

User's Guide



Isokratis Piano

RELEASE B

A microtonal tunable piano, allowing for arbitrary N-ET step (incl. half-step) sharps and flats, individually in each piano key of the octave of the selected scale family (In-app), along with N-ET pitch shift, for adjustable N. It further, features (97+)-key Piano (with octaves' shift), Button Keys (In-app) instead of Piano Keys, and contains Piano, Isokratis voice, and ability to add your own Isokratis voices (In-app), and synthetic Choir sounds, Metronome, Chronome, Virtual LCD, different Reference Frequencies (e.g. A4 440 Hz, C4 256 Hz, C4 220 Hz), 12-ET (Western Music) and Byzantine Scales' selection capabilities, and many more.

**Runs on regular Computer or Tablet
with Windows 8.1**

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<http://apps.microsoft.com/windows/app/isokratis-piano/8059790b-52d8-491c-b7fe-79244d70f3b3>
<http://psaltiki.gr/en/apps/isokratis-piano>

1 Nov 2014

Statement

Isokratis Piano was developed for the following objectives:

- musicological research on the micro intervals,
- accurate ear/voice tuning on the micro intervals,
- assisting in the teaching of the Byzantine Music (Psaltiki),
- assisting in the learning of the Byzantine Music, and
- ison voice companion in the home practice of Byzantine Music

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23/9/2014



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1. Technical Specifications

1. **Key Tuning (Scale Tuner): Programmable N-ET step (incl. half-step) tuned sharps and flats**, individually in each piano key (In-app¹); Load/Save tunings
2. **Scales: 12ET, Byzantine Scales (Committee 1881, Chrysanthos), Didymos** (non-tempered)
3. Sounds: Piano, **Isokratis 1 (single human voice)**, synthetic **Choir sPro**, synthetic **Choir sPro bass**, synthetic **Choir 1**, synthetic Choir 2
4. **Ability to Load/Play your own .wav Isokratis' voices "Your Ison"** (In-app), taking advantage of the app's vast capabilities (piano soundboard)
5. **Metronome** (European), **Chronome** (Byzantine) with virtual "LED" and sound
6. **Pitch Shift in steps of configurable N-ET intervals**
7. N-ET steps/cents (decimal numbers) with **adjustable N from 12-99999**
8. **97-key Piano (+optional B#, E# black keys)**, C0-C8 or G0-G8 (with octaves' shift), 2-4 full octaves' display (with Piano sound)
9. **Button Keys** (In-app) for Isokratis functionality
10. **Release Time adjustment**
11. **Continuous key press mode (Hover/Hold modes)**, for Isokratis and Synthetic Choir sounds
12. **Byzantine Piano** (with Byzantine Scales)
13. **Chroas** (In-app)
14. Virtual LCD displaying useful information
15. Tone intervals between the Keys, Keys' frequencies on top of the Keys, Personal Settings saving capability
16. Key labels choice: **Byzantine Music Martyrias**, Tone names (**Ni, Pa, Vou, ...**), European notation (**Do, Re, Mi, ...**), American (US) notation (**C, D, E, ...**)
17. **4 different reference frequencies** (Ke/A 440, Ni/C 261.63, Ni/C 256, Ni/C 220)
18. Volume Control (logarithmically, and independent of computer's volume control)
19. Keyboard help (piano keys - keyboard keys correspondence appearance) / Keys' size change
20. Adjustable app width (**to be used in parallel with your favorite eBook reader**), Background image selection
21. **Multi-touch, Keyboard, Mouse input**

