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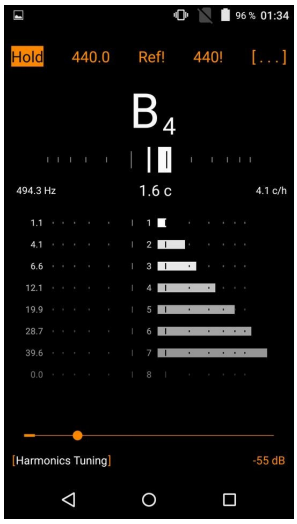
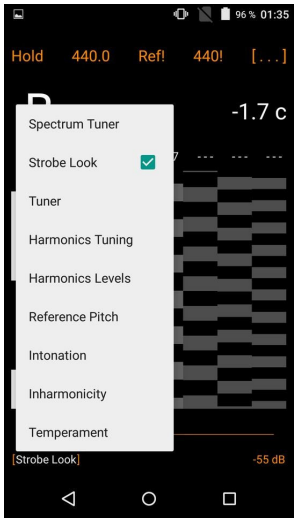
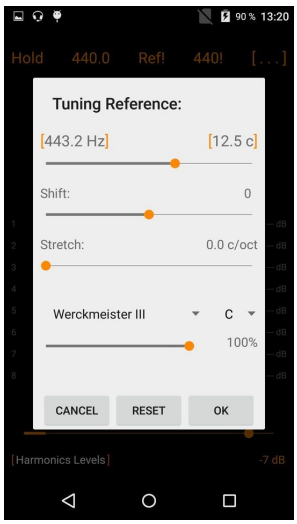
Date: 21/04/2018

Harmonic Tuner	Harmonic Tuner Free	Harmonic Tuner Strobe Look	Spectrum Tuner	Harmonic Tuner Guitar Setup	Harmonic Tuner Suite (Full)	Harmonic Tuner Intonation Expert	Harmonic Tuner Sustain Analyzer
Harmonic Tuner +/- 0.1 Cent, displaying frequency & inharmonicity	✔	✔	✔	✔	✔	✔	✔
Reference pitch (Concert A) range: 320...604 Hz (precision 0.1Hz)	✔	✔	✔	✔	✔	✔	✔
Quickly set Reference Pitch from current tuning note	✔	✔	✔	✔	✔	✔	✔
Chromatic Reference Tone Generator (4 Waveforms, 7 Octaves)	✔	✔	✔	✔	✔	✔	✔
Harmonic-wise tuning and frequency bargraphs (up to 16 harmonics)	Trial	Trial	Trial	Trial	✔	✔	Trial
Harmonic-wise level bargraphs (up to 16 harmonics)	Trial	Trial	Trial	Trial	✔	✔	✔
Strobe look tuner (up to 16 individual harmonics)	Trial	✔	Trial	Trial	✔	✔	Trial
Reference pitch (Concert A) detection from polyphonic music	Trial	Trial	✔	Trial	✔	✔	–
Musical key detector (Major/Minor scales)	Trial	Trial	✔	Trial	✔	✔	–
Spectrum tuner (polyphonic)	Trial	Trial	✔	–	✔	✔	–
Temperament detector (from polyphonic music)	Trial	Trial	Trial	Trial	Trial	✔	–
Intonation (tuning) protocol & Overlay comparison & storage	Trial	Trial	Trial	Trial	Trial	✔	–
Inharmonicity protocol & Overlay comparison & storage	Trial	Trial	Trial	Trial	Trial	✔	–
Guitar & Bass intonation adjustment & error calculation (Nut/Bridge)	Trial	Trial	Trial	✔	Trial	✔	–
Stretch tunings (0...5 Cent per octave)	–	–	–	–	–	✔	–
Historical and custom Tuning temperaments, transpose, scale & store	–	–	–	–	–	✔	–
Temperament Editor for manipulation, comparison & analysis	–	–	–	–	–	✔	–
Sustain measurement (Amplitude chart, Sustain bargraphs)	Trial	Trial	Trial	Trial	Trial	Trial	✔
Sustain protocol & Overlay comparison & storage	–	–	–	–	–	–	✔

General Usage







Swipe through pages to access the different tuning and measurement modules or click Page button for direct access (restricted features are marked with (*)). For individual details see HELP on each view.

Controls:

Hold: Pause measurement and keep current values displayed (Then swipe through the different views for detailed inspection).

440.0: Current reference pitch (Concert A, Hz), stretch tuning*, Temperament* - details below,

Ref!: Use current detuning measurement as new reference pitch.

440!: Set reference pitch back to standard 440 Hz.

Menu: Access configuration settings, reference tone generator etc.

Level Bar / Slider: Adjust lowest signal level activating pitch and harmonics detection.

[Page name]: Direct access to different modules

-50dB: Set Temperament (* Intonation Expert version only)

Tuning Reference Settings (440.0 button):
Finetuning (-50 - +50 cent): if not 440Hz, button colors are inverted,
Shift (-5 - +5 semitones): if not 0, button is marked with 5b to 5#,
*Stretch (0 - 5 cent/octave): if not 0, button is marked with
*Temperament (Equal, Werckmeister etc.): if not Equal, button is marked with T,
threshold level display/temperament button colors are inverted,
*Temperament root note (C-B),
*Temperament scaling (default 100%): blend between selected temperament (100%) and equal temperament (0%),
Reset: set dialog controls to default values
(* only available in Intonation Expert version)

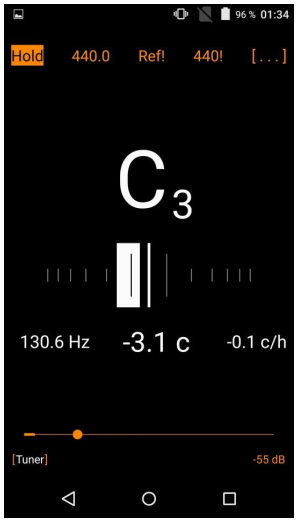
Reference Tone:
Display: Current note, octave, fundamental frequency (according to current Tuner settings)
Selector Buttons: Choose note, octave and waveform of test tone (Tone 1 = Sine wave, Tone 2 etc.: different harmonic overtone mixtures)
Control Buttons:
Off: Stop reference tone and leave dialog
A4: Set to reference A
OK: Leave dialog with reference tone enabled.

How to get the best tuning accuracy:

- Reduce background noise
- Bring the device's microphone close to your instrument / loudspeaker
- Turn off audio effects to get a clean signal
- Turn up your amplifier
- But prevent overdriving the microphone input (see level bar)
- Increase Tuning Smoothness setting

Some Android systems perform pre-processing of the microphone input signal like noise-gate or noise reduction. This might affect tuning accuracy, especially at low levels.

