Gil Mellé (1931–2004) was an American baritone saxophonist, visual artist, composer, and record producer. A tinkerer who was fascinated by electronic technology, he thought that a marriage of jazz and electronic instruments would make for a new and interesting hybrid musical sound. Noting that previous attempts at creating "electronic jazz" (his term) relied on composing sounds on tape, he was determined to invent a set of instruments that could be played live.[6] In 1966, during a lull in his jazz recording career, and while working primarily with Army-surplus electrical components, Mellé handmade several electronic instruments for use in a jazz combo. He formed a group called the *Jazz Electronauts*, consisting of a conventional jazz quartet. Mellé provided each player with a specially made electronic instrument to be used in addition to their conventional instruments. These instruments included the *Electar* (a tone generator and arpeggiator), the *Envelope* (for shaping the attack of a cello or string bass sound), the *Doomsday Machine* (a noise generator and filter), the *Tome VI* (a soprano saxophone outfitted with oscillator circuitry to produce five different types of voices), the *Direktor* (a multiple oscillator controller), and various consoles and devices, including the *Percussotron*, an early drum machine. With these instruments, the Electronauts created a breezy blend of cool jazz and modal jazz with electronic sounds interwoven naturally into the mix. Mellé released the album *Tome IV* in 1967 on the Verve jazz label. The group made several live appearances including the Monterey Jazz Festival in 1968. Mellé only made one other jazz album using his electronic instruments—the obscure *Waterbirds* in 1970—but he continued to use electronic instruments in soundtrack and television work, most notably the music for the science fiction film *Andromeda Strain* in 1971.

Another approach to electronic jazz worth noting from the late 1960s was the work of several live performance groups specializing in free jazz. In some cases, they incorporated the use of portable modular synthesizers, such as the EMS Synthi made in Great Britain, but also electronic effects often found in rock groups. Among these ensembles were MEV (United States and Italy), AMM, Iskra 1903, Hugh Davies and Derek Bailey (The Music Improvisation Company, United Kingdom), Gruppo Di Improvisazione Nuova (Italy), New Phonic Art (France), and Wired (Germany).

LIVE ELECTRONIC MUSIC

Cage and Cunningham began working together in the early 1940s when the two first established their radical approach to developing musical accompaniment for modern dance. Until about 1950, when pianist David Tudor joined the company to work with Cage, all of the musical accompaniment for the troupe had been produced acoustically, often with percussion and prepared piano. With the coming of the tape recorder in the early 1950s, Cage and Tudor shifted their attention from acoustic to electroacoustic music for Cunningham's choreography. Their first efforts were dance performances set to pre-recorded loudspeaker music: *Symphonie pour un homme seule* by Schaeffer and Henry in 1952, and Christian Wolff's *For Magnetic Tape* in 1953.[7] It was not long, however, until Cage realized the chief liability of relying on pre-recorded tape music:

> I was at a concert of electronic music in Cologne and I noticed that even though it was the most recent electronic music, the audience was all falling asleep. No matter how interesting the music was, the audience couldn't stay

> awake. That was because the music was coming out of loudspeakers. Then, in 1958—the Town Hall program of mine—we were rehearsing the *Williams Mix*, which is not an uninteresting piece, and the piano tuner came in to tune the piano. Everyone's attention went away from the *Williams Mix* to the piano tuner because he was live.[8]

The artistic backlash to loudspeaker music began with Cage and Tudor. The necessity of creating interesting electronic music for Cunningham "stimulated us very much, and it led to the use of microphones for purposes other than to amplify."[9] Some of their earliest experiments were merely to move the sound around in the performance space. This led directly to works such as *Cartridge Music* (1960), in which phono cartridges were plugged with different styli and scraped against objects to magnify their sounds. This seminal work resulted in electronic music conceived primarily for live performance—a critical stage in the evolution of avant-garde music.

