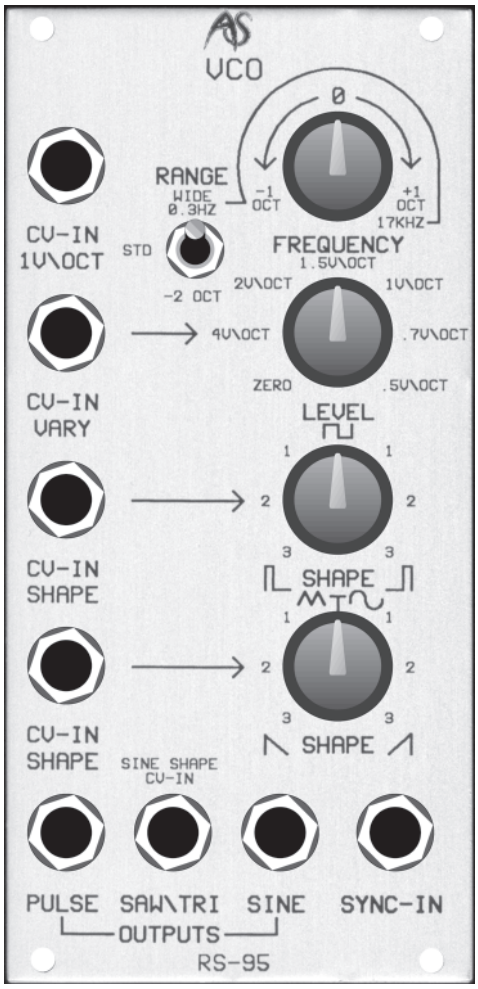
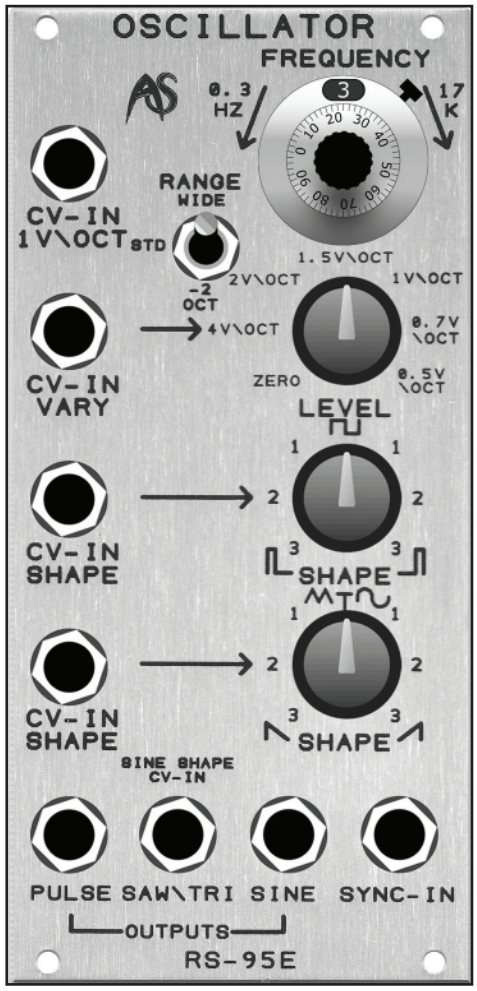
RS95 AND RS95E

ADVANCED VOLTAGE CONTROLLED OSCILLATORS WITH WAVE SHAPING





The RS95 and RS95E are further developments of the RS90 Voltage Controlled Oscillator. They differ from each other only in the addition of a high-resolution vernier potentiometer (similar to that used on the EMS VCS3 and Synthi AKS) on the RS95E. Compared with the RS90, each offers extra waveforms, additional waveshaping, and a third audio output. Consequently, many of the details in this section are identical with those of the RS90.

IN USE

The operation of any oscillator can be subdivided into three major categories: its pitch (or 'frequency') its tone (determined by its waveform) and its volume (or 'level').

FREQUENCY

The RS95 and RS95E generate a particularly wide range of frequencies. The minimum - approximately 0.3Hz - is well into the subsonic range, so they will double as LFOs when required. This architecture emulates that of the Minimoog and larger Moog synthesisers such as the IIIC and System 55. At the upper end of the scale, they will produce frequencies of approximately 17kHz, which is beyond many people's upper limit of hearing.

