XP SoftAmp FM25

User Manual

Version 1.0.00

20 March 2014

http://www.soft-amp.com

axp@soft-amp.com

Introduction

SoftAmp FM25 is a virtual-analog model of the Fender Frontman 25R combo amp. The Frontman is a versatile solid-state practice amplifier for electric guitar. It's equipped with 10" speaker, has 2 channels that share a 3-band equalizer, and a spring reverb. The current issue sports a classic "Blackface" look.

"Huh, a solid state Fender practice amp model. Now that is an interesting choice" - was the initial response from one of the beta testers. The reason for that choice is simple: Frontman 25R was the first guitar amp I've ever owned. To my best knowledge its digital model did not exist, so I decided to fill the gap. And after all, who needs yet another incarnation of say, JCM800? :)

This VST model is a tribute to the original design and faithfully models all its essential features. It is mainly intended for quick and simple recording of draft tracks as well as for some live jamming whenever you don't feel like setting up a more sophisticated amp simulator.

This one runs straight out of the box, looks exactly like a guitar amp and has everything you need to start playing - clean and distorted channels with speaker simulation and a reverb!

As usual, it's got all the conveniences associated with AXP plug-ins, like a stereo processing capability, high quality anti-aliasing oversampling and switchable speaker simulation.

All controls are carefully mapped to produce linear sound pressure level changes, i.e. they are linearized in dB scale.

In addition, there's a special switch added late in the beta test cycle – the "AXP Mod". It does two things:

- Replaces all gain stages with vacuum triodes (each based on the SoftAmp 3OD algorithm)
- Alters the tone stack's middle control frequency response

Yes, you've read it right, with a flip of a switch a solid-state amp becomes a tube one and the real fun begins! You already knew I couldn't stand the temptation to do something like this, right?

Installation

Get the latest version at: http://www.soft-amp.com/softamp-fm25

Unzip the archive and put the "AXP SoftAmp FM25.dll" or "AXP SoftAmp FM25 x64.dll" to your VST folder. Make sure to select the one appropriate for your system (32- or 64-bit).

This plug-in requires the Windows Imaging Component library. It's included in all Windows versions starting with Windows XP SP3. If you are using Windows XP SP2, you can get it as a stand-alone library here: http://www.microsoft.com/en-us/download/details.aspx?id=32

User Interface

The SoftAmp FM25 user interface mimics the original amp. To better understand how the control knobs work refer to the DSP Model Details section. The other controls specific to the VST implementation are outlined below:

All switches are toggled by clicking on them

All knobs are operated by holding the left mouse button over them and dragging the mouse up or down. To reset any knob to the 50% setting, click the knob while holding the "Ctrl" key on your keyboard.

If the plug-in's interface looks not like pictured above, make sure your desktop is configured for 32-bit color depth.

The SoftAmp FM25 will not check for updates automatically. It was done deliberately to make sure it doesn't get in the way of your audio production workflow. There's a manual "Check for updates" feature that will query my website to see if you are using the latest version. If you are not, you will be prompted to open the download page in your browser.

Operation Details

Unlike the amp being modelled, SoftAmp FM25 features a stereo spring reverb. The left channel sounds exactly like the original amp's reverb, and the right channel is artificially created from it to expand the stereo base. To hear the reverb in stereo, turn on the overall stereo mode in the plug-in interface. The mono variant has a more pronounced springy "boing" sound, while the stereo one is far more spacey. Make sure to try both!

Enabling the HQ (oversampling) mode introduces a 4 sample delay. It will NOT be compensated by the DAW.

The Drive Channel Volume control is just a divider - it will not affect the tone in any way. Unlike the Normal Channel, which frequency response depends on the Volume setting and also has enough gain to boost the signal beyond the OpAmp linear range at high Volume settings and distorting it.

The output signal is not limited and in some cases may exceed 0dB. Sometimes it may desired, for example when using the Normal channel at high volume to produce slightly distorted tones. You have to take care of external attenuation and/or limiting yourself.

