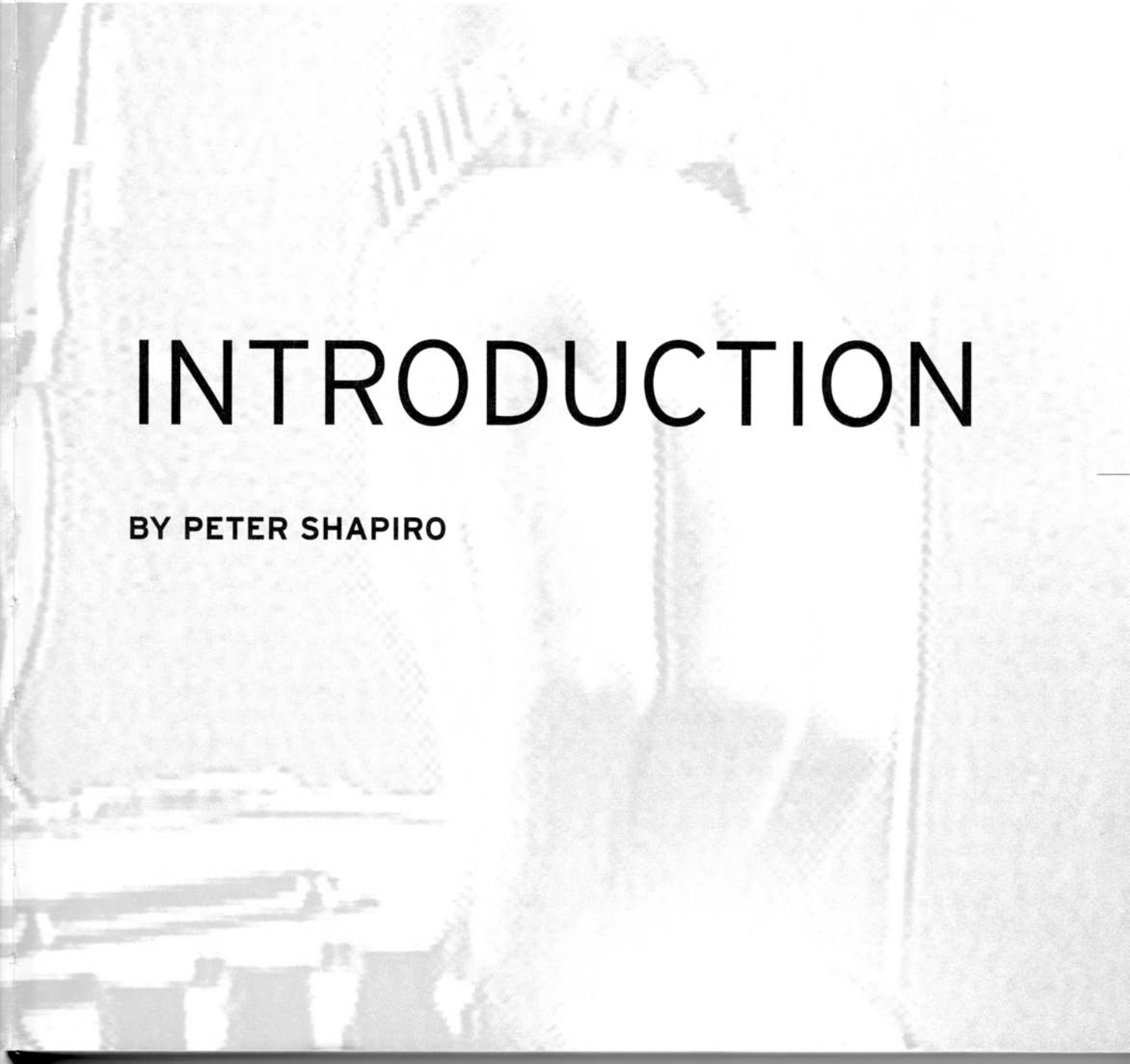

INTRODUCTION

BY PETER SHAPIRO

Although Thomas Alva Edison's phonograph was a handcranked mechanical device made of cogs and gears rather than an electronic box of wires and capacitors (electronic recording didn't begin until the mid-1920s), his first recording of "Mary Had a Little Lamb" in 1877 was the dawn of electronic music. The partially deaf Edison originally imagined the phonograph simply as a dictating machine: It was advertised as "the ideal amanuensis" when it was first put on the market. The user would speak into the machine's horn while a needle engraved the patterns of the soundwaves into grooves on a cylinder covered with tin foil that could then be played back. Though Edison failed to capitalize on the commercial potential of his invention, this strange new device that captured the human voice became the toast of the society set in parlors across Europe. Entranced by the sound of their own voices, the singers of the day (always the most egotistical of musicians) were captivated by the phonograph and instigated its use as a musical reproduction device.

