# Waves Harmony

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Introduction

Thank you for choosing Waves! To get the most out of your new Waves plugin, please take a moment to read this user guide. To install software and manage your licenses, you need to have a free Waves account. Sign up at www.waves.com. With a Waves account you can keep track of your products, renew your Waves Update Plan, participate in bonus programs, and keep up to date with other important information.

We suggest that you become familiar with the Waves Support pages: www.waves.com/support. There are technical articles about installation, troubleshooting, specifications, and more. Plus, you’ll find company contact information and Waves Support news.

Waves Harmony is a vocal harmony generator, layering tool, and creative FX plugin; it’s simple, fun, and playable in the studio and on stage. Waves Harmony lets you create vocal harmonies in 3 different ways: 1) by automatic chord generation based on the source vocal’s pitch, 2) by playing MIDI in real-time, or 3) by drawing and arranging voices visually on the graphical display. The last method provides you with ultimate control over each note, and the ability to automate through different vocal arrangements using snapshots.

Once you’ve set the key and scale of your song, everything will sound tight and in tune. Nine modulators enable you to bring added excitement and life to most Harmony controls. Building and controlling harmonies is quick and easy, so nothing stands between you and your creative ideas.

Features

- Eight-voice vocal harmony engine
- Pitch correction and harmony generation to musical scales
- Automatic chord generation based on incoming audio
- Pitch and formant shift per voice
- Independent voice-mixing controls
- Delay and filter array per voice
- Modulation of most controls; five types of modulations
- Graphic/visual workflow
- MIDI Control (MIDI Input)
- Snapshot control
Harmony Overview

Key and Scale
Set the key and scale of your song before you start so that Harmony can do its job well.

Chords
Select chords.

Mixer
Set correction mode, Source/Harmony mix, and Output level.

Note Generator
Create notes based on input voice.

Notes Panel
Control pitch, formant, delay, feedback, filter, pan, and level of one or more selected notes.

Modulators
Five kinds of modulators can be assigned to most Harmony controls. Drag a modulator button onto a control to assign the modulator.

Global Controls On/Off
Control the note characteristics and effects that are common to the entire Harmony plugin.

Snapshots
Make up to 32 snapshots of harmonies that you create on the graph. Snapshot recall can be automated in your DAW.

Note Map Editor
Choose which notes will play when voice or MIDI notes are detected. You can also select how to treat notes that are illegal within the selected key and scale. Click the Edit button to open the Note Map Editor.
Quick Start

There are three basic ways to create harmonies. This Quick Start shows you how to make them work. These techniques will teach you most of the things you need to know to run the plugin. To learn more, refer to the Controls chapter later in this user guide.

We suggest that you start by selecting the correct Key and Scale to match your session. This ensures that the created harmonies suit the song.

Example 1: Harmonize Using a MIDI Keyboard

This is a quick and simple setup that’s well-suited for performances or fast and easy composition of harmonies for pre-recorded material.

Connect MIDI into the plugin and play. That’s it.

1. Insert Waves Harmony on a vocal track in your DAW.
2. Create a new MIDI track in your DAW and route it to Waves Harmony. If the Harmony virtual keyboard is mirroring your MIDI keyboard, you’re good to go. If you don’t know how connect a MIDI channel to an audio plugin, or if you are having trouble, refer to this Waves Tech article.
3. Play MIDI notes from your keyboard, along with the vocal track in the DAW. Each played MIDI note appears on the virtual keyboard. You will hear the resulting harmony playing along with the source.

4. Use the Notes panel (left side) to further control each harmony.

**Example 2: Automatically Generate Harmonies From Your Vocal Track**

Use Waves Harmony to generate notes based on the changing pitch of your vocal track. These generated notes are then used to create harmonies. This technique is useful if you don’t have a MIDI keyboard, or if you simply want to let the vocals themselves create new harmonies.

1. Insert Waves Harmony on a vocal track.
2. Set Key and Scale to fit your session.
3. Activate Generate Notes. Notes are now being generated from the audio on the vocal track. The Tolerance Time sets the speed of the newly generated notes.
4. Browse through the Chords menu (just below Key and Scale) to find the perfect fit for your song. Many of the suggested Chords have names that are evocative rather than technical—they suggest a mood or color. Experiment with them.

