FREQUENCY CENTRAL

Build documentation for:

TRANS EUROPA

Powered by Electric Druid code exclusive to Frequency Central

Trans Europa is a CV processor/generator module with a number of unique features:

- Octave switching over 9 octaves
- Voltage controlled octave switching, CV input is bipolar +/-5V
- Semitone transposition over 1 octave
- Voltage controlled semitone transposition, CV input is bipolar +/-5V
- 8 Modes (see below)
- Glide feature, which can be applied either manually or by external gate.
- CV thru, you can patch a 1V/oct voltage source in Trans Europa's Input, it will be replicated at the Output, with the benefit that all Trans Europa's features can be applied.

Although both CV inputs are bipolar +/-5V, they will also operate well from 0V to 5V CV sources, courtesy of the cunning way in which the input data is interpreted by Trans Europa. CV inputs are not 1V/oct, as Trans Europa was designed as a transposer rather than a quantiser (see 'Backstory'). For example, in Mode 1 (Semitones), 0V to +5V CV input will allow transpositions over 13 semitones, -5V to +5V will allow transpositions over 25 semitones, in both cases 0V corresponds to no transposition.

8 Modes are available:

- Semitones
- Minor 7^{th}
- Major 7^{th}
- Rick's Chord
- First Fourth Fifth
- Diminished
- Sustained A
- Sustained B

By applying control voltages to the Transpose CV input, arpeggios and tuned pseudo-random sequences can be achieved based upon the Mode selected, further enhancements can then be made by modulating the Octave CV input. Suitable input devices are wheels, joysticks, touch pads, FSRs, ribbons, LFOs, ADSRs, S/H etc.

Trans Europa can be used in a number of different ways:

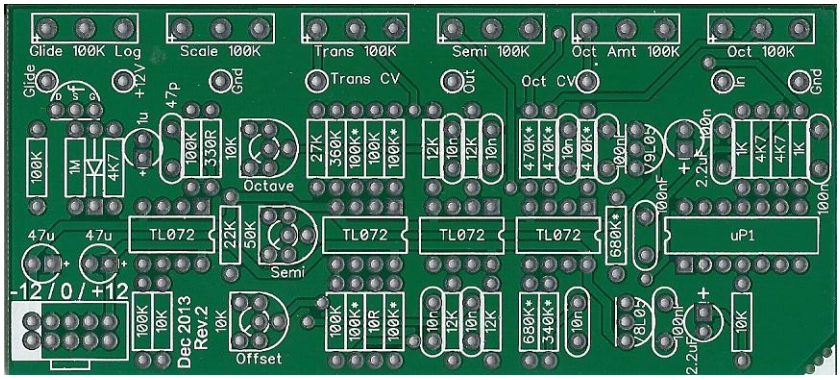
1. As a simple CV source for quick on-the-fly octave and semitone transposition, using the Octave and Transpose knobs only.
2. As a complex CV source for octave and semitone transposition by applying CVs to the Octave and Transpose CV inputs, in this way many interesting pseudo sequences and arpeggios can be created.
3. In conjunction with 1V/oct source, using Trans Europa to transpose the octave and semitone of the 1V/oct source. Additionally, the 1V/oct source can be used to transpose pseudo sequences and arpeggios set up in point #2 (above).

