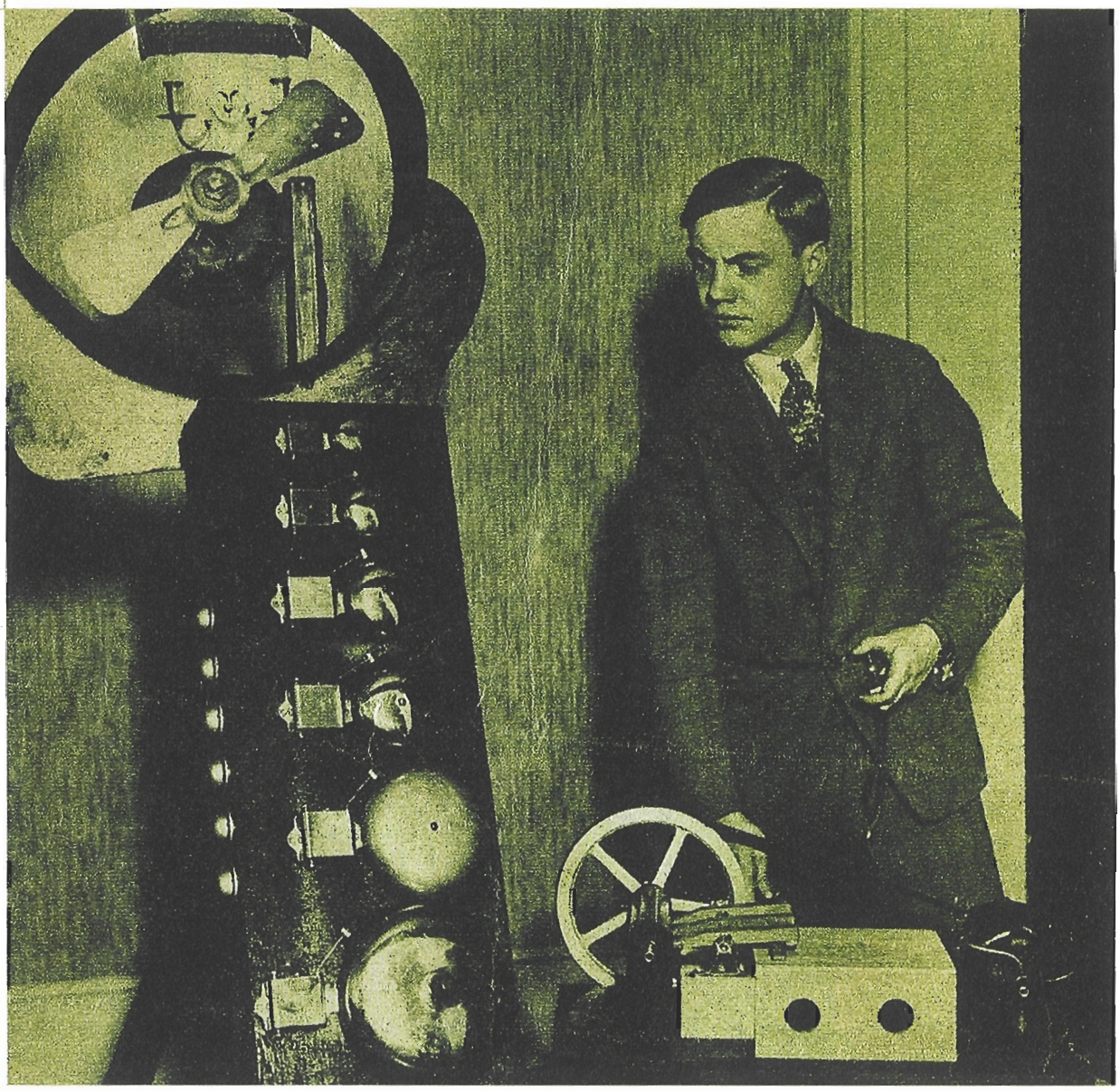


Blast From the Past

A lost musical revolution of sirens, gongs, airplane propellers, and 16 player pianos is about to come roaring to life.

By Paul D. Lehrman

I am sitting in my studio on the top floor of my suburban home, listening to music no one has ever heard before. This isn't unusual, since I'm a composer. Nor is it unusual that the piece calls for the collaboration of humans and computers. As one of the early adopters of digital machines in music, I've been working with the technology for nearly 20 years.

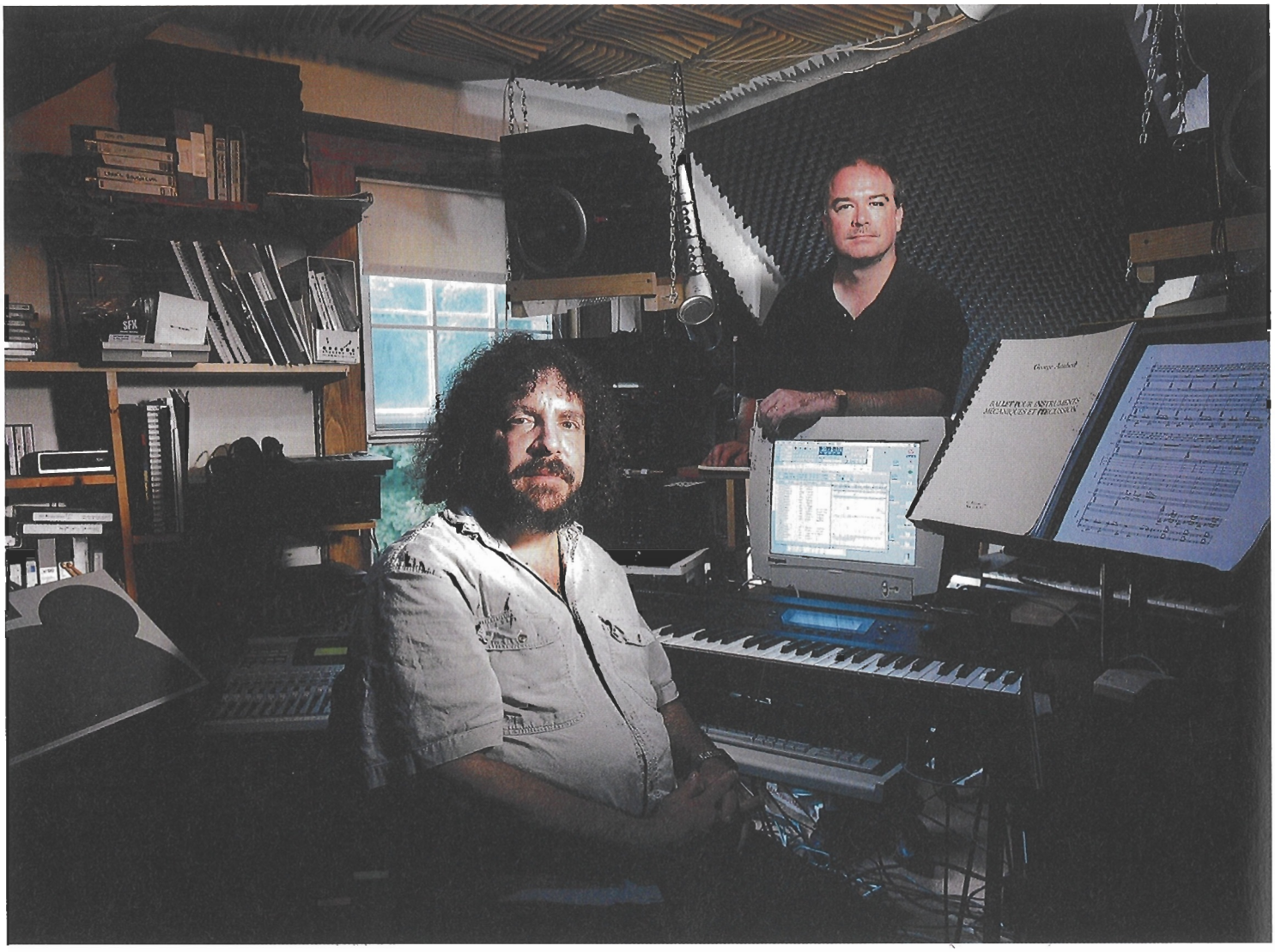
But this score wasn't written with a computer. And the composer, who died 40 years ago, probably never touched a computer. Moreover, he himself never heard his masterpiece performed, since the technology it required didn't exist during his life.

