

A Microtonal Piobaireachd on Prime Numbers

~ Òran do beag madadh-ruadh ~

“Song for the Small Fox”

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for solo

- Great Highland Bagpipe -

Jordan Alexander Key

(2017)

*Winner of the Alt Pibroch Club and Altpiborch.com
“Modern Pibroch Library” Competition, 2018*

Program Notes and Piece Mechanics:

Shrouded in myth and mystery, a tradition that has been passed from master to pupil for unknown centuries, piobaireachd (Scots Gaelic for “piping” and anglicized as “pibroch”) is the “classical music” of the Great Highland Bagpipe, originating sometime during the Middle Ages. Piobaireachd is the oldest and perhaps most austere of all the Scottish bagpiping genres, focusing on simple tone progressions with slight elaborations over a series of variations. Crucial to this style is tone and timbre, and thus highly refined and particular tunings were constructed around these pieces, generally emphasizing tuning by Pythagorean ratios, particularly focusing on the 7th and 11th partials.

This piece returns the modern Scottish bagpipe to these medieval traditions, however in unconventional ways through building a scale of 15 micro-tonal notes based on octave transpositions of the prime partials of an implied fundamental. Along with the 7th and 11th partials, the scale of this piece incorporates all the prime partials from 2 to 31. This resulting piece is both Medieval in aesthetic and form, but modern in its expansion of Pythagorean tuning and extended techniques on the bagpipe, including unconventional droning, alternative fingerings, and multi-phonics.

The scale is based on octave transpositions of all the prime partials (up to 31) of the fundamental note, which is (approximately) 60 Hz. This fundamental was chosen for convenience, since most Great Highland Bagpipes are tuned to about 480Hz on the lowest “A” of the chanter. The three drones form the second, third, and fifth partials above the non-sounding, implied fundamental of 60Hz. The primary chanter notes (melodic notes), given on the first page of the score instructions, form the other octave-transposed prime partials up to the 31st – 7, 11, 13, 17, 19, 23, 29, 31 – barring the low-A, which is simply a multiple of the 60Hz fundamental (Note: the tuning of these partials is as close as possible, +/- 5 Hz or so, pretty much indistinguishable to most human ears). The additional microtonal inflections or embellishments are totally for color and are not based on any mathematical proportion. They are simply created through alternative fingerings. The primary melodic content, however, is solely based on these prime partials.

APC and Altpibroch.com:

The Alt Pibroch Club and altpibroch.com are sites dedicated to the pursuit of bringing new approaches to bagpipe performance informed by ancient scores. While we support reconstructions of old playing, they are also interested in bringing new musicality to piobaireachd long since forgotten, much to the detriment of audiences and performers alike. AltPibroch.com is the definitive resource for information on pre-1841 pibroch manuscripts, their interpretation and history. These are the original, unexpurgated primary sources of our art, and the different musical perspective, interpretation and insight they bring is a revelation to those accustomed to the modern pibroch scene. They encourage performers to explore the full musical depth and creativity of the folk music of piobaireachd, from as many sources of instrumentation and inspiration as they can find.

Jordan Alexander Key:

Jordan Alexander Key (b. 1990) currently pursues his PhD in composition and musicology at the University of Florida. He earned bachelor's degrees in music composition, mathematics, and Eastern Asian philosophy from The College of Wooster (2013), as well as a master's degree in music composition from the University of Arizona (2015). His significant recent projects include his European premier with Vienna's PHACE Ensemble performing his Octet, "Threnody on the Death of Children;" a performance by Boston String Quartet of his *String Quartet No. 1*; a concert with Bold City Contemporary Ensemble performing his Quintet, "Discursus Anachronismus;" a collaboration with the Vancouver Queer Arts Festival for his Art Song, "God Ourselves;" and the display of his recent audio-visual projects as part of the Wolfsburg Kunstmuseum's new exhibit, "Never Ending Stories: The Loop in Art, Film, Architecture, and Music," in Germany during the Winter and Spring of 2018. Jordan gives regular concerts on his two instruments: the pipe organ and bagpipes. His performance repertoire focuses primary on music from the Middle Ages, Early Renaissance, and Early Baroque. He has been a bagpiper for 15 years as of 2018. For more information on Jordan Alexander Key and for recent recordings of his works, see his website, www.jordanalexanderkey.com, or search for his work on YouTube (channel, "Jordan Alexander Key")

