

Description - model 252e Polyphonic Rhythm Generator 252151029

The 252e sequences pulse patterns and CV values stored in the cells of eleven concentric rings. Ring cells resemble the stages of more conventional sequencers, but the architecture of the 252e allows for interesting and unusual possibilities not previously available. Four pulse outputs and six CV outputs can be assigned freely amongst the cells. Each of the three clocks can be assigned to any of the 11 rings and synchronized to generate two- and three-part polyrhythms and polymetric patterns. Pulses and CVs can be shifted independently within a ring. Pitch and velocity CV pairs can be captured from MIDI input – while editing and during performance. The 252e can synchronize to - or generate - MIDI clock. A Euclidian pattern generator is included to serve as a rhythmic library.

Anatomy

The 252e consists of 5 primary functional areas (roughly clockwise from the top-right):

- CV output and editing
- Display layer selection
- Clock assignment and synchronization
- Cell selection and Euclidian pattern generation
- Pulse editing and output

Quick Start

The default preset is configured with the master clock assigned to the 4 beat ring. There are single Red, Green, and Blue pulses in cells 1, 2, and 3 of the ring respectively. If you press the “play/stop” button, the playhead-cursor will begin to step at the default 120 BPM and you’ll see from the LEDs in the “PULSE OUTPUT” section that pulses are being performed at the expected times.

To alter the BPM setting, turn the “MASTER BPM” knob. The value shown on the segmented display will begin blinking to indicate that you have deviated from the current BPM. To apply the new BPM setting to the master clock, press the encoder down. The value will stop blinking to indicate that the displayed BPM value is now active.

The cells in a ring can only be performed when a clock is assigned to the ring to “drive” it. Clocks are assigned to rings using the clock assign knobs and buttons. The current clock assignment is indicated by an unblinking yellow ring number LED. A pending clock assignment is indicated by a blinking LED.

To change the clock assignment, turn the “assign” knob until the blinking LED moves to the desired ring number. When you press the “assign” button, the LED begins blinking faster and the assignment is changed the next time cell 1 is performed for that ring. Try changing the master clock assignment by turning the “assign” knob and pressing the “assign” button. When the current ring arrives at cell 1, you’ll see the play cursor jump to the new ring you’ve assigned and being travelling around the ring. In the next section you’ll learn how to add pulses to an empty ring.

Basic Cell Editing

Press the “edit” button to begin editing cell data. In cell edit mode the “edit” LED will be illuminated and a white blinking edit cursor will appear on the ring display. The edit cursor can be moved around the current ring using the “cell” rotary encoder. To switch rings use the “beats/cycl” encoder. When you switch rings, the encoder’s neighboring segmented display will show the number of cells/beats in the selected ring.

To assign a simple pulse to a cell, select the cell with the edit cursor and press one of the “red”, “green”, or “blue” pulse buttons. The selected cell in the ring display will illuminate with the pulse color to show the assignment and the corresponding LED in the “PULSE OUTPUTS” section will also illuminate. Adding more than one pulse to the same cell will mix their colors. Pressing a pulse button a second time will remove the assignment.

Using the “pulse duration” knob you can change the length of the pulses in a cell, anywhere from a transient to the entire cell duration at the current BPM. The “behind/ahead” knob will cause the cell to be performed late or early relative to the cell’s position in the sequence.

The “cell subdivide” section lets you add up to 7 pulses that will be performed **during the course of the cell’s duration**. The button increments the number of pulses to perform, and knob distributes them in time. Zero is an equal time distribution; larger values group the pulses closer and closer together and push them further and further towards the end of the cell’s time domain. Cell subdivide pulses always appear at the “sub-div” jack in the “PULSE OUTPUTS” section.

The “phase” knob rotates cell data in the ring forwards or backwards by single cell increments. See the *Ring Display Modes* section below for details about how data is rotated.

Copy, Paste, Clear, and Pulse Fill

When a cell is selected, pressing the “copy” button copies all of the cell’s associated data: pulses, pulse timing, and CV assignments (which will be discussed next).

As you might expect, the “paste” button replaces the currently selected cell’s data with whatever was most recently copied. If you hold down the “paste” button and turn the “cell” rotary encoder, the paste will be repeated into each successive cell. See the *Ring Display Modes* section below for details about how data is pasted.

The “clear” button will erase all cell data from the currently selected cell. If you hold the “clear” button and turn the “cell” encoder, the erasure will be repeated in each cell. See the *Ring Display Modes* section below for details about how data is cleared.

