



RED SQUARE

user manual
user manual

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SPECIFICATION

Brief Overview of the Red Square:

Red Square is a patchable analogue monosynth that can also be used as an effects processor. It has some of the advantages of a modular synth (re-wireable synth circuits, external control, external signal routing) and advantages of a pre-patched monosynth (easy to use, instant sound, tidy front panel). Its 1/4" jacks sockets mean it can easily be integrated into a studio just like any synth or processor.

VCO1

Glide, sync in, triangle out, saw out, square out, sub oscillator out

VCO2

Glide, triangle out, saw out, square out

VCF

Low pass filter, cut-off CV, Q CV, cross modulation from VCO1, external signal in, EG modulation

VCA

Mode switch, CV control

EG1

AR envelope with switchable sustain/release

EG2

Full ADSR envelope with normal or inverted output

VC LFO

Speed CV, saw, inverse saw, square and triangle outputs

Sample and Hold

Lag control

Noise Generator

White noise

Ring Modulation

MIDI to CV Converter

16 bit high resolution with auxiliary controller CV output

Headphone output

Multiples:

2x 4 ways

1x 5 way

Many other features.

Rotary controls:

31

Push button:

1

Switches

3 push pull

2 slide

1 momentary

LEDs:

4

+ 1 neon

Jack sockets (6.35mm, mono - 1 is stereo);

52

Rugged steel and aluminium construction

Dimensions:

5U/5HE (222mm high). Width (not inc. ears): 435mm. (inc. ears) 483mm. Depth:
145mm

Weight:

5.5Kg

Power:

230V or 115V (switchable), IEC socket, 2x Fuses

Accessories:

Manual, IEC power lead, patch leads

RED SQUARE

VC01 TUNE OUT=-2ve MOD.LEV PITCH GLIDE SYNC

VC02 TUNE OUT=-2ve MOD.LEV PITCH GLIDE SYNC

VC LFO SPEED MOD.LEV

MIXER NOISE OUT=-SUB EXT-SIG RM

VC LP FILTER CUTOFF EG AMNT Q X-MOD MOD.LEV

EG1 EG IN OUT SUSTAIN

EG2 EG TRIG

VCA THRU GATE EG1 MODE VOLUME

NOISE SUB NOISE

EXT-SIG EXT-SIG

TRIG TRIG

LEVEL LEVEL

SIGNAL SIGNAL

MOD.LEV MOD.LEV

PITCH PITCH

GLIDE GLIDE

SYNC SYNC

SPEED SPEED

LAG LAG

SIGLEVEL SIGLEVEL

CLOCK CLOCK

SIG SIG

PITCH PITCH

CV2 CV2

GATE GATE

ACCENT ACCENT

PROGRAM PROGRAM

MIDI-EV MIDI-EV

MULTIPLE MULTIPLE

MULTIPLE MULTIPLE

MULTIPLE MULTIPLE

PATCHABLE ANALOGUE EFFECTS PROCESSOR



PATCHABLE ANALOGUE SYNTHESIZER

INTRODUCTION

Congratulations on buying the Phobos Red Square patchable synthesiser. Red Square is part of the Phobos range of analogue music equipment.

Red Square's voice synthesiser circuitry is discrete (plus op-amps and logic ICs) and analogue.

APPLICATIONS

Red Square introduces 'modular synthesis' style sound creation for all those that are either daunted by their complexities, do not have to space for them, or find them too expensive. Red Square gives you the opportunity to create a diverse range of sounds by using patch cables to re-route the signals. Red Square is a quick and easy to use synthesiser as its design is in a more familiar monosynth format.

MONOSYNTHESISER

The top row of controls on Red Square act as a complete (pre-patched) monosynth. This section allows Red Square to be used straight away without having to patch any sections together. All that is needed is a MIDI cable and an audio cable. This means Red Square can be used straight away with no fuss or confusion as a powerful and flexible synthesiser sound machine.

The top row synthesiser comprises VCO1, Noise, External Signal, Sub Oscillator, VCLPF, EG1 and the VCA. The Ring Mod output also goes to the filter audio input, but its inputs must be patched first.

The additional sections like EG2, VCO2, Ring Mod, etc, can be patched into the monosynth to create even more varied and complex sounds, or they can be used independently or in conjunction with other synthesisers.

EFFECTS PROCESSOR

Don't just think of Red Square as just a patchable synthesiser. It is also a highly versatile analogue effects processor. Red Square has a panel full of professional quality 6.35mm jack sockets which allows it to be integrated into your studio set-up just like any effects processor. But instead of just another lifeless DSP processor, you have a warm, fat, or even down right dirty analogue effects processor.

The analogue filter and ring modulator can be used as two independent effects processors or chained in series for dual effects. They can be wired into your mixing desk's effect sends and returns just like any other effects unit. The additional sections of Red Square can be patched in to modulate the effect on your external audio signals. All this and you can still create and use an independent synthesiser patch too!

SAFETY INSTRUCTIONS

Please read carefully before using:

- Only use the correct power - 230 (or 115V whatever selected)
- Never handle the adaptor adaptor 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 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. This is to allow any possible condensation moisture inside the unit to evaporate. Although any built up moisture will not damage the unit, any shorting may be hazardous.
- Never open the case or attempt to make repairs. Refer any servicing to a qualified service personnel.

