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new chapter on  
MIDI 2.0!

# THE MIDI MANUAL

A PRACTICAL GUIDE TO MIDI WITHIN  
MODERN MUSIC PRODUCTION

FOURTH EDITION



DAVID MILES HUBER

A Focal Press Book



# The MIDI Manual

*The MIDI Manual: A Practical Guide to MIDI within Modern Music Production*, Fourth Edition, is a complete reference on MIDI. Written by David Miles Huber (a 4× Grammy-nominated musician, producer and author), this best-selling guide provides clear explanations of what MIDI 1.0 and 2.0 are, acting as a guide for electronic instruments, the DAW, MIDI sequencing and how to make best use of them. You will learn how to set up an efficient MIDI system and how to get the most out of your production room and ultimately ... your music.

Packed full of useful tips and practical examples on sequencing and mixing techniques, *The MIDI Manual* also covers in-depth information on system interconnections, controllers, groove tools, the DAW, synchronization and more. For the first time, the MIDI 2.0 spec is explained in light of the latest developments and is accompanied with helpful guidelines for the long-established MIDI 1.0 spec and its implementation chart.

Illustrated throughout with helpful photos and screenshots, this is the most readable and clearly explained book on MIDI available.

**David Miles Huber** is a 4× Grammy-nominated producer and musician in the electronic dance and immersive genres, whose music has sold over the million mark. His dance performance style is energized and balanced out by lush beats and live acoustic instruments that combine to create a “Zen-Meets-Tech Experience”. His latest music can be heard at [www.davidmileshuber.com](http://www.davidmileshuber.com) and [www.davidmileshuber.bandcamp.com](http://www.davidmileshuber.bandcamp.com).

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# **The Midi Manual**

## **A Practical Guide to MIDI within Modern Music Production**

Fourth Edition

**David Miles Huber**

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# Foreword

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*The MIDI Manual* was first published in 1991. Nearly three decades later, the information in this new edition is still vital to anyone who wants to create music using today's technology.

The Musical Instrument Digital Interface (MIDI) specification was first introduced at the 1983 National Association of Music Merchants (NAMM) Show, with a simple primary goal: play a note on one MIDI hardware keyboard that's physically connected to another MIDI hardware keyboard, and have them both sound at the same time.

Yet this relatively modest specification continued to develop, adapt and expand. Today, you can connect a MIDI controller via wireless Bluetooth LE, and play and record hundreds of notes of software-based synthesis on your smartphone ... or program lighting changes in a Broadway play, for that matter.

The key to MIDI's continued evolution is the collaborative effort of an entire industry, from giant multinational corporations to single-person companies. They set aside their differences and competitive nature to embrace a spirit of cooperation and mutual respect. As one MIDI user said, *"MIDI is without a doubt an example of what happens when competing companies work together for common good. In no other industry before or since have we seen something so noble"*. MIDI has been connecting people, companies and products for almost 40 years – an unprecedented lifespan for a technical standard that started back when computer memory was measured in kilobytes, not gigabytes.

The MIDI specification's evolution is overseen by the MIDI Manufacturers Association (MMA), a volunteer, non-profit trade organization that works in tandem with AMEL, the Japanese equivalent. With their stewardship, MIDI's capabilities continued to grow after its introduction.

In 1991, the MMA adopted the Standard MIDI File specification, which simplified the sharing of MIDI recordings among users. That year also saw the adoption of MIDI time code, which synchronized MIDI sequencers and tape machines – and revolutionized how Hollywood scored movies.

In the late 1990s, music production started incorporating software-based synthesizers and digital audio workstations for music creation and editing, but you still needed a hardware MIDI controller to input music into your computer. MIDI controllers expanded beyond keyboards to guitars, drums, wind instruments, voice and more. Almost every instrument on the planet, from harmonicas to



bagpipes, has been adapted to generate MIDI control signals. When DJs went digital in the early 2000s, MIDI provided the standard interface among products, and because Apple, Google and Microsoft all support MIDI in their operating systems, MIDI is incorporated in literally billions of computers, tablets and smartphones. As music industry legend Craig Anderton says, “MIDI is in the DNA of all modern music productions. Many people don’t even realize how much of what they do would be impossible without MIDI, because it has been integrated so transparently, and successfully, into the musical mainstream”.

