EASY CV

Introduction

Digital created LFO+ENV with CV-Output. No Displays, No Menues, Minimal buttons, much Scopes, much Led-Ring-Rotarys (Planed for LRE-8x2CS), one big UI with complete functions for one LFO+ENV Voice... switching between the UI-Voices is done from the BREAKOUTMODULES...to this later

LFO+ENV are mixed together softwareside, to use only one CV-Output

8xCV-Outputs (VOICES) are supported > if u are on a VCF+VCA-Setup = 4 Voices on the Analog-Side (4xFilterbank)

Copy Paste for LFOs and ENVelopes between the Voices

Copy Paste for a Songa aka Preset aka Bank aka Program(change)

Jam Style Pattern load (next Preset Display) + Preset Morph between Current-Preset and Next-Preset

A Breakoutmodule for each CV-Output, with Depth-rotary, Focusswitch (Pushrotary), 2x Scopes (LFO+ENV) and LFO/ENV-Switch to show on one Display the Mixed Waveform & to switch the Rotary to "ENV" or "LFO" Mode (there is only space for one Encoder - maybe just make PAN Style, instead of 2 individual level -maybe more live feel?, how ever when using an 3Stage switch, i could disable MIX-View, or display it on ENV or LFO...maybe a good choise ;)) The Depth-rotary has no Ledring, want to display it as a bar or as Value in the scope...

Whole thing will not be compatible on MB-CV concepts... i will copy code snippets and so on, but i have to understand it from scratch... anyhow this is not generic

FrontPanel

Brain

<u>THE LEFT SIDE of the BRAIN > Preset-Management:</u> Save & Load the PROGRAM, can be done by Midi-ProgramChange -or With the LOAD-PRESET-Encoder

then press LOAD -or Morph to the next Program slowly with the MORPH-Encoder

-Another option is to take a **PUSH-ENCODER** for **LOAD** & **STORE** > and load and store it by pushing it... would free 2 buttons for other functions.

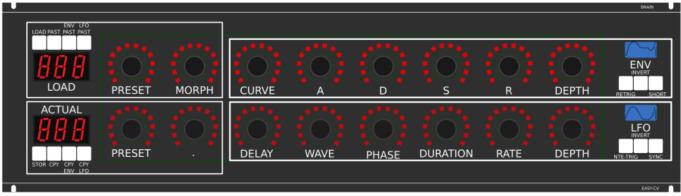
MORPH?:

-The Upper 7 Segment LED- Display: is the **LOAD Display** indicate the new Program with ENV+LFO -The downer7 Segment LED- Dsipaly: is the **STORE Display** it indicates also the current Program with ENV+LFO

-with morph you crossfade between both Presets (be carefull, first Store the current Preset **Paste** & **Copy** do their job @ the whole PROGRAM Memory

ENV-PASTE & **ENV-COPY** do their job @ the selected Envelope > (ENV-Voice selection is done by the breakout Modules) ... LFO..same

Midi-Channel Note NR or Number of Envelope is a real programmer job (C), with usb-upload from computer this is a individual device, and once set, it has to play > and it just should do LFOs and Envelopes Fixed routed, no generic, special > in my case for a filterbank.



THE **RIGHT** SIDE of the BRAIN > LFO + ENV Settings (one Voice): ADSR with:

CURVE Paremter which give exponentially to it (no straight lines While Fall and Rise)

Short: just shorten the Maximal lenght of a Envelope, haveing more Feeling on Encoders should change Scope Display also...

LFO: get synced with Midi, and there is a retrigger by Notes...

Phase: offsets the start-Phase

Delay: simple delay (nte-Trig)

Rate: clear from 8 wholes to 128th or so

Wave: access to the Waveforms

Duration: interpret Midisync in trippled, whole notes or whatever...

DEPTH: is the maximal Value of FALL and RISE and SUSTAIN, i know i loose resolution with this...but i have to have a memory filterbank,...doing depth instead with Potentiometers on Filtermodules... would give no memory...

