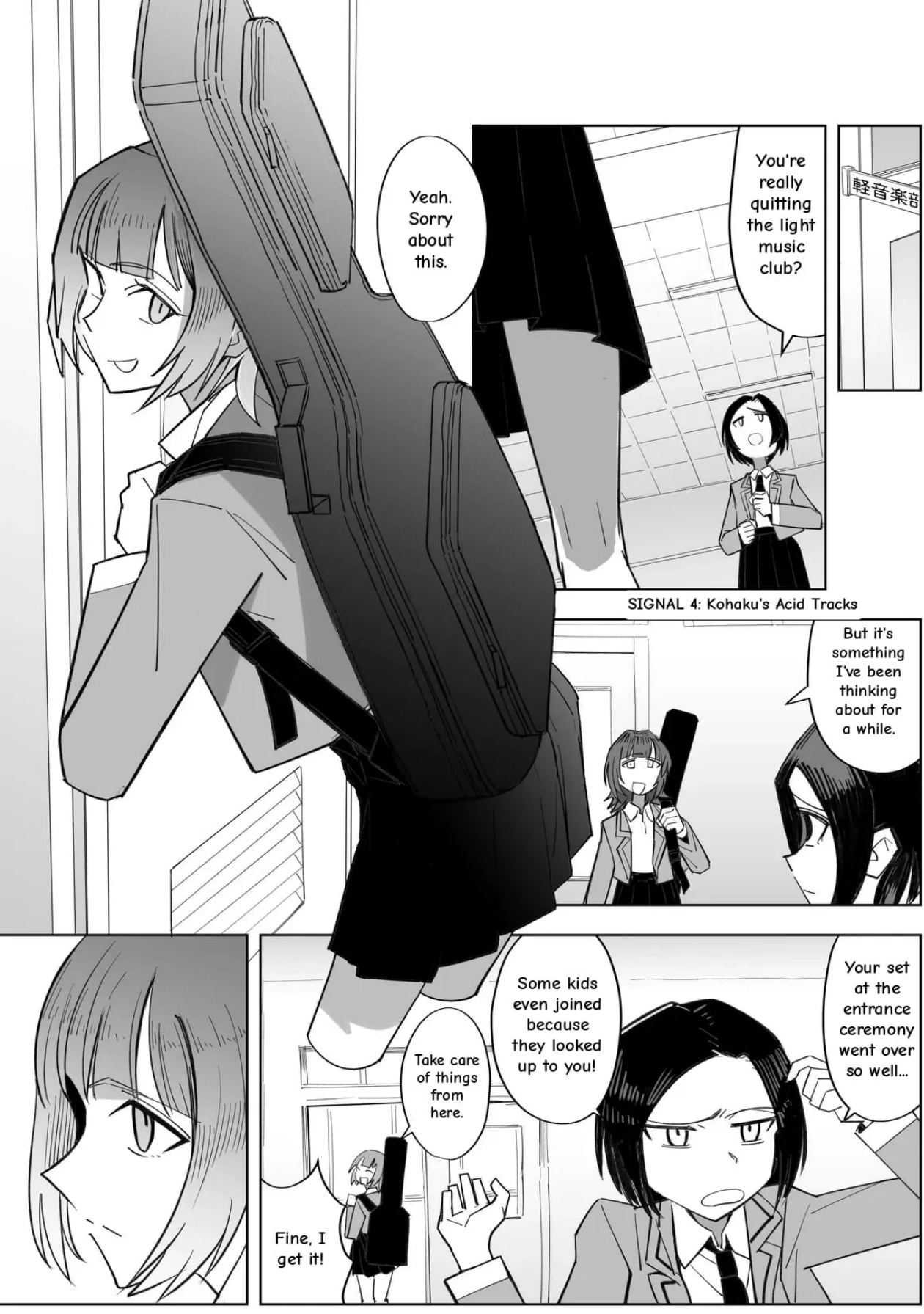
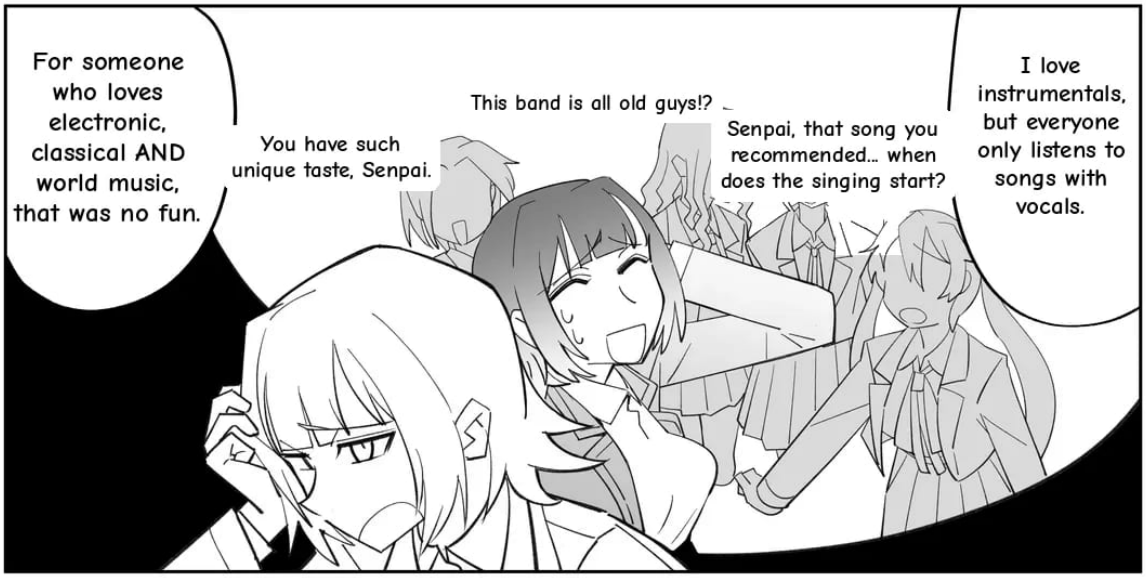
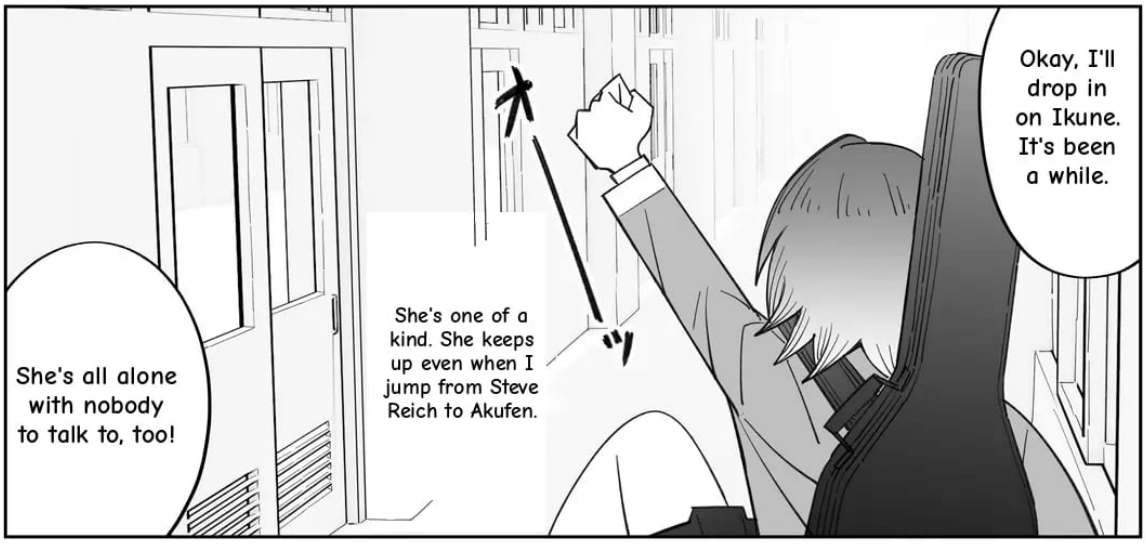
