

NastyDLA

MANUAL

revision 1.0

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1 Introduction

1.1. License

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1.2. Installation

Requirements:

- Win32 compatible system with SSE2 (or higher) instruction set support
- Tested and known to work in many VST compatible hosts

Put the DLL file contained in this archive in the VST plug-in folder of your host.

1.3. Overarching topics

Warning: Lower your listening volume while operating the plug-in to avoid hearing damage or damage of speakers or any other equipment.

Important: The plug-ins outputs is audio always on two channels and hence a stereo channel is necessary to insert this plug-in.

Usage tips:

- Use the power switch on the right side for handy A/B comparisons
- Use <ctrl> + mouse left click on a knob or switch to restore default position
- Use <shift> + mouse left click on a knob to fine adjust values
- Use this plug-in as an insert effect in any stereo channel of your VST host

1.4. Credits

The gorgeous graphic design was done by Patrick Barca – thanks again, mate!
Thanks to Dozius for providing his filter pack and many thanks to all the beta testers.
Most presets were created by *sink*, www.sinkmusic.com.

2 Jump Start

2.1. Overview

NastyDLA – a classic chorus echo device with tape-delay simulation.

Inspired by the classic analog chorus echo device, this plug-in implements some of the most distinctive and much appreciated sonic effects generated by these devices:

- classic chorus and echo effects
- authentic signal path coloration
- tape-delay style feedback and saturation

Functions at a glance

- applies gentle feedback driven delay effects
- performs smooth audio signal modulations
- shapes frequency and phase response
- adds extra harmonics and saturation effects

Plug-in specification

- Win32 / VST compatible
- state-of-the-art digital signal processing
- performance-critical parts are written in assembler
- completely SSE optimized

2.2. Quick reference



From left to right according to the graphical interface:

#	GUI label	Label in host automation	Description
0	POWER	POWER	Plug-in ON/OFF operation.
1	INPUT	INPUT	The input stage volume control. With SAT enabled this is a true drive/gain control.
2	SAT	SAT	If SAT is enabled then the input stage changes the signal coloration. Frequency and phase response of the signal are affected and non-linearities are applied.
3	CHORUS	CHORUS	Depth control of the chorus/flanger effect. Left most position means <i>off</i> and is a true bypass.
4	RATE	RATE	Modulation frequency control for this effect.
5	COLOR	COLOR	This is a overall frequency balancing filter (high vs. low frequencies). It's rather subtle but gets more meaning when increasing the amounts of feedback (FB) of the delay section. Mid position is off position.
6	I-II	COLOR-I-II	Switches between a rather flat frequency response (when <i>off</i>) and a more resonant and mid-focused timbre (in <i>on</i> position).
7	FEEDBACK	FEEDBACK	Amount of feedback in the delay circuit.
8	HP	HP	A standard DSP 12dB high-pass filter.
9	LP	LP	The custom "tape-style" low-pass filtering.
10	<i>none</i>	MODE	The big knob right beside the VU meter selects one out of the seven different delay modes.
11	NOISE	NOISE	Adds simulated "tape hiss" noise.
12	FEEL	FEEL	Adds negative or positive pre-delay.

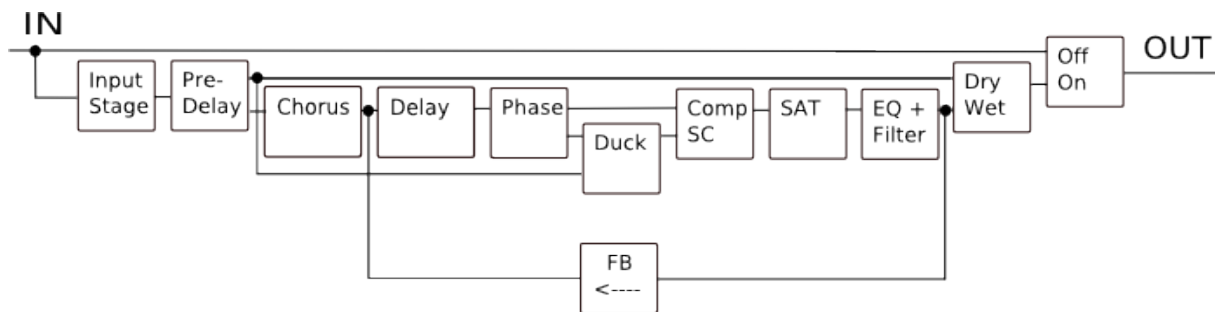
13	DUCK	DUCK	Switches the internal tape compressor into ducking mode.
14	ECHO1	ECHO1	The first echo time control slider.
15 16	SYNC	SYNC1 SYNC2	Syncs ECHO1 and/or ECHO2 to host.
17	ECHO2	ECHO2	The second echo time control slider.
18	AGED	AGED	Adds further phase smear.
19	MODULATION	MODULATION	Delay time modulation. Left most position means OFF.
20	I-II	MODULA- TION-I-II	Switches between two internal types of modulation.
21	DRY	DRY	Dry signal amount.
22	WET ONLY	WET-ONLY	"Wet Only" control. Suppresses the dry signal.
23	WET	WET	Wet signal amount.