Harmonic Tuner



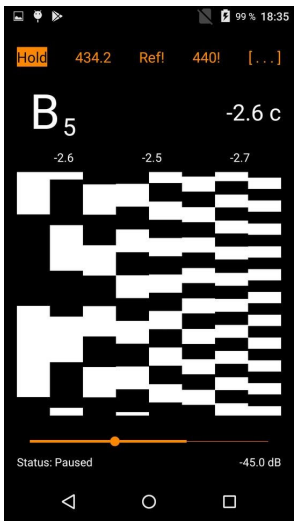
Basic Tuner.

Displays:
Current note,
Overall detuning (Cents) and In-Tune Indication,
Fundamental Frequency (Hz),
Inharmonicity estimate (Cents per harmonic)

Related Settings:
Sensitivity,
Tuning Smoothness,
In-Tune Indication Tolerance (Cents),

Details:
If detuning is lower than the In-Tune Tolerance, the center of the bar is highlighted. The tolerance limit is highlighted by special grid markers. The individual tuning of each detected partial is used to get the overall tuning measurement. With high Sensitivity and low In-Tune-Tolerance settings, even slight detunings are clearly visible. The grid markers are placed between -25...25 cent with a distance of 5 cent. The region around 0 cent is stretched for readability according to Sensitivity setting.

Strobe Look



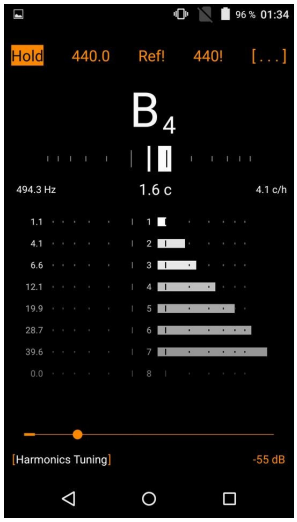
Shows the true individual harmonic's detuning in an intuitive strobe tuner look.

Displays:
Current note,
Overall detuning (Cents),
Individual harmonic detuning (Cents)

Related Settings:
Number of harmonics,
Speed,
Tuning smoothness,
Level / Brightness coupling

Details:
While offering a tuning precision of 0.1 cent and optimal readability like conventional strobe tuners, the Harmonic Tuner Strobe Look shows the detuning of each harmonic (partial, overtone) of a note. Especially the overtones of a plucked or hammered string are detuned compared the ideal harmonic overtone series depending mainly on string condition.
While mechanical strobe tuners only show the detuning of the octave harmonics (1,2,4,8, ...), Harmonic Tuner shows all (1,2,3,4,5,6 ...)

Harmonics Tuning



Shows the individual detuning (Cents) of each detected harmonic (partial).

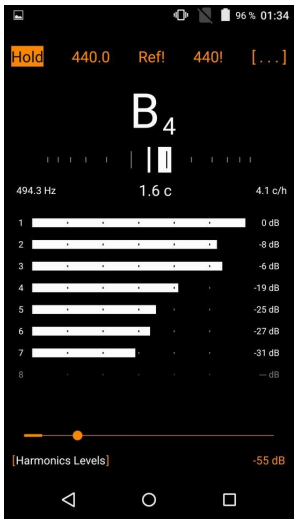
Displays:
Detected Note,
Overall Tuning,
Detuning of each Harmonic

Related Settings:
Number of harmonics,
Tuning Smoothness,
Absolute/Relative Harmonic Detuning,
In-Tune Indication Tolerance (Cents),
Sensitivity
Level / Brightness coupling

Details:
The bargraphs show the detuning of each harmonic (overtone) of a note. Especially the overtones of a plucked or hammered string are detuned compared the ideal harmonic overtone series depending mainly on string condition (corrosion, damage, wear).
You can choose betweeg displaying absolute detuning or relative detuning (showing only the deviation of each harmonic from the detected note pitch).
The individual tuning of each detected harmonic is used to get the overall detuning value in Harmonic Tuner.

If detuning is lower than the In-Tune Tolerance, the center of the bars is highlighted. The tolerance range is highlighted by long grid markers.
Adjust the Sensitivity and In-Tune-Tolerance settings to the display precision you need.
The grid markers are placed between -25...25 cent with a distance of 5 cent. The region around 0 cent is stretched for readability according to Sensitivity setting.

Harmonics Levels



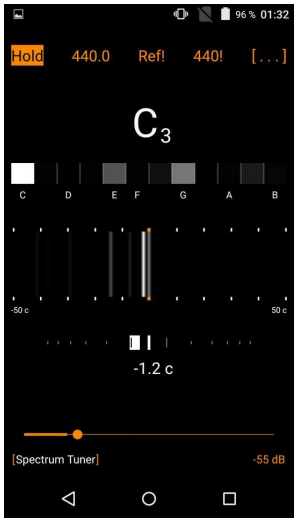
Shows the individual levels (Decibel scale) of each detected harmonic (partial) related to the strongest harmonic.

Displays:
Detected Note,
Overall Tuning,
Harmonics dB level bars

Related Settings:
Number of harmonics,
Tuning Smoothness

Details:
The levels of harmonics define the timbre of a note and vary with playing style, pickups, EQ settings, Sustain behaviour, overdrive effects, tube amp circuits etc.
dB-Scale: The strongest detected harmonic is always shown with a level of 0 dB (100% Amplitude). A harmonic of -6 dB only has 50% of the amplitude of the strongest harmonic, a harmonic of -12 dB has 25% a.s.o.
The level measurement depends on the device's microphone, placement, noise reduction etc., so there can be deviations from measurements done with professional equipment.

