

Programs and Patches

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

- Synthesizers use various methods for selecting patches. Common schemes include use of bank and number buttons, alpha dials, and increment/decrement buttons.
- It is important to know how to switch patches, because listening to a synth's patches is an easy way to determine a particular synthesizer's capabilities.
- Four very common raw sounds on synthesizers are saw, sine, square, and pulse waves. Each kind of wave has a distinctly different sound.
- Each synthesizer makes sound a slightly different way, and as such, no two synthesizers can produce exactly the same sound.
- Some synthesizers are very specialized, and as such, produce only one kind of sound (piano, drum, etc.)
- Some patches on synthesizers are intentionally monophonic and are designed to be played in the style of early synthesizers.
- Not every sound is appropriate for any part being played on the keyboard. It is important to constantly access the appropriateness of a particular sound for the part you are currently playing.
- General MIDI synthesizers have very similar sounding sounds in specific locations in memory so that songs played on different synthesizers will at least sound similar.

Glossary for this Lesson:

Alpha Dial- A large, flat knob usually with a thumb hole used to enter values into a synthesizer. Turning clockwise increases the value on the synthesizers screen while turning counterclockwise decreases the value shown on the synthesizer's screen. Alpha dial can often be used to step through different patches on a synthesizer.

Bank- A set of patches. Banks can hold 8-128 patches depending upon the synthesizer in question. Many synthesizers allow users to select patches by first pressing a bank button and then pressing a number to select a particular patch from within that bank. The advantage of this system is that a very small number of buttons can be used to call up a very large number of patches. Early synthesizers didn't group patches in any particular order while more modern synthesizers tend to group similar sounds into banks (pianos, bass guitars, etc.)

Decrement- A button used to decrease a value shown on the synthesizer's screen by one unit. Decrement buttons can often be used to step downwards through a synthesizer's sound list.

General MIDI- A synthesizer specification developed in 1991. General MIDI or GM requires that the synthesizer has certain capabilities. Among them, the synthesizer must have at least 128 patches, organized into 16 banks of 8 sounds each, and certain types of sounds must be in certain memory locations. (E.g. patch 1 must be an acoustic piano, patch 53 must be choir ahhs, etc.)

Increment- A button used to increase a value shown on the synthesizer's screen by one unit. Increment buttons can often be used to step upwards through a synthesizer's sound list.

Pulse- A waveform commonly found on vintage synthesizers. The duty cycle of this pulse wave is often varied continuously to produce a continuously changing timbre. Pulse waves generally sound rather nasal, but can also sound somewhat hollow when their duty cycle approaches 50%.

Saw- A waveform commonly found on vintage synthesizers. Saw waves are full of harmonics, and thus have a very buzzy sound.

Sine- A waveform commonly found on vintage synthesizers. Sine waves have only one harmonic, which is their fundamental, and thus have a very pure, mellow sound.

Square- A waveform commonly found on vintage synthesizers. A Square wave is merely a pulse wave with a duty cycle of 50%. Square waves have only odd numbered harmonics, and as such sound rather hollow, not unlike a clarinet.

HELP YOUR STUDENT EXPLORE AND LEARN MORE

The best way for students to learn to call up patches on synthesizers is hands-on experimentation. Take an hour or so out of your day to visit a pro-audio music store again. Salespeople are often more willing to let students try out instruments when their parents are present. As before, try to find a time that the store is not horrifically busy. Keep the volume low on the instruments you try, and be respectful of others in the store.

Programs and Patches

In the last lesson, we learned a little bit about the history of the synthesizer and learned how to make the basic connections needed to make a synthesizer work. In this lesson, we will get hands-on and find out how to play different synth sounds.

When looking at any synthesizer for the first time, the single most important thing you need to know (except maybe how to turn it on) is how to change the patch the synthesizer is set to. By changing through the different patches, you can hear the different sounds the synthesizer is capable of making.

SWITCHING PATCHES

There are almost as many ways to change sounds on a synthesizer as there are synthesizers. In synthesizers, each sound is given a number. Older synthesizers have one numbered button for every patch in their memory. This is great in a live performance situation, because you can just push one button and instantly have the sound you need. As synthesizer's memories got larger and they could remember more patches, manufacturers came up with a system of **banks** and **numbers**. A synthesizer might have 8 buttons to call up patches 1-8, but then it might also offer eight banks. You would push a bank button and then a number button to get the sound you want. This way, only 16 buttons can access 64 sounds.

