

Wilsonic

- MTS-ESP + Simple Synth

WilsonicController

- MTS-ESP + MIDI Effect

wilsonic.co

Public Beta [Downloads](#)

- [MacOS 0.43 Beta](#)
- [Windows 10 64-bit 0.43 Beta](#)

Support in [Wilsonic Discord](#)

Updated 2024-07-14



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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*

[Automatable
Parameters](#)

**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:

- STATUS**
- 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" window showing a grid of notes. At the bottom, there are controls for "Period Middle C" (0), "Note Number Middle C" (60), and "Frequency Middle C" (261.625580). A piano roll at the bottom displays notes 49 through 78 with various colored circles and lines.

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 with "Options" and "Wilsonic". Below the title bar, there is a "Moments of Symmetry" dropdown menu and a star icon. The main interface displays several control elements: a frequency value of 1.17951 (F), a copyright notice © 285.823, and three sliders for G (0.236186), P (2.000000), and M (0). A small diagram with colored dots and lines is visible on the left. The central part of the interface shows a grid with various ratios (1, 1/2, 1/3, 1/4, 1/5, 2/9, 3/13, 4/17, 5/21, 6/25) and a piano roll at the bottom with notes numbered 48 to 68. A yellow warning icon is present in the top right corner, and a tooltip is displayed over it. The tooltip contains 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
- 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
 - TRANPOSE = 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 when enabled
- 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

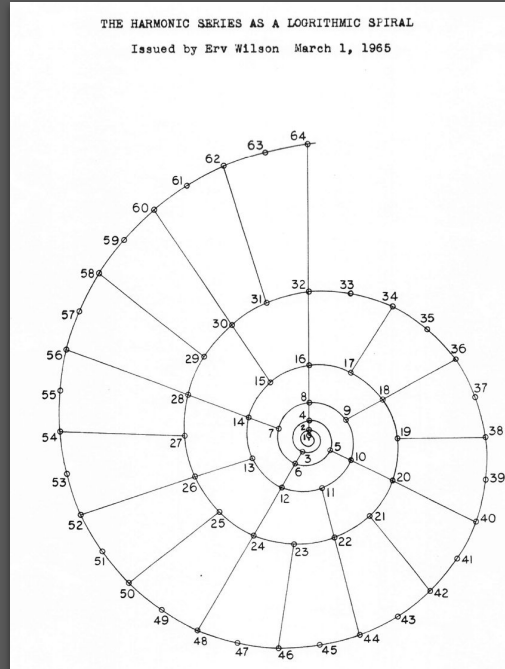
The screenshot displays the Wilsonic software interface. At the top, the title bar reads "Wilsonic" and "Wilsonic registered as MTS-ESP Source". Below the title bar, there are controls for "Moments of Symmetry" (a dropdown menu), a star icon, and navigation arrows. The main interface features several sliders and buttons: "F" 1.17951, "C" 0.238186, "P" 2.000000, and "M" 0. There are also buttons for "Gral" and a "5, 4, 4, 4" label. The central part of the interface shows a large, colorful, curved keyboard layout with various notes and intervals. Below the keyboard, there are two columns of ratios: 1, 1/2, 1/3, 1/4, 1/5, 2/9, 4/13, 4/17, 5/21, 6/25. The "4/17" ratio is highlighted in blue. At the bottom, there is a "Pitch Wheel" section with a "NPO Override" checkbox, and three display fields: "Period Middle C" (12), "Note Number Middle C" (60), and "Frequency Middle C" (261.625580). The pitch wheel itself is a circular diagram with lines radiating from a center point to various notes. To the right of the pitch wheel is a piano roll with a grid of notes and a staff with a treble clef.

Pitch Wheel

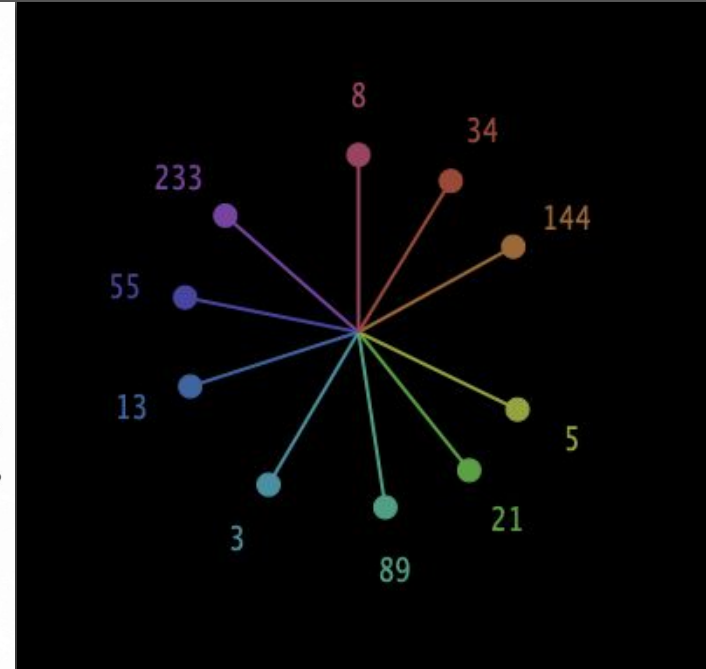
Pitch Wheel

- 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
- Favorites ID is automatable!

