Arithmophone O/U – quickstart guide

INTRODUCTION

The Arithmophone O/U is a software instrument that you can play from any phone, tablet or computer (it works best in landscape orientation). It is based on an idea by the wonderful instrument designer Bart Hopkin called the over-under. The Arithmophone O/U is web based, and you can play it straight from your browser, but you can also install it as a standalone app, so you can have a nice full screen experience and still play it when you're not online. To play from your browser, simply go to chielzwinkels.net/arithmophone/OU, click on the 'play the Arithmophone O/U' link and start playing. To install the Arithmophone as a standalone app, you will need to use a suitable browser: this works with Safari on iOs or iPad OS, and with Chrome on Android. In Safari, click the share button and choose 'add to homescreen'. In Chrome, click the three dots in the top right and choose 'install app'. You can also install the Arithmophone app on Mac and Windows desktop computers: If you use Chrome or Edge as your browser an icon for this option will appear in the address bar when you open the website. After you have installed the Arithmophone, it will appear alongside the other apps on your device and you can open it to start playing.

CONTROLS & OPTIONS

The button at the top left labeled **o** brings up the options screen, where you can adjust different sound parameters. Once you have finished adjusting sound parameters, you can press the **options** button to close the options screen, this will return you to the keyboard so you can resume playing.

The three buttons in the middle let you switch between different waveforms:
o = Sine wave (dark, round sound)
△ = Triangle wave (warm, mellow sound)
□ = Square wave (bright, sparkly sound)

The **mono/poly** button switches between polyphonic and monophonic mode. In poly mode, the Arithmophone O/U can sound up to four notes at a time, so you can play chords as well as melodies. In monophonic mode, the Arithmophone O/U will sound only one note at a time. This gives a different kind of sound, less like a piano or a guitar and more like a saxophone or an old school synthesizer.

The tuning mode button determines the reference frequency for the root note. In **O/U** mode this is set to 62.4 Hertz, as suggested by Bart Hopkin in his original design for the over-under. In **D** mode it is set to the musical note D in standard tuning, as on the other Arithmophone instruments.

Seven sliders allow for further adjustments of the sound, as detailed on the following page.

THE SLIDERS

Slider 1: delay mix
There is a stereo delay on the Arithmophone, that produces echoes to make the sound more wide and spacious. The blue slider determines the amount of delay that is mixed in with the original sound. Low values (slider to the left) give you less delay, high values (slider to the right) give you more delay. When the slider is completely to the left, there is no delay at all mixed in.

Slider 2: delay feedback
This slider determines how many echoes are produced by the delay. Low values give only a few echos, while at high values the echoes go on for a long time.

Slider 3: delay time
This slider determines the time between echoes. At low values, the echoes follow each other very quickly, like in a small room. At high values, there is a lot of time between echoes, like in a large cave or a canyon.

Slider 4: vibrato
This slider determines the vibrato added to the notes. Vibrato is a slight 'wobble' in pitch that can make notes sound more lively and expressive. At the lowest value there is no effect at all, at the highest value there is a very fast and pronounced effect.

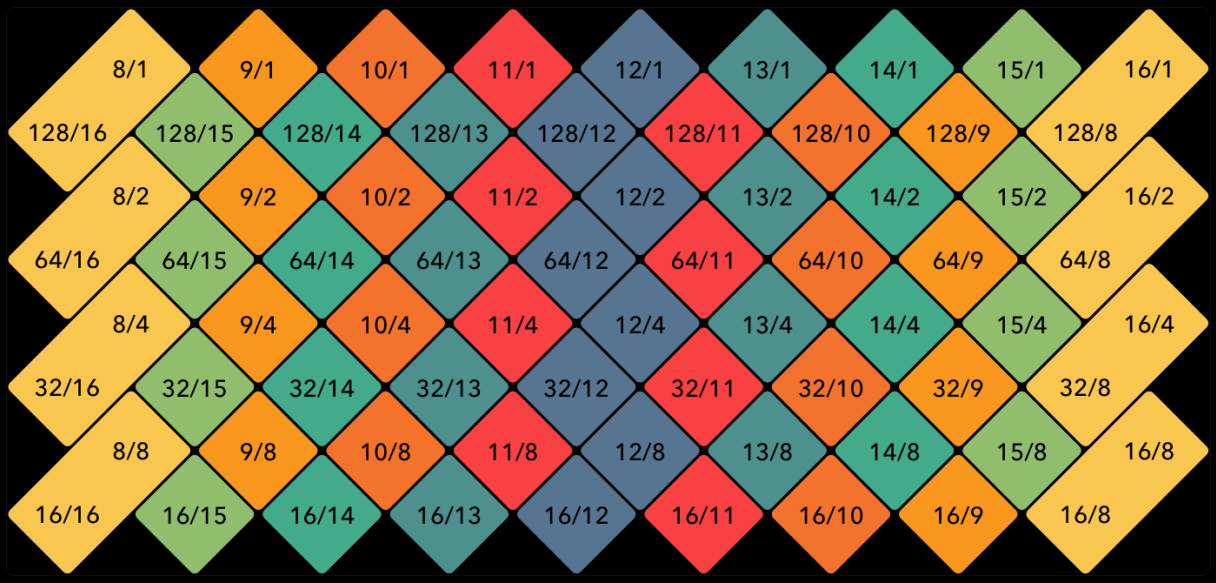
Slider 5: attack
This slider determines how quickly the notes rise to full volume. Low values give a snappy sound (like a piano or a guitar), high values give a softer start of the sound (like a violin or a cello).

Slider 6: decay
This slider determines how long the notes ring out. Low values make for short notes, high values make for longer notes.

Slider 7: octave / transpose
By default, the Arithmophone O/U is tuned to 62.4 Hz. With the red slider, you can adjust the octave range in 5 steps, giving the instrument a total range of 8 octaves (from 31.2 to 7987.2 Hz). When you switch the tuning mode from O/U to D, the instrument is tuned to the musical note D in standard tuning, and the red slider then controls the transposition, so you can change the pitch up or down in standard tuning semitone steps, from G (seven semitones below) up to A (seven semitones above). This gives you more flexibility for the root frequency, in exchange for a smaller total range of about 5 octaves.

THE KEYBOARD

The notes on the Arithmophone O/U are laid out as follows:



The overtones (harmonics) and undertones (subharmonics) are intertwined and each horizontal row provides the (sub)harmonics from 8 to 16 in a different octave. The keyboard provides a 4 octave range, so the complete overtone series up to the 16th harmonic is present from the lowest note upward. Conversely, when starting at the highest note, the full undertone series down to the 16th subharmonic can be played as well.

It may be easier to think of the notes by name instead of by ratio. Assigning note names to harmonics is a bit tricky and the notes on the over-under don't correspond directly to the notes of standard (12 tone equal) tuning. But if we name the notes according to the standard interval they are closest to, using sharps for overtones and flats for undertones, we can get a pretty helpful naming scheme. Using D as the central note, it looks like this: