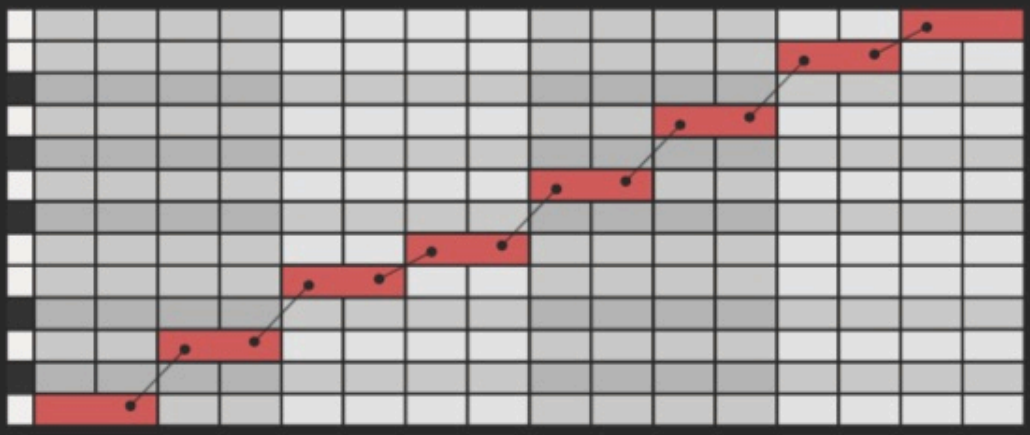
Music Theory for Electronic Music Producers

The producer's guide to harmony, chord progressions, and song structure in the MIDI grid.



J. Anthony Allen, PhD

SLAM ACADEMY

EDITION 1

J. Anthony Allen, PhD

Music Theory for Electronic Music Producers

The Producer's Guide to Harmony, Chord Progressions, and Song Structure in the MIDI Grid

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To my Slam family (Slam Academy) and to my real family (Erin and Scully).

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Preface

Throughout this book, note names will be referred to using International Pitch Notation (also called Scientific Pitch Notation, or American Standard Pitch Notation). This is the system in which each note in an octave is assigned a letter (A through G) and sometimes a symbol (flat, sharp, or natural) to go with that letter.

Not all regions use this system for notation. Many European countries use a system called solfege. (This system is used in the International system as well, but in a slightly different way.) Yet other countries use other words, letters, or symbols. Music notation goes back to around the 12th Century, so it should be no surprise that there are a few different systems. If you are in a country that uses a different system, you will need to convert the letter names that I use to your local system.

1. Introduction

Music Theory is the green vegetable of electronic music. You know that it's good for you, you know that it will make you a better producer. But why spend time learning it when you could launch your software and rock out some chocolate-sauce covered beats? In the long run, we all know it will be good for us to learn, but it's tedious, complicated, and boring. With this book, I can't turn broccoli into ice cream, but what I can do is help you through the process of learning music theory in a simple way, specific to electronic music, that cuts down on the technical jargon and makes the whole thing go down smoother.

1.1 What is Music Theory?

Simply put: Music theory is knowing what notes are going to sound good together in context. Let's pick that sentence apart a bit:

Music Theory is knowing...

What we want to be able to use music theory for is predicting, while we are in the moment of producing, what our options are. You should be able to run through a few concepts and say to yourself, "Ok, we are on this type of chord, so I have a few common options". But you will know quickly what your options are for chords and notes that will sound good.

Music Theory is knowing what notes are going to sound good...

Good, in this context, doesn't mean happy, or harmonious, or anything like that. It means they are going to fit in with the notes around them. They might be dissonant, abrasive notes, but if that is what our track is all about, then that is what we want. It is important to remember - and I'll remind you of this constantly throughout this book - that if we always put the notes that sound happy or harmonious we are going to end up with an entirely predicable and boring track. Sometimes you have to break the rules, and in this book that is encouraged.

