Miroslav Spasov

TEN SEFIROT

for

Piano and Electronics

(2021)

Notes on Performance

CUES: 1, 2…13 The underlined numbers above the stave designate the *Cue* number.

ELECTRONICS

2 microphones	Mic.1 & Mic.2, (DPA or any other 'close' mics) to be placed close to the strings of the piano. Mic.1 will capture high and Mic.2 low registers.
Audio Interface	2-mono in/8 mono-out
Computer	(Apple Mac Book Pro with OSX 10.15 or later)
Software	*Ten Sefirot for Piano and Electronics.app* (standalone performance application)
Audio mixer	(takes 2 Mic inputs and outputs 8 channels routed to 8 speakers around the audience)
Eight speakers	8 speakers (1-8) in clockwise direction around the audience
Smartphone Camera/	Any smartphone camera with **Bluetooth** protocol can be used to send the video capturing wirelessly to the computer. **The distance between the smartphone and the computer should not exceed 10 meters.** Alternatively a camcorder can be connected to the computer using a **USB** cable.
or Camcorder	
1 technician	a person sitting at the mixer, who will be responsible for:

- activating and deactivating the microphones
- controlling the work of the computer during the performance — pressing the **space bar** to set the following cue and activate the software instrument associated with that number
- controlling the balance between the sound of the piano, the sound coming out of the microphones and processed in real-time by the computer, and the sound of the pre-processed soundfiles stored into the computer's hard-drive.

Duration: 24 minutes

Stage Setting and Equipment

Equipment (Audio and Computer)

2 mono microphones, one placed at the high (Left), the other at the low (Right) register of the piano should be routed either directly (not recommended) or through a mixing desk to the two mono inputs of the audio interface;

Audio interface and loudspeakers: 8 mono outs should be connected to a mixing desk and from there routed to the eight speakers around the audience. The numbering should be in a clockwise direction (1-8) with No.1 at Left-Front. No.2 should be at Right-Front and the remaining speakers should close the circle at No.1. No speaker should be placed behind the piano (placed at the front of the audience). The sound of the piano need no extra amplification. Balanced cables should be used.

The **audio interface** has to be connected to the **computer** via **USB/Firewire** cable. The appropriate 'driver' for the **audio interface** has to be installed so the computer can 'see' it.

Equipment (Smartphone camera or camcorder) *see FIGURE 1

Any smartphone camera with **Bluetooth** protocol can be used to send the video capturing wirelessly to the computer. The distance between the smartphone and the computer should not exceed **10 meters**. To connect the device enable the **Bluetooth** connection in both the smartphone and the computer. If a smartphone camera is used, it has to be mounted on the piano, vertically above the keyboard at a hight above pianists' head and positioned 'face-down' in a such a way to capture exactly the entire piano keyboard — from the bottom to the top white key. **A strong clip can be used to fix the smartphone selfie-stick to the piano and attached either to the piano's lid or the Music Rack's base.**

If a camcorder used, it has to be placed on a tripod at a hight above pianist's head and positioned in such a way to capture exactly the entire piano keyboard — from the bottom to the top white key.

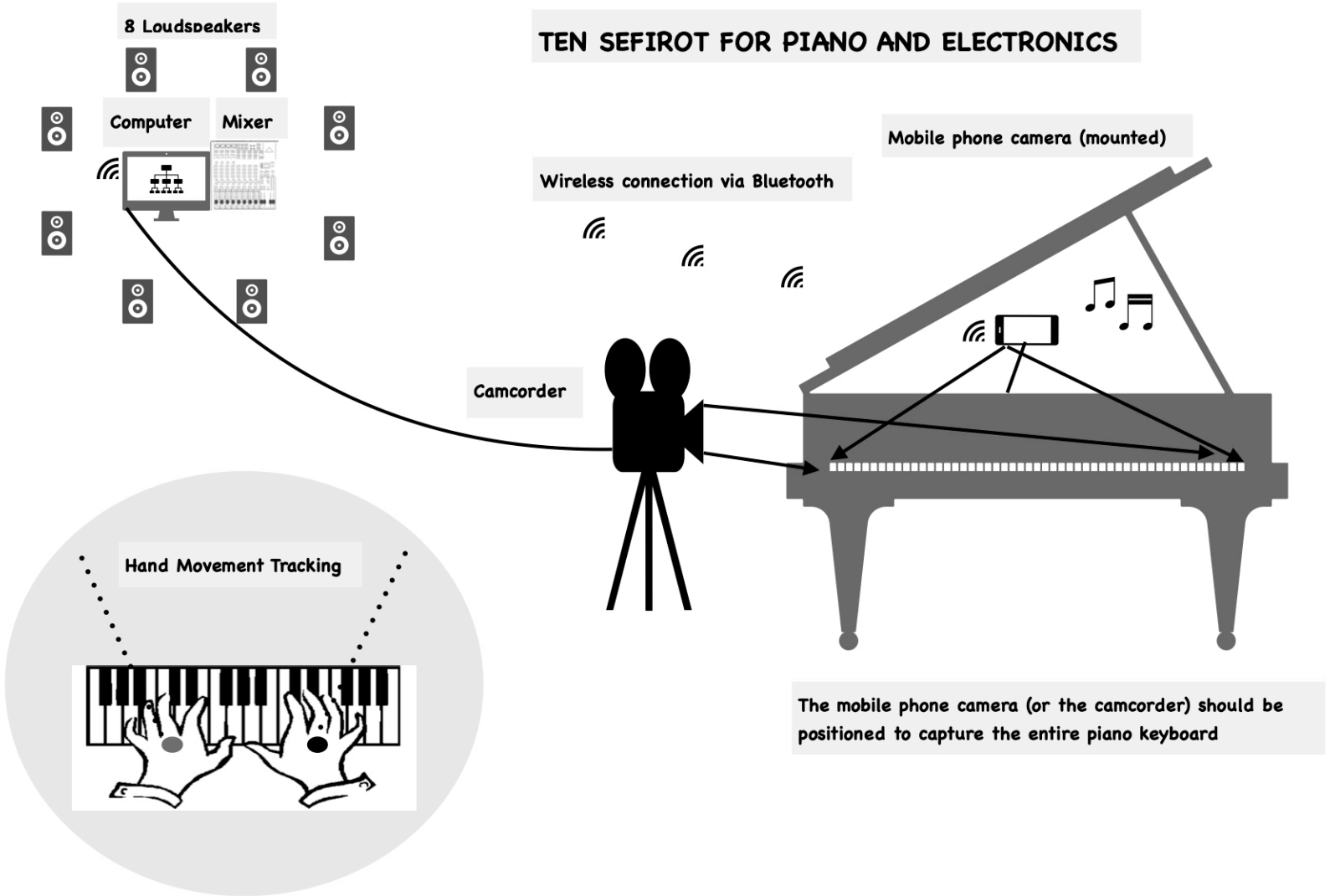
Connecting the Equipment (audio equipment, audio Interface, smartphone camera/camcorder, computer and software)

