



Snyderphonics JD-1 Custom Keyboard/Sequencer

Reference Manual

Power Supply

The power supply provided is a triple output desktop supply, with +5V, +15V and -15V outputs. The connector is a 5-pin DIN circular connector. The power input jack is on the left side of the wooden case, and the toggle switch next to it turns the keyboard on and off (up is on, down is off).

Ground Connection

The black banana jack on the side of the wooden case next to the power supply and on/off switch is a GND connection. When using the JD-1 to control an analog synthesizer, connect this GND jack to your synthesizer with a banana cable.

FEATURES:

Keyboard

The keyboard is made up of 32 anodized aluminum keys that operate as capacitive touch sensors.

Knob Banks A and B

There are 64 knobs above the keyboard, organized into two knob banks, labeled A and B. Each key has an A knob (top), and a B knob (bottom).

Joystick

The joystick is a spring return Doepfer-style joystick. The aluminum joystick lever is included in a Ziploc bag wrapped with the power supply. I've also included the plastic

lever that came with the joystick. The joystick sends X and Y values from 0-5V, with the center at around 2.5V. The knobs near the joystick outputs can scale this output down.

Pitch CV Outputs

There are four pitch CV outputs, colored blue and labeled “P”, for voice 1, 2, 3, and 4. These produce voltages from 0-10V, with 16-bit precision. These outputs are designed to produce musical pitches, based on a 12-note scale. The tuning of these pitches is effected by the V/Oct scaling (1.0V or 1.2V, default is 1.2V), the Fine Scaling (from 0-200, 100 is no scaling), and the Tuning setting (which selects between 12-note tunings, such as Equal Temperament and Meantone). When in monophonic keyboard mode, the first two pitch outputs produce the same pitch, while the third and fourth output “Ribbon Controller” information – see below for those specifications. When in sequencer mode, all four pitch outputs send the same information. When in 2 note or 4 note polyphony keyboard mode, the different pitch outputs send the voltages for the different voices.

Surface-Area CV Outputs

There are four surface-area CV outputs, colored green and labeled “V”, for voice 1, 2, 3, and 4. These outputs produce voltages from 0-10V, with 12-bit precision, and 10ms analog smoothing. They are designed so that covering as much surface area as it is generally possible to cover will produce an output of around 8V. These outputs can be scaled down with the use of the knob that is mislabeled “scale all”. When in monophonic keyboard mode, voices 1 and 2 are the same voltages, and 3 and 4 output nothing. When in sequencer mode, all four voices show the same value. When in 2 or 4 voice polyphony, the voices each show the value that corresponds to its respective polyphony voice.

Knob A and B Outputs

There are four Knob A outputs, and four Knob B outputs, all of which are colored purple, one of each for voices 1, 2, 3, and 4. The Knob A outputs correspond to the values of knobs in the A knob bank, and the Knob B outputs correspond to the values of knobs in the B knob bank. These outputs can be scaled with the “scale A” and “scale B” knobs, respectively. When the scale A and scale B knobs are fully clockwise, the knobs will output values between 0-10V, in 12-bit resolution. When in monophonic keyboard mode, voices 1 and 2 report the same values, and voices 3 and 4 are unused. When in sequencer mode, all four voices report the same values. When in 2 or 4-voice polyphony, the voices reflect the knob values of the polyphony voice. When the “combined/independent” setting is changed from “independent” to “combined”, the A knob is fine-tuned by the value of the B knob, and is not affected by the “scale A” knob. The B output operates normally in “combined” mode.

Gate and Trigger Outputs

Each of the four voices has one Gate (really a gate+trigger), and one Trigger output. The top jack is the Gate, and the bottom is the Trigger. The behavior of these outputs depends on the “gate style” setting. When in Buchla style (the default), the Gate output will pulse at 15V for around 10us, then fall to 7V and hold until a release happens. The

Trigger will pulse at 15V for 20us, and then fall to ground immediately. In Euro style, the Gate output will rise to 7V, then hold until a release happens, and the Trigger pulses at 7V and then falls to ground. In Moog style, the outputs hold at 7V in their off state, and the Gate outputs stays at ground through the duration of a note, while the Trigger pulses at ground and then rises immediately back to 7V.

Sequencer/Keyboard button

This button changes the JD-1 from operating in keyboard mode, where the user plays the keyboard with monophonic or polyphonic handling, to sequencer mode, where the JD-1 steps through stages when it receives a clock pulse, and the user can guide this sequencer action using the keyboard.

Transpose Selector

This rotary encoder allows the performer to alter the pitch of the “P” outputs up or down by up to 12 semitones. An indicator light shows when the transpose value is non-zero, and the LCD display shows the current transpose value with the marking “Tr=”.

Sequencer Mode Selector

When in sequencer mode, the rotary encoder determines how the sequencer steps. The options are “left-to-right”, “right-to-left”, “back-and-forth”, and “random”.

Quantize/Range Button

When in sequencer mode, this button determines how the keyboard interacts with the step sequencer. In Range mode (the default), pressing two keys will set the range within which the step sequencer can step. When in Quantize mode, the sequencer will only step on stages that the user selects by touching them. Quantize mode can also be used as an arpeggiator.

Mono/Poly Selector

This rotary encoder selects between the polyphony modes when in keyboard mode. The options are “mono retrigger” (the default), in which each new keypress initiates a new gate and trigger event, “mono legato”, in which a new gate and trigger event will only happen after a rest, and 2 and 4-voice polyphony.

Octave Buttons

These buttons allow the performer to raise and lower the pitch output by 2 octaves in either direction.

