Polymath
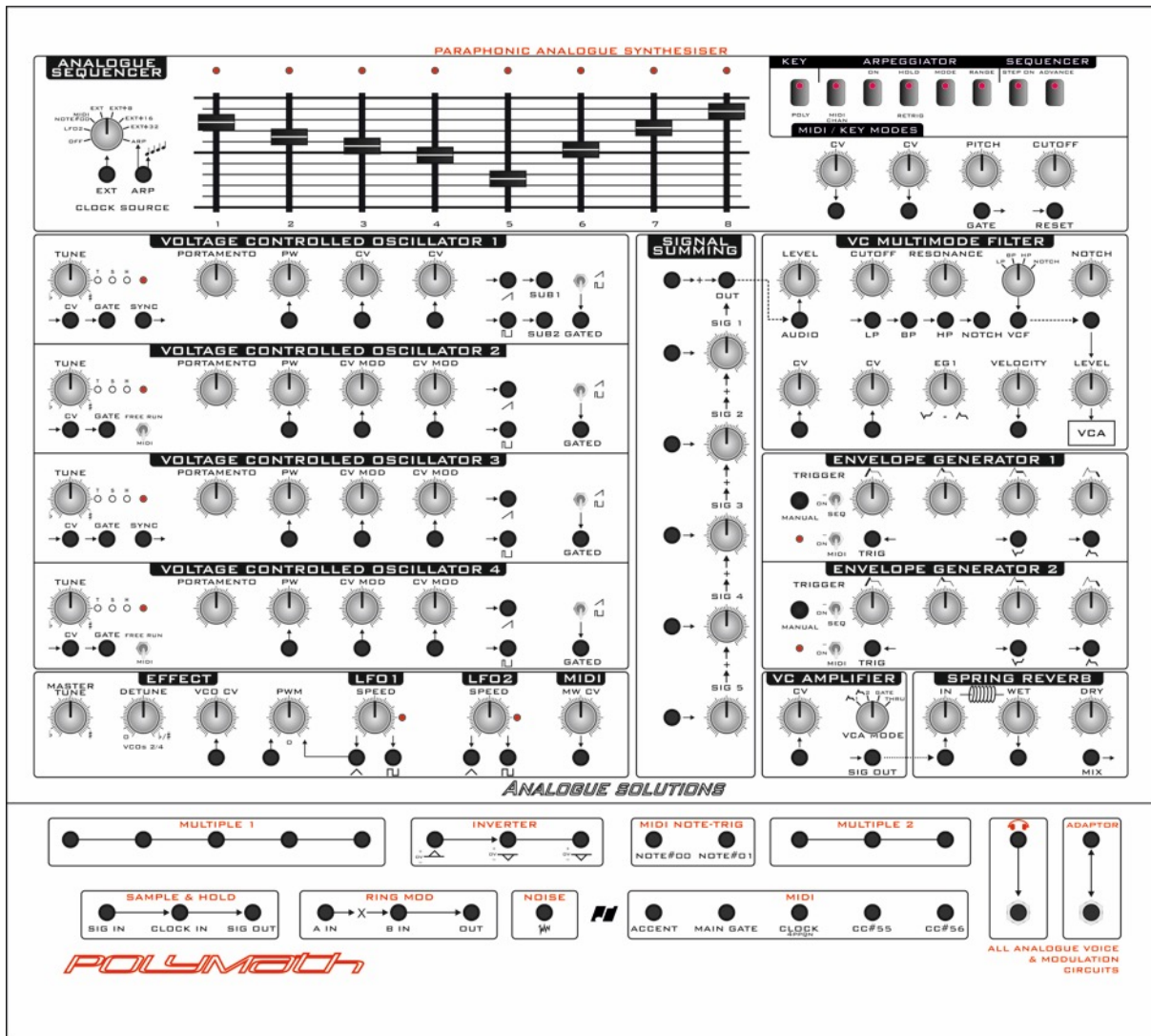
User manual

Analogue Solutions

POLYMATH, WHAT IS IT?

Polymath is a 4 voice paraphonic analogue modular synthesizer, with built in analogue step sequencer, arpeggiator and spring reverb.

The circuit designed is quite literally from the 1970s. It has a very old sound. And isull of character. Analogue synths of the 1970s had that just ever so slightly drifty sound that many would agree is so much more full of life than many of its digitally sanitized analogue synths.

Let's deal with the two main labels in isolation, paraphonic and modular.

Polymath

Paraphonic is half way between a traditional monophonic and full polyphonic synth (though closer to the second).

Up to four note chords can be played, since it has four separate oscillators. However, it only has one filter and one amplifier section. Polyphonic synths usually have a filter/vca/envelope per voice/oscillator.

Traditionally this kind of polyphony was used to save money, since instead of four filters, four envelopes and four amplifiers (for a four note polyphonic synth), you only need one set share between the four VCOs. It would also save space as a much smaller PCB can be used and ultimately the reason was also to save cost.

However, this isn't really the full reason we have chosen this implementation.

It is true money has been saved, but this saving has been used instead to invest in other extra features like the analogue sequencer and spring reverb.

The main reason is we chose paraphonic is we wanted this synth to be mostly modular. A fully patchable polyphonic modular synth is an absolute nightmare and a sea of patch cables. We know, because we have tried this! The patching is significantly reduced using the paraphonic method.

With paraphonic, you get the best of all worlds but still remaining practical. With a small number of patch leads you can set up a simple paraphonic patch and still be able to see the controls through the cables.

Also paraphonic implementation offers its own creative advantages over monophonic or polyphonic systems in the way voices can be cross-patched to cross-modulate. A paraphonic synth also has a different 'sound' to a full polyphonic synth, and being different is always good!

MODULAR

There are several terms like modular and semi-modular that are bandied about in the synth world. There is no standard in their meaning, and often they are used incorrectly (you only have to look at descriptions of old and new synths on forums, manufacturer web sites and places such as ebay). People have different opnions about how patchable a synth must be before it can be called modular.

There are many synths now that have a handful of sockets and get called modular. The term seems to be applied to synths that have 'fixed' circuits and those where sections can be swapped out. Some people think modular means that the circuits like VCOs must be able to

be physically removed, swapped or changed with other circuits, like say, VCF. (For instance a Concussor or Doepfer modular) to be classed as modular.

Some say the synth can be called modular if the circuits are fixed and not swappable, but has a full complement of sockets.

I won't debate which is the correct description of semi-modular or fully modular, but I would say Polymath can safely be classed as modular!

What we can say is that every circuit is completely independent, and can be patched where you want with just a few exceptions. The exceptions are there to reduce the amount of cable patching to a reasonable level. Where there is prepatching within Polymath, it can almost always be 'cancelled' by zeroing a control or flicking a switch.

PREPATCHED

The control voltages from the MIDI-CV converter are prepatched to each VCO, VCF, VCA, EGs. However, in many cases the signal can be switch out via a toggle switch.

In a similar way to above, some other signals are pre-patched to other circuits, but once again can be 'turned off' via a control or toggle switch.

The position of many key sockets has been carefully chosen so that in the most common patches the patch cables can be short, and will not 'hang' over the controls and obscure front panel vision. E.g., the VCF audio output socket is right next to the VCA audio input sockets. Since you'd normally patch these together we placed the sockets right by each other.

Polymath

INTRODUCTION

Congratulations on buying the Polymath synthesiser. Polymath is part of the Analogue Solutions range of analogue music equipment. Polymath is a precision electronic musical instrument. It combines all the often needed music electronic circuitry to make a music synthesiser in one compact module.

No compromise has been made with the construction of Polymath. Cheaper options in parts have not been used;

- Full rugged steel/aluminium case - no plastic mouldings
- Good quality smooth potentiometers, fully sealed against dust
- Good quality knobs with spun aluminium caps
- High grade double-sided circuit board
- High Quality 16bit DAC for MIDI-CV conversion
- Very stable MIDI to CV
- Stable analogue oscillators
- Hand built by humans
- True retro analogue voice and modulation circuits to give an authentic retro sound
- 1970s retro sound
- Real thick quality wood side panels

BRIEF OVERVIEW

Polymath is a self-contained TRUE analogue synthesiser. The voice and modulation circuitry are entirely analogue, using all discrete and op-amp components.

Polymath uses a 12dB per octave multimode filter which has plenty of character.

