Macintosh II: Sound capabilities (3/94)

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TOPIC ---

This article provides an overview of the sound capabilities introduced by the
Macintosh II.

DISCUSSION --

The Macintosh II extends the sound capabilities of the Macintosh Plus by
implementing the software Sound Driver in an Apple Sound Chip and the Sound
Manager in the Macintosh II Toolbox. The hardware permits sound to be played
asynchronously of other Macintosh II operation, while the software is flexible
enough to support additional sound hardware through a NuBus slot or the external
stereo sound port.

Macintosh II Sound Hardware

Sound is produced on the Macintosh II by a custom digital sound chip (the Apple
Sound Chip), two Sony sound chips, and an internal speaker or through the
external sound jack. The Apple Sound Chip generates an audio/stereo signal,
which is then filtered and buffered by the Sony sound chips. The Apple Sound
Chip also contains a 1024 byte FIFO buffer to accept sound values. This permits
the Macintosh II to more frequently operate asynchronously of sound generation,
and to provide stereo capabilities.

Sound may be played through the 2 1/4" internal speaker, or through the external
stereo mini-jack. The jack will not drive a speaker directly, but can use a
Walkman-style headphone.

The Sound Manager

There are four standard synthesizers defined within the Macintosh II Sound
Manager. Each of the synthesizers is controlled by commands passed to them via a
channel, or queue, of commands. A common set of commands is available to each of
the synthesizers, with extensions as appropriate for each individual driver.
Sound Manager routines can direct a synthesizer to the queue that holds the
sound commands, play the channel, set up new channels, etc.

Each channel is interpreted according to the rules supplied by the called
synthesizer, and data is passed through the Apple Sound Chip's two FIFO buffers

to the internal speaker or to the external sound jack. Since the internal speaker is monophonic, the Sound Chip will combine all four channels (if used) into one voice for the speaker. When the external sound jack is used, two voices are kept separate, with two channels used in each. Either sound output device may be used asynchronously of other Macintosh II operation while the Sound Chip feeds channel information to the speaker in use.

The note synthesizer allows a simple melody to be played. It permits monophonic sound only, and should be used to play simple sounds, such as SysBeep.

Either monophonic or polyphonic sound is possible using the wave table synthesizer. It may be used to produce voice sound by triggering the synthesizer at non-regular intervals.

The MIDI (Musical Intstrument Digital Interface) synthesizer provides a way to play music on an external device via a MIDI synthesizer through the serial ports of the Macintosh II. Since the type of sound depends largely on the type and sophistication of the external equipment, the limits of its capabilities are largely hardware defined.

Pre-recorded sounds may be played back through the sampled sound synthesizer. The pitch, rate, and amplitude may be varied as the sound sample is played. The synthesizer has the ability to alternately play two buffers to provide uninterrupted sound as long as the buffers are refilled by the application when a channel of sound is completed.

If a programmer wishes to expand upon the synthesizers provided in the Macintosh II ROM, he may do so by defining a synthesizer or sound resource. The Sound Manager can call the new resources to play existing channels, using the rules defined by the new synthesizer. This feature permits developers the flexibility to develop external sound hardware via NuBus slots, while using the Sound Manager to provide a consistent interface for sound software.

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