The SoftAmp FM25 comes with 2 cabinet models:

- 1x10" is sampled from the original amp (open-back combo amp with 10" speaker by Fender). It was recorded from close distance and the microphone was offset a little from the cone axis to compensate the speaker's overly pronounced brightness.
- 2x12" is a custom open-back cabinet that was recorded with the microphone set a bit further away from the speakers, so it's got a more even frequency response.

DSP Model Details

The real FM25 has a very clear structure and a very intentional design – all stages are well defined and have obvious boundaries which makes its model rather predictable and accurate. It becomes especially evident when compared to my previous work, the SoftDrive GV, which was based on a more messed up circuit. It left the impression of being designed empirically, rather than based on any theory and called for some new techniques to be modelled properly because of the inter-stage coupling.

The internal structure of the SoftAmp FM25 is shown below:
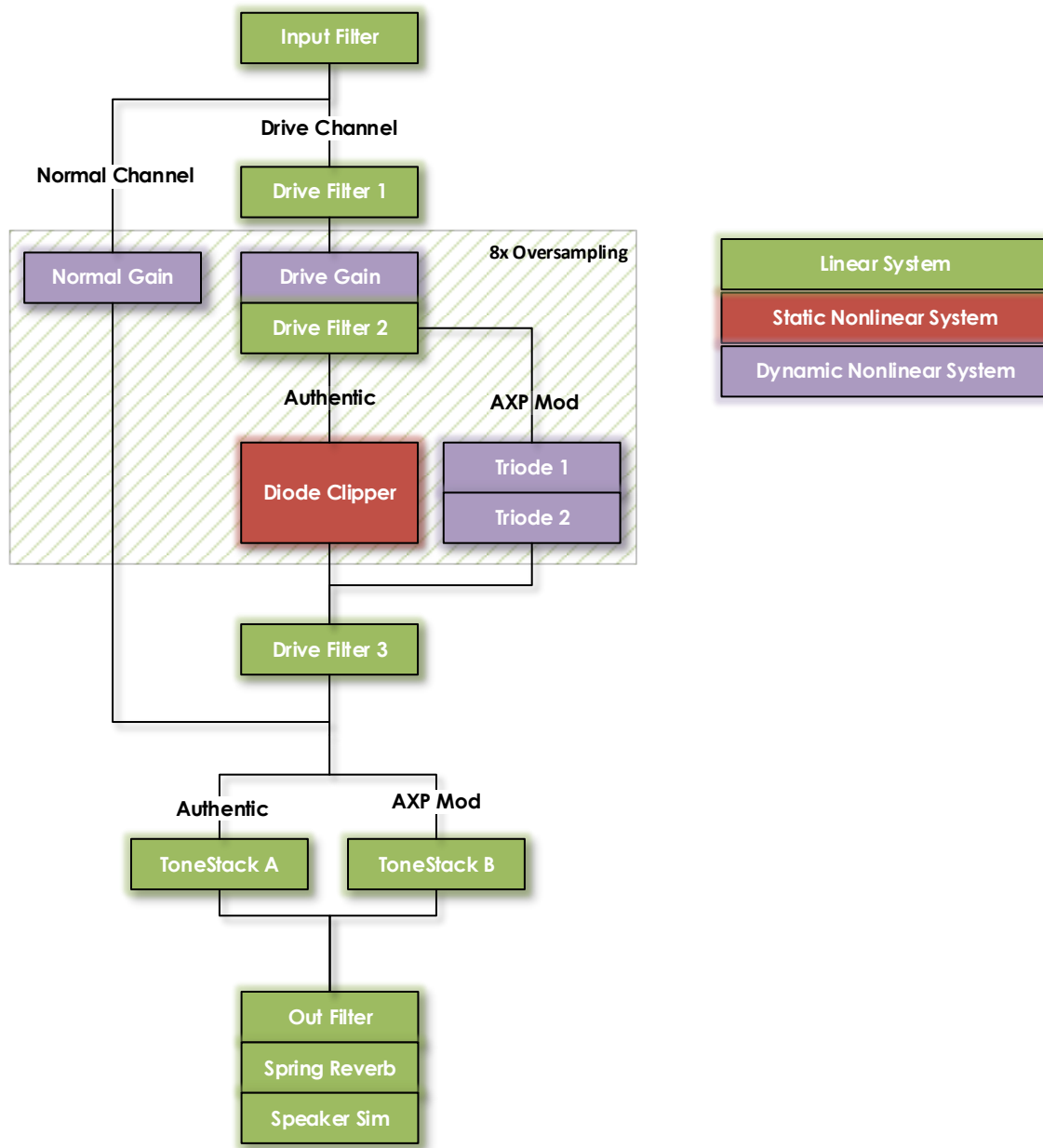
In the Authentic mode, SoftAmp FM25 exactly follows the design of the original amp. The Normal Gain and Drive Gain stages are based on my own dynamic nonlinear OpAmp model which was first introduced in SoftDrive GV. I've recently made a breakthrough that allows me to explicitly calculate the solution to the system that doesn't require neither iterative solvers nor any look-up tables. It's now both faster and more accurate than before. The Diode Clipper is in fact another OpAmp with nonlinear feedback. Thanks to the original circuit design it doesn't demonstrate any dynamic behavior, so it was very straightforward to model.

