Circular Limit

for amplified bass recorder and computer

Juan Sebastián Lach Lau
2008

Circular Limit

This piece stems from my research into algorithmic harmonic fields. Its building material is a microtonal pitch set derived from a psychoacoustic analysis of a low G tone of the bass recorder. This set provides the content to a stochastic field that is navigated amid its defining poles of consonance/dissonance (related to auditory roughness), harmonicity/ inharmonicity (related to proportionality of intervallic ratios) and verticality/horizontality (relating densities in time and pitch). Articulation, duration and dynamics are also coupled to the field according to its key parameter, *strength*, which can be negative in order to mirror the field with a zone in which inharmonicness takes precedence. The probabilities of the pitches can either be related to a tonic and a mode, or each new pitch can be considered a new tonic on which to base the probabilities (called 'atonic' mode).

This algorithmic control allows for slow, almost imperceptible transitions between distinct harmonic configurations, as in the second half of the piece, running in atonic mode from a state of high strength(tonal) to one of no strength (atonal), finally towards negative strength (antitonal). The first half of the piece presents the material with a 'tonic' logic, taking excursions through the fields for each of the possible modes constituted by the pitch set. These journeys are interspersed with interludes based on timbral properties of the pitch set and the sound of the instrument. It was composed by improvising with the computer generator and transcribing the results.

The computer part accompanies the recorder by generating in realtime the same kind of harmonic journeys, providing a wider ambitus of notes, timbres and vertical/horizontal combinations. In the timbral interludes it extends and intensifies the sound of the recorder.

Juan S. Lach

May 2008

The recorder part was made in collaboration with Tomma Wessel, who premiered it with the author on April 15th and 16th 2008 at *Logos*, Ghent and *'t Stuk*, Leuven in Belgium.

Durata: ca 13 min 30 sec

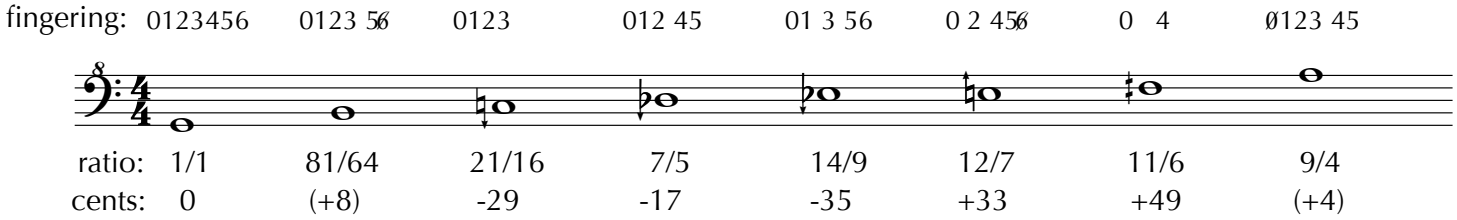
Performance notes

The amplification involves the recorder and the computer, which outputs a stereo signal.
The microphone signal from the recorder is also fed into the computer.

Recorder

Two microtonal pitch sets are used which correspond to the parts labelled dsp1 through 8 and cues 1 through 8 respectively.
After cue 9, the playing should be with normal equal tempered fingerings.
In the dsp parts, each note has its deviation in cents from equal temperament written below it.

The material for cues 1 through 8 is based on the following microtonal pitch set, written with the fingerings for a Yamaha bass recorder (number B61). The interval regarded as a tonic is indicated at the beginning of each section (in purple). Fingerings can be different on other instruments. In the score only the microtonal accidentals are indicated, not the deviations in cents for each note. The pitch set should be learned to be played directly as a scale:



Playing techniques:

Multiphonics are indicated by a note with ^ ^ together with their fingering.
Ord: Ordinario, use no special technique for playing a note
Fltz: Flatterzunge
Air: Air tone, leaking air
Noise: Noise tone, add a sharp "f" or "sss'' to the sound
t, **tk**: Attack of note with a sharp 't' or alternation of t and k sounds
slap: Slap tounge

Vibrato types:
vib ord: breath vibrato
*chevrote*r: very fast and round throat vibrato
flattement = finger vibrato: movement of a finger or fingers on or at the edge of a keyhole
shadow effect: a tremolo/vibrato made by moving the hand over the labium
tounge vibrato: very fast '[l]'
flatt + breath: a combination of finger and breath vibrato in opposite directions

Computer:

The computer part is played live and consists of either cues or dsp sections.
Cues are triggered manually by following the score. The computer will play synthetic material generated in real-time. The dsp parts will process the live input of the recorder and the computer performer should improvise on the four parameters of the dsp process:

bandwidth of vocoder,
mix level of vocoder / phase-vocoder
transposition of the spectrum
overall amplitude

The computer program can be obtained from the composer at lachjs@gmail.com. It is a standalone application with graphic interface running SuperCollider on Mac OS X. It includes documentation on how to use it. A 2-in, 2-out audio interface is needed.