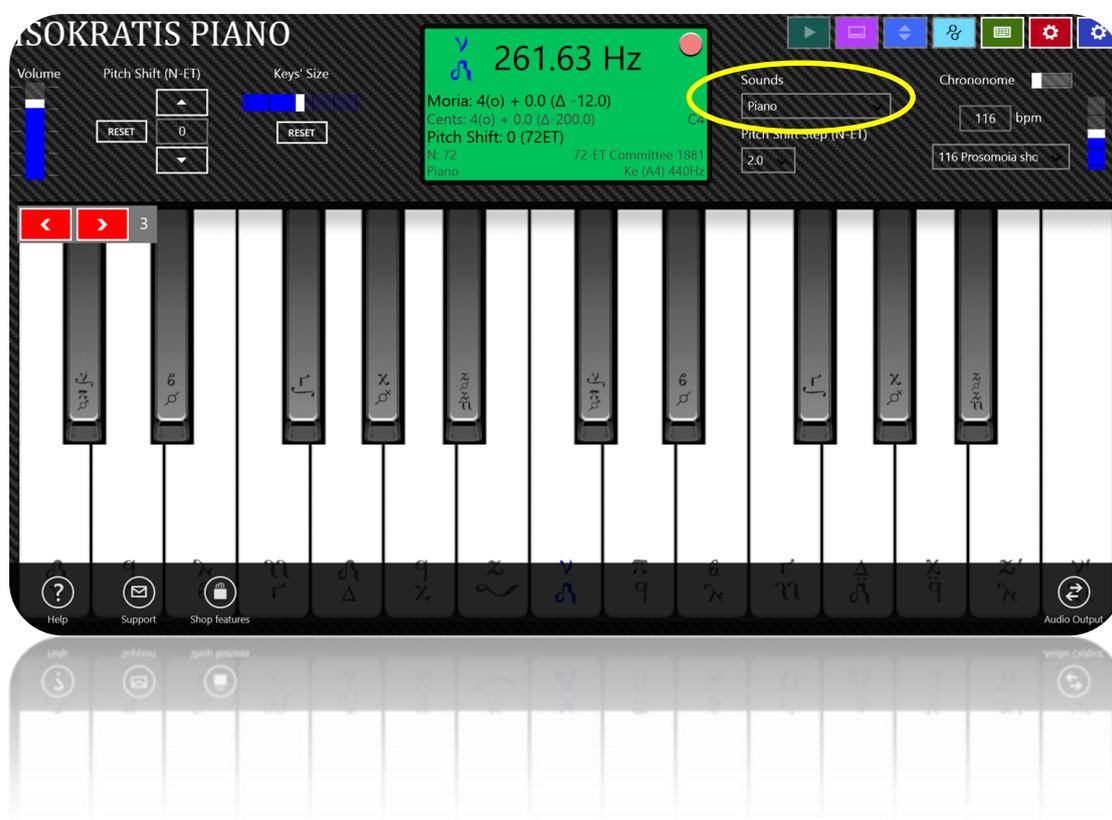
¹ In-app is an additional feature and product for this app that is sold through the Windows Store (through the app).

2. Quick Start - Isokratis

1. In the main screen, in the section “Sounds” (as seen in the image below), select the sound “choir sPro”, or “Isokratis 1” or “Synthetic Choir 1”.
2. Connect your computer or tablet to speakers that are capable of producing bass sound else the output sound may be distorted.

You are ready!

The default scale is the standard byzantine scale (72-ET of the Committee 1881), and the reference frequency is $K_e=A_4=440\text{Hz}$.



3. Analytical Description

a. Main Screen

The main screen is as shown below:



The various buttons in the main screen are explained below:

1. Sound Settings (F2)



It allows someone to control various sound settings, such as scales, sound type, release time, chronome sound, octave settings, pitch shift, reference frequency. It is explained also later in each own section. You can activate it also by pressing F2 (provided you have focused on the keyboard).

2. Other Settings (F3)



Controls other than sound settings, such as martyrias, tonal distances, tone frequencies, keyboard help, etc. It is explained also later in each own section. You can activate it also by pressing F3 (provided you have focused on the keyboard).

3. Keyboard Focus

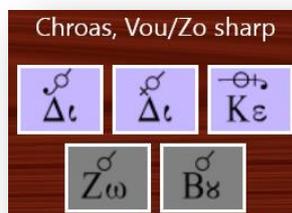


Use it to focus on the keyboard (if you want to use your computer's keyboard), to be able to press the piano keys with the corresponding keyboard keys. Alternatively, you may use once the key "Tab" on your keyboard. In addition, by successively pressing "Tab" you can focus through all buttons of the main screen.

4. Chroas (Zo/Vou sharp) (Chroas, etc.) - In-app



By pushing this button (the button is activated after the "Chroas, etc." feature is purchased; see later for [shopping additional features](#)), the Chroas and Zo/Vou sharp buttons appear. The selection of Chroas change (whenever applicable by the theory) the corresponding tonal intervals, and red circles show the pentachord where the Chroas are applied.



