Quad satellite system

Manual v0.1.0 **(WORK IN PROGRESS)**

Table of contents

Safety warning

warning warning.

Installation

installation steps installation steps installation steps
installation steps installation steps installation steps
installation steps installation steps installation steps

Specs

height 3U | width 18hp | depth 25mm
power consumption NA on +/-12V rails
48khz 16bit

Unique UI
Datum sampling™
4x 20 bands filterbanks
4x spectral buffers
4x user buffers for recording
4x internal oscs
4x Warp modifiers

Based on esp32 and daisy 2

Eisei

Eisei is our most advanced system for spectral analysis and timbre control. It allows easy access to 4 satellites, each armed with a 20 bands filter bank and dedicated IN & OUT. Eisei offers global controls to move and calibrate these 4 filterbanks to spread them across the spectrum, focus, zoom or warp on specific spectrum areas, all while scanning thru a spectral data table we named Datum. Eisei can filter, process, harmonize, warp and resynthesize anything coming across.

The four satellites are constantly observing the Datum : a table containing rich harmonic events to stimulate Eisei's filterbanks. Any signal being processed by the satellites will be affected by the Datum. Eisei provides 4 default Datums and allows to record and store up to 4 user defined ones. Pour an audio signal in the REC input and let Eisei generate a new observable sonic world.

Panel Overview

Key
Musically control the tonic and harmonics of the satelleites filterbanks

Datum Selector
Eisei can recall 4 preset Datum and can store 4 user recorded Datum.

Spread
Direct the focus of the satellites from a single point to 4 different equidistant chunks of the spectrum

Lens
From steep, narrow and surgical response from a single band to a wide view of the spectrum, passign through a perspective distortion when approaching the fully CCW position

Orbit
Set the speed of the satellites revolving around the planet

Time
Move the satellites across the ring to process past and future events

Warp Mode
4 different types of alteration are available to further process what is captured by Lens:
Shift, Freeze, zip e zap

Satellite Selector
Edit ORBIT and TIME for each satellite individually or select them all for a synchronized movement

Reset
4 different types of alteration are available to further process what is captured by Lens:
Shift, Freeze, zip e zap

Set
Edit input gain and ring start & end

INs & OUTS
Each satellite has a dedicated input for external signals and a dedicated individual output as well as a mix output

Record
Hold REC or send a gate to transform the incoming signal into an observable Ring

