

Wolfgang von Schweinitz

# Plainsound Forest Song

Trio in 47-limit just intonation  
for Violin, customized French Horn, and 6-valve Tuba in F

op. 68  
(2022-2023)

for Sara Cubarsi, Christine Chapman, and Maxime Morel

**SCORE**  
and French Horn iPad performance part

**PLAINSOUND MUSIC EDITION**

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## PROGRAM NOTE

The 'Plainsound Forest Song' was composed in the summer weeks of 2022 and 2023 for Sara Cubarsi, Christine Chapman, and Maxime Morel. PART 1 features the microtonal potential of the 6-valve F-Tuba and of Christine Chapman's customized French Horn which is equipped with an additional quartertone valve. The violin part was inspired by Sara Cubarsi's extraordinary expertise in the field of microtonal just intonation, and in PART 2 the violin explores some novel melodies and harmonies associated with pitches that are tuned to the very high overtones °29, °31, °37, °41, °43, and °47.

## PERFORMANCE DURATION

circa 43 minutes

PART 1 : circa 14 minutes

PART 2 : circa 28 ½ minutes

PART 2 may also be performed on its own.

# TUNING INSTRUCTIONS

**VIOLIN:** The strings are tuned in non-tempered Pythagorean Fifths (frequency ratio 3/2).

## **Customized FRENCH HORN with 4 valves:**

Before carrying out the step-by-step tuning procedure, please make sure that you have a simple and efficient method to restore all the standard valve slide positions, either by marking them, by measuring them, or by retuning them by ear with a synthesizer or piano in Equal Temperament. – The open F horn is tuned with harmonics 5 & 10 to the pitch of the violin's A string. The open B-flat horn is tuned with harmonics 3 & 6 to the pitches of the harmonics 4 & 8 of the open F horn. The F horn's 3<sup>rd</sup> valve slide (D horn) is tuned with harmonics 6 & 12 to the harmonics 5 & 10 of the open F horn. The B-flat horn's 3<sup>rd</sup> valve slide (G horn) is tuned with harmonics 6 & 12 to harmonics 5 & 10 of the open B-flat horn. The B-flat horn's 2<sup>nd</sup> valve slide (A horn) is tuned with harmonic 8 to harmonic 10 of the open F horn (or to the pitch of the violin's A string). The F horn's 2<sup>nd</sup> valve slide (E horn) is tuned with harmonic 8 to harmonic 6 of the A horn or to harmonic 9 of the D horn. The F horn's 1<sup>st</sup> valve slide (for the 17-limit E-flat horn) is tuned with harmonics 6 & 12 by employing the valve combination 1+2 (to get another identical D horn) to harmonics 5 & 10 of the open F horn (or to the pitch of the violin's A string). The B-flat horn's 1<sup>st</sup> valve slide (for the 17-limit A-flat horn) is tuned with harmonics 6 & 12 by employing the valve combination 1+2 (to get another identical G horn) to harmonics 5 & 10 of the open B-flat horn (or to the pitch of the violin's D-string). The horn must be equipped with a 4<sup>th</sup> valve (stopping valve) with an extra-short custom-built slide to lower the pitch of the open B-flat horn by a 31-limit Quartertone (31/30, or 57 cents) by prolonging the B-flat horn's tube length by 1/30 of the open horn's length (circa 10 cm). The quartertone valve slide is tuned with harmonic 11 by employing the valve combination 2+4 (on the B-flat side of the horn) to harmonic 10 of the open B-flat horn. – Please see next page!

## **6-valve TUBA in F:**

Before carrying out the step-by-step tuning procedure, please make sure that you have a simple and efficient method to restore all the standard valve slide positions, either by marking them, by measuring them, or by retuning them by ear with a synthesizer or piano in Equal Temperament. – The open horn (5-limit F comma up) is tuned with harmonic 5 to the violin's A string. The 3<sup>rd</sup> valve slide (D) is tuned with harmonic 6 to harmonic 5 of the open horn. The 2<sup>nd</sup> valve slide (E) is tuned with harmonic 8 to harmonic 9 played with valve 3. The 1<sup>st</sup> valve slide (for the utonal 17-limit E-flat) is tuned by employing valve combination 1+2 (to get another identical D horn) with harmonic 6 to harmonic 5 of the open horn. The 4<sup>th</sup> valve slide (5-limit C comma up) is tuned with harmonic 8 to the open horn's harmonic 6. Then the 5<sup>th</sup> valve slide is tuned by employing valve combination 4+5 (5-limit B-flat comma up) with harmonics 6 & 9 to harmonics 4 & 6 of the open horn. The 6<sup>th</sup> valve slide is tuned with valve combination 4+6 (B) with harmonics 4 & 8 to harmonics 3 & 6 played with valve 2. – Please see next page!



# Microtonal ACCIDENTALS for JUST INTONATION

## The revised Helmholtz-Ellis JI Pitch Notation HEJI 2020

The intended tuning of each note is spelled out in this score with the following harmonically defined accidentals:

Prime Harmonic 3	$\flat\flat$ $\flat$ $\natural$ $\sharp$ $\times$	Pythagorean series of non-tempered perfect fifths	
Prime Harmonic 5	$\flat\flat$ $\flat$ $\natural$ $\sharp$ $\times$ $\flat\flat$ $\flat$ $\natural$ $\sharp$ $\times$	Alteration by one syntonic comma (81/80)	21.5 cents
Prime Harmonic 5	$\flat\flat$ $\flat$ $\natural$ $\sharp$ $\times$ $\flat\flat$ $\flat$ $\natural$ $\sharp$ $\times$	Alteration by two syntonic commas	43.0 cents
Prime Harmonic 5	$\flat\flat$ $\flat$ $\natural$ $\sharp$ $\times$ $\flat\flat$ $\flat$ $\natural$ $\sharp$ $\times$	Alteration by three syntonic commas	64.5 cents
Prime Harmonic 7	$\flat$ $\natural$	Alteration by one septimal comma (64/63)	27.3 cents
Prime Harmonic 7	$\flat$ $\natural$	Alteration by two septimal commas	54.5 cents
Prime Harmonic 11	$\flat$ $\natural$	Alteration by one undecimal quartertone (33/32)	53.3 cents
Prime Harmonic 13	$\flat$ $\natural$	Alteration by one tridecimal thirdtone (27/26)	65.3 cents

Prime Harmonic 17	≈	≉	Alteration by one 17-limit schisma (2187/2176)	8.7 cents
Prime Harmonic 19	↘	↙	Alteration by one 19-limit schisma (513/512)	3.4 cents
Prime Harmonic 23	↓	↑	Alteration by one 23-limit comma (736/729)	16.5 cents
Prime Harmonic 29	⇓	⇑	Alteration by one 29-limit sixtitone (261/256)	33.5 cents
Prime Harmonic 31	↙	↘	<b>Alteration by one 31-limit quartertone (32/31)</b>	<b>55.0 cents</b>
Prime Harmonic 37	↙	↘	<b>Alteration by one 37-limit quartertone (37/36)</b>	<b>47.4 cents</b>
Prime Harmonic 41	-	+	Alteration by one 41-limit comma (82/81)	21.2 cents
Prime Harmonic 43	▼	▲	Alteration by one 43-limit comma (129/128)	13.5 cents
Prime Harmonic 47	⌵	⌶	Alteration by one 47-limit quartertone (752/729)	53.8 cents

CENTS: The HEJI accidentals may be combined with an indication of their deviation in cents from Equal Temperament.