Cacophonous composer George Antheil in 1927, showing off his avant-garde instruments.

The technology exists now, though, and I am using it to stage the very first performance of the work whose debut has been 75 years in the making.

And I am smiling.

Composer George Antheil was 23 years old in 1923 when he began work on what was to be his most



Conductor Jeff Fischer (right) and author Lehrman tune up a chip-controlled piano in preparation for *Ballet mécanique*.

famous – or most infamous – creation, *Ballet pour instrument mécaniques et percussion*, more commonly called *Ballet mécanique*. Antheil was a young American living in Paris, where he was friends with Igor Stravinsky, James Joyce, Ernest Hemingway, Gertrude Stein, Ezra Pound, Pablo Picasso, Salvador Dali, and other artistic lights of the era. In fact, he lived at the epicenter of it all, in a one-room apartment above Shakespeare & Company, the legendary English-language bookstore owned by Sylvia Beach, the first publisher of Joyce's *Ulysses* and the plaintiff in the book's US obscenity trial.

Enamored with the industrial age, and with the anarchic, Dadaist, and anti-Romantic sentiments that fed his social circle, Antheil conceived of his elaborate creations as celebrations of machines as music makers. He won great approval for his early efforts. At the premiere of one work for player piano – called, appropriately, *Mechanisms* – the influential French composer Erik Satie leaned out of his box and cried, "*Quel précision*!" Along with various combinations of pianos and percussion instruments, his piece called for electric bells, a siren, and several airplane propellers. He proclaimed it, in an article for the avant-garde publication *De Stijl*, "the first piece of music that has been composed OUT OF and FOR machines, ON EARTH."

Antheil conceived of his elaborate creations as celebrations of machines as music makers.

Antheil eventually wrote three versions of *Ballet mécanique*. The final one, drafted in 1953, six years before his death, is fairly well known to contemporary music aficionados. It is played with some regularity by more ambitious percussion ensembles, and several recordings of it are available. The middle version, written in 1926, caused a riot at its premiere in Paris – a sure sign of a composer's success at that time – but it was deemed an utter failure at its American debut the following year. This version of the piece virtually disappeared from the music world until 1989, when it was performed at Carnegie Hall.

But it is the first version that I have been laboring over for the past nine months. This *Ballet mécanique*, written in 1923-24 and

IMAGE: EVAN KAFKA

originally intended to be the soundtrack for a film of the same name by Cubist painter Fernand Leger, has never been performed in its original instrumentation. A look at the score immediately reveals why: Antheil was in love with the player piano – called a "pianola" back then – an instrument that first appeared in 1895. He set the piece for 16 of them playing four parts. They were to be accompanied by two grand pianos played by musicians, as well as three xylophones, four bass drums, a gong, three airplane propellers, seven electric bells, and a siren.

The symphony is highly, often brutally, rhythmic, and calls for dozens of notes to be played simultaneously. The 16 pianolas must be tightly synchronized. But that was the problem: Synchronized pianolas existed only in theory. It was one thing to encode music for an instrument using punched paper and vacuum force, but it was another thing to get those instruments to speak to each other. How would you make the 16 rolls of paper begin turning at precisely the same instant and then continue together, perfectly paced? Or, if you used one central roll mechanism, how could it control 16 instruments spread out around the stage?

The 1924 *Ballet* was performed several times in Paris salons, but Antheil was never able to realize his original vision. Instead, the four pianola rolls were combined into one and played on a single instrument. Thus it was that, in 1926, Antheil rewrote the piece, creating the version that would make it to America a year later. This one made do with a single pianola (electrically amplified) and an unspecified multiple of two human-played pianos, plus the percussion and the noisemakers. By the time he got to the 1953 version, he had dispensed with the pianola altogether.

What Antheil so desperately needed, I've got: MIDI (musical instrument digital interface), which is the standard musical computer language, and a new generation of MIDI-compatible player pianos. Others have this stuff, too, of course, and they've used it to play Antheil. *Ballet mécanique*, for example, has been explored in Europe by the Ensemble Modern. Working with Juergen Hocker, president of the Society for Self-Playing Musical Instruments, the ensemble used antique pianolas retrofitted to respond to MIDI commands. But those performances, mounted in concert halls in London, Vienna, Frankfurt, and Berlin, used only two player pianos and six human pianists. My attempt will go whole hog.

Already I can feel the hairs on the back of my neck stand up as I listen to my computer play all the raucous parts of the piece on banks of MIDI synthesizers and samplers, even though I know that what I'm hearing is just an approximation of how the piece is really supposed to sound. Soon enough I'll hear the real thing, though. In November, on the stage of a concert hall in the old industrial town of Lowell, Massachusetts, I'll deploy 16 state-of-the-art player pianos, two pianists, seven student percussionists, and a Macintosh Quadra 650 computer with PowerPC acceleration to play *Ballet mécanique* as George Antheil first intended it to be played. Before a live audience of a thousand – and a potential electronic audience of millions via public-radio station WGBH's Web site (*www.wgbh.org/radio*) – perhaps the loudest piece of concert music ever composed will at long last have its world premiere.