Mod Input
Send audio to be processed and stored as Datum

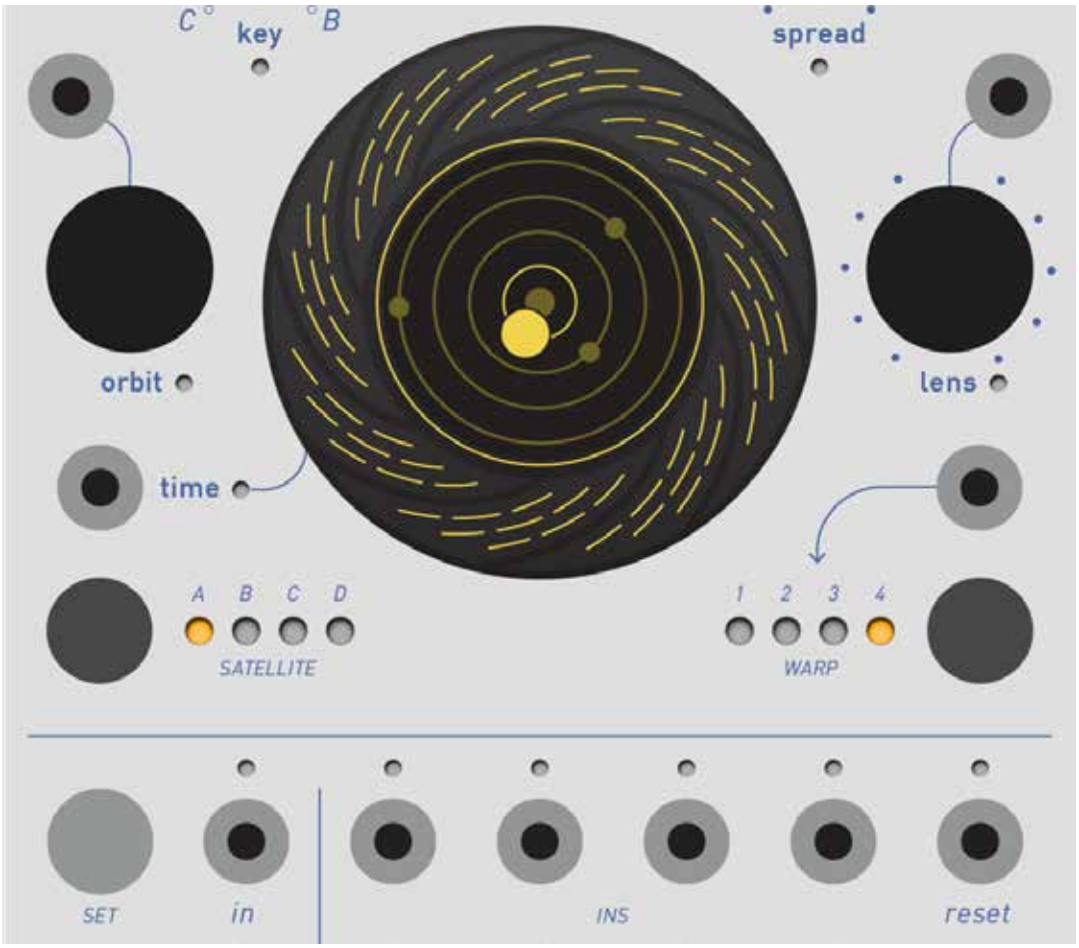
Orbits

Each satellites runs on its own orbit at its own pace. Sweeping their orbits the satellites read the Datum which contains all the spectrum info captured when holding REC. So to do an analogy, look at the satellites as playheads (each with independent speed control) and Datum as a vinyl record. We can run through the Datum with 4 playheads at different speed and direction and highlight a slice of interest to loop in (more on this later).
It is possilble to individually modify each satellite speed and direction using the *orbit* push encoder.
Select the satellite you want to modify the speed to using the *SATELLITE* selector button, the corresponding LED next to the button will be lit to confirm selection and the satellite on the screen will be highlighted. After 5 seconds of inactivity the selection will be disabled and will be back to default (all 4 satellites selected).
Twisting clockwise will increase the selected satellite speed if it is running clocwise or will decrease if it running counterclockwise and viceversa.
it is possible to reach speed 0 to make the selected satellite(s) stop both by twisting the encoder with precision or simply by pushing down the encoder (don’t hold).

It is possible to reset orbit speed and position (maintaining time offset) sending a trig ora gate to the reset intput

Time

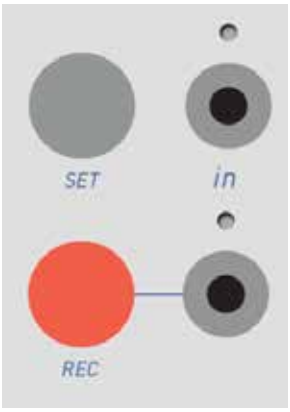
Deeply entangled with orbit is time.
It acts as an offset on the position of the satellite on the orbit.
It is possilble to individually modify each satellite time position using the *time wheel.*
Select the satellite you want to move along the orbit to using the *SATELLITE* selector button, the corresponding LED next to the button will be lit to confirm selection and the satellite on the screen will be highlighted. After 5 seconds of inactivity the selection will be disabled and will be back to default (all 4 satellites selected).
Touching the time wheel will move the selected satellite(s) in the corresponding position.
Time comes particularly handy to make sort of delay effects, having the same orbit value for all the satellites and offsetting them like a multi tap delay.
Or freeze the satellites and listen to different points of the datum simultaneously.



Datum

Datum Recording
origins of the name
Press & hold the REC button or send a gate to the REC input to start recording. Recording will start as soon as the button is pressed or a high gate is received and will stop as soon as the button is released or the gate is low. Immediately after that the new datum will be available in the datum slot to be explored.

Save DATUM in a slot
Once the datum is captured, hold select and SET for 3> sec. The selected slot's led will blink to confirm success.



Default datums

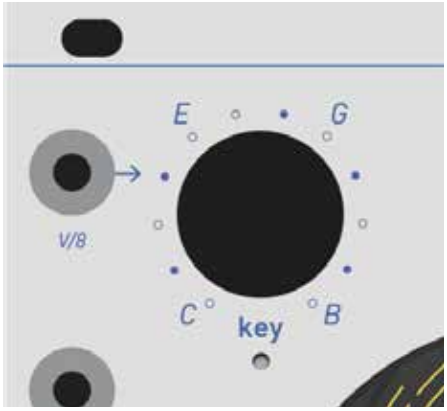
Eisei comes with 4 pre-stored datums that can’t be overwritten.
These are useful datums made out of pure mathematical shapes that can be used for many uses like classic filter sweep, panning, vca, etc.
These datums take slot s1 to 4.
To use a default datum simply select it with the datum selector button to activate it.
If REC is enabled while using using a default datum it will temporarly be overwritten but won’t be stored and at the next power cycle the recorded datum will be lost. You can save the datum by holding SET and selecting a user slot (5-8) then hold SELECT (keep holding SET) for 3 sec to confirm, the selected user slot will blink to confirm succeded operation.
ANY PREVIOUSLY STORED DATUM IN THAT SLOT WILL BE LOST.