Spectrum Tuner



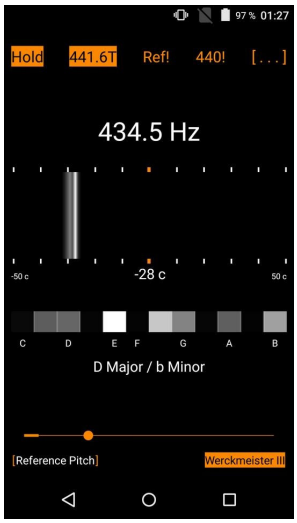
Shows the current note(s) in a real-time Tuning Spectrum (-50...50 Cents)

Displays:
Current note,
Note Spectrum,
Tuning Spectrum,
Precise detuning of the Tuning Spectrum's main line (Cents)

Related Settings:
Temporal smoothing of the Tuning Spectrum

Details:
Like the different colour components of light are analyzed by an optical prism, the novel feature Spectrum Tuner breaks up the components of the audio signal into detuning and note spectra.
Prominent lines in the tuning spectra indicate the dominant audio signal components in the detune range of -50 to 50 Cents and note range of C to B (related to the chromatic scale of current reference pitch).
Polyphonic signals like chords give multiple peaks in the Note Spectrum but one main line in the Tuning Spectrum, if tuned precisely and consist of significant fundamental and octaves of fundamental partials.
Notes with strong overtones can lead to a widened line in Tuning spectrum (as especially the perfect intervals of non-octave overtones are detuned related to the equal temperament standard chromatic scale).
Notes with strong non-octave overtones will lead to according peaks in Note Spectrum (For instance the 3rd harmonic (partial) of the note C appears as G in the harmonic series and in Note Spectrum)

Reference Pitch Detector



Detects the reference pitch (Concert A) frequency of a performance or recording and suggests a best-fitting musical key.

Displays:
Reference pitch frequency,
Long-Time Tuning Spectrum,
Long-Time Note Spectrum,
Detected Key (Major/minor scale) and signature

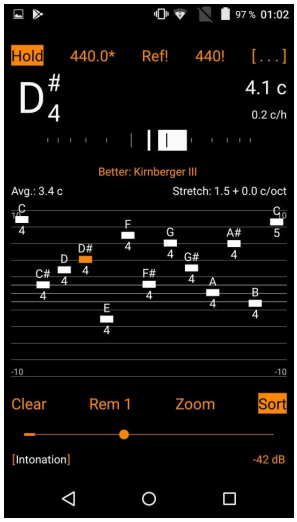
Related Settings:
Pitch Detection Analysis (Averaging) Time

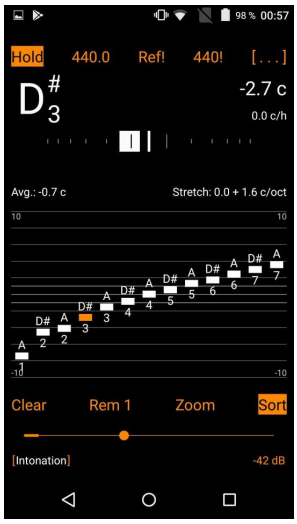
Details:
For Reference Pitch Detection, the Tuning Spectrum is analyzed for the time of a few seconds to detect the most dominant tonal components of a musical performance and their detuning (See Spectrum Tuner). The related tuning reference frequency is displayed and can be easily set as new reference of Harmonic Tuner (click Ref! button).
The Note Spectrum gives an indication of the dominant notes in the audio signal. A key estimation finds a best-matching Major/minor scale containing the most dominant notes. The estimation shows both key name and signature.

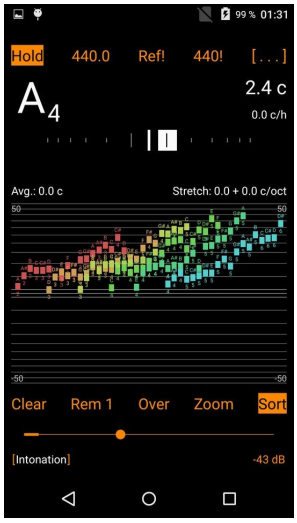
Intonation Protocol

Shows series of notes and their tuning in one protocol diagram.
Used to inspect and set up the intonation, tuning stretch and temperament of an instrument.
Protocols can be stored, displayed and compared as Overlay diagrams. Transmission of protocol data to Temperament Editor is possible to derive custom temperaments from a protocol measurement. Measurement protocol data can be exported as text list via clipboard.
Values and functionality of Intonation and Inharmonicity Protocols are coupled.

Displays:
Chart with 10/5/2 c grid and In-Tune markers,
Current Note,
Tuning (cent),
Average detuning (all notes),
Stretch Tuning (cent per octave),
Detected Temperament (Suggestion),







Inharmonicity of current note (cent per harmonic, estimated)

Controls:
Detected Temperament (Suggestion): Switch to suggested temperament,
Clear: Empty protocol,
Rem 1: Remove last measured note,
Over: Open Overlay menu (details below),
Zoom: Select displayed cent range and stretched diagram,
Sort: (De-)activate sorting by pitch,
Protocol Chart: Popup menu via long touch, see below
Avg.: Sets Tuner reference frequency to average detuning
Stretch: Sets Tuner Stretch setting to detected Stretch value

Overlay Menu / Functions:
Add: Adds current protocol values to Overlay display,
Remove ...: Removes a protocol from Overlay,
Leave Only ...: Remove all but selected protocols from Overlay,
Clear: Remove all Overlay values from display,
Inharmonicity: Display current inharmonicity value in chart,
Save Set ...: Stores current groups of Overlay values to a named set,
Load Set ...: Loads and displays a stored Overlay set of value groups,
Append Set ...: Add a stored set of values to current Overlay,
Delete Set ...: Deletes a stored set of Overlay groups

Protocol Chart Popup Menu (Long-touch desired note):
Info on selected note (closest to touch position),
Delete Note: Removes note,
Show Intonation Table: Shows detailed list of all values (for copy & paste)
Use in Temperament Editor: Open Temperament Editor using these protocol notes (at least 7 different notes necessary)

Related Settings:
Intonation Protocol: Plot Lines,
Tuning Reference Frequency,
Temperament,
Stretch Setting (cent per octave),
In-Tune Indication Tolerance,
Tuning Level Threshold

Details:
Harmonic Tuner Intonation Expert lets you measure and display detuning variation over multiple notes. It helps you to find intonation problems or stretch tuning on your instrument, which is especially useful when setting up intonation of guitars and basses. An addition, the temperament detection tries to find the best-fitting temperament from a set of popular historic tuning temperaments.

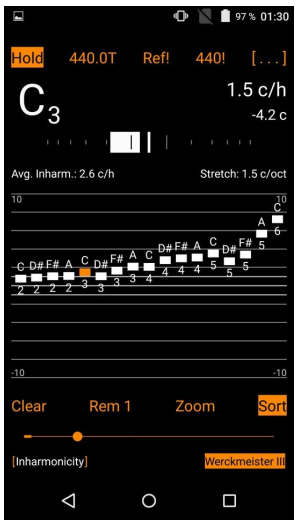
Stable notes exceeding a minimum duration are written into the Intonation Protocol.
If Sort button is highlighted, the detuning values are sorted by their pitches - each note only appears once in the protocol; if a note is repeatedly played, it will override on older value at the same note.
If Sorting is inactive, even note repetitions can pe protocolled.
The average detuning of all displayed notes is displayed. By clicking the Ref! button, you can set a new tuning reference using the average value.
Trends of detuning vs. pitch are estimated and displayed as Stretch tuning value (cent per octave).
You can adjust the tuner do a stretch value manually by clicking the 440.0 Tuning Reference button. If a tuning reference / stretch is adjusted, the displayed protocol values are compensated accordingly.