Once the communication between the audio interface and the computer has been established, launch the ***Ten Sefirot for Piano and Electronics.app*** software. This standalone application doesn't need any additional drivers and it should work on any computer. **Detailed instructions about how to enable both the audio interface and the smartphone camera (camcorder) from within the software are given at the application's main window/interface**.

Pianist's Hands (* see FIGURE 1)

In order to allow the single camera to track both of performer's hands independently the **back of the pianist's hands** need to be marked with different colour — by either using a marker or applying very thin stickers on the back of the hands, if the pianist is comfortable with that. If markers are used, the pianist can draw a circle (1/2-inch in diameter) anywhere on the back of each of his/her hands. Any two colours can be used, however **green** and **blue** are the safest as they make a good contrast to the skin colour. **NOTE: neither of the two colours used should appear on the pianist's hands or arms as the software will track these colours wherever they appear in the video captured.**

FIGURE 1


8 Loudspeakers
Computer
Mixer
TEN SEFIROT FOR PIANO AND ELECTRONICS
Mobile phone camera (mounted)
Wireless connection via Bluetooth
Camcorder
Hand Movement Tracking
The mobile phone camera (or the camcorder) should be positioned to capture the entire piano keyboard

Performance

1. Drop the application *Ten Sefirot for Piano and Electronics.app* on the computer's Desktop (or anywhere convenient) and launch it.

2. In DSP Status:

Set the appropriate audio driver, input, and output sources;
Set the Sampling rate to 44100
I/O and Signal vector size to 512
Max Scheduler in Overdrive and Scheduler in Audio Interrupt to "ON"

3. In the left upper corner of the main patch (INPUTS:MICROPHONES) double-click on the IO object and from the popup menu on the left choose "Audio input".

4. The performance of the work require an audio/computer technician — a person sitting at the mixer and controlling the microphones, the computer during the performance, the balance among the piano sound and the real-time processing.

Detailed instructions about how to start using the software application and engage the audio interface and the smartphone camera (camcorder) are given in the **application's main window/interface**.

How It Works (*** see FIGURE 2 & FIGURE 3**)

The smartphone camera (camcorder) tracks the pianist hands's movement with respect to the piano keyboard's octave/register. The user can pick the colour/hue to be followed by clicking on the actual colour inside the video showing the hands and the keyboard. The colours chosen are shown in the two smaller windows — the one to the left for the left hand and the one to the right for the right hand (**Figure 3**). The location coordinates of a colour region of each of the hands are sent to particular MaxMSP-Jitter patch with virtual 'instruments'. The data coming from the smartphone camera (camcorder) is first conveniently scaled and converted into streams of variables and routed to the 'mapping area' directly controlling the parameters of sound synthesis and processing as well as multi-channel spatialisation in real-time (**Figure 2**).

