

# Wilsonic

- MTS-ESP + Simple Synth

# WilsonicController

- MTS-ESP + MIDI Effect

[wilsonic.co](https://wilsonic.co)

Public Beta [Downloads](#)

- [MacOS 0.42 Beta](#)
- [Windows 10 64-bit 0.42 Beta](#)

Support in [Wilsonic Discord](#)

Updated 2024-07-01



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# What is MTS-ESP?

- MTS-ESP is a protocol for automatically and invisibly sharing tuning data between plug-ins in a DAW in real-time, without any routing or other setup required. [ODDSound Github link](#)
- MTS-ESP does not use MIDI data and is not routed through MIDI connections in a DAW.
  - Wilsonic is an MTS-ESP Source and has a simple synth for reference tones
  - WilsonicController is both an MTS-ESP Source and a MIDI Source, but has no simple synth
- Sharing of tuning data happens directly between plug-ins. It does not involve the DAW at all and therefore it will work in any DAW.
- Developers must explicitly add support for MTS-ESP to their plug-ins for this to work. A list of supported plug-ins can be found [here](#)
- Most synths that support MTS-ESP will automatically retune to Wilsonic when loaded, however some have a UX preference to enable MTS-ESP (like SurgeXT).
- Synths that don't natively support MTS-ESP can usually be retuned using MIDI pitch bend messages. This can even work polyphonically for synths that support MPE.

# What is MTS-ESP?

- Synths that don't natively support MTS-ESP can usually be retuned using MIDI pitch bend messages. This works best for synths that support MPE.
- Re-tuning via MIDI pitch bend requires a plug-in that can receive tuning data via MTS-ESP and generate MIDI pitch bend messages in response. Available options are:
  - Paid:
    - ODDSound MTS-ESP MIDI Client (part of the MTS-ESP Suite)
  - Free:
    - Ableton Microtuner M4L device (in MTS-ESP client mode) and
    - Xen MIDI Retuner
- The Wilsonic installer includes everything required for MTS-ESP to work on your computer, however if you have problems you can do a clean install of the MT-ESP components here
  - Mac-specific MTS-ESP [installer](#)
  - Windows-specific MTS-ESP [installer](#)

# Architecture

- Wilsonic should be the *only* MTS-ESP **Master** active in your DAW/Host session
- Your software synths are the “**clients**”

Desktop

DAW/Host

Wilsonic  
MTS-ESP  
Master:

*Global  
Tuning  
Table*

**MTS-ESP  
Clients:**

Software  
Synths that  
natively  
support  
MTS-ESP

**ODDSound  
MTS-ESP Midi  
Client**

Software  
Synths that  
support  
MPE

**Ableton  
Microtuner M4L**

Software  
Synths that  
support  
MPE



See [Wilsonic MTS-ESP](#)

# MTS-ESP Status Indicator: Green

- Wilsonic should be the *only* MTS-ESP Master active in your DAW/Host session
- The green indicator means Wilsonic is actively managing the global tuning table
- Do not run Wilsonic and WilsonicController simultaneously—I'm still figuring out how to gracefully manage multiple apps wanting to be the Master
- Hover over status label for status history

The screenshot shows the Wilsonic application window. At the top right, a green circle icon is labeled "Wilsonic registered as MTS-ESP Source". A tooltip is visible over this icon, containing the following information:

- Wilsonic v0.34
- (c) 2023 Marcus Satellite
- MTS-ESP Status: Wilsonic is registered as the MTS-ESP Source. Connected to 0 clients.
- Documentation (opens in your browser)

The main interface includes a "Moments of Symmetry" section with sliders for C (0.238186), P (2.000000), and M (0). Below this is a "Cartesian" plot showing a grid of vertical lines. At the bottom, there are controls for "Period Middle C" (0), "Note Number Middle C" (60), and "Frequency Middle C" (261.625580). The bottom-most part of the window displays a piano roll with notes and a diagram of a star-like structure.

# MTS-ESP Status Indicator: Yellow

- This status may appear if there is another plug-in already managing the global tuning table, or after a crash.
- The yellow indicator means this instance of Wilsonic is NOT actively managing the global tuning table.
- Check there is no other instance of Wilsonic or any other MTS-ESP master plug-in in use, then select “Register” from the menu to make Wilsonic the master.

The screenshot shows the Wilsonic software interface. At the top, there is a title bar "Wilsonic" and a "Moments of Symmetry" dropdown menu. Below this, there are several control knobs: "G" (0.236186), "P" (2.000000), and "M" (0). A central display shows a grid of ratios (1, 1/2, 1/3, 1/4, 1/5, 2/9, 3/13, 4/17, 5/21, 6/25) and a piano roll with notes numbered 48 to 68. A yellow warning icon is visible in the top right corner. A tooltip box is open, displaying the following text:

Wilsonic v0.24  
by Marcus Satellite

▲ MTS-ESP Status  
Wilsonic is NOT registered as the MTS-ESP Master  
This is likely because it did not shut down properly.  
**Register Wilsonic as MTS-ESP Master**

Documentation  
(opens in your browser)

# Installation

- Download installer at [wilsonic.co](http://wilsonic.co)
- Run installer
- Reboot your machine
- Run as a Plugin in your favorite DAW
  - Rescan plugins
  - Load Wilsonic as a AUv2 or VST3 on a MIDI track
  - Wilsonic's "simple synth" can be played from this track. Check that your synths are tuned.
  - Wilsonic's DAW automation will be on this track
  - Load your soft synths in other tracks per the [ODDSound client documentation](#)
  - See [next slide](#) for more details
- Run as a standalone:
  - Standalone synths such as Surge and Pianoteq are tuned up in real-time!



# MTS-ESP Overview

- [ODDSound MTS-ESP Overview](#)
- [ODDSound Client Support \(DAW+Soft Synth setup\)](#)
  - Ableton
  - Bitwig
  - Cakewalk
  - Cubase/Nuendo
  - Digital Performer
  - FL Studio
  - Kontakt
  - Logic Pro
  - Reaper
  - and many more
- [How To Install ODDSound Plug-ins \(Mac and Windows\)](#)
- [Microtuning in Ableton Live with MTS-ESP](#) (YouTube)
- [Microtuning in Bitwig Studio with MTS-ESP](#) (YouTube)



# Microtonal Keyboard

These 3 controls define the global tuning table root frequency and MIDI mapping:

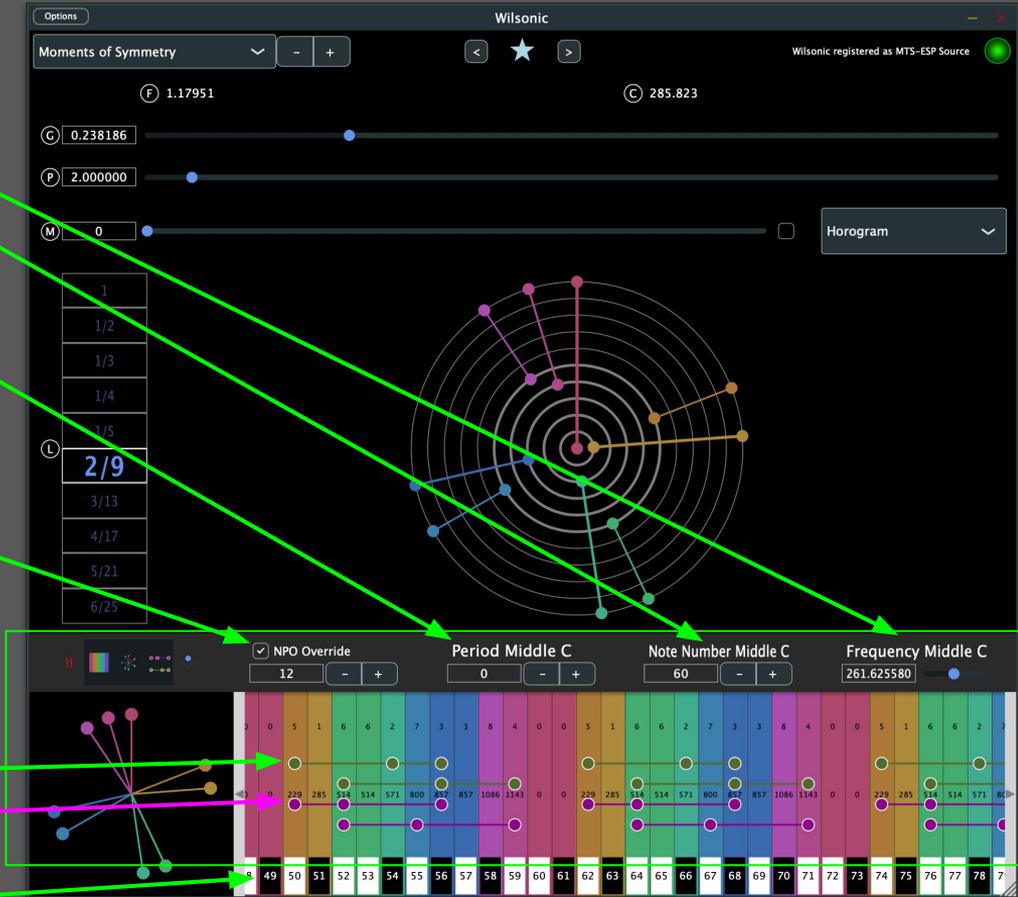
- Frequency of Middle C
- Note Number Middle C:
  - Default = Origin = Middle C = 60
  - TRANSPOSE = PERFORMANCE
- Period Middle C:
  - lower/raise all notes by this octave/period
- All automatable in the DAW!
- Notes Per Octave (NPO) Override adds/removes notes
- Resize keyboard by dragging bar vertically

Real-time Major/Minor Analysis:

## Pythagorean Means

- Arithmetic Mean: “Proportional Triad”
- Harmonic Mean: “Subcontrary Triad”

MIDI Note Number Mapping + Black and White Keys of linear keyboard



**Microtonal keyboard is updated in real-time (!)**

# Microtonal Keyboard

- Offset Pitch Wheel color at Middle C
  - Toggle Proportional Triads
- Toggle Pitch Wheel on Keyboard
  - Toggle Microtonal Keyboard
- MIDI Panic: turns all playing notes off

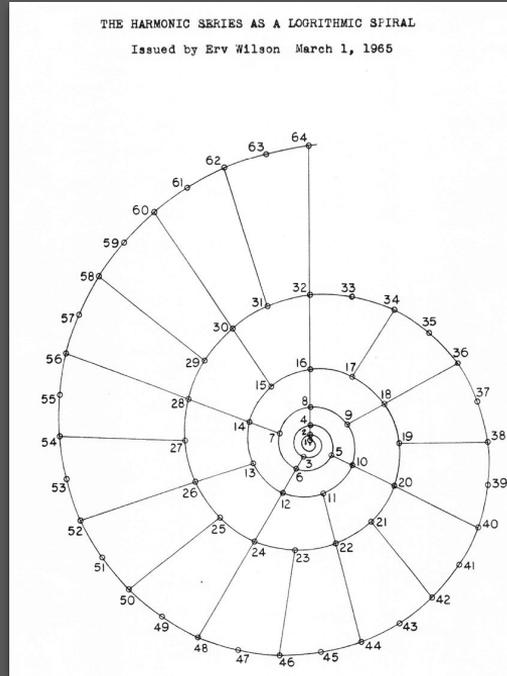
The screenshot displays the Wilsonic software interface. At the top, the title bar reads "Wilsonic" and "Wilsonic registered as MTS-ESP Source". Below the title bar, there are control elements for "Moments of Symmetry" (a dropdown menu), a star icon, and navigation arrows. The main interface features several sliders and buttons: "F" 1.17951, "C" 0.238186, "P" 2.000000, and "M" 0. There are also five circular buttons with blue indicators and a "Gral" dropdown menu. The central part of the interface is a large, colorful, curved keyboard layout with notes labeled with numbers and ratios. Below the keyboard, there are two columns of ratios: 1, 1/2, 1/3, 1/4, 1/5, 2/9, 3/13, 4/17, 5/21, 6/25. The bottom section of the interface includes a "NPO Override" checkbox, three display panels for "Period Middle C" (12), "Note Number Middle C" (60), and "Frequency Middle C" (261.625580), and a piano roll with a grid of notes and a circular diagram on the left.

# Pitch Wheel

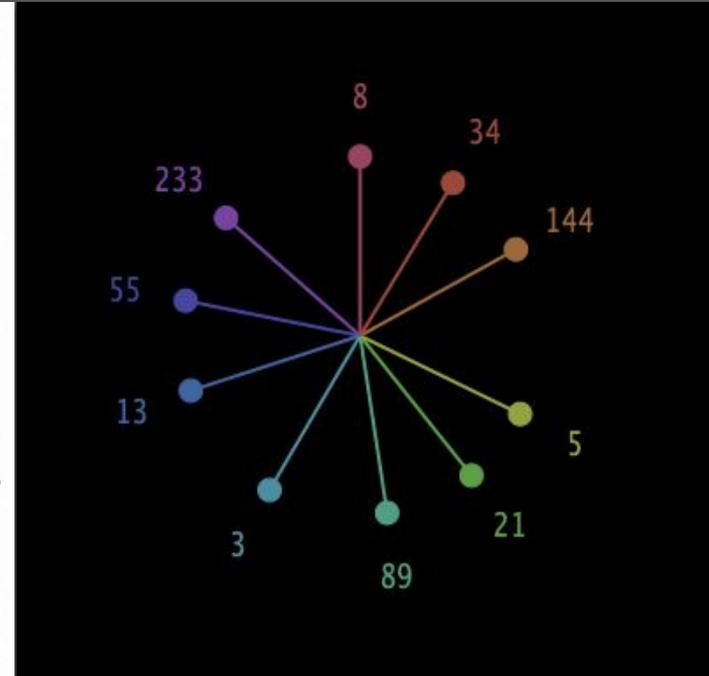
## Pitch Wheel

- Pitch Wheels appear throughout the app
- Pitch is defined as  $\log \text{base-Period of Frequency}$
- $\text{Period} = 2 = \text{Octave}$ : the most common period
- The Pitch Wheels also take the modulus of Period
- $\text{Period} = \text{Octave Equivalence}$ :  $1=2=4=8=16=32=64=\dots$
- 12 o'clock = C = "1" =  $2^0$
- The colors of the Pitch Wheels correspond to the colors of the microtonal keyboard
- Wilsonic supports non-octave tunings such as Scala files and MOS
- When you change the Period the appearance of the Pitch Wheels do not change because by definition they are log-base-period