When "AXP Mod" is toggled, the Diode Clipper gets replaced by a pair SoftAmp 3OD modules, each configured to match the 12AU7 triode dynamic and harmonic response. Each tube is manually biased for the best sound. All other nonlinear gain stages are also retuned to provide tube-like response. You will hear how the solid state and the tube models have a very different gain structure. The solid state one has a very even response with harmonic content not depending a lot on the input level. The tube variant on the other hand is much more dynamic. At first it will be harder to play evenly, but this is just how the tube amp feels.

Additionally, the "AXP Mod" changes the tone stack frequency response. The original FM25 tone stack is not exactly a classic 3-band one. Instead, it is a 2-band tone stack with additional middle control that is similar to Marshall's "Contour", Crate's "Shape" and some other tone controls. When "AXP Mod" is engaged, the center frequency of the Middle control is shifted downwards and the amount of the mid boost in the rightmost knob position is slightly increased. The effect of the "AXP Mod" on the tone stack response is shown below:
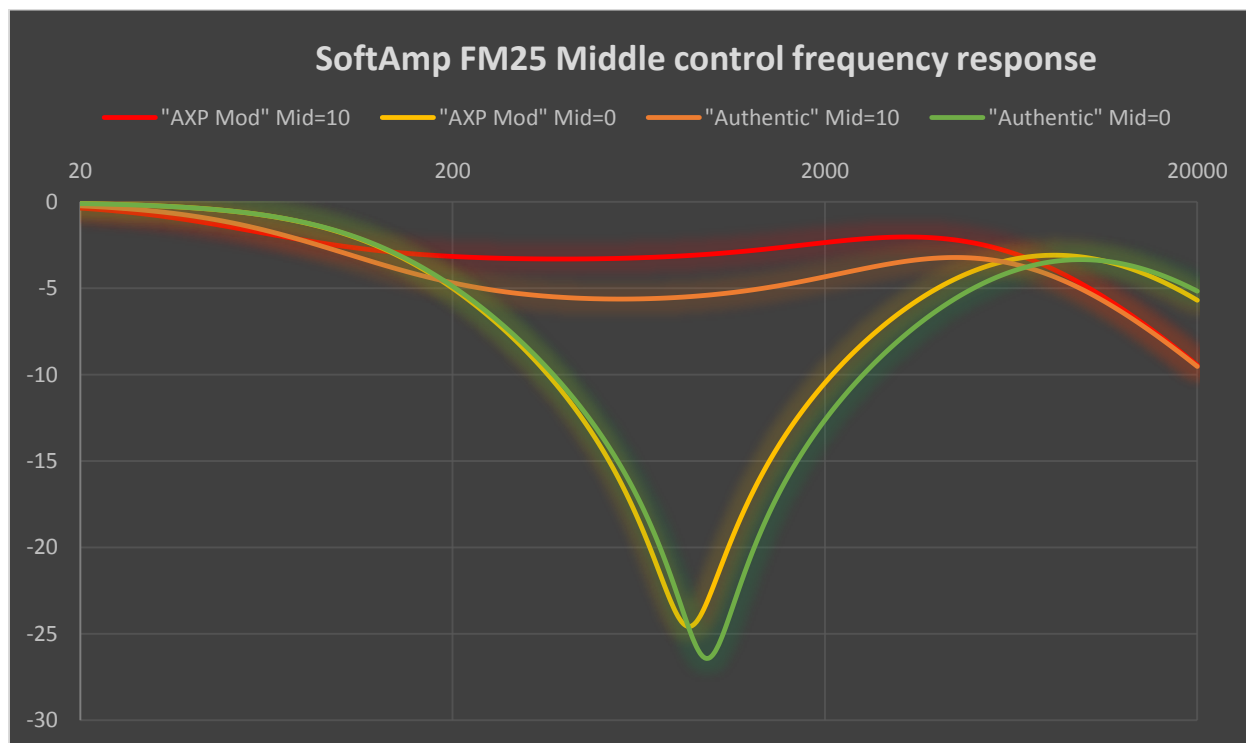
The SoftAmp FM25 offers an 8x oversampling to reduce the aliasing from the nonlinear distortion stages. To understand what aliasing is, see the following spectrograms. First, let's put a logarithmic sine sweep through the Drive channel of SoftAmp FM25 with the HQ switch disabled. We expect to see the original sweep itself plus a number of harmonics, i.e. the additional sine sweeps increasing at 2x, 3x, 4x, etc. the original sweep rate. Instead, we see that as soon as the output frequency exceeds the ½ of sample rate (44100Hz in this case) the sine sweeps get "reflected" back into the sonic range, this is called aliasing:
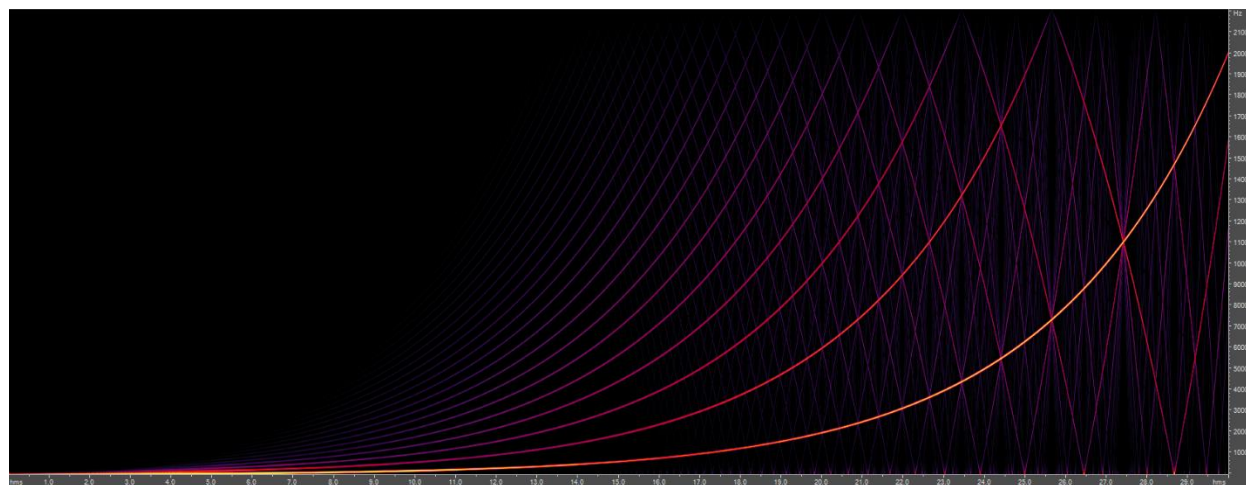
Now let's repeat the same experiment with the HQ mode enabled:
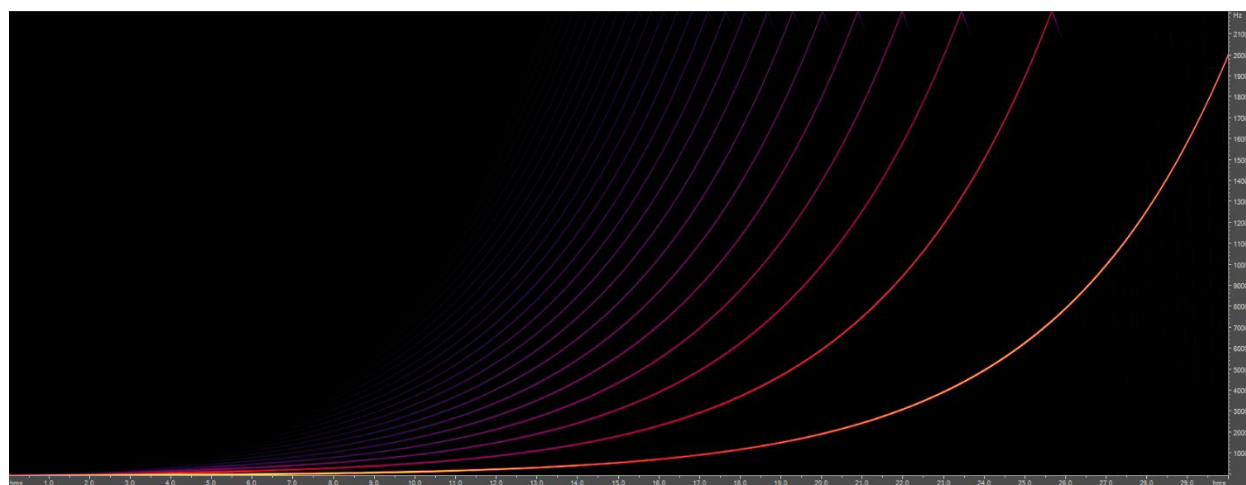
We observe, that now those parasitic frequencies got "filtered" out. To do that, the signal got upsampled to 8x the original sampling frequency before the nonlinear stages, then after all the model processing was applied, it was low-pass filtered and downsampled back to the original sample rate.

