JELSTUDIO's "Auto EQ", version 3 (20220602)

A dynamic automatic tonal equalizer plugin for LIVE or mixing/mastering use.

AutoEQ's purpose is to automatically and continuously adjust the EQ-curve, the audio's 'color', to obtain a generally all-round pleasing tonality.

Technically it is a 32/64 bit VST2 audio-effect plugin mainly for DAWs and sound/video-editors on Windows, but it can also be used in a LIVE VST-host (for example with LIVE stage-performance audio, or with music/TV home-stereo audio)

AutoEQ is optimized for music (both songs and individual instruments) but often works equally well with spoken content (such as television and movies)

Some of AutoEQ's key-points:

- Built-in safety brickwall-limiter on output (can be disabled)
- Zero latency (for LIVE use or for tracking)
- Automatic input-gain control (+/- 18 dB for a 36 dB total range)
- GUI layout is optimized for 'peripheral vision overview' (when looking at the center of the GUI; all important displays can be read at a glance with peripheral vision)
- For Windows 7, 8, 10
- Zip with .dll (no .exe installation)
- No DRM (Such as PhoneHome, iLok, etc)
- 3 different EQ 'color' choices.

Order of AutoEQ's internal audio-routing:

Mono/Stereo input → Gain Stage → EQ Filter → EQ Gain Algorithm → Gain Match Algorithm → Safety Limiter → Output

Usage (how to operate):

TL;DR
(Minimum required reading)

#1: Add AutoEQ to your plugin-chain.

#2: Start your sound playing.

#3: Adjust listening volume on your sound-system to taste.

#4: That's it. Enjoy the (hopefully) pleasing sound.

Now follows more in-depth info:

GUI
The GUI has 1 'wall-projector' and 10 mouse-controls.

Right side:

"AutoEQ", warm white, always ON.
This is just a light showing the plugin's title.

"WORKING", red, ON when signal is detected and AutoEQ is active.

"READY WAITING", cool white, ON when no signal is currently detected but AutoEQ is ready and waiting for input.

"LIMITER", warm white, ON when output-limiter (limits all real* samples to a maximum of 0 dB FS) is active. Output-limiter may deteriorate the sound-quality if clipping occurs (see info on clipper, and how to avoid clipping, further below)
*Real samples defined here as samples actually measured in reality, at your host's current sample-rate, as opposed to interpolated virtual samples (AKA 'true')

"AFTERBURNER", warm white, ON when the internal 'power-potential' (you can read more about the simulated circuitry later in this manual) is getting close to 'hot' levels. Occasional blinking, or steady light for less than ~10-15 seconds, is of no serious concern, since the automatic gain-staging will adjust the signal as needed to avoid a 'runaway chain-reaction', and this warning can be ignored in most situations.
Only if the gain-staging is already at its lowest (the blue slider seen at the bottom has gone all the way to the left and indicating -18 dB gain-compensation) this warning, if remaining ON for prolonged times (more than 15 seconds), should lead to you manually reducing the input-volume of the signal going into the plugin (this can really only happen if you feed the plugin audio at levels significantly above zero dB FS)
This warning-light was more relevant in version 2 of AutoEQ, which has manual gain-staging, but was left in just to make sure potential overload-cases can still be identified.
To sum up; the afterburner-light can generally be ignored in version 3 of AutoEQ (it does not indicate clipping of any audio)

"NORMAL", warm white, ON when the general-purpose EQ-color program is active. This mode is the most 'mix-translation friendly', and should generally be used for most audio. It is designed to accommodate 'popular' music of any time-era.

"SUBWOOFER", magenta, ON when the extended general EQ-color program is active. This mode is LESS 'mix-translation friendly', is more 'bass heavy', and should generally only be used after careful consideration that extra bass is really what you want for your material.

"ELECTRONIC", warm white, ON when the 'techno' EQ-color program is active. This mode is specially designed for electronic music-styles (techno, drum'n'bass, etc).

"BASS TRAP", cyan, ON when the sub-bass limiter is active. This mode is useful for some types of microphone-recordings, where sub-bass 'rumble' must be limited.

"VU OUT", warm white, ON when the output-level is 'VU friendly'. Use this mode if you get clipping-warnings in the plugin-window. It will lower the output-level and give you more headroom to avoid output-clipping.
This mode is useful when feeding the plugin already-mastered music peaking near or above zero dB FS.
It has no effect on the EQ-color, but only affects the output-gain.

The center screen:

On the main projector-screen you have 2 options of visual display (toggle between them by clicking the right mouse-button while hovering the cursor over the main screen)

"Nuclear reactor", multi-colored, ON when signal is processed. It shows what you may think of as a traditional graphic-equalizer panel, with the output spectrum-color averaged onto 5 vertical bars, the 'nuclear control rods', with the lowest frequency (bass) being to the left and the highest (treble) to the right. The lower a bar is vertically; the more this frequency is attenuated. The 5 bars are not directly linked to the internal processing of the EQ-color, but only an averaged summation of the entire spectrum-adjustment meant to give an easy visual overview of the resulting general EQ-curve/sound-color.

