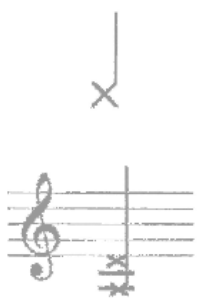
Thomas Hummel

cocoon

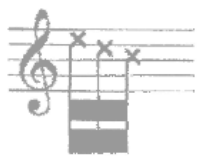
for string quartet
and computer controlled live-electronics
(1993)

explanations strings



play with damped strings. Damp with fingers of the left hand. The string is indicated by the pitch of the note:

as an example: play on string g and d



if the pitch does not correspond a string, it means damping fingerings on an appropriate string (e.g. re in this case)

play on the bridge (normally as transition ord--sp--bridge)

short, long fermata

cl	col legno
clb	col legno battuto
get	gettato

exaggerated bow pressure

play with fingernail
(used with pizzicato, scratching along the string)

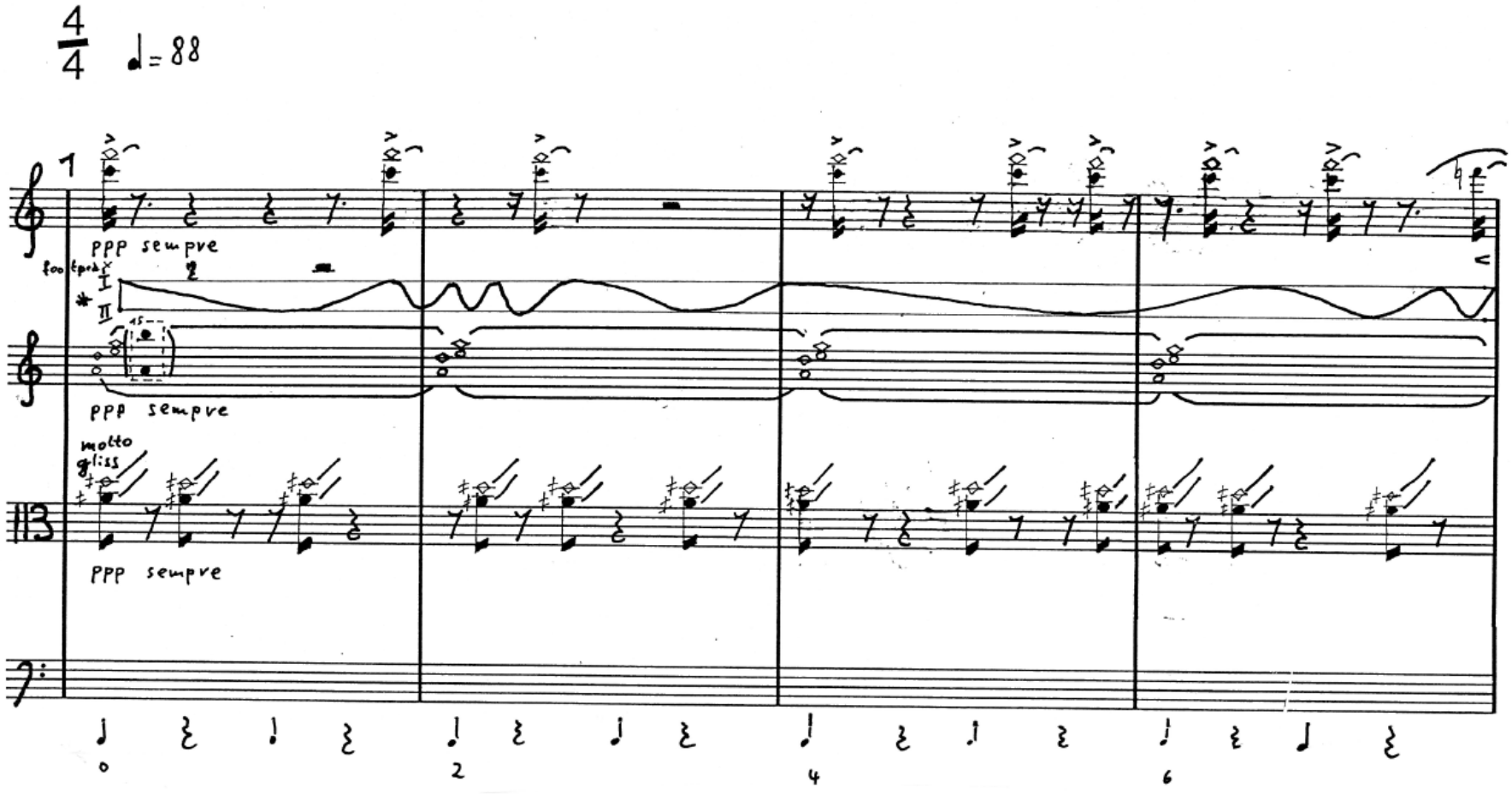
hit with fingers on the corpus

bow parallely to the strings,
damped strings. Also used with fingernail
(then scratch with fingernail parallely
to the strings

same as above, tremolo up and down

The score consists of an instrumental part, a computer synchronization line (below) and a part of the live-electronic processes at the bottom. This representation is not a complete description of the live-electronic processes, but serves for the rehearsal of the sound diffusion part. As all instruments are transformed individually, the live-electronic part is divided up by the four instruments.

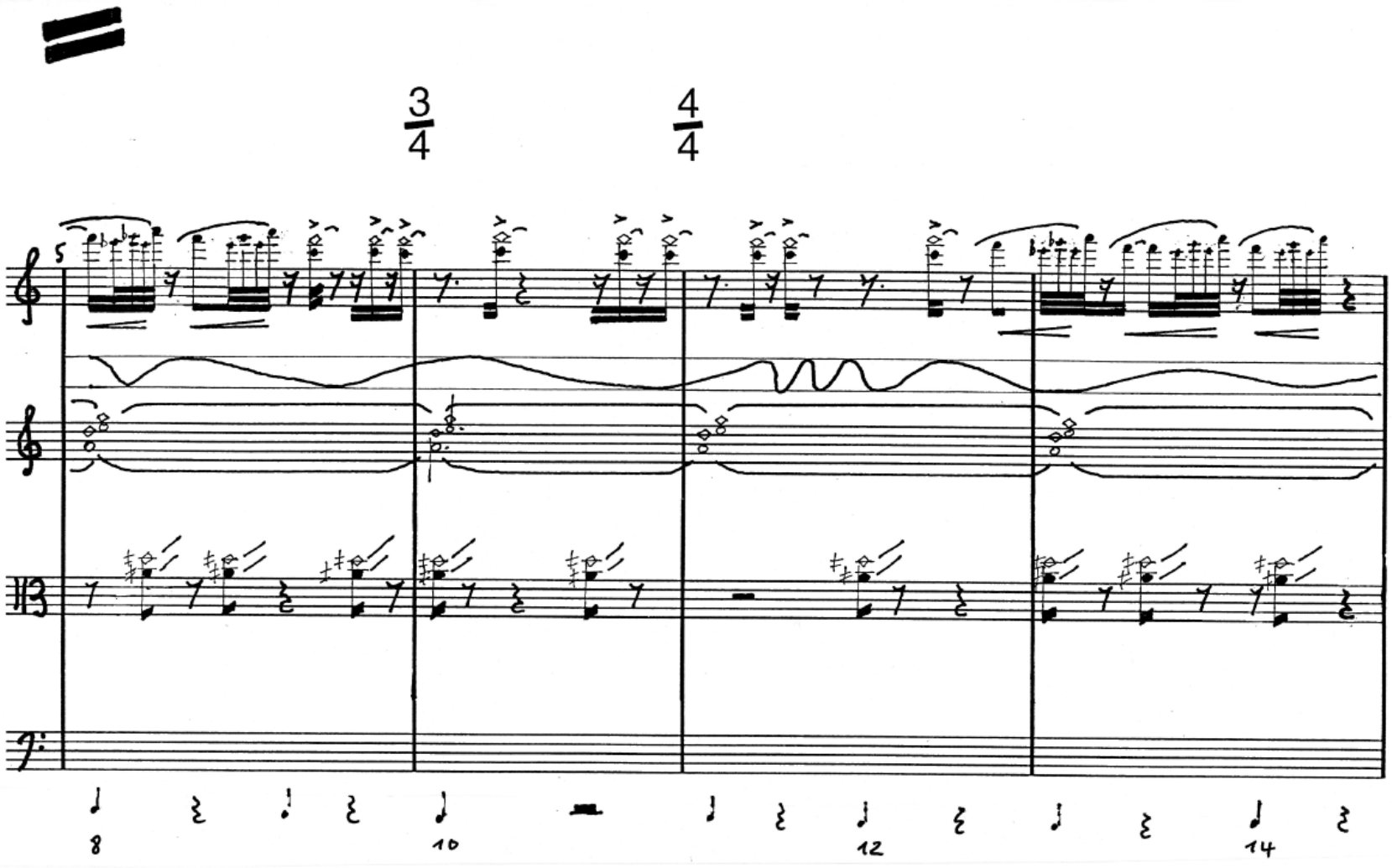
duration 11'



Vl1 | high pass filter → RM → reverb (A) | reverb

Vl2 | irregular Doppler, reverb, spatialization (C)

Vla | fshift-gliss, spatial positions



Vl1 | (B) | high pass filter → RM → reverb (A) | reverb (B)

Vl2

Vla

* emphasize I or II

5/4 4/4

(sim)

I
II

16 18 20 22 24

VL1 A

VL2 high pass filter C

Vla

3/4 4/4

14

26 28 30 32

VL1 B A B

VL2

Vla

5/4 ♩= 76

4/4

19

gliss

tv

gliss

ord

5

Footpedal

tv

gliss

gliss

ord

get sp

get sp

ord (I)

34

36

38

Vl1		A	B	D
Vl2		D	A	B
Vla		C		
Vc		C		

RM 5 Hz

RM 6 Hz

A = fshiftgliss B = Harmonizer
C = bp-filter, rapid freq change D = RM 38 Hz → reverb

23

gliss

trm

ord.

