# OLE-HENRIK MOE: KRAV, FOR PERCUSSION AND ELECTRIC GUITAR.

WRITTEN FOR KJELL TORE INNERVIK AND ANDERS FØRRISDAL,

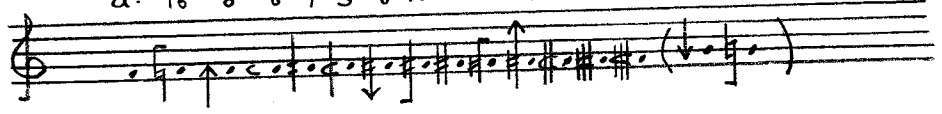
THE PIECE IS DEDICATED TO THE MEMORY OF THE NORWEGIAN PIONEER - COMPOSER AND GUITARIST, BJØRN FONGAARD 1919 - 1980.

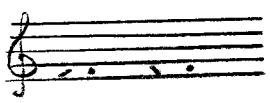
WRITTEN WITH FINANCIAL SUPPORT FROM NORSK KULTURRÅD.

## I. : GENERAL

### a) INTONATION

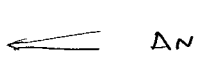
a: $\frac{1}{16}$ $\frac{1}{8}$ $\frac{1}{6}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{3}{8}$ $\frac{7}{16}$ $\frac{1}{2}$ $\frac{9}{16}$ $\frac{5}{8}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{5}{6}$ ($\frac{7}{8}$ $\frac{15}{16}$) - TONE HIGHER

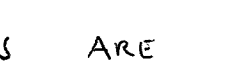


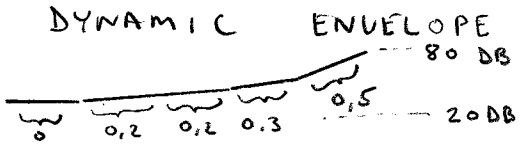
 = MEANS SMALLER PITCH-DEVIATIONS (SHARPER AND LOVER, RESPECTIVELY). THE FREQENCIES OF THESE TONES ARE ALWAYS GIVEN IN HERTZ IN THE "SPECTRUM-SECTION", ABOVE THE MUSIC-STAFF.

### b) DYNAMICS

DYNAMICS IS GIVEN IN DECIBELS (SPL), NOTATED BELOW THE MUSIC-STAFF, WITH THE TRADITIONAL CRECENDO AND DIMINUENDO SIGNS. THE DECIBEL-NUMBER INDICATES HOW LOUD THE INSTRUMENT SHOULD SOUND, ABOVE THE BACKGROUND NOISE-LEVEL IN THE ROOM, (WHICH SHOULD BE AS QUIET AS POSSIBLE), AT A DISTANCE TO THE (IDEAL) LISTENER OF ABOUT 3 METERS.

THE DYNAMIC PROGRESSION (OR ENVELOPE) IS NOTATED ON THE < AND > SIGNS, LIKE 

, WHERE THE NUMBERS ARE DERIVATIVES OF A CONTINUOUS PROGRESSION, WHERE 0 MEANS NO CHANGE, AND 1 STANDS FOR A TOTALLY LINEAR PROGRESSION. SO, GRAPHICALLY, A DYNAMIC ENVELOPE NOTATED LIKE: 

COULD LOOK LIKE: 


### c) TIMBRE

FOR THE PERCUSSION, THE TIMBRE IS NOTATED IN TWO WAYS: FOR THE "DENSITY-CLUSTER-SOUND" (  ), THE FUNDAMENTAL AND THE PARTIALS ARE NOTATED ALONG THE FREQUENCY-SPECTRUM-LINE, WHERE [ INDICATES THE RELATIONSHIP BETWEEN THE PARTIALS. FOR THE OTHER "SINGLE-BARS", THE TIMBRE IS NOTATED ON A SEPARATE LINE, WHERE THE FUNDAMENTAL AND PARTALS ARE NOTATED ON ONE SIDE, AND THE CORRESPONDING RELATIVE DECIBEL VALUES ARE ONE THE OTHER:

## TIMBRE, CONT.

| PARTIALS: ↓ | DB ↓ |
|---|---|
| F·3,2 | -10 |
| F·0,7 | -5 |
| F·1 | 0 |

F MEANS FUNDAMENTAL.

FOR THE GUITAR, THE PARTIALS ARE HARMONIC, SO THEREFORE THE PARTIALS ARE GIVEN WITH ROMAN NUMERALS (AND I. IS THEREFORE THE FUNDAMENTAL), ON ONE SIDE, AND WITH THE CORRESPONDING RELATIVE DECIBEL - VALUE ON THE OTHER.

THE TIMBRIC TRANSFORMATION IN THIS PIECE, IS IN A WAY EQUAL TO THE TRANSFORMATION BETWEEN THE DIFFERENT SOUND-STATES IN ITSELF, MEANING THAT THE STATES COULD BE REGARDED AS STATIC "ICONS" THAT TRANSFORM INTO THE NEXT IN A "CROSS-FADE"-MANNER.

THE PROGESSION OF TRANSFORMATION IS GIVEN IN A SEQUENCE OF NUMBERS (EX. (0 0,1 0,2 0,7), WHERE THE NUMBERS ARE DERIVATIVES, WHERE 0 MEANS NO CHANGE, AND 1 MEANS A TOTALLY LINEAR CHANGE. (THE NUMBER OF NUMBERS GIVES THE EQUAL-LENGTH-TIME-UNITS, AND THE SUM OF THE NUMBERS SHOULD ALWAYS BE EITHER 1 OR 0).

### d) TREMOLO, NOISE MODULATION AND AMPLITUDE MODULATION

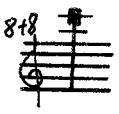
THE SPEED OF TREMOLO IS NOTATED IN CYCLES PER SECOND (HERTZ), JUST ABOVE THE MUSIC STAFF. AGAIN, THE PROGRESSION OF TRANSFORMATION IS NOTATED ALONG AN ARROW BETWEEN THE STATES, GIVING THE DERIVATIVES. AND, AGAIN, TRY TO DO THE TRANSFORMATIONS IN A CROSS-FADE MANNER, SO, INSTEAD OF DOING ACCELRANDOS AND RITARDANDOS BETWEEN THE SPEED-STATES, TRY TO DO "CROSS-FADE-INTERFERENCES" BETWEEN THEM.

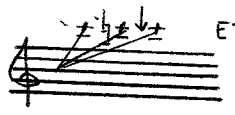
THERE WILL ALWAYS BE AN AMOUNT OF ATTACK-NOISE IN THE TREMOLO-ATTACKS, AND THE SPECTRUM OF THE DESIRED ATTACK-ENVELOPE IS GIVEN BY THE SPECTRAS MARKED MB. THE PERCENTAGE-NUMBER BELOW THE SPECTRUM GIVES THE DIFFERENCE IN LOUDNESS BETWEEN THE ATTACK-NOISE AND THE GENERAL SOUND.

LIKEWISE, THE THE SPECTRUM OF THE ENVELOPE OF AMPLITUDE-MODULATION IS GIVEN BY THE SPECTRUM MARKED MA. THE PERCENTAGE-NUMBER BELOW THIS SPECTRUM GIVES THE FALL IN LOUDNESS FROM LOUDEST TO WEAKEST IN THE PERIOD.

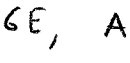
## II. : PERCUSSION

a) INSTRUMENTATION : THE INSTRUMENTATION CONSISTS ENTIRELY OF GLOCKENSPIEL - BARS, APART FROM PART Γ, THAT ALSO REQUIRES CROTALES AND HANDBELLS.

THE  MEANS A "SOUNDCLOUD" OF (AS MANY AS POSSIBLE!) FINELY-TUNED GLOCKENSPIEL - BARS OF DIFFERENT DENSITIES, WHERE THE DENSITY IS GIVEN AS SUBHARMONIC FREQUENCIES OF DIFFERENT (VERY HIGH) FREQUENCIES. THE DENSITY AT EACH (A, B, Γ, ETC.) STATE IS FOR THE FUNDAMENTAL GIVEN BY THE LETTER α, AND FOR THE CORRESPONDING PARTIALS WITH β AND γ. THE FILTER - WIDTH IS GIVEN BY THE [ AT THE FREQUENCY - SPECTRUM, WITH CORESPONDING RELATIVE DECIBEL - VALUES OF THE FILTER ON THE OTHER SIDE. TRY TO MAKE THESE "SOUNDCLOUDS" AS NEAR AS POSSIBLE TO THE DENSITIES INDICATED.

THE  ETC. MEANS (HERE 3) SINGLE BARS, WHERE THEIR EXACT FREQUENCIES ARE WRITTEN BELOW THE "SOUNDCLOUD"-SECTION ([), ON THE FREQUENCY - SPECTRUM

THE PERCUSSIONIST SHOULD TRY TO PLAY AS MANY TONES AT THE SAME TIME AS POSSIBLE, THIS COULD BE MADE EASIER BY USING MULTI-HEADED - MALLETS, AND BY ARRANGING THE BARS THAT ARE TO SOUND AT THE SAME TIME, AS CLOSELY AS POSSIBLE.

b) VARIABLE STATES : SOME STATES ARE A SET OF 2 OR MORE STATES. IN THESE SECTIONS THE MUSICIAN SHOULD ALTERNATE BETWEEN THE STATES IN A WAY THAT IS DESCRIBED IN THE VARIABILITY - MATRICES, WHERE THE NUMBERS INDICATE THE PROBABILITY FOR STATE n IN THE VERTICAL ROW TO BE FOLLOWED BY STATE n IN THE HORIZONTAL ROW. 0 MEANS 0 % PROBABILITY, 1 MEANS 100 % PROBABILITY.
THE "FV" UNDER THE MATRIX INDICATES THE AVERAGE SPEED (FREQUENCY) OF THE STATE - CHANGE, AND THE  INDICATES THE STATISTICAL VARIABILITY OF THE CHANGE - SPEED.



## III. : EL - GUITAR

a) PLAYING TECHINIQUE : DURING THE WHOLE PIECE, THE GUITARIST SHOULD PLAY ON (THE) 3 (UPPER) STRINGS, WITH A BOW, TREMOLO, AND WITH A PLAYING - ANGLE ON THE STRINGS THAT IS ALMOST PARALELL TO THE STRINGS, THAT WILL PRODUCE LONGITUDINAL VIBRATIONS ("SQUEAK - TONES"). THE FREQUENCIES ARE CONTROLLED BY THE QUALITY OF THE STRINGS (THICKNESS, DENSITY), AND THE LENGTH. TUNING IS OF MINOR IMPORTANCE. THUS, ONE COULD USE A FRETLESS GUITAR (HAWAII, OR LAP - STEEL, FOR INSTANCE), AND CONTROL THE LENGTH WITH A BOTTLENECK, ETC.. THE VARIATIONS IN MB, MA, AND TIMBRE IS DONE WITH VARIATIONS IN BOW - SPEED AND BOW - PRESSURE.

(EL - GUITAR, CONT.)

b) THE ELECTRONIC RESONATORS

THE GUITAR SHOULD (OR COULD(?)) BE COUPLED TO A SET OF ELEC - TRONIC RESONATORS, THAT WILL BE TRIGGERED BY THEIR DIFFERENT RESONANCE - FREQUENCIES. THESE RESONATORS WILL PRODUCE TONES THAT ARE FILTERED, SUBHARMONIC SPELTRAS OF VERY HIGH FREQUENCIES. THESE FREQUENCIES ARE GIVEN BY THE LETTER a, e AND i FOR THE FUNDA - MENTAL (I.), b, f AND j FOR THE SECOND PARTIAL, c, g AND k FOR THE THIRD (III.), AND d, h AND l FOR THE FOURTH (IV.) THE SOUND OF THE RESONATORS SHOULD BE 80 % OF THE GUITAR - SOUND, IN ADDITION TO THE ENTIRE GUITAR - SOUND. (SOMETIMES LETTERS a, b, c AND d ARE VALID FOR ALL THREE STRINGS.)