FIGURE 2

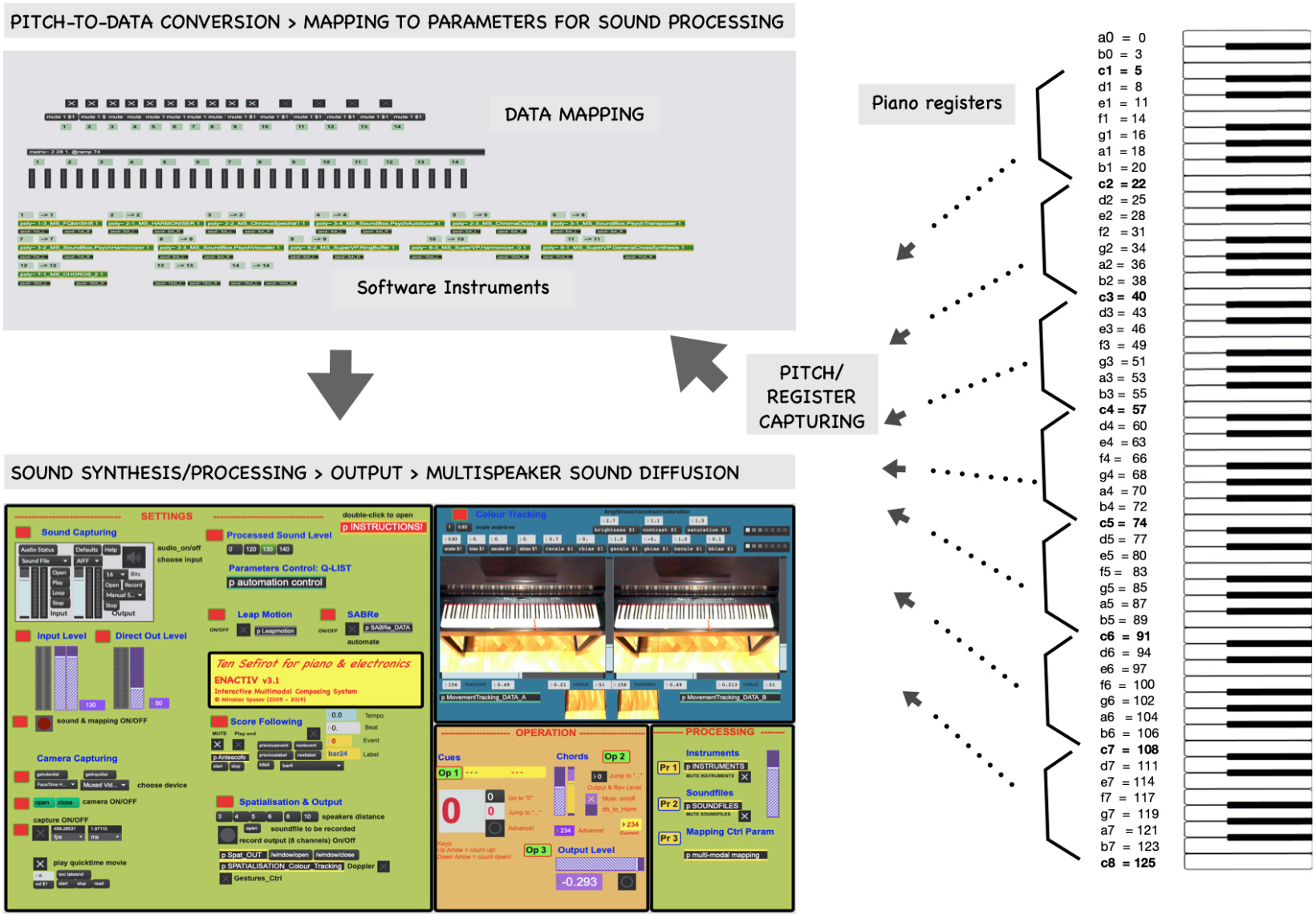
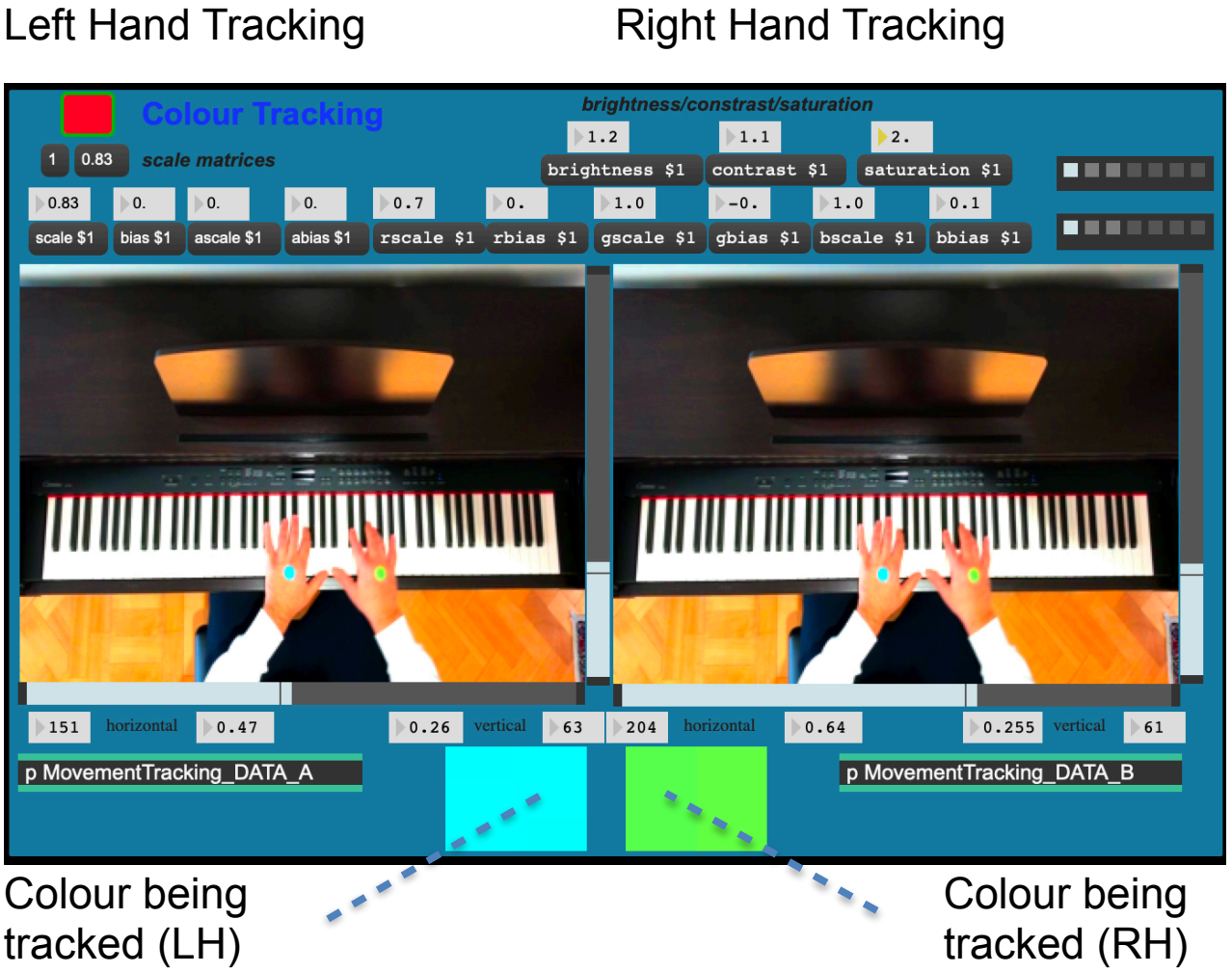