In November, live and Web audiences will hear the world premiere of what may be the loudest piece of concert music ever composed.

Antheil and Me

As a kid, I had a passion for trying out different musical instruments. At one time or another, I played piano, guitar, clarinet, saxophone, and string bass. My college degree says I am a bassoonist, but in high school and college I also played orchestral percussion: timpani, bass drum, xylophone, chimes – all those outlandish noisemakers you see lined up at the back of the symphony.

One summer in the late '60s, at a music camp in Vermont, a teacher named Stanley Hecht invited me to join his percussion ensemble and introduced me to a genre of music I didn't know existed: music for percussion instruments alone. I hadn't realized that in the hands of the right composer, there could be melody, harmony, dynamics, and expression in the banging and shaking of objects of wood, metal, and skin. Percussion ensemble music had an exotic, primordial feel that was at the same time thrillingly avant-garde.

Hecht and I shared a passion for tape recording as well – not only for its usefulness in preserving musical performances but also for its significance in the new genre of electronic music. When camp was over, he sent me a reel of selections from his record collection. The tape included a completely over-the-top piece called *Ballet mécanique*, in a recording (the only one commercially available at the time) by Robert Craft and the Los Angeles Contemporary Music Ensemble. The xylophone parts in this piece were more complicated and exhilarating than anything I'd ever heard, the pianists were obviously insane, and when the airplane propellers made their first entrance, I almost died from excitement.

I was 15 years old. Over the next three decades, I would occasionally hear about performances of the *Ballet*, events I was never able to attend – usually because they were taking place thousands of miles away. But in May 1998, 30 years after that first encounter, I got an email that would lead to an adventure with the *Ballet mécanique* I could never have imagined.

The message came from Bill Holab, director of publications at the New York music-publishing giant G. Schirmer. The company, he wrote, wanted to publish the never performed 16-pianola version of *Ballet mécanique* so it could be played by an ensemble using modern player pianos. The company needed someone with MIDI expertise to put it all together. Furthermore, Yamaha, one of the largest piano manufacturers in the world, which makes microprocessor-controlled player pianos under the brand name Disklavier, had expressed interest in helping put on an initial performance. Might I be interested in working on the project?

I read through the message three times before I exhaled.

The assignment from Schirmer was to take Antheil's original score and program it – all 1,240 measures – into a MIDI sequencer. A sequencer is a hardware device or software program that records data such as keystrokes, pedal presses, and knob twirls, then lets you edit the data and play it back again through one or many MIDI instruments, such as synthesizers, samplers, or digitally enhanced pianos. Sequencers, which have been around since the early days of synthesizers, today are among the basic tools used by composers of all kinds of music. With its programmed paper piano rolls, *Ballet mécanique* was, in effect, a giant multitrack sequence – created 40 years before the concept had a name. My role would be to make the composition playable so that any group, with enough ambition, could perform it. Orchestral materials – parts and scores – are almost never sold, but rather are rented to performing groups, so that when renting *Ballet mécanique*, Schirmer could distribute these sequences, along with samples of the bells, sirens, and propellers that I would record on CD-ROM.

I had to start off the project with basics. While I knew something about the *Ballet*, I knew nothing about George Antheil. I assumed he was French and that his name was pronounced "an-TAY." It was Holab who told me that Antheil was born in Trenton, New Jersey, the son of a shoe salesman, and that his ancestry was German: His name was pronounced "AN-tyle." He wrote a huge amount of concert music, including chamber music, piano sonatas, symphonies, and operas. Still, for decades his oeuvre – except for the notorious *Ballet mécanique* – was almost totally unknown.

My research began with Antheil's 1945 autobiography, *Bad Boy of Music*, which tells of his early days in the heart of literary Europe; how he fell in with Stravinsky and out again (in large part over the issue of who copied whose idea of composing for multiple player pianos); his attempts to write an opera with Joyce based on a chapter from *Ulysses*; and his foray to North Africa. In an audacious publicity stunt just before the first *Ballet mécanique* performance, Antheil enlisted a reporter friend to plant news stories saying that the composer had been eaten by lions. If only half of the book is true, the man led an incredible life.

It was the sort of life that would not have been possible without the help of a wealthy patron; in his case, this was Mary Louise Curtis Bok, whose family owned the *Saturday Evening Post* and who would later found the Curtis Institute of Music in Philadelphia. Mrs. Bok gave Antheil some $40,000 over the course of nearly two decades. She didn't claim to understand his music, and her support waxed and waned depending on the latest reports she got about the composer's work from her supposedly more sophisticated friends. Antheil often had to beg for more. In his supplicative letters to Bok – and, indeed, in all of his writings at the time – he consistently portrayed himself as a significant, revolutionary figure, and thus beyond reproach for either his artistic or his personal excesses. "Never did a well-behaved young man become a great musician, in the truly great creative sense," he wrote in one letter.

Antheil's brashness knew few bounds. He pulled audacious publicity stunts, jeered at fellow artists, and palled around with the Euro elite.

Antheil's brashness knew few bounds. In the article for *De Stijl*, he wrote, "My *Ballet mécanique* is the first piece of music that has found the best forms and materials lying inert in a medium that AS A MEDIUM is mathematically certain of becoming the greatest moving factor of the music of future generations." In his "Manifesto of Musico-Mechanico," he declared, "We are done with Satie, Les Six, Stravinsky, and the Dadaists. Even though we recognize the value of the innovations brought about by these men in our imbecilic age, we want nothing to do with them."

Along with the bombast was some truly original and prescient thinking. Take, for instance, his strange collaboration with Tinseltown legend Hedy Lamarr. It was Antheil who sat with Lamarr at her Hollywood Hills estate and sketched out on a napkin the invention – a method of controlling US Navy torpedoes by employing multiple radio frequencies – that would later be called spread spectrum. To prevent signal jamming by the enemy, frequencies would be switched rapidly according to a predetermined code punched into a paper tape remarkably similar to a player-piano roll. Antheil and Lamarr received a patent for the invention in 1941, though neither ever made a dime from it. In fact, it remained classified until 1985.

There was also his foresight about music. In his manifesto, Antheil predicted that all music would someday be played by programmed devices: "We shall see orchestral machines with a thousand new sounds, with thousands of new euphonies, as opposed to the present day's simple sounds of strings, brass, and woodwinds. It is only a short step until all [musical performance] can be perforated onto a roll of paper. Of course, we will find sentimental people who will object that there will then be no more of these wonderful imprecisions in performance. But, dear friends, these can be added to the paper roll. Do not object; you can have what you want, but let us go on."

... and the Machine

Antheil was not the only composer of his time to be fascinated by the player piano. Besides him and Stravinsky, such major composers as Paul Hindemith and Maurice Ravel wrote for the instrument. In an increasingly industrial age, the pianola was the ultimate expression of the machine in music.

