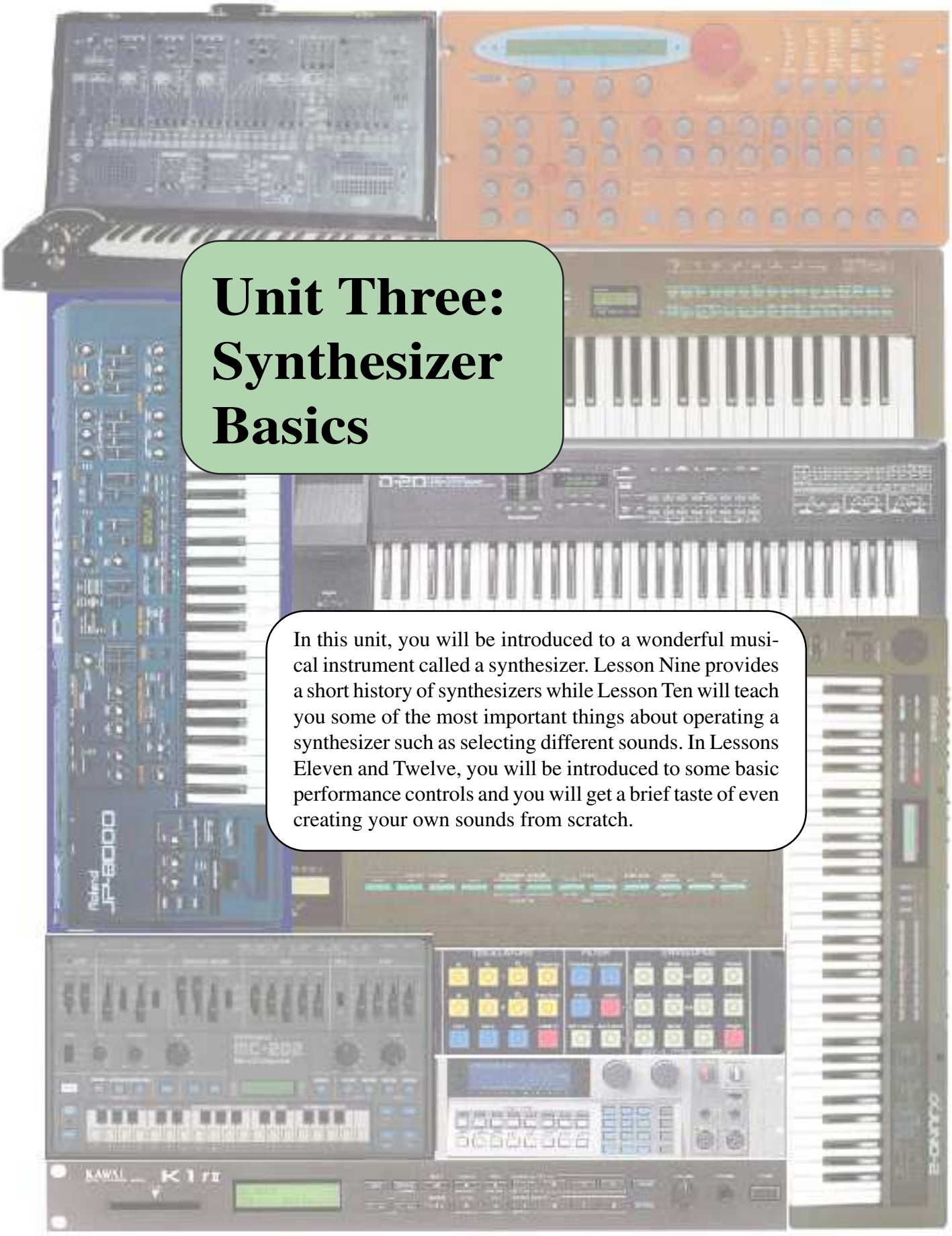


Unit Three: Synthesizer Basics

In this unit, you will be introduced to a wonderful musical instrument called a synthesizer. Lesson Nine provides a short history of synthesizers while Lesson Ten will teach you some of the most important things about operating a synthesizer such as selecting different sounds. In Lessons Eleven and Twelve, you will be introduced to some basic performance controls and you will get a brief taste of even creating your own sounds from scratch.

