

Shattered Glass Audio

PHOENIX



User Manual

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Introduction

Phoenix is a faithful digital simulation of five preamp circuits, which share the same two, voltage amplification, stage topology, with a three-band EQ. Each circuit derives its unique sonic character from a different active element (12AX7, 12AT7, and 12AU7 triodes, and J201 and 2N5457 JFET transistors) used in the voltage amplification stages. To achieve the most authentic analog sound, each preamp circuit is simulated in real time using Shattered Glass Audio's state-of-the-art circuit simulator. The three-band EQ can be positioned either before or after the preamp, or be completely taken out of the signal chain. Signal is 4x oversampled to eliminate aliasing.

Use Phoenix to add warmth to a track, as a saturation compressor, or to add "dirt" with tube or transistor overdrive.

Features:

- Authentic analog sound through real-time high-performance circuit simulation.
- Three preamps featuring triodes 12AX7, 12AT7, and 12AU7.
- Two preamps featuring JFET transistors J201, 2N5457
- Three-band EQ that can be taken out of the signal path or placed either before or after the preamp.
- Automatic 4x oversampling.

Signal Routing

Figure 1. Shows the signal path through Phoenix.

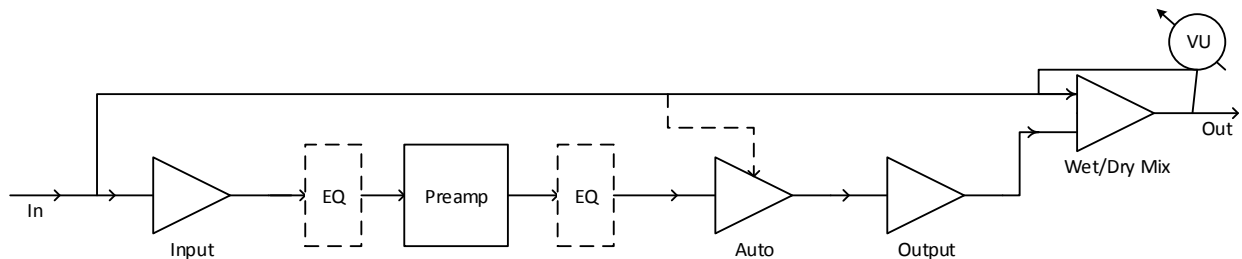


Figure 1. Signal routing.

EQ is shown in dashed line box because it can be placed before or after the preamp as well as taken completely out of the signal path.

Equalizer

Equalizer is a Baxandall type EQ with an added mid-range control. Bass threshold frequency is approximately 300 Hz and the bass shelf frequency is approximately 30Hz. Treble threshold frequency is approximately 1 kHz whereas the treble shelf frequency is approximately 10 kHz. Center frequency of the mid-range peaking filter is approximately 700Hz. Maximum gain and reduction of the circuit are +20dB and -20dB respectively.

Preamplifier

The tube preamp in Phoenix, shown in the Figure 2, is loosely based on a vintage two-stage triode-based preamp.

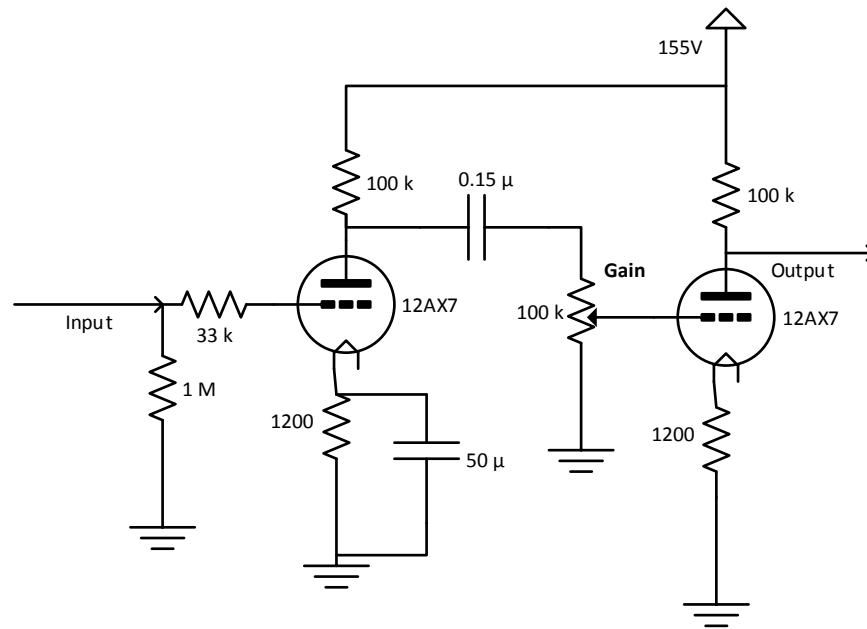


Figure 2. Schematic of the preamplifier circuit.

