

*Double Horn in Bb and F
tuning in Just Intonation*

*microtonal accidentals designed by / mikrotonale Vorzeichen konzipiert von
Marc Sabat & Wolfgang von Schweinitz, 2004*

Marc Sabat, 2005

PLAINSOUND MUSIC EDITION

Double Horn in Bb and F / **Bb-Horn** : Tuning in Just Intonation

valves 1, 2, 3* (custom-built) are tuned to rational proportions (2/15, 1/15, 4/15) of the respective open horn's length producing, in various combinations, two Utonal Series of fundamental pitches with wavelengths in the proportions 15 : 16 : 17 : 18 : 19 : 20 : 21 : 22 with the two horns tuned a just perfect fourth (3:4) apart

* Alternately, the normal 3rd valve may be used, tuned to the proportion 3/15, so that the valve combination 1+2 and 3 are synonymous. In this case, the undertone tuning "22" will not be available, and the fingerings indicated for undertones 19 - 22 apply instead to 18 - 21

notated AT SOUNDING PITCH using the Extended Helmholtz-Ellis JI Pitch Notation accidentals designed by Marc Sabat and Wolfgang von Schweinitz, 2004

The musical score displays 15 numbered notes (15-22) for the Bb-Horn. Each note is shown on two staves: a bass clef staff on the left and a treble clef staff on the right. Numerical values above and below the notes indicate pitch adjustments in cents. Fingerings are indicated by numbers 1-4 and slurs. The notes are: 15 (Bb), 16 (B), 17 (Bb), 18 (B), 19 (Bb), 20 (B), 21 (Bb), and 22 (B).

Note	Staff	Adjustment (cents)	Fingering
15	Bass	+11.7, +11.7, +13.7, +11.7	1, 1, 2, 1
	Treble	-2.0, -19.4, -2.0	1, 1, 1
16	Bass	+2.0, +2.0, +3.9, +51.3, +2.0	1, 1, 2, 3, 1
	Treble	-13.7, -31.2, -13.7	1, 1, 1
17	Bass	-5.0, -5.0, -3.0, -5.0, -18.6, -3.0, -36.1, -5.0, -1.0, -18.6, -3.0, -64.4	1, 1, 2, 2, 3, 1, 2, 1, 2, 3, 1, 2
	Treble	+46.4	1
18	Bass	-3.9, -3.9, -2.0, -3.9, -17.6, -2.0, -35.1, -3.9, -17.6, +47.4, -2.0, -63.4, -35.1	1, 1, 2, 2, 3, 1, 2, 1, 2, 3, 1, 2
	Treble	-2.0, -35.1, -3.9, -17.6, -2.0, -63.4, -35.1	1, 1, 1, 1
19	Bass	+2.5, +2.5, +4.4, +2.5, +4.4, +2.5, +6.4, +53.8, +4.4	1, 1, 2, 2, 3, 1, 2, 3, 1
	Treble	-11.2, -28.7, -11.2, -57.0, -28.7, -9.2	1, 1, 1, 1, 1
20	Bass	+13.7, +13.7, +15.6, +13.7, +15.6, +13.7, +17.6, +65.0, +15.6, +2.0, +13.7	1, 1, 2, 2, 3, 1, 2, 3, 1, 2, 3
	Treble	-17.5, -45.8, -17.5	1, 1, 1
21	Bass	+29.2, +29.2, +31.2, +29.2, +15.5, +31.2, +29.2, +33.1, +15.5, +80.5, +31.2, +17.5, +29.2	1, 1, 2, 2, 3, 1, 2, 3, 1, 2, 3, 1, 2
	Treble	-2.0, -30.3, -2.0	1, 1, 1
22	Bass	-49.4, -51.3, -65.0, -49.4, -82.5, -51.3, -47.4, -65.0, -49.4, -110.8, -82.5, -63.0, -51.3, -46.3	1, 1, 2, 2, 3, 1, 2, 3, 1, 2, 3, 1, 2, 3
	Treble	-51.3, -51.3	1, 1

Double Horn in Bb and F / F-Horn : Tuning in Just Intonation

valves 1, 2, 3* (custom-built) are tuned to rational proportions (2/15, 1/15, 4/15) of the respective open horn's length producing, in various combinations, two Utonal Series of fundamental pitches with wavelengths in the proportions 15 : 16 : 17 : 18 : 19 : 20 : 21 : 22 with the two horns tuned a just perfect fourth (3:4) apart