The 5 control-rods go up and down to raise or dampen the power-potential of the reactor. When they go up the 'rate of fission' increases, meaning the internal audio-level gain is raised and more power is built up in the simulated system. When they go down they dampen the power-generation and the gain goes down.
This movement is controlled by the automatic gain-staging control, to keep the EQ working at its 'sweet-spot' (the middle of the reactor-pool)

If the signal becomes to hot, or too cold, for the control-rods to control, the reactor-pool is either flooded with, or drained from, coolant-water. You will see this as a big blue color rising or sinking on the screen, indicating how much coolant-water is in the reactor-pool.

While this happen you can of course also see the glow of Cherenkov radiation in the reactor-core.

This entire visual is merely to make AutoEQ more fun to look at, since it is mostly automated and does not require much user-interaction when running.
However, if you do not like the nuclear-reactor display, you can switch to a relaxing

'psychedelic visual', called 'moving boxes', instead.

"Moving boxes", multi-colored, ON when signal is processed. It reacts to the internal processing to indicate things are working. It has no real audio-informational purpose, but is there to avoid the plugin from looking static.
The boxes will continuously alter in shape, size and color depending on processes taking place in the internal simulated system.

Bottom:

"Internal gain compensation", blue, horizontal slider, always ON.
Fully to the LEFT and 'empty' looking; AutoEQ is reducing the input-audio's gain internally by 18 dB (-18 dB gain)
Fully to the RIGHT and 'filled' looking; AutoEQ is boosting the input-audio's gain internally by 18 dB (+18 dB gain)
This does not affect output-gain, but is done to calibrate the audio into the EQ's 'sweet-spot' (This is related to the simulated analog system, which you can read more about further below)
There are no user-controls of this gain-compensation, as in version 2, as it is fully automated in version 3.

The mouse-controls:

Main window:
"Comparison bypass", invisible, big yellow cross when active. Click and hold your left mouse-button (anywhere on the GUI except over the buttons on the right and the dry/wet slider at the bottom) to bypass the EQ-processing but maintain a comparable output-gain. This is useful to make judgments on whether AutoEQ is improving your audio or not. The gain will not always match perfectly, but should in most cases be close enough to make a valid quality-comparison without your hearing being colored by gain-differences. If the original audio has already got the 'perfect' EQ, as AutoEQ defines it, then you may not hear any or much difference at all between processed and bypassed audio.

Bottom:
"Wet vs Dry level", orange, horizontal slider, always ON. Fully pulled LEFT and 'empty' looking (Click and hold left mouse-button to drag slider LEFT and RIGHT, click and release right mouse-button to reset to fully wet level, which is also the default level), AutoEQ outputs its wet signal (the fully processed signal). Fully pulled RIGHT and 'filled' looking, AutoEQ outputs its gain-compensated but otherwise fully dry signal (the same signal you get when 'comparison bypass' is ON (the signal you get when the big yellow X is showing)). You can use this slider to add some gain-compensated dry signal back into your audio-chain if you do not prefer the fully processed signal. As with the 'comparison bypass'; the level-gain may not always match 100%, since

the gain-compensation is based on the EQ-color and not 'loudness'. But it should definitely match closer than what you might get with a host's dry-wet option (where the dry signal would be obtained by bypassing AutoEQ's gain-compensation)

"EQ tempo control", red, horizontal slider, always ON. Fully pulled LEFT and 'empty' looking (Click and hold left mouse-button to drag slider LEFT and RIGHT, click and release right mouse-button to reset to default tempo), the EQ will change the sound-spectrum at a slower tempo. Fully pulled RIGHT and 'filled' looking, the EQ will change the sound-spectrum at a faster tempo.
Depending on the type of audio-program, a certain tempo can sound either more 'transparent' or more 'invasive', so adjust to taste if the default tempo does not suit your material.
For movies and television/podcast type programs a slower tempo may sometimes work better, while for 'digital' music a faster tempo may sometimes work better. The default (50 percent) is tuned for general music and should fit almost any scenario.

Right:
All buttons (the lights on the right side) are controlled with your left mouse-button (toggle the light ON and OFF to engage or disengage that particular mode)

The wall-projector:

Center:
"CLIP", warm white, 'projected' on the 'main screen'. Comes ON whenever a real sample above zero dB FS is hitting the limiter-stage (before the output-stage). If the output-limiter is ON, the actual output from AutoEQ will not technically go above zero dB FS, but clipping may occur internally in AutoEQ (at the final output limiter-stage) and deteriorate the output sound-quality.

