

IGNITE AMPS

engineering for the moshpit

TS-999

SubScreamer

AUDIO PLUG-IN

USER MANUAL

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Introduction

TS-999 “SubScreamer” is a digital emulation of an overdrive pedal for guitar. It has been developed to accurately model its real hardware counterpart, built for Subhuman guitarists Matteo Buti and Elia Murgia by Ignite Amps in 2010.

The TS-999 core circuit is inspired by the most famous green “808” overdrive pedal, with additional features to increase its versatility.

It can easily add dirt and bite to clean guitar tones, as well as make the amplifier distortion sound tighter, more focused and more responsive to picking, avoiding low-end muddiness and high-end fizz.

Every single component on the signal path of the real analog circuit has been taken into account and modeled in the best possible way to match the original sound, keeping an eye to CPU performances and real-time playability at the same time.

TS-999 is meant to be used as an overdrive pedal for live playing, tracking or mixing inside hosts capable of VST or AU Plug-Ins support.

Minimum System requirements

Windows:

Windows XP/Vista/Windows 7 (32/64 bit)
Intel Pentium 4 or AMD Athlon XP

Mac:

OSX 10.5
Intel processor with SSE2 instructions support

Installation

To install the TS-999 Plug-In, just follow the instructions below, according to the platform and plug-in format you want to use.

Windows VST:

Copy the **TS-999.dll** file into your VST Plug-Ins folder (i.e. C:\Program Files\Steinberg\VSTPlugins)

Mac OSX VST:

Copy the **TS-999.vst** bundle at the path: /Library/Audio/Plug-Ins/VST/

Mac OSX AU:

Copy the **TS-999.component** bundle at the path: /Library/Audio/Plug-Ins/Components/

For Windows VST format, we provide separate x86 (32 bit) and x64 (64 bit) binaries, so make sure to choose the right one according to your operative system and plug-in host specifications.

Keep in mind that x64 binaries will not run on 32 bit environments, while x86 binaries will most likely run on 64 bit environments, although we do not recommend such usage, for performance and stability reasons.

Mac plug-ins (VST/AU) are compiled in Universal Binary format, containing both 32 bit and 64 bit code in the same bundle, which means that you don't need to care about choosing x86 or x64 version, as the system will handle that automatically.

After installing the plug-ins, you should (re)start your favourite VST/AU host, making sure it re-scans your Plug-Ins folder(s) to recognize TS-999 as a new “Effect” Plug-In (please note that some hosts may not re-scan the plug-in folder automatically at every start-up, so you may need to do it manually. Refer to your host's manual for instructions).

If everything is right, you should now see the TS-999 entry into the “Effect” Plug-Ins list of your host.

You're now ready to rock!

Main Features

- Dynamic 2N3904 BJT input and output buffers analog modeling
- Dynamic 1N4148 diode clipping circuit analog modeling
- Op-amp saturation analog modeling
- Symmetric / Asymmetric clipping mode
- Normal / Fat bass response mode
- Mono / Stereo processing support
- Switchable Input and Output Buffer modeling to decrease CPU usage
- Selectable oversampling rate (up to 8x)
- Variable Input Level control for better response to different pickups
- Double precision (64 bit) floating point internal processing
- Fully automatable controls
- Zero latency

TS-999 Circuit Diagram

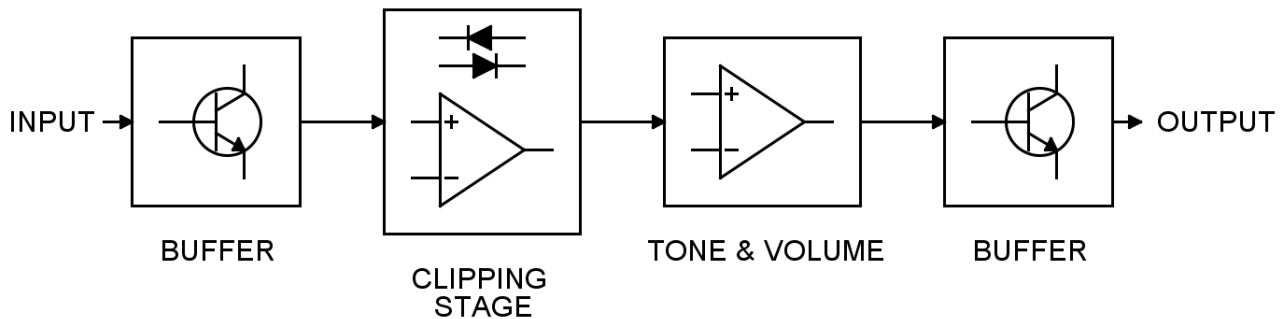


Fig. 1 - TS-999 Circuit Diagram

Graphical User Interface



Fig. 2 – TS-999 Front Panel



Fig. 3 – TS-999 Rear Panel

As you can see from the screenshots ([fig.2](#) and [fig.3](#)), we decided to make TS-999 as similar as possible to the real hardware, in order to make the user experience easier, giving the chance to tweak the controls of the plug-in like one would do when having a real stomp box in front of him. The GUI is divided in two main sections: front panel and rear panel, freely switchable using the double arrow button placed at the bottom of the interface.

