MAAT

RSPhaseShifter

User Manual

MAAT Inc.

Table of Contents

Installation & Setup

When preparing for installation of your MAAT RSPhaseShifter, we recommend that you quit all applications prior to proceeding. Also, after downloading the installer and prior to installation, let any anti–malware measures you may have running scan the installer. Then, temporarily disable all anti–malware measures once scanning is complete.

To install, simply double click on the downloaded Installer for your particular operating system. The installation process will guide you through the install procedure. If you have an older OS version, restarting your host may be required. Don't forget to reënable anti–malware measures or simply restart your host.

Licensing

MAAT software is licensed through our dongle–free, cloud–based license control framework. If your hosts are net–connected, our licenses "float," making it easy to move from one machine to another. All you have to do is close all MAAT stuff on one machine before you open anything on another. If you're going to use the laptop in an environment where internet is spotty or non–existent, you can also go offline temporarily for up to 30 days.

To license your MAAT purchase, open yours or instantiate an example in your preferred plug–in host. When licensing, we recommend you open a new session in your DAW just for this purpose.
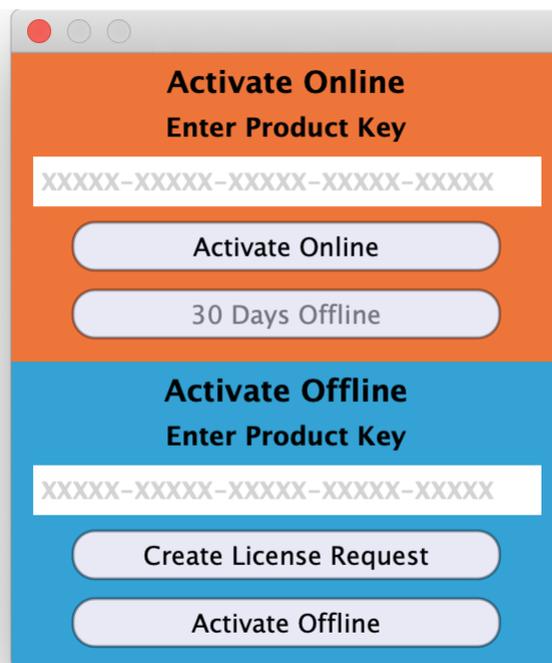

Figure 1: The initial Activation dialog

Online Activation

Once the Activation dialog appears, paste or type in your Product Key supplied at the time of purchase. Then click on Activate/Deactivate Online and follow the prompts.

👁 NOTE: THE ONLINE PROCESS REQUIRES A LIVE INTERNET CONNECTION. YOU MUST HAVE AN ACTIVE INTERNET CONNECTION FOR ACTIVATION.

A feature of our cloud–connected system is that, if you close a DAW session that contains MAAT plug instances, then open that session on another host, the license will "follow" you onto the new host as long as you have live internet.

You can also return or park your license on our licensing server, and pick it up later on another host. Once your product is licensed, click the Activate/Deactivate Online button to deactivate your license, then repeat to reactivate.

Offline Activation

If, for security reasons you have an offline host computer or you plan on working without a reliable internet connection, it is best to go with an offline license. There are two offline options, temporary offline and full offline.

Temporary Offline

If you plan on working without a reliable internet connection, we designed the temporary offline option just for you. The temporary offline process also requires a live internet connection, but only during activation.

A temp offline license has two unique features:

- It can remain offline, without an internet connection, for up to 30 days

- It auto–renews its lease whenever it does make a server connection

So, if your internet is spotty or unreliable, or you're heading temporarily to a location where an internet connection isn't available, the temporary offline option let's you work untethered to the 'net for up to a month.

