What Is MIDI?

Referenced from "Modern Recording Techniques"...

Simply stated, the Musical Instrument Digital Interface, or MIDI, is a digital communications language and compatible hardware specification that enables multiple electronic instruments, performance controllers, computers, and other related devices to communicate with one another within a connected network.

MIDI is used to translate performance- or control-related actions (such as playing a keyboard, selecting a patch number, or varying a modulation wheel) into equivalent digital messages. It then transmits these messages to other MIDI devices where they can be used to control their sound generation or control parameters in a performance setting. Alternatively, MIDI data can be recorded into a digital device (known as a *sequencer*) that can be used to record, edit, and playback MIDI performance data.

System Interconnection

MIDI enables 16 channels of performance, controller, and timing data to be transmitted—in one direction—over a single data line. Consequently, it's possible for a number of devices to be connected within a network through a single data chain for communicating MIDI messages.

A MIDI cable consists of a shielded, twisted pair of conductor wires that has a male 5-pin DIN plug located at each end. The MIDI specification presently uses only three of the possible five pins, with pins 4 and 5 being used as conductors for MIDI data, and pin 2 being used as a ground connection. Pins 1 and 3 currently are not in use but are reserved for possible changes in future MIDI applications.

Computer-Based Sequencers

Sequencers also are available as software packages that use the personal computer for performing central processing, memory, and I/O (input/output) functions. These systems are often powerful and extremely versatile in their speed, digital signal processing capabilities, memory management, and their capability to perform a diverse range of tasks under software control.

As you might expect, sequencing software is available for most Apple and IBM compatible machines. The majority of these computers require an external MIDI interface that is used for receiving and distrubuting MIDI data.

Computer based sequencers have several advantages over their hardware-based counterparts. One of the strongest advantages is easy visibility and access to both basic and advanced editing functions, resulting from the PC's extensive DSP and graphics capabilities. Using standard cut-and-paste methods it becomes a simple matter to move a musical segment from one track to another, cut a musical passage from a song and save it to clipboard memory for later use, or copy a passage to a track. In addition, the large screen and established graphics interface style make it much easier to perform a complex function. Graphics pattern editing also lets the user quickly and easily change the pitch, start, and duration of times of a note as it appears on the screen (in a style known as piano roll editing), often through the simple movement of a mouse.

Because computer-based sequencers make use of the PC's memory management capabilities, sequenced files can be easily stored onto either hard or floppy disks, while note capacity is usually restricted only by the PC's amount of internal RAM.

Sequencers

One of the most important devices in MIDI production is the MIDI sequencer. A sequencer is a digitally based device or a computer program that is used to record, edit, and output performance-related MIDI data in a sequential fashion. The recorded MIDI-related channel and system messages commonly represent real-time or non-real-time performance events such as note on/off, velocity, modulation, aftertouch, and continuous controller messages. After a performance has been "recorded" into a sequencer's or a computer's internal memory, the data can be edited and saved to hard or floppy disk. When the sequence is played back, the device outputs these MIDI messages to the various connected MIDI devices within the system to re-create the performance. Unlike a recorded performance in which the instrument's sounds are produced under the direct control of a live player, a sequencer communicates real-time performance data to various electronic instruments, which in turn produce the performed sound.

Most sequencers have a design similarity to their distant cousin, the multitrack tape recorder, in that MIDI data can be recorded onto separate "tracks" that contain isolated, yet related, performance material that is synchronous in time. Each of these tracks can be assigned to any MIDI channel and may contain any number of performance-and control-related messages (within the memory constraints of the device). When played back, the instruments and devices in the system that are assigned to a specific MIDI channel (0-16) respond only to track (or tracks) transmitting on that particular channel.

The number of individual tracks offered varies widely from one manufacturer and model type to the next and ranges from 8 to

over 500 tracks. Almost every system is capable of transmitting and receiving data over all 16 MIDI channels, although most professional sequencers can communicate data over two or more independent MIDI data lines, which enables them to address 32 or more separate MIDI channels.

Another important feature offered by most sequencers is the capability to edit MIDI data in the digital domain. Standard cut-and-paste editing techniques generally are offered, which enable segments of sequenced data to be cut, copied, or reinserted at any point in a track or to any other track. Complex algorithms for performing such tasks as velocity changes, modulation and pitch bend, transposition, and humanizing (the controlled randomization of performance data to approximate human timing errors that are generally present in a live performance), as well as control over program or continuous controller messages, can also be inserted and changed.

The MIDI Interface

Although both the MIDI protocol and the personal computer communicate through digital data, a digital hardware device known as a MIDI interface must be used to translate MIDI's serial message data into a structure that can be understood by and communicated to the computer's internal operating system. MIDI interfaces such as the Portman, Winman and the Midisport series, plus the BiPort 2x4/s, are available from www.midiman.net.