

In 1950, the Columbia University Music Department requisitioned a tape recorder to use in teaching and for recording concerts. In 1951, the first tape recorder arrived, an Ampex 400, and Vladimir Ussachevsky, then a junior faculty member, was assigned a job that no one else wanted: the care of the tape recorder. This job was to have important consequences for Ussachevsky and the medium he developed. Electronic music was born.

Over the next ten years, Ussachevsky and his collaborators established the Columbia-Princeton Electronic Music Center, which Ussachevsky directed for twenty years. It was the first large electronic music center in the United States, thanks to the path-breaking support of the Rockefeller Foundation and encouragement from two of the country's leading universities. The Center became one of the best-known and most prolific sources of electronic music in the world. All of the music on this historic reissue is the result of the pioneering work of the Center and its composers.

Vladimir Ussachevsky, (died 1990) who was of Russian descent, was born in 1911 in Manchuria, Inner Mongolia. He was a hereditary Mongolian prince and, as a young person, became a gifted pianist in the Romantic repertoire. After the Russian Revolution, his father was arrested and later executed in a Siberian prison for his outspoken criticism of the new Russian government. Vladimir fled from Mongolia to join the rest of his family in California. There, he graduated in music from Pomona College where he studied harmony, counterpoint, music history, and composition. After receiving his B.A. in 1935, Ussachevsky went on to get an M.M. from the Eastman School of Music in 1936 and a Ph.D. in composition from the Eastman School in 1939. His early works were known for their rich choral and lush instrumental scoring in a Neo-Romantic style. In 1947, after serving in the U.S. Army Intelligence division in World War II, he joined the Columbia University Music Department as an instructor.

And so, in 1951, Ussachevsky took on the job of teaching with the department's newly purchased tape recorder. Ussachevsky began to experiment with changing the speed of piano sounds that he had recorded with the tape recorder's speed-change switch. He then met Peter Mauzey, an undergraduate engineering student at Columbia who was in charge of the WKCR (the University radio station) Magnecord tape recorder and built the station's first mixer. Mauzey used this mixer and tape recorder to demonstrate tape feedback to Ussachevsky, using signals from a live microphone, phonograph recordings, and radio sound effects as sound sources.

Ussachevsky was intrigued and asked Mauzey to build him such a device, which the young student subsequently did. With Mauzey's feedback box and the departmental tape recorder on top of his piano, and a Western Electric microphone on a floor-stand nearby, Ussachevsky improvised on the piano, listening to the recorded effect on earphones. He would raise or lower the feedback controls and the tape recorder's speed to see what the musical effects would be. The tape, of course, recorded these feedback experiments and he would keep what pleased him.

Such were the techniques and equipment used by Ussachevsky to create the first electronic music compositions to be played in the United States. Ussachevsky's compositions, *Transposition*, *Reverberation*, *Experiment*, *Composition*, and *Underwater Valse*, created in 1951–2, were premiered at the Composers' Forum concert on May 5, 1952, in New York City. This was the first concert of electronic music in America. Virgil Thomson wrote that the pieces were "utterly charming and delighted the audience to no end."

Otto Luening (died New York, 1996) was born in 1900 in Milwaukee, Wisconsin. From 1915 to 1917, he studied flute, piano, harmony, and orchestration at the Royal Academy of Music in Munich, Germany. At the outbreak of the First World War, he left Munich and studied composition in Zurich with Ferruccio Busoni. Back in America, Luening taught at the University of Arizona and Bennington College before joining the Columbia University Music Department as full professor and chairman of the Barnard College Music Department. Also known as a flutist and an opera conductor, Luening was influential in American funding organizations such as the Rockefeller Foundation, the Guggenheim Foundation, and the American Academy and Institute of Arts and Letters. Luening is the author of an anecdotal autobiographical account of his life in music, *The Odyssey of an American Composer*.

In the summer of 1952, Luening invited Ussachevsky to bring his equipment to the Bennington College Composers Conference in Vermont. Ussachevsky drove up with his equipment and set it up as in his previous experiments: with Mauzey's feedback box and the tape recorder on top of the piano with the earphones ready. This time, however, he set up the microphone so that it would pick up not only his piano playing, but also Luening's improvisations on flute. Ussachevsky put on the earphones to listen to the electronic effects that were actually going onto the tape. They both

began to improvise on piano and flute while Ussachevsky changed the amount of feedback and the speed of the tape recorder by manipulating dials and switches for musical effect. Through such experiments, these tape manipulation techniques were developed and led to an expansion of the aural language of the piano and flute beyond their idiomatic possibilities.