All of these innovations were achieved with the same basic set of messages (MIDI 1.0 protocol) agreed to in 1983. But by 2015, the MIDI 1.0 protocol had reached a dead end, because there was no room left in the spec for further expansion. Yet people clamored for more resolution, more channels, more expressive possibilities, smoother workflow and other advantages made possible by advances in computer technology. Other industries might have simply created a new specification, and said “sorry, your 40 years of equipment is obsolete. You’ve gotten enough use out of it anyway, just go buy all new gear”.

That wasn’t an acceptable answer for AMEI and the MMA, and thus began work on improving and enhancing the MIDI spec to meet the needs of not only today, but tomorrow – while remaining backward-compatible with the universe of existing MIDI gear. That work culminated in February 2020, with the adoption of MIDI 2.0. The main breakthrough was turning MIDI from a monolog, where one instrument sent messages to another, to a dialog, where instruments could talk with each other and provide functions such as auto-configuration. This was also the key to backward compatibility – if a MIDI device tried to start a conversation with another MIDI device and didn’t get an answer, it would know to fall back to the MIDI 1.0 protocol. MIDI 2.0 gear is now being designed, and the MMA gave David a sneak peak of the specifications so he could include a preview in this new edition. The latest information on MIDI 2.0 is always available from the MMA at [www.midi.org/](http://www.midi.org/).

But understanding MIDI 2.0 requires a firm background in MIDI 1.0. MIDI 2.0 isn’t a completely different language, it’s just “more MIDI”. So, all of the concepts described in David Huber’s *The MIDI Manual* still apply to MIDI 2.0 (and future expansions to come).

You would be hard-pressed to find a better reference to MIDI than *The MIDI Manual*. David not only understands MIDI, but explains it from a user’s perspective, because he has been creating and exploring MIDI’s creative possibilities for decades. We’re sure you will enjoy this book, and it can serve as your MIDI reference guide for many years to come.

Athan Billias  
Marketing Technology Strategy Manager  
Yamaha Corporation of America

Craig Anderton  
Author, Musician and Electronic Music Guru

## CHAPTER 1

# What Is MIDI?

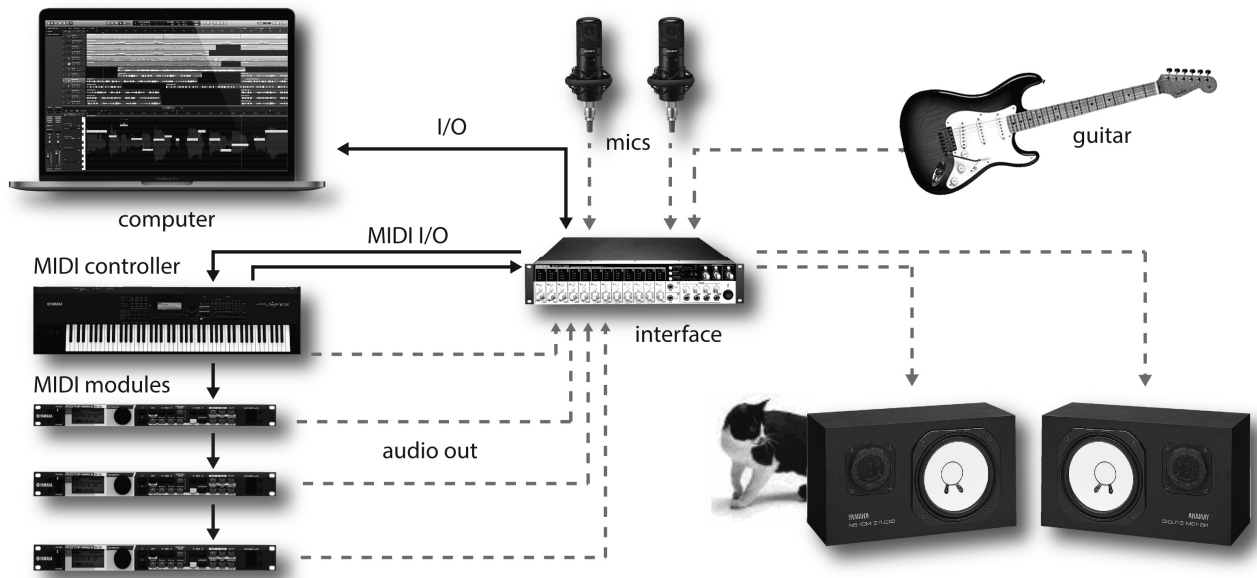
1

Simply stated, Musical Instrument Digital Interface (MIDI) is a digital communications language and compatible specification that allows multiple hardware and software electronic instruments, performance controllers, computers and other related devices to communicate with each other over a connected network (Figure 1.1). MIDI is used to translate performance- or control-related events (such as playing a keyboard, selecting a patch number, varying a controller modulation wheel, triggering a staged visual effect, etc.) into equivalent digital messages and then transmit these messages to other MIDI devices where they can be used to make music and/or control performance parameters. The beauty of MIDI is that its data can be recorded into the “sequenced” track of a software Digital Audio Workstation (DAW), where it can then be edited and transmitted to electronic instruments or other devices within a networked system.

