

# Planning and Designing a MIDI Home Studio

By Eddie Konczal

## Defining the goal

This document describes how I will plan and design a MIDI home recording studio.

MIDI, an acronym for Musical Instrument Digital Interface, is a communications protocol that allows synthesizers, keyboards, computers, and other electronic musical devices to communicate with each other (Lipscomb 1). I currently own several musical instruments and devices that are MIDI-compatible. By integrating these items into a home studio I hope to become more productive as a musician and composer. The studio should provide the following specific functions:

- Facilitate composition by recording, editing, and playing back MIDI music data played from synthesizers
- Produce CDs of original music
- Print sheet music to be used in copyrighting musical works

By developing a home studio that meets the above criteria, I plan to save the time, money, and inconvenience involved in hiring third-party professionals and firms (such as recording studios, music copyists, and CD duplication outfits). I also hope to create a comfortable environment in my own home that will enhance the creative process, and circumvent the compromises that relying on others often entails.

## Background

The MIDI technology for connecting musical instruments was unveiled at the first NAMM (North American Music Manufacturers) convention in 1983 (Lipscomb 1). The developers demonstrated that two synthesizers connected via MIDI cables could send musical note data to each other, thereby allowing both instruments to be heard when one or the other was played. After the NAMM convention, manufacturers of musical instruments adopted MIDI as an industry standard for allowing their products to communicate with each other. MIDI now allows synthesizers, keyboards, samplers, drum machines, and computers to communicate much in the same way that the Internet allows communications between personal computers (Lipscomb 2).

My own musical career began shortly after the introduction of MIDI. I purchased my first MIDI synthesizer in 1985. Since then I have played in musical bands and for personal enjoyment, acquiring several MIDI-compatible instruments and devices along the way. I also possess a home computer, which is outfitted with a sound card that can be interfaced to MIDI devices. Although my instruments have not been organized into a functional recording studio, I have been able to record original music in home studios of friends and bandmates. From these experiences I have witnessed the powerful capabilities of home studios driven by the MIDI technology.

## Steps towards achieving the goal

*Step 1: Determine which items are needed for the studio.* I used Barnes (MIDI 1-3) to develop a checklist to determine which items I need in addition to those I already own. I updated the checklist to replace “cassette recorder” with “CD writer.” CD writers, devices that allow compact discs to be created with a home computer, have emerged in recent years as a more

permanent and lower cost alternative to cassette tapes. Table 1 below, “Items needed for MIDI Home Studio,” illustrates which items I own and which ones I need to purchase.

**Table 1: Items needed for MIDI Home Studio**

<b>Essential Items</b>	<b>Owned</b>
keyboard	yes
sequencer (stand-alone or computer-based)	no
expander	yes
amplifier	yes
speakers	yes
CD writer	no
<b>Non-essential items</b>	
hard disk recorder	no
mixer	yes
computer	yes
synchronizer	no
drum machine	yes
sampler	yes
reverb unit	yes
microphones	no
compressor	no
<b>Ancillary Items</b>	
stands	yes
cables	yes
headphones	no
foot switch	yes
recordable CDs	no
MIDI patch bay	yes

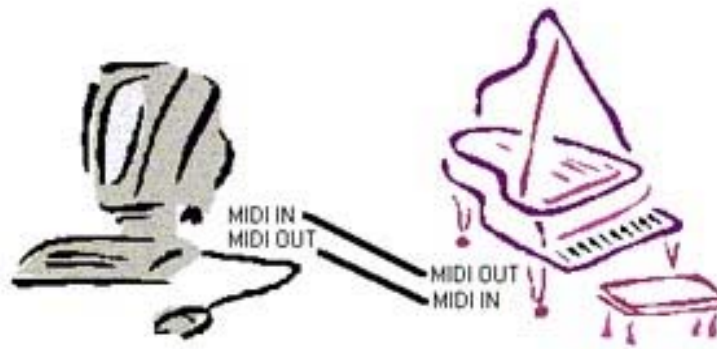
A review of Table 1 shows that I need to purchase a sequencer and a CD recorder. A sequencer records MIDI data, such as musical notes, and sends this data out to instruments for playback (Barnes, *Music* 9). These capabilities make a sequencer the driving force of any MIDI studio. The CD writer will allow reproduction of the finished music in a permanent format.

Most of the non-essential items (microphones, synchronizer, and compressor) allow recording of acoustic instruments and voice. I decided to defer these items since they do not

serve the required functions of the studio. Later in the report, I will evaluate the necessity of a hard disk recorder. Ancillary items, particularly a pair of headphones and a supply of recordable CDs, round out the studio.