In many households, the player piano was the home entertainment center. Owners could purchase rolls of classical works or popular songs, listen to them, and even sing along, karaoke style, in their living rooms.

The coding for a traditional player piano is contained on a paper roll, which moves like an open-reel tape recorder from one spool to another as the piece plays. Holes punched on the roll correspond to notes. A complex pneumatic-mechanical system controls the piano's keys and hammers. Suction to power the pneumatics is provided

by a human being, a pianolist, who pumps on a pair of large pedals. The harder the pumping, the louder the music. A hole in the paper passes over a sensing mechanism, which creates a vacuum that yanks at the appropriate hammer, which then hits a string. The speed of the roll – and thus the tempo of the music – is set by the pianolist, using a lever at the front of the keyboard.

For many years, rolls for player pianos were cut by hand using a paper punch and a ruler. There was no way to associate true dynamic levels – loud or soft or somewhere in between – with individual notes, but manufacturers came up with their own schemes to vary the musical volume on a more general scale. Pianolas made by Pleyel, the French manufacturer with whom Antheil worked closely, used two pedals, one for the bass end of the piano and one for the treble. When pressed, the pedals shifted the hammers toward the strings so they would strike more softly. These pedal actions were marked on the piano roll with special punches. Other punches – two small holes close together known as "snakebites" – served as accents, negating the action of the pedals and allowing individual notes to pop out of the softer background.

Later instruments, known as reproducing pianos, were able to record a human pianist in real time. George Gershwin and Sergei Rachmaninoff were among some of the great pianists of the era who left a recorded legacy in the form of reproducing-piano rolls.

The popularity of the player piano began to wane in the 1930s and '40s with the advent of the radio and the phonograph. These new electronic entertainment devices were cheaper, took up less space, were far easier to maintain, and offered an almost unlimited repertoire. But the anachronistic player pianos are still being made today. Aside from Yamaha, two companies – PianoDisc, in Sacramento, California, and QRS, in Naples, Florida – sell the systems. (See "Ebony & Circuitry," page 222.)

These modern instruments use electrically driven solenoids to operate the hammers and employ onboard computers with disk drives instead of paper rolls. They also speak MIDI, which means they can be played from an outside source of data – a computer, for instance.

The Spectacle

Antheil didn't immediately realize that he was attempting the impossible with the *Ballet mécanique*. Pleyel, whose instruments were known as Pleyelas, had designed and even patented a method of synchronizing multiple player pianos using lots of electric motors and mazes of pneumatic tubes; one pianola had a control roll that played all the others. This was the system Antheil had planned to employ. But it was not to be. According to Denis Hall of the London-based Pianola Institute, the composer's ambition proved far too complicated for the time. "Can you imagine 88 pneumatic tubes times 16 pianolas?" he says. "It would be a forest."

Yet even in its reduced form – a single pianola standing in for the 16 instruments – *Ballet mécanique*'s was a sensation at its 1926 premiere at the Champs Elysées Théâtre. Shakespeare & Company's Sylvia Beach proclaimed it one of the most significant artistic events of the 1920s. Bravig Imbs, the American writer and self-described sycophant of Antheil's who allegedly planted the lion-attack news stories, reported that "people began to call each other names and to forget that there was any music going on at all. Ezra Pound took advantage [of a lull] to jump to his feet and yell, '*Vous êtes tous des imbéciles!*' One fat, bald old gentleman who had been particularly disagreeable lashed out his umbrella, opened it, and pretended to be struggling against the imaginary gale of wind from the electric fans [substituting for propellers]. His gesture was immediately copied by many."

"When the *Ballet* was over," wrote Imbs, "George got an ovation that was greater than the catcalls, for everyone was willing to applaud a man who had at least accomplished something." Having caused the greatest riot at any musical event since the premiere 11 years earlier of Stravinsky's *Sacre du printemps* (as composer Aaron Copland put it, "outsacking the *Sacre*"), Antheil wrote, "From this moment on I knew that, for a time at least, I would be the new darling of Paris. Paris loves you for giving it a good fight, and an artistic scandal does not raise aristocratic lorgnettes."

Antheil's reputation followed him around Europe, and all his subsequent concerts were Events. In Budapest, the audience rebelled when it found out that *Ballet mécanique* was *not* going to be performed. By the time the piece reached Carnegie Hall, rewritten for one pianola and 10 conventional grands, it had been hyped to the hilt, with the story of the Paris premiere repeated and exaggerated. The promoter not-at-all-subtly hinted that there might well be an public uproar at Carnegie as well.

In New York, provocateurs hired to create disturbances at the back of the hall were ignored. Two huge murals – one of a cityscape and another of a dancing African-American couple (to evoke the spirit of Antheil's *A Jazz Symphony*, also premiering that evening) – provoked laughter. This time, the propellers/fans were pointed right at the audience, and when they cranked up, people had to clutch their programs and hats with both hands to keep them from blowing away. One audience member reportedly attached a white handkerchief to the end of his cane and waved it at the stage in mock surrender.

Staged off the Champs Elysées in 1926, *Ballet mécanique* caused a riotous audience to break out in shouts, catcalls, and ovations.

Even without his 16 Pleyelas, Antheil's machinery went out of control. Among other things, the siren player, who had had no chance to rehearse, didn't realize that his instrument needed to warm up before it would sound. When the cue came from the conductor, he started cranking furiously, but no sound emitted. After the piece ended, the siren, finally ready, sang out a solo.

Reviewers were almost unanimous in their ridicule of the concert and its composer. At least one made sneering reference to "trying to make a mountain out of an Antheil."

Antheil's reputation never really recovered from the New York debacle. While America jeered at the audacity of *Ballet mécanique*, many Parisians rejected his

next work, a piano concerto in a much more tonal neoclassical vein, as a betrayal of his revolutionary ethos.

In the '30s, when Antheil returned to the US for good, Mrs. Bok's support tapered off, and he found it impossible to make a living as a serious composer. He quickly went through several career changes, including stints as a feature writer for *Esquire* and as a syndicated lonely-hearts columnist. He eventually settled in Hollywood, where he had a successful, if unsung, career as a film and television composer, working with such luminaries as Stanley Kramer, Ben Hecht, and Cecil B. DeMille.

After Antheil's death in 1959, most of his older manuscripts sat in a closet. In 1978, his Hungarian-born widow, Böski, contacted San Francisco-based composer and musicologist Charles Amirkhanian and offered to give him the entire archive if he would help keep the composer's music alive and tend a royalty stream to provide for the couple's son, Peter. Amirkhanian agreed, and for nearly two decades he edited and published dozens of Antheil's works for piano, violin, orchestra, and various chamber groups under the umbrella of the Antheil Press. In the early '90s, Amirkhanian sold the publishing rights to Schirmer and the manuscripts, along with the correspondence, articles, and other files that had been in Böski's closet, to the New York Public Library of the Performing Arts.