Front Panel Controls

In the front panel of TS-999 you'll find the classic overdrive controls along with other features:

Drive: lets you control the amount of distortion added by the diode clipping circuit. It's worth noting that in the "808" clipping circuit, the diode saturated signal is added to the clean input signal, mixing a compressed component with an uncompressed one, giving the user the chance to add dirt and compression retaining a good amount of dynamics and keeping the overall output volume pretty much constant throughout the whole sweep of the Drive control. It is also worth noting that the TS-999 features an higher maximum distortion level compared to the classic circuit version.

Tone: controls the character of the pedal on the high frequencies. The higher the Tone level, the brighter the sound.

Level: controls the overall output level. It can be useful to drive tube amps harder, increasing their saturation level.

Fat: controls the low-end response of the pedal. One of the most important features of the TS-999 is its bass cut, which makes the tone tighter, especially when the pedal is placed in front of an hi-gain amplifier. In some cases, anyway, the classic amount of bass-cut may be considered too much, depending also on the guitar pickup used, tuning and amplifier character, so the Fat mode has been added to reduce the amount of low-end filtering and give more versatility and "fatness" to the pedal, if needed.

Asymmetric: this switch changes the dynamic response of the clipping circuit, making it clip in an asymmetric way. Asymmetric distortion adds odd order harmonics as well as even order ones, while symmetric clipping generates only odd order components. Even order harmonics are perceived as smoother and more "musical" by the human ears, so the distortion character is perceived differently depending on the clipping type. Keep in mind that the asymmetric mode will increase the output level a bit, because one half of the signal is going to be less saturated than the other and obviously higher in amplitude.

Mono / Stereo: lets the user select the processing mode of the plug-in. It is extremely important to note that a complete stereo separation, and so a correct stereo image preservation, is only possible when TS-999 is placed on a stereo bus and fed with a stereo signal with left and right components panned at 100%. Feeding TS-999 with two DI tracks panned at less than 100% left and right, will not preserve the correct stereo separation of the tracks at the output. Stereo Mode will obviously double the CPU load of the plug-in, as the two audio channels are being implicitly processed by two separated instances of TS-999.

Bypass: the pedal switch simply bypasses the plug-in, avoiding any processing. The blue led will switch on and off according to the bypass setting.

Panel Switch: the double arrow placed at the bottom of the GUI, allows the user to switch between front and rear panel controls.

Rear Panel Controls

In the TS-999 rear panel you'll find controls to manage the plug-in to suit your system and guitar at best:

Oversampling: lets you choose the internal processing sample rate of the plug-in. The available options are 2x, 4x or 8x. This means that if your host is set up to process at 44100Hz sample rate, by selecting 4x oversampling, for example, TS-999 will process your signal at $44100 \times 4 = 176400$ samples per second. Oversampling is needed to avoid digital artifacts (aliasing) and improve the accuracy and musicality of the plug-in.

Obviously, the higher the oversampling, the higher the CPU usage.

In our experience and tests, we've found 4x oversampling to be the best compromise for accurate processing and good performance, but we've decided to add other two options to help users with slower machines to run the plug-in without CPU overloading (2x) or run the plug-in at its full potential when having a powerful system at disposal (8x).

Keep in mind that the sound difference between these three modes is not going to be night and day, so, for mixing purpose, you will hardly need to rework the mix settings when switching between different oversampling values. A good practice would be to run the plug-in at 4x or 2x during mixing and switch it to 8x right before rendering your project. This will avoid CPU usage problems when using multiple plug-ins in mixing phase and still give you full processing quality once your tracks are exported.

In Buffer: enables or disables the input buffer modeling. Buffers are almost always omitted in these kind of circuit simulations, as the emitter followers used on the circuit are meant to be perfectly linear with unity gain. Of course this is only true in ideal conditions. In real world conditions, emitter followers are always going to add some "colour" to the tone, generating harmonic distortion (with both even and odd components) because of their intrinsic non-linearities. We consider this kind of "colour" a part of the overall pedal tone, so we decided to model it. Of course this is going to increase the CPU usage, that's why we've added the possibility to switch it off and save system resources.