In artistic terms, this digital language is an important medium that lets artists express themselves with a degree of flexibility, repeatability and control that, before its inception, simply wasn’t possible. Through the transmission of this control language, an electronic musician can create and develop a song or composition in a practical, flexible, affordable and fun production environment that can be tailored to his or her needs.

In addition to composing and performing a song, musicians can also act as creative producers, having complete control over a wide palette of sounds, their timbre (sound and tonal quality), overall blend (level, panning, effects, etc.) and other real-time controls. MIDI can also be used to vary the performance and control parameters of electronic instruments, recording devices, controllers and signal processors in the studio, on the road or on-stage.

The term “interface” refers to the actual data communications link between software/hardware systems within a connected MIDI network. Through MIDI, it’s possible for all of the electronic instruments and devices within a network to be addressed using real-time performance and control-related MIDI data messages throughout a system to multiple instruments and devices over one or more data networks. This is possible because a single, connected network is capable of transmitting a wide range of performance- and control-related data, in a way that allows creative individuals to record, overdub, mix and playback their performances in



**FIGURE 1.1**  
Example of a typical MIDI  
system with the MIDI network  
connections highlighted.

a working environment that loosely resembles the multitrack recording process. Beyond this, however, MIDI surpasses this analogy by allowing a composition to be edited, controlled and altered with complete automation and repeatability – providing a wide range of production possibilities that are well beyond the capabilities of the traditional analog and digital audio process.

## THE DIGITAL WORLD

One of the best ways to gain insight into how the MIDI specification works is to compare MIDI to a spoken language. As humans, we've adapted our communication skills to best suit our physical bodies and brains. Ever since the first grunt, we've found that it's easy for us to communicate with our vocal cords ... and we've been doing it ever since. Over time, language developed by assigning a standardized meaning to a series of vocalized sounds (words). Eventually these words came to be grouped in such a way as to convey meanings that can be easily communicated ... and, finally, written. For example, in order to write down the English language, a standard notation system was developed that assigned 26 symbols to specific sounds (letters of the alphabet) that, when grouped together, could communicate an equivalent spoken word (Figure 1.2). When these words are strung into complete sentences, a more complex form of communication is used that conveys information in a way that has a greater meaning. For example, the letters B, O, O and K don't mean much when used individually; however, when grouped into a word, they refer to a physical media form that hopefully conveys messages relating to a general theme. Changing a symbol in the word could change its meaning entirely; for example, changing the K to a T within the grouped word makes it refer to a handy thing that's better

b, o, o, k = (0100 0010)(0100 1111)(0100 1111) (0100 1010) =

(alpha-bits)

(digital words)

(book)

off worn on your feet than carried in a backpack (e.g., Dude, is that a book about pirate boots?).

Microprocessors and computers, on the other hand, are digital devices that obviously lack vocal cords and ears (although even that's changing). However, since they have the unique advantage of being able to process numbers at a very high rate, digital is the obvious language for communicating information at high speeds with complete repeatability.

Unlike our base-10 system of counting, computers are limited to communicating with a binary system of 0s and 1s (off and on). Like humans, computers group these binary digits (known as bits) into larger numeric "words" that represent and communicate specific information and instructions. Just as humans communicate using simple sentences, a computer can generate and respond to a series of related digital words that are understood by other digital hard- and software systems (Figure 1.3).