get sp

ord

get sp

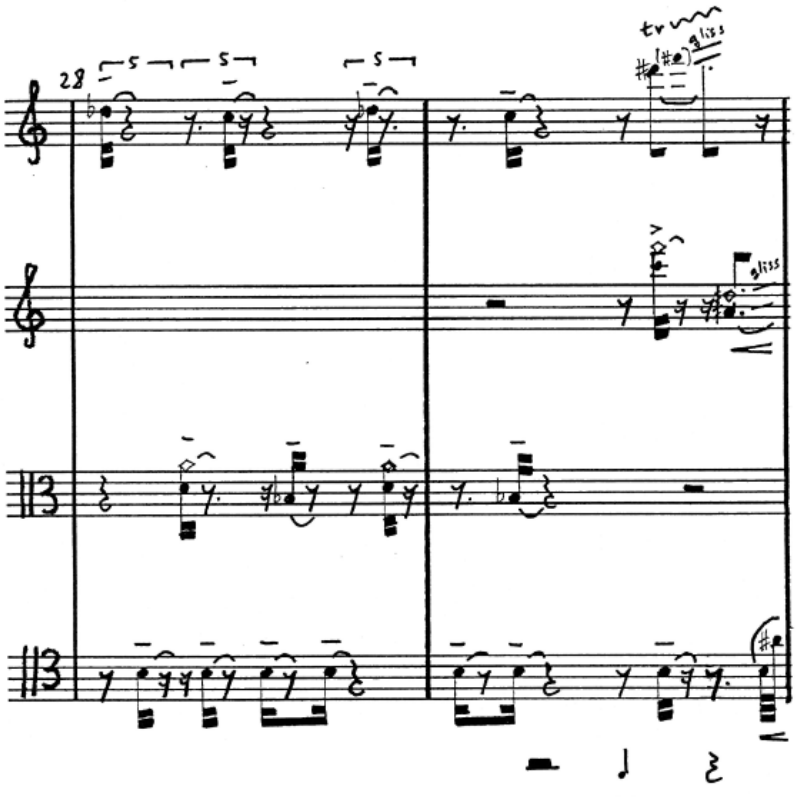
40

Vl1		A	B	D
Vl2		D	A	B
Vla		C		
Vc		C		

RM 5 Hz

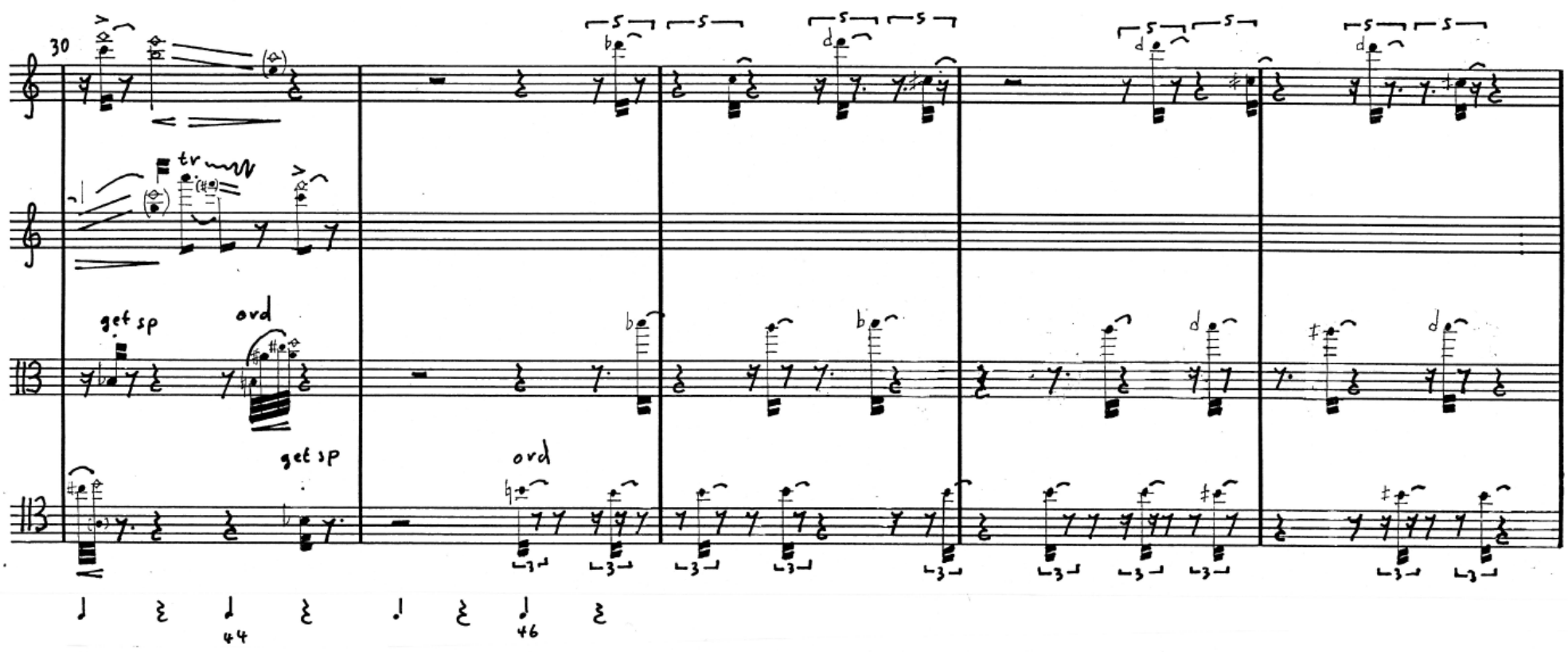
RM 6 Hz

RM 5 + 6 Hz



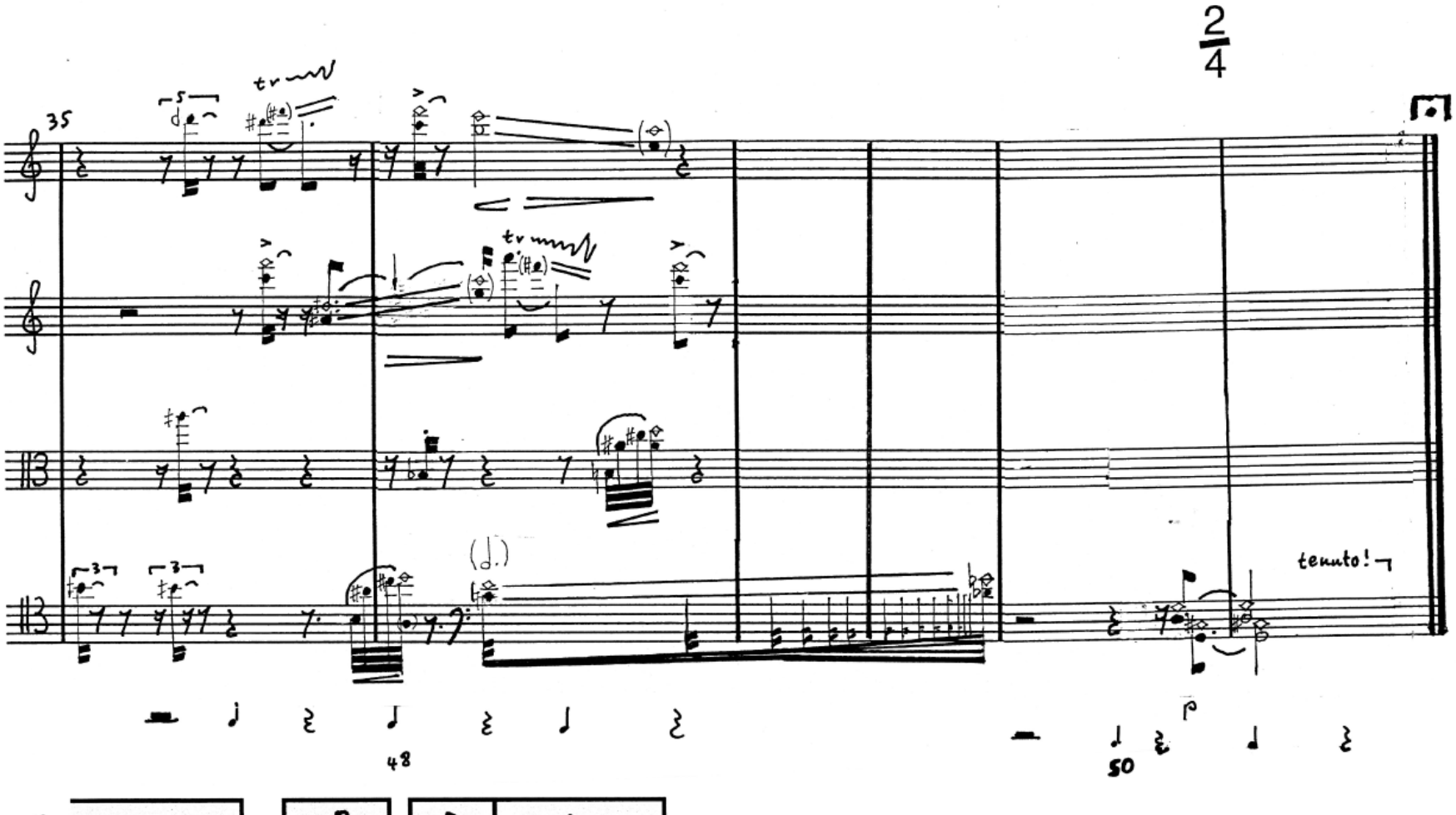
42

Vl1 | B
Vl2 | D | A
Vla
Vc



Vl1 | D | A
Vl2 | B | D
Vla | C
Vc | C

RM 5 Hz
RM 6 Hz
RM 5+6 Hz

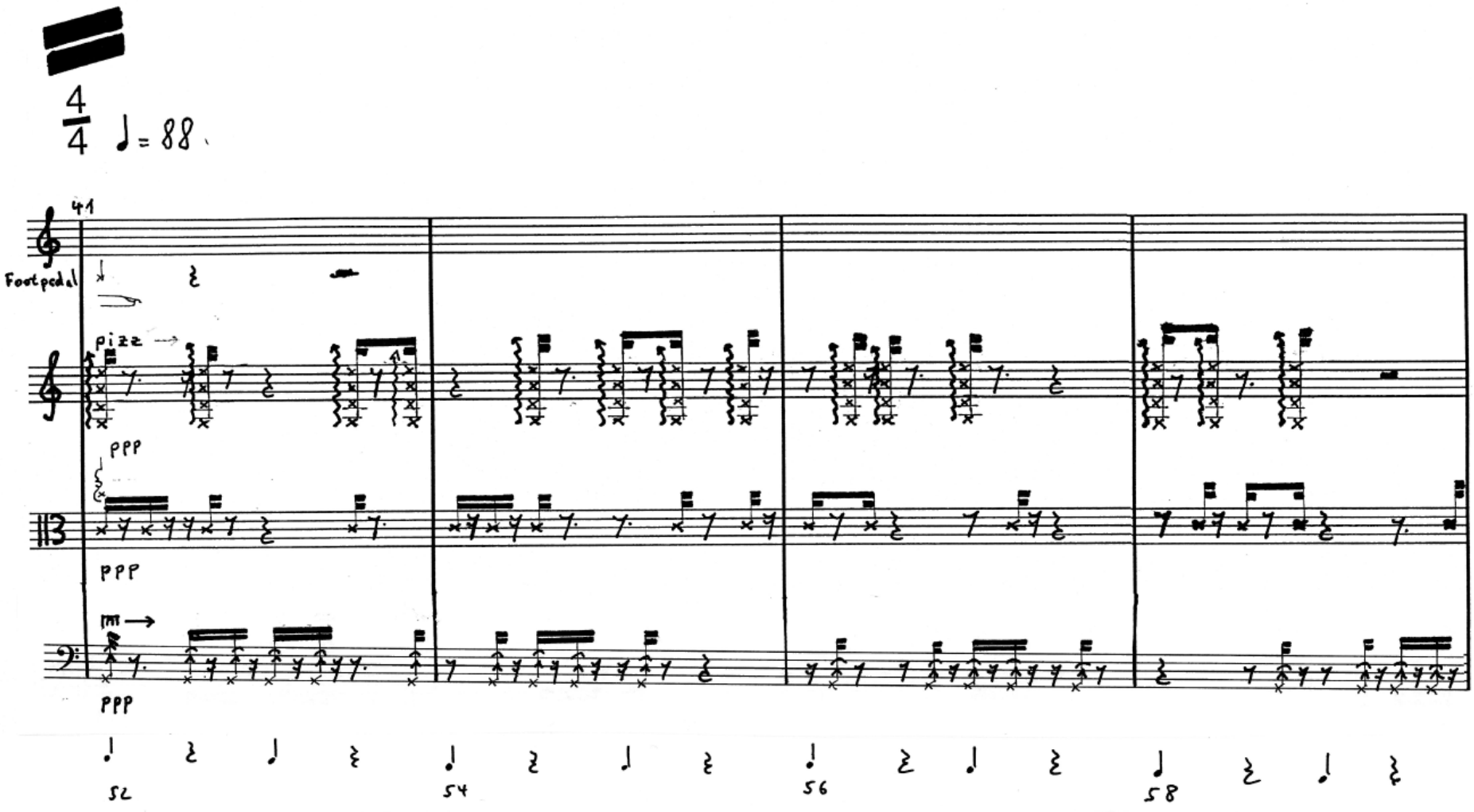


Vl1 | | B | D | A |

Vl2 | D | A | B | D |

Vla | | C |

Vc | | C | halaphon + reverb accel. | harmonizer |

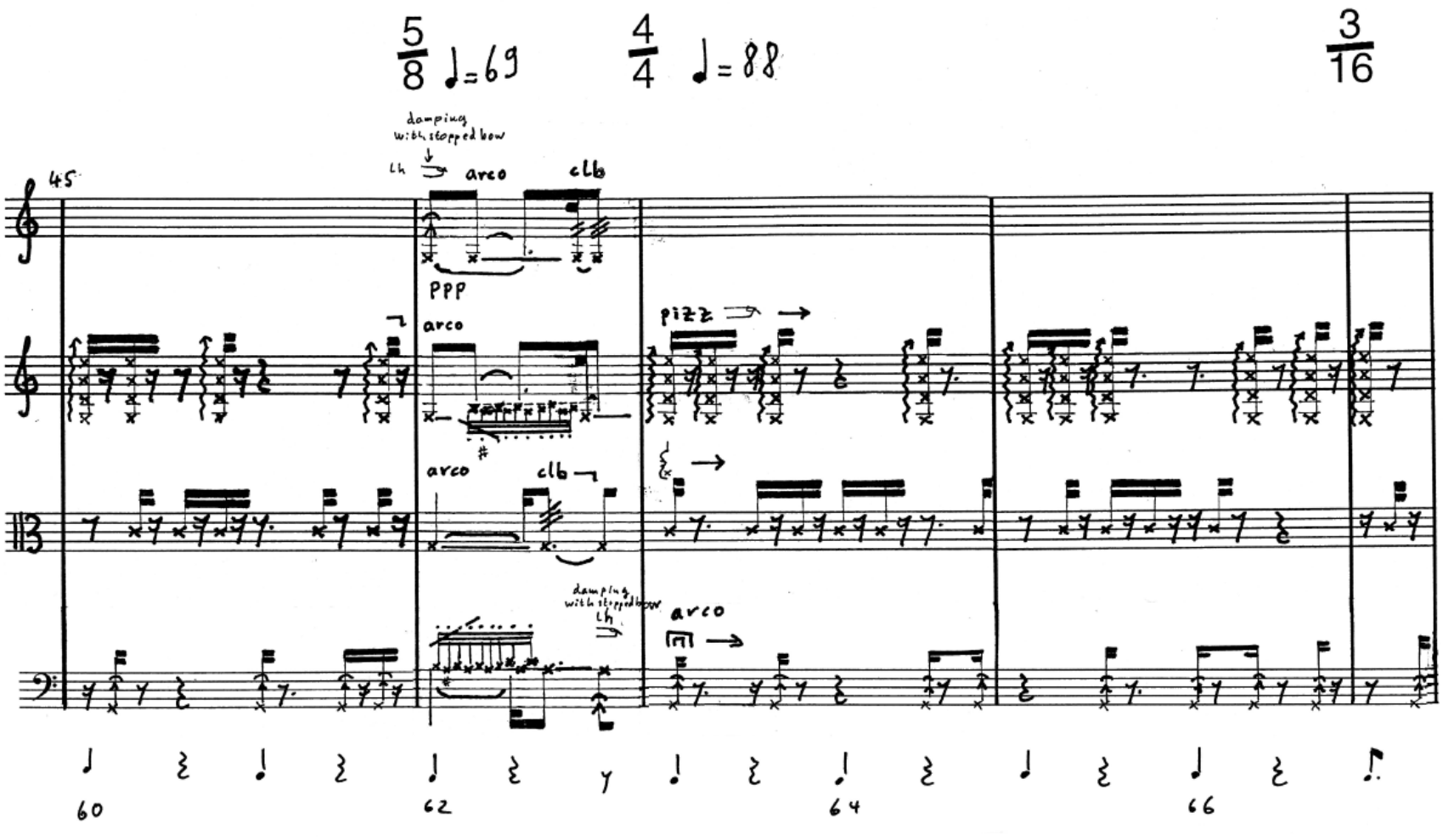


Vl2 | spatial rythm (Fibonacci)

Vla | spatial rythm (Fibonacci)

Vc | spatial rythm (Fibonacci)

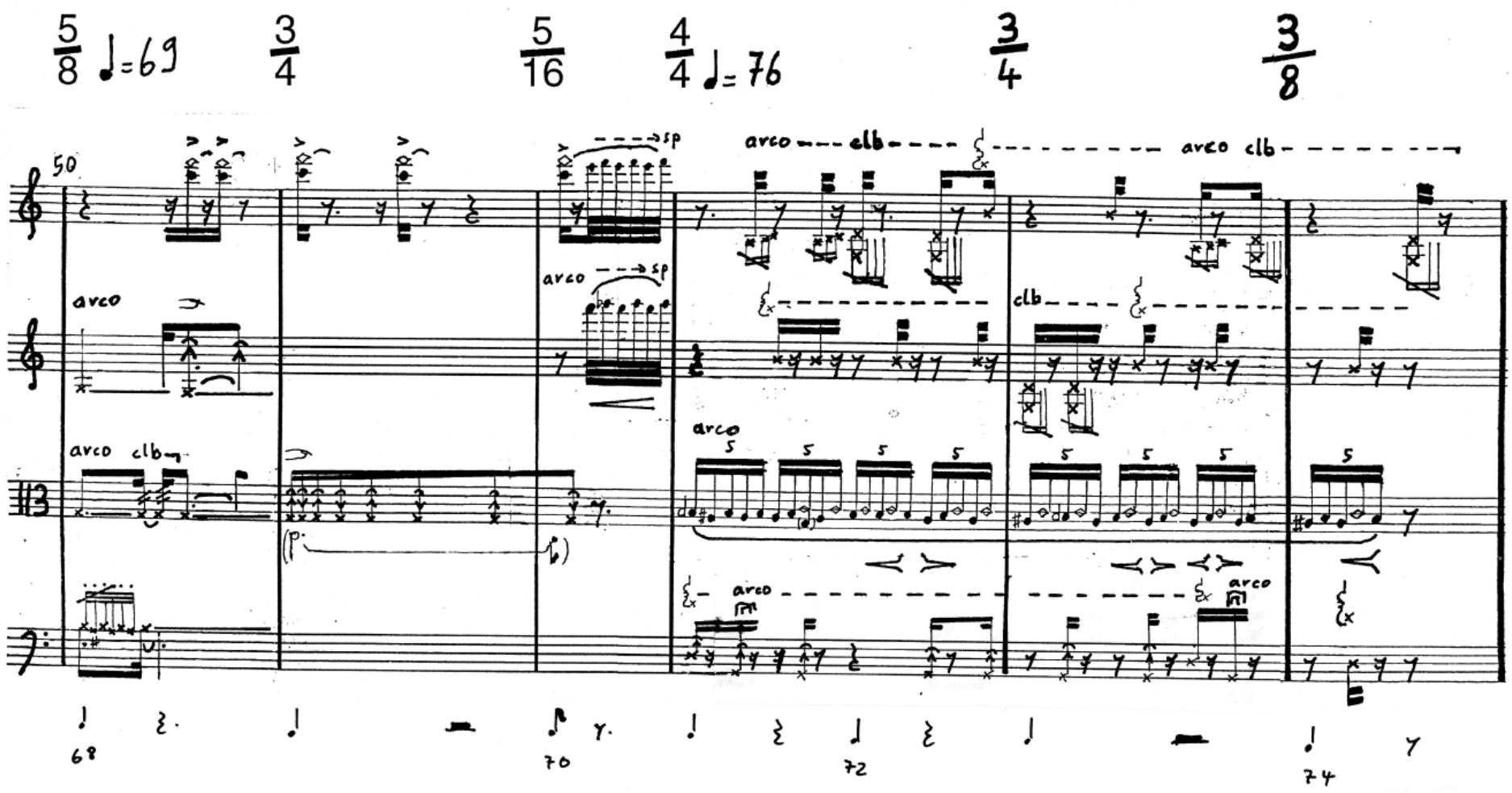
different loudspeakers: different filter regions



Vl1
Vl2
Vla
Vc

filter → pulse

spatial rythm
spatial rythm
spatial rythm



Vl1 — pulse envelope → variable delay

Vl2 — filter → pulse

Vla — filter → pulse

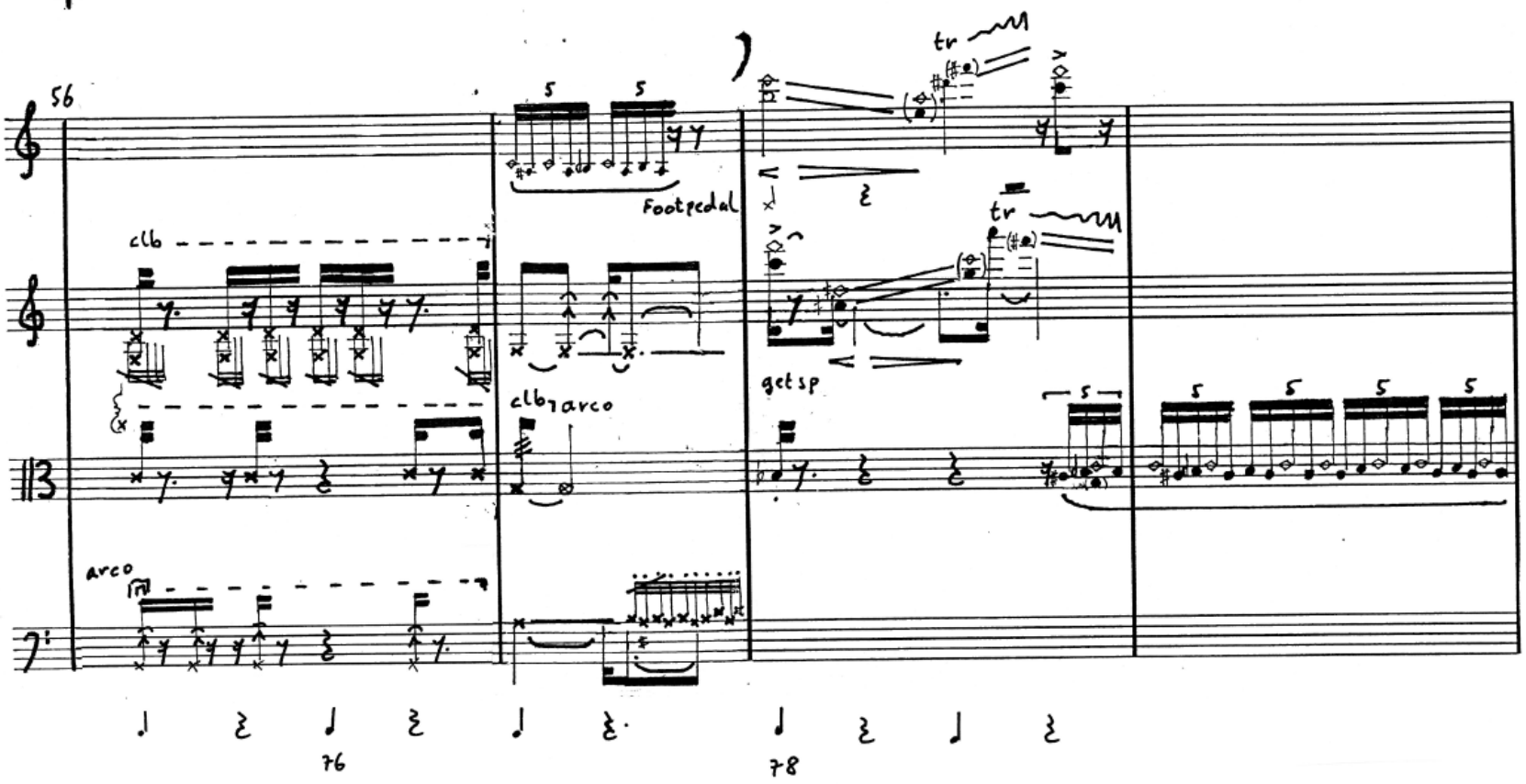
Vc — filter → pulse

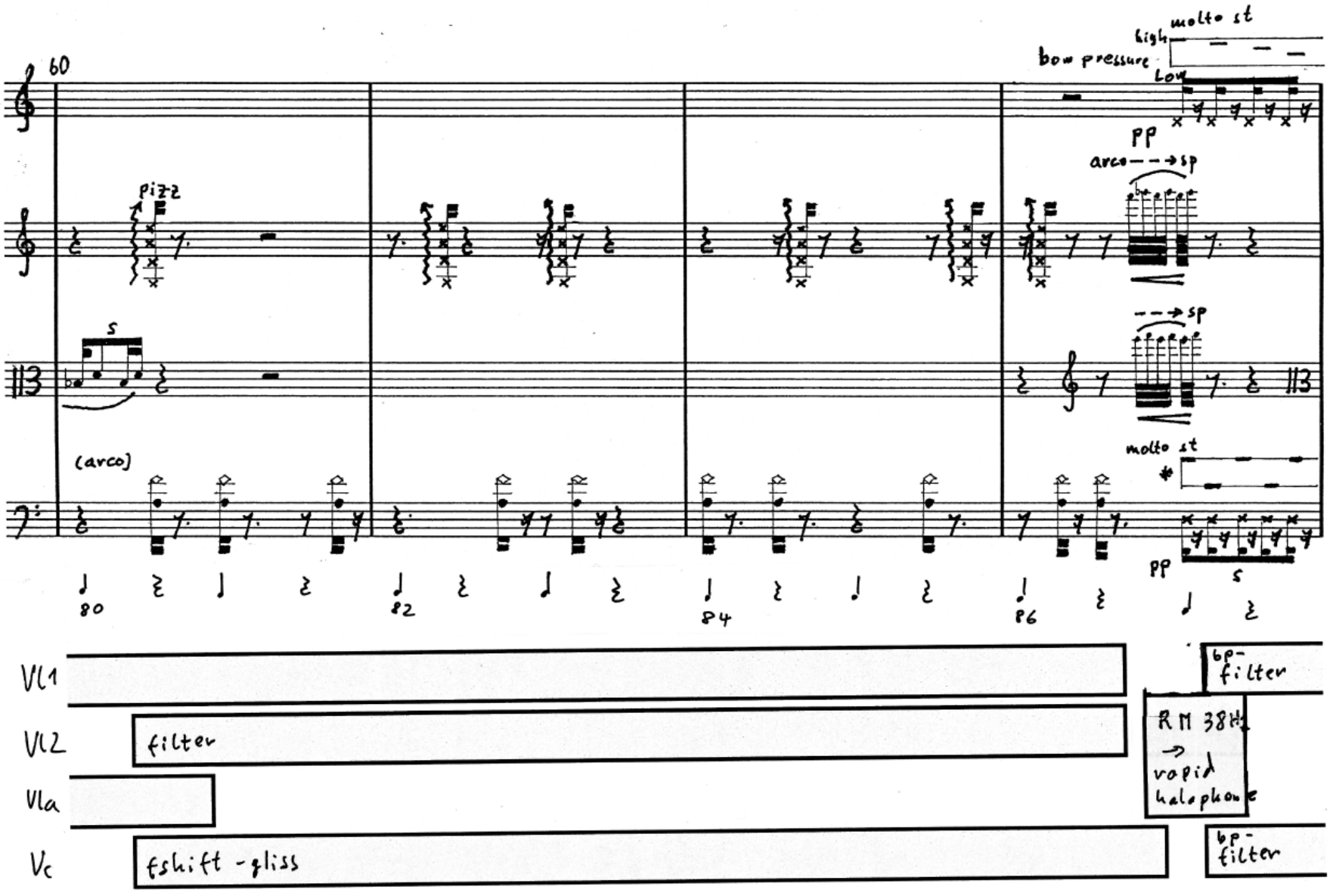
RM → rapid halaphone — spatial rythm

spatial rythm

RM 5Hz → halaphon

spatial rythm


4/4
5/8 ♩= 69
4/4 ♩= 76
56
Footpedal
clb
clb arco
arco
tr
tr
get sp
76
78
Vl1
RM→ halaphon
fshift gliss
Harmo-nizer
long reverb → variable delay
Vl2
spatial rythm
filter→ pulse
RM→ reverb
fshift gliss
Harmo-nizer
Vla
spatial rythm
filter→ pulse
bp-filter
RM → halaphon
Vc
spatial rythm
filter→ pulse


60
molto st
high
bow pressure
low
pp
arco → sp
pizz
(arco)
80
82
84
86
Vl1
bp-filter
Vl2
filter
RM 38Hz → rapid halaphon
Vla
Vc
fshift - gliss
bp-filter

64

ord

get ord. → molto sp

pp

get ord → molto sp

molto sp

ord → molto sp

get

non get, ma sp

get ord → molto sp

pp

ord → molto sp

non get, ma sp

88 90 92 94

direct amplification

changing delay/fb + bp-filter

changing delay/fb + bp-filter

changing delay/fb + bp-filter

68

5/8

non get, ma sp

get

sp → ord.