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Juan S. Lach Lau

♩ = 108

dsp1

Computer

Bass Recorder

fltz

fltz ord

noise air

mf

f non vib

-22 -16

-31

sfp

-49

7

1

ord

1/1

air

(ord)

air

air

fast, round chevroter

f vib ord

p

f

p f

vib

14

air

fast, round chevroter

air

air

vib

p

f

p

f

20

dsp2

air

tk allow to underblow

p

f

-31

-14

p

26

2

flattement

ord.

ord

tk allow to underblow

ord

12/7

finger

air

air

fff

sfp

-22

+18

-49

sfp

mf

vib

f

p

f

32

finger

air

ord air

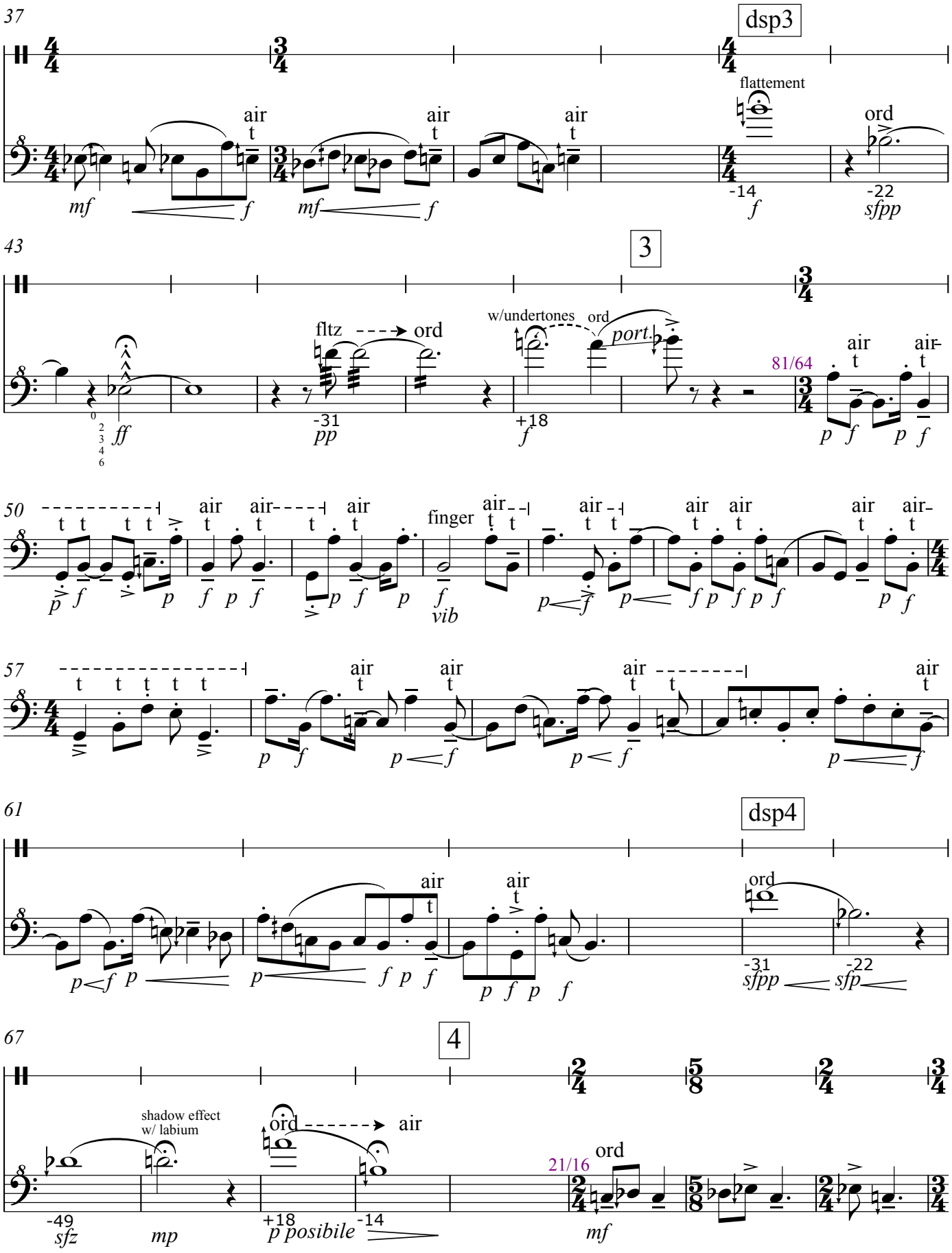
slap

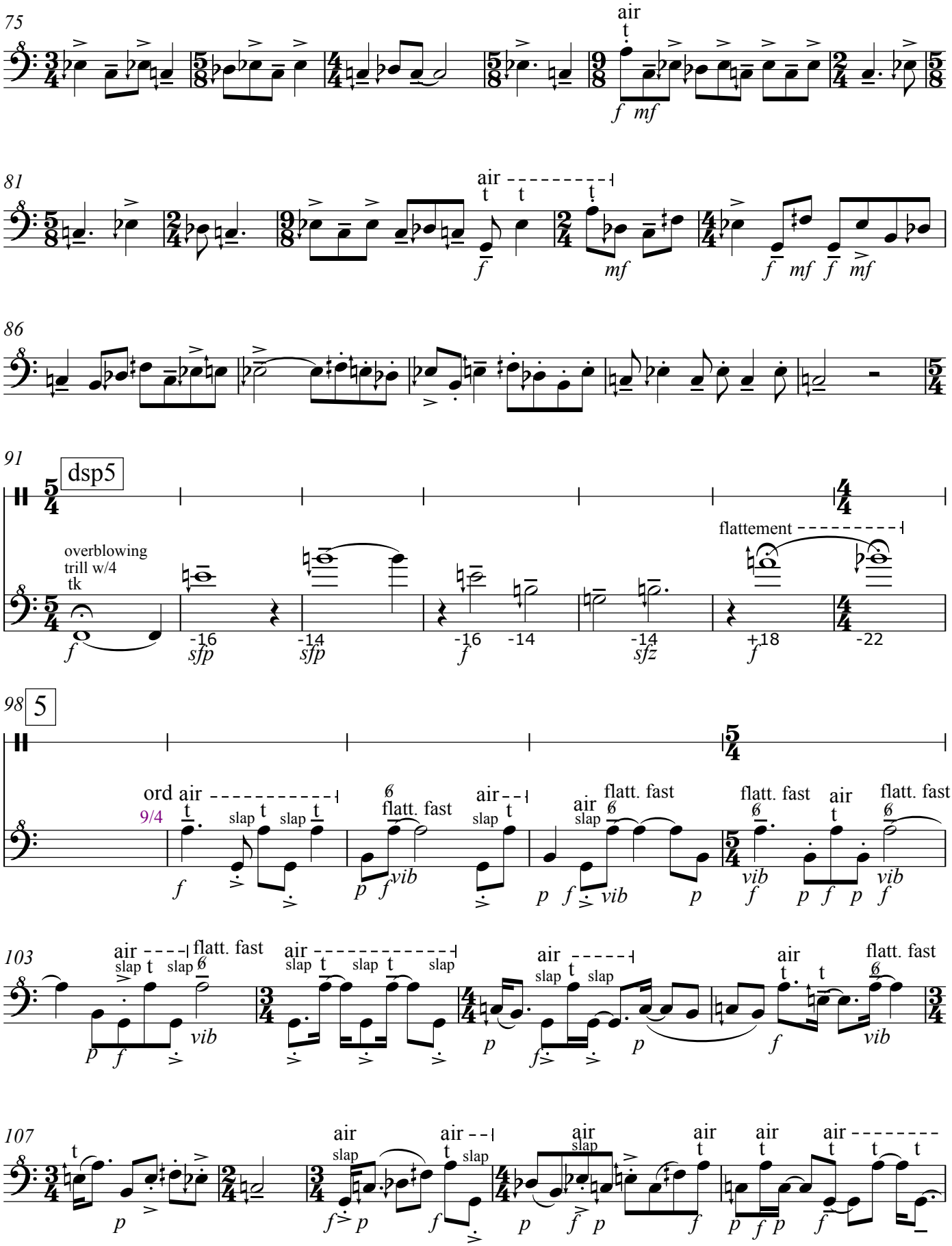
vib

