

NN76

Version 1.1.2

User Manual



Acknowledgements

NN76 was made using the open source plugin framework iPlug2. Without this framework NN76 would not have been possible.

<https://github.com/iPlug2/iPlug2>

NN76 would also not have been possible without the Awesome Audio Plugin Framework.

<https://github.com/Tremus/awesome-audio-plugin-framework>

Thank you to Leander Hofmann for helping create the factory preset library.

Legal

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1 Welcome

1.1 Introduction

NN76 is a neural network model of the renowned FET compressor. At its core, the plugin runs a real-time neural network that has been trained on hundreds of hours of audio processed through famous "Blackface" version. We took extraordinary measures to sample the circuit with meticulous precision, using high-quality hardware and converters. Knob positions were adjusted robotically across their entire range. This enabled us to capture an exceptionally accurate dataset that encompasses the full capabilities of the compressor. The end result is a plugin re-creation of the hardware that truly sounds unlike any other.



Figure 1: Main User Interface

1.2 Neural Network Emulations

Neural networks are a machine learning concept that refers to a specific type of mathematical function. These functions describe a vast web of interconnected nodes, which can be thought of as a network of neurons. Neural networks can be used for various tasks, but they are commonly employed to model complex systems through a technique called supervised learning. In supervised learning, a neural network is trained by feeding it a large set of inputs and corresponding expected outputs. The network then learns the behavior required to produce the expected output given a specific input. Therefore, if we have a large enough dataset of audio inputs and corresponding outputs from a hardware effects unit, we should be able to train a neural network on this data to accurately model the hardware. This is precisely how we developed NN76.

To understand the benefits of this approach, we need to examine the limitations of traditional modeling techniques. Most hardware emulations are currently created using a method called circuit modeling which uses mathematical models to represent individual components in the electrical circuit. In electrical engineering, there is a concept called "ideal behavior," which refers to a simplified mathematical model used to describe the intended behavior of an electrical component—such as a resistor. However, in reality, electrical components have tolerances and often perform within a deviation of this ideal behavior. Additionally, real-life components frequently ex-

hibit other non-linear characteristics that these models do not capture. These tolerances have a cumulative effect across the entire circuit, leading to a digital model that can sound quite different from the hardware. This model often lacks the pleasing distortion and non-linear characteristics inherent in the original hardware's sound.

In contrast, neural networks do not concern themselves with the specifics of the circuit. They focus solely on the input and output, aiming to manipulate the signal in whatever way is necessary to approximate the expected output as closely as possible. The result is a digital model that captures all the nuances and non-linear behavior present in the original hardware, resulting in an emulation that is full of life like the real hardware.

2 Installation

2.1 MacOS

To install NN76 on macOS, run the `NN76 Installer.pkg` file that you downloaded from our website. Follow the installer prompts to complete the installation. Once the installation is complete, you will see a "Installation Successful" screen.

To completely uninstall NN76 delete the following files and folders:

1. `/Library/Application Support/Tree DSP/NN76`
2. `/Library/Audio/Plug-Ins/Components/NN76.component`
3. `/Library/Audio/Plug-Ins/VST3/NN76.vst3`
4. `/Library/Application Support/Avid/Audio/Plug-Ins/NN76.aaxplugin`

2.2 Windows

To install NN76 on Windows, run the `NN76 Installer.exe` file that you downloaded from our website. Follow the installer prompts to complete the installation.

To completely uninstall NN76, click on the Start menu and search for "Add or Remove Programs." Locate NN76 in the list and run the uninstaller. Alternatively, you can manually delete the following files and folders:

1. `C:\Program Data\Tree DSP\NN76`
2. `C:\Program Files\Common Files\VST3\NN76.vst3`
3. `C:\Program Files\Common Files\Avid\Audio\Plug-Ins\NN76.aaxplugin`

3 Activation

3.1 First-Time Activation

After installing NN76, you must activate the plugin on your device before first use.



You will need an active internet connection to complete the activation. Once activated, you can continue to use the plugin offline if you own a full license.

To activate NN76, load the plugin in your DAW and click the **Activate** button. A browser window will open automatically. If you are already logged into your account, you will be presented with a page to authorize the device. If you are not logged in, you will be prompted to log in first, then proceed to authorize the device. Once authorization is complete, return to your DAW—the activation dialog will close automatically and the plugin will be ready to use.

