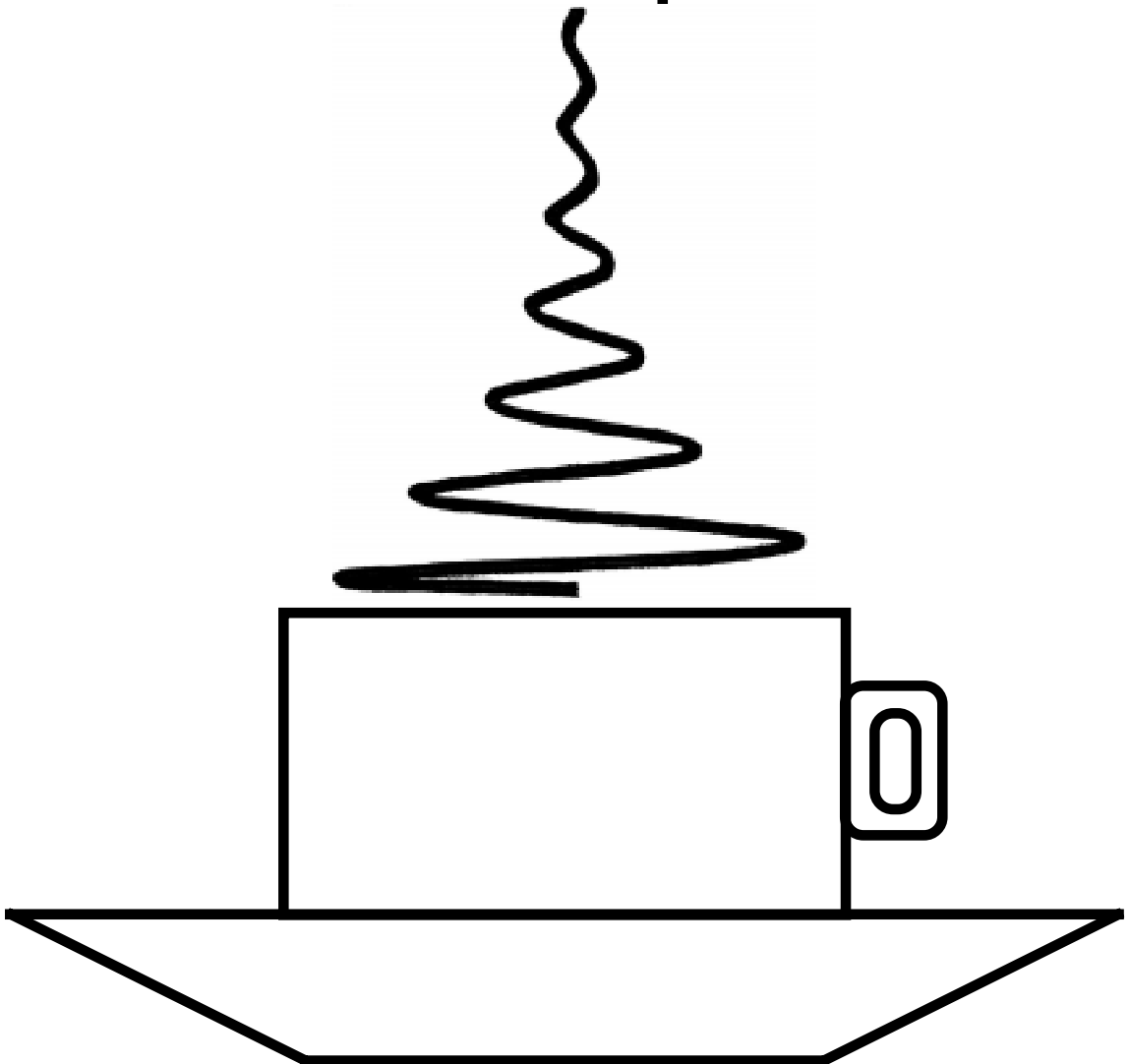


preliminary!

black COFFEE



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Introduction

Smallest full featured analogue monosynth complete with MIDI control, including TB303 style 'Slide'. The black coffee uses true analogue voice circuitry for a fat and warm sound.

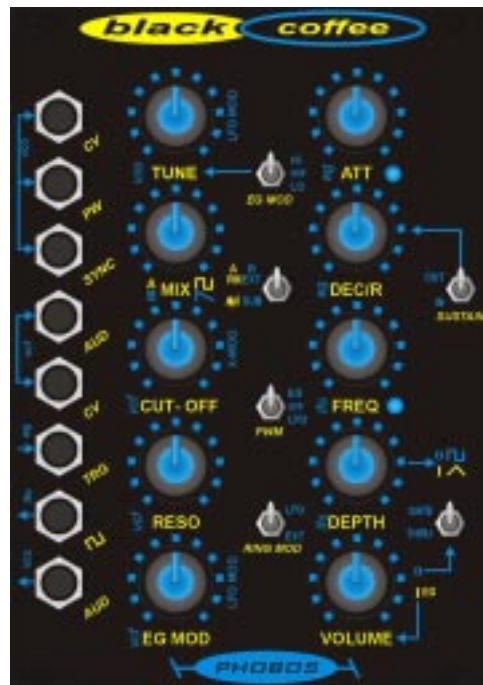
By switching the VCA to 'THRU' the unit can then be used as a versatile analogue effects unit for guitarist and vocalists.