Learn more about Generating Notes.
### Example 3: Set Up Harmonies Manually

You can create complex harmonies on the main graph and control the pitch, formant, delay, feedback, pan, and level for each harmony. These are “fixed” notes—they track the input signal directly, unaffected by the harmonies derived from MIDI notes or generated notes. Harmonies can be saved as snapshots for recall with automation or MIDI.

1. Insert Waves Harmony on a vocal track.
2. Set Key and Scale to fit the song.
3. Click anywhere on the graph to add new harmonies. The marker will initially be labeled “U” for “Unison,” meaning that the created harmony is the same pitch as the source.
4. Adjust pitch in one of three ways:
   a. Hover over the marker and use the mouse-wheel.
   b. Double-click the marker and enter the pitch value with the computer keyboard.
   c. Use the Pitch control on the Harmonies panel.
5. Drag the markers around the graph to adjust the level and panning of the note.
6. Use the Harmonies panel on the left side to adjust all attributes of a harmony.
7. On the Snapshot panel, click “+” to add a new snapshot of the current harmony setup. Click through the snapshots to play your chord progressions. Harmonies can be saved as snapshots for recall with a click or automation.

Learn more about the [Main Graph](#).
Controls

Note Mapping

The Note Mapper section maps a single incoming sung note or MIDI note to one or more notes to create harmonies.

The Note Mapper is divided into two sections: **Key and Scale** controls (top row) and **Chords** (below). Key and Scale together determine the musical scale to which all notes and individual harmonies are corrected.

**KEY**

Click the musical note button to turn the Key and Scale section On or Off.

**Key** sets the root of the Scale and Chords and provides the reference note for the Scale and Chord tables. Values are in musical notes (e.g., C, C#/Db, D). There are three ways to select a Key: 1) click repeatedly on the box to cycle through the key options, 2) click on the box and drag up or down, and 3) click on the down arrow to open the dropdown menu.

**SCALE**

**Scale** sets the musical scale of the plugin. Click on the name to open a list of popular scales. You can also edit and create new scales.

**CHORDS**

These presets provide chords and harmonies that map input notes to one or more triggered notes. Click on the Chord Map title to open the Chord Mapping dropdown menu or use the left and right arrows to cycle through the maps. Note:

- Presets in the **Chords** category will output chords from single notes.
- **Harmonies** presets generate the same intervals for every incoming note.
- Save your own chords as **User Library presets** for later recall.
LOCK MUSICAL SCALE AND CHORDS

Once you’ve set the musical scale of your session, you probably want it to stay the same, even while browsing between different presets. The Lock button prevents Key and Scale from changing when a preset is loaded. You can always adjust these settings, even when they are locked.

NOTE MAP EDITOR ON/OFF

You can edit how notes produce chords using the Note Map Editor. To open the editor, click the Edit button under the Scale menu. To learn more, refer to the Note Map Editor section at the end of this user guide.
Generating Notes

The Notes Generator creates new notes from the input voice signal. These notes are then used to create harmonies. New notes are generated when energy greater than complete silence is detected, or when there is a distinctive change in pitch. The sensitivity to these note changes is determined by the Tolerance controls: Time and Cents.

Generated notes are monophonic but can be translated into harmonies using the Chord Maps in the Note Mapping section.

**GENERATE NOTES ON/OFF (the “Generate Notes” button)**

- **On** The input vocal's pitch is being detected by a pitch detector at the very beginning of the signal chain. You can set the parameters that trigger new notes based on these pitch changes.
- **Off** Notes will not be generated from the input signal. Incoming MIDI notes will still pass into the plugin.

**MIN NOTE**

Sets the minimum pitch limit for note detection. Notes below this value are not considered. This improves the accuracy of the pitch detector.

- **Range:** C0 to C2
- **Default:** G0

**TOLERANCE**

Sets the threshold pitch and time values for note transition: Cents and Time. Until the Tolerance threshold is met, the target pitch doesn’t change, and a new note is not created. This eliminates note transition glitches caused by small irregularities in a singer’s performance. With these thresholds at their lowest settings, even the smallest pitch variation outside the legal boundaries of an intended pitch will result in a new note being generated.

**TOLERANCE CENTS**

Tolerance Cents is the pitch variance threshold. When the pitch variation from a detected note is below this setting, a new note will not be generated.