APPLICATIONS

MONO SYNTHESISER

Polymath is for use any time you need analogue sound effects, fat basses, screaming leads, beeps, tones, zaps, and all the other crazy sounds associated with analogue synthesis. Use in place of your boring digital synth's and DSP soft synth's. In Unison Mode the sound is HUGE!

Polymath

EFFECTS PROCESSOR

Polymath has an audio input socket, so you can feed external sounds into the on-board analogue filters for analogue processing. This sound could come from an audio track on your DAW (for example a vocal track), from a sampler, or even, say a CD player.

POLYSYNTH

In Poly mode you can play 4 note chords!

DRUM SYNTHESISER

It is easy enough to patch this synth up to create all sorts of electronic percussion sounds, including, snares, kicks, hihats, metal sounds.

Polymath

SAFETY INSTRUCTIONS

Please read carefully before using:

Only use the correct power adaptor. 230V (or 115V whatever your country needs). Check rear panel to see what voltage the unit has been set up to take.

Never handle the power cable or the unit with wet hands.

Never excessively bend the adaptor cable or get it trapped or place heavy objects on it. If the adaptor cable becomes damaged, replace the adaptor.

Ensure the unit is disconnected from the mains before moving or cleaning.

Always disconnect the unit from the mains if there is lightning in your area.

Ensure the unit is on a stable surface, and never place heavy objects on top of it.

Never allow young children or animals to operate the unit or adaptor.

Do not use excessive force when using the controls or inserting cables to the connectors.

The unit should not be operated in the rain or near water and should not be exposed to moisture.

If the unit is brought from a cold environment to a warm one, the unit should be left to reach the ambient temperature.

Keep away from heat sources, such as radiators, ovens, heaters etc.

Never allow it to get wet. Do not operate it near water, like pools, sinks, bathrooms etc.

Do not place beverages on or near it.

Never open the case or attempt to make repairs. Refer any servicing to qualified service personnel.

PREVENTING DAMAGE TO OTHER CONNECTED DEVICES;

Polymath has a very high dynamic range. It is capable of produce loud signals of very high and sub-sonic frequencies that could blow inadequate speakers if played too loud. It is recommended that input levels to external equipment (mixers, amp's etc.) are kept low when first connected, and then slowly increased to a useable level.

Polymath

MAINTENANCE INSTRUCTIONS

Any cleaning of the Polymath case should be done with a clean lint-free cloth. DO NOT USE SOLVENTS OR CLEANERS, as this will deteriorate the exterior appearance of the equipment.

MOUNTING

Mounting does not mean 'place on the wall' or 'to make love to' in this instance. Place Polymath soundly on any stable surface so he cannot fall off or over, causing it or yourself injury.

POWER

The unit must be connected to the mains using an earthed and fused IEC power lead. Ensure the voltage indicated on the rear panel matches your mains outlet. It will be factory set to either 115V (USA) or 230V (Europe). There is a Voltage select switch inside, but it is advised this is only changed but a qualified electronics engineer.

SIGNAL TO NOISE / PITCH SCALING

Polymath uses analogue circuits, 1970s designs, and components such as op-amps that were originally designed in the 1970s.

Some background noise and odd little noises and crackles can be heard in some instances if you turn down the VCO levels and really crank up the levels!

This synth was designed using old circuits intentionally to get an old vintage sounds.

With normal use, any background noise will be completely masked and should not prove to be a problem.

To get the best signal to noise ratio do what you should naturally do with any audio/music system that is use the highest signal level you can through out the signal chain.

So keep VCO output levels, Filter input and output, etc at maximum.

Also another odd but desireable consequence of using vintage circuits is you will find the pitch tracking subtley drift a little up the scale. This gives a great warm chorusing effect when using more than one VCO. Again another reason why this synth sounds so much more 'analogue' than some modern analogue contemporary synths.

Polymath

INITIAL TUNING

Once the MIDI and audio connections have been made it may be necessary to tune in the VCOs to the rest of your music set-up. Allow a five minute warm up time.

First set up the controls of Polymath to make a simple sound. It is usually best to leave the VCA at ON. Turn VCO2, 3, & 4 to zero volume so you can only hear VCO1.

Centre all the VCO Tune controls, and also the MASTER TUNE and DETUNE knobs.

Ensure no other CVs affect VCO pitch. For example, ensure that the Step Sequencer pitch CV level is at zero.

Play, say, middle C on the keyboard. Using a digital keyboard as a reference, adjust the Tune of VCO1 until it plays in tune with your reference.

Finally, turn up VCO2 so both VCOs can be heard. Using the tune controls of VCO2, tune it to VCO1.

VCOs 3 and 4 can then also be tuned to VCO1

Polymath

CIRCUIT IN DETAILS

Here follows details on all the sockets and controls, with brief simplified explanations of what the circuits do. We have not gone into technical details on how or exactly what each circuit does but tried to explain each control's function and effect.

We won't describe in full detail what a 'VCO' is, for example. In principle, a Polymath VCO is the same as any other VCO. We have assumed you have at least abasic understanding of analogue synthesis and modulars. There are plenty of resources and tutorials on the web explaining the fundamentals of subtractive analogue synthesis and modular use.

This synth has been designed to be simple and intuitive to use, just like the original analogue synth's of the 70s and 80s. There are no multi-layered menus to work through.

Anyone who has used synthesisers before should be familiar with the terms used and therefore be able to predict their behaviour and how they affect the sound. The best way to learn how to use Polymath is to go straight ahead and play with it. Reading of this manual may only be necessary for finer operational detail.

SOME INITIAL NOTES

To get a useful sound from Polymath, some cable patching will be neccesarry. See the 'Basic Patch' example at the end of this manual as a starting point.

There are a few dashed lines on the front panel 'connecting sockets'. These just suggest some patches you can do with cables.

Polymath

CIRCUITS – MAIN PANEL

VOLTAGE CONTROLLED OSCILLATORS (VCOS)
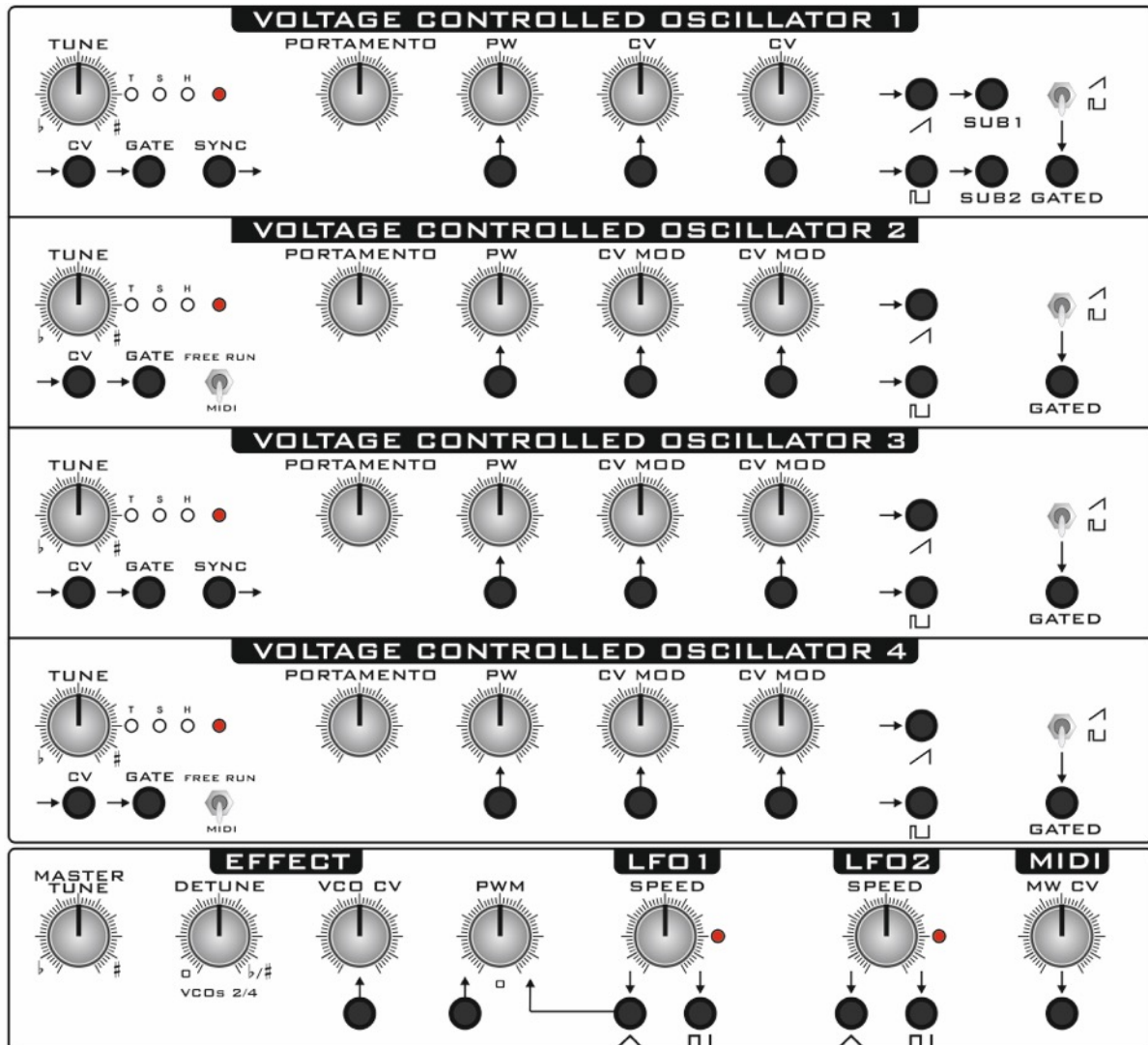
These are circuits that produce the initial sound that is then shaped by the filters and amplifiers. They are what produce the 'notes'.