With 12 sockets, 10 controls & 12 switches you won't be short on creativity.

The black coffee system incorporates everything you would expect to find in a small monosynth and a whole lot more! Considering this is probably the smallest monosynth in the world you will be please to see very little has been omitted. Through the clever use of routing through 12 switches and 12 pots, an extreme wide variety of sounds can be produced. Unlike many other analogue minisynths, ours includes MIDI. MIDI allows you to play the black coffee from a MIDI keyboard or sequencer. MIDI channel can be selected and you get control of pitch, gate (note on/off), filter cut-off control (via MIDI controller 1/mod wheel), TB303 style 'Slide' on/off (activated by overlapping notes) and Accent on/off (a velocity of over 64 will briefly increase the filter cut-off).

There are three parts to this system: the actual black coffee module, the case (part number AS0018) and the MIDI to CV converter (MCV). All 3 parts together are called the black coffee system. Parts can be bought separately to allow choice of units you need for your requirement.

The black coffee module will fit into a Concussor, Integrator and A100 modular system rack so can be integrated and used with a modular synth system. When housed in the AS0018 case, it becomes a totally self-contained analogue monosynth. Add the MCV it now becomes a MIDI analogue synth!



Quick Start

Some tips to get you going:

- ◆ Connect AC transformer - power up!
- ◆ Ensure the Volume control of the BC is at zero, you don't want to blow your monitors!
- ◆ Connect the audio out to your mixer - either from the front panel or rear panel jack socket.
- ◆ Connect the MIDI out of your sequencer/keyboard to the MIDI in of the BC. Make sure your MIDI channels match.
- ◆ or, connect your analogue sequencer or monosynth to the CV/Gate input sockets on the front panel.
- ◆ The Volume control should be pushed in.
- ◆ Ensure the cut-off control is above mid-way. If it is too low you may filter out all the signal and hear nothing!
- ◆ With the BC being played via a keyboard/sequencer, you should see the trigger LED flash.
- ◆ Slowly increase the volume of the BC using the volume control.
- ◆ Some other controls may affect whether you hear any useful audio, so play around with other controls like Mix or Attack.

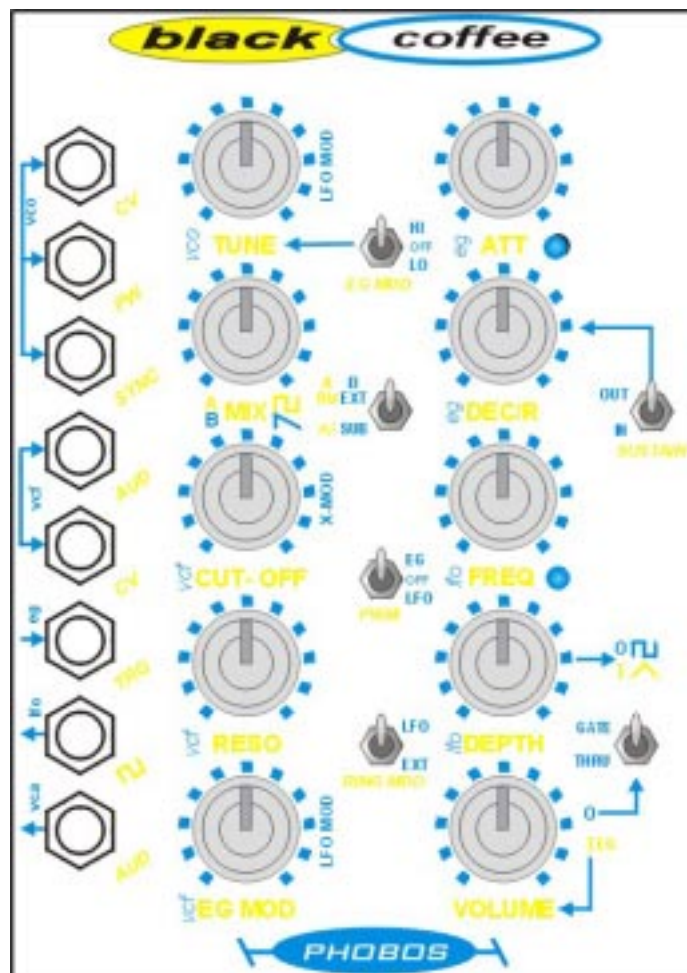
This all assumes of course that your mixer and MIDI is correctly set-up.

