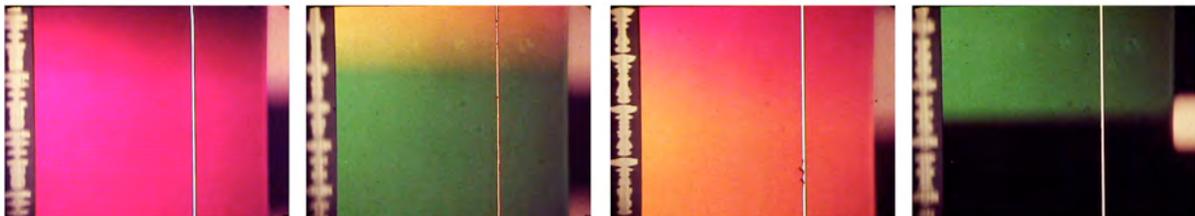
Figure 4.1: Frames from the first section of Paul Sharits's *Episodic Generation* (1978)

In addition to the colored filmstrip and frame lines, sprocket holes, and variable

area optical track, the other primary visual element in *Episodic Generation* is a deep

emulsion scratch that runs consistently through the right third side of the frame. The

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[13] Specimen II was used to make *Synchronousoundtracks* and part of *Color Sound Frames*. Ibid., 339.
[14] Ibid.

scratch appears as a jagged-edged white line that, as Sharits explains, is thinner than the optical soundtrack but has contours "roughly related to it."[15] The scratch remains in this portion of the frame throughout the film, and initially appears to be an unintentional scratch on the film print itself, rather than a part of the photographed image. Sharits writes, "We notice that the movement of the scratch is constant even though the filmstrip image shifts speeds; in fact, the scratch is not on the rephotographed strip but is on the actual filmstrip going through the projector—or so it seems."[16] The scratch is not on the physical film itself that we are watching in the projector, but was rather scratched into the final print used to generate the internegative or interpositive print from which the release, or projection, prints were made. Sharits wanted the scratch to "allow one to monitor the speed of the flow of the actual film strip (upon which are recorded two illusional flow speeds)."[17] Continuing his work with the film as a linear strip of physical material, the use of the scratch in *Episodic Generation* extends back to the work with scratches and temporal flow that defined Sharits's epic *S:TREAM:S:S:ECTION:S:ECTION:S:S:ECTIONED* (1968–71). While the scratch in *S:S:S:S:S:S* functions, in part, to generate the image, Sharits writes that the scratch is also a "natural surface-dividing actuality of cinema" that always refers "back to the vertical movement of the filmstrip downwards through the projector."[18] This interest in using the emulsion scratch to work through various superimposed layers of movement and isolate different registers or signifiers of the passage of time is clearly evident in not

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[15] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, element 19.
[16] Ibid.
[17] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, element 4.
[18] Paul Sharits, "Hearing : Seeing," *Film Culture* No. 65-66 (1978): 73.

only *S:S:S:S:S:S*, but in *Episodic Generation*. The scratch in *Episodic Generation*, while

a consistent reminder of the film moving through the projector, also becomes a part of

the photographed image, subjected to a gradual, generational process of abstraction in

each of the film's sections.

The filmstrip in *Episodic Generation* is dominated by a color palette that moves

from reds to blues to greens, with short passages of a few black frames that

intermittently break up the shifting colors. In one of Sharits's notes on the film, he

explains that the film's pulsing colors, and limited palette of three primary tones

interspersed with frequent black frames, are based on the patterns of structure and

rhythm found in the typical optical film soundtrack in which sound is generated by rapid

alternations of light and darkness.[19] The filmstrip does pulsate and move between

sliding shades of pink to red to black to greenish blue to blue, in a matter not unlike

Sharits's other films from this period. Because the movement of the strip that Sharits is

photographing is constantly changing in speed and tempo, and because the strip is not

gate-registered, the viewer is aware that the film is being manipulated by hand during

the process of rephotography. We also see the frame lines of the filmstrip—as in works

like *Color Sound Frames* and *Synchronousoundtracks*—and these frame lines mark the

shifting speed and forward momentum of the filmstrip. Because the frame lines appear

as black horizontal marks across the image, they provide a very direct or concrete

indication of the fluctuating speed of the original strip. The intermittent passages of

black frames do not function as moments of shocking interruption in the way that they

do in films like *Ray Gun Virus* or Sharits's locational installation piece *Shutter Interface*;

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[19] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, element 41.

here they slide by and create a more fluid and soft, pulsing sense of rhythm than the precise punctuation that one experiences in these other works.

As the speed of the strip accelerates and the frames and frame lines are no longer visible, the colors begin to blur into one another—sometimes seeming to overlap within the frame so that it appears that there is red on the left side of the image and green on the right, or blue on the top and red on the bottom. In a way similar to the phenomenological experience of viewing a flicker film, where the rapidly alternating frames generate perceptual effects in which individual frames begin to blend and generate new patterns, colors, and shapes, the colors of *Episodic Generation*'s filmstrip begin to merge in new and unexpected ways as the material Sharits is photographing speeds up.

In addition to the ever-changing movement of the rephotographed filmstrip, multiple other, more complex layers of movement start to become evident in the first section of the film. On first glance, what we see appears to be a filmstrip that Sharits is moving at an irregular pace, free from the registration of the projection gate, and then rephotographing. While the motion of the film recalls the "un-registered" slippage and "zoomed-out" reframing of the filmstrip that Sharits was playing with in pieces like *Color Sound Frames* and *Synchronousoundtracks*, in *Episodic Generation*, the strip is no longer a unified whole, and multiple layers of movement are happening concurrently within the frame. The strip of film appears to be moving down, an impression that is supported by the downward movement of the film frames and frame lines. In Sharits's early notes for the film from 1975, he refers to this movement as giving the impression that the camera is running backwards, which creates the illusion of the strip moving

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downward. He states that this gives the viewer a sense of "false isomorphism" or correlation between the rephotographed filmstrip and the forward momentum of the actual film running through the projector. The scratch in the image moves at the same pace throughout each of the sections of the film and provides us with a sense of how projected film—progressing forward at a consistent rate of twenty-four frames per second—looks and moves. Because the scratch is not on the original filmstrip that Sharits was manipulating, but rather was made on a subsequent print of the film, it moves at a different rate than the rephotographed filmstrip does. This scratch thus functions as a marker, or cue, for the viewer to reexamine the unity of the projected image.

In the same illustrated note from 1975, Sharits states that the soundtrack is also recorded (visually) in order to give the viewer yet another impression of false isomorphism.[20] The optical track that we see on the left side of the frame moves at a rate that is independent from the movement of the filmstrip and the scratch. Because the optical track is being projected as an image, Sharits thought that the viewer would initially assume that it is the same optical track that is being heard, or that the optical track is on the same filmstrip print that Sharits was originally working with and rephotographing. The soundtrack was optically printed (through a process of matting) as a separate element of the image, and it moves at a speed that is completely unrelated to the sprocket holes and colored frames of the filmstrip and the scratch.[21] At points, the

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[20] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, element 4.

[21] Note that "op. print master = matte edge; JK B roll of soundtrack." Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, element 24.

filmstrip will move quickly, causing the sprocket holes to blur into long streaks of white light on the right side of the frame, as the soundtrack slow downs to the extent that it is almost completely still. During a few of these moments, in which the rapid downward movement of the film strip is juxtaposed with the slow movement of the optical track, the optical track slows down to the point that we see it starting to melt—a result of it sitting still for too long in front of the projector or optical printer lamphouse bulb when it was in the process of being rephotographed.

Thus, the film contains three embedded planes of visual movement within the image: the filmstrip and sprocket holes, the scratch, and the optical soundtrack—all of which change speeds independently of one another. In addition to these three constantly shifting elements, the emulsion scratch makes us aware of the fourth layer of movement in the film—the regulated forward momentum of the filmstrip as it runs through the projector. Rosalind Krauss, after viewing Sharits's 1971 four-projector locational piece *Sound Strip/Film Strip* at the Bykert Gallery in December 1972, wrote that his work pushes the viewer to "realize that the material support of Film is being shown to us from within the context of Time."[22] This statement precisely describes one of the most prevalent concerns of Sharits's work in the 1970s, including *Episodic Generation*. In playing with these multiple layers of movement within the image, *Episodic Generation* is pointing to the strip's temporal animation in the projector while simultaneously calling into question the unity of the various elements of the filmstrip, including the presumed unity of sound and image. The independent slippage of image and sound works to question what most viewers assume is a naturally occurring state of

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[22] Rosalind Krauss, "Paul Sharits," *Film Culture* no. 65-66 (1978): 92.

sound and image synchronization. When synchronism between image and sound is created, it is just that—created. The sound film is by its very nature a "double-system" medium. Sound and image are recorded separately using separate machines, then "married" together in the printing/post-production process. Unity between sound and image is always a construction, or an approximation, of true synchronicity, and the initially unified image we see in *Episodic Generation* similarly reveals itself as constructed from multiple "un-married" sources.[23]

The first section of the film is followed by three subsequent sections, all exactly the same length and all progressive generations of the first. In the second section, the original image has been rephotographed and reduced, or to use Sharits's term, "compressed," into the center of the frame. It is now flanked on the left and right sides of the frame by two new strips of sprocket holes, giving the impression that the original section has been embedded within the first.
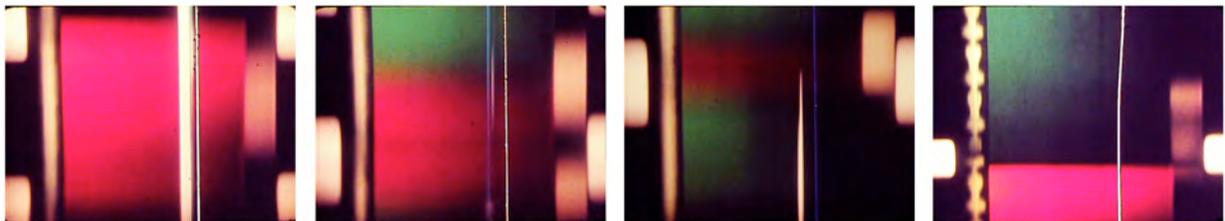
Figure 4.2: Frames from the second section of Paul Sharits's *Episodic Generation* (1978)

The centered, original image from section one has been rephotographed so that it is slightly out of focus, an effect that renders the sprocket holes, as well as the original

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[23] The displacement of sound from image is also something that Frampton is playing with in *A Lecture* (through the use of Snow's voice instead of his and the physical separation of the tape recorder—situated on stage—from the projecter in the back of the room. These concerns can be seen in practially all of Frampton's sound films, ranging from *Surface Tension* (1968) to *Critical Mass* (1971) to *nostalgia* (1971) to the unfinished *Magellan* (1972—).

scratch, as soft blurs of white light. A new scratch has appeared in the same location as it was in the first section, and is in focus. Mirroring the kind of independent movement seen within the frame in the first section, the sprocket holes on either side of the frame in the second section move at a fluctuating speed that bears no relationship to the rephotographed image from section one. Sharits writes that

> beginning with section II, each section is a re-recording of the former section. The second section "encloses" the first, in both image and sound; therefore, now we see a new set of sprocket holes—one strip in another. The third section "contains" (and is a product of) the second (and the first). The fourth section "contains" the images of Sections I, II and III. Of course, there are varied modulations of rephotographed speeds, giving rise to some curious images of strip "motion."[24]

As the film progresses through each of the four sections, it becomes apparent that each section, or episode (as suggested by Sharits's title) is a new generation created from, and encompassing, the one seen prior. These subsequent generations do not clarify the image, but rather undergo a progressive degeneration and deterioration of image quality and clarity. Similar to the analog quality loss that occurs when a copy is made from a copy, and another copy is made from a copy of that copy, the film, with the exception of the scratch, loses a certain level of sharpness and clarity as it progresses. The colored frames of the filmstrip become more like blurred, soft streaks of color washing through the center of the frame. The color contrast also increases, so that the color washes have less variation and progressively become more bold and blocked in hue. By the third generation or section, the sprocket holes have started to swallow up

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[24] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, element 19.

the original filmstrip and are a dominant visual element in the frame, forming three linear

passages of black and white patterns on the left and right sides of the frame.

Figure 4.3: Frames from the third section of Paul Sharits's *Episodic Generation* (1978)

They move both against and with one another, forming flickering passages of white

streaks on the sides of the image that intermittently slow to reveal flashing rectangular

white shapes on a moving field of black. The various layers of sprocket holes move at

speeds that are not synchronized; in fact, a part of the pleasure of viewing the film lies

in experiencing the moments when they seem to move quickly and in pace with one

another, then fall progressively out of sync. These moments where the sprocket holes

seem to move into and then back out of phase with one another recall both Sharits's

use of phasing—in particular in a piece like *Shutter Interface*—and the work in sound

being done in the 1960s and '70s by artists like Steve Reich, Tony Conrad, La Monte

Young and the Theatre of Eternal Music, and Terry Riley (just to name a few) who

utilized phase shifts in order to generate pulsing, overlapping, combinations of sounds.[25]

When the fourth section of the film begins, the image has become almost a

complete abstraction. The filmstrip is still visible in the center of the frame, and its

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[25] Sharits mentions the influence of "certain composers' works and theories—e.g., those of John Cage and Iannis Xenakis, as well as those younger composers, Steve Reich, Phil Glass and La Monte Young" in reference to the study of cinema in Paul Sharits, "A Cinematics Model for Film Studies in Higher Education," *Film Culture* no. 65-66 (1978): 50.

shifting color patterns have become more noticeable due to the increased contrast in the image, a result of the progressive rephotography.
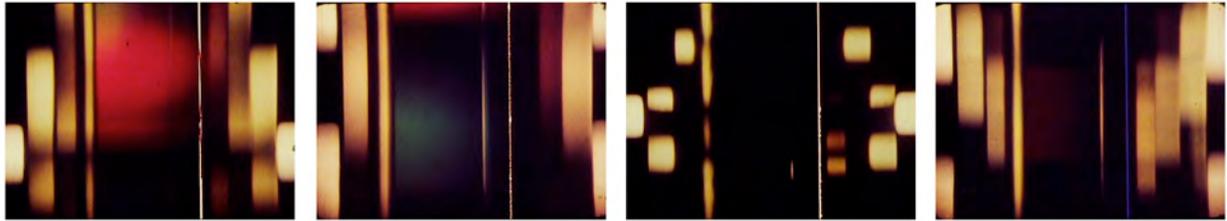
Figure 4.4: Frames from the fourth section of Paul Sharits's *Episodic Generation* (1978)

The central image of the filmstrip has degraded to the point that the colors no longer shift in subtle progressions, but rather move in bold patterns of red, green, and black. The strip still gives the impression of downward movement, and unexpected overlapping shapes and blended colors continue to occur when it increases in speed. That said, by the time we reach the fourth section of the film, the dominant visual impression is one of dark abstracted colors, flickering and blurring sprocket holes, vertical white streams of light (the scratch, the out-of-focus rephotographed scratch), and pure, slippery motion.

