Virtual Mix Room



User Guide

WAVES

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Chapter 1 – Introduction

1.1 Welcome

Thank you for choosing Waves. In order to get the most out of your Waves processor, please take the time to read through this manual.

We also suggest you become familiar with www.waves.com/support. There you will find an extensive answer base, the latest tech specs, detailed installation guides, new software updates, and current information on licensing and registration.

By signing up at www.waves.com, you will receive personalized information on your registered products, reminders when updates are available, and more.

1.2 Product Overview

The Waves Nx Virtual Mix Room plugin is a virtual monitoring tool that allows you to hear the ideal acoustics of a high-end mix room – inside your headphones.

When you monitor on headphones, Nx allows you to experience your mix in the spatial context of a highly optimized studio control room, with either a stereo or a surround speaker configuration. It lets you judge mix depth, panning, stereo image, balance and reverb with confidence, giving you an accurate representation of how your headphone mix will translate to speakers. Paired with your favorite headphone set, it will provide you a good and reliable reference point for your mix.

Nx is a binaural processing plugin. It uses state-of-the-art mathematical modeling of human psychoacoustics to achieve a natural, immersive and transparent spatial sound over headphones. For enhanced realism, Nx can also track your head movements in real time.

1.3 Components

Nx has several components to support different input channel settings: mono, stereo, and 5.0 or 5.1 surround. The output of Nx is always a binaural stereo signal containing all the mix channels in their virtual positions, and playing to the L and R channels of your headphones:

Each of the surround components has two versions – one with the same number of input and output channels (though only the L and R outputs are playing audio), and one with only two output channels:

Nx contains these components:

- Mono to Stereo
- Stereo to Stereo
- 5.0 to Stereo
- 5.0 to 5.0 (only L and R outputs play audio)
- 5.1 to Stereo
- 5.1 to 5.1 (only L and R outputs play audio)

See Appendix A at the end of this user guide for more information on the inputs/outputs of the surround components.

Chapter 2 – Quick Start Guide

1. Since Nx is a monitoring-only plugin, insert only one instance of NX plugin on your master buss (not on individual tracks). Make sure that the plugin is bypassed when you later bounce the mix.

2. Open the plugin, and the head tracking application will automatically open as well. This application uses your computer's camera to track your head movements.

   To enable the head tracking application to properly follow your head, make sure that:
   (a) There is enough light in the room to enable a tracking rate of at least 20 frames per second. Webcams generally have a tracking rate of up to 30 fps. The optimal rate is anywhere between 25 and 30 fps.
   (b) Be no more than 5-6 feet away from the camera (optimal distance varies by camera)
   (c) Move no further than 30 degrees left or right relative to the camera.

   Now move your head around, and see the virtual head in the GUI move in sync with you. Note that in many DAWs, you will need to play audio first in order for the virtual head in the Nx interface to start moving.

3. Decide where you want to be located, and press the Sweet Spot button in the Head Tracking section, on the left side of the Nx plugin interface. This will now be your center position in the Virtual Mix Room.

4. Listen to the audio you're playing. Take a few minutes to let your ears adjust to the effect. Listen to a good reference you're familiar with.

   The default values of the plugin's controls are a good place to start. We recommend you wait a bit before you start playing with the Room Ambience and Speaker Position knobs.

5. To get the most out of Nx, it is highly recommended that you set the values in the Head Modeling section to your own individual head measurements. For detailed information on how to do this and why, read below.

If you choose not to enter your individual head measurements, it is recommended that you stick with the default values, which are the average for the human population. Radical departures from the recommended values will seriously distort the effect.

6. A tip on using Nx for surround monitoring on your regular headphones:

   In Nx, each surround option, 5.1 and 5.0, has two different versions – surround-to-surround, and surround-to-stereo. For example, when you open Nx on a 5.1 surround session, you can either choose either regular 5.1 component, or the 5.1-to-Stereo component.