TO PROBABLY MAXIMISE THE EFFECT OF THESE RESONATORS, ONE COULD LET AN AMOUNT OF THE SOUND OF THEM BE MEDIATED BY ELECTROMAGNETIC WAVE - GENERATORS, AND, LET THE GENERATOR(S) GENERATE THESE DIFFERENT HIGH CARRIER FREQUENCIES (ENERGIES), AND LET THE RESONATOR - FILTER - FREQUENCY AMPLITUDE - MODULATE THE HIGH "CARRIER" - FREQUENCY SINUSODIALLY. THIS MUST, OF COURSE, ONLY BE DONE TO A DEGREE THAT JUST "SUBTLY" AMPLIFIES THE SOUND, BY, LETS SAY, UP TO 30 % OF THE GUITAR - SOUND. AND IT MUST NEVER EVER BE DONE IN A WAY THAT MAKES IS HAZARDOUS TO HEALTH.

## IV.: A LITTLE NOTE ON ROOM ACOUSTICS

THE LISTENERS SHOULD HAVE AS BIG AMOUNT OF DIRECT - SOUND AS POSSIBLE, AND THE REVERBATION - TIME SHOULD NOT BE LONGER THAN 1,5 METRIC SABINS.

$\alpha = 10^{12}$ $\beta = 2{,}5 \cdot 10^{12}$ $\gamma = 5 \cdot 10^{12}$

$S = \sum_{n=1}^{\infty} \left( \frac{\gamma}{n} \right)$ [15979,72 → -12 ; 14944,02 → -7 ; 14908,32 → -12]

$S = \sum_{n=1}^{\infty} \left( \frac{\beta}{n} \right)$ [11371,16 → -7 ; 11344,06 → -2 ; 11316,96 → -7]

$S = \sum_{n=1}^{\infty} \left( \frac{\alpha}{n} \right)$ [4196 → -5 ; 4186 → 0 ; 4176 → -5] (0 0 0 0 0,2 0,4 0,4)

4166,4 -3 ; 4156,8 -3 ; 4147,2 -3 ; 4137,6 -3 ; 4128 -3

F·3,25 | -7 ; F·2,75 | -2 ; F·1 | 0

$n = \{1, 2, 3, 4 \ldots\}$

MB: 32 → -26 ; 1 → 0 (0 0 0 0 0,1 0,3 0,6)

MA: 80% ; 32 → -26 ; 1 → 0 (0 0 0 0,1 0,1 0,2 0,2 0,4) ; -0,7%

♩ = 12

1.; I.: 9,6 (0 0 0 0 0,1 0,2 0,7) → 13 (0 0,01 0,03 0,06 0,2 0,7)

DUE 8 → (0 0 0 0 0,2 0,4 0,4) → (0 0 0 0,1 0,1 0,3 0,5)

110 (0 0 0 0,1 0,2 0,7) → 90 (0 0 0,1 0,2 0,2 0,5)

(A)

(B)

$\alpha = 5 \cdot 10^{11}$ $\beta = 7{,}5 \cdot 10^{11}$ $\gamma = 10^{12}$

$S = \sum_{n=1}^{\infty} \left( \frac{\gamma}{n} \right)$ [15979,72 → -12 ; 14944,02 → -7 ; 14908,32 → -12]

$S = \sum_{n=1}^{\infty} \left( \frac{\beta}{n} \right)$ [11371,16 → -7 ; 11344,06 → -2 ; 11316,96 → -7]

$S = \sum_{n=1}^{\infty} \left( \frac{\alpha}{n} \right)$ [4196 → -5 ; 4186 → 0 ; 4176 → -5] (0 0 0 0,1 0,1 0,3 0,5)

4158,5 -3 ; 3836,77 -5 ; 3754,46 -7 ; 3487,54 -9 ; 3322,92 -10 ; 3138,31 -12 ; 2891,38 -13 ; 2789,08 -15 ; 2459,84 -25 ; 1741,39 -27 ; 1596,76 -30

F·3,25 | -7 ; F·2,71 | -2 ; F·1 | 0

MB: 32 → -30 ; 1 → 0 (0 0 0 0,1 0,9)

MA: 70% ; 32 → -30 ; 1 → 0 (0 0 0 0,1 0,9) ; -0,4%

$S = \sum_{n=1}^{\infty} \left( \frac{\delta}{n} \right)$ [IV. 0] $\alpha = 10^{14}$ $b = 10^{15}$ $c = 5 \cdot 10^{15}$ $d = 10^{16}$

$S = \sum_{n=1}^{\infty} \left( \frac{c}{n} \right)$ [III. -2] F: I.: -5 DB / 0 / -5 DB ; -5 HZ CF +5 HZ SEMPRE

$S = \sum_{n=1}^{\infty} \left( \frac{b}{n} \right)$ [II. -5]

$S = \sum_{n=1}^{\infty} \left( \frac{\alpha}{n} \right)$ [I: 4297 → -10] (0 0 0 0 0,3 0,7)

$S = \sum_{n=1}^{\infty} \left( \frac{d}{n} \right)$ [IV. 0]

$S = \sum_{n=1}^{\infty} \left( \frac{c}{n} \right)$ [III. -2] F: I.: -5 DB / 0 / -5 DB ; -5 HZ CF +5 HZ SEMPRE

$S = \sum_{n=1}^{\infty} \left( \frac{b}{n} \right)$ [II. -5]

$S = \sum_{n=1}^{\infty} \left( \frac{\alpha}{n} \right)$ [I: 4260 → -10] (0 0 0 0 0,3 0,7)

$S = \sum_{n=1}^{\infty} \left( \frac{d}{n} \right)$ [IV. 0]

$S = \sum_{n=1}^{\infty} \left( \frac{c}{n} \right)$ [III. -2] F: I.: -5 DB / 0 / -5 DB ; -5 HZ CF +5 HZ SEMPRE

$S = \sum_{n=1}^{\infty} \left( \frac{b}{n} \right)$ [II. -5]

$S = \sum_{n=1}^{\infty} \left( \frac{\alpha}{n} \right)$ [I: 4223 → -10] (0 0 0 0 0,3 0,7)

$n = \{1, 2, 3, 4 \ldots\}$

MB: 32 → -19 ; 1 → 0 (0 0 0 0,3 0,7)

80%

MA: 32 → -15 ; 1 → 0 (0 0 0,1 0,2 0,3 0,4) ; -11%

$S = \sum_{n=1}^{\infty} \left( \frac{\delta}{n} \right)$ [IV. 0] $\alpha = 10^{12}$ $b = 5 \cdot 10^{12}$ $c = 10^{13}$ $d = 2{,}5 \cdot 10^{13}$

$S = \sum_{n=1}^{\infty} \left( \frac{c}{n} \right)$ [III. 0]

$S = \sum_{n=1}^{\infty} \left( \frac{b}{n} \right)$ [II. 0]

$S = \sum_{n=1}^{\infty} \left( \frac{\alpha}{n} \right)$ [I: 4273 → 0] (0 0 0,1 0,2 0,3 0,5)

$S = \sum_{n=1}^{\infty} \left( \frac{d}{n} \right)$ [IV. 0]

$S = \sum_{n=1}^{\infty} \left( \frac{c}{n} \right)$ [III. 0]

$S = \sum_{n=1}^{\infty} \left( \frac{b}{n} \right)$ [II. 0]

$S = \sum_{n=1}^{\infty} \left( \frac{\alpha}{n} \right)$ [I: 4244 → 0] (0 0 0,1 0,2 0,3 0,5)

$S = \sum_{n=1}^{\infty} \left( \frac{d}{n} \right)$ [IV. 0]

$S = \sum_{n=1}^{\infty} \left( \frac{c}{n} \right)$ [III. 0]

$S = \sum_{n=1}^{\infty} \left( \frac{b}{n} \right)$ [II. 0]

$S = \sum_{n=1}^{\infty} \left( \frac{\alpha}{n} \right)$ [I: 4215 → 0] (0 0 0,1 0,2 0,3 0,5)

8 → 2 → 1 → 0 (0 0 0 0,2 0,2 0,6)

70%

5 → -30 ; 3 → -18 ; 1 → 0 (0 0 0 0,1 0,3 0,6) ; -4%

♩ = 12

SUONI DI VIBRAZIONI LONGITUDINALI: FREGARE SEMPRE

CHIT. EL.

10 (0,3 0,3 0,4) → 9,6 (0 0,01 0,02 0,7 0,2 0,3 0,4) → 7 (0 0,01 0,03 0,06 0,1 0,3 0,5)

3. 2. 1. (0 0 0 0 0,3 0,7) → (0 0 0,1 0,2 0,3 0,5)

60 (0,2 0,3 0,5) → 120 (0,02 0,03 0,05 0,1 0,2 0,2 0,4) → 86 (0,01 0,02 0,07 0,1 0,1 0,1 0,2 0,4)

$S=\sum_{n=1}^{\infty}\left(\frac{\epsilon}{n}\right)$ 15243,82 — 14944,72 — 14503,61

$S=\sum_{n=1}^{\infty}\left(\frac{\delta}{n}\right)$ 11344,06 — 9944,77 — 9669,07

$S=\sum_{n=1}^{\infty}\left(\frac{\gamma}{n}\right)$ 9460,84 — 7870,86

$S=\sum_{n=1}^{\infty}\left(\frac{\beta}{n}\right)$ 5659,94 — 5637,79

$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ 4196 — 4186 — 4176 (0 0 0 0,1 0,2 0,7)

4156 4136 4116 4096 4076 4056 4036 4016 3996 3976

F·3,25 | 0 F·2,71 | 0 F·1 | 0

$\alpha=7\cdot10^{11}\ \beta=8\cdot10^{11}\ \gamma=2{,}5\cdot10^{13}\ \delta=7{,}5\cdot10^{13}\ \epsilon=5\cdot10^{14}$

$\alpha=10^{12}\ \beta=2{,}5\cdot10^{12}\ \gamma=5\cdot10^{12}$

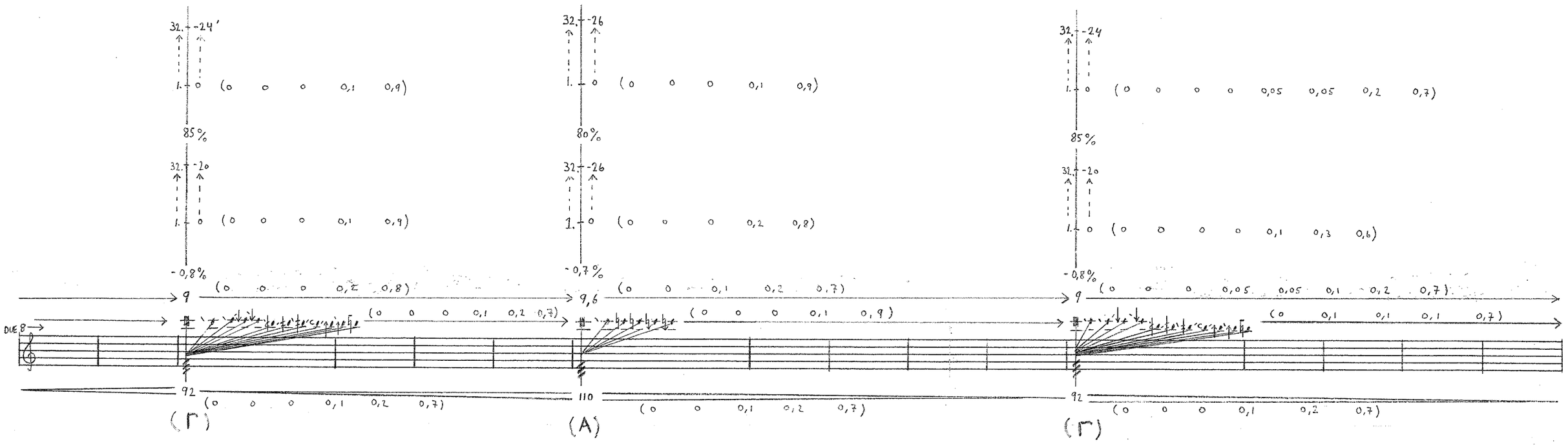
$S=\sum_{n=1}^{\infty}\left(\frac{\gamma}{n}\right)$ 15939,72 — 14944,02 — 14908,32

$S=\sum_{n=1}^{\infty}\left(\frac{\beta}{n}\right)$ 11371,16 — 11344,06 — 11316,96