 Episodic Generation's gradual visual degradation reflects a generational loss in image quality—most notably an increase in contrast and decrease in clarity or "sharpness"—that is endemic to analog media. Structural films from this period, such as J.J. Murphy's *Print Generation* (1974) and Ken Jacobs's *Tom, Tom the Piper's Son* (1969), are marked by similar concerns and explore, visually, the same kind of progressive, generational degradation and abstraction that one hears in a sound piece like Alvin Lucier's *I am sitting in a room* … (1969), or the tape work of Steve Reich from

the early 1960s.[26] As Stuart Liebman writes of *Episodic Generation*, this consecutive "ordering establishes an inexorable, logical movement toward some future moment when the image will be so congested that the initial configuration of elements—indeed, the elements themselves—will no longer be identifiable."[27] Sharits, in conversation with Gary Garrels in October 1982, when the installation versions of *Episodic Generation* and *3rd Degree* (1982) appeared in the group exhibition "Mediums of Language," said that "the relationship between the successive images is in part didactic, because in each rephotographing stage something more will be revealed about the process of making."
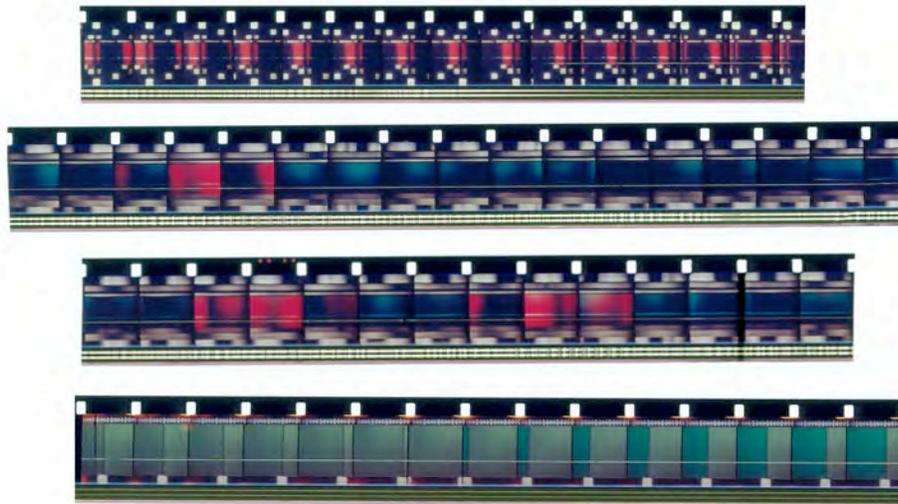
Figure 4.5: Filmstrips from Paul Sharits's *Episodic Generation* (1978)
Courtesy of the Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY

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[26] Although, with the exception of Lucier's piece, each of these works does not just progressively degrade, but rather moves through multiple generations to a state of loss and transformation, and then progressively back through the stages to build up legibility.
[27] Stuart Liebman, *Paul Sharits* (St. Paul: Film in the Cities & the Walker Art Center, 1981), 16.

Sharits was speaking about *3rd Degree*, which employs a similar format of multiple projections of successive image generations, but his comment is certainly applicable to the manner in which *Episodic Generation* reveals the process of its own construction.[28]

When *Episodic Generation* is installed as a four-projector locational work, the progressive, temporal, degradation of the image that occurs in the single-screen version is no longer seen in, or through, time over the course of thirty minutes, but rather all at once on the gallery wall. In this manifestation of the film, each of the four projectors loops one of the four sections of the film, projecting the image rotated ninety-degrees counter-clockwise (as in *Sound Strip/Film Strip*).
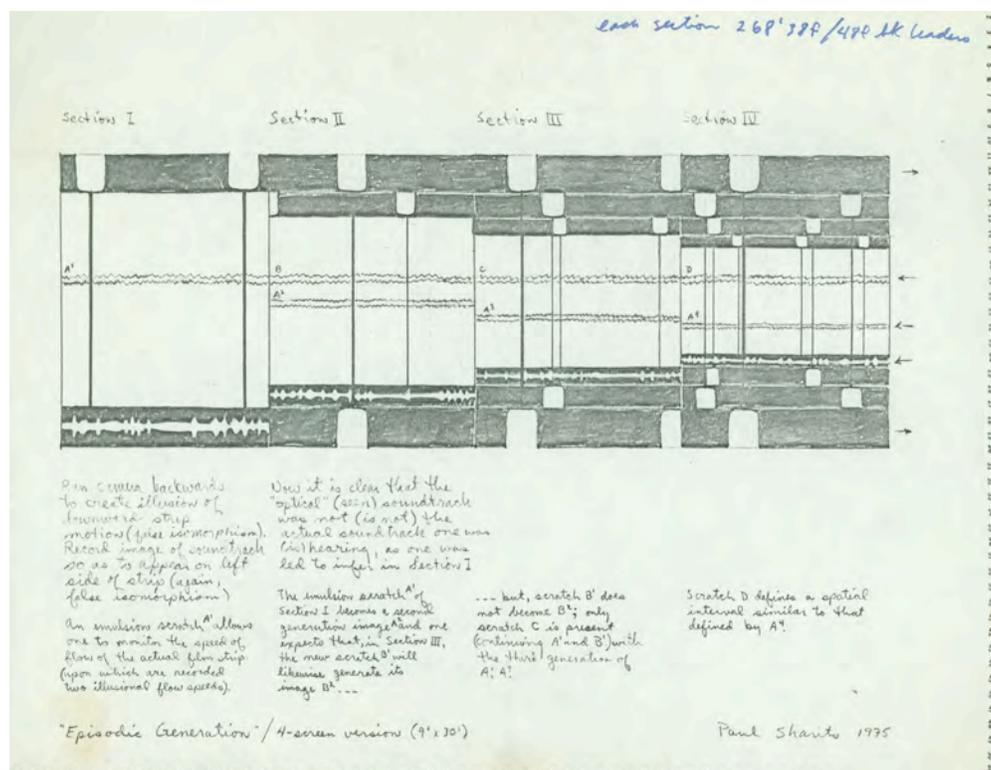
Figure 4.6: Paul Sharits, *Episodic Generation* 4-screen version sketch (1975)
Courtesy of the Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY

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[28] One of the major differences between these pieces is that the images projected in *3rd Degree* are different sizes and the projectors are not placed equidistant from the wall.

The four projections are positioned so that the sections of the film are arranged in order, progressing from section one on the far left to section four on the far right. The projected images directly abut one another, and form what appears to be a kind of composite "widescreen" projection, approximately nine feet high and thirty feet wide. Sharits wanted the sheer enormity of this projection—"these big filmstrips"—to be able to keep his viewer in the room and experience the feeling of "immediate presence…." that refers "to that thing that is in the projector, that is in the room, rather than the landscape or the people out there."[29]
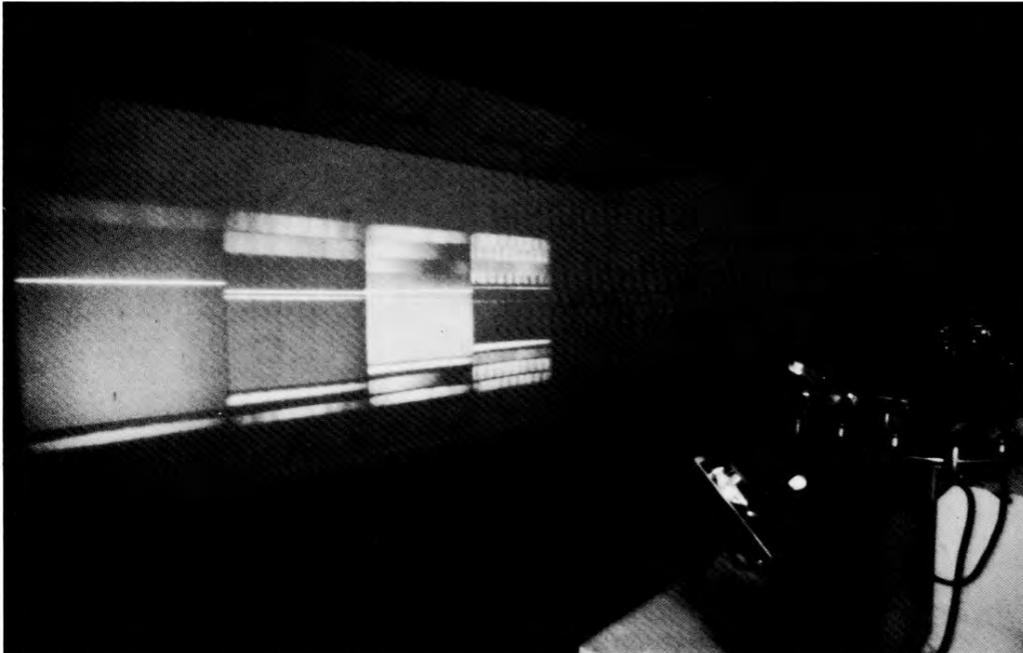
Figure 4.7: Paul Sharits's *Episodic Generation* 4-projector installation
at the Whitney Museum of American Art's 1981 Biennial Exhibition, photograph by Peter Moore.
Courtesy of the Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY

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[29] Sharits in conversation with Gary Garrels in October 1982. See *Mediums of Language: Vernon Fisher, Myrel Chernick, Paul Sharits* (Cambridge: Massachusetts Institute of Technology, 1982). Published in conjunction with the exhibition of the same name shown at the Hayden Gallery at the Massachusetts Institute of Technology, November 19-December 24, 1982.

Sharits writes that this projection should appear "as if the strips from one segment flow into the next, becoming progressively more compressed, as if 'collapsing,' from the first image of a single strip into the fourth image of all the succeeding sections."[30] Here, the viewer is faced with the movement within each projected image (as described before) as well as the lateral, horizontal movement from generation to generation. Able to see the image progressively enclosing itself across the span of the wall, or, as Sharits's describes it, "collapsing down into itself," one experiences the gradual degradation of the copy of the copy of the copy all at once, an experience that is typically tied to a linear, progressive movement through time—from past to present. As Liebman writes, the installation eliminates the "progressive temporal thrust" of the single-screen version, although, when occasionally the "alignments, speed, and directions of moving elements momentarily match," the screens "fuse into a unity and the entire wall seems to lead the eye from the past toward the future as the compositional elements move from left to right."[31] This four-projector work screened at the Whitney Biennial in 1981, and while it has rarely screened in this form since, Amy Taubin described it as "the knockout piece of the show" and the "richest and most elegant" of Sharits's work to date.[32]

While *Episodic Generation* is undoubtedly forcing the viewer to think about movement, linearity, time and space, the materiality of the filmstrip and the sprocket holes that propel it forward, as well as the degeneration of the image through progressive stages of rephotography, it makes a much more significant assertion about

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[30] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, element 4.
[31] Liebman, *Paul Sharits*: 16.
[32] Amy Taubin, "Reel Video-Syncrasies," *The Soho News*, February 11, 1981: 28.

the materiality of sound and the complex relationship between projection and film sound reproduction technology. Sound is, of course, seen, and becomes a part of the film's image, as Sharits reproduces the optical audio track and inserts it into the image of the filmstrip that forms the basic unit of the film. The track that we see is a variable area optical audio track, which represents sound as a wave form (height corresponding to amplitude, and the space between the peaks and valleys of the waves corresponding to pitch or frequency). Optical audio tracks are never projected or seen under normal circumstances, and it is safe to assume that most viewers do not know that film sound reproduction is a process in which sound is rendered as image and then translated back into sound. We are not hearing the optical track that we are seeing as image onscreen, but what we are seeing *is* the same optical track that was used to create the film's soundtrack. Sharits rephotographed the print of the optical track that was used in the first generation of the film, and then, through the process of matting and optical printing described above, manipulated it by pulling it through the gate of the optical printer in the same way that he did with the filmstrip of colored frames. The filmstrip's downward movement is contrasted with the soundtrack's movement up, from the bottom to the top of the frame. As I mentioned before, the soundtrack moves at an irregular pace— sometimes quickly, sometimes slowly, and occasionally slowing to the point of stillness/almost melting. In two early notes for the piece, Sharits describes his desire to have the sound ascend spatially and for the independent movement of the filmstrip and the printed optical track to provide an "audio-visual contradiction" more revealing of "the sound-image relation than … a faked realism."[33]

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[33] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic

In Sharits's early notes for the film, he sketched out various ideas for the film's soundtrack and its spatial organization within the gallery space. It seems clear that he was initially working with linguistic sounds similar to those he explored in *Sound Strip/Film Strip*, in which four projectors asynchronously looped a stretched recording of the word "miscellaneous." In the installation of *Sound Strip/Film Strip*, the speed at which the word was heard was constantly changing, as Sharits wanted it to be "taken out of its normative temporal shortness and suspended in a linear space."[34] The word was broken up into sections that roughly related to its syllabic division, pronunciation, and stress patterns, and these fragments were elongated not only in time, but in space, stretched out across four speakers connected to the four projectors in the gallery. Sharits wrote of his "word-soundtrack works" (including *Film Strip/Sound Strip* and the earlier single-projection *S:TREAM:S:S:ECTION:S:ECTION:S:S:ECTIONED*) that "linguistic meaning levels, which form a sort of horizontal commentary to the streams of visual imagery they accompany, and phonemic sound qualities, which exist in a vertical-harmonic relationship with the flow of visual pulses, are both equally operable."[35] Sharits's notes for *Episodic Generation* show that he was playing with the breaking apart of the words "articulation," "ontological," and "methodological" on paper, and thinking through the various new meanings that could arise from speed shifts and their "linear fragmentation."[36]

Generation" folder, element 27.

[34] Paul Sharits, "Locational Film Pieces," *Film Culture* no. 65-66 (1978): 121.

[35] ———, "Hearing : Seeing," 71.

[36] When he was playing with the word "articulation," Sharits notes that he could "fragment and intercut vowels into 2.5 minute tape." Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, element 29.
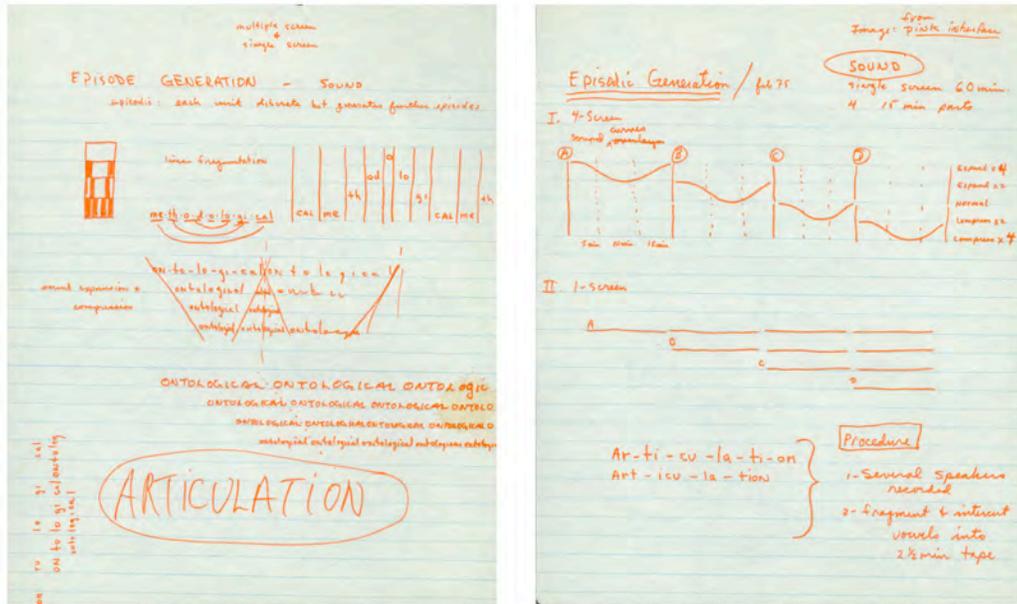
Figure 4.8: Paul Sharits, *Episodic Generation* sketch
Courtesy of the Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY

It is unclear if Sharits ever made any recordings of these words or how he settled on the source material that eventually became the basis of the film's soundtrack, an explanatory text on optical audio film technology.