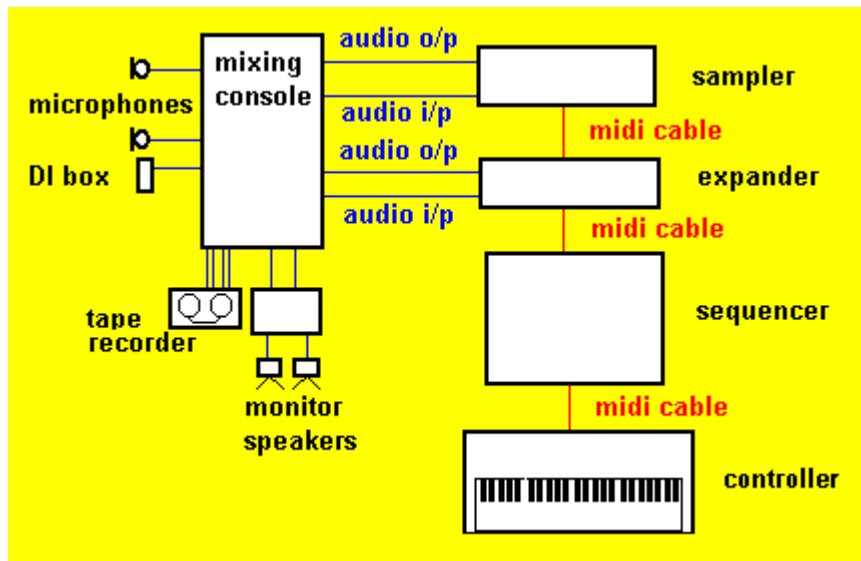
In terms of estimated costs, I would like to set an initial budget of \$1000 to \$2000 to purchase the additional items for the studio. Most people starting home studios invest within this price range (Maschino 1).

*Step 2: Designing the layout of the studio.* Once all the necessary items have been acquired, planning how they all fit together is essential. In its simplest design, a MIDI studio consists of a single MIDI keyboard and a computer with sequencing software installed. A MIDI cable links the keyboard's MIDI OUT jack to the computer's MIDI IN jack, allowing the computer sequencer to record music data played by the keyboard. Another MIDI cable runs from the computer's MIDI OUT jack to the keyboard's MIDI IN, so that the sequencer can send the recorded data to the keyboard for playback. Figure 1 below illustrates this simple setup (Long 2).



**Figure 1: Basic MIDI Studio**

Since my home studio will include several MIDI devices, and will also require recording of audio, the layout becomes more complex. Figure 2 (Barnes, [MIDI 4](#)) shows an advanced studio design with audio connections and multiple MIDI instruments. These instruments include a sampler, which digitally reproduces the sound of acoustic instruments (Barnes, [Music 4](#)), and



**Figure 2: Recording studio equipment connections**

an expander, which is essentially a synthesizer without a keyboard (Barnes, [MIDI 1](#)). The audio connections (denoted in Figure 2 as “audio o/p” for “audio output” and “audio i/p” for “audio input.”) route sound from the MIDI instruments to the mixing console. The mixing console coordinates the sound and routes it to a tape recorder and monitor speakers. A computer with sequencing software installed may replace the sequencer in the diagram, while a CD-writer installed in the computer replaces the tape recorder.

## Considering the alternatives

*Alternatives to a Home MIDI Studio.* Renting time in a professional recording studio is one alternative to setting up a home studio. This alternative would result in professional quality recordings. Also, employing recording engineers would save me the time of having to learn the

basic sound and MIDI techniques required for running a home studio. However, the drawbacks of relying on recording studios ultimately outweigh these advantages. The main disadvantage is cost. Expensive bills can be run up in professional studios, making mistakes and bad sessions costly (Aiken 52). Recording studios do not ordinarily produce sheet music or finished CDs; these functions require additional professional services at extra costs. Aside from monetary concerns, there would also be a loss of freedom and comfort. Reliance on a recording studio eliminates the convenience and spontaneity that a home studio offers during a burst of inspiration (Aiken 52).