## WHAT MIDI ISN'T

For starters, let's dispel one of MIDI's greatest myths: MIDI does not communicate audio nor can it create sounds on its own! It is nothing more or less than a digital language that instructs a device or program to create, playback or alter

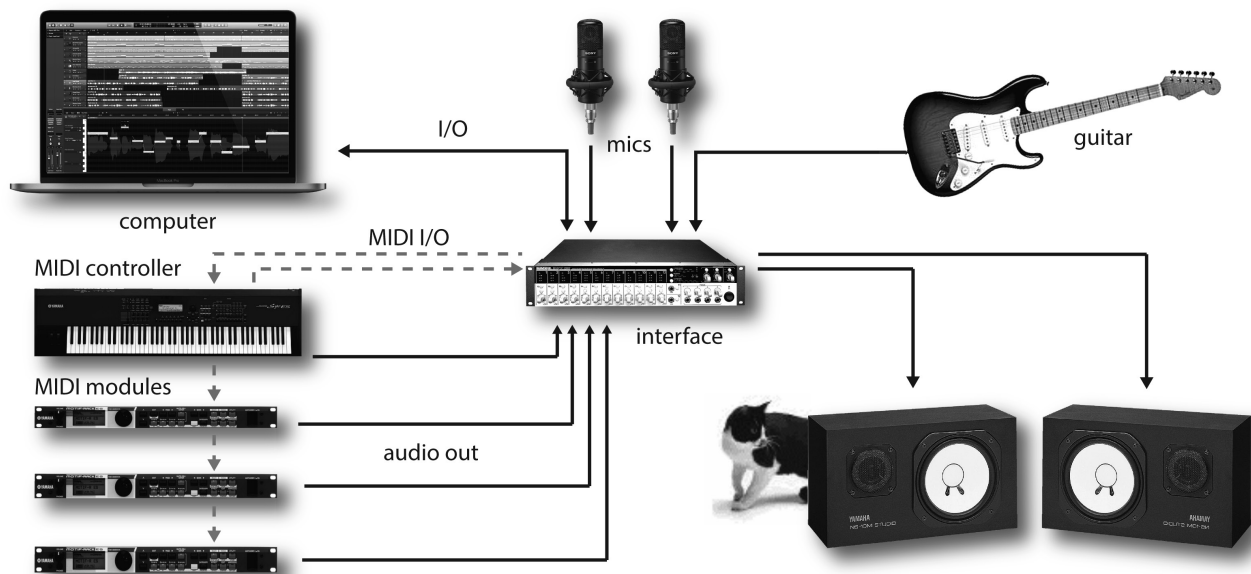
**FIGURE 1.2**

Meaning is given to the alphabet letters "b, o, o and k" when they're grouped into a word or placed into a sentence.

**FIGURE 1.3**

Example of a digitally generated MIDI message.





**FIGURE 1.4**  
Example of a typical MIDI  
system with the audio con-  
nections highlighted.

sounds. MIDI is a data protocol that communicates control info and parameter messages to instruct instruments and/or devices to generate, reproduce or control production-related functions. Because of these differences, the MIDI data path and the audio routing paths are entirely separate from each another (Figure 1.4). Even if they digitally share the same transmission cable (such as through USB, Thunderbolt, FireWire or LAN), the actual data paths and formats will remain completely separate.

Put another way, MIDI communicates information that instructs a digital instrument or device to play or carry out a function. It can be thought of as the dots on an old player-piano roll. When we put the paper roll up to our ears, we hear nothing, but when the cut-out dots pass over the sensors on a player piano, the instrument itself begins to make music. It's exactly the same with MIDI. A MIDI file or data stream is simply a set of instructions that pass down a wire in a serial fashion, but when an electronic instrument interprets the data ... only then can we begin to hear sound.

## WHAT MIDI IS

In everyday use, MIDI can be thought of as a compositional tool for capturing, editing and controlling production-related media. It's an amazingly powerful environment that, as with the digital world, is extremely chameleon-like in nature.

- It can be used in straightforward ways, allowing sounds and textures to be created, edited, mixed and blended into a composition.



- It can be used in conjunction with groove and looping tools to augment, control and shape a production in an endless number of ways and over a wide range of music genres.
- It is a tool for capturing a live performance (as a tip, if an instrument in the studio has a MIDI out jack, it's always wise to record it to a MIDI track on your DAW). The ability to edit, change a sound or vary parameters after the fact is a useful tool that could save, augment and/or improve a performance.
- MIDI, by its very nature, is a “re-amp” beast; the ability to change a sound, instruments, settings and/or parameters in post-production is largely what MIDI is all about. You could even play an instrument back in the studio, turn it up and capture the electronically generated sounds acoustically in the studio or bedroom by using mics ... there are practically no limits to your creative options.
- The ability to have real-time and post-production control over music and effects parameters is literally in MIDI's DNA. Almost every parameter can be mangled, mutilated and finessed to fit your wildest dreams – either during the composition phase or in post-production.

