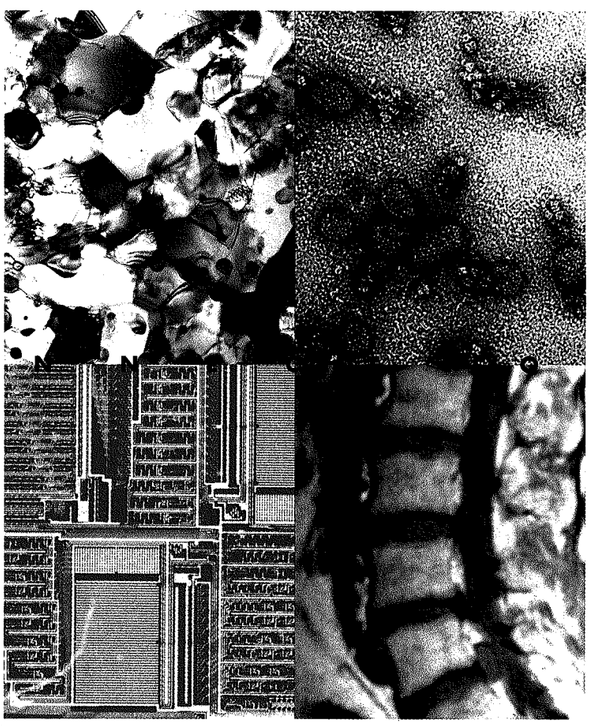
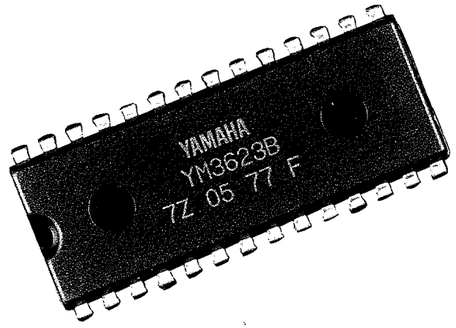
OFFICE OF TECHNOLOGY LICENSING



C O N N E C T I O N S

STANFORD UNIVERSITY



The list of names spills off the page: Panasonic, Wurlitzer, Moog Music, Atari, Bell Telephone Labs, the Hammond Organ Company, United Recording, even a production company owned by Bing Crosby.

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"I always hoped that Bing Crosby would call," Sally Hines, OTL's administrator since its founding, laughs.

Between 1971 and 1975, the Office of Technology Licensing tried to interest one U.S. company after another in John Chowning's FM Sounds, an invention that would soon revolutionize the electronic music industry. But not a single one could be persuaded. The manager of Advanced Development Engineering at the Hammond Organ company wrote, after reviewing the initial concept: *"Our viewpoint is that some of the alternative approaches are more attractive in terms of design implementation, manufacturing cost, and breadth of performance."*

"Soon after they went out of business, I think," Chowning reflects. It was an engineer from Yamaha who listened to the brass canon Chowning played, took one look at the technique, and understood immediately its potential. At the time, music synthesizers made use of analog devices, where oscillators create sound waves that can be altered into new tones using filters. Chowning, who is professor of music and director of the Center for Computer Research in Music and Acoustics (CCRMA), created an algorithm that led to an entirely new type of synthesizer. The technique is known as frequency modulation (FM) synthesis, because it relies on a variation of the frequency modulation used for radio broadcasts. Put simply, the device modulates one pure tone (or frequency) and distorts it with another pure tone to produce a third tone, much as a painter mixes two colors to create a third color. From a brass section to bongo drums, from winds to strings, from a grand piano to a soprano, dozens of musical sounds are possible—in rich, full tones.

An equation for success

Today, virtually every Yamaha synthesizer since the original DX series (synthesizers that are especially popular with rock 'n roll groups) contains a single chip using Chowning's algorithm. But in the beginning, Chowning remembers, it took nearly forty chips to hold all of the mathematics. "The engineer from Yamaha understood—not only the technology, but also the research effort that would be required to actually produce a product."

In 1975 Yamaha was granted an exclusive license to develop and manufacture the music synthesizer. "During the critical negotiation stage, OTL listened to the engineers from Yamaha explain how long it would take to really turn this in to something," Chowning says, and agreed that such a significant investment warranted the protection that an exclusive license affords.

"The incubation period from an initial disclosure to production can be very long," licensing associate Joe Koepnick agrees. In fact, Chowning spent seven years collaborating with Yamaha to develop his invention. "I probably traveled to Japan twenty times between 1975 and 1982," he says. "Each time I would work very intensively with the engineers at Yamaha for a week or ten days. Actually, for me it was a wonderful break from my

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"I have the greatest admiration for the staff at OTL," he continues. "They are very well informed and extremely effective—sensitive to the needs of the inventor, and to companies and their expectations. I think they've established a wonderful interface between faculty and the outside world. And the result has been some amazingly good relationships."

Rich sounds

The second most lucrative invention ever licensed through OTL, cumulative royalties to Stanford from FM Sounds surpassed 13.9 million dollars this year.

"Of course the inventor directly receives only a third of any profits from an invention," Chowning notes. "But the Center receives a third also, which is great." (The School of Humanities and Sciences receives the final third, which it actually returns to the Center.) "Even more important," he remarks, "I didn't have to deal with any of the business aspects."

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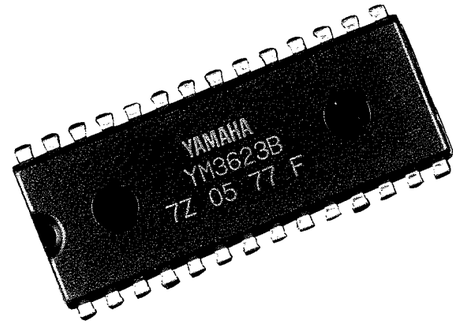

"I was convinced that the simplicity of the composition and the richness of results would lead somewhere. And when I approached OTL, Niels understood immediately."
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Chowning stresses that when he stumbled upon the idea of frequency modulation synthesis, he was looking for a way to make new sounds, not new money. But royalties from the Yamaha DX series helped to finance the $1.2 million remodeling of the Knoll, the 1916 Italianesque mansion that once housed Stanford's presidents. It became CCRMA's home in 1985.

"Our relationship with Yamaha remains very good," he goes on. The company has become a member of CCRMA's industrial affiliates program, and continues to make generous donations of equipment to the Center.

Chowning attributes the tremendous success of the licensing process with Yamaha to OTL, which, he says, "is extremely sensitive to the exigencies of academia; particularly the need to publish freely. I never felt any pressure or constraint of academic freedom."

"They don't invest money until there is a good reason to. But they do invest their time, and they are very good at determining what will sell. They are not intrusive, but they pay attention to what we do here," he reflects.