   If you just want to route surround audio to your stereo headphones, the simplest way to do this is to choose the surround-to-stereo component (5.1-to-Stereo or 5.0-to-Stereo).

   If you do not want to change the routing settings of your existing session, use the surround-to-surround component (5.1-to-5.1 or 5.0-to-5.0). You will then need to route the L and R channels to your headphones, either from the I/O settings of your DAW or from an external patch.

Chapter 3 – Interface and Controls

3.1 Interface

5.1 Surround Component



5.0 Surround Component



Stereo Component



Mono Component



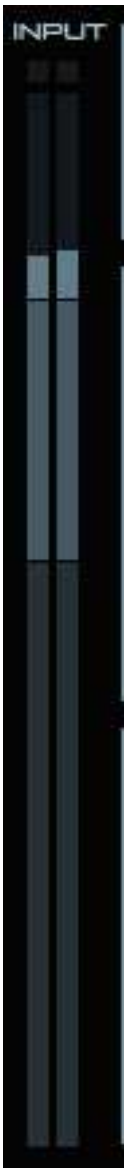
3.2 Controls

INPUT METERS

Indicate your input levels. The number of meters varies cording to the Nx component you are using: mono, stereo, 5.0 or 5.1.



Nx 5.1 Surround



Nx Stereo

HEAD TRACKING



Use this section to control the head tracking application that works in conjunction with the Nx plugin.

TRACKING ON/OFF – Toggles the head tracking on and off. In off mode, the simulated image returns to the center position without tracking the listener's real-world location.

TRACKING DEVICE – Here you can select which tracking device to use. As of January 2016, the only available option is your computer's camera. A second option, a wireless IMU tracker, is listed in the drop-down menu but is not yet available and therefore cannot be selected at present. The wireless Waves Nx Head Tracker device is scheduled for release in 2016.

RESTART – Clicking this button restarts the head tracking application. It is advised to press the Restart button whenever you change users or if you suspect that the tracking sensor is not tracking you optimally.

SWEET SPOT – Clicking this button tells the head tracking application to refer to your head position at the moment of clicking as your center position, or your "sweet spot."

Each time you start the system or change either your position or the camera's, you can reset your sweet spot. Hold your head centered, look straight forward, and click the button to let the system know where your sweet spot is.

The Sweet Spot button will blink until you click it once and set your sweet spot – just a reminder!

TRACKING RATE – Indicates the rate of tracking in frames per second (fps). The optimal rate is 25-30 fps.

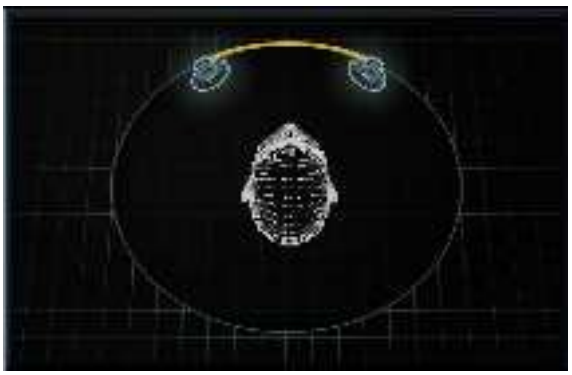
XYZ LOCK – Locks the movement of the virtual head on the XYZ axes (left/right, forward/back, up/down). When this button is pressed, Nx will represent only your head rotations. This means you will remain in the virtual "sweet spot" even if you move sideways, forward/back, or up/down.