Out Buffer: same as above, but applied to the output buffer.

Input level: it is a simple control to adjust the amount of guitar signal going through the virtual circuit. It is really important not to underestimate this control, since it is the key to have the TS-999 reacting correctly to your guitar and playing. In fact, we can safely say that this is the most important control to get the best out of the TS-999.

What's the correct way to use it, then? Let's start from your guitar signal: as you know, when you play, the pickup output going to your sound-card input will be transformed to a digital signal by the AD converter of your audio interface. The first thing you should keep in mind, is that the converter has a maximum headroom that should never be exceeded. If your signal goes over this maximum threshold, it will be clipped. A clipped signal means less dynamics and the introduction of digital distortion.

So, the first thing you need to make sure of, is to never clip the AD converter (if you are clipping it, the clipping led indicator featured in most audio interface will light on, warning you that your input signal is too hot, so you need to lower the preamplifier control until the problem disappears).

On the other hand, an important thing to keep in mind, is that the higher the input signal (within the above mentioned headroom limit), the more accurate the AD conversion will be, keeping also the signal-to-noise ratio at the higher possible value. This means that, in order to get the best out of your sound-card, you need to keep the input signal as high as possible right before reaching the clipping threshold.

Ok, cool story, but when does the input level control comes into play? Once your signal is converted to digital, it will be represented as a series of numbers that you can see as voltage values. These voltages can have a maximum and minimum value of 1.0 and -1.0 respectively. Supposing your input signal is peaking at its higher possible value right before the clipping threshold of the converter, it will be represented as 1.0 inside your host and the TS-999 will react to it like if you're sending a 1.0V signal to its input stage.

Why is it so important to know these details? Because if your guitar pickup has a maximum output voltage higher than 1V (or 2V peak-to-peak), like many modern active pickups have, you'll need to adjust the input signal that's being sent to TS-999. That's where the Input Level control comes into play. You need to tweak it to compensate the voltage scaling/normalization made by your AD

converter.

Every tick you see under the Input Level slider, represents a variation of 0.25. For example, if your pickup has a maximum output of 1.5V (so 3V peak-to-peak), you'll need to set the slider at the 2nd tick moving it to the right. By doing this, your input will be multiplied by 1.5 ($1 + 0.25 + 0.25 = 1.5$), so the TS-999 will not be fed with a 1.0V maximum signal, instead, it'll get a $1.0V \times 1.5 = 1.5V$ maximum signal, which is the correct value to match your pickup specifications.

If you are using a single coil, instead, and its maximum output value is, let's say, 0.5V, you'll need to lower the input level by moving the slider to the second tick to the left. This will make the TS-999 react like the input signal is 0.5V, or $1V \times 0.5 (1 - 0.25 - 0.25 = 0.5)$.

Remember that the sound-card input level is meant to be always set so that you use the full AD converter headroom. Signal level adjustments, to pair the TS-999 with your guitar pickups, need to be made after the AD conversion, using the Input Level control.

Please note that these concepts applies only when TS-999 is the first plug-in of your virtual guitar chain. If you are using another digital effect before the TS-999, we suggest you to keep the input level control at half (default).

Tips for “digital” guitarists

- Always use the high impedance (Hi-Z) input of your sound-card (when featured). This will ensure less noise and signal loss. Most real (pre)amplifiers and stomp boxes, have an input impedance of 1MegaOhm, so it would be a good idea to get a sound-card with 1MegaOhm input impedance to use Ignite Amps simulators at their best.
- As mentioned above, make always sure to have the highest input signal before the AD conversion, avoiding clipping.
- Amp sims and stomp box simulators are not noisy, they do not add noise. In fact, they're a lot less noisy than real hardwares. If you have noise issues, check your guitar electronic circuit, cables and sound-card settings.
- In almost all cases, amp sims and stomp box simulators don't introduce latency. TS-999 doesn't introduce latency. If you're experiencing latency issues, check your sound-card settings (specifically the Input Buffer Size).

Acknowledgments

Ignite Amps wants to thank [Matteo Buti](#) and [Elia Murgia](#) of [Subhuman](#) for believing in Ignite Amps, letting us build their TS-999 and its twin, the TS-666.

Thanks to all the musicians interested in the Ignite Amps project, trusting us into taking care of their sound. You know who you are.

Thanks to You too, for downloading and trying the TS-999 “SubScreamer” and for reading the f***ing manual! :-)

Sincerely
The Ignite Amps Crew

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