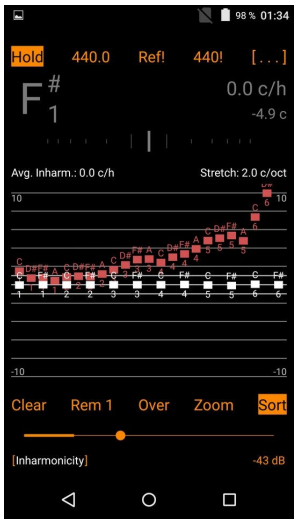
Overlay - Details:
Multiple measurement protocols can be shown simultaneously on the Overlay background of the Intonation Protocol chart for inspection and comparison.
Each set of protocols shown as Overlay can be added to Intonation Expert's internal memory via "Over" menu / "Save Set". Up to 100 sets of up 10 protocols can be stored.
The displayed Overlay set can be edited via the Overlay menu (removing, adding protocols) or by touching a note chart for a second (deleting single notes from Overlay protocols). Editing the displayed Overlay data does not affect any stored preset.

Example - Guitar Set-Up:

The intonation of guitars typically aims at setting the fretted octave of each string to the exact detuning of the empty string. With Harmonic Tuner Intonation Expert you can quickly measure and display the detuning of multiple notes (critical: frets 1-3, highest frets) and inspect, how well the intonation of your guitar and string is (intonation degrades significantly with string use and corrosion), and if it needs correction.
The deviation of each note from the ideal chromatic scale defines the intonation and temperament of an instrument. Due to the inharmonicity of plucked and hammered strings, pianos are typically tuned with slightly stretched tuning scale.

Inharmonicity Protocol





Shows series of notes and their inharmonicity in one protocol diagram.
Used to inspect string behaviour and to get info for stretch tuning adjustment.
Values and functionality of Intonation and Inharmonicity Protocols are coupled.

For details on features and usage see Intonation Protocol.

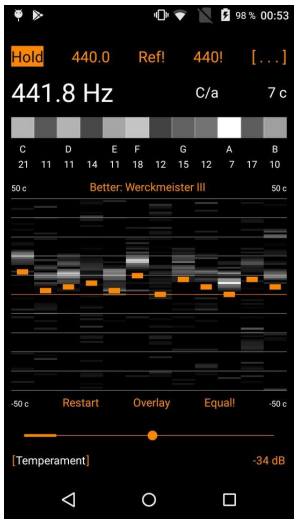
Displays:
Avg. Inharm.: Average inharmonicity value

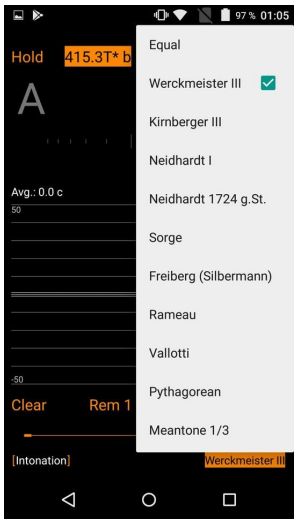
Contols:
Avg. Inharm: Set Tuner Stretch to average inharmonicity value

Details:
Harmonic Tuner Intonation Expert lets you measure and display overtone inharmonicity over multiple notes. See Intonantion Protocol for general protocol handling.
Inharmonicity of overtones is typical on plucked and hammered strings on guitars, basses, pianos etc. Stretch tunings aim to achieve overtone consonance by widening intervals according to overtone series widened by inharmonicity.
The inharmonicity measure in Harmonic Tuner is expressed in values of cent/harmonic. If a note's overtones are perfectly harmonic, the inharmonicity value is 0. If the inharmonicy value is 2 c/h, the second harmonic is 2 cent higher above the ideal harmonic than the first, the 3rd is 4 cent higher, the 4th is 6 cent higher and so on (in average).

Inharmonicity depends on different factors. Worn, damaged or corroded strings tend to have higher inharmonicity than new strings. Fretted (shortened) Strings have higher inharmonicity than open (long) strings. Inharmonicity and Intonation measurements can be used to indicate worn strings.

Temperament Detector





Helps to analyze and recognize the tuning temperament of a recording or performance (mainly keyboard instruments) and suggests a best-fitting musical key.

Displays:
Detected Reference Pitch (Hz, mode as selected in Settings),
Detected Key (Major/minor scale) and signature,
Detected Reference Pitch Offset (cent to current reference),
Long-Time Note Spectrum,
Detected Temperament (Suggestion),
Temperament Spectrum and Chart

Controls:
Restart: Clear/Restart Temperament Spectrum,
Overlay: Select a Temperament to compare with spectrum,
Equal!: Set Tuner to Equal temperament (default),
Ref!: Set reference pitch to currently detected value (as selected in Settings)

Related Settings:
Temperament Spectrum Average Time,
Root Range,
Preferred reference pitch retrieval (Average/Note A),
Reference Pitch, Stretch Tuning, Temperament

Details:
Tuning temperaments that deviate from the standard equally spaced chromatic scale are important in performances of historical music on keyboard instruments like organs, harpsichords or pianos.
Harmonic Tuner Intonantion Expert offers a tool to recognize typical temperaments from the audio signal mainly of polyphonic solo keyboard performances / recordings.
Like the Reference Pitch detector, the Temperament Detector performs a long time analysis of the audio signal. It calculates Tuning Spectrums for each note, displayed in the Temperament Spectrum diagram.

The dominant detuning values for each note are compared with the internal Temperament database to get a best-fit Temperament suggestion (including root note if deviating from C), that is displayed above the Temperament Spectrum. Click on the estimated Temperament to make it the current Temperament of the Tuner.
To improve estimation performance, the range of compared temperament scale roots is limited to a low number of scale steps around C by default - corresponding to the range of semitones the Concert A pitch reference typically can vary on historic instruments. The temperament scale root range can be narrowed or widened via Settings menu according to the expected range of Concert A pitch.