They produce a continuous sound/waveform. Normally this is used as audio for the filters, but they can also be used as modulation signals.

Polymath

There are four VCOs. They can all be used together to make sound, or just some can be used for sound, and others as modulation sources.

All four VCOs are essentially the same. VCOs 1 and 3 are identical, and 2 and 4 are identical. 1/3 and 2/4 are almost the same. VCOs 1/3 and 2/4 have some slight different controls.

First we will go over what they have in common.

TUNE

Sets the initial Pitch of the VCO.

PORTAMENTO

This control sets the time it takes for the pitch to change from one note to another. When a new voltage is set to change the pitch of the VCO, is will glide from the old note to the new note.

When set to zero, then there is no portamento, and pitch changes will be instantaneous. Gradually turning clockwise increases the time.

PW

The Pulse Width (duty cycle) of the square wave output can be changed. Changing this changes the tone of the Square Wave. Note, this control is not an attenuator for the PW CV socket described below.

PW CV Socket

This is a modulation input socket to control pulse width with an external voltage, or from another circuit within the synth, e.g. Envelope signal.

CV (MODULATION)

There are two input sockets to modulate VCO pitch from a control voltage (CV). CV Input 1 is pre-Portamento (the modulation signal is affected by portamento). CV Input 2 is post-Portamento (the modulation signal is un-affected by portamento).

Use either to modulate the pitch from another voltage such as EG or LFO.

CV Input Sockets

Polymath

These are sockets used to modulate the pitch of the VCO with an external voltage, or from another circuit within the synth, e.g. Envelope signal.

Take the CV from the external source, and patch it into the socket. Use the CV Control knob to set the strength of modulation to the VCO pitch.

Waveform select switch

This switch determines whether Saw or Square is fed to the Voice Gate circuit.

Additional VCO Sockets and switches (vary depending on VCO)

MIDI /Free Run switch (VCOs 2 and 4 only)

When set to MIDI the VCO will respond to MIDI notes.

When set to free run it is unaffected by MIDI notes. This is ideal when using this VCO for effects or modulation.

SYNC In (VCOs 1 and 3 only)

It is possible to reset the waveform using an external signal. Normally audio from another VCO would be patched into here. Then when the pitch of the VCO is changed, interesting new harmonics can be heard.

CV Out

This is the Pitch control voltage from the MIDI Converter for the VCO.

Gate Out

This is the Voice Gate output from the MIDI converter for the VCO.

Saw Out

This is the Sawtooth waveform audio output

Square Out

This is the Square wave/PW waveform audio output.

Voice Gated Out

Polymath

This is the audio output from the Voice Gate circuit, that is controlled by the MIDI converter. The actual waveform is determined with the Wave select switch.

SUB1 Out (VCO1 only)

This is the audio output from the Sub oscillator. This follows the pitch of the main oscillator but at -1 octave.

SUB2 Out (VCO1 only)

This is the audio output from the Sub oscillator. This follows the pitch of the main oscillator but at -2 octave.

Normally a sub-osc is used to beef up the sound, particularly good on bass sounds.

Just patch one of the Sub outputs (Sub1 may be best) into the mixer.

VCF
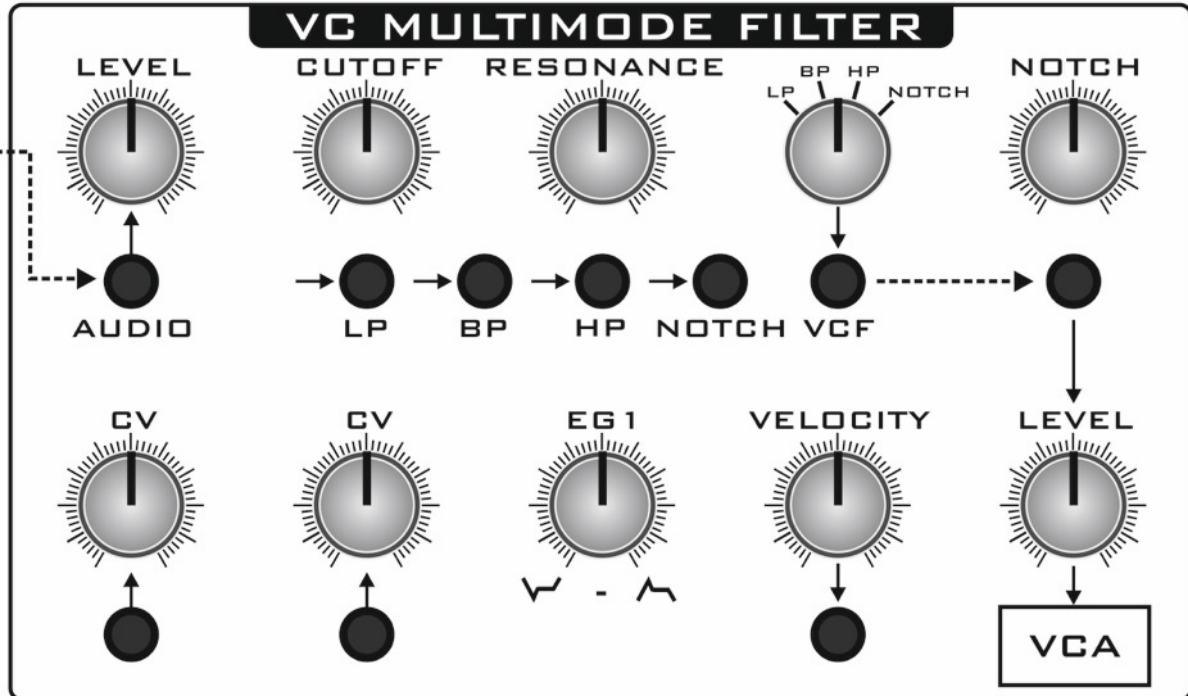
Polymath has a multimode filter similar to that found in the old Oberheim SEM.

It comprises low and high pass filters, and they can be combined to create band and notch filters.

The voltage controlled filter (VCF) is used to change the tone/frequency content of the raw oscillators.

LEVEL

This controls the input level of the audio going into the filter through the AUDIO sockets.

AUDIO socket

This is the audio input to the filter. Typically this would be patched to the Mixer's audio OUT socket.

CUT-OFF

This sets the filter cut-off frequency. It is used to change the tonal characteristics of the audio going through the filter.

RESONANCE

This control increases feedback at the filter cut-off frequency. What some people like the technically refer to as squigyness.

MODE rotary switch

This four position switch selects the type of filter used, and the filtered audio of the selected filter type is sent to the VCF audio out socket.

LP – low pass

BP – band pass

HP – high pass

Notch

Each of these filters also has their own audio output socket, independent of the switch position. See below.

LP / BP / HP / NOTCH sockets

These are audio outputs direct from each filter type.

VCF socket

This is the filtered audio from the filter selected by the MODE switch. Normally patch this to the socket just to the right, which is the VCA Audio input socket.

VCA Audio In socket

This is the audio input to the VCA.

LEVEL

This controls the level of the audio fed into the VCA.

CV control and socket

There are two filter cut-off CV control input sockets. Each has its own attenuator.