## Log Base 2 of Frequency, drawn as a log2 spiral



## Log Base Period of Frequency, drawn as a circle



# Favorites

- Toggle Favorites panel by clicking on Favorites star icon
  - Favorites takes up 1/3 of the vertical screen space: you can resize Wilsonic to increase the height
- Navigate Favorites by hitting “<”, or “>” buttons
- Toggle to save NPO Override with Favorite
- Toggle to save Period with Favorite
- Toggle to save Note Number Middle C with Favorite
- Toggle to save Frequency Middle C with Favorite
- Save current scale as a Favorite by hitting “+” button
- Delete a selected row by hitting “backspace”
- Double-click Description cell to edit description
- Tap column header to sort by:
  - ID
  - Design
  - NPO (“number of notes per octave”),
  - Description

Options Wilsonic

Euler Genus 6 Wilsonic registered as MTS-ESP Source

NPO Override  Period  Note Number  Frequency +

Set Favorite ID: 190, at row: 181

ID	Icon	Design	NPO	Description	Parameters
182		Euler Genus 6	6		CPS_4_2(1,135,19,377)*45
183		Euler Genus 6	10		CPS_5_3(45,135,225,17,377)
184		Euler Genus 6	6		CPS_6_1(15,35,45,55,63,75)
185		Euler Genus 6	6		CPS_6_5(15,35,45,55,63,75)
186		Euler Genus 6	10	debugging proportional triads	CPS_5_3(1,45,135,225,19)*377
190		Euler Genus 6	6		CPS_4_2(1,45,19,377)*225

A B C D E F

1 45 135 225 19 377

- + - + - + - + - + - +

(M)

CPS\_5\_2(1,45,135,19,377)\*225

10

(S)

CPS\_4\_1(1,45,135,19)\*225\*377

CPS\_4\_2(1,45,135,19)\*225

CPS\_4\_1(1,45,135,377)\*225\*19

CPS\_4\_2(1,45,135,377)\*225

CPS\_4\_1(1,45,19,377)\*135\*225

CPS\_4\_2(1,45,19,377)\*225

CPS\_4\_1(1,135,19,377)\*45\*225

CPS\_4\_2(1,135,19,377)\*225

CPS\_4\_1(45,135,19,377)\*1\*225

CPS\_4\_2(45,135,19,377)\*225

NPO Override  Period Middle C  Note Number Middle C  Frequency Middle C

12 0 60 261.625580

- + - + - + - +

DEF BDF ADE ABD ADF BDE DEF BDF ADE ABD ADF BDE DEF BDF ADE A

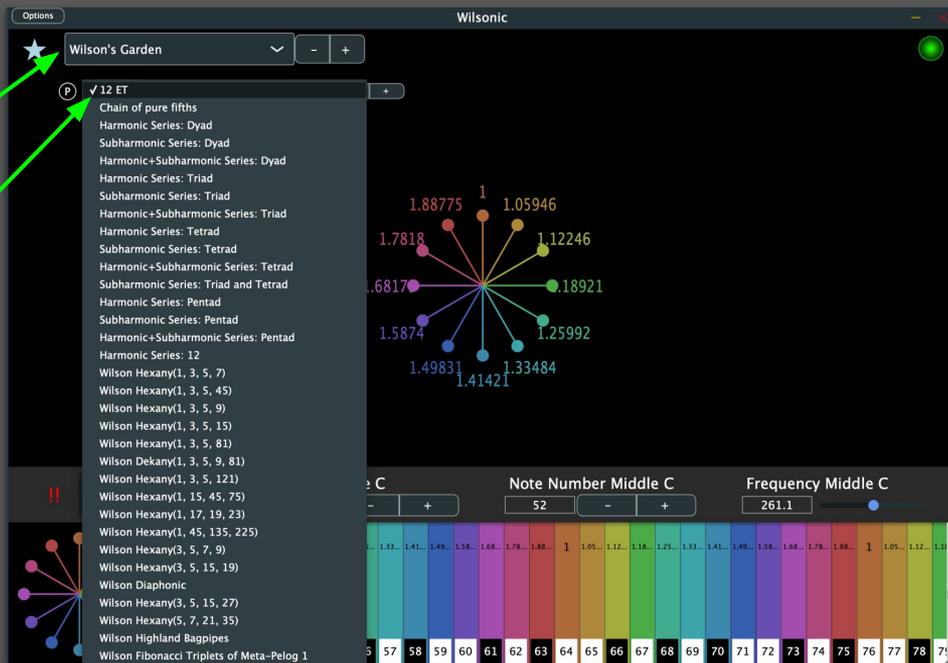
58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 7

# “Wilson’s Garden”

- Select “Wilson’s Garden” from the Scale Design menu
- Select a scale from the “Curated Presets” menu

## Curated scales by

- Erv Wilson
- Kraig Grady
- Stephen James Taylor
- Jose Garcia
- Gary David
- Marcus Hobbs
- Elementary, archetypal scales

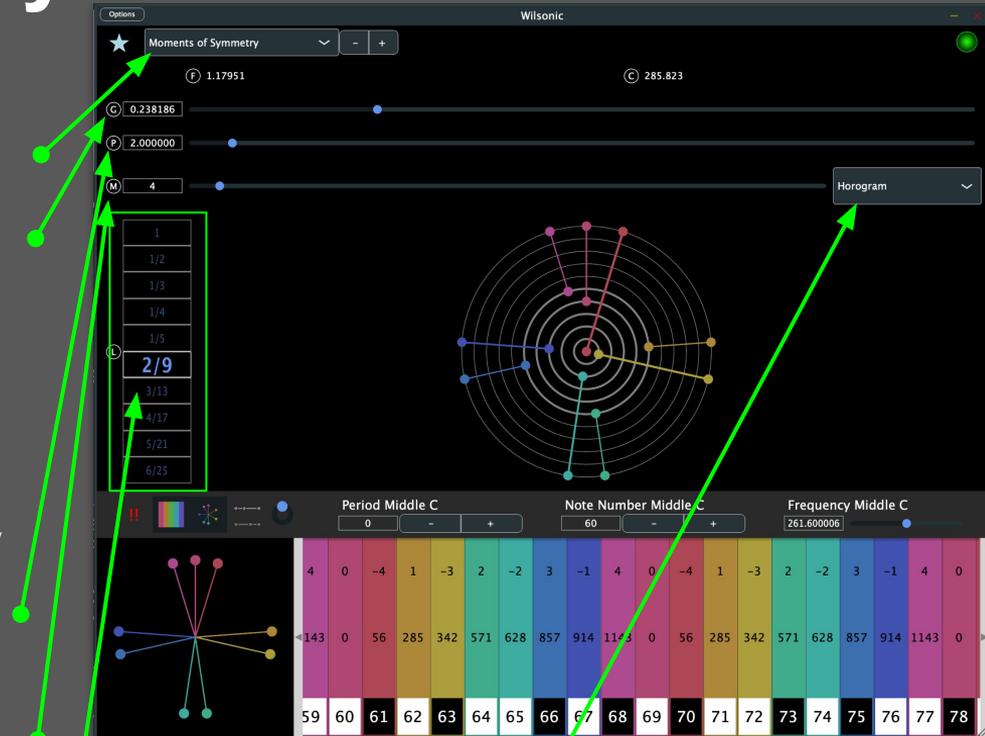


\*Be sure to also explore the [Scala Archives](#)

# Moments of Symmetry

[Link to Erv Wilson's MOS papers](#)