The power rating is switchable between 115 and 230 volts. Ensure the unit is switched off and the mains adaptor cable is disconnected before changing the voltage selection. Do not change when power is connected.

MOUNTING

Red Square can be rack-mounted in any standard 19" rack case. It requires 5U height, and very little depth. Always use all all four mounting holes so it is secured in the rack.

Alternatively, just place the unit on a stable surface. Rubber feet can be stuck on the back to stop it sliding about.

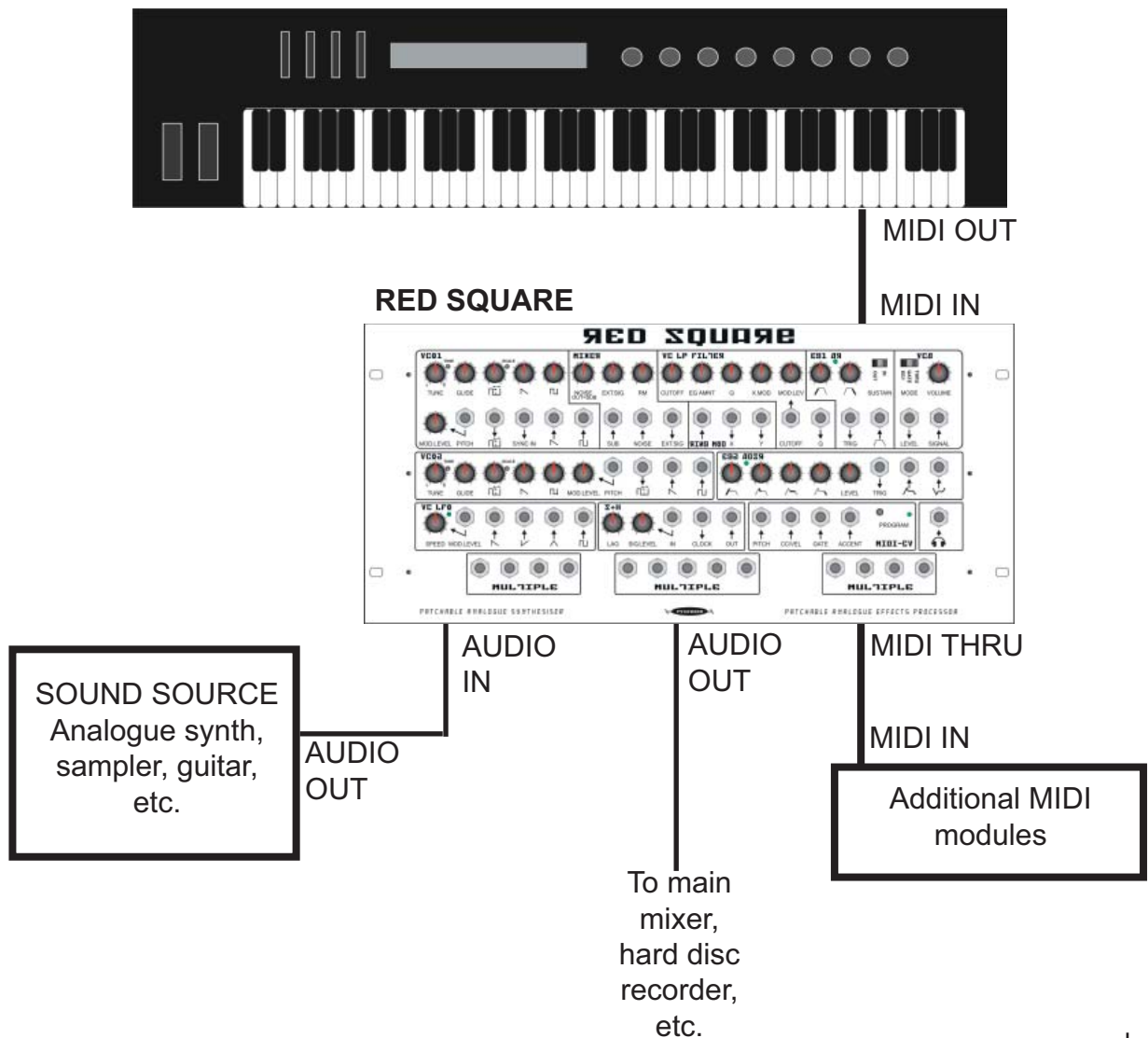
MIDI CONNECTIONS

Although Red Square can be controlled from another analogue synthesiser or analogue sequencer (using the CV and gate inputs), it is best played from a MIDI keyboard or sequencer.

Connect MIDI Out (or Thru) from your MIDI controller device to the MIDI In of Red Square. Additional MIDI devices can be daisy chained from the Red Square MIDI Thru socket.

REAR PANEL AUDIO CONNECTIONS

The main signal output is on the front panel, but it is also duplicated on the rear panel so Red Square can be integrated into your studio rack set-up. Connect this socket to a spare mixing desk input channel. In addition to the signal input socket on the front panel, there is a direct signal input socket on the rear panel (this one has no attenuation control though). Use this signal input socket if you wish to hardwire a signal to Red Square from your desk's effect send.