PITCH-TO-DATA CONVERSION > MAPPING TO PARAMETERS FOR SOUND PROCESSING
DATA MAPPING
Software Instruments
PITCH/
REGISTER
CAPTURING
Piano registers
a0 = 0
b0 = 3
c1 = 5
d1 = 8
e1 = 11
f1 = 14
g1 = 16
a1 = 18
b1 = 20
c2 = 22
d2 = 25
e2 = 28
f2 = 31
g2 = 34
a2 = 36
b2 = 38
c3 = 40
d3 = 43
e3 = 46
f3 = 49
g3 = 51
a3 = 53
b3 = 55
c4 = 57
d4 = 60
e4 = 63
f4 = 66
g4 = 68
a4 = 70
b4 = 72
c5 = 74
d5 = 77
e5 = 80
f5 = 83
g5 = 85
a5 = 87
b5 = 89
c6 = 91
d6 = 94
e6 = 97
f6 = 100
g6 = 102
a6 = 104
b6 = 106
c7 = 108
d7 = 111
e7 = 114
f7 = 117
g7 = 119
a7 = 121
b7 = 123
c8 = 125
SOUND SYNTHESIS/PROCESSING > OUTPUT > MULTISPEAKER SOUND DIFFUSION
SETTINGS
Sound Capturing
Processed Sound Level
Parameters Control: Q-LIST
p automation control
Leap Motion
SABRe
Input Level
Direct Out Level
Ten Sefirot for piano & electronics
ENACTIV v3.1
Interactive Multimodal Composing System
Score Following
Camera Capturing
Spatialisation & Output
Colour Tracking
OPERATION
Cues
Chords
Op 1
Op 2
Op 3
Output Level
PROCESSING
Instruments
Soundfiles
Mapping Ctrl Param

FIGURE 3


Left Hand Tracking
Right Hand Tracking
Colour Tracking
brightness/constrast/saturation
1.2
1.1
2.
brightness $1
contrast $1
saturation $1
1
0.83
scale matrices
0.83
0.
0.
0.
0.7
0.
1.0
-0.
1.0
0.1
scale $1
bias $1
ascale $1
abias $1
rscale $1
rbias $1
gscale $1
gbias $1
bscale $1
bbias $1
151
horizontal
0.47
0.26
vertical
63
204
horizontal
0.64
0.255
vertical
61
p MovementTracking_DATA_A
p MovementTracking_DATA_B
Colour being tracked (LH)
Colour being tracked (RH)