Still later in that summer of 1952, Ussachevsky transported the equipment to Henry Cowell's house in Woodstock, New York, where Ussachevsky worked on his piece *Sonic Contours*, and Luening on his tape pieces *Low Speed*, *Invention in Twelve Notes*, and *Fantasy in Space*. On October 28, 1952, Leopold Stokowski presented these Ussachevsky and Luening compositions at a concert at the Museum of Modern Art. The first four pieces on this disc are presented in the same order in which they were performed on that historic concert of electronic music.

Often present at the experimentation sessions with Ussachevsky and Luening was the engineer Peter Mauzey. His task was adjusting the spatial relationship between Luening and the microphone. Mauzey also built a prototype mixer. In 1953, Ussachevsky and Luening got a small grant to expand their equipment with filters, sine and square wave oscillators, and another Ampex tape recorder. With Mauzey's small mixer and this additional equipment, Ussachevsky and Luening created the first works for tape and live musicians: *Rhapsodic Variations* for tape recorder and orchestra (1953–54) and *A Poem in Cycles and Bells* (1954), also for orchestra and tape.

At this point, Ussachevsky became aware of similar musical experiments in Europe, and flew to Paris in 1953 to introduce his and Luening's work on Paris Radio. He also went to Cologne to introduce it to Karlheinz Stockhausen and Herbert Eimert.

Until 1955, the studio had resided primarily in Ussachevsky's living room. Then, he and Luening were given a small studio on the Columbia campus in an old building called The Gate House, which had once been the entry point for the Bloomingdale Asylum for the Insane. In these gothic surroundings, Ussachevsky created such works as *Piece for Tape Recorder* (1956) and, in collaboration with Luening, *King Lear* (1956).

In 1957, a permanent studio was built on campus on the ground floor of the McMillan Theatre. This studio was not built for teaching, and was too small to accommodate other composers. Finally, in 1959, with funding from the Rockefeller Foundation, the Columbia-Princeton Electronic Music Center was founded by Ussachevsky and Luening of Columbia, and Milton Babbitt and Roger Sessions of Princeton. Ussachevsky was designated chairman and Peter Mauzey was appointed director of engineering. As chairman, Ussachevsky designed the teaching curriculum and studio facilities and administered the organization until his retirement in 1980.

Over the twenty years of his directorship of the Electronic Music Center, Ussachevsky shaped the future of electronic music in the United States. Through his gracious, energetic leadership and his technological and aesthetic expertise, electronic music centers began springing up all over the country. Ussachevsky personally trained many of the most important figures in electronic music today. He invited hundreds of composers from every continent to come and create music at the Center. He also contributed to the design of important technological developments such as the Moog and Buchla synthesizers. After a long, distinguished composing and teaching career, Ussachevsky died in 1990 in New York City.

The guest composers and Columbia-associated composers who have produced pieces at the Center include Bülent Arel, Luciano Berio, Mario Davidovsky, Jacob Druckman, Arthur Kreiger, Daria Semegen, Pril Smiley, and Edgard Varèse. Ussachevsky's own students at the Center included Jon Appleton, Wendy Carlos, Charles Dodge, Robert Moog, Alice Shields, Harvey Sollberger, and Charles Wuorinen. Of the seven composers most closely associated with the Center from its early years, six are present on this disc. (The seventh is Milton Babbitt, whose seminal electronic work *Vision and Prayer* is available on CRI CD 521).

Bülent Arel (born 1919, Istanbul, Turkey, died 1990, Stony Brook, New York) was the first staff member to join the new Center. A leading advocate of Turkish art and music, Arel graduated from the Ankara Conservatory. He was a conductor and music director of major orchestras and choruses in Turkey and studied sound engineering with engineers from the Paris Radio. Arel eventually became the first music director of Radio Ankara. In 1957, he was considered a pioneer in electronic music after composing *Music for String Quartet and Oscillator*. In 1959, Arel was invited by the Rockefeller Foundation to join the staff of the Columbia-Princeton Electronic Music Center as a research associate to Ussachevsky.

Starting in 1963, he taught composition and electronic music at Yale University and designed and installed their first electronic music studio. For seven years, he also taught composition and electronic music at Columbia. From 1971 on, he was a professor of music and founding director of the Electronic Music Studios at the State University of New York at Stony Brook.