The screenshot shows the Wilsonic software interface. At the top, there's a 'WilsonicController' header with a star icon for Favorites and a 'Recalled Favorite ID: 190' indicator. Below this is a table of favorite scales:

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_3_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(1,45,10,377)*225

Below the table are several control panels for saving and editing favorites, including buttons for NPO Override, Period, Note Number, and Frequency. At the bottom, there's a keyboard layout with colored keys and a diagram of a scale.

Favorites work by sending to your DAW the [automatable parameters](#) that define your tuning.

DAW: Automatable Parameters

Wilson|Favorites ID

Wilson|Designs

App Tuning|Enable Notes Per Octave Override

App Tuning|Notes Per Octave Override

App Tuning|Period Middle C

App Tuning|Note Number Middle C

App Tuning|Frequency Middle C

Wilson's Garden|Presets

Brun2|Generator

Brun2|Period

Brun2|Level

Brun2|Level Gral Keyboard

Brun2|Murchana

Brun2|Auto Murchana

17-Persian N. Indian Raga|Scale

CPS|Scale

CPS|A

CPS|B

CPS|C

CPS|D

CPS|E

CPS|F

Euler Genus 6|A

Euler Genus 6|B

Euler Genus 6|C

Euler Genus 6|D

Euler Genus 6|E

Euler Genus 6|F

Euler Genus 6|Preset

Recurrence Relation|Index