Cage's growing interest in chance music paralleled his first electronic works for the Cunningham Dance Company. The abstract and untested potential of electronic music was a natural complement to Cunningham's equally original choreographic vision. While the two had sometimes composed the music first and then the dance, or the other way around, they came to the realization that the two were co-equal partners, unified by the element of time: "The relationship between the dance and music is one of co-existence, that is, being related simply because they exist at the same time."[10]

The company soon became Cage's laboratory for experimenting with live electronic music, a tradition that he oversaw with help primarily from David Tudor, Alvin Lucier, David Behrman, and Gordon Mumma for 30 years.[11] This was the mountain spring from which all live electronic performance music eventually flowed.

The reason that Cage got involved with dance in the first place was another motivating factor leading to the development of live electronic music. As a composer working in the 1940s, he found it increasingly difficult to find large ensembles of musicians willing to learn and play his music: "I soon learned that if you were writing music that orchestras just weren't interested in—or string quartets, I made several attempts, I didn't give up immediately—that you could get things done very easily by modern dance groups."[12] After establishing a base of operations with the Cunningham Dance Company, and having brought David Tudor on board as his chief musical collaborator, the two began to take their live electroacoustic performances on the road in the early 1960s. These performances throughout the United States and Europe defied all conventional wisdom in the field of classical music. Rather than sitting around writing instrumental music and waiting for someone to perform it, these classically trained composer-musicians took control of their careers by packing up their own gear and doing it all themselves. Theirs was the antithesis of the Cologne loudspeaker roadshow: no theory, no proselytizing, just performers making live electronic music.

In 1958, Cage composed the first in a series of *Variations* for any number and combination of instruments. The works were improvisatory in the sense that performers were allowed to make "immediate but disciplined decisions, and within specific structural boundaries," a mode of composing used at the time by composers including Cage, Earle Brown, and Christian Wolff.[13] Wolff himself noted that the *Variations* were most significant for the following reasons:

> [they] really pushed the notion of what constituted a piece of music, because nothing was said about anything except you had to make yourself something out of these lines and dots and things that were on plastic sheets. And that seemed to be about as far away from a musical identity as possible. But what always struck me as so mysterious was that what people did with those things almost all the time would come out sounding like John's work . . . There's this mysterious thing that in those days people would try some of John's chance techniques, but their music wouldn't come out sounding like John's.[14]

Variations V (1965) was certainly the most ambitious of these pieces. The "score" was written after the first performance, and, as Cage later said, it merely consisted of "remarks that would enable one to perform *Variations V*," a fine example of an *instructional score*.[15] The piece sprang from the idea of electrically triggering sounds through the physical movement of people. Preparation for the first performance at the Lincoln Center in New York (July 23, 1965) became something of a Manhattan Project for new music technology. The performance featured the Cunningham dancers on stage and an assemblage of musicians and electronic gear on a raised platform at the rear of the stage. Experimental film by Stan Vanderbeek and video images by Nam June Paik were also featured.[16]

Some of the sounds were triggered by movements of the dancers on stage; others were controlled and mixed by the musicians. Audio sources included continuously operating tape machines (at least six) playing sounds composed by Cage, Tudor, and Mumma; shortwave receivers (at least six); audio oscillators; electronically generated sounds triggered by proximity-sensing antennae (similar in principal to the Theremin); light beams aimed at photocells that could be interrupted to generate sounds; contact microphones attached to objects on stage (e.g. chairs and a table) that could be used by the dancers; and other homebrewed electronic sound generators that were manually adjusted as needed. Cage recruited several engineers to fabricate the equipment he needed to produce the music. Max Mathews from Bell Labs built a 96-port input mixer into which all of the sound sources were fed. Robert Moog, so familiar with Theremin technology, was retained to make the proximity-sensing antennae that were triggered when a dancer came near them. The light beams were in the base of the antennae and aimed at photocells to close a sound-generating circuit; when a dancer broke one of the beams by stepping into it, whatever sound being fed by that circuit was interrupted.