Music Theory is knowing what notes are going
to sound good together in context.

Let's say you are writing music for a video game. In one scene, the character is in the wild west. In the next, he gets into a time machine and is now a knight in a medieval era. Oh, and you have two hours to write all the music for both scenes. Music Theory to the rescue. We know what chords and scales are common in both eras. In the first scene, we would think about what scales and chords sound appropriate to that context. We would then produce as much music as we could using those elements, before we switch context to the the medieval era. We then would grab a new set of scales and chords that sound good in that context. You still have a lot of creative work to do, but you've skipped ahead on all the exploring of sounds that you would have done if you didn't know that both of those eras have a set of chords and scales you can use to quickly make the listener feel like the music is in context.

1.2 The Most Important Rule of Music Theory

I approach music theory from the perspective of a composer and producer. Not as an academic music theoretician. The rules that we will cover in this book have been around for centuries, and they tend to work well for making "good" sounding music. But music is a constant evolution of experimentation and rule-breaking. As a producer, when I talk about music theory I have one rule on this that I insist you keep in mind while using music theory:

Rule No. 1: Don't let music theory be a bully. Your ear always wins.

I often have students come to me with a partially completed track and tell me that they came up with a chord progression they liked,

but it didn't make sense, so they changed it. This makes me cry a little bit. It didn't "make sense"? If it sounded good to you, then it made sense. You are letting music theory tell you how you should write your track, and that is not the role of music theory. Your ear always wins: If it sounds good to you, then go with it. Break the rules. Make your own theory. It is, after all, just a theory.

Music Theory gives us clues and guidance while we are writing, and helps us to know what will sound good. But it should never be in the drivers seat when you are in your creative mode. Let it be the navigator, but don't be afraid to make your own roads. Innovative music always comes with the risk of driving off a cliff. Embrace it.

1.3 Our Method: No Pianos, No Singing

Traditionally, when you study music theory in a college class, you actually take three classes at once: Music Theory, Sight Singing (sometimes called Aural Skills), and Piano Skills. The idea is that you study the concepts of music theory, and at the same time you reinforce it by learning to sing (by just looking at sheet music) some of the concepts, and then you nail it home by learning to play it on the piano. This method has been around a very long time, and has it's advantages. I'm not going to tell you that it is a bad method for teaching music theory. But this book isn't for people in a college music theory class.

This book is for people who are producing music in software (or hardware) and realizing that they need better control over picking what notes to use for their melodies, harmonies, and even percussion. Learning to sing and play the piano are not bad skills to have at all,

but in this book I've found another way to teach music theory. Instead of learning to play the piano, we are going to be using the Piano Roll Editor - available in any software that you choose to use. We will be skipping over some of the music theory lingo in favor of focusing on how something sounds, and how you can use it in your tracks.

I'll be using Ableton Live for all the screenshots in this book, but because we are only using the Piano Roll Editor, you can use any software you like. As long as it has a Piano Roll Editor, you will be fine using any other program.

1.4 Do As I Say and Do

Another thing we will be doing throughout this book is dissecting some popular tracks that you have probably heard before. We will look at the chords they used and figure out how and why it works the way it does. In each of these analysis sections, you can input the notes into your software and follow along. All the examples I'll be giving you work best when you hear them. Seeing them is nice, but it is no comparison to hearing them. After that, you can experiment with the track and see if you can find some new and interesting chords using the analysis as a starting point.

For best results: follow along with the examples and listen to them.

1.5 A Bit About Me

I started making music as a guitar player when I was pretty young. I got hooked on it, and went to college for music composition. While I was in college one of my professors turned me on to electronic music and I became fascinated with it. I continued my studies in graduate school, eventually earning a Ph.D. in Music Composition, started teaching composition and theory at the college level, and shortly thereafter went through the program to become an Ableton Certified Trainer. I'm more than just a theory-nerd, I produce music myself - my last album reached into the top 100 on the CMJ charts, and it's subsequent remix album made it to the top 25 on the CMJ charts.