$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ 4196 — 4186 — 4176 (0 0 0 0,1 0,9)

41664 4156,8 4147,2 4137,6 4128

F·3,25 | 7 F·2,71 | 2 F·1 | 0




$S=\sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)$ 4196 — 4186 — 4176 (0 0,1 0,1 0,1 0,7)

4156 4136 4116 4096 4076 4056 4036 4016 3996 3976

F·3,25 | 0 F·2,71 | 0 F·1 | 0

$\alpha=7\cdot10^{11}\ \beta=8\cdot10^{11}\ \gamma=2{,}5\cdot10^{13}\ \delta=7{,}5\cdot10^{13}\ \epsilon=5\cdot10^{14}$

$S=\sum_{n=1}^{\infty}\left(\frac{\epsilon}{n}\right)$ 15243,82 — 14944,72 — 14503,61

$S=\sum_{n=1}^{\infty}\left(\frac{\delta}{n}\right)$ 11344,06 — 9944,77 — 9669,07

$S=\sum_{n=1}^{\infty}\left(\frac{\gamma}{n}\right)$ 9460,84 — 7870,86

$S=\sum_{n=1}^{\infty}\left(\frac{\beta}{n}\right)$ 5659,94 — 5637,79

$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ 4196 — 4186 — 4176 (0 0,1 0,1 0,1 0,7)

4156 4136 4116 4096 4076 4056 4036 4016 3996 3976

F·3,25 | 0 F·2,71 | 0 F·1 | 0

$\alpha=10^{12}\ b=7\cdot10^{12}\ c=10^{13}\ d=7\cdot10^{14}$

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [IV.] 0

$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [III.] -2

$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [II.] -5

$S=\sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)$ [I.:4289] -10 (0 0 0,1 0,1 0,8)

32. -15
1. 0 (0 0 0,1 0,2 0,7)
80%
32. -12
1. 0 (0 0 0,2 0,2 0,6)
-6%

$\alpha=10^{14}\ b=10^{15}\ c=5\cdot10^{15}\ d=10^{16}$

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [IV.] 0

$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [III.] -2

$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [II.] -5

$S=\sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)$ [I.:4297] -10 (0 0 0,1 0,2 0,7)

32. -19
1. 0 (0 0 0,1 0,2 0,7)
80%
32. -19
1. 0 (0 0 0,1 0,3 0,6)
-11%

$\alpha=10^{12}\ b=7\cdot10^{12}\ c=10^{13}\ d=7\cdot10^{14}$

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [IV.] 0

$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [III.] -2

$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [II.] -5

$S=\sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)$ [I.:4258] -10 (0 0 0,1 0,1 0,8)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [IV.] 0

$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [III.] -2

$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [II.] -5

$S=\sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)$ [I.:4260] -10 (0 0 0,1 0,2 0,7)

32. -15
1. 0 (0 0 0,1 0,2 0,7)
80%
32. -12
1. 0 (0 0 0,2 0,2 0,6)
-6%

$\alpha=10^{12}\ b=7\cdot10^{12}\ c=10^{13}\ d=7\cdot10^{14}$

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [IV.] 0

$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [III.] -2

$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [II.] -5

$S=\sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)$ [I.:4217] -10 (0 0 0,1 0,1 0,8)

$S=\sum_{n=1}^{5}\left(\frac{d}{n}\right)$ [IV.] 0

$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [III.] -2

$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [II.] -5

$S=\sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)$ [I.:4223] -10 (0 0 0,1 0,2 0,7)

32. -19
1. 0 (0 0 0,1 0,2 0,7)
80%
32. -19
1. 0 (0 0 0,1 0,3 0,6)
-11%

$\alpha=10^{12}\ b=7\cdot10^{12}\ c=10^{13}\ d=7\cdot10^{14}$

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [IV.] 0

$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [III.] -2

$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [II.] -5

$S=\sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)$ [I.:4289] -10 (0 0 0,05 0,05 0,1 0,2 0,7)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [IV.] 0

$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [III.] -2

$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [II.] -5

$S=\sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)$ [I.:4258] -10 (0 0 0,05 0,05 0,1 0,2 0,7)

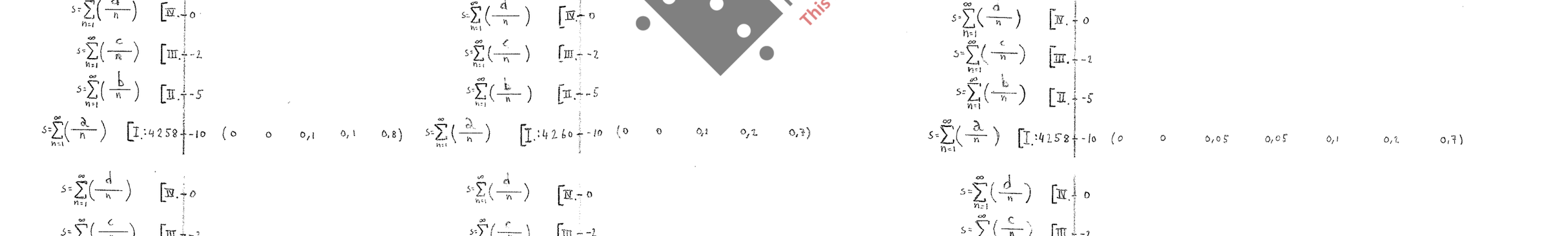
$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [IV.] 0

$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [III.] -2

$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [II.] -5

$S=\sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)$ [I.:4217] -10 (0 0 0,05 0,05 0,1 0,2 0,7)

32. -20
1. 0 (0 0 0 0,1 0,3 0,6)
80%
32. -12
1. 0 (0 0 0 0,1 0,3 0,6)
-6%



$\alpha = 5\cdot10^{11}\quad \beta = 7{,}5\cdot10^{11}\quad \gamma = 10^{12}$

$S=\sum_{n=1}^{\infty}\left(\frac{\gamma}{n}\right)$ [15979,72 -12; 14944,02 -7; 14908,32 -12]

$S=\sum_{n=1}^{\infty}\left(\frac{\beta}{n}\right)$ [11371,16 -7; 11344,06 -2; 11316,96 -7]

$S=\sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)$ [4196 -5; 4186 0; 4176 -5] (0 0 0 0,2 0,2 0,6)

4158,5 -3; 3836,77 -5; 3754,46 -7; 3487,59 -9; 3322,92 -10; 3138,31 -12; 2891,38 -13; 2789,08 -15; 2459,84 -25; 1741,39 -27; 1596,76 -30

F·3,21 | -7
F·2,71 | -2
F·1 | 0

32. -30
1. 0 (0 0 0,1 0,3 0,6)

70%

32. -30
1. 0 (0 0 0,1 0,3 0,6)

-0,4% (0 0 0 0,1 0,2 0,7)

13 (0 0 0 0,2 0,2 0,6)

87 (0 0 0,1 0,1 0,2 0,6)

(B)

$\alpha = 10^{12}$
$\beta = 2{,}5\cdot10^{12}$
$\gamma = 5\cdot10^{12}$

$S=\sum_{n=1}^{\infty}\left(\frac{\gamma}{n}\right)$ [15979,72 -12; 14944,02 -7; 14908,32 -12]

$S=\sum_{n=1}^{\infty}\left(\frac{\beta}{n}\right)$ [11371,16 -7; 11344,06 -2; 11316,96 -7]

$S=\sum_{n=1}^{12}\left(\frac{\alpha}{n}\right)$ [4196 -5; 4186 0; 4176 -5] (0 0 0,3 0,7)

4166,4 -3; 4156,8 -3; 4147,2 -3; 4137,6 -3; 4128 -3

F·3,21 | -7
F·2,71 | -2
F·1 | 0

32. -26
1. 0 (0 0 0 1)

80%

32. -26
1. 0 (0 0 0 1)

-0,7% (0 0 0 1)

9,6 (0 0 0,3 0,7)

110 (0 0 0 0,1 0,9)

(A)

$\alpha = 7\cdot10^{11}\quad \beta = 8\cdot10^{11}\quad \gamma = 2{,}5\cdot10^{13}\quad \delta = 7{,}5\cdot10^{13}\quad \epsilon = 5\cdot10^{14}$

$S=\sum_{n=1}^{\infty}\left(\frac{\epsilon}{n}\right)$ [15243,82 0; 14944,72 0; 14503,61 0]

$S=\sum_{n=1}^{\infty}\left(\frac{\delta}{n}\right)$ [11344,06 0; 9944,77 0; 9669,07 0]

$S=\sum_{n=1}^{8}\left(\frac{\gamma}{n}\right)$ [9460,84 0; 7870,86 0]

$S=\sum_{n=1}^{8}\left(\frac{\beta}{n}\right)$ [5659,94 0; 5637,79 0]

$S=\sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)$ [4196 -5; 4186 0; 4176 -5] (0 0 0,1 0,2 0,7)

4156 -3; 4136 -3; 4116 -3; 4096 -3; 4076 -4; 4056 -4; 4036 -4; 4016 -5; 3996 -5; 3976 -5

F·3,21 | 0
F·2,71 | 0
F·1 | 0

32. -24
1. 0 (0 0 0,05 0,05 0,1 0,3 0,5)

85%

32. -20
1. 0 (0 0 0,05 0,05 0,1 0,3 0,5)

-0,8% (0 0 0,1 0,3 0,6)

9 (0 0 0,1 0,2 0,7)

90 (0 0 0,1 0,2 0,7)

(Γ)

$\alpha = 5\cdot10^{11}\quad \beta = 7{,}5\cdot10^{11}\quad \gamma = 10^{12}$

$S=\sum_{n=1}^{\infty}\left(\frac{\gamma}{n}\right)$ [15979,72 -12; 14944,02 -7; 14908,32 -12]

$S=\sum_{n=1}^{\infty}\left(\frac{\gamma}{n}\right)$ [11371,16 -7; 11344,06 -2; 11316,96 -7]

$S=\sum_{n=1}^{\infty}\left(\frac{\gamma}{n}\right)$ [4196 -5; 4186 0; 4176 -5] (0 0 0 0,1 0,9)

4158,5 -3; 3836,77 -5; 3754,46 -7; 3487,59 -9; 3322,92 -10; 3138,31 -12; 2891,38 -13; 2789,08 -15; 2459,84 -25; 1741,39 -27; 1596,76 -30

F·3,21 | -7
F·2,71 | -2
F·1 | 0

32. -30
16. -24
1. 0 (0 0 0,1 0,2 0,7)

70%

32. -30
1. 0 (0 0 0,1 0,2 0,7)

-0,4% (0 0 0,1 0,3 0,6)

13 (0 0 0 0,1 0,9)

86 (0 0 0 0,2 0,8)

(B)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [Ⅳ. 0 $a=10^{12}$ $b=5\cdot10^{12}$ $c=10^{13}$ $d=2{,}5\cdot10^{13}$]
$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [Ⅲ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [Ⅱ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ [Ⅰ.:4273 0] (0 0 0 0,1 0,9)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [Ⅳ. 0 $a=10^{14}$ $b=10^{15}$ $c=5\cdot10^{15}$ $d=10^{16}$]
$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [Ⅲ. -2]
$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [Ⅱ. -5]
$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ [Ⅰ.:4297 -10] (0 0 0 0,3 0,7)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [Ⅳ. 0 $a=10^{12}$ $b=7\cdot10^{12}$ $c=10^{13}$ $d=7\cdot10^{14}$]
$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [Ⅲ. -2]
$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [Ⅱ. -5]
$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ [Ⅰ.:4289 -10] (0 0 0,1 0,2 0,7)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [Ⅳ. 0 $a=10^{12}$ $b=5\cdot10^{12}$ $c=10^{13}$ $d=2{,}5\cdot10^{13}$]
$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [Ⅲ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [Ⅱ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ [Ⅰ.:4273 0] (0 0 0 1)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [Ⅳ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [Ⅲ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [Ⅱ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ [Ⅰ.:4244 0] (0 0 0 0,1 0,9)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [Ⅳ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [Ⅲ. -2]
$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [Ⅱ. -5]
$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ [Ⅰ.:4260 -10] (0 0 0 0,3 0,7)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [Ⅳ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [Ⅲ. -2]
$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [Ⅱ. -5]
$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ [Ⅰ.:4258 -10] (0 0 0,1 0,2 0,7)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [Ⅳ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [Ⅲ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [Ⅱ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ [Ⅰ.:4244 0] (0 0 0 1)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [Ⅳ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [Ⅲ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [Ⅱ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ [Ⅰ.:4215 0] (0 0 0 0,1 0,9)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [Ⅳ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [Ⅲ. -2]
$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [Ⅱ. -5]
$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ [Ⅰ.:4223 -10] (0 0 0 0,3 0,7)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [Ⅳ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [Ⅲ. -2]
$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [Ⅱ. -5]
$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ [Ⅰ.:4227 -10] (0 0 0,1 0,2 0,7)