5. Key Tuning (Scale Tuner)



By pushing this button (the button is activated after the "Key Tuning" feature is purchased; see later for [shopping additional features](#)) you can tune the scale family, i.e. individually tune each key (scale tuning) in the octave (of the selected scale family) in +/- N-ET (incl. 72ET, 53ET, 1200ET) steps, for programmable N (12-99999).

The step sizes are programmable (through the "Sound Settings", "Pitch Shift Step"), e.g. in 72-ET, every 2 moria², or every 0.01, 0.1, 0.5, 1.0, 2.0, 6.0, 10.0, 12.0 moria, as shown in the below exemplary figure.



² In byzantine music, moria are called the 72ET cents. Here we use the word moria interchangeably with the word cents, and they are in general meant for N-ET.



You can also adjust N (through the “Sound Settings”) in any integer value from 12 (Western music 12ET), to 53, to 1200 (cents), to ...99999! In that case, the step sizes are N-ET moria for the selected N.

You can also Save and Load your tunings with the corresponding buttons (see Figure above). To reset the tunings to the original family of scales you have selected (in the “Sound Settings”), press the Reset. To apply the tunings you programmed, you have to press the button APPLY, which will show a yellow check mark next to it.

The key tunings are a function of the selected family of scales, and of the programmed N value (N-ET).

6. Button Keys enabler



This button toggles the keyboard between Piano (default) and Button Keys. The functionality of the button keys is explained later in the section “Keyboard: Piano or Button Keys”.



7. Continuous Key Press (Hover/Hold) (F5)



It alternates the key press type between piano mode (hover mode) and isokratis mode (hold mode). It is active only when the sound type is Isokratis 1 or Synthetic Choir. You can activate it also by pressing F5 (provided you have focused on the keyboard).

The continuous key press functionality applies to both the Piano keyboard, as well as the Button Keys.

8. Chrononome/Metronome (F6)

In the sound options (F2) you can select Chrononome (suggested for the chanters/students of the Byzantine music), or Metronome (suggested for the musicians/students of the European music).

Chrononome is configurable, with also preset beats per minute list for different hymns categories. In addition, there is a visual effect (small virtual “LED” on the upper right of the “LCD”) per beat.

Metronome provides the ability to select the time signature of 1/4, 2/4, 3/4, 4/4, in addition to a list of preset beats per minutes values (according to European music).

You can activate them also by pressing F6 (assuming you have focused on the keyboard). They are explained in further detail later.

9. Sounds, Pitch Shift Step

In the main screen, you can choose the sound, as well as the pitch shift step, which capabilities exist primarily under “Sound Settings (F2)”.



10. Pitch Shift

There is pitch shift (tuning) option, to shift concurrently all the keys' pitch using preset pitch shift step sizes.



The pitch shift can be done in two ways:

1. By changing directly the number (clicking inside the box and typing), which will be limited to the corresponding limits)
2. By pressing the corresponding up/down buttons. The pitch shift step sizes are N-ET, hence they depend on the N setting. For example, if N=72 is programmed (in

the sound options F2), the pitch shift step may take values of 0.1, 0.5, 1, 2, 6, 10, 12 (72-ET). If N=1200 is programmed, the pitch shift step may take values of 200, 100, 50, 25, 10, 2, 1, 0.1, 0.01 (1200-ET). The step size can be chosen from the “Sound Settings (F2)” in the setting “Pitch Shift Step”, or from the main screen.

11. Octave Shift



When the selected sound type is Piano, the Octave Shift buttons appear, so that the application can play in total 97 tones/keys C0-C8 (or G0-G8).

12. Keys' size

Someone can change the piano keys' width within range, using a slider.

13. Volume

Application's volume control (independent of computer's volume control), adjusting the sound volume logarithmically.

14. Virtual «LCD»

There is a virtual “LCD” for providing useful information on the Isokratis Piano operation and settings. It is explained later in further detail.

b. AppBar (Application Bar)

The application bar appears by right clicking with the mouse somewhere on the background of the Isokratis Piano, or by sliding our finger (in a touch screen device) from the bottom edge upwards.



The AppBar provides the following three functionalities:

1. Help (F1)

It provides helpful information and contains the “User’s Guide”. You can activate it also by pressing F1 (provided you have focused on the keyboard).