Recurrence Relation|Terms

Recurrence Relation|Offset

Recurrence Relation|Hn_1

Recurrence Relation|Hn_2

Recurrence Relation|Hn_3

Recurrence Relation|Hn_4

Recurrence Relation|Hn_5

Recurrence Relation|Hn_6

Recurrence Relation|Hn_7

Recurrence Relation|Hn_8

Recurrence Relation|Hn_9

Recurrence Relation|Cn_1

Recurrence Relation|Cn_2

Recurrence Relation|Cn_3

Recurrence Relation|Cn_4

Recurrence Relation|Cn_5

Recurrence Relation|Cn_6

Recurrence Relation|Cn_7

Recurrence Relation|Cn_8

Recurrence Relation|Cn_9

Equal Temperament|ET

Equal Temperament|Period

Tritriadic|Dominant

Tritriadic|Mediant

Scala|Library

Scala|Bundled Tuning ID

Scala|User Tuning ID

CoPrime|A

CoPrime|B

CoPrime|C

CoPrime|D

CoPrime|S

CoPrime|T

CoPrime|X

CoPrime|Y

CoPrime|Display Mode

Diamonds|Preset

Diamonds|A

Diamonds|B

Diamonds|C

Diamonds|D

Diamonds|E

Diamonds|F

Diamonds|G

Diamonds|H

Morph|Favorite A ID

Morph|Favorite B ID

Morph|Interpolation Type

Morph|Interpolation Value

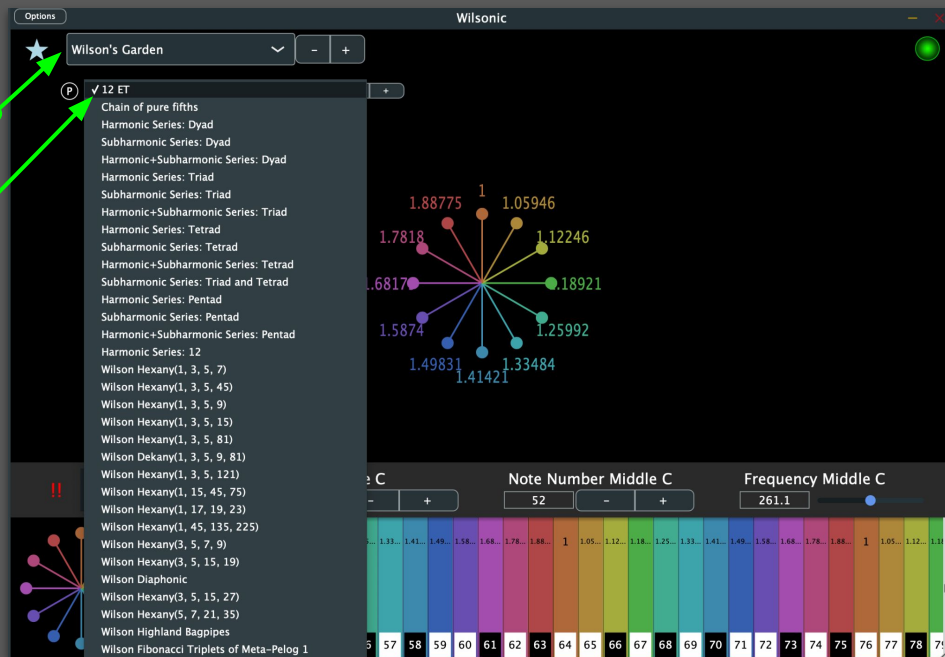
Partch|Scale

“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

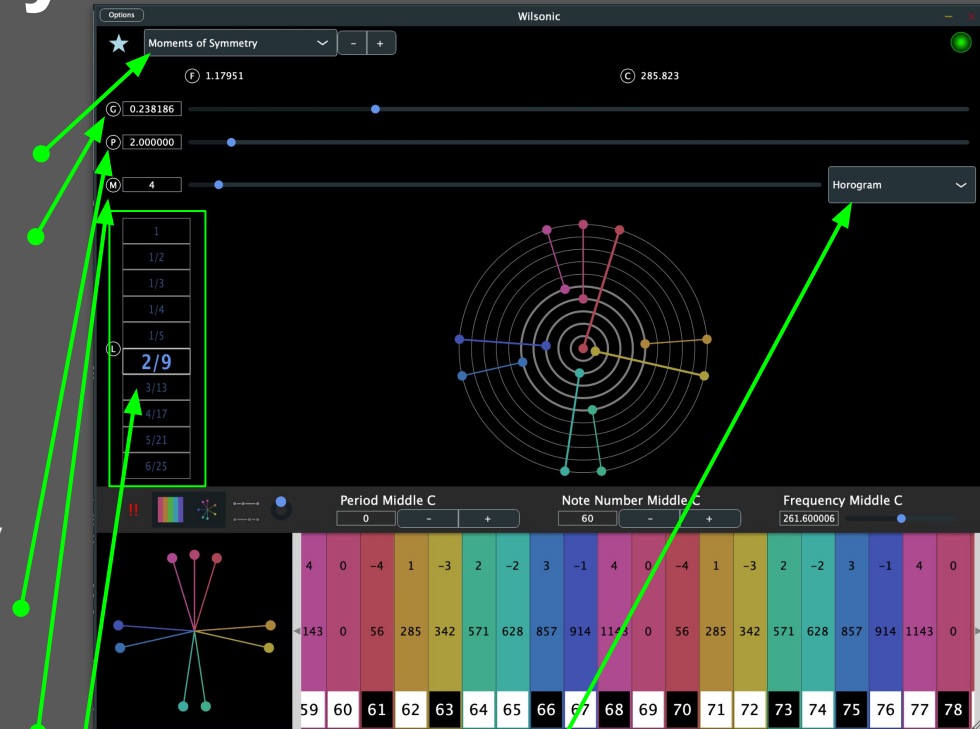


*Be sure to also explore the [Scala Archives](#)

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



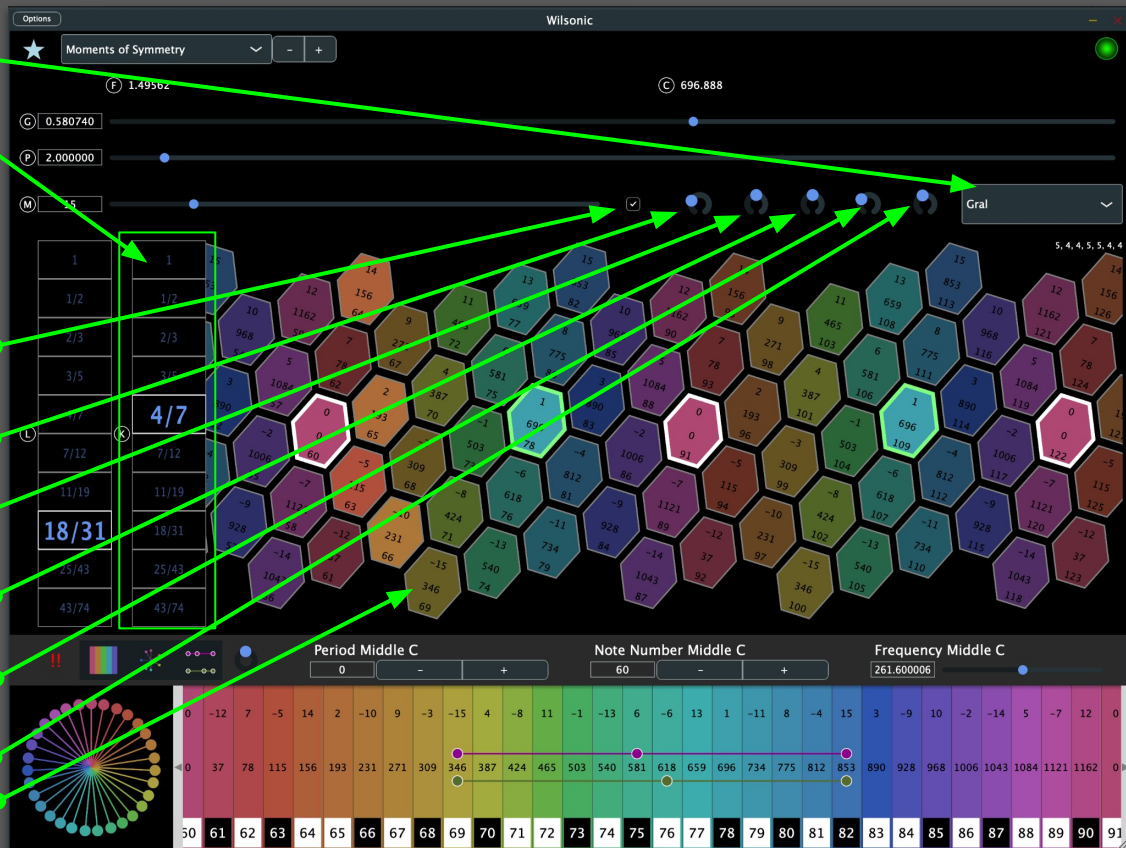
Four drawing modes:

- 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



North Indian Raga Scales

“17-Persian Version w. North Indian Raga Scales”

- Select “Persian 17 North Indian” from scale design menu
- Select the variant from the scale menu

Wilson
17-Persian Version w. North Indian Raga Scales
© 1996 by Eric Wilson

0.	1.	2.3.	4.	5.6.	7.	8.9.	10.	11.	12.	13.	14.	15.16.	17.	
135/128	10/9	135/128	16/15	135/128	9/8	135/128	10/9	135/128	16/15	135/128	9/8	135/128	10/9	Kalyan
9/8	10/9	9/8	16/15	9/8	10/9	9/8	10/9	9/8	16/15	9/8	10/9	9/8	16/15	Bilawal
9/8	10/9	9/8	16/15	9/8	10/9	9/8	10/9	9/8	16/15	9/8	10/9	9/8	16/15	Khamaj
10/9	16/15	9/8	9/8	10/9	9/8	10/9	9/8	10/9	16/15	9/8	9/8	10/9	9/8	Mazri
9/8	135/128	9/8	9/8	9/8	9/8	135/128	9/8	9/8	135/128	9/8	9/8	135/128	9/8	Kafi
9/8	135/128	9/8	9/8	9/8	9/8	135/128	9/8	9/8	135/128	9/8	9/8	135/128	9/8	Asawari
135/128	9/8	9/8	9/8	9/8	9/8	135/128	9/8	9/8	135/128	9/8	9/8	135/128	9/8	Bhairavi
135/128	32/27	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Marua
135/128	32/27	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Purvi
135/128	32/27	16/15	135/128	32/27	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Lalit 2
135/128	9/8	32/27	16/15	135/128	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Todi
135/128	32/27	16/15	135/128	32/27	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Lalit
135/128	9/8	32/27	16/15	135/128	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Nalme
135/128	32/27	16/15	135/128	32/27	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	And
135/128	32/27	16/15	135/128	32/27	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Bhairavi
135/128	32/27	16/15	135/128	32/27	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Teet
9/8	135/128	32/27	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Mahubanti
9/8	10/9	16/15	9/8	135/128	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Mel
135/128	32/27	16/15	9/8	10/9	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Bhairav
9/8	135/128	4096/3645	9/8	135/128	32/27	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Ahir
9/8	135/128	4096/3645	9/8	135/128	32/27	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Gharav
135/128	32/27	16/15	135/128	32/27	9/8	16/15	10/9	9/8	16/15	10/9	9/8	16/15	10/9	Chand-a
9/8	9/8	10/9	16/15	9/8	135/128	4096/3645	9/8	135/128	4096/3645	9/8	135/128	4096/3645	9/8	Kanada
9/8	9/8	10/9	16/15	9/8	135/128	4096/3645	9/8	135/128	4096/3645	9/8	135/128	4096/3645	9/8	Savari
9/8	9/8	10/9	16/15	9/8	135/128	4096/3645	9/8	135/128	4096/3645	9/8	135/128	4096/3645	9/8	Mukhari
9/8	9/8	10/9	16/15	9/8	135/128	4096/3645	9/8	135/128	4096/3645	9/8	135/128	4096/3645	9/8	Chempakali
9/8	135/128	4096/3645	9/8	9/8	9/8	10/9	9/8	9/8	10/9	9/8	10/9	9/8	10/9	Ratideep
9/8	10/9	16/15	9/8	135/128	4096/3645	9/8	135/128	4096/3645	9/8	135/128	4096/3645	9/8	135/128	Mohan
135/128	4096/3645	9/8	10/9	9/8	10/9	9/8	10/9	9/8	10/9	9/8	10/9	9/8	10/9	Kauns
135/128	4096/3645	9/8	10/9	9/8	10/9	9/8	10/9	9/8	10/9	9/8	10/9	9/8	10/9	Parameswari

Ref: Applied Theory of Indian Music (North), Amige Dasgupta 1977, California Institute of the Arts

The screenshot shows the Wilson software interface. The 'Options' menu is open, showing 'Persian 17 North Indian' selected in the scale design menu and 'Ahir Bhairav' selected in the scale menu. The main display area shows a visualization of the scale's intervals and frequencies. The intervals are represented by colored boxes: 135/128 (orange), 32/27 (green), 16/15 (cyan), 9/8 (blue), 10/9 (purple), 16/15 (pink), and 9/8 (red). The frequencies are represented by a bar chart with 17 bars, each labeled with a number from 1 to 17. The bar chart shows the relative frequencies of the notes in the scale, with the middle C note (52) as a reference point.

