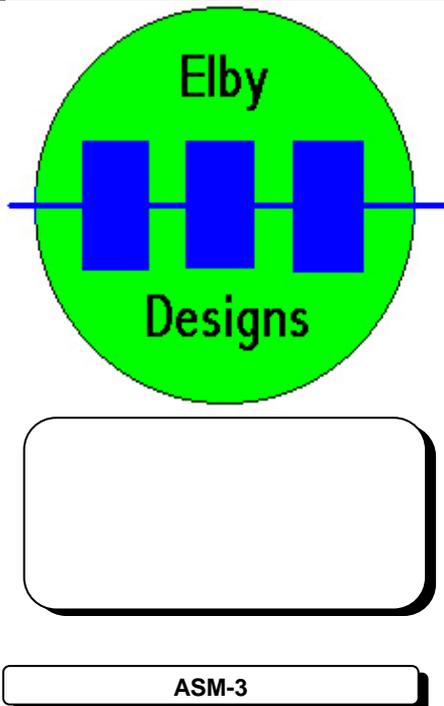# Elby Designs Newsletter

ASM-3

A number of customers have been enquiring about the ASM-2 and its successor, the ASM-3.

About a year ago the stocks of the ASM-2 where at a low and it was decided to take the opportunity to update the pcb to rectify a few errors in both the design and the manufacture of the board. Whilst discussing this with some people it became apparent that there was a desire to further improve the design and consequently, what started as a 1 or 2 month project has turned in to a 14 month saga.

I can say now that the design of the ASM-3 has pretty well been locked down and the design of the pcbs is in progress. During the early stages of laying out the pcb it became apparent that the ASM-3 was going to require a MONSTER pcb and looking at costing and other practical implications, it became quickly obvious that a re-think of the boards was needed. I have eventually settled on a 2 board solution. The first board is a UTILITY Board while the second is a VOICE Board.

The VOICE Board comprises the following modules:-

2 x VCO
2 x Sub-Harmonic Generators
2 x VCF
2 x VCA
2 x VCLFO
1 x ADSR
1 x AD/AR
1 x LAG Generator
2 x 4-channel Mixers
1 x Ring Modulator
1 x Velocitizer.

The keen eyed among you may notice that this configuration is not too dissimilar to the ASM-2 with omission of 2modules, namely the Noise Generator and the Sample & Hold.

Most, if not all, of these modules have been improved over their ASM-2 counterparts plus we have gained some extra features and functionality as summarized below:-

VCO
The VCOs retain the original ASM VCO core but add additional and improved wave shaping circuitry. An addition to the original sine, square, triangle and sawtooth (SLOPE) outputs, the ASM-3 VCOs add a RAMP (inverted sawtooth) and an animated sawtooth output to the range.

For improved stability, each VCO has its own +/-10V reference circuit

Further, each VCO includes its own VCA that allows a mix of all six waveforms to be amplitude modulated.

Sub-Harmonic Generators
Two sub-harmonic Generators have been added to the design. Each generator provides 4 stages of division of the input signal which are then presented to a 4-channel mixer to allow complex sub-mixes to be made. Thus each generator has 5 outputs in total; one from each of the 4 divider nodes plus a mixed output

Each of the 4 sub outputs can be switched out of the mixer and either ignored are used as a direct output. Similarly, any ignored/direct output jack can be used to feed an external signal IN TO the 4-channel mixer

VCF1 (SVF)
The State-Variable Filter of the ASM-2 is only changed by replacing each CA3080 of the previous design with ½ an LM13700.

VCF2 (Ladder)
The output stage of the Ladder Filter from the ASM-2 has been modified to correct a phasing problem that allows VCF2 to generate really deep, ,low frequency filtering.

VCA
The CA3080-based VCA's of the ASM-2 have been replaced with an LM13700 design based on one presented by Jurgen Bergfors.

VCLFO1
This module has been re-designed and now uses the ASM-1 VCO core at the heart of its design. With the new design comes an extended frequency range, superior tracking capabilities, logarithmic and linear modulation plus SYNC control. In addition, the module outputs sawtooth, square (with pulse-width modulation), triangle and sine wave shapes. In addition, theis VCLFO includes a VCA that allows any one of the 4 waveforms to be amplitude modulated.

VCLFO2
The 2nd VCLFO uses the original ASM-2 design but adds a RANGE control as well as +ve sawtooth (RAMP) and –ve sawtooth (SLOPE) outputs to the original triangle and square outputs. The voltage control section has been tweaked and

now provides a greater range of control as well as adding a RESET function.

ADSR
The main ADSR has been expanded with the inclusion of a DSR Phase output. This output goes when the ADSR moves from the ATTACK phase to the Decay-Sustain-Release phase and can be used to trigger a second envelope generator.
Additional LEDs have been added to show `ENVELOPE LEVEL' and `DSR PHASE'.

AD/AR
The 2nd ADSR has been replaced with a simpler AD/AR/LFO circuit

LAG Generator
The ASM-2 GLIDE Generator has been replaced by a LAG Generator based on a design by Harry Bissell. The LAG Generator gives you individual control of the rise and fall sections of the input along with a variable lin/log law.

Ring Modulator
The Ring Modulator remains unchanged from the ASM-2 version.

Mixer
Two 4-channel Mixers have been added to the module to assist with generating more complex wave shapes from the VCOs or for any other mixing application that is desired.
Both mixers have an OVERLOAD status LED to ensure that the mixed output (normal and inverted mixes provided) does not exceed acceptable levels for subsequent modules.