2. Support email

By pressing this button the mailer opens to start writing an email to the Isokratis Piano publisher, for any support issues/questions you may have.

3. Shopping additional Features – In-app



With this button, you can first see (and then buy, if you will) the available In-app offers/features of the Isokratis Piano: 1. **Button Keys**, 2. **Key Tuning**, 3. **“Your Ison”** Isokratis, 4. **Chroas**, etc.. The prices are shown within the app.

Your "Button Keys" product allows the usage of large Button Keys, instead of the piano keys, for the necessary notes of Isokratema.

Purchase "Button Keys" [Price: \$0.00]

FREE

"Key Tuning" product allows for individually tuning each key in the octave (of the selected scale family) in +/- N-ET steps, for programmable N and step sizes.

Purchase "Key Tuning" [Price:]

"Your Ison" product allows to play your own recorded Ison (.wav) files in the Isokratis Piano taking advantage of app's functionalities.

Purchase "Your Ison" [Price:]

"Chroas Etc." product provides buttons for fixed (non-programmable) Chroas, Zo and Vou sharp settings.

Purchase "Chroas Etc." [Price: \$0.00]

FREE

4. Audio Output (Automatic default playback device search)

Use it when e.g. adding headset, so that the application will find the new default playback device set by the system, and output the sound.

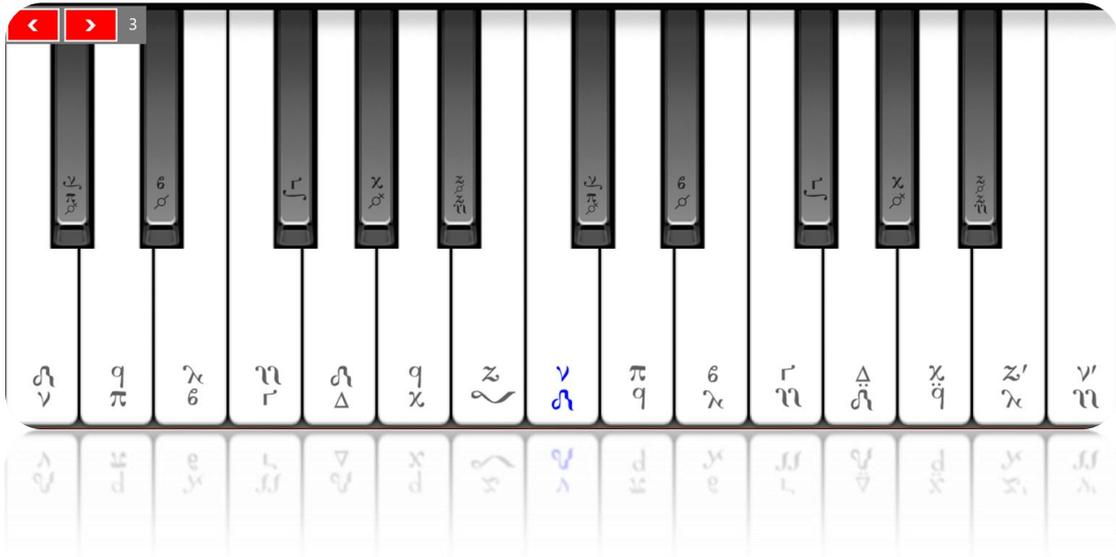


c. Keyboard: Piano or Button Keys

Isokratis Piano provides two keyboard options: Piano and Button Keys:

- i. Both keyboard options, work with the continuous key press switch (Hover/Hold modes).
- ii. Button Keys support multi-button press (like of course the piano keys).
- iii. Both keyboard options can work together with the Key Tuning In-app for individual tuning of each key.

Piano Keys:



Button Keys:



The button keys with the blue labels denote one octave lower, than the ones with the black colored labels.

d. Sound Settings (F2)



By pressing the sound settings button (F2), the menu shown in the right appears. The following settings options are available:

1. Scales

The following “families” of scales can be set:

- i. 72-ET Committee 1881
- ii. Non-tempered Committee 1881
- iii. Non-tempered Chrysanthos
- iv. Non-tempered Didymos
- v. 12-ET (12-tone ET)

It should be mentioned that the first two scales' options are the scales of the established Byzantine Music theory.