Once you have audio, then start experimenting with the BC. Most controls should be familiar to those who have used synths before, especially analogue monosynths. Whether you are an experienced programmer or not, we advise you read the whole manual anyway just so you don't miss any hidden treasures.

Specifications

Synthesiser Features

- VCO (Saw/Square)
- LFO (Square/Triangle)
- VCF 24db/oct (4pole) Moog Ladder Style LPF
- EG (A, switchable Sustain, D/R)
- VCA
- White Noise
- Ring Modulator
- Slew generator (activated via MIDI only)



Sockets (front panel) - all 3.5mm

VCO
Pitch CV In
PW CV In
Sync In

VCF
Audio Input
Cut Off CV In

EG
Trigger In

LFO
Square Wave Out

VCA
Audio Out

Sockets (rear panel) - all 6.35mm except * which is 3.5mm. The following features are only available with the AS0018 case.

Audio In (duplicate of front panel socket)
Audio Out (duplicate of front panel socket)
Pedal In - plug the correct type of CV control Pedal
Pedal CV Out* - use an optional CV pedal to produce a CV

Front Panel Rotary Controls (AKA Pots)

VCO
Tune
Mix

VCF
Cut
Resonance
EG Depth

EG
Attack
Decay

LFO
Frequency
Depth

VCA
Volume

Rear Panel Pots
Pedal CV Level

Front Panel Switches - built into the Pots

(Tune) LFO Mod on/off
(MIX) Mix Source A/B
(CutOff) LFO Mod on/off
(EG Depth) Cross Mod on/off
(LFO Depth) LFO Waveform select
(Volume) EG/ Thru/Gate select

Front Panel Toggle Switches

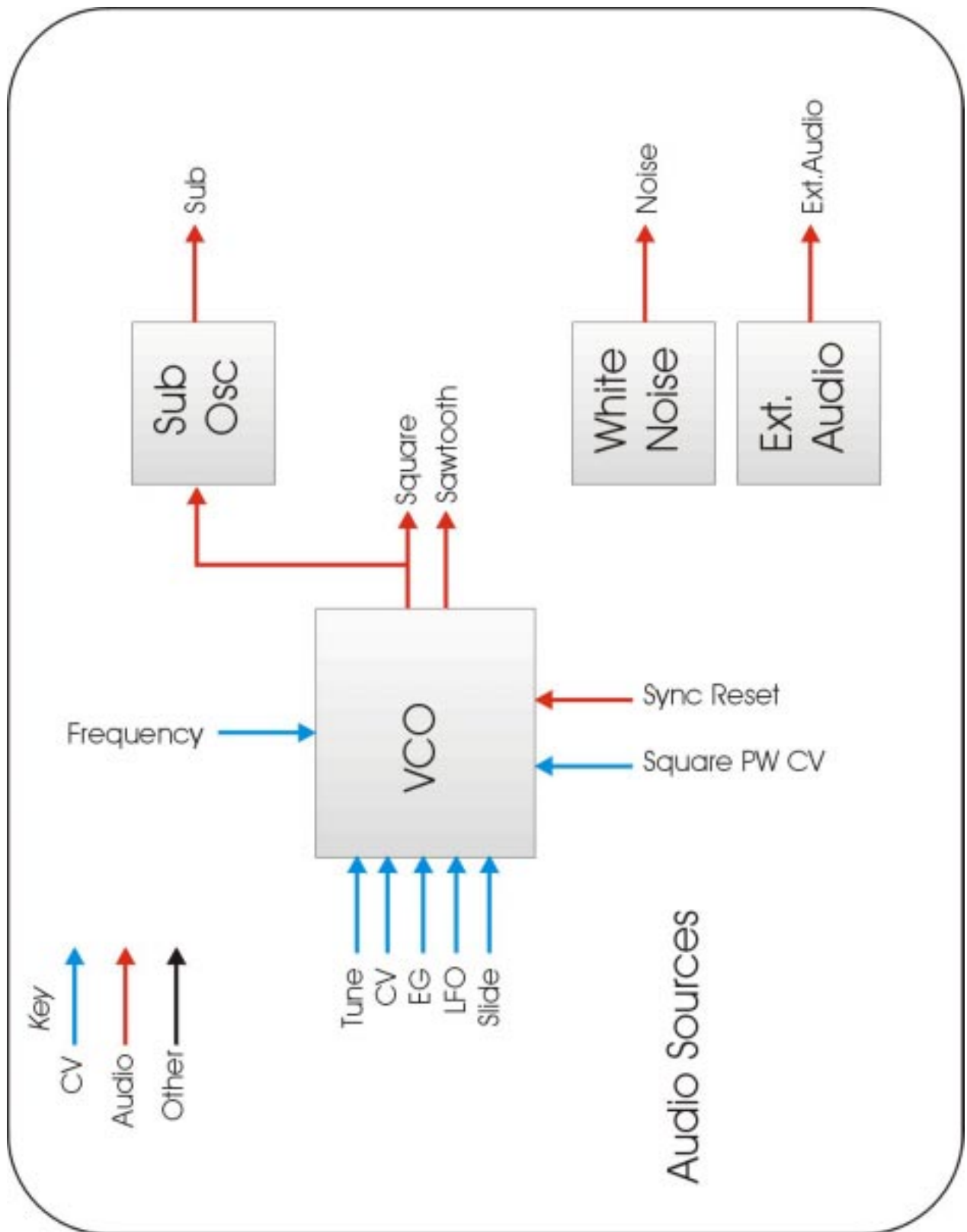
VCO Pitch Sweep - high/off/low
MIX Source
PWM Source - LFO / off / EG
Ring Mod Source - External Audio / LFO
Sustain - In / Out
VCA Mode - Thru / Gate (only active when Volume pot switch is on (out)).