Each amplification stage is a 12AX7 based common-cathode amplifier. Common cathode configuration is commonly used in (pre)amplifiers to amplify a weak signal to required levels.

There are couple of interesting things to note about this circuit:

- Supply voltage is 155V, which is substantially lower than the usual 200V+ voltage supply. The lower supply voltage translates into less clean headroom thereby making this preamp easy to overdrive.
- Gain potentiometer is 100k Ω , which is of the same order as the output impedance of the first stage. A consequence of this is the reduced gain of the first stage. Usually this potentiometer would have a value of 1M Ω so it does not affect the gain of the first stage.

Common-drain amplifier is the FET topological and functional equivalent to common-cathode amplifier for tubes.

Schematic of a generic two-stage preamp is shown in Figure 3. Specific values of passive elements (resistors and capacitors) as well as supply voltage are dependent on the active element and are chosen such that each stage is properly biased.

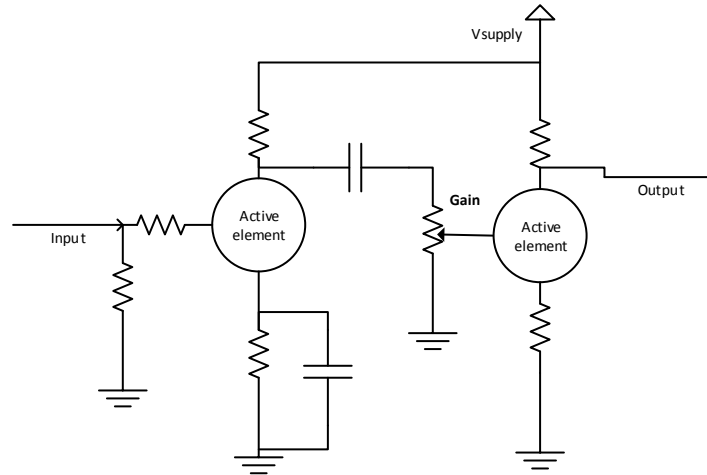


Figure 3. Generic two-stage preamp schematic.

For 12AX7 triode we have used values for resistors, capacitors, and supply voltage as shown in Figure 2.

Circuit Simulation

Analog-circuit simulators, the most well-known of which is SPICE, have been in use by engineers for decades. At the most basic level, circuit simulators take the circuit schematic, input signals, and simulation parameters as inputs and return voltages and optionally currents as outputs. To do that, circuit simulators turn the schematic into a set of differential equations that needs to be solved at each time step during transient analysis. If the circuit contains non-linear components (e.g. vacuum tubes, transistors, etc.) resulting set of non-linear differential equations needs to be solved iteratively at each time step during transient analysis. The circuit simulation provides the most accurate simulation of analog circuits at the expense of heavy CPU usage.

At the heart of the Phoenix circuit simulation is the Shattered Glass Audio's high-performance circuit simulator. We, at Shattered Glass Audio, have created a circuit simulator using the same principles that SPICE is built on and optimized it for real time analysis. As a result of using circuit simulation to simulate the preamp, Phoenix delivers sound that possesses the genuine analog warmth associated with the vintage tube amplifiers.