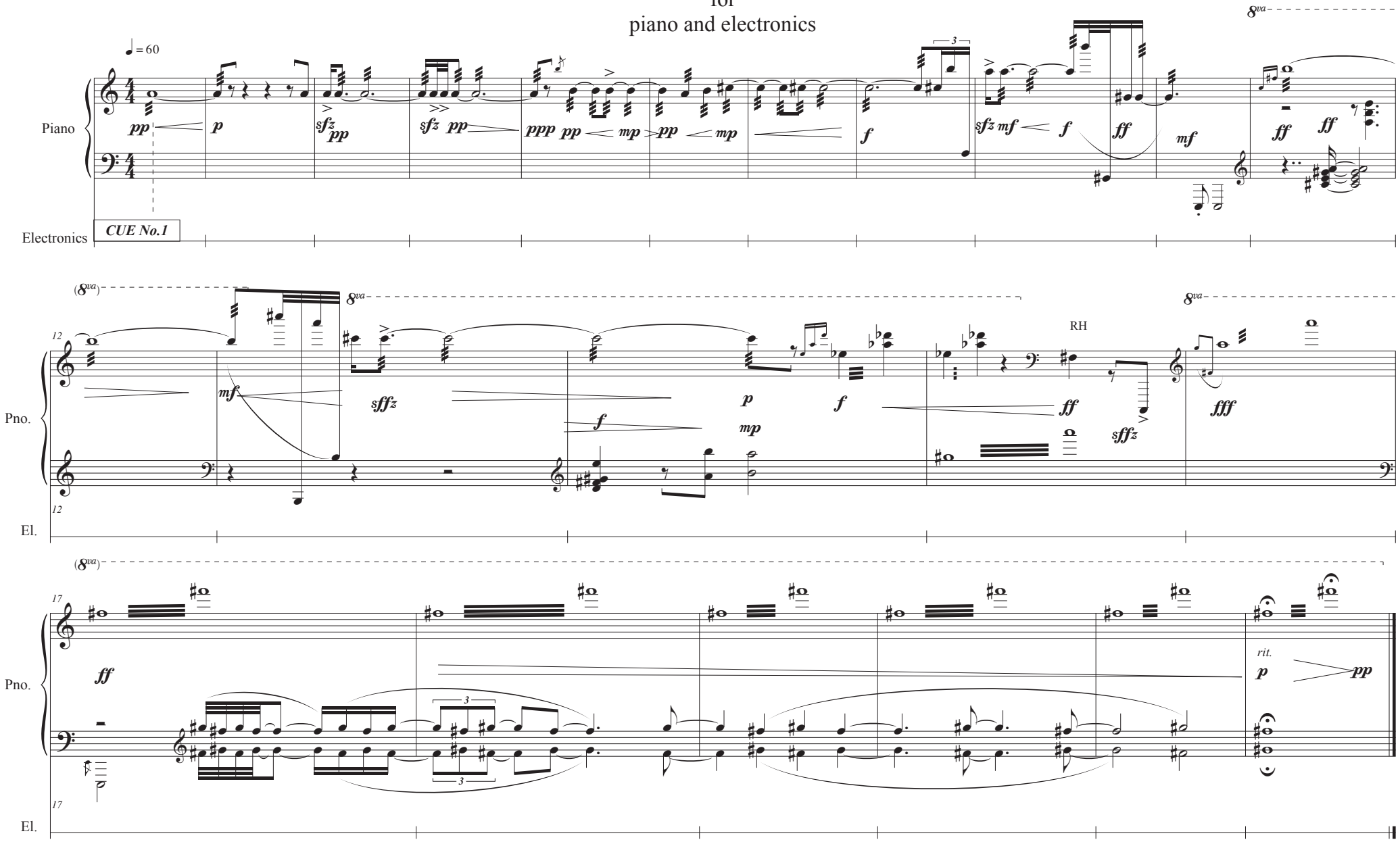
Programme Notes

As in many other compositions, my main creative interest in this work is closely related to- and influenced by, the study of cognitive science and anthropology — the parallelism of structures between musical processes on the one hand and the processes of culture-coloured consciousness on the other. In this case, I have made an attempt to bring some ideas stemming from the ancient tradition of *Kabbalah* (*'reception' or 'tradition'* from the school of thought in Jewish mysticism). Its teachings define the inner meaning of the Hebrew Bible through one of the fundamental kabbalistic texts, the Medieval Zohar, which was first published in the 13th century. *Kabbalah* sees the human soul as mirroring the Divine (after Genesis 1:27, "God created man in His own image, in the image of God He created him, male and female He created them"), and more widely, all creations as reflections of their life source in the S*ephirot*. The *Sephirot* are considered revelations of the 'Creator's Will' and they should not be understood as ten different "gods" but as ten different ways the one 'God' reveals his 'Will'. Underlying the structural purpose of each of the S*ephirot* is a hidden motivational force which is understood best by comparison with a corresponding psychological state in human spiritual and cultural experience.