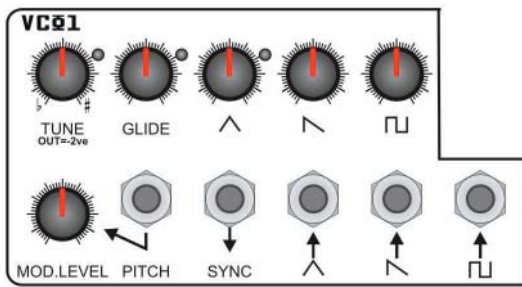


CIRCUITS IN DETAILS

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 and exactly what each circuit does but tried to explain their function and effect.

Several of Red Squares signals are hardwired to other circuits for your convenience, but note input and output sockets are still provided in most instances to retain maximum flexibility..

VCO1



The voltage controlled oscillators (VCOs 1 and 2) produce the raw audio waveform usually used as the initial source for sound creation. They provide cyclic audio waveforms that can be pitched. VCOs usually receive treatment from a VCF to turn their harshness into pleasant audio tones.

The pitch input for VCO1 is hardwired to the pitch CV of the MIDI to CV converter so it can be played from a MIDI keyboard. The saw and square wave signal outputs are hardwired to the mixer. Input and output signals are provided to enable VCO1 to be re-patched with other circuits.



TUNE control

Controls the pitch of VCO1. Range is about +/- 2 octaves. Use this to tune VCO1 to your other instruments.



PITCH CV LEVEL control and



CV input socket

This is a CV input for modulating the VCO pitch with a modulation CV, such as the LFO or envelope. The depth of the modulation is changed with the LEVEL control. Higher settings increases the modulation depth.

Usually something like an LFO is used to create vibrato effects, or the EG output to create pitch sweeps and drum sounds. Alternatily, use the output of VCO2 to create FM and metallic sound effects.



GLIDE control

Glide adds portamento to the pitch. As you play up or down the keyboard, instead of instant pitch changes, the pitch will slide up or down from the previous frequency to the new one played. The speed at which this happens lengthens as the GLIDE control is increased. A zero setting produces no glide.



SYNC signal input socket

Normally, you would feed a VCO signal into this socket, such as VCO2. Then try varying the pitch of VCO1 and listen to the results!



^ TRIANGLE LEVEL control and



signal output socket

Controls the output signal level of the triangle waveform fed into the filter input. The signal is output at fixed level from the TRI socket.



∩ SAW LEVEL control and



signal output socket

Controls the output signal level of the sawtooth waveform fed into the filter input. The signal is output at fixed level from the SAW socket.



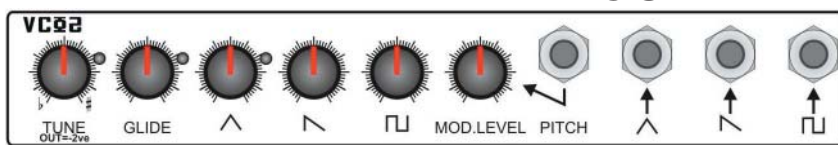
□ SQUARE LEVEL control and



signal output socket

Controls the output signal level of the square waveform fed into the filter input. The signal is output at fixed level from the SQUARE socket.

VCO2



VCO2 is not internally hardwired to any of the other circuits. It must be patched with other circuits

or used independently.



TUNE control

Controls the pitch of VCO2. Range is about +/- 2 octaves. Use this to tune VCO2 to your other instruments.



PITCH CV LEVEL control and



CV input socket

This is a CV input for modulating the VCO pitch with a modulation CV, such as the LFO or envelope. The depth of the modulation is changed with the LEVEL control. Higher settings increase the modulation depth.

Usually something like an LFO is used to create vibrato effects, or the EG output to create pitch sweeps and drum sounds. Alternatively, use the output of VCO1 to create FM and metallic sound effects.

It is also an octave scaling control. Use this to scale the octave spacing in-line with VCO1 (if you want both to track together).

To scale VCO2 to 1;

Patch an audio out from VCO2 to external signal in. Patch MIDI-CV Pitch out to VCO2 Pitch in. Set up the mixer, VCF and VCA so that both VCO's can be heard.

Hit note C2 on your MIDI keyboard. Use VCO2 Tune to tune the two VCO's together. Now hit a higher note, say C4. Now use VCO2 MOD.LEVEL to scale the octave spacing and therefore tune the two oscillators in. Repeat several times until both VCO's are in tune.



GLIDE control

Glide adds portamento to the pitch. As you play up or down the keyboard, instead of instant pitch changes, the pitch will slide up or down from the previous frequency to the new one played. The speed at which this happens lengthens as the GLIDE control is increased. A zero setting produces no glide.



^ TRIANGLE LEVEL control and



signal output socket

Controls the output signal level of the triangle waveform fed into the filter input. The signal is output at fixed level from the TRI socket.



∩ SAW LEVEL control and



signal output socket

Controls the output signal level of the sawtooth waveform fed into the filter input. The signal is output at fixed level from the SAW socket.

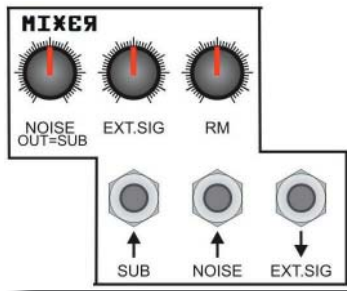


□ SQUARE LEVEL control and



signal output socket

Controls the output signal level of the square waveform fed into the filter input and also controls the volume at the SQUARE socket.



