

**advanced SID chip emulation** / MBSID v2 based sound engine / 6x LFO / 8x MOD / 2x ENV / 4x WAVESEQ / 3x ARP / 24x14 trigger matrix / phybus instrument clusters / UI cooperation / 12x poly chain option / MIDI option



# zetaSID

expandable modular  
SID synthesizer voice

## USER MANUAL

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# 1. Welcome to zetaSID!

*zetaSID is a small but powerful 4HP synthesizer voice that goes above and beyond classic SID sounds. Choose from an extensive selection of built-in patches or edit a voice with subtle to wild parameterisation and modulation.*

If mono voices aren't enough, extend zetaSID with phybus: a behind-the-scenes digital network that links and controls multiple modules. Up to twelve zetaSIDs can comprise a phybus instrument cluster for six stereo voices of polyphony.

Interact with zetaSID using a CV/gate interface, a high-contrast OLED display along with other high-quality hardware elements. Go beyond standard CV/gate control of zetaSID by connecting nexusMIDI or other expanders (available separately) into a phybus network. zetaSID also supports ASID compatible SID-file playback over MIDI.



## 2. Specifications

- Width: 4HP
- Case depth required: 30mm (with cable)
- High-quality milled aluminium frontpanel (no PCB material)
- Power connector: standard eurorack +/-12V 10-pin IDC
- Power requirements:
  - +12V: 120mA
  - -12V: 15mA
  - 5V: 0mA/not required
- Storage (optional): µSD card 10/A1 or faster; FAT32 format
- Maximum instrument cluster size: 12 zetaSID units (6 stereo voices)
- Physical inputs (for classic patching):
  - CV input: -5V to +5V or 0 to 10V (configurable)
  - Gate/trigger input: nominal +5V gate/trigger standard
- Physical outputs (for classic patching):
  - Audio output (eurorack level audio)
- Phybus input sockets (for virtual patching):
  - MIDI: MIDI In 1, 2
  - Gate: Note Gate
  - Trigger: Drum Trigger 1, 2, 3, 4, SEQ step, SEQ rst
  - CV: Note Pitch, LFO1 depth, Filter cutoff, SEQ pat
- Phybus output sockets (for virtual patching):
  - MIDI: MIDI Out
- Maximum phybus network size: 16 modules
- Maximum total phybus cable length: 150 centimeters

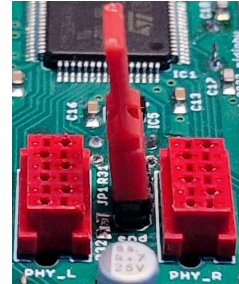
## 3. Features

- Advanced SID lead engine: sculpt three oscillators with a plethora of filter options, LFOs, modulators, envelopes, an extensive trigger matrix and more
- Sequenced bassline engine: SID acid for the win! :-)
- Access up to 16 lo-fi SID drum sounds in a single drum engine patch
- Noise-free SID sound chip emulation
- Stereo sound engine design: chain two zetaSIDs linked via phybus for true stereo voicing supported by all engines
- Stereo voice polychaining: link up to twelve zetaSID modules in a phybus network for up to six lead engine stereo voices
- Unison mode: link and detune multiple zetaSIDs to create fat sounds
- Screen-per-function editing with OLED display and signature midiphy hardware
- User interface collaboration: delegate specific editing tasks to dedicated units
- ROM bank with more than 100 hand-selected and optimized preset patches
- Advanced features and expansion:
  - Independent arpeggiator per oscillator

- Integrated wave sequencer: progressive animation of sound parameters
- MIDI input and output through nexusMIDI expanders (available separately)
- phybus network connectivity: reassign ports and route control signals
- Save and load sessions and patches to micro SD card (available separately) with total recall capability

## 4. Quickstart

1. Make the appropriate connections and screw into a rack
  - a. Add phybus cables between modules (skip if there is only one module)
  - b. Place exactly two bus termination jumpers: one on the first and one on the last module of a chain
  - c. Plug in IDC Eurorack power cables
2. Usage example: attach cables to ports
  - a. 1V/oct CV source to CV In
  - b. Gate source to Gate In
  - c. Audio out to a mixer or output module
3. Power up and play or sequence in notes with CV/gate
4. Turn the encoder knob to scroll through the ROM bank, exploring preset patches
5. Select patch "R010 Acid Blob"
6. Enter the menu by pressing the encoder knob
7. Navigate to the filter page by turning the encoder knob
8. Press the key to enter the filter menu
9. Scroll to the "Cutoff" submenu
10. Press the key and modify cutoff value by turning the encoder knob
11. After setting the cutoff frequency, press the key again to jump back to the filter submenu
12. Press the encoder knob to jump back to the main menu
13. Navigate to the ARP screen
14. Scroll through the settings and set Arpeggio to on
15. Set Octaves to 3
16. Play or sequence in notes with CV/gate to hear the arpeggiated sound
17. Push the encoder to navigate back to the menu system and explore the other sections.
18. Insert a microSD card to automatically save your current session, allowing you to continue your work when you next power up your modular system. (Note: patches need to be saved manually on the SD card after they were edited)



Enjoy your zetaSID!

## 5. Connections

### 5.1 Eurorack power

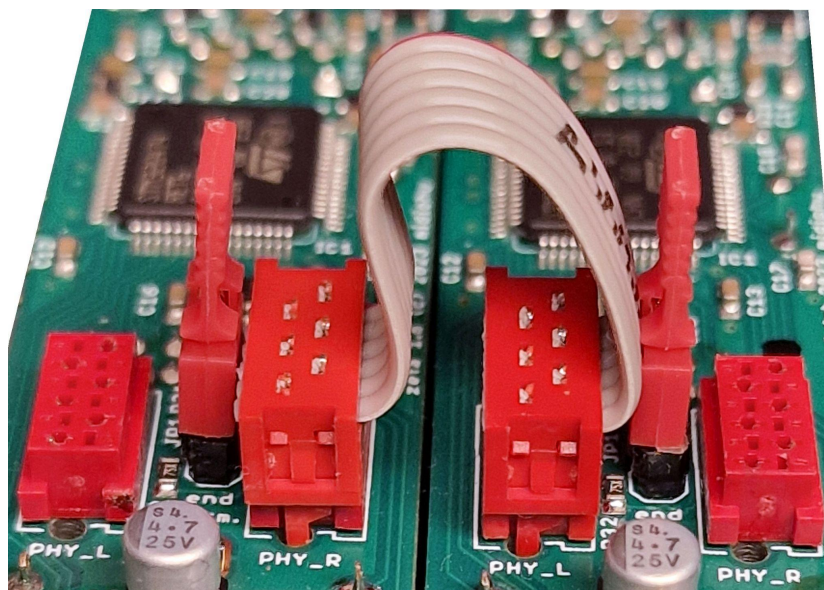
- Standard 10-pin header with –12V indicated using the red stripe
- The module is protected from reverse polarity, but it is still recommended to make all connections with the rack power switched off
- 5V bus power is not required

### 5.2 phybus

*The midiphy phybus system is a high-speed, expandable data protocol for low-latency routing of data streams, MIDI and CV/gate conversion: connected modules can interact to share user interface control elements and virtual services.*

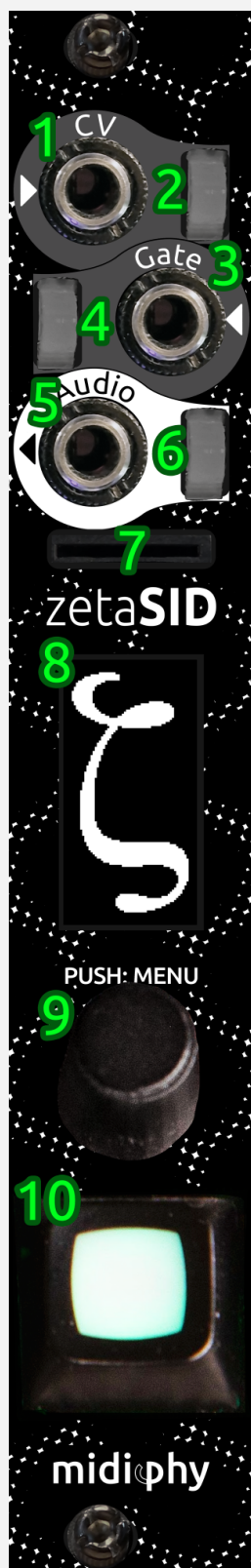
Connect as follows:

- Daisy-chain adjacent modules using a six-conductor phybus ribbon cable from PHY\_L to PHY\_R
  - Consider making all phybus connections before connecting to power and screwing the modules into the rack
- Leave the outer PHY\_L and PHY\_R connectors empty
- Place a total of two termination jumpers on the two-pin “end term.” headers
  - Only the outer (two) modules of a network should be terminated
  - Don’t place the jumper for internal modules
  - If additional modules are added, remove all jumpers except for those located on the two modules at the ends of the chain
- Don’t use the phybus headers for any other purpose



(empty) — terminator — phybus cable — terminator — (empty)

## 6. Front panel features and ports



- ① CV in local port
  - Range:  $-5V$  to  $+5V$  or  $0$  to  $10V$  (configure via the setup screen)
  - Default:  $1V/oct$  scaling (configure scaling, quantization, offsets via the input socket screen)
- ② CV in LEDome
  - Press to splice this physical input port to a compatible input socket on your phybus network
  - Default: spliced to the **Note Pitch** input socket
- ③ Gate in local port
  - Accepts nominal  $+5V$  gate signals
  - Default: spliced to the **Note Gate** input socket
- ④ Gate in LEDome
  - Press to splice this physical input port to another compatible input socket on your phybus network
- ⑤ Audio out local port
  - zetaSID audio output
  - outputs eurorack level audio, **do not directly attach headphones to the 3.5mm audio output port**
- ⑥ Audio out configuration LEDome
  - Press to configure the audio output
- ⑦ MicroSD card slot
  - Use FAT32 formatted cards
- ⑧ OLED
  - Shows the local user interface - expand with more zetaSIDs via phybus to grow the available user interface
- ⑨ Encoder with pressable knob
  - Press to enter the menu
  - Turn to change parameters
  - Push-and-hold while turning to accelerate parameter inputs, i.e. to perform a faster filter sweep
- ⑩ Illuminated mechanical key, referred to as “key”
  - Press to enter the currently selected menu item or to edit the currently selected parameter or setting

## 7. Interacting with zetaSID

### 7.1 Sound structure overview

- A session (see chapter 9) holds all performance state like CV routing, MIDI configuration and phybus splices, as well as links to the active patch
- A patch (see chapter 10) is using one of the engines (Lead, Bassline or Drum)
- The engines (see chapters 11-13) have different individual features and capabilities to make best use of the emulated SID chip characteristics for the engine usecase

### 7.2 Menus and editing

- When in the menu or in a screen, turn the encoder to navigate between screens and to select parameters
- Press the key to enter the selected screen or to start editing the selected parameter
  - Active editing is indicated by a larger font size and animated lines
  - Turn the encoder knob to adjust the active parameter
  - Push and turn the encoder knob to accelerate inputs while editing a parameter
  - Press the key to confirm the change and stop editing the active parameter
- Return to the main menu by pressing the encoder knob
  - Nested screens require two presses to return to the main menu

### 7.3 Play a lead, bassline or drum engine voice

- Lead engine
  - Use CV/gate local ports
    - Note pitch/CV for tuning: 1V/oct (0V = C3)
    - Note gate to fire the SID output amplifier envelope
  - Use MIDI
    - Requires additional phybus MIDI capable module, e.g. nexusMIDI, splice by pushing the MIDI IN LEDome button and assign to the virtual MIDI In 1 or 2 input.
- Bassline engine
  - Use CV/gate local ports
    - Splice a phybus gate input port by pressing the nearby LEDome button and assign it to the SEQ step input socket to be able to progress bassline sequence steps with an external eurorack clock
    - Optional: splice a phybus gate input port by pressing the nearby LEDome button and assign it to the SEQ rst input socket to be able to externally reset the sequence progression to step 0