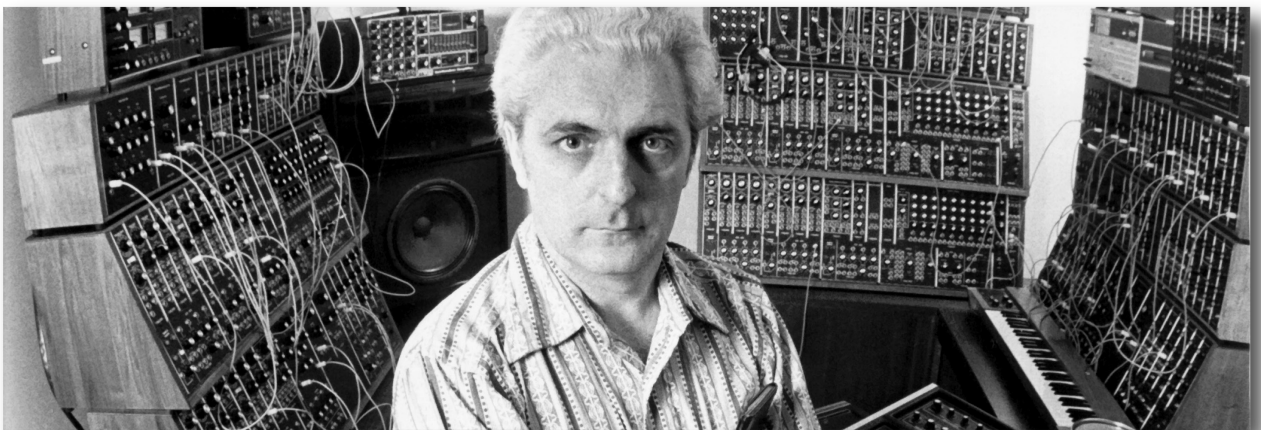
In short, the name of this game is editability, flexibility and individuality. There are so many ways of approaching and working with MIDI that there are few wrong ways to approach a project ... it's very individualistic in its nature. Because of the ways that a system can be set up, the various approaches by which the tools and toys are used to create music and sounds are very personal. How you use your tools to create your own style of music is literally up to you, both in production and in post-production... That's the true beauty of MIDI.

## MIDI 1.0 – A BRIEF HISTORY

In the early days of electronic music (Figure 1.5), keyboard synthesizers were commonly only monophonic devices (capable of sounding only one note at a time) and often generated tones that were often simple in nature. These limiting

**FIGURE 1.5**

The late, great synth pioneer Bob Moog, who was outstanding in his field. (Photograph courtesy of Roger Luther; [www.moogarchives.com](http://www.moogarchives.com).)



factors caused early manufacturers to look for ways to combine instruments together to create a thicker, richer sound texture (known as layering). This was originally accomplished by establishing an instrument link that would allow a synthesizer (acting as a master controller) to directly control the performance parameters of one or more other synthesizers (known as slave sound modules). As a result of these links, a basic control signal (known as control voltage or CV) was developed.

This simple yet problematic system was based on the fact that when most early keyboards were played, they generated a DC voltage that could directly control another instrument's voltage-controlled oscillators (VCO – which affected the pitch of a sounding note) and voltage-controlled amplifiers (VCA – which affected the note's volume and on/off nature). Since many keyboards of the day generated a DC signal that ascended at a rate of 1 volt per octave (breaking each musical octave into 1/12-volt intervals), it was possible to use this standard control voltage as a master-reference signal for transmitting pitch information to other synths. In addition to a control voltage, this standard required that a keyboard transmit a gate signal. This second signal was used to synchronize the beginning and duration times of each note. With the appearance of more advanced polyphonic synthesizers (which could generate more than one note at a time) and early digital devices, it was clear that this standard would no longer be the answer to properly controlling a connected system. Thus, new standards began to appear on the scene, thereby creating the crazy fun of having incompatible control standards. With the arrival of early drum machines and sequencing devices, standardization became even more of a dilemma.