MIXER

The mixer is used to bring various audio signals together for filtering. The following audio signals are hard-wired to the mixer; VCO1 square, VCO1 saw, noise (or sub depending on switch NOISE/SUB status), ring modulator & external signal. The mixer output is hard-wired to the filter audio input.

Other signals can be patch into the mixer using the external signal input socket.



NOISE / SUB level control & switch

Controls the audio level of the noise generator or sub oscillator signal that is fed into the filter. This control has a built in push/pull switch. When it is push in, noise is selected and routed into the filter input. When pulled out, the sub oscillator is selected and routed to the filter input.

Whichever is selected, noise or sub, the control will alter the filter input level for that sound source. Both signal types are still available at full level out of their respective sockets.

Although with this method you might think only one or the other can be routed to the filter, that is not the case. If both are needed, route the one not selected via the switch from its output socket and back into the external signal input.



EXTERNAL SIGNAL input control

Controls the level of the external audio that is fed into the filter. The external audio must be patched via the EXT.SIG socket.



RM control

Controls the level of the ring modulator output that is fed into the filter. The RM output signal is available at full level from the RM out socket.

NOISE GENERATOR

The noise generator produces white noise. This is like the hiss you hear between radio stations. It can be patched into the S+H for random effects or to the filter for 'wind' and other sound effects.



NOISE signal output socket

The noise generator signal is output at full level from the NOISE socket - the NOISE / SUB level control does not affect the level.

SUB OSCILLATOR



SUB socket

The sub oscillator signal is derived from VCO1. It generates a square wave signal that is the same pitch, but one octave below VCO1. It can be used to beef up sounds. The sub oscillator signal is output at full level from the SUB socket. The NOISE / SUB control does not affect the level. When using the Sub, it is best to leave VCO1's PW unmodulated.

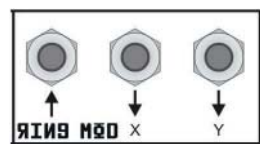
EXTERNAL SIGNAL INPUTS



EXTERNAL SIGNAL input socket

When you wish to filter external audio signals, for example synthesisers, effects processor, mixer effect sends, guitar, vocals, etc.; patch the signal into this socket. The signal can then be attenuated with the EXT.SIG level control and is then fed to the filter input.

RING MODULATOR



The ring mod (RM) is an effect that combines two sounds to produce interesting effects. I won't go into any technical details of how (you can read up on this if you wish). The best thing is to use it and listen to the results.

The RM needs two audio signals to work. You may wish to use VCO1 and VCO2 as the sources. Patch their outputs to the RM X and Y inputs, and hear the result from the RING MOD socket. Modulate either or both VCOs for maximum effect.

Alternatively, try one VCO as an input, and a second audio source such as vocals or guitar.

Whatever your input, the output will change depending on the pitch of the VCO signal or harmonic content.

The RM can be used independently from the rest of the synthesiser as a separate effects processor.



RING MOD signal output socket

This is the output from the RM. It is at full level and unaffected by the RM level control.



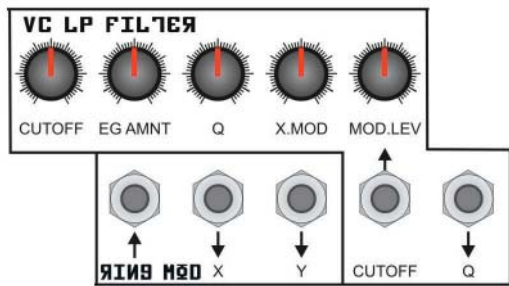
X signal input socket

This is one of the RM signal inputs. Feed an audio signal into here, such as the VCO1 output.



Y signal input socket

This is one of the RM signal inputs. Feed an audio signal into here, such as the VCO2 output.



VC LPF

The voltage controlled low pass filter (VCLPF) is a transistor ladder type filter. It has a sound similar to the popular 'Moog' sound. LPFs are circuits that remove harmonics above a certain frequency - the cut-off frequency. Use the LPF to change the tone of the sound. The filter has a roll-off of 24dB/octave. The mixer output is hard-wired to the filter audio input, however, external signals can still be processed using the external audio inputs sockets. The LPF audio output is hard-wired to the VCA signal input. EG1 signal output is wired through the EG Amount socket.

The filter audio input, however, external signals can still be processed using the external audio inputs sockets. The LPF audio output is hard-wired to the VCA signal input. EG1 signal output is wired through the EG Amount socket.



CUT-OFF control

This sets the cut-off frequency, the point at which the LPF will start to filter-out harmonics.



EG AMNT control

The EG Amount control sets the amount EG1 will modulate the filter cut-off. When this control is set above zero, the filter cut-off will sweep up and down with the EG signal.

Use this to add some movement to the cut-off over time.



Q control and



Q input socket

Q, or resonance is a feature of adding feedback to the filter circuit. The output of the filter is feed back into the input. Q sets the level of feedback. As the control is increase to higher levels, the filter will self-oscillate. The oscillation frequency is set by the cut-off control. Use Q to alter the tone of the filter effect. It can be used to create 'squiggy' sounds and 'pulse hits'. The amount of resonance can be set using an external CV from, for example, the LFO, using the Q input socket.



