

# USING MIDI

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It's finally time to look at what makes up a MIDI system. With an understanding of the INs, OUTs, and THRUs of MIDI, everything in this section should come together for you.

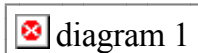
A MIDI system starts with some instruments. You need one as a master controller on which to perform. You also need one more additional MIDI instruments slaved to the controller for additional parts or sounds. To complete the studio, you will want a sequencer--which can be a stand-alone model or one that runs on your personal computer--and all the audio equipment needed to hear everything. Finally you'll need one or more people--including yourself--to create, play and listen to music.

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## MASTER/SLAVE

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A MIDI system can be as simple as two instruments connected together with a single MIDI cable (*Diagram 1*). This could be a basic live performance situation.



In this setup, playing on the master keyboard will play both instruments, as long as they are set to the same MIDI channel. The next level of sophistication would be to add a third instrument or more. This can be done either by using the MIDI THRU port of the first slave instrument, or by using a MIDI Thru Box or patchbay, which have one MIDI IN and several MIDI THRUs. This is still a setup for a live performance.

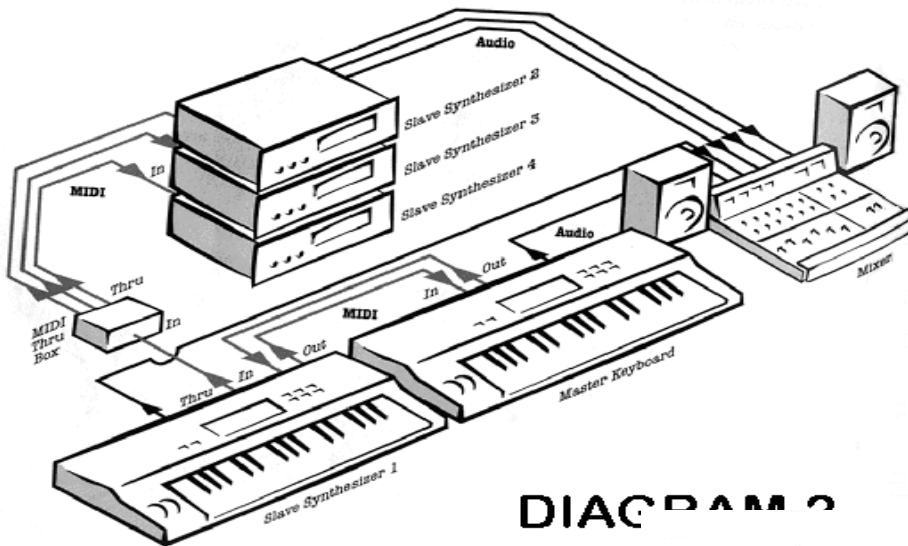


DIAGRAM 2

- In *Diagram 2*, MIDI OUT from the master keyboard goes to MIDI IN of the first slave instrument.
- The MIDI THRU of the slave repeats the data from the sender on the second slave instrument.
- Both slaves are set to the same MIDI channel as the master.

- In *Diagram 3*, MIDI OUT from the master keyboard goes to MIDI IN of a MIDI Thru box.
- Each MIDI OUT of the Thru box goes to the MIDI IN of a slave instrument.
- All slaves are set to the same MIDI channel as the master.
- Some Thru boxes have switches to select which MIDI OUTs send MIDI and which do not. This allows for quick selection of sound layers with the various slaves.

