# 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.

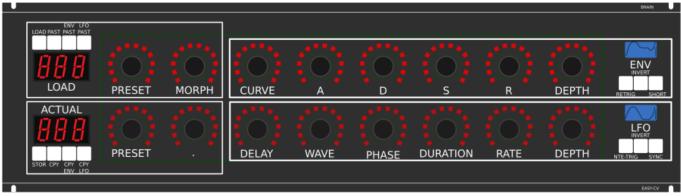
MORPH?:

-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 integer 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)

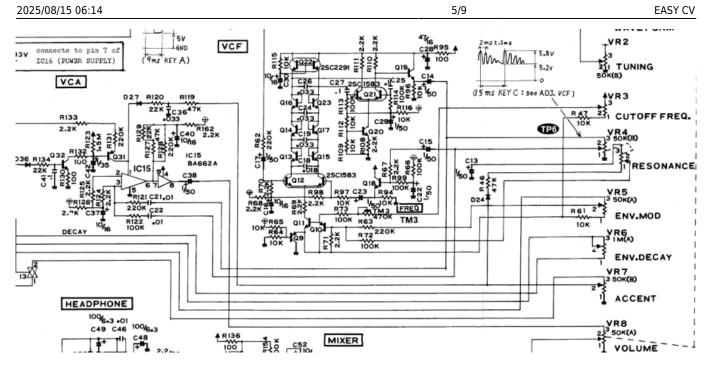
sound now goes to the Post-VCF-Gain-Potentiometer

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**

🔧 Fix Me!

Style with standart components...

# **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.

|  |                                    |                                    |                                    | BNAIN                              |
|--|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| ENV LFO<br>LOAD PAST PAST  | 7                                  |                                    |                                    |                                    |
| nnn titt til   | 1. Star 1.                         |                                    |                                    | ENV                                |
|  |                                    |                                    |                                    |                                    |
| LOAD PRESET MORP   | H CURVE /                          | A D                                | S R Î                              | DEPTH RETRIG SHORT                 |
| ACTUAL   |                                    |                                    |                                    | LFO                                |
|  |                                    |                                    |                                    | INVERT                             |
| STOR CPY CPY CPY ENV LPO   | DELAY WA                           | VE PHASE DUI                       | RATION RATE [                      | DEPTH NTE-TRIG SYNC                |
|  |                                    |                                    |                                    | EASYLOV                            |
| THE BRAIN - LEFT SIDE  | U BREAKOUT U BREAKOUT U            | U BREAKOUT U U BREAKDUT U          | U BREAKOUT U U BREAKOUT U          | U BREAKOUT U BREAKOUT U            |
| Preset-Management:<br>Save and Load the "SONC" or call it "BANK"<br>The Song Is loadet by ProgramChange  |                                    |                                    | Terms                              |                                    |
| OR<br>With the LGAD-PRESET-Encoder<br>BUT is will not be heard   | ENV ENV                            | ENV ENV                            | ENV ENV                            | ENV ENV                            |
| you must first press LOAD<br>or Morph to it slowly with MORPH-Encoder<br>MORPHT:   | LFO LFO                            | LFO LFO                            | LFO LFO                            | LFO LFO                            |
| Spu have the NEW+ENV+LFO (# LDAD<br>Spu have the current ENV+LFO @ ACTUAL<br>with morph you crossfade between both   | $\sim$                             |                                    |                                    |                                    |
| Paste, and Capy do their job (); the full BANK<br>ENV-MSTE ENV-COPY do their job (); the selected Envelope<br>(selection is done by the brankout Modules)        |                                    |                                    |                                    |                                    |
| Midi-Channel Note NR or Number of Envelope is<br>a real programmer job, with usb-upload from computer  | DEPTH DEPTH<br>MIXED ENV MIXED ENV |
| <ul> <li>this is a individual device, and once set, it has to play<br/>and it just chould do LFOs and Envelopes<br/>fixed routed, no generic, special</li> </ul> |                                    |                                    |                                    |                                    |
| m my case for a filterbank.  | EAST-CV CASUCUT                    | TASKOV CASKOV                      | EAST-CV EAST-CV                    |                                    |
|  | L IN R CV LOUT R                   |
| MPLE-CV-Brain & UI-MAIN (Scopes + Digital CV-Amount)<br>ated near the CV-Destination (e.g. a Filter).  | DRIVE EFX-SEND                     | DRIVE EFX-SEND                     | DRIVE EFX-SEND<br>+DRV             | DRIVE EFX-SEND<br>+DRY             |
| lagether softwareside  |                                    |                                    |                                    |                                    |
| s saved in the patch, so the CV-Amount to a Filter is saved in the Patch<br>Initiaval destination  | POST-VCA EFX -DRY<br>DRIVE         | POST-VCA EFX -DRY                  | POST-VCA EFX -URY                  | POST-VCA EFX -DRY                  |
| w. and the code has to be addet much or have to be made from scrutch<br>ny-Fitterbox (VCF+VCA), i am or with the pros and cons, so i call it Simple-CV           | POST-VCF DRY/WET VOLUME            |                                    |                                    |                                    |
|  |                                    |                                    |                                    |                                    |
|  |                                    | GREATFULLTERX                      | GREATFILLITEKX                     | GREATFULITEKE                      |

### 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 Mei

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)

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