Combination Product Sets

Combination Product Sets

- Select “Combination Product Sets” from the scale design menu
- Select the CPS from the scale menu
 - “4_1” = “4 choose 1” = Harmonic Tetrany
 - “4_2” = “4 choose 2” = Hexany
 - “4_3” = “4 choose 3” = Subharmonic Tetrany
 - “6_3” = “6 choose 3” = Eikosany
- Set the seeds (A, B, C, D) of the master set

More CPS resources [here](#)

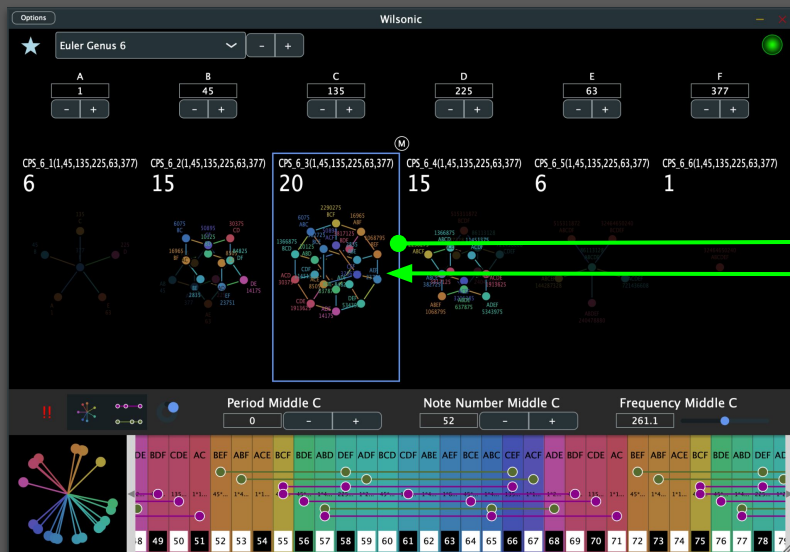
The screenshot shows the Wilsonic software interface for Combination Product Sets. The title bar reads "Wilsonic". The main window has a dark background with a menu bar at the top containing "Options" and "Combination Product Sets" (with a dropdown arrow and minus/plus buttons). Below the menu bar, a dropdown menu shows "4_2" with minus and plus buttons. There are four seed selection boxes labeled A, B, C, and D, each containing a number and minus/plus buttons: A=1, B=3, C=5, D=7. Below these is the text "CPS_4_2(1,3,5,7)" and a large number "6". The central area features two diagrams: a star-shaped graph on the left with nodes labeled AD, BC, AC, BD, AB and edges labeled with products like 1*7, 3*5, 5*7, 1*3, 21, 3*7, 1*5; and a circular graph on the right with nodes labeled AD, BC, AC, BD, AB and edges labeled with products like 3, 15, 21, 35, 5, 7. At the bottom, there are three tabs: "Period Middle C" (value 0), "Note Number Middle C" (value 52), and "Frequency Middle C" (value 261.1). Below the tabs is a piano roll with 78 keys, each with a colored background and a circle representing a note.

Euler Genus 6

Euler Genus 6

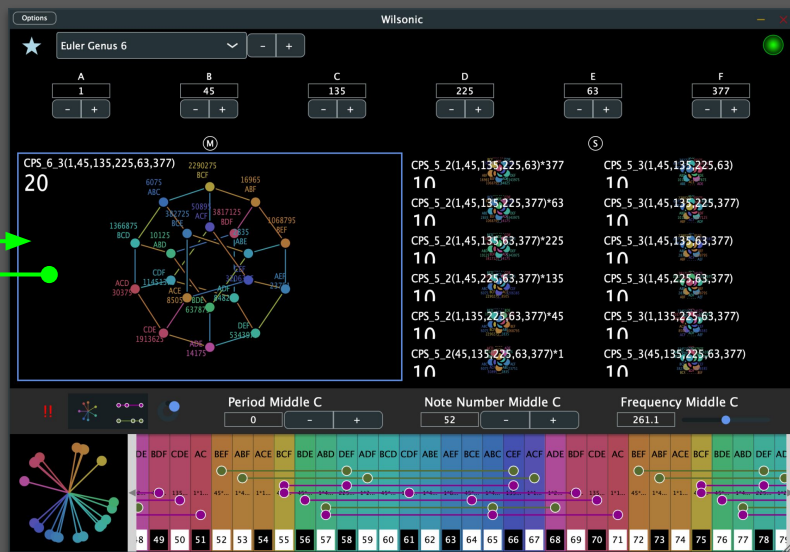
Euler Genus 6 page

- 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

Wilsonic

Recurrence Relation

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

Terms: 7

Offset: 0

H[n-1]: 384

H[n-3]: 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

! 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

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 setting up an Equal Temperament scale. The window title is "Wilsonic". At the top left, there is a star icon and a dropdown menu currently set to "Equal Temperament". To the right of this menu are minus and plus buttons. Below the menu, there are two sliders: "N" (Notes per octave) set to 13, and "P" (Period) set to 3.000000. A circular diagram with 13 colored dots and numbers 0 through 12 is visible, representing the scale's structure. 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 with 13 notes, each with a number above it (1-12, 0, 1-12) and a number below it (18-79).