* Alternately, the normal 3rd valve may be used, tuned to the proportion 3/15, so that the valve combination 1+2 and 3 are synonymous. In this case, the undertone tuning "22" will not be available, and the fingerings indicated for undertones 19 - 22 apply instead to 18 - 21

notated AT SOUNDING PITCH using the Extended Helmholtz-Ellis JI Pitch Notation accidentals designed by Marc Sabat and Wolfgang von Schweinitz, 2004

The musical score displays eight staves, numbered 15 to 22, representing different undertone tunings. Each staff contains two systems of notation: a bass clef system on the left and a treble clef system on the right. The notes are accompanied by numerical values in cents, indicating the pitch deviation from the standard equal-tempered scale. The staves are divided into three measures by vertical dashed lines. The notes are often beamed together, and some have accidentals. The numerical values range from -49.4 to +65.0 cents.

Staff	Measure 1 (Bass)	Measure 1 (Treble)	Measure 2 (Bass)	Measure 2 (Treble)	Measure 3 (Bass)	Measure 3 (Treble)
15	+13.7, +13.7, +15.6, +13.7, +15.6	-17.5	+13.7, +17.6, +65.0, +15.6	-45.8, -17.5	+2.0, +13.7	
16	+2.0, +2.0, +3.9, +2.0, +3.9	-11.7, -29.2	+2.0, +5.9, +53.3, +3.9	-57.5, -29.2, -9.8	+2.0, +6.9	
17	-3.0, -3.0, -1.0, -3.0, -16.7, -1.0	-34.2	+0.9, +48.3, -16.7, -1.0, -62.5, -34.2, -14.7	-3.0	+2.0, +0.9	
18	-2.0, -2.0, -2.0, -15.6	-33.1	+2.0, +49.4, -2.0, -15.6	-61.4, -33.1, -13.7	-2.0, +3.0, +2.0	-4.4
19	+6.4, +4.4, +6.4	-9.2, -26.7	+4.4, +8.4, +55.8, +6.4	-55.0, -26.7, -7.3	+4.4, +9.4, +8.4, +2.0	-9.2
20	+15.6, +15.6, +17.6, +15.6, +2.0, +17.6	-15.5	+15.6, +19.6, +2.0, +70.0, +17.6	-43.8, -15.5	+3.9, +15.6, +20.6, +19.6, +13.2, +2.0	
21	+33.1, +31.2, +17.5, +33.1	+31.2, +31.2	+35.1, +17.5, +82.5, +33.1	-28.3	+19.4, +31.2, +36.1, +35.1, +28.7, +17.5	
22	-49.4, -49.4, -47.4, -49.4, -63.0, -47.4, -80.5	-49.4	+2.0, -45.5, -63.0, -47.4, -108.8, -80.5, -61.1	-49.4, -44.4, -45.5, -51.9, -63.0		

Double Horn in Bb and F : Tuning in Just Intonation (RISING)

valves 1, 2, 3* (custom-built) are tuned to rational proportions (2/15, 1/15, 4/15) of the respective open horn's length producing, in various combinations, two Utonal Series of fundamental pitches with wavelengths in the proportions 15 : 16 : 17 : 18 : 19 : 20 : 21 : 22 with the two horns tuned a just perfect fourth (3:4) apart

* Alternately, the normal 3rd valve may be used, tuned to the proportion 3/15, so that the valve combination 1+2 and 3 are synonymous. In this case, the undertone tuning "22" will not be available, and the fingerings indicated for undertones 19 - 22 apply instead to 18 - 21

notated AT SOUNDING PITCH
using the Extended Helmholtz-Ellis JI Pitch Notation
accidentals designed by Marc Sabat and Wolfgang von Schweinitz, 2004

The image displays six staves of musical notation, each representing a different valve combination for a double horn. Each staff shows a note with a pitch deviation value and a rational proportion in a box. The notes are arranged in a sequence that corresponds to the Utonal Series 15:16:17:18:19:20:21:22.

- Staff 1: Note with pitch deviation -49.4 and proportion $\frac{2}{22}$.
- Staff 2: Note with pitch deviation +31.2 and proportion $\frac{2}{21}$.
- Staff 3: Note with pitch deviation +15.6 and proportion $\frac{2}{20}$.
- Staff 4: Note with pitch deviation +4.4 and proportion $\frac{2}{19}$.
- Staff 5: Note with pitch deviation -2.0 and proportion $\frac{2}{18}$.
- Staff 6: Note with pitch deviation -3.0 and proportion $\frac{2}{17}$.

At the bottom of the page, there is an additional staff showing a note with a pitch deviation of -51.3 and a proportion of $\frac{2}{22}$.