Setting up a tape-based home studio offers another alternative to a MIDI-based home studio. In this scenario, analog tape recording devices replace the computer in recording and editing the music (Marans 76). The overall design is similar to Figure 2, but the sequencer is omitted and a multi-track cassette recorder replaces the mixing console. This configuration eliminates complex MIDI computer configurations and software applications as well as the sequencer, resulting in simplicity and potentially lower costs. However, the drawbacks of a tape-based system seem to outweigh the gains. Unlike computer-based studios, tapes introduce distortion or “noise”, making it difficult to achieve CD-quality recordings (Marans 76). Also, tape recorders do not facilitate editing or manipulating musical tracks as well as MIDI sequencers do. With MIDI-based recording, a click of a mouse or a push of a button fixes a wrong note or moves an entire section of music. Tape recording necessitates re-recording part or all of the performance, which consumes much more time. Finally, tape systems do not offer all the functionality of MIDI software, such as printing musical scores.

*Alternatives within the Home MIDI Studio.* Alternatives exist within the realm of home MIDI recording that determine the cost and functionality of the studio. In Table 2, “Essential

and Ancillary Items Not Owned”, I summarize the items needed for the MIDI studio, to illustrate the options within this project:

**Table 2: Summary of Items Needed for Studio**

Items needed	Importance
sequencer (hardware or computer-based)	essential
CD writer	essential
hard disk recorder	non-essential
headphones	ancillary
recordable CDs	ancillary

First, I must decide whether to use a stand-alone (hardware) sequencer or a computer-based sequencer. Barnes (10) considers a computer sequencer “superior in the vast number of facilities it offers,” as well as more cost effective since the computer can be used for other tasks. A stand-alone sequencer does offer portability. However, since I intend to record at home, this advantage does not justify the loss of functionality and cost-effectiveness.

The possibility of adding a hard-disk recorder to the studio presents another alternative. This option offers another method of editing recorded music, and allows the creation of CD-quality master recordings (Marans 78). Adding a hard-disk recorder does not necessarily add significantly to the cost of the studio, since most music software applications now incorporate both sequencing and hard-disk editing capabilities (Morris 1-2).

### **Choosing from among the alternatives**

Deciding on a final course of action requires considering the pros and cons of all alternatives. Table 3 summarizes the advantages and disadvantages of all the options discussed so far:

**Table 3: Comparing home MIDI studio to alternatives**

Option	Advantages	Disadvantages
Professional recording studio	Highest quality recordings possible	Most expensive option in long run; additional professional services required; less convenient than home recording
Home multi-track tape recording	Simplicity of design; potentially lower cost	Lowest quality recordings; music less easily manipulated; does not produce musical scores
Home MIDI studio (computer sequencer)	CD-quality recordings possible; most cost effective option; computer and most other components already owned	Initial investment in time and money relatively expensive
Home MIDI studio (hardware sequencer)	Portability	Less functionality than computer sequencer; less cost-effective than computer

A home MIDI studio with computer-based sequencer seems preferable to the alternatives based on the advantages and disadvantages of all the options. I already own most of the necessary devices, which reduces the cost outlay and minimizes the drawbacks. The remaining items to be purchased will total approximately \$800, a significant but affordable investment and well below the original estimated budget. (See Table 4 below, “Startup Costs of Home Studio,” for a summary of the costs). A home MIDI studio therefore provides more “bang for the buck” than the other alternatives. Relying on a professional studio introduces prohibitive costs and a loss of convenience and comfort. The other options sacrifice either recording quality or added functionality, without offering any cost savings or other significant advantages.

**Table 4: Startup Costs of Home Studio**

<b>Item</b>	<b>Brand &amp; Model</b>	<b>Cost</b>	<b>Source</b>
Computer Sequencer/ Audio Software	Cakewalk Sonar XL	\$499.99	Guitar Center Monster Deals catalog, October 2001
Headphones	AKG K301M	\$69.99	Guitar Center Monster Deals catalog, October 2001
CD-Writer	Yamaha CRW- 2200EZ	\$199.99	www.cdw.com
CD-RW media	Imation CD-RW Media 20-pack	\$25.39	www.cdw.com
<b>Total Costs</b>		<b>\$795.36</b>	

## Conclusion

The initial plan of building a home MIDI studio remains the most attractive option for a variety of reasons. A computer-based MIDI setup offers all the functionality I am seeking in a home studio: compositional tools, high-quality recordings, and the ability to produce sheet music. I can complete the studio by combining new items with those already owned, and remain under my established budget. Finally, after considering all the alternatives, I am confident that a home MIDI studio is the best way for me to take advantage of today's recording technology. I look forward to pursuing my plan, using the knowledge gained from producing this report.

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