Getting Down to Business

To me, re-creating the *Ballet mécanique* felt like an opportunity to rewrite history, to reenact a duel – only this time the good guy would win. I would overcome the technical obstacles that had stymied Antheil, and I would find, in this age in which machines are revered more than ever, an audience that would appreciate the composition's precocious aesthetic. The piece had defied the technological forces assembled to perform it – and ultimately defeated the composer himself – but through me, Antheil was going to get another crack at it.

My first task was to take those 1,240 measures – some with several hundred notes in them – and about 600 time-signature changes and input them into a MIDI sequencing program. In performance, the sequencer would then control all the player pianos through a

Machine Will Grind Out Opera of Future

Steel Riveters and Airplane Propellers to Be Used in "Ballet Mecanique."

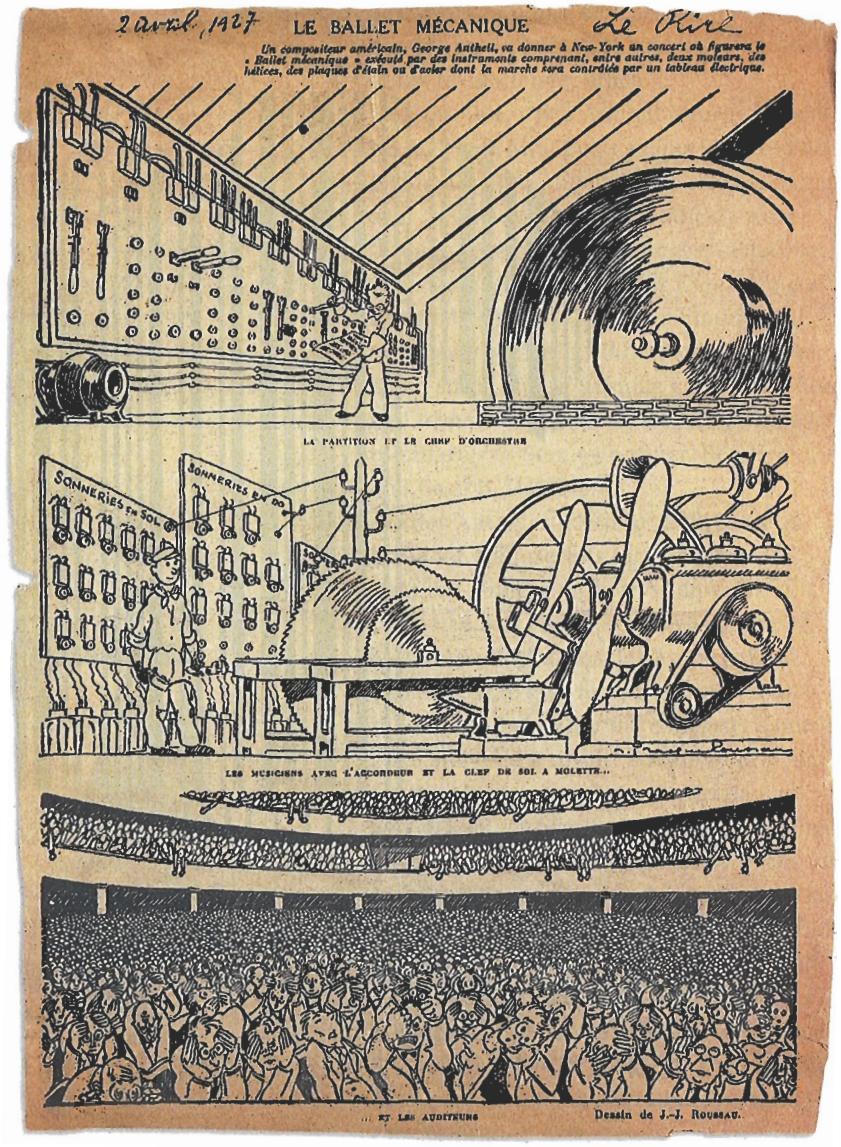
By EDITH H. WALTON.

"PROFESSIONAL musicians may soon be deprived of their bread and butter. In the future, pianists and violinists will be replaced wholly by machines."

This is the prophecy of George Antheil, youthful American composer, whose sensational "Ballet Mecanique" is expected to rock Carnegie Hall on April 10 by its use of mechanical pianos, steel riveters and airplane propellers.

In scoring music for mechanical instruments, Antheil feels that he is taking a step into the future. Why not use the mechanical devices we have on hand is his plea and turn music over entirely to the composers. He says:

"In the future, music will be scored by sound waves, not by



2 avril 1927 LE BALLET MÉCANIQUE Le Rire

Un compositeur américain, George Antheil, va donner à New-York un concert où figurera le « Ballet mécanique » exécuté par des instruments comprenant, entre autres, deux moteurs, des hélices, des plaques d'étain ou d'acier dont la marche sera contrôlée par un tableau électrique.

LA PARTITION ET LE CHEF D'ORCHESTRE

SONNERIES EN SOL

SONNERIES EN DO

LES MUSICIENS AVEC L'ACCORDEUR ET LA CLEF DE SOL A MOLETTE...

... ET LES AUDITEURS

Dessin de J.-J. Rousseau.

The young musico-mechanico sensation splashed into the pages of *The New York Times* (above left) and the French newspaper *Le Rive*.

MIDI interface and cables hooking the interface to the pianos' MIDI inputs. Sequencers allow for multiple tracks, so each group of pianos could play its own part. Driven by the same computer, they would play in perfect sync.

The sheer number of notes Antheil managed to put on paper was astounding. While I was able to use my software's "step time" function – which lets me play in chords of any size as fast or slow as I want and allows me to specify timings independently of how I actually play them – and while I had no need to even lift a pencil, it still took me weeks to program all the music. The copy/paste functions of my software were a mixed blessing. Often, they let me enter huge globs of repeated music instantly. But just as often, Antheil pulled a fast one, and I would find two bars that were almost identical, but not quite: One bar might be 4/4 and the next 7/8, and then the pattern would repeat, but the half-beat's worth of material that was chopped out of the second bar wasn't the same as the material taken from the fourth. So after I copied and pasted, I would have to go in and ferret out the differences and then tweak the rogue measure by hand.

