

## Apple MIDI IN to Mockingboard or Phasor: Tone Generator, Visualizer, and Interaction

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The vision of this project is to explore the capabilities of Apple II series computers to process realtime MIDI input using available sound cards (Mockingboard and Phasor). It is similar to the 8-Bit Weapon MIDI DMS project that plays MIDI input using Apple generated sound waveforms, but instead offloads the sound generation to the sound card.

The Mockingboard offers 6 simultaneous voices and the Phasor offers 12 voices, so it is theoretically possible to implement a polyphonic MIDI tone generator using these devices.

Special effects may be achieved on these cards by quickly bit banging the volume register of each voice with values between 0 and 15.

The Passport MIDI Interface card has a modern reproduction available from A2Heaven when supply is available, with the manual available on [archive.org](http://archive.org).

The CPU speed is the limiting factor in the quality of MIDI capture and use of effects during playback.

A 1Mhz baseline would provide the minimum functionality for a set of MIDI devices which the Apple can read and successfully process in real time.

The Apple 2GS 2.8 Mhz speed will offer some performance improvement.

It is also possible to use an Arduino or similar device to receive the MIDI input and filter/throttle it to the Apple using a serial interface.

The MIDI DMS hardware does this by converting the MIDI note data into keystrokes sent over the serial interface.

The long term use case desirements envisioned are:

1. Instrumentalist playing a solo MIDI instrument using sounds from the sound card.
  1. Mono instrument (ex: wind controller) - using one sound channel for playback
  2. Mono instrument - using a mix of 3, 6, 9, or 12 voices for playback (experimenting with harmonics) - using built-in envelopes of AY chip
  3. Mono instrument - using custom realtime envelopes created by scaling MIDI velocity, volume, and envelope data into volume levels 0-15, possibly managed by a timer interrupt.
  4. Mono instrument - adding support for available MIDI effects such as breath controller, aftertouch, channel pressure, pitch bend implemented on the Mockingboard/Phasor.
  5. Poly instrument (ex: MIDI Piano) - using up to 12 voices for realtime playback

6. Poly instrument - using up to 4 voice polyphony on a Phasor, using 3 voices for playback of each note, using built-in envelopes of AY chip.
2. MIDI sequencer, computer, or other playback device sending multi-channel MIDI data to the Apple.
  1. Visualization of the MIDI note data being played on each channel.
  2. User decides which MIDI channel(s) are sent to the sound card.
  3. A file that sets up the channel configuration for a specific song can be saved and loaded.
3. Interaction
  1. User can solo or mute any of the 16 MIDI channels in real time.
  2. User can experiment with different voice allocation algorithms (ex: set split point, reserve voices for range of notes)
4. Alternate tunings
  1. Alternative MIDI note to pitch mappings can be loaded to experiment with tunings other than 440Hz.
5. Integration with other vintage computers.
  1. An Arduino front end can be a router for incoming MIDI data to multiple machines, each receiving data at a speed and method that it can handle.