Tritriadic

“Tritriadic” by John Chalmers

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

Tritriads 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 central diagram shows a scale layout with notes labeled 0, D+M, 2*D, M, M-D, D, and 1-D. The notes are represented by colored dots and connected by lines. 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 active, showing a scale from 48 to 78. The notes are color-coded to match the diagram above.

See [Xenharmonikon](#) for more details

Scala File Support

- Hover over status label for status history

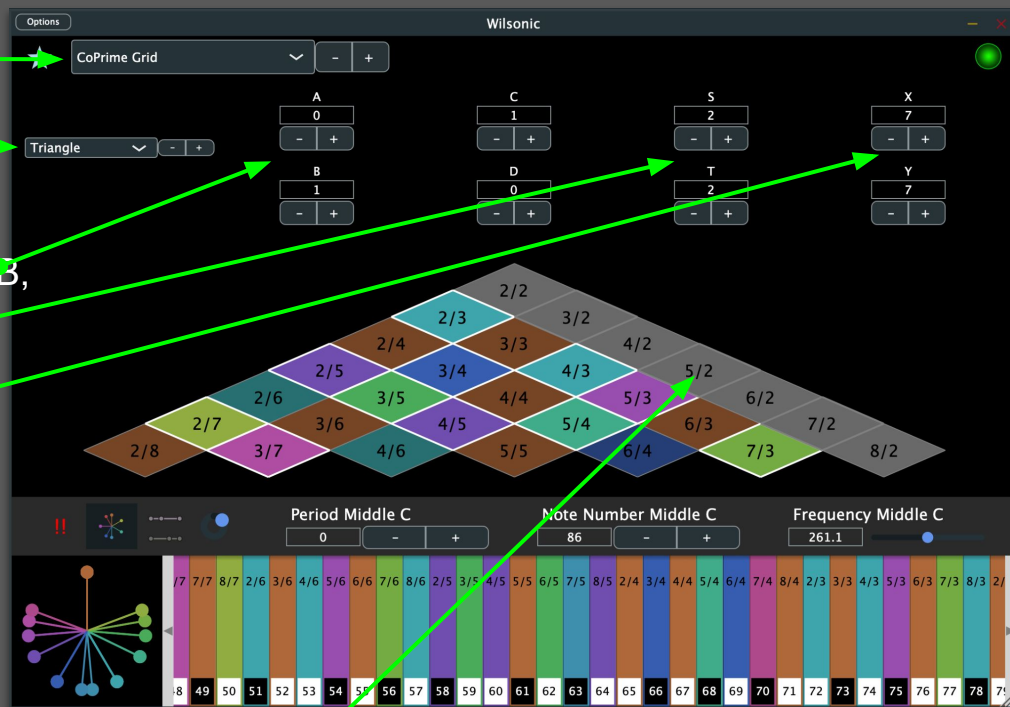
- Select “Scala” from the Scale Design menu
- Select “Bundled” or “User”
- Highlight the row and hit RETURN to tune up the Microtonal Keyboard
- Supports non-Octave tunings
- Mouse-Hover over the row to see the contents of the Scala file
- Only when “User” is selected can you import/delete .scl files:
 - 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 the scale design, including a dropdown menu set to "Scala" and another set to "Bundled". A status bar at the top right indicates "Wilson registered as MTS-ESP Source" and "Selected bundled Scala file ID: 277". Below this is a table of Scala files with columns for ID, Icon, scl, Period, and NPO. The table lists various files such as "seventeentosixteen.scl", "diat25.scl", "carlos_super.scl", "parizek_epi2a.scl", "valentine.scl", "ushshaq tetrachord 11-limit.scl", "kacapi2.scl", "liu_minor.scl", "diat31.scl", "singapore_coh.scl", and "deka6144.scl". A tooltip is visible over the row for "ushshaq tetrachord 11-limit.scl", showing a list of "Selected bundled Scala file ID" numbers. At the bottom, there are controls for the microtonal keyboard, including "Period Middle C" (0), "Note Number Middle C" (60), and "Frequency Middle C" (261.625580). The keyboard itself is a piano-roll style interface with a circular icon on the left and a grid of notes 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	! kacapi2.scl
284		liu_minor.scl	2.0	7	! LIU_MINOR.scl
285		diat31.scl	2.0	8	! diat31.scl
286		singapore_coh.scl	2.0	7	! singapore_coh.scl
287		deka6144.scl	2.0	20	! deka6144.scl

CoPrime Grid

- Select “[CoPrime Grid](#)” from the Scale Design menu
- Select “Harmonic”, “Triangle”, or “Subharmonic”. Same tones, just different layouts
- [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*

Wilsonic

Options

Diamonds

PENTADIC DIAMOND

A 3 B 5 C 7 D 17 E 31

PentadicDiamond(3,5,7,17,31)

