Wolfgang von Schweinitz

# Horned Owl Sequence

## INTONATION STUDY
for two F-tubas with five valves

op. 53

2010

*composed for*
*Lukas Storm and Doug Tornquist*
*and the*
*Machine Project*
*Hammer Museum, Los Angeles*

PLAINSOUND MUSIC EDITON

# Performance Notes

## INTONATION

*This piece is a study exploring new playing techniques for microtonal just intonation. All the valve slides must be carefully tuned according to the instructions given below; and as all notes should be played with the valve combinations specified in the score, they "only" need to be centered in order to produce the intended microtonal pitches.*

*The pitches are notated in the "Extended Helmholtz-Ellis JI Pitch Notation" (see legend below), with an additional cent number for every note specifying its pitch deviation from the respective pitch in Equal Temperament.*

## TUNING INSTRUCTIONS

for the 5-VALVE F-TUBA

*The open horn is tuned a pure major third below A, so that its 5$^{th}$ harmonic produces 220 Hertz. The 4$^{th}$ valve slide is tuned such that the 4$^{th}$ harmonic of the C-Horn produces the same pitch as the 3$^{rd}$ harmonic of the open F-Horn. The 3$^{rd}$ valve slide is tuned such that the 6$^{th}$ harmonic of the D-Horn produces the same pitch as the 5$^{th}$ harmonic of the open F-Horn (220 Hz). The 2$^{nd}$ valve slide is tuned such that the 4$^{th}$ harmonic of the E-Horn produces the same pitch as the 5$^{th}$ harmonic of the C-Horn (115 Hz). Then the 1$^{st}$ valve slide is tuned in combination with the 2$^{nd}$ valve such that all harmonics of the valve combination 1+2 have the same pitches as those produced with the 3$^{rd}$ valve (D-Horn). The 5$^{th}$ valve slide is tuned in combination with the 4$^{th}$ valve such that the 6$^{th}$ harmonic of the valve combination 4+5 (B-flat-Horn) produces the same pitch as the 4$^{th}$ harmonic of the open F-Horn.*

*Thus the valve slides 1, 2, 3, 4 and 5 are tuned to the rational proportions 2/15, 1/15, 3/15 = 1/5, 5/15 = 1/3 and 5/30 = 1/6 of the open horn's length – producing, in various valve combinations, a Utonal Series of fundamental pitches with wavelengths in the proportions:*
*30 : 32 : 34 : 35 : 36 : 37 : 38 : 39 : 40 : 41 : 42 : 43 : 44 : 45 : 46 : 47 : 48 : 49 : 50 : 51 : 52 : 53 : 55 : 57.*

*Please see the table "Microtonal Pitch Repertoire of the 5-Valve F-Tuba" on the next page!*

## PERFORMANCE DURATION *circa 90 seconds*

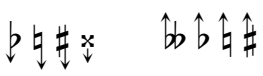
*This piece has been commissioned by the Machine Project 2010, Hammer Museum, Los Angeles.*
*It is dedicated to Lukas Storm and Doug Tornquist.*

# ACCIDENTALS **EXTENDED HELMHOLTZ-ELLIS JI PITCH NOTATION**

*for Just Intonation*

***The exact intonation of each pitch is written out by means of the following harmonically defined accidentals:***

*Pythagorean series of non-tempered perfect fifths*
*(based on the open strings : … c g d a e …)*



*Lowers / raises the pitch by a syntonic comma*
*(81/80) =* ***circa 21.5 cents***

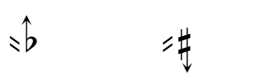
*Lowers / raises the pitch by two syntonic commas*
*(81/80)*(81/80) =* ***circa 43.0 cents***

*Lowers / raises the pitch by a septimal comma*
*(64/63) =* ***circa 27.3 cent***

*Raises / lowers the pitch by two septimal commas*
*(64/63)*(64/63) =* ***circa 54.5 cents***

*Raises / lowers the pitch by an 11-limit undecimal quarter-tone*
*(33/32) =* ***circa 53.3 cents***