By clicking the "30 Days Offline" button, your online license will become temporarily offline for a maximum of 30 days. If, however, you use the product while connected to the internet at all during that time, the "lease" duration is automatically reset, extending another 30 days.
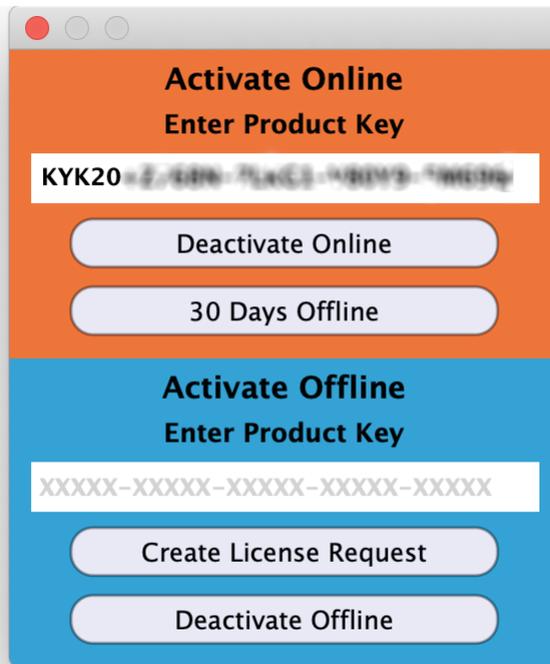
Figure 2: The 30 Days Offline activation option

Full Offline

This will license your MAAT product without the need to periodically contact our licensing server. If you anticipate working without the internet for more than a month at a time or, for security purposes, your studio machine is "air gapped" and has no internet, take a moment to surrender your online license, and replace it with an offline version.

Note: A full offline license does need to be explicitly renewed once a year.

To prepare for offline activation, you will need:

1. Your Product Key!

2. Some method to move your License Confirmation file to the offline host machine.

That latter requirement can be accomplished in any number of ways, but a USB flash drive is often readily available and most convenient. You will also need your Product Key that was supplied to you via e–mail when you purchased your MAAT product.

The offline activation process starts with generating a License Request, with a "maatr" file extension, which is submitted on–line to our server or via e–mail to MAAT Support <support@maatinc.zohodesk.com>. A License Confirmation file, with a "maatc" extension, will be returned to you, which will activate your product.

To proceed, click on the Activate/Deactivate Offline button, and follow the prompts.

In a year's time, 365 days from the date the maatr file is created, a full offline license must be renewed using the same maatr/maatc method.

Introduction

RSPhaseShifter is great for any situation where you need to creatively control tonal and harmonic content through phase manipulation. RSPhaseShifter was created in conjunction with Roger Schult/German Audio Lab, and is a painstaking, 64 bit digital realization of the Phase Shifter W2324 hardware. From both the original W2324 Operating Manual, and all of us at MAAT…"Dear customer, we sincerely thank you for purchasing our product."

"In order to maintain the factory specs and guarantee safe operation in the future, we advise that you read the included operating manual… (it contains) important notes for operating and handling your product. When passing the unit on to third parties, please also make them aware of these documents."

RSPhaseShifter Mastering Filter/Phase Shifter

Based on Roger Schult's active analog W2324 Phase Shifter module for the API® 500 System, MAAT's RSPhaseShifter is a "…high precision tool to solve phase problems in sound recording and playback applications. Comb filtering is a common and usually undesirable effect caused by differences in phase when combining multiple signals from one source, such as a microphone and a DI signal from an electric guitar or multiple microphones on a kick drum. The phase shifter is the ultimate tool to hone in and correct those phase problems with unheard-of accuracy and sound quality. Alternatively, experienced engineers will appreciate the creative sound design possibilities offered by the module."

"Furthermore, the (RSPhaseShifter) can be used in the subwoofer path of any playback system to optimize the low-frequency response and remedy room mode issues thanks to the continuously adjustable phase angle."

"Within the selectable frequency range…any frequency build–ups or cancellations due to the time delay between two sources or (when used in the playback path) due to problematic room acoustics can be addressed by shifting of the phase. Simply select the desired frequency with the 13 position rotary switch and correct the level and phase. A 3 position flip switch further allows phase angle extension in excess of 180° as well as

providing a bypass position for a quick and easy comparison with the uncorrected signal."