As the ten *Sephirot* are a step-by-step process illuminating the 'Divine plan' as it unfolds itself in 'Creation', the 'Infinite Light' is 'dispersed' among this collection of miniatures representing metaphorically an acoustic reflection of that process. I have been driven by the *Sephirot*'s 'light refraction' and used it as a metaphor to develop a musical form consisting of separate short movements based on a simple melodic phrase, each of which originates from the rich folk musical tradition of the Slavic people living in the south-east region of Europe – and predominantly the Balkan peninsula (North Macedonia, southern part of Serbia, Bulgaria and northern parts of Greece). The 'sonic illumination' starts from the first of the *Sephirot* – *Keter* (above-consciousness) and its five-tone 'rubato' song and continues through *Hokmah's* (wisdom) slow dance phrase, Bina's (understanding) rhythmic character, Hesed's (kindness) lullaby-like motive, Gevurah's (severity) 'impressionistic' mode, Tifferet's (beauty) tonality-bound traditional phrase, Netzah's (Eternity) folk dance, Hod's (Splendour) marching rhythm, Yesod's (Foundation) 'elegy', to the last one – Malkuth's (Kingship) emotional pathos. The eleventh miniature from this collection, DA'AT (Knowledge of Good and Evil) is the location where all ten *Sephirot* are united as one — metaphorically represented by the extremely simple melody consisting of three tones in downward motion very common in the folk music from the region described above as well as across many other cultural traditions around the world.

KETER

for
piano and electronics



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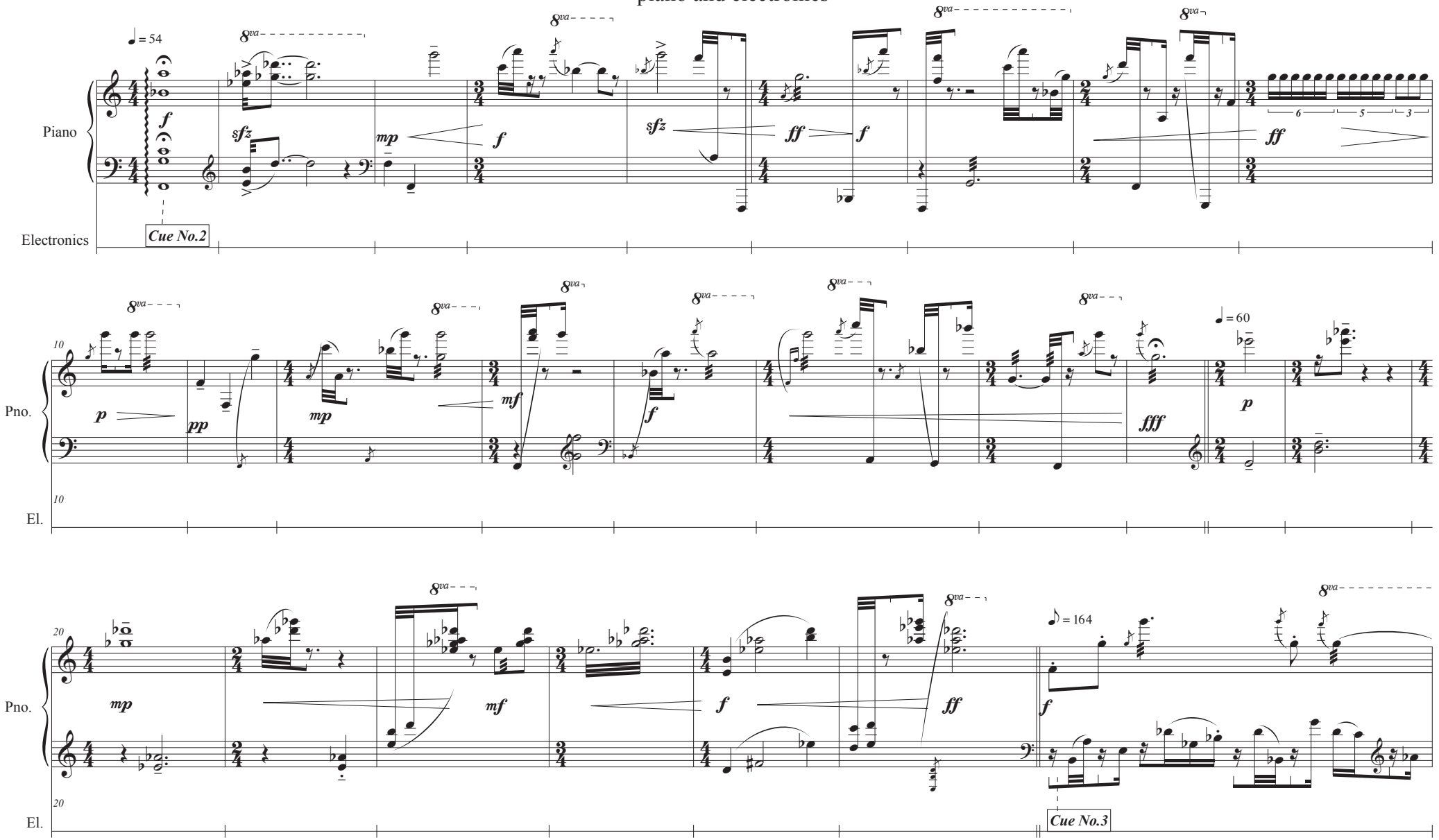
HOCHMA