- **Range:** 50 cents to 200 cents, Off
- **Default:** 50 cents
**TOLERANCE TIME**

Tolerance Time is a threshold that determines if a change in pitch is sufficiently long to trigger a new generated note. It is effectively the note generation speed. If, for example, Tolerance Cents is set to 100 ms, and Cents is set to 50, then a new note will be generated only after the note passes +/- 50 cents for 100 ms. Brief, intentional vocal embellishments can result in unwanted note generation if tolerance is set too low. Settings depend largely on the accuracy of the singer and the effect you want to achieve with the created notes.

**Ranges:**

- **Time:** 1 ms to 1000 ms (via text entry or mouse wheel)
- **Synced:** 1/64t to 4 Bars (via dropdown menu)
- **Default:** 1/2
**Main Graph**

The Main Graph lets you create harmonies that directly track input notes. Each harmony that you create has a fixed interval from the original voice or can play a selected fixed note when the harmony is flattened. The distribution of harmonies is presented visually on the Main Graph. Pitch, Delay, and other note attributes are controlled in the Harmony Panel. Level and Pan can be controlled from the Graph or the Harmony Panel. Harmony pitch correction is governed by the Key and Scale settings.

If notes are not played, only the original voice and the fixed harmonies are heard. Fixed harmonies are color-coded and appear in the Tabs bar. Note harmonies, derived from MIDI notes or Generated Notes, appear as blue tabs for as long as the note is held.

Harmonies are represented on the graph as markers and tabs.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Harmony Markers</td>
<td>Fixed harmonies are displayed and controlled from this graph. Harmonies are represented as circles; their values are either pitch interval or absolute notes. Note harmonies appear momentarily in blue as they are played (or from the Note Mapper), with their note values displayed.</td>
</tr>
<tr>
<td><strong>2</strong> Harmony Tabs</td>
<td>These tabs are used to quickly access the Harmony panel of a specific harmony.</td>
</tr>
</tbody>
</table>

Y-axis: Level
- Range: -inf to +6dB

X-axis: Pan
- Range: -100 to +100
- Center line = 0
CREATING A NEW HARMONY

There are three ways to create a new harmony:

- **Click** anywhere on the graph to create a marker at the x/y position of the click. Initially its pitch value will be “U,” indicating that there has not yet been any pitch shifting.
- **Ctrl+Click** to create a flattened voice. Flattened Default is C3.
- **Click** on an empty Voice Tab at the upper left of the Main Graph.

DISPLAY VALUES:

For **Flattened** harmonies and Note harmonies (from MIDI or Note Generator), the note name is displayed (e.g., C2, G#3).

For **Relative** harmonies (fixed harmonies that are not flattened), the pitch offset is displayed in semitones with a minus or plus sign (e.g., +4, +4.2, -12).

**U** (Unison) is a harmony with no pitch offset.

**Fine Display**

A voice’s pitch is displayed on the marker as *semitones* followed by *cents*.

There are two ways to adjust the fine value:

- Use the fine value with the Fine control on the harmony panel.
- Double-click a harmony marker and enter the exact pitch interval (e.g., +3.25 or -1.30).
## Controlling Markers

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Click on an empty area on the graph.</td>
<td>Adds a new marker at that location.</td>
</tr>
<tr>
<td>Click on an empty Tab.</td>
<td>Creates a new marker at the middle of the graph.</td>
</tr>
<tr>
<td>Drag the marker on the graph.</td>
<td>Adjusts marker location, which controls the pan and level of the harmony. Marker value is displayed as shown above.</td>
</tr>
<tr>
<td>Double-click on a marker.</td>
<td>Opens a value box for direct entry of pitch. If a harmony is not flattened, its value is displayed in semitones. Flattened harmonies appear in musical notation.</td>
</tr>
<tr>
<td>Right-click on the marker.</td>
<td>Deletes the marker.</td>
</tr>
<tr>
<td>Scroll up and down over a marker with the mouse wheel.</td>
<td>Changes the pitch/note value.</td>
</tr>
<tr>
<td>Scroll the mouse wheel horizontally (if available).</td>
<td>Adjusts the formant.</td>
</tr>
<tr>
<td>Ctrl+click on the graph.</td>
<td>Creates a flattened harmony. The default is C3.</td>
</tr>
<tr>
<td>Drag the cursor over several markers, or Shift+click on them individually.</td>
<td>Links the controls of several harmonies and opens the Multi-Selection panel. Learn more about multiple selections.</td>
</tr>
</tbody>
</table>
Harmony Panel

The Harmony Panel controls the selected harmony. To activate a Harmony Panel, click on its corresponding marker on the graph or its Harmony Tab. Most controls in the Harmony Panel can be modulated.