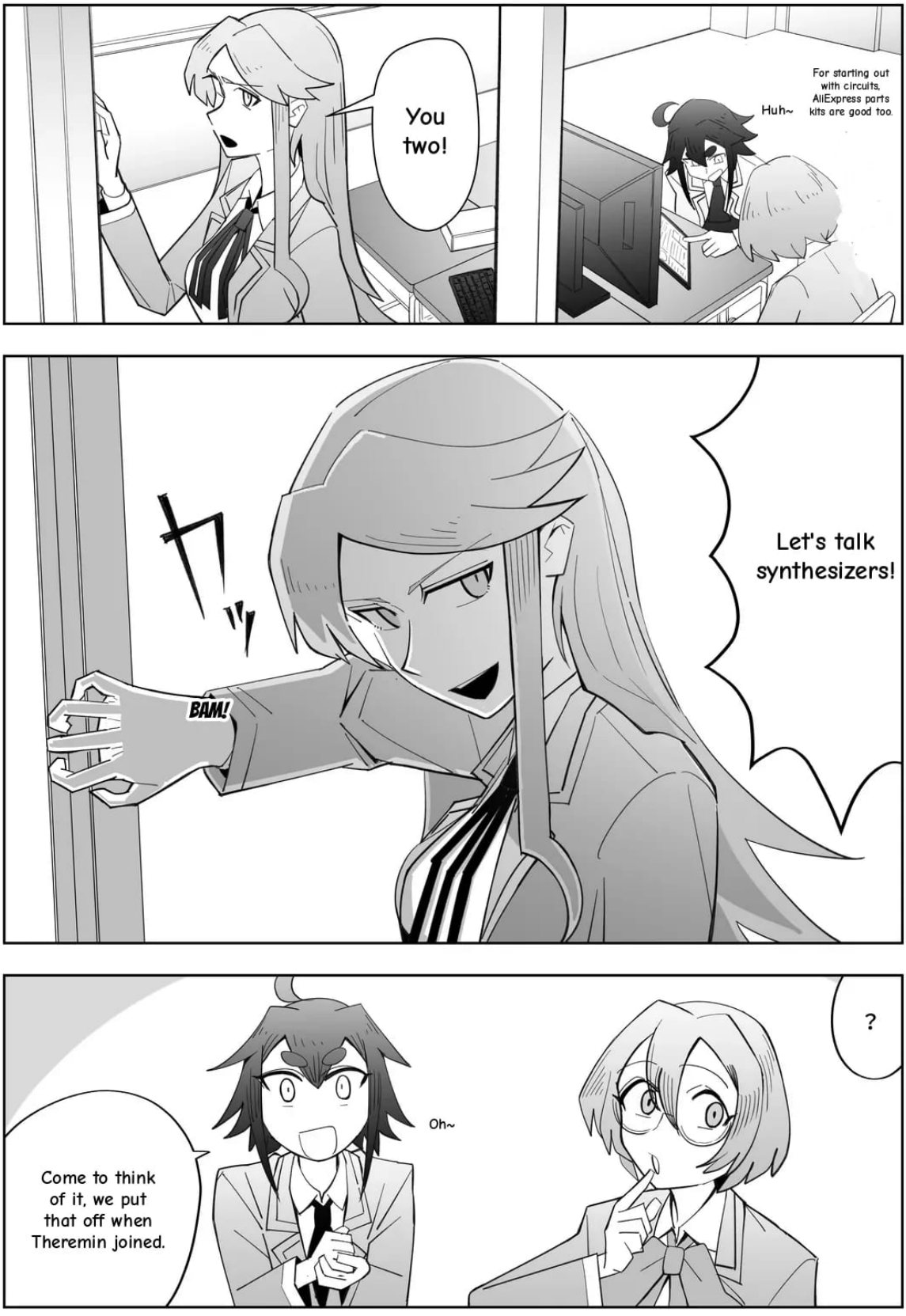
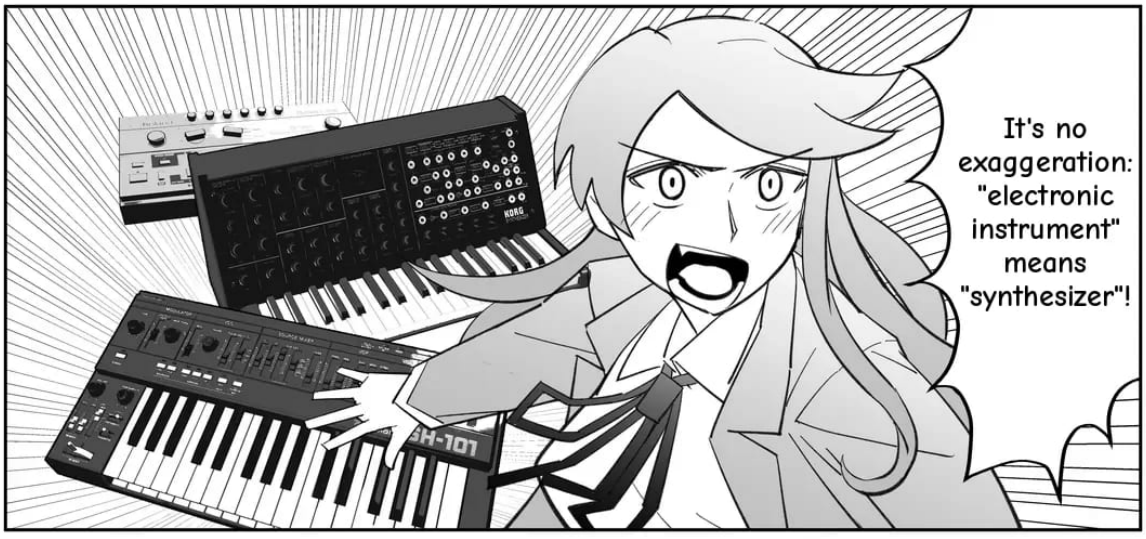