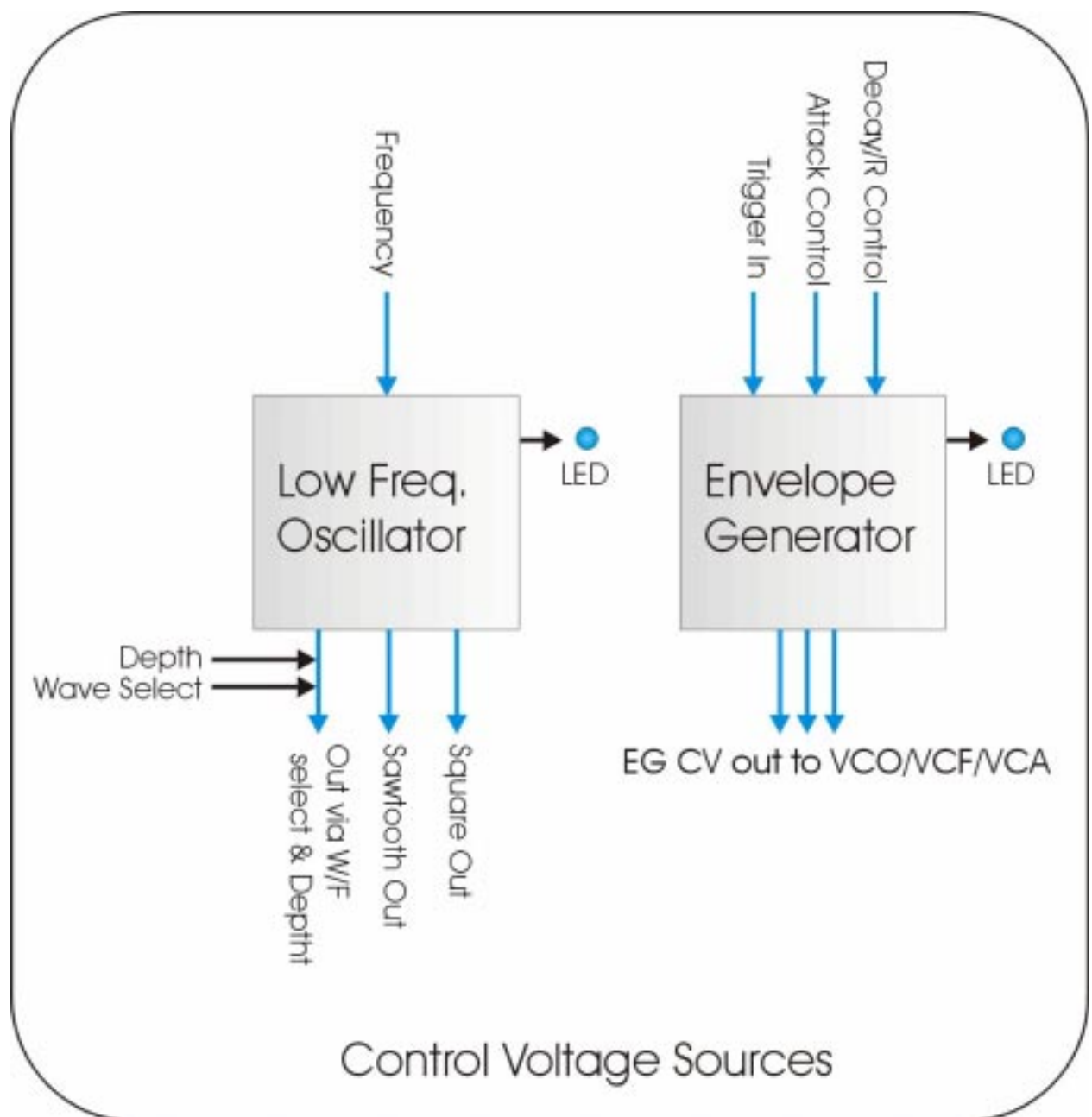
Front Panel LED Indicators

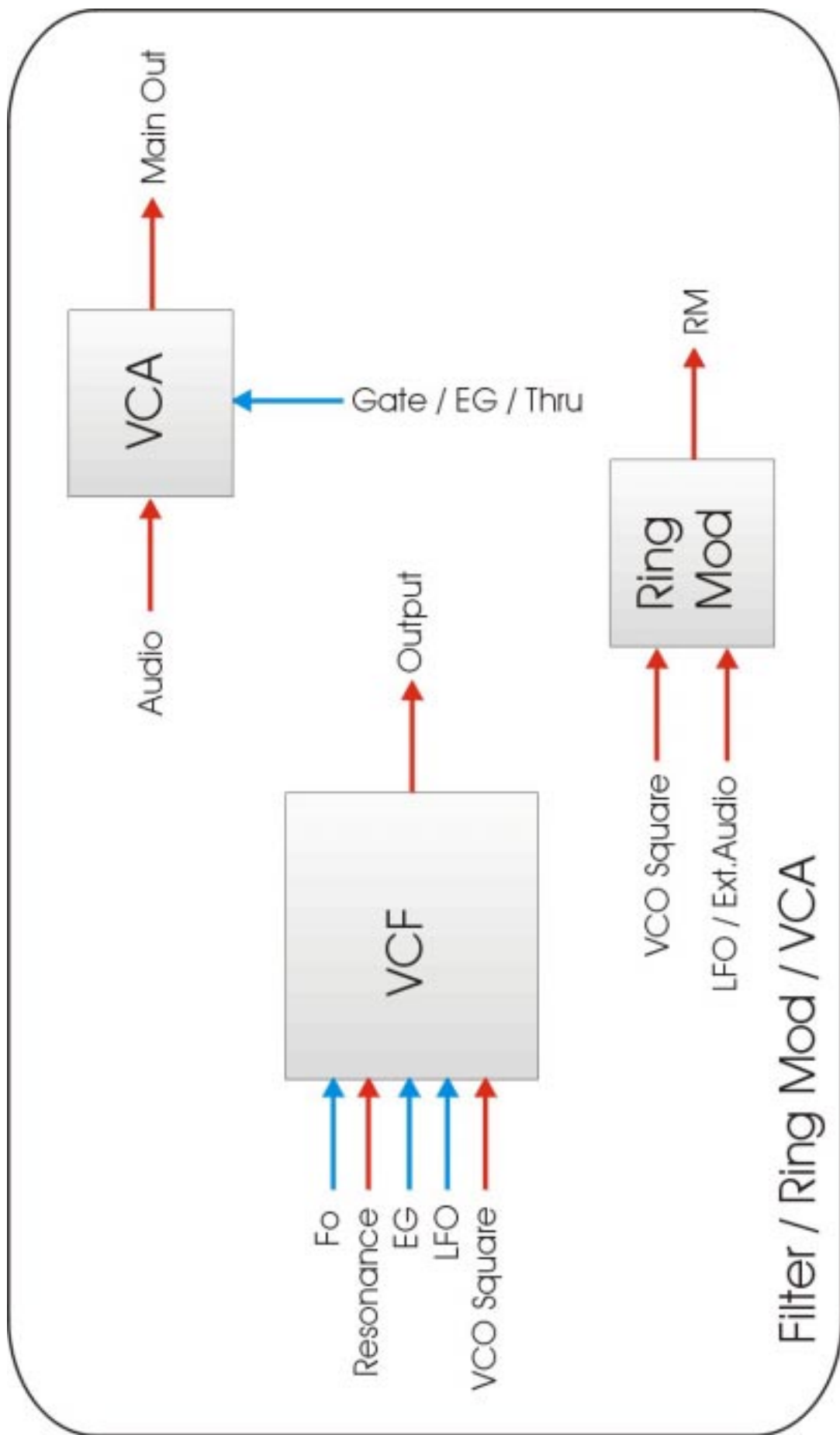
EG Trigger
LFO Frequency

Signal Path

To make a complete signal path schematic would be far too complicated and confusing due to the sophistication, so we have broken down the BC into smaller sections giving a basic guide to what is going on







Very Brief Synth Tutorial Analogue Synth Circuit Modules

VCO - Voltage Controlled Oscillator

This is the part that produces the raw sound that will later be altered by other circuits. The VCO produces a continuous sound. Its pitch can be altered by various sources like CV in or the LFO. It produces two waveforms, sawtooth wave and square wave. The pulse width of the square wave can be modulated.