These accidentals for Just Intonation were devised in collaboration with Marc Sabat in the early 2000s and revised in 2020 by Marc Sabat and Thomas Nicholson in collaboration with Catherine Lamb and M.O. Abbott

# The Helmholtz-Ellis JI Pitch Notation HEJI 2020

Harmonic / Subharmonic series  $^{\circ}1\text{-}^{\circ}49$  notated by modifications of Pythagorean notes

*atonal notation above Pythagorean A*

8<sup>ba</sup>  $\lrcorner$

Staff 1 (Bass clef): +2, +2, +4, +51, +2, -14, -31, -14, -59, -31, -12

Staff 2 (Treble clef): +5, +4, +51, +28, +2, +6, +30, -2, -14, -29, -27, -59, -31, -12, -55

Staff 3 (Treble clef): +53, +5, +4, +51, +29, +12, +51, +28, +66, +2, -45, -2, -58, -14, -29, -10, -62

*atonal notation below Pythagorean E*

1 8<sup>va</sup>  $\lrcorner$

Staff 1 (Treble clef): +2, +2, +16, +33, +2, +16, +61, +33, +14, +2, -2, -49

Staff 2 (Bass clef): +4, +16, +31, +29, +61, +33, +14, +57, +2, -3, -2, -49, -26, -4, -28

Staff 3 (Bass clef): +47, +4, +59, +16, +31, +12, +64, -51, -3, -2, -49, -27, -10, -49, -26, -64

# Microtonal Pitch Repertoire of the 4-Valve French Horn

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

Notation in F

## B-flat Horn

The score displays the microtonal pitch repertoire for a 4-valve French Horn with valve slides 1, 2, 3, and 4 tuned to specific rational proportions. The notation is in F major. The staves are labeled with their respective valve slide ratios: 30/30, 31/30, 31/30, 32/30, 33/30, 34/30, 35/30, and 36/30. Numerical values above the notes indicate pitch deviations in cents. Tuning pitches are marked with specific notes and text labels: "tuning pitch" for the 31/30 and 32/30 slides, "tuning pitch (for 4th valve slide)" for the 33/30 slide, and "tuning pitch (for 3rd & 1st valve slide)" for the 36/30 slide. The 31/30 and 32/30 slides also feature a  $+3c$  marking. The 33/30 slide includes a  $+3c$  marking and a  $+3c$  marking. The 34/30 slide includes a  $+3c$  marking. The 35/30 slide includes a  $+3c$  marking. The 36/30 slide includes a  $+3c$  marking.

37/30

38/30

39/30

40/30

41/30

41/30

42/30

43/30

*tuning pitch (for 4th valve slide)*

'46/45'

Diagrammatic symbols for fingerings and valve slides are placed above the notes on several staves, such as  $\text{B}_b^\bullet/\bullet$ ,  $\text{F}_2^\circ/\bullet$ ,  $\text{B}_b^\bullet/\bullet$ ,  $\text{F}_2^\circ/\bullet$ ,  $\text{B}_b^\bullet/\bullet$ ,  $\text{F}_2^\circ/\bullet$ ,  $\text{B}_b^\bullet/\bullet$ ,  $\text{F}_2^\circ/\bullet$ ,  $\text{B}_b^\bullet/\bullet$ , and  $\text{F}_2^\circ/\bullet$ .

# Microtonal Pitch Repertoire of the 4-Valve French Horn

with valve slides 1, 2, 3, and 4 tuned to the rational proportions  $2/15 = 4/30$ ,  $1/15 = 2/30$ ,  $1/5 = 6/30$ , and  $1/40$  of the open F horn's length

Notation in F

## F Horn

The score displays microtonal pitch adjustments for various valve slides. The adjustments are indicated by numbers above the notes, such as +13.7, +15.6, +17.6, +0.0, +65.0, +15.6, -45.8, -17.5, +2.0, +13.7, -29.1, +67.3, -24.4, -22.4, -38.1, -22.4, -55.5, -24.4, -20.5, -38.1, +27.0, -22.4, -83.8, -55.5, -36.1, -24.4, -29.1, -27.1, -29.1, -42.7, -27.1, -60.2, -29.1, -25.2, -42.7, +22.3, -27.1, -88.5, -60.2, -40.8, -29.1, +2.0, +3.9, +2.0, +2.0, -11.7, +3.9, -29.2, +2.0, +5.9, -11.7, +53.3, +3.9, -57.5, -29.2, -9.8, +2.0, -38.1, +63.0, +65.0, +31.9, +63.0, +67.0, +49.4, +114.4, +65.0, +3.6, +31.9, +51.3, +63.0, -3.0, -3.0, -1.0, -3.0, -16.7, -1.0, -34.2, -3.0, +0.9, -16.7, +48.3, -1.0, -62.5, -34.2, -14.7, -3.0, -40.8, +63.4, +65.3, +63.4, +49.7, +65.3, +32.2, +63.4, +67.3, +49.7, +114.7, +65.3, +3.9, +32.2, +51.7, +63.4, -2.0, -2.0, +0.0, -2.0, -15.6, +0.0, -33.1, -2.0, +2.0, -15.6, +49.4, +0.0, -61.4, -33.1, -13.7, -2.0.

tuning pitch

tuning pitch (for the 3rd & 1st valve slide)

F#<sub>2</sub> ●●/●  
F#<sub>2</sub> ○●/●

147/120

+62.3 +62.3 +64.3 +62.3 +48.7 +64.3 +31.2 +62.3 +66.3 +48.7 +113.7 +64.3 +2.9 +31.2 +50.6 +62.3

tuning pitch (for 4th valve slide)

F#<sub>2</sub> ●●

152/120

+4.4 +4.4 +6.4 +4.4 -9.2 +6.4 -26.7 +4.4 +8.4 -9.2 +55.8 +6.4 -55.0 -26.7 -7.3 +4.4

F#<sub>2</sub> ●●/●

155/120

+70.6 +70.6 +72.6 +70.6 +56.9 +72.6 +39.4 +70.6 +74.5 +56.9 +121.9 +72.6 +11.1 +39.4 +58.9 +70.6

F#<sub>2</sub> ●●/●

155/120

+70.6 -32.2 -30.2 -32.2 -45.9 -30.2 -63.4 -32.2 -28.3 -45.9 +19.1 -30.2 -91.7 -63.4 -43.9 -32.2

F#<sub>2</sub> ●●

160/120

+15.6 +15.6 +17.6 +15.6 +2.0 +17.6 -15.5 +15.6 +19.6 +2.0 +67.0 +17.6 -43.8 -15.5 +3.9 +15.6

F#<sub>2</sub> ○●/● F#<sub>2</sub> ○●/●↑ +1c F#<sub>2</sub> ○●/●↓ -6c

163/120

-16.5 +84.4 -22.4 -20.5 -22.4 -36.1 -20.5 -53.6 -22.4 -18.5 -36.1 +28.9 -20.5 -81.9 -53.6 -34.1 -22.4