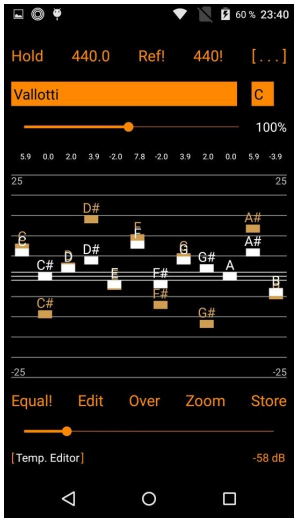
The reliability and stability of the Temperament detection strongly depends on audio quality, on significant timbral content of funcamental and octave frequencies and matching of the analyzed instrument with one of the stored temperaments. The list of available temperaments was limited to tunings of significant historical relevance.
Reliability of temperament detection is best, if the keyboard performance contains all 12 chromatic notes.
Click Overlay to dispay one of the supported temperaments in the diagram and to show the detuning of each note (relative to the currently set tuner temperament).
Select Overlay-Detected to always show the detuning of the currently detected temperament.
Click Restart and Equal! to easily reset Spectrum (e.g. after disturbing background noises) and current Tuner temperament.

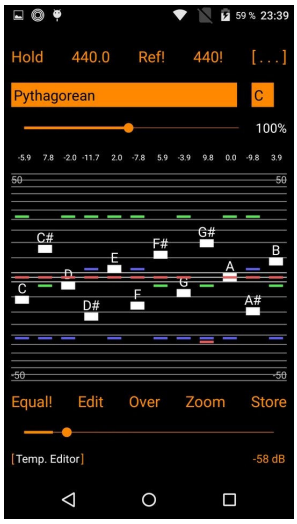
The concert A pitch reference of a baroque performance could be shifted by some semitones e.g. to 415Hz, 465 Hz etc. In this case, detected temperaments can appear in a transposed way (Werckmeister III Db) and detected Major/minor keys are distant from C Major key in the circle of fifths, indicated by their key signature. To compensate this, shift the reference pitch accordingly via 440.0 menu button.

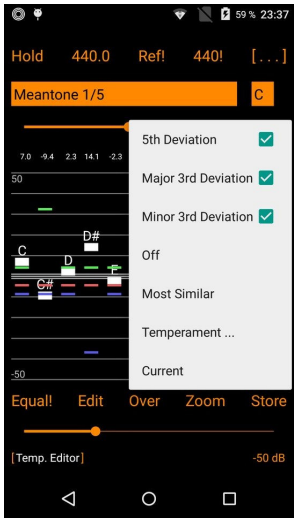
Temperament Editor

Inspect, compare, modify and create new temperaments. When saved as new preset, a custom temperament can be used by the tuning / protocol / detection modules of Harmonic Tuner Intonation Expert.

Displays:
Temperament Chart incl. comparison overlay & deviation from perfect intervals (Cent),







Temperament Values (Cent)

Controls:
Editor Temperament: Select Temperament preset to start editing with,
Temperament Transposition Root: Transpose temperament,
Temperament Scaling: Scale magnitude of temperament,
Equal!: Sets Editor Temperament back to Equal,
Zoom: Select diagram zoom,
Note Edit Popup Menu: long-touch on note - Detail editing functions (details below),
Edit Menu: Editing functions - details below,
Over Menu: Overlay control - details below,
Store Menu: Custom temperament preset management - details below

Store Menu:
Save as / Activate ...: Store / Replace current editor temperament as custom temperament preset and activate in Tuner,
Delete ...: Delete a custom preset (default presets can not be changed),
Rename ...: Rename a custom preset,
Export stored ...: Display all custom presets as cent list for exporting via Copy & Paste

Edit Menu:
Input ...: Input custom temperament values (Cent),
Edit ...: Edit current editor temperament values (Cent),
Normalize: Shift editor temperament values to A=0 Cent,
Use Tuner Setting: Load currently active Tuner temperament into editor,
Use Most Similar: Replace editor temperament by most similar preset

Over Menu:
Current: Use current editor temperament as overlay for comparisons,
Temperament ...: Use a temperament preset as overlay,
Most Similar: Overlay most similar temperament preset,
Off: Clear overlay background,
5th Deviation: Show deviation (Cent) of the Fifth of each note from a perfect Fifth,
Major 3rd Deviation: Same with Major Third,
Minor 3rd Deviation Same with Minor Third

Long-touch Note Edit Menu:
Note info: Shows note & Cent value chosen to edit,
Set ...: Input a Cent value,
Set to 0: Set note to 0 Cent,
Set to Average: Set note to average Cent value of all notes,
Set Perfect 5th: Make Fifth above this note perfect,
Set Perfect 4th: Same with 4th,
Set Perfect Maj. 3rd: Same with major 3rd,
Set Perfect Min. 3rd: Same with minor 3rd,
Info / Statistics: Display current editor temperament's Cent values, deviation from perfect intervals (as pythagorean/syntonic commas), most similar temperament preset and similarity statistics - for Copy & Paste export

Details:
With Intonation Expert's Temperament Editor you can analyze, compare, modify and design your own temperament presets for tuning measurements and temperament detection. A temperament preset consists of detuning values for all 12 chromatic notes expressed in cent (1/100 semitone).

Creating custom presets starts with setting the 12 temperament cent values via Edit/Input menu, by selecting one of the existing temperament presets (the editor offers several functions to select preset temperaments) or by feeding your measured temperament values from Intonation Expert's Intonation protocol module. Also, selecting the tuner's temperament, sets the editor's temperament values.

Modifying a temperament in the editor won't affect the tuner until saving it as preset in the temperament store. Temperament Editor's manipulation features include the transposition and scaling of a temperament, the individual editing of values and a number of functions to set perfect intervals.

The app lets you quickly inspect harmonic characteristics of each temperament: its distribution of more or less pure, consonant intervals and triads. To show the harmonic consonance/dissonance behaviour of a temperament, Intonation Expert's editor can display the deviation of the main intervals within a temperament (Fifth, major, minor thirds) from pure intervals as coloured overlay marks for each note in the temperament

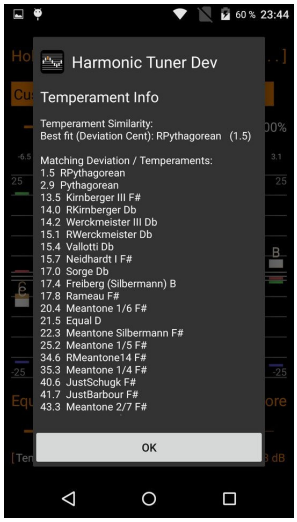


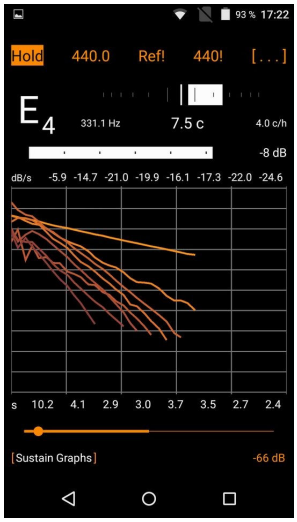
diagram. With the help of these markers it is easily visible, on which steps of a temperament scale triads are formed by perfect or imperfect intervals.