In 2011 I started Slam Academy, a company that focuses on training students in a non-degree setting in DJing, Production, Recording, and similar topics. I realized through my students at Slam Academy that the typical electronic music producer has a very different background than me when it comes to music theory. In my "academic" education, it was a given that everyone knows music theory if you are going into composition. You have to study a lot of music theory in those programs. But people practing producing tend to dive headfirst into making tracks, and don't study theory at all. So I started talking to students about music theory, developed a method for teaching it that is focused on electronic music, and that led me to writing this book. I hope you enjoy it. ▶

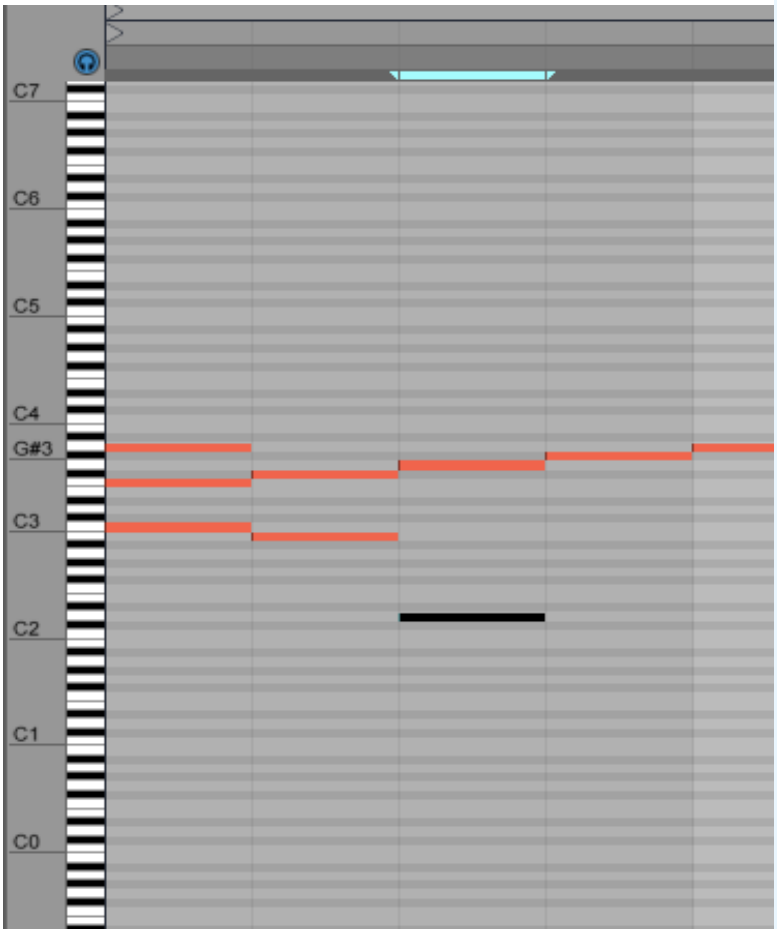
J. Anthony Allen

2. The Keyboard Layout

As promised, we are not going to spend much time at the piano. However, the piano is the fundamental model for the keyboard and (for better or worse) our DAW (Digital Audio Workstation) is built around the piano model. So we need to understand the basic layout of the keyboard in order to fully understand what our DAW is showing us.

2.1 Why Do We Care About Pianos?

Every music production program that I'm aware of uses a Piano Roll Editor. This is the name of the system we use to lay out MIDI (Musical Instrument Digital Interface) notes on a grid. When we play a sequence, a playhead will read the Piano Roll Editor from left to right, playing notes near the bottom as low notes, and notes near the top as high notes. Before we get too far along, we need to learn a few more things about how this is working.