2.3. Delay modes explained

#	GUI label	Description
1	mono 1	One single classic "tape-style" echo. Just the ECHO1 controls are in charge in this configuration.
2	mono 1&2	Same with both echos. This is still configured as mono.
3	dual mono	ECHO1 operates on channel one and ECHO2 on channel two.
4	ping pong	The typical ping-pong style echo configuration. The input is taken from channel one and then ECHO1 is applied first and output to channel one and feedback to ECHO2 which outputs to channel two and then again feedback to channel one and so on.
5	cross feedback	This is a dual mono configuration but with both channels cross changed in the feedback path. This configuration gives highest diffusion if feedback is applied.
6	retro 1	Both "retro" modes are changing the routing in general: The DRY output is wired to channel one and the WET output is wired to channel two. Otherwise similar to the "mono echo 1" program.
7	retro 1&2	Same here but with both delay lines activated and controllable.

3 Advanced

3.1. Internal architecture



Internally, NastyDLA consists of quite a bunch of DSP processing building blocks which as a whole are summing up to an authentic signal path simulation of it's analog models. The blocks and the according signal flow are shown in the diagram above. Basic signal flow goes from left to right except the feedback path which goes in the opposite direction.

With NastyDLA, signal path coloration already starts in the input stage which provides a complete model of both, frequency and phase response as well as dynamic saturation. It's located in the dry path but all nonlinear processing and coloring can be disabled (via the SAT switch) on demand so it remains as a simple input volume con-

trol then. But while switched in, the input stage can greatly contribute on getting the processed signal to fit right into a mix.

The pre-delay block changes the timing between the following dry and wet signal paths and can be positive or negative which means that the wet signal can be delayed related to the dry path but the opposite as well. This can be dialed in with the FEEL knob in the interface.

The chorus algorithm is hard wired and is the very first block in the wet signal chain. Internally it computes four audio lanes and depending on the operation mode of the plug-in (mono, dual-mono/stereo) they are dynamically configured to compute the appropriate audio output. Rate (RATE) and amount (CHORUS) can be adjusted to obtain a broad effects spectrum ranging from subtle and smooth chorusing up to flanger like effects.

Next in the chain is the delay algorithm itself which offers seven different configurations (two mono modes, dual-mono, ping-pong, a cross feedback delay and two retro modes) and contains additional modulation options. Given the modulations, static audio delay imaging can be avoided and even tape-like timing imbalances can be obtained. This is also the place where a sophisticated tape hiss simulation takes place which basically implements a colored and animated noise model (NOISE). With the two retro modes the dry signal is routed to the left audio output channel and the wet is to the right, being a reminiscent to the analog originals.

Serious amounts of additional phase distortion can be introduced with a dedicated phase section behind the delay block. This can be used for an increased dispersion of re-occurring delays in between the feedback path and contributes to a more “reverb-ish” sound and also the typical screaming sound when the units feedback is driven right into self oscillation. This option is accessible through the AGE switch.

NastyDLA contains a comprehensive and detailed modeled dynamics section. It consists of a compressor/saturator tandem where not only static waveshaping is applied but subtle frequency dependent compression as well. The basic technology for this is taken from the already released and award winning FerricTDS tape dynamics simulator. The compressors sidechain can be switched from the processed feedback path back to the dry signal to provide a slight audio ducking effect (DUCK). Also, the saturator itself is not static at all but aware of dynamics too. Altogether an authentic and consistent saturation experience can be achieved. The compressor and saturator are always in and can't be disabled.