Sub Oscillator

This is a little circuit that takes a square wave and divides it down to half the original frequency, i.e. produces a signal one octave down from the original

Noise Generator

This produces white noise. It's the hissing sound you find between the tuning of radio stations.

Ring Modulation

LFO - Low Frequency Oscillator

This is similar to a VCO - it produces a continuous signal, however the frequency is below the audio range. It is used to modulate other parameters, like to produce vibrato by modulating the pitch, or wah-wah type filter sweeps. The LFO produces two waveforms, triangle and square waves.

EG - Envelope Generator

This needs to be triggered (by receiving a signal in the trigger input for instance). Then a control voltage that varies over time is produced. It is used to modulate other parameters, such as VCA volume or filter sweep.

VCF - Voltage Controlled Filter

The VCF is used to remove harmonics from the input audio. The Black Coffee filter is a low pass type. This filters out the higher harmonics. But all you really need to know that this is the section that does the sound shaping.

VCA - Voltage Controlled Amplifier

This is usually the last section. It does the volume changes over time.

Web Info

If you would like to learn more about analogue monosynths and analogue monosynths try one of the many websites covering these topics. Here's one....

<http://www.>

Controls / Switches In Detail



VCO
Tune

Rotary control

alters the oscillator pitch by approximately +/- 1 octave
Use this control to tune the BC to your other instruments.

LFO Mod on/off

Push/Pull switch built into Tune knob

when this switch is on (out), then the VCO pitch will be modulated by the LFO giving a vibrato effect. The intensity of the modulation is set by the LFO DEPTH control (which also will affect the VCF modulation).



VCO Pitch EG Mod - high/off/low

this switch will route the EG output to the VCO pitch control input. This enables the pitch to be swept up/down by the envelope. This is very useful for sound effects and drum synthesis. There are high and low intensity settings for a more or less dramatic pitch sweep. At the centre position there is no pitch sweep.

PWM Source - LFO / off / EG Toggle Switch

this switch allows the VCO square wave to have its pulse width modulated. When the switch is up, the envelope will modulate the PW, when down the LFO will modulate the PW. When at the centre position there will be no PW modulation (other than via the front panel jack socket if used). PWM is an effect employed by single VCO monosynths to fatten up the sound with a chorusing type effect. It can also be used to create sound effects in certain set-ups.



Mix

Rotary Control

alters the level between the 2 audio sources (selected via source switches)

Mix Source A/B

Push/Pull switch built into Mix knob

when this switch is in the clockwise source is VCO square wave, anticlockwise is source A
when this switch is out the clockwise source is VCO sawtooth wave, anticlockwise is source B

MIX Source

Toggle Switch

this switch selects the audio source available for the MIX control positions A and B.
switch up: A is Ring Mod B is External Audio
switch down: A is Noise B is Sub Oscillator
The combination of the MIX control push/pull switch and the MIX Source toggle switch give a total choice of 6 different audio sources!



VCF

Cut-Off

Rotary Control

alters the filter cut-off frequency
As you turn this control clockwise the sound will become brighter as less harmonics are filtered out.

Resonance

Rotary Control

alters the filter resonance. In maximum position, the filter will self-oscillate
Careful balance of this control and the Fo control gives the analogue sound we all love.

EG Depth

Rotary Control

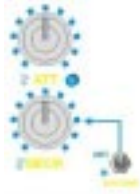
sets the depth of cut-off modulation by the envelope generator. Set this control near maximum, and Fo near minimum, and set the VCA mode to Gate for filter sweep effects.

LFO Mod on/off

Push/Pull switch built into EG Mod knob

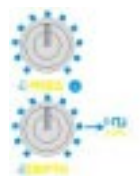
when this switch is on (out), then the VCF cut-off will be modulated by the LFO giving a wah-wah filter sweep effect. The intensity of the modulation is set by the LFO DEPTH control (which also will affect the VCO modulation).

Cross Mod on/off Push/Pull switch built into Cut-Off knob
 when this switch is on (out), then the VCF cut-off will be modulated at a preset level by the square wave output of the VCO. This effect will be most noticeable when the resonance is set to a point near or at self oscillation. The effect will be to add extra harmonics to the sound. Metallic, distortion and other sound effects are possible. Improve the effect more by modulating either the VCO pitch or the VCF cut-off.



EG
Attack Rotary Control
 sets the length of time it takes the EG to reach maximum level after being triggered
Decay Rotary Control
 sets the length of time the EG takes to reach zero after reaching maximum level
 This control becomes a Release setting when the Sustain switch is set to IN.
 Release is the time it takes for the EG to reach zero when the trigger goes low (note off).