Meanwhile, I was interpreting Antheil's intentions, translating them from the language of the pianola to that of modern electronics. Consider, for instance, tremolos – two notes or chords that alternate as quickly as possible. In conventional music, whether for piano or any other instrument, tremolos are imprecise; they are by definition so fast that they become nonrhythmic. My first guess was that Antheil would have expected some timing inconsistencies in his pianolas, so I "smeared" each of his tremolos: Whenever they appeared in two of the pianola parts simultaneously, I made one pianola play eight repetitions to the beat while the other instrument played nine. But a consultation with British pianola expert Rex Lawson, who had handled the pianola part in *Ballet mécanique*'s 1989 performance, set me straight: The pianolas of Antheil's day were quite precise. If Antheil wrote eight repetitions, he meant eight. I went back and corrected them all.

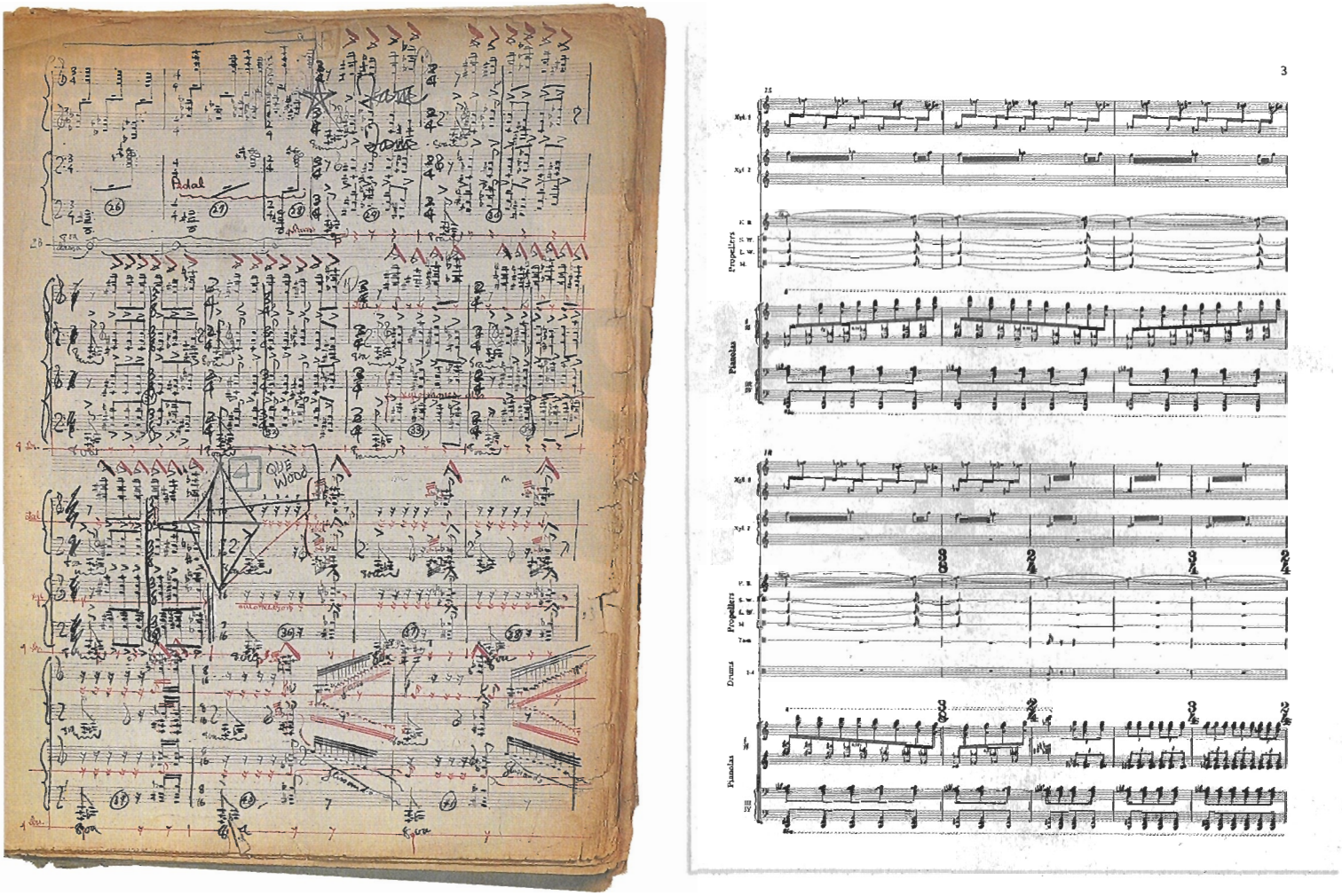
I also encountered contradictions in the score – inconsistencies in the way chords were laid out or spelled, for instance, and rhythmic values that didn't add up. I decided

I needed to see the original manuscript. I paid a visit to the Antheil archives at the New York Public Library of the Performing Arts. There, in addition to the manuscript, I found several boxes of articles about Antheil and a first draft of his autobiography. I also found a preoriginal manuscript of *Ballet mécanique* for four pianolas alone, without the percussion. It was in color, and beautiful: Purple and red and blue and green notations flew across the pages, marking cuts Antheil had included at the last minute, as well as sustain pedals, accents, and rehearsal numbers. Here and there among the pianola parts, in faint red pencil, were cues for the percussion instruments that would be included in the next version of the piece.

This new manuscript provided clues. Its markings for the sustain pedals, for instance, had been missing from the big manuscript and from Schirmer's typeset version of the score, but I knew that the pianolas of Antheil's day could execute those commands. Here they were, on the colorful edition. I added them to my sequences.

But in other ways the colored, pianolas-only manuscript contributed to my confusion. In Antheil's handwritten introduction to it were explanations of how the treble and bass pedals worked to control dynamics. However, no such pedal markings existed anywhere in the music itself. In fact, there were no dynamic markings in the pianola parts on any of the scores – no soft or loud, crescendo or decrescendo – with the exception of a few accent marks sprinkled inconsistently among the notes. According to Antheil's widow – via Charles Amirkhanian, the composer who inherited Antheil's manuscripts – the dynamic levels of the piece were to be determined solely by the entrances and exits of the different pianolas. Antheil himself wrote in his *De Stijl* article, "My *Ballet mécanique* has absolutely no forte or piano moments. It is MERELY PLAYED LOUD ENOUGH TO BE HEARD." The treble bass notes were a perplexing discovery – I chose to ignore them.

As I worked with the score on this microsurgical level, I also faced the issue of tempo. Someone performing the piece could play it at any tempo they liked – either now using the MIDI sequences or back then using the pianolas' levers. What did Antheil have in



Antheil's original 1924 manuscript (left) and the 1999 score of *Ballet mécanique*.

mind? The printed score prepared by Schirmer's freelance editor, George McGuire, had designated the tempo as 76 beats per minute based on his interpretation of the manuscript. But that didn't feel right to me at all. For one thing, at that tempo, the piece would have been about 40 minutes long, and in all the descriptions I'd read, by Antheil and others, none said it lasted longer than about 20 minutes.