The Difference Between Hardware & Software

As with all Roger Schult by MAAT products, the RSPhaseShifter is hand crafted and precision engineered in California by way of Germany. This is an explicit digital recreation of the analog W2324 topology, not a modeling algorithm. We copied the functionality of the original hardware without analog's shortcomings. This tool's value is more about what it does technically, so we left out stuff like fake transformer color, hum or Johnson Noise. There are lots of colorful plug–ins, we simply provide convenient access to the useful functionality along with a stylin' API 500 look.

Our algorithm provides top audio quality from 180°, at the upper limit, down to a few degrees. We set the plug–in's lower limit to 15°. A real 0° is impossible, as it is in hardware. Also, values very close to 0° cause numerical problems during calculation, as well as problems in hardware. "It's simply a mathematical fact of life," as our designer says! Fortunately, in real workflows, there's no need for very small phase shifts.

Because of high resolution calculations, we are able to extend the ranges for frequency and phase shift compared to the original hardware. We can do this while still maintaining full 24 bit audio quality in terms of THD+N (Total Harmonic Distortion + Noise).

The hardware's analog degree scale is highly non–linear, due to issues with analog circuitry. The original W2324 has ten tick marks, from 10 to 125°. Freed from the limitations of an analog implementation, we have moved to a true, linear scale and extended the range slightly, something only possible in the digital domain. RSPhaseShifter's eleven tick marks, in 15° steps, are:

15; 30; 45; 60; 75; 90; 105; 120; 135; 150; 165°

Though not technically a tick mark, the vertical line at 6 o'clock on the dial, in addition to visually linking the phase adjustment control and phase range switch, corresponds to the 180° end stop for the phase adjustment control.

Output Polarity

Also note that RSPhaseShifter has an inverting output, as does the original analog W2324 Phase Shifter. In other words, the output exhibits an absolute polarity inversion relative to its input. The phase shift values starting at 15° above are actually negative values (negative polarity) but, throughout the majority of this user manual, the minus sign has been removed both for clarity and in keeping with the original hardware's markings. The inverted output does not affect the plug–in during use.

Functions

- Continuously adjustable filter gain range of ±5 dB

- Continuously adjustable phase angle between 15° and 180°

- 3 position range switch to bypass or extend phase angle from +180° to 0 (360)°

- 13 position steeped or continuous rotary control to select frequency range from 16 to 4 kHz

Applications

- Correct the phase between multiple microphone signals to avoid comb filtering, such as when tracking drums or guitars

- Get control of phase problems when mixing a "DI" or direct injected signal with a microphone signal

- Match and optimize the time delay or phase response of a subwoofer in a 2.1, 5.1 or N.N monitoring environment

- Reduce the influence of standing waves (room modes) of a loudspeaker setup in conjunction with one or more subwoofers

- Create ultra–wide sounds and phase sweeps by deliberate phase manipulation of one side of a stereo track

- Acoustically optimize the sound field in studio and live sound environments

- Reduce the acoustical energy caused by low frequency cancellations in live sound applications

- Creatively control tonal and harmonic content in mix and mastering

Re-equalize problematic mixes, and rescue vocals or instruments "lost" in dense mixes

The Interface

Once installed, the plug–in appears in your DAW as MAAT RSPhase-Shifter.

Figure 3: The RSPhaseShifter user interface

The straightforward RSPhaseShifter user interface contains two rotary controls, stepped gain and continuous phase rotation, a three position range/bypass switch, a rotary frequency selector and three optional mode switches.

Double clicking on a control resets the control to the default.

LEVEL

The top of the module is occupied by a rotary gain control with a range of ±5 dB. This level control allows adjusting the output level to compensate for potential level jumps caused by shifting phase.

PHASE

The phase control provides a continuous phase shift of 15° to 180°, with the phase switch in the bottom position. Extending the phase range by setting the Phase Mode switch, see below, to the top position (+180°) increases the phase shift by an additional 180°, resulting in a total range of 195° to 360°. Phase values between 0° and 15° are unavailable because of limitations of the filter topology employed within RSPhaseShifter.

Phase Mode

This three position switch is used to select the range of the phase shifter.

Top position: +180° (+180 - 0°)

Center position: Bypass

Bottom position: 0 - 180° (0 - -180°)

The center position, the "0" setting or Bypass mode, provides a means to compare the effect of the selected phase shift with the unprocessed, original phase of the source material.