'244/165'

F#<sub>2</sub> ●●

168/120

+31.2 +31.2 +33.1 +31.2 +17.5 +33.1 +0.0 +31.2 +35.1 +17.5 +82.5 +33.1 -28.3 +0.0 +19.4 +31.2

F#<sub>2</sub> ●●/●

171/120

+0.5 +0.5 +2.5 +0.5 -13.2 +2.5 -30.6 +0.5 +4.4 -13.2 +51.8 +2.5 -58.9 -30.6 -11.2 +0.5

# Microtonal Pitch Repertoire of the 6-Valve F-Tuba

with valve slides 1, 2, 3, 4, 5, and 6 tuned to the rational proportions  $2/15 = 12/90$ ,  $1/15 = 6/90$ ,  $1/5 = 18/90$ ,  $1/3 = 30/90$ ,  $1/6 = 15/90$ , and  $4/45 = 8/90$  of the open horn's length

The image displays a musical score for a 6-valve F-tuba, illustrating its microtonal pitch repertoire. The score is organized into 11 staves, each representing a different valve combination. The staves are labeled on the left with their respective valve configurations and corresponding ratios to the open horn's length:

- Staff 1: 90/90 (8<sup>va</sup>)
- Staff 2: 96/90 (8<sup>va</sup>)
- Staff 3: 98/90 (8<sup>va</sup>)
- Staff 4: 102/90 (8<sup>va</sup>)
- Staff 5: 104/90 (8<sup>va</sup>)
- Staff 6: 105/90 (8<sup>va</sup>)
- Staff 7: 108/90 (8<sup>va</sup>)
- Staff 8: 110/90 (8<sup>va</sup>)
- Staff 9: 111/90 (+1c, 8<sup>va</sup>)

Each staff contains musical notation (notes and rests) with numerical values indicating the microtonal pitch deviation in cents. The values are as follows:

Staff	Ratio	Valve	Microtonal Pitch Deviation (Cents)
1	90/90	8 <sup>va</sup>	+13.7, +13.7, +15.6, +13.7, +0.0, +15.6, -17.5, +13.7, +17.6
2	96/90	8 <sup>va</sup>	+2.0, +2.0, +3.9, +2.0, -11.7, +3.9, -29.2, +2.0, +5.9
3	98/90	8 <sup>va</sup>	+66.3, +66.3, +68.2, +66.3, +52.6, +68.2, +35.1, +66.3, +70.2
4	102/90	8 <sup>va</sup>	-3.0, -3.0, -1.0, -3.0, -16.7, -1.0, -34.2, -3.0, +0.9
5	104/90	8 <sup>va</sup>	+63.4, +63.4, +65.3, +63.4, +49.7, +65.3, +32.2, +63.4, +67.3
6	105/90	8 <sup>va</sup>	+46.8, +46.8, +48.8, +46.8, +33.1, +48.8, +15.6, +46.8, +50.7
7	108/90	8 <sup>va</sup>	-2.0, -2.0, +0.0, -2.0, -15.6, +0.0, -33.1, -2.0, +2.0
8	110/90	8 <sup>va</sup>	-33.7, -33.7, -31.8, -33.7, -47.4, -31.8, -64.9, -33.7, -29.8, -47.4, +17.6
9	111/90	+1c, 8 <sup>va</sup>	-49.4, +51.7, +51.7, +53.6, +51.7, +38.0, +53.6, +20.5, +51.7, +55.6

This musical score consists of eight staves, each representing a different instrument or voice part. Each staff is labeled with a measure number on the left and a numerical value above the first note. The values range from -13.0 to +88.4. Many notes are marked with an octave sign (8va) and a sharp or flat symbol. The staves are arranged vertically, with the top staff labeled 113/90 and the bottom staff labeled 123/90. The numerical values are: 113/90: -2c, +19.7, -82.5, -82.5, -80.5, -82.5, -96.2, -80.5, -113.7, -82.5, -78.6, -96.2, -31.2; 114/90: +4.4, +4.4, +6.4, +4.4, -9.2, +6.4, -26.7, +4.4, +8.4, -9.2; 116/90: +4c, -25.7, -21.4, -21.4, -19.4, -21.4, -35.1, -19.4, -52.6, -21.4, -17.5, -35.1; 117/90: +59.4, +59.4, +61.4, +59.4, +45.8, +61.4, +28.3, +59.4, +63.4, +45.8; 119/90: +30.1, +30.1, +32.1, +30.1, +16.4, +32.1, -1.0, +30.1, +34.0, +16.4; 120/90: +15.6, +15.6, +17.6, +15.6, +2.0, +17.6, -15.5, +15.6, +19.6, +2.0; 122/90: -3c, -13.0, +84.4, +86.4, +84.4, +70.8, +86.4, +53.3, +84.4, +88.4, +70.8; 123/90: +5c, -27.1, -22.4, -20.5, -22.4, -36.1, -20.5, -53.6, -22.4, -18.5, -36.1; 123/90: -27.1, -27.1, -25.2, -27.1, -40.8, -25.2, -58.3, -27.1, -23.2, -40.8.

125/90 +45.0 +45.0 +46.9 +45.0 +31.3 +46.9 +13.8 +45.0 +48.9 +31.3

126/90 +31.2 +31.2 +33.1 +31.2 +17.5 +33.1 +0.0 +31.2 +35.1 +17.5 +82.5

128/90 +3.9 +3.9 +5.9 +3.9 -9.8 +5.9 -27.3 +3.9 +7.8 -9.8 +55.2

129/90 -1c -9.6 -10.8 -8.9 -10.8 -24.5 -8.9 -42.0 -10.8 -6.9 -24.5 +40.5

131/90 +1c -36.2 +65.0 +67.0 +65.0 +51.3 +67.0 +33.8 +65.0 +68.9 +51.3 +116.3

132/90 -49.4 -49.4 -47.4 -49.4 -63.0 -47.4 -80.5 -49.4 -45.5 -63.0 +2.0

134/90 -5c +24.6 +19.4 +21.4 +19.4 +5.8 +21.4 -11.7 +19.4 +23.4 +5.8 +70.8

135/90 +11.7 +11.7 +13.7 +11.7 -2.0 +13.7 -19.5 +11.7 +15.6 -2.0 +63.0 +13.7

137/90 +2c -13.7 -11.2 -9.2 -11.2 -24.9 -9.2 -42.4 -11.2 -7.3 -24.9 +40.1 -9.2

138/90

140/90

141/90

143/90

144/90

146/90

147/90

149/90

138/90 fret numbers: -26.3, -24.4, -26.3, -40.0, -24.4, -57.5, -26.3, -22.4, -40.0, +25.0, -24.4

140/90 fret numbers: +48.8, +48.8, +50.7, +48.8, +35.1, +50.7, +17.6, +48.8, +52.7, +35.1, +100.1, +50.7

141/90 fret numbers: -61.1, -59.1, -61.1, -74.8, -59.1, -92.3, -61.1, -57.2, -74.8, -9.8, -59.1

143/90 fret numbers: +12.1, +12.1, +14.0, +12.1, -1.6, +14.0, -19.1, +12.1, +16.0, -1.6, +63.4, +14.0, -47.4