$S=\sum_{n=1}^{\infty}\left(\frac{d}{n}\right)$ [Ⅳ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{c}{n}\right)$ [Ⅲ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{b}{n}\right)$ [Ⅱ. 0]
$S=\sum_{n=1}^{\infty}\left(\frac{a}{n}\right)$ [Ⅰ.:4215 0] (0 0 0 1)

8. -20
1. 0 (0)

70%

32. -19
1. 0 (0 0 0,2 0,8)

80%

32. -15
1. 0 (0 0 0,1 0,3 0,6)

80%

8. -20
1. 0 (0 0 0,1 0,2 0,7)

70%

5. -30
3. -18
1. 0 (0)

-4%

32. -15
1. 0 (0 0 0 1)

-11%

32. -12
1. 0 (0 0 0,2 0,4 0,4)

-6%

5. -30
3. -18
1. 0 (0 0 0,1 0,2 0,7)

-4%

7 (0 0 0,05 0,05 0,1 0,9)

3. 2. 1. (0 0 0 0,1 0,9)

36 (0 0 0,1 0,3 0,6)

10 (1)

3. 2. 1. (0 0 0 0,3 0,7)

120 (0,8 0,2)

9,6 (0 0 1)

7,3 (0 0 0,1 0,3 0,6)

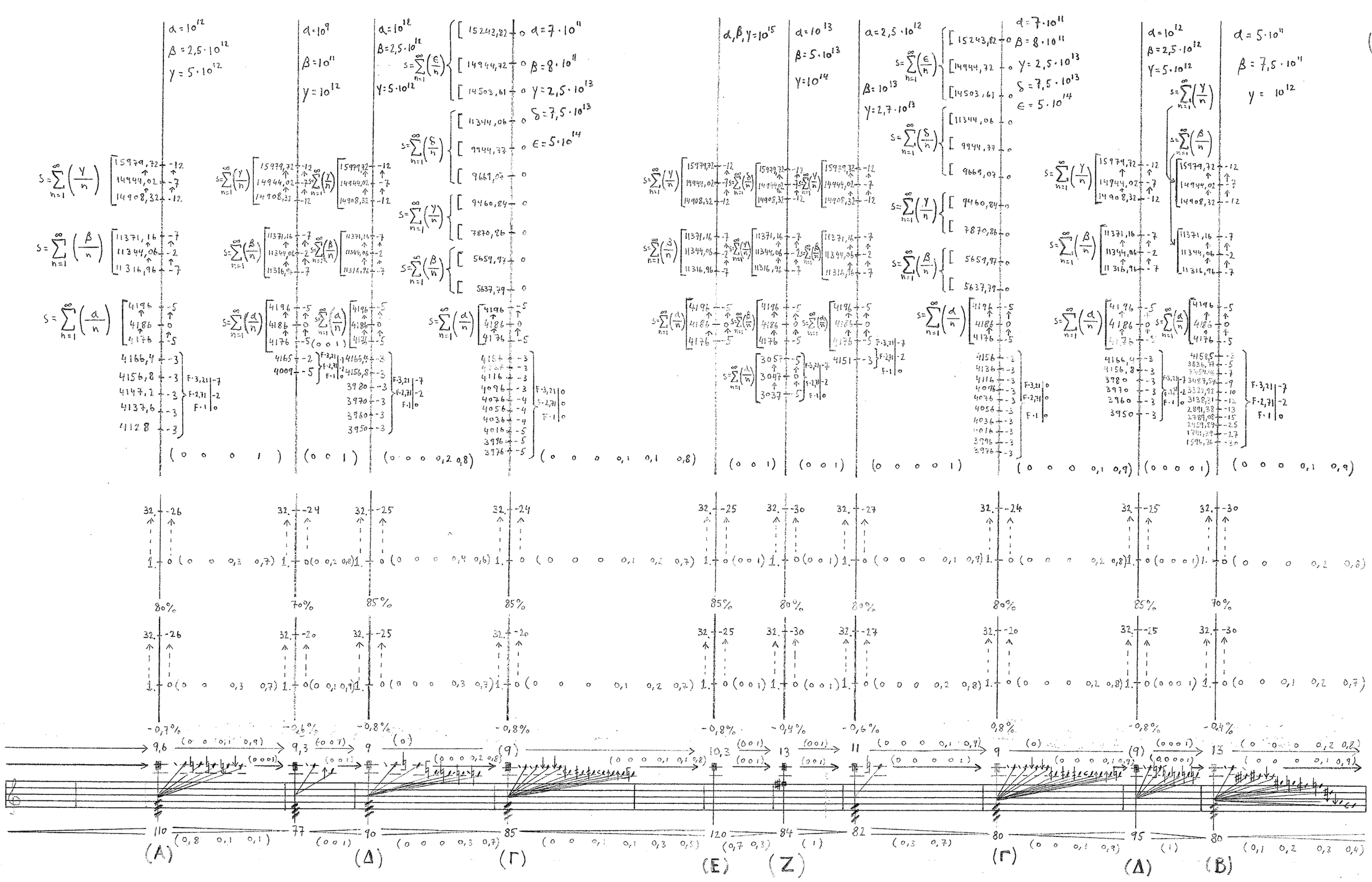
3. 2. 1. (0 0 0,1 0,2 0,7)

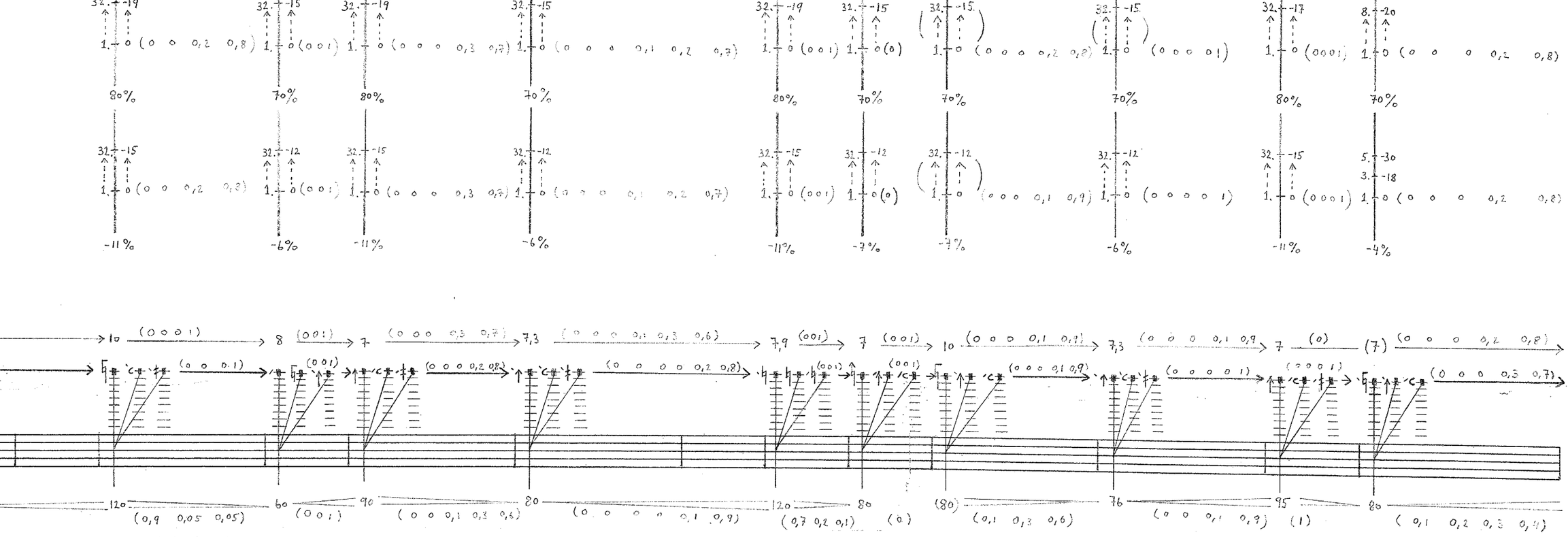
88 (0 0 0,1 0,2 0,7)

7 (0 0 0 0,3 0,7)

3. 2. 1. (0 0 0 1)

84 (0 0 0 0,1 0,7)



SIM. (Г)

(0 0 0 0 0,1 0,9)

(001)

$d = 10^6$
$\beta = 1{,}2 \cdot 10^6$
$\gamma = 2{,}7 \cdot 10^6$

$S = \sum_{n=1}^{\infty} \left(\frac{\gamma}{n}\right)$ [15979,37 → -12; 14944,02 → -7; 14908,32 → -12]

$S = \sum_{n=1}^{\infty} \left(\frac{\beta}{n}\right)$ [11371,16 → -7; 11344,06 → -2; 11316,96 → -7]

$S = \sum_{n=1}^{\infty} \left(\frac{a}{n}\right)$ [4196 → -5; 4186 → 0; 4176 → -5; 4168 → -3; 4160 → -3; 4152 → -3; 4144 → -3]

SIM. (B)

(0 0 0 0,1 0,2 0,3)

(001)

SIM. (H)

(001)

ETC.

(0001)

(001)

(0 0 0 1)

(0001)

(001)

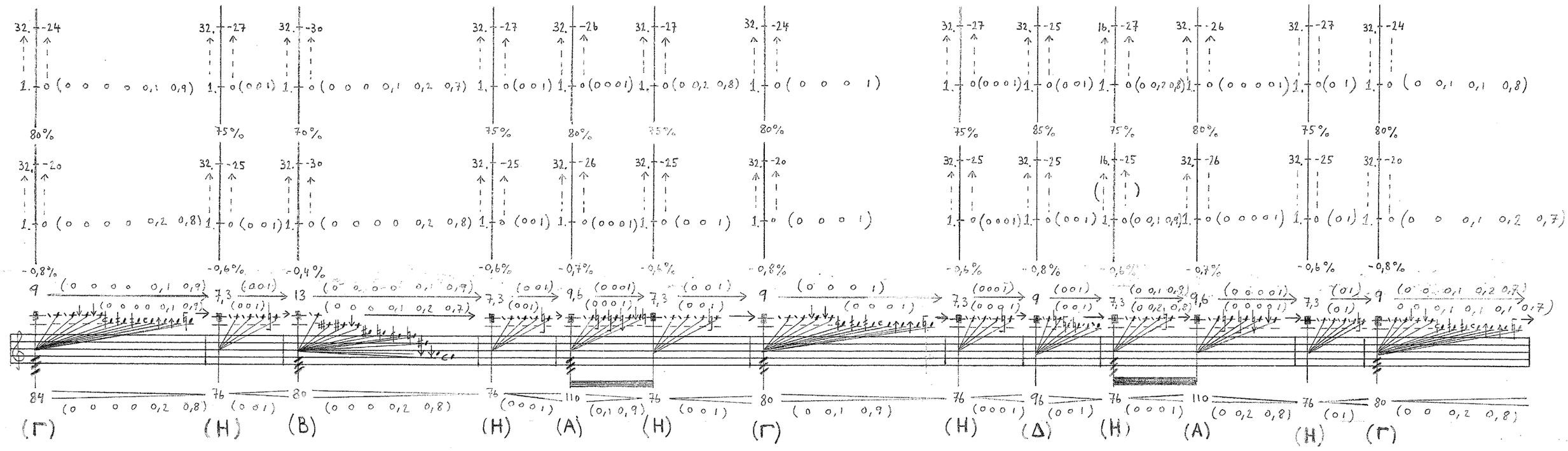
(0 0,2 0,8)