Notes for tuning and multiphonics

Standard Fingerings (notation)

c. 420Hz

c. 480Hz

c. 510Hz

c. 570Hz

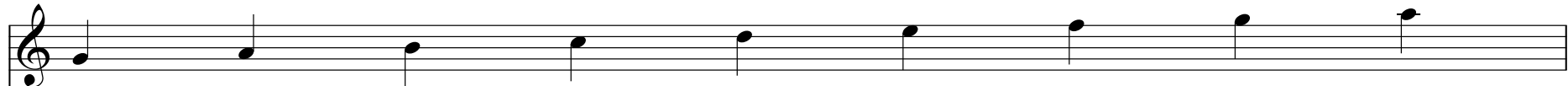
c. 660Hz

c. 690Hz

c. 780Hz

c. 870Hz

c. 930Hz



Sounding Pitches

+20 cents

-50

-44

+48


+2

-21

-9

-20

-4



7th harmonic

8th harmonic

17th harmonic
(1 trasposition)

19th harmonic
(1 trasposition)

11th harmonic

23th harmonic
(1 trasposition)

13th harmonic

29th harmonic
(1 trasposition)

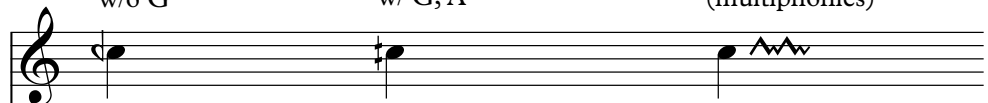
31st harmonic
(1 trasposition)

Selected Alternate Fingerings (C)

c. 570Hz
w/o G

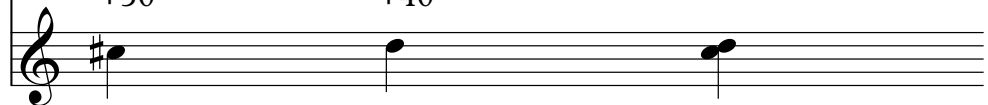
c. 600Hz
w/ G, A

overblow on standard C
(multiphonics)



+50


+40



Alternate Fingerings (D)


c. 625Hz
w/ G, A, B

whistle tone
w/ middle & ring, w/o pinky
+



+10


15^{ma} -



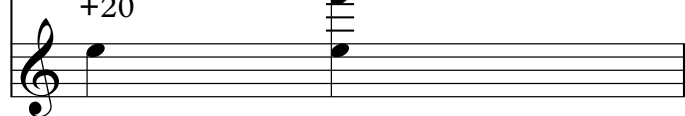
Alternate Fingerings (E)

c. 666Hz
w/o C

multiphonics
w/o A, G

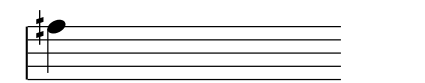


+20

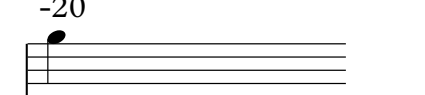


Alternate Fingerings (F)

c. 777Hz
w/o A, G

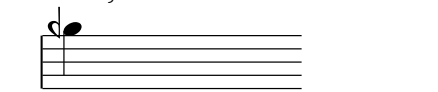


-20

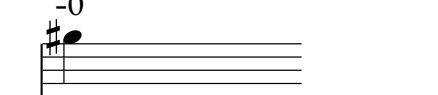


Alternate Fingerings (G)

c. 830Hz
w/ E, D



-0

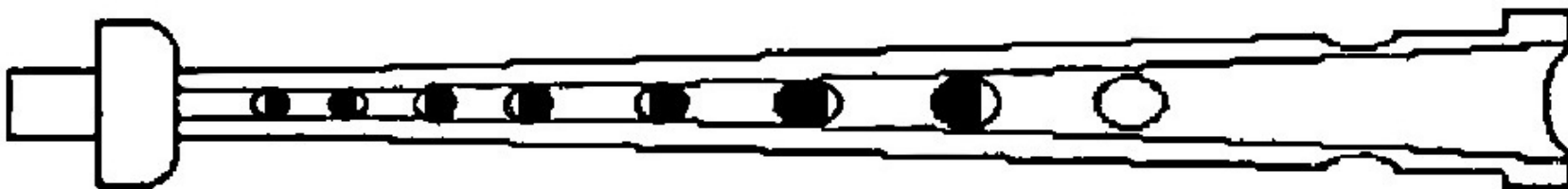


Complete Scale (as notated)*

*Red notes indicate the notes of the bagpipe scale as standardly fingered. Other pitches are embellished inflections.