non get, ma sp

sp → ord

get

arco ord

get

96 98 100 102

Vl1

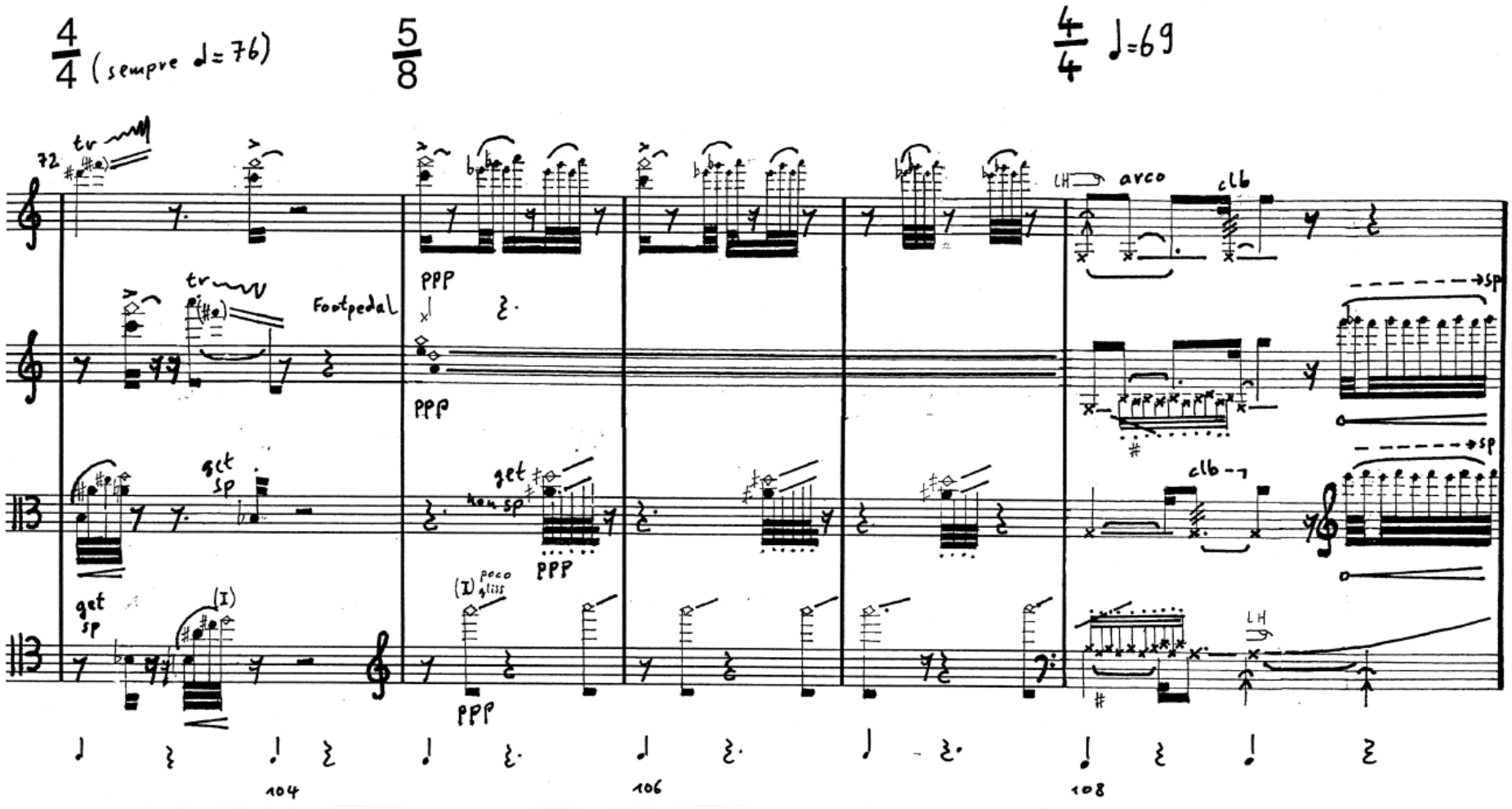
Vl2

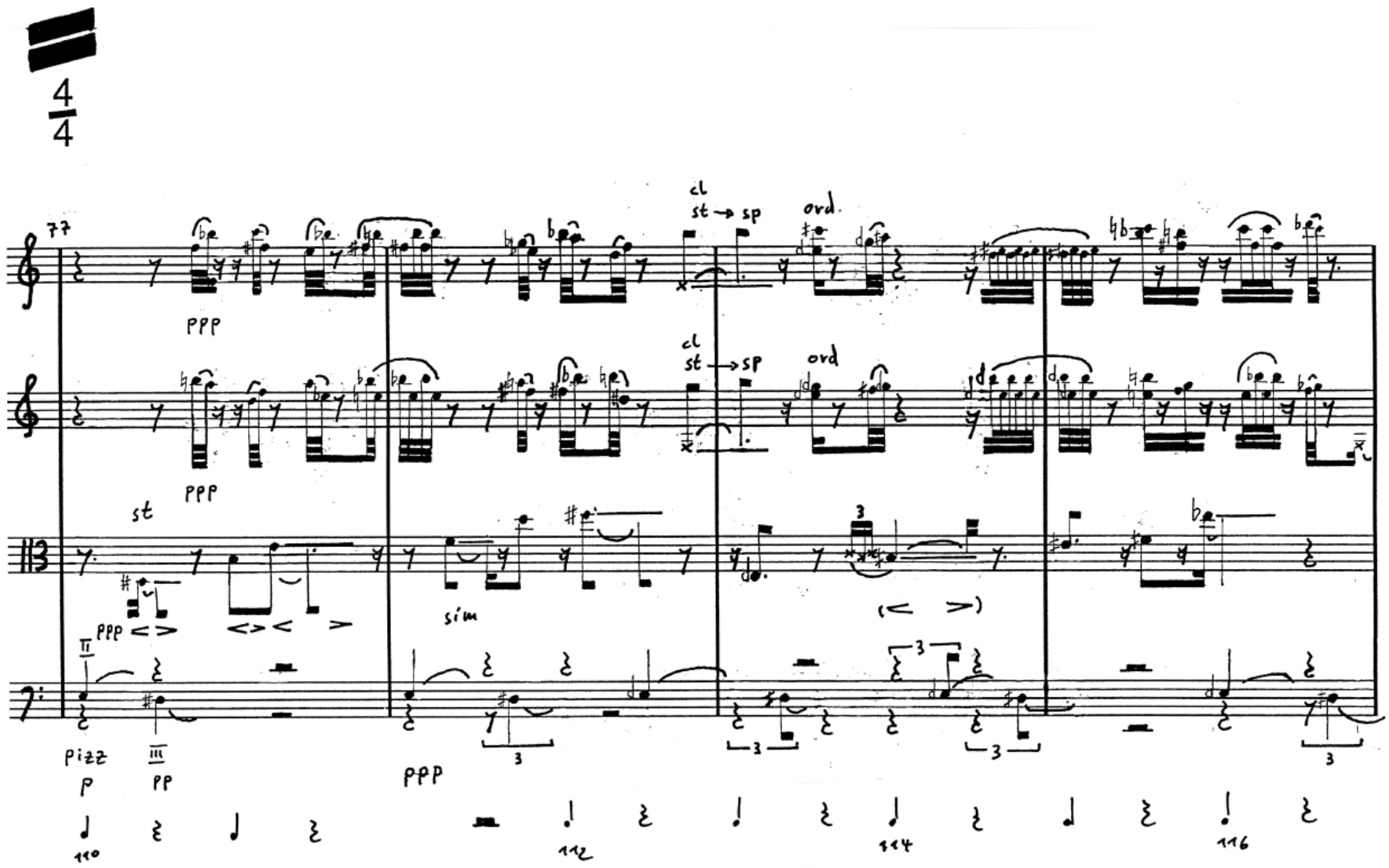
Vla

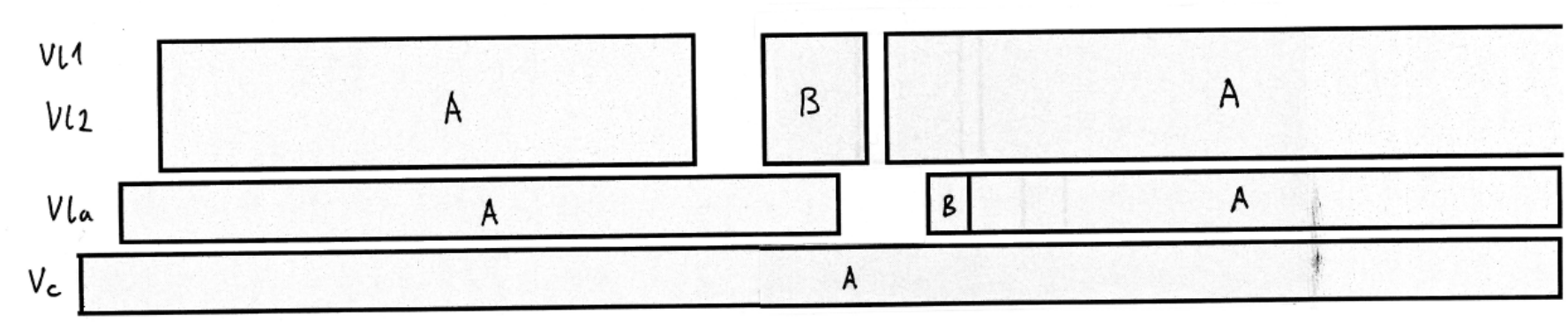
Vc

bp-filter-chord + RM

changing delay/fb + bp-filter







A = reverb
B = filter-Chord → RM, bandwidth getting smaller by and by

81

sp

cl st → sp

ord

morendo

cl

118 120 122 124

Vl1		B	A	B	A	B	A	B
Vl2								
Vla	A	B A	B	A	B	A		B
Vc	B + Harmonizer gliss up							

bow pressure too high
⇒ unsteady sound

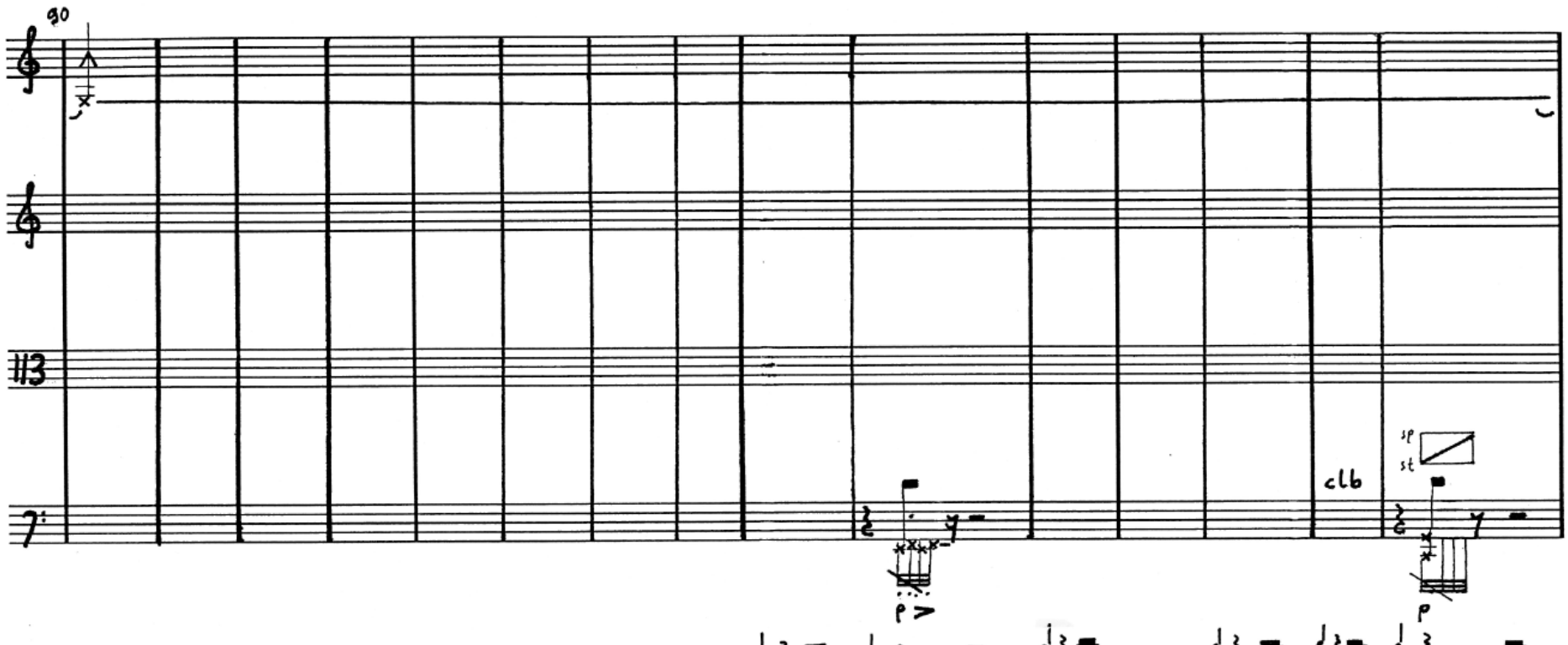
85

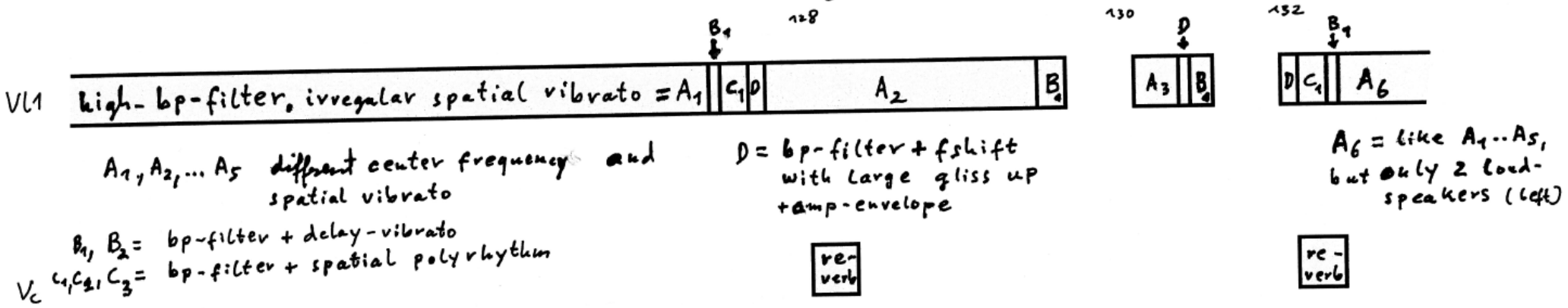
ppppp

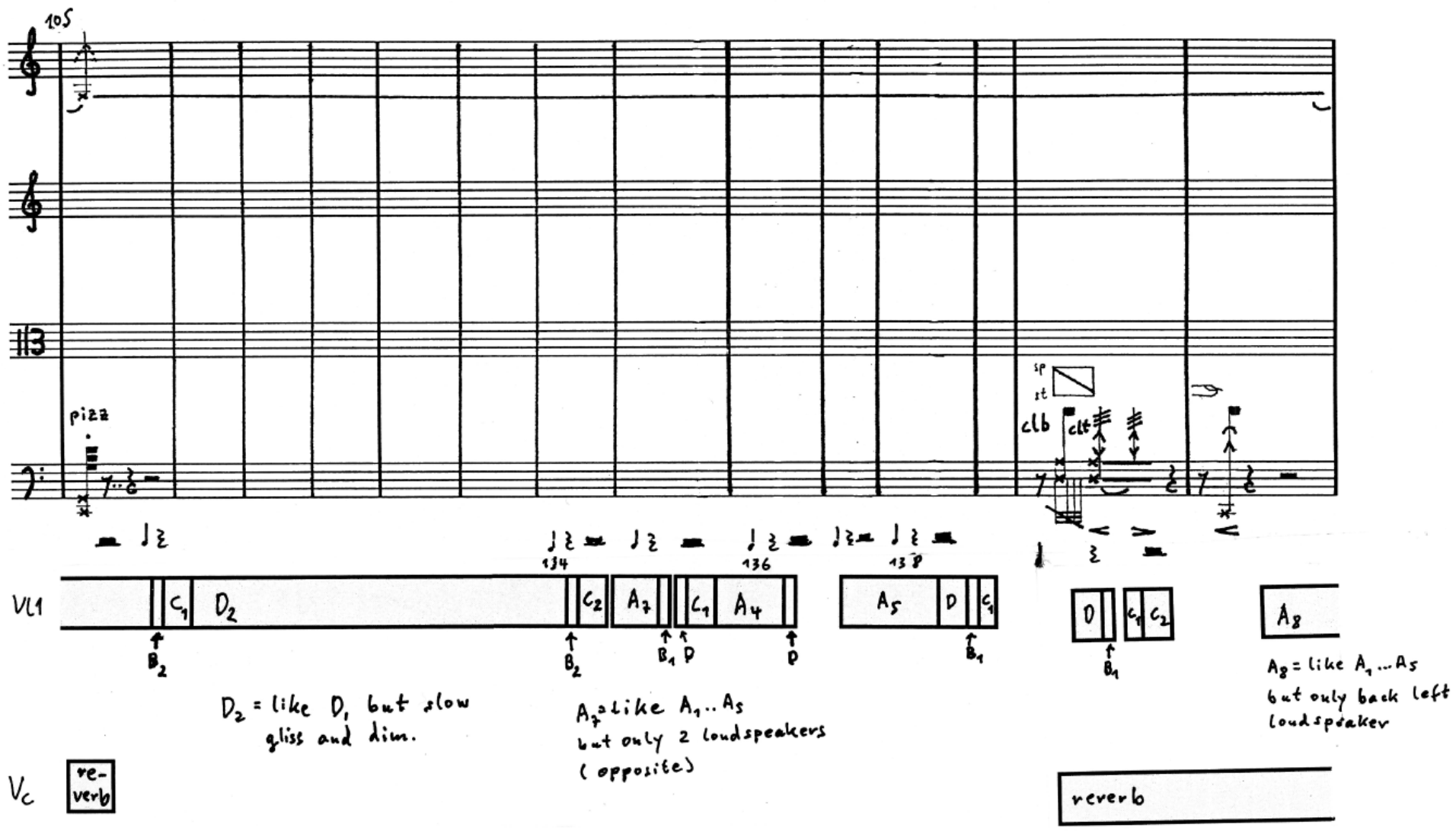
126

Vl1	
Vl2	
Vla	
Vc	(B) + Harmonizer gliss up

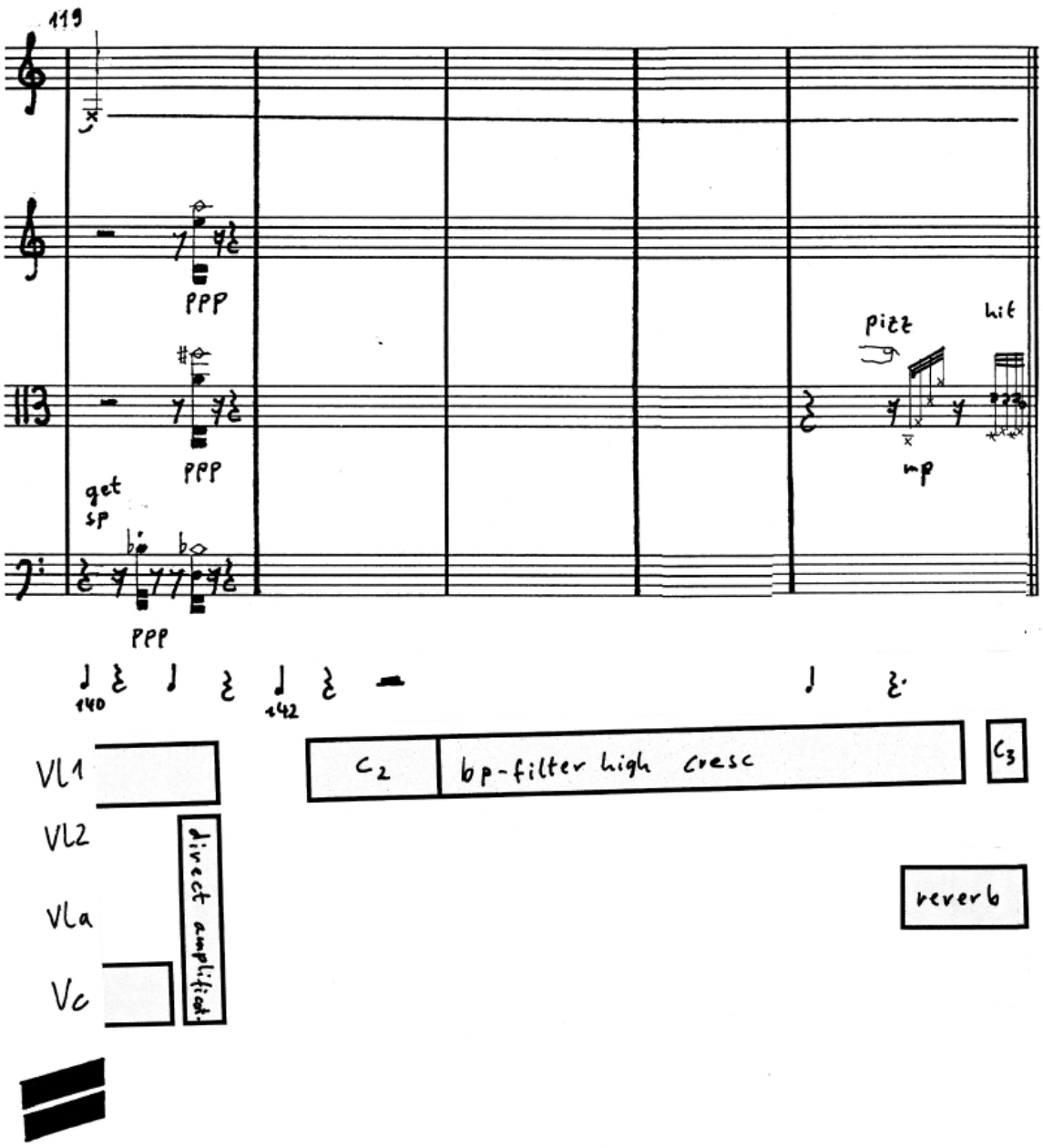
until bar 109:
- change gradually to horizontal bow movement
- lower gradually bow pressure to achieve a solid tone