144/90 fret numbers: +0.0, +0.0, +2.0, +0.0, -13.7, +2.0, -31.2, +0.0, +3.9, -13.7, +51.3, +2.0

146/90 fret numbers: -23.9, +73.2, +75.1, +73.2, +59.5, +75.1, +42.0, +73.2, +77.1, +59.5, +124.5, +75.1, +13.7

147/90 fret numbers: +64.3, +64.3, +66.3, +64.3, +50.6, +66.3, +33.1, +64.3, +68.2, +50.6, +115.6, +66.3

149/90 fret numbers: +40.9, -53.3, -51.3, -53.3, -67.0, -51.3, -84.4, -53.3, -49.4, -67.0, -2.0, -51.3

150/90 +29.3 +29.3 +31.3 +29.3 +15.6 +31.3 -1.8 +29.3 +33.2 +15.6 +80.6 +31.3 -30.1

152/90 +6.4 +6.4 +8.4 +6.4 -7.3 +8.4 -24.8 +6.4 +10.3 -7.3 +57.7 +8.4 -53.1

153/90 -5.0 -5.0 -3.0 -5.0 -18.6 -3.0 -36.1 -5.0 -1.0 -18.6 +46.4 -3.0 -64.4

155/90 +72.6 +72.6 +74.5 +72.6 +58.9 +74.5 +72.6 +76.5 +123.9 +74.5 +13.1

155/90 -3c +72.6 -30.2 -28.3 -30.2 -43.9 -28.3 -61.4 -30.2 -26.3 -43.9 +21.1 -28.3 -89.7

156/90 +61.4 +61.4 +63.4 +61.4 +47.7 +63.4 +30.3 +61.4 +65.4 +47.7 +112.7 +63.4 +2.0

158/90 -4c +39.4 -65.0 -63.0 -65.0 -78.7 -63.0 -96.2 -65.0 -61.1 -78.7 -13.7 -63.0 -124.5

159/90 -1c +28.4 -72.7 -70.8 -72.7 -86.4 -70.8 -103.9 -72.7 -68.8 -86.4 -21.4 -70.8 -132.2

161/90 +6.8 +6.8 +8.8 +6.8 -6.9 +8.8 -24.4 +6.8 +10.7 -6.9 +58.1 +8.8 -52.7

164/90 -25.2 -25.2 -23.2 -25.2 -38.8 -23.2 -56.3 -25.2 -21.2 -38.8 +26.2 -23.2 -84.6

164/90 -6c -25.2 +69.2 +71.2 +69.2 +55.6 +71.2 +38.1 +69.2 +73.2 +55.6 +120.6 +71.2 +9.8

165/90 -35.7 -35.7 -33.7 -35.7 -49.4 -33.7 -66.9 -35.7 -31.8 -49.4 +15.6 -33.7 -95.1 -66.9

167/90 -1c -56.5 -57.2 -55.2 -57.2 -70.9 -55.2 -88.4 -57.2 -53.3 -70.9 -5.9 -55.2 -116.7 -88.4

171/90 +2.5 +2.5 +4.4 +2.5 -11.2 +4.4 -28.7 +2.5 +6.4 -11.2 +53.8 +4.4 -57.0 -28.7

173/90 +2c -17.6 -15.6 -13.7 -15.6 -29.3 -13.7 -46.8 -15.6 -11.7 -29.3 +35.7 -13.7 -75.1 -46.8

179/90 -2c +23.3 +21.4 +23.4 +21.4 +7.7 +23.4 +9.8 +21.4 +25.3 +7.7 +72.7 +23.4 -38.1 +9.8

# Plainsound Forest Song

for Sara Cubarsi, Christine Chapman, and Maxime Morel

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op. 68 (2022-2023)

## PART 1

♩ = 120

The musical score is written for Violin, Horn in F, and Tuba. It begins with a 4/4 time signature and a tempo of 120 beats per minute. The Violin part starts with a dynamic of *f* and a *flautando* marking, moving to *p* and then *pp*. The Horn in F part starts with *f* and moves to *pp*. The Tuba part is mostly silent, with some notes appearing later. The score includes various musical notations such as slurs, accents, and dynamic markings. A notation key for the Horn in F part indicates that circles represent notes in F major (Bb, Bb, Bb, Bb, F#).

Violin

Horn in F

Tuba

Notation in F

*f* *p* *pp flautando*

*f* *p* *pp*

*pp*

3

*sempre non vibrato*

*p*

8/7

7/6

5

↑1 (+36c)

sonore

pp

pp

Chord diagrams:  
 Measure 5: F#4, Bb  
 Measure 6: F#4, Bb, Bb, Bb, F#4, F#4

Diagram below bass staff:  
 ↑0+4C

15:14  
(-119c)

7

↑1 (+36c)

Chord diagrams above piano staff:  
 Measure 7: Bb, F#4, Bb, F#4  
 Measure 8: Bb

Diagram below bass staff:  
 ↑0+4C

9

Musical score for measures 9-10. The top staff (treble clef) contains a 'v' marking and notes with slurs. The middle staff (treble clef) has 'F#4' chord symbols and notes. The bottom staff (bass clef) has notes and rests. Dynamic markings include 'pp' in the middle and bottom staves.

11

Musical score for measures 11-12. The top staff (treble clef) contains a 'v' marking and notes with slurs. The middle staff (treble clef) has 'F#4' and 'F#4 +3C' chord symbols and notes. The bottom staff (bass clef) has notes and rests. Dynamic markings include 'p sonore' and 'espr.'.

7/4                      56 : 55                      11/6                      7/4                      7:6    22:21    23:24  
 (-31 c)                      (-267 c) (-81 c)                      (74 c)

7/1                      23/4

○ ○ ○    ○ ○ ○    ○ ○ ○    ○ ○ ○    ● ● ● / ● ↑    ○ ○ ○    ● ● ● / ● ↑    ● ● ● / ● ↑ (14)    ○ ○ ○    ○ ○ ○ / ● ↑    ● ● ● / ● ↓    ○ ○ ○ / ● ↑  
 F<sub>4</sub>    F<sub>4</sub>    F<sub>4</sub>    F<sub>4</sub>    F<sub>4</sub> +3C    F<sub>4</sub>    F<sub>4</sub> +3C    F<sub>4</sub> +1C    F<sub>4</sub>    F<sub>4</sub> +5C    F<sub>4</sub> -6C    F<sub>4</sub> +5C

+84                      -22

↓ ○ -3C                      ↑ ○ +5C

25 : 24                      21 : 20  
 (-71 c)                      (-22 c)                      (-81 c)

mf marc.                      mf dolce                      p

mf marc.                      p > pp                      p

↑ ○ +5C                      ↑ ○ +5C

8:9 (-204 c) 20 : 21 (81 c) allarg.

17

9/3/1 15/9/5/2

*f* *mp* *p* *pp*

*mf* *p* *pp*

*mf* *p* *pp*

F# F# F# F# F# Bb

-5C -5C

a tempo The 11-limit Harmonic Region 33:34 (52 c)

20

*pp* *p* *espr.*

17/11/6 17/10/7

*pp* *pp*

Bb F# F# +1C Bb Bb Bb Bb Bb Bb Bb

+6C



27

espr.