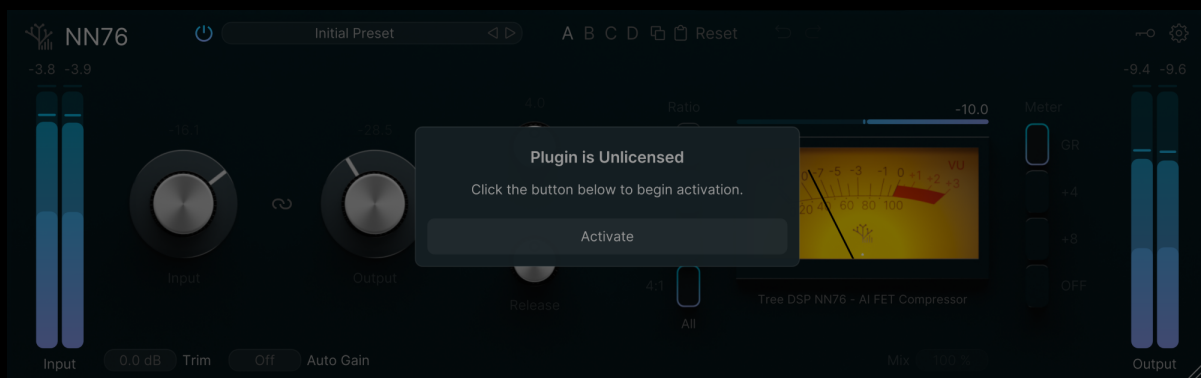


Figure 2: Plugin Activation

3.2 Viewing Activation Status

You can view your device's activation status by clicking the small key icon in the top right corner of the plugin interface. This will display a popup window with your account and license details.

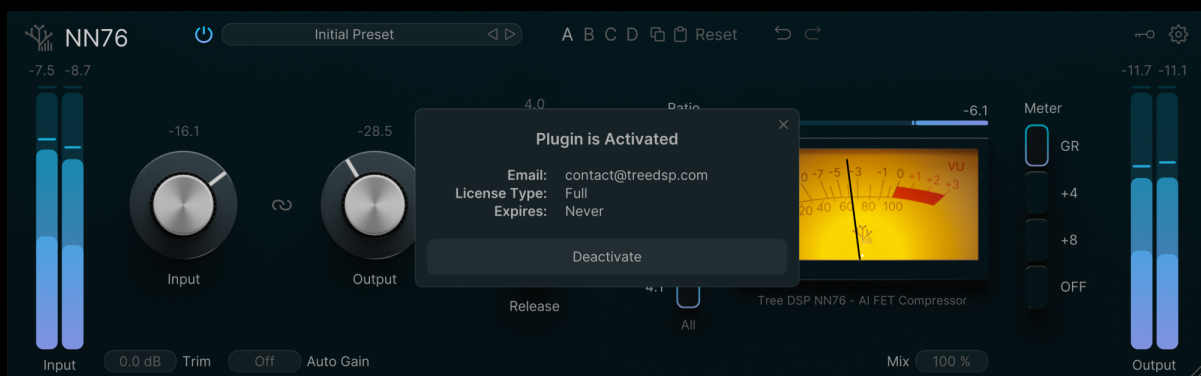


Figure 3: View Activation Status

3.3 Deactivating a Device

You can activate NN76 on up to three devices simultaneously. If you wish to use the plugin on a new device, you must first deactivate one of the existing devices. This can be done in two ways:

1. Deactivate through the plugin interface: Click the key icon in the top right corner and select "Deactivate." The plugin will temporarily wait, and once the device has been deactivated, the activation screen will appear. Note that your device will need an active internet connection.
2. Deactivate through our website: Log in to your account and navigate to the Licenses tab on your account page. You will see a list of currently activated devices. Find your device on the list and click "Deactivate." After a few seconds, the device will be removed from the list.

4 User Interface

NN76 features an intuitive and modern user interface with GPU-accelerated graphics and a 60Hz refresh rate. We have taken every measure to ensure the interface is smooth and visually appealing, all while maintaining full functionality and usability.

4.1 Overview

The interface is designed logically, closely resembling the original hardware while incorporating many useful features. Input and output meters are located on either side, while the main compressor controls are displayed in the center section of the plugin. Additional controls are conveniently placed in the top and bottom menu bars.

4.1.1 Resizing the Interface

You can resize the entire user interface by dragging the two lines in the bottom right corner. To reset the interface to its original size, simply double-click on these two lines.