Many modern synthesizers use **increment/decrement** buttons. These buttons basically increase or decrease the number of the patch by one each time you press a button. They are often marked with a + or - sign, or an abbreviation like INC or DEC. Other synthesizers use a large knob called an **alpha dial** to select sounds. By turning the dial clockwise, the synthesizer steps up through its patches. Turn it the other way and the synthesizer goes to lower numbered patches. Some synthesizers have a combination of increment/decrement buttons and an alpha dial. This is very helpful, because you can quickly move through a lot of patches using the alpha dial, or step through them one by one with the inc/dec buttons.

KINDS OF SOUNDS

The earliest synthesizers could only produce a few different raw sounds. Modern synthesizers often try to copy the way these old synths sound, so you often see the names of these raw sounds in the names of patches on modern synthesizers. The most common raw sounds are **saw** (which sounds buzzy), **square** (which sounds hollow), **sine** (which sounds pure) and **pulse** (which sounds sort of nasal, but constantly changes). You will sometimes see these sound's names appear in the names of patches on modern synthesizers. A patch might be called "Hollow Sq." for a square sound. (The name of sounds are sometimes abbreviated because you only get to use 8-12 letters to name your sounds on most modern synths.)

More modern synths will have categories of sounds, like strings (which would be all sorts of violin, cello, bass and orchestra sounds) or brass (which would be sounds like trumpet, french horn, and trombone).

DIFFERENT SYNTH, DIFFERENT SOUND

It is important to realize that it is not possible to make the same exact sound on two different synthesizers. Each synthesizer has its own unique sound all its own, and cannot exactly duplicate the sounds from other synthesizers. This is because every synthesizer makes sound in a slightly different way. We will learn a lot more about the different ways synthesizers make sound at a later time. This is the reason that professional musicians will often have many different synthesizers in their setup, because they can create many different kinds of sounds.

SPECIALIZED SYNTHESIZERS

Some synthesizers (old or modern) are very specialized and produce only a few kinds of sounds. For instance, they might produce only drum sounds, only piano sounds, or only organ sounds. Many modern synthesizers fall into this category, because they

only produce synthesizer sounds, but no sounds that sound like acoustic instruments. It is important to notice what kinds of sounds each synthesizer is capable of producing, because otherwise you could spend hours looking through a synthesizer's patches for a flute sound, when the synthesizer is only capable of producing synthesizer sounds.

MONO SOUNDS

You may recall from the last lesson that most early synthesizers were monophonic. These monophonic synthesizers caused players to play them in a very different way than you play a piano. Modern synthesizers usually offer you a choice when making a new patch. The synthesizer can respond like a monophonic or polyphonic synth. It is important to listen carefully to each sound to see if it is a mono sound. Attempting to play a mono sound polyphonically (i.e. more than one note at a time) will not give good results.

On this same note, it is important to continually listen to sounds and decide if the sounds are right for the part you are trying to play. Pianos are very forgiving, and most keyboard-like parts played on them sound good. It is very important to remember that synthesizers are not pianos, and as such, some sounds do not work well at all with some parts. This is why it is very important to turn a critical ear towards our playing and constantly ask ourselves if what we are creating is musically effective.

SALUTE THE GENERAL!

In 1991, many synthesizer companies decided that it was time to create a standard sound set for synthesizers, so that musicians could count on the locations of certain sounds. For example, patch #1 must be an acoustic piano sound, while #53 must be a choir ahh sound. This sound set was called **General MIDI**. You can tell if a synthesizer is General MIDI because it will have the General MIDI sign on it's front. While many synthesizers are GM compatible, most are not because you can only use so many copies of those same 128 sounds. You can see the listing of GM patches to the right.