As one might imagine, the performances resulting from this assemblage of interactive gear were remarkably chaotic. Moog was somewhat puzzled by the whole plan, but knew that he was taking part in a legendary event:

> John Cage retained us to build some equipment for the first production of *Variations V*. It was done but it didn't work all that well. There were six Theremin-like antennae that the Merce Cunningham dancers would dance around and they would turn on different sounds. That was our part of *Variations V*. We had the antennae tuned so that if a dancer came within four feet of one it would set something off. They were scattered around the stage. There was so much stuff . . . I can't remember all that there was, but there was just a lot going on. It was an experience for me. All these wires at the edge of the dance area, where all of the technicians like me were set up, there were so many cables and

> what-not that it was like walking on a forest floor. You couldn't determine whether something was working or not. I think John Cage knew. But I don't think anybody else knew. It was serious business, though.[17]

Composer Ron Kuivila became acquainted with the history of this event while working with David Tudor, acknowledging that Moog was not alone in being puzzled by the piece's technological complexity. The proximity-sensing antennae apparently did not work as they had hoped during the Lincoln Center premiere. One had to get very close to them to get a response. The idea had been for the dancers to trigger them by moving about more freely on the stage.[18] But the show did indeed go on the road with more success. According to Mumma, "we always used the proximity antennae and the photo cell emitters, though we cut back on the number (about one half) of them because of the logistic challenges in touring performances."[19] Mumma also made some modifications to the equipment so that it worked better.

Another performance that must go down in history as one of the most complex multimedia events ever staged occurred in 1969 at the University of Illinois. John Cage and Lejaren Hiller teamed up to present a joint composition called *HPSCHD*. Using a computer-derived extrapolation of the *I Ching* developed for Cage, the two assembled 51 sound tapes generated by computer and combined them in a live setting with the activities of seven harpsichordists. The work was presented in a sports arena, with the electronic sounds amplified by 51 individual speakers mounted along the ceiling. Seven additional speakers were also used to amplify the harpsichords. In addition, 52 slide projectors provided streams of unrelated imagery, which was projected onto a large hanging screen measuring 100 feet by 160 feet as well as a semicircular screen that ran 340 feet around the inside rim of the ceiling. For five hours, hundreds of people sat in