for

piano and electronics



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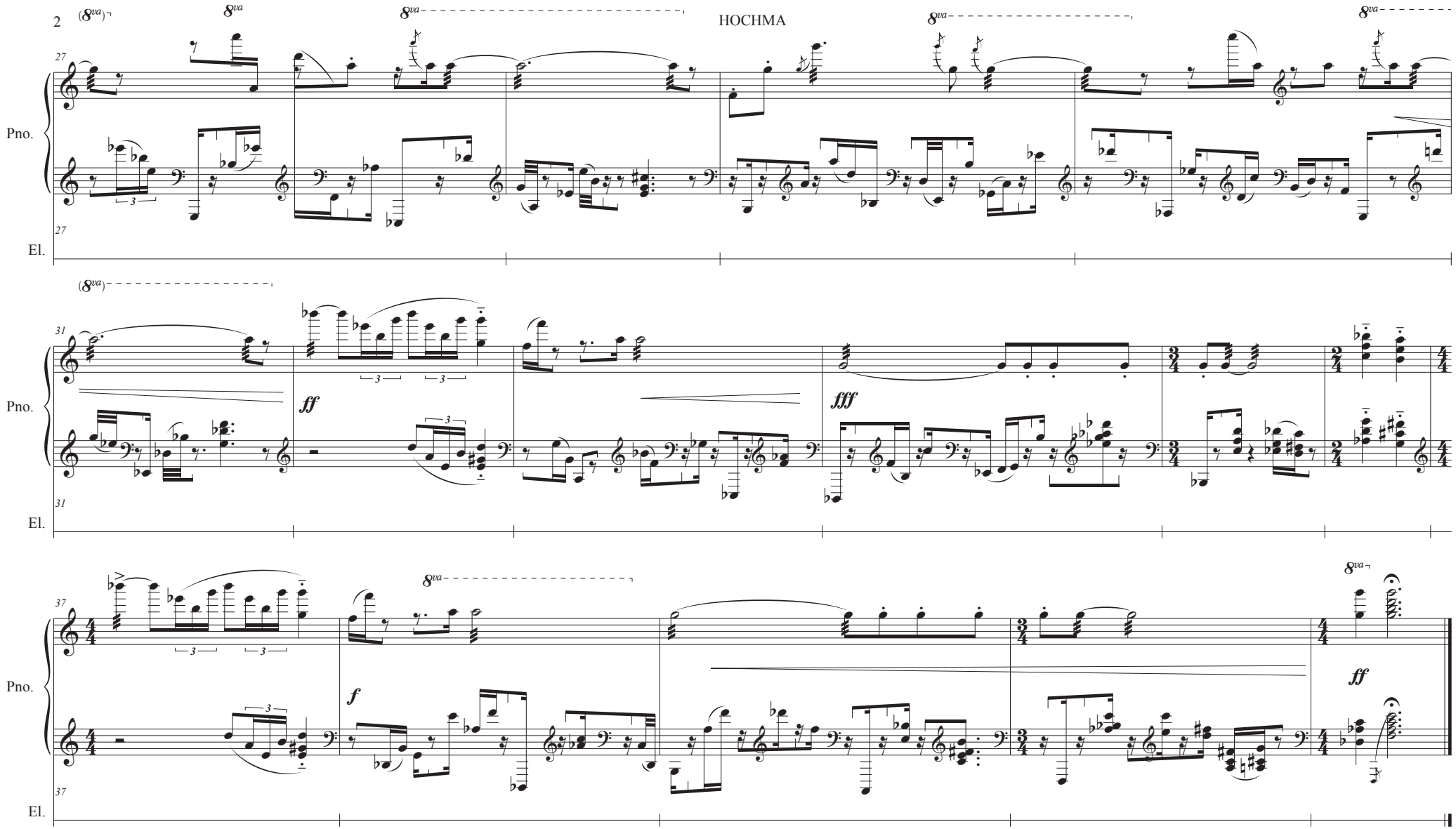
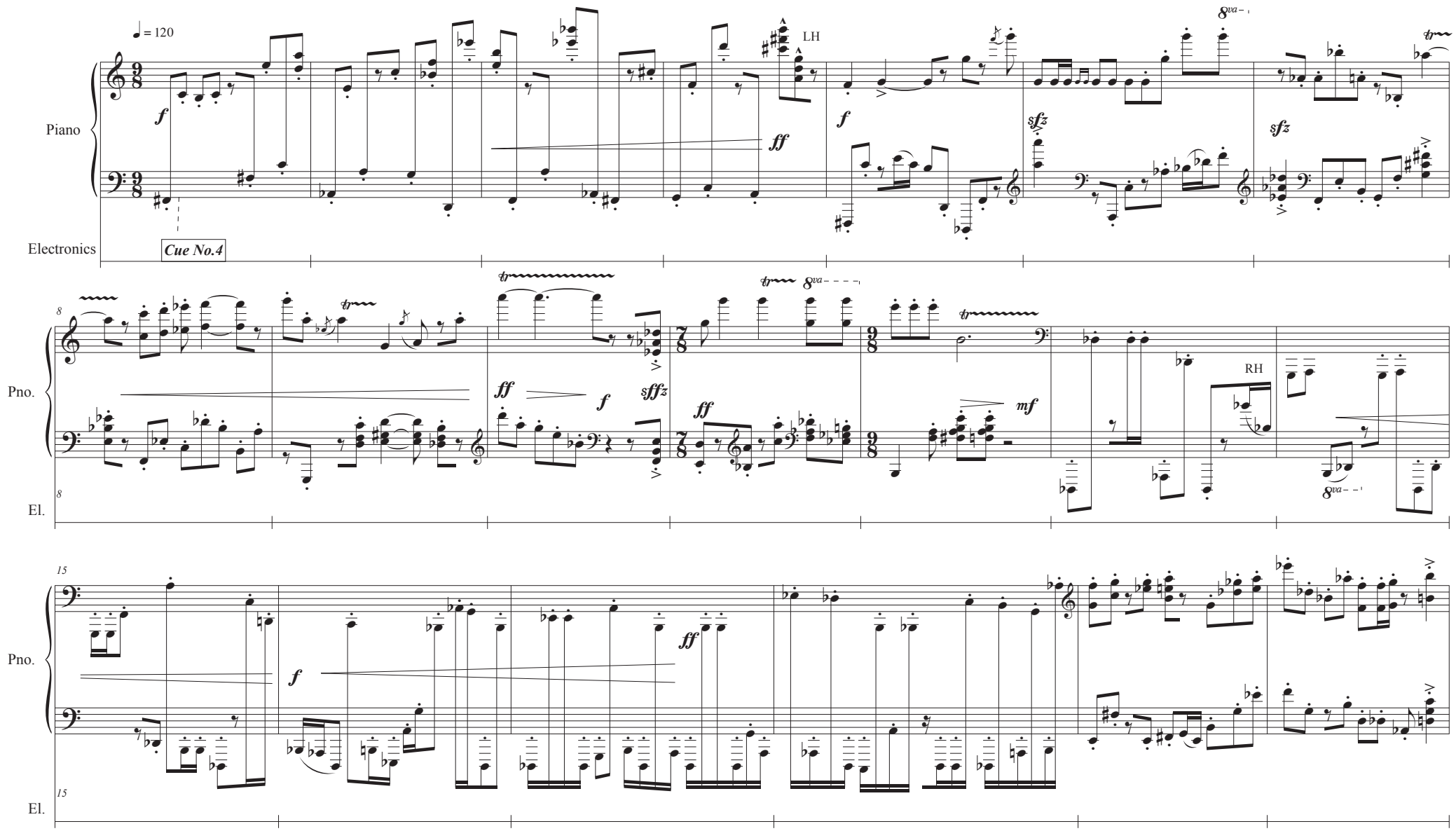