The source text Sharits ended up using has been described as didactic and technical, and while it does certainly contain some complex technical ideas and explanations, I have the impression that it did not originate in a technical manual and was (most likely) written by Sharits. He clearly understood the process and technology of optical audio reproduction and does a decent job of relaying basic information, but the text bears the markings of his unique linguistic style. The soundtrack text is a critical element of the film, and as such, I think it is important to reproduce some of it here. The transcription that follows is mine, and I have excerpted the sections (in order) that I find most relevant. Because of the quality of the recording (which I will discuss next),

transcribing the text was, at times, quite difficult, and there may be minor errors in what follows.

Sound, as we have seen, is recorded on film … and, like the picture, photographic recording makes use of the variable light-stopping properties of a sensitive emulsion.… In short, whereas the picture is an area which is entity modulated into space (two) dimensions, the soundtrack is a ribbon modulated in the one time dimension.

How then are the pulsations of a light beam passing through the variable light stopper to be retranslated into sound? A photosensitive cathode … emits electrons under the impact of light and then an anode … draws the negative electrons across a vacuum, which separates it from the cathode and thus enables them to flow through an external circuit as a variable electric current. This current can be read directly on a micrometer in a film reproducer. It is passed through an exceedingly high resistance … in order to be electronically amplified. If the light beams striking the … cathode vary in intensity, the current flowing through the phototube will vary correspondingly.

Now, suppose we took a light source and a phototube opposite one another and run a piece of film in between the two. If the light-obstructing quality of this piece of film is constant all the way through, its motion will not interfere with the constant current flow through the phototube because there will be no fluctuation of the incoming light.… Suppose, however, that we placed between the light source and the tube a piece of film having different amounts of light obstruction at different points along its length. If this piece of film is moved backward and forward, the micrometer needle in the phototube circuit will move up and down in an exactly corresponding manner. If now we take another piece of film and paint opaque blobs on it with marking ink in average intervals, and if we replace the meter with an amplifier and loudspeaker and then pull the film rapidly to and fro, a musical note (or rather a rude noise) will be heard. The faster the piece of film is pulled, the higher the frequency of pitch of the sound will be … because more blobs will interrupt the passage of the light beam to the phototube.… If the speed varies, the pitch will vary even though the blobs are all exactly the same distance apart. The process of introducing fluctuation into a steady light beam is called modulating … and the fluctuations of amplitude … are called modulations.

We now have all the basic requirements of a sound-reproducing system. The light source of constant intensity is called the exciter lamp. Light from this lamp is

focused on the soundtrack area of the film. The film must travel at an absolutely constant speed of ninety beats per minute for 35mm film and thirty b[eats] per minute for 16mm film. If the speed fluctuates as we have seen, a wavering of pitch (which is called flutter, or wow) will be introduced. When the light beam has passed through the film, it strikes a phototube. The output of this tube is magnified by means of an amplifier called an audio amplifier because it passes the band of frequencies corresponding to the audio spectrum twenty to 15,000 cycles per second.

Reflecting what Sharits described in 1975 as his enormous project to deconstruct cinema and reveal the material nature of film, *Episodic Generation* describes the very process by which its soundtrack is made.[37] Audibly enacting a descriptive deconstruction of its process, the film's soundtrack functions, in part, as an anti-illusionist gesture intended to reveal the means by which sound is reproduced and made audible. Revealing and demystifying the complexities of the process, and the connections between sounds and their optical translations, *Episodic Generation* works, in part, to explain itself as a sound film. By revealing or exposing this process, Sharits is not exclusively interested in demystifying the inner workings of optical audio technologies; he is also explaining the technology and the process of optical to aural conversion in order to make work that, fundamentally, is about the experience of cinema and the projection of images. This text traces out the relationship between images (blobs of ink) and their aural equivalents, pointing to Sharits's larger interest in the connections between images and sounds and the creation of "operational analogues"

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[37] Writing in 1975 and reflecting back on his work from the last ten years, starting with *Ray Gun Virus* in 1965, he writes that *Ray Gun Virus* was the "first segment of my project of deconstructing film from a very particular frame of reference, a frame which is still not wholly defined." Sharits, "Hearing : Seeing," 69.

between "ways of seeing and ways of hearing."[38] Sharits described *Episodic Generation* as beginning with this spoken text "regarding the nature of optical soundtracks," and then, through "a series of analogue-to-digital transformations" of the original sound recording, creating a sonic "analogue of what happens in the visual track."[39] He explains this sonic analog as: "One hears the entire text in Section I, hears it (compressed) twice in Section II, and so on; the text is compressed in such a way that it does not change pitch, which is what normally occurs when a recording is sped up ('compressed')."[40]
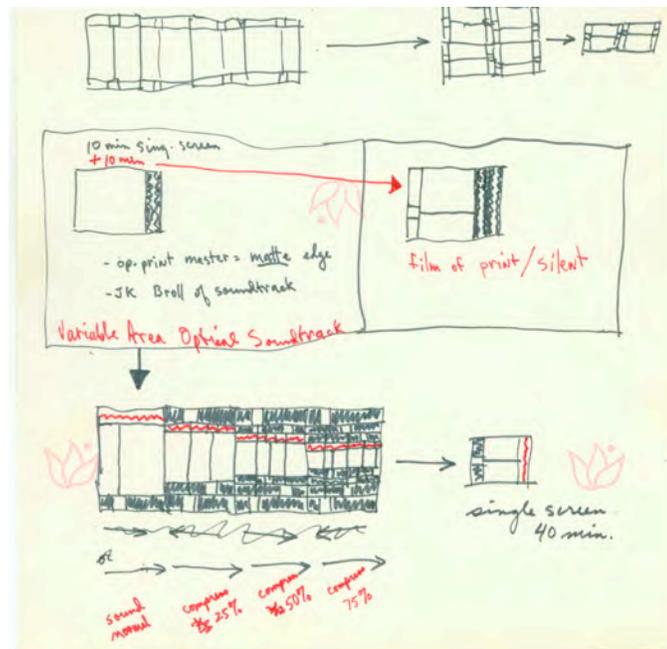
Figure 4.9: Paul Sharits, *Episodic Generation* sketch
Courtesy of the Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY

The transformations and manipulations of the soundtrack were the result of two different processes and collaborations. The initial work on the soundtrack was done by

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[38] Ibid., 70.
[39] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, element 19.
[40] Ibid.

Christopher Cooper, a student in the Computer Science Department at Carnegie Mellon University. Sharits wanted to have all of the moments of silence, including the pauses between words and "the fragments of silences within words," selectively removed from the spoken text. This rendered the text "jammed up, making it 1/2 its original length" and "created a very rapid, but still intelligible, flow of speech, which seems intentionally rhythmical (whereas the text was actually spoken in an intentionally uninflected monotone." Cooper, after a number of delays and technical problems, finished processing the original text in the fall/winter of 1974, and in a letter to Sharits explained the algorithm used to extract these moments of silence: "Silence lasting .0008 seconds or more was eliminated with the exception of the first and last samples which were left in to smooth the transitions. This transformed data was re-converted to an analog signal by use of a digital-to-analog converter." Cooper continues, "The acoustic effect is very interesting. The ear, in an attempt to explain the unnatural quickness with which each word follows the next, exaggerates a slight sing-song in the original data until it sounds like two voices alternating words."[41] Indeed, while words are intelligible and it is possible to comprehend most of what is being said, the primary impression of the soundtrack is one of odd rhythmic shifts and annunciations. The words we hear are recognizable, but the way in which they are being said or articulated is extraordinarily unusual. In the processing of the voice and the removal of these momentary silences, the tone has also changed from the natural (analog) recording to one that is clearly artificial or "computerized." The words have a certain coldness to them, as though they are being spoken by a robot. In fact, the effect is quite like that of the voice programs (like Apple's

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[41] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, element 49.

"Text to Speech" option) that are now standard on personal computers. The voice vibrates and wavers, conveying a jagged, almost hollow quality. Sharits wanted the soundtrack to be "pure sound" and what we hear is dense, yet full of harmonic variation.

The digital quality of the recording is most likely the result of the text's compression and subsequent elongation. After Cooper removed the silences, reducing the length of the original text in half, Sharits completed the final work on the soundtrack in 1978 at Thomas Lopez's ZBS Foundation, an audio studio/media-consciousness-raising commune on the Hudson River in upstate New York.[42] At ZBS, Cooper's processed text was expanded back to its original length without reintroducing the silences or pauses, effectively slowing the articulation of the spoken words. This expansion, or elongation, was done using a processor that Sharits called "the Harmonizer," which he described as having the ability to "expand or compress sounds without altering pitch." This recording of the text, processed by Cooper so that all of the silences were removed and then re-expanded to its original length at ZBS, is what is heard in the first section of *Episodic Generation*. In the second section of the film, Cooper's recording (without the use of the ZBS Harmonizer) is heard twice, back to back. In the third section of the film, Cooper's text is compressed by about 70 percent and then repeated three times, and in the fourth section of the film, the recording is compressed by about 50 percent and is heard four times. Sharits wanted the pitch to remain the same through each of these temporal compressions, and the harmonizer effect allowed him to adjust and equalize pitch in each of the subsequent sections.

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[42] A number of artists came to ZBS to do audio work, including Bill Viola (who apparently spent several days floating on a pond in an inner tube, making recordings underwater using hydrophone microphones), Phillip Glass, Amiri Baraka, Meredith Monk, Allen Ginsberg, and Laurie Anderson. http://whirlitzer.org/zounds3.html

Sharits used the first recording made by Cooper at Carnegie Mellon to make the optical track that we see in the film, and he notes that this image is "purely a <u>sound</u>track since all silences have been removed from the text."[43] Mirroring the gradual degeneration and compression of the image of the filmstrip in each of the subsequent sections of the film, the soundtrack text, as it is progressively and temporally compressed, becomes unintelligible. As we become unable to hear what is being said, the experience of listening to the film is one in which we move toward abstraction, listening to rhythmic and tonal shifts rather than language. In Sharits's description of the film, he writes that

> the visual "degeneration" of the image of Section I, through successive rephotography, is paralleled by the compression of verbal information to the point of its loss of legibility; yet, both the "degenerated" sound and image are perceptually engaging, even in the most advanced stages of "degeneration." It is obvious why the film has its title, because of the strategies of its coming into being, but, paradoxically, at the level of effect, its dynamics arise from its "Episodic Degeneration."[44]

While both the image and the sound are reduced in some capacity (the filmstrip's progressive enclosure by the sets of sprocket holes and its diminishing size, and the temporal compression of the length of the spoken text), through each of the film's generations, their progressive abstraction is the result of two very different processes: analog degeneration and digital compression. When the film is seen in its single-screen version, the four movements of the piece carry the viewer through a gradual, temporal progression—from clarity to abstraction, from image to copy of a copy of a copy of the

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[43] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, element 19.
[44] Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY. "Episodic Generation" folder, element 20.

image. The sound mirrors this movement, albeit in a very different way. We have the sense that the sound is shrinking in size and pushing in on itself, in much the same way that the image is gradually swallowed by sprocket holes. The words are lost in the first processing at Carnegie Mellon—jammed up into one linguistic string of pure sound. They lose their meaning and push into complete abstraction, becoming pure electronic rhythms and pulses. By the time we reach the fourth segment, we see blurs of sprocket holes on the far right and left sides of the frame, and the inner sprocket holes blur and pulse around the saturated colors of the filmstrip. The movement of the image is much more pulsating and has the impression of moving back and forth, or being pulled up and down in irregular patterns and fragments. This impression of pulsating forward and backward movement is matched by electronic word fragments that flutter and alternate between high and low tones.

When *Episodic Generation* was installed, each of the segments and their corresponding soundtracks were looped in the gallery so that the progressive compressions of the text and image were seen and heard all at once. In describing the experience, Stuart Liebman said, "Permeated by the dirge-like buzz of the soundtracks, the room is a site of dynamic activity in which rhyming and dissonant patterns, movements and counter-movements, constitute, dissolve, and reconstitute an infinite variety of significant configurations."[45] While, to the best of my knowledge, *Episodic Generation* hasn't been screened in this four-projector configuration since the early 1980s, it is possible to imagine the complete cacophony of sound that one would hear

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[45] Liebman, *Paul Sharits*: 17.

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surrounded by these four simultaneous sonic generations, temporalities, and abstractions.

In 1974, as Sharits was sketching out ideas for the various permutations of *Episodic Generation*'s soundtrack and locational configuration, Coleen Fitzgibbon, a young artist living in New York City, began working on the film that would become, perhaps, her most defining: the radically minimal *Internal System*.[46] Fitzgibbon was a student at the School of the Art Institute of Chicago from 1971–73, and during this time, took classes from Phil Morton, Carolee Schneeman, Owen Land (George Landow), and Stan Brakhage. She recalls hearing about Sharits from his former student and assistant, Bill Brand, who was a graduate student at SAIC from 1972–74, and saw a number of

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[46] Without the advocacy and critical interventions of the artist and film preservationist Sandra Lea Gibson, it is very likely that *Internal System* would never have been re-discovered. The original print of the film had been at the Film-Makers Coop in New York since Fitzgibbon deposited in there in 1976 and, according to the Coop's distribution records, had never been rented. Gibson began working as Fitzgibbon's archivist in 2007 and, after seeing the film and recognizing its importance, curated numerous national and international screenings and exhibitions of *Internal System* (and other works by Fitzgibbon), bringing her work to new, contemporary audiences around the world. Gibson supervised the complex preservation of *Internal System* on 16mm film, and subsequently produced new exhibition prints of the film as well as a series of "alternative preservation" digital versions of the piece–including a "full aperture" transfer that makes the variable density track visible. Her impressive master's thesis on the preservation of *Internal System*, "A Case Study: *Internal System* by Coleen Fitzgibbon," details Fitzgibbon's history and work and Gibson's preservation process, including the complex issues Gibson faced while preserving this "imageless" film. Using the "meta-archival" *Internal System* as a case study, Gibson's thesis explores larger philosophical questions and challenges facing film archivists in the 21st century through the specific challenges posed by Fitzgibbon's film. To say that Gibson has been a vocal and indefatigable advocate for Fitzgibbon's films is an enormous understatement. Without her work, I (and the hundreds of people who have been to screenings of Fitzgibbon's work in the last five years), would most certainly not know about her body of work. Gibson has been extraordinarily generous in sharing her knowledge and time, as well as making available copies of her master's thesis, Fitzgibbon's production notebook and DVD transfers of Fitzgibbon's films. See Sandra Gibson, "A Case Study: Internal System by Coleen Fitzgibbon" (master's thesis, New York University, 2010).

Sharits's early films in Brakhage's classes.[47] In addition to Brand, Fitzgibbon was

friendly with fellow students Saul Levine, Diego Cortez, Gregory Lehman, Louis Hock,

and Marjorie Keller (who worked in the Dean's office), as well as Brand's wife at the

time, JoAnn Elam. Elam wasn't a student at SAIC, but was a talented filmmaker in her

own right, working mostly in 8mm film and eventually moving on to play an integral role

in the creation of *Internal System*.[48] Fitzgibbon left Chicago in 1973 to attend the

Independent Study program at the Whitney Museum of American Art in New York,

where she was exposed to the work of critics and artists including Lucy Lippard (whose

influential *Six Years: The dematerialization of the art object* had just been published),

Yvonne Rainer, Vito Acconci, Dennis Oppenheim, Michael Snow, Charlemagne

Palestine, Steve Reich, and Philip Glass.