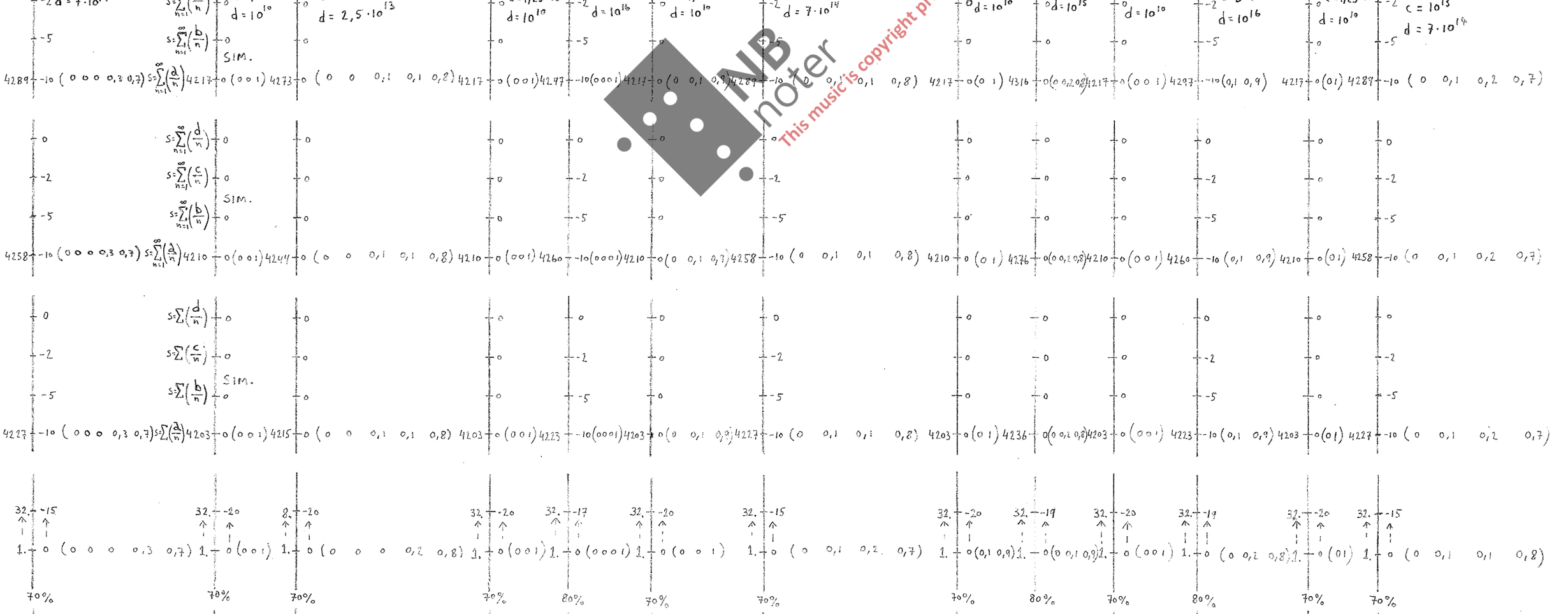
(0 0 0 0 0 0 1)

(01)

(0 0 0,1 0,1 0,1 0,7)

(Г) 84 (0 0 0 0 0,2 0,8) — (H) 76 (0 0 1) — (B) 80 (0 0 0 0,2 0,8) — (H) 76 (0001) — (A) 110 (0,1 0,9) — (H) 76 (0 0 1) — (Г) 80 (0 0,1 0,9) — (H) 76 (0001) — (Δ) 96 (0 0 1) — (H) 76 (0 0,2 0,8) — (A) 110 (0 0,2 0,8) — (H) 76 (01) — (Г) 80 (0 0 0,2 0,8)



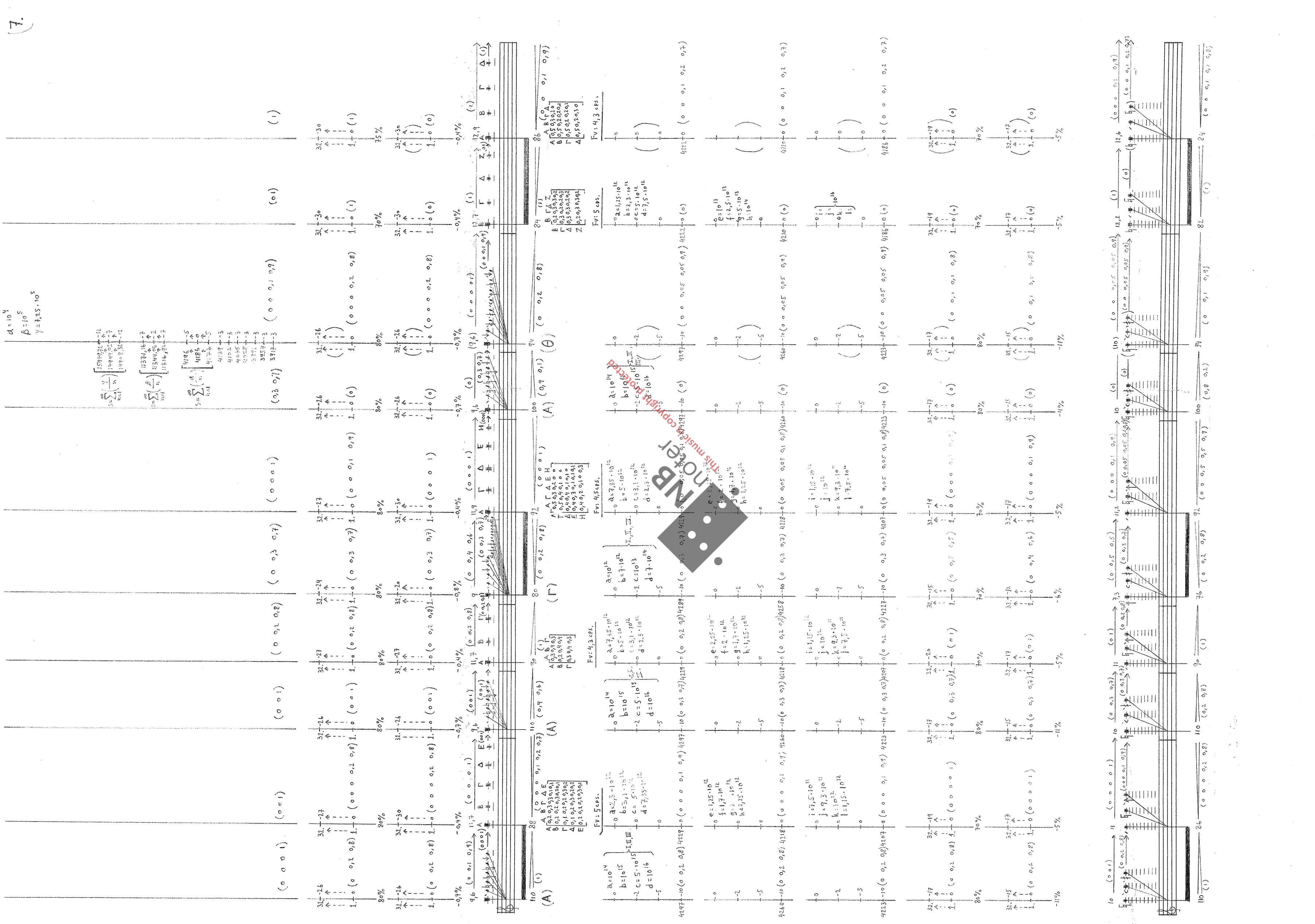



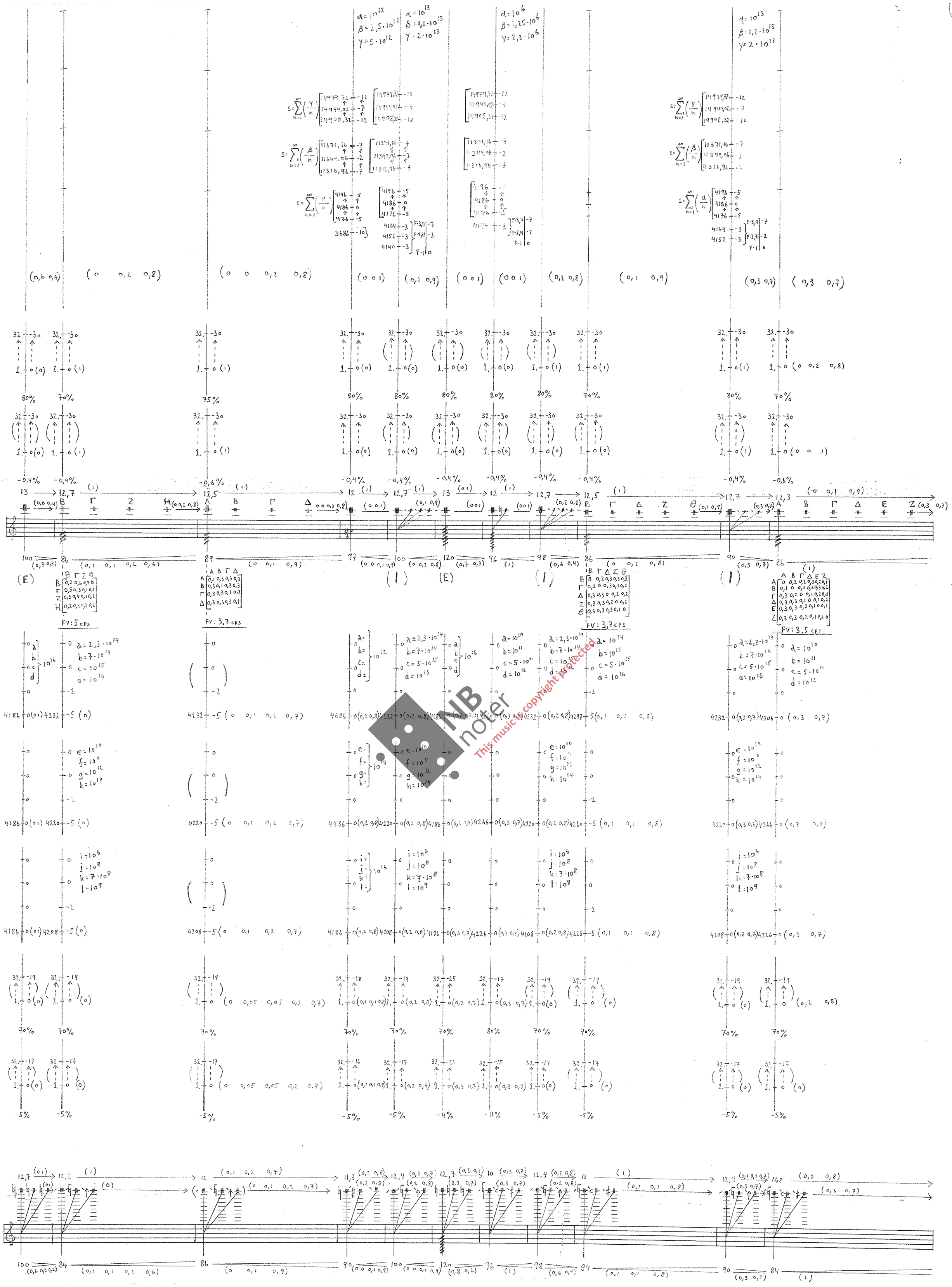
$\lambda = 10^{12}$

$\beta = 2{,}5 \cdot 10^{12}$

$\gamma = 5 \cdot 10^{12}$

7.