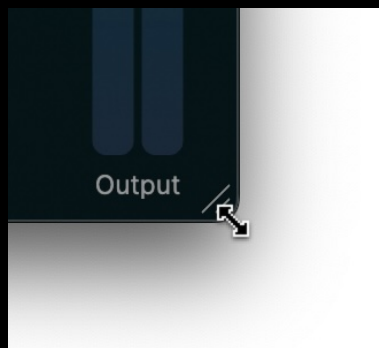


Figure 4: Resize Interface

4.2 Input and Output Gain

NN76 provides comprehensive control over input and output levels, allowing you to dial in the perfect amount of compression while maintaining optimal signal levels throughout the processing chain.

4.2.1 Input and Output Gain



Figure 5: Input and Output Gain

Like the original hardware, NN76 has a fixed threshold level. To achieve the desired amount of gain reduction, you'll need to adjust both the input and output gain together. Increase the input gain to boost the amount of gain reduction, and decrease the output gain accordingly to maintain the desired output level.

To adjust the levels, click and drag each knob to rotate and change its gain value. You can also hover over a knob and use your mouse scroll wheel to make adjustments. Alternatively, you can click on the text value above the knob to type in a specific value directly, which will open a small text field. To reset a knob to its default value, double-click on it.

NN76 also features a convenient link option that synchronizes the input and output gain adjustments. When activated, this feature allows you to change the amount of gain reduction without altering the overall volume of the source material. Simply click the small chain icon between the knobs to activate or deactivate the link feature. The icon will be colored when the link is active. Note that the link feature is not affected by preset recalls, preset bank switching, or resetting individual knobs.

4.2.2 Input Trim

The **Input Trim** control, located in the bottom left near the input meter, provides an additional gain stage applied before the signal reaches the main input gain knob. This trim control functions as if you were adding a gain plugin before NN76, affecting both the input metering and auto-gain measurements.

The input trim can be adjusted from -12dB to +12dB. To adjust the trim, click and drag the text bubble up or down to change the value. Alternatively, you can double-click on the control to enter a specific value using your keyboard. The input trim operates completely independently of all other controls, including the input/output link feature.

4.2.3 Auto-Gain



Figure 6: Auto-Gain

The **Auto-Gain** feature, located in the bottom left of the interface, automatically compensates the output level to match the input loudness. When enabled by toggling the button to the ON position, NN76 measures the input signal loudness using LUFS-based measurements. This measurement is taken after the input trim is applied, but before the main input gain knob.

Auto-gain then applies additional gain to the final output signal (after the output gain knob) to maintain consistent perceived volume. The amount of auto-gain being applied is displayed visually as an arc on the output gain knob. This arc extends from the output knob's current position, showing where the effective output level is with the auto-gain compensation applied.

You can still manually adjust the output gain knob while auto-gain is active; however, the auto-gain will continue to apply its compensation after your manual adjustment. Auto-gain operates independently of all other parameters, including the input/output link feature.

4.3 Compressor

4.3.1 Attack and Release



Figure 7: Attack and Release

NN76 includes both attack and release controls. The attack control adjusts how quickly the gain reduction is applied to the source material after the threshold is exceeded, while the release control determines how quickly the gain reduction decreases once the level drops back below the threshold.

The attack time can be set between 20 and 800 microseconds, and the release time can be set between 50 milliseconds and 1.1 seconds. Like the original hardware, the attack and release controls are somewhat counterintuitive: increasing the attack/release value actually decreases the corresponding time.

To adjust the attack and release values, click and drag each knob to rotate and change its setting. You can also hover over a knob and use your mouse scroll wheel for adjustments. Alternatively, you can click on the text value above the knob to enter a specific value directly, which will open a small text field. To reset a knob to its default value, simply double-click on it.

4.3.2 Ratio



Figure 8: Ratio

NN76 offers four ratio modes: 4:1, 8:1, 12:1, and 20:1. The higher the first number in the ratio, the more gain reduction is applied to the signal when it exceeds the threshold. As with the original hardware, the threshold level increases with higher ratio settings.

Additionally, NN76 features an A11 button that activates all-buttons-in mode, replicating the classic technique of pressing all four ratio buttons simultaneously on the original hardware. This mode produces the distinctive "British mode" compression characteristic, known for its intense and heavily distorted sound. To exit all-buttons-in mode and return to a single ratio, simply click any of the four ratio buttons.



Figure 9: All-Buttons-In Mode

To change the ratio, click on the button corresponding to your desired ratio mode or click A11 for all-buttons-in mode.

4.4 Metering

NN76 is equipped with modern and precise metering to aid in dialing in a great sound.

4.4.1 Input and Output Metering



Figure 10: Input and Output Meters

NN76 features two prominent meters on either side of the main interface—the input meter on the left and the output meter on the right.