You're really quitting the light music club?
Yeah. Sorry about this.
軽音楽部
SIGNAL 4: Kohaku's Acid Tracks
But it's something I've been thinking about for a while.
Your set at the entrance ceremony went over so well...
Some kids even joined because they looked up to you!
Take care of things from here.
Fine, I get it!

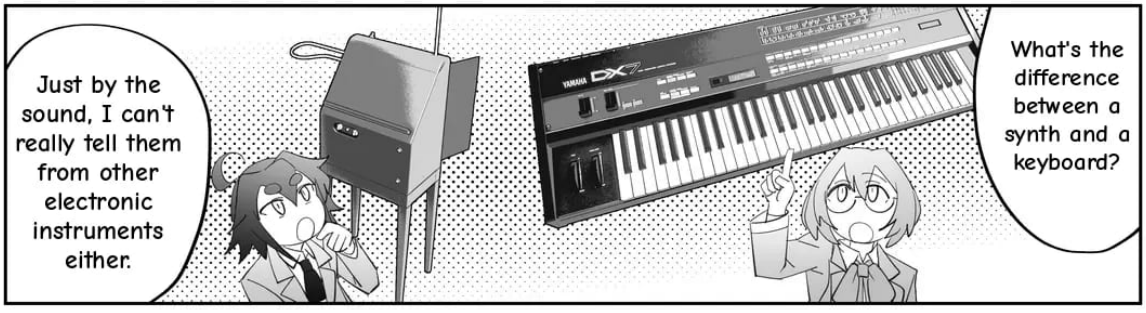

there was nobody there I could really talk to.
Phew. The light music club... It wasn't a bad place, but...

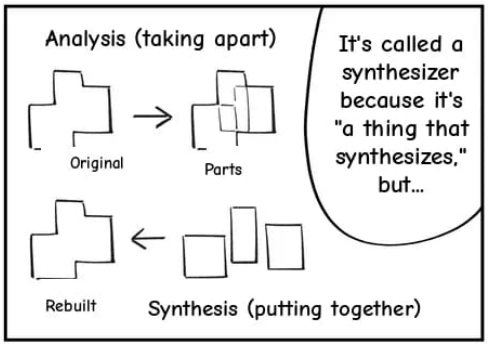

For someone who loves electronic, classical AND world music, that was no fun.
You have such unique taste, Senpai.
This band is all old guys!?
Senpai, that song you recommended... when does the singing start?
I love instrumentals, but everyone only listens to songs with vocals.

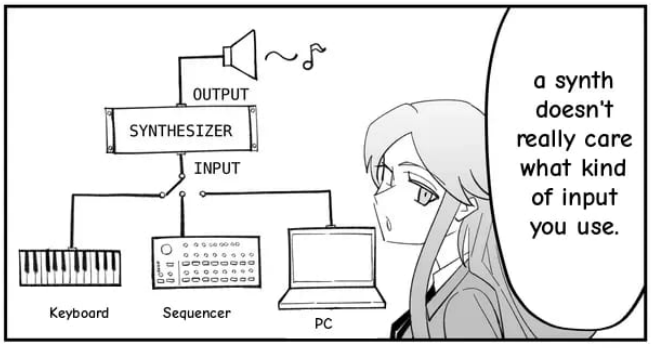

She's all alone with nobody to talk to, too!
She's one of a kind. She keeps up even when I jump from Steve Reich to Akufen.
Okay, I'll drop in on Ikune. It's been a while.

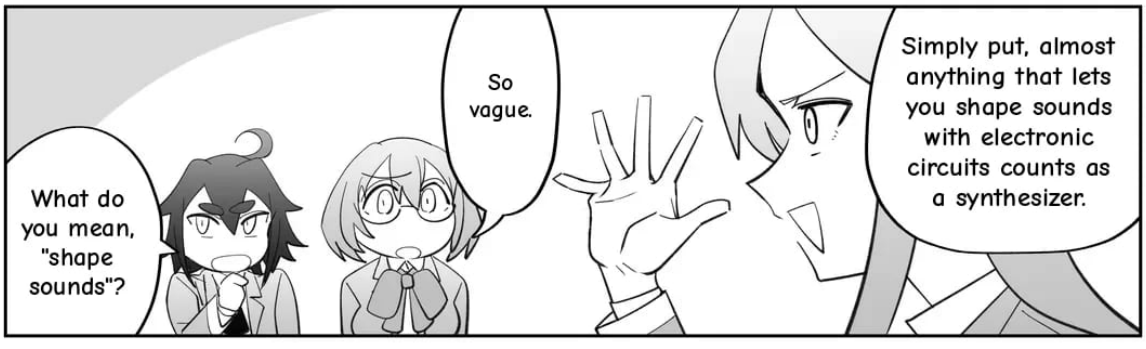

You two!
Huh~
For starting out with circuits, AliExpress parts kits are good too.
BAM!
Let's talk synthesizers!
?
Oh~
Come to think of it, we put that off when Theremin joined.

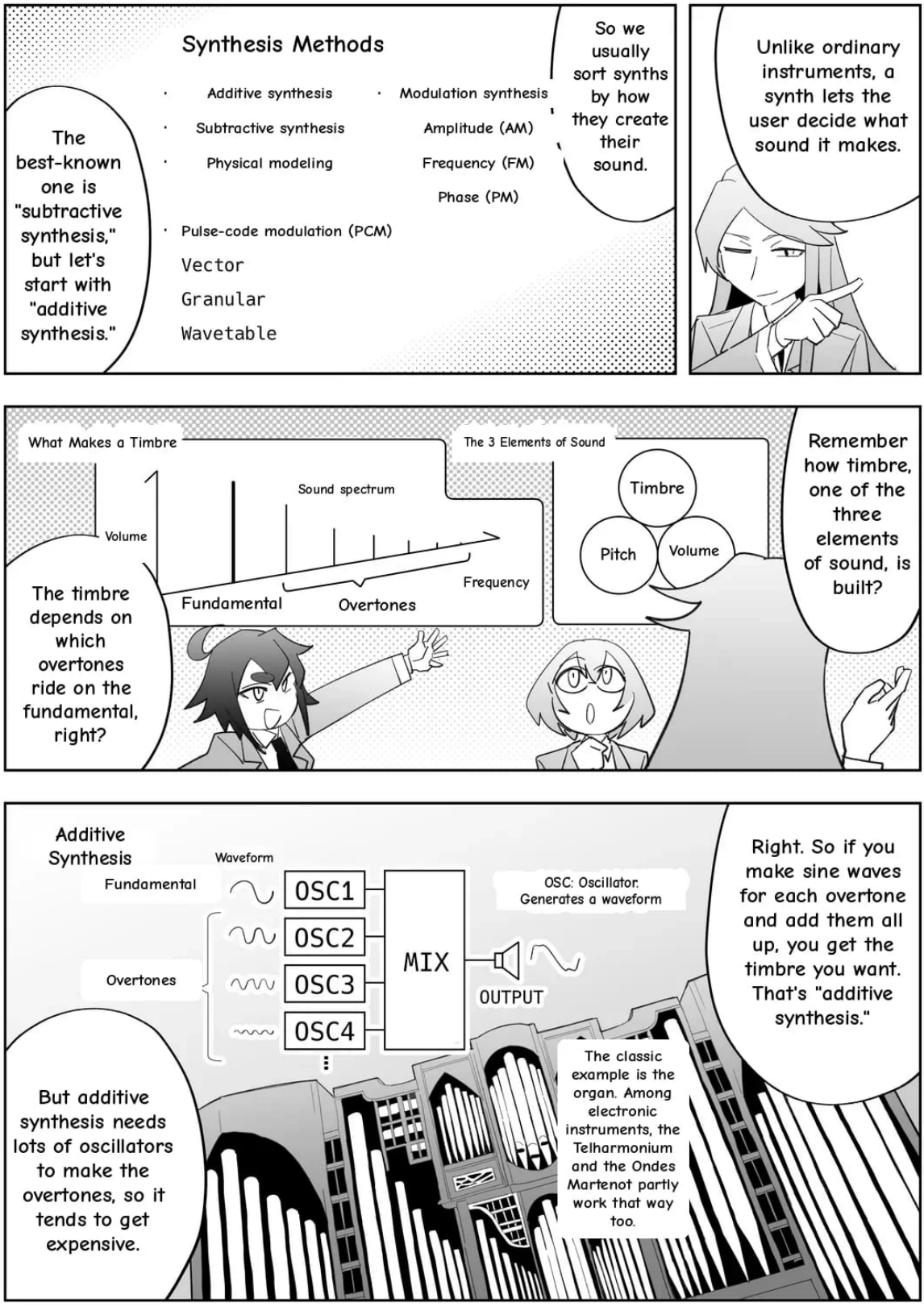

It's no exaggeration: "electronic instrument" means "synthesizer"!
KORG
MS-10


Just by the sound, I can't really tell them from other electronic instruments either.
What's the difference between a synth and a keyboard?
YAMAHA
DX7

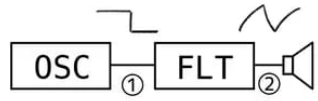

Analysis (taking apart)
Original
Parts
Rebuilt
Synthesis (putting together)
It's called a synthesizer because it's "a thing that synthesizes," but...