- CV-IN 1V/OCT

  The primary method of controlling the pitch is by applying a suitable CV to the CV IN socket. This respond to the 1V/Oct standard adopted by Moog, ARP, Roland and Sequential Circuits (among others). It will not allow you to play conventional melodies if you apply a CV conforming to the Hz/Volt standard used by Yamaha and on most Korg monosynths.

  Before leaving the factory, every RS95 and RS95E is calibrated to respond linearly to input control voltages ranging from -10V to +10V. This gives them a theoretical audio range of 20 octaves. In practice, the range is closer to a 16 octaves - far exceeding the capabilities of most other manufacturers' devices.

- FREQUENCY RANGES

  The frequency knob has three ranges:

  - WIDE
    Turning the FREQUENCY control from its minimum to its maximum will cause the RS95 or RS95E to produce its full range of frequencies from 0.3Hz to 17kHz.

  - STD

    This allows you to tune the oscillator across a full two octaves, making it possible to generate any given pitch between the -2 OCT and STD settings without applying a pitch CV.

    Slight detuning of one of a pair of oscillators produces a much thicker sound than would be obtained if both were in tune with each other. Radical tunings - such as fundamental with added third and fifth - offer a range of conventional 'synth' sounds.

  - "-2 OCT"
    This reduces the pitch of the RS95 or RS95E two octaves with respect to STD, but in all other respects the oscillator's operation is identical with the STD mode.

- CV-IN VARY

  The CV-IN VARY socket and its associated LEVEL control allow you to specify the oscillator's sensitivity to pitch CV within the range ∞V/Oct (marked "ZERO") to approximately 0.5V/Oct. The former of these makes the oscillator invariant to incoming CVs, while the latter makes it oversensitive compared to CV-IN 1V/OCT. This is particularly useful when using an RS95 as a sync oscillator because it then becomes harmonically unrelated to the audio oscillator, thus generating a different timbre on each note that you play.

WAVEFORMS

Unlike the RS90 (which generates two families of waveforms), the RS95 generates three families. The first is the rectangular family, whose waves are generally known as pulse waves and square waves. The second is the sawtooth family that includes falling saws, triangle waves, and rising saws ('ramp' waves). The third is the sine wave and an associated family of skewed waves with unusual harmonic structures.

You can set the nature of the waveforms manually or control them dynamically using the CV-IN inputs provided for each family.

- PULSE WAVE

  You can adjust the pulse wave output from 0% (leading pulse) through square wave to 100% (trailing pulse) as you turn the PULSE SHAPE control from its fully anticlockwise position through to its most clockwise position. A square wave will be obtained when the knob is at 12 o'clock. You can also influence the pulse wave shape by applying a CV to the CV-IN SHAPE socket next to the PULSE SHAPE control, as follows:

  - A CV of +2.5V will generate a 0% duty cycle;
  - A CV of 0V will generate a square wave;
  - A CV of -2.5V will generate a 100% duty cycle.

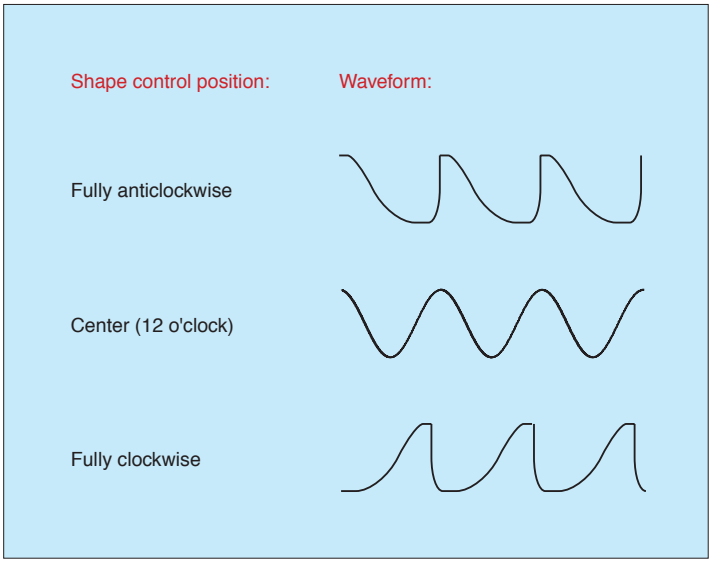
  The output from the SQR OUTPUT socket is approximately ±5V.