These sockets allow the cut-off to be modulated from an external CV.

EG1 modulation control

This controls the amount EG1 modulates the filter cut-off. Turn to the left and an inverted EG1 signal is used, to the right and positive, and centre is zero.

Velocity

Polymath

This controls the amount that MIDI Velocity modulates the filter cut-off. Note, this control does not affect the Velocity CV output by the socket described below.

Velocity VC Output socket

This socket outputs the MIDI Velocity control voltage.

NOTCH
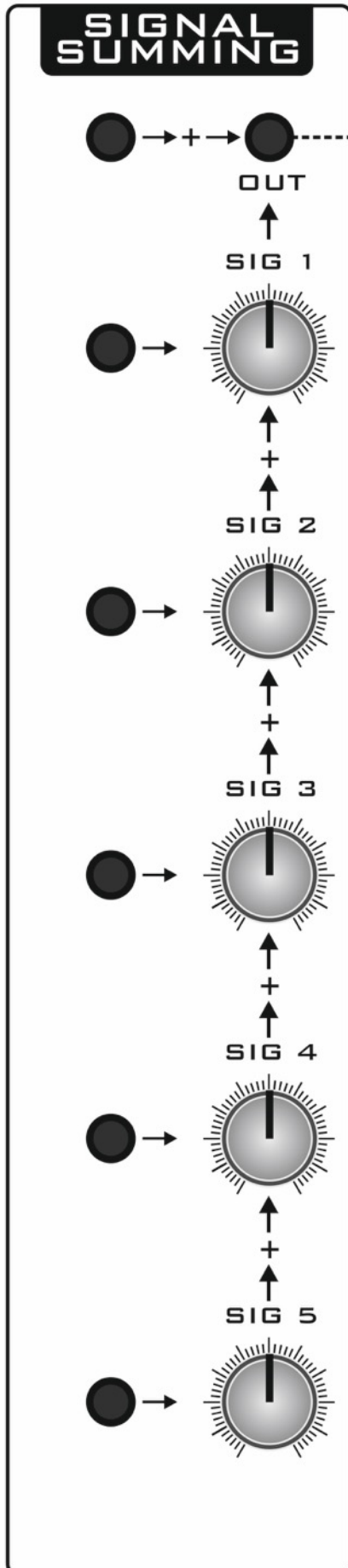
SIGNAL SUMMER / MIXER

The mixer is typically used to mix the audio outputs from each oscillator so they can then be fed to the Filter. Take each VCO audio output and patch to the mixer inputs.

Patch the mixer Out socket to the Filter AUDIO in socket.

It is possible to overdrive the mixer for a crunchier sound. If you want a smoother sound you may have to slightly reduce the Level controls.

It can in fact be used to mix control voltages too. Note, however, you wouldn't normally want to mix CVs and audio at the same time!

There are six audio input sockets to the mixer. Five of them have level controls.

The top one has no level control.

OUT

The output from the mixer is the top right socket.

Polymath

ENVELOPE GENERATORS (EGS)
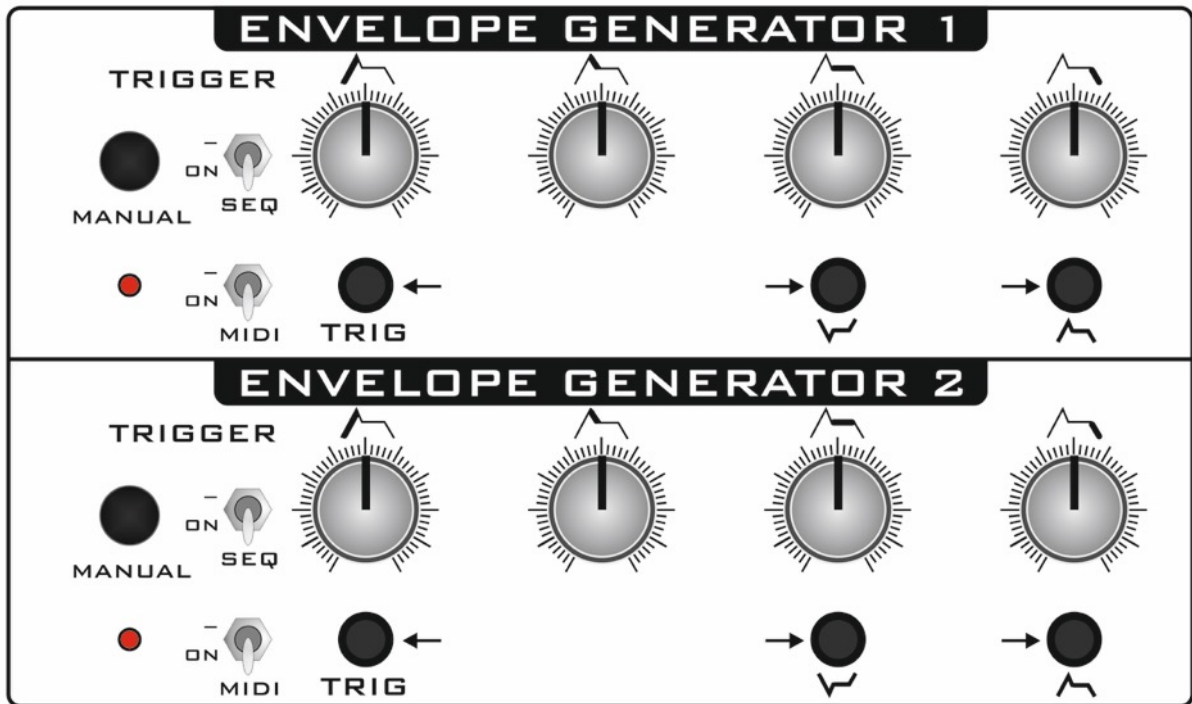
The EGs produce a control voltage that varies over time. Typical used to shape the volume of a sound when controlling the VCA, or the tone, when controlling filter cut-off.

But can also be used to modulate, say, the pitch, for drum effects, or, pulse width, for brassy sounds.

A

This controls how low the EG takes to reach maximum level once triggered.

D

After reaching maximum level following the Attach stage, Decay sets the time taken to reach the level set by Sustain.

S

Once the Attack and Decay stages have passed, Sustain sets the level that the EG will hold its output at for as long as a key is held down.

R

Once the key is released, this sets the time take for the signal to fade to zero.

MANUAL push button

Push this button to manually trigger the EG. Note, this button may not appear to work with certain trigger toggle switch positions, as the trigger toggle switches take priority. The toggle switches are outlined below.

LED

The LED gives a rough approximation of output level.

SEQ Toggle switch

When this switch is down it can be triggered from sequencer.

MIDI Toggle switch

When this switch is down it can be triggered from MIDI.

TRIG socket

This is the input socket for an external trigger signal, eg, use an LFO square wave to trigger the EG.

-EG CV Output

This is the CV output of the EG, but the signal is inverted.

+EG CV Output

This is the CV output of the EG

Polymath

VOLTAGE CONTROLLED AMPLIFIER

The VCA is an amplifier whose gain can be changed with a modulation signal, typically an envelope.

There are four choices available on the rotary switch.

EG1

EG1 CV is used to control the VCA level.

EG2

EG2 CV is used to control the VCA level.

GATE

MIDI Gate - an on/off (organ like) voltage is used to control the VCA level.

THRU

The VCA is left 'open' / on. It stays at full level.

CV Level control and socket

An external CV can be used to control the VCA level.

SIG OUT socket

This is the signal output from the VCA. In 'normal' use, this is in effect the MAIN AUDIO OUTPUT from the synthesiser, which you would patch to your mixing desk.

