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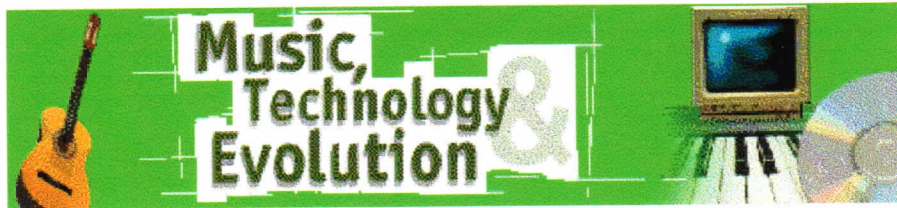
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## Count Basie Meets The Jetsons

**Heather Camlot**  
Canadian Technology Editor  
March 25, 1998

**M**usic recording technology has drastically changed the face of music. In the 1930s, recording music meant presenting an unaltered acoustical event. By the 1990s, recording had shifted from performance to computer-generated sound. Some recording artists have not only embraced new technology but have pushed the envelope to coerce further innovations.

"The city is Chicago. The year is 1960. It's Monday, the 24th of August. The weather is hot and humid. The band is Count Basie. The vocalist is Joe Williams," reminisced recording engineer Bruce Swedien as he introduced one of his first and favorite recordings at the 1998 MEIEA Conference in Toronto. With a push of the tape deck's play button, the audience is treated to the only stereo recording of Mean Old World.

A saxophone blows close on the right. A trumpet solo comes from the far left. Williams is dead center. Basie's band members jammed together in one room, playing off each other's groove. Little equalization was used. The only [reverb](#) came from the hard plaster walls. The reel-to-reel machine had only two tracks. And yet the piece casts a spell on the audience as people close their eyes, tap their feet and bob their heads in rhythm.

In today's studio, each Basie band member would have two tracks of his own, to make it easy to single out -- or edit out -- a particular instrument. Williams would later dub his vocals over the music. If the producer wanted Williams to repeat the chorus an extra time, the engineer could just copy and paste the vocals. Because of advances in music technology, the players -- the musicians, the singer and the producer -- wouldn't even have to be in the same country, much less the same studio.

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"For Paul Simon's Graceland, parts were recorded in Johannesburg, parts in the southern United States, parts in Los Angeles, parts in London, and mixed in New York. Where's the performance?" said Paul Theberge, a professor of sound recording and music theory at Concordia University in Montreal, and author of Any Sound You Can Imagine: Making Music in the Age of Digital (Re)production. "When he went on tour with it, he actually had to bring the musicians together to play the album live. The record was made before that group of musicians ever came together in one place."

The record buying public was no longer interested in cold reality in popular music

With the options technology has made available today, a sound engineer can spend a week just looking for the best drum sound -- be it from a live drummer, a drum machine or a CD-ROM -- for one song. In the 1950s, four pieces could be recorded -- and finished -- in four hours.

"The music was highly imaginative and soulful and had all the elements that we recognize as indicative of music of that era," Swedien said of his early recording days while appearing as a keynote speaker on March 5 at the MEIEA Conference, held in conjunction with Canadian Music Week. "But the object of recording a piece of music at that time was to present an unaltered acoustical event."

As early as the 1880s, when Alexander Graham Bell first became interested in the phonograph, recordings helped make specific performances more widely available and could be heard endlessly without the need for sheet music and musical talent. Through the 1950s, recordings continued to put the listener in the best seat in the house.

But by 1951, said Swedien, music and music recording would change forever. That year, Les Paul and Mary Ford released How High the Moon to great success, in which Paul played all the guitar parts and Ford sang the entire four-part harmony.

"It seemed as though a big section of the record buying public was no longer interested in cold reality in popular music," he said. "As the 1950s came to a close, we in music recording found that perhaps reality wasn't even desirable."





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The control room of the 1950s and earlier had a small mixing console with four to 12 microphone inputs and one-track mono recording. Many of the record moguls believed there was no future in stereo and would not even pay for reel-to-reel tape, Swedien said. When he first started at the Schmidt music company, they didn't have a tape machine. Instead, the sound went from the studio, where the musicians were arranged in a concert like setting, through the console -- which was built by the engineers -- and onto two disk recording layers. Only in the 1950s, did engineers attempt to separate sound sources with innovative microphone techniques.

Two important steps in technology occurred over the next 40 years, beginning with [multi-tracking](#) in the 1960s. Recordings escalated from a two-track machine, used to record the Count Basie Band, to four-track, eight-track and then 24-track machines by the early 1970s.



In 1982, Swedien used 24 tracks just to build the introduction of Michael Jackson's song Thriller.