Fitzgibbon would end up meeting Sharits in Amsterdam in 1977 during a

residency at the de Appel Arts Centre with her collaborator Robin Winters, where

Fitzgibbon and Winters (as "X & Y") were performing their installation work "X & Y:

International Services Adaptable to Your Situation." The two ended up becoming casual

friends, and Fitzgibbon recalls Sharits saying that he liked her films, in particular *Internal*

System, because it was similar, in some ways, to his thinking and work at the time.[49]

Likewise, Fitzgibbon felt a connection to Sharits's work *Axiomatic Granularity* (1972–

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[47] In conversation with the author, Fitzgibbon mentioned really liking Sharits's
S:TREAM:S:S:ECTION:S:ECTION:S:S:ECTIONED, in particular the syllabic
fragmentation of the word, its gradual articulation, and the way in which the scratches
progressively obliterated the image. She emphasized that the film's sound really "helped
you to think about what it was you were looking at." Coleen Fitzgibbon, in conversation
with the author, Chicago, IL, October 15, 2010.
[48] Elam often attended classes and lectures at SAIC and was able to access the film
department's equipment, including the optical printer, on occasion.
[49] Coleen Fitzgibbon, email message to the author, April 16, 2012.

73), a film that takes as its primary subject the emulsion of the filmstrip, reducing its image to pure "representations of light sensitive crystals, or 'grain.'"[50] Sharits invited Fitzgibbon to apply for a teaching position at the Department of Media Study at SUNY Buffalo in 1979 and they remained in touch, albeit intermittently, until the last several years of his life.[51]

Like Sharits's *Episodic Generation*, *Internal System* was intended to have optical audio projected on screen, making visible this portion of the filmstrip that is normally unseen. *Internal System* was shot on Agfa-Gevaert 16mm film stock using a Bach Auricon Ciné-Voice camera that had the capacity to simultaneously record image and sound as a variable density optical track.[52] Fitzgibbon intended for the film to be projected with either a customized/carved-out gate, or a Super-16mm gate, so that the variable density soundtrack would be visible on screen next to the image.[53]

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[50] Vasulka and Weibel, *Buffalo Heads: Media Study, Media Practice, Media Pioneers, 1973 – 1990*, 336.

[51] Coleen Fitzgibbon, email message to the author, April 16, 2012.

[52] Andy Warhol is probably the most famous artist to use the 16mm Auricon Ciné-Voice optical sound-on-film camera. Designed for television news crews and the "advanced amateur," the system was unique because it eliminated the intermediate transfer and printing steps of the standard dual-system 16mm sync sound camera (which would typically be accompanied by a crystal-sync ¼-inch Nagra tape recorder). Warhol shot a number of his sound films in the 1960s on an Auricon, including *Harlot* (1964) and *Lupe* (1965). The audio quality of the Auricon's variable density recordings were notoriously terrible, as is evident in both of these films.

[53] Normally the gate of a 16mm projector masks the soundtrack so that it, and all of the material on the filmstrip other than the image area, are not seen on-screen. Super-16mm gates are rare, as it was not intended as a projection format. Super-16mm cameras shoot single-perf film and have wider gates, essentially exposing more of the surface of the film (with the image) by using the area normally designated for the soundtrack. Because this was normally done with the intention of blowing up the Super-16mm film to 35mm film (at the standard theatrical 1:1.85 aspect ratio) in the later stages of the production process, projectors that can screen Super-16mm film in its full aspect ratio (1:1.78) are very uncommon.

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Figure 4.10: Frame from Coleen Fitzgibbon's *Internal System* (1974)
Courtesy of the Fitzgibbon Films Archive, New York, NY

The film only screened once in this capacity, at a solo screening of Fitzgibbon's work

titled "Your Basic Film" held at Anthology Film Archives in 1975.[54]

Like *Episodic Generation*, *Internal System* consists of four discrete sections.

While Sharits's film deconstructs the material basis of the filmstrip through four

successive photographic generations, Fitzgibbon's project examines the range of

possibility inherent to the film stock itself—its specific spectral sensitivity—through

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[54] Due to the technical difficulty of screening the film in this capacity, this 1975 screening at Anthology was the only time that the film screened with the variable density track visible. Before the film was brought back into circulation by Sandra Gibson in 2007, it only had two public screenings—at the EXPRMNTL 5 festival and Anthology Film Archives—before being deposited at the Film-Makers Coop in New York in 1976. While Fitzgibbon and Gibson have created a digital version of the film in which the variable density track is visible, the film has been screened in recent years without the optical track visible. The two times that I saw *Internal System* projected on film, it was without the variable density track visible. I have been lucky to be able to carefully study the "full color/full aperture/unprocessed raster" digital transfer (produced January 25, 2010), which provides a good sense of what it must have been like to see the film with its optical audio track visible on-screen.

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flickering, or cyclical fluctuations of lightness and darkness meant to roughly correspond

to the relative amount of light in each of the four seasons of the year.[55] Not solely

focused on exploring the properties of the film material or the cinematic apparatus,

Fitzgibbon's film traces out connections between these materials and their internal,

functional systems (systems of capture) and larger, external, natural systems and

cycles.

In interview with Sandra Gibson in 2008, Fitzgibbon stated that she was

interested in the way in which

> life is affected by the varying amount of light wavelengths (and everything else)
> that arrive as the earth rotates around the sun. I was reading *Scientific American*
> articles about bird migration and how the angle of the sun, which would indicate
> the time of the year, sets off photosensitive parts of the feathers to indicate to the
> birds that this was the time to go. I had originally started reading *Scientific
> American* to study film stocks because I wanted to know their range of
> exposure.[56]

Internal System explores the stock's unique sensitivity to light through an examination of

its chemical constitution and material limitations, the mechanics of the camera, and the

projector as its light source, with the intent of revealing something close to the pure

essence of the filmic—what Fitzgibbon has described as the internal system—film and

its ability to capture light, the camera/projector system and its ability to expose.[57]

Speaking about the film in 2010, Fitzgibbon said that while "images have the ability to

relay symbolic or visual information, light is able to tell us something as well, and is

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[55] In Kodak's *Student Filmmakers Handbook*, spectral sensitivity is defined as "the
relative sensitivity of a particular emulsion to specific bands of the spectrum within the
film's sensitivity range." *Student Filmmakers Handbook*, (Rochester: Eastman Kodak
Company, 1995), 171.
[56] Gibson, "A Case Study: Internal System by Coleen Fitzgibbon," 33.
[57] Fitzgibbon Films Archive, New York, NY. "*Internal System* production notebook,
1974."

telling us things all the time."[58] As Peter Wollen wrote in his 1976 essay on "'Ontology'

and 'Materialism' in Film,"

> light is no longer seen as the means by which the pro-filmic event is registered on film, but as the pro-filmic event itself, and at the same time part of the material process of film itself, as transmitted through the lens and indeed the strip of celluloid in the projector - so that the strip can be seen as the medium for the transmission (and absorption) of light, the basic raw material.[59]

Internal System was made using four 400-foot rolls of Agfa-Gevaert Gevachrome

color reversal film that Fitzgibbon received as an award based on her submission of

FM/TRCS to the EXPRMNTL 5 film festival in 1974.[60] Each of these 400-foot rolls of film

was "treated as an individual unit" and shot continuously with the Auricon camera

running at sound speed (twenty-four frames per second) as Fitzgibbon and JoAnn Elam

made adjustments to the f-stop of the lens and the microphone input gain on the

Auricon's "sound on film recording amplifier."[61] A contact microphone was taped on top

of the camera motor, the camera was positioned facing a Bell and Howell 16mm

projector, and between the camera and the projector was a makeshift semi-translucent

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[58] Coleen Fitzgibbon, in conversation with the audience following the Gene Siskel Film Center's screening of *Internal System* on October 14, 2010.

[59] Peter Wollen, "'Ontology' and 'Materialism' in Film," *Screen* 17, no. 1 (1976): 14.

[60] Both *FM/TRCS* and *Internal System* screened at the EXPRMNTL 5 festival held in Knokke-Heist, Belgium from December 25, 1974–January 2, 1975. As Sandra Gibson notes, "All submissions to the festival were automatically included in the festival's International Experimental Film Competition, which awarded a number of films with a cash prize and Agfa-Gevaert film stock. The film stock was awarded on condition that the filmmaker would produce a new film work in time for its premiere at the festival, which ran from December 25, 1974 through January 2, 1975." Gibson, "A Case Study: Internal System by Coleen Fitzgibbon," 31.

[61] Fitzgibbon Films Archive, New York, NY. "*Internal System* production notebook, 1974." The Auricon's sound recording system involved a detached unit called the "Sound-on-Film Recording Amplifier" that was cabled to the camera.

screen—a setup resembling that of an optical printer.[62] Fitzgibbon wanted to shoot the light emanating from the projector and to make what she termed an "autonomic film"—a film that would refer back to only itself.[63] Dissatisfied with "the metaphoric quality of film where light was being used to record reflections and preserve previous sensibilities," Fitzgibbon explored the materials of camera, projector, light and sound in their most basic form, working toward revealing the whole flickering cinematic system as it were.[64]

Internal System starts with a typed black-and-white text scroll that shakily moves up and through the frame, lasting a little under thirty seconds. The text is an exhaustive list, or catalog, of all of the technical and material variables that went into making the film. It begins with the film stocks used, the technical model and serial details of the camera and projector, the electrical source, and finally concludes with a technical description, of sorts, of Fitzgibbon and Elam.

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[62] In which a camera is positioned, usually on a system of rails, facing a modified projector with a piece of ground-glass material between the two. The film in the projector unit is projected onto the ground glass and then rephotographed frame by frame.
[63] Fitzgibbon Films Archive, New York, NY. "Internal System production notebook, 1974."
[64] Ibid.

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FLAT FREQUENCY RESPONSE.
115V/60CYCLES/35WATTS

MODEL 1552B BELL & HOWELL.
EMM 205W 25V 50HR. SYLVANNIA.
24FLS SOUND SPEED.
120V/60HZ.

115/VOLTS 60CYCLES CON EDISON.

F/BRN HR/125LBS/1951/J. ELAM
F/BRN HR/135LBS/1950/ C. FITZGIBBON

Until the very end of the text scroll—which, a second or two after Fitzgibbon's name

scrolls into the bottom of the frame, cuts abruptly to the title card of the film—the list is

one of pure, detailed technical minutiae. When Elam and Fitzgibbon's statistics, as it

were—essentially the physical information about each of the women that would have

appeared on their drivers licenses—appears on screen, the film suddenly transforms

from being a work that is announcing itself (prior to its content or body) as about the

materials that contributed to its technical construction, to being a work that considers

the human bodies operating these devices a part of its materiality.
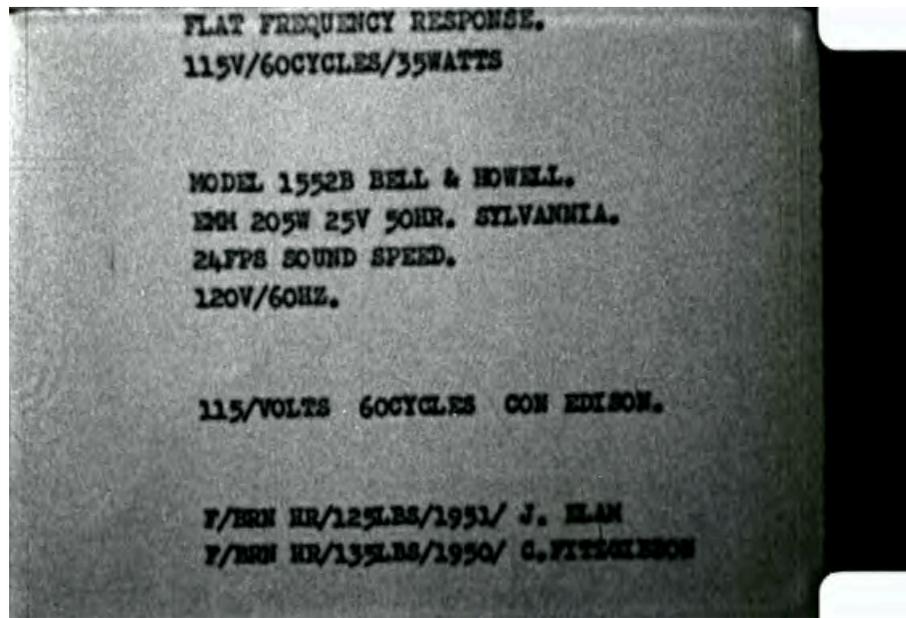
Figure 4.11: Frame from Coleen Fitzgibbon's *Internal System* (1974)
Courtesy of the Fitzgibbon Films Archive, New York, NY

This last (fleeting) moment, clearly intended as humorous, works to undermine the idea

that film can be purely about its form, materials, and structure. While recalling Sitney's

formulation of the structural film as a "cinema of structure in which the shape of the

whole film is predetermined and simplified, and it is that shape which is the primal

impression of the film," and the structural work as one that "insists on its shape,"

keeping its content "minimal and subsidiary to the outline," *Internal System* announces

its form while simultaneously revealing the performance that went into its making.[65] In

keeping with the strains of minimalist music that worked to reveal, or make audible, their

processes, *Internal System* purports to bare all of its tools and materials in an act of

preemptive demystification. Within this process-oriented introduction, the film interjects

its makers—reflecting, perhaps, an approach Michael Nyman has labeled one of

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[65] P. Adams Sitney, *Visionary Film: The American Avant-Garde, 1943-2000*, 3rd ed.
(New York: Oxford University Press, 2002), 369-70.

"people process," in which the performers of a work and their "natural individual differences" determine its outcome.[66] Because each section of the film was shot continuously, or "live" at twenty-four frames per second, and all of the adjustments were made as the camera was rolling, Fitzgibbon and Elam's performance of these actions ("on the fly") is as much a part of the film as its constituent materials.

After the scrolling text detailing the film's various technical variables and materials, the film's title appears—a background that unevenly fades from white to a pinkish-red color over which are superimposed two lines of text: "Internal System" and "CM-72A." While this might seem like a minor detail, the inclusion of the Auricon's specific camera model "CM-72A" suggests that the internal system Fitzgibbon is exploring is primarily that of the camera and its ability to record light and sound. In connection to this, one of the descriptions of the film in her production notebook, reads "a variable density exposure of 1600agfa-gevaertfilm from the vibrational quality of a auricon cm-72A cini-voice II camera."[67]

Following the opening titles, the film opens up into an experience that couldn't be any more different than its textual introduction. Beginning with slight pulsing beats of yellow and white, waves of light fluctuate and shift very gradually over the course of the first section of the film. Pulses turn into a soft, almost gentle flicker as the film continually wavers between washes of light, color, and darkness. I hesitate to use the term "flicker" in describing these pulsing fluctuations between light and dark, as the movement in *Internal System* couldn't be more different than the frame-specific flicker of

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[66] Michael Nyman, *Experimental Music: Cage and Beyond*, 2nd ed. (Cambridge: Cambridge University Press, 1999), 6.
[67] Fitzgibbon Films Archive, New York, NY. "*Internal System* production notebook, 1974."