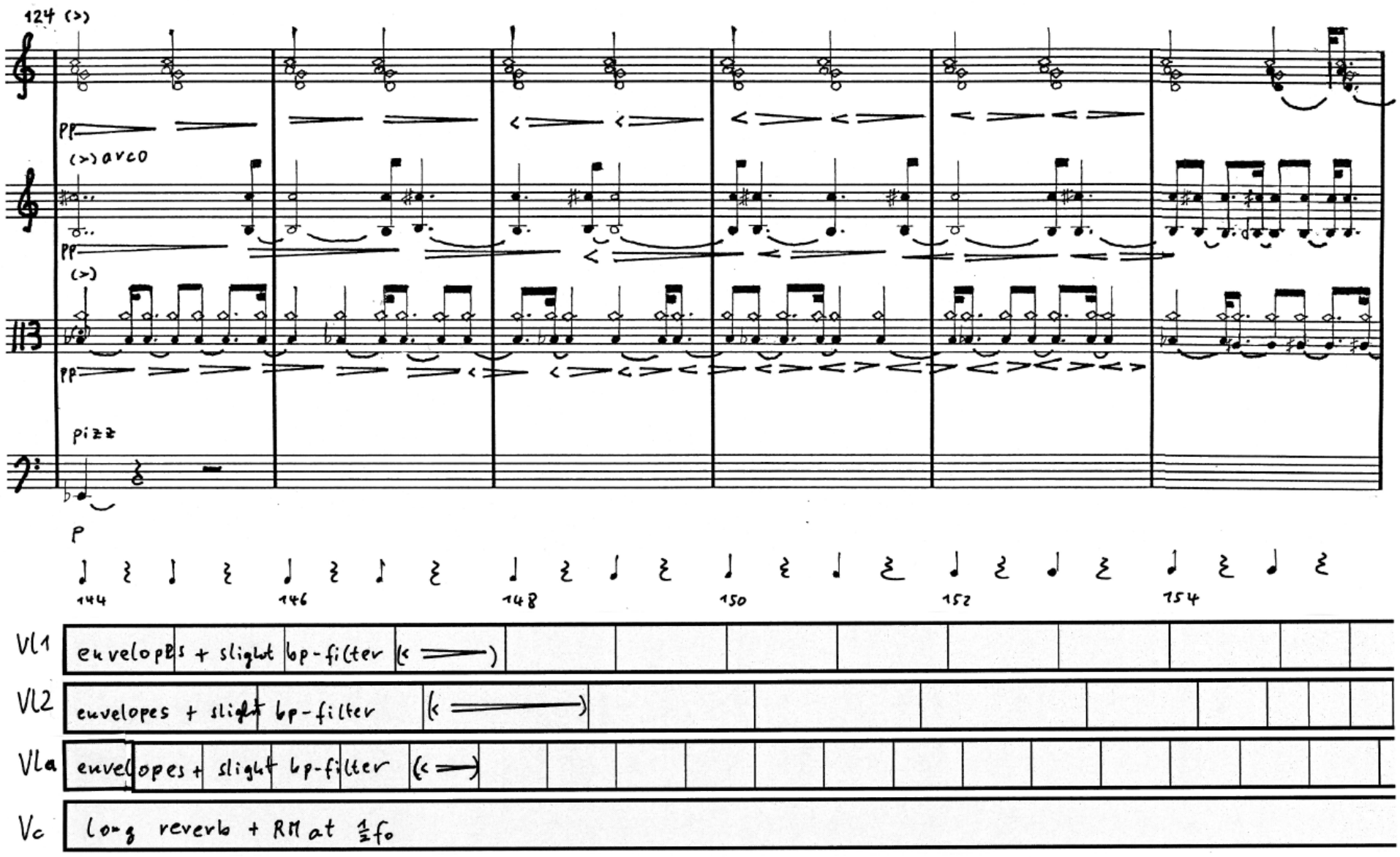


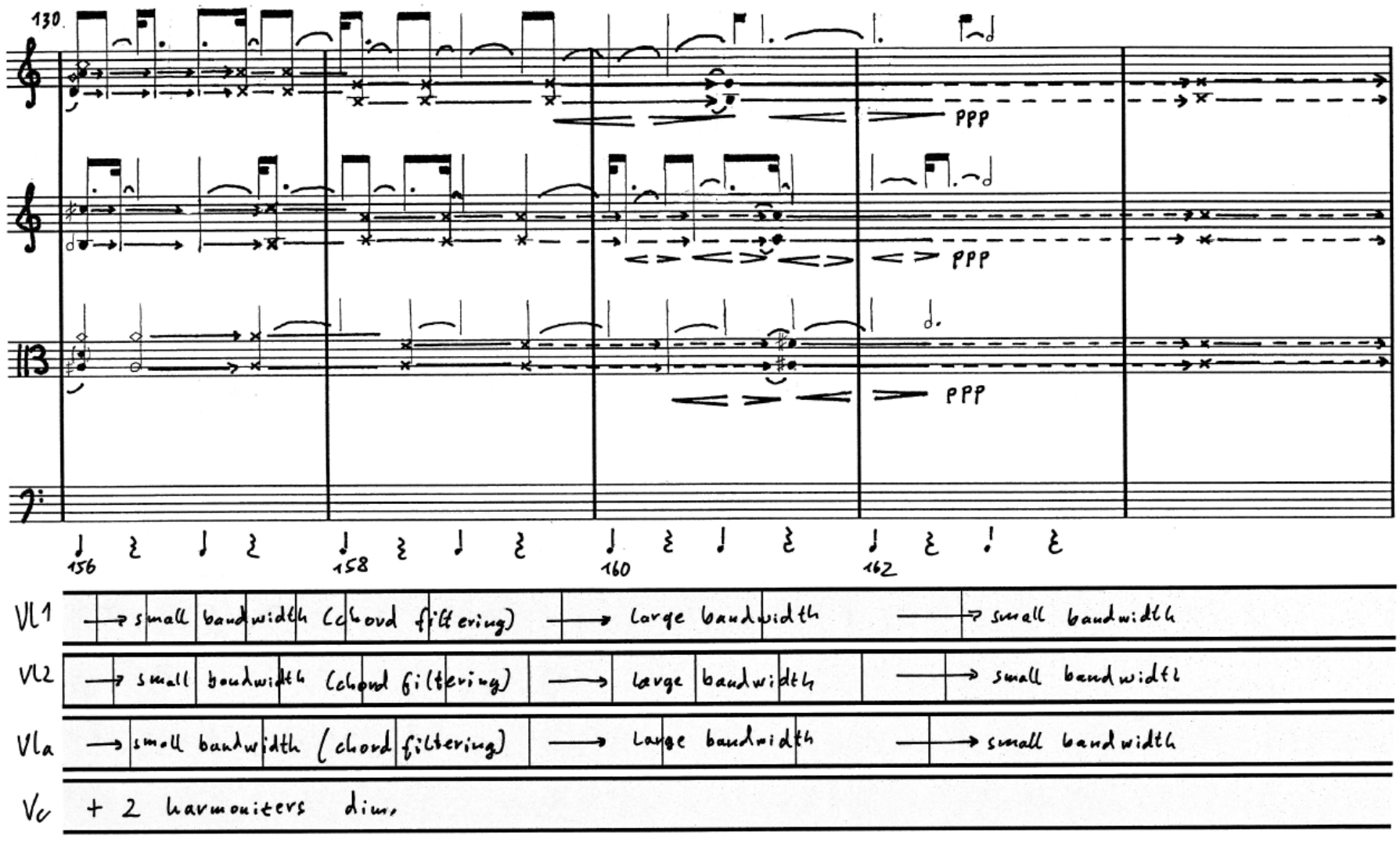


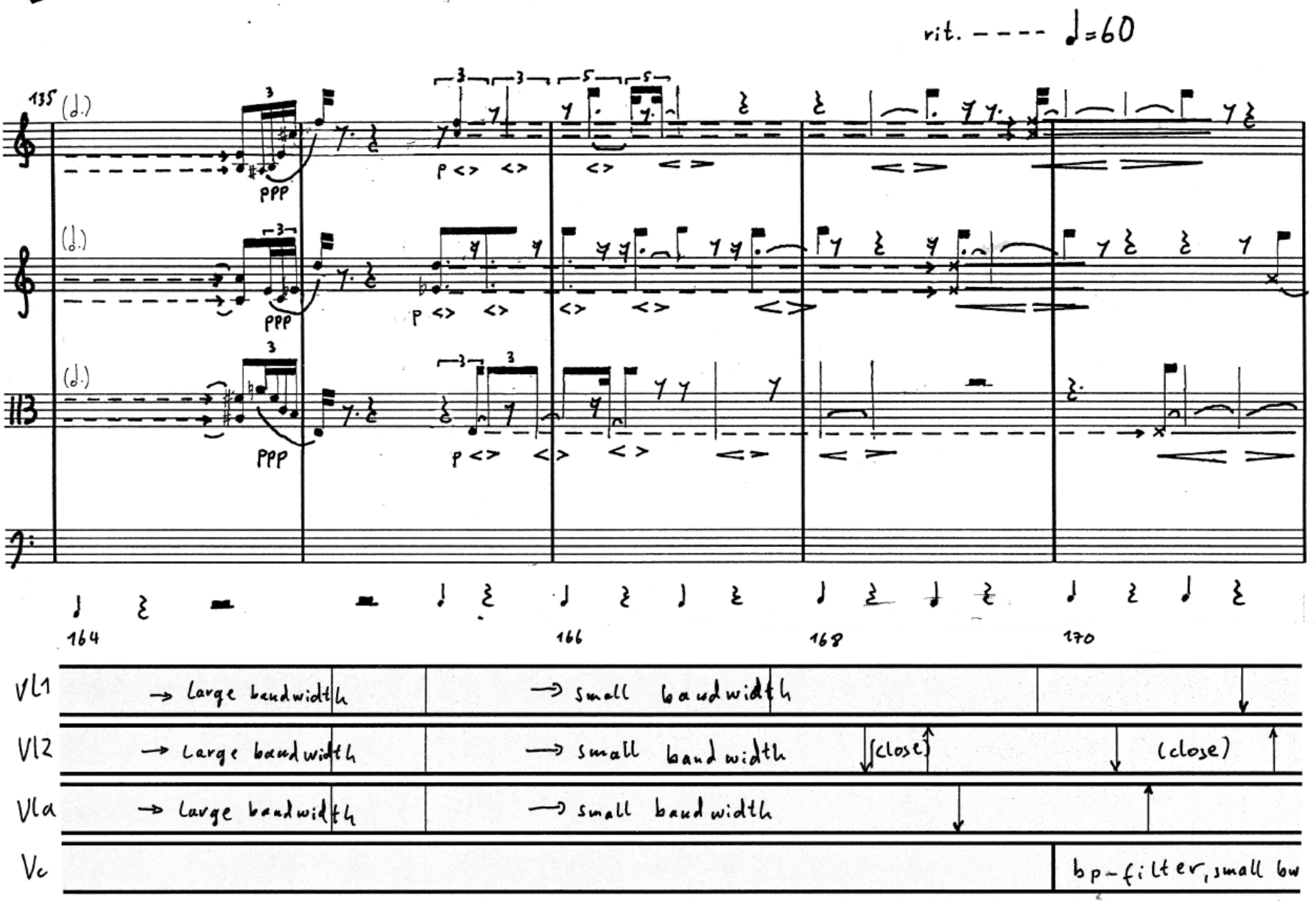
$\frac{2}{4}$ $\frac{5}{8}$



$\frac{4}{4}$ ♩= 76




130
PPP
PPP
PPP
156
158
160
162
VL1 → small bandwidth (chord filtering) → large bandwidth → small bandwidth
VL2 → small bandwidth (chord filtering) → large bandwidth → small bandwidth
Vla → small bandwidth (chord filtering) → large bandwidth → small bandwidth
Vc + 2 harmoniters dim.


rit. ---- ♩=60
135
PPP
PPP
PPP
164
166
168
170
VL1 → large bandwidth → small bandwidth
VL2 → large bandwidth → small bandwidth (close) (close)
Vla → large bandwidth → small bandwidth
Vc bp-filter, small bw

acc - - - ♩=69

140

gliss

sp

A

p

172 174 176

Vl1	large bw, reverb	reverb	--> filter (chords)
Vl2	large bw, reverb	reverb	--> filter (chords)
Vla	large bw, reverb	bp-filter -> RM (1-20 Hz) -> halaphon	
Vc	large bw, reverb	reverb	--> filter (chords)

5/4

146

sp ord

gliss

178 180

Vl1	- - - -> reverb	--> filter	-> reverb
Vl2	- - - -> reverb	--> filter	-> reverb
Vla	- - - -> reverb (+ RM + halaphon)	--> filter sim.	-> reverb sim.
Vc	- - - -> reverb	--> filter	-> reverb

4/4

151

sp

ord

ppp

182 184 186

Vl1 amplification | bp-filter (chords) | bp-filter gliss up → reverb

Vl2 1 octave low + low pass fil. | amplification | bp-filter gliss up → reverb

Vla RM (1→20 Hz→1 Hz) → balaphon | bp-filter gliss up → reverb

Vc amplification | bp-filter gliss up → reverb

9/16 5/16 2/4

♩= 76

156

ord

Foot pedal

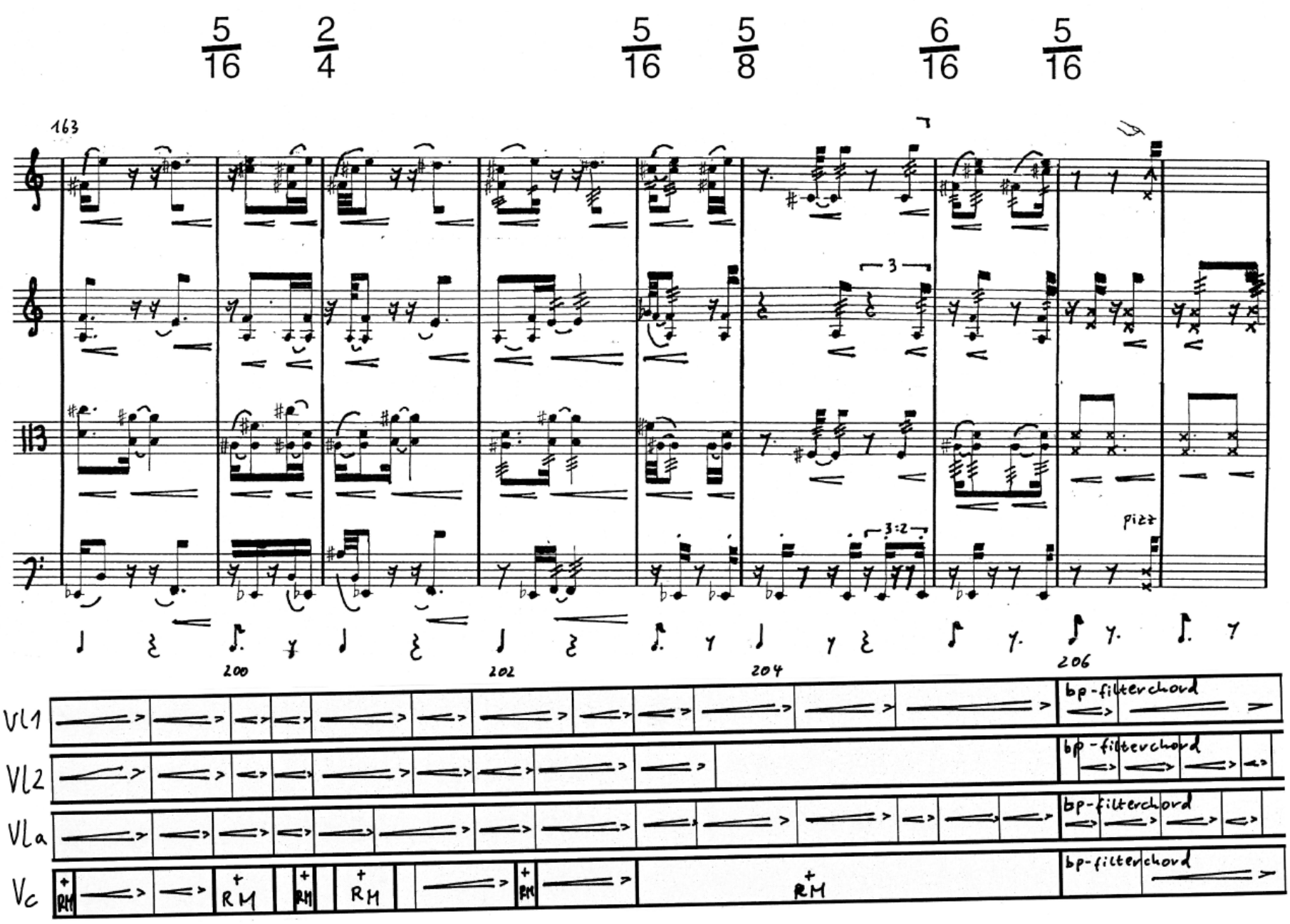
188 190 192 194 196 198

Vl1 reverb

Vl2 reverb

Vla reverb

Vc reverb | +RM ½ t. | +RM | +RM | +RM | +RM | +RM


5/16 2/4 5/16 5/8 6/16 5/16
163
3
3:2
pizz
200 202 204 206
bp-filterchord
Vl1
Vl2
Vla
Vc
RM

6/16 5/16 2/4 5/8 5/16 3/4
172
3
gliss
Footpedal
Flag gliss
gl. (V)
(pizz)
arco
pizz
pp
208 210 212 214 216
another chord
reverb
+RM ½ f₀ + reverb
A
B
transforms
all instruments:
rh1 os1 rh1 os1 rh1 os1 rh1 os1 fr1 fr2 os2
rh1: pulse (+ filter)
rh2: pulse + delayvibrato (+ filter)
rh3: pulse + molto delayvibrato (+ filter)
os1: delay vibrato (+ filter)
os2: delay vibrato + poco halaphon (+ filter)
os3: delay vibrato + halaphon (+ filter)
fr1: halaphon (+ filter)
fr2: another halaphon (+ filter)
fr3: another halaphon (+ filter)
A: no filter
B: with filter

2/4 5/16 5/4

181

molto gliss

avco

5:4

gliss

avco

(IV)

gliss

218 220 222

VL1 B | B A | B | A

VL2 A B | A | B

Vla B B B B A | B

Vc B | A | A

all os2 rh1 os1 rh1 os1 rh1 os1 fr1 fr2 fr1 os1 os2 fr1 fr2 fr1 os2 fr2 fr2 fr2 os2