- Optional: splice a phybus CV input port by pressing the nearby LEDome and assign it to the SEQ pat input socket to be able to select the local bassline pattern number with an external control voltage
- Use phybus based MIDI notes C3–G3 and C4–G4 to launch left- and right-channel bassline sequence patterns
  - Requires additional phybus MIDI capable module, e.g. nexusMIDI: splice by pushing the MIDI IN LEDome button and assign to the virtual MIDI IN 1 or 2 input socket. Note: the zetaSID MIDI input sockets can sync to an external MIDI clock master to be able to synchronize the bassline sequence progression to it - or set their own tempo - in absence of an upstream MIDI master clock
- Drum engine
  - Use CV/gate local ports (see above)
  - Use virtual trigger 1–4 input sockets
    - Splice one or more phybus gate input ports by pressing their nearby LEDome buttons and assign them to the Drum trig 1-4 input sockets
  - Use phybus based MIDI notes C3–D#4 to trigger drums 1–16
    - Requires additional nexusMIDI module, splice by pushing the MIDI IN LEDome button and assign to the virtual MIDI In 1 or 2 input

## 7.4 Modulation, splicing and subscription

- Use internal modulators, i.e. LFOs and the MOD matrix to achieve complex internal modulation without requiring any external modules (see dedicated chapters)
- External modulation (also see next chapter): repurpose any spare ports on phybus connected modules (press port LEDome buttons and assign)
  - Splice CV ports from other modules (using LEDome buttons)
  - Splice MIDI ports (using LEDome buttons)
  - Subscribe to broadcasted phybus data streams from other modules (via the inputs menu)

## 8. Splicing and subscription over phybus

*All phybus-equipped modules may interact, sharing ports and datastreams to create a powerful inter-connected network.*

A virtual connection between a physical port and any module on the network is established by creating a splice between them. Voltage or data received at the port is then used to control the remote modules without using physical patch cables. Likewise, data produced by a module may be spliced to an output port and used elsewhere within the modular system.

Some modules may also offer logical services (not based on a physical input or output port) that other modules may subscribe to.

## 8.1 Definitions

### 8.1.1 Virtual and physical connections

| Term         | Description                                                       |
|--------------|-------------------------------------------------------------------|
| Local        | Module on the phybus network that is the current point of focus   |
| Remote       | Module on the phybus network that is distal from the local module |
| Stream       | Network data broadcasted/subscribed to or flowing to/from a port  |
| Port         | Physical connector e.g., DIN, 3.5mm                               |
| Socket       | Virtual location that transmits or receives a stream              |
| Splice       | Connection or action that interfaces a socket with a port         |
| Service      | Provides data that other modules may subscribe to                 |
| Subscription | Action that interfaces a service with an input socket             |

### 8.1.2 Stream and port types

| Symbol                                                                              | Type    | Description                                  |
|-------------------------------------------------------------------------------------|---------|----------------------------------------------|
|  | CV      | CV or high-resolution service                |
|  | Gate    | Active with an indefinite duration           |
|  | Trigger | Active with a fixed duration                 |
|  | MIDI    | Notes, clock, controllers, modulators, sysex |

### 8.1.3 LEDome indication

| Colour     | Indicates                                                             |
|------------|-----------------------------------------------------------------------|
| Warm white | Port is unused and available for splicing, flashes with port activity |
| Cool white | Splice process started with this port (blinks momentarily)            |
| Off        | Port is spliced and in use, but is idle or voltage is near 0V         |
| Green      | Voltage 0 to +10V, brightness scales with positive voltage            |

| Colour | Indicates                                                    |
|--------|--------------------------------------------------------------|
| Red    | Voltage –10 to 0V, brightness scales with negative voltage   |
| Orange | Gate                                                         |
| Cyan   | Trigger                                                      |
| Blue   | Audio +/- up to 10V p-p, brightness scales with output level |

## 8.2 Splicing



- 1 Port type (**MIDI**)
- 2 Associated source global stream name (**in 03**)
- 3 Associated module name and enumeration (**midiA** = first nexusMIDI)
- 4 Connection established indicator
- 5 Local socket if connected, or clear/cancel commands
- 6 Encoder knob and key action legend

- To start splicing, press an LEDome adjacent to a local or remote physical port
- All OLEDs on the phybus network display the splice screen
- Turn the encoder knob on the selected module to associate the port with a compatible socket
- Press the key to confirm connection of the splice
  - The LEDome next to the physical port flashes white to indicate that it is selected
- Continue to create splices as required
  - One port may be spliced to multiple sockets
- Choose the cancel option to abort the operation and return to the previous screen
- Choose the clear option to disconnect a port
- Query an actively spliced port by pressing the corresponding LEDome
  - All modules that associate with that port display the established connections
  - Clear splices if desired

## 8.3 Input sockets

View and configure the input sockets that receive voltage or data signals from local or remote ports on a phybus network, or subscribe to services offered by modules.



- ① Current session number
- ② Currently selected input socket and connected source port type, stream name and source module name
- ③ Next input socket

### 8.3.1 Select input socket

- Scroll through the available input sockets by turning the encoder knob
- Configure an input socket by pressing the key
  - Press the encoder knob to exit the input socket configuration screen
  - Press again to exit to the main menu

### 8.3.2 Input socket activity indicator



- ① Input socket name
- ② Socket activity (varies by socket)
- ③ Stream type and direction indicator (from/to)
- ④ Source stream name
- ⑤ Source module name

| Input socket | Stream type | Activity indicators                                                                                                           |
|--------------|-------------|-------------------------------------------------------------------------------------------------------------------------------|
| MIDI In 1, 2 | 🎵           | <ul style="list-style-type: none"> <li>• Note</li> <li>• Clock</li> <li>• CC</li> <li>• Pitchbend</li> <li>• SysEx</li> </ul> |
| Note Gate    | ⏏           | <ul style="list-style-type: none"> <li>• Gate (triggers lead engine playback)</li> </ul>                                      |
| Trig 1–4     | ⏏           | <ul style="list-style-type: none"> <li>• Drum trigger status</li> </ul>                                                       |

| Input socket  | Stream type | Activity indicators                                                                                                       |
|---------------|-------------|---------------------------------------------------------------------------------------------------------------------------|
| SEQ step      | ⊥           | <ul style="list-style-type: none"> <li>• Pattern step progression status</li> </ul>                                       |
| SEQ rst       | ⊥           | <ul style="list-style-type: none"> <li>• Pattern step reset status</li> </ul>                                             |
| Note Pitch    | ∩           | <ul style="list-style-type: none"> <li>• Graphical</li> <li>• Voltage</li> <li>• Nearest quantised note</li> </ul>        |
| LFO1 depth    | ∩           | <ul style="list-style-type: none"> <li>• Graphical</li> <li>• Voltage</li> <li>• Applied depth setting</li> </ul>         |
| Filter cutoff | ∩           | <ul style="list-style-type: none"> <li>• Graphical</li> <li>• Voltage</li> <li>• Applied filter cutoff setting</li> </ul> |
| SEQ pat       | ∩           | <ul style="list-style-type: none"> <li>• Graphical</li> <li>• Voltage</li> <li>• Selected bassline pattern 1-8</li> </ul> |

### 8.3.3 Connect port or service to input socket

- Scroll through the available ports or services by turning the encoder knob
  - For ports: the LEDome associated with the port illuminates
  - For services: the broadcasting module provides a notification
  - Clear an input socket by selecting "---"
- Confirm by pressing the key

Note: pressing the LEDome associated with a port creates an equivalent splice to a socket.

### 8.3.4 Configure input socket

| Input socket | Configuration options                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MIDI In 1, 2 | <ul style="list-style-type: none"> <li>• MIDI channel               <ul style="list-style-type: none"> <li>◦ Omni</li> <li>◦ 1–16</li> </ul> </li> <li>• Velocity               <ul style="list-style-type: none"> <li>◦ On: scales output DCA</li> <li>◦ Off (default): notes played at full velocity</li> </ul> </li> <li>• Program Changes Received               <ul style="list-style-type: none"> <li>◦ On: receives MIDI program changes (and CC#32 bank select: 0: bank R (ROM patches), 1-7: bank A-H)</li> <li>◦ Off (PC messages ignored on this socket)</li> </ul> </li> <li>• Clock               <ul style="list-style-type: none"> <li>◦ Auto (default): incoming clock overrides internal clock</li> </ul> </li> </ul> |

| Input socket  | Configuration options                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <ul style="list-style-type: none"> <li>○ Agent: waits for incoming clock <ul style="list-style-type: none"> <li>■ Never uses internal clock</li> </ul> </li> <li>○ Chief: ignores incoming clock <ul style="list-style-type: none"> <li>■ Always uses internal clock</li> </ul> </li> <li>○ Chief BPM (auto/chief clock; default 120) <ul style="list-style-type: none"> <li>■ Choose BPM</li> </ul> </li> </ul>                                                                                                                                                                                                        |
| Note Gate     | <ul style="list-style-type: none"> <li>● Invert (default off)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Trig 1–4      | <ul style="list-style-type: none"> <li>● Target (drum 1-16)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| SEQ step      | <ul style="list-style-type: none"> <li>● Reset After: timeout, before the pattern step position is reset to "0" (default: 3 seconds) - if no clock pulse arrives within this time, the clock is assumed to have been stopped, restarting at pattern step position 1 when the next clock pulse arrives</li> </ul>                                                                                                                                                                                                                                                                                                        |
| SEQ rst       | <ul style="list-style-type: none"> <li>● None (always resets the pattern step position to 1, when a trigger pulse is detected)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Note Pitch    | <ul style="list-style-type: none"> <li>● Scale <ul style="list-style-type: none"> <li>○ Range (default 100%): –200% to +200% <ul style="list-style-type: none"> <li>■ Negative values invert the signal</li> </ul> </li> </ul> </li> <li>● Octave <ul style="list-style-type: none"> <li>○ Range (default 0V = C3): 1V steps</li> </ul> </li> <li>● Transpose <ul style="list-style-type: none"> <li>○ Range (default 0V): 1/12V steps (semitones)</li> </ul> </li> <li>● Finetune <ul style="list-style-type: none"> <li>○ Range (default 0): –100 to +100 cent</li> </ul> </li> <li>● Quantise to semitone</li> </ul> |
| LFO1 Depth    | <ul style="list-style-type: none"> <li>● Scale <ul style="list-style-type: none"> <li>○ Range (default 100%): –200% to +200% <ul style="list-style-type: none"> <li>■ Negative values invert the signal</li> </ul> </li> </ul> </li> <li>● Offset <ul style="list-style-type: none"> <li>○ Range (default 0V): 1V steps</li> </ul> </li> <li>● Trim <ul style="list-style-type: none"> <li>○ Range (default 0V): 1/12V steps</li> </ul> </li> </ul>                                                                                                                                                                     |
| Filter Cutoff | <ul style="list-style-type: none"> <li>● Scale <ul style="list-style-type: none"> <li>○ Range (default 100%): –200% to +200% <ul style="list-style-type: none"> <li>■ Negative values invert the signal</li> </ul> </li> </ul> </li> <li>● Offset <ul style="list-style-type: none"> <li>○ Range (default 0V): 1V steps</li> </ul> </li> <li>● Trim <ul style="list-style-type: none"> <li>○ Range (default 0V): 1/12V steps</li> </ul> </li> </ul>                                                                                                                                                                     |
| SEQ pat       | <ul style="list-style-type: none"> <li>● Scale <ul style="list-style-type: none"> <li>○ Range (default 100%): –200% to +200%</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Input socket | Configuration options                                                                                                                                                                                                                                                                          |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | <ul style="list-style-type: none"> <li>■ Negative values invert the signal</li> <li>• Offset <ul style="list-style-type: none"> <li>○ Range (default 0V): 1V steps</li> </ul> </li> <li>• Trim <ul style="list-style-type: none"> <li>○ Range (default 0V): 1/12V steps</li> </ul> </li> </ul> |

## 8.4 Output sockets

View and configure the output sockets that send voltage or data signals to local or remote ports on a phybus network.