Tony Conrad's *The Flicker*, Peter Kubelka's *Arnulf Rainer*, or Paul Sharits's early films. The movement between lightness and darkness in *Internal System* is the result of timed adjustments made to the aperture of the camera lens by Fitzgibbon and Elam while the camera was running. Elam worked out a detailed mathematical formula based on the length of (or number of frames in) each roll, the range of f-stops that would be utilized in each roll (summer: f2.2–f8; fall: f8–f22; winter: f2.2−22; spring f22–f2.2), and the pattern of movement from light to dark based on the relative amount of light in each of the four seasons (summer: light to light; fall: light to dark; winter: dark to dark; spring: dark to light) in order to determine the length of time spent on each aperture setting.[68]
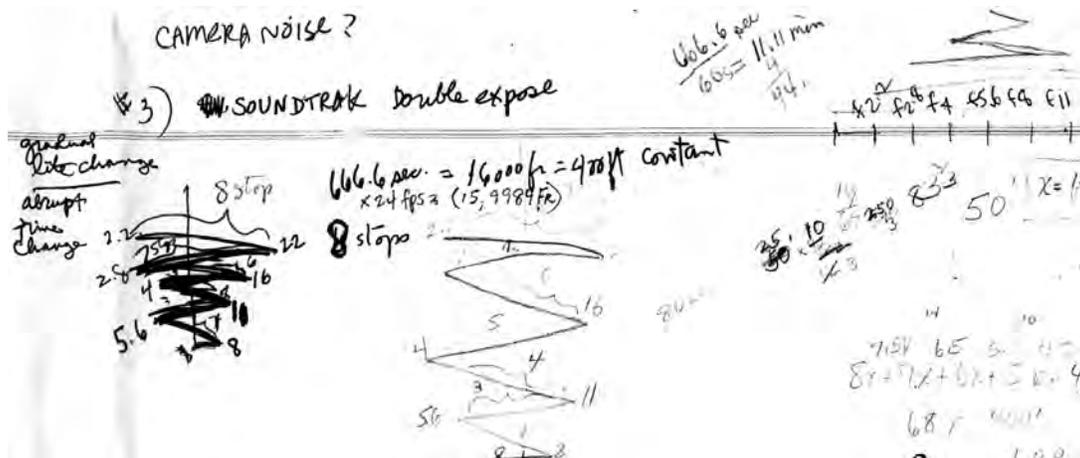
Figure 4.12: Section of one page from Coleen Fitzgibbon's *Internal System* notebook (1974)
Courtesy of the Fitzgibbon Films Archive, New York, NY

The aperture adjustments were made based on this system, and precisely timed during the shooting of each roll of film. While Elam's mathematical skills were a crucial factor in the creation of this shooting system, and her copious and detailed calculations can be

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[68] Gibson, "A Case Study: Internal System by Coleen Fitzgibbon," 35.

seen throughout Fitzgibbon's production notebook, Fitzgibbon had previously drawn out or scored the movement of each section and primarily relied on Elam to help figure out the formula for the timing of the aperture adjustments.

Figure 4.13: Page from Coleen Fitzgibbon's *Internal System* notebook (1974)
Courtesy of the Fitzgibbon Films Archive, New York, NY

In conversation with Fitzgibbon in December of 2010, she stated that she wanted these passages of fluctuating movement between light and dark to be visible, but more than visible—to be felt in a more physical kind of way.[69] As a result of the gradual, timed aperture changes on the camera lens—and, importantly, the fact that Fitzgibbon was

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[69] Coleen Fitzgibbon in conversation with the author, New York, NY, December 16, 2010.

shooting (directly) the flickering light emanating from the film projector—the film's pulsing flicker isn't defined or harsh, but rather fluid and almost organic in feel. These shifts in lightness and darkness take place across series of frames (rather than being frame-specific, as in the works mentioned above), and give the impression that the movements of tones and colors are happening from all sides of the image and in various fluid washes.
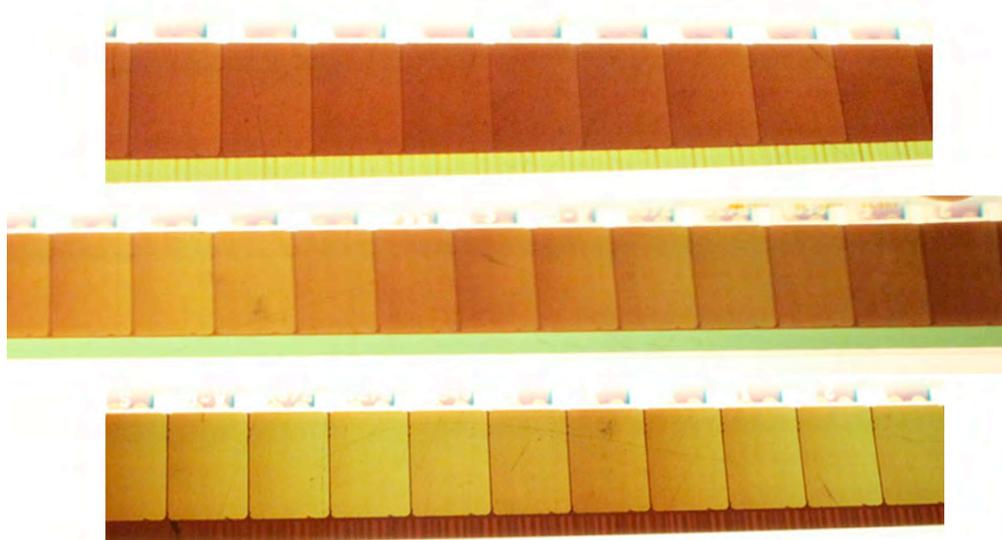

Figure 4.14: Filmstrips from Coleen Fitzgibbon's *Internal System* (1974)
Courtesy of the Fitzgibbon Films Archive, New York, NY

Pale blue turns into an almost pure white, and back to a light blue that is gradually interrupted with pulses of yellow. Yellow fluctuates into a deeper ochre, to a reddish brown and then back to yellow. The first section, representing summer, moves from patterns dominated by pulsing light to pulsing darkness and back to light. We hear a slight whirring purr at the beginning of the film, and as it progresses, the audio moves in and out, fluctuating in amplitude and pulse, at a rhythm similar to that of the images.

As the color pulses begin to get more intense, the audio gradually increases in volume, not mirroring the density of the image movement, but rather unfolding alongside it. The second section is dominated by yellows, dark reds, oranges, and light blues, and the sound becomes much louder, turning from a fluttering purr into a buzzing, vibrating low rumble that moves in and out of audibility, gradually gaining and then decreasing in amplitude. In the third section, the audio is very pulsing and rhythmic, almost crackling at times. By the middle of the fourth section, the pulsing image has started to get very dark and red, and the sound's whirring rhythm seems to take on a more mechanical regularity, becoming audible and then slowly drifting out until we hear only the dirt and crackle of the empty optical track in the projector.

When the film was shown at Anthology Film Archives in 1975 with the variable density track visible, these audible sonic fluctuations were also seen in their optical audio form—as horizontal patterns of bars on the right side of the frame.


Figure 4.15: Frames from Coleen Fitzgibbon's *Internal System* (1974)
Courtesy of the Fitzgibbon Films Archive, New York, NY

Variable density audio recording results in the exposure of "a track of constant width in which the sound waves are represented by bars of varying density, the spacing of the bars [corresponds] to the frequency of the sound. For loud sounds, the density

differences between the bars are large, resulting from large changes in the opening of the light valve (full modulation). For quieter sounds the density differences are comparatively small."[70] When watching *Internal System* with the variable density track visible, the viewer sees the image of the sound just momentarily before hearing it because (as explained in chapter 2) when projection prints are made, sound has to be displaced and printed twenty-six frames before its corresponding image. Even with this slight discrepancy, we are able to see the bands of optical sound gather in frequency and density as the sounds get louder, and then dissipate, fluttering away, as the sounds become inaudible.

While it is extraordinarily difficult to attempt to capture the experience of seeing the film projected on a large screen in a theater filled with other living, breathing human bodies, the dominant impression I had when watching it was one in which I was slowly put into a kind of hypnotic trance—a trance in which my body, surrounded by other bodies, was somehow inside a larger, all-encompassing body.[71] The film moves in waves, almost oceanic in nature, and the combination of the warmth of its tones, the organic fluctuations of light and dark, and its cyclical rhythm put me into a state of mind that I can only describe as hypnotic. Coming out of this experience and the theater brought to mind Roland Barthes's description of leaving the movie theater in a state akin

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[70] L. Bernard Happé, *Basic Motion Picture Technology* (New York: Hastings House, 1971), 166-67.

[71] I saw the film projected twice on a large screen in the 197-seat theater at the Gene Siskel Film Center in Chicago in October 2010. The first of these screenings was a press screening, with just a few people in attendance, and the second was a public screening in which the theater was at least seventy-five percent full.

to one of hypnotic healing.[72] Being inside the film and theater, *Internal System* doesn't

feel so much like one is inside the medium of film, but more as though one is inside the

trance-like space of a large cinematic body. Not surprisingly, the light fluctuations that

constitute the film's pulse, while constantly variable, hover at around one hundred beats

per minute—approximating the rhythmic pulse of the average human heart.[73]

Correspondingly, without knowing that the sound is the recorded vibrations of the

camera motor, one almost has the impression that we are hearing the whirring internal

rhythms of the human body.

Included in Fitzgibbon's notebook for the film are detailed illustrations and

technical descriptions regarding the recording range of the microphone, notes pertaining

to the gamma range of the print soundtrack and noise levels, explanations of the way in

which variable density optical audio translates modulating light beams into sound, as

well as a page on which she notes the human eye's "lite [sic] sensitivity," or

wavelengths that fall within the visible spectrum, and the ear's range of "sound

(vibration) sensitivity."[74] Later in the notebook, she writes that in addition to the

"investigation of the film-camera-projection system's capture of light, exposure of light,

projection of light," these explorations are in "relation to the human need to duplicate

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[72] Roland Barthes, "Leaving the Movie Theater," in *The Rustle of Language* (New York: Hill and Wang, 1986), 345.

[73] I came to this conclusion by watching the film, tapping out a beat that approximated the film's rhythmic pulse between light and dark, and matching this beat to a metronome.

[74] Fitzgibbon notes that the human eye responds to frequencies in the range of 400–700nm and the ear to vibrations ranging from 20–20,000 cycles (Hz). In recent years, the range that the typical human eye is thought to respond to is generally considered to be from about 390–750 nm. Fitzgibbon Films Archive, New York, NY. "*Internal System* production notebook, 1974."

itself in mechanical terms … to explore one's own functions …"[75] These statements

point to the two parallel, yet interwoven investigations that *Internal System* undertakes:

one, an examination of the internal workings of the cinematic apparatus—camera,

projector, film stock, and the other, an exploration of human perception, natural cycles,

and the rhythms of the body.

As much as *Internal System* is an exploration of projected and photographed

light and the chemical properties of the film stock on which it was made, it is also a

record of its own creation, or rather, a recording of its own making. In recording the

physical vibrations of the camera motor and reproducing them as sound (and projected

image), *Internal System* is addressing questions of presence and mediation similar to

those posed in Robert Morris's sonic sculptural object *Box with the Sound of Its Own

Making* (1961). Morris's box, a small (9 ¾") enclosed wooden cube containing a

speaker through which one hears a three-and-a-half-hour recording of the construction

of the box, reveals its process of becoming through sound. On hearing *Box with the

Sound of Its Own Making*, Brandon LaBelle writes "[it] resonates as [a] self-referential

object: what is heard is process and yet what is seen is the result of such process.… [It]

is both here and there, present and past, audible and fixed, for its presence is made

dependent upon the recording of its past …"[76] *Internal System* draws out a similar kind

of temporal and material displacement in which the viewer is moving between the

experience of the projected work in the present, while hearing the sound of its past—the

sound of filmic reproduction. Returning, in some ways, to where this chapter began

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[75] Ibid.

[76] Brandon LaBelle, *Background Noise: Perspectives on Sound Art* (New York: Continuum, 2006), 81.

(Hollis Frampton's *A Lecture*), with the pure pulsating light of the film projector, the temporal and material displacement of the audio recording, and the artist as live performer, *Internal System* records and projects an experience of the cinematic at its most bare and essential. And yet, the real power of the projected experience of the film comes from the cinematic space that it creates—the regular heartbeat of its light pulses and the soft purring of the camera motor conflating the internal rhythms of film, or the cinema, with the internal rhythm of the human body.

CHAPTER FIVE: CONCLUSION

LISTENING TO THE MATERIAL, LISTENING INSIDE THE BODY

"Sound permeates and penetrates my bodily being. It is implicated from the highest reaches of my intelligence, which embodies itself in language, to the most primitive needs of standing upright through the sense of balance which I indirectly know lies in the inner ear. Its bodily involvement comprises the range from soothing pleasure to the point of insanity in the continuum of possible sound in music and noise. Listening begins by being bodily global in its effects."[1]

—Don Ihde

"…All music is what awakens from you when you are reminded by the instruments,
    It is not the violins and the cornets, it is not the oboe nor the
        beating drums, nor the score of the baritone singer singing
        his sweet romanza, nor that of the men's chorus, nor that
        of the women's chorus,
    It is nearer and farther than they…"[2]

—Walt Whitman

Coleen Fitzgibbon's exploration of enclosed, internal systems of image and sound reproduction, and their amplification and extension outward and then into the body of the watching-listening-perceiving subject in *Internal System* (1974) reflects concurrent examinations of the spatial and physiological effects of sound by artists

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[1] Don Ihde, *Listening and Voice: A Phenomenology of Sound* (Athens: Ohio University Press, 1976), 45.
[2] Walt Whitman, *Leaves of Grass* (New York: E.P. Dutton & Co. Inc., 1912), 183.

including Maryanne Amacher, Charlemagne Palestine, Steve Reich, Alvin Lucier, and Philip Glass in the 1960s and mid-1970s. Like her close friend and colleague Bill Brand, Fitzgibbon cites the avant-garde/minimalist music scene in New York—in particular the work being done by Reich, Palestine, and Amacher—as having a strong influence on her thinking about the phenomenological experience of watching and listening to images and sounds. Fitzgibbon recalls seeing performances of Philip Glass's *Music with Changing Parts* (1971) and Steve Reich's *Drumming* (1971) while at the Whitney program in New York and being intrigued by their use of extended duration and repetition—techniques and processes that she would later explore and develop in *Internal System*.[3]

The durational aspect of *Internal System*, in which the viewer experiences its four, slowly pulsating, seasonal sections over the course of forty-five minutes, suggests clear parallels to Steve Reich's set of observations in "Music as a Gradual Process," first published in the catalog for the *Anti-Illusion: Procedures/Materials* exhibition held at the Whitney Museum of American Art in 1969. Fitzgibbon's film explores its own celluloid materiality and records, in sound, the process of its making—reflecting Reich's stated interest in music that makes its process evident through the experience of the work over time. Reich believed that the musical process should evolve slowly and gradually to allow listeners to "hear the process happening through the sounding music" and to shift their "attention away from *he* and *she* and *you* and *me* outward toward it."[4] While Fitzgibbon's process is clearly revealed at the beginning and end of her film (the

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[3] Coleen Fitzgibbon, in conversation with the author, New York, NY, December 16, 2010.
[4] Steve Reich, "Music as a Gradual Process" in *Writings on Music, 1965-2000* (Oxford: Oxford University Press, 2002), 34-36.

opening titles repeat at the end of the last of the four cycles, only in negative and with the title and camera model number superimposed over the technical specifications), the length of the piece, its use of repetition, and the encompassing and meditative space it creates are more closely aligned with the conceptual premise of "Music as a Gradual Process," Reich's work in sound, and his stated desire to closely, carefully *listen in* to the material.

This final chapter begins by looking at several artists, including Fitzgibbon and Reich, who were working with sound and film in the late 1960s-70s, and draws links between their shared investigations of process and active listening, acoustic spaces, and sonic architecture. I analyze Paul Sharits's locational film installation *Shutter Interface* (1975) in the context of Alvin Lucier's work with brain waves in the 1970s, and conclude by shifting our focus from where we began in the first chapters of this project—with sonic explorations of the materiality of film and the cinematic apparatus— to concentrate on listening to the reverberations between the sounds of the projector and the sounds of the body.