33:34 17:18  
(52 c) (99 c)

Chord diagrams: Bb, Bb, F#, Bb, F#, Bb, F#, Bb, Bb

Diagrammatic changes: ↑ +6C, ↓ -4C, ↑ +6C, ↓ -4C, ↓ -4C, ↑ +6C, ↑ +6C

29

portamento

ord.

33:34 17:18  
(52 c) (99 c)

Chord diagrams: Bb, F#, Bb, Bb, F#, Bb, F#, Bb, F#, F#, F#, F#, F#, F#, F#, F#

Diagrammatic changes: ↓ -4C, ↑ +2C, ↓ -4C, ↑ +6C, ↓ -4C, ↑ +6C, ↑ +2C, ↓ -4C, ↑ +2C, ↑ +2C

65 : 64 allarg. a tempo  
(-29 c) 7/6 over 4

31 *f marcato* *f*

mf marcato 35:36 (49 c) 13:12 (-139 c) *f* 14:13 (-128 c) 12:11 (-151 c) 11:10 (-165 c)

*mf marcato* +2C -2C +6C +2C +2C

33 8/5 55:56 (31 c) port. 3 11/7 11/7 11/8 simile 39:40 (44 c)

*ff* *ff*

Bb F# +4C Bb F# +4C F# +4C F# +4C



14 : 13 13 : 12  
(-128 c) (-139 c)

17 : 16  
(-105 c)

39

7/4

*port.* *port.*

22 : 21 21 : 20 20 : 19 19 : 17  
(-81 c) (-84 c) (-89 c) (-193 c)

**f**

7/4

B $\flat$  - 4 C B $\flat$  B $\flat$  B $\flat$  B $\flat$

+6C +6C +6C +6C -2C

41

7/4

**mf** **mp** **mf** **f**

$\uparrow$  3 (+27 c)

6/5

F $\sharp$  B $\flat$  B $\flat$  - 6 C

+6C -2C -1C



48

18:17 (-99 c) 14:13 (-128 c) 11/6

17/8/3 7/6/2 13/11/4

*f* *p* *pp* *p* *mf* *f*

*gliss.*

13:14 (128 c) poco ritenuto

50

7/4

*gliss.* *mf* *gliss.* *p*

*gliss.*

*mf* *p*

The 13-limit Harmonic Region

a tempo

B major

52

*mf* *f marcato sempre*

*p* *f* *p*

*gliss.*

●○○/●↑ F#4 +4C    ○○○/●↓ F#4 -4C    ○○○/●↑ Bb4 +1C    ●○○/●↑ F#4 +4C    ○○○/●↓ F#4 -4C    ○○○ ○○○/●↑ F#4 Bb4 +1C    ○○○/●↓ F#4 -4C

○○ ○○○    ●○○    ○○○    ○○○    ○○○    ○○○    ○○○

↑○    ↑○    ↑○    ↑○    ↑○    ↑○    ↑○

+1C    +1C    +1C    +1C    +1C    +1C    +1C

54

●○○/●↑ F#4 +4C    ○○○/●↑ Bb4 +1C    ●○○/●↑ F#4 +4C    ○○○/●↓ F#4 -4C    ○○○/● Bb4    ●○○/●↑ F#4 +4C    ○○○/●↑ Bb4 +1C    ○○○/●↓ F#4 -4C    ●○○/●↑ F#4 +4C    ○○○/●↓ F#4 -4C

○○ ○○○    ○○○    ○○○    ○○○    ○○○    ○○○    ○○○    ○○○    ○○○    ○○○

↑○    ↑○    ↑○    ↑○    ↑○    ↑○    ↑○    ↑○    ↑○    ↑○

+1C    +1C    +6C    +1C    +1C    +1C    +1C    +1C    +2C    +6C

56

$\circ\circ/\bullet\uparrow$   $\bullet\circ\circ/\bullet\uparrow$   $\circ\circ\circ/\bullet\downarrow$   $\circ\circ\circ/\bullet\uparrow$   $\bullet\circ\circ/\bullet\uparrow$   $\circ\bullet\bullet/\bullet$   $\bullet\circ\circ/\bullet\uparrow$   $\circ\bullet\bullet/\bullet$   $\bullet\circ\circ/\bullet\downarrow$   $\circ\bullet\bullet/\bullet$   
 $Bb +1C$   $F\# +4C$   $F\# -4C$   $Bb +1C$   $F\# +4C$   $Bb$   $F\# +4C$   $Bb$   $F\# -4C$   $Bb$

$\circ\circ 7$   $\circ\circ$   $\bullet\bullet$   $\circ\circ$   $\circ\circ 7$   $\bullet\bullet$   $\circ\circ$   $\bullet\bullet$   $\circ\circ$   $\bullet\bullet$   $\circ\circ$   $\bullet\bullet$   $\circ\circ$   $\bullet\bullet$   $\circ\circ$   
 $\uparrow\circ$   $\circ$   $\uparrow\circ$   $\circ$   $\uparrow\circ$   $\uparrow\circ$   $\circ$   $\uparrow\circ$   $\circ$   $\circ$   $\circ$   $\circ$   $\circ$   $\circ$   $\circ$   
 $+2C$   $+1C$   $+2C$   $+1C$   $+1C$

58

39:38 (-45 c)

$\bullet\circ\circ/\bullet\downarrow$   $\circ\bullet\bullet/\bullet$   
 $F\# -4C$   $Bb$

$\bullet\bullet$   $\circ\circ$   $\bullet\bullet 7$   $\circ\bullet 7$   $\bullet\bullet$   $\circ\circ$   $\bullet\bullet$   $\circ\circ$   $\bullet\bullet$   $\circ\circ$   $\bullet\bullet$   $\circ\circ$   $\bullet\bullet$   $\circ\circ$   $\bullet\bullet$   $\circ\circ$   
 $\uparrow\circ$   $\circ$   $\uparrow\circ$   $\bullet$   $\circ$   $\circ$   $\circ$   $\circ$   $\circ$   $\circ$   $\circ$   $\circ$   $\circ$   $\circ$   $\circ$   $\circ$   
 $+3C$   $+5C$   $-5C$

19:20 10:11  
(89c) (165c)

(+45c)

B-flat major

60

11/8/3

40:39 (-44c)

13/5/2

Chord diagrams:  $\circ \circ \circ / \bullet$  B $\flat$ ,  $\circ \circ \circ$  B $\flat$ ,  $\circ \circ \circ / \bullet$  B $\flat$ ,  $\bullet \circ \circ$  B $\flat$ ,  $\circ \circ \circ / \bullet$  B $\flat$ ,  $\circ \circ \circ / \bullet$  B $\flat$ ,  $\circ \circ \circ / \bullet$  B $\flat$ ,  $\circ \circ \circ \uparrow 7$  B $\flat$  +4C,  $\circ \circ \circ / \bullet$  B $\flat$ .

Dynamics: *mf*, *p*.