VIRTUAL MIX ROOM WINDOW

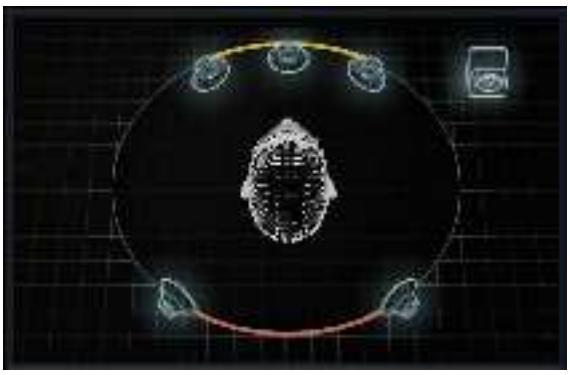
This Virtual Mix Room window represents your head movements and the position of the virtual speakers. When head tracking is on, you will see the virtual head moving in coordination with your actual head movements.

Double-clicking a speaker icon will mute and unmute it. The icon will become darker when the speaker is muted. Speakers are unmuted be default.

Clicking-and-dragging one of the L or R speakers will symmetrically change the width of the speakers' spread, also affecting the Speaker Position knob below the head position graph.



Virtual Mix Room – Stereo



Virtual Mix Room – 5.1 Surround

HEAD MODELING



Here you can personalize the psychoacoustic effect of Nx by entering your individual head measurements – your head circumference, and the semi-circumference from ear to ear over the back of your head. Nx is a binaural effect, so it factors these parameters to calculate the inter-aural delays, filters and gains for each ear. These are used to approximate your individual Head-Related Transfer Function (HRTF). The default settings are based on average data for the adult human population, but because these parameters can vary widely between individuals, it is advised to adjust them to your personal dimensions. This will ensure optimal experience with Nx.

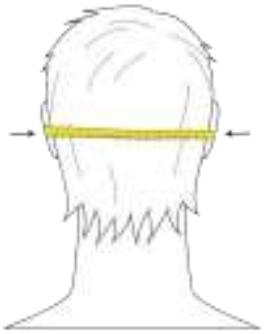
Please note: Entering values completely unrelated to your personal head measurements will heavily distort the effect. If you do not enter your individual measurements, it is advised that you use the default values.

CIRCUMFERENCE – Enter your head circumference in either centimeters or inches. To find your head circumference, use a measuring tape to measure the longest distance around your head – over the back of the head, around your ears and around your eyebrows.



Default: 55 cm / 21.6 in (average for the adult human population)
Range: 35 to 75 cm / 13.8 to 29.5 in

INTER-AURAL ARC – Enter your inter-aural arc – the distance from ear to ear around the back of your head, on a horizontal plane parallel to the floor.



Default: 25 cm / 9.8 in (average for the adult human population)
Range: 15.3 to 40 cm / 5.9 to 15.8 in

UNITS – Choose whether to enter your head measurements in centimeters or inches.

USER/FACTORY DEFAULT – When you first use the plugin, it loads with generic default values (see above). You can also save your own head measurements as presets by clicking on the arrow at the right-hand side of this control.



Save as many user presets as you want, and select one of them to be your User Default.

Please note: The parameters in this section are completely separate from the main presets that are accessible from the Top Toolbar. They are saved and loaded under a dedicated preset

system that is only accessible through the drop-down menu at the top of the Head Modeling section.

"?" help button – Clicking the "?" button will open a help tab with information on how to measure the above parameters. The "?" help button will blink as long as you do not enter your individual head measurements or open the plugin with User Default in place.

ROOM AMBIENCE



Determines the amount of room ambience, that is, the amount of simulated reflections added to the signal.

AMOUNT – Increasing the amount of room ambience increases your sense of distance from the source. Decreasing the amount results in a more focused sound.

Range: 0 (off) to 100
Default: 17

CENTER TRIM (Surround components only) – Allows you to reduce room ambience from the Center speaker only. This is useful in situations where you want spatial sound for the L, R and rear speakers but a more focused sound for elements in the Center, such as dialogue.

SPEAKER POSITION



This section lets you control the position of the speakers in the Virtual Mix Room. The Mono component has only one Speaker Position knob – Rotate. The Stereo component also has a Front knob for controlling the width of the L and R spread. The Surround components have an additional Rear knob for controlling the width of the rear L and R spread.