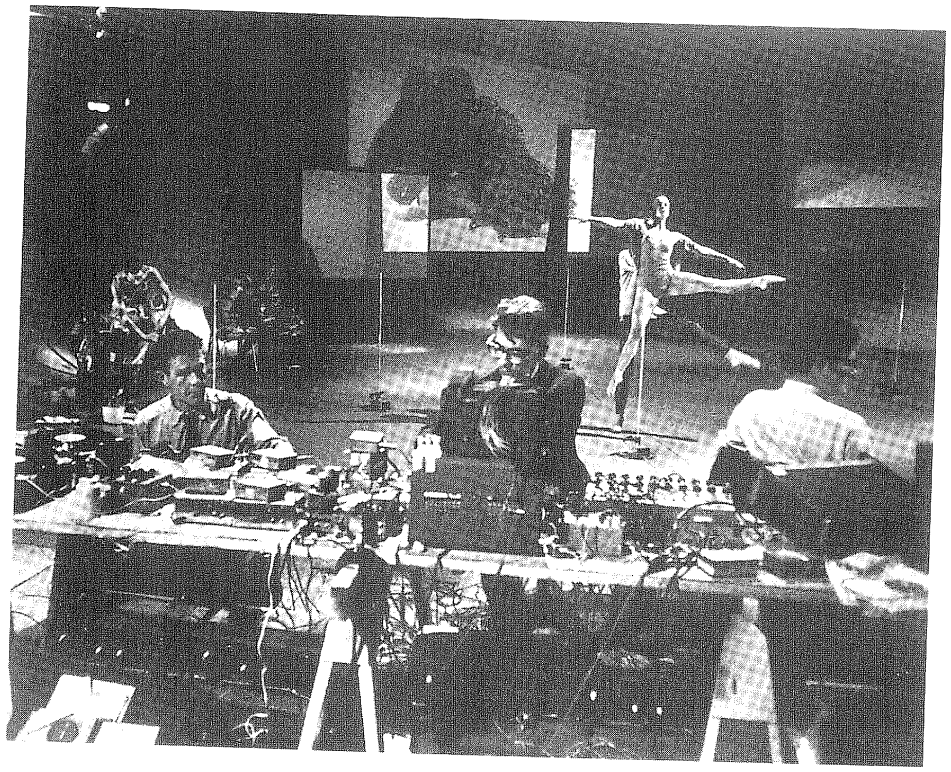

Figure 13.5
John Cage, David Tudor, and Gordon Mumma with the Merce Cunningham Dance Company performing *Variations V* at the Lincoln Center, New York, 1965. "There were so many cables and what-not that it was like walking on a forest floor," said Robert Moog, who acted as an audio engineer for the performance. (John Cage Trust)

the bleachers and milled around on the main floor of the arena immersed in this sensory bath. It was big and absorbing and live. The commercial recording of *HPSCHD* released by Nonesuch Records (H-71224) in 1969 included a computer printout (individualized for each copy of the record) with a randomly generated set of instructions for controlling the volume, treble, and bass knobs on one's stereo while listening to the music. Each printout was individually numbered. Mine happens to be "Output Sheet No. 374."

Cage's Influence

John Cage was without question one of the most important and influential composers of the twentieth century. His work had a ripple effect that permeated not only the fields of classical music, but also jazz, rock, dance, and other performance art. The fact that he often used electronics in his work was only secondarily important. The true impact of his music was in changing people's expectations about what was musical and what was not. In 1937, he said, "Wherever we are, what we hear is mostly noise. When we ignore it, it disturbs us. When we listen to it, we find it fascinating."[20]

His dissatisfaction with tape composition was amplified by his thoughts about musical indeterminacy delivered in a lecture entitled "Composition as Process":

> An experimental action is one, the outcome of which is not foreseen. Being unforeseen, this action is not concerned with its excuse. Like the land, like the air, it needs none. A performance of a composition which is indeterminate of its performance is necessarily unique. It cannot be repeated. When performed for a second time, the outcome is other than it was. Nothing therefore is accomplished by such a performance, since that performance cannot be grasped as an object in time. A recording of such a work has no more value than a postcard; it provides a knowledge of something that happened, whereas the action was a non-knowledge of something that had not yet happened.[21]

In a conversation with the author, Cage characterized his experience with chance music in this way:

> I think the thing that underlies my works since the use of chance operations—whether it's determinate or indeterminate—is the absence of intention. I've used the chance operations as a discipline to free the music precisely from my taste, memory, and any intentions that I might have. It's a discipline equivalent, I think, to that of sitting cross-legged, but the cross-leggedness would carry one, so to speak, in toward the world of dreams, the subconscious and so forth, whereas this discipline of chance operations carries one out to the world of relativity.[22]

Improvisation

There is a close affinity between the pioneers of live electronic music and jazz musicians. They often worked together, played to the same audiences, and crossed over as musicians from one idiom to the other. They also share the sociological experience, at least following the 1960s, of being cut off from most arts funding because of increasing corporate and institutional pressures to support more mainstream tastes in music.

Improvisation in electronic music is a 45-year tradition going back to the late 1950s, when the possibilities of live performance in this idiom were first being explored. Cage and Tudor were working with the Merce Cunningham Dance Company about the same time that Mumma and Ashley were performing live improvised electronic music in Ann Arbor, Michigan. Its practice has benefited from the evolution of smaller and more compact electronic instruments and computers. The widespread growth of digital sampling, keyboards, turntables, and other real-time audio processing technology has formed entirely new subcultures of music based on live electronic performance, including hip-hop, techno, and electronica, all of which are sustained by the social settings of raves, clubs, and other performance events.

Improvisation defies clear definition. Even though most musicians have difficulty explaining what it is, many can tell you the basic way that they approach it. Unlike jazz, which often deals with improvisatory rules in a kind of gamelike exchange of modes and melodies, electronic music often lacks the qualities of rhythm, harmony, and melody that many jazz musicians rely on. Instead, electronic music improvisation is largely based on the spontaneous modification of non-pitched aspects of sound: the shape of the envelope, timbre, rhythm, layers or filtering, effects (echo, delay, ring modulation, etc.), amplitude, and duration. A seasoned improviser learns how to listen to many layers of sound activity as part of a performance.

