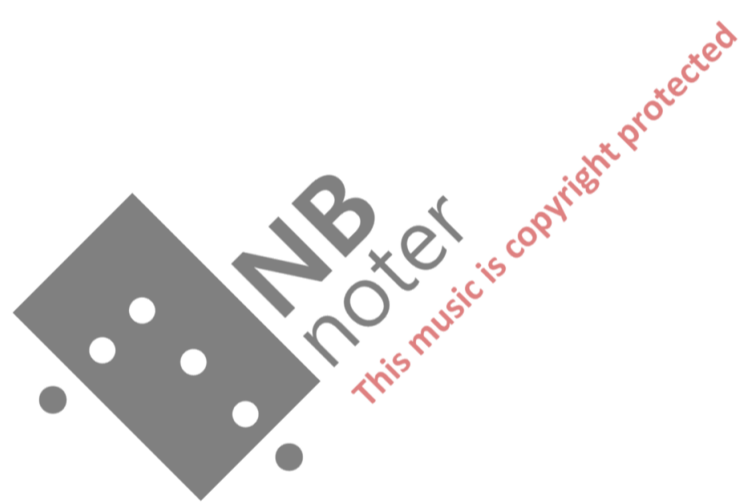


Circadian Cycles

for sinfonietta, electroacoustic sound and real-time signal processing

duration 20'10



Natasha Barrett 1999

Circadian Cycles

for sinfonietta, electroacoustic sound and real-time signal processing

'Circadian Cycles' are patterns of biological activity that occur on a 24-hour cycle. They are important biological regulators in virtually every living creature.

The main materials for the composition 'Circadian Cycles' were extracted from data brought home from a sound recording research trip to the Costa Rican rain forests. These data consist of spatial, temporal, and spectral information. 4-track recordings allowed me to accurately locate the position of animal calls up to 50 meters away, and this information has been interpreted through the location of instruments in the ensemble, and through the spatialisation of live signal processing (executed on the live instrumental sound). Short-term temporal data have been extracted from the discrete articulation of some animals calls, contributing to rhythmic motives and short-term phrasing, while long-term temporal data such as 24-hour spectral contours contribute to the long term structuring of the work. Spectral data yielded perhaps the most interesting material for compositional interpretation: the short term spectral analysis clearly indicated that every band of the frequency spectrum was occupied by an animal sound of some kind. From 20Hz to 20KHz, the frequency range was chocker-block with a diverse variety of repeating or irregular spectral shapes. This material was developed, sometimes independently from the source, through the 20 minute duration of the work.

From an extra-musical standpoint, inspiration, along with extracts of text used in the electroacoustic materials, were taken from the English translation of "The Popol Vuh", which is the Sacred Book of Creation of the ancient Quiche' Maya community.

'Then they made the small wild animals,
the guardians of the woods, the spirits of the mountains,
the deer, the birds, pumas, jaguars, serpents, snakes, vipers,
guardians of the thickets.

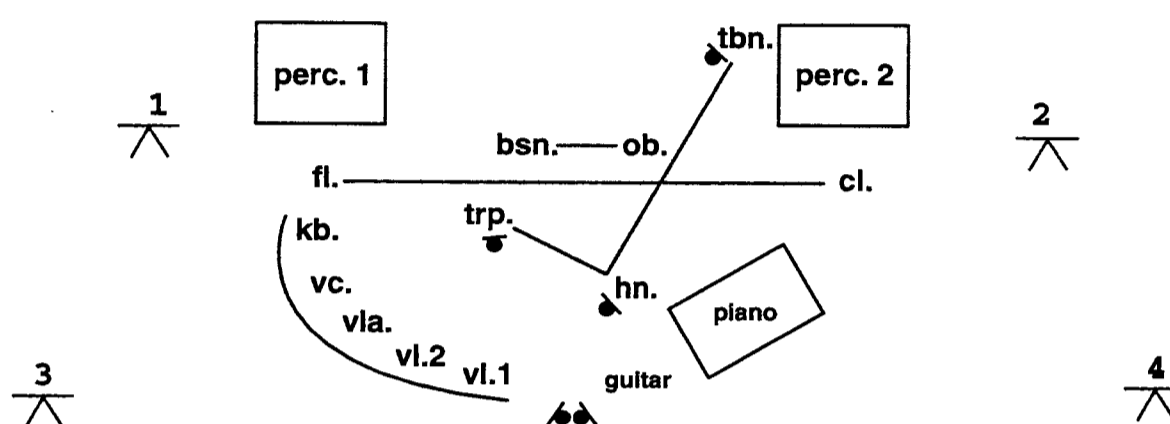
And the Forefathers asked: "Shall there be only silence and calm,
under the trees, under the vines?
It is well that hereafter there be someone to guard them.

" '.....' "Speak, cry, warble, call, speak each one according to your
variety, each, according to your kind." '


'Circadian Cycles' involves a large amount of electroacoustic sound material, which is triggered from a computer in synchrony with the instrumental performance. Live signal processing binds acoustic and electroacoustic materials together in the same space, intending to interrelate sometimes opposite materials into the same 'ecosystem'.


This work was realised in the electroacoustic music studio in Tromsø, at NoTAM, and in the composers private studio. The work was commissioned by the Oslo Sinfonietta, with funds from Norsk Kulturråd.

Instrument, loudspeaker and microphone positions



The ensemble should be positioned as above. Important features are the positional relationships between the horn, trumpet and trombone, the symmetrical, widely spaced percussion, flute and clarinet and the sweeping arc of the strings.

Microphones  are used to feed the audio input to the computer (and effects unit) for real-time signal processing. For this purpose spot microphones are used for the horn, trumpet and trombone, and a frontal stereo pair for capturing the general ensemble. The stereo pair can also be used to amplify the ensemble for projection over the loudspeakers, although this should be used very subtly and sparingly.

Loudspeakers  should be positioned as indicated. It is important for (a) one pair of loudspeakers to be placed at the rear of the ensemble, (b) one pair to the front of the ensemble (and this pair should be of a high audio quality) (c) one pair to the sides and one pair to the rear. If the venue is equipped with a pair hanging from the ceiling above the ensemble, these can also be used. Note that reasonable quality loudspeakers are as important as using the correct acoustic instruments.

See technical set-up for more details.

The electroacoustic and computer parts

A mixing desk to control instrumental amplification and computer volume should be placed in the audience in an ideal listening position.

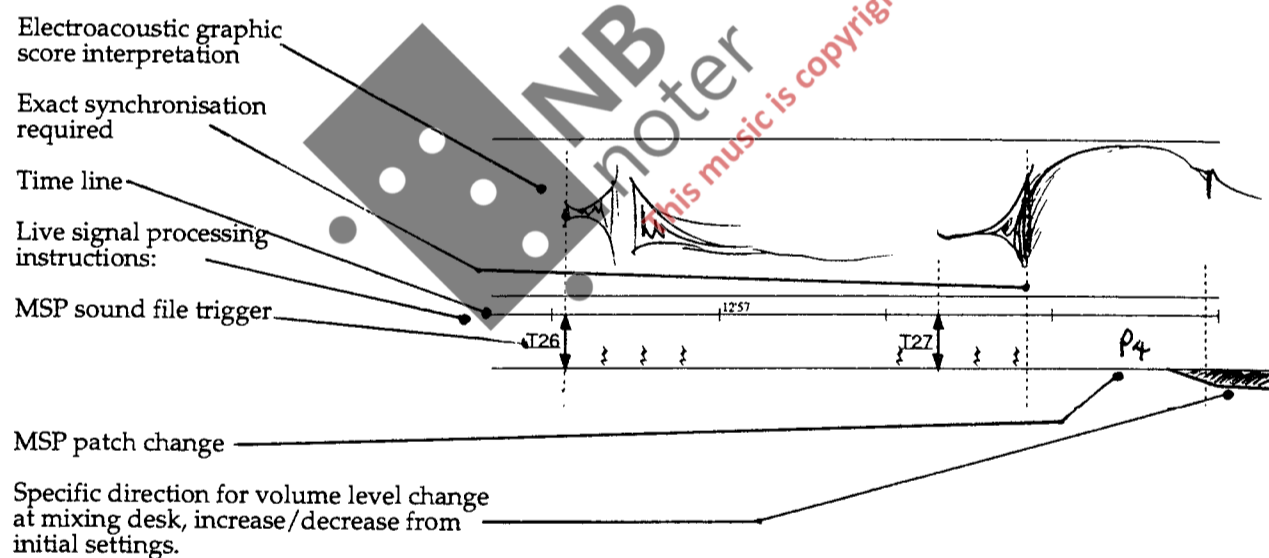
Equality in volume level should be maintained between the acoustic and electroacoustic materials.

One person performs the computer part and sits in the ensemble. A second person operates the mixing desk controlling sound levels.

