RS380

MODULATION CONTROLLER

INTRODUCTION

The RS380 is a composite module comprising four separate 'sub-modules' that you can patch together or with other RS Integrator modules to generate and control a wide range of effects. It is designed for use when space is at a premium, and combines a flexible Voltage Controlled Low Frequency Oscillator (VC-LFO) with a noise generator, a Voltage Controlled Amplifier (VCA) and a random signal (sample & hold) generator.

The RS380 is extremely flexible, but should you require more extensive facilities and control in each of these areas, you should consider using three separate modules: the RS40 Clock module, Noise Generator, and Sample & Hold Generator; the RS80 Voltage Controlled Low Frequency Modulator; and the RS180 Voltage Controlled Amplifier.

VC-LFO

Voltage Controlled Low Frequency Oscillator

[The following introduction is derived from the chapter on the RS80 Voltage Controlled Low Frequency Oscillator.]

Not all periodic oscillations occur within the range of audible frequencies, but this does not mean that you can not hear them. For example, a violinist's vibrato may take the form of an oscillation at, say, 5Hz, while the growl produced by over-blowing a brass instrument may occur at 18Hz. Even in isolation, you may hear a periodic waveform at subsonic frequencies - for example, a clock oscillator with an output of 1Hz will sound like a series of clicks. (Strictly speaking, these have a high bandwidth due to the transient nature of the waveform, and you would not hear a sine wave of the same frequency, but that is not the point.)

Synthesisers have a class of oscillators - Low Frequency Oscillators (LFOs) - that create these, and many other, effects. They can add vibrato to a sound, produce growl, act as low frequency clocks and, on some synthesisers, double as audio frequency oscillators.

IN USE

The RS380 VC-LFO offers a very low minimum frequency that allows you to create a variety of varying modulations and effects. Its maximum frequency lies in the middle of the audio range. The RS380 VC-LFO can, therefore, be used in three ways: as a low frequency modulator; as an audio frequency modulator; and as a secondary sound source.

Frequency

The FREQUENCY knob has two ranges:

- HIGH

  Turning the FREQUENCY control from its minimum to its maximum will cause the VC-LFO to produce its upper range of frequencies from 5Hz to 1,500Hz.

- LOW

  Turning the FREQUENCY control from its minimum to its maximum will cause the VC-LFO to produce its lower range of frequencies from approximately 0.3Hz to 6Hz.

You may control the VC-LFO rate by applying a suitable CV to the CV FREQ socket. In doing so, you may extend the maximum and minimum frequencies well beyond the ranges quoted above. This is normal.

Note: The CV FREQ input does not conform to the 1V/oct standard so you will not be able to use it as a conventional oscillator.

Waveforms

The RS80 generates two waveforms, although you can not use these simultaneously. The first of these is the triangle wave, which is often used for imitating acoustic characteristics such as vibrato and tremolo. The square wave is suitable for acoustic effects such as trills, as well as for controlling many other aspects of the synthesiser.

- TRIANGLE

  The level of the triangle wave is controlled using the associated OUTPUT DEPTH control, and has a maximum output of approximately ±2.5V.

- SQUARE WAVE

  The level of the square wave is controlled using the associated OUTPUT DEPTH control, and has a maximum output of approximately ±5V.

Status LED

The status LED gives you a visual indication of the LFO frequency.

NOISE GENERATOR

INTRODUCTION

[The following introduction is derived from the chapter on the RS40 Clock module, Noise Generator, and Sample & Hold Generator.]

Most audio oscillations are 'periodic': that is, when displayed on a screen, they exhibit a recognisable shape that repeats and repeats and repeats… The best known examples of periodic waveforms are sine waves, triangle waves, pulse waves, and sawtooth waves. However, not all audio frequency oscillations exhibit this repetitious nature, and the most common of these 'aperiodic' waves is called "white noise". But why "white" and why "noise"? Let me explain each in turn…

A signal is perceived as noisy if it is random. Described another way, pure noise contains no discernible frequencies or tones.

But some noises may be described as rumbles, hisses, or even shrieks. In each of these cases, the waveform itself is random, but the signal contains only a narrow band of frequencies. Audible noise may, therefore, be "coloured" in exactly the same way that visible light is. If lower frequencies predominate, the noise has a deep, rumbling character, and it is called 'pink' or 'red' depending upon its precise nature. If high frequencies predominate, the noise is 'blue'. But if all frequencies are present in equal amplitudes, the noise is 'white'. This is analogous to light, where the presence of all the visible frequencies at equal amplitudes is perceived as 'white'.