As members of composer Paul Epstein's improvisation ensemble in the mid-1970s, we spent much of our time tuning our senses to the performance space and other musicians with whom we would be working. Most of the work we did was without any instruments at all. We used body movement and vocal sounds as our main musical resource. There were two essential talents necessary to improvise successfully in an environment where any sound was fair game: *listening* and *patience*. You listened so as to comprehend the dynamics of the sound relationships being explored by other performers, and carefully chose a moment to make a contribution after having been subsumed by the experience.

The improvisatory process just described had the following attributes:

1 listening;
2 reacting;
3 augmenting (adding a sound to any fragment of what others were doing);
4 creating new sounds, or fragments to explore.

Those steps in and of themselves might constitute a composition or plan of action for an improvisation using any sound source.

Live, improvised electronic music can be heard in multiple venues in New York City, London, Tokyo, Rome, Berlin, and most other large cities any night of the week. In New York, a number of musicians and composers are in great demand for what they contribute to the improvisational situation. Familiar names include Elliot Sharp, Ikue Mori, John Zorn, Thurston Moore, Christian Marclay, Zeena Parkins, and Charles Cohen. What do these people bring to a performance that their collaborators so admire? Aside from being good listeners, Parkins thinks that it has something to do with the personality of the sound offered by each performer:

> People might be drawn to the personalized sound palette that we have. When you hear the electric harp, it is pretty unlikely that you are going to think of

> anything else besides what it is. I think the same is true for when you hear Ikue on drum machines. Her sound is pretty unmistakably her sound. We have developed this very distinctive language. For those that have imagination to think of situations where that language might be well suited it's a really great thing to have such personalized sounds to work with.[23]

Pauline Oliveros has focused on the art of improvisation for many years. Instrumentation is much less important to her than the art of *practiced listening*:

> The central concern in all my prose or oral instructions is to provide attentional strategies for the participants. Attentional strategies are nothing more than ways of listening and responding in consideration of oneself, others and the environment. The result of using these strategies is listening. If performers are listening then the audience is also likely to listen.[24]

The instructions for one of her works are worth considering within the context of any improvisatory situation:

> My instructions are intended to start an *attentional* process within a participant and among a group which can deepen gradually with repeated experience. Here is an example of a piece for voices or instruments: *Three Strategic Options*. Listen together. When you are ready to begin choose an option. Return to listening before choosing another option. Options are to be freely chosen throughout the duration of the piece. The piece ends when all return to listening together. 1) Sound before another performer 2) Sound after another performer 3) Sound with another performer. If performing as a soloist substitute sound from the environment for another performer.
>
> In order to perform *Three Strategic Options* all players have to listen to one another. Attention shifts with each option. Sounding before another could have a competitive edge. One has to listen for a silence which is the opportunity. Sounding after another implies patience. One has to listen for the end of a sound. Sounding with another takes intuition—direct knowing of when to start and to end. A definitive performance is not expected as each performance can vary considerably even though the integrity of the guidelines will not be disturbed and the piece could be recognizable each time it is performed by the same group. Style would change according to the performers, instrumentation and environment.[25]

Being aware of these dynamics, even as an audience member, can greatly embellish the experience of listening to live electronic music.

THE ONCE FESTIVALS: A COALITION OF ELECTRONIC MUSIC PIONEERS

In Ann Arbor, Michigan, in the late 1950s, Robert Ashley and Gordon Mumma successfully staged weekly performances of live electronic music and avant-garde theater

in the Space Theater of Milton Cohen. The success of the Space Theater and a burgeoning community of performing artists in Ann Arbor provided the momentum to take their efforts to the next level. Beginning in 1961, composers Ashley, Mumma, Roger Reynolds (b. 1934), George Cacioppo (1927–84), Bruce Wise, and Donald Scavarda (b. 1928) joined forces with the local Dramatic Arts Center of Wilfrid Kaplan to produce the first ONCE festival of contemporary music. They were joined by artists in other disciplines, including architects Harold Borkin and Joseph Wehrer, filmmaker George Manupelli, and painter-sculptors Mary Ashley and Milton Cohen.[26]