Controls

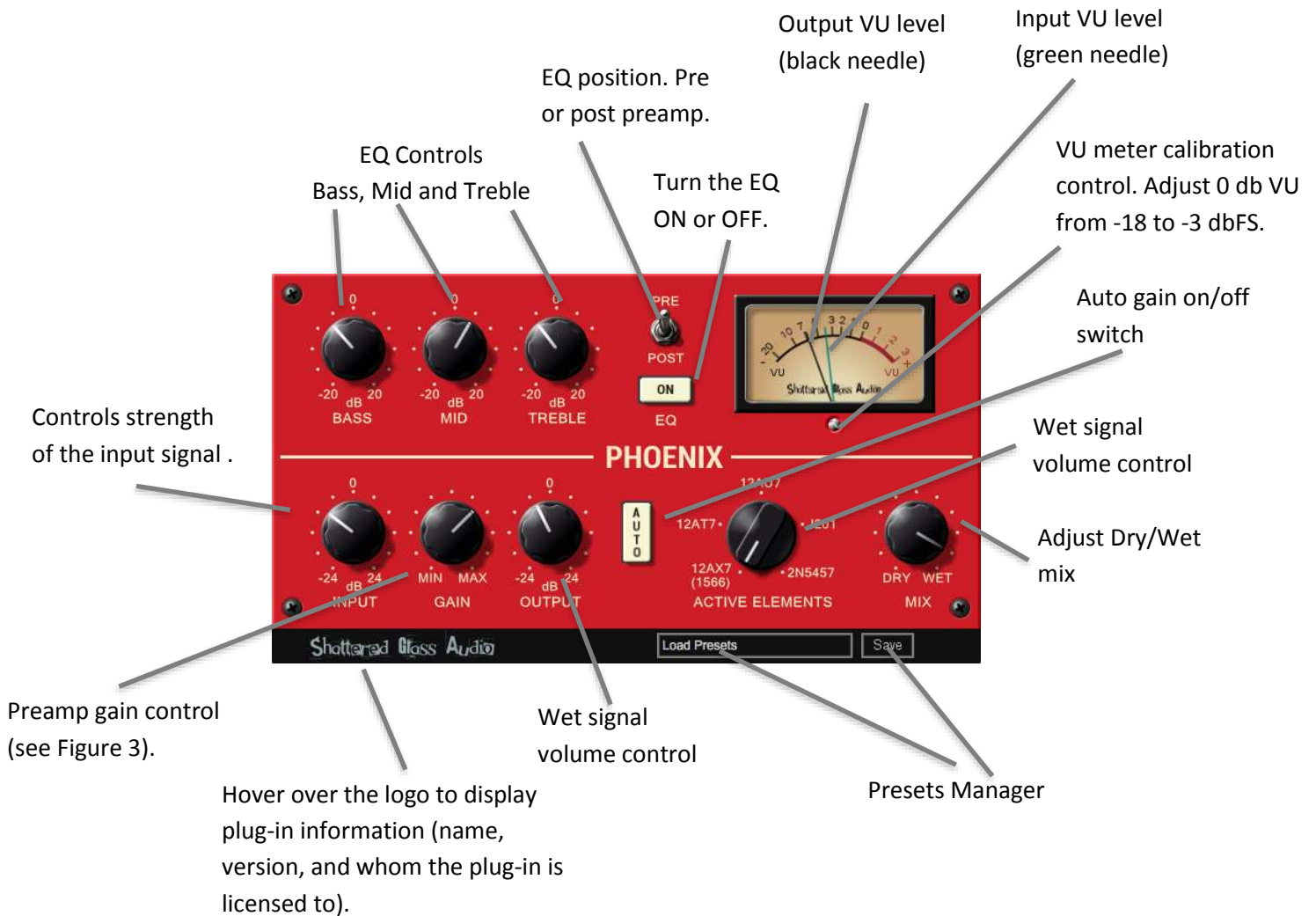


Figure 4. Phoenix Controls

Settings controlled by knobs can be changed by clicking on them and dragging the mouse up and down. Settings controlled by switches can be changed by clicking on the appropriate switch or by clicking a switch and dragging the mouse.

Using Phoenix

At low input signal levels and low Gain settings, Phoenix preamplifier simulates a clean preamp. When operated in such conditions Phoenix can be used to enrich the original sound by adding “warmth” (additional harmonics) to it. The effect of adding warmth to the original sound is a direct consequence of the nonlinear nature of active elements be they tubes or JFETs.

At higher signal strengths and/or higher Gain settings Phoenix simulates an overdriven preamp. Because of the clipping when driven into overdrive, Phoenix can be used as a saturation compressor/limiter.

System Requirements

This plugin is available in VST, AU, and AAX formats. AU version is available for Mac only.

Mac

OS X 10.12 or higher. Only 64-bit hosts.

Windows

7/8/10.

Product Unlocking

Unlocking your product is easy. To unlock the product you will need the license file sent to you in an email at the time of purchase. If you did not receive the license file you can download it by going to SUPPORT > LICENSE at www.shatteredglassaudio.com. You should save the license file at a location on your file system that is accessible to the product.

When you run the product for the first time, after installation, you will be presented with the dialog shown in Figure 5. Click the “Unlock with the License File” button and select the license key file.



Figure 5. Product unlocking dialog.

If there are no errors importing the license key, plug-in's user interface will replace the product unlocking dialog.

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