Info Talk

INFORMATION TECHNOLOGY DIVISION

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New music lab—a big hit!

by Rusty Harris, Senior Publications Specialist

Riley Hayes

"Tickling the ivories" takes on new meaning for students in the new Music Lab located in the Humanities Building. Electronic keyboards are connected with Musical Instrument Digital Interface (MIDI) software and synthesizers, so students can listen to music they compose and experiment with tracks, keys, tempos, and more.

Want to compose music? Want to hear how your masterpiece will sound "for real," not just in your head? Now students can in Emory's new music lab, with the aid of electronic keyboards connected to a computer running Musical Instrument Digital Interface (MIDI) software and a group of synthesizers. Prof. Dwight Andrews of the Music Department faculty is the driving force behind the new lab in the Humanities Building. Andrews, probably most widely known for his musical direction of the hit plays "Ma Rainey's Black Bottom" and the Pulitzer Prize-winning "The Piano Lesson," has been working with MIDI and synthesizers for some years now and is convinced that these electronic tools and their Macintosh computer adjunct are radically changing the way in which composers work and should be trained.

The new lab was supported by the Instructional Computing Development Fund and the Information Technology Division. Jerry McCall, ITD's Manager of Computing Labs, installed the Macintosh SE/20 computers, all of which are connected to the Emory Apple Internet network. ITD's Network Services group installed the wiring for the lab.

The heart of the computerized system in the music lab is MIDI synthesizers and software. In the early 1980s each synthesizer had its own keyboard. Now with the MIDI industry standard and advances in technology, most MIDI keyboards have 16 discrete channels, each of which can provide a different instrument or "voice." All can be controlled with a Macintosh or PC using MIDI software. You as composer can record a song into the computer's memory using a synthesizer, store it, then

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Music lab

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play it back and change it as desired. You can record more tracks (also known as "virtual tracks") as you listen to the first one. You can edit your composition and change the key, the tempos, the choice of instruments you use and dozens of other parameters; you can keep editing until the result is just what you want. MIDI software lets you experiment with your music, then play it back and hear how it will really sound.

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Andrews, who received his training in Music Theory at Yale and has been teaching music since 1974, says that MIDI and synthesizers controlled by a microcomputer are a real breakthrough for teaching. Many contemporary American instrumentalists come to composing from a band or orchestra background and have little experience with either using a keyboard or the art of improvisation. Synthesizers controlled by MIDI software can help train budding composers in these two important areas. Composers will have to acquire some degree of computer literacy and perhaps take a somewhat different approach to composing, but the results in terms of being able to "preview" a composition will be well worth it. Another advantage is that you can now compose at the computer screen using traditional notation, play your composition, edit it and then print the various parts instead of having to send your score to an expensive copyist.

The new music lab, which Andrews has been working on for two and a half of his three years at Emory, is a computer-assisted classroom with music workstations. Ten MIDI keyboards with real piano "feel" are linked to a Macintosh.

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Professor Dwight Andrews is the driving force behind the new lab in the Humanities Building. He believes that these electronic tools and their Macintosh computer adjunct are radically changing the way composers work and should be trained.

The lab will be used in three ways:

1. *a piano classroom.* Nine students, each with an individual keyboard and earphones, can play for the instructor and receive his evaluation. This arrangement also takes the place of individual practice rooms—for which there's never enough space.
2. *music theory and analysis instruction.* For example, the computer asks the student to play a specific chord in a specified key. When the student plays the chord, the computer tells him whether he was right or wrong and how to correct it if he was wrong. The lab will be helpful in ear training and developing analytical methods and techniques, as well as for student homework.
3. *bibliographic searches and methods.* Beginning this fall, Emory is offering a master's degree in music. With the music lab Macs linked to the DOBIS library system, students can do library searches on musical topics.

Andrews says the faculty are definitely intrigued with the possibilities of this lab.