Prior to the ONCE festivals, the only periodic showcase for new music had been in Darmstadt, Germany, and by the early 1960s those had become more of an aesthetic battleground than a showcase. Darmstadt was also institutional in its backing and those who managed it exercised judgmental control over the selection—and censorship—of works to be featured. The ONCE festival, on the other hand, grew out of the devotion of its artist-performers and was sustained both by the efforts of Kaplan as the initial patron and by the tremendous public support that the series gained. Gordon Mumma explained:

> The ONCE festival happened because a community of artists took matters into their own hands. They extended their responsibilities beyond the limits of producing their art into the organization and promotion of their art before the public. In this process they simultaneously took advantage of the means of commerce, private and public patronage, and pedagogy. But for the most part they did this outside of the established avenues of artistic commerce, pedagogy and patronage.[27]

Even though the ONCE festivals took place in Ann Arbor, they existed without any support from the University of Michigan. Being outside of the normal avenues of commerce for the arts, it was difficult finding financial and other support for the festivals. Despite the fact that some of the participants were employed by the university, Mumma noted:

> virtually all efforts at enlisting support from this institution precipitated resistance and animosity to the project. Applications and contacts with numerous foundations, continuously for more than six years, produced no responses beyond a growing file of polite, through sometimes enthusiastic, fine-bond, raised-letterhead replies.[28]

Ashley recalled that one of their principal benefactors withdrew his support in 1965 because the festivals were getting too far-out: "He and his wife were amateur musicians who had friends in the University of Michigan music department, which I think it is fair to say was ferociously jealous of our success. I think his departure was under their influence."[29]

Contrary to its name, the festival did occur more than once and continued to grow year by year, filling successively larger auditoriums. There were six ONCE festivals in all between 1961 and 1965 (two occurred in 1965, the final one being called ONCE AGAIN).

From the start, Ashley, Mumma, and Reynolds made an effort to attract European composers and conductors to the festival. They also opened their arms to influential jazz musicians who were exploring the outer reaches of that idiom. The concerts were an immediate international success, and a potent antidote to the musical dogma associated with Darmstadt.

The first ONCE festival took place in a 200-seat Unitarian church in Ann Arbor and consisted of four concerts. The subsequent festivals comprised four to eight performances spread out over a week or two, usually in February and March. According to Ashley, only one performance during the entire eight years had less than standing room-only attendance. Apart from the festivals themselves, there were also year-round concerts and performances given by individual members of the collective, which came to be known as the ONCE group. The fame of the concerts eventually inspired similar events around the country, particularly on college campuses.

The programs of the ONCE festivals featured the hottest new music performers and musicians. Live and taped electronic music was at the heart of many performances. In all, 29 concerts of new music were offered during the six ONCE festivals, including 67 premiere performances out of a total of 215 works by 88 contemporary composers.[30]

The fourth festival was preceded by a publicity controversy that enraged the critics almost as much as the music itself did. Mumma recalled:

> Mary Ashley designed an accordion-folded, purple and white flyer that featured on one side the enormously detailed programs. On the other side was a photograph of the composers Ashley, Cacioppo, Scavarda, and myself, looking like the Mafia in drag, standing behind a voluptuous nude reclining on the lunch counter of a well-known local eatery called "Red's Rite Spot."
>
> The appearance of this flyer created a small hysteria, and the Dramatic Arts Center called an emergency meeting. Suggestions that the flyer be withdrawn were overcome: the ultimate problem was obtaining further funds for reprinting it to meet the demand for souvenir copies. The extent of this flyer's success was indicated to me dramatically in New York City the following April. At the seminar following one of Max Polikoff's "Music in our Time" concerts, on which Ashley and I had just performed, the first question from the audience concerned the availability of autographed copies of the purple ONCE flyer.[31]