To compare the edited temperament with others, the Temperament Editor offers several options to overlay temperaments on the diagram background: the current editor's temperament, a preset from the store or the most similar of the store presets (transposed to best fit).

The temperaments created in Temperament Editor should be normalized before saving them to a preset to have note A on 0 cent = reference pitch frequency (Choose Edit/Normalize from the menu for this). Normalization is up to the user, as is checking for redundant temperaments. Use Info/Statistics menu or Overlay/Most Similar to check, if the current editor temperament is already contained (as similar variant with only small deviation metric) in the presets. Preventing very similar or double temperament presets is useful to get more stable temperament detection results.

Custom temperament presets can be exported as list of cent values via the Store/Export menu, using clipboard Copy and Paste.

Sustain Graphs



Shows amplitude graphs of each measured harmonic and its sustain as dB/s metric and decay time (seconds, T60).
The level and sustain envelopes of a note's harmonics define its timbre.

Displays:
Amplitude graphs diagram (5sec / 100dB range),
Current Note,
Overall sustain of current note (dB/s),
Harmonics sustain values (dB/s),
Harmonics sustain values (s, T60),
Tuning (cent),
Fundamental frequency (Hz),
Inharmonicity (c/h)

Related Settings:
Sustain: Number of Harmonics,
Unit of Sustain (dB/s or sec),
Tuning Level Threshold

Details:

Sustain Analyzer estimates how fast the harmonics levels of a note decrease over time. Typically the harmonics levels of a plucked string decrease nearly linearly (equaling an exponential amplitude reduction).

With Sustain Analyzer's protocol and overlay features your can quickly visualize how sustain changes along an instrument's note range, for example to detect dead spots and wolf notes.

Sustain Analyzer displays the note harmonics' sustain for example as -6 dB/s: a level reduction of 6dB per second (= reduction of 50% amplitude per second). The sustain is displayed in seconds as well (indicating the time, a harmonic's level decays by 60 dB, calculated from the dB/s value - a common metric for describing reverberation time of rooms - T60). Notes ringing shorter than 1sec have a sustain value lower than -60 dB/s, notes without any decay have a sustain value of 0 dB/s.

For proper sustain measurement and protocoling, the tuner's concert A reference frequency should not deviate from the instrument's tuning reference by more than 25 Cent: You can use the Ref! Button to quickly set the tuner's reference to the tuning of a note played on the instrument.

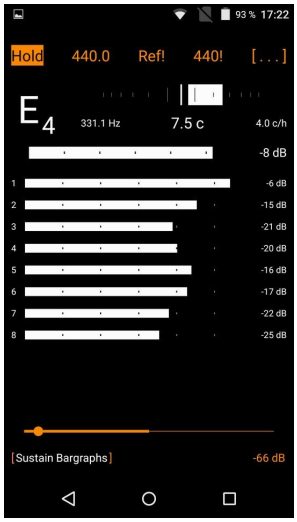
As harmonics of a note typically have different sustain times, the sum signal of all harmonics does not follow a linear level slope but reduces faster right after the note was plucked than when it rings out. For this reason the overall sustain value behaves not like harmonics' sustain measurements: The overall sustain measurement of a note typically increases during a note and strongly depends on the initial amplitudes of all harmonics (on how the string is plucked / hammered / picked up).

The individual harmonics' sustain values depend of different factors, for example string condition, acoustical coupling to the instument's other components, fretting. Resonating strings or body parts on the same instrument can affect the decay curves of a notes as well. That is why real decay curves can deviate significantly from the linear level curve described above: Sustain Analyzer estimates average sustain values of the recorded harmonic envelopes.

Some Android systems perform dynamics processing of the microphone input signal like noise-gate or noise reduction. This might affect sustain estimation accuracy, especially at low levels.

How to improve decay measurement accuracy:
- Reduce background noise
- Prevent overdriving the microphone input (see level bar)
- Bring the device's microphone close to your instrument / loudspeaker
- Turn off audio effects, compressors to get a clean signal
- Turn up your amplifier
- Pluck / hammer string at a position that stimulates desired harmonics
- Mute unwanted strings to prevent ringing and interfering with the plucked string
- Let note ring for some seconds
- Adjust input level threshold slider

Sustain Bargraphs



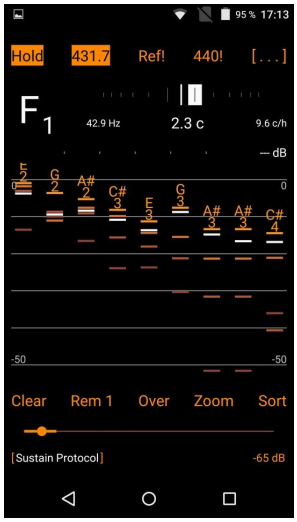
Shows sustain of each measured harmonic as bargraph diagram (dB/s or seconds T60).

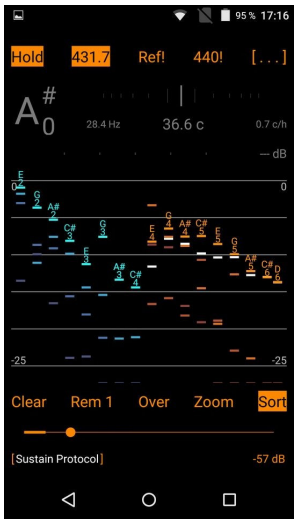
Displays:
Current Note,
Overall sustain of current note,
Harmonics sustain bars,
Tuning (cent),
Fundamental frequency (Hz),
Inharmonicity (c/h)

Related Settings:
Sustain: Number of Harmonics,
Sustain: Display Attack Level,
Unit of Sustain (dB/s or sec),
Tuning Level Threshold

Details:
For details on sustain measurement / metrics see Sustain Graphs help.