How MIDI works

by Steve Pittard, Academic Computing Consulting

MIDI is a protocol that allows appropriately equipped synthesizers to exchange information known as MIDI messages. MIDI compatible instruments usually have three MIDI ports labelled *MIDI In*, *MIDI Thru*, and *MIDI out*. (A MIDI port is just a place for a MIDI plug). Incoming messages enter at the *MIDI In* port, and may be passed to other instruments via the *MIDI Thru* port. MIDI messages originating from the instrument are sent out the *MIDI Out* port. MIDI cables can be recognized by the 5-prong male DIN connectors at either end of the cable.

MIDI was initially developed to make it easier to control multiple synthesizers from another. Combining the sounds of several different synthesizers is very desirable as it allows one to press a single key on one keyboard and have the note played on a number of other synthesizers simultaneously. This allows one to achieve a very full sound without requiring two hands to play on two or more different synthesizer keyboards. In this controlling/subordinate context, the subordinate keyboard requires specific information from the

controlling keyboard. Primarily, it needs to know when a key is pressed and when it is released. These correspond to two MIDI events or messages: *Note On*, and *Note Off*. Additional messages such as key velocity, aftertouch ,and pitch may also be sent as well.

While the controlling/subordinate synthesizer setup is attractive to composers and musicians, it is not easy to manage or manipulate large numbers of MIDI messages very well. Because of this, the digital sequencer was developed to aid the MIDI musician. A sequencer is generally a software program that intercepts MIDI codes, saves them and reproduces them on demand. Sequencers are capable of duplicating a performance exactly. When a sequencer is in record mode, it waits for a note to be played. When a note is played, it is assigned a MIDI number, the information is time stamped with the aid of a high resolution lock, and it is saved into memory. After the note is released, the software receives a MIDI Note Off message and saves it to memory. In playback mode, the sequencer sends out the exact MIDI codes it previously recorded, with an excellent reproduction of the original timing. Other typical sequencer abilities include the ability to fix errors in performance via quantization, copying and merging existing sequences, as well as overdubbing capabilities.

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Students in the new Music Lab.

MIDI Glossary

Aftertouch—This MIDI message tells how much pressure a keyboard player uses while holding down the notes.

Controller/MIDI Controller—Anything that can send out MIDI messages to control other units.

Note Off—A MIDI message that is sent when a key is released on a keyboard.

Note On—A MIDI message sent when a key is pressed on a keyboard.

Quantization—This refers to the conversion of continuous information or phenomena to discrete events. When continuous information is sent via MIDI, it is assigned an integer value between 0 and 127. A smooth change of pitch would be quantized into many tiny discrete steps.

Sequencer—Software that allows you to play a specific sequence of notes with correct timing on a specific MIDI device.

Velocity—Most keyboards can measure how fast a note is pressed down. This information can be sent via MIDI. Faster presses usually result in louder notes with different tones.

EDUCOM'92

"Charting Our Course"

"Charting Our Course" will be the theme of the EDUCOM'92 conference, to be held in Baltimore, Maryland October 28-31, 1992. The Johns Hopkins University will be the conference host. Educators, information technology professionals, and colleagues from industry and government will work together to chart a course for information technology and higher education into the 21st century.

There will be presentations, debates, demonstrations, and innovative sessions that look hard and critically at the current position of information technology in support of teaching, learning, and research. Attendees will have opportunities to explore the latest trends in technology, applications, and management, with an eye to the best use of scarce resources in the decade ahead. In addition, EDUCOM'92 will include working sessions, discussions, and plenary meetings in which conference attendees will debate, refine and even vote on a compelling national agenda for information technology and higher education in the 90s. This emerging agenda will include proposals for action in four critical areas:

- inter- and intra-institutional organization and change
- teaching and learning
- access to resources for learning and research
- new scholarship and the changing nature of information

Findings from the conference will be made available to thousands of faculty members, administrators, and policy makers in the higher education community and to decision-makers in government and industry through network conferencing, print and video materials. The Conference Committee hopes many of you will be able to come and participate.