Chrysanthos of Madytos (one of the Three Teachers) left us only one non-tempered scale, the diatonic (it plays using only the white keys). For the scales used in the application, please see (only in Greek) the references [1], [2], [3].

12-ET scale is to be used by musicians of the European music, or for comparison purposes.

2. N (N-ET)

N is fully configurable, and can take integer values between 12 and 99999.

Attention is needed in the fact that the N does not change the keys' frequencies of the various scales of this application, because the scales (in the current version) are preset, and the moria/cents are decimal numbers. N is changing only the:

- a. pitch shift step (becoming N-ET)
- b. key tuning step size (N-ET)
- c. depicted (N-ET) tonal intervals between the piano keys: for example, for the non-tempered Committee scale, the diatonic Ni-Pa (C-D) is $9/8$, so in $N=72$ it is 12.23 moria [$=72\log_2(9/8)$], in $N=563$ it is 95.67 moria [$=563\log_2(9/8)$], and in $N=1200$ it is 203.91 moria/cents [$=1200\log_2(9/8)$].

← Sound Settings

Scales
72-ET Committee 1881 ▼

N (N-ET)
72

Sounds
Piano ▼

Pitch Shift Step (N-ET)
Sets the Step of the Pitch Shift buttons
[min : step : max].
2.0 ▼

Number of Octaves
2 ▼

Starting Note
Ni/C ▼

Show all black keys
Off

Release Time
 Small Medium Large

Chronome or Metronome
 Chronome Metronome

Chronome Sound
Wooden Sound A4 ▼

Reference Frequency
Sets the basic reference frequency.
Ke (A4) 440Hz ▼

"Your Ison" Settings
Settings

3. Sounds

The following sound types are available in this Release:

- Piano
- Isokratis 1: **Human voice** of one isokratis (copyrighted)
- **Choir sPro** (copyrighted)
- *Choir sPro (-12)* (copyrighted)
- *Choir sPro (+12)* (copyrighted)
- **Choir sPro bass** (copyrighted)
- *Choir sPro bass (-12)* (copyrighted)
- *Choir sPro bass (+12)* (copyrighted)
- Synthetic Choir 1
- Synthetic Choir 2
- **“Your Ison” Isokratis³**

The sPro sound of Release 7 was renamed to the “sPro bass” in this Release. The new sound choir sPro is less bass than the previous one. The 4 additional sounds (+12), (-12), are recommended when the pitch shift is above 12 moria, or below -12 moria correspondingly. The selection of the Sounds can be done also from the main screen.

For better sound results (better sound/key change, sound start/stop), fade-in and fade-out are used with the press and release of the piano buttons (see also Release Time below).

For best overall sound performance, it is recommended to connect the computer/tablet to good speakers (with good bass performance) or to the home theater system.

4. Pitch Shift Step (N-ET)

The pitch shift step selection has effect in the following settings:

- a. **pitch shift step (becoming N-ET)**
- b. **key tuning step size (N-ET).**

5. Number of Octaves

It sets the number of visible octaves, two, three or four.

6. Octave Starting Note

When the sound type is Piano, the octave starting note can be Ni (C) or Di (G).

7. Show all Black keys

With this switch you select or not the appearance of all black keys (i.e. the additional B#, E# that don't exist in the standard piano layout).

³ This In-app offer/feature, “Your Ison” Isokratis, is available only after it gets purchased and adjusted. See more details below in the corresponding section.

8. Release Time

It controls the sound release time (with fade-out). “Small” setting means that the sound diminishes fast (in short time), while “Large” setting means that the sound diminishes slower.

9. Chronome or Metronome

See later in the Chronome or Metronome section.

10. Chronome Sound

Capability to select the Chronome sound.

11. Reference Frequency (Hz)

There is support for four reference frequencies, according to which the rest of the keys' frequencies are defined. Those frequencies are Ke (A4) 440 Hz, Ni (C4) 261.63 Hz, Ni (C4) 256 Hz, Ni (C4) 220 Hz.

These settings can be used in parallel to the pitch shift for wider control of the pitch.