- 1 Current session number
- 2 Currently selected output socket
- 3 Next output socket

### 8.4.1 Select output socket

- Scroll through the available output sockets by turning the encoder knob
- Configure an output socket by pressing the key
  - Press the encoder knob to exit the output socket configuration screen
  - Press again to exit to the main menu

### 8.4.2 Output socket activity indicator



- 1 Output socket
- 2 Socket activity (varies by socket)
- 3 Currently selected socket option: audio output gain adjustment

| Output socket | Stream type | Activity indicators                                                                |
|---------------|-------------|------------------------------------------------------------------------------------|
| MIDI Out      | 🎵           | <ul style="list-style-type: none"> <li>• Note (for arpeggio forwarding)</li> </ul> |

|       |      |                                                                                                                                   |
|-------|------|-----------------------------------------------------------------------------------------------------------------------------------|
|       |      | <ul style="list-style-type: none"> <li>• SysEx - truncated (for use with a remote SysEx controller)</li> </ul>                    |
| Audio | None | <ul style="list-style-type: none"> <li>• Output Audio Scope</li> <li>• Automatic audio limiter level (avoids clipping)</li> </ul> |

### 8.4.3 Connect output socket to port

- Scroll through the available ports by turning the encoder knob
  - The LEDome associated with the port flashes white
  - Clear an output socket by selecting "---"
- Confirm with the key

Note: pressing the LEDome associated with a port creates an equivalent splice from a socket.

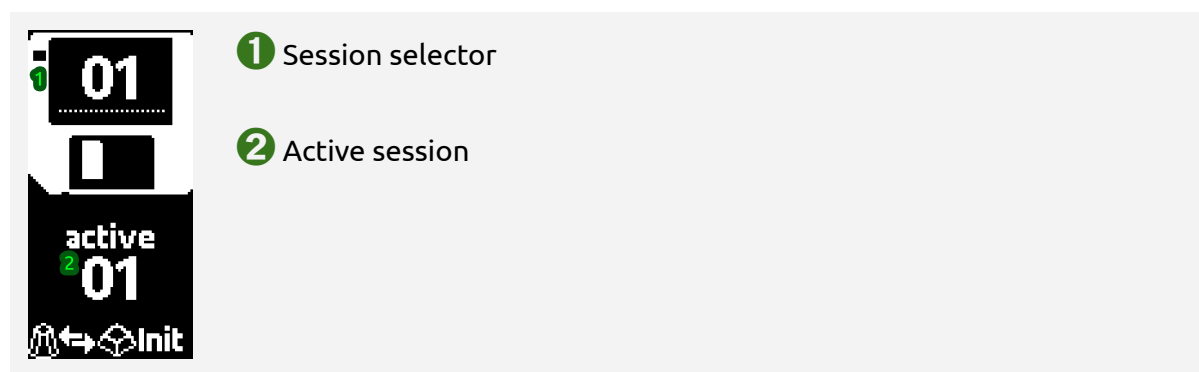
### 8.4.4 Configure output socket

| Output socket | Configuration options                                                                                                                                                                      |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MIDI Out      | <ul style="list-style-type: none"> <li>• MIDI channel (1-16)</li> <li>• Send ARP (forward arpeggio notes to MIDI output)</li> <li>• Reset to defaults</li> </ul>                           |
| Audio         | <ul style="list-style-type: none"> <li>• Base Gain (default "Low"): 0 to +24 dB output gain, affected by automatic audio limiter to avoid clipping</li> <li>• Reset to defaults</li> </ul> |

## 9. Session

*A session represents the complete state of zetaSID: it links to the currently active patch and holds all performance and routing state around it, plus module-wide settings such as MIDI and CV configuration/splicing.*

zetaSID stores up to 100 sessions on a microSD card (available separately). If configured, it can broadcast a session switch operation to other modules on the phybus network. As loading a session recalls a previous state, this allows for instant reconfiguration of patches and splices on all phybus modules.



To initialize a session:

- Turn the encoder knob so that the selected and active session numbers show the same value
- Press the key to initialize the session - this will reset the session to its
  - default patch settings
    - Link mode
    - Polyphony mode
    - Instrument ID
  - default input and output socket options

To switch a session:

- Turn the encoder knob to select another session number
- Press the key to save the active session and switch to the selected session
  - Sessions are also saved continuously in the background
- Alternatively, insert another microSD card to load the most recent session on that card

Note: if you are using multiple zetaSIDs to increase voice polyphony and if you are happy with the default input and output socket options for each module, it is sufficient to use only a single microSD card: configure one module as a **Chief** (see next section) and store all patch data on the microSD card of that node. All other nodes will by default become **Agents** after startup, when no local SD card is present and when a **Chief** is detected.

## 10. Patch

*Inside the session sits the active patch: one sound, using one of three engines (described in the following chapters).*

The patch screen allows manipulation of patches and is shown after startup, with the "patch select" command activated.



- ① phybus name of this module (sidD)
- ② Polyphony
  - number (2)
  - stereo channel (R) of this module
- ③ Oscilloscope view of the current audio output
- ④ SID patch engine type
  - L (lead)
  - B (bassline)
  - D (drum)
- ⑤ Active command
- ⑥ Patch name
- ⑦ Editing indicator: animated when modifying a parameter or command
- ⑧ Encoder knob and key action legend

zetaSID automatically creates a PATCHES folder within the root directory of a fresh microSD card. Saved patches take the following form:

*A123 - Patch Name.syx*

- The first letter (A-H) corresponds to user patch bank 1-8
- Three digits designate the patch number within the bank (up to 127)
- The patch name is spelled out in plain text
- The .syx extension

On an external device, transfer downloaded patches into the PATCHES folder on the microSD card, ensuring that they follow the naming convention above.

Backup patch data regularly!

### 10.1.1 Patch select

- Load new patches from user banks A–H or ROM bank R



- If configured as chief (see link mode), this zetaSID transmits patch changes to all connected link mode agents
- The active patch is stored in the current session

### 10.1.2 Link mode

- Off: standalone operation
- Chief: facilitates storing, loading, polyphony mode, name and initialisation of the shared patch
  - In chief mode, the number of peer agents is listed
  - Only one chief can be configured per instrument cluster
- Agent: follows the chief regarding patches, polyphony modes, etc.
  - In agent mode, the name of the chief module is listed
- The selected link mode is stored in the current session

Link Mode  
**Chief**  
+3 agents

Note: chiefs and agents must be configured with the same instrument ID to link up to a polyphonic instrument cluster (see Section 10.1.3).

### 10.1.3 Instrument ID

- Range: 0–15
- Agents with the same instrument ID load the same patch and expand the polyphony
  - Modules configured with different IDs (or with link mode switched off) can load a different patch
- IDs are stored in the current session
  - Configure and switch sessions to instantly re-partition an instrument cluster into different voicing or engine types

Instrument  
**# 0**

### 10.1.4 Polyphony mode

- Indicates the current polyphony, limited by the total number of zetaSID modules within an instrument cluster and the voice mode
  - The maximum polyphony count is six for both stereo and mono operation
    - Stereo operation assigns two zetaSID modules per voice
  - Define an instrument cluster by assigning one chief and the desired number of agents
- The following voice modes are available
  - Unison
  - Stereo
  - Mono
- The selected polyphony mode is stored in the current session

Polyphony  
**2**  
**Stereo**

### 10.1.5 Unison detune

- Spreads the pitch of multiple zetaSIDs operating in unison voice mode
- The selected unison detune value is stored in the current session

Unison  
Detune  
**0**

### 10.1.6 Legato mode

- On: sends a gate-off only when all notes are released (typically only relevant for MIDI notes or ORed gate sources)
- Off: sends a gate off when a note is released regardless of any held notes
- The selected legato mode value is stored in the patch

Legato  
Off

### 10.1.7 Glide mode

- Normal: active if configured within oscillator portamento rate
- SusKey: active only if the second note is played before the previous note is released
- The selected glide mode value is stored in the patch

Glide  
Normal

### 10.1.8 Init patch

- Hold the key for two seconds to reset parameters to a generic starting point
- Tap the key to exit
- Turn the encoder knob to choose the SID engine type
  - L: lead engine
  - B: bassline engine
  - D: drum engine
- Initialising a patch deletes the current patch
  - Save the current patch if required (see section 10.1.10)



### 10.1.9 Edit patch name

- Turn the encoder knob to select a different letter
- Press and turn the encoder knob to adjust the cursor position
  - Acceleration is not active for this action
- Press the key to apply the current patch name and exit to the previous screen
- Save the patch to apply any changes



### 10.1.10 Save patch

- Ensure that a FAT32 formatted microSD card is inserted
- Turn the encoder knob to choose a save location
  - Banks A–H each with 128 slots are available
  - Bank R is ROM memory
- Choose an empty slot to save a new patch, or overwrite an existing one
- Hold the key for two seconds to save the patch
- Tap the key to exit without saving



### 10.1.11 ASID mode

- Engaged: zetaSID responds to the ASID protocol over MIDI, i.e. provided via a nexusMIDI expander (try <https://deepsid.chordian.net/> for ASID files that can be streamed from your browser to a USB MIDI device which should then be connected to nexusMIDI)
- If using multiple zetaSIDs: turn the encoder to perform fat unison detuning per zetaSID (see displayed **UniDet:** value)
- Push the key to engage or disengage ASID mode



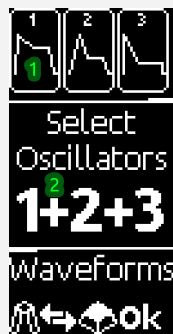
## 11. Lead engine

*The Lead engine is zetaSID at its most expressive: a polyphonic-expandable and stereo-capable synth voice with the richest synthesis, modulation, and performance toolkit on the module.*

The following sections describe all Lead engine parameters and are often applicable for other engine types as well.

### 11.1 Oscillators (OSC)

In lead engine mode, configure three oscillators of the emulated SID sound chip.



- ① Output DCA (digitally controlled amplifier) DADSR envelope per oscillator; selected oscillators are highlighted
- ② Active menu item: select oscillators for editing

#### 11.1.1 Select oscillators

- Turn the encoder knob to select one or more oscillators to edit
  - By default, parameter changes propagate to
    - both left and right channels, which can be disabled from Setup > Patch Stereo Edit
    - all modules with the same instrument ID



#### 11.1.2 Waveform selection

- Select any combination of waveforms for each oscillator
  - Triangle
  - Sawtooth



- Pulse
- Noise

### 11.1.3 Transpose

- Adjusts the coarse tuning in semitone steps (range: -64 to +63)

Transpose  
**24**

### 11.1.4 Finetune

- Adjusts the fine tuning

Finetune  
**6**

### 11.1.5 Oscillator sync

- Activates hard sync

Osc Sync  
**off**

| Follower | Leader |
|----------|--------|
| OSC1     | OSC3   |
| OSC2     | OSC1   |
| OSC3     | OSC2   |

### 11.1.6 Ring modulation

- Only applicable for triangle waveforms

Ringmod  
**off**

| Oscillator | Modulated by |
|------------|--------------|
| OSC1       | OSC3         |
| OSC2       | OSC1         |
| OSC3       | OSC2         |

### 11.1.7 Delay/attack/decay/sustain/release (DADSR)

- Output DCA envelope curve
  - Visualised graphically in the OSC screen

Delay  
**0**

Attack  
**4**

Decay  
**14**

Sustain  
**10**

Release  
**7**

### 11.1.8 Pitchbend range

- Specifies the maximum MIDI pitch bend range in semitones

Pitchbend  
Range  
**2**

### 11.1.9 Portamento rate

- Range: 0-255
  - A value of 0 disables portamento
- See also: 10.2.7 Glide Mode, especially "SusKey"

Porta Rate  
**4**

### 11.1.10 Portamento type

- Normal: rate of pitch change depends on the direction of the slide
  - Sliding up to higher notes “accelerates” as pitch increases
  - Sliding down to lower notes “decelerates” as pitch decreases
- Glide: pitch changes at a constant rate
- Glissando: plays each semitone step

Porta Type  
**Glissando**

### 11.1.11 Pulsewidth

- Range: 0000–4095
  - At least one pulse waveform must be active
  - Set a value of 2048 for a symmetrical square waveform

Pulsewidth  
**1280**

### 11.1.12 Gate hold

- Output DCA is held constant at the sustain level
  - Gates or note off messages have no effect

Gate Hold  
**off**

### 11.1.13 Detune

- Range: 0–127
- Applies an offset value to Finetune for all oscillators

Detune  
**16**

## 11.2 Filter

Control the 12dB/octave multimode filter, including oscillator routing.