21

5 5 5 5 5

Period Middle C 0 Note Number Middle C 60 Frequency Middle C 261.0

C/E	E/D	1	D/E	E/C	C/A	B/D	A/B	D/C	B/E	E/A	C/B	A/D	D/A	B/C	A/E	E/B	C/D	B/A	D/B	A/C	C/E	E/D	1	D/E	E/C	C/
31/17	17/31	1	17/31	31/7	7/3	5/17	3/5	17/7	5/31	31/3	7/5	3/17	17/3	5/7	3/31	31/5	7/17	5/3	17/5	3/7	7/31	31/17	1	17/31	31/7	7/31
58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84

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

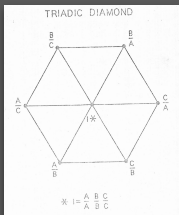
[YouTube Demo of Diamonds](#)

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

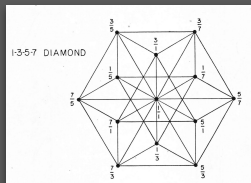
Triadic

_one	B/A	C/A
A/B	_one	C/B
A/C	B/C	_one



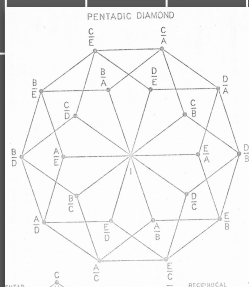
Tetradic

_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



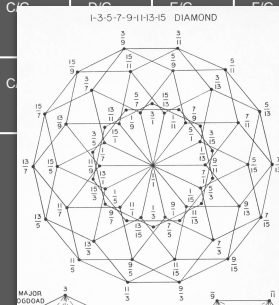
Pentadic

_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's a menu bar with 'Options' and 'Wilsonic'. Below that, a 'Morph' dropdown menu is open. The main area is split into two panels of favorite designs, labeled 'A' and 'B'. Panel A (left) contains designs 259, 260, 261, 196, 197, 222, 256, 257, and 258. Panel B (right) contains designs 161, 162, 163, 164, 165, 169, 170, 171, and 172. A central morphing area shows a slider at 0.626528 and a dropdown for 'Linear' interpolation. At the bottom, there's a pitch wheel and a microtonal keyboard with 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(257,1,120)
261		Combination Product Sets	3		CPS_3_1(65,1,120)
196		CoPrime Grid	49	7x7 cpg	$\frac{7}{12}(3.500000), \frac{8}{12}(2.4)$
197		CoPrime Grid	49		$\frac{8}{12}(2.666667), \frac{7}{12}(3.333333)$
222		CoPrime Grid	11	Subharmonic flute mode 11	$\frac{11}{12}(0.916667), \frac{11}{11}(1)$
256		CoPrime Grid	121	yaaah	$\frac{13}{3}(4.333333)$
257		CoPrime Grid	11	Harmonic modes 4,5,6,7 in one row!	$\frac{14}{11}(3.500000)$
258		CoPrime Grid	11	Subharmonic modes	$\frac{7}{4}(1.750000), \frac{5}{4}(1.250000)$

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)*377
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

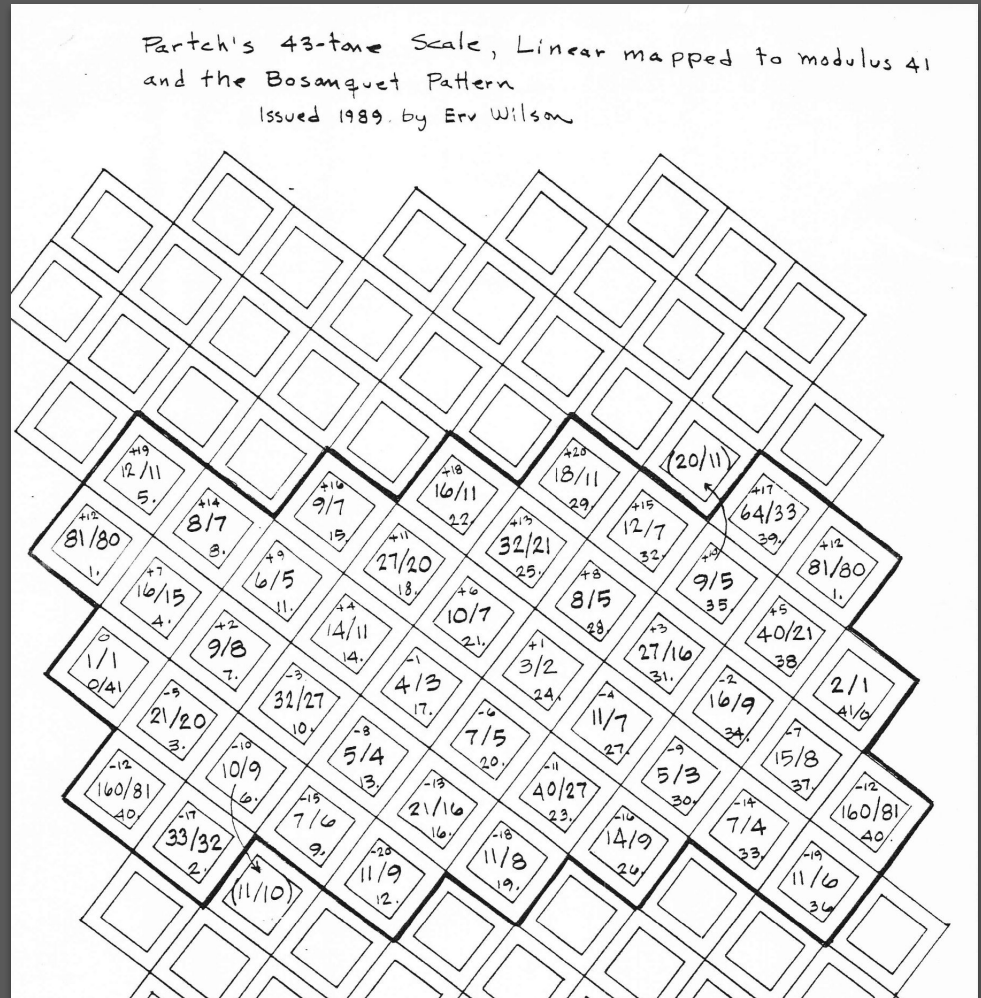
See next slide for [Erv Wilson's paper of this design](#)