12. “Your Ison” Settings

This settings' option appears only after the corresponding “Your Ison” In-app offer/feature is purchased. See more detail below in the corresponding section.

e. Other Settings (F3)

1. Reset/Save Preferences

Supports saving of personal settings, such as sound type, N, pitch shift, number of octaves, keys' size, background picture.

2. Tone Intervals / Key Frequencies

It provides the option to display the tonal distances between two neighbor keys, or the keys' frequencies.

3. Keyboard Help

It shows the correspondence between the keyboard keys and the piano keys. To change the octave's correspondence, press the forward-slash key "/" (provided you have focused on the keyboard).

4. Key Labels (Martyrias)

For notes' help, there are the following key labels options displaying on top of piano keys:

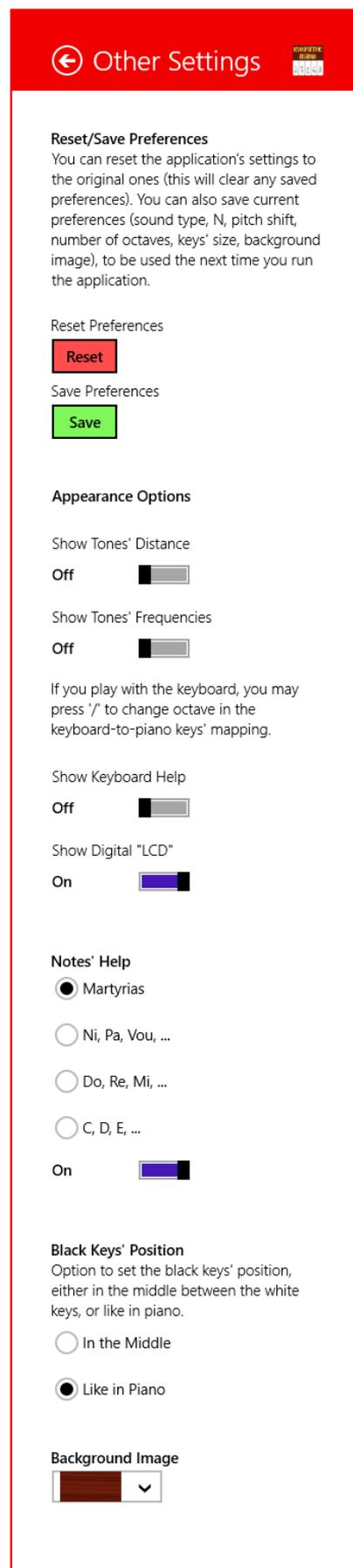
- Byzantine Martyrias
- Byzantine Notation (Ni, Pa, Vou, ...)
- European Notation (Do, Re, Mi, ...)
- US Notation (C, D, E, ...)

5. Black Keys' Position

There is the option placing the black keys either in the middle between white keys, or like in piano.

6. Background Image

It provides the capability to select among various piano backgrounds.



f. "Your Ison" Isokratis – In-app

Once this In-app feature is purchased (see above in the section "Shopping additional Features"), go to the "Sound Options" and to the newly appeared "Your Ison" Settings section and press that Settings button which shows the following menu.

Follow carefully the guidelines, and then you will be ready to use your Isokratis, taking advantage of all Isokratis Piano capabilities!

Please note, that you have to record 9 wav (*) sound files for "Your Ison" Isokratis to work. You should record lower Di (G), lower Ke (A), lower Zo (B) (and name them: 3g.wav, 3a.wav, 3b.wav), and also Ni-Ke (C-A) (and name them: 4c.wav, 4d.wav, 4e.wav, 4f.wav, 4g.wav, 4a.wav), according to the standard byzantine 72ET scale 12-10-8-12-12-10-8 (which is same to the piano 12ET scale except the E and B)! **Hint:** To tune yourselves to the correct pitch of each tone, use the Isokratis Piano!

(*) Because there are different wav files formats, in the case your .wav files don't play in the Isokratis Piano, after you purchased and adjusted this feature, please contact us at panayiotis.apps@gmail.com to help you!

The image shows two screenshots of the "Your Ison" Settings screen in the Isokratis Piano app. The left screenshot shows the initial setup instructions, and the right screenshot shows the same screen after a folder has been selected and loaded. A green arrow points from the left screenshot to the right one, indicating the progression of the setup process.