62

Chord diagrams:  $\circ \circ \circ \uparrow 7$  B $\flat$  +4C,  $\circ \circ \circ / \bullet$  B $\flat$ ,  $\bullet \circ \circ / \bullet \uparrow 14$  F $\sharp$  +4C,  $\circ \circ \circ / \bullet$  B $\flat$ ,  $\circ \circ \circ \uparrow 7$  B $\flat$  +4C,  $\circ \circ \circ \uparrow 9$  F $\sharp$  +1C,  $\circ \circ \circ / \bullet$  B $\flat$ ,  $\circ \circ \circ \uparrow 7$  B $\flat$  +0C,  $\circ \circ \circ / \bullet$  B $\flat$ ,  $\circ \circ \circ \uparrow 7$  F $\sharp$  +0C.

Dynamics: *p*.

39:40 10:11 40:39 39:38 19:18 65:64  
(44 c) (165 c) (-44 c) (-45 c) (-94 c) (-27 c)

64

*mf* *pp* *p*

○●●/● B $\flat$  ○●○7 F $\sharp$  + 0C ○●● $\sharp$ 7 B $\flat$  + 4C ○●○7 F $\sharp$  + 0C ○●○ $\uparrow$  F $\sharp$  + 1C ○●○7 F $\sharp$  + 0C ○●●/● B $\flat$

○●● $\uparrow$  +5C ○●○ -3C ○●● $\downarrow$  -6C ○●● $\downarrow$  -3C

15:14 28:27 27:26 13:12  
(-119 c) (-63 c) (-66 c) (-139 c)

66

*p* *espr.*

(right hand) ○●●/● B $\flat$  ○●○/● $\sharp$  F $\sharp$  - 8C ○●●/● B $\flat$  ○●○/ $\uparrow$ 13 F $\sharp$  + 0C ○●●/● B $\flat$  ○●○ B $\flat$  ○●○/● B $\flat$  ○●○/● $\sharp$  F $\sharp$  - 8C ○●●/● B $\flat$

○●● $\downarrow$  -6C ○●○ -3C ○●● $\downarrow$  -6C ○●○ $\uparrow$  +5C ○●○ -6C ○●○ $\uparrow$  +5C ○●● $\downarrow$  -6C ○●○ -3C ○●○ $\uparrow$  +1C ○●○ -6C ○●○ $\uparrow$  +5C ○●○ $\downarrow$  -6C ○●○ $\downarrow$  -3C





21:19 19:18  
(-173 c) (-94 c)

78

19/10/6 17/9/4

15:17  
(217 c)

17:16  
(-105 c)

80

32/17/6 15:17 (217 c)

82

21:19 (-173 c)

84

17/9

allarg. 7/4

mf

f

mf

f

mf

f

a tempo

allargando

21:20  
(-84c)

86

17/14/8      17/14/8      17/14/8      17/7/3

Chord diagrams for measures 86-91:

- Measure 86: Bb, Bb, Bb, F#
- Measure 87: Bb, Bb, F#
- Measure 88: Bb, Bb, F#
- Measure 89: Bb, F#
- Measure 90: Bb, F#
- Measure 91: F#, F#

♩ = 90

88

17/6/2      17/7/2

8va ad lib.

Chord diagrams for measures 88-91:

- Measure 88: v, v, v, v
- Measure 89: v, v, v, v
- Measure 90: v, v, v, v
- Measure 91: v, v, v, v

22 PART 2 The 17-limit Harmonic Region, with all the high primes up to  $^{\circ}47$

$\text{♩} = 90$

1

*sempre non vibr.*

*f* *sfz* *mf (piano intenso)*

17/4 3/2 9/7/3

Notation in F  $\bullet \circ \circ / \circ$   
F $\sharp$

*f* *p marcato*

*f* *p marcato*

3

27:28 (63 c) 28:29 (61 c) 29:30 (59 c) 25:26 (68 c) 26:27 (65 c)

9/5/4 7/4/3 29/17/12 5/3/2 5/3/2 13/8/5 9/5/4

$\bullet \circ \circ$  B $\flat$   $\bullet \circ \circ$  F $\sharp$   $\bullet \bullet \circ$  F $\sharp$   $\bullet \circ \circ$  F $\sharp$   $\bullet \circ \circ$  B $\flat$   $\bullet \circ \circ$  F $\sharp$   $\bullet \circ \circ$  B $\flat$   $\bullet \circ \circ$  F $\sharp$

27:28 (63 c)      28:29 (61 c)      29:30 (59 c)

5

7/4/3      29/17/12      5/3/2

B $\flat$       F $\sharp$       B $\flat$       B $\flat$       B $\flat$       B $\flat$       B $\flat$       F $\sharp$       B $\flat$       F $\sharp$

30:31 (57 c)      31:32 (55 c)      32:33 (53 c)

7

31/17/14      16/9/7      11/7/4

B $\flat$       B $\flat$       F $\sharp$       F $\sharp$       F $\sharp$       F $\sharp$       B $\flat$       F $\sharp$       B $\flat$

9

34:35 (50 c)

35:36 (49 c)

36:37 (47 c)

5/3/2

12/7/5

37/20/17

11

37:38 (46 c)

38:39 (45 c)

39:40 (44 c)

19/12/7

6/5/1

13/9/4

9/7/3

10/7/3

40:41 (43 c)      41:42 (42 c)      42:43 (41 c)      43:44 (40 c)

41/24/17    12/9/4      7/4/3      43/27/16      11/9/2

Chord diagrams: F#1, Bb, F#1, Bb, Bb, Bb, F#1

44:45 (39 c)      45:46 (38 c)      46:47 (37 c)      47:48 (36 c)      48:49 (36 c)

9/7/4    5/3/2      23/14/9      47/33/14      12/7/5      7/4/3      16/11/5

Chord diagrams: Bb, F#1, Bb, F#1, Bb, F#1, Bb, F#1

18

48:47  
(36 c)

*p* (con molto d'arco)

16/11/5      47/33/14      47/32/15      47/30/17

B $\flat$    F $\sharp$    B $\flat$    F $\sharp$    B $\flat$    F $\sharp$    F $\sharp$

*pp*

*pp*

21

48:49  
(36 c)

47/28/19      47/27/20      7/4/3      49/27/22      49/32/17      49/33/16

B $\flat$    F $\sharp$    B $\flat$    F $\sharp$    B $\flat$    F $\sharp$    F $\sharp$

8

$\uparrow$  + 3C



29

●●● / ●↓  
B $\flat$  -1C

○●○ 9  
○●● ●↓  
○● -1C

31

●●○ F $\sharp$   
●●○ B $\sharp$   
●●○ F $\sharp$

○●○ ●●○ ●●○ ●●○ ●●○ ●●○ ●●○  
○●○ ●●○ ●●○ ●●○ ●●○ ●●○ ●●○

The 19-limit Harmonic Region, with primes  $^{\circ}13$ ,  $^{\circ}19$ ,  $^{\circ}29$ ,  $^{\circ}31$ , and  $^{\circ}37$

33

18:19 (94c)      19:18 (-94c)

*p* *espressivo*      *pp*

19/6/2      short and slow trills (19:18)

$F\sharp_4$        $F\sharp_4$        $F\sharp_4$        $B\flat$

*p*      *pp*      *pp*

35

36:37 (47c)      37:38 (46c)

*p*      *pp*      *pp*

9/5/4      37/22/15      19/11/8

$F\sharp_4$        $B\flat$        $F\sharp_4$

*p*      *pp*      *pp*

37

19/12/7      19/13/6      19/14/5      19/8/3      13/8/5      5/3/1

38:39 (45 c)      39:40 (44 c)

