

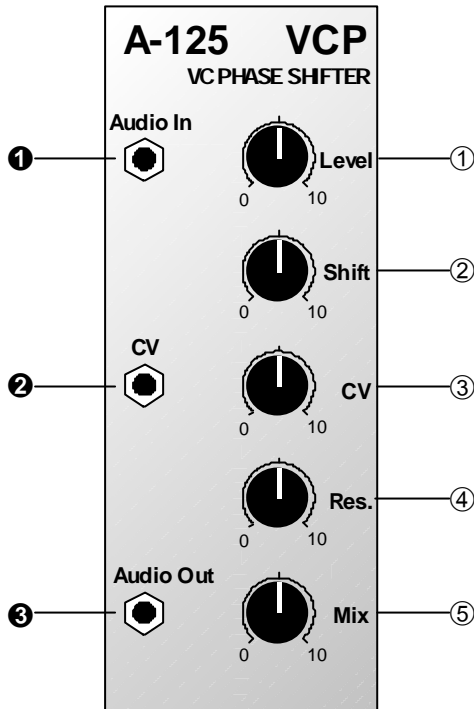
### 1. Introduction

Module **A-125 (VC Phaser)** is a voltage controlled phase shifter.

**Phase shifting** can be controlled either manually or by voltage control.

Other parameters which can be controlled are **resonance** (governing the depth of the comb filtering, and tonal color - see page 3) and **mix** (the amount of the original signal which is added to the phase-shifted signal).

## 2. VC Phaser - Overview



### Controls:

- 1 **Level** : Attenuator to control the level of the signal at input !
- 2 **Shift** : Control for manually setting the amount of phase shift
- 3 **CV** : Attenuator for the phase shift voltage control signal at input "
- 4 **Res.** : Resonance control
- 5 **Mix** : Control for setting the amount of the original signal added to the phase-shifted signal

### In / Outputs:

- ! **Audio In** : Audio input
- " **CV** : Input for pitch-shift voltage control
- § **Audio Out** : Audio output

### 3. Basic principles

The phasing process relies on dynamic comb filtering. The comb filtering produces a series of gaps in the audio spectrum (in Fig. 1, at 200 Hz, 1 kHz and 5 kHz), by the cancelling process which is created by having identical sounds 180° out of phase with each other (or 'inverted').

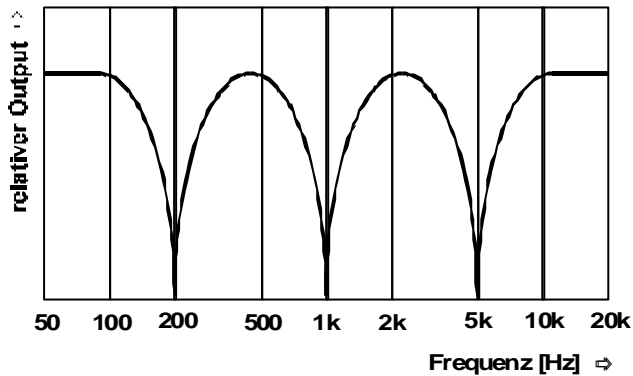


Fig. 1: The principle of phasing

These zero points are continuously swept through the audio spectrum, cancelling out different frequencies, and producing the characteristic phasing sound.

The principle can be explained by looking at the diagram (Fig. 2) of a phaser created by three band pass filters. Here, audio is input to the three filters BP1 to BP3 (notch filters also work), set to different middle frequencies. A slow LFO modulates the frequencies.

The outputs of the band pass filters are then mixed with the original signal. Because of the phase reversal inherent in the filter design (most apparent close to the middle frequency), different areas of the audio spectrum are cancelled out.

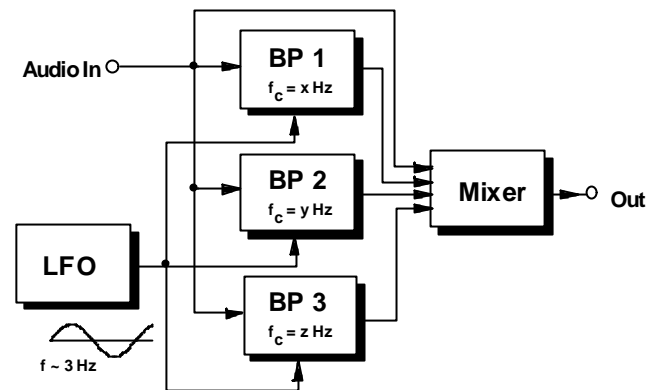


Fig. 2: A phaser model using separate modules

## 4. Controls

### 1 Level

Attenuator 1 controls the **level of the input signal**.

### 2 Shift

**Phase shift** amount is controlled with this knob, in a range from around 0° to 180°.

### 3 CV

As well as manual phase shifting, a control voltage at input " " can modulate the shift. Attenuator 3 sets the level of voltage control.