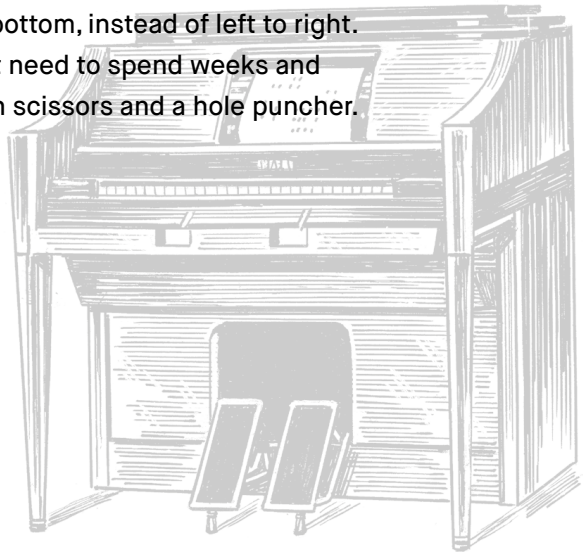
The piano roll editor from Ableton Live

2.2 A Brief History of the Piano Roll Editor

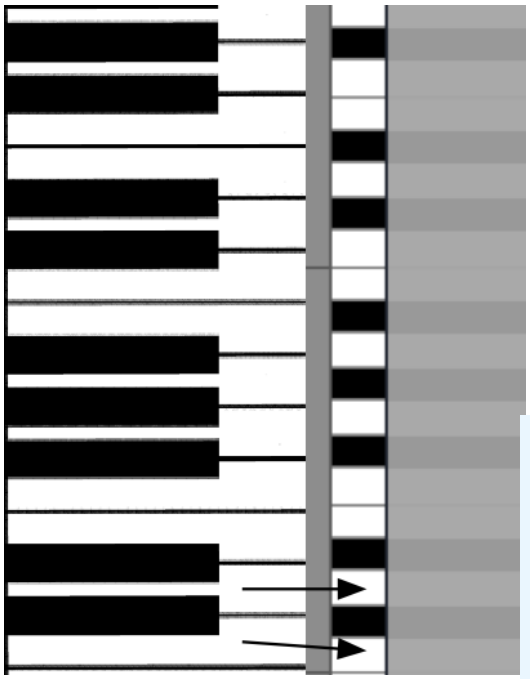
The Piano Roll Editor is an often understated tool for displaying notes. Despite all of the new technology packed into our audio sequencing software, the Piano Roll Editor makes it's first appearance all the way back in the year 1800.

It was in 1800 that a Frenchman name Jacquard Mills first developed an automatically playing piano using punch cards (interestingly based originally on a loom). About 20 years later, paper rolls replaced punch cards, and the Player Piano was born. The Player Piano would read a sheet of paper with holes punched out at different points that represented the different keys on the piano. The roll was slowly pulled over an airway, which pushed through the paper in places that had holes, and the keys were then struck.

The sheet of paper pulled over the airway looked and acted exactly like the Piano Roll Editor that we still use today. The only real difference between our modern digital equivalent and the 1800 version is that the old paper rolls read from top to bottom, instead of left to right. Ours is digitally created, so we don't need to spend weeks and weeks to input a piece of music with scissors and a hole puncher.



2.3 Finding the Piano in the Piano Roll Editor



The piano roll editor is really just a piano, turned on it's side.

In the image below, look at bottom keys with the arrow on them. On the left, we have a typical piano keyboard laid on it's side. On the right, the piano roll editor from Ableton Live. The arrows are connecting the notes on the keyboard to the notes on the piano roll.

Let's look at this a different way. Look at the piano keyboard on the left side above, and look especially at the black keys. They are arranged in a group of two black keys, then a space, then a group of three black keys, then a space, then two, then three, and so on. Now look at the piano roll editor. You will find that same group of black keys: two, then a space, then three, then a space, etc.