Sustain Protocol





Shows series of notes and their sustain (as decay value in dB/s) in one protocol diagram. Used to inspect the sustain behaviour of an instrument (typically plucked or hammered strings).
Protocols can be stored, displayed and compared as Overlay diagrams. Measurement protocol data can be exported as text list via clipboard.

Displays:
Sustain protocol chart with 10/5 dB/s grid,
Current Note,
Overall sustain of current note (dB/s or seconds T60),
Tuning (cent),
Fundamental frequency (Hz),
Inharmonicity (c/h)

Controls:
Clear: Empty protocol,
Rem 1: Remove last measured note,
Over: Open Overlay menu (details below),
Zoom: Select displayed dB/s range and number of harmonics,
Sort: (De-)activate sorting by pitch,
Protocol Chart: Popup menu via long touch, see below

Overlay Menu / Functions:
Set: Copy current protocol values to Overlay background,
Add: Append current protocol values to Overlay protocol,
Clear: Clear Overlay protocol,
Save ...: Stores Overlay values as a named protocol,
Load ...: Loads and displays a stored Overlay protocol,
Load to Compare ...: Displays a 2nd stored protocol,
Append ...: Add a stored protocol to current Overlay protocol,
Delete ...: Deletes a stored Overlay protocol

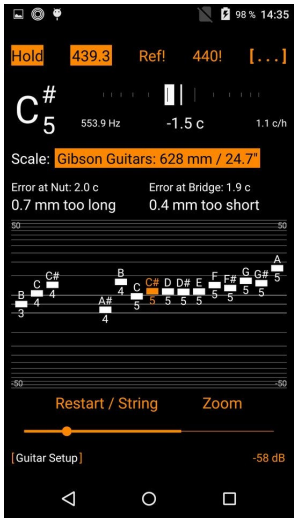
Protocol Chart Popup Menu (Long-touch desired note):
Info on selected note (closest to touch position),
Delete Note: Removes note from protocol or overlay,
Show Sustain Table: Shows detailed list of all sustain values (for copy & paste)

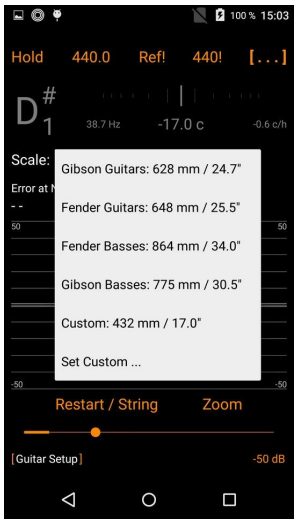
Related Settings:
Sustain: Number of Harmonics,
Sustain Protocol: Plot Lines
Unit of Sustain (dB/s or sec),
Tuning Level Threshold,

Details:
For details on sustain measurement / metrics see Sustain Graphs help.

Guitar Setup

Easy and quick intonation assessment and setup of fretted instruments like guitar, bass,





mandolin, ukulele etc.
Shows how much bridge and nut of a guitar or bass should be adjusted to get optimal intonation.

Checking/adjustment Procedure for a String:
- Tune up the instrument (no 100% perfect tuning required here).
- Choose your string scale length in the app.
- Empty the tuner protocol (Restart/String)
- Now play a series of notes on ONE string to be recorded to tuning protocol:
- Play the open string, tuning value appears in protocol, then
- for Bridge error: Play several often-played high frets 12 and above.
- for Nut error: Play string at lowest frets 1 and 2.
- Error values in mm/inch suggest, how much bridge and nut should be compensated.
- Only adjust the instrument if you know what you do.
- See Details section below.

Displays:
Tuning chart with 10/5/2 c grid and In-Tune markers,
Current note and tuning,
String length error at Bridge,
String length error at Nut,
String scale length preset

Controls:
Scale: Choose or set your string scale,
Restart / String: Remove old notes before measuring a string,
Zoom: Select displayed cent range and stretched diagram,
Sort: (De-)activate sorting by pitch,
Protocol Chart: Popup menu via long touch, see below,
Ref!: Set the tuning reference to lowest note (open string)

Protocol Chart Popup Menu (Long-touch desired note):
Info on selected note (closest to touch position),
Delete Note: Remove single note
Show Intonation Table: Shows detailed list of all values (for copy & paste export)

Related Settings:
Intonation Protocol: Plot Lines,
Tuning Reference Frequency,
Tuning Level Threshold,
Unit of Length (mm/inch),
Allow unequal Temperaments (effective in Intonation Expert only)

Details:
Harmonic Tuner Guitar Setup eases the precise intonation assessment and correction of guitar setups. Based on only a few automated tuning measurements it tells how much bridge (and nut) should be moved/corrected to achieve optimal intonation of a string. The app shows - in millimeters or inches - if a string's length is adjusted too long/short at bridge and nut. Use the app to compare instruments in a shop, checking before buying if the nontrivial task of nut adjustment was properly done.
Compared to the conventional intonation setup method, this app does not require the string being precisely tuned +/-1 Cent to reference, because only the tuning difference is relevant here. Harmonic Tuner has the advantage of evaluating multiple notes to calculate a more precise adjustment error (averaging varying finger pressure and finding an intonation compromise for all measured notes). Furthermore the amount of error is displayed, so time-consuming trial-and-error adjustments can be skipped.
The measured string's notes are shown in an intonation protocol while the lowest note is assumed to be the open string. To not damage the instrument, nut corrections should only be conducted by luthiers, while bridge adjustments can be done by experienced musicians following the manufacturer's manual.

Intonation measurements should be conducted as usual after setting up truss rod and action (and nut slots).
Bridge and nut correction suggestions of the app are calculated by automatically comparing the tuning of the open string with the tuning of a number of fretted notes.
If notes of high frets (7 and above) are recorded, the bridge error is estimated.
If notes on frets 1 and 2 are measured, the error at the nut is estimated.

The diagram shows the tuning difference of fretted notes to the open string. Use the Zoom Button and Intonation Table for a detailed view. Adjustment of bridge and nut is

usually only needed if average tuning deviation exceeds a 1 cent tolerance significantly.

As intonation of heavily worn strings cannot be adjusted properly, the setup should be done with mostly fresh strings. (On electric guitars worn strings tend to intonate too low around frets 8-12 but too high at the highest frets.)

Harmonic Tuner Guitar Setup calculates adjustment values to achieve an unstretched Equal Temperament chromatic scale.
In Harmonic Tuner Intonation Expert, intonation adjustments for stretched tunings (to better match the inharmoncity of guitar strings) and special unequal temperament fret layouts are possible - along with comparison and storing of tuning protocols.