Synchronization between these early devices was also problematic, as manufacturers would often standardize on different sync-pulse clock rates. Synchronizing incompatible systems could be extremely difficult, because they would lose their timing over a very short period of time, rendering sync nearly impossible without additional sync-rate converters or other types of modifications. Because of this mess, Dave Smith and Chet Wood (then of Sequential Circuits, a now-defunct manufacturer of electronic instruments) began creating a digital electronic instrument protocol, which was named the Universal Synthesizer Interface (USI). As a result of this early protocol, equipment from different manufacturers could finally communicate directly (e.g., a synth from one company finally worked with another company's sequencer). In the fall of 1981, USI was proposed to the Audio Engineering Society. During the following two years, a panel (which included representatives from the major electronic instrument manufacturers) modified this standard and adopted it under the name of Musical Instrument Digital Interface ... and the MIDI Specification 1.0 was born.

The strong acceptance of MIDI was largely due to the need for a standardized protocol, as well as the fast-paced advances in technology that allowed complex circuit chips and hardware designs to be manufactured cost-effectively. It was also due, in part, to the introduction of Yamaha's wildly popular DX-7

synthesizer in the winter of 1983, after which time keyboard sales began to grow at an astonishing rate.

With the adoption of this industry-wide standard, any device that incorporated MIDI into its design could transmit or respond to digital performance and control-related data that conformed to the MIDI 1.0 spec. For the first time, any new device that conformed to this spec would integrate into any existing MIDI system and actually work ... without any muss or fuss.

Over the course of time, new devices came onto the market that offered improved sound and functional capabilities that led to the beginnings of hardware/software instruments, controllers, effects and a whole world of gizmos that could be controlled in the MIDI environment. In fact, this explosion of software emulation and control has breathed a new degree of life into the common, everyday use of this amazing medium.

## MIDI 2.0 – A MORE RECENT HISTORY

For over 30 years, the MIDI 1.0 spec remained unchanged. This is a true testament to the hard work and dedication that the original members of the MIDI Manufacturers Association (MMA, [www.midi.org](http://www.midi.org)) and the Association of Music Electronics Industry (AMEI, its Japanese counterpart) put into making a spec that would withstand the test of time. However, at the 2019 winter National Association of Music Merchants (NAMM) Convention, it was announced that the spec was getting an overhaul and, in the fall of 2019, MIDI 2.0 was ratified for general industry use.

Within Chapter 3, we'll be taking an in-depth look into the changes and enhancements that went into the creation of MIDI 2.0, including bi-directionality, increased performance and controller resolution, expanded feature-sets, increased port/channel capabilities and so forth. Above all, the MMA and AMEI have made backwards compatibility a key requirement, stating that users can expect MIDI 2.0 and the related newer systems to work seamlessly with MIDI devices that have been sold over the past 33 years.

## WHY IS MIDI?

As we read, before MIDI, it was pretty much necessary to perform a musical passage in real time. Of course, there are a few exceptions to this statement. In earlier days, sounds could be created and re-created through the mechanical triggering of a musical device (music boxes and the aforementioned player piano come to mind). When tape-based recording came along in the middle part of the last century, it became possible to edit two or more problematic performances together into a single, good "take". However, when it came to the encoding of a musical passage and then faithfully playing it back – while still being able to edit or alter the tempo, notes and control variables of a performance – we were pretty much back in the horse-and-buggy days.



With the introduction of MIDI and electronic music production, a musical performance could be captured in the digital domain and then faithfully played back in a production-type environment that mimicked the traditional form and functions of multitrack recording. Basic tracks could be recorded one at a time, allowing a composition to be built up using various electronic instruments. But, here's the kicker: MIDI finally made it possible for a performance track to be edited, layered, altered, spindled, mutilated and (most of all) faithfully repeated with relative ease, under completely automated computer control. If you played a bad note ... you can simply fix it. If you want to change the key or tempo of a piece, just change it. If you want to change the expressive volume of a phrase in a song, just do it! Want to change the piano patch (sound) into a wildly gyrating synth ... no problem. These editing capabilities only hint at the full power of MIDI!

This affordable potential for future expansion and increased control throughout an integrated production system has spawned the growth of an industry that's also very personal in nature. For the first time in music history, it's possible for an individual to cost-effectively realize a full-scale sound production in their own time ... all within the comfort of one's own home or personal project studio.

I'd also like to address another issue that has sprung up around MIDI and electronic music production. With the introduction of drum machines, modern-day synths, samplers and powerful hardware/software instruments, it's not only possible but it is also relatively easy to build up a composition using instrument voices that closely mimic virtually any instrument that can be imagined. In the early days, studio musicians spoke out against MIDI, saying that it would be the robot that would make them obsolete. Although there was a bit of truth to this, these same musicians are now using the power of MIDI to expand their own musical palate and create productions of their own. Today, MIDI is being used by professional and nonprofessional musicians alike to perform an expanding range of production tasks, including music production, audio-for-video and film post-production and live on-stage production. Such is progress in the modern world.