White Noise is, therefore, a signal that contains all the audio frequencies in equal amounts, and which manifests no recognisable pitches or tones. Another definition is this: a white noise signal is one in which the probability of a frequency being present is equal to the probability of any other frequency being present.

Many natural sounds display noisy characteristics - the crashing of waves and the howl of a strong wind are prime examples of these - and it would be impossible to synthesise such sounds without a noise generator. Many musical instruments also generate noise, although the amplitude of this part of the signal is generally low, and its colour is largely dependent upon the instrument. Fortunately, you can filter white noise to produce all other 'colours' of noise. You can also use resonant filters to accentuate certain frequencies, and modulate the noise amplitude to create such things as chiffs or wind and wave effects.

IN USE

Unlike a standard oscillator, a white noise generator requires no controls for its waveform or its frequency. There is, therefore, just a single output, which carries the noise signal. There are no controls, and no inputs.

NOISE OUT

The noise is output from the NOISE-OUT socket.

RANDOM GENERATOR (SAMPLE & HOLD)

INTRODUCTION

[The following introduction is derived from the chapter on the RS40 Clock module, Noise Generator, and Sample & Hold Generator.]

Sample & Hold (S&H) circuits provide many recognisable 'synthesiser' sounds by making modules such as oscillators and filters 'step' between values, thus creating rapidly varying patterns of pitch or timbre. They do so like this…

The S&H circuit produces stepped voltages by 'sampling', and then 'holding' the instantaneous value of any signal presented at its input. This signal could be a CV, an external signal such as the music from a CD or the sound of an instrument being played. Most commonly, however, a noise source is used because this creates a number of musically pleasing 'random' effects.

The circuit samples the incoming signal voltage when it is told to do so by an external trigger, usually provided by some form of clock or other triggering pulse. The voltage thus measured will then be held and presented to the output until the next trigger is received, at which time a further sample will be made, and the voltage at the output assumes its new value.

When the S&H output is presented to an oscillator's CV input it causes the pitch of the oscillator to follow the instantaneous amplitude of the signal presented to the S&H input. If directed to a filter, the S&H value determines the cutoff frequency of the filter, and therefore affects the brightness or timbre of any signal passing through that filter. Of course, the S&H circuit's output can be directed to all other modules, and can be used to modify any of the CVs or signals within the synthesiser.

IN USE

The RS380 RANDOM GENERATOR incorporates a highly stable S&H circuit that will sustain a constant voltage almost indefinitely. The S&H Clock is derived exclusively from the RS380's internal VC-LFO. There is just one input, the source signal input (SRC IN); and a single output.

SRC IN

This input accepts signals in the range ±10V. These signals may be CVs or audio signals, and may be generated within the RS Integrator or presented by outside sources such as CDs, microphones, or other musical instruments. If the signal amplitude is too low for effective use as a source, you can use the Pre-Amp sub-module in the RS70 to boost it to an appropriate level.

If no signal is presented to SRC IN, the RANDOM GENERATOR derives its source from the RS380's NOISE generator. This is pre-patched internally, so you do not need to use a cable to make this connection.

RND-OUT

Sampled voltages are output here. The maximum signal amplitude lies in the range ±6V.

VOLTAGE CONTROLLED AMPLIFIER (VCA)

INTRODUCTION

[The following introduction is derived from the chapter on the RS180 Voltage Controlled Amplifier.]

Amplifiers have a simple job - they amplify or attenuate the signals presented to them. Voltage controlled amplifiers (VCAs) are more sophisticated… they allow you to control the amount of amplification or attenuation by applying a voltage to a CV input. VCAs exist in every synthesiser that can shape a sound. You may think that it's the envelope that is, for example, changing the volume, but it isn't. The envelope is producing a CV that, when applied to a VCA, causes it to modify the signal passing through it. The VCA is one of the fundamental modules that allow us to make sounds develop over time.

IN USE

SIG-IN

This accepts audio signals and CVs in the range ±10V. The signal presented to this input is the signal that will ***be amplified*** by the VCA.

CV-IN and CV-DEPTH

The CV-IN input accepts audio signals and CVs in the range ±10V. The signal presented to this input is the signal that will ***affect the gain*** of the VCA.

You can adjust the depth of the CV-IN signal using the associated CV-DEPTH control.

SIG OUT A and B

There are two outputs. These carry the same signal in the range ±10V.

Note: The RS380 was designed for players who use modules such as the RS220 X-Y Controller (Joystick) as performance controllers. The VCA allows you, for example, to take the output from the RS380 VC-LFO and control its depth using the joystick. (To do this, you patch a joystick output to the CV-IN on the VCA.) However, the RS380 VCA is equally suitable for controlling the depths of signals provided by other RS Integrator modules.