LESSON 9

Synthesizer History

After completing this lesson, the student should be familiar with the following concepts:

- The first synthesizer design was patented in 1897 by Thaddeus Cahill.
- In the 1960's, Bob Moog designed the first modern synthesizer.
- In the mid 60's and early 70's, you had to connect the parts (modules) of a synthesizer with patch cords to make a sound. Synthesizers were expensive at this time and were monophonic.
- In the mid 70's and early 80's, synthesizers became polyphonic, and could remember sounds. Patch cords were no longer used to create sounds, but sounds were still called patches. Synthesizers also became more reasonably priced.
- In the mid to late 1980's, synthesizers dropped to modern prices (typically $1000-2000) and many synths were multitimbral. 8-16 notes of polyphony were common and synthesizers could remember more sounds than ever. Synths got better at imitating acoustic instruments.
- Today, synthesizers can typically play 64-128 notes at once, and 8-32 different sounds at once. Synthesizers usually take the shape of a keyboard, tone module or a software program.
- Almost all synthesizers have power, audio (to get sounds to mixers), and MIDI jacks.
- Home keyboards do not count as synthesizers because they don't usually let you make your own sounds.
- Mother keyboards are keyboards which can't make any sound, but are used to control other synthesizers and tone modules.
- Two advantages of tone modules are that they take up less space than keyboards, and cost less.

Glossary for this Lesson:

Bob (Robert) Moog- Developed voltage-controlled synthesizer modules in the mid 1960's and is thus considered the father of modern synthesis. Founded the Moog Music synthesizer company and is currently president of Big Briar.

Keyboard- A term used for synthesizers which have keyboards as well as home keyboards. Keyboard also refers to the keys on a synthesizer.

MIDI- Musical Instrument Digital Interface. The jacks on the back of synthesizers that allow keyboards and computers to play synthesizers.

Module- A discreet part of an early synthesizer. One had to connect the modules using patch cords to create a sound.

Monophonic- A synthesizer is monophonic if it can play only one note at a time. Most early synthesizers were monophonic.

Multitimbral- A synthesizer that can create more than one sound at a time.

Patch- A name for a sound on a synthesizer. Sounds were called patches because of the patch cords used to create the sounds. Synthesizers today don't have patch cords anymore, but sounds are still referred to as patches.

Patch Cords- Short instrument cables used on early synthesizers to connect the different modules of the synthesizer together to create a sound.

Polyphonic- A synthesizer that can play more than one note at a time.

Polyphony- A measurement of how many notes a synthesizer can play at once.

Thaddeus Cahill- Inventor of the first synthesizer in 1897.

Tone Module- A synthesizer which does not have a keyboard. Tone Modules are played from keyboards or other devices which have MIDI.

Vladimir Usachevsky- Professor of composition at Columbia Princeton University who was highly influential in the design of the first modern synthesizer. He designed several of the modules which are used in synthesizers today.

Wendy Carlos- A student of Vladimir Usachevsky and friend of Bob Moog. She was highly influential in the design of the first Moog synthesizers, providing Dr. Moog with suggestions and feedback about his creations. Her album "Switched-On Bach" was the best selling classical album from the time it was released in 1968 until 1997. She is also well-known for her score to the film *A Clockwork Orange* and the development of several new methods of tuning instruments.

LESSON 9

Synthesizer History

For some people, the word "synthesizer" has a magical sort of ring to it. You might picture a rock star on stage with fireworks, smoke, and lights, or maybe the mad scientist type, working in a sound laboratory, turning knobs with impossible looking names like "frequency modulation" or "wavetable start index" and making strange sounds late into the night. Before we begin to learn about the synthesizer's place in modern music, it is important to understand a little bit about the history of synthesizers. The synthesizer's past is important to us because its past is partially what has shaped the synthesizer's unique place in today's music.