The pitch offset of the harmony is displayed in the value box as semitones and cents (left). Range: -24 to +24.

When the harmony is flattened to a predetermined note, the box displays the name of the note.

A Harmony Tab is a direct shortcut to a Harmony Panel.

There can be up to eight tabs, each representing one of the eight harmonies. Click a tab to select it: the Harmony Panel appears, and its marker is selected on the main graph.
### Harmony Panel Controls

<table>
<thead>
<tr>
<th></th>
<th>Voice On/Off</th>
<th>Turns the harmony off completely. No matter what's being fed into the voice, it will not output audio, and the marker will become colorless.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Harmony Value/Name</td>
<td>The pitch interval or the name of the note that the harmony is set to. Values: C1 to C5</td>
</tr>
<tr>
<td>3</td>
<td>Solo</td>
<td>Click this button to solo the harmony. Solo status is shown on the Harmony Panel and on the tab.</td>
</tr>
<tr>
<td>4</td>
<td>X</td>
<td>Deletes the harmony. In the Notes Panel, it resets all the parameters.</td>
</tr>
<tr>
<td>5</td>
<td>Harmony Correction (musical symbol)</td>
<td>Turns on or off the harmony's pitch correction. This correction occurs after all of the voice's pitch calculations (flatten, pitch shift, and modulations) and quantizes the &quot;output pitch&quot; of the voice to the active Key and Scale. When there is no Key and Scale, the correction is chromatic.</td>
</tr>
<tr>
<td>6</td>
<td>Pitch</td>
<td>Applies pitch offset to the harmony. Increments in semitones. Values: -24 semitones to +24 semitones; Default: 0</td>
</tr>
<tr>
<td>7</td>
<td>Fine</td>
<td>Applies fine offset to pitch, after pitch correction. This cannot be modulated. Values: -50 cents to 50 cents; Default: 0</td>
</tr>
<tr>
<td>8</td>
<td>Flatten On/Off</td>
<td>Forces the harmony to a single selected note.</td>
</tr>
<tr>
<td>9</td>
<td>Formant</td>
<td>Adds a formant offset to the harmony. Values: -12 semitones to +12 semitones; Default: 0</td>
</tr>
<tr>
<td>10</td>
<td>Delay</td>
<td>Adds delay to a harmony. Values: 1 ms to 1000 ms Click the note symbol to change the time units of measurement to musical notes. Synced: 1/64t to 1 Bar (dropdown)</td>
</tr>
</tbody>
</table>
|   | Feedback | Determines the gain of the feedback loop per harmony.  
Values: 0 to 100%; Default: 0 |
|---|----------|--------------------------------------------------------------------------------------------------|
| 12 | Filter Controls | A filter is applied to each harmony. There are two controls:  
**Filter Type** (low-pass, high-pass, and band-pass): click on the control handle to toggle between types.  
**Filter Cutoff** (20 Hz to 20 kHz): Slide to control; Default: 20 kHz |
| 13 | Pan | Pans the harmony in the stereo spectrum.  
Values: -100 to +100; Default: 0 |
| 14 | Level | Sets the initial level of the harmony.  
Values: -inf to +6 dB; Default: 0  
*The Level control of the Notes Panel is normally connected to ADSR1.* |
Controlling Several Harmonies Together

Several fixed markers can be selected and controlled simultaneously. To select a group of adjacent markers, draw a box around them. To select markers that are not in the same part of the graph, hold shift+click on each marker that you want to select.

When more than one marker is selected, the Multi-Selection Panel appears. Adjust the controls here and all selected markers will move together, maintaining their relative positions. When a value is adjusted through direct text entry, all selected markers are set to the same value (for that control only).

The split lines on a control indicate the minimum and maximum values of the selected harmonies.
Snapshots

Snapshots are small presets that let you quickly write and recall certain states and harmonies. They store Harmony controls only. Global controls, Note Mapper choices and Modulator settings are not stored in snapshots, but Modulator assignments are.

Up to 32 snapshots can be stored simultaneously.

- Click “+” (plus) to create a new snapshot of the current state of all harmony controls.
- Click on any unselected snapshot to recall it and select it.
- To delete a selected snapshot, click on the Trashcan icon at the bottom of the panel.