This dissertation, while marked as historical by its analytical methodology, archival research, and the dates that conclude its title, was not intended as a straightforward historical project. Rather, it has attempted to push open, just a little bit wider, the window through which we view this period of art practice—a period defined in so many ways by its lack of boundaries—with the broad intent of bridging and combining the ideas, practice, and history of artists working in film and sound. By analyzing Frampton's, Fitzgibbon's, Lerman's, Sharits's, Spinello's, and Russett's films in the context of concurrent developments in avant-garde sound, I have drawn

connections between the formal, structural, and conceptual concerns of artists working within the rubric of what we now call structural cinema and avant-garde (more specifically, minimalist) music. That said, simply pointing out that avant-garde filmmakers and avant-garde sound artists were working with similar ideas and in similar ways cannot take us very far. Claiming, for example, that filmmakers like Fitzgibbon, Sharits, and Russett were using repetition, sustained drones, and phase shifts as both visual and sonic elements in their films is a good place to begin—but where do we go from there?

This is a project of resonance in the sense that it hears the sustained sound of these films, their reverberation, and their response to and reevaluation of their position in the history of avant-garde cinema and sound. The phenomenon of resonance, insofar as it entails the dissolution of boundaries and "the production of resultant tones, harmonics, or cosmic vibrations"[5]—essentially new manifestations determined by the unique dimensions of, and space or context within which we experience and place the work—underlies this entire study. In these final pages, I propose parallels between the explorations of drone, phase shifts, and acoustic space in avant-garde film and avant-garde sound in order to connect these artists' desire to *listen in* to the material of cinema and to the sounds of the body.

The idea of being able to listen inside sound (to its very process of becoming) that is such a big part of the experience of *Internal System* is also one of the most pronounced markers of avant-garde and minimalist music, reflected in works ranging

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[5] Ben Neill, "Pure Resonance," in *Sound and Light: La Monte Young Marian Zazeela*, ed. William and Richard Fleming Duckworth (Lewisburg: Bucknell University Press, 1996), 193.

from Reich's *Pendulum Music* (1968), *Piano Phase* (1967), *Drumming* (1971), and

Music for 18 Musicians (1976) to Tony Conrad's *Four Violins* (1964), Folke Rabe's

What?? (1967), Philip Glass's *1 + 1* (1968), Terry Riley's *In C* (1964) and *Reed Streams*

(1965), Ramon Sender's *Worldfood* pieces (1965), and Philip Corner's explorations of

reverberation and resonance in 1974's *Gong!* and *Pulse Polyphony*. The use of

sustained drone in the performances of La Monte Young's Theatre of Eternal Music

"became an occasion for listening *inside* the sounds, in the sense of one's envelopment

within the sound and in the sense of the attention paid to 'microscopic' subtleties of the

sounds that had hitherto gone unheard."[6] Describing the experience of vividly hearing

"difference tones" in his left ear (the result of playing two notes together on his violin)

and the intense listening required in order to perform sustained tones, Tony Conrad

said, "I spent all of my playing time working on the inner subtleties of the combination

tones, the harmonics, the fundamentals, and their beats…"[7]

> Our work together was exercised "inside" the acoustic environment of the music,
> and was always supported by our extended discourse pertinent to each and
> every small element of the totality, both as to each person's performance (the
> inexorably evolving "improvisation") and as to the ideas which could be attached
> to the overall sound image. Much of the time, we sat inside the sound and helped
> it to coalesce and grow around us.[8]

Young and Marian Zazeela's ongoing "sound and light environment" project, the Dream

House (a resonant room filled with Zazeela's slowly shifting light installations and the

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[6] Douglas Kahn, *Noise, Water, Meat: A History of Sound in the Arts* (Cambridge, Mass.: MIT Press, 1999), 230.
[7] Kahn quotes Conrad in his chapter on "The Parameters of All Sound" in the context of thinking through the use of amplification, specifically Cage's interest in all sound ("small sounds") and Young's often extreme "loudness." Ibid. Tony Conrad, liner notes to *Early Minimalism: Volume 1*, four-CD box set, Table of the Elements 33, 1997: 21-22.
[8] Ibid., 19.

sound of amplified sine-wave generators), as well as the Theatre of Eternal Music's use of extreme amplification, created sonic spaces in which one could hear minute shifts in tone and phasing, overtonal harmonics, and the product of the specific acoustics of each of the spaces in which these performances took place. The amplification at some Dream House and Theatre of Eternal Music events was so extreme that the sound would take on "a physical mass—or better, the actual physical movement of the sound waves became apparent in a way that was exhilarating for some, painful for others, but in any case inescapable. At high volumes, the interplay of harmonics could be clearly perceived, and the sustained tones would form 'standing waves,' with different notes staking out particular areas of the space."[9]

The materialization of sound in space was also a prominent feature of Charlemagne Palestine's sound work when he and Coleen Fitzgibbon met and became friends in the mid-1970s. Palestine had previously worked with filmmaker Len Lye on some experiments with "sound, light and magnetism as elements for sculpture, film and sound," and with members of the Theatre of Eternal Music on music for Beverly and Tony Conrad's film *Coming Attractions* (1970). He had also begun to create a series of intensely physical video performance pieces (*Body Music I* and *Body Music II*, 1973-74) that explored the resonances of sonic spaces and architecture through the use of his voice and body.[10] Fitzgibbon remembers being impressed and inspired by Palestine's use of overtones and harmonics, and how the brutally physical and intense manner of

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[9] John Schaefer, "Who Is La Monte Young?," in *Sound and Light: La Monte Young Marian Zazeela*, ed. William and Richard Fleming Duckworth (Lewisburg: Bucknell University Press, 1996), 32.
[10] Antonio Guzman, ed. *Charlemagne Palestine: Sacred Bordello* (London: Black Dog Publishing Limited, 2003), 5.

his work caused the listener to become aware of the "physical presence of sound in the room."[11] She described this experience as one in which, similar to the work of La Monte Young, Marian Zazeela, and the Theatre of Eternal Music described above, the harmonics and overtones were so overwhelmingly resonant that "all of a sudden it would seem like the sound had moved, or a new sound had been created over there in some other part of the room, a sound with real, physical mass."[12]

Fitzgibbon was equally excited by the work of Maryanne Amacher, whose site-specific sound pieces made use of what she termed "structure-borne sound"—sounds that traveled through "walls, floors, rooms, corridors" as opposed to the "airborne sound experienced with conventional loudspeaker placements."[13] Recalling Max Neuhaus's statement that "our perception of space depends as much on what we hear as what we see," Amacher's installations were designed as "immersive aural architectures" in which the atmosphere of the piece was

> similar to the drama of entering a cinematic closeup, a form of "sonic theater" in which architecture magnifies the expressive dimensions of the work. The audience enters the set and walks into the "world" of the story. As they move through new scenes being created by the "Sound Characters" they experience the expanded dimensions of a sonic world which is staged throughout the architectural site, an entire building or its rooms.[14]

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[11] Fitzgibbon was also friendly with Jack Smith and went fairly frequently to his live performance events in the 1970s. She recalls being very moved by his use of sound in these performances, particularly by the way he used old records as accompaniment. Coleen Fitzgibbon, in conversation with the author, Chicago, IL, October 15, 2010.
[12] Ibid.
[13] Marianne Amacher, liner notes to *Sound Characters (Making the Third Ear)*, CD release on Tzadik Records, Composer Series, catalog number 7043, 1999.
[14] Ibid.

Amacher was creating acoustic environments filled with resonance and vibration—environments through which the viewer moved freely, able to determine their own unique experience of her work based on the amount of time spent in any given location within the space and its proximity to the sources of her structure-borne sounds. Amacher described her "Music for Sound-Joined Room" pieces as creating immersive acoustic spaces in which "the rooms themselves become speakers, producing sound which is felt throughout the body as well as heard."[15] Fitzgibbon's interest in Amacher's sound work stemmed from her firsthand experience of Amacher's sound performances in New York in the 1970s, as well as Amacher's concept of "Third Ear Music."[16] The two artists share a clear affinity for radically heightened listening experiences, and for listening to objects and their internal, manifest sonic vibrations. Amacher's vibrating walls and floors, and Fitzgibbon's vibrating camera motor both—once they are externalized, amplified, and broadcast into space—create a kind of self-contained sonic environment in which we are really, truly able to *listen inside* sound.

Much of this dissertation has focused on the way in which "second generation" structural filmmakers such as Russett, Spinello, and Fitzgibbon were critically exploring sound as an essential component of the medium of film and the experience of cinema, and, in doing so, were working to make sound visible. This visibility is seen in all of the films considered in this dissertation, from Sharits's variable area track in *Episodic Generation* to Fitzgibbon's variable density track in *Internal System* to Richard Lerman's

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[15] Ibid.

[16] Coleen Fitzgibbon in conversation with the author, New York, NY, December 16, 2010. Amacher's "Third Ear Music" uses otoacoustic emissions, essentially tones generated by high-amplitude sound in which, to quote Amacher, our ears act as "neurophonic instruments" creating their "own tones and melodic shapes."

projected sonic score to Russett's and Spinello's simultaneously seen and heard audiovisual films. I propose that visibility wasn't the only aim of this work, but that filmmakers, specifically Fitzgibbon and Sharits, were using acoustic spaces in much the same way that sound artists like Palestine, Young, and Amacher were—with the intent of making sound not just visible, but material. Like Palestine, Young, and Amacher, these filmmakers wanted to create an experience of sound in which it had a real, physical presence.

Creating specific sonic environments based on the particulars of an architectural space was a central focus of Paul Sharits's work in the 1970s. The Fluxus sound pieces I discussed in chapter 2 explored the specific physical and architectural spaces in which they were installed; the shifting proximity of the sound source (in the case of configuration "A," water circulating in a bucket) to its pickup device (the microphone) and amplification; as well as the viewing-hearing subject's proximity to the various components of the work. As Sharits wrote in his sketch for these sound pieces, his investigation was, in part, about the relationship of sound space to room space.[17] Sharits's use of three loops of phasing sprocket-hole sound in *Synchronousoundtracks*—which bounced and reverberated off the walls of the gallery space where the piece was shown—was, as I have proposed, an exploration of overtones and the complex harmonic relationships created by those overlapping tones, at the same time that it created an intense, all-encompassing acoustic space filled with the phasing noise of sprocket holes. After *Synchronousoundtracks*, Sharits would continue to explore phase shifts in reverberant acoustic architectural spaces, and in the

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[17] Paul Sharits, sketch for *Sound Pieces*, 1970. The Poetry Collection at the University of Buffalo archive.

1970s created a body of locational film installation work that investigated the sounds of spaces and the role and position of the viewer within these acoustic environments.

Shutter Interface, like Synchronousoundtracks and many of Sharits's works from the mid-1970s, was made in two different forms: a double projection meant to be shown in a theatrical setting and an installation version consisting of four projectors, four film loops of "indefinite duration" with discrete soundtracks, four pedestals, and four speakers. Made in the summer of 1975 while Sharits was in residence at Artpark in Lewiston, New York, Shutter Interface screened there in 1975, at the Albright-Knox Art Gallery in Buffalo in 1976, and at the Droll/Kolbert Gallery in New York City in 1977 in its four-projector locational form. Anthology Film Archives recently restored the four original film loops, and the installation version of Shutter Interface screened in early 2009 (I believe for the first time since 1977) in a solo exhibition of Sharits's work at the Greene Naftali Gallery in New York City.
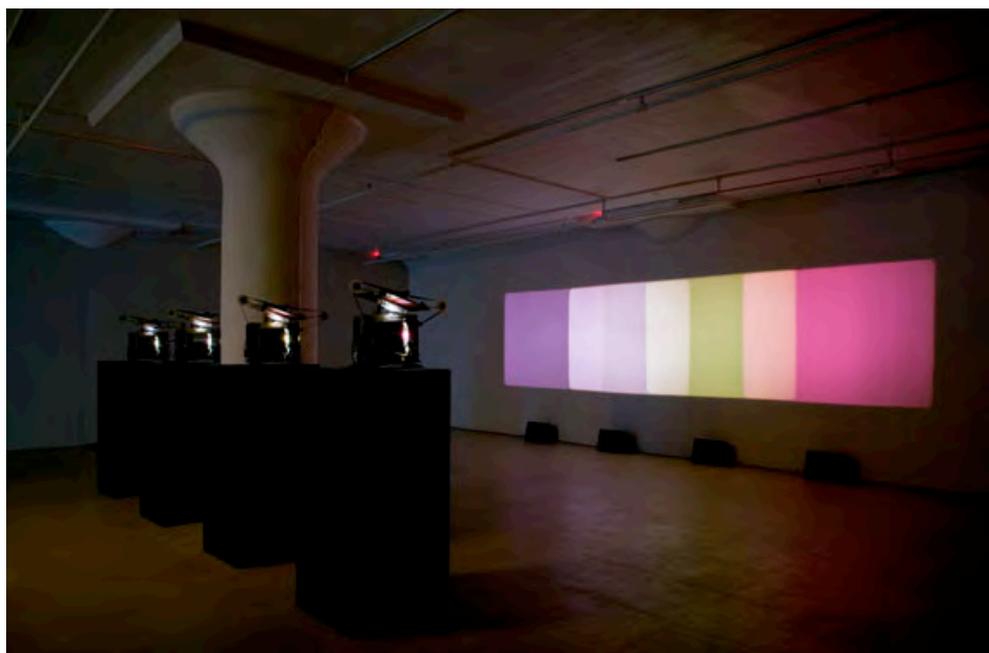
Figure 5.1: Installation view of Shutter Interface at Greene Naftali Gallery, 2009
Courtesy of Greene Naftali Gallery, New York

Shutter Interface consists of four projectors atop four 4.5-foot-high, 2-foot-wide column pedestals lined up 34 inches apart and placed 18 feet from a large wall in the gallery space. Four speakers that correspond to each of the projectors (described by Sharits as A, B, C, and D, left to right as you face the wall) are placed directly beneath the corresponding projected images. The projections each overlap by 29 inches so that a composite projection is created that measures approximately 26 feet in width and 6 feet in height.[18]
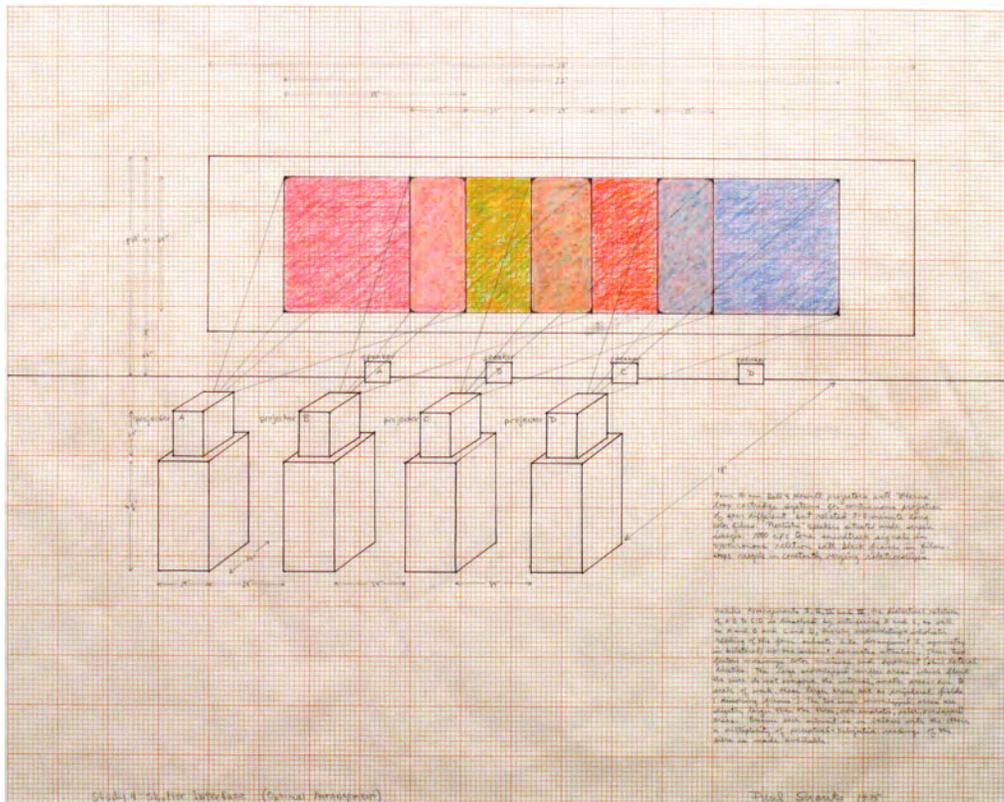

Figure 5.2: Paul Sharits, "Study 4: *Shutter Interface* (Optimal Arrangement)" (1975)
Courtesy of the Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY

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[18] This dimension is noted in one of Sharits's sketches for the installation of the piece. Widths of 22 and 24 inches (and heights from 5 to 6 feet) also appear in various other illustrations and descriptions.