X.MOD control

X.MOD (cross-modulation) sets the level of cut-off modulation received from the audio output of the mixer. Increasing this control can add crunchiness to the sound. Plenty of audio effects can be created by experimenting with the cut-off, Q and levels and input signals of the mixer. Put Q into self-oscillation to produce a more dramatic effect.

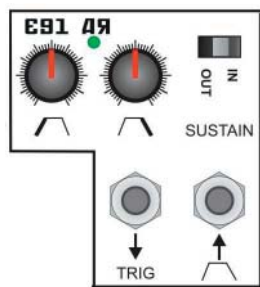


EXT.CV control and



CUT-OFF input socket

The cut-off frequency can be modulated with an external CV, for instance the LFO. Patch the modulation CV to the CUT-OFF socket. The level of modulation is determined with the EXT.CV control. There is no external modulation when the level is at zero. Increasing the control increases the level of cut-off modulation,



EG1 AR

EG1 is an AR (attack / release) envelope generator. Its output internally hard-wired to the filter cut-off level (via the EG AMT control) and the VCA level (via the VCA MODE switch). The trigger input is hard-wired to the MIDI to CV converter Gate output. TRIG and CV inputs are available to re-patch it with other circuits.

LED indicator

This wil turn on each time EG1 receives a gate signal.



OUT IN

SUSTAIN IN/OUT switch

IN

When selected Sustain is enabled, and the Decay/R control becomes a Release time control. After the attack sequence has finished and the envelope has reached full level, it will remain there as long as the Gate input is held high (i.e. note held down),

OUT

When selected there is no Sustain, and the Decay/R control becomes a Decay time control. After the attack sequence has finished, the envelope signal will decrease down to zero at a rate determined by the Decay control.

ATTACK control

Controls the Attack time. This is the rate at which the envelope signal will take to reach full level when the Gate input goes from low to high (note pressed).

DECAY/Release control

Controls the Decay or the Release time, depending on the position of the SUSTAIN switch. See SUSTAIN IN/OUT switch above for more details.



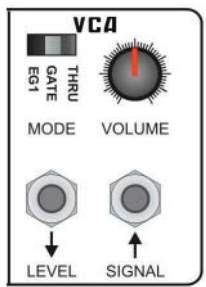
TRIGGER input socket

This is the Trigger or Gate signal input that sets the envelope in motion. Use a +5 to 10V gate signal.

EG1 CV signal output socket

This is the envelope CV signal output for EG1.

VCA



The Voltage Controlled Amplifier (VCA) is the circuit that is used to change the output volume. Normally an envelope signal would be used to do this, so the sound starts loud then gradually fades away. The filter audio output is hard-wired to the VCA signal input.



EG1 THRU GATE

MODE switch

EG1

When EG1 is selected, the envelope signal of EG1 is used to modulate the VCA level. Use it if you require the VCA level to change over time.

GATE

When GATE is selected, the MIDI converter's Gate signal is used to modulate the VCA. With this, the VCA level is either off or full on. The audio envelope would be like an organ's, with no attack or decay time.

THRU

When THRU is selected, the VCA is left permanently on at full level. Use this setting if you wish to use the Filter as an effects processor, to process external audio fed into Red Square.



CV input socket

Use this socket if you wish to modulate the VCA level from a source other than EG1, Gate, or permanently on. Maybe feed an LFO into this socket for tremelo type effects. Usually it is best to put the VCA Mode switch to Gate when using this socket.



SIGNAL output socket

This is the main audio output of Red Square. This is the socket you would use to connect it the your mixer. It is the output from the VCA, which is the last circuit in the signal chain. The signal level is affected by the Volume control (see below).



VOLUME control

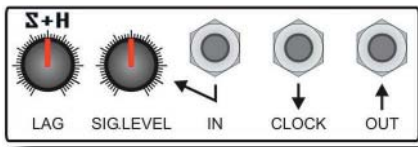
This sets the volume of Red Square, i.e. the output level from the VCA that is output from the SIGNAL output socket. It also controls the output level for the Headphone socket.



Headphone output socket

This is a stereo output for private headphone listening. Level is controlled with the VOLUME control, which also controls the SIGNAL output level too. Please note, the main SIGNAL output will still be active when headphones are used, so you may wish to disconnect the SIGNAL output, or mute Red Square on your mixer. Ensure the level is not too high before putting on the headphones! Turn the level to zero first, then slowly increase it to a comfortable level.

SAMPLE AND HOLD



The sample and hold (S+H) circuit is for CV processing. It is entirely independent from all the other circuits, and must be patched to be used.



LAG control

This adds slew/portamento to the S+H output. The voltage will 'glide' from one level to the next, smoothing out the voltage changes.



input LEVEL control and



signal INPUT socket

The LEVEL control attenuates the input voltage coming in the INPUT socket. Typical sources to use for the S+H are noise (for random voltage effects) or maybe an LFO output (for a stepped LFO signal). If the input signal is too loud, the S+H may not function correctly (producing interesting results!) so if necessary, reduce the input level to a satisfactory level.



CLOCK input socket

Input a clock signal into the CLOCK input. Maybe use a square wave from an LFO, or the GATE output of the MIDI to CV converter. Each time a clock signal is received, the S+H will sample the voltage at the INPUT socket, and hold that level at the OUTPUT until the next clock signal is received.



signal OUTPUT socket

This is the S+H signal output.