FREQUENCY

The phase shift is dependent on the selected frequency setting. Frequency selection is managed by an 13 step ELMA–style control with the following frequencies conforming to ⅔ octave ISO recommendations:

16 Hz	400 Hz
25 Hz	630 Hz
40 Hz	1000 Hz
63 Hz	1600 Hz
100 Hz	2500 Hz
160 Hz	4 kHz
250 Hz	

The Frequency control is stepped by default, and changes to a continuous control when the shift key is held down.

DELTA

The DELTA switch, marked δ, lets you hear an isolated stream of only the processed audio. This mode helps to aurally identify the aspects of the signal that are being changed or processed.

Note that DELTA is unavailable within a MONO instance of RSPhase-Shifter. Also, don't forget to disable DELTA mode when you're done finding your preferred settings.

Figure 4: RSPhaseShifter with DELTA enabled

Making Sense of DELTA

The use of the Delta function is an optional feature which makes sense for specific advanced use cases. Rather than using it for pure phase alignment against a separate track, it is particular helpful when you use

RSPhaseShifter as an insert FX for modifying stereo spread in an MS workflow. To do so, first insert an MS encoder prior to the RSPhaseShifter, then the RSPhaseShifter and subsequently an MS decoder. Now you can either alter the phase of the M or Mid/Mono signal (left channel), the S or Side/Difference signal (right channel) or both. Delta allows you to hear the processed portion in this scenario, helping you to arrive at the best setting faster.

DELTA Nonsense

When you use RSPhaseShifter for the sole purpose of phase alignment with another track, one not being processed by RSPhaseShifter, using Delta mode makes no sense because the mix or sum of your processed track with the unprocessed track is what counts. Particularly when you move the phase of a stereo room ambience track in relation to another room ambience track, the use of Delta makes no sense!

Mono vs Stereo Operation

A mono instance appears as a double wide UI, with controls on the left channel, and the right channel having a matching "cover plate" or blank panel.

A stereo instance also appears as a double wide UI, with controls on the right channel, and the left channel having the cover plate. The three aforementioned buttons, δ, MIRROR and FLIP, also appear.

MIRROR

For a stereo instance with MIRROR disabled, only one channel is processed. With MIRROR disabled, the cover plate is on the left, and the UI is on the right as mentioned above. The left channel is not altered.

With MIRROR enabled, the second set of controls appear. Note that, normally, no offset is possible between controls in MIRROR mode. Identical settings are applied to both channels, with a ganged set of controls for both. Also note that, in MIRROR mode, the FLIP button is disabled.

Figure 5: RSPhaseShifter with MIRROR enabled

Unlink

In MIRROR mode, the controls are linked or ganged by default. You can defeat the linking, to apply different settings to each channel.

To enable UNLINK mode, control–click the MIRROR button. In UN-LINK Mode, the MIRROR button blinks slowly, indicating that the left and right channel controls are no longer ganged. To deactivate UN-LINK, click either the MIRROR or FLIP button. You can also control–click the MIRROR button again to reënable the default LINK mode.

See Stereo Track Caveats below for more information on the implications of UNLINK mode.

FLIP

FLIP simply flips the RSPhaseShifter from processing the default right channel to the left. The user interface also flips. Again note that, in MIRROR mode, the FLIP button is disabled.

Figure 6: RSPhaseShifter with FLIP enabled

Use Cases

In many cases, it makes sense to use this tool on just one channel, rather than on both stereo channels. This is the case when, for example, a stereo pair of ambiance mics suffer because of slightly different distances to the source.

1) You have a DI'd bass track, which sounds annoyingly "D.I.ish," and you drop the track into the mixing project so you can re–amp. You create a great, let's say, Ampeg SVT sound and you try to blend the DI track with the re–amped track and it sounds awful…

    Just grab the RSPhaseShifter, insert it into only one mono track of the two bass tracks, and start off with what ever frequency, let's say 73 Hz, and play around with the phase angle…Bang!