The electroacoustic and computer parts are two-fold:

1. Prepared electroacoustic material is stored on the computer as a series of sound files. These are played back or 'triggered' in an overlapping sequence to create the effect of a continuous tape part. Triggered sound files are used instead of a continuously running DAT or CD so that the orchestra is not rigidly tied to a click track, yet can still maintaining accurate synchronisation with the electroacoustic part. Many of the sound files can be conducted with flexible timing of up to a few seconds if rubato is desired.
2. Live signal processing is performed on the signal picked up from the microphones (see 'Instrument, loudspeaker and microphone positions'). The purpose of the live signal processing is to integrate acoustic and electroacoustic sound-worlds in the one space.

Once the computer outputs are set up correctly (see technical set-up), the MSP patch executes all loudspeaker signal changes.



MSP (MAX signal processing)

The electroacoustic part of this work is divided into two aspects:

1. Pre-prepared electroacoustic sound materials are triggered by the computer performer at the correct points in the score, marked T1, T2, T43.
2. Sounds from the acoustic instruments are processed by the computer. Points at which the computer performer must select a new signal processing patch are indicated by P1, P2, P7. Instructions on setting up the sound levels to and from the computer are listed on the live performance CDROM (CD number 2).

* [To obtain a clear impression of the music, the score should be read at the same time as listening to the CD of sound materials (CD number 1). Track 1 is an example realisation of the pre-prepared electroacoustic sound materials as if triggered in performance (resulting in a continuous tape part). Tracks 2 - 44 are the 43 individual sound files, triggered live.

Below are a list of the different signal processing patches so that when reading through the score and listening to track 1 on CD number 1, one understand the effect of the live signal processing.

- P1 = granulation and delay on the brass instruments only.
- P2 = spatialisation over six loudspeakers, gentle motion, only on the string instruments.
- P3 = fast, random spatialisation over eight loudspeakers, on all instruments.
- P4 = gentle version of P3
- P5 = Microtonal harmonisation to give a 'meaty' sound, on brass and wind instruments.
- P6a-d = spatialisation over eight loudspeakers, gentle motion, on all instruments (this might change to being only on the wind instruments).
- P7 = fast, random spatialisation over eight loudspeakers, on all instruments.

(the last patch change returns to P1)

Notation

General notation (full score is in concert pitch, parts are in written pitch).

Proportional notation between conducted units. The number (4") gives an approximate indication of the duration of the unit, in seconds.

Parts with normal notation, perform as notated while the other parts perform proportional notation.

As fast as possible.

Quarter sharp, three-quarters sharp, quarter flat. Performers should be careful to execute sustained passages of microtones with accurate tuning.

Wind

Breath only through instrument.

Rapid key clicks, where possible without changing pitch.

't' or 'p' percussive articulation to note.

Single key click.

Very high notes in one phrase, play with a lilting or swaying quality.

Brass

Trill with the valve only half depressed, giving a timbral rather than pitch trill.

Breath only through instrument.

't' or 'p' percussive articulation to note.

Strings

Arco on tail piece.

Hit string col legno.

Arco col legno.

Bow behind the bridge.

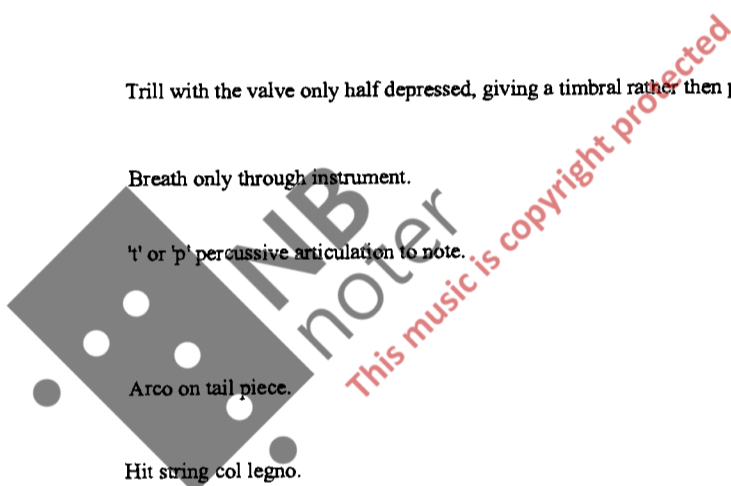
Artificial harmonic (sounding two octaves higher).

Piano

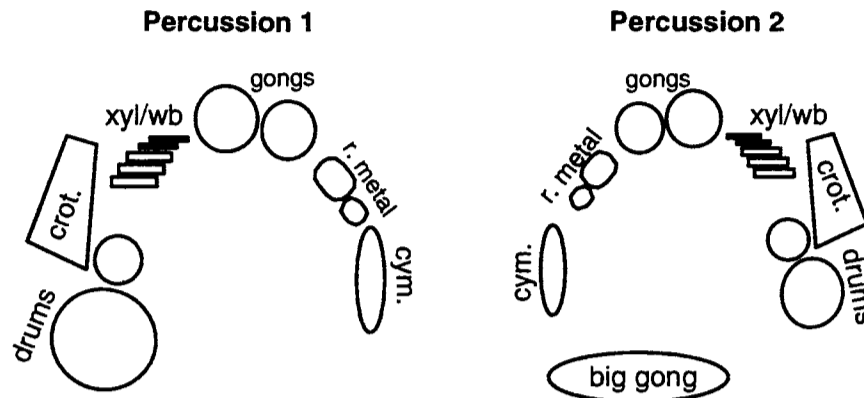
Prepared piano notes: indicated notes dampen either with a rubber covered clothes-peg, or by pressing a rubber object onto the strings by hand.

Sustain notes with middle pedal.

NOTE: all accidentals are cancelled by the bar line



Percussion



The two percussionists are spaced widely, at opposite sides of the stage area.

Xylophone: xylophone notes are used as pitched extensions to the woodblocks. Only the following pitches are used, these can be removed from the main instrument and placed with the woodblocks.

Percussion 1: Percussion 2:

Woodblocks:

Percussion 1: high low Percussion 2: high low

Crotales:

both parts use two octaves. (In some performances, obtaining two full sets of crotales may be problematic. In this case, percussion part 2 can be substituted with a glockenspiel.)

Gongs:

Percussion 1: two tuned gongs partially dampened. Percussion 2: two tuned gong partially dampened; one large gong or tam suspended, with deep tone colour.

Drums:

Percussion 1: one small with high tone, 'hide' membrane to allow for 'scrape' sound; one large with very deep tone, no clear pitch

Percussion 2: one small, one medium; each with 'hide membrane to allow for 'scrape' sound.

Cymbal:

both parts approx. 18" cymbals. (Do not need to be identical).

Rusty metal:

both parts with two rusty, or unusual shaped metal objects. (Each part should use objects which sound different).

General Percussion Notation:

Hit rim of drum DRUM

Obtain a thinner sound from the gong GONG

Single 'swish' scrape

Textured 'circling' scrape

Types of sticks: 'stick' = wooden stick; 'mallet' = stick with a head; 'brushes' = metal brushes; 'arco' = with a bow

When 'soft yarn mallet and brush' are directed (bar 29), use the brush on the gongs as much as possible. When 'stick and mallet' are directed, (bar 382) attempt to use the stick on the gongs as much as possible.