You may prefer to patch this to the Adaptor – so that the main signal output of the synth is then on a ¼" jack, which will make it easier to patch to your mixing desk.
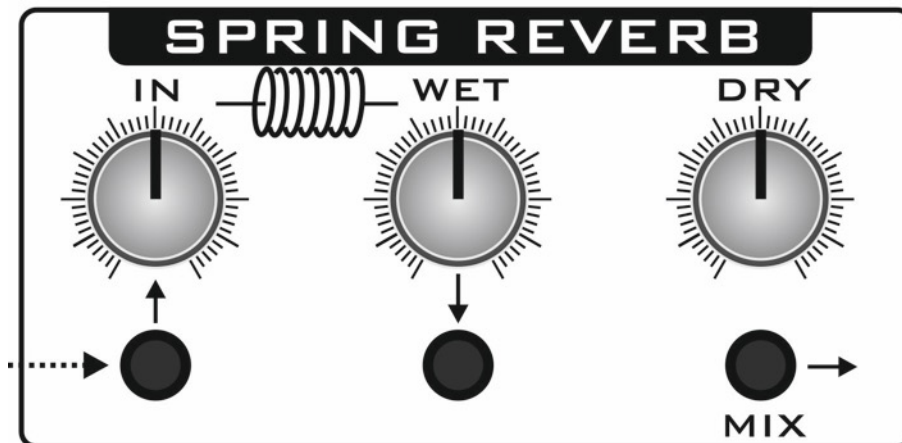
SPRING REVERB

The spring reverb is a vintage effect. It was a pre-digital solution in getting artificial reverberation.

Polymath uses a high quality triple spring Accutronics unit.

Ordinarily, you would patch this in at the very end of the signal chain, just like a traditional effect. But, for more fun, why not try patching it between the mixer output and the filter input, for example?

IN Level and socket

This it the audio input to the spring. The level can be attenuated with the Level control.

WET Level control and output socket.

The wet effect signal is output here.

DRY Control

Sets the level of dry signal fed to the MIX output socket

MIX Output socket

This is the wet effect signal plus the dry signal.

Note; spring units are typically 'quite noisey' compared with modern effects, and even some other types of vintage effects. So don't expect a perfect signal to noise ratio. Always try to keep the audio level of the input signal as high as possible.

It is normal to here a metallic boing sound if the case is knocked or moved since a spring reverb is a mechanical effect!

LOWER SECTION / EXPANDER PATCH PANEL
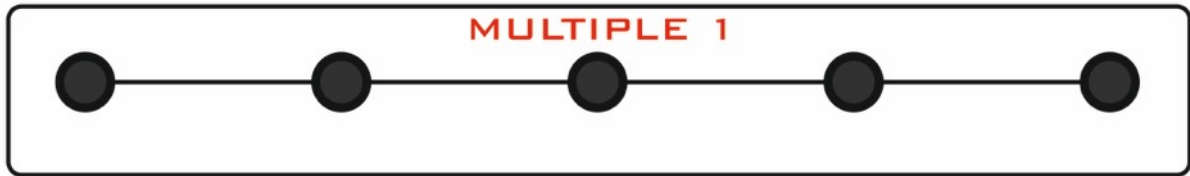
MULTIPLE 1/2

A multiple is used to split signals. It is not a mixer!

It would typically be used to split an audio or CV so that it can be fed to more than one source.

INVERTER
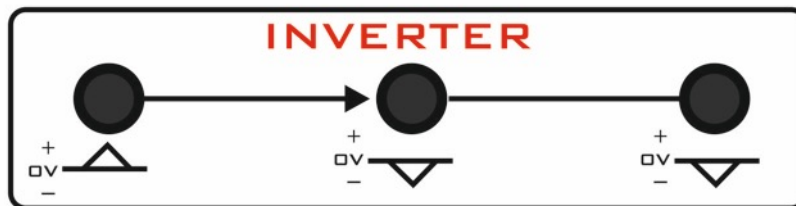
The inverter will invert any control voltage fed into it.

There is one signal input, and two inverted outputs.

MIDI NOTE-TRIG

MIDI Note Trigs 00 and 01 are used for triggering EGs or to clock the sequencer, for example. The notes share the same MIDI channel as the rest of the synth. These 2 MIDI notes will not affect pitch.

#00

This is a gate voltage that is produced each time MIDI note 00 is received. This is also pre-patched to the Sequencer Clock Source switch, so the sequencer can be clocked using MIDI note 00 – a far more versatile method than using MIDI Sync.

#01

This is a gate voltage that is produced each time MIDI note 01 is received.

This could, for example, be patched to the Sequencer's RESET input, so the sequencer can be programmed to reset using MIDI Note 01.

SAMPLE & HOLD (S+H)
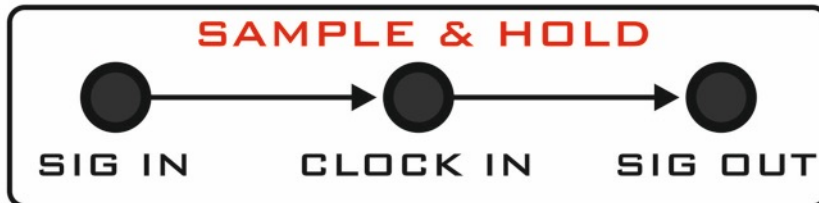
A sample and hold will 'record' a voltage level and hold it there.

SIG IN socket

Patch the CV to be sampled into here, typically an EG or LFO, or patch in white noise.

CLOCK IN socket

Each time the input signal goes high the input signal will be sampled and held, until the next clock.

Typically use the square wave output from an LFO, or, the Gate signal from the MIDI converter.

SIG OUT socket

This is the CV output from the sample and hold circuit. Maybe try patching this to filter cut-off or VCO pitch.

A typical use of S+H is to create a stepped random voltage. To do this patch Noise to the SIG IN, LFO square wave to the CLOCK IN.

RING MOD (RM)
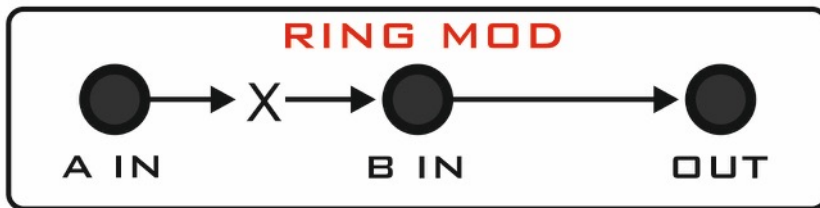
RM takes typically two audio signals, multiplies them together, and produces a rich harmonic sound. Typically used to create metallic and bell type sounds.

For best results, use two VCO audio outputs and patch into the two RM inputs. Then take the output to the mixer, and further onto the filter for further processing.

NOISE

Noise generator literally produces noise, white noise in fact.

This can be used as a signal source for the Sample and Hold generator (for random voltage effects). Or, can be patched to the mixer, to make percussion and wind sound effects.

MIDI – Additional Sockets

There are additional CV/Signals from the MIDI converter that can be patched back into the synth.

ACCENT

Polymath

Each time a MIDI note with velocity over 80 is received, this socket will output a trigger.

MAIN GATE

This is the main Gate signal of the converter – the one that ordinarily controls the paraphonic gating. It will turn on whenever a MIDI key is held down.

CLOCK

This converts MIDI Sync to 16th (semiquaver) analogue clock pulses at 4ppqn.

CC#55

This is CV output controlled by MIDI controller number 55.

CC#56

This is CV output controlled by MIDI controller number 56.

Headphone output
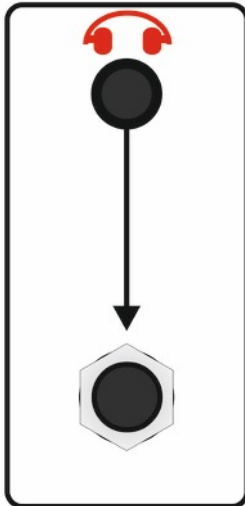
A mono headphone pre-amp. Normally you would patch the output from the VCA to the headphone amp.

Although this is a monosynth (that is monoaurial!), you must use stereo headphones, that is use a stereo jack, since a mono jack will cut out the signal -if mono headphones exist ☺

The top minijack is the input. Feed the output of the VCA into here. The bottom jack is for your stereo headphones.
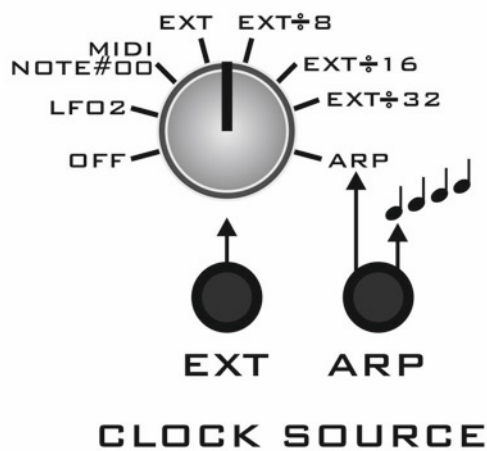
ADAPTOR
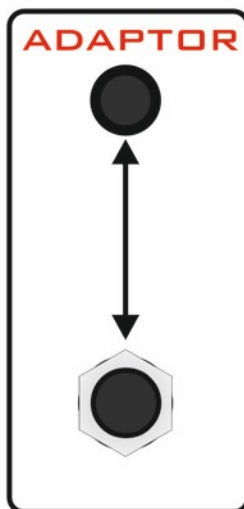
This is used to convert a mini-jack to a big jack (either way!)