Joining the staff shortly after Arel was **Mario Davidovsky** (born 1934, Buenos Aires, Argentina). Davidovsky won the Pulitzer Prize for Music in 1971 for his *Synchronisms No. 6* for piano and tape. This is one of a series of pieces for electronic tape and live instrumentalists for which he is well known. After Ussachevsky's retirement in 1980, Davidovsky became director of the Center, henceforth called the Electronic Music Center of Columbia University. As a professor of music at Columbia, Davidovsky continues to teach electronic music and composition.

Pril Smiley (born 1943, Mohonk Lake, New York) began her apprenticeship with Ussachevsky and her long association with the Center in 1963, when, on New Year's Day, she first met Ussachevsky in the middle of a blizzard. Smiley assisted Ussachevsky on several of his classic works, including the score to the film *No Exit* (available on New World Records 80389-2). From 1966 to 1982, Smiley composed more than forty electronic music works for major theater, film, and dance productions. Nine were composed for stage productions at the Vivian Beaumont Theater at Lincoln Center. Smiley was associate director of the Center until 1995.

Alice Shields (born 1943, New York City) was the next to arrive on the teaching staff of the Center at Columbia, from where she received her undergraduate and graduate degrees in composition. She had been Ussachevsky's teaching assistant in sixteenth-century counterpoint, and, in 1965, started working as Ussachevsky's assistant at the Electronic Music Center. While working with Ussachevsky on his film, theatrical, and electronic opera pieces, she performed as an opera singer at Lincoln Center and wrote electronic music-theater pieces and operas of her own. Shields continues to perform in and record her own operas. In her electronic compositions, she primarily uses concrete or sampled sounds triggered by Midi, created on the SUN computer, or in the analog studio. From 1965 to 1980, Shields and Smiley carried the main burden of assisting the actual studio work of composers who were enrolled in the two graduate courses in electronic music composition. Shields was an associate director of the Center from 1978 to 1982.

Vladimir Ussachevsky

Sonic Contours (1952)

This piece extends Ussachevsky's earlier explorations of feedback and speed variation. Here he uses careful splicing and mixing to achieve striking manipulations of piano sounds. For example, some chords are cut off instantaneously in a manner that a live pianist could never perform. Ussachevsky spoke of having two primary objectives in this piece: to make the sensation of each line moving at its own rate clearly perceptible and to achieve an asymmetry of canonic structures that would avoid interfering with the clarity of the other lines.

Ussachevsky also incorporated some "found" sounds into *Sonic Contours*. One portion includes a sped-up conversation between Ussachevsky, his wife Betty, and Peter Mauzey as they listen to themselves speak with feedback. (In the part of this conversation that I could detect by filtering, I heard Vladimir say "Why?" Betty answers "No." He says "Why?" She: "Because." He says, "Yes.") *Sonic Contours* consists of four sections of delightful, joyous music.

Otto Luening

Low Speed (1952)

In the creation process of *Low Speed*, Luening made sketches on which he based his flute improvisations. He transposed the first recording an octave lower and successive versions each a fifth higher than the initial recording. Feedback produced a kind of unearthly, ghostly counterpart of the live flute. A rather solemn mood is established.

Invention in Twelve Notes (1952)

This piece is in two parts: the first in a slow tempo, the second fast. Continuous canons mix with fed-back flute, which sustain a lyrical mood until we hear a cadence-like signal, rising from the flat sixth degree, to the flat seventh, to the tonic.

Fantasy in Space (1952)

This is a lovely, lyrical piece. Luening recorded himself playing the flute, and then, while listening on earphones, taped a second flute part over the first, and a third and fourth over that, resulting in the equivalent of a flute quartet. At the end, he included an original folk-like melody on the flute without manipulation. Again, there is a melodic cadence to the tonic at this point, as well as a *ritardando* signaling closure.

Otto Luening—Vladimir Ussachevsky

Incantation (1953)

This is a piece in three parts: a brief introduction, a vocal section, and a coda. The fed-back flute is in a relaxed, medium register and the piano is often sped up and played backwards. A mellow, gently rocking mood is established through the soft dynamic of the gently rising and falling pitch contours. Eventually, a muted male voice is heard in the strange, ascending progressions. The voice, moaning and speaking incomprehensibly, is played backwards. The sound materials also included an alto recorder, bell sonorities, and a plate.