OUTPUT
SYNTHESIZER
INPUT
Keyboard
Sequencer
PC
a synth doesn't really care what kind of input you use.

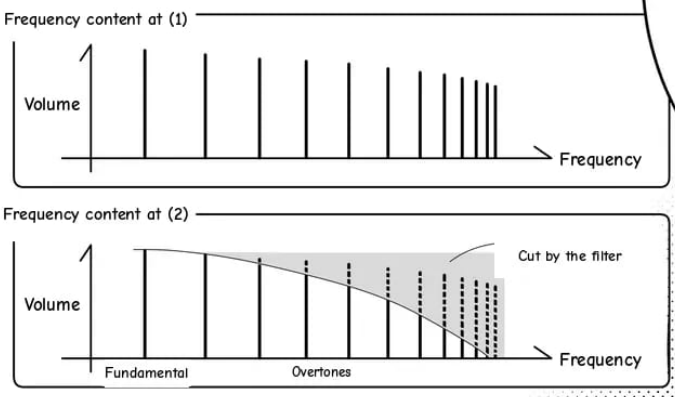

What do you mean, "shape sounds"?
So vague.
Simply put, almost anything that lets you shape sounds with electronic circuits counts as a synthesizer.


Synthesis Methods
Additive synthesis
Subtractive synthesis
Physical modeling
Modulation synthesis
Amplitude (AM)
Frequency (FM)
Phase (PM)
Pulse-code modulation (PCM)
Vector
Granular
Wavetable
So we usually sort synths by how they create their sound.
The best-known one is "subtractive synthesis," but let's start with "additive synthesis."
Unlike ordinary instruments, a synth lets the user decide what sound it makes.
What Makes a Timbre
Sound spectrum
Volume
Frequency
Fundamental
Overtones
The timbre depends on which overtones ride on the fundamental, right?
The 3 Elements of Sound
Timbre
Pitch
Volume
Remember how timbre, one of the three elements of sound, is built?
Additive Synthesis
Waveform
Fundamental
Overtones
OSC1
OSC2
OSC3
OSC4
MIX
OUTPUT
OSC: Oscillator. Generates a waveform
But additive synthesis needs lots of oscillators to make the overtones, so it tends to get expensive.
The classic example is the organ. Among electronic instruments, the Telharmonium and the Ondes Martenot partly work that way too.
Right. So if you make sine waves for each overtone and add them all up, you get the timbre you want. That's "additive synthesis."

Subtractive Synthesis

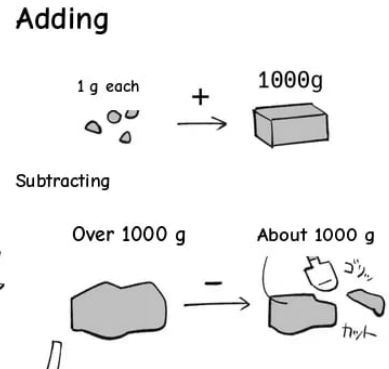


FLT: Filter. Cuts out frequency components



And when you say "synth," you mean this: "subtractive synthesis"!

Simply put, it's the opposite of additive! You start with a waveform that's already full of overtones and carve away what you don't need.



I don't really get it. Isn't adding or taking away the same amount of work?

?

It's like... instead of building a 1 kg lump of clay 1 g at a time, it's easier to take a bigger lump and roughly hack it down to about 1 kg?

: Square wave: made of odd harmonics only

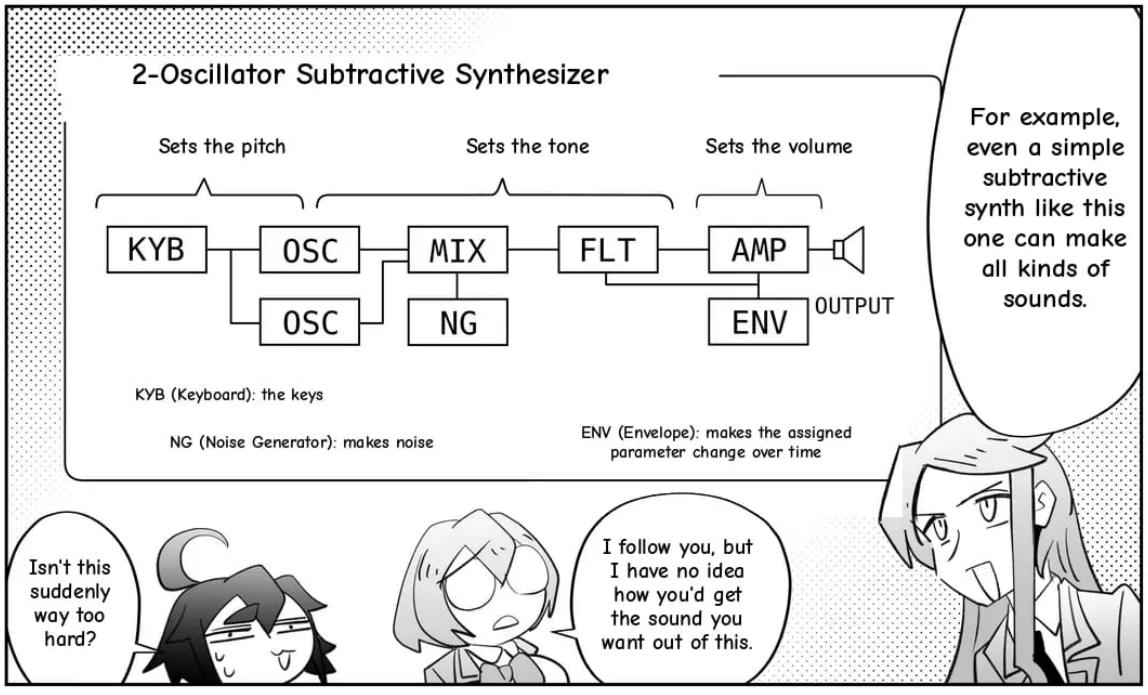
: Sawtooth wave: made of all integer harmonics

Waveforms with lots of overtones, especially integer harmonics, are fairly easy to make with electronic circuits.

Like square and sawtooth waves.

Hack it down with a filter!