Synth History

Believe it or not, synthesizers have actually been around since 1897 when Thaddeus Cahill took out patents on an instrument he called the Telharmonium. However, the beginnings of modern synthesizers took place in the 1950's. Experimenters began to develop different machines that could make sound and then shape it in different ways. Each of these machines was a completely separate device, but when connected together with instrument cables, they could make some wonderful sounds.

In the mid 1960's Robert Moog, who was a technical assistant at Columbia-Princeton University began experimenting with a new design which would let the different electronic music machines communicate with each other. With the help of Vladimir Usachevsky (a professor at the university) and Wendy Carlos (one of Usachevsky's students) he built the world's first modern synthesizer.

Bob Moog started the famous Moog synthesizer company which was the first company to make commercially available synthesizers. Wendy Carlos recorded an album of pieces by Johann Sebastien Bach in 1968 using one of Bob Moog's synthesizers which was the best selling classical album of all time until 1997.

In the 1960's and 70's, people didn't know what synthesizers were. Most synthesizers being made were monophonic, which means that they could only play one note at a time. Synthesizers were also very very expensive at this time. Most synthesizers cost between $5,000 and $10,000 with some costing even more. Synthesizers were still pretty hard to use. You may recall that synthesizers started out as a bunch of different devices. Synthesizers made at this time were still made up of lots of individual devices called modules, but they were all in one case. To make a sound, you had to connect the different devices together with cables called patch cords. You also had to set many knobs and sliders to just the right spot to make the sound you wanted. The synthesizer couldn't remember the sounds you made, so you would have to remember where each cord was connected and where each knob or fader was set.

Modern Times

In the mid 1970's and early 1980's, people had seen synthesizers on TV and knew what they were. Synths became easier to use, too. Many synthesizers could play several notes at once (sometimes as many as 6-8 notes), so the synthesizers were said to be polyphonic. The number of notes a synthesizer can play at once is its polyphony. Many synthesizers could remember the sounds you made. Instead of having to connect lots of patch cords and reset all of the knobs, you would just touch a few buttons and the synthesizer would set the knobs or faders for you. (The sounds were still called patches, however, after the cords that were once used to make sounds.) Most synthesizers could remember 8-64 sounds. Prices on synthesizers also began to drop. Most synths fell into the $2000-$5000 price range.

The mid and late 1980's saw some big changes in the world of synthesizers. Synthesizers dropped greatly in price. You could still find synthesizers that cost over $10,000, but most synthesizers cost between $1000 and $2000. Synthesizers also got a lot better at reproducing acoustic instrument sounds.

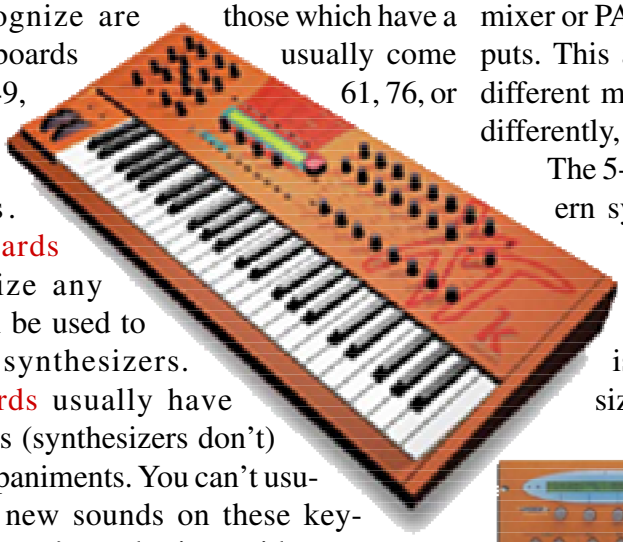
The piano sounds began to sound like real pianos, and the drums like real drums. Synthesizers could remember more sounds, too. Most synthesizers could remember 64-256 sounds. Synthesizers could also play more notes. 8 notes was typical, but it wasn't hard to find synthesizers that could play 16-32 notes at once. It was also at this time that the first multitimbral synths became available. A multitimbral synth can create more than one sound at once. Most synths could play 8-16 different sounds at once.