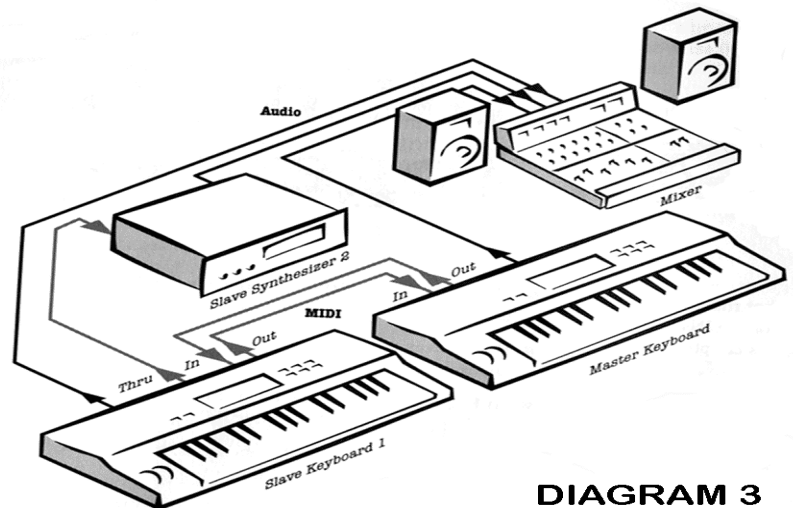


DIAGRAM 3

Both systems work perfectly well, and there is no real advantage to one or the other. Using a Thru box makes it possible to add even more instruments without building a long chain of MIDI THRU's to MIDI INs on the instruments themselves, which is easier and more flexible in larger setups for live performances.

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# SEQUENCING

**Sequencers can either be software or hardware based. Software-based sequencers are programs require a personal computer to operate. MIDI sequencers are available for all popular computers. Hardware, or "stand-alone" sequencers are complete by themselves. They are more compact and portable than computer sequencers, but are not as versatile for editing the music inside the machine. Some hardware sequencers come with synthesizer and drum machine capabilities built in, making them ideal for live music situations where a prerecorded accompaniment is needed.**

**For composing and arranging music, no MIDI studio is complete without a sequencer. Here's how to connect a keyboard synthesizer, a sequencer and one or more additional MIDI instruments. *Diagram 4* illustrates a very typical MIDI system.**



- The MIDI OUT of the keyboard goes to the MIDI IN of the sequencer to send MIDI data to it.
- The sequencer, with a single MIDI IN and OUT needs to send data to several destinations. By using a MIDI Thru box, the output of the sequencer is split and sent to each receiving instrument's MIDI IN, as well as going back to the master keyboard's MIDI IN for playback.
- When not recording, the sequencer passes all data from its MIDI IN to its MIDI OUT port. Most sequencers can change the MIDI channel of the

incoming data in order to direct it to the desired slave instrument set to the same channel. Doing so lets you preview each part on the synthesizer of your choice from the master controller.

**Multitimbral synthesizers are used like any other MIDI instrument, only now a single box is capable of performing many parts by responding to many MIDI channels at a time. The setup is the same, only**

**With the addition of a sequencer, a drum machine may not be far behind (unless you are far behind on the payments for your sequencer). The setup will be something like in *Diagram 6*.**

**DIAGRAM 6**

- The main sequencer transmits MIDI Clocks based on the temp you've set.
  - The drum machine's MIDI IN is connected to the MIDI OUT of the sequencer, and will synchronize its performance to the master sequencer.
  - The drum machine is set to MIDI Sync Mode, as opposed to Internal Sync Mode. This slaves its performance to the master sequencer.
  - Once the machine is connected and set to the proper mode, the master sequencer will run the drum machine via MIDI -- you need not touch the drum machine to start or stop it.
  - Be sure that the MIDI Channel of the drum machine isn't the same as another slave synthesizer, or you'll get extra notes being played on the drums.
- The diagram shows two electronic devices. On the left is a 'Sequencer' with a 'MIDI Out/Thru' port. On the right is a 'Drum Machine' with a 'MIDI In' port. A cable connects the Sequencer's MIDI Out/Thru port to the Drum Machine's MIDI In port. The Drum Machine is labeled 'Drum Machine Slaves to MIDI Clock'.
- DIAGRAM 6**

**Programming rhythms on a drum machine is, for many people, easier and more intuitive than using a keyboard and sequencer. The pads used for triggering the drums are better organized than tapping keys on a piano-style keyboard. The looping method of sequencing used by drum machines makes creating and editing each rhythm easier than most sequencers. In many cases, the rhythmic accuracy of drum machines is superior to a standard MIDI sequencer. In short, the MIDI drum machine has been optimized for doing one thing well—recording and organizing drum and percussion parts for songs.**

# PATCHBAY

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route MIDI from each synth only as needed for the librarian program. You'll never need to touch a cable again.