① Graphical filter response curve

② Active menu item: filter channel routing

### 11.2.1 Oscillator channel routing to filter

- Routes any combination of oscillators O1/O2/O3 into the filter
- Unrouted oscillators bypass the filter

Routing  
**O 1+2**

### 11.2.2 Filter cutoff frequency

- Range 0–4095

Cutoff  
**1984**

### 11.2.3 Filter resonance

- Range: 0–15

Resonance  
**2**

### 11.2.4 Filter mode

Set any combination of:

- LP (Lowpass)
- BP (Bandpass)
- HP (Highpass)

Mode  
**LP+BP**

Note: This implementation of the SID filter emulates the behavior of the original chip; the audio output can be routed to an external module for different sounds if desired. Some distortion is audible if all filters are active.

### 11.2.5 Filter key tracking

- Range Off, 1–255

Key Track  
**off**

### 11.2.6 OSC 3 out

- Determines whether OSC3 will be routed to the filter or muted
  - Optionally mute OSC3 if it is used for sync or ring modulation

OSC3 Out  
**On**

### 11.2.7 Filter interpolation

- Smoothes out filter cutoff changes when modulated

Interpolate  
**off**

## 11.3 Arpeggiators (ARP)

Each arpeggiator controls one oscillator.



① Arpeggiator overview: shows the generated arpeggio notes as they are played.

② Active menu item: arpeggio routing.

### 11.3.1 ARP routing

- Edit any combination of arpeggiators 1/2/3, each of which is coupled to the respective oscillator

ARP->OSC  
Routing  
**1+2+3**

### 11.3.2 ARP enable

- Enables or disables arpeggio(s)

Arpeggio  
**On**

### 11.3.3 ARP direction

Considering a chord of notes **A**, **B**, **C** and **D**, the direction setting determines the note order:

Direction  
**Down**

- Up: **A****B****C****D****A****B****C****D**
- Down: **D****C****B****A****D****C****B****A**
- U&D (Up&Down): **A****B****C****D****C****B****A****B****C****D****C**
- D&U (Down&Up): **D****C****B****A****B****C****D****C****B****A****B**
- UD2 (Up&Down #2): **A****B****C****D****D****C****B****A****A****B****C****D****D****C**
- DU2 (Down&Up #2): **D****C****B****A****A****B****C****D****D****C****B****A****A****B**
- Random: random note order

### 11.3.4 ARP clock divider

- Range: 1–64
- Divider relative to the MIDI or chief clock
- The equivalent note step length is displayed for rational divisions

Clock Div  
**48**  
8th note

### 11.3.5 ARP gate length

- Range: 1–64
- Sets the duration of a gate triggered by an arpeggio event

Gate length  
**8**

### 11.3.6 ARP octave range

- Range: 1–8
- Octave alteration is added on top of the ARP direction effect

Octaves  
**2**

### 11.3.7 ARP sorted

- On: notes play in chromatic order
- Off: notes play according to the order in which they were entered

Sorted  
**On**

### 11.3.8 ARP latch

- On: latches and continues to play the arpeggio when keys are released
  - Entering a new note clears the latched arpeggio and starts another

Latch  
**off**

### 11.3.9 ARP clock sync

- On: arpeggiated notes are synchronised to the clock

Clock Sync  
**off**

- Off: arpeggiated notes play as they are entered

### 11.3.10 ARP constant cycle

- On: notes play within a fixed clock period
  - The more notes in the arpeggio, the shorter the duration of each note
- Off: notes play sequentially according to the divider setting

### 11.3.11 ARP easy chord

- On: upon releasing notes, arpeggios continue to play through the release segment of the output DCA envelope
  - Entering a new note clears the arpeggio and starts another
  - When this feature is enabled and if using ARP forwarding to an external MIDI port, MIDI notes will continue to play even after note release.
- Off: upon releasing notes, the last note of the arpeggio rings out through the release segment of the output DCA envelope

EasyChord  
On

## 11.4 LFO

In lead engine mode, configure up to six LFOs with optional sync and one-shot triggering.



① Graphical LFO overview; the currently selected LFO is highlighted.

② Active menu item: LFO selection

Note: LFOs are shared for both channels of a stereo instrument but may be separately assigned to L/R targets.

### 11.4.1 LFO selection

- Select LFO1–6

LFO Select  
LFO1

### 11.4.2 LFO enable

- Enables or disables the selected LFO

Enable  
On

### 11.4.3 LFO depth

- Range: –128 to +127

Depth  
127

- Negative values invert the waveform

#### 11.4.4 LFO rate

- Range: 0–255
  - Value 0: LFO holds at the current level (stopped)
  - Corresponds to ca. 0.008–45 Hz
- If clock sync is active, rates > 244 correspond to the following bar or note lengths
  - 245: 64 bars
  - 246: 32 bars
  - 247: 16 bars
  - 248: 8 bars
  - 249: 4 bars
  - 250: 2 bars
  - 251: 1 bar
  - 252: 1/2 note
  - 253: 1/4 note
  - 254: 1/8 note
  - 255: 1/16 note

Rate  
**42**  
0.8774 Hz

#### 11.4.5 LFO delay

- Range: 0–255
  - A value of 0 disables the delay
- Effect of cycle mode on transition behavior
  - One-shot: transitions from zero to the starting phase
  - Retriggering: current phase held, then transitions to the starting phase
  - Free running: delay has no effect

Delay  
**0**

#### 11.4.6 LFO phase

- Range: 0–255
  - A value of 128 applies a 180° phase shift
- Applicable only if one-shot or retriggering is configured

Phase  
**0**

#### 11.4.7 LFO waveform

The following bipolar and unipolar waveforms are available:

- Sine
- Triangle
- Pulse
- Ramp (sawtooth)
- Random (sample and hold)

Waveform  
**Sine**  
unipolar

### 11.4.8 Clock sync

- On: LFO syncs to a multiple or division of the clock according to the LFO rate setting

Clock Sync  
**off**

### 11.4.9 LFO oneshot

- On: runs through one waveform period upon receiving a trigger
  - Configure the trigger source from Trigger Matrix > LFO1–6 restart
- Off: LFO is free-running

Oneshot  
**off**

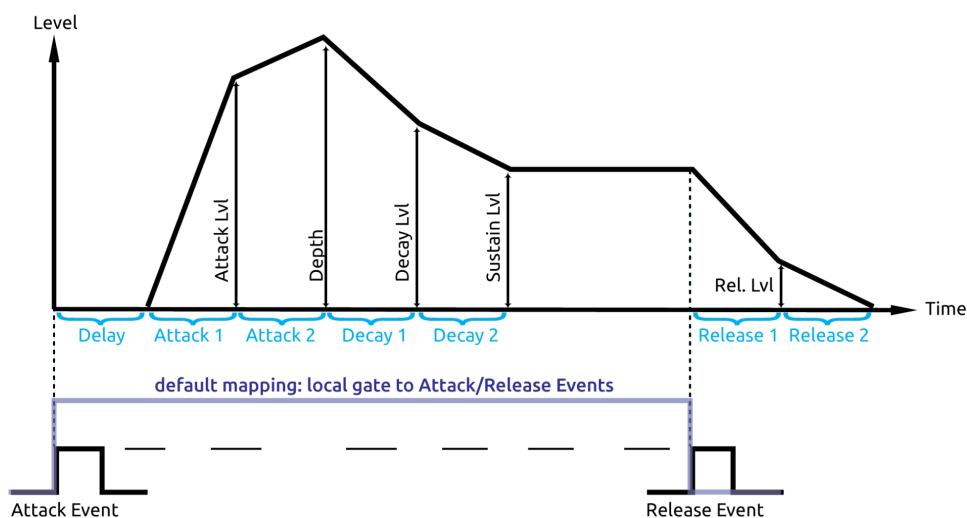
## 11.5 Envelopes (ENV)

In lead engine mode, configure two DA<sup>2</sup>D<sup>2</sup>SR<sup>2</sup> envelopes with variable slopes (linear, exponential or log).



- Graphical overview of each envelope state. The selected envelope is highlighted.
- Active menu item: envelope selection

Note: envelopes are identical for both channels of a stereo pair but may be separately assigned to L/R targets, or a single envelope can be inverted for the second channel.



### 11.5.1 ENV select

- Select ENV1 or 2

ENV Select  
**ENV1**

### 11.5.2 ENV depth

- Range: -128 to +127
  - Negative values invert the envelope

Depth  
**127**

### 11.5.3 ENV delay

- Range: 0-255

Delay  
**0**

### 11.5.4 ENV attack/decay/sustain/release

- Range: 0-255

| Segment time | Ramps to      |
|--------------|---------------|
| Delay        | (Minimum)     |
| A1           | Attack level  |
| A2           | Depth         |
| D1           | Decay level   |
| D2           | Sustain level |
| R1           | Release level |
| R2           | Minimum       |

Attack 1  
**121**

Attack Lvl.  
**255**

Attack 2  
**0**

Decay 1  
**36**

Decay Lvl.  
**255**

Decay 2  
**48**

Sustain Lvl.  
**64**

Release 1  
**32**

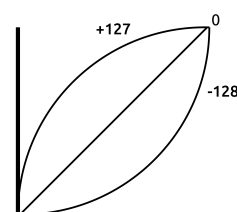
Rel. Lvl.  
**60**

Release 2  
**0**

### 11.5.5 ENV attack/decay/release curve response

- Value 0: linear curve
- Range -128 to -1: exponential curve
- Range 1 to 127: log curve

Note: increasing the magnitude of curve response increases the respective segment time.



## 11.6 Modulators (MOD)

Modulators 1–8 each combine two sources using an operator and are distributed to one or several targets at a selected depth.



❶ Graphical MOD overview; the currently selected modulator is highlighted.

❷ Active menu item: modulator selection.

Note: modulators are identical for both channels of a stereo pair but may be separately assigned to L/R targets, or a single modulator can be inverted for the second channel.

### 11.6.1 MOD select

- Select MOD1–8

Select Path  
**MOD1**

### 11.6.2 MOD source 1/2

The following sources are available:

- ---: disable source
- ENV1, ENV2
- LFO1–6
- MOD1–8
- ModW (modwheel)
- Note
- CC1 (Mctl1), CC16-19 (Mctl2-5)
- Vel (velocity)
- PB (pitch bend)
- AT (aftertouch)
- WS1–4 (wave sequence)
- 0–127 (constant offset)

Source 1  
**LFO1**

Source 2  
**MOD2**

Note: MIDI sources are only available if a MIDI splice is present.