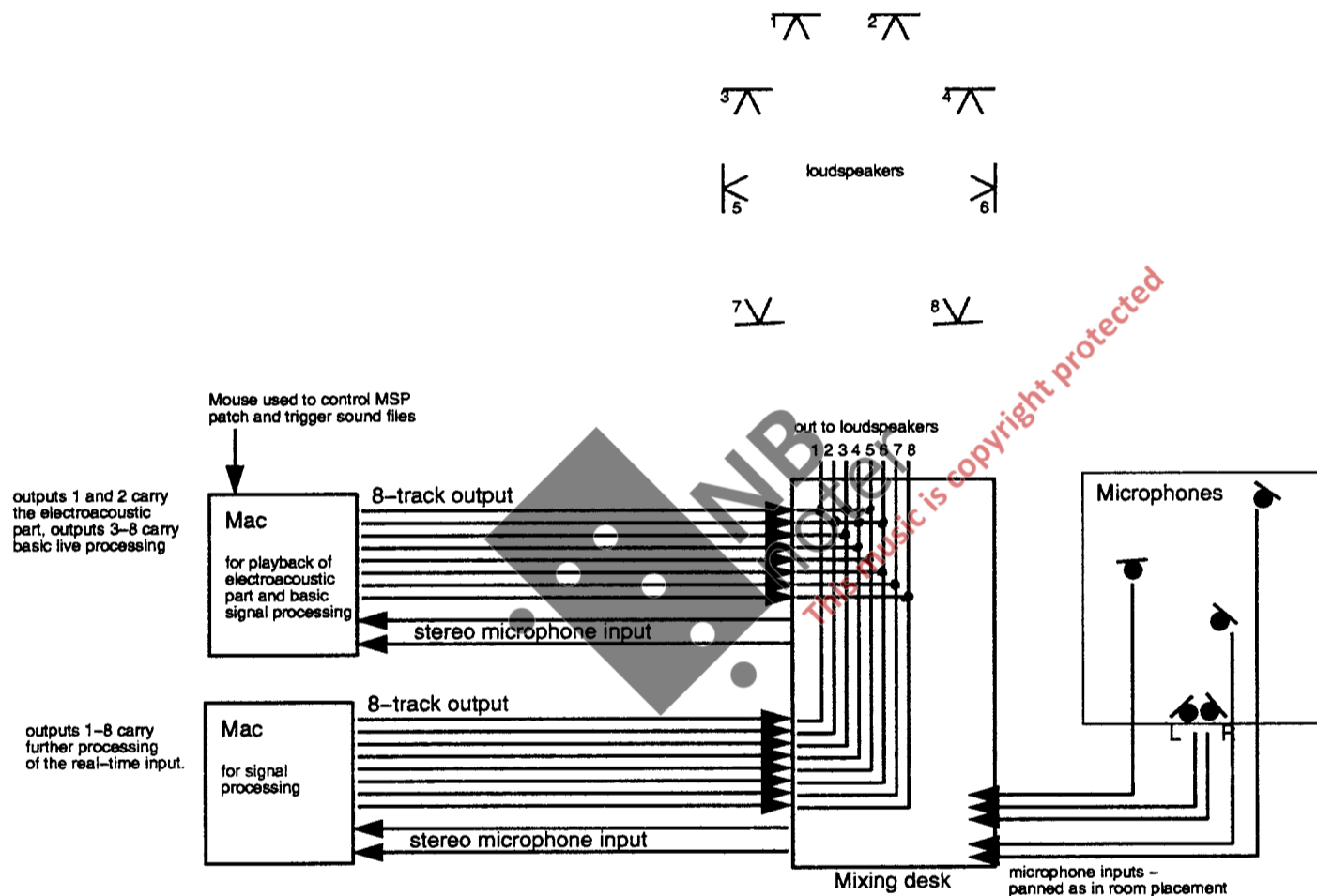
Technical Set-up

Version for two computers

Two versions of the live processing part have been designed. One version uses one macintosh computer and external effects processor, the other version uses two macintosh computers. The main difference between the two versions is in the sophistication of spatialisation techniques and of the cross synthesis of live materials. Two computers are required when using more sophisticated live techniques..

Hardware requirements (slowest options):

2 x Macintosh G3-350Mhz 120mb RAM with 8-track analogue sound card compatible with MAX/MSP software
(Note: using the computer's built-in analogue outputs are possible only for rehearsal. The audio output quality is not suitable for performance)



Relative levels of sound outputs on different loudspeaker combinations:

Electroacoustic part: high volume on loudspeakers 1, 2, 3, 4,
6db lower on loudspeakers 5, 6, 7, 8.
The result is a bias towards the front of the space.

Live computer processing: Equal level on all loudspeaker.
The result is an even distribution throughout the space.

Electroacoustic

Time 0'00 0'16

MAX/MSP T1 P1

$\text{♩} = 75$

Piccolo *f* (fluttersong)

Oboe

E flat Clarinet *f* (fluttersong)

Bassoon

Horn *mp* *stac.* *mp*

Trumpet *mf* *con sord.* *mp*

Trombone *mp* *f*

Tuba

Piano

percussion 1 hard mallets

Xylophone

Woodblocks

crotales

Gongs

percussion 2 hard mallets

Xylophone

Woodblocks

Cymbal

Gongs

Violin I *sul pont* *p* *f* *p* *f*

Violin II *sul pont* *p* *f* *p* *f*

Viola *sul pont* *p* *f* *p* *f*

Cello *sul pont* *p* *f* *p* *f*

Bass

Elec.

time

MAX/MSP

Picc. (8va)

Ob.

Cl. (8va)

Bn.

Hn.

Tpt. senza sord. mf con sord. mp

Trb. mp f

Tuba

Pn.

Xyl.

Wbl. mf

Crot.

gongs

Xyl.

Wbl. mf

Cym.

Gongs

vln. I p mf

vln. II p mf

Vla. p

Vc. p

Kb.

032

048

T2

This music is copyright protected

Electronics (Elec.) part with handwritten scribbles and a "(whisper)" annotation. A time signature change to 3/4 is indicated at measure 104.

MAX/MSP part with a trill (T3) and triplet markings.

Woodwind section (Piccolo, Oboe, Bass Flute, Bass Clarinet, Bassoon) with dynamics like *mp* and *p*.

Brass section (Horn, Trumpet, Trombone, Tuba) with dynamics like *mf*, *f*, and *senza sord.*

Percussion section (Piano, Xylophone, Woodblock, Gong, Cymbal) with various rhythmic patterns.

String section (Violin I, Violin II, Viola, Violoncello, Kontrabaß) with *non vibrato* and *mp* markings.



Elec.

time

MAX/MSP

25

Bass Fl.

Ob.

Bass Cl.

Bn.

Hn.

Tpt.

Trb.

Tuba

Pn.

Xyl.

Wbl.

Crot.

gongs

Xyl.

Wbl.

Cym.

Gongs

vln. I

Vln. II

Vla.

Vc.

Kb.

mp

mf

f

con sord.

p

mf

mp

mf

mp

soft yarn mallet + brush

soft yarn mallet + brush

sul pont I II

1'20

T4

1'36

This music is copyright protected

Elec.

time | 152

MAX/MSP

Bass Fl. 33

Ob. 33

Bass Cl. 33

Bn. 33

Hn. 33

Tpt. 33

Trb. 33

Tuba 33

Pn. 33

Xyl. 33

Wbl. 33

Crot. 33

Gongs 33

Xyl. 33

Wbl. 33

Cym. 33

Gongs 33

vln. I 33

vln. II 33

Vla. 33

Vc. 33

Kb. 33

This music is copyright protected

swaying

swaying

swaying

(F to G#) tr

tr (C to Db)

Elec. *Full ensemble*

time 208 224

MAX/MSP T5 P1-off

Bass Fl. 41

Ob. 41

Bass Cl. 41

Bn. 41

Hn. 41 *p*

Tpt. 41 *p* *tr*

Trb. 41

Tuba 41

Pn. 41

Xyl. 41

Wbl. 41

Crot. 41

Gongs 41

Xyl. 41

Wbl. 41 *p* *L3*

Cym. 41

Gongs 41

vln. I 41 *pp*

Vln. II 41 *pp*

Vla. 41 *pp*

Vc. 41

Kb. 41 *tr* *3* *tr* *(C to Db)*

Elec.

time

MAX/MSP

240

T6

↑

↓

P2

motion closely co-ordinated with strings

256

49

Bass Fl.

49

Ob.

49

Bass Cl.

49

Bn.

49

Hn.

49

Tpt.

49

Trb.

49

Tuba

49

Pn.

49

Xyl.

Wbl.

Crot.

gongs

49

Xyl.

Wbl.

Cym.

Gongs

49

vln. I

49

Vln. II

49

Vla.

49

Vc.

49

Kb.

balance with tape

balance with tape

NB noter

This music is copyright protected

Elec.

time

MAX/MSP

T7

3'12

Bass Fl.

Ob.

Bass Cl.

Bn.

Hn.

Tpt.

Trb.

Tuba

Pn.

Xyl.

Wbl.

Crot.

Gongs

Xyl.

Wbl.

Cym.

Gongs

Vln. I

Vln. II

Vla.

Vc.