"People weren't just writing songs, rehearsing them, or getting an arranger, and then going into the studio and recording them," said Theberge. "Songwriting and recording became integrated. You were now starting to make the music in the

studio."

The second fundamental break came in the 1980s with [samplers](#), synthesizers and [MIDI](#). Synthesis and sound recording become one -- in idea and in machine, namely the sampler.

"There is an increasing emphasis put on sound and technology at that point and it becomes possible not just to write the song and record it but to make the sounds part of the song," said Theberge. "You can choose a snare drum sample that you want for this song; you can choose a particular feel."

For Jackson's Earth Song in 1995, Swedien used an enormous Solid State Logic G plus series mixing console, which has 100 inputs. An unusual Lexicon 480L inverse room effect was designed by Lexicon specifically for the mix. On the drums is a highly modified wooden hall reverb. Although Swedien admits he got carried away with the technical effects on the song, he believes they don't get in the way of the music's passion.



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The computer, the center of most studios today, allows engineers the freedom of arrangement. Just like word processing, pieces can be cut and pasted elsewhere in the song. You can also get down to 44,000th of a second to pick out a sample and clean it up or choose a passage for looping, erasing or enhancing. Other elements of the modern studio include Digital Audio Tape machines, [midi sequencers](#), samplers, drum machines and synthesizers, to name but a few.

For those involved in the music recording industry, technology is constantly being weighed for good and evil. With today's options, musicians can experiment in ways they couldn't in the past. An entire orchestration, for example, can be composed with the help of a sampler, a synthesizer and a computer. Paul McCartney, who cannot write notes, was able to write his Liverpool Oratorio (1991) with MIDI by simply sitting at a keyboard and playing the parts for each instrument. A programmer then transcribed the parts into notes for the orchestra.

"In the past, a songwriter like him would have hired an arranger. He would write the tunes and some basic accompaniments, and the arranger would do the full-blown score," said Theberge.

In the 1980s, when it became difficult to find clubs to play, many new bands began placing an emphasis on the recording process in order to break in to the music business. And with so much cheap and good equipment out there, the ability to produce a viable demo became increasingly easier.

"In the home studios of the 1970s, where they had four-track tape recorders and eight-track tape recorders, you could do a passable demo tape," said Theberge. "Today, you can do a passable platinum record in the small home studio."

On the flip side, musicians no longer need the same musical talent so necessary generations before because of the libraries of samples and CD-ROMs available.



"With the technology you have today, you have the opportunity to lay down a note at a time," said David Leonard, founder and president of Trebas Institute, a music recording and business school in Montreal, Toronto and Vancouver. "In the old days, you had to have specific skills that took years to develop. Today, you don't even have to have musical training."

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"Sampling is cheating as far as I'm concerned," he said. "Is it because they can't do it on their own? Are they paying royalties? It's intellectual theft; copyright is the only thing that you have as a true natural resource."

Although Swedien loves sampling, he agrees that it has made some musicians lazy. "There is a drum sound that I created on (Michael Jackson's) Man in the Mirror, which is a combination of a snare drum, a clap and a big wooden sound, and I have heard that drum sound on at least 20 other people's records," said the five-time Grammy-award winner.

Hearing song after song with the same samples, especially in the mid-1980s and the popularity of electro-pop, may have contributed to the Unplugged phenomena of the late 1980s and early 1990s. Suddenly, electric bands, such as Nirvana and Pearl Jam, and artists who began their careers acoustically, such as Neil Young and Bob Dylan, were performing unplugged. And audiences loved it.



"Unplugged is a myth," said Theberge. "It certainly is the result of people being saturated with a particular kind of sound that came from digital technology, but it's a total misconception to think that unplugged is unplugged."

The very fact that the artists are singing into a microphone, that audiences are watching the performance through the television or listening to it on CD, means technology is present, he said. Further, there is as much [equalization](#) and [compression](#) and as many engineers off stage doing all sorts of work to the music before it ever reaches the audience as in any studio recording.

A wonderful exception that proves the rule is The Trinity Session (1988) by the Cowboy Junkies. The Toronto-based band went into Church of the Holy Trinity in Toronto, set up one microphone and recorded the album. Although quite beautiful, the simplistic recording style had its drawbacks. "You couldn't play certain types of material; they couldn't play fast, as the reverb was such that it would just mush everything together," said Theberge.



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"It's a great example of all the strengths and all the weaknesses of that kind of recording but the proof of the pudding is that you didn't have dozens of artists running out renting churches. Even the Cowboy Junkies didn't make another recording like that," he added.



The latest technology is here to stay -- at least until an even later technology replaces it.

Swedien is already raving about the latest mixing desk by SSL, the 9000 J series, which has no capacitors and therefore little deterioration with age. It combines DC analog technology with digital control and automation.