Otto Luening

Moonflight (1968)

This piece, presented in four sections, might be considered an aria for the flute. After the flute's introduction in the first section, Luening uses ascending and descending arpeggios in the second section. One is carried gently onward and eventually an un-manipulated flute in the foreground "sings" a simple, but original, American "folk-tune." The ascending and descending arpeggios end this dreamy piece.

Vladimir Ussachevsky

Piece for Tape Recorder (1956)

Here, Ussachevsky intended to see if basing everything in a piece of music on a limited number of sound sources actually led to musical coherence. For sound sources, he recorded and transformed a single stroke on a gong, the sound of a jet plane, a single note on a kettledrum, a piano, an organ, four oscillator tones, and the noise from a tape recorder switch. After developing these materials, he set himself the challenge of assembling them together in a logical continuity.

Pril Smiley

Kolyosa (1970)

Kolyosa, says Smiley, is the Russian word for wheels revolving in space. Indeed, one can listen to this piece as if it were being played by non-human percussionists who can instantly move in all dimensions of space. Long and short sounds are juxtaposed and a tension is furthered by building one sequence of events at one tempo, while another is changing at a different tempo—a form of rhythmic contrapuntal differentiation.

Events are also contrasted in the spatial dimension. Smiley plays with three degrees of perceived distance from the listener: close, medium, and far. Tension is increased by the use of panning between the loudspeakers at moderate or fast rates.

The tones with long durations have pitches in a low register and tones with short sounds are high in pitch. During the piece, the tempo and dynamics increase from the low, long events. The sounds start rising in pitch with maximum tension reached in the middle of the pitch range. As the sounds continue to rise, they eventually become high in pitch and short in duration. After this climax, the rhythmic counterpoint disappears, and the tension diminishes to silence.

Bülent Arel

Stereo Electronic Music No. 2 (1970)

Commissioned by the Center for its Tenth Anniversary Celebration, this piece is based on two elements: a melodic event and percussive sounds that interrupt it. It is an example of Arel's and Ussachevsky's concept of "continuous evolution," which is the creation of form through an expansion of Beethovenian variation techniques beyond pitch and rhythm into

timbre and space. The melodic motif of an ascending minor second is the stabilizing center around which huge percussive sounds swirl. As in the Smiley piece, the spatial element is significant, but here, the prime contrast is between the pitched and the non-pitched elements. This contrast peaks about two-thirds of the way through the piece, where staccato percussive sounds climax in the foreground. What follows is one of the most eerie, chilling moments in electronic music as masses of ascending half-steps move slowly off into the distance.

Vladimir Ussachevsky

Computer Piece No. 1 (1968)

Two Sketches for a Computer Piece (1971)

These pieces were both put together in an analog electronic music studio using sound materials produced with digital computers at the Bell Telephone Laboratories.

Computer Piece No. 1 was composed from three types of materials: material initially generated on the GE 635 computer by composer-physicist Jean-Claude Risset, a succession of four-note clusters originally synthesized for Ussachevsky by F.R. Moore, and material from several “concrete” sources such as a gong, Alice Shields’s distorted speaking voice, and a frequently modulating passage of electronic origin. The composition could have been totally pre-programmed as it not for the fact that Ussachevsky transformed the timbres after the generation of the piece by using analog devices including the Bode frequency shifter and EMT reverberation. As such, it is an example of electronic music from computer-generated and computer-processed sound materials, modified and assembled according to “classical studio” analog techniques.

Two Sketches for a Computer Piece was markedly different in the method of producing sound materials. The GROOVE program, developed by Dr. Max Matthews and F.R. Moore at Bell Labs, was used to create, store, reproduce, and edit sounds. The computer was the DDP224. The GROOVE program made it possible to tune and play a succession of pitches in real time on a small keyboard connected to the computer. Digital-to-analog converters sent voltages into a set of saw-tooth wave generators and a voltage-controlled filter. A distinctly different method of computer-controlled random production of unusually tuned pitches, random amplitudes, and random rhythmic succession was used to obtain other sounds. An occasional sequence of softer sounds in the piece comes from a special resonant circuit designed by Dr. Matthews. Only a moderate amount of timbre modification was employed at certain points, but the piece is largely formed by real-time sound production, which was a great advantage of using the GROOVE system.