The phonograph created popular music not only in the sense that it allowed music to become a mass commodity, but also in the sense that it created twentieth century music's fundamental paradigm. The history of music in the millennium's final hundred years has largely been the history of technology: The invention of the ordinary volume microphone that allowed Bing Crosby and Frank Sinatra to croon softly on top of a big band; the development of the 33 RPM record that allowed jazz musicians to expand their compositions beyond the four minutes allowed by 78 and 45 rpm discs; country session musician Grady Martin discovering the pleasures of an overdriven guitar amplifier on Marty Robbins' 1961 hit "Don't Worry"; and the junglists' discovery that the time-stretch function of the sampler was a musical effect in and of itself. The excitement generated by pop music has often been the thrill of exploration and the sense of possibility provided by technology's shock of the new.

However, the exploitation of technology is often disguised by claims of authenticity and naturalism – camouflage designed to preserve and protect the myth of artistic inspiration. From the Rolling Stones to James Brown, even the "earthiest" musicians have kept it real by surreptitiously dabbling in the black magic of the recording studio. The musicians featured in *Modulations*, on the other hand, make no bones about their relationship to machines; they don't masquerade in the cloak of roots or tradition. They recognize that the drum machine and sampler are no less organic than an acoustic guitar and a harmonica. Following the dictum of *musique concrète* pioneer Pierre Schaeffer – "It is by ruler and compass that the Greeks discovered geometry; musicians might do well to follow their example" – electronic musicians have jimmied open the bars and staffs that have imprisoned western music for centuries and created their own multi-dimensional configurations of sound. Tuning into the noise of the city, hot-wiring the hearts of their machines, diving headfirst into mysterious realms, reinstating lost rituals and imagining new identities, these musicians have opened their minds to the possibility that the supposedly dehumanizing machine might actually make us more human.

The phonograph was perhaps the first machine to truly live up to the Luddites' fears by imprisoning a fundamental aspect of human identity within its cogs and gears, but the history of music and technology has not been dominated simply by the logic of the machine. Maybe the first technological advance to become truly practical only when it was used in a way for which it was not originally designed, the phonograph and its subsequent use and misuse has taught us that the human-tech interface is not all one-way traffic.

A century after its invention, a Bronx teenager once again changed the way we approach the phonograph. Practicing his mixing skills on two turntables in his bedroom, Theodore Livingston (soon to be called Grand Wizard Theodore) was interrupted by his mother who wanted him to turn the music down. As he turned around to say something like, "Aww Mom, get off my back," he accidentally rubbed one of the records across the stylus and serendipitously invented scratching. As hip-hop's signature flourish, the technique of scratching (not to mention subsequent developments like transforming and beat juggling) has shown that, despite Edison's best intentions, the phonograph is really a percussion instrument and not simply a playback device.

Even more malleable than the vinyl disc, and just as crucial to the development of music in the twentieth century, was magnetic tape. Although the process of converting soundwaves to electronic signals and imprinting them on to tape was invented in the 1930s, recording tape machines did not come onto the market until after World War II. With a greater signal-to-noise ratio, the possibility of controlling volume, and the potential for mixing and filtering, magnetic tape quickly replaced recording straight to disc as the standard medium of sound reproduction.

Just like the vinyl record, though, it was the fact that tape could be spliced and its information rearranged that really captured the imagination of more inventive musicians and composers. After hours of painstaking tape editing with a razor blade, a broadcasting engineer for *Radiodiffusion-Télévision Française* named Pierre Schaeffer constructed two pieces of music out of the noises of trains (*Étude aux Chemins de Fer*) and saucepans (*Études aux Casseroles*) that were broadcast on French radio in 1948. He called his collages *musique concrète*, but in the ensuing years, this process of reassembling fragments of sound has been called dub, disco, hip-hop, house, drum and bass, trip-hop, electronica – heck, even rock 'n' roll.

While there might be something of Marshall McLuhan's famous pronouncement that "the medium is the message" in all of this, it is not merely the fact that it is electronic that makes electronic music interesting. By taking trips to the moon on gossamer wings and submerging 20,000 leagues under the sea, electronic music represents what journalist Kodwo Eshun calls "sonic fiction." After all, why keep it real when you can surf on sine waves? *Modulations* is about this ecstatic freefall into the unknown in the era of electronic and digital technologies – an age in which the boundaries between human and machine are becoming increasingly blurred, a time in which the rhythms of machines are beginning to sound like what Detroit techno producer Derrick May calls the "Strings of Life."

Alexander Graham Bell invents the telephone, which converts sounds into electronic signals.

1876

1877

Thomas Edison invents the phonograph, heralding the age of mechanical reproduction.

Canadian scientist Thaddeus Cahill invents the telharmonium, the first electronic instrument. The only problem is that it is 60 feet wide, 20 feet tall and weighs 200 tons. American inventor Lee DeForest invents the triode, a vacuum tube that allows the transmission of sound through electrical signals.