Suddenly, it sound awesome and you are done. You just need to find the sweet spot so that you have a fat bass and both tracks complement each other perfectly in terms of phase.

2) Another scenario would be a set of two, let's say stereo, distorted guitar tracks recorded with different guitars or amps but playing the same riff. They sound awful because both are modeling–based guitar amp simulations. You insert the stereo version of the RSPhaseShifter into one of those pair of tracks and play around in the same way, after you enabled Mirror mode, so that both tracks are ganged. Within seconds, you will find a sweet spot where both guitars blend perfectly, because by sweeping through the phase angle control, you're applying very complex comb filters which you could not create with EQ.

3) A common situation is you have closely spaced, multi–mic'd sources, like a snare with top and bottom mics, some instrument with two mics, or an acoustic guitar with a mic and a piezo pickup. Just play around with the RSPhaseShifter on one of the feeds, preferably the one which is closest to the source, such as a piezo or D.I.'d signal, and find the sweet spot by feel.

4) Yet another would be you've made a great acoustic stereo recording and have used supporting microphones, such as room, spot or far hall placements. To meld these into your main stereo pair, take your mains as the phase reference, and align one supporting mic after the other with the mains. This is easiest if your supporting sources are panned center and approximately the same level during phase alignment. Afterwards, you can set gain and panning back to taste.

5) Special Effects & Sound Design: Maybe you want to create phase sweeps to "fly a sound into the mix from outer space." Play around, especially with RSPhaseShifter within an MS environment, to open a creative playground for fancy phase tricks which are difficult to achieve with other plug–ins.

6) Acoustical issues are often an annoyance at low frequencies. RSPhase-Shifter lets you compensate for time delays between main speakers and subwoofer channels…

a) Reduce the influence of standing waves, or room modes, for a loudspeaker setup in conjunction with one or more subwoofers.

b) Reduce the acoustical energy caused by low frequency cancellation in live sound applications.

Stereo Track Caveats

In most stereo use cases, it makes sense to adjust the phase of just one of two stereo channels. For that reason, in stereo you get one mono instance on the right channel as a starting point, with the unaltered left channel

shown with its cover plate. When you want to use the MAAT RS Phase Shifter on the left channel, just press the FLIP button. If you want to apply phase shift to both channels equally, use MIRROR mode.

Note that, normally, you cannot have offset control settings in MIRROR mode; the same settings are applied to both channels. By control–clicking on MIRROR, the two sets of controls are unlinked, operating independently.

You may be asking yourself, "How can I have different treatment for left and right channels?" In most cases, that simply doesn't make sense and you'd have a good chance of getting lost in your plug–in setup. That said, unlinking via control–clicking MIRROR as mentioned above would do the trick. You would need that function if the stereo channel you are working on has:

    a) an internal phase problem to be cured and

    b) a phase problem in relation to another channel or stereo pair

To prevent you from getting lost in finding the best phase settings, we recommend that you not unlink, and instead first use a plug–in instance with just one side in use, either left or right, to adjust the internal phase relation between the two. When you're done, just open another plug–in instance and switch that instance to MIRROR mode. Now you can find the proper phase relation in conjunction with other tracks by shifting the phase of the left and right channel, always with the same phase rotation so that you can't mess up the correct internal phase relation set by the first instance. This is much faster and allows individual A/B-ing of both steps of phase correction.

The unlink mode is useful when using RSPhaseShifter in an MS workflow where you want to create special effects. We have added this option to make it available to you geeks, you know who you are, who simply can't resist going one step further.