As the sophistication of your music systems grows, the necessity for organizing the connection between the various components becomes more and more apparent. Recording studios, for example, require an enormous amount of audio equipment, each piece having inputs and outputs. It is often necessary to change the way components are connected: the output of a tape track may need to go to a mixer at one point and to a delay device next. A microphone can be connected to an input channel of the mixer, to a compressor, or to a special effects device. This is called a patching. As a musical situation changes, so does the patching of the system.

So, add a MIDI patchbay to the list of MIDI devices you might require. If you have just one or two MIDI instruments, or do not use a patch librarian, a MIDI patchbay is not essential. However, if you find it necessary to change MIDI cables in order to perform different tasks, these devices are definite time-savers.

A typical MIDI patchbay has several MIDI INs and MIDI OUTs. By using controls on the patchbay's front panel, it can route any IN to any OUT. A patchbay may also have memories, so that various routing setups can be stored for recall later. Many patchbays will respond to MIDI program change messages to change from one setup to another. Some patchbays are able to merge two or more INs to the same OUT. It is also possible to route one input to go to several outputs in order to split the MIDI information like a simple MIDI thru box.

MIDI patchbays are highly recommended in a MIDI system with a patch librarian and a personal computer. Most sequencer or computer MIDI interfaces have only a single MIDI IN port. That precious input is needed most of the time by the master keyboard. If you need to do a System Exclusive data transmission from a synthesizer module instrument into the patch librarian program, you would have to unplug the keyboard in order to connect the other instrument, then put everything back to resume sequencing. A patchbay solves this problem by allowing you to choose the way all the MIDI messages will be routed for a given application.

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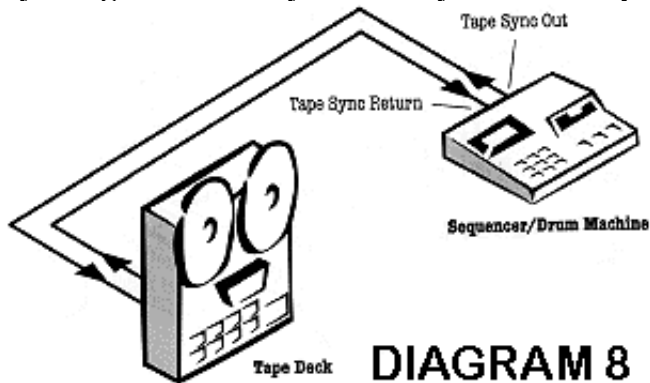
## *SYNCHRONIZATION*

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Synthesizers don't replace the need for recording live parts onto audio tape on occasion. If you are a songwriter, you will want to record lead and background vocals. Almost any type of music benefits from the addition of some "real" instruments or voices. The wonderful thing about working with MIDI sequencers and multitrack tape is that the synthesizer parts never have to be recorded to the tape. MIDI sequencers and tape can be synchronized together, so MIDI parts are in the sequencer and acoustic parts are on multitrack tape, both working together as one. When finished, the whole piece can be mixed and recorded to a stereo master tape. Welcome to the "virtual studio."

Most sequencers, computer MIDI interfaces, and drum machines have built-in sync to tape. Tape sync is a special audio signal created by a MIDI device that is recorded onto one track of the multitrack tape and then played back into the device. It's simple to use. The sequencer can record or playback while locked to the sync signal tape.

All sequencers and drum machines have special timing clocks that maintain the tempo to which you set them. Tape sync converts this clock into tones that are recorded onto tape as shown in *Diagram 8*. The sync signal is usually labeled sync out or tape out on most devices.



Three technologies are available for synchronizing sequencers to tape. Virtually every sequencer or special tape synchronizer uses one of these:

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- FSK (Frequency Shifted Keying)
- Smart FSK (with Song Position Pointer)
- SMPTE Time Code

Using a multitrack recorder, even the most basic four-track cassette studio, gives more power to any MIDI system. In addition to recording voices or other instruments, you can also synchronize and overdub your synthesizers onto tape, which effectively gives you the sound of many more instruments than you actually have. If there are more parts in your music than you have instruments available, a few parts can be recorded at a time on each track of the tape machine by synchronizing the sequencer. You can also take advantage of layering several instruments onto a track of the tape for a single part to get a bigger, lush sound.