Sustain - In / Out Toggle Switch
 when this switch is set to IN, then the envelope will sustain when the trigger input is high (or when a key is held down). In this mode the Decay control becomes Release. When the Sustain switch is set to OUT, there is no sustain point in the envelope signal and the Decay control behaves as Decay.



LFO
Frequency Rotary Control
 alters the speed of the LFO
Depth Rotary Control
 sets the LFO modulation depth that will become available to modulate other parameters of the synth. Turning clockwise increases the intensity of the modulation.

LFO Waveform select Push/Pull switch built into LFO Depth-Off
 when this switch is out, then the triangle waveform is selected and therefore available for VCO or VCF modulation. When this switch is in, square wave is selected.



VCA
Volume alter the final volume output of the synthesiser
VCA Mode - Thru / Gate Toggle Switch
 when the Volume control switch is out, the source of modulation for the VCA is determined by the position of the VCA Mode switch. When this switch is up, the VCA will be in Gate mode, when down it will be in Thru mode. Gate is best used to hear the full effect of filter sweeps. Thru is used when the BC is to be used as an effects processor. In this mode, the output of the BC will always be on effectively bypassing the VCA; there is no need to trigger the envelope for VCA modulation.

EG/ Thru/Gate select Push/Pull switch built into Volume control
 when this switch is in, then the VCA (volume) is modulated by the EG. When this switch is out the source for VCA modulation is determined by the VCA mode toggle switch.



Ring Mod Source - External Audio / LFO Toggle Switch
 the RM has two inputs. One is hardwired to the VCO square wave, the other is selectable. When the switch is up, the second source for the RM is the LFO. When down the external audio (if patched in) is the source.

Front Panel LED Indicators

EG Trigger

this indicator will light when ever a trigger voltage is present (note on/held).

LFO Frequency

this indicator will light on the positive cycle of the LFO waveform to indicate LFO speed. Its brightness will follow the level of theLFO, so with the triangle wave selected you will see it fade in and out of brightness.

Rear Panel (if bought with AS0018 case)

Pedal CV Level

alters the CV range of the CV pedal. Fully clockwise will give a pedal range of about 0-10V

Tips

Many of these tips require patching: this means using a CV lead to connect 2 sockets together. A CV lead is a standard mono 3.5mm mini jack to jack lead.

Auto Repeat

Patch LFO square out to EG trigger in. This way every time the LFO starts a new waveform, the envelope will re-trigger. To hear the effect best, have the VCA mode to EG, make sure the Attack and Decay settings are low.

AS0018 Case

Some features of the BC can only be used when mounted in the AS0018 case, such as the 6.35mm audio in and out sockets, and also the CV pedal. Other features require the optional MIDI board.

The AS0018 case provides additional rear panel sockets:

6.35mm Audio output	- a duplicate of the front panel audio out, but with professional 1/4" jack socket
6.35mm Audio input	- a duplicate of the front panel audio input, but with professional 1/4" jack socket
CV Pedal sockets/control	- see below
15V AC power input	- power input for a 500mA 15V AC power pack. Use a 2.1mm standard DC plug

[rear panel pic]

The case requires a 'wall wart' power pack. Current rating at least 500mA and voltage around 15V AC (not DC!) power pack but anything from 12 to 16 should be OK. Cable termination with a 2.1mm standard DC plug.

Internally, the AS0018 power board supplies the BC with regulated 5V, 12V and -12V power.

MIDI Option

The BC can be control from a MIDI to CV converter via its front panel sockets, however if the MIDI option is purchased for BCs fitted in the AS0018 case, certain additional features are unlocked and CVs are conveniently hardwired to the BC so it becomes a MIDI analogue synth.

Hardwired controls

Pitch CV	- hardwired to the oscillator
Gate	- hardwired to the envelope generator
CV2	- hardwired to the filter cut-off level
Accent	- hardwired to the filter cut-off level
Slide	- hardwired the the BC's internal slew generator

For more details on the AS0018 MIDI option and how to use it, see the relevant section in this manual