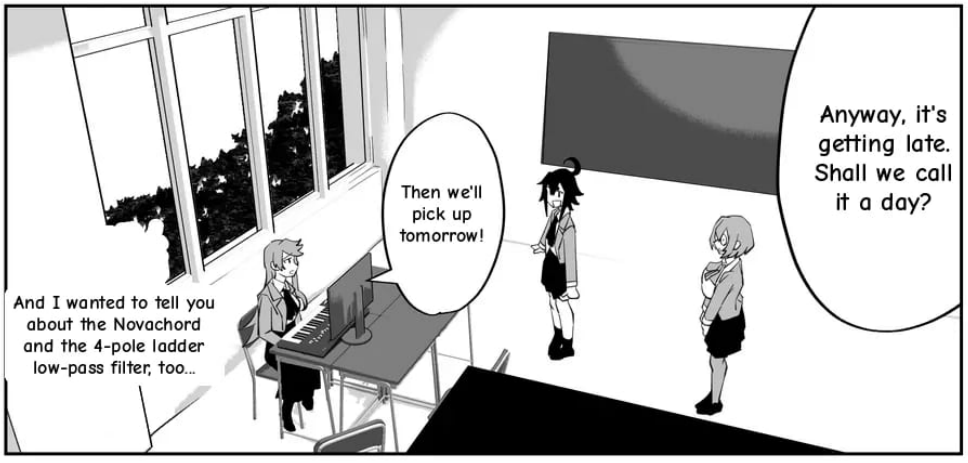
Then all you need is a filter to carve the sound, and shaping sounds is easy. That's the big plus of subtractive synthesis.

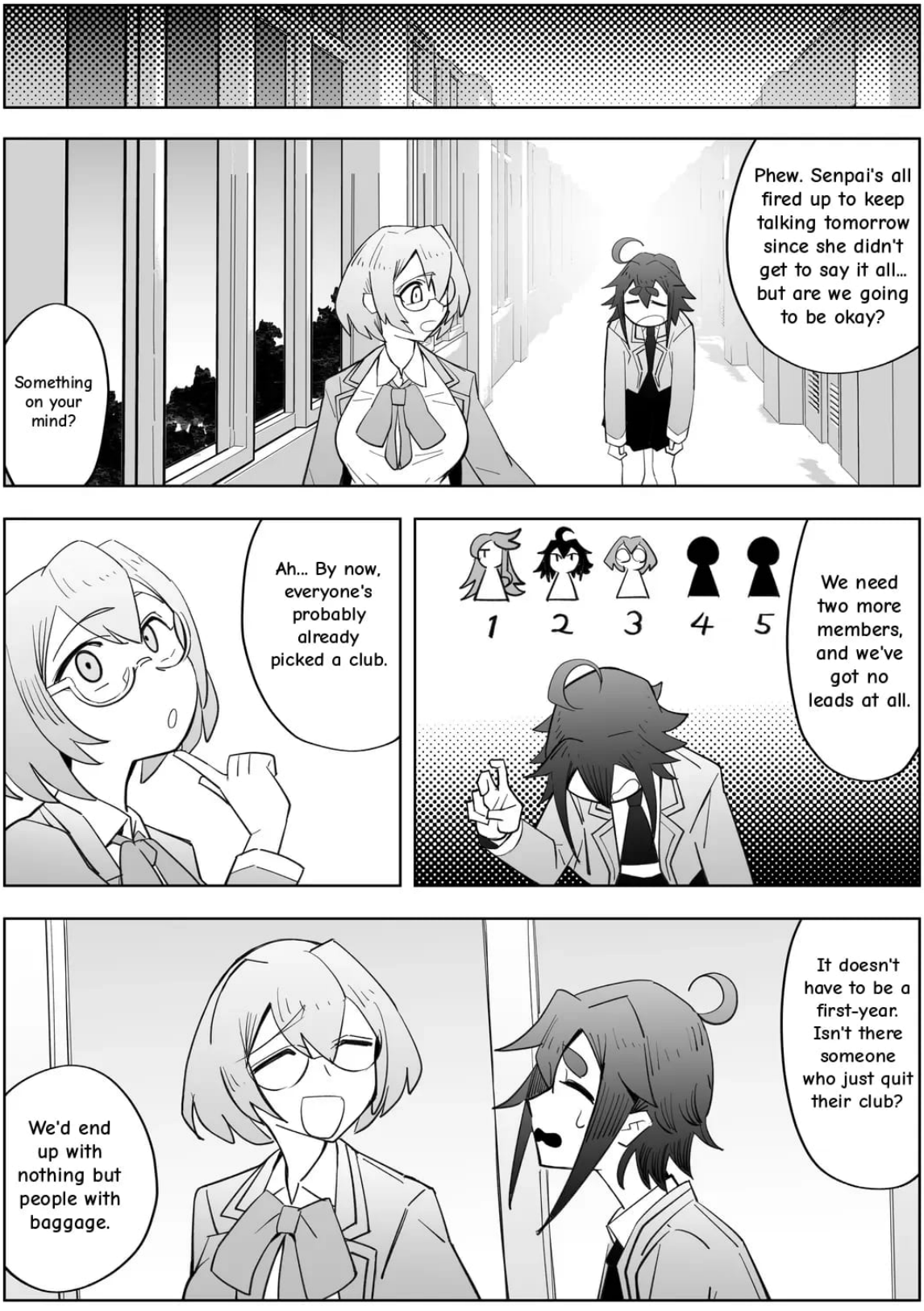

2-Oscillator Subtractive Synthesizer
Sets the pitch
Sets the tone
Sets the volume
KYB
OSC
OSC
MIX
NG
FLT
AMP
ENV
OUTPUT
KYB (Keyboard): the keys
NG (Noise Generator): makes noise
ENV (Envelope): makes the assigned parameter change over time
For example, even a simple subtractive synth like this one can make all kinds of sounds.
Isn't this suddenly way too hard?
I follow you, but I have no idea how you'd get the sound you want out of this.


No! I'm good!
You sure?