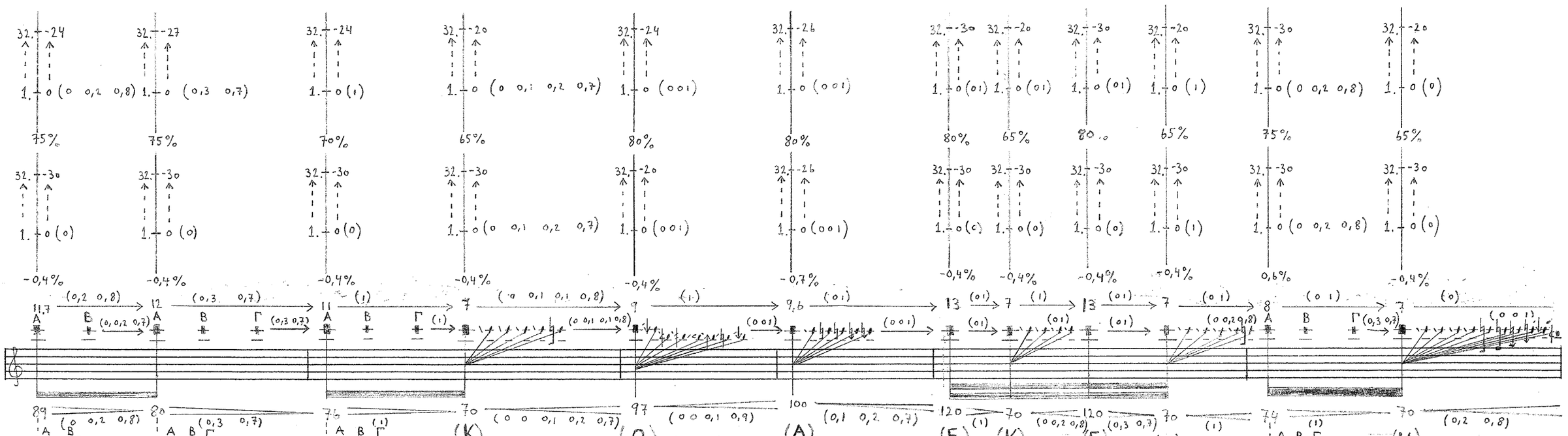


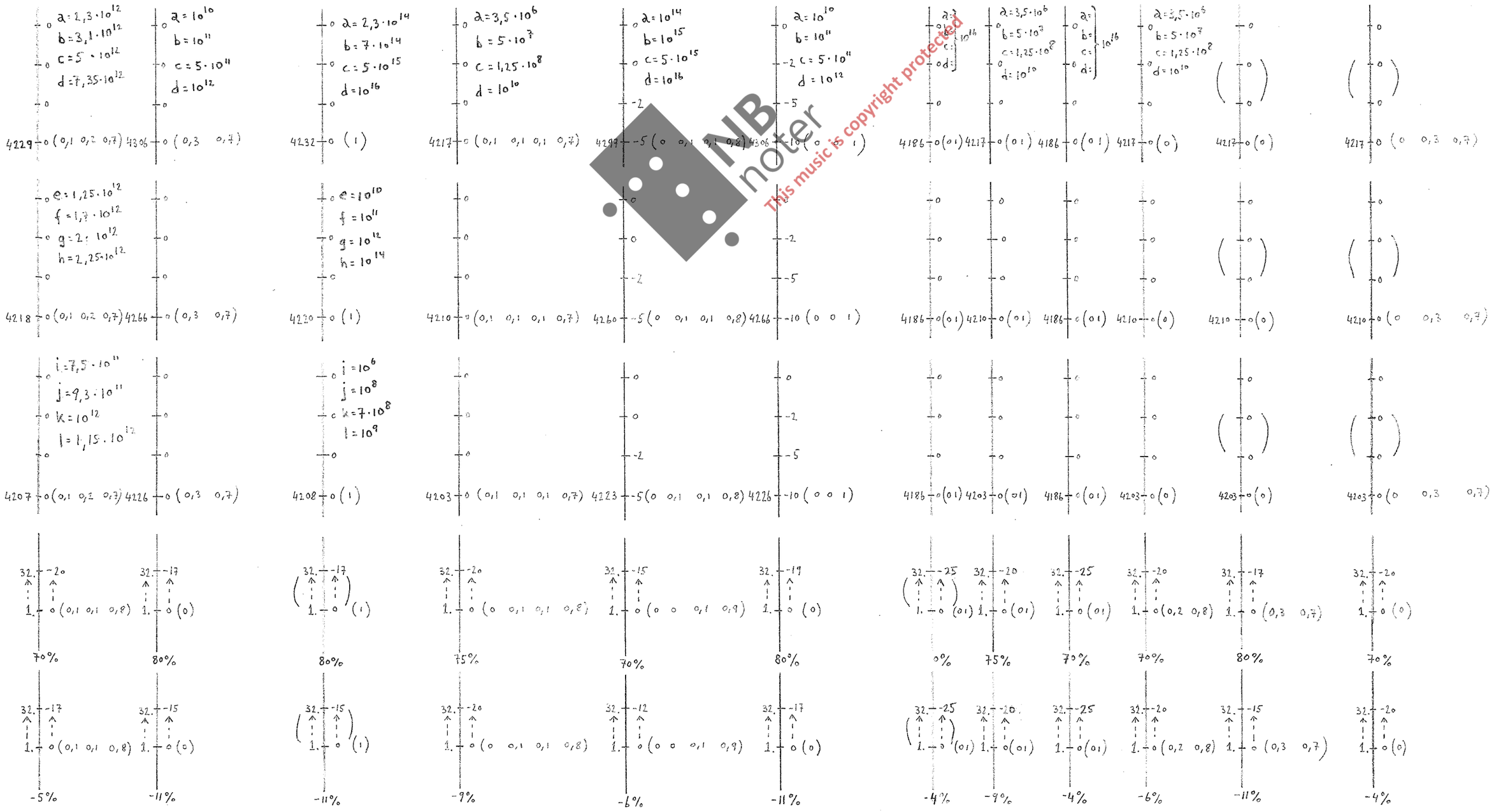
$\alpha = 10^6$
$\beta = 10^7$
$\gamma = 7{,}25 \cdot 10^7$

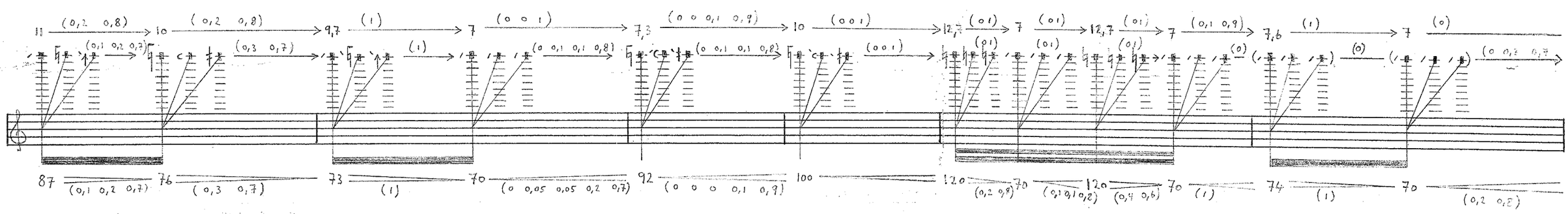
$S = \sum_{n=1}^{\infty} \left(\frac{\gamma}{n}\right)$ [14979,72 — 12 ↑ 14944,02 — 7 ↑ 14908,32 — 12]

$S = \sum_{n=1}^{\infty} \left(\frac{\beta}{n}\right)$ [11371,16 — 7 ↑ 11344,06 — 2 ↑ 11316,96 — 7]

$S = \sum_{n=1}^{\infty} \left(\frac{\alpha}{n}\right)$ [4196 — 5 ↑ 4186 — 0 ↑ 4176 — 5] 4169 — 3, 4162 — 3, 4155 — 3, 4148 — 3, 4141 — 3, 4134 — 3, 4127 — 3, 4120 — 3, 4113 — 3, 4106 — 3



(0,1 0,2 0,7) | (0,1 0,2 0,7) | (0001) | (0 0,1 0,9) | (0,3 0,7) | (0 0 0,2 0,3 0,5)

32. -20 / 1. 0 (0 0,2 0,8) — 65%
32. -26 / 1. 0 (0 0 0,1 0,9) — 80%
32. -30 / 1. 0 (0) — 80%
32. -30 / 1. 0 (0 0 0,1 0,1 0,8) — 80%
32. -20 / 1. 0 (0) — 60%
32. -20 / 1. 0 (0 0,2 0,8) — 65%

( ) 32. -30 / 1. 0 (0 0,2 0,8) — -0,7%
32. -26 / 1. 0 (0 0 0,1 0,9) — -0,7%
32. -30 / 1. 0 (0) — -0,4%
( ) 32. -30 / 1. 0 (0) — -0,4%
( ) 32. -30 / 1. 0 (0) — -0,4%
( ) 32. -30 / 1. 0 (0) — -0,4%

(7) (0,2 0,3 0,5) → 9,6 (0 0 0 0,2 0,8) → 13,2 (0) → (13,2) (0 0 0 0,1 0,9) → 7,7 (1) → 7 (0 0 0,2 0,3 0,5)

B Γ Z Θ K (0,1 0,2 0,7) A B Γ Δ E (0,1 0,2 0,7) A Δ E Z H I (0001) A B Γ Δ E H (0 0,1 0,9) (0,3 0,7)

76 (0,1 0,2 0,7) | 89 (0 0,1 0,9) | 96 (0 0 0 1) | 110 (0,7 0,2 0,1) | 60 (K) (1) | 76 (K) (1)

B Γ Z Θ K
B 0 0,3 0,2 0,3 0,2
Γ 0,2 0 0,3 0,2 0,3
Z 0,3 0,2 0 0,2 0,3
Θ 0,3 0,3 0,2 0 0,2
K 0,3 0,3 0,2 0,2 0

A B Γ Δ E
A 0,1 0,2 0,2 0,3 0,2
B 0,2 0,1 0,3 0,2 0,2
Γ 0,2 0,3 0,1 0,1 0,3
Δ 0,3 0,2 0,2 0,1 0,2
E 0,3 0,3 0,2 0,1 0,1

A Δ E Z H I
A 0,6 0,2 0,2 0 0 0
Δ 0,6 0 0,1 0,1 0,1 0,1
E 0,7 0,1 0 0,1 0 0,1
Z 0,7 0,1 0,1 0 0,1 0
H 0,7 0,1 0 0,1 0 0,1
I 0,7 0,1 0,1 0 0,1 0

A B Γ Δ E H
A 0 0,1 0,3 0,2 0,2 0,2
B 0,2 0 0,2 0,2 0,2 0,2
Γ 0,3 0,2 0 0,1 0,2 0,2
Δ 0,2 0,1 0,3 0 0,2 0,2
E 0,1 0,3 0,2 0,1 0 0,3
H 0,3 0,2 0,3 0,1 0,1 0

FV: 4,6 cps
a = 7,5 · 10^11
b = 9,3 · 10^11
c = 10^12
d = 1,15 · 10^12
4207 0 (0,1 0,2 0,7)
4200 0 (0,1 0,2 0,7)
4193 0 (0,1 0,2 0,7)

FV: 5 cps
a = 10^12
b = 1 · 10^12
c = 2,3 · 10^12
d = 5 · 10^12
4216 -5 (0,1 0,2 0,7)
4206 -5 (0,1 0,2 0,7)
4196 -5 (0,1 0,2 0,7)

FV: 5 cps
a = 10^14
b = 3 · 10^14
c = 3,5 · 10^14
d = 3,7 · 10^14
4225 0 (0 0,1 0,1 0,8)
4212 0 (0 0,1 0,1 0,8)
4199 0 (0 0,1 0,1 0,8)

FV: 5,7 cps
a = 10^10
b = 10^11
c = 5 · 10^11
d = 10^12
4306 0 (0 0,1 0,9)
4266 0 (0 0,1 0,9)
4226 0 (0 0,1 0,9)

a = 9 · 10^12
b = 10^13
c = 2,3 · 10^13
d = 5 · 10^13
4220 0 (1)
e = 1,25 · 10^12
f = 2,3 · 10^12
g = 5 · 10^12
h = 7,5 · 10^12
4212 0 (1)
i = 10^11
j = 3,3 · 10^11
k = 7 · 10^11
l = 10^12
4204 0 (1)

a = 3,5 · 10^6
b = 5 · 10^7
c = 1,25 · 10^8
d = 10^10
4217 0 (0 0,3 0,7)
4210 0 (0 0,3 0,7)
4203 0 (0 0,3 0,7)

32. -20 / 1. 0 (0,2 0,3 0,5) — 70%
32. -17 / 1. 0 (0,2 0,3 0,5) — 80%
32. -30 / 1. 0 (0) — 70%
( ) 32. -30 / 1. 0 (0 0,2 0,8) — 70%
32. -20 / 1. 0 (0) — 70%
( ) 32. -20 / 1. 0 (0 0 0,1 0,9) — 70%