You have to decide for yourself if it's worth the extra processing power it takes to run the oversampled model. To hear how it would sound in real life, get your guitar, "plug" into the SoftAmp FM25, make an artificial harmonic at some high fret and bend it up a tone. Without oversampling, you'll be able to hear those parasitic tones going down in pitch as you bend the string up!

Credits

I'd like to thank the following people who volunteered to test this plug-in:

- Dax Liniere

- Dean Stockwell

- Andy McDonough

- Jeff Baker

- Alexey Khomich

And a huge thanks to my wife for putting up with me spending endless nights developing this!

It is my hobby to develop the VST audio effect models. I'm not getting paid for it and I use my own (very limited) spare time to do this work. If you like my projects and would like to encourage the future development please consider doing something of the following:

- Tell your friends about my site and my plug-ins
- Send me audio tracks you've made with my plug-ins
- Drop me a line or two with any comments and suggestions
- Make a small donation through my web site

License

This software is licensed for an unlimited usage by everyone, including personal, commercial and scientific applications. You are NOT allowed to modify it (including both the binary code and the copyright information) or sell it, in either stand-alone or bundled form. The plug-in is provided "as is" without a warranty of any kind. In no event I shall be liable for any damage associated with the usage of this software. I encourage further distribution by sharing a link to the effect web page.

Please send your questions and suggestions to my e-mail or post them on the site.

VST is a registered trademark of Steinberg, GmbH

FFTReal library by Laurent de Soras (http://ldesoras.free.fr)

"Fender", "Frontman", and "Blackface" are registered trademarks of Fender Musical Instruments Corporation.

AXP is not affiliated with or endorsed by Fender Musical Instruments Corporation.

AXP SoftAmp FM25 (c) 2014 Alexander Petrov-Savchenko