- Select “Moments of Symmetry” from the Scale Design menu
- Select the Generator with the slider.
  - Units are in “Pitch space”, i.e., Log-base-Period of Frequency
    - 0 = Middle C
    - 1 = C one Period higher
  - $G = 0.58333 = 7/12 = 12$  tone equal temperament when Period = 2
  - The “F” label is the Generator in Frequency
  - the “C” label is the Generator in Cents
- Select the Period with the Slider
  - Units are in Frequency, default is “2”, the Octave
- Select the Murchana with the slider
  - Murchana is a type of mode, or rotation
- Select the Level by click-dragging over the Level box



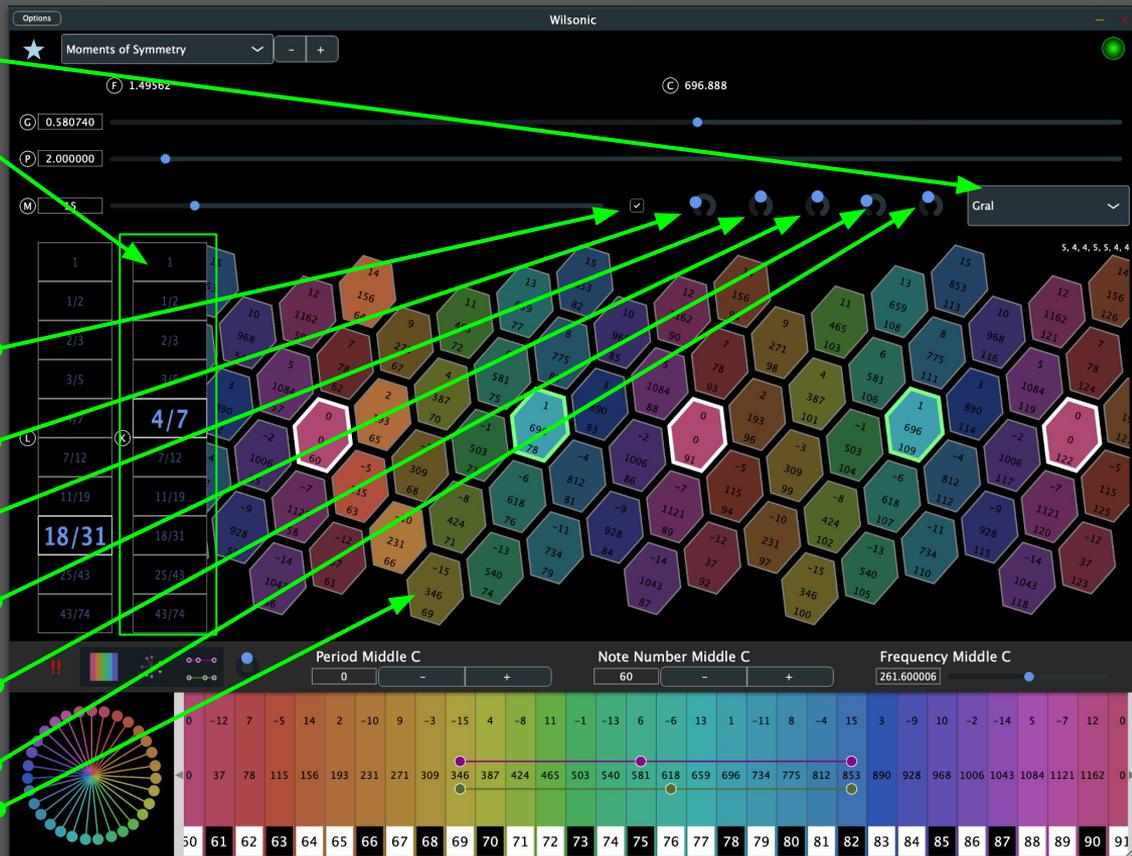
Four drawing modes:

- Cartesian
- Horogram
- Horogram Inverse
- Gral (continuum of generalized keyboards)

# Moments of Symmetry

Supports “Touch” Devices

- Select “Gral” from the display mode popup
- A secondary Level box appears...this is the keyboard mapping. The denominator is the number of columns in an octave. Shown here is the 4/7 layout of the 18/31 MOS.
- The toggle will set Murchana to 0 at the center of the chain, automatable
- The first knob is the zoom
- The second knob is the rotation. Leave this at 0 for Wilsonic to optimize for horizontal layout
- The third knob is “shear” which you can use to make the columns vertical
- The fourth knob is the left-right position of the keyboard
- The fifth knob is the up-down position
- Hex tile labels: Scale degree, frequency, and MIDI NN





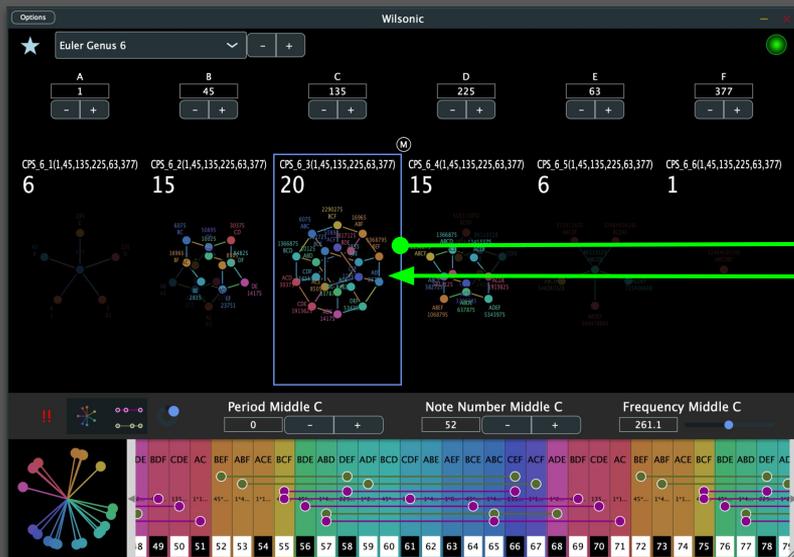


# Euler Genus 6

## Euler Genus 6

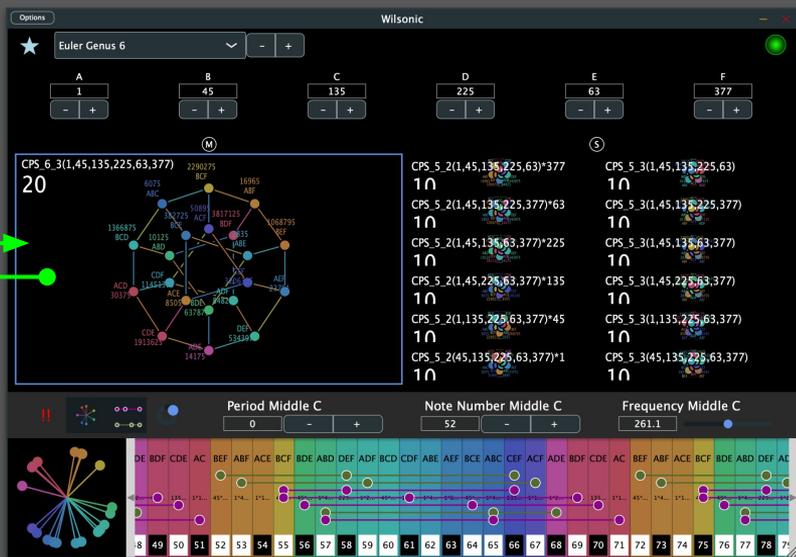
### Euler Genus 6 page

- Seeds can be changed on every page
- Selected scale is outlined in blue
- Shift-Mouse-Hover selects scale
- Cursor Left-Right selects scale
- Ctrl-Click drills into Subset page



