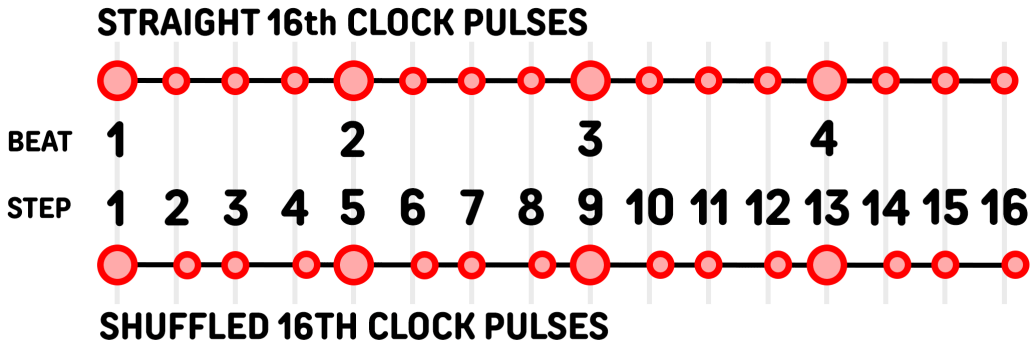
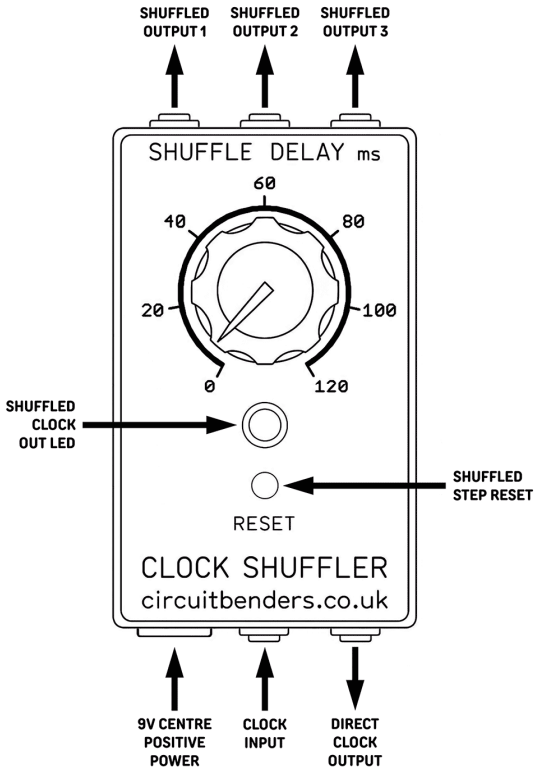
circuitbenders.co.uk CLOCK SHUFFLER

The circuitbenders.co.uk Clock Shuffler is designed to sit between any unit acting as a master clock generating a stream of straight 16th clock pulses, and a drum machine, synth or sequencer that can be synced to advance one step per clock pulse, with a total of 16 steps per 4 beat bar. This is known as 4ppqn sync (pulses per quarter note) as every beat is divided into 4 clock pulse steps. The Clock Shuffler applies a variable delay (0-120ms) to every other clock pulse it receives from the master clock source. In most situations step 1 is the on beat, step 3 is the offbeat and the shuffle delay is usually applied to step 2 and step 4 of every beat. Delaying these two steps adds a grooving shuffle or swing to a pattern. The amount of shuffle delay can be varied at any time.



The Clock Shuffler has five 3.5mm sockets and a DC power jack. The unit should be powered using a 9v centre positive power supply, but it'd also work fine with 12-15v at a push.



The sockets consist of:

- **CLOCK INPUT**: A standard 3.5mm jack cable should be taken from the clock or sync out of the unit supplying the master clock, and plugged into the clock input socket on the Clock Shuffler. Ideally you want the clock source set to 16th notes. For preference the clock pulse should peak at 5v. It will work with higher voltage input pulses, but the shuffled and direct output pulses are limited to 5v maximum.

The Clock Shuffler detects the rising edge of the pulse so the millisecond width/duration of the pulse is generally not important.