### 11.6.3 MOD operator

The following operators are available:

Operator  
**Add**

| Operator | Output                                                                                                                  |                             |
|----------|-------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| ---      | Disabled                                                                                                                |                             |
| Source1  | Source 1 only                                                                                                           |                             |
| Source2  | Source 2 only                                                                                                           |                             |
| Add      | Source 1 + source 2                                                                                                     | Arithmetic (decimal values) |
| Sub      | Source 1 – source 2                                                                                                     |                             |
| Mul      | Source 1 * source 2                                                                                                     |                             |
| XOR      | Source 1 and Source 2 are treated as binary numbers and bitwise operations are performed. See table below for examples. |                             |
| OR       |                                                                                                                         |                             |
| AND      |                                                                                                                         |                             |
| Min      | Minimum(source 1, source 2)                                                                                             |                             |
| Max      | Maximum(source 1, source 2)                                                                                             |                             |
| <        | Maximum depth if source 1 < source 2                                                                                    |                             |
| >        | Maximum depth if Source 1 > source 2                                                                                    |                             |
| =        | Maximum depth if source 1 = source 2                                                                                    |                             |
| S&H      | Source 1 sampled when source 2 transitions from negative to positive                                                    |                             |

XOR, OR and AND operator examples:

|                                | Operator |        |        |
|--------------------------------|----------|--------|--------|
|                                | XOR      | OR     | AND    |
| <b>Source 1 (= 45 decimal)</b> | 101101   | 101101 | 101101 |
| <b>Source 2 (= 56 decimal)</b> | 111000   | 111000 | 111000 |
| <b>Output (binary)</b>         | 010101   | 111101 | 101000 |
| <b>Output (decimal)</b>        | 21       | 61     | 40     |

### 11.6.4 MOD depth

- Range: –128 to +127
  - A value of 0 disables the modulator

Depth  
127

- Negative values invert the modulator

### 11.6.5 MOD targets

- Pitch Oscillator 1–3
  - Route to L/R channel or both
- Pulswidth (PW) Oscillator 1–3
  - Route to L/R channel or both
- Filter Cutoff
  - Route to L/R channel or both
- Volume
  - Route to L/R channel or both
- Target 1/2; assign to the following destinations:
  - Pitch
    - Left channels: OSC1–3
    - Right channels: OSC1–3
  - PW (pulswidth)
    - Left channels: OSC1–3
    - Right channels: OSC1–3
  - CutL/R (filter cutoff frequency)
  - VolL/R (volume)
  - LFO1–6 depth
  - LFO1–6 rate
  - WS1–4 (wave sequencer position)

Pitch Osc1  
**L+R**

Pitch Osc2  
**L+R**

Pitch Osc3  
**L+R**

PW OSC1  
**Off**

PW OSC2  
**Off**

PW OSC3  
**Off**

CutOff  
**Right**

Volume  
**Off**

Target 1  
**LFO2 Dept.**

Target 2  
**Off**

### 11.6.6 MOD invert target 1/2

- Inverts a modulator before distributing to target 1/2
  - Useful for stereo effects stemming from a single modulator

Invert  
Target 1/L  
**Off**

Invert  
Target 2/R  
**On**

## 11.7 Trigger matrix

Configure a set of 14 events to trigger 24 targets.



- 1 Graphical trigger matrix overview, with events arranged by row and targets by column. Active row and column are highlighted, with connections indicated in bold white.

- 2 Active menu item: select source event (matrix row).

Note: the trigger matrix is identical for both channels of a stereo pair but events may be separately assigned to L/R targets.

Note: default patches use the Note On event to trigger the OSC1/2/3 output DCA envelopes, ENV1/2 and WS1–4.

### 11.7.1 Select event source

The following sources are available:

Source  
Note On

| Event       | Occurs when                         |
|-------------|-------------------------------------|
| Note on     | Note on or gate in event received   |
| Note off    | Note off or gate off event received |
| ENV1/2 sus. | ENV sustain segment reached         |
| LFO1–6 cyc. | LFO completes one period            |
| Clock       | Clock pulse received                |
| Clock:6     | 6th clock pulse received            |
| Clock:24    | 24th clock pulse received           |
| Clock start | MIDI clock start event received     |

### 11.7.2 Select target

| Target       | Result                                                                                                                                         |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| OSC1–3 L/R   | Triggers output DCA envelope <ul style="list-style-type: none"> <li>Special: a received note off event triggers the release segment</li> </ul> |
| ENV1/2 att.  | Triggers ENV attack segment                                                                                                                    |
| ENV1/2 rel.  | Triggers ENV release segment                                                                                                                   |
| LFO1–6 reset | Resets LFO                                                                                                                                     |
| WS1–4 reset  | Resets wave sequencer                                                                                                                          |
| WS1–4 step   | Increments wave sequencer                                                                                                                      |

|              |                 |                  |                   |                 |                 |
|--------------|-----------------|------------------|-------------------|-----------------|-----------------|
| Osc1 L<br>On | ENV1 Att.<br>On | ENV1 Rel.<br>off | LFO1 Reset<br>off | WS1 Reset<br>On | WS1 Step<br>off |
|--------------|-----------------|------------------|-------------------|-----------------|-----------------|

## 11.8 Wave sequencer (WS)

In lead engine mode, configure four tracker-like sequences that step through almost any zetaSID parameter.

Note: the original SID term was “wavetable”, which zetaSID renames as “wave sequencer” to avoid confusion with “wavetable synthesis”.



- ① The currently selected wave sequence is highlighted
- ② Position
- ③ Output value
- ④ Active menu item: selected wave sequence for editing

Note: wave sequences are identical for both channels of a stereo pair but may be selectively applied to a L/R channel or controlled from the modulator setting.

### 11.8.1 Select wave sequence

- Select WS1–4

Select  
**WS1**

### 11.8.2 Clock divider

- Range: 1–64
- Divider relative to the MIDI or chief clock
- The equivalent note step length is displayed for rational divisions

### 11.8.3 Stereo channel assignments

- WS applied to either L/R channel, both or none

Left Chn  
**On**  
Right Chn  
**On**

## 11.8.4 WS target

- Select from the table of targets
  - e.g., T96–103: MOD1–8 depth
- Certain targets control all elements of a group
  - e.g., T40: finetune OSC1+2+3

Assign to  
1  
Volume

| Group  | Parameter       | Group element |     |     |     |     |     |     |     |     |
|--------|-----------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|
|        |                 | All           | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   |
| Volume | Volume          | 1             |     |     |     |     |     |     |     |     |
| Filter | Cutoff          | 4             |     |     |     |     |     |     |     |     |
|        | Resonance       | 5             |     |     |     |     |     |     |     |     |
|        | Routing         | 6             |     |     |     |     |     |     |     |     |
|        | Mode            | 7             |     |     |     |     |     |     |     |     |
| OSC    | Detune          | 3             |     |     |     |     |     |     |     |     |
|        | Waveform        | 32            | 33  | 34  | 35  |     |     |     |     |     |
|        | Transposition   | 36            | 37  | 38  | 39  |     |     |     |     |     |
|        | Finetune        | 40            | 41  | 42  | 43  |     |     |     |     |     |
|        | Portamento rate | 44            | 45  | 46  | 47  |     |     |     |     |     |
|        | Pulsewidth      | 48            | 49  | 50  | 51  |     |     |     |     |     |
|        | Pitch bend      | 80            | 81  | 83  | 84  |     |     |     |     |     |
| DADSR  | Delay           | 52            | 53  | 54  | 55  |     |     |     |     |     |
|        | Attack          | 56            | 57  | 58  | 59  |     |     |     |     |     |
|        | Decay           | 60            | 61  | 62  | 63  |     |     |     |     |     |
|        | Sustain         | 64            | 65  | 66  | 67  |     |     |     |     |     |
|        | Release         | 68            | 69  | 70  | 71  |     |     |     |     |     |
| ARP    | Clock divider   | 72            | 73  | 74  | 75  |     |     |     |     |     |
|        | Gatelength      | 76            | 77  | 78  | 79  |     |     |     |     |     |
| MOD    | Depth           |               | 96  | 97  | 98  | 99  | 100 | 101 | 102 | 103 |
| LFO    | Waveform        |               | 128 | 129 | 130 | 131 | 132 | 133 |     |     |
|        | Depth           |               | 136 | 137 | 138 | 139 | 140 | 141 |     |     |
|        | Rate            |               | 144 | 145 | 146 | 147 | 148 | 149 |     |     |
|        | Delay           |               | 152 | 153 | 154 | 155 | 156 | 157 |     |     |

| Group      | Parameter     | Group element |     |     |     |     |     |     |   |   |
|------------|---------------|---------------|-----|-----|-----|-----|-----|-----|---|---|
|            |               | All           | 1   | 2   | 3   | 4   | 5   | 6   | 7 | 8 |
|            | Phase         |               | 160 | 161 | 162 | 163 | 164 | 165 |   |   |
| ENV        | Depth         |               | 193 | 209 |     |     |     |     |   |   |
|            | Delay         |               | 194 | 210 |     |     |     |     |   |   |
|            |               |               |     |     |     |     |     |     |   |   |
|            | Attack 1      |               | 195 | 211 |     |     |     |     |   |   |
|            | Attack level  |               | 196 | 212 |     |     |     |     |   |   |
|            | Attack 2      |               | 197 | 213 |     |     |     |     |   |   |
|            | Decay 1       |               | 198 | 214 |     |     |     |     |   |   |
|            | Decay level   |               | 199 | 215 |     |     |     |     |   |   |
|            | Decay 2       |               | 200 | 216 |     |     |     |     |   |   |
|            | Sustain       |               | 201 | 217 |     |     |     |     |   |   |
|            | Release 1     |               | 202 | 218 |     |     |     |     |   |   |
|            | Release level |               | 203 | 219 |     |     |     |     |   |   |
|            | Release 2     |               | 204 | 220 |     |     |     |     |   |   |
|            | Attack curve  |               | 205 | 221 |     |     |     |     |   |   |
|            | Decay curve   |               | 206 | 222 |     |     |     |     |   |   |
|            | Release curve |               | 207 | 223 |     |     |     |     |   |   |
| WS         | Clock divider |               | 224 | 225 | 226 | 227 |     |     |   |   |
|            | Start         |               | 228 | 229 | 230 | 231 |     |     |   |   |
|            | End           |               | 232 | 233 | 234 | 235 |     |     |   |   |
|            | Loop          |               | 236 | 237 | 238 | 239 |     |     |   |   |
|            | Position      |               | 240 | 241 | 242 | 243 |     |     |   |   |
| Direct OSC | Play note     | 252           | 253 | 254 | 255 |     |     |     |   |   |

Note: Direct OSC note support for oscillators 2 and 3 (targets 254/255) is currently not supported.

### 11.8.5 WS start/end/loop position

- Range: 0–128
  - Default: Start 1, End 32, Loop 1
  - WS1–4 may use overlapping positions

### 11.8.6 MOD to WS position

- Position controlled by modulator value

MOD to  
Position  
**off**

- Limited by WS start and end position range
- Assign WS1–4 as targets within MOD configuration
- Lower priority than note to position
- Clock divider and loop position ignored

### 11.8.7 Note to WS position

- Position controlled by note value
  - Limited by start and end position range
  - Higher priority than MOD to position
  - Clock divider and loop position ignored

Note to  
Position  
**off**

### 11.8.8 WS oneshot

- On: runs through one cycle upon receiving a trigger
  - Ignores loop position
  - Trigger source derived from Trigger Matrix > WS1–4 Reset
- Off: WS is free-running

Oneshot  
**On**

### 11.8.9 WS editor

- Position number: 0–127 steps
  - WS1–4 share the same table
    - Limited by WS1–4 start and end positions
  - Active position highlighted
- Output value in hexadecimal
  - Set relative change from the previous value ("rel" in decimal):
    - Decrement: 0x00–0x39 (–64 to –1)
    - Static: 0x40
    - Increment: 0x41–0x79 (+1 to +63)
  - Set absolute value ("abs" in decimal):
    - 0x80 to 0xFF (0 to +127)
- Values are scaled to match the full range of the target
  - Certain targets decode values to perform special functions

#016 0x80  
#017 0x40  
#018 0x40  
#019 0x40

#001  
**0x80**  
**0 (abs)**

### 11.8.10 Special WS targets

The following subsections list targets and hexadecimal values or ranges that correspond with particular settings.