### Euler Genus 6 Subset page

- Seeds can be changed on every page
- Selected scale is outlined in blue
- Shift-Mouse-Hover selects scale
- Ctrl-Click navigates down into subset
- Command-Click navigates up into superset
- Cursor Left-Right-Up-Down selects scale
- Superset on the left, subsets on the right



# “Subsets of Combination Product Sets”

Wilsonic scale designs of “Combination Product Sets” and “Euler Genus 6” are implementations of these canonical microtonal papers:

- [D'Allesandro, Like a Hurricane](#), Erv Wilson,
- [Combination-Product Set Patterns](#), Kraig Grady, 1986
- [THE EIKOSANY VIEWED FROM THE CENTERED PENTAD LATTICE](#), Kraig Grady
- [THE EIKOSANY VIEWED FROM A HEXANY LATTICE](#), Kraig Grady
- Cycle of Hexanies in a Dekany, Kraig Grady, 1998
- [Resources Of The Eikosany](#), Kraig Grady, 1985

# Recurrence Relation

## Recurrence Relation

- Select “Recurrence Relation” from Scale Design menu
- Select the **terms** of the recurrence relation from the dropdown.
- Selected terms are highlighted in blue
- Select the **number** of terms to compute
- Select the **offset** (throws away previous terms)
- Set your **Seeds** for each term (initial conditions)
- Set your **Coefficients** for each term from the dropdown
- Final Scale:
  - Sorted as if octave-reduced
- Period is 2 (i.e., an octave)
- Recurrence Relations optimize for difference tones by creating an additive sequence

Options

Recurrence Relation

Terms: 7

Offset: 0

$H[n] = H[n-3] + H[n-4]$

$H[n-1]$ : 384  
 $H[n-2]$ : 288  
 $H[n-3]$ : 216  
 $H[n-4]$ : 162  
 $H[n-5]$ : 1  
 $H[n-6]$ : 1  
 $H[n-7]$ : 1  
 $H[n-8]$ : 1  
 $H[n-9]$ : 1

Coefficients: 1, 1, 2, 1/2, 1, 1, 1, 1, 1

Seeds: 912, 513, 388, 216, 162, 384, 684

$H[n] = 2 * H[n-3] + (1/2) * H[n-4]$

Integer Sequence, including seeds:  
162, 216, 288, 384, 513, 684, 912

Sequence converges to:  
F = 1.333333  
P = 0.415038

Final Scale:  
513, 288, 162, 684, 384, 216, 912

Period Middle C: 0, -, +  
Note Number Middle C: 52, -, +  
Frequency Middle C: 261.1

Scale: 84, 384, 216, 912, 513, 288, 162, 684, 384, 216, 912, 513, 288, 162, 684, 384, 216, 912, 513, 288, 162, 684, 384, 216, 912, 513, 288, 162, 684, 384, 216, 912, 513, 288, 162, 684, 384, 216, 912

18 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79

# Equal Temperament

## “Equal Temperament”

- Select “Equal Temperament” from the Scale Design menu
- Select an ET (“EDO”) from 1-128 notes per octave
- Select the period. “Octave” = period of 2

The screenshot shows the Wilsonic software interface for designing an Equal Temperament (ET) scale. The window title is "Wilsonic". At the top, there is a dropdown menu set to "Equal Temperament" with minus and plus buttons. Below this, there are two sliders: "N" (Notes per octave) set to 13, and "P" (Period) set to 3.000000. A circular diagram on the left shows 13 notes arranged in a circle, numbered 0 through 12. Below the sliders is a horizontal bar with 13 colored segments. At the bottom, there are three input fields: "Period Middle C" (0), "Note Number Middle C" (60), and "Frequency Middle C" (261.1). Below these fields is a piano roll showing 13 notes, numbered 1 through 13, with their corresponding frequencies and note numbers.

| Note Number | Frequency (Hz) |
|-------------|----------------|
| 1           | 261.1          |
| 2           | 271.1          |
| 3           | 281.1          |
| 4           | 291.1          |
| 5           | 301.1          |
| 6           | 311.1          |
| 7           | 321.1          |
| 8           | 331.1          |
| 9           | 341.1          |
| 10          | 351.1          |
| 11          | 361.1          |
| 12          | 371.1          |
| 13          | 381.1          |

# Tritriadic

## “Tritriadic” by John Chalmers

- Select “Tritriadic” from the Scale Design menu
- Select the Mediant with the slider
- Select the Dominant with the slider

Tritriadics are very simple and are based on the major scale as a template. They are defined as three triads composed of a tonic, mediant and dominant interval. Let us set the tonic to 0 [in Cents], then the basic triad has the form 0, M, D. By adding a subdominant triad 1200-D, M-D, 1200 and a dominant triad, D, D+M 2\*D, one gets the notes in ascending order 0 2\*D M 1200-D D M-D D+M 1200 for an octave spanning scale. In ET, 0 and 1200 are the same note an octave apart, in JI 1/1 and 2/1 have the same harmonic function.

They are also definable in JI—take any triad such as 4:5:6 and write it as 1/1 5/4 3/2. The subdominant is the octave-adjusted triad obtained by dividing by D (=3/2) or more conveniently as 4/3 5/3 2/1. The dominant triad is the tonic multiplied by the dominant interval. This operation yields 3/2, 15/8 and 9/8. Hence the three triads are 4/3 5/3 2/1, 1/1 5/4 3/2, and 3/2 15/8 9/8 (when reduced to the same octave. Symbolically written as 2/D M/D 2/1, 1/1 M D, D D\*M D^2 or in ascending order 1/1 D^2 M 2/D D M/D D\*M 2/1--1/1 9/8 5/4 4/3 5/3 15/8 2/1.

In both cases there are two supplementary triads which I refer to as conjugate r triads--M D D+M and M-D 1200 M. These have the form of 0 D-M D or in the JI case, 5/4 3/2 15/8 and 5/3 2/1 5/4, to be reduced to the same octave. Major and minor or more generally prime and conjugate are thus conjugates of each other

Any triad may be used--4:5:6, 4:5:7 or even irrational numbers.

—John Chalmers, May 4, 2022

The screenshot shows the Xenharmonikon software interface. At the top, the 'Options' menu is open, and 'Tritriadic' is selected. Below the menu, there are two sliders: 'M' (Mediant) set to 0.2381860 and 'D' (Dominant) set to 0.5802414. A diagram in the center shows a scale structure with notes labeled 0, D+M, 2\*D, M, M-D, D, and 1-D. The notes are represented by colored circles and connected by lines. The diagram also shows the intervals between notes: 0 to D+M (982.112854), 0 to 2\*D (192.579315), 0 to M (238.1823212), 0 to M-D (789.533569), 0 to D (696.2896735), and 0 to 1-D (703.10327). A text box on the right provides the Mediant and Dominant values in P:0.238186, F:1.179509, C:285.823212 and P:0.580241, F:1.495099, C:696.289673. At the bottom, there are three tabs: 'Period Middle C', 'Note Number Middle C', and 'Frequency Middle C'. The 'Note Number Middle C' tab is selected, showing a scale from 48 to 78. The scale is represented by a row of colored boxes, each containing a note number and a symbol (e.g., 48: 5.4, 49: 503.7, 50: 696.2, 51: 789.5, 52: 982.1, 53: 0, 54: 192.5, 55: 285.8, 56: 381.7, 57: 478.2, 58: 574.7, 59: 671.2, 60: 767.7, 61: 864.2, 62: 960.7, 63: 1057.2, 64: 1154.7, 65: 1251.2, 66: 1347.7, 67: 1444.2, 68: 1540.7, 69: 1637.2, 70: 1733.7, 71: 1830.2, 72: 1926.7, 73: 2023.2, 74: 2119.7, 75: 2216.2, 76: 2312.7, 77: 2409.2, 78: 2505.7, 79: 2602.2).