If the output-limiter is OFF, the actual output from AutoEQ can go as high as it wants, provided your host supports +dB FS levels (be aware that in this mode AutoEQ may inadvertently, under certain conditions, output short spikes/bursts of sound-levels that go close to, or perhaps even above, +100 dB FS)

Even though you can mix at +dB FS levels with AutoEQ; if you intend to export the audio to a standard 16 or 24 bit audio-file (Such as CD or MP3 files or similar), it is advised (but can obviously be ignored if you like the sound) to keep levels below the level that triggers the clip warning (since too much compression or limiting at your final output-stage (to bring levels back below zero dB FS) can destroy most of the improvements AutoEQ attempts to make.

There is a certain 'sparkle', or 'glimmer', the AutoEQ process creates, that is lost if the colored signal is compressed/limited heavily later.

The clipping-warning does NOT mean the signal is clipping internally (which is nearly

impossible to achieve with this design), only that the final output-signal from AutoEQ is clipped.

If you really wanted to saturate the plugin internally, you would need to feed it levels far in excess of zero dB (There is no exact saturation-level, since it depends dynamically on a combination of things relative to the incoming signal-structure)

The logo and plugin version info:

Center:
The 'breathing logo' will 'breathe' (brightness will continuously rise and fall slowly) to show that the plugin is running and not stopped or 'crashed'.
The link to the website (jelstudio.dk) (not clickable).
The date the plugin was last edited.

Technical concept (in general terms):

AutoEQ works by simulating a theoretically possible physical device (aka analog device) that operates in real-time.

The EQ 'color' is formed by unstable high-power 'capacitors' sitting in parallel configuration.

Broadband signal-level is formed by similar capacitors sitting in serial configuration.

The system simulated in AutoEQ (version 2 and 3) is the result of a defense-related concept-simulation of a theoretical high-powered electro-magnetic aircraft launch-catapult with a massive mis-match of the ratio between control-power and inertial-weight.

While that original concept-device is physically possible, it turned out to be much too sensitive to quantum-noise to be feasibly safe in a day-to-day military operation (especially on an aircraft-carrier setting), leaving the code shelved for some time. That the code could be translated into something useful for music was a mere coincidence I only discovered later.

However, the fundamental instability of the original design remains (it is sensitive to quantum-noise, which, in its current audio-implementation here, means lack of 'qualified' audio-input; it basically 'collapses' when it is not fed any suitable audio), meaning the device can exhibit unexpected power-surges (Self-powering chain-reactions spiraling out of control, triggered by certain noise-fluctuations), leading to the device 'blowing up' (but since this is obviously only a simulation of a theoretical physical device; the effect of such surges translates into large positive dB FS levels. Be aware, however, that this can cause sound to be output at such high volume that it may be potentially dangerous to your hearing, depending on your amplifier setup! Be extra careful until you get sufficiently acquainted with AutoEQ, as tinnitus and hearing-loss is no joke.)

I have done my best to implement safety systems to the code (methods that are not physically possible if this device was built in the 'real analog world', but can be achieved by 'cheating' the simulation digitally) and have found, now that this specific implementation of the code has had 3 years of use to prove itself (in version 2, which uses the same code to generate the EQ-color as version 3), that it is generally very safe to use.

The digital 'unreal' safety-systems are limited to such that do not interfere with the 'real' analog sound, so they do not provide a 100% guarantee against 'blow-ups'.

When used with normal music it has not 'chain-reacted' uncontrollably even once, which is good but does not mean it can not happen.
So I advise you keep the limiter ON at all times you listen to audio from this plugin.

Additionally; if you use 'console-plugins' that output 'analog noise' continuously, so that AutoEQ never sees any 'near silence', then you may be further safe-guarded from 'blow-ups' since this will keep AutoEQ's internal system active.

It may help to think of AutoEQ's nature as that of a bicycle; it's stable while moving, but falls over when you stop moving. Or perhaps an aircraft-wing; requires specific air-flow to generate lift, but will stall if the flow becomes too turbulent.

So fundamentally AutoEQ is not a traditional EQ, but rather a simulation of a highly chaotic and unstable analog device, which just happens to sound pleasing when working :)

At the end of the day though; it's the resulting music that is key, and I hope you will find AutoEQ useful on yours.

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*If you receive 'weird nonsense' email/facebook-messages (like, for example, invitations to play Facebook games) from this account, it is NOT sent by JELSTUDIO! Feel free to use Twitter/Facebook for communication instead of email if preferred (Not via PM though, because I rarely check those, but as comments to posts or via the @ on twitter or facebook)

Purchase link: https://sites.fastspring.com/jelstudio/instant/autoeq
(JELSTUDIO does not get your credit-card info, or other payment-details, only your email and your name and address)

And, as a final note, a personal plug to my own music :) :
https://open.spotify.com/artist/2I0gyn2gnEkN53dfU7YCP1

Thank you.