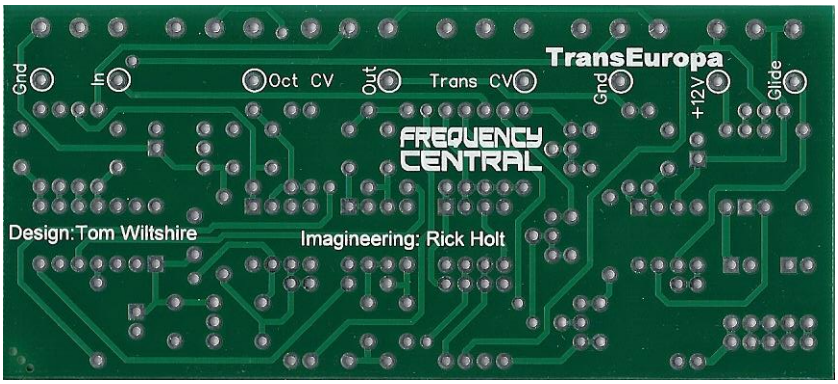
Backstory

The original idea for Trans Europa was to provide a simple octave switch for VCOs which lacked this feature. We then decided that it would also be nice to include semitone switching too. It soon became apparent that working with PIC rather than in the analogue domain would provide for both features plus a lot more. PIC gave us the ability to include CV control of both octaves and semitones. It also presented the opportunity to include additional transposition modes, which added arpeggiation-like abilities to the feature set.

We added 1V/oct CV 'thru' so you can send a 1V/oct source such as a keyboard through Trans Europa and have the ability to transpose it both manually and under CV modulation. Finally, as Trans Europa developed into a CV processor, we decided to add gated glide to round out it's feature set.

Early on in development, we decided that Trans Europa was to be a dedicated transposer, rather than a quantiser, by making this decision we were able to make the Transpose CV input far more manageable and useable, specific pseudo sequences and arpeggios are far more easily dialled in.





Notes on PCB

f – FET 2N5485
uP1 – Trans Europa PIC
*resistors – see BOM below
Pin 1 of all ICs designated by square pad

Bill of Materials

10R x 1 100R[1] x 1 (LED resistor) 330R x 1 1K x 2 4K7 x 3 10K x 2 12K x 4 22K x 1 27K x 1 100K x 5 100K[2] (0.1%) x 4 340K[3] x 1 360K[4] x 1 470K[5] x 3 560K[4] x 1 680K[3] x 4 1M[4] x 2	47pF ceramic x 1 10nF polyester film x 6 100nF polyester film x 5 1uF electrolytic x 1 2.2uF electrolytic x 2 47uF electrolytic x 2	uP1/Trans Europa PIC TL072 x 3 2N5485 x 1 78L05 x 1 79L05 x 1 1N4148 x 1 5mm Green LED x 1 Bezel for above x 1	A100K Alpha 16mm x 1 (Glide pot) B100K Alpha 16mm x 5 10K[6] trimmer x 2 50K[6] trimmer x 1

Please observe correct polarity of the electrolytic caps, voltage regulators, transistor, ICs etc!

Please particularly note that uP1/Trans Europa PIC is to be inserted the opposite way around to the TL072s.

Superscripts - Notes on the Bill of Materials

1. 100R resistor: mounted between LED anode (longer leg) and Glide socket input lug.

2. 100K (0.1%) x 4: These four resistors form part of the CV thru circuit and can be identified on the PCB by a * after the resistor value. **For optimum tracking buy 0.1% resistors.** Or you could get away with using standard 1% resistors as long as you match them, they don't have to be matched to 100K, they could all be 99K (for example), as long as they are matched. Best way to match them yourself is to go through a batch and test them with a DMM.

3. 340K and 680K: These form part of the Transpose CV input circuit, and should be matched 1% resistors. Easiest thing to do is find four matched 680K resistors, then use two of them in parallel to make a 340K. These resistors can be identified on the PCB by a * after the resistor value.

4. 360K, 560K and 1M: Yes 360K is a weird value that you may have trouble sourcing. Easiest thing to do is instead use a 560K and a 1M in parallel, which will give you ~358K, that's close enough. This resistors can be identified on the PCB by a * after the resistor value.