Normally used when you want to send, or receive, audio from/to and external device such as a mixing desk.

ANALOGUE SEQUENCER
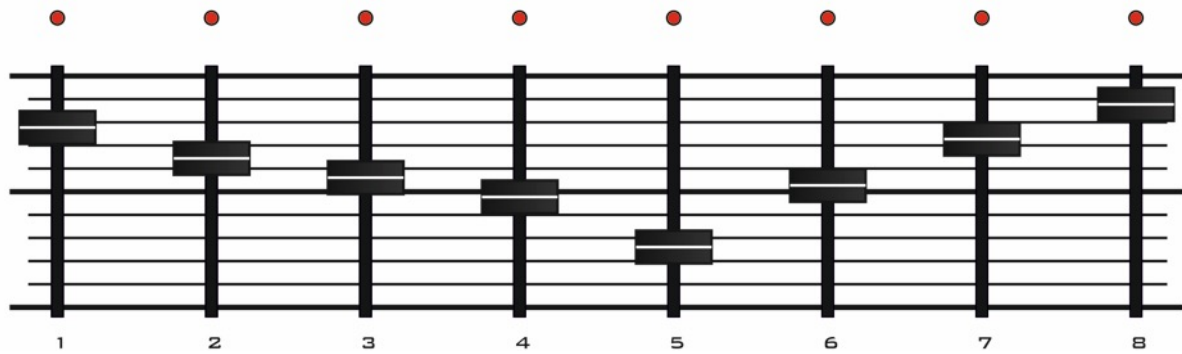
CLOCK SOURCE

Clock source is selected using an eight way rotary switch.

OFF

Sequencer does not step

LFO2

LFO2 controls tempo

MIDI NOTE #00

MIDI Note 00 controls tempo.

EXT

The signal fed into the EXT socket is used as a clock source. Typically use a square wave or gate signal from your modular.

EXT/8, EXT/16, EXT/32

These also use the signal from the EXT socket, but divide the clock ratio down by 8, 16 and 32.

Polymath

This is particularly useful if you want the SEQUENCER to run at different clock divisions from the ARPEGGIATOR. This was the SEQUENCER can be used to transpose Polymath/the Arpeggio every bar, every 2 bars, or every 4 bars.

ARP

The clock source will be taken from the ARP socket. That way both the SEQUENCER and ARPEGGIATOR will be running together from a common clock.
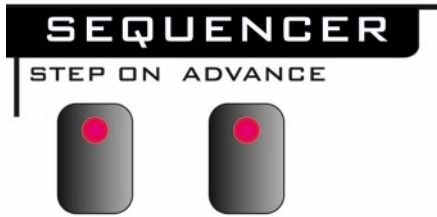
Step Sliders

It is an 8 step sequencer, so there are 8 sliders! Voltage range is approximately 0-5V.

Step LEDs

These light up in turn to show the active step.

STEP ON push button

SEQUENCER
STEP ON ADVANCE

This button toggles on/off the selected step's Gate. When off, no gate is output for that step, when on a gate will be output for that step (when the sequencer is running).

It is best to stop the sequencer when setting the steps' Gates on or off.

ADVANCE push button

Pushing this button steps the sequencer forward one place. Typically this would only be used when the sequencer is stopped.

CV Control and Output socket (x2)

There are two identical CV outputs available from the sequencer.

Each has its own CV level control and output jack.

PITCH

This control sets the amount the sequencer will 'play' all four VCOs.

Polymath

CUTOFF

This control sets the amount the sequencer will change the filter cut-off

GATE output socket

This is the gate signal generated by the sequencer
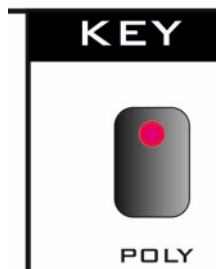
RESET input socket

This socket is used to reset the sequencer to step one. A 5V signal will reset the sequencer.

To reset the sequencer from MIDI, patch this to the MIDI NOTE #001 sockets. Every time MIDI Note 002 is played by keys or a DAW, then you can reset the sequencer.

KEY MODES MODE

POLY push button / LED

Push this button to toggle between mono and poly modes.

In Mono mode, Polymath will play all VCOs at the same pitch.

Polymath

In Poly mode, as you play each MIDI key, each VCO in turn is played, cycling through all four VCOs.
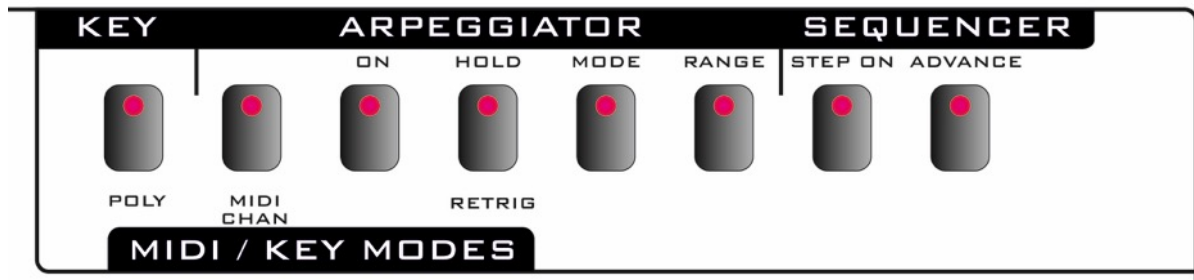
RETRIG push button / LED

When the Arp' is off, this button toggles on/off Gate re-trig mode.

When off, if notes are overlapped the Gate signal is not retriggered. This means when overlapped notes are played, the EGs will not retrigger.

When on, if notes are overlapped the Gate signal is retriggered. This means when overlapped notes are played, the EGs will retrigger.

ARPEGGIATOR

An arpeggiator allows you to hold down 2 or more and have those notes played out individually.

Eg, hold down notes C, E and G, (as a chord) and the arpeggiator will play back singles notes in a sequence, C, then E, then G, and then loop back to C and repeat.

Note!!! For the Arpeggiator to work it needs a timing signal. This could be the LFO (square wave) or MIDI note (gate signal) for example. So for it to work, you must patch the timing signal to the ARP clock source jack.

Eg. Patch LFO1 Square Wave out to ARP clock source in.

Some notes;

For the Arp to function-

A clock signal Must be fed into the Arp Clock Input. Use either a Square LFO output, or if you want to sync to MIDI use MIDI Note Trig #00, then create a 'clock sequence' in your DAW by playing a string of MIDI Note #00.

If you are using the EGs, then the MIDI Trig Toggle switches must be On.

ON push button / LED

This push button toggles on/off the arpeggiator. The arp' is on when the LED is lit.

Polymath

HOLD push button / LED

When the Arp' is on, this button toggles on / off HOLD mode.

When this is activated then any note you play will be memorised even after you have released the key. The memorised notes will be cancelled once HOLD is turned off.

It will note only remember pitch (note number) but also velocity (how hard you hit the key). This is perfect to have, for instance, the filter cut-off to play back a particular pattern of cut-off setting (when MIDI Velocity is set to mod' cut-off).

MODE push button / LED

There are 3 modes, the way in which the arppegiator plays back the notes.

Push the button to cycle through each setting. The LED will flash to indicate the mode.

If say, notes C, E, G are played (in that order) and held, then;

UP

The order played back will be C E G C E G etc

DOWN

The order played back will be G E C G E C etc

UP/DOWN

The order played back will be C E G G E C C E G G E C etc

RANGE push button / LED

When this is activated the sequence of notes will play as normal once, then the second time repeat but an octave higher. Then after this higher octave they will be played back at the original lower octave.

RANGE push button / LED

Polymath

There are 2 octave ranges. When selected, the arpeggio will paly at the original pitch, the at an octave higher, or lower.

Push the button to cycle through each setting. The LED will flash to indicate the range.

Off

Only the original octave is played

-1

The arp' is played at the original octave, then at one octave below, before repeating.

+1

The arp' is played at the original octave, then at one octave above, before repeating.

ARP Clock input jack.