Use

The most typical use of a S+H is to produce random voltages;

Patch the Noise output to the S+H INPUT.

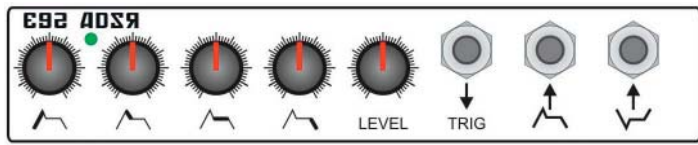
Patch LFO Square wave to the S+H CLOCK input.

Turn LAG to zero.

Patch the S+H OUTPUT to, for example, the VCO CV input.

Increase the S+H LEVEL input control to a suitable level.

EG2 ADSR



EG2 is a full ADSR envelope generator with normal and inverted outputs. It is entirely independent from all the other circuits, and must be patched with them to be used.

LED indicator

This indicator shows the output status of the envelope socket, varying in brightness as the CV signal changes.



ATTACK control

After a Gate signal is received at the GATE input, Attack sets the time it takes the envelope signal to rise to maximum value from zero.



DECAY control

This sets the time it takes the envelope signal to decrease from the peak level (after the Attack time has completed) to the Sustain level.



SUSTAIN control

This sets the level at which the envelope signal will settle at after the Decay time has finished. The envelope signal will remain at the Sustain level as long as the Gate signal is present.



RELEASE control

When the Gate signal is off, Release sets the time the envelope signal takes to decrease to zero from the Sustain level.



LEVEL control

This sets the envelope output signal level for both the normal and inverted outputs.



Normal output socket

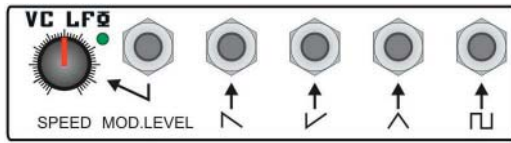
Is the output for normal (positive) envelope signal.



Inverted output socket

Is the output for the inverted (negative) envelope signal.

VC LFO



The Voltage Controlled Low Frequency Oscillator (VCLFO) is basically identical to a VCO, except that it produces periodic wave forms of low frequency, typically sub-audio. These slow cyclic waveforms are used for modulating other circuit parameters, for example, for sweeping the filter cut-off up and down, either slowly for a nice sweep, or faster for a 'wah-wah' type effect. It could be used to modulate the VCO pitch for vibrato, or the VCA level for tremelo. It could even be used to trigger the sample and hold or the envelope generator.



SPEED control

This sets the frequency (speed) of the VC LFO.

SPEED LED indicator

This will turn on each time the LFO signal is at a positive voltage, indicating the speed of the LFO waveform.



SPEED CV input socket

The speed of the LFO can be changed using another CV, for example an EG output signal can be used to change the speed of the LFO over a period of time.



Sawtooth waveform output socket

Is the output for sawtooth CV signal.



Inverse Sawtooth waveform output socket

Is the output for inverse sawtooth CV signal. It is the same as the sawtooth output, except the wave form is inverted.



△ Triangle waveform output socket

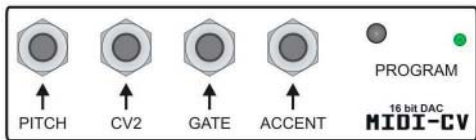
Is the output for triangle CV signal. This wave is more suited to smooth modulation changes, e.g. vibrato, filter sweeps.



□ Square waveform output socket

Is the output for square wave CV signal. This is suitable for sudden changes of CV, or for triggering other devices, for example, the Sample and Hold, or one of the Envelope Generators.

MIDI to CV CONVERTER



The MIDI to CV converter (MCV) is a device that converts some MIDI signals into analogue voltages. It allows analogue synthesiser circuits to be integrated and used with your MIDI set-up.

MIDI messages that are responded to are Note on/off, Velocity, Mod Wheel, All notes off. Note messages provide analogue outputs for pitch CV, auxiliary CV, Accent and Gate.

Activity LED

The Activity LED will briefly light whenever it receives a MIDI message that itself will respond to, i.e. a message on the correct channel, and of correct type, note on/off and mod wheel (if CC/VEL source is set to mod wheel). It remains on when Red Square is in Program mode.

PROGRAM button

See 'MIDI Set-Up' section later.



PITCH CV output socket

PITCH is the pitch control voltage output from the MIDI to CV converter. Incoming note value data from the MIDI In socket is converted from digital MIDI signals into analogue CV's. The pitch CV varies from -2V to about 8V. The scaling is 1V per Octave. This means as you go up one octave, the output voltage goes up by 1V. Use PITCH to control the pitch of VCO2. Note, PITCH is hard-wired to the pitch input of VCO1.

The pitch will respond to pitch bend messages. The range can be changed (see later). The pitch output can be transposed (see later).



CONTROL output socket

CONTROL is the auxiliary control voltage output. Incoming controller data from the MIDI In socket is converted from digital MIDI signals into analogue CV's. CONTROL varies from 0V to about 10V. Use CONTROL when you want to control certain parameters of Red Square from MIDI. Typical useful examples are velocity to control filter cut-off (great for filter dynamics), Mod Wheel to control LFO speed, etc.