Kb.

pp

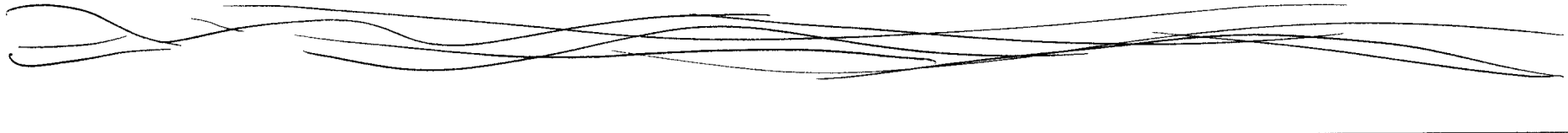
high, if not accurate pitch

p

p

This music is copyright protected

Elec.



time 3:28 P2-off (auto fade) 3:41

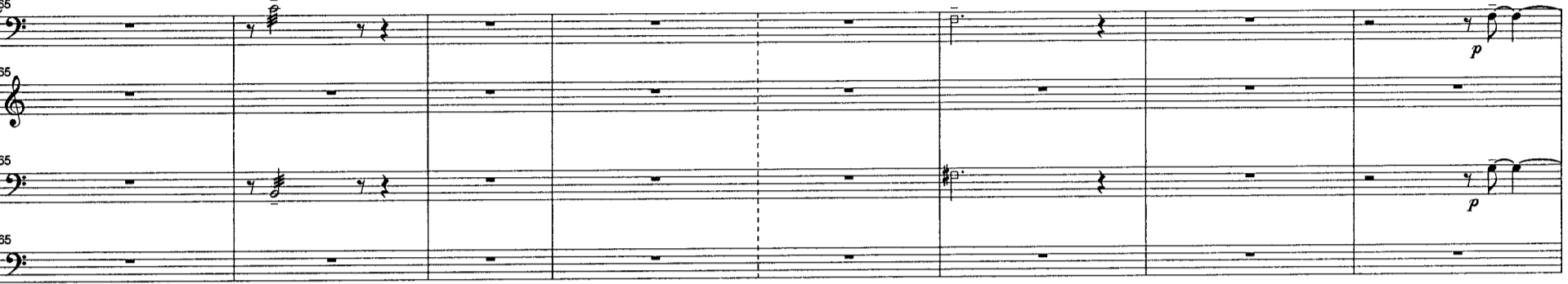
MAX/MSP

65 Bass.Fl. =60 p

65 Ob.

65 Bass.Cl. p

65 Bn.

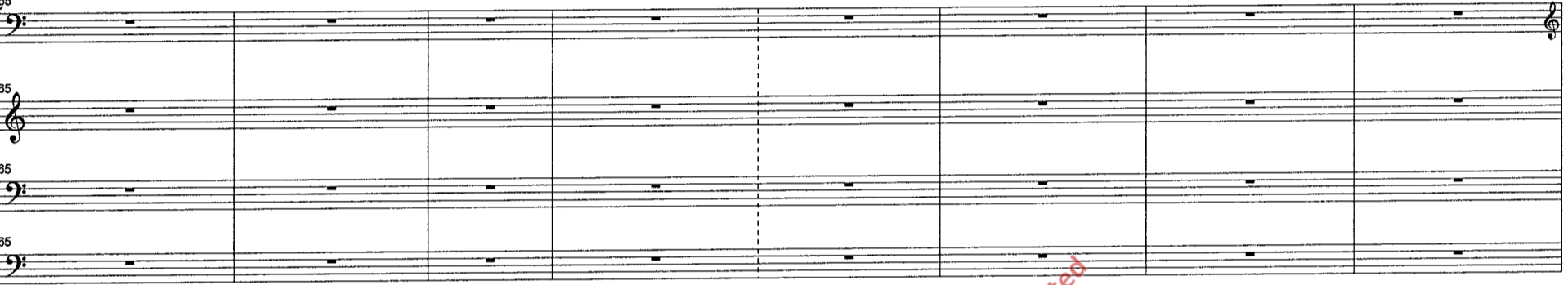


65 Hn.

65 Tpt.

65 Trb.

65 Tuba



65 Pn.




65 Xyl.

65 Wbl.

65 Cro.

65 gongs

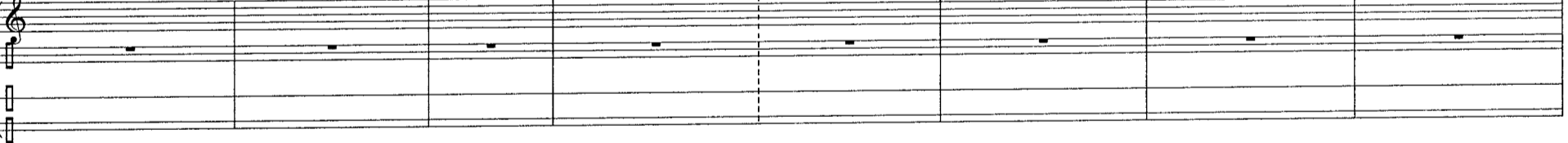


65 Xyl.

65 Wbl.

65 Cym.

65 Gongs



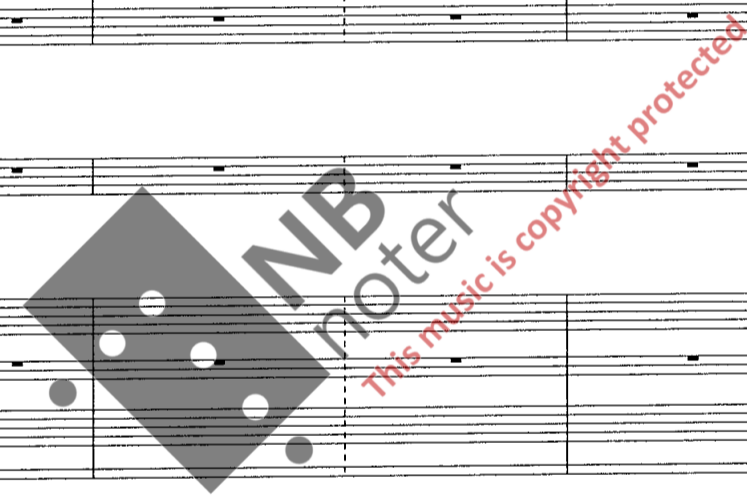

65 vln. I PPP

65 Vln. II

65 Vla.

65 Vc.

65 Kb.



Elec. *Erweiterung*

time 3'53 4'01 4'09 4'17

MAX/MSP T8 P3 T9 T10

Bass Fl. *p*

Ob. *mf* *tr*

Bass Cl. *p*

Bn. *mp*

Hn. *senza sord.* *mf*

Tpt. *senza sord.* *mf*

Trb. *sfz* *p*

Tuba

Pn.

Xyl.

Wbl.

Crot.

Gongs *f*

Xyl.

Wbl.

Cym. *arco* *p* *mf*

Gongs *arco* *mp*

vln. I *tr* *pp* *col legno* *mf*

Vln. II *tr* *pp* *col legno* *mf*

Vla. *tr* *pp* *col legno* *mf*

Vc. *col legno* *mf*

Kb. *col legno* *mf*

Elec. *text*

time 4'25 4'33 4'41 4'49

MAX/MSP T1 (plus large reverb.) T2

Bass Fl. *p*

Ob. *p* *mp* *f*

Bass Cl. *p*

Bn. *p*

Hn. *f*

Tpt. *f*

Trb. *p* *mf*

Tuba *p* *mf*

Pn.

Xyl. *metal sticks* *mp*

Wbl. *metal sticks* *crotales*

Cym. *nat.* *mp*

Gongs

vln. I *f* *col legno* *nat.* *sul pont.* *mp* *tr d* *p*

vln. II *f* *pizz.* *arco* *mp* *p*

Vla. *f* *pizz.* *arco* *mp*

Vc. *f* *col legno* *arco* *sul pont.* *mp* *tr †*

Kb. *f* *col legno* *arco* *sul pont.* *mp*

NB noter
This music is copyright protected

Elec. *text* 

time 4:57 5:00 5:04 5:08 5:10

MAX/MSP T13 P4 (decrease desk levels on all loudspeakers to 'just heard')

Bass Fl. *mf* *p* *mf*

Ob.

Bass Cl.

Bn.

Hn. 2" 8"

Tpt.

Trb.

Tuba

Pn. *mp* *8va* *Red. (on all until *)*

Xyl.

Wbl.

Cro. *mp*

gongs

Xyl. *mp*

Wbl. *mp*

Cym.

Gongs

vln. I *arco p* *pizz. mp*

Vln. II *arco p* *pizz. mp*

Vla.

Vc.

Kb.

NB noter This music is copyright protected

Elec.

time 5'14 5'18 5'22 5'26

MAX/MSP

Fl.

Ob.

Cl.

Bn.

Hn.

Tpt.

Trb.

Tuba

Pn.

Percussion 1
Crot.

Percussion 2
Crot.

Guitar

Vln I

Vln II

Vla.

Vc.

Kb.