The proportion of the composite projection, its aspect ratio as it were, makes it approximately 1:4.33, significantly wider than anamorphic or widescreen "Cinemascope" projection, which in the mid-1970s had an aspect ratio of 1:2.35. The four projections create seven interlocked rectangles, with the two largest on the extreme left and right sides of the projection.

Each of the four film loops is printed with sequences of color frames ranging in length from two to eight frames and separated by a single black frame. Each black frame coincides with a 1000Hz tone that is printed on the soundtrack, such that on any of the four individual film loops, tones occur synchronously with the black frames. Each loop is a different length (218 feet and 23 frames, 210 feet and 28 frames, 223 feet and 37 frames, 224 feet and 7 frames) and thus has a slightly different running time (averaging in the range of six minutes).
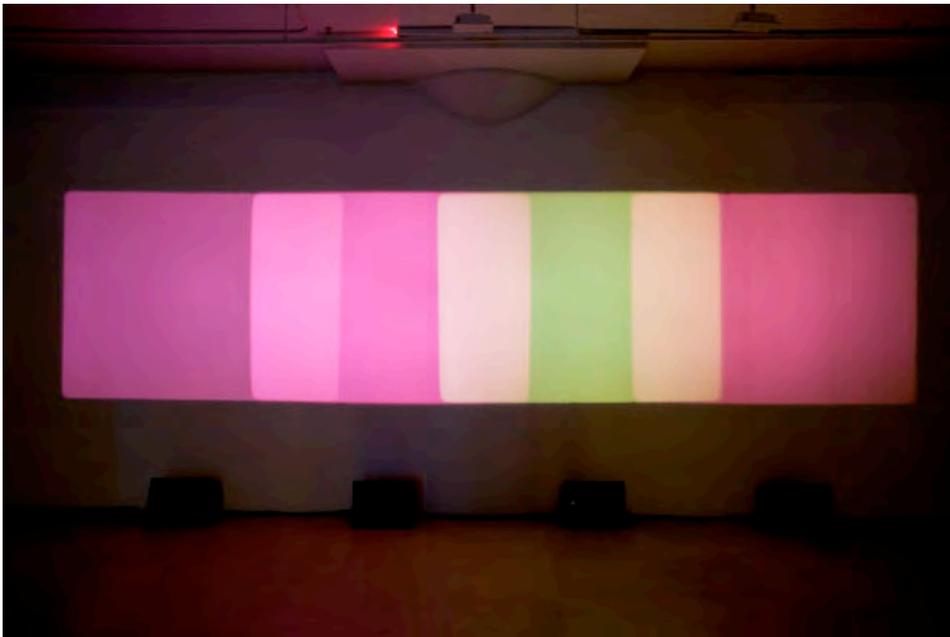

Figure 5.3: Installation view of *Shutter Interface* at Greene Naftali Gallery, New York, 2009
Courtesy of Greene Naftali Gallery, New York

Each loop is dominated by a slightly different color and pattern of alternating colors—in one of Sharits's early notes for the film he describes the relationship of these colors as A containing yellow vs. D; and C containing dark green vs. the dark purple of B. Various shades of pink and purple dominate, yet these are "accented by 'overtones' of greens and blues."[19]

Sharits described the experience of *Shutter Interface* as akin to watching "fireflies or water flowing over a dam—something that's moving. A fire or a candle—it's shifting—but it doesn't change its form dramatically."[20] The colors move in fascinating ways: they will be articulated and distinct in one instant, appear to move in horizontal washes from left to right across the wall (described by critic Stuart Liebman as a "gently rippling chromatic wave"),[21] and then seemingly pulse and flicker in and out of one another. In the overlapping areas, the projected colors have a tendency to push toward a brightness that becomes, at times, close to white. Sharits wanted the colors to blend in distinctly different ways and, in an early sketch, referred to this as a "subtle shimmering of tints."[22] The piece will move from appearing to be almost a single wash or mass of color to a shivering, flickering pulse in which isolated tones begin to pop. A pink will seem to dominate and then be interrupted by bursts of yellow, green, and purple. The projector lenses are set slightly out of focus so that the viewer concentrates on the colors and not on any scratches or dirt that might appear on the film strips; and after watching the piece for an extended period of time it seems impossible to not allow your

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[19] Stuart Liebman, "Apparent Motion and Film Structure: Paul Sharits's *Shutter Interface*," *Millennium Film Journal* No. 2 (Spring/Summer 1978): 107.
[20] Linda Cathcart, "An Interview with Paul Sharits," *Film Culture* no. 65-55 (1978): 108.
[21] Liebman, "Apparent Motion and Film Structure: Paul Sharits's *Shutter Interface*," 107.
[22] Sharits, files of Anthology Film Archives/Burchfield Penney Art Center.

eyes to go slightly out of focus. What is experienced is a pulsing, fluctuating, flickering,

and constantly modulating color that feels somewhat organic, almost like a

representation of pulsing blood or air moving in and out of the lungs.

The intermittent black frames work to create the pulsating rhythm of the piece

and, as Liebman noted, modify the intensity and saturation of the colors that are seen.[23]

Sharits wanted the black frames to "signify the shutter blade mechanism and the 1/48th

second darkness it creates to prevent blurring and generate the illusion of continuous

coherent figure motion."[24] As Sharits wrote in his description of the piece for Artpark in

1975:

> The central idea was to create a metaphor of the basic intermittency mechanism
> of the cinema: the shutter. If one slows down a projector, one observes a
> "flicker." This flickering reveals the rotating shutter activity of the system. Instead
> of slowing down a projector, one can metaphorically suggest the frame-by-frame
> structure of film (which is what necessitates a shutter blade mechanism) by
> differentiating each frame of the film by radical shifts in value or hue; this
> metaphor was the guiding principle of my work in the 1960's, in my so-called
> "color flicker films." I discovered, two years ago, that I could heighten this
> metaphor by partially overlapping two screens of related but different "flicker
> footage" and the conception of four overlapping screens began to evolve.[25]

When Sharits began working on the piece in 1973-74, it was initially titled *Pink

Interface*.[26] In one of Sharits's early notes for the piece, he asks:

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[23] Liebman, "Apparent Motion and Film Structure: Paul Sharits's *Shutter Interface*," 107.
[24] Ibid., 109.
[25] Paul Sharits, "Locational Film Pieces," *Film Culture* No. 65-66 (1978): 122.
[26] In terms of the relationship between "pink" and "shutter," specifically in the context of
film projection, I can't help but think about the use of pink noise film loops—loops that
contain electronically generated pink noise—to test and set the sound frequency
spectrum in a theater. Pink noise is occasionally referred to as "flicker noise" (when
used with direct current).

What is being signified? What is "pink" and what is "shutter" and why are each being suggested by the piece's title, as existing within an "interface?" Is the "interface" the same for both the pink and the shutter or are there two interfaces?[27]

Sharits wanted the black frames to signify or suggest the shutter mechanism of the projector without being discernable as a "discrete absence of light."[28]
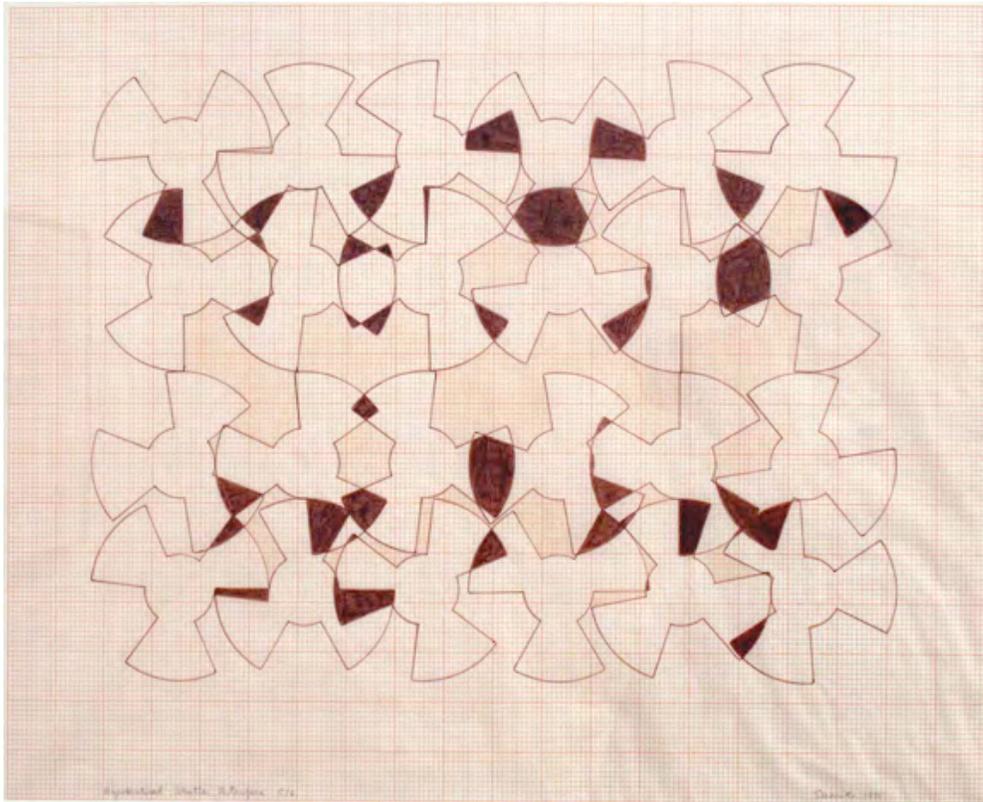
Figure 5.4: Paul Sharits, Representational drawing for *Shutter Interface* (1975)
Courtesy of the Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY

In another sketch for the piece, he writes that because the shutter and its signifier, the black frames, are "not directly perceivable," the soundtrack should indicate these "imperceivable dark moments. [The] soundtrack is in sync with what we cannot see but

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[27] Sharits, files of Anthology Film Archives/Burchfield Penney Art Center.
[28] Ibid.

which is the basis of the entire enterprise… Sound units are perceived more clearly/distinctly than their visual-temporal equivalents… Sound separates the light flashes and helps to 'see' the individual black frames."[29]

The sound that Sharits used in *Shutter Interface* is a 1000Hz beep tone, which he believed approximated the sound of his own alpha rhythm. In conversation with Linda Cathcart, Sharits said that he did biofeedback to listen to the sound of his alpha rhythm and attempted to replicate his own high-amplitude alpha waves in the sonic rhythms heard in the film.[30] Sharits wanted the soundtrack to be in sync with "what we cannot see," referencing the movement of the shutter through the insertion of these intermittent black frames and their synchronous accompanying beep tones, and also with a frequency and pulse that approximates something very human, invisible, and embodied: alpha brain waves.[31]

Ten years prior to Sharits's work on *Shutter Interface*, American avant-garde composer Alvin Lucier began working on the first musical performance to employ the

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[29] Ibid.

[30] In "Apparent Motion and Film Structure: Paul Sharits's *Shutter Interface*," Liebman discusses the work's installation at the Droll/Kolbert Gallery in New York City in 1977 and refers to the tone as being 1,000 cycles per second. Alpha waves are inaudible to the human ear (typically within the frequency range of 8-12Hz), so I assume that they are amplified during the process of biofeedback so they can be heard and that Sharits was attempting to replicate the sound of his *amplified* alpha brain waves. Cathcart, "An Interview with Paul Sharits," 105. Typically in biofeedback, various sensors including an electroencephalograph (EEG) are attached to the body and measure information about its physiological activity (brain activity, heart and breath rate, temperature, etc.). This information is then "fed back" to the user with the idea that with this awareness, in conjunction with cognitive, emotional, and behavioral modifications, the user will be able to control their physiological activity.

[31] Alpha brain waves are low-frequency brain waves (typically 10Hz) that reflect a quiet, idle state of brain activity, one associated with a relaxed wakefulness or meditative state in which the eyes are closed. See the "Quantitative EEG and Neurotherapy Fact Sheet": http://www.qeeg.com/qeegfact.html (accessed May 20, 2011).

amplification of alpha brain waves. This investigation would develop into *Music for Solo Performer* (1965), a live audio performance work in which Lucier utilized the amplification of his alpha brain waves as a means of triggering the vibration of various percussive instruments ranging from bass and timpani drums, cymbals, gongs, and snare drums to a metal can, cardboard box, and piano.
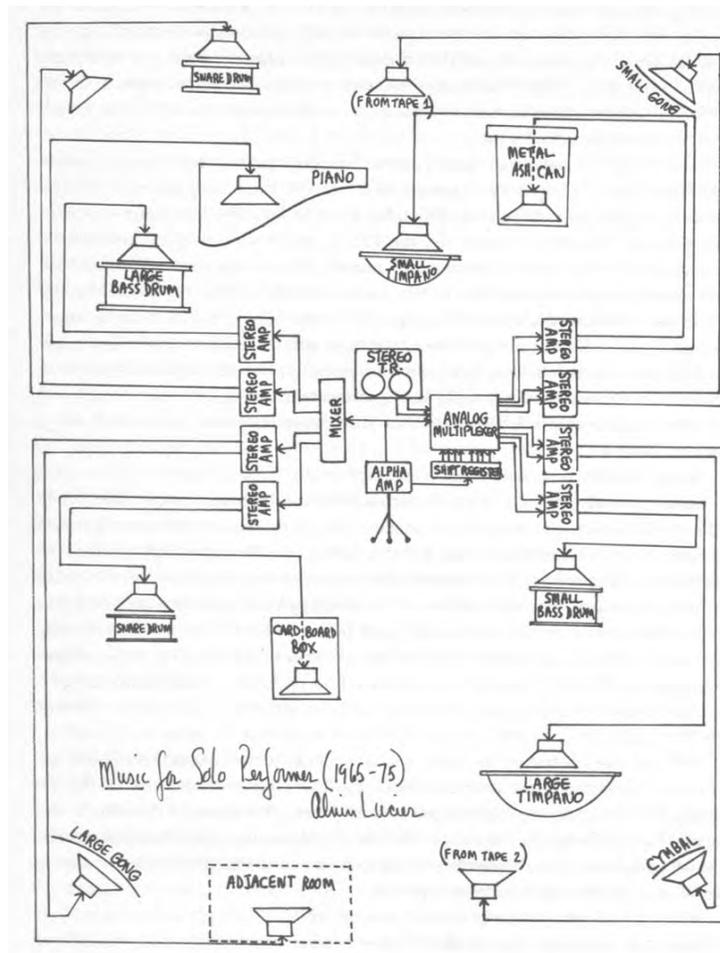

Figure 5.5: Alvin Lucier, diagram for *Music for Solo Performer* (1965-77)
Alvin Lucier, *Reflections: Interviews, Scores, Writings* (Köln: MusikTexte, 1995), 54