4/4 5/4

186

gliss

3

3

gliss

gliss

ppp

224 226 228 230 232

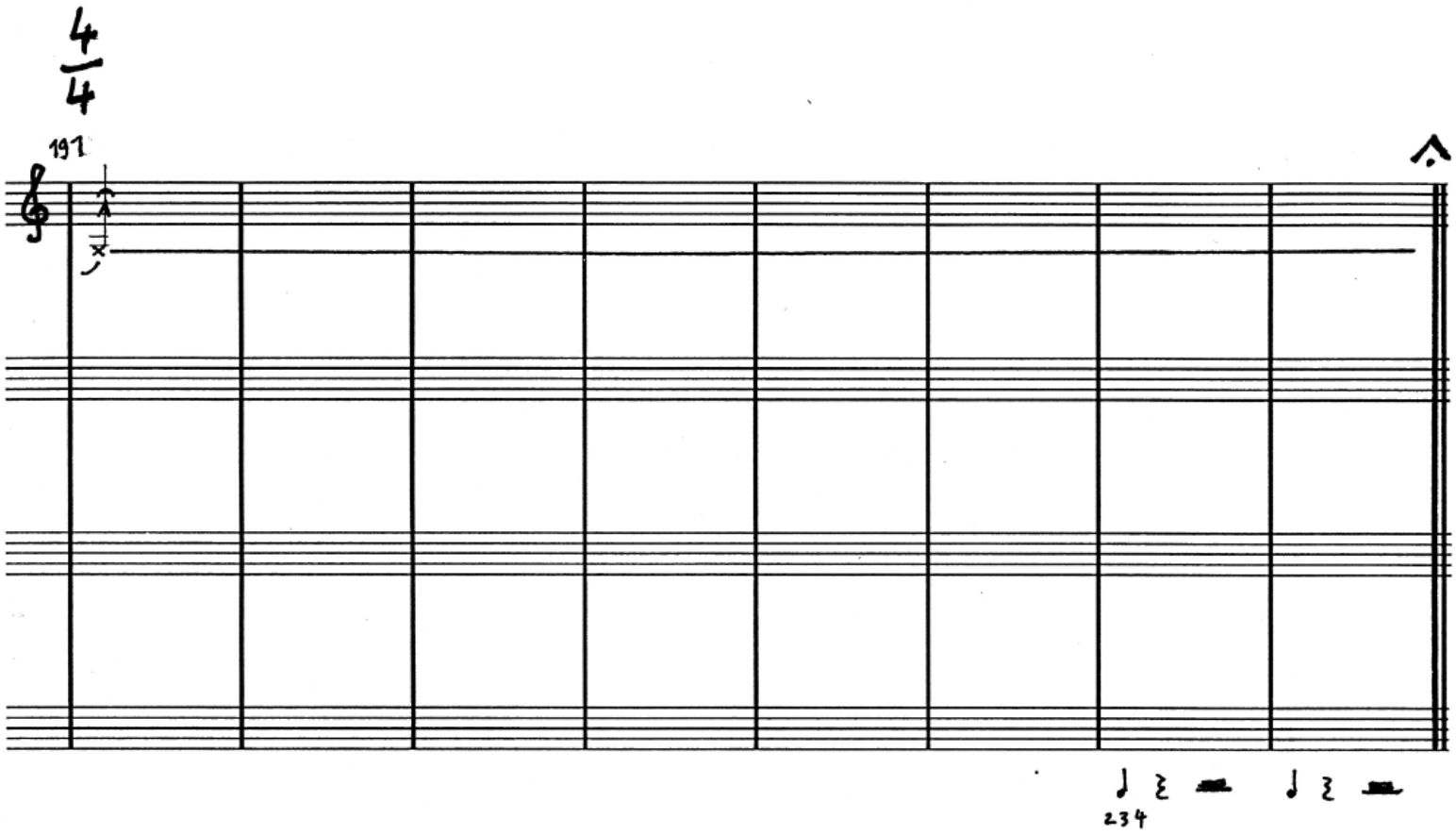
VL1 B | A

VL2 B | A | B

Vla A

Vc A

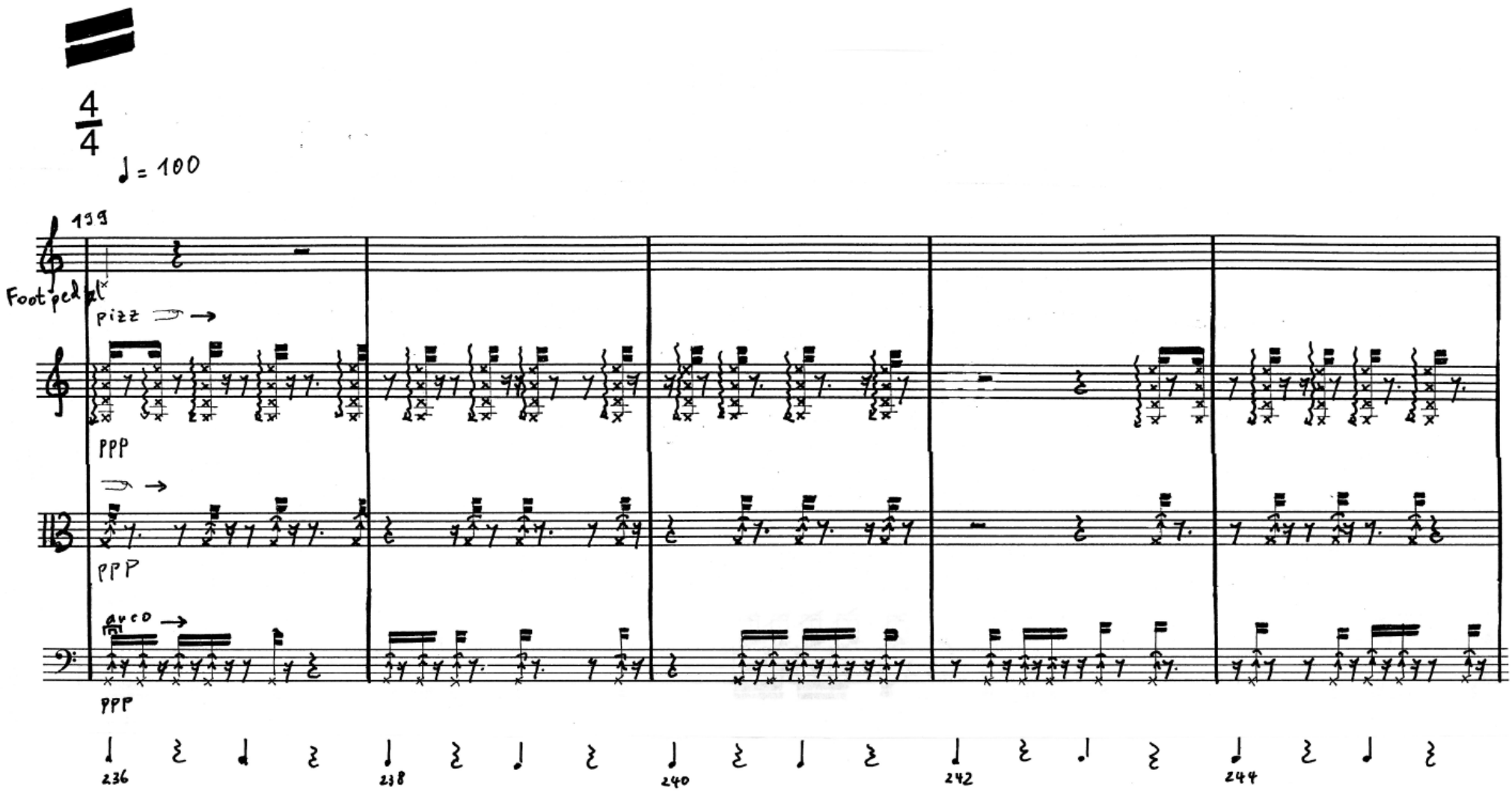
all os2 fr2 rh1 os1 fr1 fr2 os2 fr1 rh1 os2 fr2 os2 fr2 os2 fr3 os3 fr3 rh3 fr3 fr3 fr2 fr3 fr2 fr1 os1 fr2 fr3 fr2 fr3 os1 fr1 rh1 fr1



Vl1 high bp-filter, irregular spatial vibrato | C_1 | C_1 | C_1 | C_1 | C_2

C_1 = bp-filter chord + vibrato + accent

C_2 = like C_1, but cresc.

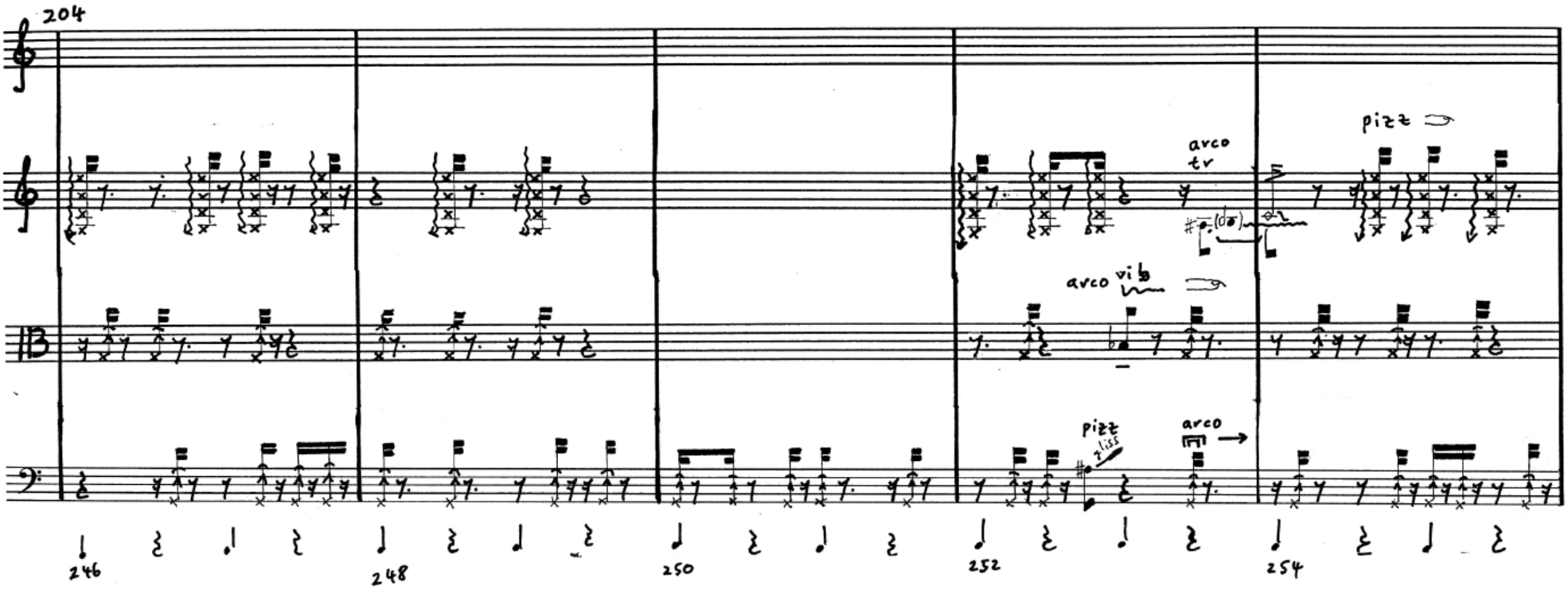


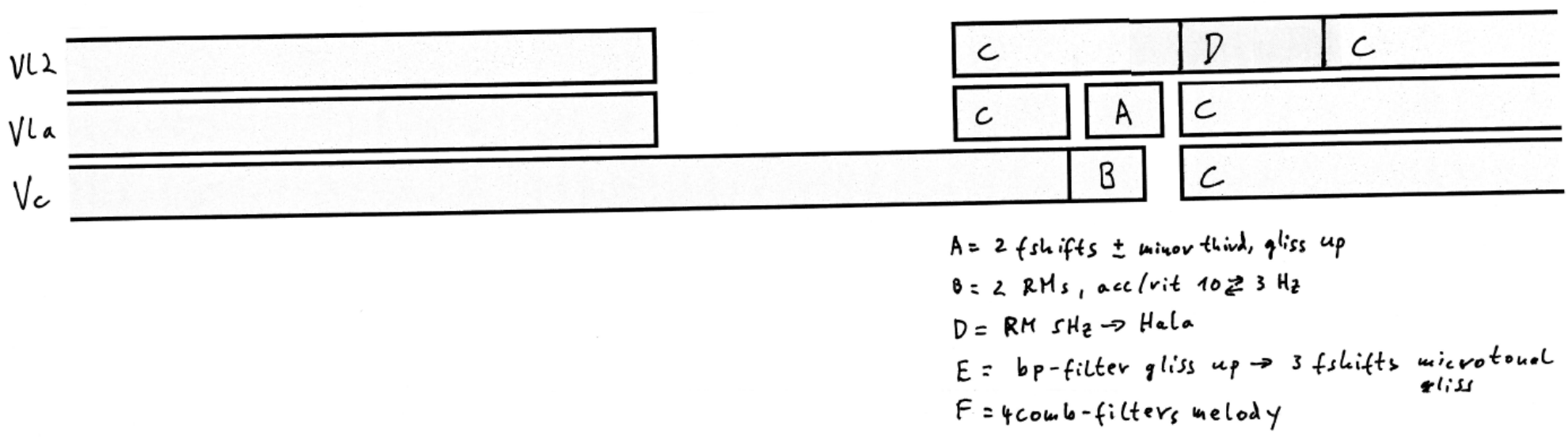
Vl2 | spatial rythm (Fibonacci) = C

Vla | spatial rythm (Fibonacci) = C

Vc | spatial rythm (Fibonacci) = C

different loudspeakers: different filter regions





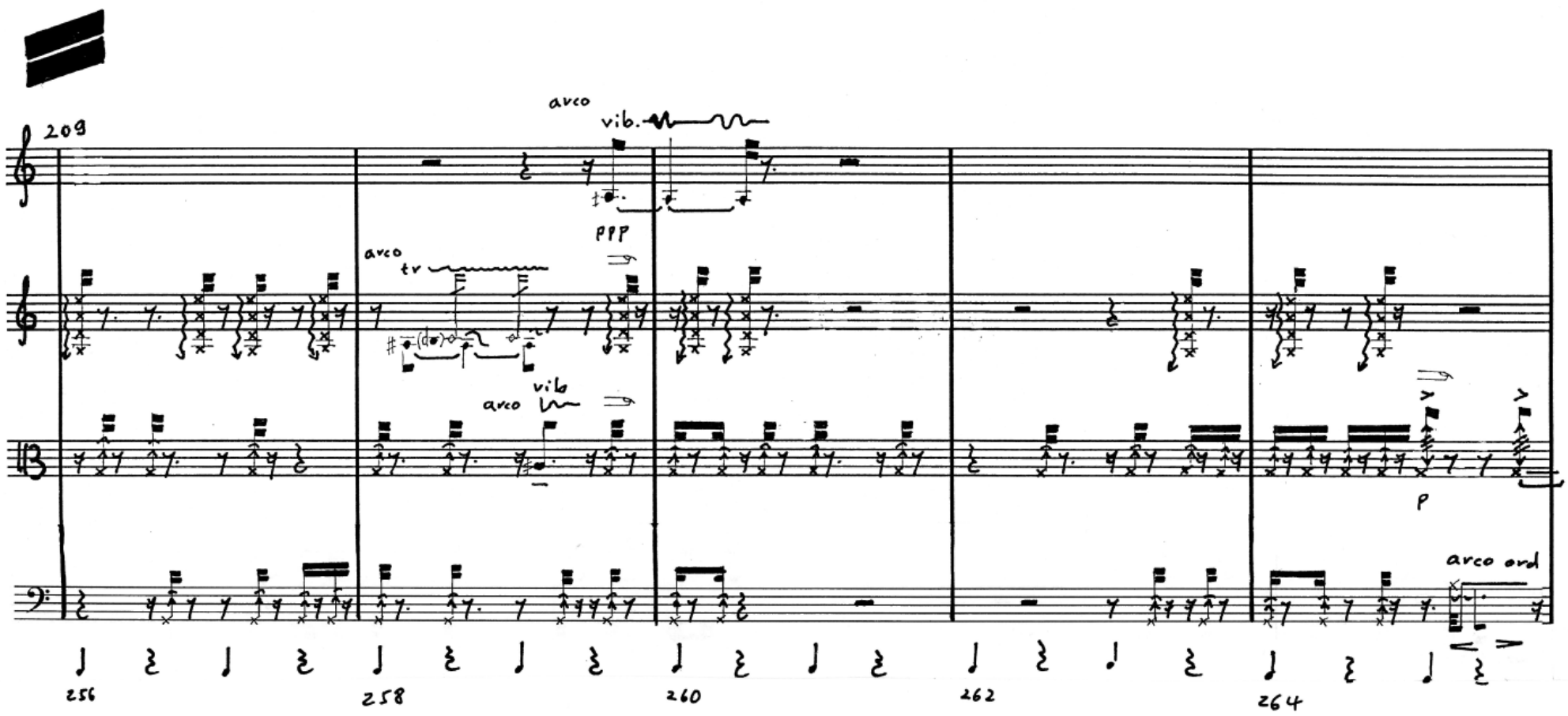
A = 2 fshifts ± minor third, gliss up

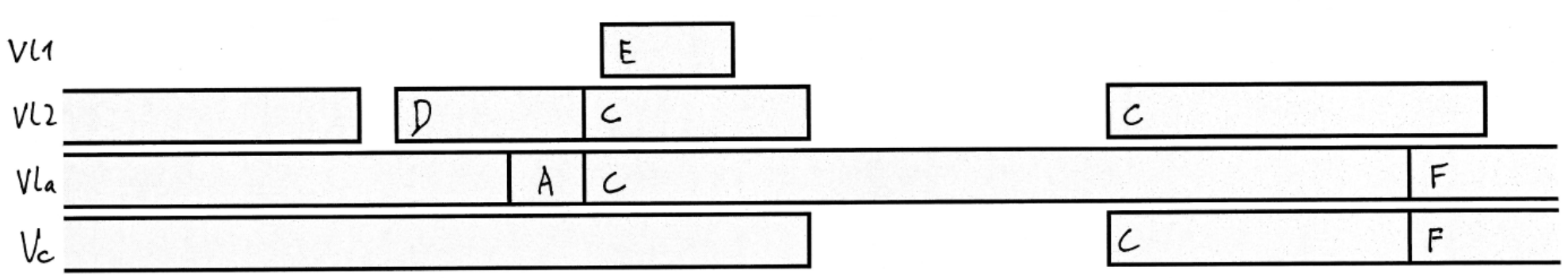
B = 2 RMs, acc/rit 10 ⇄ 3 Hz

D = RM 5Hz → Hala

E = bp-filter gliss up → 3 fshifts microtonal gliss

F = 4comb-filters melody





214

vib

p

ppp

ppp

pizz

gliss

266 268 270

Vl1			E
Vl2	F	C	
Vla		C	
Vc		C	B

3/8 3/4

219

vib

arco tr

pizz

pizz ord.