The image shows two musical staves. The top staff, titled 'Complete Scale (as notated)*', displays a scale of 15 notes on a treble clef staff. Above each note is a frequency value: c. 420Hz, c. 480Hz, c. 510Hz, c. 570Hz, c. 580Hz, c. 600Hz, c. 610Hz, c. 625Hz, c. 666Hz, c. 690Hz, c. 780Hz, c. 777Hz, c. 830Hz, c. 870Hz, and c. 930Hz. Red notes are placed at the 2nd, 3rd, 5th, 7th, 9th, 11th, 12th, 14th, and 15th positions. The bottom staff, titled 'Complete Scale (as sounded)', shows the same 15 notes with cent adjustments: +20, -50, -44, +48, -20, +40, -34, +10, +20, -21, -9, -20, -0, -20, and -4. Red notes are placed at the 2nd, 3rd, 5th, 7th, 9th, 11th, 12th, 14th, and 15th positions.

Chanter is to be taped approximately as shown to achieve desired microtuning. Depending on the make of the chanter, different tappings might be necessary. Adjust taping as needed with the aid of a tuner to reach approximate designated frequencies.



Drones:

Bass Drone: The bass drone should be tuned, as typical, two octaves below the pitch sounding when fingering the classical formation for low-A. Then the top joint will be totally removed from the drone. This should create, not the octave above the fundamental, but rather the octave plus a perfect fifth (perfect 13th). This note is the **third partial** of the harmonic series (180 Hz). Adjust lower joint as needed.

Tenor Drone 1: The first tenor drone should be tuned one octave below the sounding pitch when fingering the traditional low-A notes on the chanter. This tone is an octave displacement of the second partial (120Hz x 2) two octaves above the implied fundamental (60Hz), or a one-octave transposition of the **second partial**.

Tenor Drone 2: The top joint (top half) of this tenor drone should be removed entirely and set aside. This will make this tenor drone sound as the **fifth partial** (300Hz) above the fundamental (60Hz), approximate a major third above the first tenor drone.

All drones sounding together should sound like a major chord (albeit with octave displacements in the notes).

If you have any questions regarding performance or execution, you may contact me via my website, email, or phone number listed below. There is also a recorded performance of this piece available on YouTube: search "Jordan Alexander Key microtonal piobaireachd."

website: <http://jordanalexanderkey.com>
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Òran do beag madadh-ruadh

(Song for the small fox)

Jordan Alexander Key
(2017, revised 2018)

Ground (Ular)



Variation I (Doubling)



Variation II (Taorluath)

Musical notation for Variation II (Taorluath). The first staff shows a sequence of notes with 'T' (Taorluath) markings below them: (T), T, T, T, T, T, T, T, T, T, T, T. The second staff shows a sequence of notes with 'T' markings below them: T, T, T, T, T, T, T, T, T, T, T, T. The notation includes various musical symbols such as treble clef, key signature, time signature, and dynamic markings.

Variation III (Crunluath)

Musical notation for Variation III (Crunluath). The first staff shows a sequence of notes with 'C' (Crunluath) markings below them: (C), C, C, C, C, C, C, C, C, C, C, C. The second staff shows a sequence of notes with 'C' markings below them: C, C, C, C, C, C, C, C, C, C, C, C. The notation includes various musical symbols such as treble clef, key signature, time signature, and dynamic markings.

Ground (Reprise)

if desired, you may repeat the first line of the Ular as well.

Musical notation for Ground (Reprise). The notation includes various musical symbols such as treble clef, key signature, time signature, and dynamic markings. It features a sequence of notes with 'tr' (trill) markings above them.

Figurations

Musical notation for Figurations. The notation includes various musical symbols such as treble clef, key signature, time signature, and dynamic markings. It features a sequence of notes with 'tr' (trill) markings above them, and 'molto rub.' (molto rubato) markings below them. The first staff shows a sequence of notes with 'tr' markings above them: tr, tr, tr, tr, tr, tr, tr, tr. The second staff shows a sequence of notes with 'molto rub.' markings below them: molto rub., molto rub., molto rub., molto rub., molto rub., molto rub., molto rub., molto rub.