Chord diagrams for measures 37-40:

- Measure 37:  $B\flat$  (x02333)
- Measure 38:  $B\flat$  (x02333)
- Measure 39:  $F\sharp$  (x23232)
- Measure 40:  $F\sharp$  (x23232)

39

30:31 (57 c)      31:32 (55 c)      30:31 (57 c)      31:32 (55 c)      8:9 (204 c)

31/19/12      8/5/3      16/11/5      5/3/2      31/19/12      8/5/3

Chord diagrams for measures 39-42:

- Measure 39:  $B\flat$  (x02333)
- Measure 40:  $B\flat$  (x02333)
- Measure 41:  $F\sharp$  (x23232)
- Measure 42:  $B\flat$  (x02333)

41

18:19 (94 c)      32:31 (-55 c)      31:30 (-57 c)      10:9 (-182 c) *portamento*      32:31 (-55 c)      31:30 (-57 c)

31/19/12    5/3/2      16/11/5      31/19/12    5/3/2

F#    F#    Bb    F#    Bb    F#    F#    F#

43

**allargando**      **stringendo**      **a tempo**

10:9 (-182 c)      30:31 (57 c)      31:32 (55 c)      38:37 (-46 c)      37:36 (-47 c)

3/1      31/19/12    5/3/2      19/12/4    37/27/10      12/7/5

F#    F#    F#    F#      Bb    F#    Bb    F#

(85 c)

8va ad lib.

The Pythagorean Tetrachords in the 23-limit Harmonic Region, with primes <sup>0</sup>11, <sup>0</sup>23, <sup>0</sup>43 and <sup>0</sup>47

46

*f* *sfz* *caloroso*

23 : 22 (-77 c)

23/16/6 11/8/3

Adjust tuning to the tuba pitches!

$F\sharp$   $B\flat$   $B\flat$  +5C  $F\sharp$  -6C  $F\sharp$  +5C

*f* *f*

8/3

The pitches played on the tuba with valve combination 3+4 should be centered. All others are lipped up or down a bit.

$\uparrow 0 + 5C$  (centered)  $\uparrow 0 + 5C$

48

22 : 23 (77 c) 23 : 24 (74 c) 24 : 23 (-74 c)

23/15/8 24/15/8 23/14/9 23/20/3 23/15/8 23/11/6

$F\sharp$  -6C  $F\sharp$  +5C  $F\sharp$  -6C

$\uparrow 0 + 5C$   $\uparrow 0 + 5C$

50

23 : 22 (-77 c)

23 : 22 (-77 c)

23/8/3

11/8/3

11/8/3

○○○/●↑  
F# +5C

○○○/●↓(9)  
F# -3C

52

23 : 22 (-77 c)

23 : 22 (-77 c)

11 : 10 (-165 c)

15 : 16 (112 c)

23/8/3

11/8/3

23/8/3

11/8/3

8/5/3

○○○/●↓(8)  
F# -3C

○○○/●↑  
F# +5C

○○○/●↓  
F# -6C

*rfz*

*rfz*

23 : 24 (74 c)

46 : 47 (37 c)

47 : 48 (36 c)

8 : 9 (204 c)

27 : 28 (63 c)

54

↑ 2 2 3 2 2 2 3 4

*rfz* *rfz* *rfz* *rfz*

11/7/4 23/18/10 12/7/5 23/14/9 12/9/4 23/20/3 47/32/15 12/7/5 3/2/1 12/7/5

48 : 47 (-36 c)

47 : 46 (-37 c)

23 : 22 (-77 c)

56

2 1 1 1 2 4 1

*rfz* *rfz*

9/5/4 47/32/15 23/15/8 23/14/9 9/5/2 23/8/3 11/8/3

○○○/●↑ F# +5C ○○/●↓ F# -6C ○○○/●↑ F# +5C

44:45 (39 c)      45:44 (-39 c)      44:43 (-40 c)      43:42 (-41 c)      (-46 c)      28:27 (-63 c)

58

15/10/4      11/7/4      43/27/16      14/8/5      *espr. (molto d'arco)*      7/5/2      14/8/3

●●●/●↓      ●●●/●↑      ●●●/●↓      ○○○/●↑      ○●●/●↓      ●●●/●↓      ○○○/●↑  
 F#m -6C      Bb +5C      F#m -6C      F#m +5C      F#m -3C      F#m -6C      F#m +5C

○○  
○○  
●

○○  
○○  
●  
↑  
+5C

○○  
○○  
●  
↑  
+5C

27:46 (922 c)      18:23 (424 c)      24:23 (-74 c)      23:22 (-77 c)

60

18/8/3      23/8/3      9/6/1      *rfz*      23/16/6      23/11/6      *rfz*      23/15/8      11/6/5

○○○      ○○○/●↑      ●●●/●↓      ●●●/●↑  
 F#m      F#m +5C      F#m -6C      Bb +5C

○○  
○○  
●

○○  
○○  
●  
↑  
+5C

○○  
○○  
●

23 : 22 (-77 c)      23 : 22 (-77 c)      23 : 22 (-77 c)

62 *rfz* *rfz*

23/16/6      22/9/4      11/8/3 23/16/7 11/6/5      11/8/3      23/11/6

○○●/●↓      ○○○/●↑      ○○○/●↓  
F# -3C      F# +5C      F# -3C

○○  
○○  
↓●-3C

23 : 22 (-77 c)      9 : 8 (-204 c)      44 : 45 (39 c)      45 : 46 (38 c)

64 *rfz* *rfz*

23/8/3      23/11/6      22/12/5      11/3/2      22/8/3      22/12/5      11/8/3      5/3/2      23/12/11

○○●/●↓      ○○○/●↑      ○○○/●↓      ○○○/●↑      ○○○/●↓      ○○○/●↑      ○○○/●↓      ○○○/●↑      ○○○/●↓  
F# -6C      F# +5C      F# -3C      F# +5C      F# -3C      F# +5C      F# -3C      F# +5C      F# -3C

○○  
○○  
↑○+5C

○○  
○○  
↑○+5C

○○  
○○  
↓●-3C



The 41-limit Harmonic Region, with primes  $^{\circ}7$ ,  $^{\circ}11$ ,  $^{\circ}13$ ,  $^{\circ}19$ ,  $^{\circ}41$ ,  $^{\circ}43$ , and  $^{\circ}47$

**a tempo**

8:9 (204 c)      9:10 (182 c)

71

+24      4      1      2      3      1      4

*pp*  
22/8/3      11/8/3      11/8/3      11/8/3      33/22/9      22/16/7      22/13/6

○○○/●  
F# +0C (centered)

*f*      *pp*      *pp*

8va  
ad lib.  
+0C      *mp*

44:45 (39 c)      45:44 (-39 c)      44:45 (39 c)      45:44 (-39 c)      44:43 (-40 c)      43:42 (-41 c)      41:42 (42 c)      20:21 (84 c)

74

*p* flautando con molto d'arco

11/8/3      10/3      11/8/3      5/2      11/6/5      43/24/19      7/4/3      9/4/3      5/3/2