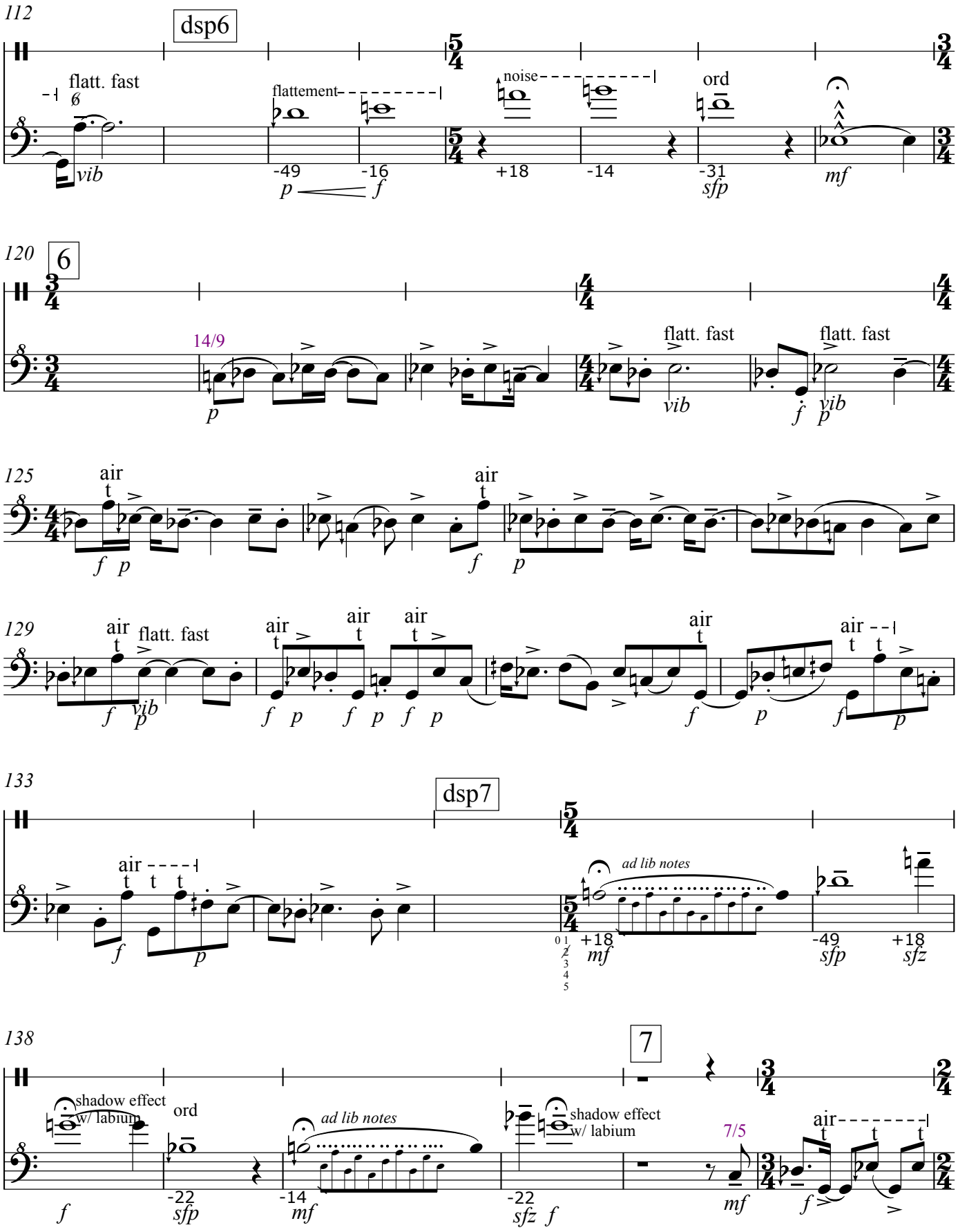
f

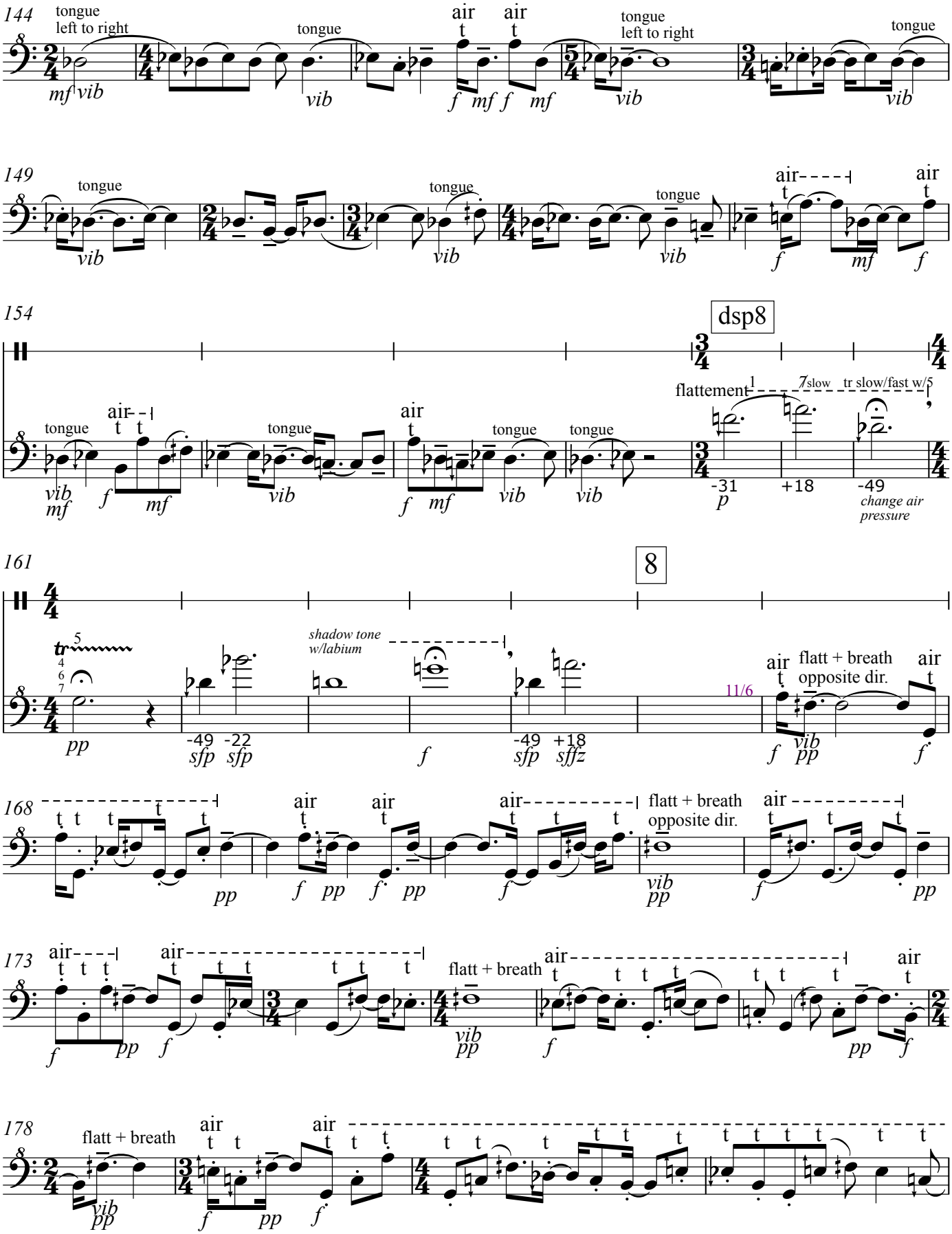
p

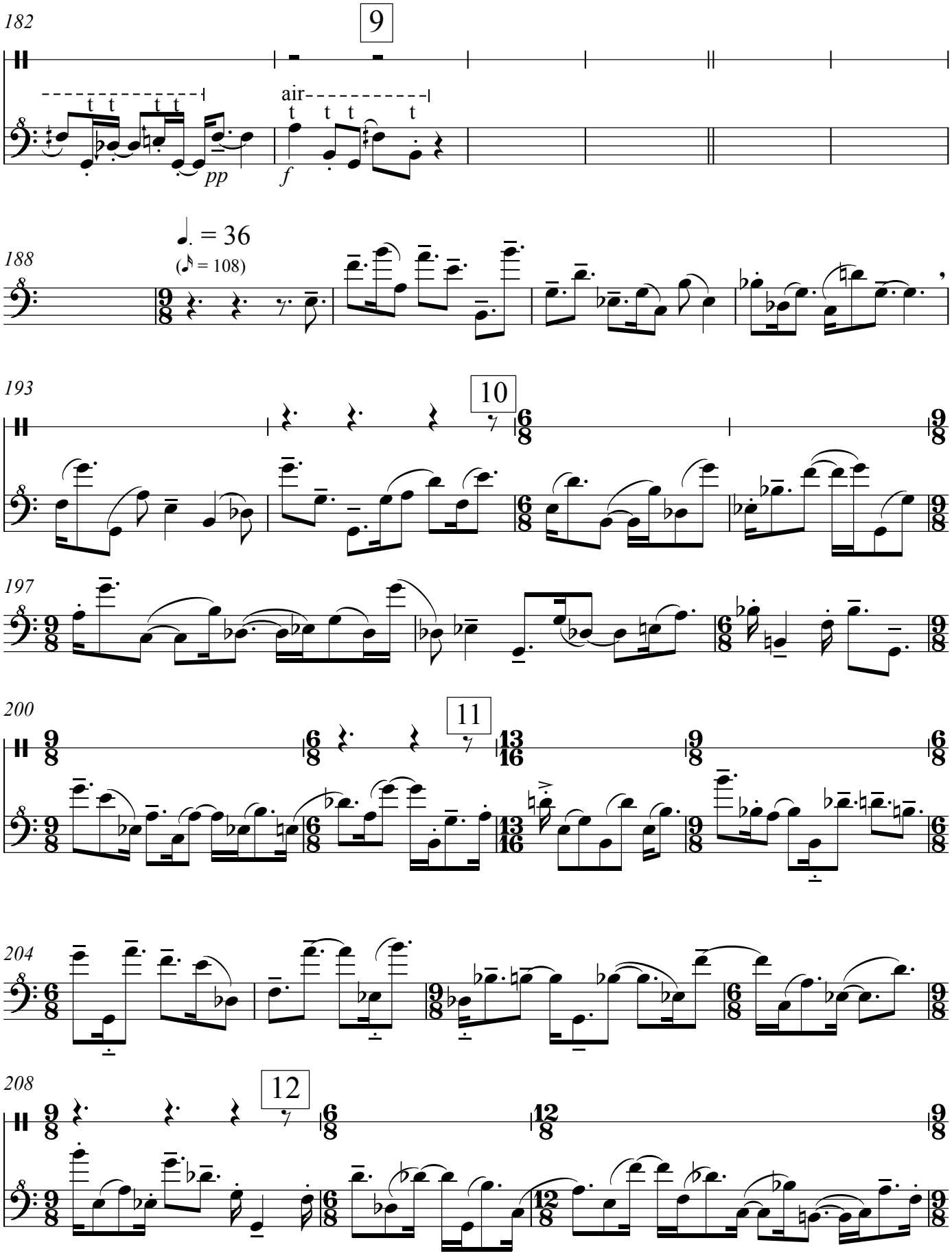
f

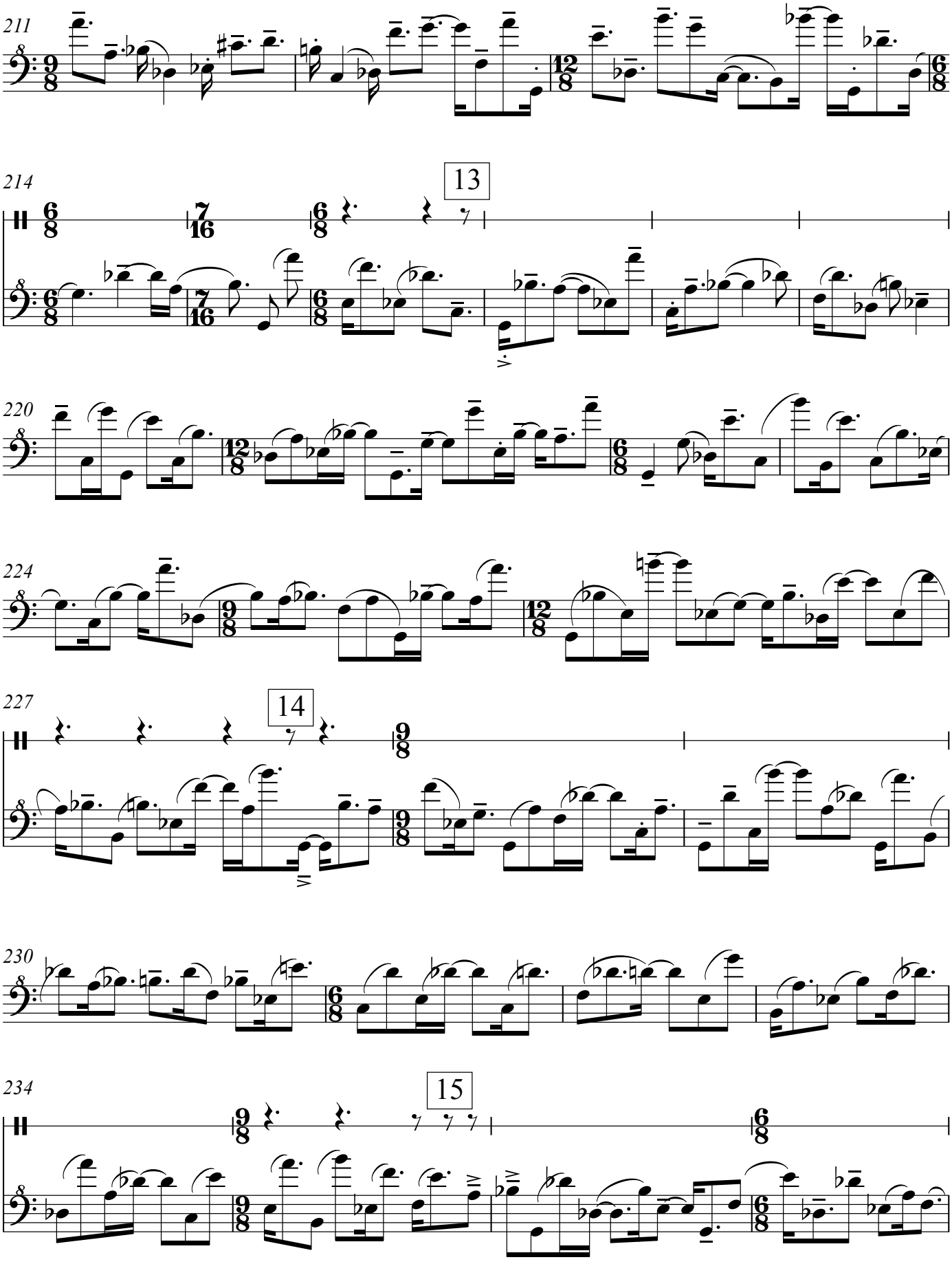

37
dsp3
flattement
air
ord
43
3
w/undertones
ord
port.
fltz
ord
81/64
50
finger
vib
57
61
dsp4
67
4
shadow effect
w/ labium
ord
air
21/16
ord
mf
p posibile