Right-click on a snapshot to open a dropdown menu, from which you can copy, paste, and delete the snapshot.

The Snapshot Selection knob allows you to browse through your snapshots. It can be automated or MIDI-learned.
**Global Controls**

Global controls, as would be expected, govern the entire plugin.

![Global Controls](image)

If Global controls are changed while the section is hidden, an asterisk indicator will appear next to the Global button:

Click the **Global** button to open the Global Controls section.

<table>
<thead>
<tr>
<th>Control</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Glide**           | Determines the transition time to move from one pitch to another, thereby controlling the smoothness of the pitch curve.  
                      | Values: 1 ms to 1000 ms (Glide Sync Off)  
                      | 1/64t to 1Bar (Glide Sync On)             |
| **Glide Sync On/Off** | Allows the transition time to be synced to the host tempo and set with musical note values. This switch looks like a music note next to the Glide value box. |
| **Correct Formant**  | Determines how much formant compensation occurs when pitch shifting. At the maximum setting, formant is always corrected, so the voice sounds as natural as possible. At 0, there is no formant correction, which will result in a “Mickey Mouse” effect when up-shifting.  
                      | Values: 0 to 100%                                                                                   |
| **Pitch**           | (Global Pitch Shift)  
                      | Sets a pitch offset to the entire process, after Note Mapping and Pitch Correction.  
                      | Values: -12 semitones to +12 semitones                                                           |
| **Formant**         | (Global Formant Shift)  
                      | Adjusts the format of the entire process.  
                      | Values: -12 semitones to +12 semitones                                                          |
| **Spread**          | Adjusts the width of the entire stereo image.                                                      |
**Mixer**

This is the final stage of the plugin, where the harmonies are mixed with the original source.

**CORRECT** (the small button next to the Source control)
Applies pitch correction to the dry vocal path (source).

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural</td>
<td>Quantizes the pitch according to the Note Mapper with respect to the detected pitch. In cases where there are more than a single note played (when loading chord maps), the pitch is quantized to the closest legal note. When Note Mapper is turned off, chromatic correction is applied.</td>
</tr>
<tr>
<td>Hard</td>
<td>Follows the same process as Natural, but with faster transition time between notes.</td>
</tr>
<tr>
<td>Notes</td>
<td>Forces the pitch correction to the generated notes or incoming MIDI notes. Use this state for creative effects, such as forcing the vocal to be “hard tuned” to one of the playing harmonies.</td>
</tr>
<tr>
<td>Off</td>
<td>No correction. The input is passed through the plugin unprocessed.</td>
</tr>
</tbody>
</table>

**SOURCE**
Determines the mix level of the original signal.
Range: -inf to +6 dB; Default: 0 dB

**HARMONY**
Controls the level of all the harmonies generated by the plugin.
Range: -inf to +6 dB; Default: 0 dB

**OUTPUT**
The summed output signal of the entire plugin.
Range: -inf to +6 dB; Default: 0 dB
Modulators

Waves Harmony offers many ways to modulate its controls. Click a modulator button to open its control panel. Click the small arrow on the right, under the Snapshots panel, to collapse the section.

**HOW TO ASSIGN MODULATORS TO A CONTROL**

1. **Drag** a modulator’s label. The controls that are available for modulation will appear in blue frames.

2. **Drop** the label of the modulator directly onto any available control. In this example, we are assigning “PT” to the Pitch control in the Notes panel.

3. Once the modulator is dropped onto the control, it will appear in the control’s first available modulation slot. **You can assign up to four modulators to any control that can be modulated.** Here, modulators A2 and AM are also assigned to the Pitch control.

4. **Click and drag vertically** over a populated slot to adjust the modulation depth. The depth of modulation applied to the control is shown above the control knob. You can see this value when you hover over the slot or adjust the depth.

A small arc inside the modulated control knob indicates the depth applied to the modulator. The arcs are color-coded to match the modulator label. A single white dot outside the knob moves in real time to indicate the effective knob position while modulated. It reflects the sum of all modulators assigned to the knob.
When applying modulation to any control, a depth setting of 100% is exactly what it takes for the modulation to get from the minimum value to its maximum value and cover the entire range. When applying modulation to a pitch-related control at 100% depth, it will span two octaves in each direction (down and up). So, the entire modulation range is four octaves.