As a convenience when editing pulses, you may hold down one or more of the R/G/B buttons and turn the “cell” encoder to fill adjacent cells with pulses.

Editing CVs

To associate a CV value with a cell, select the cell using the “cell” and “beats/cycl” encoders as described in the *Pulses* section above. Next press the “select” button in the “CV EDIT” section until the desired CV output is selected. Turn the encoder below the “select” button to assign a

CV value. A fine tune mode is available by pressing the encoder down; press again to return to coarse CV edit mode.

Up to six CV outputs (each with different values) can be assigned to any one cell. Remember that the outputs are shared, so if you assign the same CV output to 2 or more cells that are performed on different rings by different clocks at the same time, the result will be undefined.

The special “none” CV value, indicated on the segmented display by “- -“ means “don’t change the output CV”. For example, if you have 4 beat pattern but only want two alternating pitches using CV output 1, you can assign CV values to cells 1 and 3, and leave cells 2 and 4 with the “none” value. The output value when cell 1 is performed will remain unchanged by the “none” value in cell 2, then cell 3 will change the output value, and cell 4 will again leave it unchanged.

Because traditional sequencers tend to operate with an assumed concept of a “note”, it’s important to emphasize here that there is no inherent relationship between pulses and CVs in the 252e. They can be assigned or not as you like. Cells can have pulses but no CVs, or CVs but no pulses. As you’ll see below, CVs and pulses are both represented in the ring display as R/G/B colors, but that doesn’t imply a functional relationship. For example, you **can** create a single synth “voice” using the 252e where the Red pulse is the note on trigger, CV 1 is pitch, and CV 4 is velocity. We have made it convenient to organize the outputs this way because it’s an obvious application when creating three voice polyrhythms using three rings at the same time. However many other logical organizations are possible and encouraged.

Ring Display Modes

The ring display at the center of the 252e can show four different sets of cell properties using the R/G/B color scheme. At power on time, the “pulses” view is displayed. It might be helpful conceptually to think of the different views as layers, analogous to visual layers in programs like Adobe Photoshop. The “pulses” layer indicates the presence of pulses in cells with the colors red, green, and blue (and their simple combinations). The “cv 1-3” layer shows the presence of CV assignments for outputs 1, 2 and 3 using the same R/G/B scheme. The “cv 4-6” and “subdiv” layers show CV outputs 4,5 and 6 as R/G/B, and cell subdivide pulses as Red. A fifth mode shows them all superimposed so you can see which cells are empty and which are occupied.

Having different display layers helps one to visualize where the various kinds of cell data has been assigned in the rings, but it also affects certain editing procedures. The “paste”, “clear”, and “phase” controls affect only the data associated with the current display layer. So for example, if you press the “clear” button when the “subdiv” display mode is active, only the cell subdivide pulses will be erased from the current cell. Similarly with the other controls and display modes. If you want to duplicate only the CV data for outputs 1, 2 and 3 from one ring into another, you can copy and paste while the “cv 1-3” is active. In fact, copy always copies the data from all layers, it is the paste function that’s selective.

This feature adds some complexity to the user interface of the 252e which may make things a little bit confusing for new users, but after a little bit of practice, its utility when editing and performing with complex arrangements will become apparent.

Let’s suppose you choose to associate pulses and CVs together to describe a set of three traditional synth voices. In this scheme, the red, green, and blue pulse outputs would represent note on triggers; red for voice 1, green for voice 2, and blue for voice 3. CV outputs

1, 2, and 3 would represent pitch, and CV outputs 4, 5, and 6 would represent note velocity. A simple application would be to use three different rings, perhaps ring 4 containing only red pulses, ring 7 containing only green pulses, and ring 16 containing only blue pulses. Next you would enter pitch data for ring 4 by adding CV values for output 1; then pitch data for ring 7 using CV output 2; and finally pitch data on ring 16 using CV output 3. Then for velocity on ring 4 use CV output 4; ring 7 velocity on CV output 5, and velocity on ring 16 using CV output 6. This gives you three kinds of data on three different display/edit layers.

Using the display modes, you can now modify and shift the temporal relationships between rhythm, pitch, and velocity independently. For example, with the “pulses” layer selected, turning the “phase” knob will shift the rhythmic pattern in relationship to the pitch and velocity data. When combined with the “randomize” feature described below in the *Advanced Editing* section, you can very quickly create musically expressive patterns and vary them in many interesting ways.