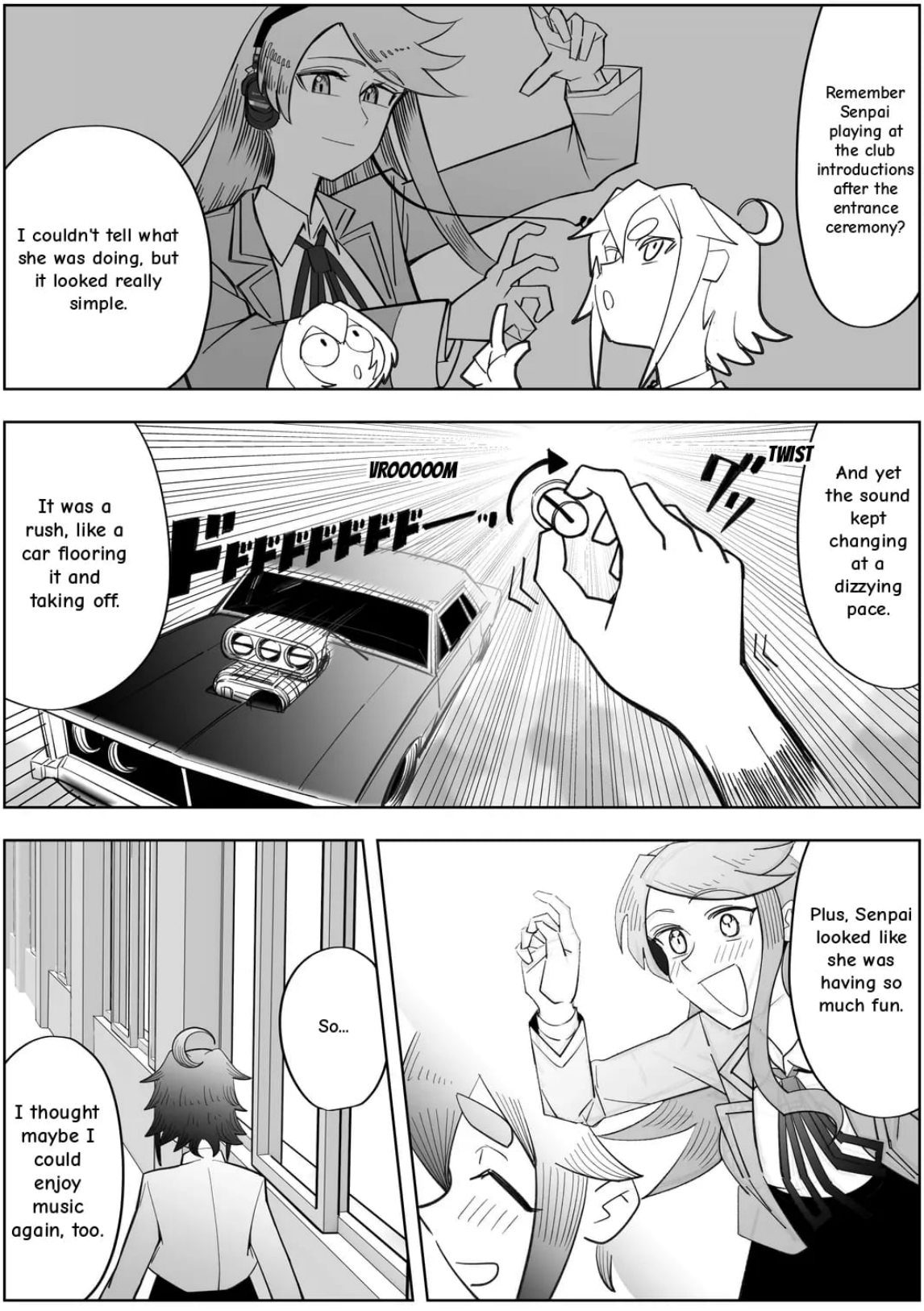

Kohaku, want to give it a try?


SLIDE
ガラララ

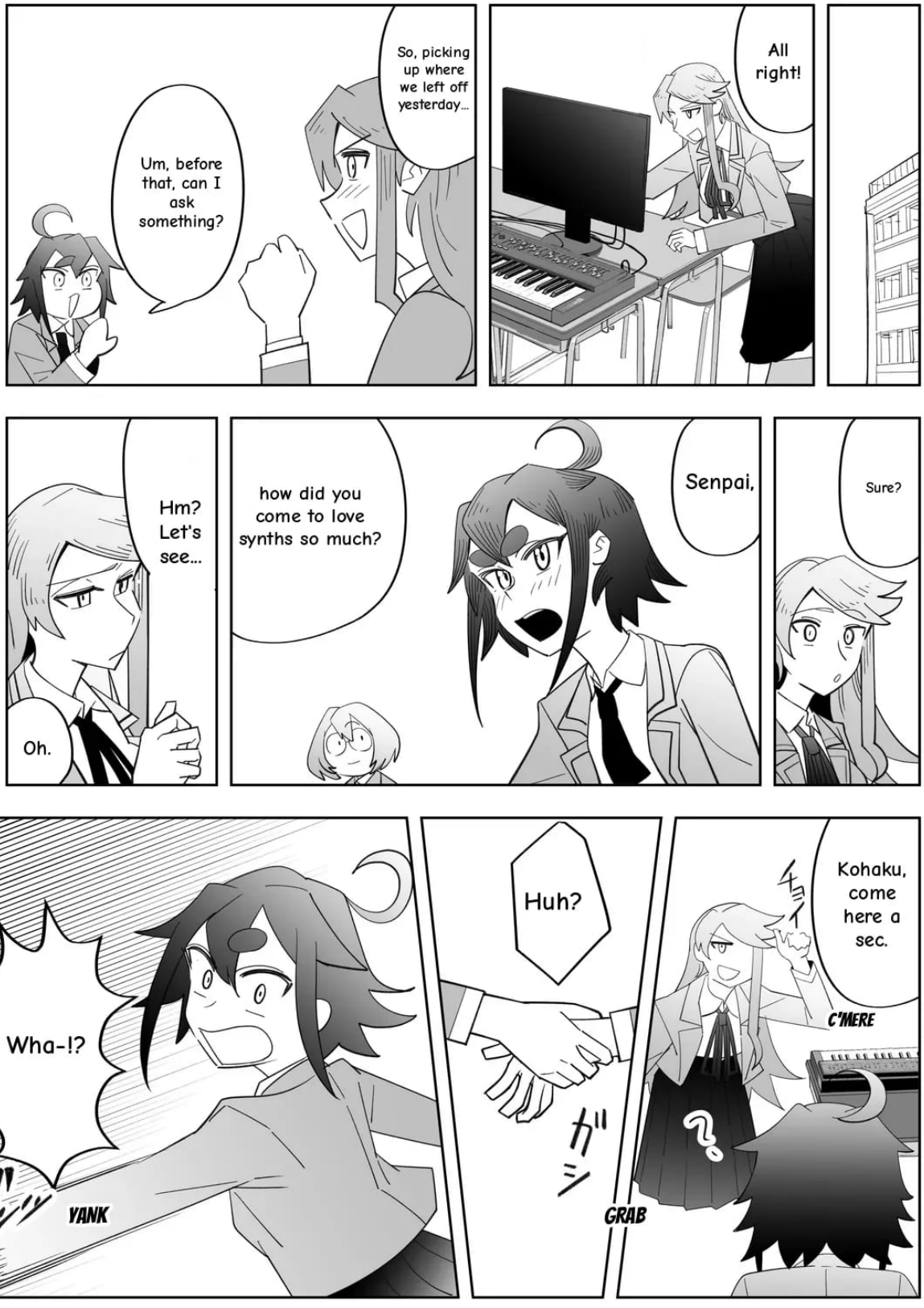

And I wanted to tell you about the Novachord and the 4-pole ladder low-pass filter, too...
Then we'll pick up tomorrow!
Anyway, it's getting late. Shall we call it a day?