The input meter displays the level of the signal before any processing, unaffected by the input gain knob. The output meter shows the final processed signal, influenced by the output gain knob. Both meters indicate three levels: small rectangles represent peak indicators, holding the highest peak within the last 1500ms; a duller bar tracks the signal's peak in real-time, and a brighter bar reflects the RMS value, calculated over a 500ms window. The numbers at the top of the meters show the held peak level in decibels.

Each meter also has a clipping indicator at the top, which lights up if the signal exceeds 0dB. The clipping indicator can be reset by clicking anywhere within the meter area. Although the signal might exceed 0dB, it won't clip, thanks to the plugin's floating point processing.

4.4.2 Gain Reduction Metering



Figure 11: Gain Reduction Meters

NN76 includes two gain reduction meters, both located in the right-center area of the interface.

The first meter is an analog-style meter with a needle indicator, faithfully replicating the look and behavior of the original hardware. While this meter responds more slowly and less accurately than the true gain reduction level, it provides a familiar and authentic experience faithful to the hardware. The analog meter offers four modes: GR, +4, +8, and OFF. By default, the GR mode displays the gain reduction in decibels. The +4 and +8 modes monitor the output signal at different levels, and the OFF mode disables the meter.

Above the analog meter, the digital gain reduction meter provides a more precise measurement. The small rectangle represents a peak hold indicator, capturing the highest gain reduction within the last 1500ms. The main bar shows the current peak gain reduction level, while the number in the top right corner displays the held peak gain reduction in decibels.

4.5 Preset Banks



Figure 12: Preset Banks

NN76 includes a preset bank feature with four banks (A, B, C, and D) that allows you to store and compare different parameter configurations within a single plugin instance. By default, the plugin operates in bank A. To switch to a different bank, simply click the corresponding button (B, C, or D). Each bank maintains its own independent set of parameters, allowing you to quickly switch between different compression settings.

The copy and paste buttons, located to the right of the bank buttons, enable you to duplicate settings between banks. To copy a bank's settings, ensure you are viewing the bank you wish to copy, then click the copy icon. The paste button will light up, indicating that settings are ready to be pasted. Navigate to any destination bank and click the paste icon to replicate the copied settings. You can paste the same settings to multiple banks; the copied settings remain available until you copy again from a different bank.

You can reset all parameters to their default values in the current bank by clicking the reset button.

4.6 Preset Browser

NN76 features a sleek and intuitive preset browser that allows you to store and load different presets effortlessly.

4.6.1 Overview

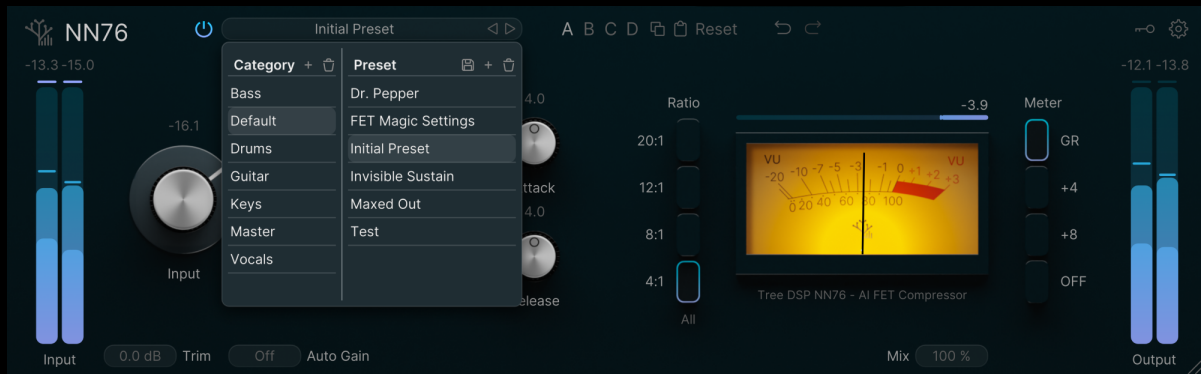


Figure 13: Preset Browser

The preset bar is located at the top of the plugin. You can navigate through presets using the left and right arrows, or click the center of the bar to open the preset browser. The browser is divided into two columns: **Category** and **Preset**. Categories act as folders to organize your presets. To open a category, simply click on it. The presets within that category will be displayed in the preset column. To select a preset, click on it once; to load it, double-click.