FRONT (Stereo and Surround components only) – Controls the spread of the front speakers, ranging from 0 degrees (all speakers directly in front of you) to 180 degrees (L and R speakers extending all the way to your left and to your right). The default is 60 degrees, where the L and R speakers form an equilateral triangle with your head. Normally when you mix for stereo, this will be the ideal position

Range: 0° to 180°
Default: 60° (recommended for stereo mixing)

REAR (Surround components only) – Controls the spread of the rear speakers.

Range: 0° to 180°
Default: 140° (ITU standard)

ROTATE – This continuous cyclic knob rotates the entire room around you.

Range: -180° to +180°
Default: 0°

In the 5.1 and 5.0 surround components, all default speaker positions are set according to the ITU surround standard.

OUTPUT METERS

No matter which Nx component you are using, you will always see two output meters, representing the binaural sound as it reaches the L and R channels of your headphones.

Range: -24 dB to 12 dB
Default: 0 dB

Please note: Nx can introduce clipping at the output even when fed with a signal whose levels are controlled by a limiter. In such cases, use the output gain fader to reduce the output.

Appendix A – Inputs/Outputs in the Surround Components

5.1 Surround Component – 6 inputs / 2 outputs

Input 1 – Left mix channel
Input 2 – Center mix channel
Input 3 – Right mix channel
Input 4 – Left surround channel
Input 5 – Right surround channel
Input 6 – Subwoofer speaker channel (post bass management)

Output 1 - Left headphone channel
Output 3 – Right headphone channel
Outputs 2/4/5/6 – No audio

5.0 Surround Component – 5 inputs / 2 outputs

Input 1 – Left mix channel
Input 2 – Center mix channel
Input 3 – Right mix channel
Input 4 – Left surround channel
Input 5 – Right surround channel

Output 1 - Left headphone channel
Output 3 – Right headphone channel
Outputs 2/4/5 – No audio

Appendix B – Troubleshooting Guide

Problem	Possible Solutions
Head does not move in GUI – no tracking	1. Verify head tracking is 'on' in plugin GUI. 2. Check if tracker app is running. 3. Play audio through the plugin (plugin on CPU). 4. Check tracking rate box in plugin GUI.
Head tracking app is not running	1. Make sure you have a camera connected. 2. Restart tracker through the plugin 3. Inactivate/reactivate plugin.
Low tracking rate in the head tracking app (<20 fps)	1. Improve lighting conditions. 2. In MacBook only, select "low light" mode in the tracker app. 3. Have the camera pointing up a bit, for a brighter frame. 4. Make sure that your face is well lit and not shadowed
Low tracking rate in plugin GUI (<20 fps)	1. Check the tracking rate in the head tracking app. 2. Verify audio buffer size is 1024 samples or lower.
Head tracking app often loses track of your head	1. Position the camera closer and straight in front of you. 2. Remove sunglasses, hat or anything covering your face. 3. Improve lighting conditions. 4. Stay within +/-30 degrees off the center. 5. Make sure you're no further than 5-6 feet away from camera.
Audio is not externalized enough, the virtual positions are not clear	1. Verify your headphones' L/R placement and routing. 2. Verify that Nx is inserted at the last summing buss in the signal flow, with no other channels bypassing it. 3. Verify that head tracking is working. 4. Set the Sweet Spot. 5. Increase the room ambience. 6. Mute/unmute individual virtual speakers by double-clicking on them and listening to their position. 7. Measure and set your personal Head Modeling parameters. 8. Make sure the head modeling section is set to your individual measurements or to the factory default settings. Unreasonable head size settings can ruin the spatial effect.
No communication between the head tracking app and the plugin	1. Close the head tracking app, inactivate and reactivate the plugin.
Head tracking shows some latency	1. Try to increase the tracking rate, optimally up to 30 fps. 2. Try to lower the buffer size. 3. In some DAWs, to run in the user-set buffer size, Nx need to be on the master buss or on a live input AUX path.