But even with all the digital equipment in the studio, recording engineers and artists still cherish sounds that can be produced with older technologies. The exact microphone that Swedien used to record Joe Williams with Count Basie's band in 1960 was also used for part of Michael Jackson's vocals on the HIStory album in 1994.

"Isn't it incredible to think that we can take the modern technology of the recording industry as it exists today, plug in a 45 year old microphone to a brand new space age recording desk and everyone listens to the results and says 'Wow'," said Swedien.

Theberge also remembers visiting a studio in which the engineer had all the latest technology, and sitting atop his mixing console was a 1950s tube equalizer in a plywood box with a couple of knobs. "He said it was great when he recorded vocals and he swore by it."

Recording engineers are not the only ones who cherish certain "old" technologies for their sound quality. Records are still considered by many to have a better sound than CDs. "To this day, we talk and teach digital, but people are still buying phonographs and records," said Leonard.

"A lot of people hated the sound of early CD players because they were brittle," said Theberge. "A well-mastered LP can sound just as good as

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a bad CD or even an average CD. It's not that one technology is better than the other, it's what your aesthetic values are."

However, a new listening medium will arrive from Sony in a few years that may settle the vinyl-CD debate forever, according to Swedien. The medium will have a sampling frequency rate of 4:4:1 kHz and a 64-bit processor. "The sound is ridiculous, it is fabulous," he said.

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To achieve or recreate the cherished sounds, people will employ any technology necessary. The Rolling Stones never performed some of their studio recordings from the sixties live because they would have had to hire a large orchestra to tour with them, said Theberge. But twenty-five years later, thanks to the digital revolution, they could recreate those particular sounds with a couple of samplers.

"Pop music in the 20th century is about sound recording. It's about technologically mediated music," he said. "You can play in an older style of music, but you can't get that sound unless you recreate that particular technology that went along with that particular era of sound recording as well."

Theberge considers the sampler the most innovative technology created for music recording. "You can't go into a studio today and not find a sampler," he said. "They are made available to keyboards so you can take any sound and play it up and down the keyboard in a very intuitive musical way. It also melded all the different kinds of technology that were so important to recording and music and brought them together in one box."

Swedien said he cannot live without his Moog synthesizer. "Robert Moog created sounds that are not available in natural instruments or acoustic instruments," he said.

All the technology in the world, however, cannot help a bad song. "There are many functions and roles in the process of making music," said Leonard. "But if I had to pick out one, it would be the songwriter. It's the song that is crucial."

"We must make the sound of the music appetizing and tasteful," said Swedien. "We cannot merely helter skelter throw sounds and recording techniques together on a piece of tape and come up with a sound that makes people remember a recording for a long time -- or maybe more important, want to hear it over and over again."

Even with a great song, its success may well hinge on how it is recorded in the studio today. The right amount of equalization; the

perfect microphone; a combination of some samples and drum machines combined with just enough reality for the ear to identify. No matter what technology is used, it has to please the audience.

"The paradox of popular music is that, while the making of pop records becomes more and more complex, it nevertheless remains a significant part of our daily lives," said Swedien. "Technological developments have changed the process of musical recording over the years, but have not changed the reason why people listen to music."

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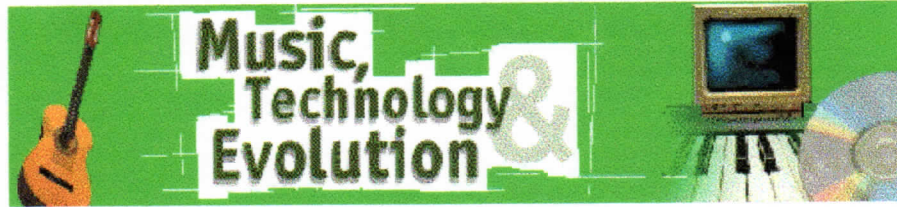
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## CREATING YOUR OWN HOME STUDIO

### Analog Recording

The most basic way to record your own music at home -- save plugging a microphone directly into a tape deck -- is with a four-track machine.

**Four-track recorder** This machine runs about two times faster than the average tape deck, resulting in a higher quality recording. Make sure that the four-track has bouncing ability, so you can transfer two or three tracks onto one track, giving you more tracks on which to record. Bouncing too many times, however, will lower the quality of the sound. It also means having to record tracks in mono. You also want the machine to have punch in/out, so if you make a small mistake while playing an instrument you'll only have to re-record that part. Four-tracks usually come with built-in mixers, to control levels on microphone and instrument input.

You should also check for an effects/aux send for adding reverb or compression to the mix. The recorder should have headphone and monitor outs to hear what you're recording. And look for lock-up capability, so you can join two recorders if and when you need to expand. Names to look for are Tascam, a long-time leader in tape decks and mixers for amateur and semi-pros; Fostex and Yamaha.