4.6.2 Saving a New Preset

To save a new preset, click the plus icon in the top-right corner of the preset column. Ensure that you are in the correct category and that your plugin settings are configured as desired. A text field will appear, allowing you to enter a name for the new preset. Press **Enter** to save it.

4.6.3 Saving an Existing Preset

You can modify and save changes to an existing preset. After adjusting the plugin parameters, select the preset you wish to overwrite by clicking on it. Then, click the save icon in the top-right corner of the preset column. A confirmation dialog will appear; click **Yes** to overwrite the preset.

4.6.4 Deleting a Preset

To delete a preset, select it by clicking on it (the preset will be highlighted). Then, click the trash can icon in the top-right corner of the preset column. A confirmation popup will appear; click **Yes** to delete the preset.

4.6.5 Renaming a Preset

To rename a preset, right-click on it and select **Rename** from the dropdown menu. A text field will appear where you can enter the new name.

4.6.6 Creating a Category

To create a new category, click the small plus icon below the **Category** heading. Enter a name for the new category and press **Enter**.

4.6.7 Deleting a Category

To delete a category, click on the category name to highlight it, then click the trash can icon below the **Category** heading. A confirmation window will appear.



Deleting a category will also remove all presets within it. This action cannot be undone, so proceed with caution.

4.6.8 Renaming a Category

To rename a category, right-click on it and select **Rename** from the dropdown menu. A text field will appear where you can enter the new name.

4.7 Other Controls

4.7.1 Undo and Redo



Figure 14: Undo and Redo

The **Undo** and **Redo** buttons, located in the top menu bar to the right of the preset bank buttons, allow you to step backward and forward through any actions taken in the user interface. Similar to undo and redo functionality in most computer programs, these buttons let you revert unwanted changes or restore changes you've undone.

NN76 maintains a history of up to 100 actions, including all parameter changes, preset bank switches, and preset recalls. To undo the last action, click the undo button. To redo a previously undone action, click the redo button.

4.7.2 Mix



Figure 15: Mix Control

The **Mix** control lets you adjust the balance between the original dry signal and the processed signal. This can be used to create the popular parallel compression effect. Click and drag the text field up or down to set the mix level. 100% represents only the processed signal, while 0% represents the unprocessed signal.

4.7.3 Bypass



Figure 16: Bypass Control

To bypass all audio processing, click the small power button in the top-left corner of the user interface. The icon will turn grey, and the interface will stop updating until the button is clicked again.

4.8 Settings

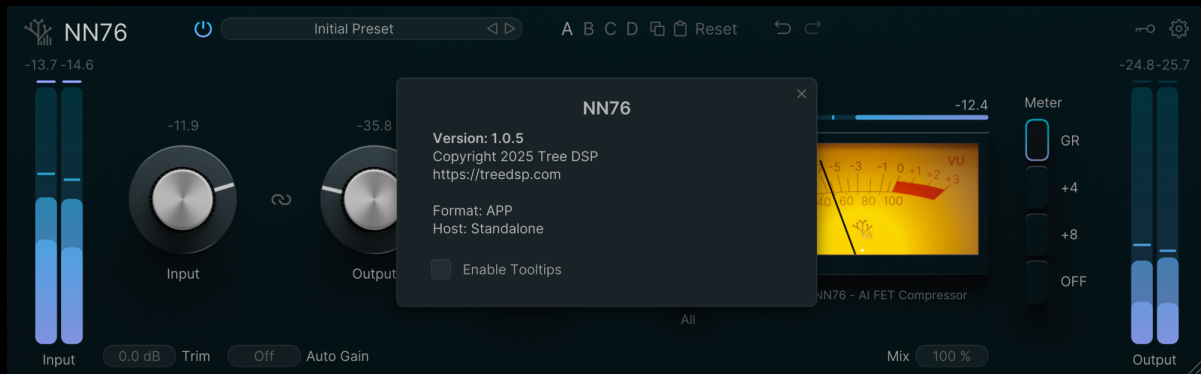


Figure 17: Settings Menu

The settings menu provides access to plugin information and customization options. To access the settings menu, click the cog wheel icon in the top-right corner of the interface. This will open a window displaying version information, host details, and plugin format information (such as VST3, AU, or AAX).

4.8.1 Tooltips

The tooltips feature provides additional information about controls when you hover over them with your mouse. To enable tooltips, open the settings menu and check the **Enable Tooltips** checkbox. When enabled, hovering over any control in the user interface will display a tooltip with more information about that control's function.

The tooltips setting is global across all plugin instances and is stored in a settings file, ensuring your preference is remembered the next time you load NN76.