Specifications

Gain	max. ±5 dB
Phase (linear scale)	-15° - -180°, mid indent at -90° continuous
Phase Mode (3 position)	0° - 180°; Bypass; +180°
Phase angle range	-15° - 180°, +180° - 0°
Frequency (11 position)	16; 25; 40; 63; 100; 160; 250; 400;
shift–click for continuous	630; 1000; 1600; 2500; 4000 Hz
Reference input level	-18 dBFS

Reference output level	-18 dBFS
Gain at linear setting	0 dB

System Requirements

- Mac: macOS 10.8 and newer, 64 bit only

- Win: Windows 7 and newer, 32 & 64 bit

- Pro Tools 10.3.10 and newer

- 4GB RAM minimum

Supported Platforms

- AAX, AU, VST2/3 Mac, VST2/3 Win

Supported Sample Rates

- 44.1 to 384 kHz

Supported Hosts

Ableton Live, Cubase, Logic, Nuendo, Pro Tools, Sequoia, Studio One, Wavelab

Updates

Please always use the latest version of the software! You can find your current version on the Info Tab of the back panel. You can download the latest version simply by visiting:

> http://maat.digital/support/#installers

For optimal security and stability, you should always stay up to date with Operating System revisions, and we keep up with compatibility changes to our products. We also continue to optimize for reduced CPU load, and this very user manual gets its own improvements.

To stay up to date with the latest version and product releases, please subscribe to our occasional newsletter. You'll find a opt–in form on our Contact page, or sign up for a copy of our free and very handy 2BusControl plug–in which will also subscribe you. Don't worry, we know you are busy so we only send out an average of 10 or 12 mailings a year.

Support

For product support, please visit:

> https://www.maat.digital/supports

License Central

License Central, located in MAAT's Shared directory, is a free utility that validates, repairs and logs your MAAT licenses. It also displays what MAAT products you have installed and assists in downloading both updates and demos.

License Central lists all of our products, and shows you:

- If a product is installed and what licenses you have [CLOUD, SUBSCRIPTION, TRIAL, OFFLINE and TEMP OFFLINE]

- What versions are installed, and version installers are available for download

It also provides:

- A one–click download of an update or a demo

- A button to activate or deactivate any of your licenses

- A copyable list of all your Product Keys

- One–click generation of the MAAT diagnostic report

It also fixes license issues automagically.

In Use

When you launch License Central, it scans your host computer and then attempts to match up each product found with a Product Key on our license server. That scanning happens in real time, and the process is shown as a progress bar. When quitting, this process happens in reverse.

Once all the licenses are validated, a list on the left displays all MAAT products, including License Central. Products that are not installed are grayed out, and installed products are displayed in high contrast. To the right of each product entry is a check mark, which indicated that the product is licensed.

Selecting a product entry displays information about the installed version and if an update is available for download.

Controls

There are two persistent buttons along the top. At upper left is Check for Updates, which refreshes the list of installed products, and pings our server again for currently available versions to download. It also recreates your Product Key list.

At upper right, the Activate/Deactivate button brings up the familiar blue and orange MAAT license window, allowing you to deactivate or return your license to the Cloud, and to switch to a 30 day temporary offline license. If you have requested a 365 day full offline license, use the Create License Request function in the MAAT license window, and have received your ".maatc" confirmation file, you can also take your license offline. Finally, you can also paste in a Product Key to activate a new

license.

> Note: Switching to 30 day temp offline requires that your license be already activated. 365 day full offline licenses require a license confirmation file as supplied by MAAT's support department.

If any product is out of date, a third Download Update button will appear when that product is selected. This button is an express method for updating you MAAT products.

At bottom left of the License Central window is an Auto–Refresh check box, which is selected by default. Deselecting that will prevent License Central from frequently scanning your host for changes including new installs. It starts a scan every 3 seconds, waiting for completion of that scan, then begins a new 3 second countdown before starting the next scan. If you find that License Central is interrupting you workflow while scanning, then disable Auto–Refresh.

Preferences

In License Central, the Preferences' gear icon brings up the Preferences window with four tabs.

Paths

For those who set up alternate directories for the management of their plug–ins in a DAW, two alternate plug–in paths can be defined. These directories will be also included when License Central searches.

Keys

This tab lists all of your Product Keys that are known to our license server. Please take a moment to copy all of your Product Keys, paste them into a text or word processor file, and print out a hard copy. Your Product Keys are your proof of purchase and, without them, your purchase will not work and we cannot provide product support.

Troubleshooting

The Troubleshooting tab has one button, which generates a Diagnostics Report. This report, automatically written to the Desktop, gathers useful, non–personal information about your machine's state that our support team can use to diagnose any problems.