A list of the programs themselves shows that the history of the ONCE festivals evolved from that of mostly musical performances in a normal proscenium setting to more open-ended stagings including dancers, multimedia, and lighting effects. By the time Alvin Lucier took part in 1965, the musicians were beginning to mingle with the audience in the performance space for some pieces, as was the case with the first performances of Lucier's *Vespers* for an ensemble using small echo-location (pulse wave oscillators) devices called Sondols (sonar dolphin):

> I first did the piece called *Vespers* in Ann Arbor at the ONCE festival[32] in the ballroom at the graduate center. I wasn't anxious about it. I didn't know how it was going to play out. I needed to see the space and the performers. I had all these ideas. It was just a question about who was going to play the Sondols

and what they would do. So, I designed the performance that afternoon for the space: "You go there"; "Somebody start here"; "Don't do this—do this." And so you make the piece. In all honesty to the music, you couldn't really plan it in advance because that was not the way it was. I don't know if I blindfolded them or not on this occasion. I actually made up some of the performance during the performance, if you can imagine. I had leather shoes on and the floor was made of wood. The lights went down and I walked around the space and you could hear echoes from my feet. Now most people wouldn't pay attention to that because it was just walking. I opened the drapes on the windows to get a more reverberant space. I was preparing the space, actually. I was giving the audience clues as to what might be going on. Everybody knows if you open the drapes there's more reverberation. Then I had stacked some chairs up. I deployed some of those as obstacles. I think there were even potted plants that I put as obstacles. It was kind of like someone preparing for a dinner party. I went around and rearranged some of the furniture.

I had four players. They were in four parts of the room. I instructed them to try, by means of hearing the echoes that came back to them, to move as if they were blind. And that they should only play when it made sense to. To hear the echoes. That they shouldn't just play the instruments as instruments, they shouldn't decide to speed up or slow down for musical effect. That kills the performance immediately. It had to be based on survival and task. That was my score. This built the task into the performance. It was in the dark.[33] [Gordon Mumma added that the performers were also blindfolded for this performance.[34]]

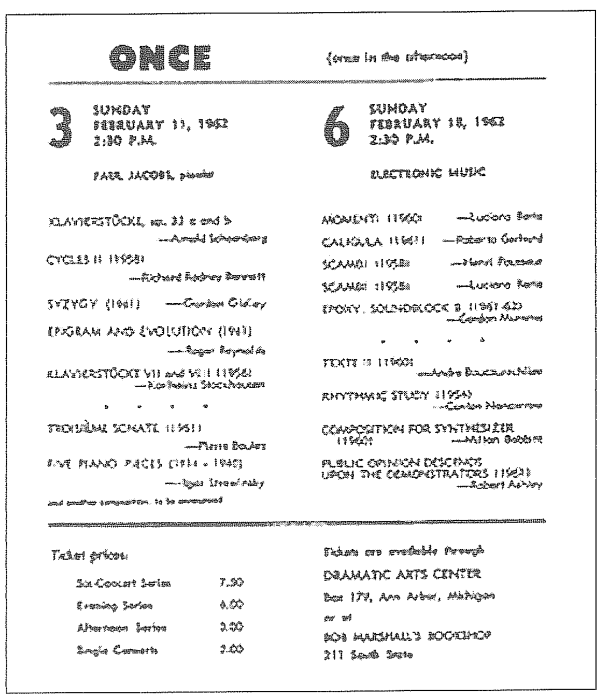

Figure 13.6 ONCE festival poster showing scheduled performances of electronic music by Berio, Mumma, Pousseur, Babbitt, and Ashley. (Gordon Mumma)

In spite of the perennial ribbing of media music critics—many of whom enjoyed beginning reviews, as Robert Ashley recalls, with a line such as "Once is enough"—the ONCE festivals served as a major influence on the contemporary-music scene. Their successful run had a galvanizing effect on the experimental music community, bringing together American composers from both coasts and ensuring that the spirit of radical experimentation of Cage and Tudor would continue into the next generation. While it would be contrary to its spirit to suggest that all of this experimental activity formed a cohesive school, it did indeed propel several movements in new American music. Many of these artists from New York, San Francisco, and Ann Arbor shared similar challenges and a common purpose: to create something new and original in contemporary music that was a reaction against what had come before and what was being lauded by the European avant-garde. As Gordon Mumma reflects, "The origins of the jazz traditions occurred in the same way—collaborative and interactive. While the Darmstadt model established fences on musical creativity, jazz traditions and the ONCE festival example let things grow, without putting limits on creative innovation."[35]