Key

the knob acts just like a tuning key to set the tonic of Eisei, it affects both the filterbanks and the internal oscillators.
Any incoming CV signal in the key input will be added to the knob offset but will be interpreted differently by oscillators and filterbanks. In fact incoming cv will be processed and split into 2 arguments: note and octave. Filterbanks will be affected only by the “note” but won’t receive the “octave” while oscillators will receive the sum of both (basically maintaing the cv unaltered).
???This means that filterbanks center band will wrap back to the low C when over riding the upper C???

Filter bank center band calculation
[Key knob *(id*spread)]+ key cv (note)

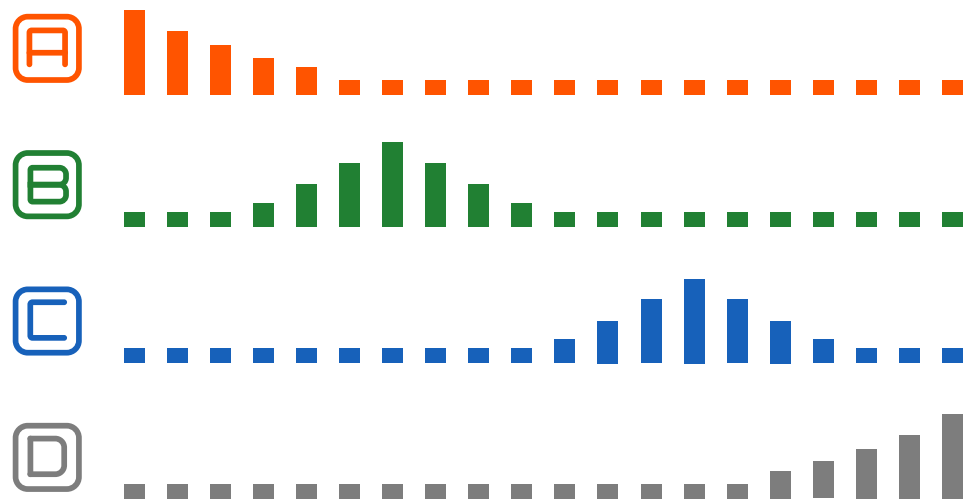
Oscillator frequency calculation
[Key knob *(id*spread)]+ key cv

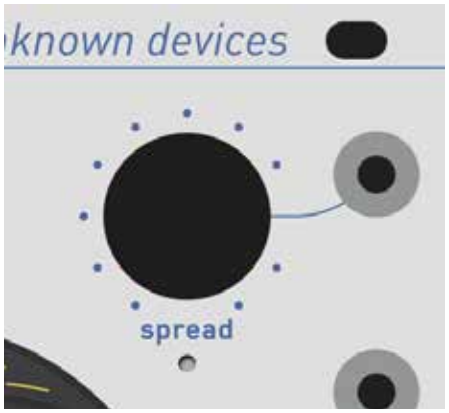


Spread

Satellites are deeply entangled one to each other and move like a hive mind thanks to the Spread parameter. Fully CCW they will be unison, focusing on the same spectrum segment. Spreading the satellites will broaden their view, each analyzing a different chunk of the spectrum. Fully clockwise opens to harmonic series ratio.

The Spread parameter moves the oscillators and the filterbanks at equi-distant interval across the spectrum following this formula
(Spread knob + spread cv)*ID
given IDs A = 0, B = 1, C = 2, D = 3





Lens

Each satellite is equipped with a powerful Lens engine to precisely control the filter bands. Just like choosing che correct optical length and framing when shooting a picture, Lens can zoom in to catch the tiniest detail or go ultra-wide angle for a landscape shot. From a single resonant flutey band at noon to a wide array of harmonics in a CW twist. CCW brings to the uncharted territories of a distorted perspective: along with the dominant center band the hi and the lo ends arise.