5. 470K x 3: These form part of the Octave CV input circuit, and should be matched 1% resistors. They don't have to be matched to 470K, they could all be 468K (for example), as long as they are matched. These resistors can be identified on the PCB by a * after the resistor value

6. 10K and 50K trimmers: options are given on the PCB to use either single turn or multi-turn. There are various footprint options available depending on what you choose. **I highly recommend using multi-turn.**

Calibration procedure

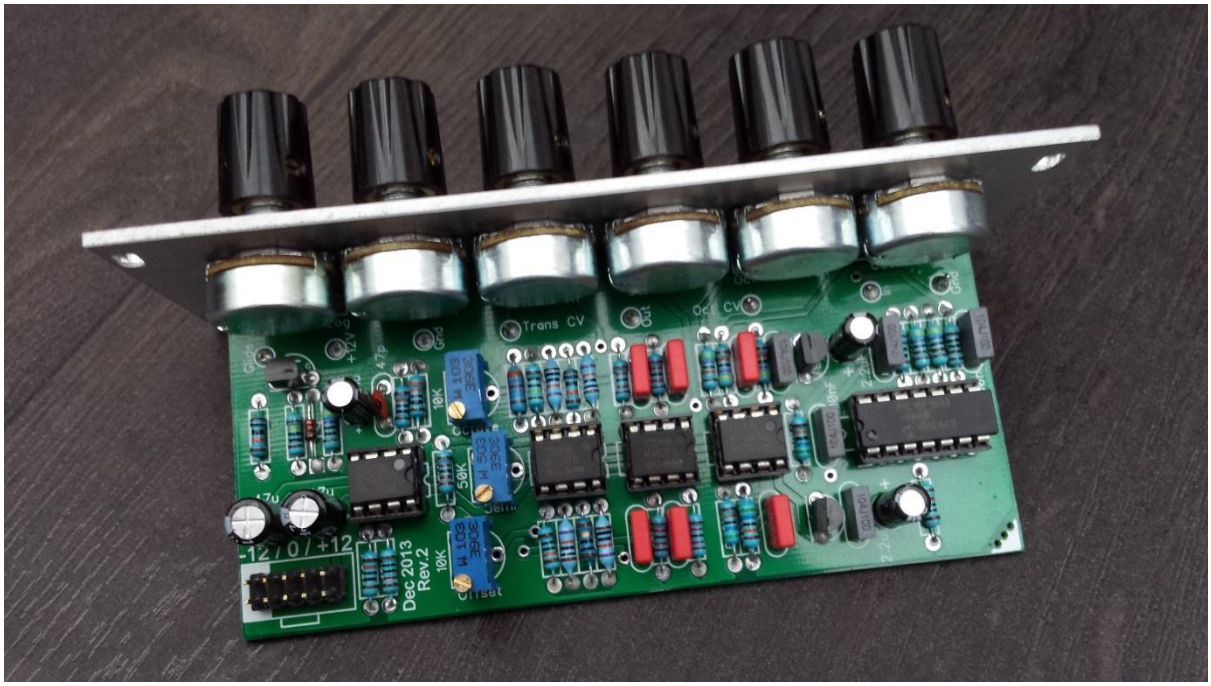
1. After building the module, power it up. The Glide LED should light up. Patch the output from Trans Europa into the 1V/oct input of a VCO. Wiggle the Octave knob – you should hear the VCO respond accordingly, we'll trim in the octaves a little later. Now wiggle the Transpose knob, you should hear the VCO respond accordingly, we'll trim this in a little later.

2. Set the knobs like this:
   Octave: 0
   Octave CV: 0
   Transpose: 0
   Transpose CV: 0
   Mode: 0
   Glide: 0

3. **Setting up the octaves.** Hook up a DMM (set to read voltage) to Trans Europa's output. At this stage we are not expecting the output to read exactly 0V, we will trim in the offset later. Note the voltage that the DMM shows. Now move the Octave knob to +1. Note the voltage. Using the Octave trimmer, trim so that when moving between 0 and +1 on the Octave knob, the DMM shows exactly 1V of difference. Now check the +2 position, the DMM should now show +2V difference between the 0 position and the +2 position. It will take a bit of going back and forth to get this just right, but is worth the effort. When you're happy, set the Octave knob back to 0.