TRIG output socket

Incoming note on/off data from the MIDI In socket is converted from digital MIDI signals into analogue Gate signals. Gate signals are either on (about 10V) or off (0V). Gate is usually used to trigger the envelopes or sample and hold circuits. Note Gate is hard-wired to EG1's trigger input. Gate can also be used to control an of the other CV inputs, like filter cut-off or LFO speed.



ACCENT output socket

When a MIDI note on message with a velocity over 80 is received, then the ACCENT socket will go high (about 10V). It will remain high until a new MIDI note on message is received that has a value lower than 80, when it will go low (0V).

This is useful for controlling CV inputs, or triggering envelopes.

Setting The MIDI Receive Channel and CONTROL CV Source

Setting up Red Square's MIDI is quick and easy. No menus or sub-menus need to be navigated.

Program Button

Ensure MIDI connections are made correctly.

Press and hold the Program Button.

Red Square will set itself to omni-on mode (will receive data from all MIDI channels).

Either press a key or move a MIDI controller.

Red Square will extract the MIDI transmit channel number from the note or controller data that was received and set itself to receive on that channel. The channel number is stored in non-volatile memory.

If a MIDI note was used to set the channel, then CONTROL CV will set to be controlled from MIDI velocity messages.

If a controller was used, then CONTROL CV will set to be controlled from that controller.

Release the button.



MULTIPLES

There are 3 multiples included in Red Square. Multiples are used to split signals so that a signal that is only available on one socket can become available on additional sockets. Therefore the output signal then can be routed to more than one output. For example, feed the MIDI converter's Control CV into the multiple, then take the multiple outputs into LFO frequencer CV input, VCF cut-off CV input and VCO2 pitch CV input.

Multiples are usually used to split output signals, but they can be used as crued mixers, but there may be problems with impedance levels.

There are two 4 way multiples and one 5 way multiple.

DIRECT
AUDIO IN

AUDIO OUT

MIDI-CV

TUNE
CONTROL
OFFSET

THRU IN

RED SQUARE

2x T500mA FUSES

230V/50Hz
115V/60Hz



Select correct mains voltage using the switch underneath. Disconnect mains before changing.
No user serviceable parts inside. Please refer servicing to qualified engineer.
To prevent risk of fire or shock, do not expose this unit to rain or moisture.
To prevent risk of electric shock do not open cover.

MADE IN GREAT BRITON

REAR PANEL

POWER IN

This unit requires 230V AC power (or 115V if selected). The socket is a standard IEC type, requiring IEC power cable. Do not change the voltage setting when a power lead is connected. Use the correct voltage for your supply.

MIDI IN

Plug your MIDI cable in here. Connect this to the MIDI out or thru of your MIDI controller.

MIDI THRU

The MIDI data coming into the In socket is copied to the Thru socket. This is so you can control additional devices from your MIDI controller without the need of a MIDI thru box.



EXTernal SIGNAL IN input socket

This is a direct signal input to the filter. The front panel EXT.SIG control does not affect the level of this input. Use this socket to feed external signals into the filter for processing.

As it is on the rear panel, it is ideal for hard-wiring into your studio set-up when Red Square is rack-mounted.



SIGNAL OUT output socket

This is the main audio output for Red Square. It is the signal output from the VCA. This socket is duplicated on the front panel (SIGNAL).

As it is on the rear panel, it is ideal for hard-wiring into your studio set-up when Red Square is rackmounted.

All jack sockets are 6.35mm mono.

PATCH EXAMPLES

To create good sounds with Red Square, simply experiment patching any output to any input. Play around with the controls and remember what works and sounds good and develop those patches. Below are some simple examples to point you in the right direction;

One Oscillator Monosynth

No patching needs to be done (aside from the MIDI In cable and audio out cable).

Ensure the correct MIDI receive channel has been selected.

To hear VCO1, VCA VOLUME level (audio out level) must be increased, the audio level of VCO1 (or SUB/NOISE level) must also be increase to maximum.

If the square wave is being used, then there are certain pulse width settings that may not produce any audio, so if necessary, adjust the PW to a suitable level.

If the filter cut-off level is too low, little audio output may result, so set the cut-off to a suitable level.

In normal use, put the VCA mode switch to EG.

Two Oscillator Monosynth

Set up the top row single voice monosynth as normal.

To get the 2nd VCO working with the 1st;

patch MIDI-CV PITCH to VCO2 PITCH to control VCO2's pitch

patch VCO2 audio out to EXT.SIG on the mixer to hear VCO2

Turn VCO2 MOD.LEVEL to maximum so the pitch is modulated by the MIDI-CV.

Turn EXT.SIG up on the mixer to hear the audio!

VCO2 will now be controlled by MIDI along side VCO1. Audio is mixed with that of VCO1.

Using The Sample And Hold To Produce Stepped And Random Voltages

patch NOISE output to S+H SIGNAL IN, noise is the signal to be sampled

patch LFO SQUARE to S+H CLOCK. The S+H will clock at the LFO rate

patch S+H OUT to VCO1 PITCH (for example) to hear the result

Increase the S+H SIG.LEVEL control to near maximum. Turn the LAG control to minimum. Turn the VCO1 MOD.LEVEL control to maximum.