*Lowers / raises the pitch by a 13-limit tridecimal third-tone*
*(27/26) =* ***circa 65.3 cents***



*Lowers / raises the pitch of the subsequent accidental by a 17-limit schisma*
*(16/17)*(16/15) = (256/255) =* ***circa 6.8 cents***

*Raises / lowers the pitch of the subsequent accidental by a 19-limit schisma*
*(19/16)*(27/32) = (513/512) =* ***circa 3.4 cents***



*Raises / lowers the pitch of the subsequent accidental by the 23-limit comma*
*(23/16)*(8/9)*(8/9)*(8/9) = (736/729) =* ***circa 16.5 cents***



*Lowers / raises the pitch of the subsequent accidental by a 29-limit comma*
*(29/16)*(5/9) = (145/144) =* ***circa 12.0 cent***



*Lowers / raises the pitch of the subsequent 11-limit accidental by a 31-limit schisma*
*(32/31)*(32/33) = (1024/1023) =* ***circa 1.7 cents***



*Lowers / raises the pitch of the subsequent 11-limit accidental by a 37-limit schisma*
*(36/37)*(33/32) = (297/296) =* ***circa 5.8 cents***



*Lowers / raises the pitch of the enclosed 5-limit accidental by a 41-limit schisma*
*(32/41)*(81/64)*(81/80) = (6561/6560) =* ***circa 0.3 cents***



*Raises / lowers the pitch of the subsequent accidental by a 43-limit comma*
*(43/32)*(3/4) = (129:128) =* ***circa 13.5 cents***

*Lowers / raises the pitch of the enclosed 7-limit accidental by the 47-limit schisma*
*(32/47)*(48/49)*(3/2) = (2304/2303) =* ***circa 0.8 cents***

*Lowers / raises the pitch of the subsequent 5-limit accidental by a 53-limit comma*
*(32/53)*(5/3) = (160/159) =* ***circa 10.9 cent***

*Lowers / raises the pitch of the enclosed 13-limit accidental by a 59-limit schisma*
*(32/59)*(24/13) = (768/767) =* ***circa 2.3 cents***