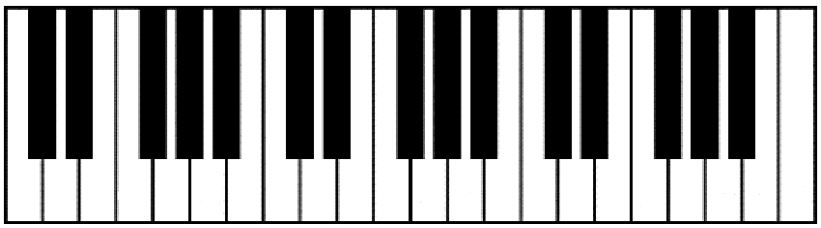
So our piano roll editor is nothing but a piano keyboard laid on it's side, but it is a convenient way to look at all the notes we have access to, from low to high. It's been working great for over 200 years, so why change it? You don't mess with perfection.

2.4 Navigating The Keyboard

The piano is a series of white and black keys, that goes from low (left side of the piano/bottom of the Piano Roll Editor) to high (right side of the piano/top of the Piano Roll Editor). The piano is made up of strings, which are hit by hammers when you press down a key. The string-hammer-key mechanism doesn't concern us too much; we need to understand how the keys are laid out.

At it's most basic, the keyboard is a series of white keys and black keys, which show different arrangements of semi-tones and whole-tones.

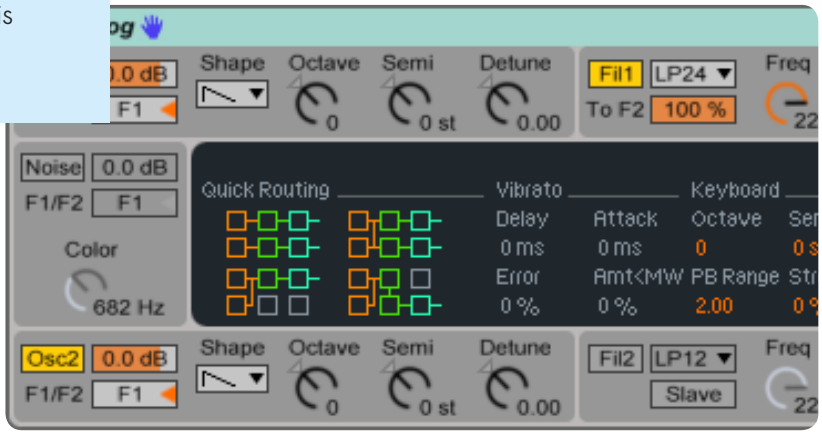
2.5 Semi-Tones



The Keyboard

Let's take a quick detour over to a synthesizer. In any modern synthesizer, you will see at least three different knobs for tuning. Usually you can find these near the oscillator. Most of the time they will be labeled "Octave", "Semi" and "Fine." There is no standardization for what we call these knobs, so they might be labeled a little differently on some synthesizers.

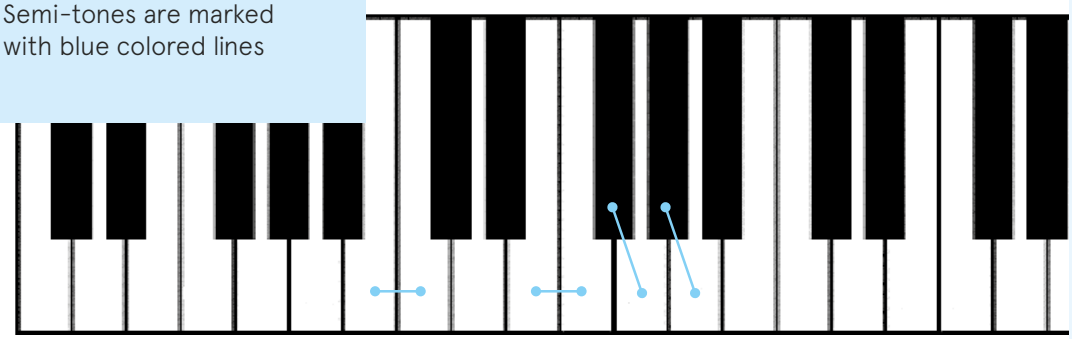
"Detune" in this case is the same as "Fine"