#### 11.8.10.1 Filter routing and mode (targets 6 and 7)

| Hexadecimal range | Filter routing | Filter mode |
|-------------------|----------------|-------------|
| 0x80–0x87         | None           | Mute        |

|           |          |          |
|-----------|----------|----------|
| 0x88–0x8F | OSC1     | LP       |
| 0x90–0x97 | OSC2     | BP       |
| 0x98–0x9F | OSC3     | LP+BP    |
| 0xA0–0xA7 | OSC1+2   | HP       |
| 0xA7–0xAF | OSC2+3   | LP+HP    |
| 0xB0–0xB8 | OSC1+3   | BP+LP    |
| 0xB9–0xBF | OSC1+2+3 | LP+BP+HP |

#### 11.8.10.2 OSC waveform (targets 32–35)

| Hexadecimal | OSC Waveform            |
|-------------|-------------------------|
| 0x80        | Off                     |
| 0x81        | Triangle                |
| 0x82        | Saw                     |
| 0x83        | Triangle + Saw          |
| 0x84        | Pulse                   |
| 0x85        | Triangle + Pulse        |
| 0x86        | Saw + Pulse             |
| 0x87        | Triangle + Saw + Pulse  |
| 0x88        | Noise (others disabled) |

The following “hexadecades” set additional OSC parameters:

| Hexadecade | Disabled | Sync | Ringmod |
|------------|----------|------|---------|
| 0x9x       | ✓        |      |         |
| 0xAx       |          | ✓    |         |
| 0xBx       | ✓        | ✓    |         |
| 0xCx       |          |      | ✓       |
| 0xDx       | ✓        |      | ✓       |

|      |   |   |   |
|------|---|---|---|
| 0xEx |   | ✓ | ✓ |
| 0xFx | ✓ | ✓ | ✓ |

### 11.8.10.3 LFO waveform (targets 128–133)

| Hexadecimal range | LFO Waveform      |
|-------------------|-------------------|
| 0x80–0x87         | Sine bipolar      |
| 0x88–0x8F         | Triangle bipolar  |
| 0x90–0x97         | Saw bipolar       |
| 0x98–0x9F         | Pulse bipolar     |
| 0xA0–0xA7         | Random bipolar    |
| 0xA7–0xAF         | Sine unipolar     |
| 0xB0–0xB8         | Triangle unipolar |
| 0xB9–0xBF         | Saw unipolar      |
| 0xC0–0xC8         | Pulse unipolar    |

### 11.8.10.4 Direct OSC (targets 252–255)

| Hexadecimal (range) | Function                                                                                |
|---------------------|-----------------------------------------------------------------------------------------|
| 0x80                | Note off                                                                                |
| 0x81                | Hold note                                                                               |
| 0x82–0xFB           | Play MIDI note number 2–123                                                             |
| 0xFC–0xFF           | Play notes in the order (1–4) in which they were received (build your own arpeggiator!) |

## 12. Bassline engine

*The bassline engine turns zetaSID into a TB-303-style step-sequenced bass voice. It inherits the concept from MIDibox SID V2 and extends it with eurorack clock and pattern CV inputs.*

Each bassline patch supports a double-sequenced/stereo setup of two independent channels, L and R. The two channels share eight sequence patterns but are otherwise programmable separately, with their own oscillator settings, LFOs and envelopes.

**When multiple zetaSIDs are polychained via phybus to a single instrument id, the Chief drives every Agent's sequencer, keeping them perfectly in sync. No additional splicing or configuration is required on the Agent side, regardless of how the Chief itself is clocked (external MIDI clock, internal MIDI clock, or eurorack clock; see 12.5.1).**

Pattern switches can be optionally synchronised to the measure, so that a new pattern starts only after the previous one has finished playing.

Each channel can run in one of two modes: with the sequencer turned on, the channel plays one of eight stored patterns and every step carries its own configurable note, octave, gate, slide, accent, and one freely assignable patch parameter (see 12.2.1). When the bassline sequencer is turned off, the channel plays live notes from MIDI or CV/gate.

The bassline engine offers an asymmetric oscillator section (OSC1 master plus OSC2 and OSC3 sub-oscillators), a bassline-specific envelope with per-segment curvature, a 16-step sequencer with eight patterns per channel, and three eurorack sockets (SEQ STEP, SEQ RST, SEQ PAT) that drive the sequencer externally (see 12.5). The next sections will describe all bassline-specific parameters - for information about common parameters or screens, have a look in the Lead engine chapter.

If you own a nexusMIDI expander module, also have a look at the web editor, it can help a lot when editing complex multi-pattern sequences (see Appendix B).

| SEQUENCE EDITOR SHARED |    |    |    |    |    |    |    |    |     |     |     |     |     |    |    |    |
|------------------------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|----|----|----|
| Pattern                | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | Cpy | Pst | Clr | Rnd | Ini |    |    |    |
| Step                   | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9   | 10  | 11  | 12  | 13  | 14 | 15 | 16 |
| Key                    | H  | H  | H  | H  | H  | H  | H  | H  | H   | H   | H   | H   | H   | H  | H  | H  |
|                        | A# | A# | A# | A# | A# | A# | A# | A# | A#  | A#  | A#  | A#  | A#  | A# | A# | A# |
|                        | A  | A  | A  | A  | A  | A  | A  | A  | A   | A   | A   | A   | A   | A  | A  | A  |
|                        | G# | G# | G# | G# | G# | G# | G# | G# | G#  | G#  | G#  | G#  | G#  | G# | G# | G# |
|                        | G  | G  | G  | G  | G  | G  | G  | G  | G   | G   | G   | G   | G   | G  | G  | G  |
|                        | F# | F# | F# | F# | F# | F# | F# | F# | F#  | F#  | F#  | F#  | F#  | F# | F# | F# |
|                        | F  | F  | F  | F  | F  | F  | F  | F  | F   | F   | F   | F   | F   | F  | F  | F  |
|                        | E  | E  | E  | E  | E  | E  | E  | E  | E   | E   | E   | E   | E   | E  | E  | E  |
| Octave                 | D# | D# | D# | D# | D# | D# | D# | D# | D#  | D#  | D#  | D#  | D#  | D# | D# | D# |
|                        | D  | D  | D  | D  | D  | D  | D  | D  | D   | D   | D   | D   | D   | D  | D  | D  |
|                        | C# | C# | C# | C# | C# | C# | C# | C# | C#  | C#  | C#  | C#  | C#  | C# | C# | C# |
|                        | C  | C  | C  | C  | C  | C  | C  | C  | C   | C   | C   | C   | C   | C  | C  | C  |
|                        | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2   | 2   | 2   | 2   | 2   | 2  | 2  | 2  |
|                        | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   | 1   | 1   | 1   | 1  | 1  | 1  |
|                        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0  | 0  | 0  |
|                        | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1  | -1  | -1  | -1  | -1  | -1 | -1 | -1 |
| Gate                   |    |    |    |    |    |    |    |    |     |     |     |     |     |    |    |    |
| Accent                 |    |    |    |    |    |    |    |    |     |     |     |     |     |    |    |    |
| Glide                  |    |    |    |    |    |    |    |    |     |     |     |     |     |    |    |    |
| Param.                 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64  | 64  | 64  | 64  | 64  | 64 | 64 | 64 |

## 12.1 Oscillator page

The bassline oscillator page controls the master oscillator OSC1 and two sub-oscillators OSC2 and OSC3. Each bassline channel (L/R) has independent bassline oscillator settings. Subtle oscillator differences between the L and R channels in a stereo zetaSID bassline setup can lead to impressive results.



① Configured OSC1-OSC3 waveforms (combinations per oscillator are possible) and configured ADSR SID DCA envelope

② Active menu item: Waveforms selection for OSC1

### 12.1.1 OSC1 (master oscillator)

**Waveform** selects the SID waveform combination: None, Tri, Saw, Tri+Saw, Pulse, Tri+Pul, Saw+Pul, T+S+P, or Noise.

Waveform  
**Tri+Pul**  
~PUL

**Pulsewidth** sets the pulse duty cycle and has an effect only when a pulse waveform is active.

Pulsewidth  
**1639**

**Transpose** and **Finetune** offset pitch in semitones and cents.

Transpose  
**5**

Finetune  
**16**

**Sync** and **Ringmod** enable the SID's hard-sync and ring-modulation behaviors.

Sync  
**Off**

Ringmod  
**Off**

**Delay** postpones the oscillator's amplitude envelope after the gate fires.

Delay  
**4**

**Attack, Decay, Sustain, and Release** shape that envelope at the SID register level, with A, D and R being time parameters and S being a level parameter.

Attack  
**0**

Decay  
**9**

Sustain  
**12**

Release  
**9**

**Pitchrange** sets the maximum pitch-modulation deviation in semitones when the sequencer is off and the bassline engine is played via MIDI and receives Pitchbend events.

Pitchrange  
**8**

**Porta Rate** sets the portamento speed; it reads "Off" when the rate is zero.

Porta Rate  
**5**

Porta Type  
**Normal**

**Porta Type** selects portamento behavior: Normal (smooth glide), Glide (constant-time glide), or Glissando (glide quantised to semitone steps).

**Gate Hold** keeps the gate open across consecutive sequence steps when On; when Off, the gate releases at the end of each step and retriggers on the next.

Gate Hold  
Off

### 12.1.2 OSC2 and OSC3 (sub-oscillators)

**Detune** offsets the pitch of sub-oscillators OSC2 and OSC3, creating hollow or beating sounds when the sub-oscillators play in the same octave range.

Detune  
42

Each sub-oscillator is shown with its own two-line header and carries a subset of OSC1's controls: Waveform, Pulsewidth, Transpose, Finetune, and Delay behave as on OSC1.

**Note** defaults to "Follow", which is the normal behavior: OSC2 and OSC3 follow the OSC1 master oscillator and act as true sub-oscillators. Setting any other value pins the sub-oscillator to that fixed pitch instead, independent of the note played.

OSC2  
Note  
Follow

OSC2 and OSC3 do not carry Sync, Ringmod, Porta, or Gate Hold; those remain OSC1 controls.

## 12.2 Sequencer page

The sequencer page is the heart of a bassline channel and is automatically mapped either to the L(eft) or R(ight) channel, depending on the stereo position of your zetaSID. Each patch holds eight 16-step patterns and each sequencer (L or R) can play back one of these patterns.



- ① Left or Right sequencer engine (L/R) and active pattern (1-8)
- ② Current playback step (1-16)
- ③ Oscilloscope view of bassline notes recently played
- ④ Active menu item: select pattern for playback and editing

### 12.2.1 Sequencer controls

**Pattern** selects the active pattern. It has nine positions: "-" (the channel's sequencer is idle and plays no steps) and patterns 1 through 8. All pattern changes respect **Sync To Measure** (see below). Next to this user-interface selector, active patterns can also be selected via

Pattern  
1

- **MIDI**: incoming MIDI notes C, C#, D, D#, E, F, F#, G on octaves 3 and 4 launch respective sequences 1 to 8 for the left and right channels, all notes > G (i.e. G# or A) set the respective sequencer to "-" (standby)
- **CV**: assign/splice a CV input to the **SEQ pat** socket (see section 12.5.3)

The **Operations** submenu performs one of these commands on the currently selected pattern:

Operations  
Copy

- **Copy** transfers the current pattern to a temporary memory buffer (useful to save a copy of the current pattern before performing note or operation modifications)
- **Paste** clones a previously copied pattern from the memory buffer to the currently selected pattern.
- **Clear** resets the pattern steps back to their defaults
- **Rnd** rolls a freshly randomized pattern from scratch
- **Rnd +10%** nudges the existing pattern slightly, useful for finding small variations of a pattern you like
- **Done** closes the submenu

**Sequencer** is the master On/Off switch for the channel's sequencer. When Off, the channel plays live MIDI or CV/gate notes instead of a pattern.

Sequencer  
On

**Clock Div** is only relevant when the sequencer is driven from a MIDI clock, whether internal or external. It sets how many MIDI clock ticks advance the sequencer by one step. Each channel has its own divider, so Bassline L and Bassline R can run at different rates from the same clock. It has no effect when the SEQ STEP input socket is successfully spliced to a local or remote port, since in that case each step trigger advances the sequencer by exactly one step.