Mario Davidovsky

Synchronisms No. 5 (1969) for percussion ensemble and electronic sounds

The electronic sounds in this piece enter about three minutes after the beginning and run to the end of the piece. The electronic sounds often enhance the sounds of the live percussion instruments by affecting the perception of the attack or the decay. There are two organizing elements. One consists of a held note, which suddenly crescendos and then terminates in several *prestissimo* percussive sounds. The other element consists of a series of pitched tones of even durations with tremolo in a moderately slow tempo. In a slightly decorated form of monophony, Davidovsky connects these two elements to each other, constantly varying timbre and often varying tempo and dynamic. Within the variation of these two gestures, one’s attention is drawn to the rich variations of timbre, which are indeed *klangfarbenmelodie*.

An interesting technique implemented in this work of Davidovsky’s is his use, at the very beginning and ending of the piece, of an opening ascent contrasted by ending with a descending cadence: He opens the piece on an ascending minor second, and ends with a cadence down a major second from the opening pitch. This signals the opening and subsequent closure of the piece and forms an interesting contrast to the non-traditional, non-developmental timbre variations they contain. Toward the end of the piece, Davidovsky also adds another technique from traditional development forms. There is a brief, exciting electronic crescendo with cymbals, which usually signal a developmental form, but here seems to provoke our awareness of two normally contradictory formal structures going on in the same piece.

Alice Shields

The Transformation of Ani (1970)

The words of this piece are from the Egyptian *Book of the Dead*. They are recited by the dying soul, who, by pronouncing the words of salvation and of identity with the savior Osiris, is carried into eternal life. All sounds except the last, obliterating one are made from my own voice speaking and singing the words of the text. Each letter of the English translation has been assigned a pitch, and each hieroglyph of the Egyptian was assigned a short phrase of more indefinite pitch. These two were then improvised upon to create the two non-text elements in the piece: singing-like phrases, and percussive phrases. These dramatic elements move behind and around the child-like, inexpressive speaking voice in explosive bursts. The text is in three verses, which follow the transmutation of the speaker.

—Alice Shields

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From Desto DC-6466:

*Sonic Contours**: ACA (BMI). *Lowspeed**, *Invention on Twelve Tones**, *Fantasy in Space**, *Incantation***, *Moonflight****: Highgate Press (E.C. Schirmer) (BMI).

*Created at the home of Henry Cowell, Woodstock, New York in 1952.

**Created at the home of Vladimir Ussachevsky, NYC, 1953.

***Created at the Columbia-Princeton Electronic Music Center, NYC, 1968.

From CRI SD 112:

Piece for Tape Recorder: ACA (BMI). Created at the Columbia University "Gate House," New York City, 1956.

From CRI SD 268:

Kolyosa: tape ACA (BMI); *Stereo Electronic Music Piece #2*: tape ACA (BMI); *Computer Piece #1*, *Two Sketches for a Computer Piece*: tape ACA (BMI); *Synchronisms No. 5*: E.B. Marks Music Corp. (BMI); *The Transformation of Ani*: (BMI). Produced by Carter Harman. All created and recorded at the Columbia-Princeton Electronic Music Center, NYC, 1968–70. Original recording was made possible by grants from the Alice M. Ditson Fund of Columbia University, the Martha Baird Rockefeller Fund for Music, the Fromm Music Foundation, the Contemporary Music Society, Mrs. Ernest Heller and Prof. Joseph Machlis.

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PIONEERS OF ELECTRONIC MUSIC

80644-2

Vladimir Ussachevsky (1911–1990)

1. *Sonic Contours* (1952) 7:19

Otto Luening (1900–1996)

2. *Low Speed* (1952) 3:41

3. *Invention in Twelve Notes* (1952) 3:42

4. *Fantasy in Space* (1952) 2:51

Otto Luening–Vladimir Ussachevsky

5. *Incantation* (1953) 2:32

Otto Luening

6. *Moonflight* (1968) 2:55

Vladimir Ussachevsky

7. *Piece for Tape Recorder* (1956) 5:38

Pril Smiley (b. 1943)

8. *Kolyosa* (1970) 6:37

Bülent Arel (1919–1990)

9. *Stereo Electronic Music No. 2* (1970) 14:18

Vladimir Ussachevsky

10. *Computer Piece No. 1* (1968) 3:42

Two Sketches for a Computer Piece (1971)

11. I. *Sketch 1* :56

12. II. *Sketch 2* 2:10

Mario Davidovsky (b. 1934)

13. *Synchronisms No. 5* (1969) 8:32

Ray Des Roches, Richard Fitz, Claire Heldrich, Donald Marcone, Howard Van Hyning, percussion; Harvey Sollberger, conductor

Alice Shields (b. 1943)

14. *The Transformation of Ani* (1970) 9:04

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