Privacy / License / Versions

Privacy Info:
Harmonic Tuner does not collect, store or share any audio data or processing results, except protocol overlay and custom temperament data, that is stored with preference settings in Harmonic Tuner's app storage. None of the stored preference settings, temperament data or overlay data is collected or shared.

License Agreement:
You may not distribute, publish, share, lease, lent, rent or sell copies of this software. You may not reverse engineer, disassemble, decompile or modify this software. This software is provided without any warranty covering the loss of stored measurement protocols, custom temperament data or settings. Grain Apps reserves all rights (such as rights covered by intellectual property laws) not explicitly granted by this agreement.

Free / Limited Versions:
Grain Apps Harmonic Tuner is released in variants of different feature sets: Harmonic Tuner Free, Harmonic Tuner Strobe Look, Spectrum Tuner, Harmonic Tuner Suite (Full), Harmonic Tuner Intonation Expert, Sustain Analyzer, Harmonic Tuner Guitar Setup. Trial features demonstrate functionality of other variants, but full usage of them is restricted. While Harmonic Tuner Intonation Expert has the most features regarding tuning (unequal, custom and stretch tunings), Sustain Analyzer offers all sustain-related features.

Default Temperaments

Temperaments relative to equal chromatic scale (cent)

Temp. / cent	C		D		E	F		G		A		B
Equal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Werckmeister III	11.7	2.0	3.9	5.9	2.0	9.8	0.0	7.8	3.9	0.0	7.8	3.9
Kirnberger III	10.3	0.5	3.4	4.4	-3.4	8.3	0.5	6.8	2.4	0.0	6.4	-1.5
Neidhardt I	5.9	0.0	2.0	2.0	-2.0	3.9	-2.0	3.9	2.0	0.0	2.0	-2.0
Sorge	5.9	2.0	2.0	3.9	0.0	3.9	2.0	3.9	3.9	0.0	3.9	2.0
Freiberg (Silbermann)	3.9	-5.9	0.0	2.0	-2.0	3.9	-5.9	2.0	-5.9	0.0	3.9	-3.9
Rameau	11.7	-3.9	3.9	0.0	-3.9	15.6	-5.9	7.8	-2.0	0.0	7.8	-7.8
Vallotti	5.9	0.0	2.0	3.9	-2.0	7.8	-2.0	3.9	2.0	0.0	5.9	-3.9
Pythagorean	-5.9	7.8	-2.0	-11.7	2.0	-7.8	5.9	-3.9	9.8	0.0	-9.8	3.9
Meantone 1/3	15.6	-20.9	5.2	31.3	-5.2	20.9	-15.6	10.4	-26.1	0.0	26.1	-10.4
Meantone 2/7	12.6	-16.8	4.2	25.1	-4.2	16.8	-12.6	8.4	-21.0	0.0	21.0	-8.4
Meantone 1/4	10.3	-13.7	3.4	20.5	-3.4	13.7	-10.3	6.8	-17.1	0.0	17.1	-6.8
Meantone 1/5	7.0	-9.4	2.4	14.1	-2.4	9.4	-7.0	4.7	-11.7	0.0	11.7	-4.7
Meantone Silbermann	5.9	-7.8	2.0	11.7	-2.0	7.8	-5.9	3.9	-9.8	0.0	9.8	-3.9
Meantone 1/6	4.9	-6.5	1.6	9.8	-1.6	6.5	-4.9	3.3	-8.2	0.0	8.2	-3.3
Just	15.6	-13.7	19.6	31.3	2.0	13.7	5.9	17.6	-11.7	0.0	33.2	3.9

Temperaments as fractions of Pythagorean (PC) or Syntonic (SC) Commas, modifying circle of perfect fifths:

	C	G	D	A	E	B	F#	C#	G#	D#	A#	F		
Temp. / Comma	G	D	A	E	B	F#	C#	G#	D#	A#	F	C		
Equal	-1/12	-1/12	-1/12	-1/12	-1/12	-1/12	-1/12	-1/12	-1/12	-1/12	-1/12	-1/12	-1/12	PC
Werckmeister III	-1/4	-1/4	-1/4	0	0	-1/4	0	0	0	0	0	0	0	PC
Kirnberger III	-1/4	-1/4	-1/4	-1/4	0	0	*R*	0	0	0	0	0	0	SC
Neidhardt I	-1/6	-1/6	-1/6	-1/6	-1/12	-1/12	0	0	-1/12	-1/12	0	0	0	PC
Sorge	-1/6	-1/6	-1/6	-1/12	0	-1/12	-1/12	0	-1/12	-1/12	-1/12	0	0	PC
Freiberg (Silbermann)	-1/6	-1/6	-1/12	-1/6	-1/6	-1/6	-1/12	-1/12	1/4	0	-1/12	-1/12	0	PC
Rameau	-1/4	-1/4	-1/4	-1/4	-1/4	0	0	0	0	1/4	1/4	-1/4	0	PC
Vallotti	-1/6	-1/6	-1/6	-1/6	-1/6	0	0	0	0	0	0	-1/6	0	PC
Pythagorean	0	0	0	0	0	0	0	0	-1	0	0	0	0	PC
Meantone 1/3	-1/3	-1/3	-1/3	-1/3	-1/3	-1/3	-1/3	-1/3	-1/3	*R*	-1/3	-1/3	0	SC
Meantone 2/7	-2/7	-2/7	-2/7	-2/7	-2/7	-2/7	-2/7	-2/7	-2/7	*R*	-2/7	-2/7	0	SC
Meantone 1/4	-1/4	-1/4	-1/4	-1/4	-1/4	-1/4	-1/4	-1/4	-1/4	*R*	-1/4	-1/4	0	SC
Meantone 1/5	-1/5	-1/5	-1/5	-1/5	-1/5	-1/5	-1/5	-1/5	-1/5	*R*	-1/5	-1/5	0	SC
Meantone Silbermann	-1/6	-1/6	-1/6	-1/6	-1/6	-1/6	-1/6	-1/6	1/4	5/6	-1/6	-1/6	0	PC
Meantone 1/6	-1/6	-1/6	-1/6	-1/6	-1/6	-1/6	-1/6	-1/6	-1/6	*R*	-1/6	-1/6	0	SC
Just	0	0	-11/12	0	0	0	-11/12	0	7/4	0	-11/12	0	0	PC

R: Remainder to sum up to -1PC

Due to regular updates, extensions and improvements of Harmonic Tuner, the actual look of the newest app version's modules can slightly deviate from the screenshots shown here.