Left Screenshot:

Sound Settings

"Your Ison" Settings
Follow carefully all steps below to set up the "Your Ison" capability.

1. Pick the folder where you have your ison wav files. In that folder you SHOULD have the following files: { "3a.wav", "3b.wav", "3g.wav", "4a.wav", "4c.wav", "4d.wav", "4e.wav", "4f.wav", "4g.wav"}, else the settings will fail. The wav files should follow the diatonic scale intervals 12-10-8-12-12-10-8.

Pick Folder

2. Load the ison wav files from the selected folder to the app by clicking the button below.

Load Folder

3. Click the back button to return to the previous Settings content. Under "Sounds" select "Your Ison Isokratis" and you're ready!

Right Screenshot:

Sound Settings

"Your Ison" Settings
Follow carefully all steps below to set up the "Your Ison" capability.

1. Pick the folder where you have your ison wav files. In that folder you SHOULD have the following files: { "3a.wav", "3b.wav", "3g.wav", "4a.wav", "4c.wav", "4d.wav", "4e.wav", "4f.wav", "4g.wav"}, else the settings will fail. The wav files should follow the diatonic scale intervals 12-10-8-12-12-10-8.

Pick Folder

Folder: IsokratisP1_Release5

2. Load the ison wav files from the selected folder to the app by clicking the button below.

Load Folder

OK!

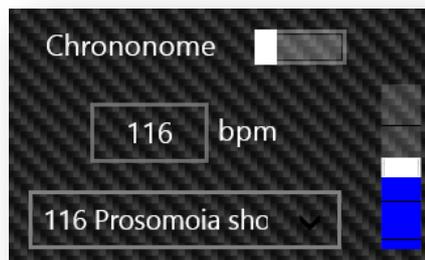
3. Click the back button to return to the previous Settings content. Under "Sounds" select "Your Ison Isokratis" and you're ready!

g. Chrononome or Metronome (F6)

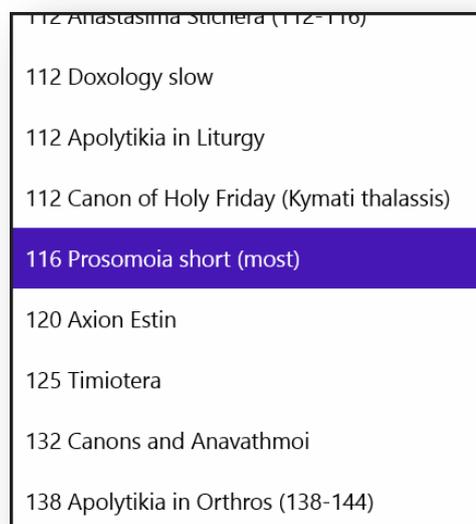
In the sound options (F2) you can select Chrononome (suggested for the chanters/students of the Byzantine music), or Metronome (suggested for the musicians/students of the European music).

1. Chrononome

The main Chrononome keys are shown in the main screen as following:



Chrononome switch can be toggled with F6 (provided you have focused on the keyboard). There is a flashing beat indication also on the upper right part of the “LCD”. The beats per minute (bpm) are fully programmable, and additionally there is a list with preset bpm for different hymns’ categories (see the part of the list below), taken from the Triodion of Protopsaltis Thrasyvoulos Stanitsas. The list below is just indicative for educational purposes and in no way mandatory.

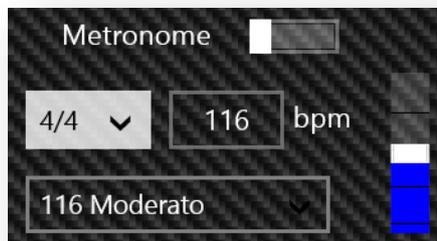


In addition, the Chrononome sound can be chosen from the “Sound Settings (F2)” in the setting “Chrononome Sound”.

2. Metronome

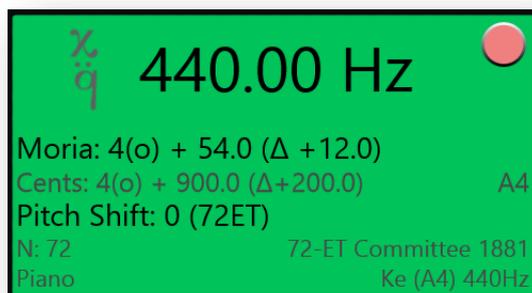
Metronome supports time signature selection (1/4, 2/4, 3/4, 4/4), in addition to a list of preset beats per minute values according to the European music.