THE GENERAL MIDI TONE MAP

KEYBOARDS	ENSEMBLE	SYNTH SFX
001 Piano 1	049 Strings	097 Ice Rain
002 Piano 2	050 Slow Strings	098 Soundtrack
003 Piano 3	051 Synth Strings 1	099 Crystal
004 Honky-Tonk Piano	052 Synth Strings 2	100 Atmosphere
005 Electric Piano 1	053 Choir Ahhs	101 Brightness
006 Electric Piano 2	054 Voice Oohs	102 Goblin
007 Harpsichord	055 Synth Vox	103 Echo Drops
008 Clavichord	056 Orchestra Hit	104 Star Theme
CHROMATIC PERC	BRASS	ETHNIC
009 Celesta	057 Trumpet	105 Sitar
010 Glockenspiel	058 Trombone	106 Banjo
011 Music Box	059 Tuba	107 Shamisen
012 Vibraphone	060 Muted Trumpet	108 Koto
013 Marimba	061 French Horn	109 Kalimba
014 Xylophone	062 Brass 1	110 Bag Pipe
015 Tubular-bell	063 Synth Brass 1	111 Fiddle
016 Santur	064 Synth Brass 2	112 Shanai
ORGANS	REED	PERCUSSIVE
017 Organ 1	065 Soprano Sax	113 Tinkle Bell
018 Organ 2	066 Alto Sax	114 Agogo
019 Organ 3	067 Tenor Sax	115 Steel Drums
020 Church Organ 1	068 Baritone Sax	116 Woodblock
021 Reed Organ	069 Oboe	117 Taiko
022 French Accordion	070 English Horn	118 Melo Tom 1
023 Harmonica	071 Bassoon	119 Synth Drum
024 Bandoneon	072 Clarinet	120 Reverse Cymbal
GUITARS	PIPE	SFX
025 Nylon-String Guitar	073 Piccolo	121 Guitar Fret Noise
026 Steel-String Guitar	074 Flute	122 Flute Key Click
027 Jazz Guitar	075 Recorder	123 Seashore
028 Clean Guitar	076 Pan Flute	124 Bird
029 Muted Guitar	077 Bottle Blow	125 Telephone 1
030 Overdrive Guitar	078 Shakuhachi	126 Burst Noise
031 Distortion Guitar	079 Whistle	127 Applause
032 Guitar Harmonics	080 Ocarina	128 Gun Shot
BASSES	SYNTH LEAD	
033 Acoustic Bass	081 Square Wave	
034 Fingered Bass	082 Saw Wave	
035 Picked Bass	083 Synth Calliope	
036 Fretless Bass	084 Chiffer Lead	
037 Slap Bass 1	085 Charang	
038 Slap Bass 2	086 Solo Vox	
039 Synth Bass 1	087 5th Saw Wave	
040 Synth Bass 2	088 Bass and Lead	
ORCHESTRA	SYNTH PAD	
041 Violin	089 Fantasia	
042 Viola	090 Warm Pad	
043 Cello	091 Poly Synth	
044 Contrabass	092 Space Voice	
045 Tremolo String	093 Bowed Glass	
046 Pizzicato Strings	094 Metal Pad	
047 Harp	095 Halo Pad	
048 Timpani	096 Sweep Pad	

Let's Review

1. What are the four ways we learned about that synthesizers allow you to select patches?
2. What are the four raw sounds that we learned about, and how does each one sound?
3. Is it possible to make the same exact sound on two different synthesizers?
4. Do all synthesizers have every kind of sound?
5. Why is it important to listen to each sound carefully?
6. What is General MIDI and what does it do for us?

Words To know:

Alpha Dial	Pulse
Bank	Saw
Decrement	Sine
General MIDI	Square
Increment	

Did You know?

In 2000, the MMA (MIDI Manufacturer's Association) created General MIDI version 2 which has the 128 General MIDI sounds plus 128 more new sounds.

In addition to specifying which patches are where in a synthesizer, both GM 1 and GM 2 specify a synthesizer's polyphony, what effects it has to have, and how many multitimbral parts it must have.

Experiments:

1. Look at several different synthesizers and see if you can figure out how to listen to the different patches that instrument has to offer. What kind of control does each instrument use to change sounds? An alpha dial? Bank and number buttons? Inc/dec buttons?
2. Play several different synthesizers. Do they sound different from each other? Do many of the sounds in each instrument have a sort of similarity?
3. As you listen to different patches, can you see patches that use the four raw sounds we learned about?
4. Try out a general MIDI synthesizer. Is the quality of sounds as high as other synthesizers? What are some of the advantages and disadvantages of General MIDI?