See [Xenharmonikon](#) for more details

# Scala File Support

- Hover over status label for status history

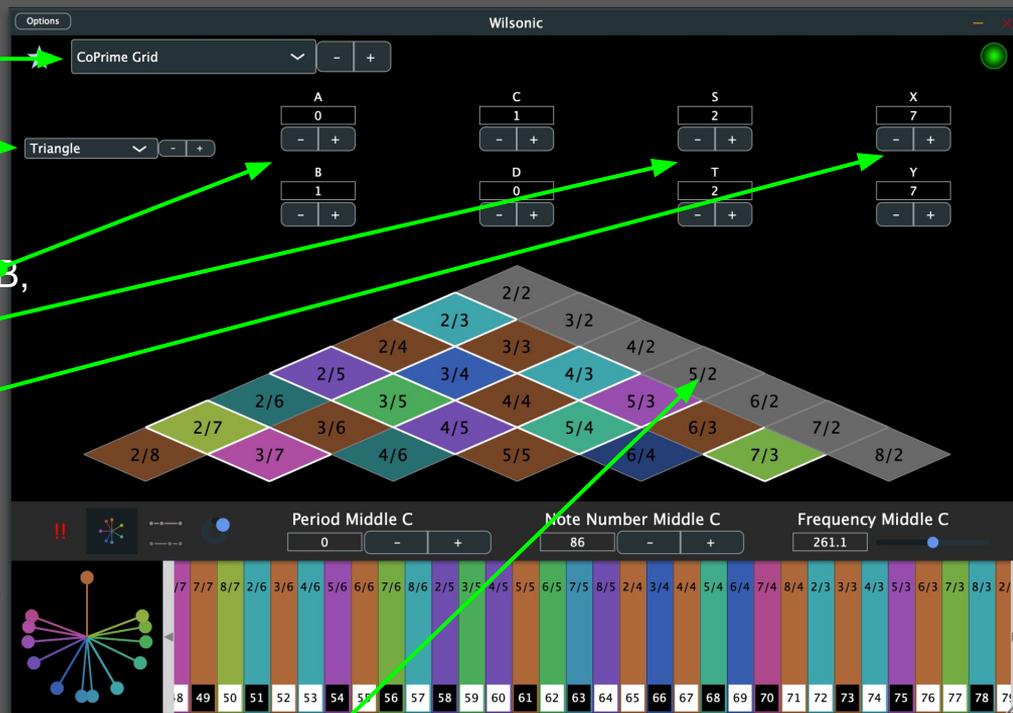
- Select “Scala” from the Scale Design menu
- Select “Bundled” or “User”
- Highlight the row and hit RETURN to tune up the Microtonal Keyboard
- Supports non-Octave tunings
- Mouse-Hover over the row to see the contents of the Scala file
- Only when “User” is selected can you import/delete .scl files:
  - Drag-and-Drop files into the window
  - Click on the “+” for a File Browser
  - Select-Backspace to DELETE
- When “Bundled” is selected:
  - 5,100+ .scl files (read-only)
  - Please see [Huygens-Fokker Centre for Microtonal Music](#)
  - Shoutout Manuel op De Coull!
- User/Bundled is automatable
- User and Bundled IDs are automatable
- You can “Favorite” Scala files

The screenshot shows the Scala application interface. At the top, there are controls for "Options" and "Wilsonic". Below that, a dropdown menu is set to "Scala" and another to "Bundled". A table lists various Scala files with columns for ID, Icon, scl, Period, and NPO. A tooltip is visible over the row for ID 277, showing "Selected bundled Scala file ID: 277". Below the table, there are controls for "Period Middle C" (0), "Note Number Middle C" (60), and "Frequency Middle C" (261.625580). At the bottom, a microtonal keyboard is displayed with a circular icon on the left and a piano roll on the right.

| ID  | Icon | scl                             | Period            | NPO |
|-----|------|---------------------------------|-------------------|-----|
| 277 |      | seventeentosixteen.scl          | 2.0               |     |
| 278 |      | diat25.scl                      | 2.0               |     |
| 279 |      | carlos_super.scl                | 2.0               |     |
| 280 |      | parizek_epi2a.scl               | 2.0               |     |
| 281 |      | valentine.scl                   | 2.0               |     |
| 282 |      | ushshaq tetrachord 11-limit.scl | 1.333333373069763 |     |
| 283 |      | kacapi2.scl                     | 2.009263277053833 | 5   |
| 284 |      | liu_minor.scl                   | 2.0               | 7   |
| 285 |      | diat31.scl                      | 2.0               | 8   |
| 286 |      | singapore_coh.scl               | 2.0               | 7   |
| 287 |      | deka6144.scl                    | 2.0               | 20  |

# CoPrime Grid

- Select “[CoPrime Grid](#)” from the Scale Design menu
- Select “Harmonic”, “Triangle”, or “Subharmonic”. Same tones, just different layout
- [Reseed](#) the CoPrime Grid by modifying A, B, C, D.
- Offset by modifying S and T\*
- Expand/Reduce number of terms by modifying X and Y
- Touchscreens: You can play the geometry as a keyboard!
- Best played on a 2-d keyboard such as the Linnstrument
- See Erv’s CoPrime designs on Kraig Grady’s [Anaphoria website](#) for more details on the construction and properties of this remarkable object



If a note is greyed out it means there is no midi note assigned to it. Use “Note Number Middle C” to lower the root note to get the notes in range