Ableton Live Analog Synthesizer

Notice in the figure above that the adjustment amount on the Semi knob is listed as "0 st." ST, in this case, stands for "Semi-tones". This adjustment knob will de-tune your synthesizer by semi-tones. A semi-tone is the smallest musical value we have [1] - that is to say, it is the smallest amount you can move on a keyboard. If you take two adjacent notes on a keyboard, they are a semi-tone apart.

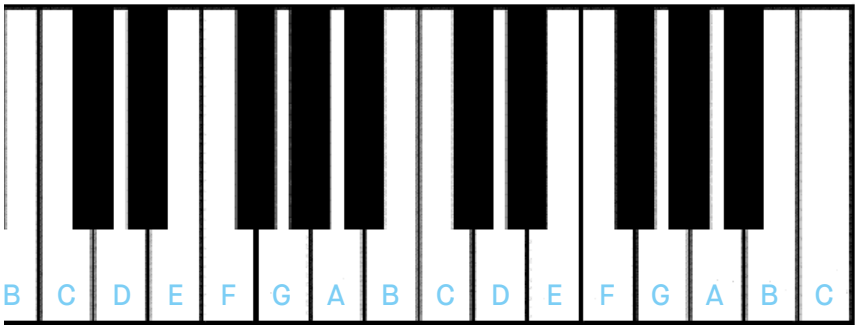
Semi-tones are marked with blue colored lines



2.6 Black and White Keys

Before we get too far along, we should define "adjacent notes" on a keyboard. That includes both the black keys and the white keys. The keyboard is organized into black and white keys for a few different reasons: the shape of the hands, tradition, and the evolution of the instrument. The most important to us in our understanding of the keyboard is the naming of the notes.

In English, all the white notes are given letter names from A through G. After G it starts over again.



Keyboard with pitch names

The black keys are named as relative to their nearest white note. A black key will always have a modifier that means "a semitone higher than" or "a semitone lower than". Remember that a semi-tone is the smallest musical value we have; the "semitone higher than" symbol means that the note is one adjacent key higher than the other.

Let's focus in on the first A that is labeled in our keyboard above (fig 2.3). What is the name of the black key just above and to the right of the A?

We could call it "A, a semitone higher". Conveniently, we have symbols that we can substitute for "a semitone higher." The symbol is called A-Sharp, or #. So that pitch would correctly be called A#, pronounced, "A-Sharp".

Let's look at another one. Look at the pitch C on the keyboard. What is the pitch just above and to the right of it? It is "C, a semitone higher" - so it would be a C#. (pronounced C Sharp).

You can take any white-key pitch, go up to the nearest black key and it will be called the sharp of the original pitch. But what about a case like B? If you go up a semitone from B, there is no black key. A semitone higher than B is C, which is a white key. For that reason, there is no such thing as B#. The same is true for E - there is no E#. [2]

2.7 Flats, Sharps, and Naturals

Let's go back and look at the first A in our diagram again. We could call the black key just to the left of the A an "A, a semitone lower." For that, we would use the word "flat", meaning a semitone lower. So we would pronounce that note as A-flat, or A♭. Let's look at the first D on the keyboard in figure 2.3. The black key to the left of it is called D-flat, or D♭.