32. -20 / 1. 0 (0,2 0,3 0,5) — -4%
32. -15 / 1. 0 (0,2 0,3 0,5) — -6%
32. -30 / 1. 0 (0) — -4%
( ) 32. -30 / 1. 0 (0 0,2 0,8) — -4%
32. -20 / 1. 0 (0) — -4%
( ) 32. -20 / 1. 0 (0 0 0,1 0,9) — -4%

(7) (0 0,1 0,1 0,8) → 10 (0 0,2 0,8) → 13 (0) → (13) (0 0,2 0,8) → 8 (0,2 0,8) → 7 (0)

(0,1 0,2 0,7) (0,1 0,2 0,7) (0 0,1 0,1 0,8) (0 0,1 0,9) (1) (0 0,3 0,7)

76 (0,1 0,2 0,7) | 89 (0 0,1 0,9) | 96 (0 0 0,1 0,9) | 110 (0,7 0,2 0,1) | 56 (1) | 73 (1)

$\alpha = 10^{12}$

$\beta = 2{,}5 \cdot 10^{12}$

$\gamma = 5 \cdot 10^{12}$

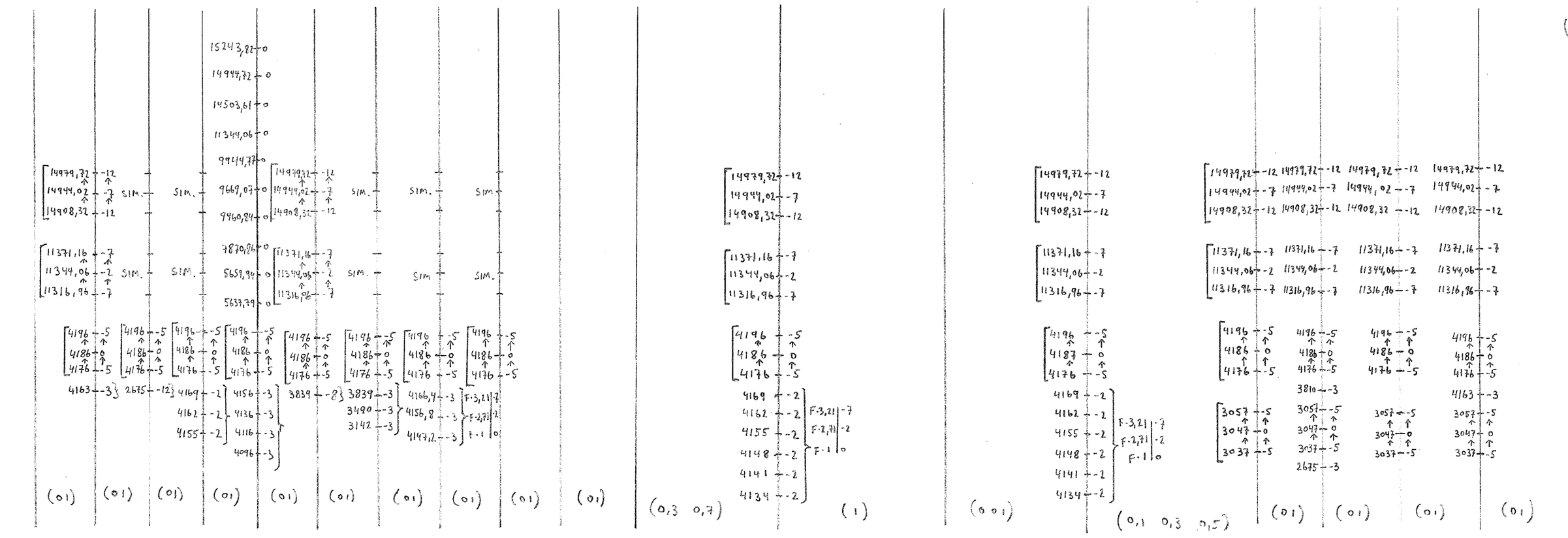
$\delta = 10^{11}$

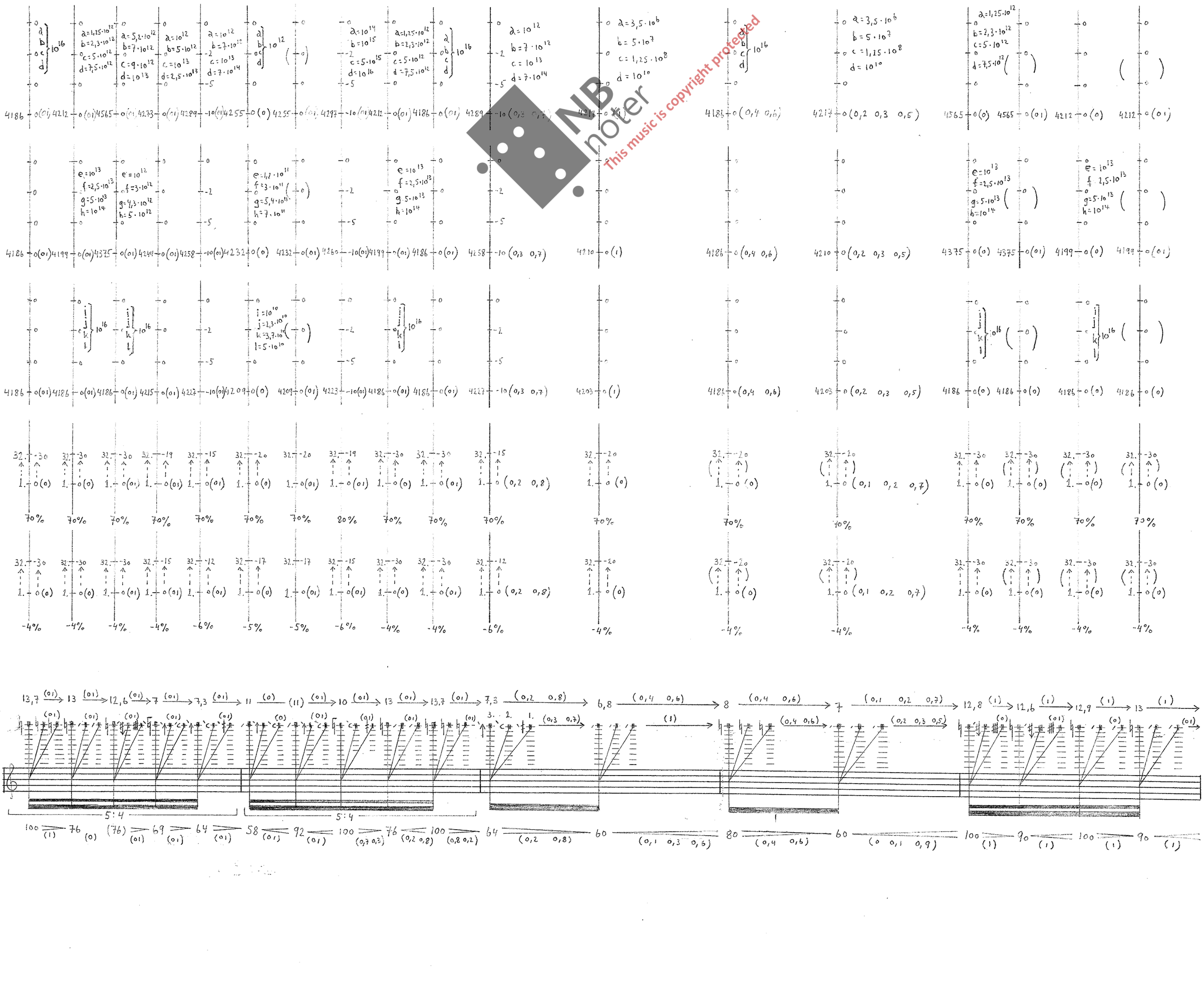
$$S = \sum_{n=1}^{\infty}\left(\frac{\gamma}{n}\right)\begin{bmatrix}14979{,}72 & -12\\ 14944{,}02 & -7\\ 14908{,}32 & -12\end{bmatrix}$$

$$S = \sum_{n=1}^{\infty}\left(\frac{\beta}{n}\right)\begin{bmatrix}11371{,}16 & -7\\ 11344{,}06 & -2\\ 11316{,}96 & -7\end{bmatrix}$$

$$S = \sum_{n=1}^{\infty}\left(\frac{\alpha}{n}\right)\begin{bmatrix}4196 & -5\\ 4186 & 0\\ 4176 & -5\end{bmatrix}$$

$$S = \sum_{n=1}^{\infty}\left(\frac{\delta}{n}\right)\begin{bmatrix}3057 & -5\\ 3047 & 0\\ 3037 & -5\end{bmatrix}\begin{matrix}F\cdot 3{,}21 & -7\\ F\cdot 2{,}71 & -2\\ F\cdot 1 & 0\end{matrix}$$