\* Wilson allowed for S and T to be zero in the construction of the

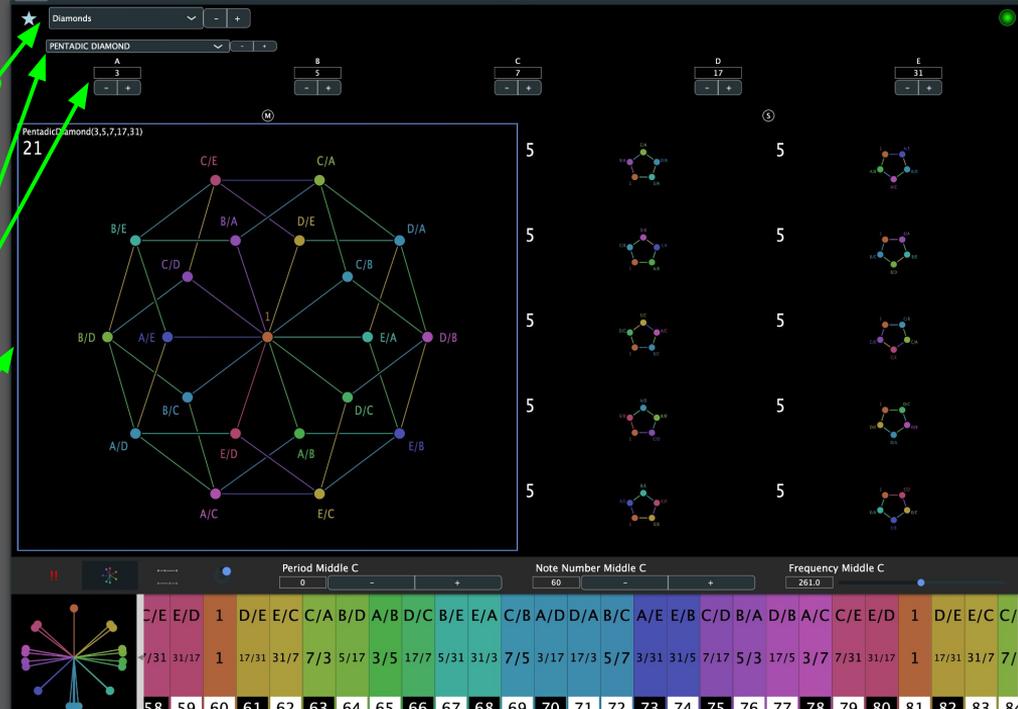
# Diamonds

## “Reciprocal Cross-Sets”

- Select “Diamonds” from the Scale Design menu
- Select a Diamond or one of its harmonic/subharmonic subsets
- Set the seeds of the master set, from (A,B,C) for Triadic, to (A,B,C,D,E,F,G,H) for Ogdoadic
  - Selected scale is outlined in blue
  - Shift-Mouse-Hover selects scale
  - Cursor Left-Right selects scale

See next slide for the definition of “reciprocal cross-set”

[YouTube Demo of Diamonds](#)

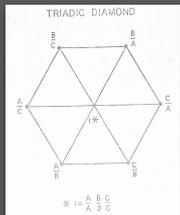


# Diamonds: Reciprocal Cross-Sets

- Rows are the harmonic series of the master set
- Columns are the subharmonic series of the master set
  - Row 0 = Harmonic series divided by A
  - Column 0 = Subharmonic series multiplied by A
  - Diagonal = 1/1

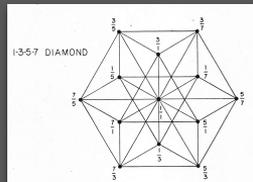
Triadic

|      |      |      |
|------|------|------|
| _one | B/A  | C/A  |
| A/B  | _one | C/B  |
| A/C  | B/C  | _one |



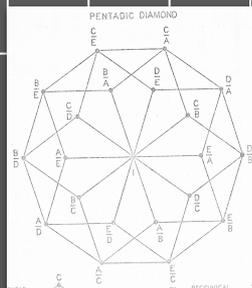
Tetradic

|      |      |      |      |
|------|------|------|------|
| _one | B/A  | C/A  | D/A  |
| A/B  | _one | C/B  | D/B  |
| A/C  | B/C  | _one | D/C  |
| A/D  | B/D  | C/D  | _one |



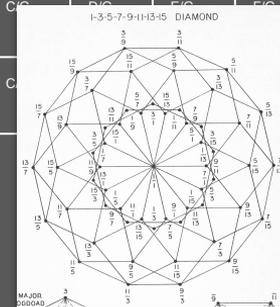
Pentadic

|      |      |      |      |      |
|------|------|------|------|------|
| _one | B/A  | C/A  | D/A  | E/A  |
| A/B  | _one | C/B  | D/B  | E/B  |
| A/C  | B/C  | _one | D/C  | E/C  |
| A/D  | B/D  | C/D  | _one | E/D  |
| A/E  | B/E  | C/E  | D/E  | _one |



Ogdoadic

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| _one | B/A  | C/A  | D/A  | E/A  | F/A  | G/A  | H/A  |
| A/B  | _one | C/B  | D/B  | E/B  | F/B  | G/B  | H/B  |
| A/C  | B/C  | _one | D/C  | E/C  | F/C  | G/C  | H/C  |
| A/D  | B/D  | C/D  | _one | E/D  | F/D  | G/D  | H/D  |
| A/E  | B/E  | C/E  | D/E  | _one | F/E  | G/E  | H/E  |
| A/F  | B/F  | C/F  | D/F  | E/F  | _one | G/F  | H/F  |
| A/G  | B/G  | C/G  | D/G  | E/G  | F/G  | _one | H/G  |
| A/H  | B/H  | C/H  | D/H  | E/H  | F/H  | G/H  | _one |



# Morph

## Morph between 2 Favorites

- Select “Morph” in Design Menu
- Left panel of Favorites are “A”
- Right panel of Favorites are “B”
- Hit “S” to swap A and B
- Top Box is A
- Middle Box is the Morph of A and B
- Bottom Box is B
- Interpolation slider morphs between A and B
- Select between Linear or Pitch interpolation
- ID A, ID B, Interpolation, and Interpolation Type are automatable in the DAW
- You can Favorite a Morph!
  - But you cannot Morph between two Morphs
- Pitch Wheel and Microtonal Keyboard reflect the state of the Morph, and show proportional triads

The screenshot shows the Wilsonic software interface. At the top, there is a menu with "Morph" selected. Below the menu are two panels of favorites, labeled "A" and "B". Panel A contains designs 259, 260, 261, 196, 197, 222, 256, 257, and 258. Panel B contains designs 161, 162, 163, 164, 165, 169, 170, 171, and 172. A central area shows the morphing process, with a slider at 0.626528. Below the slider are three sections: "Period Middle C", "Note Number Middle C", and "Frequency Middle C". At the bottom, a microtonal keyboard is visible, showing proportional triads.

| ID  | Icon | Design                   | NPO | Description                        | Parameters   |
|-----|------|--------------------------|-----|------------------------------------|--|
| 259 |      | Combination Product Sets | 3   |                                    | CPS_3_1(257,1,513)   |
| 260 |      | Combination Product Sets | 3   |                                    | CPS_3_1(257,1,100)   |
| 261 |      | Combination Product Sets | 3   |                                    | CPS_3_1(65,1,128)  |
| 196 |      | CoPrime Grid             | 49  | 7x7 cpg                            | $\frac{2}{1}(\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7})$  |
| 197 |      | CoPrime Grid             | 49  |                                    | $\frac{8}{3}(\frac{2}{1}, \frac{3}{2}, \frac{4}{3}, \frac{5}{4}, \frac{6}{5}, \frac{7}{6})$  |
| 222 |      | CoPrime Grid             | 11  | subharmonic flute mode 11          | $\frac{11}{1}(\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{8}{9}, \frac{9}{10}, \frac{10}{11})$  |
| 256 |      | CoPrime Grid             | 121 | yaaah                              | $\frac{13}{3}(\frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{8}{9}, \frac{9}{10}, \frac{10}{11}, \frac{11}{12}, \frac{12}{13})$  |
| 257 |      | CoPrime Grid             | 11  | Harmonic modes 4,5,6,7 in one row! | $\frac{14}{1}(\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{8}{9}, \frac{9}{10}, \frac{10}{11}, \frac{11}{12}, \frac{12}{13}, \frac{13}{14})$               |
| 258 |      | CoPrime Grid             | 11  | Subharmonic modes                  | $\frac{4}{1}(\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{8}{9}, \frac{9}{10}, \frac{10}{11}, \frac{11}{12}, \frac{12}{13}, \frac{13}{14}, \frac{14}{15})$ |

| ID  | Icon | Design        | NPO | Description | Parameters                   |
|-----|------|---------------|-----|-------------|------------------------------|
| 161 |      | Euler Genus 6 | 3   |             | CPS_3_1(45,135,225)*19*377   |
| 162 |      | Euler Genus 6 | 6   |             | CPS_4_2(45,135,225,17)*3*77  |
| 163 |      | Euler Genus 6 | 4   |             | CPS_4_1(1,135,225,17)*45*377 |
| 164 |      | Euler Genus 6 | 4   |             | CPS_4_1(1,45,225,17)*135*377 |
| 165 |      | Euler Genus 6 | 6   |             | CPS_4_2(1,225,19,377)*45     |
| 169 |      | Euler Genus 6 | 10  |             | CPS_5_3(1,45,135,225,17)     |
| 170 |      | Euler Genus 6 | 6   |             | CPS_4_2(45,135,225,17)*1     |
| 171 |      | Euler Genus 6 | 10  |             | CPS_5_3(1,45,135,225,19)     |
| 172 |      | Euler Genus 6 | 10  |             | CPS_5_3(1,45,135,225,377)*19 |