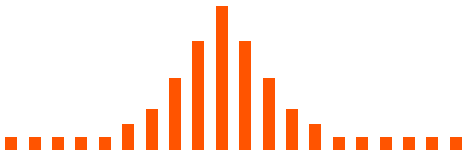


fig. 1
Lens at noon
Single central band is active

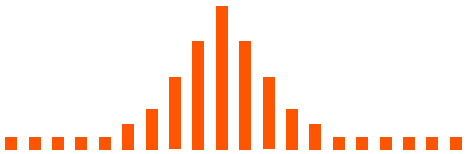


fig. 2
Lens at 4 o'clock
Wide bell shape, similar to a wide bandpass, cutting low and high end (when possible)

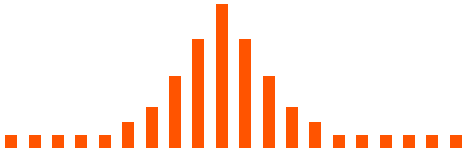


fig. 3
Lens at 5 o'clock
All bands are wide open

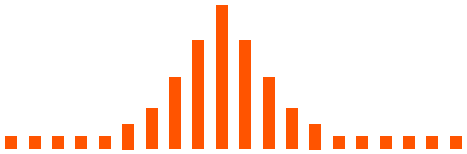


fig. 4
Lens at 7 o'clock
Single central band is slightly weaken and arise low and high ends

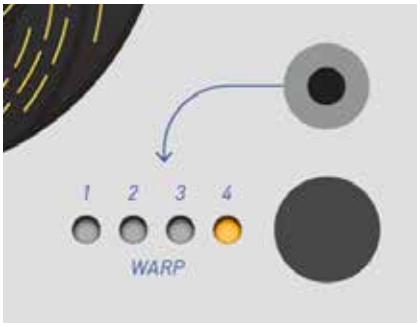
Lens
This parameter shapes the filterbanks combining and masking the datum shape.
We can extract 4 main key shapes:
- Single band at noon (fig.1)
- Wide bell almost full CW (fig.2)
- All open at fully CW (fig.3)
- Single band + reverse wide bell at fully CCW (fig.4)

Everything between these positions is an interpolation between the corresponding two shapes.
Incoming CV is summed to the knob value.
The corresponding LED shows the actual value of the parameter (knob offset + cv) where unlit = noon, white = fully CW, yellow = fully CCW.

Warp

definitions and modes

shift -

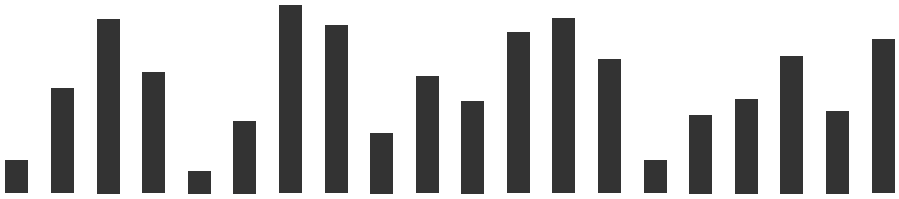


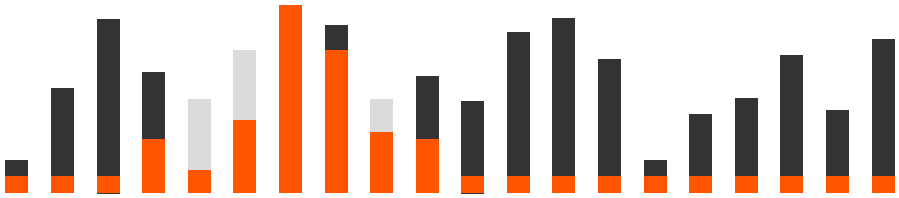
Processing

Eisei features 4 cascading audio inputs. This means that it can process 4 different signal with a dedicated filterbank per signal or process a single signal with 4 filterbanks (or any combination in between). The signal passes into 2 stages:

first it passes in the peaks specified by the Lens parameter
then the Datum bands are applied

so the result is a combination of Lens and Datum.





Audio path

Audio path can be divided in two main blocks:
- modulator
- - - Satellites
The modulator block simply receive an incoming signal then analyzes the signal and stores the data

The satellites block in a bit more articulated.
First when non patched each satellite input is normalized to the corresponding internal oscillator then either incoming signal or the oscillator passes through the processor (lens > datum > warp) and finally comes out of the corresponding output. A sum of all the outputs is available at the “all” output.

Firmware update procedure

flash flash

Troubleshooting

shoot shoot shoot shoot shoot shoot shoot shoot shoot shoot shoot shoot shoot shoot shoot shoot shoot shoot shoot shoot