The color score included the notation "Pianola=85," which, pianolist Rex Lawson explained to me, meant that the rolls were to be fed at 8.5 feet per minute. According to his measurements of the distance between the notes on the rolls, this figure translated to 152 bpm. That tempo agreed with some of Antheil's later notes about the piece, so McGuire must have been wrong.

Or was he? At 152 bpm, the last 150 or so bars of the piece are impossibly fast, certainly for any human percussionists to follow, and possibly for any player piano to execute accurately. Lawson theorizes that Antheil got lazy at this point and merely repeated several big chunks of earlier material, playing it backward and twice as fast. McGuire, when he prepared the score, decided that if this section were to be played at a reasonable tempo, the entire thing needed to be slowed down. "Antheil," he says, "was always getting things wrong by a factor of two."

> The conductor would keep the human players together as they all hung on for dear life.

My conclusion? I would recommend that the tempo be taken as fast as possible, but leave it to each performing group to finally decide. Meanwhile, I would assume that conductors would lead *Ballet mécanique* at between 120 and 140 bpm.

Collecting the Samples

Antheil's tribute to the transcendence of machines didn't stop with simply lining up an impossible number of player pianos on one stage – as formidable a racket as that would have made. On top of that, he wished to add the real soundmakers of the industrial age – airplane propellers, alarm bells, and a siren – and turn them into musical instruments. If I hoped to find those industrial sounds, I'd have to venture beyond the conservatory.

First, my friend Tim Tully, a fellow writer and MIDI freak, spent one morning at an airfield in San Carlos, California, with a portable DAT deck, recording a range of prop

planes starting, idling, taking off, flying by.

Next, the electric bells. Antheil's score called for seven of them, all at different pitches. Sampling them would be easy – I even had in my closet an old alarm bell from Radio Shack I could have used for that, changing the pitch and tone digitally to make it sound like different bells. But it struck me that the piece would be far more fun with the real McCoy. A search at electrical-supply houses turned up nothing – all they had in stock were high tech buzzers and digital chimes, not the old-fashioned end-of-the-factory-shift bells that Antheil had in mind. So I turned to the Web, and there, on the site for Edwards Instruments in Connecticut, was everything I needed. Within a month, for about $125, I had my collection, and a device for translating MIDI commands made by MIDISolutions of Vancouver, Canada, allowed me to turn the bells on and off automatically.

Giddy with my success at finding bells online, I next searched for sirens. I needed a mechanical siren, not one of those electronic whoop-whoop things that don't scare anybody anymore. Preferably, my siren would be driven by an electric motor and would start and stop quickly – no Carnegie Hall-style debacle for me. I found one – the Web site for Federal Signal of Illinois advertised the perfect siren – but because of its $2,700 price tag, I had to pass.

Instead, I turned to the fellow who cleans our chimney, a firefighter in a nearby town. Could he let me know the next time they were testing the fire-alarm sirens there so I could record one? "Oh, we don't test them," he told me. "We just turn 'em on when we go out. But come on down anytime, we'll blow one of 'em for you."

The sample I made should clear some people out of the music hall.

Who Leads?

With this newly reconstituted *Ballet mécanique* taking shape before me, I faced an enormously difficult question: Should the human players follow the machines, or could a flesh-and-blood conductor tell the machines what to do?

An expert pianolist, using the mechanical tempo lever, can adjust the speed of a performance with a great deal of accuracy

and finesse. The instrument can be made to respond to a conductor's subtle changes of tempo – to actually be part of an ensemble. When the single-pianola version of Antheil's piece has been performed in recent years, this is how it has been done: The conductor conducts; the pianolist follows.

And perhaps the composer expected it to work that way with his 16-pianola version as well. Since the multiple pianolas in Pleyel's patent all were controlled by one master instrument, only one pianolist following the conductor would have been necessary. Yet, that Antheil's score indicated no tempo variations at all seemed too significant. Perhaps he expected that the pianolas would run by themselves. With the 16 mechanical instruments setting the pace, the role of the conductor would be primarily to keep the human players together as they all hung on for dear life.

MIDI sequencers can respond live to tempo changes – many have a tap-tempo feature that lets you hit a rhythm on a MIDI or computer key, and the sequence will speed up or slow down in response. Other experimental devices – for example, the Digital Baton, designed by MIT Media Lab graduate student Teresa Marrin Nakra – translate various human gestures into MIDI information, which can be used to control the tempo of a sequencer. A clever software program called In Concert, created by Boston-based educator and consultant George Litterst, provides interactive MIDI accompaniments to live musicians. It can listen to what a musician is playing and adjust the tempo accordingly, so that music students can practice and even perform pieces of the standard repertoire without having to enlist an accompanist.

Could our premiere of *Ballet mécanique* use one of these devices, allowing the conductor to run the show?

I sought counsel from a former teacher of mine, Raymond DesRoches, director of the New Jersey Percussion Ensemble, which had recently put out a recording of the 1953 version of *Ballet mécanique*. "The piece has to groove," he said. "It has to kick butt. You have to have a conductor pushing and pulling the tempos. Otherwise, it doesn't work."

But DesRoches was familiar only with the 1953 version, which has tempo changes

Ebony & Circuitry

Yamaha

Yamaha offers 37 models of Disklavier digital/acoustic pianos, including the Disklavier Grand Mark II XG, which can accompany any piano performance with an orchestra of more than 700 instruments.
Disklavier: $10,000-52,000. Yamaha: +1 (714) 522 9011, *www.yamaha.com*.

PianoDisc

Turn any acoustic piano into a digital player piano with PianoDisc's PDS-128 Plus MIDI retrofit system. If you don't already have an acoustic piano, the system can be factory installed in a variety of new uprights or baby grands and delivered to your door.
PianoDisc PDS-128: $5,000 for retrofit system, $7,000-28,000 for equipped piano. PianoDisc: (800) 566 3472, *www.pianodisc.com*.

QRS

Like the PianoDisc, the Pianomation MIDI player-piano system can be retrofitted into the acoustic piano of your choice or installed in any of 22 models of Story & Clark pianos. QRS also makes the Playola, a portable version of the Pianomation system that fits onto any piano keyboard.
Pianomation: $5,000 for retrofit system or Playola with case, $7,000-28,000 for equipped piano. QRS: +1 (941) 597 5888, *www.qrsmusic.com*.