## **MIDI IN THE HOME STUDIO**

It almost goes without saying that a vast number of electronic musical instruments, effects devices, computer systems and other MIDI-related devices are currently available on the new and used electronic music market. With the introduction of the large-scale integrated circuit chip (which allowed complex circuitry to be quickly and easily mass produced), many of the devices that make up an electronic music system have been made affordable to virtually every musician or composer, whether he or she is a working professional, aspiring artist or beginning hobbyist (Figure 1.6). This amazing diversity lets us build up a home project studio that's very personal in nature, allowing us to create an environment that best suits our own particular musical taste and production style ... all in the comfort of our own home.



## MIDI ON THE GO

Of course, MIDI production systems can appear in any number of shapes and sizes and can be designed to match any production and budget need. For example, these days, on-the-go musicians can often be seen pulling out their laptops, portable keyboard and headphone/ear buds to lay down a track on a plane, bus or simply laying by the pool with a margarita at hand. Even more portable toys, such as the iPad, might be the tool of choice for getting the job done while you're drifting down a slow river in a small boat. Obviously, these small systems have gotten powerful enough that they can let us compose, produce and mix virtually anywhere (Figure 1.7).

**FIGURE 1.6**

Gettin' it all going in the project studio. (Courtesy of Yamaha Corporation of America; [www.yamaha.com](http://www.yamaha.com).)

## MIDI IN THE STUDIO

MIDI has also dramatically changed the sound, technology and production habits of the recording studio. Before MIDI and the concept of the home project studio, the professional recording studio was pretty much the only place that allowed an artist or composer to combine instruments and sound textures into a final recorded product. Often, the process of recording a group in a live setting

**FIGURE 1.7**

Between takes. (Photograph courtesy of M-Audio, a registered trademark of inMusicBrands, LLC; [www.m-audio.com](http://www.m-audio.com).)



**FIGURE 1.8**

MIDI in the studio. (Courtesy of Steinberg Media Technologies GmbH, a division of Yamaha Corporation, [www.steinberg.net](http://www.steinberg.net).)

was (and still can be) an expensive and time-consuming process. This is due to the high cost of hiring session musicians and the hourly rates that are charged for a professional studio – not to mention Murphy’s studio law, which states that you’ll always spend more time and money than you thought you would in an effort to capture that elusive “ideal performance”.

With the advent of the DAW and MIDI, much of the music production process can now be preplanned and rehearsed (if not totally produced and recorded) before you step into the studio (Figure 1.8). This out-and-out luxury has drastically reduced the number of hours that are needed for laying down recorded tracks to a cost-effective minimum. We’re all aware that it’s often the norm for musicians to record and produce entire albums in their own project studios. If the artist doesn’t feel that they have the expertise to see the process through to its final form (it’s often a wise person who knows their limitations), the artist(s) could print the various instrument tracks into the DAW and then bring the session files into a professional studio (obviously, a much easier process than lugging all of their equipment around).

In essence, through the use of careful planning and preproduction in the home or project studio, a project can be produced in a pro-environment in a much more timely fashion (and hopefully on budget) than would otherwise be possible.

## MIDI IN AUDIO-FOR-VISUAL AND FILM

Electronic music has long been an indispensable tool for the scoring of full-feature motion picture sound tracks, as well as in the production and post-production of television commercials, industrial videos, television shows and the like (Figure 1.9). For productions that are on a tight budget, entire scores will often be written and produced in a project studio at a mere fraction of what it might cost to hire musicians and a studio.

Even mega-budget projects make extensive use of MIDI in their pre-production and production phases, as it’s the norm that sound cues and orchestral scores



for such projects to be composed, edited and finessed into a MIDI version of the composer's score before the final score can be printed and distributed to the musicians at the final scoring session.

## MIDI IN LIVE PERFORMANCE

Electronic music production and MIDI are also very much at home on the stage. Obviously, MIDI has played a crucial role in helping to bring live music to the masses. The ability to sequence rhythm and background parts in advance, chain them together into a single, controllable sequence (using a jukebox-type sequencing program) and then play them on stage has become an indispensable live-performance tool for many working musicians. This technique is widely used by solo artists who have become one-man bands by singing and playing their guitar to a series of background sequences.