10"

10"

8va

p

mp

mp

114

NB noter

This music is copyright protected

Elec.

time 5'30 5'33 5'37 5'41 5'45

MAX/MSP

Fl. 105 *pp*

Ob. 105 *pp*

Cl. 105 *pp*

Bn. 105 *pp*

Hn. 105 *p* *tr* *con sord. p*

Tpt. 105 *p* *tr* *con sord. p*

Trb. 105 *p* *con sord. p*

Tb. 105 *p* *con sord. p*

Pn. 105 *mf*

Crot. 105 *mf*

Crot. 105 *mf*

Gtr. 105 *f*

Vln. I 105 *arco mf* *mp*

Vln. II 105 *pizz. mf* *mp*

Vla. 105 *pizz. mf* *mp*

Vc. 105 *pizz. mp*

Kb. 105

Elec. 

time 549 553 557 601
P4-OFF

MAX/MSP

Fl. 113

Ob. 113

Cl. 113

Bn. 113

Hn. 113

Tpt. 113

Trb. 113

Tb. 113

Pn. 113

Crot. 113

Crot. 113

Gtr. 113

Vln I 113

Vln. II 113

Vla. 113

Vc. 113

Kb. 113

ped 2, throughout second piano staff

piano always clear, but not dominating

guitar always clear, but not dominating. *mf*

con sord. p

mp



Elec. *Handwritten musical notation*

time 605 609 613 617

MAX/MSP

Fl. 121
Ob. 121
Cl. 121
Bn. 121

Hn. 121
Tpt. 121
Tbn. 121
Tb. 121

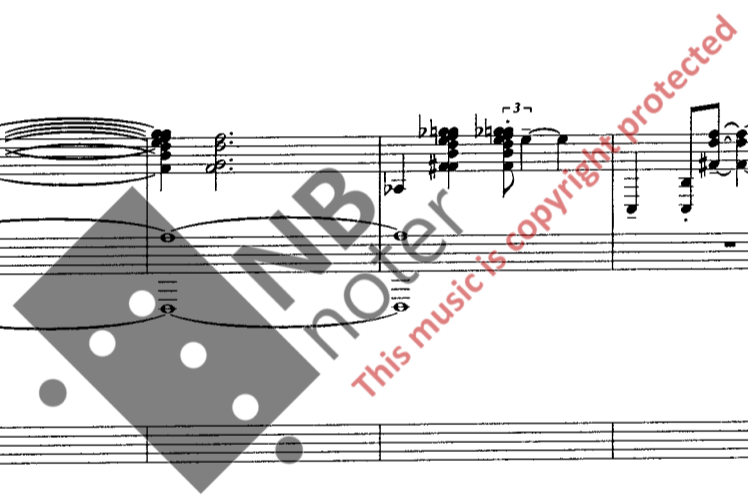
Pn. 121

Crot. 121
Crot. 121

Gr. 121

Vln. I 121
Vln. II 121

Vla. 121
Vc. 121
Kb. 121



Elec.

time 621 625 629 633

MAX/MSP

Fl. 129

Ob. 129

Cl. 129

Bn. 129

Hn. 129

Tpt. 129

Trb. 129

Tb. 129

Pn. 129

only split chords where necessary

Crot. 129

Crot. 129

Gtr. 129

Vln I 129

Vln. II 129

Vla. 129

Vc. 129

Kb. 129

Elec.

time 653 701 709

MAX/MSP T16 P5-on ♩ = 60

Fl.

Ob.

Cl.

Bn.

Hn.

Tpt.

Tb.

Tb.

Pn.

Crot.

Crot.

Gtr.

Vln. I

Vln. II


Vla.

Vc.

Kb.

senza sord. mf sfz mp f

accurate timing required for tape sync.



This music is copyright protected

elec. *Clarinet sound* *rough strings sound*

Time 713 721 729 737 740

MAX/MSP

153 Fl. *sfz* *mp* *f* *pp* *f* *mp* *f* *mf*

153 Ob. *sfz* *mp* *f* *pp* *f* *mp* *f* *mf*

153 Cl. *mp* *f* *sfz* *mp* *pp* *f* *pp* *f* *mp* *f* *mf*

153 Bn. *sfz* *mp* *f*

153 Hn.

153 Tpt.

153 Trb. *p* *mf*

153 Tuba *p* *mf*

153 Ph.

153 percussion Rusty metal *hard mallets*

153 Wbl. *hard mallets*

153 Croc. *f* *mp*

153 Cymal. *f* *mp*

153 Gongs

153 percussion 2 Rusty metal *hard mallets*

153 Wbl. *hard mallets*

153 Croc. *f* *mp*

153 Cym. *f* *mp*

153 Gongs

153 Gtr.

153 Vln. I *arco* *sfz* *ff* *f*

153 Vln. II *arco* *sfz* *ff* *f*

153 Vla. *arco* *sfz* *ff* *f*

153 Vc. *arco* *sfz* *ff* *f*

153 Kb. *arco* *ff* *f*

This music is copyright protected

elec. *Bassoon sound* *melodic sways* F#

time 746 749 757 805 813

MAX/MSP I17

Fl. *stac.* *p* *nat.*

Ob. *mf*

Cl. *stac.* *p* *nat.*

Bn. *ff* *mp*

Hn. *mf* *f*

Tpt. *mf* *f*

Trb. *mf* *f*

Tuba *mp* *f*

Pn.

Rm. *just audible*

Wbl. *just audible*

Crot. *just audible*

Cym. *brushes* *mp*

Gongs *brushes* *mp*

Rm. *just audible*

Wbl. *just audible*

Crot. *just audible*

Cym. *brushes* *mp*

Gongs *brushes* *mp*

Gtr. *f*

Vln. I *mf*

Vln. II *mf*

Vla. *mf*

Vc. *mf*

Kb. *mf*

NB *noter* *This music is copyright protected*

elec.

time

8'21 | 8'29 | 8'37 | 8'45

MAX/MSP

Fl. 169

Ob. 169

Cl. 169

Bn. 169

p

Hn. 169

Tpt. 169

Trb. 169

Tuba 169

con sord. *p*

Pn. 169

Rm. 169

Wbl. 169

Crot. 169

Cym. 169

Gongs 169

Rm. 169

Wbl. 169

Crot. 169

Cym. 169

Gongs 169

Gtr. 169

Vln. I 169

Vln. II 169

Vla. 169

Vc. 169

Kb. 169

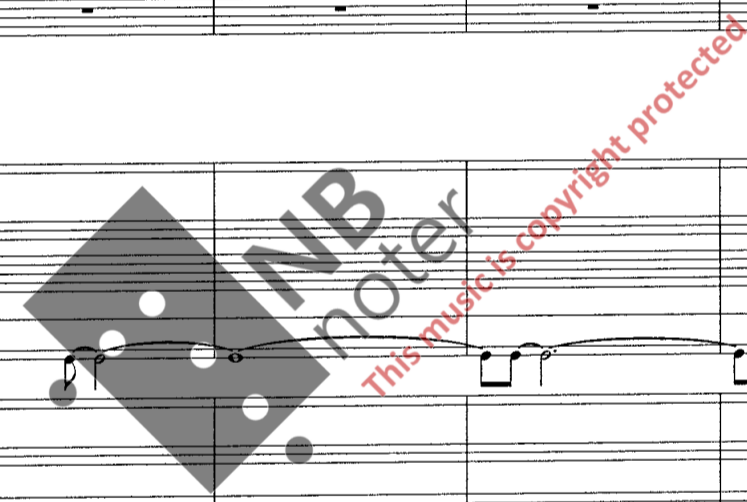
f *mp* *f* *mp* *p* *con sord.* *p*

f *mp* *f* *mf* *p* *con sord.* *p*

f *mp* *f* *f* *mp* *con sord.* *p*

f *mp* *f* *p* *con sord.* *p*

f *mp* *f* *mp* *con sord.* *p*



elec.

SILENCE

time

853 901 909 917

MAX/MSP

177

Fl. *p*

Ob. *p*

Cl. *p*

Bn. *p*

Hn. *p*

Tpt. *p*

Trb. *p*

Tuba *p*

Pn. *p*

Rm. *p*

Wbl. *p*

Crot. *p*

Cym. *p*

Gongs *p*

Rm. *p*

Wbl. *p*

Crot. *p*

Cym. *p*

Gongs *p*

Gtr. *p*

Vln. I *p* *pp*

Vln. II *p* *pp*

Vla. *p* *pp*

Vc. *p* *pp*

Kb. *p* *pp*

This music is copyright protected

elec.

time

MAX/MSP

925 933 941 949

LIVE
FADE MSP AT DESK
(Tape part normal levels)

I18

Fl.

Ob.

Cl.

Bn.

Hn.

Tpt.

Trb.

Tuba

Pn.

Rm.

Wbl.

Crot.

Cym.

Gongs

Rm.

Wbl.

Crot.

Cym.

Gongs

Gtr.

Vln. I

Vln. II

Vla.

Vc.

Kb.

pp

ppp

mf

mp

This music is copyright protected

elec.

time

MAX/MSP

9'57 10'05 10'13 10'21

I19 I20

Beat frequency ~ 3Hz

Fl. 193 *sfz* *pp*

Ob. 193

Cl. 193 *sfz* *pp*

Bn. 193

Hn. 193

Tpt. 193 *con sord.* *pp*

Trb. 193

Tuba 193

Pn. 193 *sfz*

Rm. 193

Wbl. 193

Crot. 193 *arco*

Cym. 193

Gongs 193

Rm. 193

Wbl. 193

Crot. 193 *arco*

Cym. 193

Gongs 193

Gtr. 193

Vln. I 193 *non vibrato* *pizz.*

Vln. II 193 *non vibrato* *pp*

Vla. 193 *non vibrato* *pp*

Vc. 193 *non vibrato*

Kb. 193 *non vibrato*

This music is copyright protected

elec.

time 10'29 10'37 10'45 10'53

MAX/MSP

Beat frequency ~ 7Hz

Fl. *pp*

Ob.