1906

1907

Inspired by the telharmonium, Italian composer Ferruccio Busoni writes *Sketch for a New Aesthetic of Music*, which envisages a future of new scales and an entirely electronic music.

Italian futurist Luigi Russolo issues his manifesto "The Art of Noises," which calls for futurist musicians to "substitute for the limited variety of tones posessed by orchestral instruments today the infinite variety of tones of noises, reproduced with appropriate mechanisms" and states that "we find far more enjoyment in the combination of the noises of trams, backfiring motors, carriages, and bawling crowds than in rehearsing, for example, the *Eroica* or the *Pastoral*." Russolo also creates his intonarumori, or noise intoner.

1913

1915

Lee DeForest invents the oscillator, which produces tones from electronic signals and is the basis of all electronic tone-generating instruments.

George William Guest and Horace Merriman record the burial service of the Unknown Warrior at London's Westminster Abbey–the first recording made with an ordinary volume microphone. Meanwhile, in Paris, Léon Thérémin develops the theremin, the first practical electronic instrument.

1920

1926

George Antheil's *Ballet Mécanique*, scored for pianos, xylophones, doorbells, and airplane propellers, causes a sensation in Paris.

Maurice Martenot invents the ondes martenot, which uses a keyboard, ribbons and knobs to produce electronic tones.

1928

1935
Laurens Hammond creates the electric Hammond organ, and the Nazis develop the tape recorder as a propaganda tool.

John Cage creates his *Imaginary Landscape No. 1*, a composition for recordings of pure frequency tones played on variable-speed turntables.

1939

1946
The atomic test at the Bikini atoll in the South Pacific is broadcast on radio in the United States–the ultimate realization of Russolo's pronouncements.

Bell Labs develops the vocoder, a device that electronically transforms the human voice, and bequeaths hits to Joe Walsh, Peter Frampton, and Zapp.

1948

1949
Pierre Schaeffer creates his *Symphonie Pour un Homme Seul* - the first fully realized *musique concrète* piece and the first piece of music to take advantage of the possibilities of magnetic recording tape.

On "How High the Moon?" Les Paul pioneers the art of overdubbing and speeds up the tape of his guitar solo, causing a whole generation of budding guitarists to contract carpal tunnel syndrome by trying to copy his solo.

1951

1954
Guitar Slim and Johnny "Guitar" Watson introduce the world to the pleasures of guitar distortion with their records *The Things That I Used to Do* and *Space Guitar*.

After a decade of experimentation, RCA engineers Harry Olsen and Herbert Belar introduce the RCA Sound Synthesizer.

1956

1958
At the World's Fair in Brussels, Edgard Varèse premiers his collage of electronic noise and airplane sounds, *Poème Électronique*, alongside Iannis Xenakis' *Concret PH*, a score for burning charcoal.

Session guitarist Grady Martin unintentionally develops the Fuzz Box effects pedal with his busted-amp solo on country singer Marty Robbins' "Don't Worry."

1961

1967
Morton Subotnick records *Silver Apples of the Moon* using Donald Buchla's touch-pad synthesizer.

The first completely synthesized record, Walter (Wendy) Carlos' *Switched on Bach*, is released and quickly becomes the biggest selling classical LP of alltime.

1968

1971
Little Roy's "Hard Fighter" includes "Voo-doo" – an instrumental version that features drop-out and echo – on the flip, which becomes the first dub record.

1977

The holy trinity of synthesizer records is released: Donna Summer's "I Feel Love", Parliament's "Flashlight," and Kraftwerk's *Trans-Europe Express.*

1978

The first polyphonic synthesizer, the Sequential Circuits Prophet 5, comes on the market.

1981

Kraftwerk releases *Computer World* and invent Techno, while Grandmaster Flash has a most excellent adventure on the wheels of steel, and proves that the turntable is a percussion instrument and not a playback device.

1982

Afrika Bambaataa, Arthur Baker, and John Robie give Kraftwerk afros and shell-toed Adidases with fat laces on *Planet Rock*. Yamaha's DX-7 synthesizer rocks the planet even more by introducing digital technology to the music world. Meanwhile, Japanese synthesizer company Roland releases the incomparable TR-808 drum machine and the ill-conceived TB-303 bassline machine, which would become notable only because of the ingenuity of musicians in Chicago.

1983

Jesse Saunders releases "On and On," generally regarded as the first Chicago House record.

1985

Juan Atkins releases "No UFOs" and creates the blueprint for Techno, while MC ADE's proto-Miami Bass records, "Bass Mechanic" and "Bass Rock Express," make booties bounce in Florida.

1986

Producer and remixer Marley Marl makes the sampler the electric guitar of the next fifty years on his mix of Eric B & Rakim's "Eric B For President".

1992

Goldie's "Terminator" introduces the technique of timestretching to hardcore Techno and lays the foundation for Jungle.