Info

As with all our products, the Info tab lists credits, copyright information, and the version number you are running.

Share The Love

Would you like to help us in our quest for better sound quality? Help support MAAT by sharing the love…Like us on Facebook!

and Twitter too:

Please tell your friends and colleagues about us. We really appreciate it, and thank you for supporting better quality audio.

Credits

W2324 idea, overall concept & realization:

Roger Schult

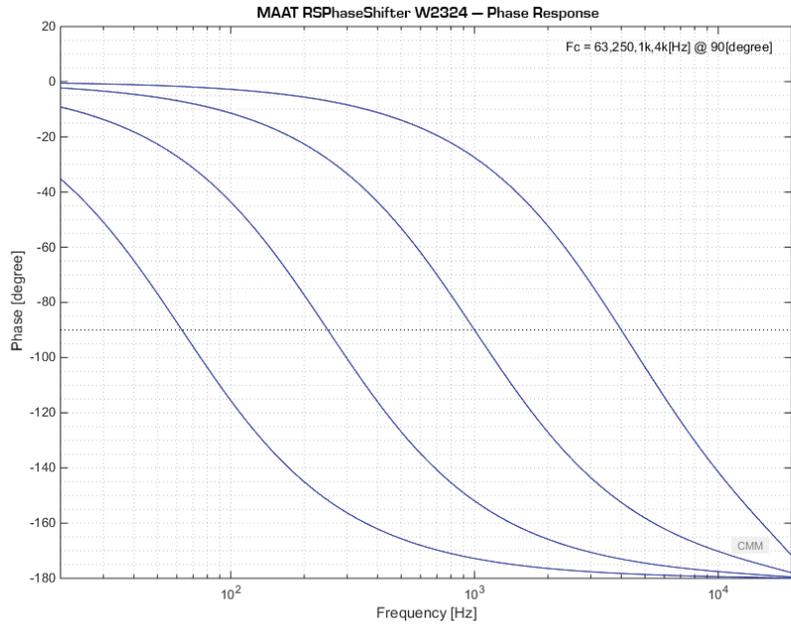Plug–in concept, design, DSP algorithms & project management:

MAAT Inc.

Programming:

Agent Tad Nicol, MAAT Inc.

Adam, Agent of Sheild

Appendix 1

RSPPhaseShifter - Reference Characteristics
Phase versus frequency plots for various settings…