*p*      *p*

*p*

●●●(9)  
●●●  
●

77

20:21 (84 c)      40:39 (-44 c)      39:40 (44 c)      15:16 (112 c)      8:9 (204 c)      18:19 (94 c)      38:39 (45 c)      39:40 (44 c)      10:9 (-182 c)      6:7 (267 c)      21:20 (-84 c)

3/1      3/1      3/2      3/1      3/2      3/1      3/2      3/1      3/2      3/1      3/2

5/3/2      13/8/5      5/3/2      19/8/5      13/8/5      5/3/2      12/8/5      7/4/3      5/3/2

*espr.*

80

48:47 (-36 c)      48:49 (36 c)      48:47 (-36 c)

9/8/3      47/41/6      9/7/3      7/2      7/4      9/4/3      47/41/6

123:112 (-162 c)

$\circ \circ \circ / \circ$   $F\sharp$        $\circ \circ \circ / \bullet$   $F\sharp$        $\circ \circ \circ / \circ$   $F\sharp$        $\circ \circ \circ / \bullet$   $F\sharp$

83

48:47 (-36 c)      9:10 (182 c)      20:21 (84 c)      6:7 (267 c)      41:42 (42 c)

*pp*      *pp*      *pp*

9/7/3      47/41/6      7/6/4      5/3/2      7/4

ooo/•      ooo/o      ooo/•

F#      F#      F#

86

41:42 (42 c)      9:10 (182 c)      24:23 (-73 c)      48:47 (-36 c)

0 1 3 4 2 ↑1 (+81c) 2 3 2 2 3 2 2 3 2 2 3

41/32/9      7/4/3      10/7/3      23/14/9      47/27/20      47/28/19      47/32/15      47/44/6

*pp*      *pp*

27/20      28/19

24:23 (74 c)      23:22 (-77 c)      9:11 (347 c)      22:23 (77 c)    23:24 (74 c)      16:15 (-112 c)

89      2 1 3 2 1 2 1 1 3 1 3 1 1 2 2      ↓ 1 (-38 c) 2 1 2

23/20/3      23/14/9      11/8/3      22/14/9      10/8/3

45:43 (-79 c)    48:43 (-190 c)    43:42 (-41 c)      8:7 (-231 c)    42:41 (-42 c)      10:9 (-182 c)

92      1 1 2 1 1 2 1 0      4/4 0 1 4/4 0 0 4/4 0 4/4 4/4 0 3 4/4 3

43/24/19      7/4/3      41/32/9      7/6/1      10/7/3      5/3/2      12/7/5      9/7/2

40:41 (43 c)      40:41 (43 c)

*pp*      *pp*

The 5-limit and 31-limit Harmonic Regions

96

48:47 (-36 c)      9:10 (182 c)    20:21 (84 c)      6:7 (267 c)      40:41 (43 c)

3      3      3    3    0 4    1      4    2      3    1    4      0 ↓ 1 (-42 c)

9/8/3    47/32/15      7/6/4      7/4      41/25/16

*pp*

*pp*

*pp*

99

41:42 (42 c)      9:10 (182 c)    24:23 (-76 c)      48:47 (-36 c)      24:23 (-74 c)

1    1    3 4    2 ↑ 1 (+157c) 2 3    2 2    4 2    2    2    2    2    1    2    1

41/32/9    7/4/3      10/7/3      23/14/9      47/27/20      47/32/15      47/39/8      23/20/3      23/18/5

*pp*

*pp*

27/20

24:23 (-74 c)      16:15 (-112 c)      45:44 (-39 c)      44:43 (-40 c)

102

23/15/8    23/14/9    5/3/2    15/8/7    11/6/5    43/25/18    43/28/15

23/27/16    43/33/10

F#    F#    F#    F#    Bb    F#    F#    F#

25:27 (133 c)

27/16

43:42 (-41 c)      42:41 (-42 c)      41:42 (42 c)

105

43/39/4    7/6/1      41/32/9    7/6/1    14/9/5    7/4/3

F#    F#    F#    Bb    Bb    F#    Bb    F#    Bb    Bb    F#    Bb

*cantando*      *pp*

*pp*

40:39 (-44 c)      39:38 (-45 c)      18:19 (94 c)

108 *p* intenso (a bit softer than the horn)

26/9/2    26/7/3    19/5/2    19/14/5    19/13/6

F#   Bb   F#   F#   F#

*p* espressivo      dolce

110 36:37 (47 c)    37:38 (46 c)    38:39 (45 c)

19/12/7    19/10/9    19/11/8    37/22/15    37/21/16    37/25/12    19/12/7    13/7/3

F#   Bb   F#   F#

39:40 (44 c)      15:16 (112 c)      10:9 (-182 c)      9:8 (-204 c)

*molto flautando (still a bit softer than the horn)*

114

30:31 (57 c)      30:29 (-59 c)      30:31 (57 c)      31:29 (-115 c)

**f**

*p dolce*

*p dolce*

29:30  
(59 c)

116

1 (-115 c)

29/22/7      10/7/3

*pp*

*pp*

118

F#m Bb Bb F#m F#m F#m F#m F#m F#m Bb Bb F#m F#m Bb F#m F#m F#m F#m F#m F#m Bb

120

*sempre flautando*  
30/18/9/2

31:30 (-57 c)

*mp*

*pp*

122

30/9/2 30/18/9/2 62/27/8 31/10/4 30/9/4 30/9/4

31:30 (-57 c)

*mp*

*pp*

10

31:30  
(-57 c)

125

*p* e sempre flautando

30/18/9/2

30/9/4

*p*

31:30  
(-57 c)

○○○/●  
B $\flat$

○○●/●  
F $\sharp$

○○○  
○○○  
○  
*pp*

31:30  
(-57 c)

●●●  
○○○

31:30  
(-57 c)

10:9  
(-182 c)

127

15/5/3

10/6/3/2

15/7/3

15/6/5

31/16/15

○○○/●  
B $\flat$

○○●/●  
F $\sharp$

○○○/●  
B $\flat$

25:24  
(71 c)

○○●/●  
F $\sharp$

129

*p* *espressivo*

31:30 (-57 c)

31:30 (-57 c)

31/12/7

31/22/9

30/22/9

*pp*

*pp*

131

31:30 (-57 c)

30:29 (-59 c)

29:30 (59 c)

24:23 (-74 c)

15:16 (112 c)

16:17 (105 c)

15:17 (217 c)

17:18 (99 c)

15/10/6

29/20/9

23/14/9

15/11/6

17/11/6

3/2

B $\flat$

F $\sharp$

24:23 (-74 c)    23:16 (-628 c)    18:19 (94 c)    57:58 (30 c)    29:30 (59 c)

133

23/16/7    1/1    19/13/6    29/20/9    10/7/3

B $\flat$     F $\sharp$

20:21 (84 c)    14:15 (119 c)    28:29 (61 c)    29:30 (59 c)    30:31 (57 c)    31:30 (-57 c)    30:29 (-59 c)    29:28 (-61 c)    7:6 (-267 c) portamento

135

7/5/2    15/10/4    29/20/9    5/3    31/22/9    5/4    29/20/9    7/4    5/3    10/7/3

B $\flat$     F $\sharp$     B $\flat$     F $\sharp$

*mf*    *p*    *pp*    *mf*