As a rule, a slowly changing signal (eg LFO, ADSR, Random, etc.) is used for this modulation.

### 4 Res.

This knob controls the **resonance** - the amount of the output signal fed back to the input. With this you can

control the exact depth of the signal cancellation (see Fig. 1). The resonance parameter controls the tone-colour of the sound; you can't use resonance to make the phaser self-oscillate like on a VCF.

### 5 Mix

Use control 5 to determine the exact balance of phase-shifted and original signal. From minimum to maximum produces the following:

**Mix = 0** : just phase-shifted signal - "phase / vibrato": the signal sounds somehow skewed.

**Mix = 10** : 50% phase-shifted + 50% original signal - phasing: typical swooshy phaser sound.

P Try out different settings for resonance and mix, to see how what effect these parameters have on the sound.

## 5. In / Outputs

### ! Audio In

Socket ! is the phaser's audio input.

### " CV

The control voltage for modulating the speed of phase shifting is input at socket ". You can set the level of this CV with control 3.

### § Audio Out

Output § has the mix of phase-shifted and original signals determined by the position of control 5.

## 6. User examples

### Standard set-up

Fig. 3 shows a typical patch, with various alternative sources of slow-changing modulators affecting the speed of the phase sweep.

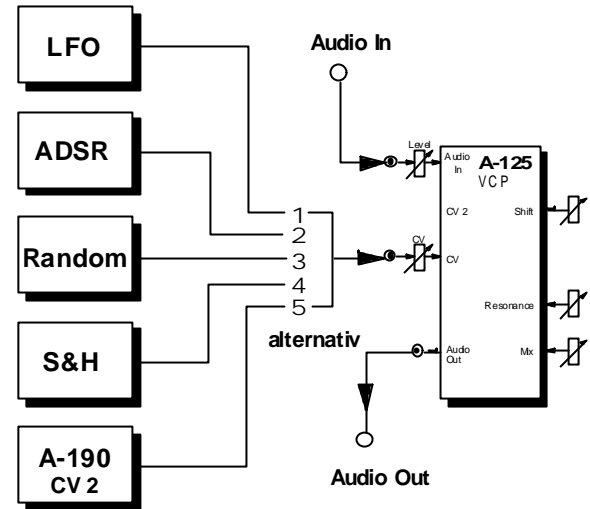


Fig. 3: Typical phaser application

The phaser is simply inserted in the audio path like this. For modulation sources, you could use, for instance, any of the following:

Alternative	Module	Adjustment	Effect
1	<b>LFO</b> A-145	low frequency (< 2 Hz)	free-running phase-shift
2	<b>ADSR</b> A-140	slow envelope	keyboard-controlled phaser
3	<b>Random</b> A-118	slow random rate	random phasing
4	<b>S&amp;H</b> A-148		random phasing
5	<b>A-190</b> CV 2	any MIDI controller for CV 2 (eg. velocity)	MIDI - controlled phasing

P With the last two of these alternative modulators particularly, you can optionally use an A-170 Slew Limiter after them, to smooth out sudden jumps of control voltage, and make the phasing transitions less abrupt.

## "Stereo"-Phasing

Using two A-125s and the patch in Fig. 4 you can create a wide pseudo-stereo phasing effect, with inverted signals coming out of each of the two audio channels (Out<sub>L</sub> und Out<sub>R</sub>).

Typically, you can use a slow LFO to provide the modulation for the phase shift, but any other modulator will work, as with standard phasing. Phaser VCP 1 is fed the modulation from the LFO directly, while an A-175 voltage inverter is patched in before the second phaser VCP 2, to invert the modulation.

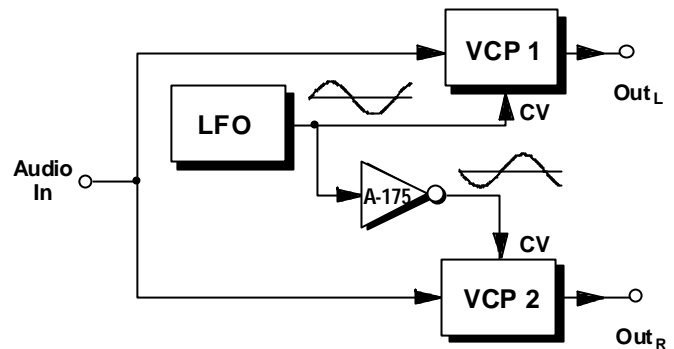


Fig. 4: "Stereo" phasing

### 7. Patch-Sheet

The following diagrams of the module can help you recall your own **Patches**. They're designed so that a complete 19" rack of modules will fit onto an A4 sheet of paper.

Photocopy this page, and cut out the pictures of this and your other modules. You can then stick them onto another piece of paper, and create a diagram of your own system.

Make multiple copies of your composite diagram, and use them for remembering good patches and set-ups.

- P • Draw in patchleads with colored pens.
- Draw or write control settings in the little white circles.