This is the clock source for the arpeggiator. Each clock pulse advances the arpeggiator one note.

Suggested clock sources are MIDI Gate, LFO Square wave, or a signal from an external device, such as a modular synth (LFO, etc) or MIDI-CV converter (ideal for sync'ing to a DAW).

IT'S LIKE A DIGITAL SEQUENCER

The Arpeggiator will remember the ORDER you play the notes, and play them back in that same order.

This means the Arpeggiator is really a sequencer! If it is in HOLD mode, you can slowly add more notes.

Note; the arpeggiator will not remember the notes when powered off.

Polymath

GLOBAL EFFECTS AND MODULATORS

The EFFECTs section provide tune and CV controls that affect ALL four VCOs at once.

MASTER TUNE

This is a master tune that affects all four VCOs' pitch.

DETUNE

DETUNE is used to 'fatten' the sound when all four VCOs are used, typically in unison.

When turned VCOs 2 and 4 are sharpened and flattened around VCOs 1 and 3 so that the overall spread of pitch remains around the root note.

Turn the control fully left for no Detune. As you turn the control clockwise, the VCOs will be detuned. The affect is to 'fatten' up the sound and add a chorusing type effect.

Note; tuning will of course also be affected by the individual TUNE controls of each VCO!

VCO CV Level control and socket.

This is a modulation CV control input that globally affects all four VCOs.

This might be used when you want to apply say vibrato equally to all four VCOs. So try, for example, patching in here the output of a LFO triangle wave.

The VCO CV control attenuates the CV signal fed into the socket.

PWM Level Control and Socket

This is a modulation CV control input that globally affects all four VCO square wave pulse widths.

Pulse width is typically used to 'fatten' the sound, or to make the sound fuller by making a sort of chorusing type sound.

When the PWM control is centred, no modulation is applied.

When it is turned to the left, the signal fed into the socket is used to modulate pulse width.

When it is turned to the right, LFO1's wave is used to modulate pulse width.

LFO1/2 SPEED Control and Output Sockets

Each LFO hasa triangle and a square wave output, each with their out signal output sockets.

The SPEED control alters the LFO frequency.

LFO1 Triangle wave can be used to directly modulate all VCOs' pulse width by turning the PWM pot.

LFO2 is an option on the Sequencer Clock Source switch, so LFO2 can control the speed of the Sequencer.

Each LFO's Triangle and Square waves are output at their respective sockets.

MIDI MW CV Control Level and Output Socket

This is a modulation wheel (MIDI Controller 001) control voltage output from the MIDI to CV converter.

This, for example, could be patched to VCF Cut-off CV input for mod' wheel control of the cut-off frequency.

OTHER

Lamps

Polymath has two 12V BNC connectors in the top panel for goose neck lamps.

Two are supplied with the unit. We recommend only using LED gooseneck lamps. These are lower power and put less strain on the power supply, and induce less noise into the electronics than an incandescent bulb.

Handle

The heavy duty handle not only looks good but you will find it comes in great use when you need to move the Polymath to a new location!

Patch Cables

Polymath uses mono 3.5mm / mini-jack 'standard' CV cables. Stereo plugs may cut out the signal / ground it to earth so do not use.

Take common sense care when patching. The sockets are very strong, however, never use unnecessary sideways force when inserting or removing patch cables.

PATCH EXAMPLES

NOTES;

These are just examples, not rules. The control positions are just suggestions – a starting point. Of course play around with the settings if it doesn't quite sound OK.

Use them as a guide to help you along. Experiement and try things for yourself.

Pay closest attention to the cable patches examples. We have shown only some examples of where to set the controls and switches, in general the important ones. But not all.

You can clearly set controls such as TUNE or PORTAMENTO to suit.

If a control or switch is shown without a position, it generally means set this how you want.

Switch, Control and Cable positions have been shown in Yellow.

Polymath

PATCH 1; BASIC SYNTH PATCH

This is the main patch to memorise. It sets up Polymath to act like a 'traditional mono/poly synth'. For playing typical leads, basses, pads etc.

The signal chains are 'typical';

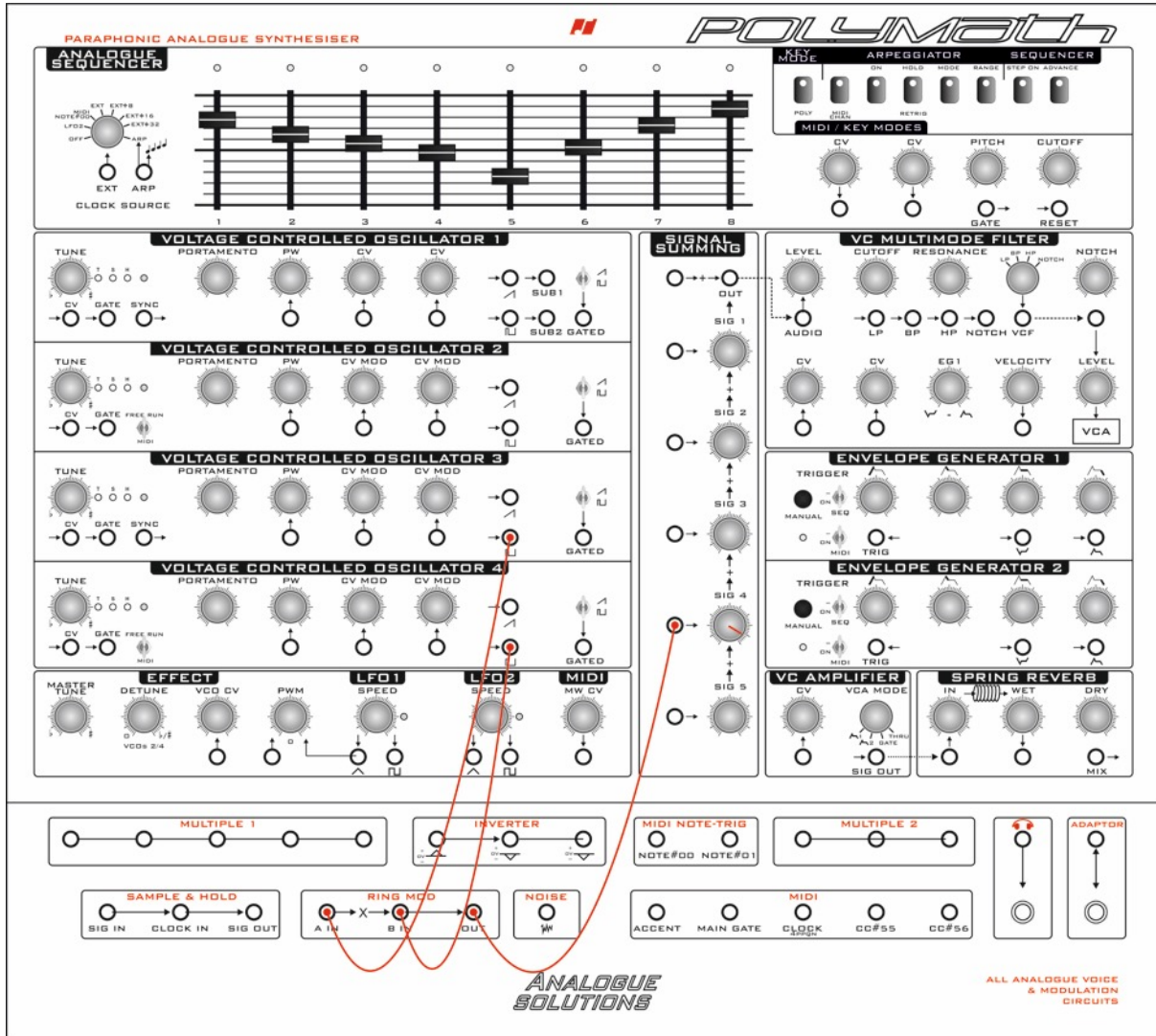Audio: VCOs->Mixer->VCF->VCA->Reverb->Adaptor->external mixing desk/DAW