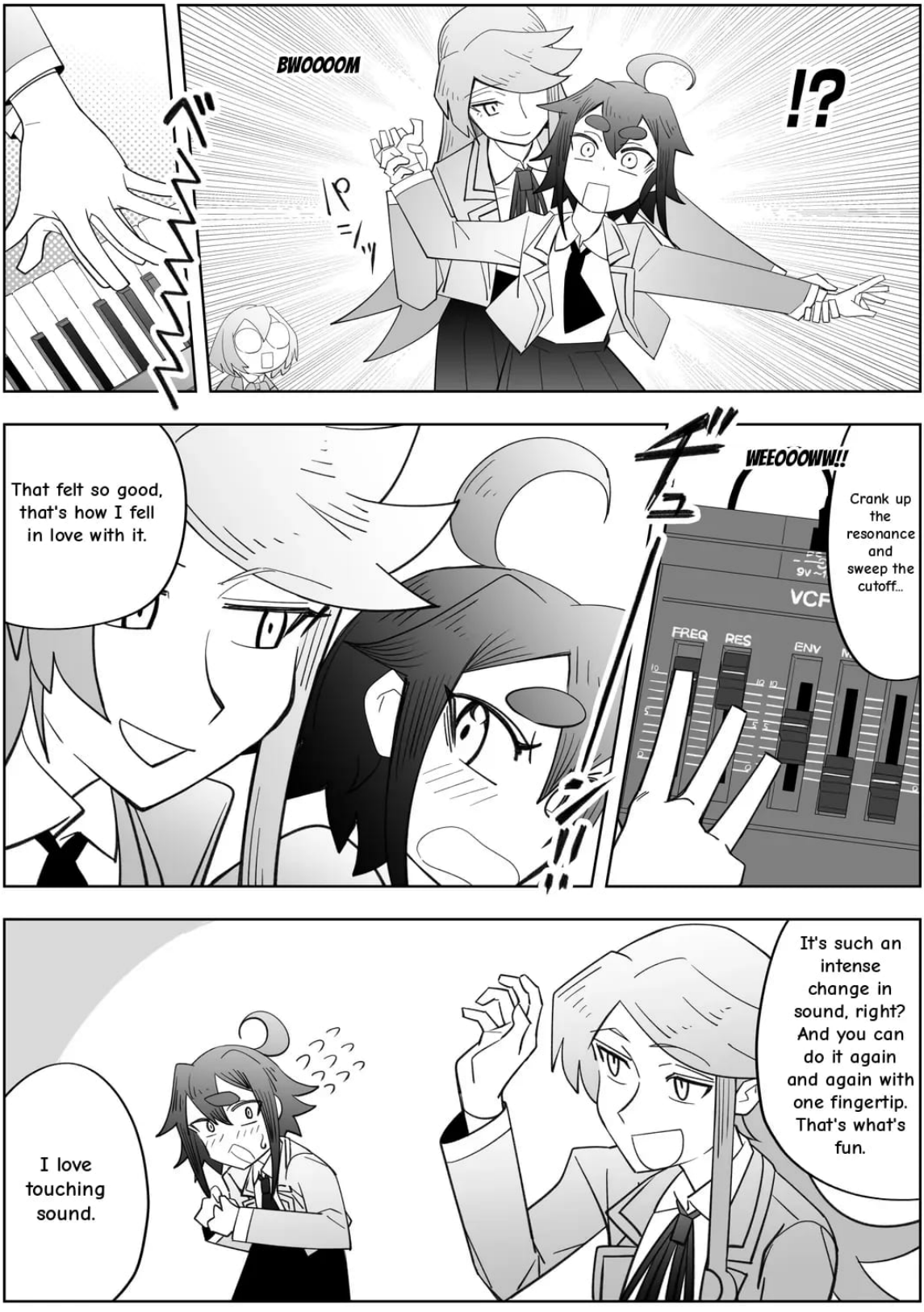

Phew. Senpai's all fired up to keep talking tomorrow since she didn't get to say it all... but are we going to be okay?
Something on your mind?
Ah... By now, everyone's probably already picked a club.
1
2
3
4
5
We need two more members, and we've got no leads at all.
It doesn't have to be a first-year. Isn't there someone who just quit their club?
We'd end up with nothing but people with baggage.

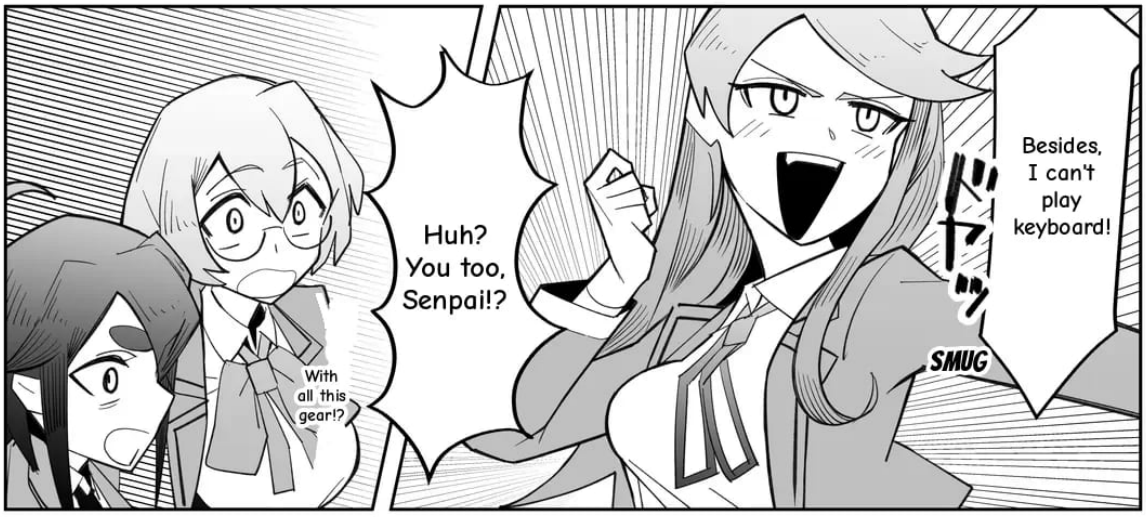

HMMM...
うーん
Hey, Kohaku, why are you trying so hard?
Because I didn't want Senpai to be sad.
A-any other reason? You didn't love electronic instruments to begin with, did you?
That's...
Don't tell Senpai, okay?
Sure, sure.

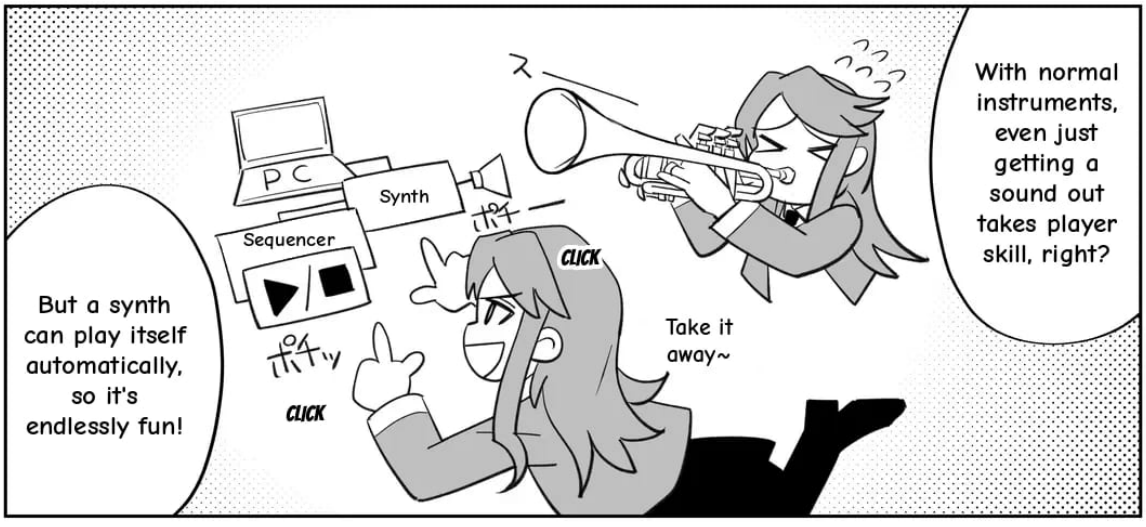

Remember Senpai playing at the club introductions after the entrance ceremony?
I couldn't tell what she was doing, but it looked really simple.
VROOOOOM
ドドドドドドー
TWIST
ヴッ
And yet the sound kept changing at a dizzying pace.
It was a rush, like a car flooring it and taking off.
Plus, Senpai looked like she was having so much fun.
So...
I thought maybe I could enjoy music again, too.