Knob Mode (independent/combined)

This button switches between “independent” knob mode and “combined” knob mode. When in “independent” knob mode (the default), the A and B knob outputs are treated separately, and each is scaled by its associated scale knob. In “combined” mode, the A output is fine-tuned by the B knob, and also is not scaled by the “scale A” knob. The B knob operates normally. This allows for finer resolution on the A knob, at the expense of independence of knob control.

Internal Sequencer Clock Speed knob

This knob is mislabeled “waveform” since it was originally intended to be for the internal synthesizer, which doesn’t exist yet. I put it to use as a speed control for the internal sequencer clock, which is selected as the sequencer clock by default.

Internal Sequencer Clock Randomness knob

This knob is mislabeled “filter” since it was originally intended to be for the internal synthesizer, which doesn’t exist yet. I wanted a panel control to add randomness to the sequencer clock, so I used this knob. Turned all the way counterclockwise, the pulses are regular and periodic. When turned clockwise, the pulse period becomes increasingly affected by random values.

Trigger/Gate In

This is the yellow jack, mislabeled as “CV in”. When sequencer clock is set to “external”, a pulse in this input will cause the sequencer to step. It looks for rising edges.

LCD Display Features

There are several features that I decided to put on the LCD because there weren’t dedicated buttons for them. I intended to make a menu system, but it doesn’t yet exist, so I used the menu navigation buttons I designed into the panel, and gave them specific dedicated roles. Listed below are explanations of the abbreviations on the LCD, with notes about which buttons control those parameters.

“Gate=”

This is “gate style”. Set it to what you need for the synthesizer you are controlling. B=Buchla, E=Euro, and M=Moog. Buchla style will turn the gate outputs into trigger+gate outputs. Moog uses inverted logic, where the “off” state is logic high. Euro will work for most modern analog synthesizers that are not Moog or Buchla. This is controlled by the button marked “store” in the “Program” section of the panel.

“Skip=”

This is the “skip step” feature. This is a probability that any step will be skipped in sequencer mode. The numbers are from 0-31, with 0 meaning a 0% probability and 32 meaning 100% probability. Therefore, you can consider 16 to be 50%, and with “skip step” set to 16, any given sequencer clock has a 50% chance of being ignored. This feature can produce nice syncopations. This parameter is controlled by the rotary encoder in the “Program” section of the panel.

“Tr=”

This is the Transpose setting. It displays the value set by the “transpose” rotary encoder.

“S=”

This is the “fine scale” feature. It allows you to tune the V/Oct scaling slightly if a synthesizer you are using doesn’t respond correctly to exactly 1V or 1.2V per octave. 100 means no scaling, and the range is from 0-200. Try playing a note in several octaves (push the octave button up and down) and if it seems to be playing sharp or flat octaves on the synthesizer you use, try tuning it with this parameter. It is controlled by the up and down buttons in the “Program” section of the panel.

“C=”

This is the Sequencer Clock Mode. It is either “I” for internal (default), or “E” for external. When set to internal, the sequencer steps on its own, with the speed defined by the internal sequencer speed knob. When set to external, it looks for a trigger pulse on the yellow “Trigger/Gate In” jack. This is controlled by the button marked “Enter” on the “Program” section of the panel.

“Tun=”

This is the Tuning parameter. There are five tuning tables in memory. Each of them is a slightly different twelve-note scale. They are “Equal Temperament”, “Just Tuning”, “Kora”, “1/4 Comma Meantone”, “Werckmeister Well-Temperament I”, and “Werckmeister Well-Temperament III”. Pressing the “left” button in the “Program” section of the panel selects between these scales.

“V/O=”

This is the “volts per octave” parameter. It is 1.2V/oct by default, but can be changed between 1.2V and 1V per octave by pressing the “right” button on the “Program” section of the panel.

MIDI Out

The JD-1 sends MIDI messages out the MIDI out jack. In monophonic keyboard mode or sequencer mode, everything will be on MIDI channel 1. In the polyphony modes, MIDI channels correspond to polyphony voices (using channels 1-4). Additionally, the A and B knob banks and the surface-area values are sent out as MIDI continuous controller values. When in polyphony modes, these values also follow the channel assignments based on polyphony voices. The CC# are listed below:

CC#16 = A knob

CC#17 = B knob

CC#18 = surface-area (V)

Ribbon Controller Output

There is a pseudo ribbon controller built into the firmware of the JD1. It’s somewhat crude, but can be useful. When in monophonic keyboard mode, a general “white-key-centroid” will be sent out the “P” output of voice 3. This can be used during normal playing as a basic “where I am on the keyboard” 0-10V output. To use it more directly,

place three fingers close together (index, middle and ring) on the white keys (the naturals) of the keyboard. Slide these fingers as a group along the keyboard (not using the black keys). You will get an approximate output of your position on the keyboard. There is another processed version of this value that appears on the “P” output of voice 4. In this output, it is scaled to be in the actual voltage range that the pitch output of the keyboard would put out, and it responds to the octave and transpose controls. Note that in this mode, only the “white keys” are understood. You can play a “black key” by pressing two white keys – they will average to be the pitch of the black key between them. This is just a little extra feature I worked up, and I haven’t found this particularly useful, but it’s kind of interesting.

Not Implemented

Several panel elements are not yet implemented. The “portamento” knob does nothing – external analog processing must be used for portamento effects. The USB and Ethernet ports are currently non-functional. The MIDI In jack is not connected or implemented in software. The black banana jack on the front panel is intended as a CV input (though mislabeled as “gate in” but it isn’t currently implemented. The audio output jack is currently not implemented.