CVs: EGs->VCA/VCF,
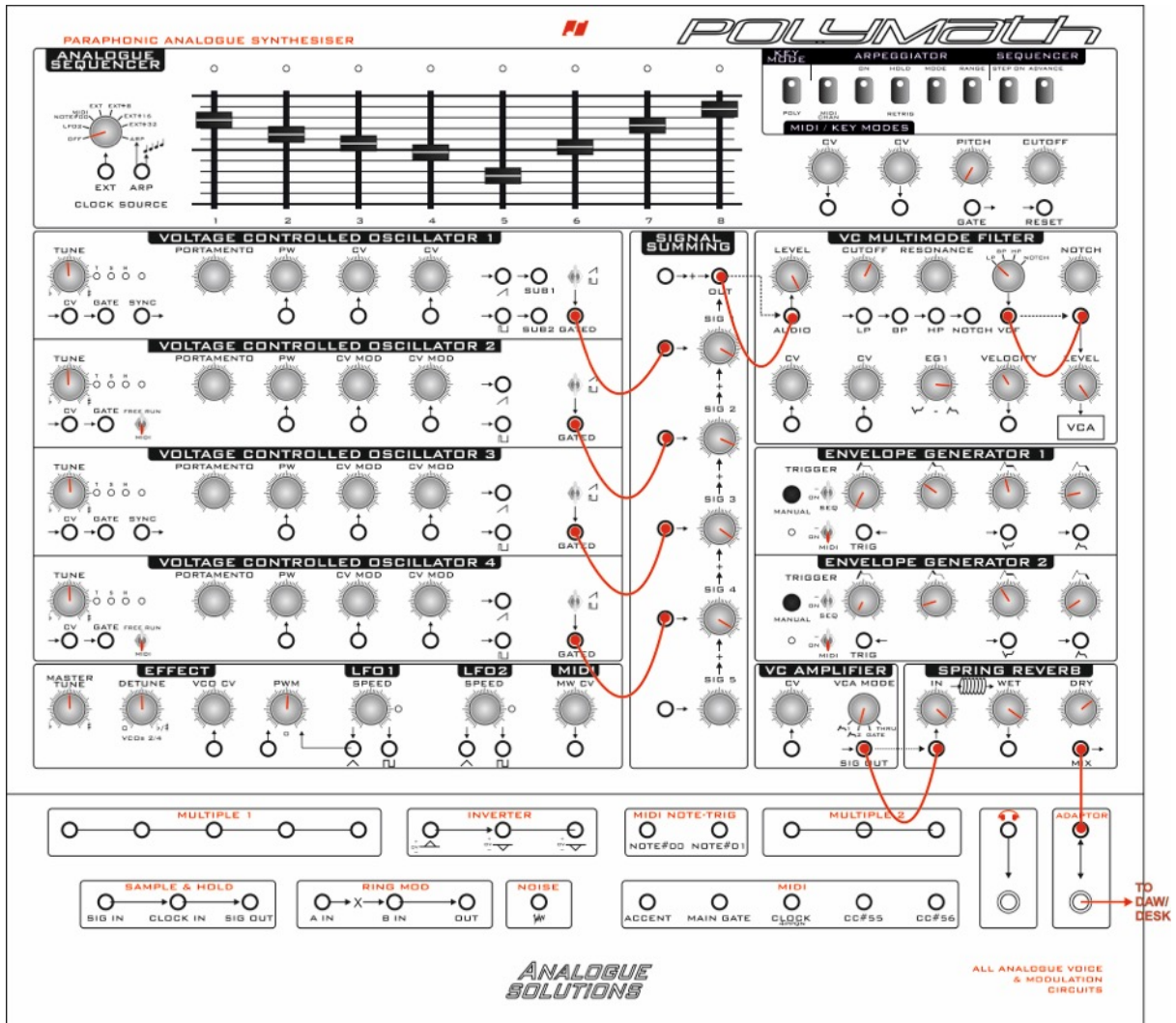
Polymath

PATCH 2; USING RING MOD

Shows typical use of ring mod to create metal type sounds. Patch 2 VCOs to the Ring Mod and take the output to the mixer (or straight to the filter). Alter pitches of the 2 VCOs for crazy sounds.

Polymath

This patch shows typical use of Sample and Hold. It uses the Noise Generator to create a Random voltage that changes each time a clock pulse received. Instead of noise, also try EG output, or LFO Triangle (use a different LFO than that used to clock it).
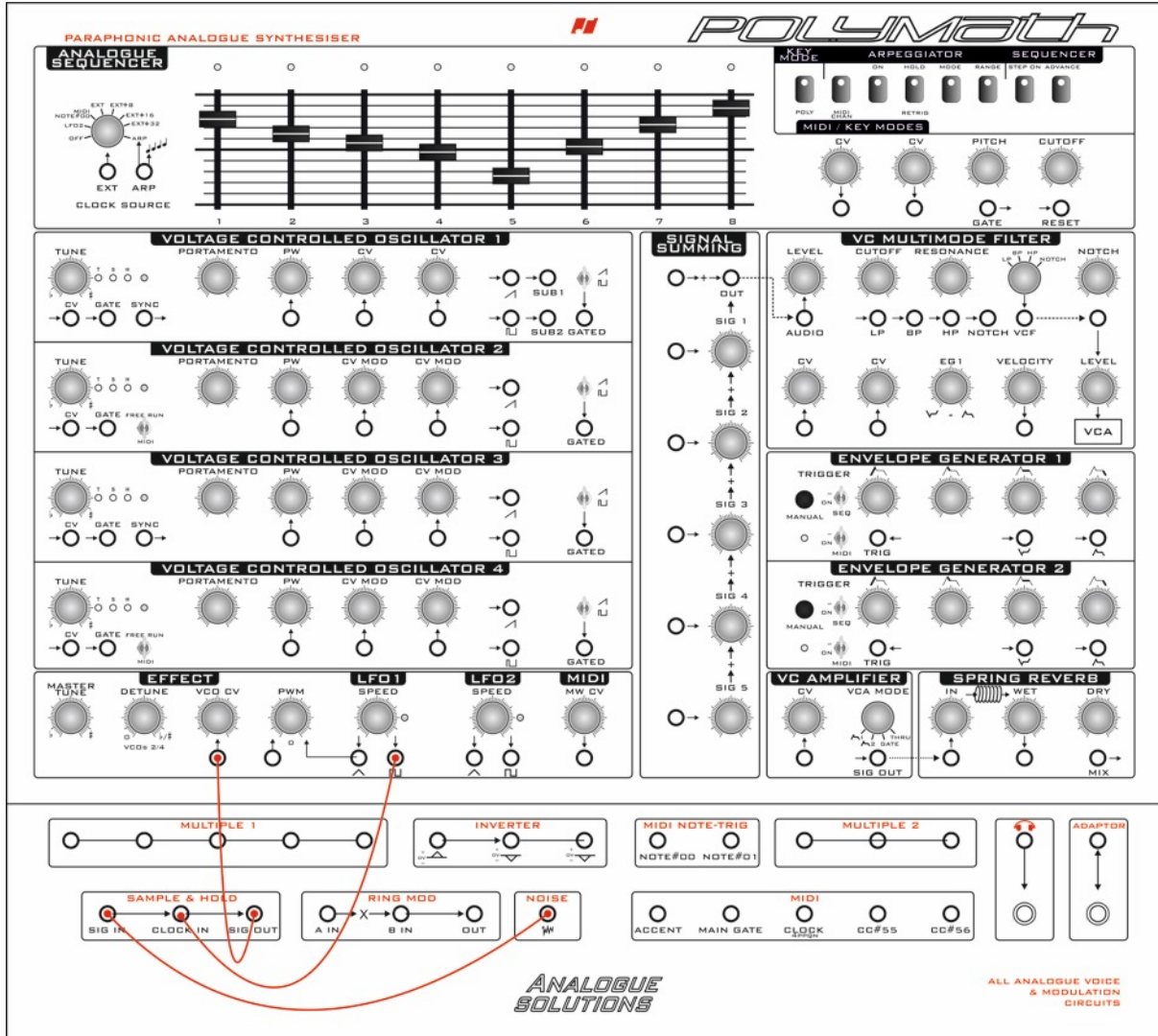
Polymath

The Arp' must receive a clock signal to work. Either use LFO square wave, MIDI Clock, or better still, MIDI Note 00 – so you can step as required using a MIDI sequencer.

Polymath

LAMPS

It is possible to connect up to two optional gooseneck lamps to the Polymath,

They must be LED type – not incandescent lamp, and 12V, using BNC connector.

Polymath

SPECS;

Size:

680mm wide

600mm high

230mm deep

Mass:

15Kg

ACCESSORIES

1x IEC Power Cable

10 x 30cm patch leads

5 x 60cm patch leads

2 x splitter leads

(manual can be downloaded off the web site)