Last in the feedback loop resides EQ and filtering. While the frequency adjustable high-pass is a standard DSP 12dB/octave filter (HP), the low-pass filter (LP) is a custom design which highly contributes to the overall specific sound especially when feedback is used. Most digital tape delay emulations just offer plain standard DSP resonant lowpass filters where increased resonance is utilized to achieve screaming effects. The obtained results sounds harsh and plastic quite often. NastyDLA avoids

this and the desired and typical feedback driven sound is created solely based on smooth filtering, dynamic saturation and massive phase distortion in the feedback path. Instead of a conventional EQ, a simple but effective “niveau” leveling filter (COLOR) is implemented which makes it dead easy to change the overall audio tonality. It's center frequency adopts automatically to the actual frequencies of the LP/HP filters.

All that meticulous modeling entirely the way through the whole signal path comes to a price at the end: the computational cost. Nonetheless, decision was made to have a no compromise technical design for NastyDLA available and not just yet another flat and digital sounding delay.

3.2. In use – some practical tips

Taking advantage of audio signal coloration

Audio signal coloration takes place in a couple of different circuits in NastyDLA. The most obvious is of course the EQ and filtering section (COLOR, LP, HP) where frequency and it's dependent phase manipulation which are applied in a direct fashion. This is typically the starting point if one chooses to dial in some specific timbre and allows some significant change of the delay tonality if FEEDBACK is used. In the default setting it provides a rather flat frequency and phase response and with the I-II switch engaged it changes to a more resonant and mid-focused sound – again, if FEEDBACK is used. Turn COLOR from mid position to the right to obtain a brighter tone and to the left to obtain a darker tone. As an example, dial in some darker tone with the COLOR option (moved to left) and to retain and not loose the mid focus engage the I-II switch.

Tip: Always adjust the FEEDBACK level to match the same level of resonance when comparing different modes.

The AGED option offers an additional and drastic method of manipulating the signals phase and (simply speaking) applies more phase smear and distortion as in older tape media or devices. Use this creatively for more delay line diffusion, for example, or to obtain different delay colors when using shorter FB settings. However, to some this might be rather subtle, depending on the actual delay time and source material.

Tip: Try it with rather short delay times to hear what it does.

The input stage colors quiet a lot as well but only if SAT is engaged. Then, a basic device frequency and phase response is applied but more important, non-linear behavior takes place in the whole signal path. This goes way beyond static wave-shaping and offers a consistent saturation experience over a wide frequency and input volume range.

Proper embedding in the mix

The aforementioned input stage saturation can greatly be utilized to get your chorus and delay signals to fit right into your mix. A more compact mid frequency range and tighter dynamics can make the final mixing way easier.

Adjusting the pre-delay option (FEEL) is another method and can drastically help to improve the delay line sitting right into it's place comparing to the dry signal. Try positive as well as negative settings to discover what your mix groove actually needs.

Proper EQing is the key, of course. The COLOR (niveau-style) filter is the fastest and most easy way to change the wet signals frequency appearance. Turned clockwise it supports a brighter sound impression and vice versa. This may be subtle if no FB is used but becomes more prominent when FB is dialed in more and more.

Tip: Enabling the I-II switch beneath the COLOR knob gives a more mid-focused and resonant tone.

With the HP filter option, unwanted low frequencies can be excluded from the party quite easily. This is done with a 12dB/octave high-pass filter which is a good compromise between smooth and steep filtering. Though, sound wise more important is the dedicated low-pass filter which is capable of shaping and attenuating the high mid/high frequencies in a “tape-style” manner. It offers the proper and smooth “roll-of” so that too much high frequency information (which is not contained in a natural echo) is avoided.

In the dynamics section the ducking option (DUCK) can definitely aid in easier mixing as well. If enabled, the wet signal slightly gets attenuated as soon as an input signal emerges. When the input signal pauses the internal compressor is going to relax and the wet effect signal raises slightly.

Note: Adjust the actual FB settings when using the ducking mode since feedback handling and self oscillation behavior differ depending on the compression mode.

Warning: In ducking mode, feedback and self oscillation behavior may appear much louder and blew up your speakers or cans (and ears).

Understanding chorus and delay modes

For the sake of simplicity, in chapter 3.2 “internal architecture” the channel specific routing is omitted for all the different delay modes. These modes partially also affects the chorus. To fully understand the internal routing and modes just a few principles are necessary:

- The plug-ins outputs is audio always on two channels (thus, a stereo channel is necessary to insert this plug-in).
- The mono programs are taking the audio input just from the first (left) audio channel (“mono 1”, “mono 1&2”, “retro 1”, “retro 1&2”) and the “ping-pong” program does so as well.