In the 1990's, synthesizers continued to improve. Synthesizers could play up to 64 notes at once, and some could remember thousands of sounds. Another important thing began to happen in the 1990's: it became cool to use old synthesizers. Up until this time, the older a synthesizer was, the less cool it was. Because these synths weren't seen as cool, they were worth almost nothing. Young people with very little money bought these old synths and created a new style of music called techno.

Today, most synthesizers can play 64-128 notes at once, and are 8-32 part multitimbral. They can store thousands upon thousands of patches, and there are more different kinds of synthesizers than ever.

Modern Synths

Synthesizers come in all shapes and sizes. The easiest to recognize are those which have a keyboard. Keyboards usually come in four sizes: 49, 61, 76, or 88 keys. Not all keyboards are synthesizers. Mother keyboards can't synthesize any sounds, but can be used to control other synthesizers. Home keyboards usually have built-in speakers (synthesizers don't) and auto accompaniments. You can't usually make any new sounds on these keyboards, so they aren't synthesizers either.



Synthesizers are also sometimes tone modules. Tone modules are synthesizers without a keyboard. Tone modules are often rack-mountable boxes with controls on their front panel, and jacks on their back panel. You can play a tone module using another keyboard, or using a computer. There are two big advantages to tone modules. First, they take up a lot less space than a keyboard version of a synthesizer, and second, they are almost always cheaper than a keyboard because you don't have to pay for a keyboard again. Tone modules are a really good choice if you already have at least one keyboard. Most synthesizers that are made as keyboards are also made as tone modules.

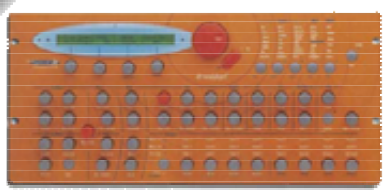
Finally, synthesizers can be a piece of software. These virtual synthesizers are a computer program that turns your computer into a synthesizer. Software synthesizers are fairly new and are still changing and developing rapidly.

Making The Connection

All hardware synthesizers offer a few basic jacks. The exact number might vary from unit to unit, but they are generally pretty similar. First, all synthesizers need power. Most synths have a power connector on the back. The power switch is usually located pretty close to the power jack.

All synthesizers have at least one audio output jack which allows you to get the synth's sounds to a mixer or PA system. Some synths have multiple outputs. This allows you to route different sounds to different mixer channels so that you can EQ them differently, or add effects to just a few of the sounds.

The 5-pin jacks found on the back of most modern synths are called MIDI jacks. We won't spend much time on MIDI in this book, as it will be the subject of an entire book later on. Right now, all you need to know is that MIDI allows us to play one synthesizer from another. MIDI is what allows us to use a mother keyboard to play a tone module, and allows computers to play synthesizers.



Let's Review

1. Who created the first synthesizer? When?

2. What three people were very important to the creation of the first modern synthesizer? When?

3. What were early synthesizers like?

4. When did synthesizers become polyphonic? When could they remember your sounds?

5. When did synthesizers become multitimbral?

6. What are the three forms of modern synthesizers? What connections do they usually have? What are the differences between home keyboards and synthesizers?

Words and Names To know:

Bob Moog
Keyboard
MIDI
Module
Monophonic
Mother Keyboard
Multitimbral
Patch
Patch Cords
Polyphonic
Polyphony
Thaddeus Cahill
Tone Module
Vladimir Usachevsky
Wendy Carlos

On the Web:

If you would like to see pictures of some real synthesizers or read more about them, check out the following sites :

http://www.vintagesynth.org/
http://www.novationmusic.com/
http://www.rolandus.com/
http://www.waldorf-gmbh.de/
http://www.korg.com/
http://www.clavia.se/

Experiments:

1. Look at several different synthesizers and decide if each one is a keyboard, tone module, or piece of software.

2. Look at the back of the synthesizers and see if you can find the audio, MIDI, and power jacks.

3. Connect each of the synthesizers in #1 to a mixer and see if you can make each one make some sound. You teacher will help you with the tone module.