- SAWTOOTH/TRIANGLE WAVES

  You can adjust the sawtooth wave output from a falling sawtooth through a triangle wave to a rising sawtooth (ramp) as you turn the SAWTOOTH SHAPE control from its fully anticlockwise position through to its fully clockwise position. The triangle shape will be obtained when the knob is at 12 o'clock. You can influence the sawtooth wave shape by applying a CV to the CV-IN SHAPE socket next to the SAWTOOTH SHAPE control, as follows:

  - A CV of +2.0V will generate a falling sawtooth wave;
  - A CV of 0V will generate a triangle wave;
  - A CV of -2.0V will generate a rising sawtooth (ramp) wave.

  The output from the SAW/TRI OUTPUT socket is -2V to +8V when a true sawtooth wave is produced, and ±2.5V when a triangle wave is produced.



- SINE AND SKEWED SINE WAVES

The sine wave is a sadly underused waveform found on few analogue synthesisers. There is a good reason for this: it is not simple to generate a pure sine wave. Most oscillators with sine wave ouputs generate the waveform by re-shaping another wave; usually the triangle or, if this is unavailable, the sawtooth. Analogue Systems has taken this idea a step further to build a uniquely ***shapeable*** sine wave output.

There are two ways to shape the sine wave:

- Using the Shape control

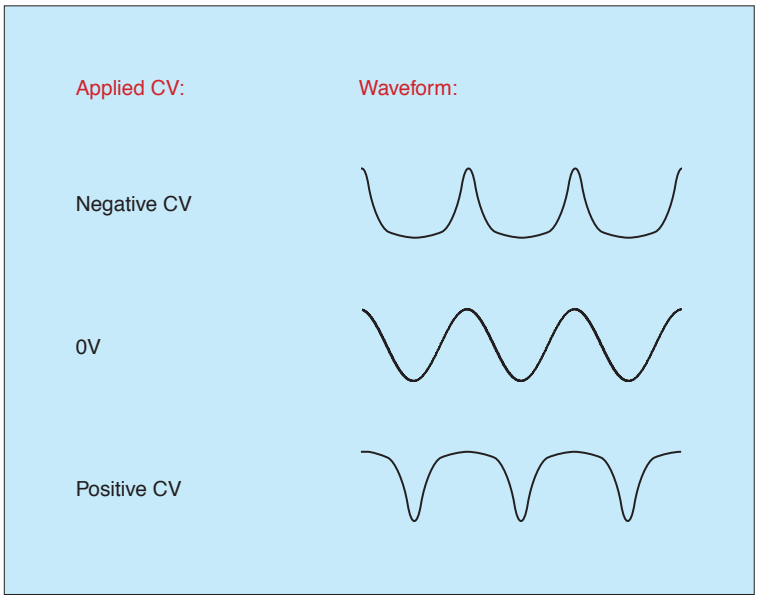
  You can use the shared SAW/TRI/SINE SHAPE knob to generate any of the waveforms shown below, or to select a waveform that lies anywhere between these extremes. These unusual waveforms have uncommon harmonic structures, and you can use them to create timbres that you will not be able to obtain from conventional synthesisers.

- Using the SINE-SHAPE CV IN

  You can use SAW/TRI OUTPUT* as a SINE SHAPE CV IN. This facility is unique to the RS95 and RS95E.

  The greater the applied CV (either positive or negative) the greater the amount of waveshaping there will be. As with the SHAPE control itself, you can use this facility to create timbres that you will not be able to obtain from conventional synthesisers.

  * ***This is not a typographical error. You use this OUTPUT as a CV INPUT.***



More on sine wave shaping:

There is nothing stopping you from using both the SINE SHAPE CV IN and the SHAPE control to create new waveforms not shown in these diagrams. Furthermore, a varying CV presented to the CV INPUT will produce interesting "chorused" sounds similar to, but more subtle than conventional pulse width modulation.

The output from the SINE OUTPUT socket varies from approximately ±1.5V to ±2.5V, depending upon the waveform produced.

Outputs

The RS95 and RS95E each offer an additional output compared with the RS90. This allows you to obtain the sine family waveforms simultaneously with the pulse and saw/triangle waveforms.

SYNC

Like the RS90, the RS95 and RS95E offer oscillator sync. This allows you to re-initialise the waveform by applying a second waveform at the SYNC IN input. The waveform is re-initialised every time the voltage of the synchronising oscillator passes 0V in a positive-going direction, increasing the harmonic complexity of the waveform, and thus the range of tones that you can obtain. The most popular use for sync is to generate "tearing" or "rasping" lead and bass sounds. However, the sync on the RS95 and RS95E is softer than that of the RS90, which makes it possible to generate a wider range of effects than before.