Ensure you can hear VCO. Turn the LFO to a suitable speed and you can hear VCO1's pitch change randomly. The LFO speed decides when the pitch will change. Altering the S+H SIGNAL LEVEL control will alter the range of the random voltage. Note, if the S+H SIGNAL input is overloaded unpredictable results may occur! Not necessarily a bad thing.

Increase the LAG control. You should now hear the pitch bend and slew to each new pitch change. Note, if the SLEW rate is too high, the S+H may appear not to work. It is, it is just that the voltage is changing far quicker than the slew rate.

Experiment with other voltage sources, for instance use the output of an envelope into the S+H. You will get a stepped rather than smooth EG signal. Try other destinations, such as filter cut-off instead of using the pitch.

The S+H can be triggered from the MIDI-CV GATE output instead of using the LFO SQUARE wave. Experiment!

Using EG2 To Modulate The Filter Cut-off

patch MIDI-CV GATE out to EG2 TRIG to trigger the EG from a MIDI note.
patch EG2 SIGNAL out to CUTOFF mod in

Setup the top row monosynth as normal. Increase the cut-off MOD.LEV control and EG2 LEVEL. Turn the EG.AMNT control to minimum, as we do not want EG1 to modulate the filter.

When the MIDI keyboard is played, EG2 will also trigger. The output will be modulated the filter-cut-off.

Unusual Effects With The LFO Speed

The speed of the LFO can be modulated by any source. First patch the output of the LFO to another module, for example to VCO1 PITCH modulation input, to produce a vibrato effect.

Next, patch another modulator source to the LFO SPEED CV input; some examples;

patch MIDI-CV CC/VEL to use MIDI to alter the LFO speed
patch EG1 SIGNAL to have EG1 sweep the LFO speed

Using The Ring Modulator On Its Own

The Ring Mod can be used independently from the rest of the synth. Simply patch 2 external audio sources into the X and Y inputs and take the RING MOD OUTPUT back into your mixer. Experiment with different audio sources and levels.

Using The Ring Modulator With The Internal VCOs

patch VCO1 signal out (saw or square) to RING MOD X
patch VCO2 signal out (saw or square) to RING MOD Y

The Ring Mod output is already hardwired to the mixer, so it can be used through the filter and VCA. Alternatively, you can keep the mix level to zero, and just take the Ring Mod output straight out the RING MOD socket.

Ensure VCO2 SIGNAL LEVEL is turned up. Play around with the pitches of the 2 VCOs and listen to the results.

CALIBRATION

Red Square is an analogue synth, that means it may need tuning from time to time. The synth is very stable, so hopefully you should never have to calibrate it, but details are given here for those who insist on making adjustments themselves.

A few important notes;

If any of the following instructions do not make complete sense to you, you are not qualified to calibrate!

Adjusting the VCOs for temperature involves opening up Red Square. This will void your warranty. We do not recommend you open up the synth for safety reasons. It is not likely you will have to make this adjustment. Just the Low and High end adjustments outlined.

Allow around 15 minutes of warm up time before attempting to calibrate. Ensure you calibrate Red Square correctly otherwise you might throw it out completely.

Calibrating the MIDI to CV Converter

See MIDI instructions.

Calibrating VCO1

Initial Set-Up

Put the Tune control to approx. centre.

Pull Tune control out to set a low octave.

Centre all cermet trimmers.

Ensure no modulation signals are patched to the VCOs.

Use a guitar tuner to measure tuning.

Temperature Adjustment

Before applying power to the board, put a short across R17. If power has already been applied, short R17 and allow 5 minutes warm up period before making the next measurement. Note; there is a 2 pin connector that can be used to make the short located just next to the Temp. adjustment trimmer.

Measure the voltage at pin 5, IC2. Note the reading.

Remove the short across R17. Adjust the Temp. trimmer until the voltage at pin 5 reads 60mV below the original reading you made. This assumes the ambient temperature is 22C. If not, refer to the table below;

F	C	mV value to subtract from 1st reading
62	16	70
67	19	65
72	22	60
77	25	55
82	28	50

Low End Tuning

Press C5 on the MIDI keyboard.

Adjust Tune trimmer to get C pitch on the guitar tuner.

Press C3.

Adjust Scale trimmer to get C pitch on the tuner (2 octaves down).
Repeat the above block of instructions until a perfect octave spread is obtained.

High End Tuning

Push the Tune control in to raise the pitch up an octave. Be careful not to turn it and disturb the pitch tuning.

Press C3 and adjust the Tune trimmer to get C pitch on the tuner.
Press C5 and adjust the Hi.End trimmer to get C pitch.
Repeat the above block of instructions until a perfect octave spread is obtained.

All should be OK now, but you can repeat the whole sequencer (except the Temperature adjustment stage) just to be sure the octave spread is satisfactory.

Calibrating VCO2

Adjusting VCO2 is identical, except;

You must patch the MIDI-CV pitch CV output into the VCO2 MOD.CV socket input.
Turn the CV MOD control to maximum.

Instead of using a guitar tuner, you could use VCO1 as an audio reference and zero-beat them for accurate tuning.

Notes;

Unless you are a competent person, do not do the calibrations yourself. You are liable to make the tuning worse!

The trimmers are available through the small front holes located in-between the main VCO controls. From left to right, they are; Scale / Tune / Hi.End. The Temperature trimmer is located inside the Synth, behind the Glide control at the back of the circuit.

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