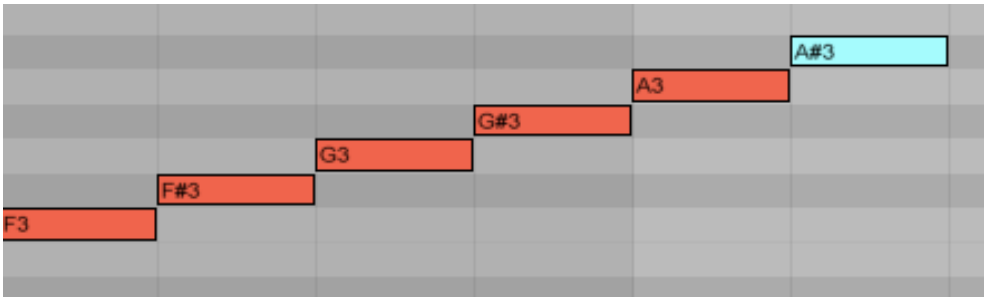
Just like the sharps, not all notes have flats. If there is no black-key to the left of a note, it doesn't have a flat. Such as C (there is no C♭) and F (there is no F♭). We sometimes call the white notes "Natural": meaning they have no sharp or flat on them.

2.8 Enharmonic Notes

Now look at the pitch C, and the black note above it. It is a semitone higher than C, so we will call it C♯. Now let's look at the pitch D, and look at the black note below it. It is a semitone lower, so we will call it D♭. Now we have a problem! The same key has two names: C♯ and D♭.

So which is correct? They both are.

These notes are called "enharmonic." Enharmonic means that the two pitch names (C♯ and D♭) will produce the same sounding pitch. Whether or not we call that pitch a C♯ or a D♭ depends on the context. What key we are in will determine which is the correct name for the pitch. We will work more with that later when we start talking about keys.



When you are working in a DAW, this can be simplified because most DAWs will only show sharps.

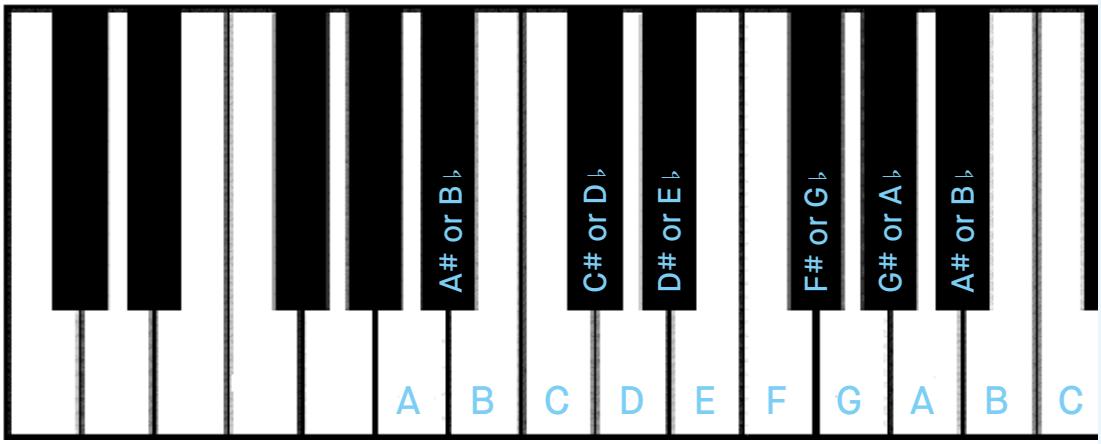
It will label all black keys as sharps. In this book I will try to favor sharps, but in some cases we will need to talk about pitches as being flat. It will be important to remember the notes that are enharmonic. They are:

C♯ and D♭ D♯ and E♭

[E♯ and F♭ - neither of these two notes exist.]

F♯ and G♭ G♯ and A♭ A♯ and B♭

[B♯ and C♭ - neither of these two notes exist.]



2.9 Whole-Tones

We don't typically have a knob on a synthesizer labeled for whole-tones in the same way we do for semi-tones. A whole-tone is just two semi-tones. The pitches A and B are a whole-tone apart, as are the pitches D and E. You can see on the keyboard that there is one key in between, which means these are a whole-tone apart. It is important to remember that whole-tones exist between all tones, even if it includes a black note. For example, a whole-tone away from E is F#. A whole-tone away from F# is G#. There needs to be one black or white key in between for it to be a whole-tone interval.