# Partch

## “Partch 43-tone scale”

- Select “Partch” from Scale Design menu
- Select “43 Tone Scale”
- Knobs: Scale, Rotate, Shear, & Translate X,Y
- Toggles highlight Otonalities, Utonalities
- Same MIDI note mapping as “Diamond Lambdoma: 43 Mapping”: You can mix/match MIDI recordings between these two scales
- 3 labels per hex: “Ratio”, Frequency, MIDI NN
- You can play the scale with the mouse and touch

See next slide for Erv Wilson’s paper of this design

The screenshot displays the Partch software interface. At the top, the 'Options' menu is open, showing 'Partch' selected. Below this, the '43 Tone Scale' is selected. The interface features several knobs for 'Scale', 'Rotate', 'Shear', and 'Translate X,Y'. There are also toggles for 'Otonalities' and 'Utonalities'. The main display area shows a large, colorful, hexagonal grid representing the 43-tone scale. Each hexagon contains three values: a ratio (e.g., 1/1, 1/2, 1/3), a frequency (e.g., 440.00, 220.00, 146.67), and a MIDI note number (e.g., 69, 68, 67). The interface is titled 'Wilson' and includes a 'Wilson registered as MTS-ESP Source' indicator. At the bottom, there are controls for 'NPO Override', 'Period Middle C', 'Note Number Middle C', and 'Frequency Middle C'. The 'Frequency Middle C' is set to 261.333344 Hz.

Wilson registered as MTS-ESP Source

Harry Partch set the 1/1 as G:  
Scale will be tuned to 1.5 \* Frequency Middle C value  
Set Frequency Middle C to 261.333333 for a G at 784Hz



# Partch

## “Diamond Marimba: 43 Mapping”

- This version of Diamond Marimba plays a subset of the Partch 43 scale using the same MIDI mapping. You can mix and match MIDI recording between the two

The total range is nearly three  $2/1$ 's, the identities of one tonality being spread over about a  $2/1$  and a half. The relationship of identities is always 4:5:6:7:9:11 in Otonalities, and 1/4:1/5:1/6:1/7:1/9:1/11 in Utonalities; consequently, the sequence of Odentities or Udentities is 1-5-3-7-9-11, rather than the 1-9-5-11-3-7 of the Tonality Diamond. In specific range, the low  $16/11$  makes about 285 cycles (just above “middle C”), the middle  $1/1$  makes 784 cycles, and the high  $11/8$  makes 2156 cycles.

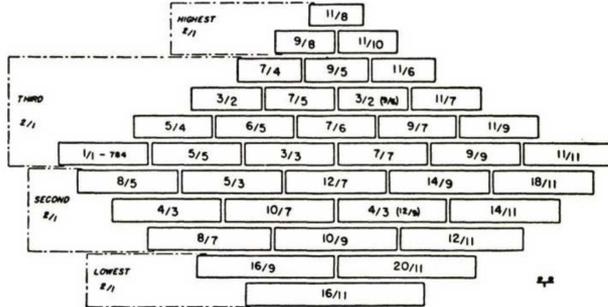


DIAGRAM 17.—BLOCK PLAN OF THE DIAMOND MARIMBA

# Partch

## “Diamond Marimba”

- This version of Diamond Marimba gets over 3 Marimbas mapped to 128 MIDI note numbers.

The total range is nearly three  $2/1$ 's, the identities of one tonality being spread over about a  $2/1$  and a half. The relationship of identities is always 4:5:6:7:9:11 in Otonalities, and 1/4:1/5:1/6:1/7:1/9:1/11 in Utonalities; consequently, the sequence of Oidentities or Uidentities is 1-5-3-7-9-11, rather than the 1-9-5-11-3-7 of the Tonality Diamond. In specific range, the low  $16/11$  makes about 285 cycles (just above “middle C”), the middle  $1/1$  makes 784 cycles, and the high  $11/8$  makes 2156 cycles.

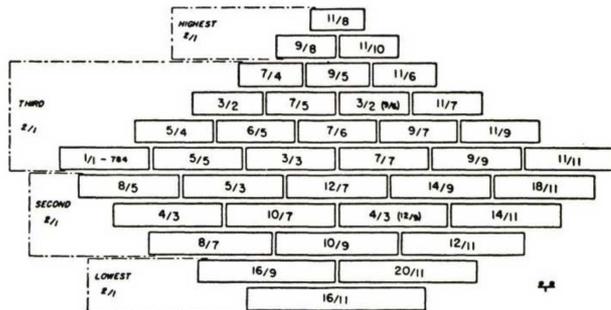


DIAGRAM 17.—BLOCK PLAN OF THE DIAMOND MARIMBA

# Partch

## “Quadrangularis Reversum”

- Two+ Reversums mapped to 128 MIDI note numbers

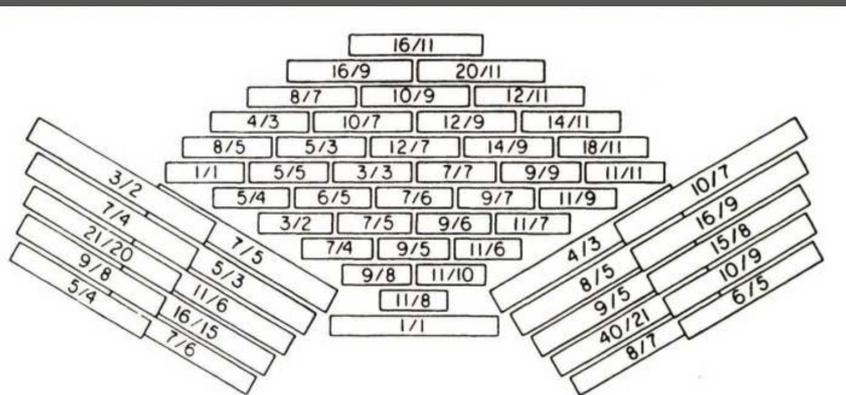


DIAGRAM 19.—BLOCK PLAN OF THE QUADRANGULARIS REVERSUM

Options Wilsonic

Partch

Wilsonic registered as MTS-ESP Source

Quadrangularis Reversum

1 3 5 7 9 11  
/1 /3 /5 /7 /9 /11

Harry Partch set the 1/1 as G:  
Scale will be tuned to 1.5 \* Frequency Middle C value  
Set Frequency Middle C to 261.333333 for a G at 784Hz

NPO Override  
12 - +

Period Middle C  
0 - +

Note Number Middle C  
71 - +

Frequency Middle C  
261.333344