Clock Div  
56  
> 8th

**Sync To Measure** is an On/Off toggle. When On, any pattern change requested from the UI, from MIDI note-select, or from the SEQ PATTERN CV input (see 12.5) is queued and applied when the sequencer next wraps to step 0, so the new pattern is played only after the old pattern has finished playing. When Off, pattern changes take effect immediately.

Sync Meas.  
On

**Steps** defines the pattern length, from 1 to 16 (default 16). Shorter patterns loop sooner. As with every sequencer parameter, the left and right sequencers can play back different pattern lengths, allowing to play polymeter basslines.

Steps  
16

**Par Assign** binds the per-step parameter column to a synth engine parameter. Parameters are applied live, so it is advisable to stop playback of the pattern before sweeping this list to avoid modifying unwanted patch parameters.

Par Assign  
5  
Filt Res

**Edit** selects which column of the step grid is currently editable: Note, Oct, Gate, Slide, Accent, or Par, moving the cursor horizontally between columns.

Edit  
Note

**Shortcut alternative: push and turn the knob in the Step Grid to switch columns.**

## 12.2.2 The Step Grid

The step grid shows each step of the active pattern and also indicates the current sequence playback position via vertical bars at the side of the screen. In the right-hand demo we're editing the note of step 05 - see inverted cursor.

| NOTE | OCT | G  | S | A |
|------|-----|----|---|---|
| 02   | D#  | -1 | * | / |
| 03   | D#  | 0  | * | 0 |
| 04   | D#  | 0  | * | 0 |
| 05   | D#  | 0  | * | - |
| 06   | D#  | 0  | * | 0 |
| 07   | E   | 0  | * | 0 |

Push the matias button to start and stop editing the highlighted cell, i.e. to choose a different note via the knob or to toggle a switch (i.e. Gate On/Off).

When not editing, you can scroll your cursor by

- turning the knob to scroll vertically
- pushing and turning the knob to scroll horizontally (or using the **Edit** selector)

Edit the pattern using these columns:

- **Note** contains the per-step semitone: C, C#, D, D#, E, F, F#, G, G#, A, A# or B
- **Octave(Oct)** can be set to -2, -1, 0 or 1
- **Gate(G)** can be On (\*) or Off ( )
- **Slide(S)** automatically indicates the slide direction when active (/ - \)
- **Accent(A)** boosts the filter envelope depth when on (o)
- **Par** sets the per-step parameter value (0-127)

## 12.3 LFO page

Each bassline channel has two LFOs with fixed routing. Every LFO drives the pitch, pulsewidth, and filter cutoff targets all at once, each with an individual depth.



① Active LFO marker (rectangle) and oscilloscope view of the respective LFO output routed to Pitch, Pulsewidth and Filter

② Active menu item: select LFO for editing

**LFO Select** switches between LFO 1 and LFO 2. The top of the screen indicates which LFO is selected: the selection rectangle also contains the modulation outputs the LFO creates for its three targets (as mini-scopes).

LFO Select  
LFO 2

**Waveform** selects the LFO shape. The first five values (Sin, Tri, Saw, Pulse, Rnd) are bipolar, centered on zero. The five "+" variants (+Sin, +Tri, +Saw,

Waveform  
Pulse

+Pul, +Rnd) are unipolar and only add to the target parameter, which is useful when modulation should never pull a parameter below its programmed value.

Rate  
144

**Rate** sets the LFO speed.

**Depth P**, **Depth PW**, and **Depth F** are the modulation depths for pitch, pulsewidth, and filter cutoff respectively. Each can be set positive or negative; negative values invert the modulation direction.

Depth PW  
9

Depth P  
120

Depth F  
-64

Key Sync  
On

**Key Sync** resets the LFO phase on each new note when On.

**Clk Sync** locks the LFO rate to the master clock when On (only when driven by an internal or external MIDI clock).

Clk Sync  
off

**Oneshot** runs a single LFO cycle per note trigger rather than free-running, which can be useful for treating the LFO as a slow auxiliary envelope.

Oneshot  
off

**Delay** postpones the start of the LFO after the gate fires (relevant if Oneshot or Key Sync are activated, as otherwise the LFO is free-running)

Delay  
0

**Phase** sets the LFO's starting phase (relevant if Oneshot or Key Sync are activated, as otherwise the LFO is free-running).

Phase  
0

## 12.4 Envelope page

Each bassline channel (L or R) has one envelope, which is in parallel routed to pitch, pulsewidth, and filter cutoff with configurable depths/weights. This "soft-envelope" is separate from the SID-based chip envelope on the oscillator page (see 12.1).



① Active Envelope oscilloscope view visualizing the envelope output routed to Pitch, Pulsewidth and Filter

② Active menu item: adjust envelope depth amount routed to Pitch

**Depth P**, **Depth PW**, and **Depth F** are the three modulation depths for the routed targets. Each can be set positive or negative; negative values invert the direction of modulation: the effect can be observed at the top of the screen in the mini-scopes, one for each of the targets (labeled P, PW and F).

Depth P  
32

Depth PW  
111

Depth F  
-80

Attack  
0

Decay  
9

Sustain  
12

Release  
9

**Attack, Decay, Sustain, and Release** set the four stages of the envelope, where Attack, Decay and Release are time-based parameters and Sustain is a level parameter.

**Curve** sets the curvature applied to the envelope segments. It can be set positive or negative, and the two signs bend segments in opposite directions.

**Curve Att, Curve Dcy, and Curve Rel** are three On/Off toggles that decide whether the Curve value is applied to the attack, decay, and release segments respectively. When all three are turned "Off", then the envelope is linear regardless of the Curve setting.

Curve Att  
off

Curve Dcy  
off

Curve  
Curve Rel  
off

**Accent** is the boost that accented steps add to the filter depth (accent affects filter only).

Accent  
64

**Acc Decay** is the decay time of that accent boost: on accented steps, Acc Decay replaces the normal Envelope Decay value for that cycle.

Acc Decay  
40

## 12.5 Eurorack clock and CV integration

The bassline engine adds three eurorack sockets dedicated to sequencer control: SEQ STEP, SEQ RESET, and SEQ PATTERN. They are used to control the bassline engine via common eurorack signals and are listed with the other input sockets in Chapter 8.

### 12.5.1 SEQ STEP

SEQ STEP is a trigger input. Each pulse on the socket advances the active sequencer by one step.

While SEQ STEP is spliced to a port, the channel's MIDI-clock-driven stepping is bypassed entirely. Clock Div has no effect in this state (see 12.2.1), and the sequencer runs only as fast as the incoming triggers arrive.

### 12.5.2 SEQ RESET

SEQ RESET is a trigger input. Each pulse jumps the sequencer to step 0 of the current pattern. Pattern selection is not changed; only the step position is reset.

SEQ RESET is typically driven from a pattern cycle or song-position reset pulse, so that all spliced bassline modules will stay aligned with each other and with the rest of your externally sequenced modules.

### 12.5.3 SEQ PATTERN

SEQ PATTERN is a 0 to 5V CV input that selects the idle pattern ("-") or one of the eight stored patterns based on input voltage - each pattern number is separated by 0.55V to be

able to squeeze the voltage range into nine equal bins. Pattern changes observe the channel's **Sync To Measure** setting (see 12.2.1).

## 13. Drum engine

*The zetaSID drum engine offers access to a kit of 16 percussion models covering a range of arcade-ish fx to old-school to low-fi 8-bit drums.*

Each MIDI note triggers one drum, with two octaves' worth of notes mapped across the kit. Up to six drums can sound at once, spread across the module's two SID chips, and the two SID filters are shared across all sounding drums.

Every drum has its own synthesis model, ADSR envelope, tune, gate length, speed, and voice assignment: left/right pair, left only, right only, or pinned to a specific voice.

**Only the pages that differ from the Lead engine are documented in this chapter.**

### 13.1 Drums

In drum engine mode, configure a kit of 16 different SID percussion models.



- ① Drum Kit overview: the currently selected drum is highlighted. Drum playback within the kit is animated with a playback indicator.
- ② Active menu item: select drum for editing

#### 13.1.1 Select drum

- Turn the encoder knob to select drum 1–16 for editing

Select  
Drum  
1

#### 13.1.2 Assign voice

- LR (Left/Right): oscillators are assigned to the next free oscillator in a round-robin fashion
  - Assign the next drum to be played to the next free oscillator
  - Drums will be played on both the left and right channels of a stereo pair
- L– (Left): the drum is only played on the left audio channel
  - Plays up to three drum voices
  - Use this setting if only one zetaSID is available
- –R (Right): the drum is only played on the right audio channel
  - Plays up to three drum voices

Assign  
Voice  
LR

- O1–O6: assigns an individual oscillator for the drum
  - Oscillators O1–O3 are played on the left **zetaSID** audio channel
    - Use O1–O3 if only one zetaSID is available
  - Oscillators O4–O6 are played on the right **zetaSID** audio channel
  - Directly assigning oscillators in this way increases the priority for selected drums but reduces the polyphony of L/R assignment modes

13.1.3 Select model

| Type        | Model | Type    | Model |
|-------------|-------|---------|-------|
| Bass drums  | BD1   | Clap    | CLAP  |
|             | BD2   | Effects | FX1   |
|             | BD3   |         | FX2   |
| Snare drums | SD1   |         | FX3   |
|             | SD2   |         | FX4   |
|             | SD3   |         | FX5   |
| High hats   | HH1   |         | FX6   |
|             | HH2   |         | FX7   |
| Toms        | TOM1  |         | FX8   |
|             | TOM2  |         | FX9   |

Select  
Model  
**BD1**

13.1.4 Attack/decay/sustain/release

- Output DCA envelope curve

Attack  
**0**

13.1.5 Tune

- Range: –2 to +2 octaves in 256 steps

Decay  
**9**

13.1.6 Drum gate length

- The duration of a drum sound

Sustain  
**12**

Release  
**9**

13.1.7 Speed

- Adjusts the playback speed of the associated drum model wave sequence

Gatelength  
**0**

Speed  
**0**

### 13.1.8 Extra parameter

- Adjusts a specific setting for each drum model
- Range: -127 to +128

Extra  
Parameter  
0

### 13.1.9 Attenuate

- Reduces the output volume for each drum model
- Useful to tune your kit drums to identical volumes
- Range: 0dB (default) to +30dB

Attenuate  
0dB

### 13.1.10 Velocity target

- Volume
- Filter cutoff
- Filter resonance
- Attack
- Decay
- Sustain
- Release
- Drum tune
- Gate length
- Drum speed
- Extra parameter

Velocity  
Target  
Filter Cut.