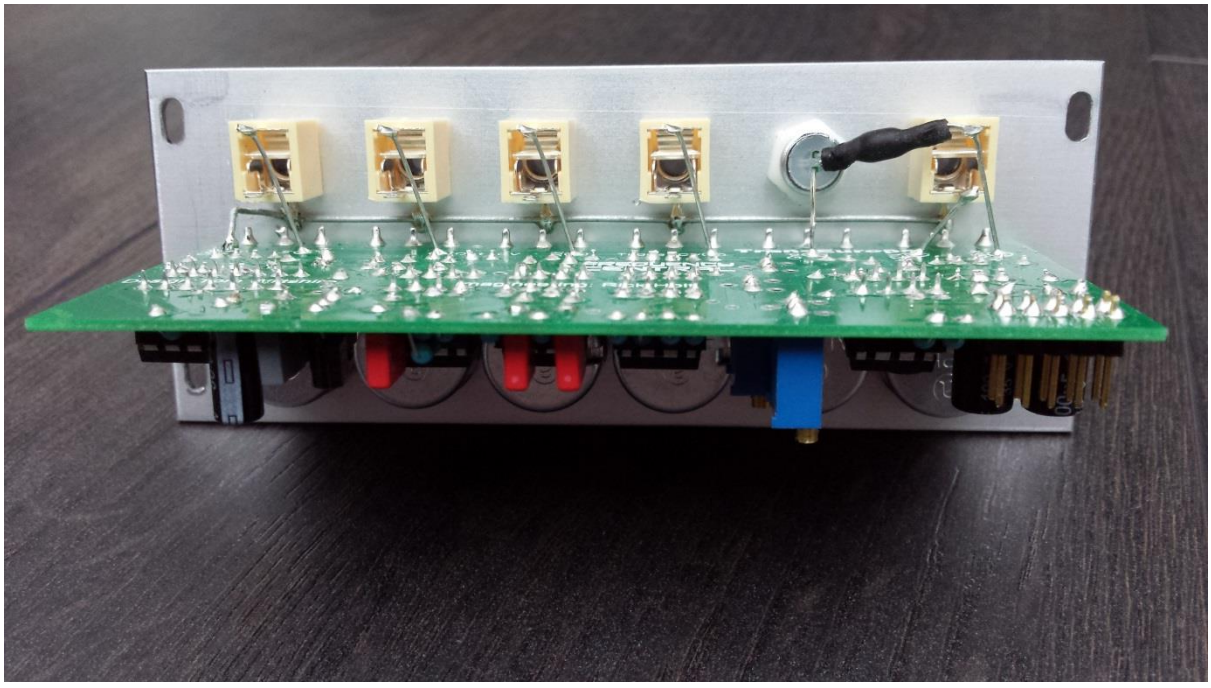
4. **Setting up the semitones.** The Transpose knob should be set at 0. Note the voltage that the DMM shows - at this stage we are not expecting the output to read exactly 0V, we will trim in the offset later. Now move the Transpose knob to 12. Note the voltage. Using the Octave trimmer, trim so that when moving between 0 and 12 on the Transpose knob, the DMM shows exactly 1V of difference. Again, it will take a bit of going back and forth to get this just right, but is worth the effort. When you're happy, set the Tranpose knob back to 0.

5. **Setting up the offset.** Both Octave and Transpose knobs should be set to 0. Adjust the Offset trimmer until the DMM reads 0V. You're done!



Photos show:

- Ground wire which joins all socket ground lugs and terminates at ground pad on the left of the PCB.
- In, Oct CV, Out, Trans CV, Gnd pad for LED cathode, +12V to Glide socket normalled lug, Glide input.
- LED anode connected to Glide input socket via 100R resistor (heatshrinked).



RDH 19/01/14

http://www.frequencycentral.co.uk/