The live performance work of the SFTMC continued to evolve during this time as well, including instrumental and electronic performances using tape and live electronic music, theater and dance pieces, and visual projections. The ONCE and SFTMC groups developed an ongoing correspondence and shared many ideas related to their common

LIVE ELECTRONIC MUSIC

1 *Cartridge Music* (1960) by John Cage
Amplified small sounds

2 *Greys* (1963) by Gordon Mumma
Music from the ONCE festival

3 *Music for Solo Performer* (1964–65) by Alvin Lucier
Music for amplified brainwaves

4 *Variations V* (1965) by John Cage
Live multimedia performance

5 *In the Realm of Nothing Whatever* (1966) by AMM
Live improvised music with electronics

6 *Hornpipe* (1967) by Gordon Mumma
Modified horn sounds

7 *Runthrough* (1967–68) by David Behrman
Homemade synthesizers and photocell mixers

8 *Spacecraft* (1970) by Musica Elettronica Viva (MEV)
Analog synthesizers and amplified instruments

9 *Automatic Writing* (1974–79) by Robert Ashley
Electronics and voice

10 *Contraband* (2006) by Ikue Mori and Zeena Parkins
Improvisation for laptop electronics and instruments

LISTEN

experiences. Oliveros was invited to perform at the ONCE festival in 1965. In 1966 she returned to Ann Arbor with a new work written for the ONCE group called *C(s) for Once*. It was scored for trumpets, flutes, voices, organ, and three tape recorders, with one tape threaded through all three to modify the sounds of the live performers. This work led to some interesting collaborations in later years between veterans of both groups, including Oliveros's production of *Valentine* (1968), which was commissioned by the Sonic Arts Union of Ashley, Mumma, Behrman, and Lucier.

LEADING INDICATORS FOR THE FUTURE: THE SONIC ARTS UNION

By 1966, Robert Ashley, Gordon Mumma, David Behrman, and Alvin Lucier had become well acquainted because of their mutual collaborations and performances with John Cage, David Tudor, the Cunningham Dance Company (after 1966), and the instrumental performances of the ONCE festivals. With the festivals coming to an end, the four of them decided to join forces as a touring group, the Sonic Arts Group, later known as the Sonic Arts Union (1966–76).

The inspiration for doing this was clearly the success that Cage and Tudor had experienced by taking their music on the road. Lucier explained:

> David Tudor really freed a lot of us . . . That was a great stimulation—that you could design your own equipment, that you could find it at Radio Shack. You could configure it in certain ways and you could make your own work. That was very important.[36]

What the world received as a part of this union were four very individual voices ready to break another set of sound barriers.

Each of the members of the Sonic Arts Union is still active in music today. In speaking to them individually about their work, it is clear that the Sonic Arts Union was an especially bright period in each of their remarkable histories. Behrman thinks that the unifying element behind their individual work was an interest in doing pieces "in which established techniques were thrown away and the nature of sound was dealt with from scratch."[37]

Forming the group was largely a matter of practicality. Some of the members had been receiving invitations to perform in Europe and elsewhere, but the expense of producing a concert on one's own would have made it economically impractical to accept such offers. By teaming up, they could pool their equipment and eliminate other costs by serving as both technicians and musicians. Because there was often little or no payment for such performances, the union served as a hedge against unnecessary expenses.

The Sonic Arts Union toured North America and Europe into the early 1970s. Even though they pooled their equipment, they didn't often collaborate on compositions except by helping each other out during performances. Each composer would bring a piece to a concert and the others would act as musicians by manning the equipment. "A Sonic Arts Union concert was about 1,000 miles of wire and all these little boxes that plugged into each other," recalls Ashley.[38]