Introduction to MIDI

Wikipedia Page on MIDI

Ok, so if you've found this site you probably already have some idea of what MIDI is, and you've probably even used it before. Maybe you use it everyday in the studio.

But, what exactly is MIDI*?*

Well, the short answer is simple: MIDI is a specification for digital communication between musical equipment, not a particular piece of hardware.

Ok, so what does that mean?

This is where it becomes more technical and we'll need to start breaking things into smaller pieces to become understandable. So, lets start with the basics.

MIDI is an acronym for Musical Instrument Digital Interface and it was one of the many brain childs of Dave Smith, daddy of such great synths as the Prophet 5 and Poly Evolver. MIDI has been around for some time now, particularly in “digital years” . When MIDI first became a standard most people were gawking at Apple IIe's ;)

So, what does MIDI do and why did Dave invent it?

What MIDI does is create a efficient way of communicating any bit of information about music: Note numbers, Note durations, Expression values, Tempo etc. It does this by assigning a special number to each kind of event and attaching that number to a value. Since digital circuits are good at dealing with numbers this is an efficient system for communicating information.

All a device that want to communicate via MIDI has to do is send the right number at the right time and all other connected devices will know what to do with it. If a device wants to receive MIDI events it simply has to listen to it's MIDI port for incoming events and respond to them by triggering it's internal processes.

The downside of being efficient in a computer is that raw MIDI information is hard if not impossible to read. You will need to study the detailed specification, become familiar with the number that represents each kind of event and the range of values each event has.

Doesn't sound too bad? Well, there is another hitch, MIDI numbers don't come in “normal” 1-10 values. MIDI is almost always written in Hexidecimal (or Hex for short), meaning each digit can be 1-F. That is 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, A, B, C, D, E, F. You get it? Let me explain a little more.

In Hexadecimal each digit can can be one of 16 values whereas we humans are used to each digit being one of 10 values. Instead of inventing new numbers for Hex people simply use the first 6 letters of the alphabet. So, A = 10, B = 11 etc. In order to tell the difference between the Hex number system and the decimal number system, hex is usually written like this: 0x01. The “0x” is to append the beginning of the number and is always the same.

Also see:

- About MIDI

Components Properties

For many people without a local electronics shop sourcing the proper components can really be a hassle. There are numerous different types of components and there seems to be no end to their variations. To make matters worse there is often little ryhme or reason behind how components are specified and labeled and sometimes it can be left to a new user to figure this out by trial and error. For those who are completely new, I would recommend checking out the electronics basics section .

- **Resistor Specifications**
  - Wattage rating
  - Ohms
  - Tolerance
- **Potentiometers specifications**
  - Taper
  - Wattage rating
  - Package
  - Dual/Single
  - Ohms
  - Tolerance
- **Capacitor specifications**
  - Capacitance
  - Voltage rating
  - Polarity
  - Capacitor types
    - Ceramic
    - Electrolytic
    - Polyester
    - Polystyrene
- Transistor Specifications
  - NPN, PNP and FET's

Microcontrollers

see Core Module

Programming

see Application Development

Getting started with electronics

/!\TO BE MERGED TO ELECTRONICS_BASICS/!

Due to the excellent hardware designs and the work of SmashTV and Mike who sell PCB's, Components, and kits, a beginning Midiboxer really doesn't need to know much about electronics. Reading the “Need To Know” section will get you up to speed and prepare you for basic assembly and troubleshooting. For those who are brave, the rest is dedicated to an in depth look at electronics for music.

The first thing to understand is that electronics is a HUGE field, far more diverse than computer programming (imo) or other similar technical feilds. If you are serious about this than you need to prepare, it will be months before you make it over the inital learning curves, at which point your reward is being able to see a dozen more learning curves ahead. Don't dispair though. There are plenty of people who will help someone who is willing to do their own work, and in alot of cases you really don't need to fully understand something to get satisfying results. In fact, many electronic designers these days have never touched a soldering iron! So take pride in your tiny bench cluttered up with half working modules, they are your creations! Now, once you've buckled up for the long ride start with these overviews:

Need To Know

- Identifying components
  - What is a Resistor?
    - Wattage rating
    - 5% Carbon resistors
    - 1% Metal film resistor
    - Color codes
  - What is a capacitor?
    - Ceramic
    - Electrolytic
    - Polyester
    - The cryptic art of identifying capacitor values
  - What is a diode?
    - Power diodes
    - Signal diodes
- Integrated Circuits
  - The “Black Box”
  - Common pin voltages for MBHP IC's
- Understanding current and voltage
  - Ohm's law
  - Kirchoff's laws
- Using a DMM
- Using a Soldering Iron
- Good bench practices
- Proper troubleshooting technique
- How to ask for help

Diodes, part II: Enter the semiconductor

As it turns out the humble diode is the gateway to everything we associate electronics with today. It all has to do with the material diodes are made of, materials classified as semiconductors because their conductive properties can be controlled using electricity. This is huge, real huge.

Linear devices

- The OTA

Logic devices

- Digital to Analog Converters and Analog to Digital Converters (DAC's and ADC's)
- Multiplexers and Switches

Electronic Fabrication

- What is a PCB?
- What kind of tools?

Also see:

- Parts

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