Velocitizer
Fundamentally added to assist with breath controller applications, the Velocitizer provides velocity control of the ADSR.

The final size of this pcb is still undefined but it is expected to be a little bigger than the ASM-2. For those on a budget or wishing a simpler system, the ASM3-VOICE Board can be used on its own. In this mode it will be similar to an ASM-2 although a NOISE and S&H section will need to be added.

The UTILITY Board comprises the following modules:-

1 x Analogue Noise Generator
1 x Sample & Hold
1 x Pan/Crossfader
1 x Stereo Headphone Amplifier
2 x External Input Buffer/Amplifiers
1 x Envelope Follower
1 x Reverb Module
1 x A-440Hz Reference Generator
1 x Seekwencer (sequencer)
1 x 3-stage Filter Bank
1 x PolyDAC 4-channel MIDI-CV.

As it's name might suggest, this board provides all the utility functions of the synth and/or modules that only 1 of is required.

NOISE Generator
The NOISE Generator products the following outputs:-
White, Pink, Coloured (Red and Blue individually mixable) and a RANDOM output with variable rate and bi-colour status LED.

The WHITE Noise Generator is a digital design taken from one proposed by Scott Gravenhorst which can be clocked from an internal clock source or an external source allowing for variable clock rates.

SAMPLE & HOLD
The Sample & Hold Module is taken from a high-quality design by Ian Fritz that has been used in a number of Panther modules released for the euro-rack modular market.

The S&H Module includes an analogue white noise generator whose output is available for driving other circuits in the synth.

PAN/Crossfader
The Pan/Crossfader provides a facility for creating pseudo-stereo affects. This module also includes 2 VCA's

HEADPHONE Amplifier
The Headphone Amplifier comprises 2 output amplifiers from a design by Rod Elliott and provide around 2Watts of output in to loads from 8Ohm to 32Ohm.

Across-feed switch is included that allows a `'mix' of the left and right channels.

External Input Buffer/Amplifier
The UTILITY Board includes 2 external input circuits allowing the ASM-3 to be used with a variety of external sound sources.

Each section includes 2 GATE processors each with adjustable thresholds. One of the processors can be switched between a GATE output or a TRIGGER output and both include an LED status indicator.

Envelope Follower
The Envelope Follower uses another Harry Bissel design that provides a fast-response, ,low-noise output envelope that follows the contour of the input signal.

Reverb Module
The Reverb Module is based on a design by Rod Elliot and can easily be adjusted to work with a range of commercially available spring-line tanks.

In addition to a Wet/Dry mixer, the module also includes a 10-stage LED drive monitor.

Sequencer (Seekwencer)
The Seekwencer is still undergoing final design tweaking. It started out as a simple custom waveshaper but has evolved in to a simple but novel sequencer. It is not a fully fledged sequencer (hence its name Seekwencer) but provides a lot of the basic functionality that might be needed.

The Seekwencer is a 2x8 stage sequencer with A/B/Fill-In capability to provide an extended range of functionality.

The Seekwencer an be driven from its internal clock or from any suitable external source as well as be manually stepped.

A440Hz Reference Generator
This generator produces a smoothed output at 439.45Hz, useful when setting up the synth. An ON/OFF switch allows the generator to be `killed' to prevent any possibility of noise break-through from the divider/oscillator.

3-Stage Filter Bank
The 3-stage Filter bank provides an additional filter for the synth with its main purpose being to provide post-filtering of the synth output. Three multi-mode filters are driven from the input with each filters output being fed to a 3-channel mixer for a final mix down.

Each filter can also be switched in and out of the circuit. This arrangement allows for the filters to be used independently.

PolyDAC
The popular PolyDAC 4-channel MIDI-CV design is included on the UTILITY Board.

It is hoped that the UTILITY Board will be of a similar size as the VOICE Board.

A fully configured ASM-3 would comprise 2 x VOICE Boards and 1 x UTILITY Board giving us an impressive system comprising:-

4 x VCO
4 x Sub-Harmonic Generators
4 x VCF
4 x VCA
4 x VCLFO
2 x ADSR
2 x AD/AR
2 x LAG Generator
4 x 4-channel Mixers
2 x Ring Modulator
2 x Velocitizer
1 x Analogue Noise Generator
1 x Sample & Hold
1 x Pan/Crossfader
1 x Stereo Headphone Amplifier
2 x External Input Buffer/Amplifiers
1 x Envelope Follower
1 x Reverb Module
1 x A-440Hz Reference Generator
1 x Seekwencer (sequencer)
1 x 3-stage Filter Bank
1 x PolyDAC 4-channel MIDI-CV.

This configuration could be configured as a dual-channel duophonic synth with each channel having voicing capabilities comparable to an ASM-2, or as a monophonic synth with extensive and rich voicing capabilities.

A single VOICE Board has almost virtually the same features as the original ASM-2 so it is possible to build an ASM-2 system using the ASM-3 VOICE Board although there 1 or 2 circuits missing from this arrangement.

I hope you all will appreciate that a lot of effort has gone in to this design and that you accept my apologies for the long delay in getting this unit back on to the market.

I have a very tight deadline at the moment with the upcoming closure of Elby Designs over the Xmas period but I am trying to get the pcbs completed before then.

ED117 WAVOLVER II

The ED117 Wavolver II has been available for a few weeks and will also be available soon through Analogue Haven.