Clock Assignment

Clock assignments can be programmed using CVs and pulses. The CV input next to the “assign” knob selects the ring, and a pulse at the pulse input next to the “assign” button starts the assignment. Note that the assignment is not fixed when the button is pressed (or pulse received), so if you turn the knob or change the CV before cell 1 is reached on the ring currently assigned to the clock, a different ring will be assigned than the one that was originally selected.

Synchronization

Press the “sync” button to change the clock synchronization method.

Sync mode “on 1” means that cell 1 of all active rings will happen at the same time. The master clock will run at the indicated BPM, and clocks two and three will drive their assigned rings at whatever rate is necessary to get the ring to cell 1 on time.

Sync mode “on cycl” means that all cells will advance at the same rate.

If neither sync LED is illuminated, the clocks are not synced. In this mode you can press and hold the “assign / Δt ” button for a clock to enable its time scaling mode. In this mode, the green LED is illuminated and the clock knob will scale the master BPM, from .5x – 3x, as does the knob’s associated CV input.

Pressing the “reset” button will force all active rings to resync at cell 1.

Euclidian Rhythms

The Euclidean rhythm in music was discovered by Godfried Toussaint in 2004 and is described in detail in the 2005 paper "The Euclidean Algorithm Generates Traditional Musical Rhythms". The greatest common divisor of two numbers is used rhythmically giving the number of beats and silences, generating almost all of the most important World Music rhythms (except Indian additive rhythms).

To generate pulse patterns using the Euclidian algorithm, select a ring using the “beats/cycl” encoder, and press the “RHYTHM SELECT” button. **NOTE: this is a destructive operation**, any pulse data in the selected ring will be erased and replaced by the Euclidian solution rendered in red pulses (however, other pulses can be added, see the *Advanced Editing* section below).

Turn the “pattern #” encoder to generate each of the Euclidian pulse patterns for the number of beats in the selected ring. The number of pulses in the current solution will be shown on the segmented display to the left of the encoder.

To exit Euclidian mode, press the “RHYTHM SELECT” button, or turn the “beats/cycl” encoder to select a different ring.

Advanced Editing

To select a range of cells for copying, press and hold the “cell” encoder while turning it.

After copying a range of selected cells, the paste operation will differ depending on whether you turned the “cell” knob clockwise or anti-clockwise when you selected the range: the pasted data will appear either forward from the current cursor, or backwards from it. Performing a few experiments will make this relationship more clear.

The “red”, “green”, and “blue” buttons can be used as modifiers to apply editing operations to subsets of cell data. For example, if you are in the “pulses” display mode, hold down the “red” button and turn the “cell” encoder to fill cells with red pulses. To clear the red pulses from the ring, hold the “red” button and “clear” and turn the “cell” encoder to remove only the red pulse from each cell. The R/G/B buttons can be combined in any manner.

This same technique applies to CVs. In “cv 1-3” mode, holding down the “green” button and pressing “clear” will remove any CV data for output 2 in the currently selected cell. To clear the entire ring, hold “clear” and turn the “cell” encoder.

The R/G/B modifier buttons applies as well to the “phase” encoder and “paste” button, enabling selective transformations within a display layer.

Randomize

An extension of the R/G/B button-as-modifier technique provides a randomize function. In the “pulses” display mode, holding down the “blue” button and pressing the “edit” button will fill the currently selected ring with a random pattern of blue pulses. This function also applies to CV values and cell subdivide pulses.

MIDI CLOCK

The 252e supports MIDI clock sync receive and transmit. To enable these modes, press and hold the “MASTER BPM” encoder. The display will change to “oFF”. Turning the encoder selects “S rc” for “sync receive”, and “S tr” for “sync transmit”.

MIDI to CV Conversion

Control voltage values can be captured and entered using MIDI note input. To enable this mode, make sure you are in cell edit mode and then press and hold the “CV EDIT” encoder. The display will change to “i.n” and the LEDs for CV outputs 1 and 4 will illuminate. In this mode, the CV outputs are considered to be pitch/velocity pairs (1/4, 2/5, 3/6) and pressing select will cycle through the pairs. A MIDI note received on any channel will trigger a MIDI to CV value conversion where the note number and velocity are converted to CV range and stored in the currently selected cell’s selected CV output pair.

Values can be entered manually by turning the “cell” encoder to select successive cells in the ring and then sending a MIDI note to capture the data. If you hold down the “cell” encoder, each MIDI note on also advanced the current cell selection by one, so you can fill an entire ring with pitches by playing notes in sequence.