**Modulator Assignment Menu**

You can also assign or unassign modulators directly from a control. Right-click on any of a control’s modulator slots and select from the menu. A modulator that is already assigned to this control is grayed out.

To remove a modulation assignment, right click on the populated slot to open the dropdown menu and select “None.”

---

**Modulation Types**

**Basic Modulators**

| M1–M4 | LFO/SEQ modulators | Each of these four modulators can be set to LFO or Sequencer. You can determine their Rate and Shape and decide how they are triggered. |
**A1–A2 ADSR modulators**

These are traditional envelope modulators that are triggered by incoming notes. Note that A1 is normally connected to the gain of the Level control in the selected Harmony Panel.

**Organic Modulators**

<table>
<thead>
<tr>
<th>AM</th>
<th>Amplitude modulator</th>
<th>The AM modulator lets you use the amplitude envelope of the voice signal to manipulate other controls in the plugin. This works much like an envelope follower.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT</td>
<td>Pitch modulator</td>
<td>The PT modulator extracts the pitch detection from the voice and lets you use pitch to modulate other controls in the plugin to create voice-responsive effects.</td>
</tr>
</tbody>
</table>

**Spread Modulator**

| SP  | Spread                      | Each incoming note receives its own value, depending on the Spreader mode. The most straightforward use is to modulate the panning of notes, but it can be used in many other creative ways. |

**MIDI Control Change Modulation**

**MIDI CC** modulation sources use the information from incoming MIDI control change messages. They are not available from the bottom bar of the plugin interface. Right-click on any control’s modulation slot and select from the menu. A modulator that it already assigned to the control is grayed out.

Assignment options: Velocity, Keyboard, PitchWheel, ModWheel, AfterTouch
MODs 1–4

TYPE
You can change the behavior of a modulator by switching it between LFO and Sequencer. Most of the controls remain the same, but certain behaviors are different, depending on the Type selection. Note:

- The sequencer’s values are quantized to whole numbers between -24 and +24. They represent semitones when the modulator is assigned to “Tune” or “Frequency” and the modulation depth is set to 100%.
- When LFO is selected, “Rate” determines the time it takes to complete a full cycle. Conversely, in Sequencer, it determines the time to complete a single step.

Range: LFO/SEQ

SHAPE CONTROLS
There are three ways to shape the modulator:

- **Draw Mode** (pencil icon) allows you to manually draw the modulator shape you want.
- **Erase** (eraser icon) resets the currently loaded shape to “None.”
- **Browse** (folder icon) opens a factory library of LFO shapes and sequencer patterns, depending on the current Type. Click on a shape to replace the one you're currently using. To undo, use the arrows on left side of the WaveSystem toolbar.
SAVE (disk icon at the bottom)
Click on the icon to save the current user-drawn modulator shape to an empty cell. User shapes appear in blue; factory shapes are purple. You can manage and access the saved shapes at:
  Mac: /Users/Shared/Waves/Plug-in Settings/ORS Modulators/
  PC: C:\Users\Public\Waves Audio\Plug-in Settings\ORS Modulators\

DELETE USER SHAPE (trashcan)
Click the trashcan icon, then click on the user shape you wish to delete. You cannot delete factory shapes.

TRIGGER MODE
Determines when the modulator resets its position. Click on the box to toggle through its five states.

Synced locks the modulator to the host. It syncs to BPM as well as transport position.
Legato resets the modulator whenever a new note is received, unless another note is already playing.
Retrigger resets the modulator every time a new note is received.
Poly triggers a new modulator per voice for each new note. When patched to polyphonic destinations (e.g., the internal synth controls), an independent modulation will be applied to each voice.
Free sets the modulator to be free running. It will not reset. Range: Sync, Retrigger, Legato, Poly, Free

PLAY MODE
There are four play modes:
  One Shot: the modulator completes a single cycle and stops running.
  Loop: the modulator plays continuously in a loop.
  Seesaw: the modulator moves back and forth within its cycle.
  Hold: the modulator pauses at its current location. Use the Phase control to alter its relative position.

STEPS
Only in SEQ Mode
Determines the number of sequencer steps.
Range: 2 steps to 16 steps
**RATE**
Sets the rate of the modulator. Display units and range are dependent on the Rate Sync setting.
Range: 0.06 Hz to 30 Hz or 1/64 bar to 8 bars

**RATE SYNC ON/OFF**
Toggles the Rate knob values. When On, the rate of the LFO is calculated by the Host BPM and is displayed in musical notation. When Off, values are displayed in Hz.