Again, the power of MIDI lies in the fact that much of a performance can be composed and produced before going on stage or on tour. Also, MIDI can be used in on-the-fly improvisation, adding a fresh and varied feel to the performance for both those on stage and in the audience. In addition to communicating performance data, MIDI controllers can provide a wide range of control over performance parameters in real time.

In addition to the musical performance, MIDI will often play a strong role in the production and execution of on-stage lighting and special effects. Most modern-day lighting boards are equipped with a MIDI interface, allowing full control over lighting from a sequencer, loop-based controller or MIDI control surface in a way that can pause, vary and execute scene changes in a more interactive and on-the-spot manner (while still allowing scenes to be solidly synchronized to the basic script, when needed).

The ability to offer control over a pre-programmed sequence or interactive video loops has put MIDI directly into the driver's seat when it comes to on-stage and venue visuals and video playback. Many bars and music acts are beginning to integrate visuals into their overall presence – so much so that VJs now stand

**FIGURE 1.9**

MIDI for visual media can be made a major production facility or it can be produced just as easily in a home production environment.

alongside their bandmates on-stage, offering up compelling visuals that can be diced, sequenced and scratched in forms that instantly switch from being totally chaotic to being in perfect sync and then back again.

## MIDI AND MULTIMEDIA

One of the “media” in multimedia is definitely MIDI. It often pops up in places that you might expect – and in others that might take you by complete surprise. With the advent of General MIDI (a standardized specification that makes it possible for any soundcard or GM-compatible device to play back a score using the originally intended sounds and program settings), it’s possible (and common) for MIDI scores to be integrated into multimedia games, text documents, CD-ROMs and even websites. Due to the fact that MIDI is simply a series of performance commands (unlike digital audio, which actually encodes the waveform data), the media’s data overhead requirements are extremely low. This means that almost no processing power is required to play MIDI, making it the ideal medium for playing real-time music scores while you’re actively play a game or browse text, graphics or other media over the Internet. Truly, when it comes to weaving MIDI into the various media types, the sky (and your imagination) is the creative and technological limit.

## MIDI ON THE PHONE

With the integration of the Mobile Downloadable Sounds (DLS) Spec into almost all mobile media devices, one of the fastest-growing General MIDI applications is probably comfortably resting in your pocket or purse right now. We’re talking about the synthesized music, game sounds and ringtones on your cell phone. The ability to use MIDI (alongside digital sound) to let you know who is calling has spawned an industry that allows your cell to be personalized and super fun. One of my favorite ring tone stories happened to me on Hollywood Boulevard in LA. This tall, lanky man was sitting in a café when his cell phone started blaring out the “If I Only Had a Brain” sequence from *The Wizard of Oz*. It wouldn’t have been nearly as funny if the guy didn’t look “a lot” like the scarecrow character. Of course, everyone broke out laughing.



## CHAPTER 2

# The MIDI 1.0 Spec

13

The Musical Instrument Digital Interface is a digital communications protocol. That's to say, it is a standardized control language and hardware specification that makes it possible for electronic instruments, processors, controllers and other device types to communicate performance and control-related data in real time. Founded in 1983 by a small group from various manufacturers, the MIDI 1.0 protocol has been instrumental in making it possible for all almost all electronic instruments to seamlessly communicate over a connected network. As the MIDI 1.0 spec is fully implemented within the 2.0 spec, it's important that it be covered in its entirety.

MIDI 1.0 is a specified data format (and a complete sub-set protocol within MIDI 2.0) that must be strictly adhered to by those who design and manufacture MIDI-equipped instruments and devices. Because the format is standardized, you don't have to worry about whether the MIDI output of one device will be understood by the MIDI in port of a device that's made by another manufacturer. As long as the data ports say and/or communicate MIDI, you can be assured that the data (at least the basic performance functions) will be transmitted and understood by all devices within the connected system. In this way, the user need only consider the day-to-day dealings that go hand-in-hand with using electronic instruments, without having to be concerned with data compatibility between devices.

## THE MIDI MESSAGE

MIDI digitally communicates musical performance data between devices as a string of MIDI messages. These messages are traditionally transmitted through a standard MIDI line in a serial fashion at a speed of 31,250 bits/sec. Within a serial data transmission line, data travel in a single-file fashion through a single conductor cable (Figure 2.1a); a parallel data connection, on the other hand, is able to simultaneously transmit digital bits in a synchronous fashion over a number of wires (Figure 2.1b).