BreakOut

1. Discharged UserInterface for the Brain in "Island mode" (Scopes + Digital-CV-Amount)

2. CV-Breakout EuroModule to be located near the CV-Destination (example: a Filter).

2 Waveforms (ENV+LFO) are mixed together softwareside

that bring 2 advanteges:

1.save one CV-Output

2. the Amplitude of each Waveform is saved in the patch, so the CV-Amount to a Filter is saved in the Patch

That bring 2 disadvanteges:

1.LFO or ENV cant get patched to individual destination

2.the Resulution gets lower 2 very low, and the code has to be adptet much... or have to be made from scratch Because I use the device for a Memory-Filterbox (VCF+VCA), i am ok with the pros and cons, so i call it EASY-CV



Envelope Scope: show the ENV-Waveform

or the Mixed-CV-Output-Waveform (when Switch is in LFO Mode) and show the Envelope-Amount with a BAR or as numeric Value? **MIXED CV Plug:** CV-Output > Mixed Waveform ENV+LFO **Switch @ ENV:**

- 1. Depth-Encoder change ENV Amount of the CV-MIX
- 2. ENV Scope will show ENV Wave
- 3. LFO Scope will Show CV-Mix

Switch @ LFO: visa versa ENV

Press the Encoders built in **ENCODER-BUTTON**:

will switch the BRAIN-A-D-S-R and L-F-O ENCODER to the Page for THIS Module...

workflow, see what you have with a Scope, over a filter, and edit exact this selected CV on the brain in full detail...

VCA-VCF

THE VCA and the VCF are controlled with each one CV - each CV has a LFO and a ENVELOPE digitaly mixed... fixed in routing.



basicly a simple VCA (MS20Like) that drives the input of a Audio transformator 1:3 which is a Neutrik NTE10-3 ($9 \in$)

this "Tesla" Hi Gain - goes now thru the Post-VCA-Gain-Potentiometer - which then overdrives the 303 Filter (my prototype was a Freebase 383)

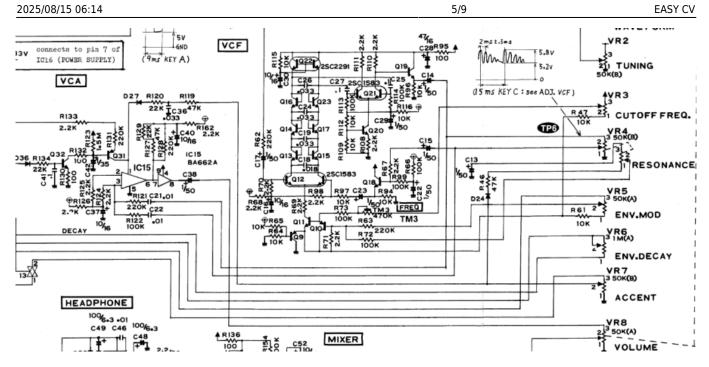
sound now goes to the Post-VCF-Gain-Potentiometer

now sound goes into a OP-Amp - to have the change for a light overdrive

From this point a EFX-Send Potentiometer send the Processed Signal to a extra Output (EFX-Send) With the +DRY-Switch, we switch the orginal Signal additional to this EFX-Send-Potentiometer (or not) Parallel to the EFX-Send Potentiometer is the DRY/WET Potentiometer it Pan between Orginal and Filtered Sound.

after DRY/WET come the Volume-knob and the Audio outs...

Original Schematics 303 - VCA-VCF



Mod Sources



Style with standart components...

In order to not use those overprized MATCHED-PAIR-TRANSISTORS (over 2€ on the cheapest place) i have to use standart Transistors and make a VBE-MATCH on my own, i have already a PCB from here - to measure the transistors with a Multimeter: https://midisizer.com/other/vbe-matching/

Example for a Filterbank

Here are 8Envelopes 4xfor VCF 4xfor VCA... in fact there could be used more then this for example 8xVCF and 8xVCA...since the BREAK-OUT-Modules are Modular, and they share the same "Main-UI"...the only limiting factor is the CODE...i am not a C-Guru, and maybe i will still have timing problems with 8x CV-Outs...we will see.