Lucier's brain waves generated sounds that were amplified and played back through loudspeakers, and the loudspeakers were placed on, underneath, or above the percussive instruments. In his words,

the idea is that alpha, which is produced without the person making any physical motions except the opening and closing of the eyes… that small amount of energy… [will] drive the percussion instruments… I tried to be very accurate about what the piece really meant: one person, alone, sitting very, very quietly, releasing a flood of energy which permeates the concert space.[32]

Music for Solo Performer was performed by Lucier, David Tudor and Gordon Mumma prior to 1968, and is documented in a number of audio recordings as well as in Robert Ashley's video series "Music with Roots in the Aether (Opera for Television Series in Seven Parts)."[33]

Figure 5.6: Still from 1975 performance of *Music for Solo Performer*
Alvin Lucier, *Reflections: Interviews, Scores, Writings* (Köln: MusikTexte, 1995), 57

In Ashley's 1975 video document of the piece, Lucier is seated in a chair and electrodes are slowly attached to his forehead, and a ground wire to his left hand. The electrodes

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[32] Alvin Lucier, "...to let alpha be itself" in *Reflections: Interviews, Scores, Writings* (Köln: MusikTexte, 1995), 46-50.
[33] Robert Ashley, *Music with Roots in the Aether (Opera for Television Series in Seven Parts) Tape 3: Alvin Lucier*. VHS (New York: Lovely Music, 1987).

are connected to an amplifier that Lucier slowly turns on. He gently opens and closes

his eyes a number of times, causing slow, rumbling vibrations to be heard when his

eyes are shut. As Lucier sits motionless in the chair, bass drums, snares, cymbals, and

other rattling and low, rumbling sounds are heard in constantly changing patterns,

amplitudes, and waves of vibration. The sound is heard as a percussive rhythm and is

never consistent—it comes and goes in unpredictable washes of vibrations caused by

the varying intensity of Lucier's alpha brain waves. Lucier described this rhythm as

resulting from the fact that although alpha waves are theoretically "a continual pattern of

ten hertz, it never comes out that way because it stops when your eyelids flutter or you

visualize a little and it tends to drift down a little bit if you get bored or sleepy."[34] Gordon

Mumma noted that the closing of the eyes didn't necessarily correlate with the

production of alpha waves, and that the performer of *Music for Solo Performer* had to

practice "non-visualization" in an attempt to exercise "great control over conditions

which are hardly ever completely predictable."[35]

　　While other avant-garde and contemporary classical composers would work with

alpha brain waves in the years following Lucier's first performance at Brandeis

University in 1965,[36] the focus of Lucier's piece was as much "about using the room as

an acoustic filter" as it was about the translation of brain waves into audible signals.[37]

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[34] Lucier, "...to let alpha be itself," 58.

[35] Gordon Mumma, "Alvin Lucier's *Music for Solo Performer 1965*," in *Source: Music of the Avant-Garde, 1966-1973*, ed. Larry Austin and Douglas Kahn (Berkeley: University of California Press, 2011), 81.

[36] Including Richard Teitelbaum, Alex Hay (*Grass Field* from 1966), and David Rosenboom, as noted by Michael Nyman in his *Experimental Music: Cage and Beyond* (Cambridge: Cambridge University Press, 1999): 106.

[37] Thom Holmes, *Electronic and Experimental Music* (New York: Routledge, 2002), 204.

Lucier's interest in exploring the unique acoustic properties and resonances of rooms, environments, and spaces would carry through performative audio works ranging from *Music for Solo Performer* to *Vespers* (1968) to the tape piece *I am sitting in a room* (1969) and the sculptural *Music on a Long Thin Wire* (1977). Lucier's investigations of the specific acoustic properties of space, along with his use of tape loops (perhaps most famously in *I am sitting in a room*), reflect concerns strikingly similar to Sharits's examinations of spatial acoustics and use of film loops in his locational pieces of the 1970s.

Just as alpha brain waves constantly fluctuate and occur at different rates and tempos, the tones of Sharits's *Shutter Interface* are constantly shifting and changing as the four looping soundtracks move into continually new and unpredictable relationships. Because the viewer is able to freely move around the gallery and installation, one can stand in the middle of the space to hear all four of the beep tone tracks overlapping and blending together into one shifting and pulsing audio drone; stand close to the projectors in order to blend the sound of the tones with the sound of the projector motors; or prioritize one of the audio tracks by standing or sitting directly in front of one of the four speakers. When standing in front of one of the speakers and listening primarily to one of the four soundtracks, the audio sounds like a high-pitched pinging beat. The sound has a rhythmic quality that is percussive and slightly irregular, and a tonal quality that is cold and electronic. Standing in the middle of the gallery, listening to all four soundtracks at a fairly equal distance from each of the four speakers, the individual pulsing tones on the four tracks blur together into a beating, high-pitched drone or whine akin to the sound of air whistling through or around an elevator shaft. As

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Stuart Liebman writes, "because at any moment there is a high probability that at least one black frame will be projected, the discrete tones dissolve into a continuous whine varying in pitch and volume (depending on the number of black frames projected) and location (depending on which of the four 'Realistic' speakers spaced along the screen wall the sound emerges from)."[38] The soundtracks of each of the four film loops become fused together in a kind of overtonal, phasing relationship that resembles the use of loops and phase shifts in Steve Reich's tape pieces from the mid-1960s (specifically *It's Gonna Rain* and *Come Out*), as well as his play with harmonics, rhythm, and phasing in works such as *Melodica* (1966), *Piano Phase* and *Violin Phase* (1967), and *Pulse Music* (1969-70).

The erratic pacing of the tones on each individual film loop, in combination with the slight differences in speed of the individual projectors (caused by minute differences in electrical currents, belt tension, etc.) and the unpredictable and inevitable buildup of dirt on the film strips and the projectors' optical readers, cause minor, microtonal differences in pitch and tone. One hears echoes and a form of acoustic beating that results from hearing slightly different frequencies simultaneously. Because all four projectors are running simultaneously, sound is constantly occurring and tones are constantly reverberating and bouncing around the gallery space. The sound will stutter and blur, move around and merge in a wash of tone, and then break away into individual, discrete pulses. At times the sound sustains like a drone, and at other times it seems to move and jump—ping-ponging back and forth across the space as though the individual tones were bouncing off of one another like metallic balls.

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[38] Liebman, "Apparent Motion and Film Structure: Paul Sharits's *Shutter Interface*," 107.

The sound of *Shutter Interface* shifts and changes dramatically, based on both the acoustic qualities of the space in which it is installed and where one chooses to stand in relation to the images, the projectors, and the speakers. When I saw the piece at Greene Naftali in 2009, I could hear a soft, whistling whine—like the sound of air rushing through an elevator shaft—before I even reached the floor where the piece was installed. Once in the space, the sound was all-encompassing. Because of the constant shifting and phasing of sound, and because of the various combinations of tones and their acoustic residue (harmonics, overtones, reverberation), the piece encourages movement through the space to alter one's acoustic experience. Of course, such movement also changes one's relationship to the image and to the projectors, which are such a prominent sculptural element of the work.

The sounds of *Shutter Interface* fluidly reflect the lateral shifts of projected color on the wall, yet progress at an entirely different pace or tempo. Liebman writes: "[A]s the sound's dynamic level rises and moves back and forth underneath the images, the colors seem to become more vibrant. As one watches, the quadraphonic whine fuses inextricably with the optical flux, reinforcing the glowing spatial environment which the piece creates."[39] This kind of interconnected, yet independent movement of sound and image seems like an attempt to respond to the question Sharits poses (perhaps for himself) in the 1970 essay "Words Per Page": "What possibilities are there for developing both sound and image from the same structural principle and simply presenting them side-by-side as two equal yet autonomous articulations of one

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[39] Ibid.

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conception?"[40] While the question reflects his interest in Sergei Eisenstein's theory of vertical montage, Sharits speculates that "it may be that through a controlled continuous collision of sound and image [that] an emergent psychophysiological heterodyne effect could be generated."[41]

Sharits's continued interest in perception and the physiological responses of the spectator, and his desire to create films and spatial environments in which, to use his words, "temporal chords of color" could alter the flow of human consciousness, is clearly evident in a work like *Shutter Interface*. There is a definite affinity between Sharits's work and La Monte Young and the Theatre of Eternal Music's exploration of the ways in which their music, specifically the use of extended drone and microtonal shifts, could directly alter the listener's neurophysiology.[42] In conversation with Richard Kostelanetz, Young said that "each time a particular frequency is repeated it is transmitted through the same parts of our auditory system. When these frequencies are continuous, as in my music, we can conceive even more easily how, if part of our circuitry is performing the same operation continuously, this could be considered to be or to simulate a psychological state."[43]

Like Young, Sharits was interested in phenomenological, psychological, and physiological investigations into the viewing body and our *bodily* response to images and sounds. *Shutter Interface* is a piece that can be experienced in a variety of different ways: you can sit directly underneath any of the four projectors, lie down on the floor in

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[40] Paul Sharits, "Words Per Page," *Film Culture* No. 65-66 (1978): 42.
[41] Ibid., 41.
[42] Branden Wayne Joseph, *Beyond the Dream Syndicate: Tony Conrad and the Arts after Cage (A "Minor" History)* (Cambridge: MIT Press, 2008), 333.
[43] Ibid.

front of the speakers, let the enormous wall of projected light completely fill your field of

vision, or close your eyes and feel the light while the sound rhythms fill your body. After

seeing the piece in 1978, Barbara Cavaliere wrote:

> Paul Sharits' installation invites the viewer into its encompassing aura; on
> walking into the room, one enters into the dreamlike atmosphere of technicolor
> sound; one becomes the shadowy form of self surrounded by the whir and hue of
> infinite life in the technology of the fascinating cinema screen.[44]

This "shadowy form of self surrounded by the whir and hue of infinite life" evokes

Sharits's statement to Hollis Frampton in 1973 (the year he started work on *Shutter*

Interface) that he wasn't interested in working on the translation of narrative into color,

but was rather working on color narrative itself.[45] The color narrative of *Shutter Interface*

is, at least in part, also an embodied color narrative of the self as it is reflected in this

visual and acoustic cinematic space.

Madeleine Burnside's review of the piece, also published in February of 1978,

incorrectly attributes the sound of *Shutter Interface* to "the amplified movement of the

film's holes over the projector's sprockets,"[46] rather than to the 1000Hz tone that Sharits

utilized and believed to be an accurate approximation of the amplification of his alpha

brain waves. Burnside's assumption, while inaccurate, does make a certain amount of

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[44] Barbara Cavaliere "Paul Sharits/American Folk Art," review of Sharits's exhibition at
the Droll/Kolbert Gallery, December 6-31, 1978, *Arts Magazine* 52, no. 6, February
1978: 32.
[45] Sharits is speaking specifically about *Ray Gun Virus*, but this statement seems to
reflect concerns that run through numerous works from this period. "Interview with Hollis
Frampton" (March 1, 1973), printed in Woody Vasulka and Peter Weibel, eds., *Buffalo
Heads: Media Study, Media Practice, Media Pioneers, 1973-1990* (Cambridge: MIT
Press, 2008), 281.
[46] Madeleine Burnside "Paul Sharits," review of Sharits's exhibition at the Droll/Kolbert
Gallery, December 6-31, 1978, *ARTnews* 7, no. 2, February 1978: 139.

sense given Sharits's use of sprocket hole audio in works like *Color Sound Frames*, *Synchronousoundtracks*, *Vertical Contiguity*, and *Divergent Intersecting Vectors*, and because the tonal quality of the intermittent pulses of sprocket holes in these pieces is quite similar to that of the amplified and intermittent brain waves used in *Shutter Interface*.

Sharits's shift from working with the sound of film itself (as medium) and the sound of the apparatus of projection to the embodied sound of the human brain is a curious one. In his next locational film piece, *Epileptic Seizure Comparison* (1976), Sharits would investigate the relationship between the satori state of Zen meditation (believed to be achieved by "boosting the amplitude of alpha waves to a high peak") and that of epileptic convulsion (in which brain waves reach an "abnormally high amplitude").[47] In *Epileptic Seizure Comparison*, Sharits combined synthesized electronic sounds that were created based on the EEG patterns of the brain during both a grand mal seizure and a flicker-induced seizure with the "natural vocal sounds" made by the patients seen in the film. Moving from the sound of the machine, the apparatus and the medium to the sound of alpha brain waves in a meditative state achieved by "non-visualization" as well as during seizure, Sharits's soundtracks in these pieces reveal his initial stated desire to

> enter directly into the higher drama of: celluloid, two dimensional strips; individual rectangular frames; the nature of sprockets and emulsion; projector operations; environmental illumination; the two-dimensional reflective screen surface; the retinal screen; optic nerve and individual psycho-physical subjectivities of consciousness.[48]

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[47] Sharits, "Locational Film Pieces," 123.
[48] ———, "Notes on Films/1966-1968," *Film Culture* No. 47 (1969): 13.

Perhaps it is not a progression from the sound of the materials of cinema to the sound

of the body that most accurately describes Sharits's engagement with these two audio

sources. Rather, Burnside's misidentification of the sound of the human brain as the

sound of a sprocket hole points to a far more compelling proposition being made by

Sharits's film: *Shutter Interface*, like Fitzgibbon's *Internal System*, is tracing out, through

sound, direct connections between the material of film, the projector that animates it into

life, and the human body. By linking the mechanical apparatus of cinema to the body of

the perceiving subject, Fitzgibbon and Sharits propose that we are *listening in* to the

sounds of cinema at the same time that we are *listening in* to the sounds of our own

bodies.
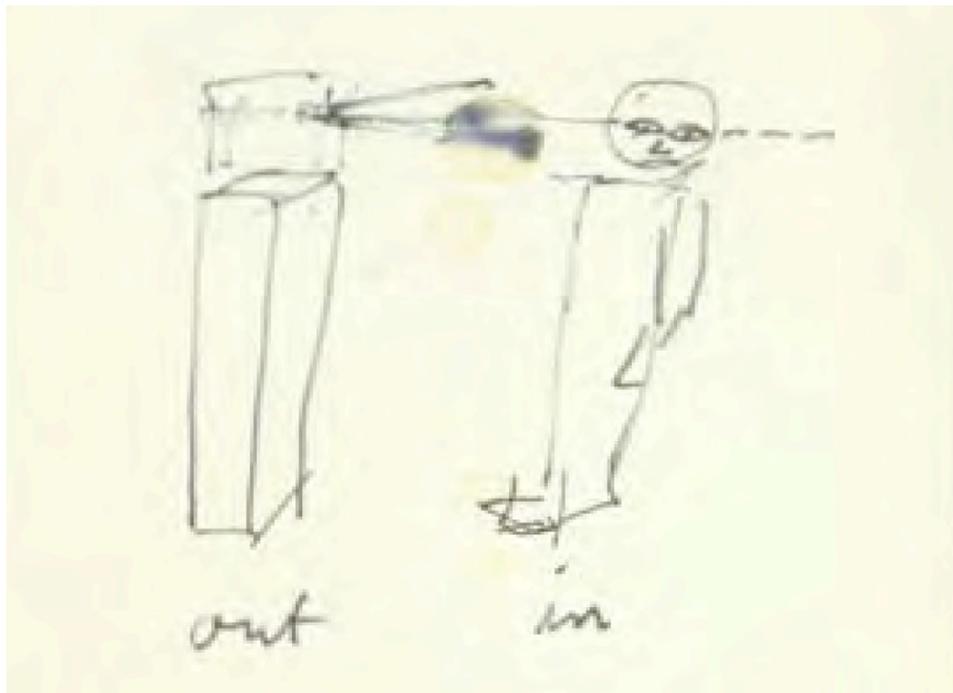
Figure 5.7: Paul Sharits, portion of a sketch found in the folder "Movie Concepts–Recent (1972)"
Courtesy of the Paul Sharits Archive at the Burchfield Penney Art Center, Buffalo, NY

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