Cl. *pp*

Bn. *pp*

Hn. *con sord.* *pp*

Tpt.

Trb. *con sord.* *pp*

Tuba

Pn.

Rm.

Wbl. *nat. arco*

Crot. *nat.* *arco*

Cym.

Gongs

Rm.

Wbl. *nat. arco*

Crot. *nat.* *arco*

Cym.

Gongs

Gtr.

Vln. I *arco*

Vln. II

Vla.

Vc.

Kb.

The image shows a page of a musical score for page 26. At the top, there are two waveforms labeled 'elec.' and 'time', with time markers at 10'29, 10'37, 10'45, and 10'53. Below these is a section labeled 'MAX/MSP' containing the text 'Beat frequency ~ 7Hz'. The main body of the score consists of multiple staves for various instruments: Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bn.), Horn (Hn.), Trumpet (Tpt.), Trombone (Trb.), Tuba, Piano (Pn.), Snare Drum (Rm.), Woodblock (Wbl.), Crotales (Crot.), Cymbals (Cym.), Gong (Gongs), Guitar (Gtr.), Violin I (Vln. I), Violin II (Vln. II), Viola (Vla.), Violoncello (Vc.), and Double Bass (Kb.). The score includes various musical notations such as notes, rests, and dynamic markings like *pp* and *con sord.*. There is also a large watermark in the center that reads 'NBNB noter' and 'This music is copyright protected'.

elec.

time

MAX/MSP

Beat frequency ~ 20Hz

The musical score is organized into several systems. The top system includes an electronic track (elec.) and a time track with markers at 11'01, 11'09, 11'17, and 11'25. Below this is a section for woodwinds: Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), and Bassoon (Bn.), with dynamics ranging from *p* to *mf*. The next system covers brass instruments: Horn (Hn.), Trumpet (Tpt.), Trombone (Trb.), and Tuba, with dynamics including *p* and *mp*. The piano part (Pn.) is shown in the following system. The rhythm section (Rm., Wbl., Croc., Cym., Gongs) is detailed in two systems, with markings for *nat.*, *arco*, and *mf*. The guitar (Gr.) part is in the next system. The string section (Vln. I, Vln. II, Vla., Vc., Kb.) is the final system, with dynamics from *p* to *mf* and the instruction *senza sord.* for the keyboard.

elec.

time 11'33 11'41 11'49 11'57

MAX/MSP

Fl. 217

Ob. 217

Cl. 217 *mf*

Bn. 217 *f*

Hn. 217 *mf* *f*

Tpt. 217 *con sord.* *f*

Trb. 217 *f*

Tuba 217 *con sord.* *f*

Pn. 217

Rm. 217

Wbl. 217

Crot. 217

Cym. 217

Gongs 217

Rm. 217

Wbl. 217

Crot. 217

Cym. 217

Gongs 217

Gtr. 217

Vln. I 217 *senza sord.* *cresc.* *ff*

Vln. II 217 *senza sord.* *cresc.* *ff*

Vla. 217 *senza sord.* *f*

Vc. 217 *senza sord.* *f*

Kb. 217 *f*

Elec.

time 12'01 12'11

MAX/MSP T22 P5-OFF P6a

♩ = 120

Fl. 225 *mf* *p*

Ob. 225 *mf* *pp* *f* *pp*

Cl. 225 bass Cl *fz* *N* *b flat cl*

Bn. 225 *mf* *pp*

Hn. 225

Tpt. 225

Trb. 225

Tb. 225 *con sord.* *p#*

Pn. 225 *f*

percussion 1 225

Rm. 225

Wbl. 225

Drums 225 *mp* *wr*

Cym. 225 *arco*

gongs 225

percussion 2 225

Rm. 225

Wbl. 225

Drums 225 *hard sticks*

Cym. 225 *mp* *arco*

Gongs 225

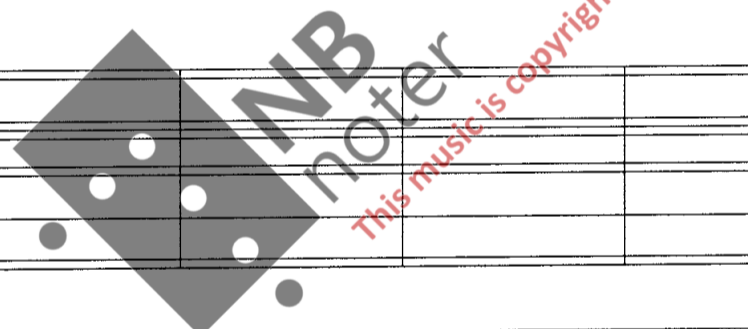
Vln. I 225 *sul pont* *f* *pp* *mf*

Vln. II 225 *sul pont* *f* *pp* *mp pizz.*

Vla. 225 *sul pont* *f* *pp* *mp pizz.*

Vc. 225 *mp pizz.*

Kb. 225 *con sord.* *pp* *mp pizz.*



Elec.

time

MAX/MSP

233

Fl.

mp

mf

pp

233

Ob.

p

233

Cl.

p

mf

233

Bn.

233

Hn.

con sord.

senza sord. mp

233

Tpt.

mf

233

Trb.

mf

233

Tb.

con sord. p

233

Pn.

knock inside piano

mf

perc.

233

Rm.

233

Wbl.

hard sticks

mf

Drums

233

Cym.

233

gongs

233

Rm.

233

Wbl.

hard sticks

mf

Drums

233

Cym.

233

Gongs

233

Vln. I

arco

p

p

mf

p

233

Vln. II

pp

p

mf

p

233

Vla.

pp

arco

mp

p

mf

p

233

Vc.

p

mf

p

233

Kb.

p

sfz

12'21

12'31

P66 T23

Handwritten notes: *arco* *mfz*

Watermark: NB noter This music is copyright protected

Elec.

(main articulations only)

time

1241

MAX/MSP

T24 P6c

Fl.

mf

mp

f

Ob.

mp

Bass Cl.

mp

Cl.

f

mp

Bn.

mp

mf

mp

Hn.

Tpt.

mp

Trb.

mp

Tb.

mp

Pn.

f

mf

perc.

Rm.

mf

Wbl.

Drums

Cym.

gongs

mp

Rm.

Wbl.

Drums

Cym.

Gongs

mf

Vln. I

mf

mf

Vln. II

mf

Vla.

mp

mf

Vc.

mf

Kb.

mp

mf

Elec.

time 12'49 12'57

MAX/MSP P6d T25 T26 T27

$\text{♩} = 150$

Fl. *mf* *mp* *p*

Ob. *mf* *mp*

Cl. *mp* *mp*

Bn. *mf* *p* *sfz* *mp*

Hn.

Tpt.

Trb.

Tb.

Pn. *mf*

perc. 249

Rm. 249

Wbl. 249

Drums 249 soft beaters

Cym. 249

gongs 249

Rm. 249 hard sticks

Wbl. 249

Drums 249

Cym. 249

Gongs 249

Vln. I *col legno f* *pizz.* *col legno*

Vln. II *col legno f* *pizz.* *col legno*

Vla. *col legno f* *pizz.* *col legno*

Vc. *col legno f* *col legno*

Kb. *col legno f*

NB
noter
This music is copyright protected

Elec.

time 13'03.4 13'09.4 13'15.4

MAX/MSP \downarrow \uparrow T28 \downarrow

\downarrow = 120 \downarrow = 150

Fl. *mp* *p* *mf* *mf*

Ob. *mp* *p* *mf*

Cl. *mp stacc.* *p* *mf* *mf*

Bn. *mp stacc.* *p* *f* *mf*

Hn.

Tpt.

Trb.

Tb.

Pn. *mf*

perc. 257

Rm. *hard sticks*

Wbl. *hard sticks*

Drums *f*

Cym.

Gongs

Rm. *hard sticks*

Wbl. *hard sticks*

Drums

Cym.