				BRAIN
ENV LED LOAD PAST PAST				
nnn :	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			ENV
				INVERT
LOAD PRESET MORI	PH CURVE /	A D	S R [DEPTH RETRIG SHORT
ACTUAL	1. 1. 1. 1.			
STOR CPY CPY PRESET .	DELAY WA	VE PHASE DUP	RATION RATE [DEPTH NTE-TRIG SYNC
ENV LFO				EASYCV
THE BRAIN - LEFT SIDE	BREAKOUT U BREAKOUT U	U BREAKOUT U BREAKOUT U	BREAKDUT	U BREAKOUT U BREAKOUT U
Preset-Management: Save and Load the "SONG" or call it "BANK" The Song is loadet by ProgramChange	-			
OR With the LOAD-PRESET-Encoder BUT it with not be heard you must first press LOAD	ENV ENV	ENV ENV	ENV ENV	ENV ENV
or Morph to it slowly with MORPH-Encoder MORPH? You have the NEW-ENV+LFO (# LDAD	LFO LFO	LFO LFO	LFO LFO	LFO LFO
Now have the current ERV +LFO @ ACTUAL with morph you crussfade between both				
Paste, and Copy to their job (); the full BANK ENVIRYTE ENVICORY do that: job (); the selected Envirope (parention is done by the brankout Modules)				
Midi-Channel Note NR or Number of Envelope is	DEPTH DEPTH	рертн рертн	DEPTH DEPTH	рертн рертн
a real programmer job, with usb-upload from computer	MIXED ENV MIXED ENV	MIXED ENV MIXED ENV	MIXED ENV MIXED ENV	MIXED ENV MIXED ENV
and it just should do LEOs and Envelopes Fixed routed, no generic, special	a uo av uo	av 170 av 170	ev ufo cv ufo	
m my case for a filterbank.	EASY-CV EASY-CV EASY-CV	LASYCV VCA-VELIN	EASTER UCANVELIP	
	L IN R CV LOUTR	L IN R CV LOUT R	L IN R CV LOUT R	L IN R CV LOUTR
MIE-CV-Brain & UI-MAIN (Scopes + Digital-CV-Amount)	DRIVE EFX.SEND	AMP CUT DRIVE EFX-SEND +DRY	AMP CUT DRIVE EFX-SEND +DRY	AMP CUT
sted near the EV Destination (e.g. a Filter). ugether softwareside	DRVE +DRV			
s saved in the patch, so the CV-Amount to a Filter is saved in the Patch	POST-VCA EFX -DRY	POST-VCA EFX -DRY	POST-VCA EFX -DRY	POST-VCA EFX -DRY
wand the code has to be addrest much or have to be made from scratch ry-Filterbox (VCF+VCA), I am ok with the pros and cons, so I call it Simple-CV				DRIVE
	POST-VCF DRY/WET VOLUME	POST-VCF DRY/WET VOLUME	POST-VCF DRY/WET VOLUME	POST-VCF DRY/WET VOLUME
	VCF	VCF	VCF	VCF
				RESONANCE CUTOFF

I will use it to filter:

2xGuitar-Loopstations 1xGuitar 1xPercussion-Master

General Design

The panel size is 3U, Eurorack compliant

FrontPanel

PCBs

The Analog Circuits (VCF+VCA) get sandwitch as normal (not90° angeled)

3D View of Sandwitches



BRAIN + BREAKOUT

- Jacks 3.5mm @ Thonk
- SPDT Switch ON-OFF-ON @ Rs-components

Value	Туре	Qty
3.5mm Jack	Vertical PCB-Mount	13
Switch	SPDT Vertical PCB-Mount ON-OFF-ON	1



Pots / Knobs

- Alps RK11K Series
- Alpha Pots @ Thonk
- Knobs Suppliers
- Fix Me!

need special 4gang 50KB potentiometers for a STEREO Resonance

(stereo filter, one UI)

- Fix Me!
- FIX Me!

need special 2gang xxKB (50?) potis for EFX Send Mix Stereo

need special 4gang xxKB (50?) potis for a Stereo DRY/WET Mix

. 🥆 Fix Me! 💡

need special 2gang 50KA potis for CUT-OFF Stereo

Fix Me! need special 2gang Post Transformator Potentiometer (Value have to look in my prototype which is used)

Value	Туре	Qty
5K	Linear	x
10K	Linear	x
50K	Linear	x
50K	Logarithmic	x
100K	Linear	x
1M	Linear	x
2M?	Linear	x
Knobs	Soft/Plastic/Alu	x

2. Analog Parts Listing

VCA-VCF-Board



3.Footprint Making in KiCAD

- ALPS Pots
- Alpha Pots
- 3,5mm Jack
- Switch
- Momentary Switch
- 7 Segment LED Display
- OLED DIsplay
- Rotary Encoder



4. Schematics in KiCAD



5.PCB Making In Kicad

PCB Making Order

- BRAIN PCBs:

a.Left-Brain

b.Right-Brain

- LRE8x2CS is a generic PCB which i already have (fairlightiiś)
- BREAKOUT PCBs (maybe have to sandwitch because of shiftregisters and less space)
- FILTER PCBs (have to sandwitch)

From: http://www.midibox.org/dokuwiki/ - **MIDIbox**

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