pizz

arco

arco vib

arco vib

ord vib

arco

pizz gliss

gliss

arco

pizz molto gliss

272 274 276 278

Vl1					E				
Vl2		D	C					reverb	
Vla	A	C	A	A	C	A	A	A	A
Vc	C		A	C		B	C		B

4/4

225

pizz

gliss

pizz

PPP

PPP

vib

P

P

PPP

280 282 284 286 288

Vl1 B

Vl2 C

Vla A A C F C F

Vc C F C F

1. 3
2. 2
3. 5

231

3 times

Footpedal

290 292

Vl2 C

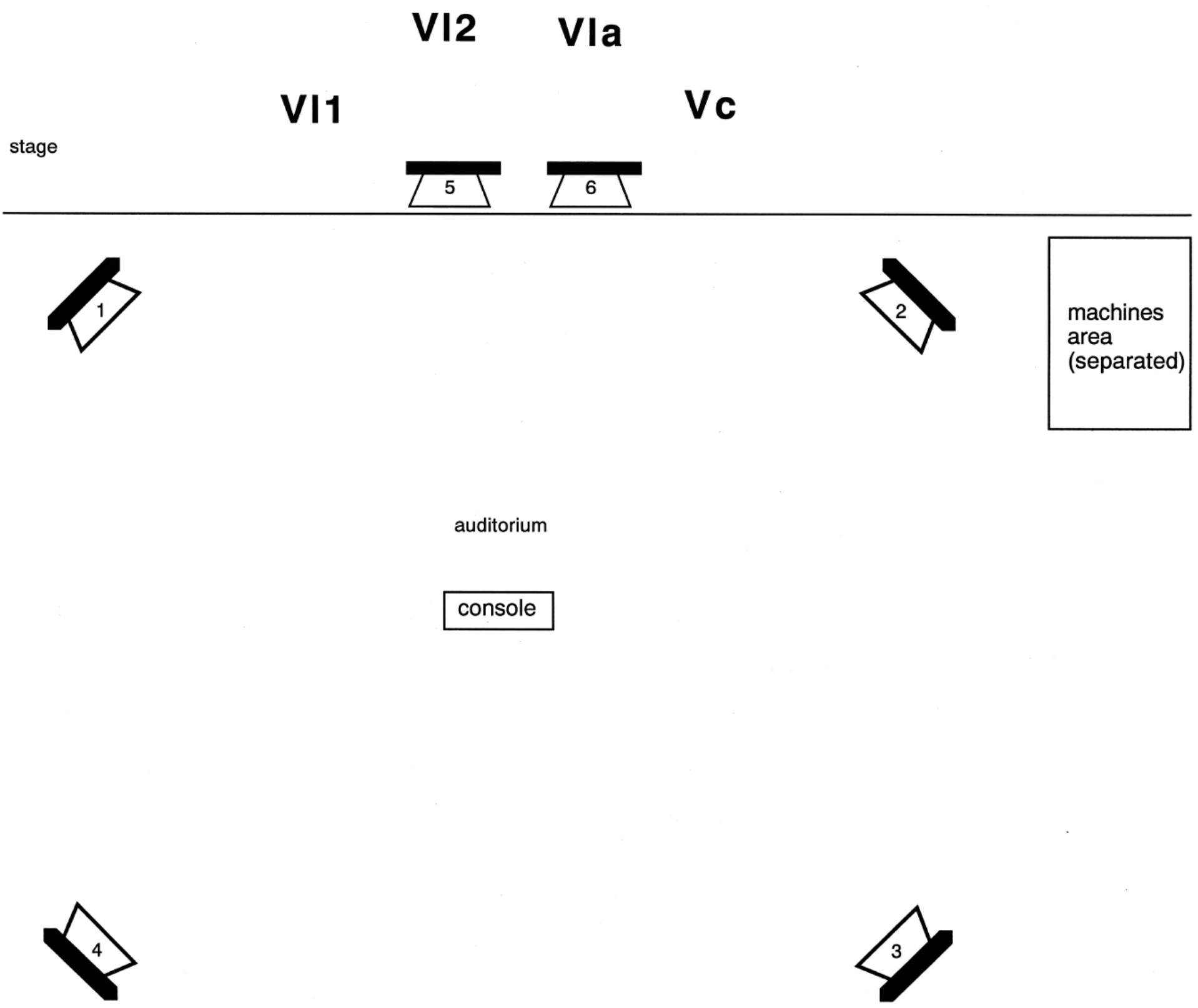
Vla C

Vc C

finis

Paris,
december '93

1.4. disposition



The following pages show some (not all!) symbolic audio circuits of the piece. An audio circuit is correlated to a section and a pitch coding the circuit. The pitch is noted together with the circuit (c4 is middle c) and can be found in th score in the staff of the transformation code.

The list of ciruits is not complete and does not show every detail of the circuits. Nevertheless it can be used as a sort of overview of occuring patches.

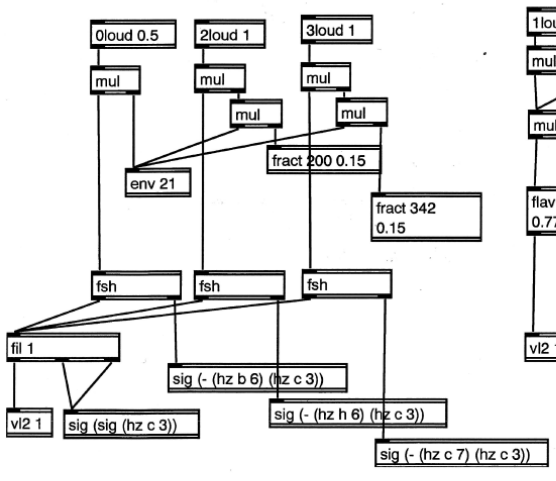
The audio flow is bottom up, so the instruments micro inputs are notated low, the loudspeakers high.

0loud 1	0. loudspeaker (rear left) with amplitude 1 (= 0dB)
1loud 1	1. loudspeaker (rear left) with amplitude 1 (= 0dB)
2loud 1	2. loudspeaker (rear left) with amplitude 1 (= 0dB)
3loud 1	3. loudspeaker (rear left) with amplitude 1 (= 0dB)
fsh	frequency shifter, left input = signal, right input = frequency shift
fil 1	bandpass filterbank (3 equifrequential band passes). left input = signal, center input = senter frequency, right input = bandwidth (Hz)
fla	flanger, left input = signal, center input = variable delay, right input = feedback
rm	ring modulator, left input = signal, right input = sine frequency
vl1 1	violin 1
vl2 1	violin 2
vla 1	viola
vc 1	violoncello
setto	linear signal converter
mul	Audio-multiplication (VCA)
sig	(constant) signal generator
env 12	envelope generator, 99 coded envelopes
li 0 -5000	line signal generator, from-to
exp .3 2	exponential signal generator
fract 100 2	"fractal" envelope generator

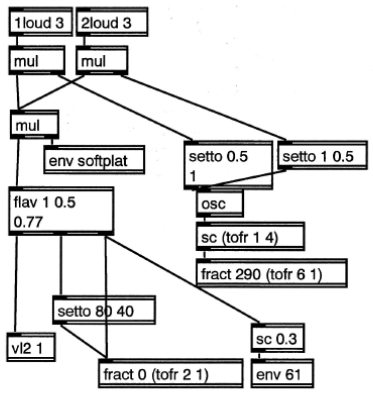
osc	sine wave oscillator
rht	puls generator with 3 possible pulse types
rht3	puls generator with 3 polyphonic pulses
sc	scaler (amplifier)

sect0

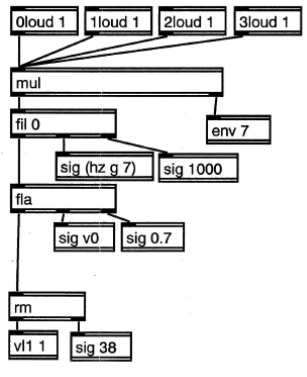
d3



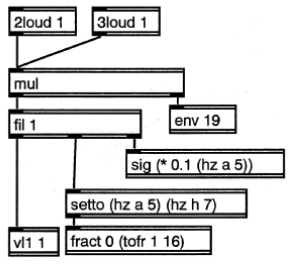
c3



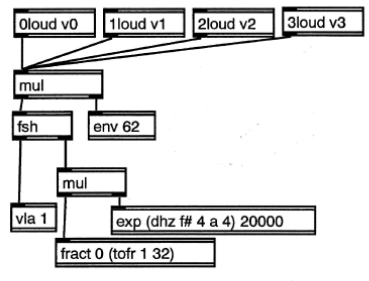
h3 v0=38
c#4 v0=49
eb4 v0=62
f4 v0=80



a3

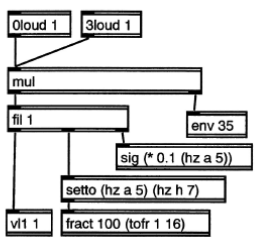


c#3 v0123=1 0 0 0
eb3 v0123=0 1 0 0
f3 v0123=0 0 1 0
g3 v0123=0 0 0 1

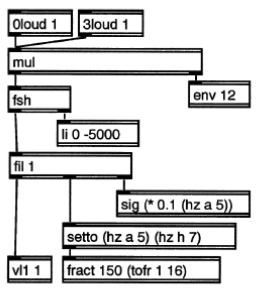


sect1

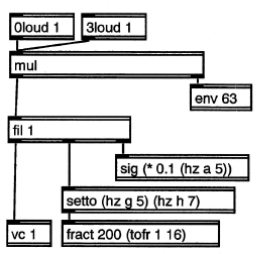
c3



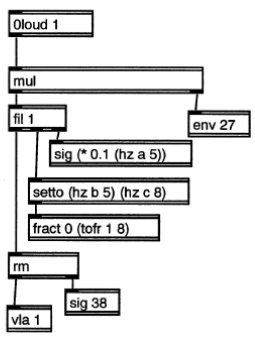
d3



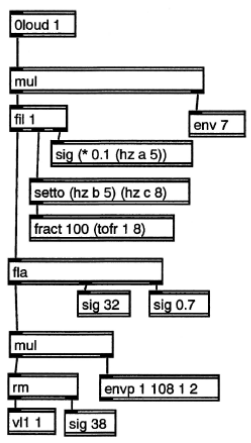
e3



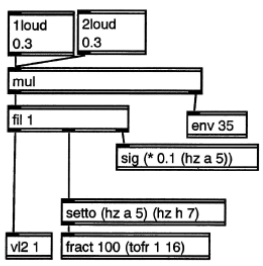
f#3



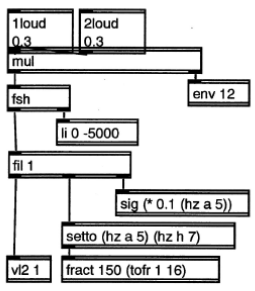
ab3



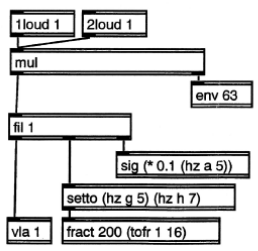
c#3



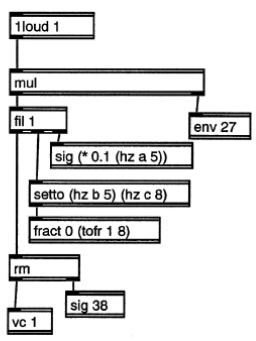
eb3



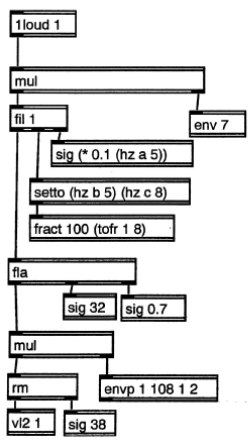
f3



g3

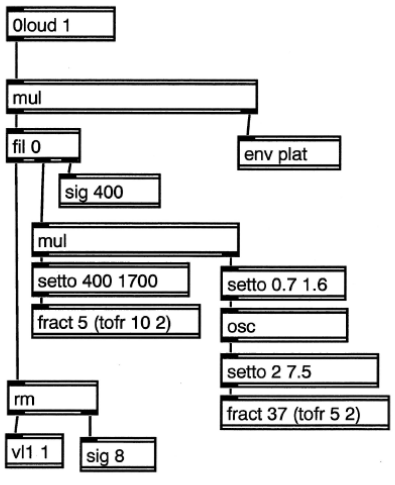


a3

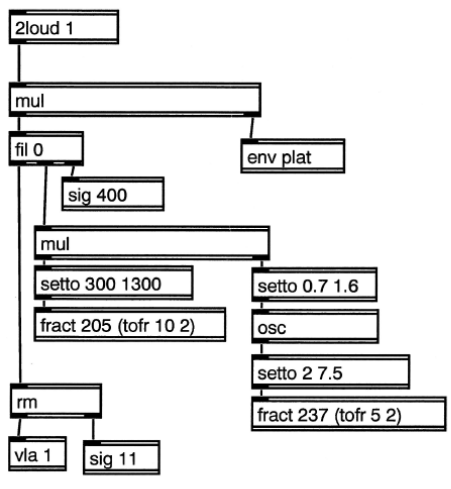


sect2

c3

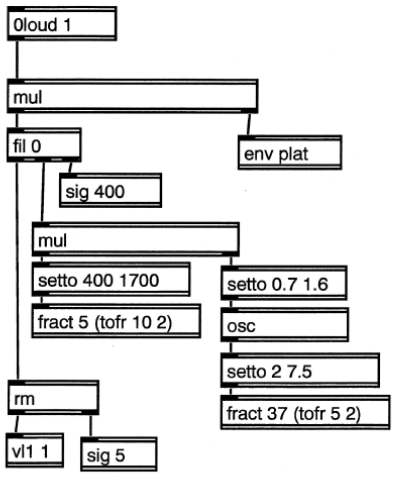

0loud 1
mul
fil 0
env plat
sig 400
mul
setto 400 1700
setto 0.7 1.6
fract 5 (tofr 10 2)
osc
setto 2 7.5
rm
fract 37 (tofr 5 2)
vl1 1
sig 8

c#3

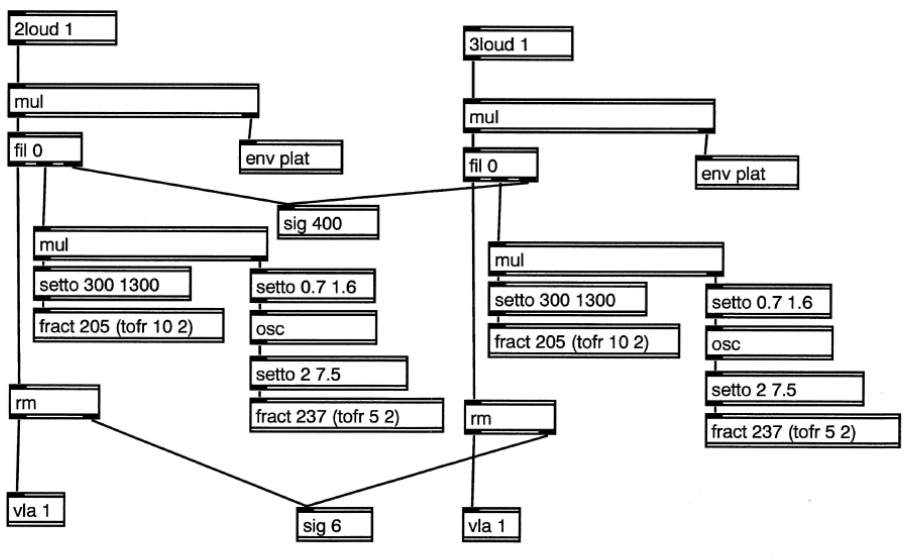

2loud 1
mul
fil 0
env plat
sig 400
mul
setto 300 1300
setto 0.7 1.6
fract 205 (tofr 10 2)
osc
setto 2 7.5
rm
fract 237 (tofr 5 2)
vla 1
sig 11

sect3

c3

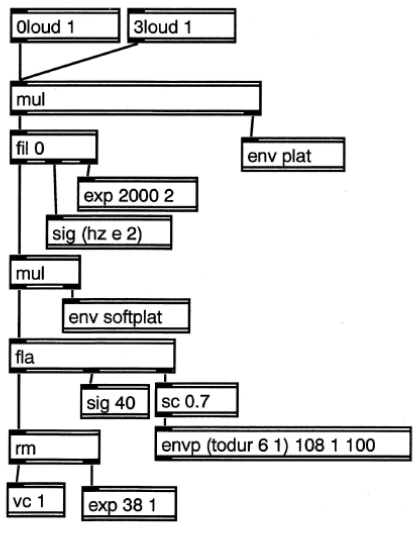

0loud 1
mul
fil 0
env plat
sig 400
mul
setto 400 1700
setto 0.7 1.6
fract 5 (tofr 10 2)
osc
setto 2 7.5
fract 37 (tofr 5 2)
rm
vl1 1
sig 5

c#3

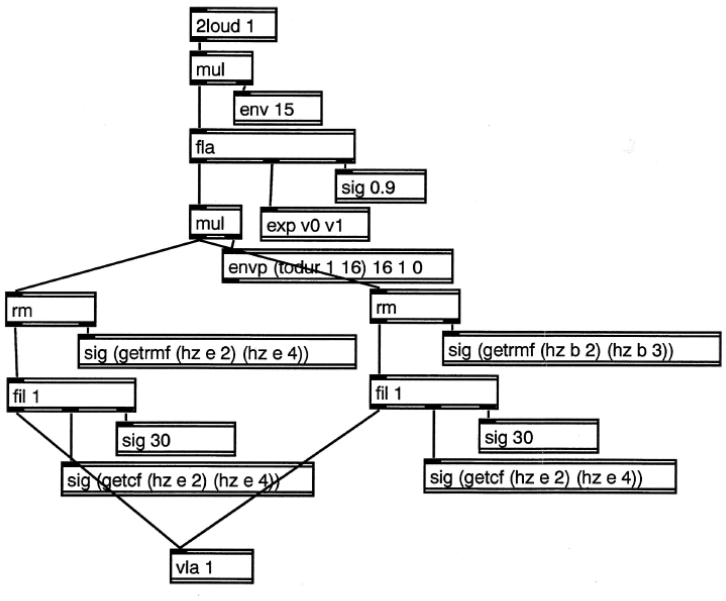

2loud 1
mul
fil 0
env plat
sig 400
mul
setto 300 1300
setto 0.7 1.6
fract 205 (tofr 10 2)
osc
setto 2 7.5
fract 237 (tofr 5 2)
rm
vla 1
sig 6
3loud 1
mul
fil 0
env plat
mul
setto 300 1300
setto 0.7 1.6
fract 205 (tofr 10 2)
osc
setto 2 7.5
fract 237 (tofr 5 2)
rm
vla 1

sect4

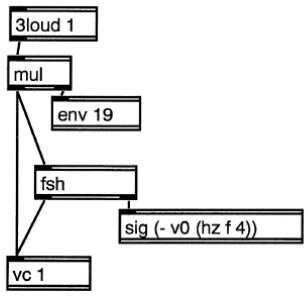
c3



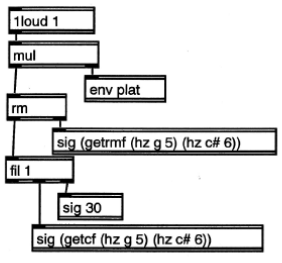
d3 v01= 80 60
e3 v01= 90 120
f#3 v01= 40 40