- **DIRECT OUTPUT**: This is an exact buffered copy of the signal at the clock input and is not affected by the shuffle settings. You can use this as a kind of clock thru socket to pass the straight clock signal on to other units.
- **SHUFFLED OUTPUTS 1/2/3**: These are three outputs on the top of the case. Each output has an identical buffered copy of the shuffled clock signal. The shuffled clock LED will flash whenever a clock pulse is present at the outputs.

The **RESET** button is used to ensure the correct steps are delayed. When the RESET button is pressed, the first clock pulse the unit receives **after it is released** will always be classed as step 1. This means the second pulse it receives will be a delayed/shuffled pulse etc
To sync units with the shuffle on the correct steps press stop on your master clock unit and on any units being synced to the Clock Shuffler, then press and release the RESET button. Press run or start on the synced units and they should hopefully return to the start of their pattern and arm the playback with them waiting to receive a clock pulse. If not then you will have to manually reset them to the start of their pattern. When you press play on the master clock device all the synced machines should start together on step 1, with the shuffled pulses being sent from the Clock Shuffler on steps 2, 4, 6, 8 etc.
You can press the RESET button whenever you like and it will always class the next pulse received as a step 1 pulse, but remember that it waits until the button is actually released before passing any pulses through to the outputs. If you press and hold the RESET button, units synced to the shuffled outputs will stop running and then restart when the button is released.

The delay on the shuffled clock pulses can be continuously varied from 0 to 120 milliseconds using the knob, but how much delay you can actually apply will depend on the bpm of the 16th pulses at the input. The slower your bpm the more delay you will be able to apply, but eventually the shuffled even numbered pulses will be delayed so much they will start to overlap the odd numbered ones. If this happens then the synced units will only see one pulse instead of two and go out of sync, but by this point the shuffle will be so extreme it'll be unusable anyway, so it's fairly unlikely that this will ever happen in practice. If you're working at Drum & Bass bpms you may only be able to get maybe 50ms of delay before things get ridiculous, but at Dub speeds you should be able to get the full 120ms of delay.

TIP: The delayed pulses don't necessarily have to be steps 2, 4, 6 etc. The delay is applied to **every other step** seen at the input regardless of any unit synced to the output. If you have a pattern on a synced device with an odd number of steps then the delay will be applied to the even numbered steps the first time the pattern plays, then the odd steps the next time round, and alternately each time the pattern loops.

KORG VOLCA NOTES: As anyone who owns a Volca probably already knows, the sync functions are appallingly badly implemented and often only just barely work, but it's even worse than you imagined! Originally on the v1 firmware for no apparent reason the Volcas could only be set to 2ppqn clock sync. This insane decision meant that they only actually advance a step on receiving a clock pulse on odd numbered steps, the on beat and the offbeat (steps 1 and 3 for example). The timing for the even numbered steps such as 2 and 4, appears to be extrapolated from the length of the spaces between the on and off beat pulses.... why?!
Even more bizarrely, when the Volca firmware was updated to include 4ppqn (1 pulse per step) sync, they don't appear to have actually removed some of the routines that decide the timing of the even numbered steps. The result of this appears to be that if you're using the Clock Shuffler and you stop the Volca playing, if it was expecting the next step to of been an odd numbered step then you reset the Volca, you reset the Clock Shuffler and everything starts again in sync with the shuffle on the correct steps. So far so good...
If the Volca was expecting the next step to have been an even numbered step when you pressed stop, then you reset both units and the Volca still thinks the next step will be even numbered. When you press play again the Volca often just randomly ignores the first pulse it receives or experiences some kind of seizure with the timing, and you end up with the shuffle on the wrong steps. Without a shuffled clock all the clock pulses are timed exactly the same so it wouldn't matter which specific pulse was driving which numbered step or if there were timing jitters for the first second or so of sync, so it appears that Korg didn't bother fixing it. This is incredibly annoying as its very difficult to stop the Volca on the correct step to make it start with the shuffle assigned to the proper steps next time you press play. You often have to make several attempts to start everything before a Volca will shuffle correctly. The only way to ensure it works properly is to turn any Volcas off and back on again to hard reset its step counting. We spent some time trying to figure this out before realising it was 100% down to Korg and some incomprehensible design decisions!