For better quality, you may want to go with a four-track or eight-track reel-to-reel tape machine. For it, you'll need to buy a mixer.

**Mixer** All your musical instruments and cables will connect through the mixer. Depending on how elaborate a recording you plan, you may want to go for a 16-channel board. If you have a 16-track recorder, you'll want more channels. Make sure the mixer has EQ (equalization), bussing, metering, a good frequency response and low noise level.

**Microphone** There are three types of microphones: ribbon, condenser and dynamic. Ribbon microphones are fragile and bi-directional, meaning they only pick up sound coming directly from in front or behind. Because they are fragile, they are not often used for live performances. Condenser microphones are made with various responses, such as omni-directional and bi-directional. Their membrane, which vibrates from sound, can be made very small for great frequency response. Condenser microphones require a pre-amp, or power source. Dynamic microphones are great for live performances



since they are rugged, relatively inexpensive, omni-directional and require no power supply. Popular home studio microphones are the SM57 and SM58, both dynamic, by Schure.

**Compressor** Everything should go through a compressor -- vocals, instruments and the final mix -- to balance the dynamics. Although compression is sometimes available in a digital effects processor, most of them aren't too useful: you may wind up with more distortion if you overload the analog-to-digital inputs. Check out Alesis, which develops inexpensive analog compressors aimed at the home studio market.

**Effects processor** You'll likely want some reverb to create a concert hall or church environment, depending on the type of music you're recording. A limiter and equalizers are also common. Other effects you may want are chorus, flange, delays, and noise gate -- to eliminate the background hiss on vocals. Names to look for are Lexicon, Rain and AKG.

Don't forget a stereo mix-down deck for your final mix, a good pair of headphones and monitors (amplifier and loudspeakers), and various cables. You may also want to look into buying a drum machine or synthesizer if your studio is small or has poor acoustics and some basic sound insulation.

## Digital Recording

Working in digital gives you the freedom to play your pieces thousands of times without losing sound quality. To create the studio, all you need are a few simple substitutions to the [analog](#) set up.

**DAT mixdown deck** You will want to trade the analog studio's stereo cassette deck and reel-to-reel tape machine for a Digital Audio Tape (DAT) machine, to record the mix. Some names to look for include Tascam and Panasonic.

**Mixer** Digital mixers are making their way to the market but most studios have stuck with analog. Mackie Designs, a new company, has developed some inexpensive, high quality analog mixers that fit well with digital recording. Another alternative to the analog four-track cassette mixer is a hard-disk recorder/mixer from companies like Fostex and Roland.

**Sampler** Most digital studios today have a sampler to loop, cut or reverse single notes or short bits of music. Look for Akai, E-mu, Ensoniq and Roland.

## Computer Recording

**Computer** The faster and the more memory, the better. Macintosh has long been considered better for music recording, but software is available for the PC as well. The computer should have at least a two-gigabyte hard drive and a minimum of 32 megs of RAM; 64 megs would be better. A large screen is always helpful. So is a fast CD-ROM drive, in case you choose to use CD samples. Make sure to have at least three PCI slots and a CPU processor of at least 233 MHz. If you are using a PC, you will also need a sound card.



**Software** One of the most popular pieces of software is Steinberg's Cubase VST, available for the Mac and the PC. It offers MIDI sequencing, editing, arranging, processing, effects and automated mixing for only a few hundred dollars.

Of course, you will still need the basics from the [analog](#) and [digital studio](#), namely microphones, mixer, monitors, cables and synthesizer.

-- Paul Theberge and David Leonard contributed to this compilation.

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**MUSIC GLOSSARY**

<b>Compression</b>	Reduces the dynamic range of the audio by boosting quiet signals and attenuating louder ones
<b>Equalization</b>	Changes the tonal characteristics by boosting or cutting certain frequencies of an audio signal
<b>MIDI</b>	Musical Instrument Digital Interface. Allows instruments to send data about a musical performance, rather than the actual sound, to another instrument
<b>MIDI Sequencer</b>	Allows the computer to record, store, replay and edit MIDI data into songs. Also provides synchronization through MIDI time code and SMPTE
<b>Multi-tracking</b>	A recording process whereby audio parts are recorded onto several different tracks to be mixed later
<b>Reverb</b>	Acoustical ambience from multiple reflection in a certain space, such as a concert hall, a church or a closet. Can be added digitally to recordings made in dead or dry rooms or with electronic instruments
<b>Sampler</b>	An electronic device that manipulates -- changes speed, loops, reverses -- short digital recordings, like a single note or a bar of a song
<b>SMPTE</b>	A real time code related to hours, minutes, seconds, and film or video frames. Used for synchronization

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