**PHASE**
Controls the starting position of the modulator.

**WARP**
Warp the speed of the modulator but keeps the overall timing of the cycle. When the Warp value is lower than 1, modulation will start at a slow pace and increase its speed toward the end of the cycle. When set above 1, the pace is fast at the start and then slows down at the end. Essentially, this is applying pulse width modulation on the cycle of the modulator.
Range: 0.1 to 100 (a value of 1 is linear)

**SMOOTH**
Applies smoothing to the modulation curve. Low settings result in distinguishable onsets and may result in clicks. High settings smooth the overall modulation curve, and in some settings may result in very low energy.
Range: 1 ms to 1000 ms

**LEVEL**
The overall level of the modulator. When the Level is set to 0, no modulation takes place.
Range: 0 to 1
ADSR 1 and ADSR 2

Two traditional ADSR envelopes, triggered by incoming notes, provide control over the Attack, Decay, Sustain, and Release of a note and its curves.

**ATTACK**
Sets the attack time of the ADSR envelope.
Range: 0.1 ms to 10,000 ms

**DECAY**
Sets the decay time of the ADSR envelope.
Range: 0.1 ms to 10,000 ms

**SUSTAIN**
Sets the sustain level of the ADSR envelope.
Range: 0 to 1

**RELEASE**
Sets the release time of the filter’s envelope.
Range: 0.1 ms to 10,000 ms

**CURVE**
*(Available for Attack, Decay, and Release)*
Sets the curve of the time function. A setting of 1 results in linear behavior. Values lower than 1 yield exponential curves. Values higher than 1 display logarithmic behavior.
Range: 0.1 to 10

Note: When there are no incoming notes (either by Generate Notes or a MIDI Keyboard), the ADSRs will not be triggered.
Organic Modulators

Organic modulators enable you to use the characteristics of the input signal to modulate most plugin controls.

**AM (AMPLITUDE)**

The AM modulator lets you use the amplitude envelope of the voice signal to manipulate other controls of the plugin. This works much like an envelope follower.

- **Attack** is the time it takes the modulator to rise when positive level values are detected.
  Range: 0.1 ms to 1000 ms
- **Release** is the time it takes the modulator to fall back to minimum once an attenuation is detected.
  Range: 0.1 ms to 1000 ms
- **Level** is the overall level of the modulator. When this is set to 0, no modulation takes place.
  Range: 0 to 2
PT (PITCH)

Extracts the pitch detection from the voice.

SMOOTH

- The time it takes for the modulator to respond to any change in detected pitch. The effect is similar to pitch gliding.
- Range: 0.1 ms to 1000 ms

OFFSET

- Applies a steady offset to the overall modulation curve. It lets you set a “reference note” about which pitch modulates.
- Range: -1 to +1

LEVEL

- Sets the overall level of the modulator. When this is set to 0, no modulation takes place.
- Range: 0 to 2
The Spreader is a new modulator introduced in Waves Harmony. Its main purpose is to allow a polyphonic assignment of values across the instrument’s voices. In other words, it provides a unique modulation value for every incoming note. This helps to automatically create divergence in the plugin, especially across the played Notes that are otherwise controlled by the same panel.

Every incoming note into the plugin (whether from MIDI or automatically generated) gets a value inside the Spreader. The exact value given to it is determined by the Spreader Mode control. When modulating other controls using the Spreader, each of the plugin voices is modulated by the unique value set by the Spreader, and therefore each voice gets its own unique modulation. The most straightforward use of the Spreader is modulating the Panning of Notes. Each Note receives its own value and gets a unique placement in the stereo spectrum, making the results wider and better spread.

**SPREADER MODE**

- **Inward** moves the control from its farthest point back to its defined value.
- **Outward** moves the control from its defined value to its farthest point.
- **Random** moves the control between its extremes in a random manner.
**TRIGGER MODE**
Determines when the modulator resets its position. Click on the box to toggle between the two Trigger states.
- **Retrigger** resets the modulator every time a new note is received.
- **Poly** triggers a new modulator per voice for each new note. When patched to polyphonic destinations (e.g., the internal synth controls), an independent modulation will be applied to each voice.