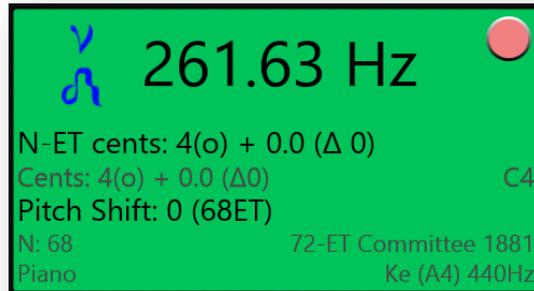
The main Metronome keys are shown in the main screen as following (Metronome can also be activated by F6, provided you have focused on the keyboard):



h. Virtual «LCD»

There is an “LCD” to display useful information on the usage of the application.





In this virtual “LCD”, the martyria of the corresponding pressed key is shown, along with its frequency and corresponding note in US notation within cents.

If two keys will be successively (or concurrently) pressed, the tonal distance/difference is shown in N-ET cents, and (1200-ET) Cents.

In addition, the pitch shift value is shown, along with the N setting, the selected sound type, the scales’ family and the reference frequency.

In the upper right part of the virtual “LCD”, a virtual “LED” is shown that blinks in the beat rate of the Chronome/Metronome (when it’s activated). In the Metronome, the virtual “LED” changes also color according to the time signature.

4. References

- [1] Παν. Δ. Παπαδημητρίου, Πώς προκύπτουν όλες οι κλίμακες της Βυζαντινής Μουσικής από τον Μείζονα Τόνο, <http://psaltiki.gr/papers/6-how-to-derive-all-scales-from-9-over-8>, έκδ. 0.9, 6/3/2014.
- [2] Παν. Δ. Παπαδημητρίου, Οί Κλίμακες και Συγκερασμοί του Χρυσάνθου εκ Μαδύτων, <http://psaltiki.gr/papers/16-chrysanthos-scales-temperament>, έκδ.0.9, 15/3/2014.
- [3] Παν. Δ. Παπαδημητρίου, Η Κλίμακα του Πλαγίου Δευτέρου Ήχου κατά τον Χρυσάνθο και την Έπιτροπή 1881, <http://psaltiki.gr/papers/14-plagal-2-tone-chrysanthos-committee1881>, έκδ. 0.9, 28/2/2014.

5. Appendix

a. Release Updates

1. Release 8

- Choir sPro sound of Release 7 was renamed to the “sPro bass” in this Release.
- New sound choir sPro (in the main package of Isokratis Piano).
- 4 additional sounds (+12), (-12), which are recommended when the pitch shift is above 12 moria, or below -12 moria correspondingly (they’re also in the main package).
- Selection of the Sounds can now be done also from the main screen.
- Selection of the Pitch Shift step can now be done also from the main screen.
- Arbitrary Pitch Shift can now be set directly by typing (which might be truncated to the corresponding limits)
- In App: Button Keys, Chroas Etc., are free.

2. Release 7

- Choir sPro (new sound added in the main package; Free)

3. Release 6

- Button Keys In-app (Free) were introduced specifically for Isokratis functionality.
- AppBar (Application Bar) added
- Sliders’ styling updated.

Release 6.1

- Offline usage issue fixed

4. Release 5

- Key Tuning In-app offer (N-ET step (incl. half-step) tuned sharps and flats, individually in each piano key) - Load/save tunings
- Load/Play "Your Ison" Isokratis’ voices In-app offer
- Chroas etc In-app (Free)
- Ga Isokratis 1 loop fixed
- F4 keyboard shortcut removed
- Chroas, Vou/Zo sharp buttons applied in all octaves
- Chroas/Vou/Zo buttons inter-switching bug fixed
- Sound Selection change, e.g. Piano to Isokratis 1, is little slower now

Release 5.1

- Finer tuning of synthetic Choir 1

5. Release 4

- Metronome added
- Configurable N (N-ET) from 12-99999 (decimal cents)
- Pitch Shift in steps of configurable N-ET cents
- Release Time bug fixed