A semi-tone is also often referred to as a half-step. A whole-tone is also known as a whole-step. In traditional music theory, we use the words "half step" and "whole step" more often, and in synthesis we like to use the terms semi-tone and whole-tone. Remember that they mean the same thing.

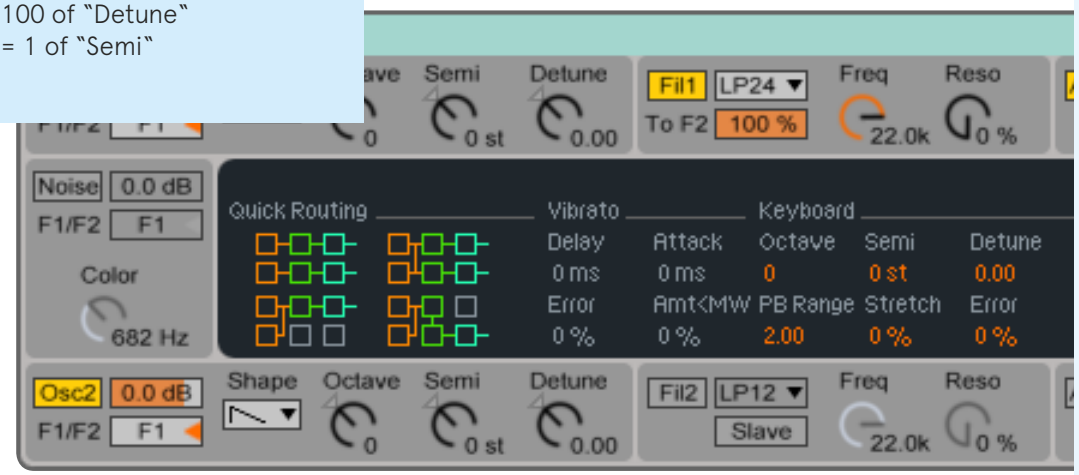
2.10 The `Semi' and `Detune' Knob on our Synth

Let's jump back to looking at a synthesizer. When you look at the oscillator tuning section, we have the three knobs we saw earlier: Octave, Semi, and Detune. Remember that "Detune" can have a variety of different names, including "Fine", "Cent", or others.

If we set the Semi knob to 1, then everything we play on the keyboard will sound one semi tone (or one half step) higher. If we set it to 2, then everything we play will sound one whole step higher. For example: if I play a C on the keyboard, but have the Semi knob set to 2, I will hear a D; if I have it set to 3, I will hear a D# (three semi tones).

A semitone is the smallest musical distance we can move, but there are still more sounds that happen in between the notes. We measure those sounds in terms of cents. There are 100 cents in a semitone. If you play the C key on your keyboard, and have the cents knob set to 100 [3], you will hear a C#. If you have it set to 50, you will hear a pitch somewhere between C and C#, which depending on the context could sound out of tune. (Detuning oscillators are useful for synthesis.)

100 of "Detune"
= 1 of "Semi"



We still need to deal with that Octave knob - but first I want to get us grounded by focusing a whole chapter on a single pitch: C. (It's the only time we will do this - don't worry. I'm not devoting an entire book to different pitches). Once we get comfortable with a few concepts around C, Octaves will be a snap. ▶

[1] In some music popular in the mid-20th Century, composers experimented with creating musical intervals smaller than a semi-tone. These are typically called quarter-tones. See the music of Henry Cowell, John Cage, and others for more on quarter-tones. In modern electronic music production they are largely non-existent.

[2] As you get more advanced in Music Theory, you might come across a situation in which we call a note B# or E#. It can exist, and has a good reason to. But in modern electronic music production, it is extremely rare and unlikely.

[3] On many synthesizers you can't actually do this: The cent knob will only let you go up to 50, and down to -50.