**SPREAD**
Sets the range of the spread algorithm.

**LEVEL**
Sets the amount of modulation sent to the modulated controls.

**Ghost Markers**
Ghost markers appear with low opacity when graph parameters are modulated. They reflect the modulation with their movement and indicate the sum of all modulation in real time.
Note Mapper

Use the Note Map Editor to edit the Chord Maps and Scales, and to save your own mapping presets.

Chord Maps let you decide which harmonies will play when receiving any incoming note, whether from MIDI input or generated from a voice.

Notes on the keyboard can be mapped to up to eight notes at a time. This allows you to quantize the pitch to a certain scale by mapping out-of-scale notes to legal ones, or to play chords or harmonies from a single note.

Click the Note Map Editor View/Hide button to open and close the editor.

NOTE ASSIGNMENT

Use the keyboard to map one or more harmonies to a played note. Assignment is similar to MIDI mapping.

<table>
<thead>
<tr>
<th>Chord Map</th>
<th>Enable Mapping</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow Key</td>
<td>Selected Note</td>
<td>The key is in assignment mode. When any other key is clicked on the Note Map Editor keyboard or the MIDI keyboard, it will be assigned to this note.</td>
</tr>
<tr>
<td>Pink Key</td>
<td>Played Note</td>
<td>A played note, whether from the input vocal or MIDI, is shaded pink. If a chord is played, then all its notes will appear highlighted, and each key will generate its properly mapped notes.</td>
</tr>
<tr>
<td>Purple Dot</td>
<td>Assigned Note</td>
<td>Notes that are assigned to the Selected Note appear as purple dots.</td>
</tr>
</tbody>
</table>
Mapping assignments are repeated in each octave.

There is a legend beneath the Editor to remind you of the color codes.

**SPREAD/FOLD**
Controls the behavior of the Note Map spread across octaves.

When **Spread** is selected, all mapped notes follow the octave transposition in relation to the incoming note. For example, if you map C#1 to trigger C1, and the incoming note is C#2, then the triggered note will be C2.

In **Fold** mode, triggered notes will always play where they were initially set to, regardless of the octave of the incoming note. Using the above example, it doesn’t matter if the incoming note is C#2, C#3 or C#4—they will all trigger C1.

This is useful when triggering chords that you don’t want to transpose to the incoming notes.

**ERASE**
Clears the entire Note Mapper preset. Use this to start a new note map from scratch.
## Scale Editor

Harmony corrects triggered notes to fit within the key and scale of the song. A scale display shows the correction direction (> or <) for the note. It is always visible.

There are 12 boxes above 12 notes. This assigns an entire octave that cycles throughout the keyboard.

Each Scale Editor box has three states:

- **Empty** (default)
- **NoteUp** (>)
- **NoteDown** (<)

<table>
<thead>
<tr>
<th>State</th>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empty</td>
<td>Legal Note</td>
<td>The incoming note outputs the same note value.</td>
</tr>
<tr>
<td></td>
<td>![NoteUp symbol]</td>
<td>Play the next legal note above the played note.</td>
</tr>
<tr>
<td></td>
<td>![NoteDown symbol]</td>
<td>Play the next legal note below the played note.</td>
</tr>
</tbody>
</table>

### SAVE SCALE INTO MENU

Click on the Scale icon to the left of the editor. This opens a menu for saving scales.

<table>
<thead>
<tr>
<th>Save (Preset Name)</th>
<th>Overwrites to the currently open User preset. You cannot change a factory preset.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Put Into Menu As…</td>
<td>Saves the current scales settings as a user preset. Scales presets are saved with the “.scale” extension. The user presets at this location will be available from the main Scales dropdown menu. (/Users/Shared/Waves/Plug-In Settings/Harmony/)</td>
</tr>
</tbody>
</table>
**WaveSystem Toolbar**

*Undo/Redo*

To undo or redo an action, use the arrows on the left side of the WaveSystem Toolbar at the top of the window. The toolbar is also where you save and load presets, compare settings, resize the plugin, enable/disable tooltips, and access user guides.

To learn more, click the icon on the right side and open the WaveSystem Guide from the dropdown menu.

*Toolips*

Hover over a control and a tooltip will appear on left side of the interface. Usually this will include a short description of what the control does or how to use it. When you move a control, its value will be displayed in either the tooltips box, or in a dedicated value box near the control. You can disable tooltips in the WaveSystem Toolbar menu.