Note: In this modes the chorus is a true 4x chorus.

- “dual mono” and “cross feedback” takes input on both input channels.
- The “retro” modes splits the dry signal to the channel 1 output (left) and the wet signal to channel 2 output (right).

The chorus is changing it's configuration depending on the selected delay mode. In mono delay configurations it works internally as a 4x chorus and in a dual channel or true stereo setup it works in a 2x2 configuration.

Delay time modulations

There are two delay line modulation options provided with the I-II switch right beneath the MODULATION dial. Engaging this unveils a subtle but more chorus alike sound and this is suitable to improve the overall depth impression of the computed echo's. Combine this also with the CHORUS itself for maximum diffusion. If a random but more dry experience is wanted then leaving this switch *off* is the ticket.

Note: This I-II switch changes the animation of the actual noise (as being dialed in by the NOISE parameter) as well.

If an echo's delay time signature is not synced to host (via the SYNC switches) then both ECHO parameters can be automated via host automation or manually animated to obtain smooth “tape speed” changes.

Compression and saturation

There is always a tape compression sort of thing working under the hood which handles both, compression as well as dynamic saturation aspects. It can be switched into a ducking mode where its sidechain path gets routed to the plug-ins dry path and given that the compression becomes dependent to the volume of the actual input signal. This provides a slight ducking effect and is activated by the DUCK switch.

Getting the tape delay feel

If you want to obtain a rather tape-style feel with NastyDLA, here are some tips as a basic guidance:

- Select one of the mono or retro modes.
- Set the LP filter somewhere between 1k and its mid position (ignore the HP switch or set it somewhere nearby 20).
- The COLOR knob (plus its I-II switch) deploys a broad range of different timbres. This way, a lot of different tape delay timbres can already be achieved.
- Its recommended to use the input stage as well (SAT) to dial in some further amounts of non-linearities and crunch.
- Dial in some amounts of MODULATION but turn its I-II option *off*.
- Always use the NOISE option and don't hesitate to go up to -80dB or an even higher noise-floor.
- The AGED switch applies even more phase smear – thats what old tape media basically does.

Note: Although the original devices does not have a ducking mode it might be useful to turn DUCK on if more tape saturation is desired. In doing so, the compression sidechain is not obtained from a signal in the feedback path anymore and therefore the saturation stage is left to do a little bit more work. Could be great if you are after that screaming sound.

In doing so, NastyDLA rewards you with the possibility of not only simulating just one single model but quite a bunch of different tape delay style timbres instead.

Tip: If you are sound-wise there then don't hesitate to combine this with more modern options such as a cross-feedback delay routing or take advantage of the ducking feature, the FEEL option or add some gentle chorus and work in true stereo – things no original or replica can give you.

About the retro modes

Similar to how some vintage models worked to their time, the two retro modes just produce a mono effect signal but the plug-ins output is stereo now: dry is routed to channel one (left) and wet is routed to channel two (right). Its just a reminiscent to that models and if one would love to have that design today in a plug-in its provided now with NastyDLA.

Note: The WET ONLY feature does not work with the retro modes by intention (its just disabled then).

4 Addendum

4.1. The classic chorus echo device

There are just a few audio effects available that are capable of instantly turning a small and wimpy riff into something big and meaningful. One of them is the classic chorus/echo combination. Beside the individual classic echo or chorus devices these combined devices were historically build around true tape or bucket brigade delays.

From today's production standards perspective they might be easily overseen (feature wise) but on the other hand they are still pretty much demanded due to their specific and warm tone and this unique sound quality is probably the charm which still today attracts producers and audio engineers to use them in their actual music productions.

NastyDLA is going to follow this path and recreates all the specific tone qualities while adding just some few but well selected modern features. The plug-in implements some of the most distinctive and much appreciated sonic effects generated by these devices:

- classic chorus and echo effects
- authentic signal path coloration
- tape-delay style feedback and saturation

NastyDLA applies gentle feedback driven delay effects, performs smooth audio signal modulations and adds extra harmonics and saturation effects.

4.2. Updates and further information

Refer to my Blog at <http://varietyofsound.wordpress.com> for some additional information and updates on this plug-in or leave a note there if any issues did occur.

There are already some readings available concerning chorus, echo and stuff.

Peace,
Herbert