Gongs

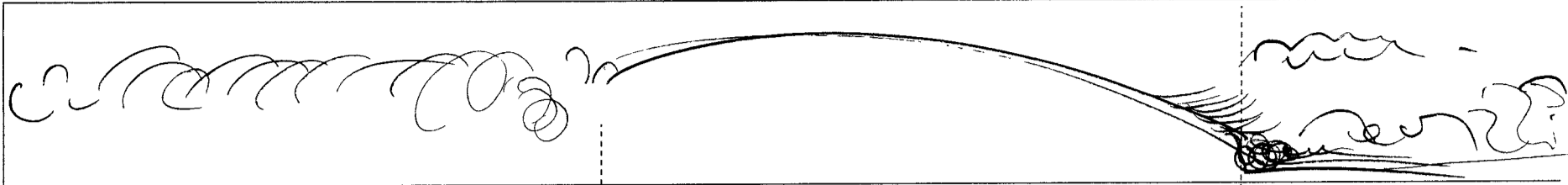
Vln. I *arco mp* *mf* *pizz. mp* *f pizz.*

Vln. II *arco mp* *mf* *mp* *f pizz.*

Vla. *arco mf* *mp* *f pizz.*

Vc. *arco mf* *mp* *f pizz.*

Kb. *arco mf* *pizz. mp* *f pizz.* *pizz. arco*

Elec. 

time 13'33.4 P6 off 13'37.4 P7 off

MAX/MSP T3 13'37.4 =120

Fl. = 150 *mf*

Ob. *mf*

Cl. *mf*

Bn. *mf*

Hn. *mf*

Tpt. *mf*

Tbn. *mf*

Tb. *mf*

Pn.

perc. 273

Rm. 273

Wbl. 273

Drums 273

Cym. 273

gongs 273

Rm. 273

Wbl. 273

Drums 273

Cym. 273

Gongs 273

Vln. I. *arco* *sul pont* *f*

Vln. II. *arco* *sul pont* *f*

Vla. *arco* *sul pont* *f*

Vc. *arco* *sul pont* *f*

Kb. *sul pont* *f*



Elec.

time 13'52.2

MAX/MSP T32

Fl. 281

Ob. 281

Cl. 281

Bn. 281

Hn. 281

Tpt. 281

Trb. 281

Tb. 281

Pn. 281

perc. 281

Rm. 281

Wbl. 281

Drums 281

Cym. 281

gongs 281

Rm. 281

Wbl. 281

Drums 281

Cym. 281

Gongs 281

Vln. I 281

Vln. II 281

Vla. 281

Vc. 281

Kb. 281

This music is copyright protected

Elec. 

time 14'02.2 | 14'12.2

MAX/MSP

Fl. *mp* *f* *mp*

Ob. *f* *mp*

Cl. b flat cl.

Bn. *mf*

Hn. (as fast as possible) *con sord. mp*

Tpt. *con sord. mp*

Trb.

Tb. *con sord. mp*

Pn. *pp* *mf*

perc. 289

Rm.

Wbl.

Drums

Cym. *mp*

gongs

Rm.

Wbl.

Drums

Cym.

Gongs *mp*

Vln. I

Vln. II

Vla.

Vc.

Kb.

Elec.

time 14'22.2 14'32.2

MAX/MSP

Fl. 297

Ob. 297

Cl. 297

Bn. 297

Hn. 297

Tpt. 297

Trb. 297

Tb. 297

Pn. 297

perc. 297

Rm. 297

Wbl. 297

Drums 297

Cym. 297

gongs 297

Rm. 297

Wbl. 297

Drums 297

Cym. 297

Gongs 297

Vln. I 297

Vln. II 297

Vla. 297

Vc. 297

Kb. 297

Elec.

time

MAX/MSP

correction to 14'42

14'42.2

I33

Fl.

Ob.

Cl.

Bn.

Hn.

Tpt.

Trb. tenor trombone

Tb.

Pn.

perc.

Rm.

Wbl.

Drums

Cym.

gongs

Rm.

Wbl.

Drums

Cym.

Gongs

Vln. I

Vln. II

Vla.

Vc.

Kb.

p

f

mp

senza sord.

sfz

soft mallets

mf

pizz.

Elec.

time 14'52 15'02

MAX/MSP

Fl. 313

Ob. 313

Cl. 313 *f* *mp*

Bn. 313

Hn. 313

Tpt. 313

Trb. 313

Tb. 313

Pn. 313

perc. 313

Rm. 313

Wbl. 313

Drums 313 *mp*

Cym. 313

gongs 313

Rm. 313

Wbl. 313

Drums 313

Cym. 313 *arco* *p* *f*

Gongs 313

Vln. I 313 *con sord. ppp*

Vln. II 313 *con sord. ppp* *nat.*

Vla. 313 *con sord. ppp*

Vc. 313 *con sord. ppp*

Kb. 313 *con sord.* *arco* *f*

Elec.

time 15'12

MAX/MSP

Fl. 321

Ob. 321

Cl. 321
mf *p* *mf* *sfz*

Bn. 321

Hn. 321

Tpt. 321

Trb. 321

Tb. 321

Pn. 321

perc. 321

Rm. 321

Wbl. 321

Drums 321

Cym. 321

gongs 321

Rm. 321

Wbl. 321

Drums 321

Cym. 321

Gongs 321

Vln. I 321
nat.

Vln. II 321

Vla. 321
nat.

Vc. 321

Kb. 321
p

This page contains a musical score for page 41. It features a variety of instruments: Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bn.), Horn (Hn.), Trumpet (Tpt.), Trombone (Trb.), Tuba (Tb.), Piano (Pn.), Percussion (perc.), Snare Drum (Rm.), Woodblock (Wbl.), Drums, Cymbal (Cym.), Gong (gongs), Violin I (Vln. I), Violin II (Vln. II), Viola (Vla.), Violoncello (Vc.), and Double Bass (Kb.). The score includes dynamic markings such as *mf*, *p*, *mf*, *sfz*, and *nat.*, and a time signature of 15'12. A large watermark 'NB noter' and the text 'This music is copyright protected' are overlaid on the score.

Elec.

time 15'22

MAX/MSP

Fl. 329

Ob. 329

Cl. 329

Bn. 329

Hn. 329

Tpt. 329

Trb. 329

Tb. 329

Pn. 329

perc. 329

Rm. 329

Wbl. 329

Drums 329

Cym. 329

gongs 329

Rm. 329

Wbl. 329

Drums 329

Cym. 329

Gongs 329

Vln. I 329

Vln. II 329

Vla. 329

Vc. 329

Kb. 329

tr (f#)

Handwritten scribbles at the top of the page.

time 15'32 15'42

MAX/MSP P1 T34

Fl. 334 mp p

Ob. 334 p

Cl. 334 p

Basn. 334 pp

Hn. 334

Trpt. 334

Tbn. 334

Tb. 334

Pn. 334

percussion 1 334

Xyl. 334

Wbl. 334

rm. 334

drums 334

cymbal 334

gongs 334

percussion 2 334

xyl. 334

wb. 334

rm. 334

drums 334

cymbal 334

gongs 334

vln.I 334

vln.II 334 tr (#) nat.

Vla. 334 tr (#)

Vc. 334 j

Kb. 334

The image displays a page of a musical score, page number 44, containing various instrumental parts. At the top, a 'time' line shows a section from 15:52 to 16:02. Below this, a 'MAX/MSP' line indicates a dynamic range with a 'T35' marking and a double-headed arrow. The score includes parts for Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Basn.), Horn (Hn.), Trumpet (Trpt.), Trombone (Tbn.), and Tuba (Tb.), all starting at measure 342. Percussion parts include Piano (Pn.), Xylophone (Xyl.), and a set of drums (Wbl. rm, drums, cymbal, gongs) starting at measure 342. The strings section includes Violin I (Vln. I), Violin II (Vln. II), Viola (Vla.), Violoncello (Vc.), and Kontrabaß (Kb.), starting at measure 342. Performance markings such as 'mp', 'con sord.', 'nat.', and 'pp' are used throughout. A large watermark 'NB noter' and the text 'This music is copyright protected' are overlaid on the score.

time
MAX/MSP

T36
16'12

Fl.
Ob.
Cl.
Basn.

Hn.
Trpt.
Tbn.
Tb.

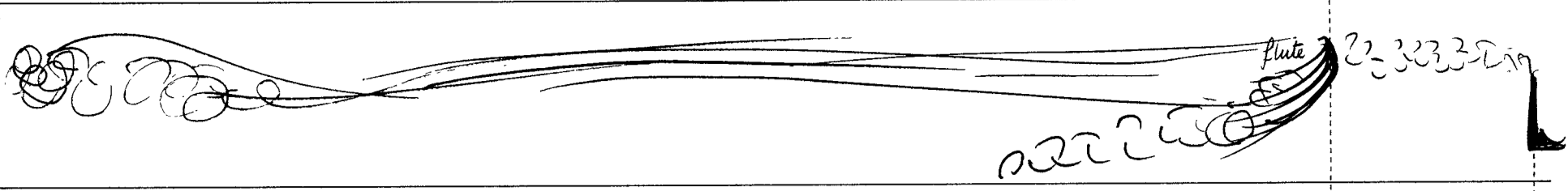
Pn.