Optional CV Pedal

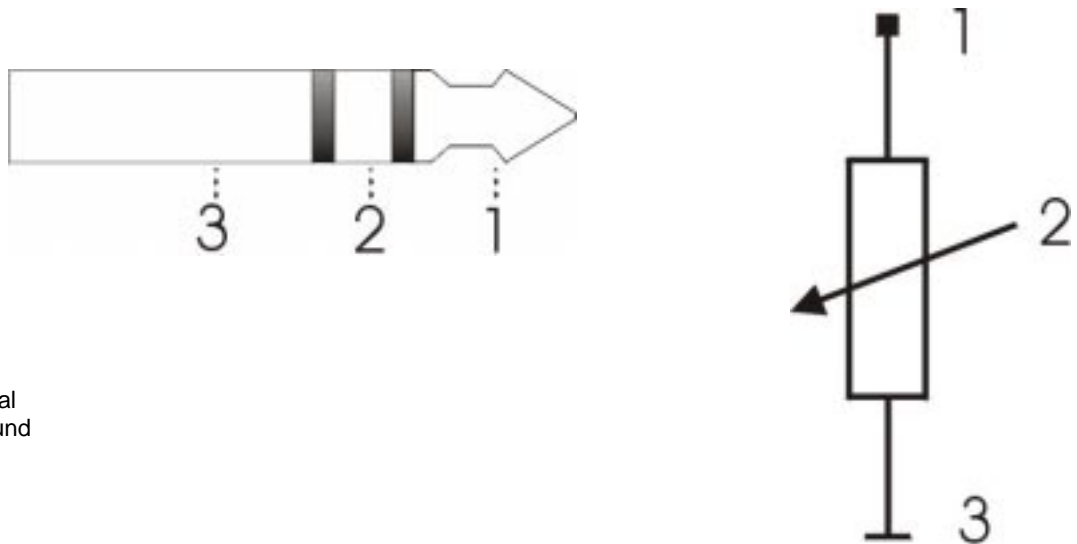
The AS0018 features a CV pedal input. A special kind of variable level foot pedal can be used to produce a variable CV. The CV range is 0 to 12V when the Pedal CV control is at maximum. This range can be reduced right from 0-12V to 0-0V.

To use the pedal CV voltage, you must use a CV patch lead (a standard audio lead terminated in 3.5mm jack plugs at both ends). Patch this from the Pedal CV output into one of the BC front panel CV inputs: Pitch, Filter Cut-Off or PW. As the pedal is push forwards, the voltage will increase.

The optional pedal we can supply is made of very durable plastic and will suit most musicians. However, we have yet to see whether it will withstand unreasonable stomping from heavy metal guitarists!

Any CV pedal that is terminated with a stereo 6.35mm jack plug, and with the correct internal wiring can be used.

The stereo 6.35mm pedal jack plug must have the potentiometer wiper on the ring as shown in the diagrams below.



- 1 12V
- 2 Signal
- 3 Ground

MIDI Instructions

note: built in MIDI is only available when the BC is mounted in the optional AS0018 case, and when the case has the optional MIDI fitted. The MIDI is the same as for our M2CV module shown below.

Introduction

The M2CV is a quick and easy to use module that allows control of analogue devices from a MIDI controller. The M2CV is straight forward MIDI to CV conversion. Whilst it has no 'thrills' it has the essential ingredients, giving you control for the lowest possible cost - yet still offers more than many converters in its price range. It is perhaps not suited to the 'live' musician as it does not have many realtime 'live playing' type parameters (like pitch bend or aftertouch), but these are not really needed for the sequencing musician which this device is aimed at.

Use

Connecting

Connect the MIDI sequencer or other MIDI device to the MIDI input of the M2CV.

Normally CV1 goes to the pitch CV input of your synth. CV2 goes to any other CV input, like filter cut-off CV. Gate goes to the Gate or Trigger input of your synth.

Make sure the M2CV is on the right MIDI channel and away you go!

Details

The Gate activity light will be lit whenever there is a gate voltage present (i.e. whenever 1 or more MIDI keys are held).

The Pitch CV out (CV1) conforms to 1V per Octave.

The controller CV out (CV2) responds to MIDI controller 1 (mod Wheel). It has a 0 to 10V range. Controller number cannot be changed. Resolution is 7 bit.

Legato

When 1 or more notes are overlapped, this output will change from 0 to 5V. It will return to 0V when no notes are overlapping. This output is ideal for activating devices like portamento, LFO reset, Clock inputs, VCF cut-off etc.

Accent

When a MIDI velocity of over 99 is received, the Accent output will go from 0 to 5V. It will not return back to 0V till it receives a MIDI note velocity value of less than 100. This output is ideal for accenting notes by connecting it to a VCA or filter cut-off input. It could also clock a sequencer or other device.

Note, there is no Pitch bend.

MIDI Channel Selection - MIDI receive channel is selected via 4 DIP switches. Their position selects the channel;



Note, switch order from top to bottom is A, B, C, D.	Switch	Channel	Switch	Channel
	A B C D	#	A B C D	#
	0 0 0 0	1	1 0 0 0	9
	0 0 0 1	2	1 0 0 1	10
	0 0 1 0	3	1 0 1 0	11
	0 0 1 1	4	1 0 1 1	12
	0 1 0 0	5	1 1 0 0	13
	0 1 0 1	6	1 1 0 1	14
	0 1 1 0	7	1 1 1 0	15
	0 1 1 1	8	1 1 1 1	16

Blank Set-up Sheets

Use these to store your favourite patches! Feel free to photocopy.