Figure A1 — Phase Response for F_C = 63, 250, 1000, 4000 Hz @ 90°
Note that the phase shift approaches 0° at low frequencies and -180° at high frequencies.
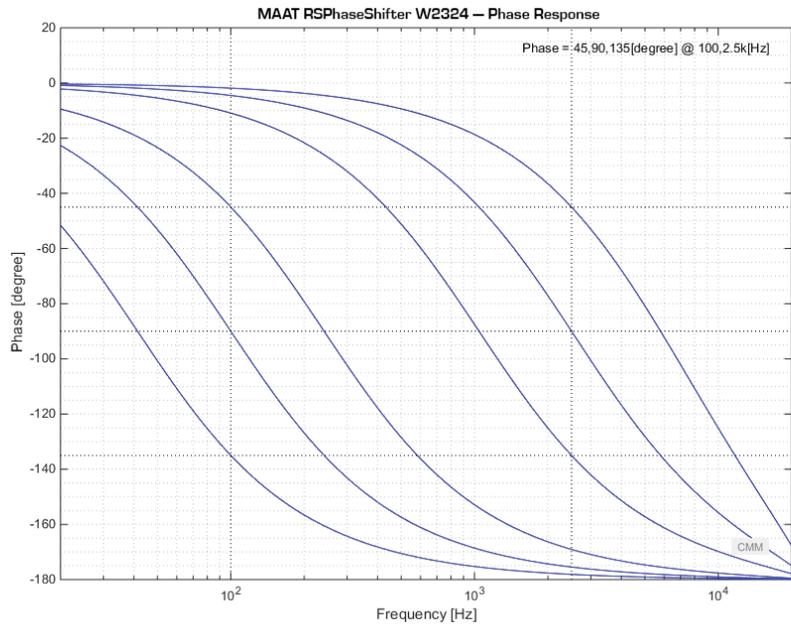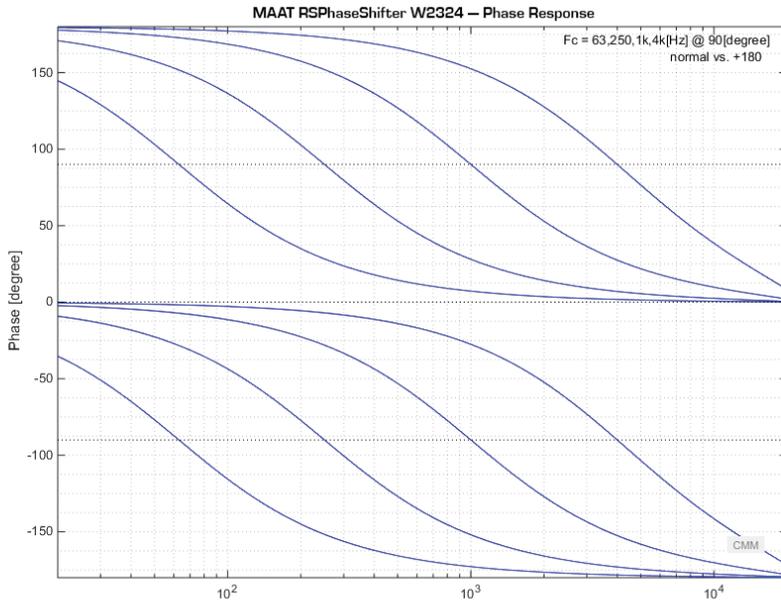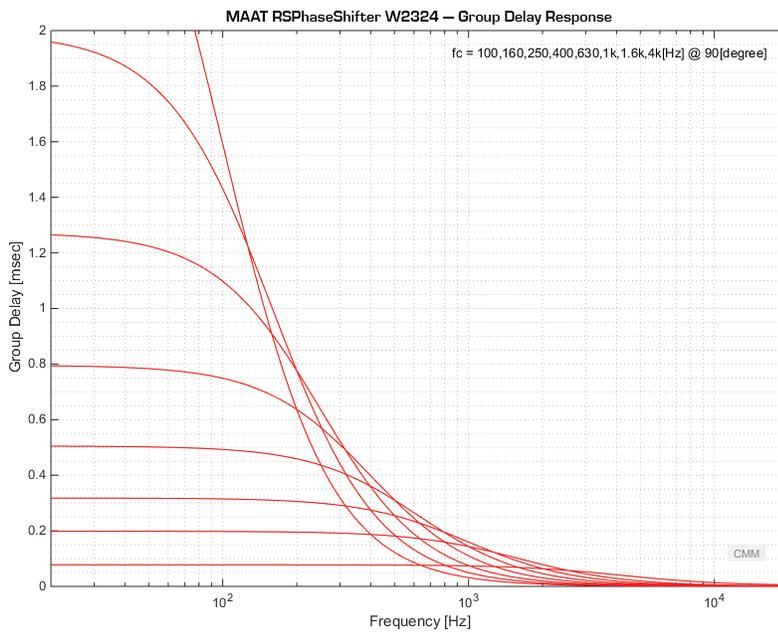

Figure A2 — Phase Response for ϕ = 45, 90, 135° @ 100 & 2500 Hz

Figure A3 — Phase Response: $F_C = 63, 250, 1000, 4000$ Hz @ 90°
with '+180' switch enabled and disabled
vIn "off" position, -180° < ɸ < 0; in "on" position, 0 < ɸ < 180°

Figure A4 — Group Delay Response: 100, 160, 250, 400, 630, 1000, 1600, 4000 Hz @ 90°
Note that at higher frequencies, delays are smaller but more linear
over a wider frequency range.

About This Manual

This manual was written in Adobe InDesign 15.1.1, and is set in Robert Slimbach's Minion Pro and Myriad Pro. The cover page is set in Aldo Novarese's modernist geometric Eurostyle.

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