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, a frequency, and a MIDI note number. The bottom of the interface shows a control panel with 'NPO Override' (set to 12), 'Period Middle C' (set to 0), 'Note Number Middle C' (set to 60), and 'Frequency Middle C' (set to 261.333344). The text at the bottom right indicates: '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

“Partch 43”

- The previous slide shows this figure by Erv Wilson, mapped to a Gral (hexagonal) keyboard by Stephen James Taylor



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 recordings 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.

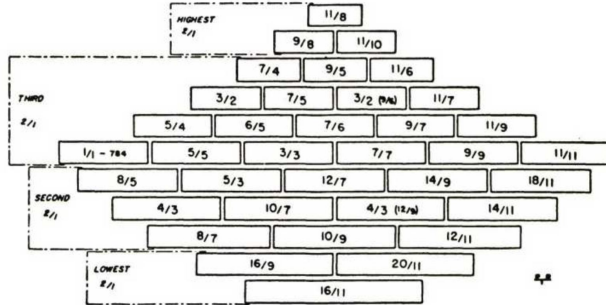


DIAGRAM 17.—BLOCK PLAN OF THE DIAMOND MARIMBA

Wilsonic registered as MTS-ESP Source

Diamond Marimba: 43 mapping

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

Scale will be tuned to 1.5 * Frequency Middle C value
 Set Frequency Middle C to 261.33333 for a G at 784Hz

NPO Override 12 - +
 Period Middle C 0 - +
 Note Number Middle C 60 - +
 Frequency Middle C 261.33344

Partch

“Diamond Marimba”

- This version of Diamond Marimba gets about 3 1/2 Marimbas mapped to its own unique 128 MIDI note number mapping.

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.

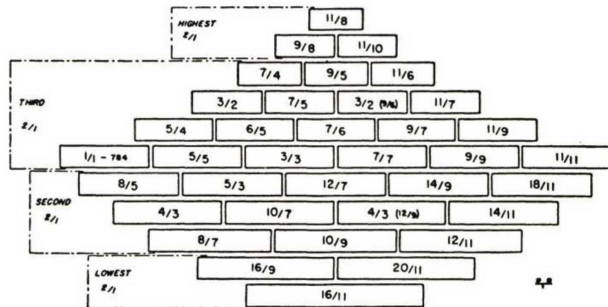


DIAGRAM 17.—BLOCK PLAN OF THE DIAMOND MARIMBA

Partch

“Quadrangularis Reversum”

- 2 Reversums mapped to its own 128 MIDI note number mapping (with a couple notes left over)

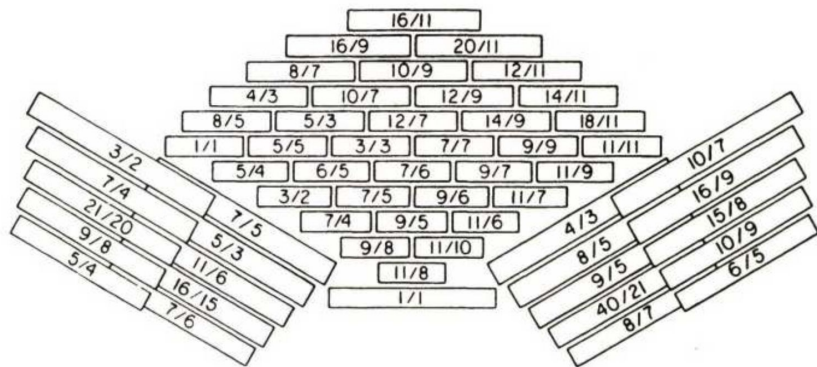


DIAGRAM 19.—BLOCK PLAN OF THE QUADRANGULARIS REVERSUM

Wilsonic registered as MTS-ESP Source

Options

Partch

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