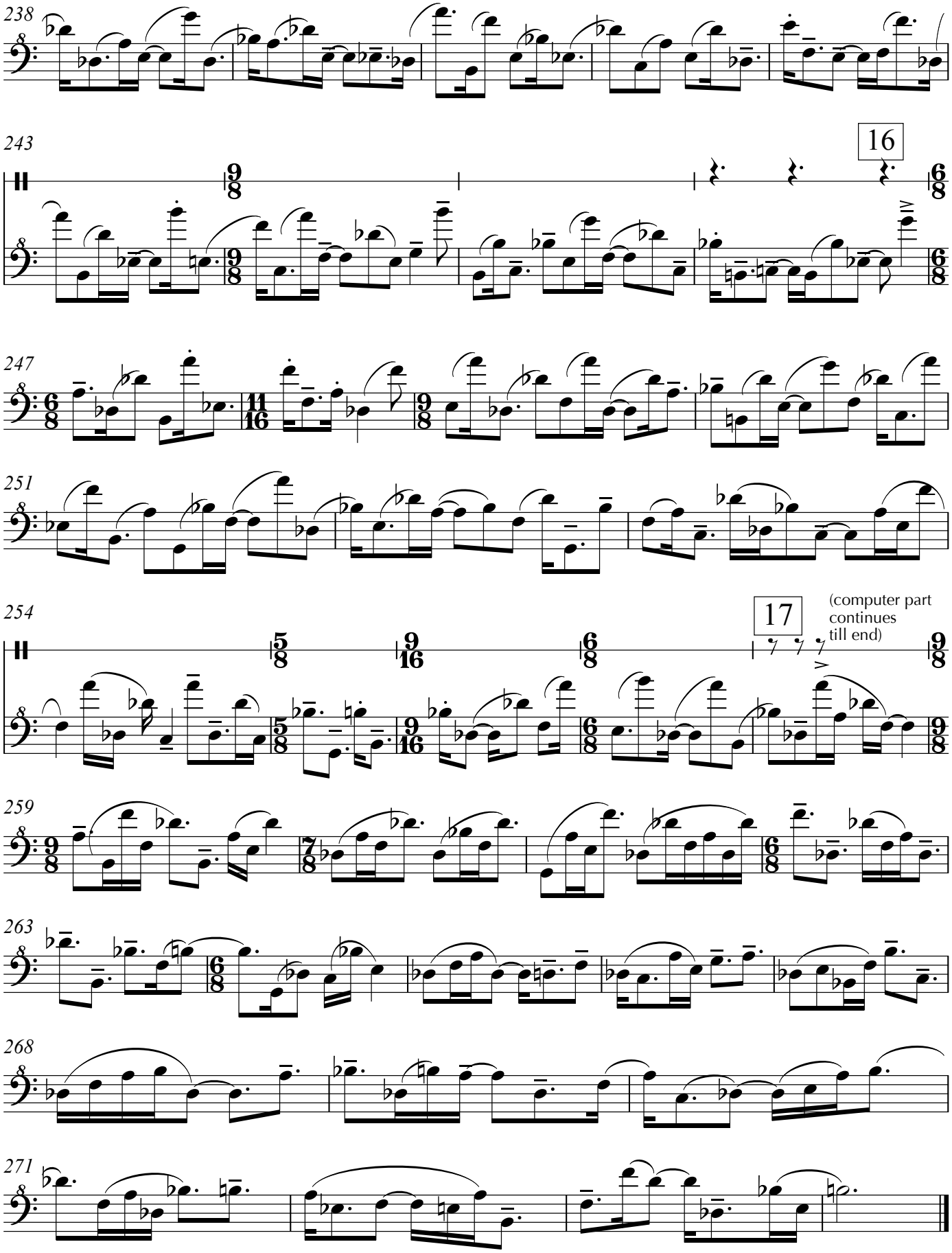

75
air
81
air
86
91
dsp5
overblowing
trill w/4
tk
flattement
98
5
ord air
9/4
slap
flatt. fast
103
107


112
dsp6
flatt. fast
vib
flattement
-49
-16
p
f
noise
+18
-14
ord
-31
sfp
mf
120
6
14/9
p
flatt. fast
vib
f
flatt. fast
p
vib
125
air
t
f p
air
t
f
p
129
air
t
flatt. fast
f
vib
p
air
t
f p
air
t
f p
air
t
f p
air
t
f
p
air
t t
f
p
133
dsp7
air
t t t
f
p
ad lib notes
0 1 2 3 4 5
+18
mf
-49
sfp
+18
sfz
138
shadow effect
w/ labium
f
ord
-22
sfp
ad lib notes
-14
mf
shadow effect
w/ labium
-22
sfz f
7
7/5
mf
air
t t t
f


144
tongue
left to right
tongue
air
air
tongue
left to right
tongue
149
tongue
tongue
tongue
air
air
154
dsp8
tongue
air
tongue
tongue
tongue
flattement
1
7slow
tr slow/fast w/5
-31
+18
-49
change air
pressure
161
8
shadow tone
w/labium
-49
-22
-49
+18
11/6
air
flatt + breath
opposite dir.
air
168
air
air
air
flatt + breath
opposite dir.
air
173
air
air
flatt + breath
air
air
178
flatt + breath
air
air


182
9
air
pp
f
188
♩. = 36
(♪ = 108)
193
10
197
200
11
204
208
12


211
214
13
220
224
227
14
230
234
15


238
243
16
247
251
254
17
(computer part continues till end)
259
263
268
271