The image displays six staves of musical notation, each featuring a bass clef and a key signature of one sharp (F#). The notation includes notes, stems, and chord diagrams. Above each staff, fret numbers are provided in boxes, often accompanied by a numerical value. The fret numbers and values are as follows:

- Staff 1: +2.0 [2/16] and +29.2 [2/21]
- Staff 2: +13.7 [2/15] [2/20] and -47.4 [3/22]
- Staff 3: +2.5 [2/19] +33.1 [3/21] and -3.9 [2/18]
- Staff 4: +17.6 [3/20] and -5.0 [2/17]
- Staff 5: +6.4 [3/19]
- Staff 6: [2/16] [3/18] and -1.0 [3/17]

Chord diagrams are represented by circles on the staff lines, with solid dots for fretted notes and open circles for open strings. Some diagrams include a sharp sign (#) indicating a specific note's alteration.

The image displays six staves of musical notation, each featuring a note and a corresponding chord diagram. The notes are marked with numerical values and boxed ratios. The chord diagrams use open circles for natural notes and filled circles for sharps.

Staff 1: Note: $+11.7$ (ratio: $2/15$). Chord diagram: one filled circle below the staff.

Staff 2: Note: $+3.9$ (ratio: $3/16$). Chord diagram: two open circles below the staff.

Staff 3: Note: $+15.6$ (ratio: $3/15$, $3/20$, $4/20$). Chord diagram: two open circles and two filled circles below the staff.

Staff 4: Note: $+4.4$ (ratio: $4/19$, $3/19$). Chord diagram: two open circles and two filled circles below the staff.

Staff 5: Note: -63.0 (ratio: $5/22$). Chord diagram: two filled circles below the staff.

Staff 6: Note: $+17.5$ (ratio: $5/21$). Chord diagram: two open circles and one filled circle below the staff.

Additional notes and ratios on the staves:

- Staff 1: -49.4 (ratio: $4/22$, $3/22$) with chord diagram of two open circles and three filled circles.
- Staff 2: $+31.2$ (ratio: $4/21$, $3/21$) with chord diagram of two open circles and three filled circles.
- Staff 4: -2.0 (ratio: $4/18$, $3/18$) with chord diagram of two open circles and three filled circles.
- Staff 5: -3.0 (ratio: $4/17$, $3/17$) with chord diagram of two open circles and three filled circles.
- Staff 6: -51.3 (ratio: $4/22$) with chord diagram of two filled circles.

4/16 3/16

+2.0 5/20 +29.2 4/21 5/19

4/15 4/20

+13.7 3/15 6/22 5/18

4/19 6/21 5/17 4/18

+2.5 +33.1 -16.7 -3.9

6/20 5/22 5/16 4/17

+17.6 -65.0 -11.7 -5.0

6/19 5/21 7/22

+6.4 +15.5 -80.5

5/15 7/21 5/20 6/18 4/16 7/20 5/19 6/17

-15.5 -11.7 -1.0

The image displays a musical score with six staves, each containing a melodic line and a corresponding dot plot. The staves are labeled with various ratios and numerical values. The ratios are enclosed in boxes, and the numerical values are placed near the notes or dot plots. The staves are arranged vertically from top to bottom.

- Staff 1 (Bass Clef):** Ratios: 4/15 (+11.7), 8/22, 6/22, 7/19, 5/18.
- Staff 2 (Bass Clef):** Ratios: 6/16 (+3.9), 8/21, 6/21, 7/18, 5/17.
- Staff 3 (Bass Clef):** Ratios: 6/15, 6/20, 8/20 (+15.6), 9/22, 7/17, 5/16.
- Staff 4 (Treble Clef):** Ratios: 8/19, 6/19 (+4.4), 7/22, 9/21 (+35.1), 7/16, 5/15, 7/21, 6/18, 8/18.
- Staff 5 (Treble Clef):** Ratios: 9/20 (+19.6), 10/22, 7/15, 7/20, 8/17, 6/17.
- Staff 6 (Treble Clef):** Ratios: 9/19 (+8.4), 10/21 (+17.5), 8/22, 7/19, 7/19.

Numerical values associated with notes or dot plots include: -49.4, -26.7, -17.6, -33.1, -18.9, -45.5, -34.2, -13.7, -82.5, -29.2, -2.0, -63.0, -17.5, -3.0, -51.3, and -28.7.