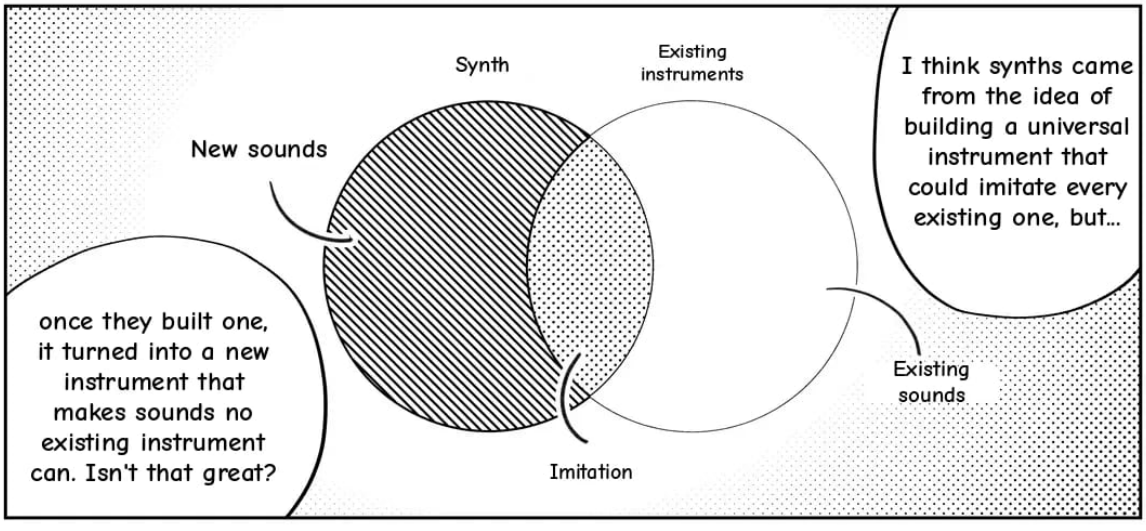

Couldn't keep the rhythm
TICK TICK
Couldn't play loud and soft
and I was just hopeless.
I took piano lessons when I was little, see.
Again?
But somehow, I stopped enjoying it.
Why... aren't you getting... any better...?
I don't hate music.
Maybe I will.
Why not ask Senpai what she loves, and what makes it fun?

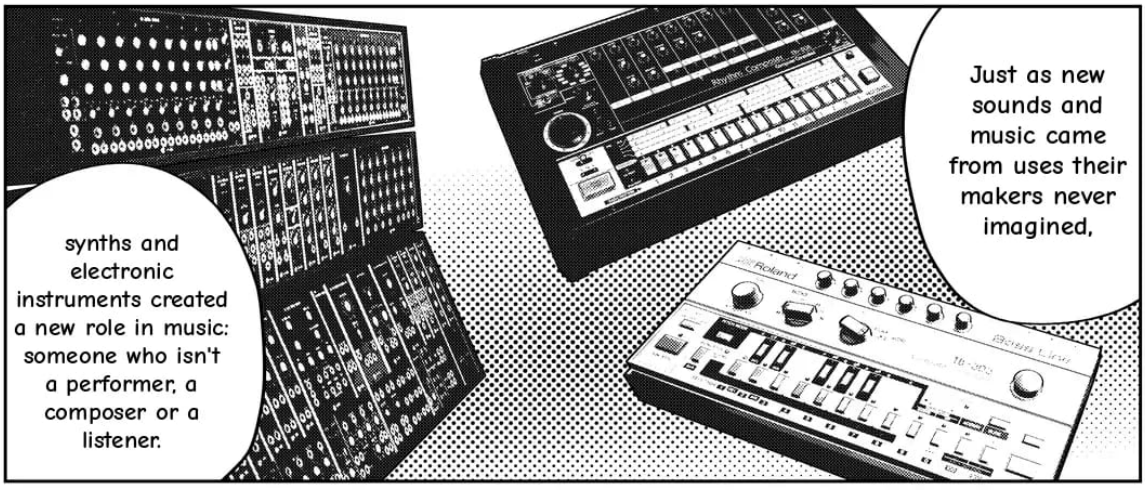

So, picking up where we left off yesterday...
Um, before that, can I ask something?
All right!
Hm? Let's see...
Oh.
how did you come to love synths so much?
Senpai,
Sure?
Kohaku, come here a sec.
C'MERE
Huh?
ガシ
GRAB
Wha-!?
YANK

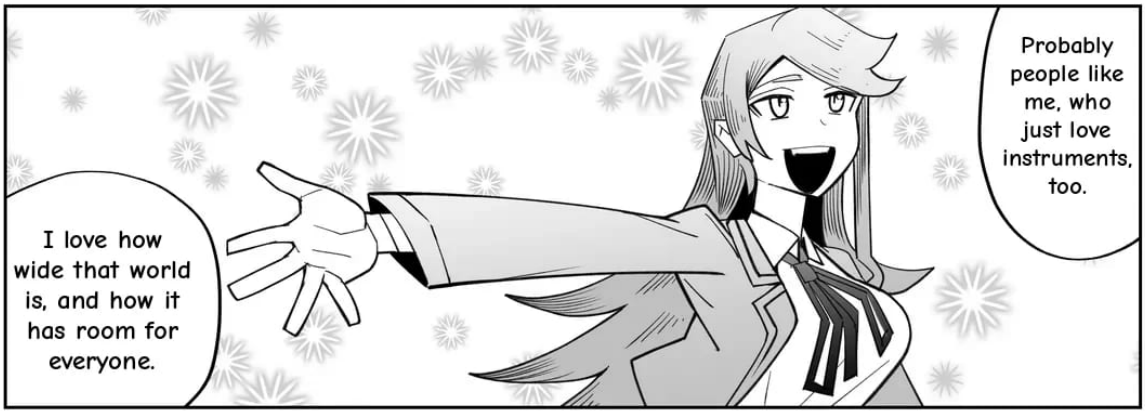

BWOOOOM
!?
That felt so good, that's how I fell in love with it.
WEEOOOWW!!
Crank up the resonance and sweep the cutoff...
VCF
FREQ
RES
ENV
It's such an intense change in sound, right? And you can do it again and again with one fingertip. That's what's fun.
I love touching sound.


With all this gear!?
Huh? You too, Senpai!?
Besides, I can't play keyboard!
SMUG


But a synth can play itself automatically, so it's endlessly fun!
PC
Synth
Sequencer
CLICK
CLICK
Take it away~
With normal instruments, even just getting a sound out takes player skill, right?


Synth
Existing instruments
New sounds
Existing sounds
Imitation
I think synths came from the idea of building a universal instrument that could imitate every existing one, but...
once they built one, it turned into a new instrument that makes sounds no existing instrument can. Isn't that great?


synths and electronic instruments created a new role in music: someone who isn't a performer, a composer or a listener.
Just as new sounds and music came from uses their makers never imagined,


I love how wide that world is, and how it has room for everyone.
Probably people like me, who just love instruments, too.


Yes!!
Did that answer your question?


Wait, huh!? Someone besides Ikune is in there!?
Huh?
電子楽器同好会
Let's see, is Ikune in?
That girl...
Hm~?
Seriously? She got new members!
ふーーーん
HMMM~
Looks like she'd be fun to tease, huh?
TO NEXT SIGNAL↲