## 14. Setup

*Configure permanent settings that persist across sessions*



- 1 Setup screen
- 2 Active menu item: choose screensaver type
- 3 Next menu item

| Parameter           | Setting                                                                                           |
|---------------------|---------------------------------------------------------------------------------------------------|
| Screensaver type    | <ul style="list-style-type: none"> <li>• Blank</li> <li>• Animated starscape</li> </ul>           |
| Screensaver timeout | <ul style="list-style-type: none"> <li>• Minutes after which the screensaver activates</li> </ul> |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CV in port range         | <ul style="list-style-type: none"> <li>• -5V to +5V (default)</li> <li>• 0-10V</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Transmit session changes | <ul style="list-style-type: none"> <li>• On: sends out a "change session to" command to other nodes when loading a session on this zetaSID (default)</li> <li>• Off: session changes are not transmitted</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Receive session changes  | <ul style="list-style-type: none"> <li>• On: modules that receive a "change session to" command switch to the appropriate session (default)</li> <li>• Off: "change session to" commands are ignored for this module</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Patch stereo edit        | <ul style="list-style-type: none"> <li>• On: parameter changes propagate to both L/R channels of an instrument cluster</li> <li>• Off: patch changes originating from the left channel propagate only to other left channels of an instrument cluster; right channels behave in the same way</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                       |
| LED Brightness           | <ul style="list-style-type: none"> <li>• Static: low brightness; static port activity</li> <li>• Low: low brightness; dynamic port activity (default)</li> <li>• High: high brightness; dynamic port activity</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Scope Speed              | <ul style="list-style-type: none"> <li>• Time axis compression of the scope (1:1 ... 1:16)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| SD Save Interval         | <ul style="list-style-type: none"> <li>• 5 sec ... 30 sec - define the time after which changes to the session are saved on the microSD card. Note: the SD card should not be removed and the system should not be powered down, when saving is in effect. Higher values reduce the risk of filesystem corruption (in case of sd card ejection/power down) and also reduce the write load on the SD card.</li> <li>• <b>A tiny "SD" icon is shown on top of the screen during SD card accesses - do not eject the card or power down your modular system when this icon is shown.</b></li> <li>• <b>Remember to back up your SD cards on your main computer from time to time.</b></li> </ul> |
| Wrap Patch Selection     | <ul style="list-style-type: none"> <li>• On: wrap when scrolling beyond the limits of the patch list, i.e. to quickly move from patch R001 to patch F052 (if that is your last user patch)</li> <li>• Off (default): stop scrolling at the limits of the patch list</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                |

## 15. What's New/Changelog

*In case you have been using zetaSID for a while and wonder what changes were introduced in newer software revisions, have a look here:*

V1.5a (released on 2026/05/15)

- Bassline engine support (thanks, Inty, for debugging help!)
- Drum engine drums can now be individually attenuated (thanks, Paulee!)
- Display rotation support (thanks, Christoph!)
- MIDI Program Change support (thanks, Inty!)

V1.4b-d (matches software released on 2026/02/26)

- Improvements of wave sequencer and patch wrap-around (thanks, Inty!)

V1.4a (matches software released on 2026/02/20)

- Initial release of zetaSID

## APPENDIX A: ROM Patchbank

Lead

R001 - Poly Sunrise H  
 R002 - The Loader  
 R003 - Relax in Space  
 R004 - Cannon Y  
 R005 - Rinkeby Centrum  
 R006 - Curveball  
 R007 - Popcorn  
 R008 - Techno 5th  
 R009 - Oldschool

R010 - Acid Blob  
 R011 - Stereo Asteroids  
 R012 - Analog Dream4  
 R013 - Gotland  
 R014 - Den of Saws  
 R015 - TV Piraterna  
 R016 - Monty Lead3  
 R017 - Lead Stacco1  
 R018 - League

R019 - Mustache On  
 R020 - Techno PWM  
 R021 - Vib Synth  
 R022 - Tensta Marknad  
 R023 - Accomp1  
 R024 - Bubble Grapes  
 R025 - Nice Lead

Bass

R026 - Deep Bass 9  
 R027 - Pulsator  
 R028 - Driving Bass  
 R029 - Bad Basshead  
 R030 - C64 Bass  
 R031 - Auto Zone  
 R032 - Warm Bass  
 R033 - Razor Blade ][  
 R034 - NT Bass

R035 - Leaky Capacitor  
 R036 - Autobahn  
 R037 - Radar Bass H  
 R038 - Slussen  
 R039 - Seq Bass4  
 R040 - Seq Bass5  
 R041 - Monty Bass  
 R042 - Chipmelter  
 R043 - PWM Bass1

R044 - PWM Bass2  
 R045 - PWM Bass3  
 R046 - PWM Bass4  
 R047 - Organic Bass  
 R048 - Twister  
 R049 - Skate or Cry!  
 R050 - Zak Bass

ARP

R051 - Power Glove ARP  
 R052 - Interlace ARP  
 R053 - Laserdome Lover  
 R054 - Auto ARP

R055 - The Future ARP  
 R056 - 8-bit Starpig  
 R057 - Pac Pill ARP  
 R058 - wARP Drive

R059 - Transistor ARP  
 R060 - Soothing ARP

Wave

R061 - SEQ Vintage B  
 R062 - SEQ Runner  
 R063 - SEQ Falling  
 R064 - Alien Groove

R065 - Step by Step  
 R066 - ARPSEQ One C  
 R067 - ARPSEQ Two A  
 R068 - ARPSEQ Four

R069 - SEQ Trance Bass  
 R070 - SEQ Powerbass

Kit

R071 - 8-Bit Mono  
 R072 - 8-Bit Kit  
 R073 - Hawkeye Mono  
 R074 - Hawkeye Kit

R075 - Frogger Mono  
 R076 - Frogger Kit  
 R077 - Chip Mono  
 R078 - Chip Kit

R079 - Smithy Mono  
 R080 - Smithy Kit

Drum

R081 - Bassdrum A  
 R082 - Bassdrum B  
 R083 - Kick  
 R084 - Snare

R085 - Cymbal A  
 R086 - Cymbal B  
 R087 - Cymbal C  
 R088 - Hat

R089 - Klick  
 R090 - Lo-Fi Perc

EX

R091 - A Stormy Day  
 R092 - RampUp  
 R093 - Shamus Case  
 R094 - Classic Zelda

R095 - Nonlinear Time  
 R096 - Arcade Lover  
 R097 - Lords of Chaos  
 R098 - Sopbil by Night

R099 - Abducted  
 R100 - Rebirth H



R101 - Bassline 2 TK  
R102 - Bassline 3 TK  
R103 - Bassline 4 TK  
R104 - Bassline 5 TK

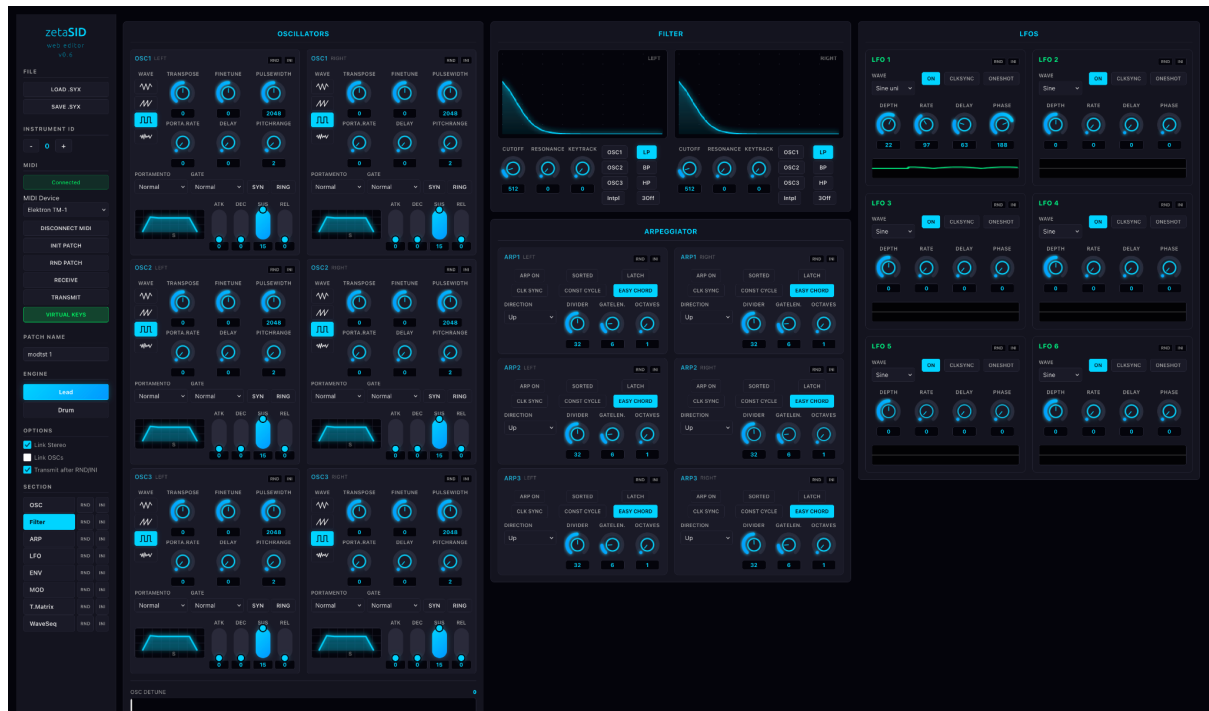
R105 - Bassline 8 TK  
R106 - Bassline 22 TK  
R107 - Bassline 24\_2  
R108 - Melb. Bounce

R109 - Smithy BL1  
R110 - Hawkeye 303

## APPENDIX B: Using the zetaSID web editor

If you are using a nexusMIDI expander, it is possible to directly edit all of zetaSIDs patch parameters with the midiphy zetaSID web editor found here:

<https://www.midiphy.com/en/zetasid-webedit/>



### Setup

- Connect USB MIDI interface cables: USB MIDI OUT to nexusMIDI IN2, USB MIDI IN to nexusMIDI OUT2
- Press the LEDome key next to nexusMIDI IN2 and create splices to the "MIDI IN2" sockets of all zetaSIDs
- Press the LEDome key next to nexusMIDI OUT2 and create splices to the "MIDI OUT" sockets of all zetaSIDs
- (If you're using microSD cards in the zetaSIDs, splices will be saved automatically)

### Usage

- Use "LOAD .SYX" and "SAVE .SYX" for file operations - loading existing patches or saving your patches to disk
- Set the Instrument Id to match the Instrument # on your Chief zetaSID
- "Connect" the USB MIDI device
- You can now receive and transmit patches, as well as randomize and rename them

- If you have no other MIDI or CV/Gate inputs connected, you can use the virtual keyboard to play notes for testing the patch

### Link options

- Use "Link Stereo" to link a single oscillator with its stereo counterpart on a neighboring zetaSID when the Chief has Polyphony mode set to "Stereo"
- Use "Link OSCs" to link all three oscillators on one stereo side of the patch

### Sections and panel use

- Click any section name to scroll directly to that section, e.g. Filter
- Use the randomize and initialize buttons next to section names to randomize/initialize only that section
- Use the randomize and initialize buttons on each panel (e.g. OSC1 LEFT) to randomize/initialize only that part of the patch

### Tips

- Save early, save often - you can always download nice-sounding patches as .syx files, especially before making major changes
- When experimenting with randomization, enable "Transmit after RND/INI" to automatically send the patch SysEx to hardware after each randomization operation
- Remember that you can randomize individual panels - e.g. drum voices - by clicking the RND buttons in the individual panels, allowing you to build a custom drum kit by randomizing individual drum sounds until you find ones you like:



## APPENDIX C: Firmware updates

You can either update a single module or automatically update all modules on your phybus network from your zetaSID!

For both cases, prepare an SD card and enter bootloader mode first:

- Either format a microSD card as FAT32 filesystem or delete the previous firmware folder.
- Download the newest modular firmware zip bundle from [www.midiphy.com](http://www.midiphy.com).
- Unpack the firmware bundle zip file into the root directory of the microSD card. The **/firmware** directory now contains the latest firmware version for all modules.
- Insert the microSD card into the card slot of the zeta module.
- Power up the module with the key held down.

In bootloader, to update a single module with a specific firmware:

- Choose **Flash App**.
- Select the appropriate firmware file.
- Press the key to start the update procedure.

In bootloader, to automatically update all modules on a phybus network:

- Choose **Update All**.  
Now you can browse the complete list of modules, including the current firmware versions and (if applicable) to which version each module will be updated.
- Choose **Proceed** to start the automatic mass update process.  
Each module will be updated and rebooted in turn.  
The local module will be updated last (if applicable).  
Larger phybus networks may require around five minutes to update.

Red LEDomes indicate that the flash process is in progress, all modules will reboot automatically after flashing.

**During an ongoing flash process, do not remove the power supply, the microSD card or any cables before the process completes.**

## APPENDIX D: Acknowledgements

Many thanks to:

- Thorsten, who created MIDibox and the original MBSID sound engine
- Hermit, who created the SID emulation engine
- All MBSID v2 patch contributors: TK., Chiptraxxx, Pingosimon, Smithy.
- All current and future users of zetaSID, who made this device possible and ensure continuous development. You know who you are!

