1. A setup consisting of separate devices that can be routed together in numerous ways is a characteristic of a _____ design.

2. Bob Moog published a paper with the Audio Engineering Society (AES) in the year _____ outlining his concept of voltage control.

3. The keyboard sends a precise tuned _____ per key to tune the oscillators to the correct pitch.

4. A _____ signal goes high when a key is pressed and goes low when a key is depressed.

5. Speakers and microphones are both examples of _____, which convert electrical signals into an acoustic signals.

6. The eardrum converts a sound wave in the air into a sound wave in the _____ of the middle ear.

7. The organ in the ear called the _____ consists of tiny hairs that resonate with the sound waves at different tune frequency bands.

NOTES:

SETUP

The following exercises are designed to cement the concepts outlined in this lesson through exploration and listening. While of course we use Moog synthesizers throughout the video series, these exercises are universal, and you can use any synthesizer you choose for them. For these exercises, all you need is a synthesizer with:

- Knobs to control various parameters of the sound
- Frequency control for the oscillators

Grab your synthesizer, plug it into a power source, and connect it to some kind of monitoring source. You can use headphones if need be, but acoustic projection from a speaker into the air in a room and finally to your ears is preferable.

The most important thing is to make sure you are in a comfortable environment. Take some deep breaths and slow down the world outside. Take all the time you like for these exercises. If a bolt of inspiration strikes in the process, follow it wherever it leads.

1.1 Listening

Close your eyes and listen to what is around you. Don't try to change anything about your environment – listen to the sounds as they are.

1.2 Sonic Dérive

Play a note on your synthesizer and begin to move the panel controls slowly. Observe how each panel control affects the sound. Let yourself follow your movements towards sounds that you are attracted to and move away from sounds you are not.

1.3 Chance Operation #1

Turn the volume down on your synthesizer so that you do not hear anything. Move the panel controls with the intention of creating a particular sound. Now turn the volume up and play a note. How close did you get to your sound? What does this sound sound like to you?

1.4 Chance Operation #9

Turn the volume down on your synthesizer so that you do not hear anything. Now move the panel controls randomly – do not think about any of your movements. Close your eyes if you must. Now turn the volume up and play a note. How does this sound make you feel? What are some characteristics that might describe it?

1.5 Speaker Watching

Play and hold a note on your synthesizer – creating a simple sustained tone. Now play with the volume of the synthesizer and your monitoring system and watch the speaker cone itself as you do this. Can you perceive the physical motion of the speaker cone increasing and decreasing as the volume is changed? You may not be able to – that's okay. Just try to explore with your senses the physical vibrations of the speaker.

1.6 Exploring the Range

Try to play the lowest note possible on your synthesizer. This may involve a combination of playing the lowest key possible, setting octave settings on the oscillators, and using frequency or detuning controls. Now try to play the highest note possible on your synthesizer. Explore the upper and lower bounds of frequencies available to you on a given instrument.

1.7 Perceptual Boundary

Explore the area between rhythm and pitch. Take a simple square wave and bring the frequency down until you hear the steady tone break up and begin to perceive separate clicks. Can you identify where exactly this perceptual transformation occurs?