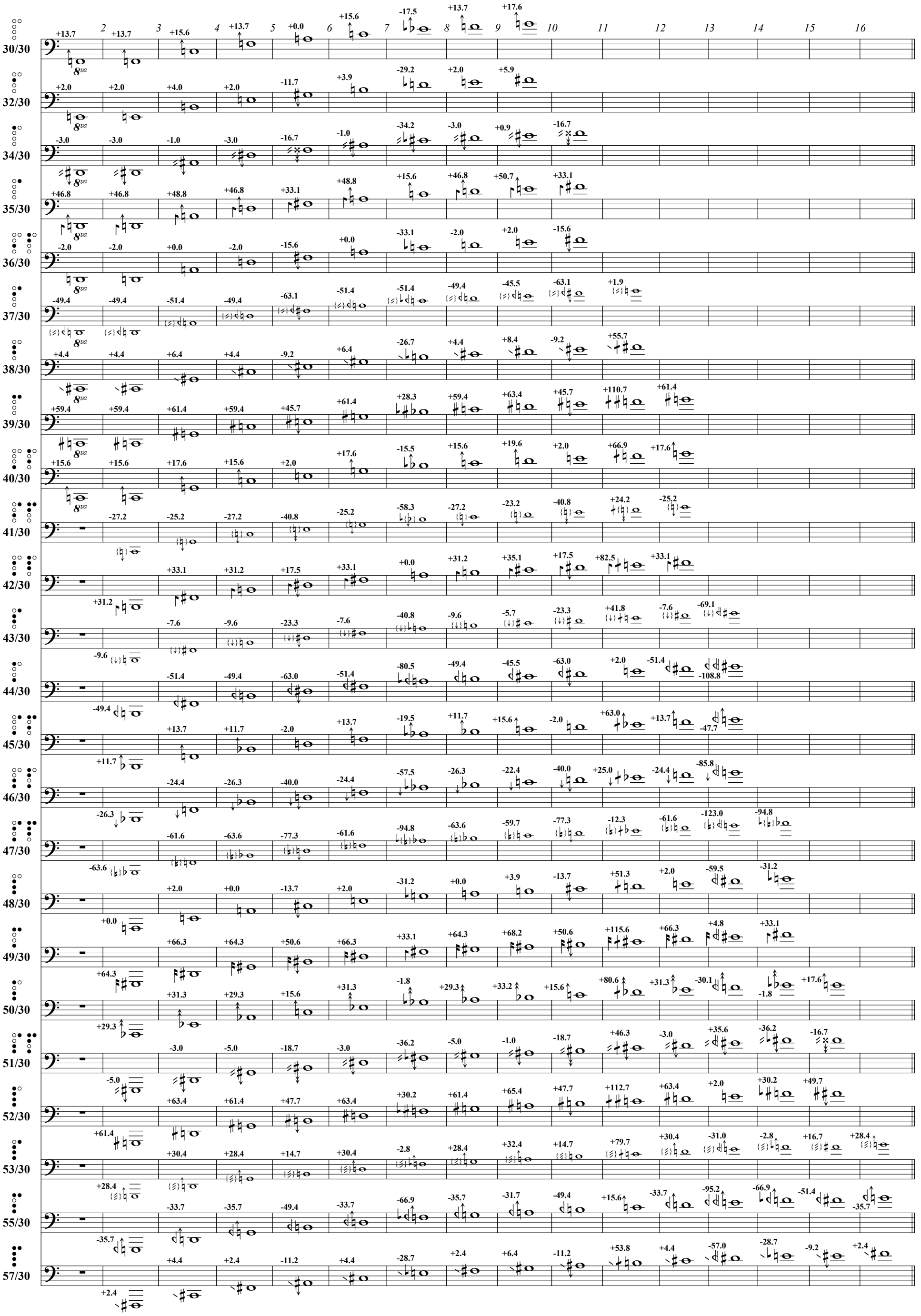


*Raises / lowers the pitch of the enclosed 7-limit accidental by a 61-limit schisma*
*(61/32)*(21/40) = (1281/1280) =* ***circa 1.4 cents***

*The attached arrows denoting the pitch alteration by a syntonic comma are transcriptions of the notation that Hermann von Helmholtz used in his book "Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik" (1863). The annotated English translation "On the Sensations of Tone as a Physiological Basis for the Theory of Music" (1875/1885) is by Alexander J. Ellis, who refined the definition of pitch within the 12-tone system of Equal Temperament by introducing a division of the octave into 1200 cents. – The accidental for the pitch alteration by a septimal comma was devised by Guiseppe Tartini (1692-1770), the composer-violinist and researcher who first studied the production of difference tones by means of tuned double-stops.*

# Microtonal Pitch Repertoire of the 5-Valve F-Tuba

with valve slides 1, 2, 3, 4, and 5 tuned to the rational proportions 2/15, 1/15, 3/15 = 1/5, 5/15 = 1/3, and 5/30 = 1/6 of the open horn's length



# Horned Owl Sequence

## INTONATION STUDY

for two F-tubas with 5 valves

Wolfgang von Schweinitz
op. 53 (2010)

ca. 56

Tuba 1

Tuba 2

*poco a poco rallentando e diminuendo (sin' al fine)*

37

8

7 / 6 8 / 7 7 / 6 7 / 6

44

9 10

6 / 5 5 / 4 8 / 7 7 / 6 6 / 5

52

11

5 / 4 7 / 6 6 / 5 5 / 4

59

12 13

7 / 6 6 / 5 6 / 5 7 / 6 5 / 4

67

14

6 / 5 5 / 4 6 / 5

ca. 48

73

15

7 / 6 7 / 4 5 / 4 6 / 5 5 / 4 4 / 3

*pp* *p* *pp* *p*

*(ca. 90″)*