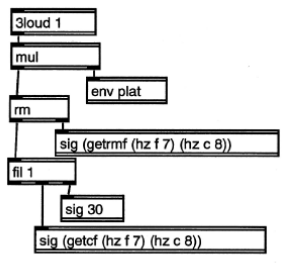
ab3 v0=(hz a 4 -50)
b3 v0=(hz a 4 0)
c4 v0=(hz a 4 +50)



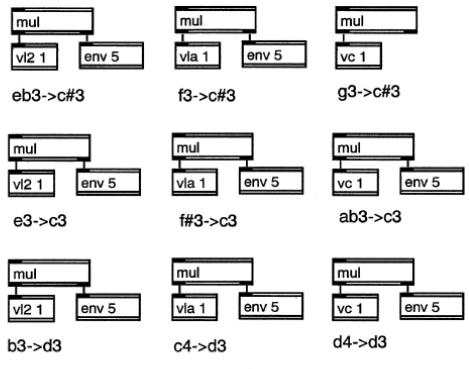
sect5

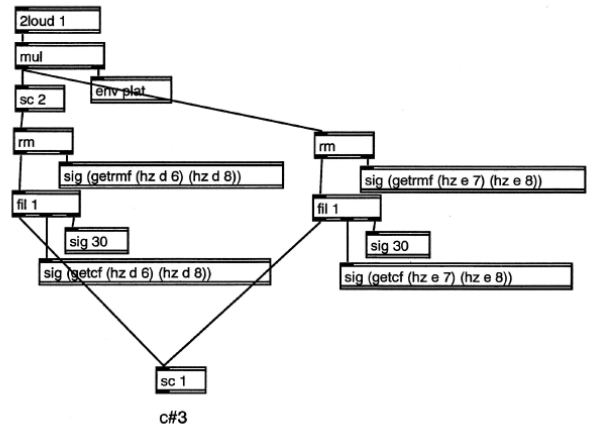


c3



d3



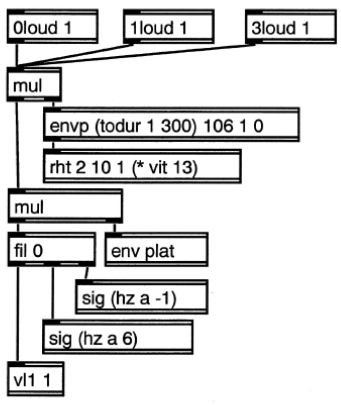


c#3

sect6

(setf vit 2.4)

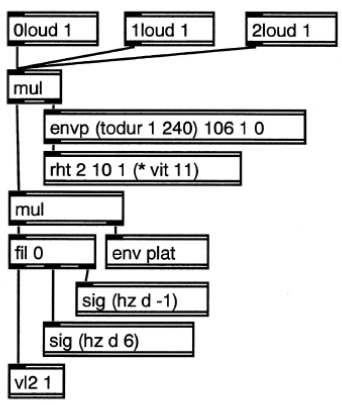
c3



36 42 48

$-\frac{1}{e}$

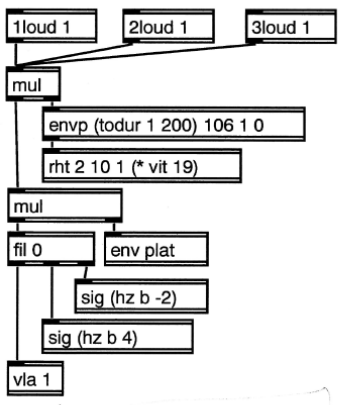
d3



32 38 44

fil 1

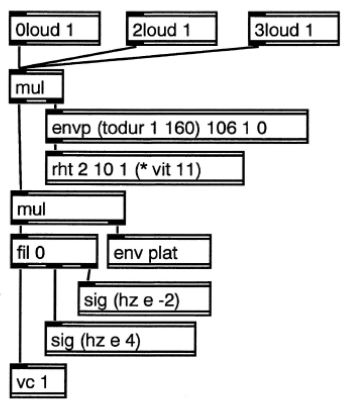
c#3



24 30 36 42 48

fil 2

d#3



21 27 33 39 45

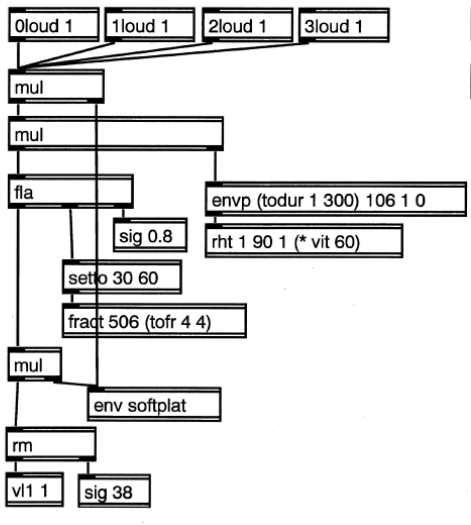
Midi - Oldove

d3 = 440 Hz

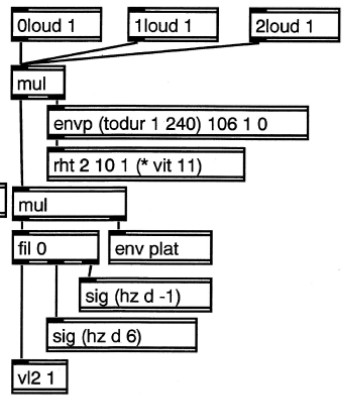
sect7

(setf vit 2.4)

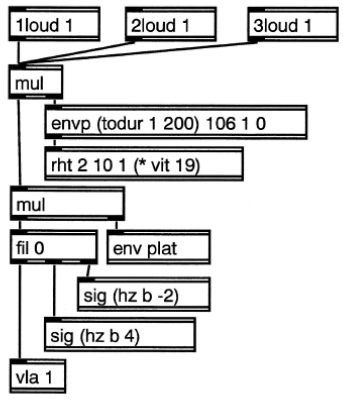
c3



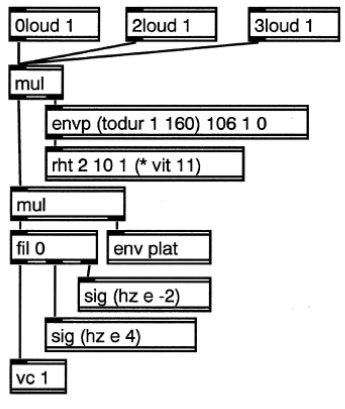
d3



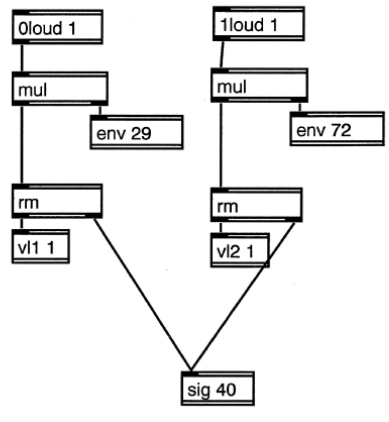
c#3



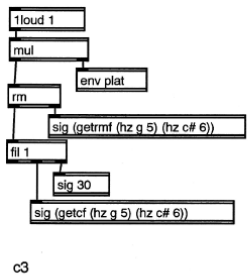
d#3



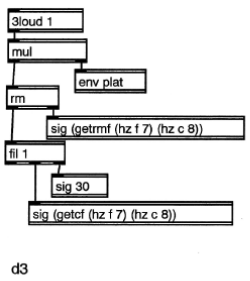
f3



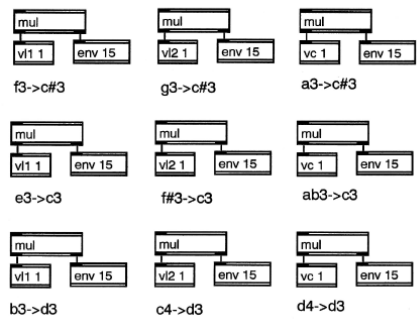
sect8

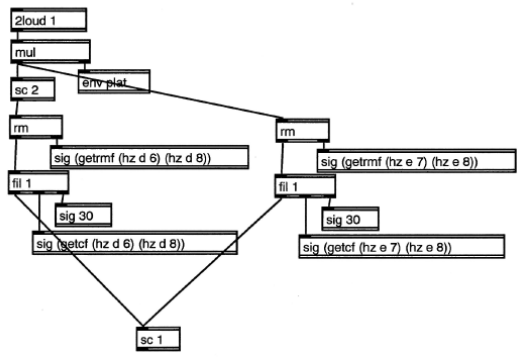


c3

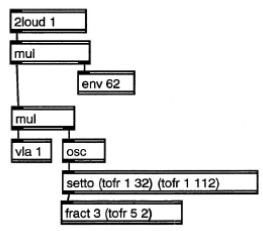


d3





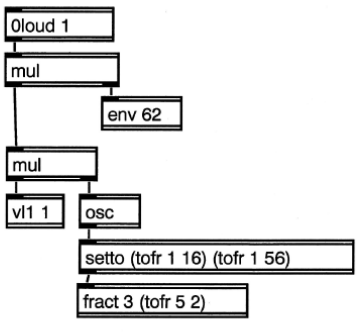
c#3



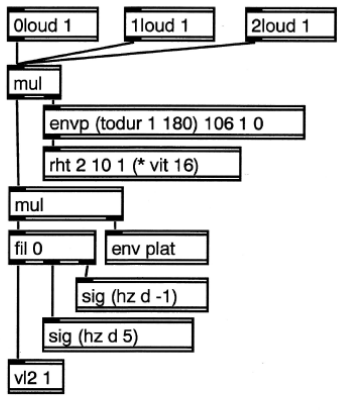
sect9

(setf vit 1.8)

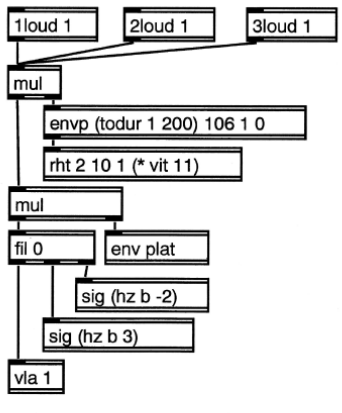
c3



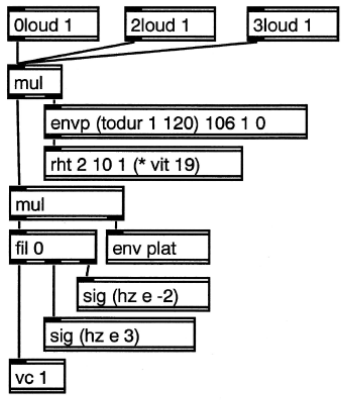
d3



c#3

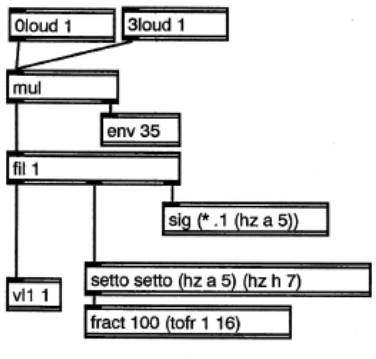


d#3

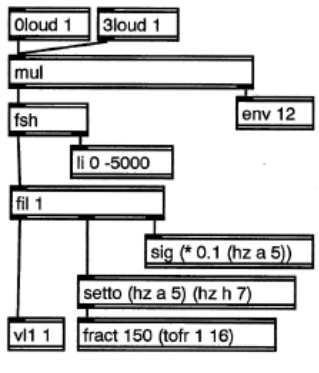


sect10

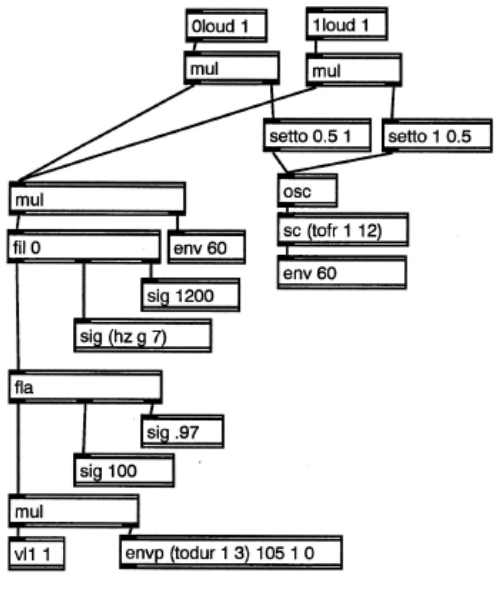
c3



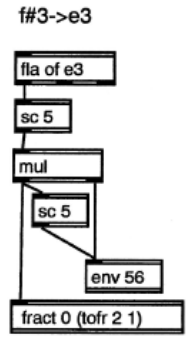
d3



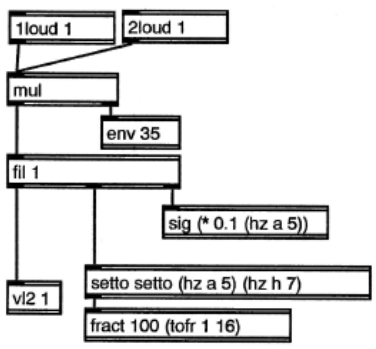
e3



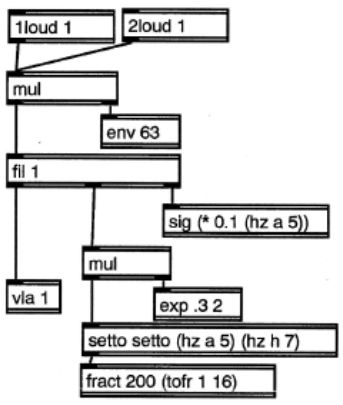
f#3->e3



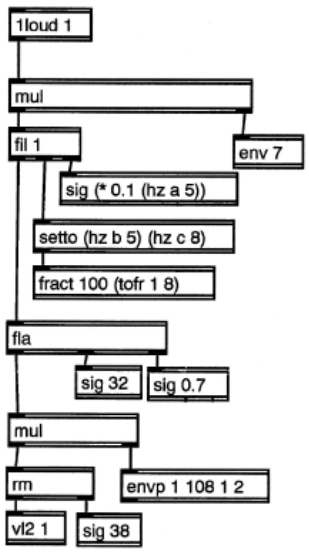
c#3



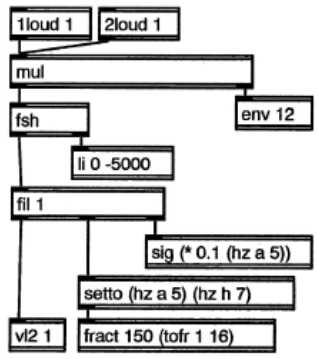
eb3



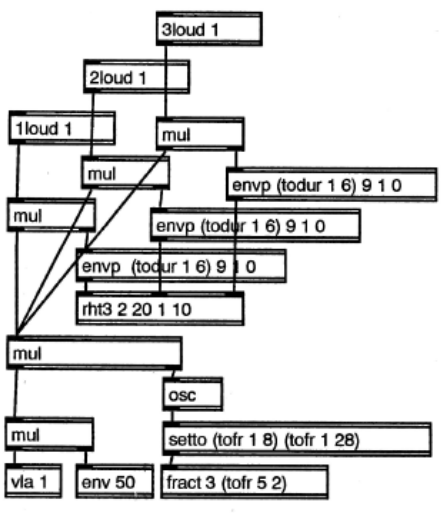
f3



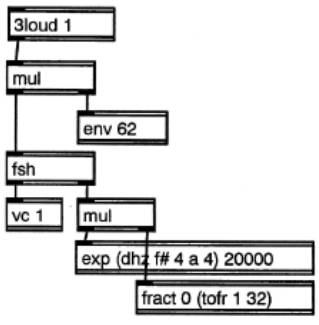
g3



a3



h3



c#3