SIM.
(E) (Λ) (K) (Γ) (M) (Δ) (Λ) (E) (Γ) (K) (K) (Z) (N) (Z) (Ξ)
5:4
5:4
FV: 5,6 cps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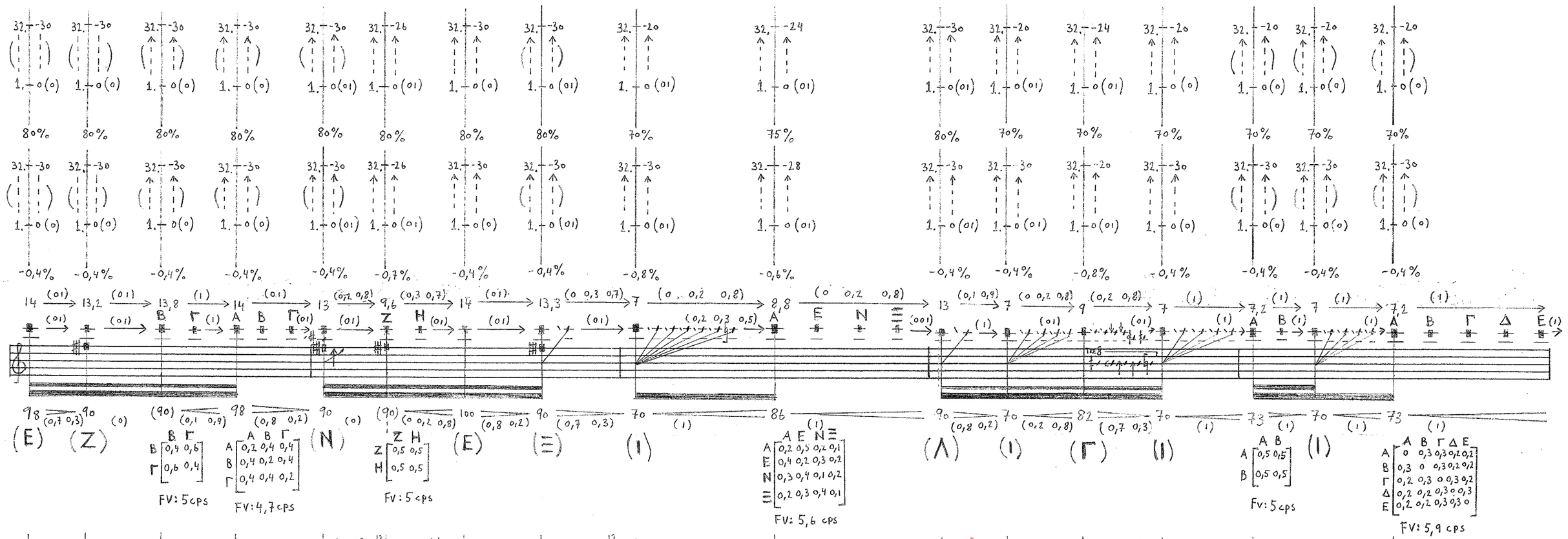
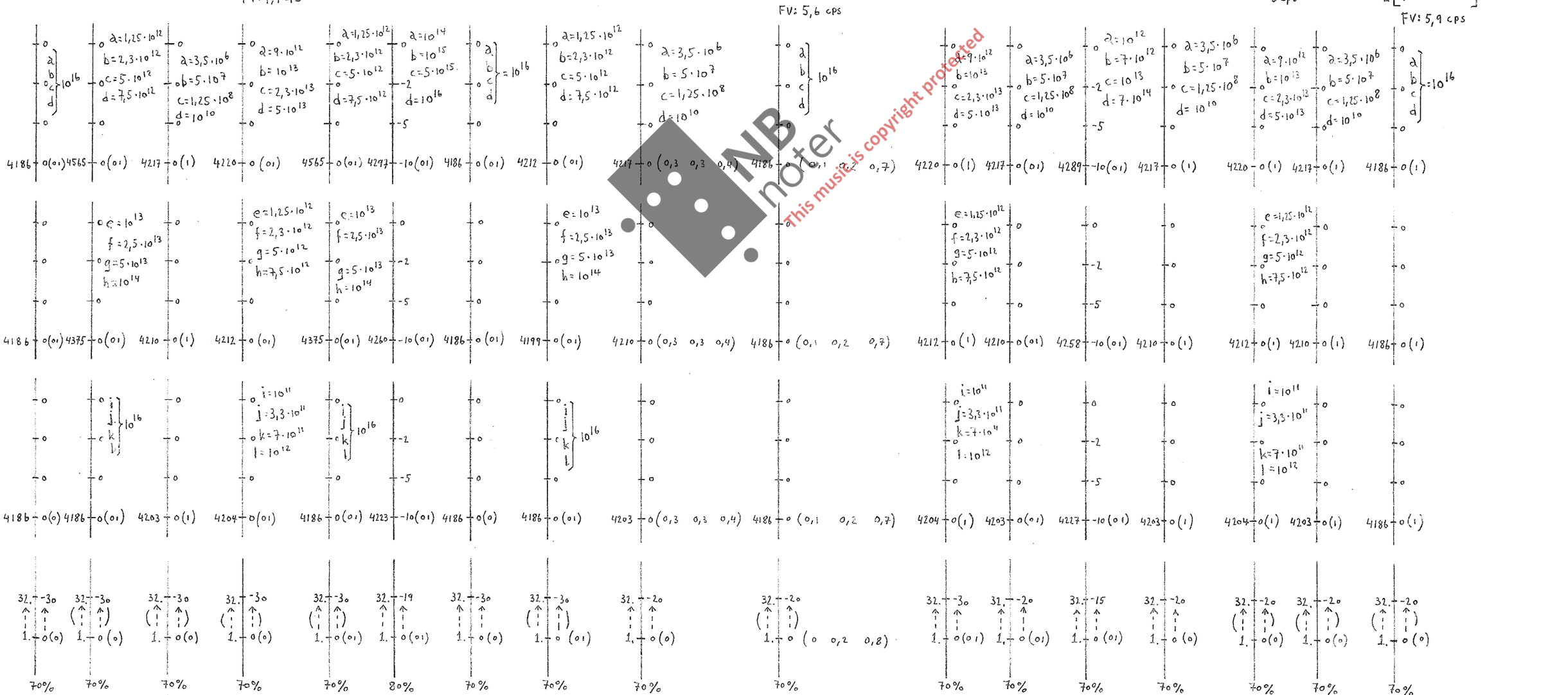
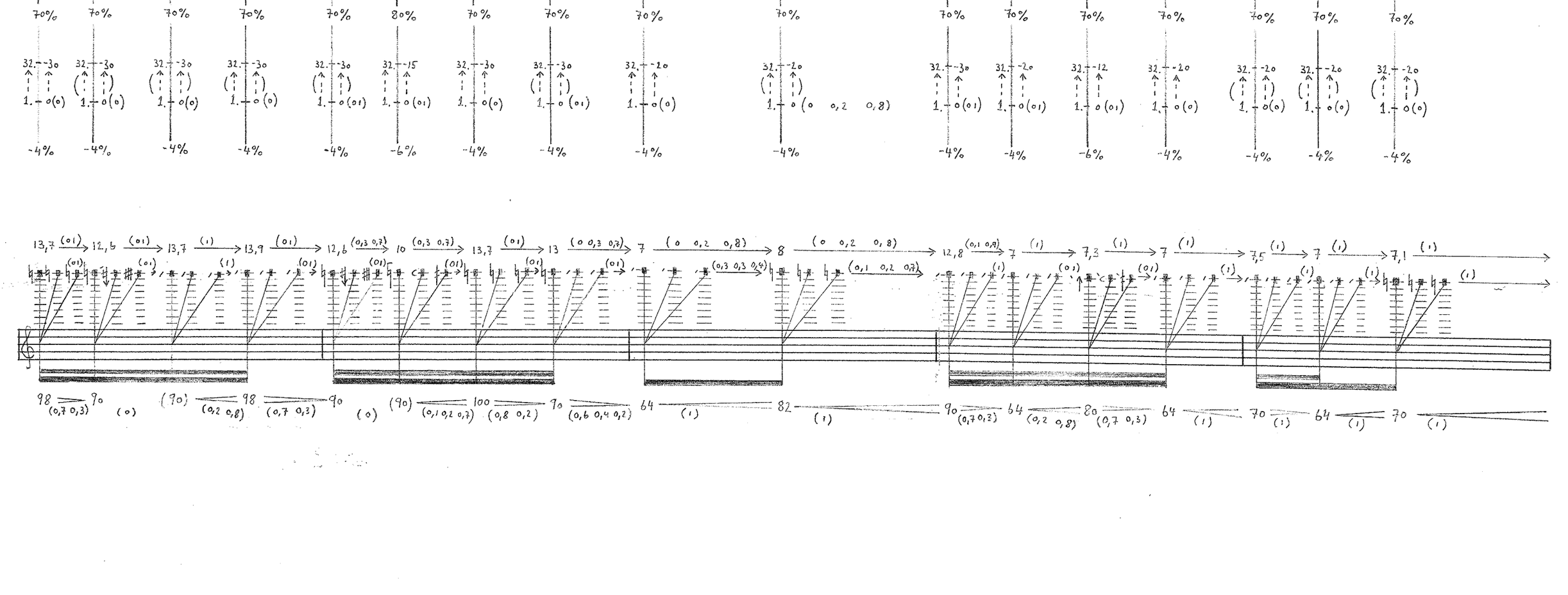
NB noter

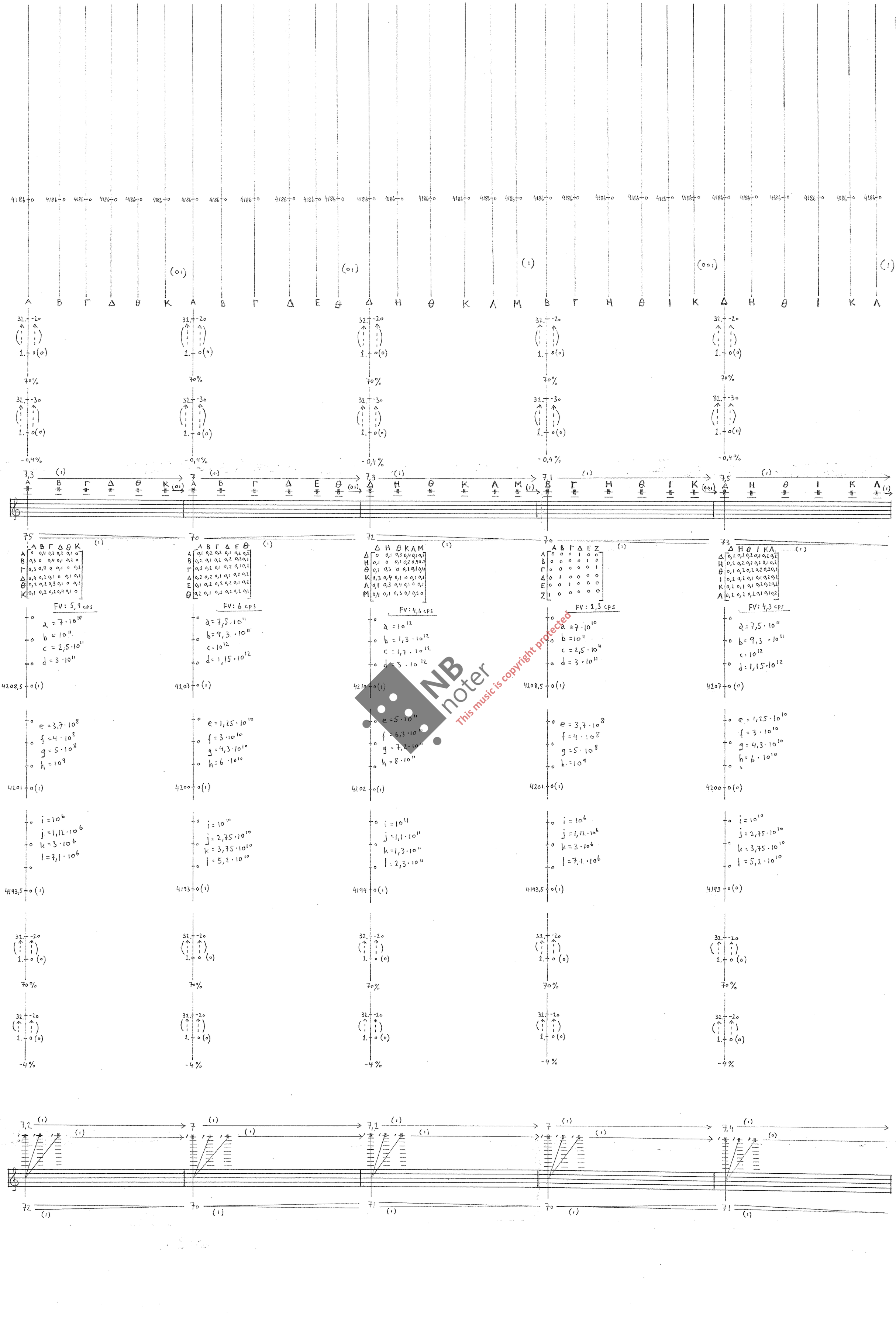

5:4
5:4

(01) (01) (1) (01) (01) (01) (01) (01) (0,2 0,3 0,5) (001) (1) (01) (01) (1) (1) (1) (1)







4196 -5
4186 0
4176 -5
4169 -3
4162 -3
4155 -3

(1) (1) (1) (1) (1) (0)

32. -20 / 1. 0 (0) — 70%
32. -30 / 1. 0 (0) — -0,4%

7,1 (1) 7,3 (1) 6,8 (1) 7,3 (1) 7,1 (1) 7 (0)
DUE 8
7,0 (1) 7,2 (1) 7,0 (1) 7,2 (1) 7,1 (1) 7,0 (0)
(K) (K) (K) (K) (K) (K)
(NON DIM.)

0 — 4207 0 (1)
0 — 4208,5 0 (1)
0 — 4207 0 (1)
0 — 4208,5 0 (1)
0 — 4207 0 (0)
0 — 4207 0 (0)

a = 7 · 10^10
b = 10^11
c = 2,5 · 10^11
d = 3 · 10^11

a = 7,5 · 10^11
b = 9,3 · 10^11
c = 10^12
d = 1,15 · 10^12

0 — 4200 0 (1)
0 — 4201 0 (1)
0 — 4200 0 (1)
0 — 4201 0 (1)
0 — 4200 0 (0)
0 — 4200 0 (0)

e = 3,7 · 10^8
f = 4 · 10^8
g = 5 · 10^8
h = 10^9

e = 1,25 · 10^10
f = 3 · 10^10
g = 4,3 · 10^10
h = 6 · 10^10

i = 10^6
j = 1,12 · 10^6
k = 3 · 10^6
l = 7,1 · 10^6

i = 10^10
j = 2,75 · 10^10
k = 3,75 · 10^10
l = 5,2 · 10^10

0 — 4193 0 (1)
0 — 4193,5 0 (1)
0 — 4193 0 (1)
0 — 4193,5 0 (1)
0 — 4193 0 (0)
0 — 4193 0 (0)

32. -20 / 1. 0 (0) — 70%
32. -20 / 1. 0 (0) — -4%

7 (1) 7,2 (1) 7 (1) 7,2 (1) 7,1 (1) 7 (0)
7,0 (1) 7,1 (1) 7,0 (1) 7,1 (1) 7,0 (0)
(NON DIM.)



OHM, 2003.