Xyl.
Wbl.
rm
drums
cymbal
gongs

xyl
wb
rm
drums
cymbal
gongs

Vln. I
Vln. II
Vla.
Vc.
Kb.

mf
mf
con sord. *mp*
con sord. *mp*
pp
pp
brushes *mp*
brushes *mp*
pp



time 1622 1632 I37

MAX/MSP
Fl. 358 mp mf
Ob. 358 mp
Cl. 358 mp mf
Basn. 358 mp mf

Hn. 358 mp
Trpt. 358
Tbn. 358
Tb. 358 mp

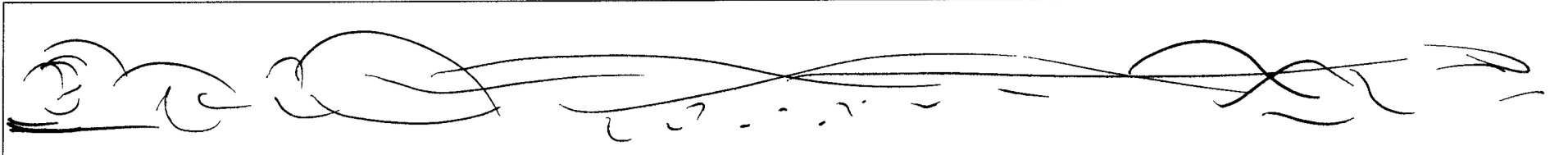
Pn. 358 mp

Xyl. 358
Wbl. 358
rm 358
drums 358
cymbal 358 mf
gongs 358 mp

xyl 358
wb 358
rm 358 mf
drums 358
cymbal 358
gongs 358 mp

Vln. I 358
Vln. II 358
Vla. 358 p
Vc. 358 nat. p
Kb. 358





16'42

time

MAX/MSP

Fl. 366 *mp*

Ob. 366

Cl. 366 *mp*

Basn. 366 *mp*

Hn. 366

Trpt. 366

Tbn. 366

Tb. 366

Pn. 366 *ff*

Xyl. 366 *mp*

Wbl. 366

rm 366

drums 366

cymbal 366

gongs 366 sticks

xyl 366

wb 366

rm 366

drums 366

cymbal 366

gongs 366 *mp* sticks

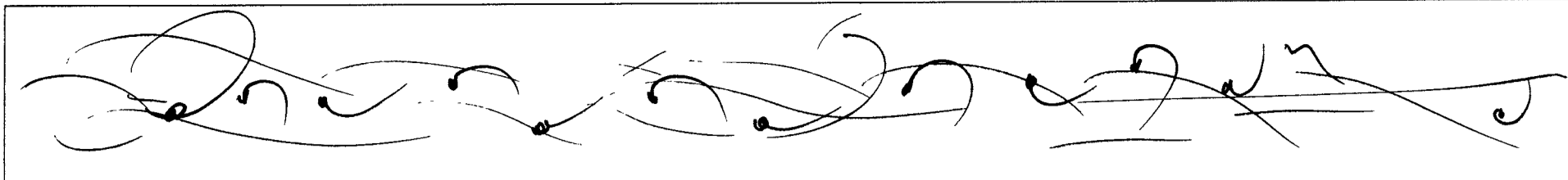
Vln. I 366 *senza sord.* *mp*

Vln. II 366 *senza sord.* *mp*

Vla. 366 *senza sord.* *mp*

Vc. 366 *senza sord.* *mp*

Kb. 366 *senza sord.* *p*



time 16'52 17'02
MAX/MSP

Fl. 374
Ob. 374
Cl. 374
Basn. 374

Hn. 374
Trpt. 374
Tbn. 374
Tb. 374

senza sord. mp
senza sord. mp
senza sord. mp

Pn. 374
374

dampen manually with rubber mp

Xyl. 374
Wbl. 374
rm 374
drums 374
cymbal 374
gongs 374

mp

xyl 374
wb 374
rm 374
drums 374
cymbal 374
gongs 374

vln. I 374
vln. II 374
Vla. 374
Vc. 374
Kb. 374

Handwritten musical notation in Arabic script at the top of the page.

time

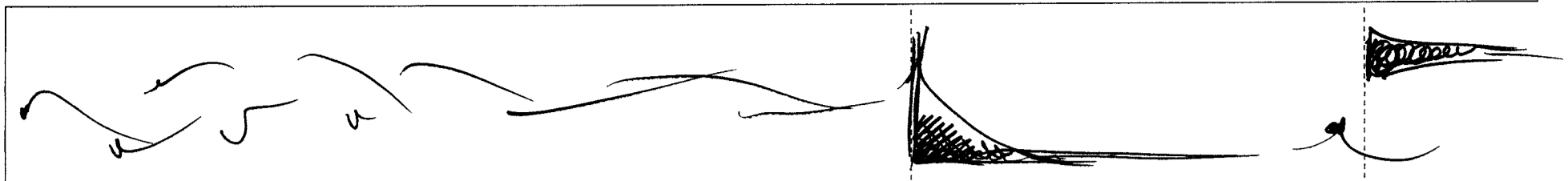
17'12

17'22

MAX/MSP

Musical score for various instruments including Flute (Fl.), Oboe (Ob.), E flat clarinet (Cl.), Bassoon (Basn.), Horn (Hn.), Trumpet (Trpt.), Trombone (Tbn.), Tuba (Tb.), Piano (Pn.), Xylophone (Xyl.), Woodblock (Wbl.), Snare drum (rm), Cymbal, Gong, Violin I (vln. I), Violin II (Vln. II), Viola (Vla.), Violoncello (Vc.), and Kontrabaß (Kb.).

Dynamic markings include *mf*, *f*, *p*, *mp*, *ff*, and *sim.*. Performance instructions include *senza sord.*, *hard mallets*, and *stick + hard mallet*. The score includes measures 382 through 415.



time
MAX/MSP

17'32
T39
T40

Fl.
Ob.
Cl.
Basn.

Hn.
Trpt.
Tbn.
Tb.

Pn.

Xyl.
Wbl.
rm
drums
cymbal
gongs

xyl
wb
rm
drums
cymbal
gongs

vln. I
Vln. II
Vla.
Vc.
Kb.

time

MAX/MSP

1742

1752

I41

I42

Fl.

Ob.

Cl.

Basn.

Hn.

Trpt.

Tbn.

Tb.

Pn.

Xyl.

Wbl.

rm

drums

cymbal

gongs

xyl

wb

rm

drums

cymbal

gongs

vln. I

Vln. II

Vla.

Vc.

Kb.



18'02

time

MAX/MSP

Fl. 406

Ob. 406

Cl. 406

Basn. 406

ff

Hn. 406

Trpt. 406

Tbn. 406

Tb. 406

ff

Pn. 406

ff

Xyl. 406

Wbl. 406

rm 406

drums 406

cymbal 406

gongs 406

ff

xyl 406

wb 406

rm 406

drums 406

cymbal 406

gongs 406

ff

vln. I 406

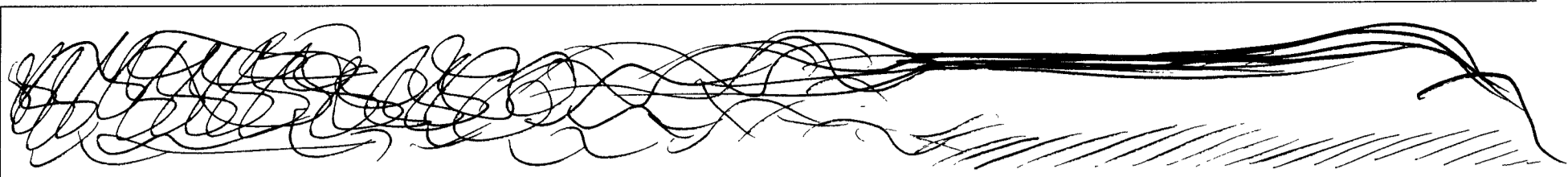
Vln. II 406

Vla. 406

Vc. 406

Kb. 406

ff



time 18'12 18'22

MAX/MSP

Fl.
Ob.
Cl.
Basn.

Hn.
Trpt.
Tbn.
Tb.

Pn.

Xyl.
Wbl.
rm
drums
cymbal
gongs

xyl
wb
rm
drums
cymbal
gongs

vln. I
vln. II
Vla.
Vc.
Kb.

time

MAX/MSP

↑ T43

18'32

Electroacoustic part continues to end (~20'10)

422

Fl.

422

Ob.

422

Cl.

422

Basn.

422

Hn.

422

Trpt.

422

Tbn.

422

Tb.

422

Pn.

422

P2

422

Xyl.

422

Wbl.

422

rm

422

drums

422

cymbal

422

gongs

422

xyl

422

wb

422

rm

422

drums

422

cymbal

422

gongs

422

vln. I

422

Vln. II

422

Vla.

422

Vc.

422

Kb.