Player Piano and Mechanical Music Exchange

Antiques aficionados from Dover, New Jersey, to Manchester, England, sell everything on the eBay of mechanical music, from dance organs with 376 pipes to a light walnut quarter-lodeon loaded with a pair of snare drums, a triangle, a cymbal, a wood block, a xylophone, and a tambourine.
Assorted instruments: negotiable. Player Piano and Mechanical Music Exchange: *mmd.foxtail.com/exchange*.

written into the score and doesn't use any mechanical instruments. I thanked him and thought some more, and I realized that the tools that exist for getting machines to follow people are designed for far more conventional scores. When you're tapping a tempo into a MIDI sequencer, you're doing it one beat at a time, but Antheil's score calls for all sorts of irregular meters, like 7/8 (three and one-half beats in a bar), 5/16 (one and one-fourth beats), and even 5/32 (five-eighths of a beat). How the heck do you get a machine to understand that? And what happens if the tapper makes a mistake?

The decision was pragmatic, but one, perhaps, that Antheil would have applauded. The machines would have to be in control. Along with the pianola and sampler parts, I would include in the MIDI sequence a click track – a MIDI track consisting of short notes on all of the beats, which would be fed to a drum machine. A kick-drum sound would be used on all the downbeats, and a sidestick sound on all the other beats. This track would be fed to an earphone worn by the conductor, which would allow him to follow along – especially during the times when the pianolas weren't playing – and keep the rest of the ensemble together.

As I thought of this, I was struck by the fantasy of feeding the click track to all of the players, not just the conductor. The pianists and percussionists, wired directly to the main computer, would hear the same beat that was controlling the phalanx of pianolas. The group could perform with no conductor at all! No doubt, the thought of 16 player pianos, two human pianists, and seven human percussionists all crashing down on the opening chord in perfect precision without any visual cues – no podium, no leader, no baton – would have brought tears of joy to Antheil.

But that idea is going to have to wait for someone more courageous than me. I am not about to send our poor percussionists on such a wild adventure without a guide.

Putting It All Together

With four Kurzweil MicroPiano MIDI modules handling the pianola parts, a Kurzweil sampler providing the sound effects, and various synthesizers delivering the percussion and piano parts, Antheil's original *Ballet mécanique* is coming to crashing,

roaring, screeching life in my home studio – sounding especially fierce once I rewired my setup in surround sound. But it's nothing compared with what's next.

On November 18, at the University of Massachusetts at Lowell – where I am on the faculty – the world will hear Antheil's piece played by 16 Yamaha Disklaviers (4 grands and 12 uprights), two live pianists, and the university's percussion ensemble conducted by the head of the school's percussion department, Jeff Fischer. Fischer, who is also one of the Boston area's busiest freelance percussionists, has played the 1953 version of the piece, so he knows some of what he is up against. But being onstage conducting this ferociously complicated version with 16 screaming computer-driven pianos will be a new challenge.

UMass professor Juanita Tsu and Tufts University professor John McDonald will hold down the live piano parts. In initial tests of my sequences on a Disklavier, in the basement studio of consultant George Litterst, who works closely with Yamaha, I quickly realized that 16 of the things would mercilessly drown out the two human players. So Tsu and McDonald will play digital pianos, which can be amplified to match the volume of the pianolas. Another irony Antheil would have relished: Machines will control the acoustic instruments, while the human beings will perform on machines.

Showtime

Upcoming performances of *Ballet mécanique*.

University of Massachusetts at Lowell
Durgin Concert Hall
November 18, 1999, 8 p.m.
Admission free, but advanced reservations are strongly advised. Or catch it on the Web at *www.wgbh.org/radio*.
+1 (978) 934 4444, *www.antheil.org*

Carnegie Hall, New York City
April 2, 2000, 3 p.m.
Admission $16-46; on sale December 6.
+1 (212) 247 7800, *www.carnegiehall.com*

San Francisco Symphony's American Mavericks Festival
June 2000
Venue and on-sale information to be announced in December.
+1 (415) 864 6000, ***www.sfsymphony.org***.

To fill out the premiere's program, the concert will include other works for multiple Disklaviers. After all, how many times in the history of musical performance will there be 16 player pianos in one place? Richard Grayson of Occidental College in Los Angeles, who has written a large body of work for player pianos, will contribute two premieres for our concert. Conlon Nancarrow, an expatriate American who lived in Mexico until his death in 1997, was the greatest composer of player-piano works in the latter part of the century, and Juergen Hocker, of the Society for Self-playing Musical Instruments, worked with him. Hocker has MIDI files for many of Nancarrow's works, including several studies for two player pianos never performed in this country. That makes two more premieres.

And I'll contribute one more. Before the age of the phonograph, at the turn of the last century, four-hand piano transcriptions of symphonic works by Mozart, Beethoven, and other composers were, like pianolas, a popular form of home entertainment. I'm a fan of the genre. As an orchestral player, I always felt frustrated that I could contribute only a single instrumental line to the ensemble, but in these arrangements you can have half an orchestra under your fingertips. So I have given myself the task of arranging the last movement of one of my favorite symphonies, Mendelssohn's Fourth (the "Italian"), for 4 player pianos – or perhaps 16. And, meanwhile, the percussion ensemble will play a program of its own – including, at my suggestion, John Cage and Lou Harrison's *Double Music*, a piece I first heard with *Ballet mécanique* on the very same tape that Stan Hecht sent me after music camp 30 years ago.

Antheil would have relished the irony: Machines will control the acoustic instruments, while human beings will perform on machines.

But there's still more to this incarnation of Antheil's opus. To commemorate the centennial of the composer's birth, Charles Amirkhanian's organization Other Minds will include the piece in a concert in San Francisco in June 2000. Last May, on a visit to Boston from his Bay Area home, Amirkhanian came to my studio and I played him my all-MIDI version of the piece. His eyes popped. "What precision!" he gasped, and I couldn't tell whether he was deliberately echoing the words Satie shouted when he first heard Antheil's mechanical music or whether it was a spontaneous exclamation.

In New York, the American Composers' Orchestra has also scheduled a performance of the new Schirmer version of the *Ballet mécanique* for April 2 at Carnegie Hall. So Antheil is coming back to New York, a fitting close to a century whose aesthetic he surely, if indirectly, helped to define. This time, one assumes, there will be no fights, no catcalls, and no flying hats – just a curious audience flung backward and forward in time and a furious outpouring of sound.

When this date was set, the orchestra's operations manager contacted me to discuss details. As it happened, he had some concern about *Ballet mécanique*'s technical requirements. He was worried about that same old thorny problem: Was it necessary for the sound effects to be played by the computer, or could they be played by musicians? The Musicians' Union, it seems, requires that any parts intended to be played by human beings remain so; they cannot be played by automated devices.

Sure, I told him. The propeller, bell, and siren parts could be played by musicians at a keyboard.

Here was one of the most forward-thinking musical ensembles in the country making sure the machines knew their place. And so I smiled again: The bad boy's battle rages on. ■ ■ ■

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