The image displays six staves of musical notation, each featuring a treble clef staff with notes and a corresponding chord diagram below. The diagrams are labeled with ratios and numerical values. The ratios are enclosed in boxes, and the numerical values are placed near the diagrams. The staves are arranged vertically, and the ratios and values are distributed across them as follows:

- Staff 1:** Ratios: 8/16, 10/20, 6/16, 9/18, 11/22, 8/21, 7/18, 11/21, 10/19. Values: +2.0, +29.2, -35.1, +82.5, -9.2.
- Staff 2:** Ratios: 9/17, 8/15, 8/20, 6/15, 12/22, 7/17, 11/20, 10/18. Values: +0.9, +13.7, -47.4, -36.1, +67.0, -15.6.
- Staff 3:** Ratios: 8/19, 12/21, 9/21, 11/19, 7/16, 10/17, 13/22, 8/18. Values: +2.5, +5.9, +33.1, +55.8, -31.1, -16.7, -108.8, -3.9.
- Staff 4:** Ratios: 9/15, 9/20, 12/20, 10/22, 11/18, 13/21, 7/15, 10/16, 8/17. Values: +17.6, -65.0, +49.4, -28.3, -19.4, -11.7, -5.0.
- Staff 5:** Ratios: 12/19, 12/20, 10/21, 14/22, 11/17, 13/20. Values: -5.0, +15.5, -80.5, +48.3, -43.8.
- Staff 6:** Ratios: 10/15, 14/21, 9/18, 11/22, 12/18, 8/16, 10/20, 15/22, 13/19, 11/16, 11/21, 10/19, 9/17, 14/20, 12/17. Values: -61.1, -55.0, +53.3, +80.5, -15.5, -11.2, -1.0.

The image displays a musical score with seven staves, each containing notes, accidentals, and numerical data. The notes are on a treble clef staff with a key signature of one sharp (F#). The numerical data includes values like +11.7, -61.4, +65.0, etc., and ratios like 8/15, 15/21, 13/18, etc. The ratios are enclosed in boxes above the notes.

Staff 1: Notes with ratios 8/15, 15/21, 13/18, 16/22, 12/22, 11/15, 11/20, 14/19, 10/18. Values: +11.7, +19.4, -61.4, -49.4, +65.0, -26.7, -17.6.

Staff 2: Notes with ratios 12/16, 9/16, 15/20, 16/21, 12/21, 13/17, 13/18, 17/22, 14/18, 10/17, 13/22, 15/19. Values: +3.9, +3.9, -62.5, +53.8, -44.4, -33.1, -18.6, -110.8, -7.3.

Staff 3: Notes with ratios 12/15, 9/15, 16/20, 12/20, 17/21, 13/16, 11/18, 18/22, 14/17, 13/21, 15/18, 10/16. Values: +15.6, +36.1, +47.4, -57.5, -45.5, -34.2, -30.3, -13.7.

Staff 4: Notes with ratios 16/19, 12/19, 14/22, 17/20, 18/21, 11/17, 19/22, 13/20, 14/16, 15/17, 16/18, 12/18, 10/15, 14/21. Values: +4.4, -82.5, +20.6, +35.1, +46.4, -51.8, -45.8, -29.2, -14.7, -2.0.

Staff 5: Notes with ratios 17/19, 18/20, 19/21, 20/22, 13/19, 11/16, 15/22, 14/20, 16/17, 14/15, 15/16, 12/17. Values: +9.4, +19.6, +28.7, -63.0, -57.0, +51.3, -17.5, -9.8, -3.0.

Staff 6: Notes with ratios 17/18, 18/19, 19/20, 16/17, 12/17, 13/18, 16/22, 11/15, 14/19. Values: +3.0, +8.4, +13.2, +17.5, -63.4, -51.3, +63.0, -28.7.

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Musical staff with notes and ratios. The notes are: G4 (ratio 15/15, cents +2.0), A4 (ratio 16/16, cents +2.0), B4 (ratio 18/18, cents +2.0), C5 (ratio 20/20, cents +2.0), D5 (ratio 15/20, cents +2.0), E5 (ratio 16/21, cents +29.2), F5 (ratio 13/17, cents -64.4), G5 (ratio 17/22, cents -46.3), A5 (ratio 14/18, cents -35.1), B5 (ratio 15/19, cents -9.2), C6 (ratio 20/19, cents -9.2), D6 (ratio 19/18, cents -4.4).

Musical staff with notes and ratios. The notes are: E5 (ratio 16/15, cents +0.9), F5 (ratio 18/17, cents +6.9), G5 (ratio 17/16, cents +13.7), A5 (ratio 12/15, cents +13.7), B5 (ratio 16/20, cents +13.7).

Berlin, 10.5.2005