Pno.
El.
27
31
37
8va
(8va)
ff
fff
f

BINA

for

piano and electronics



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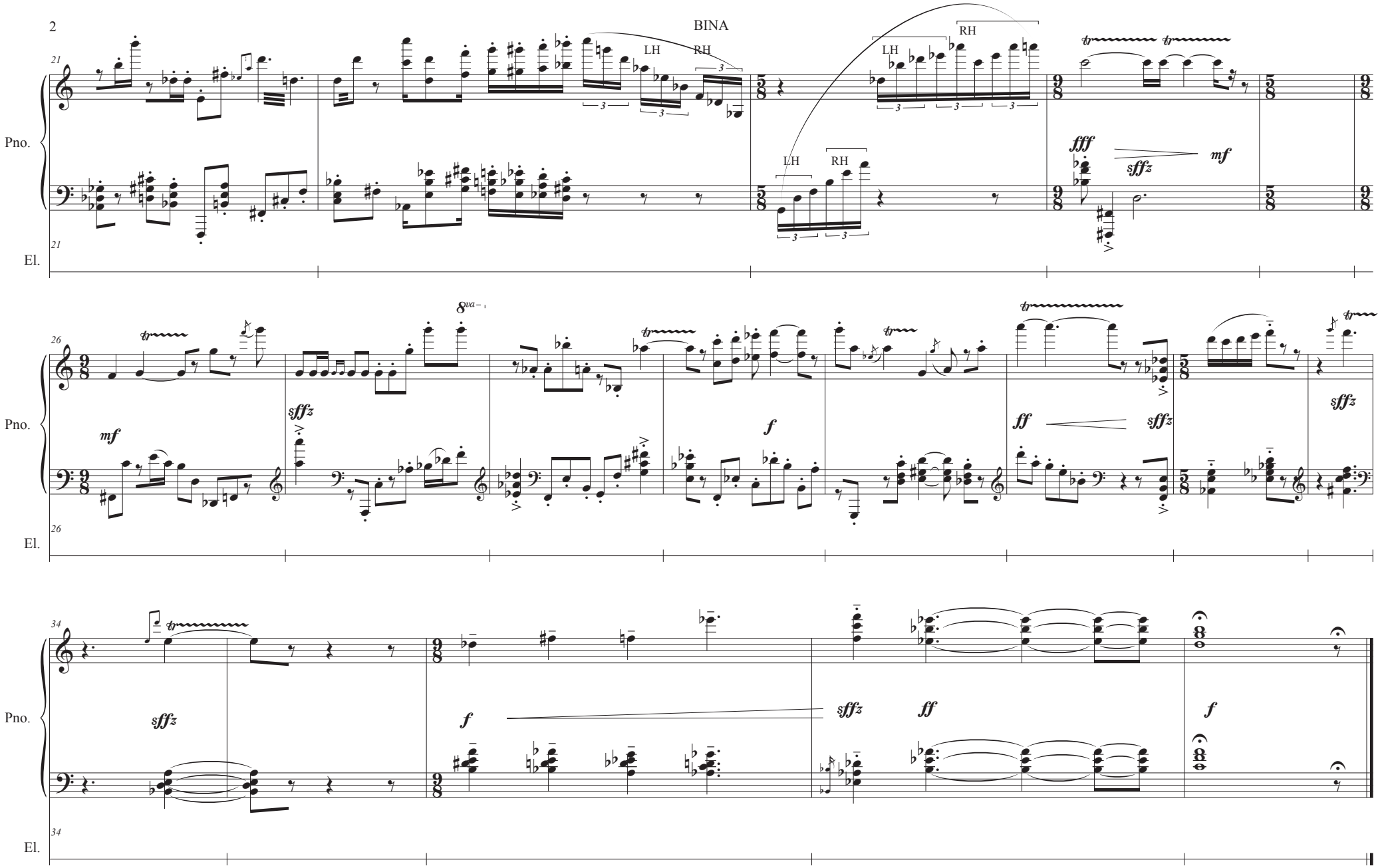
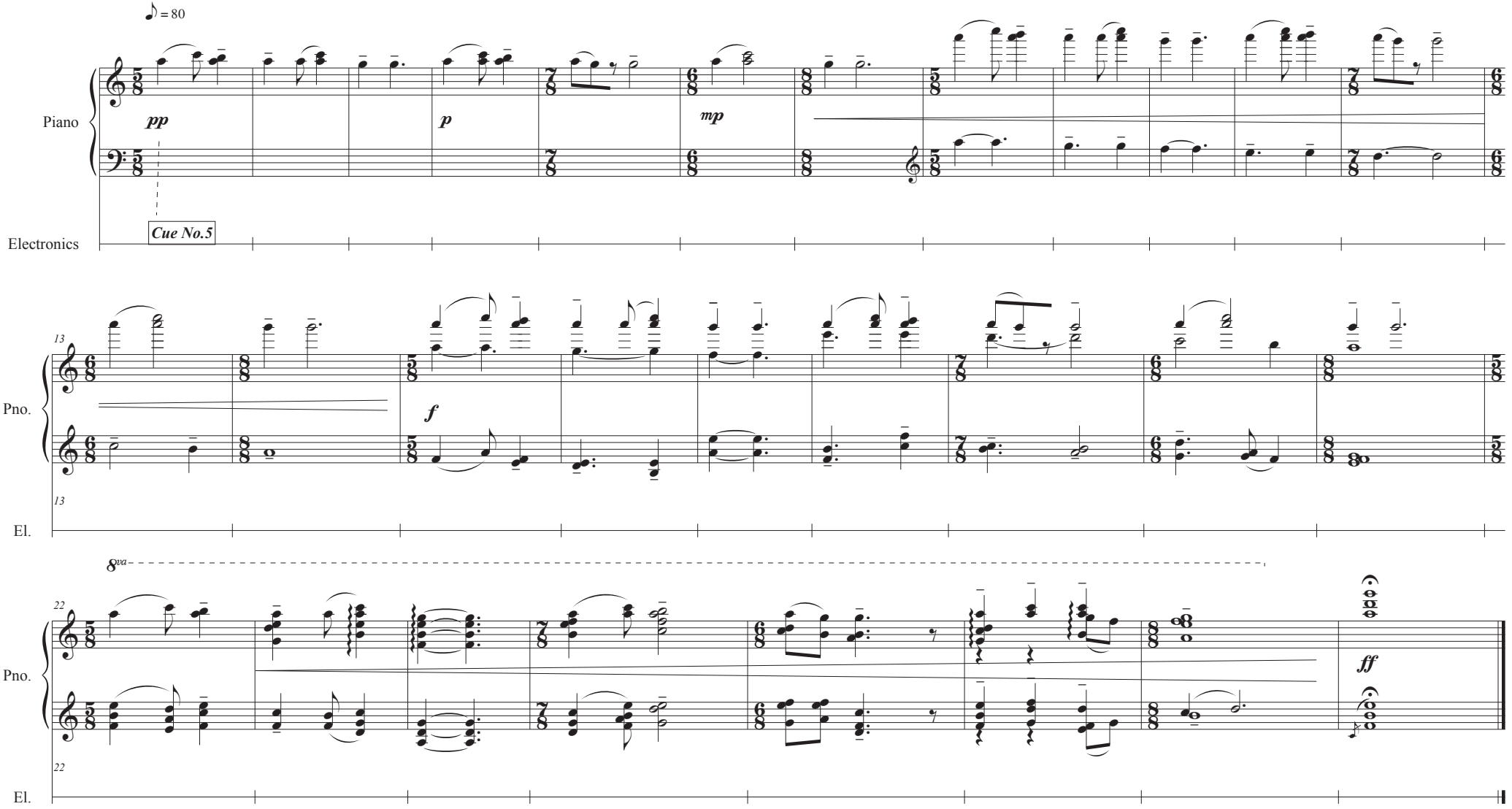

BINA
Pno.
El.
21
LH
RH
fff
sffz
mf
26
8va
mf
f
ff
34

HESED

for

piano and electronics



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GEVURA

for

piano and electronics

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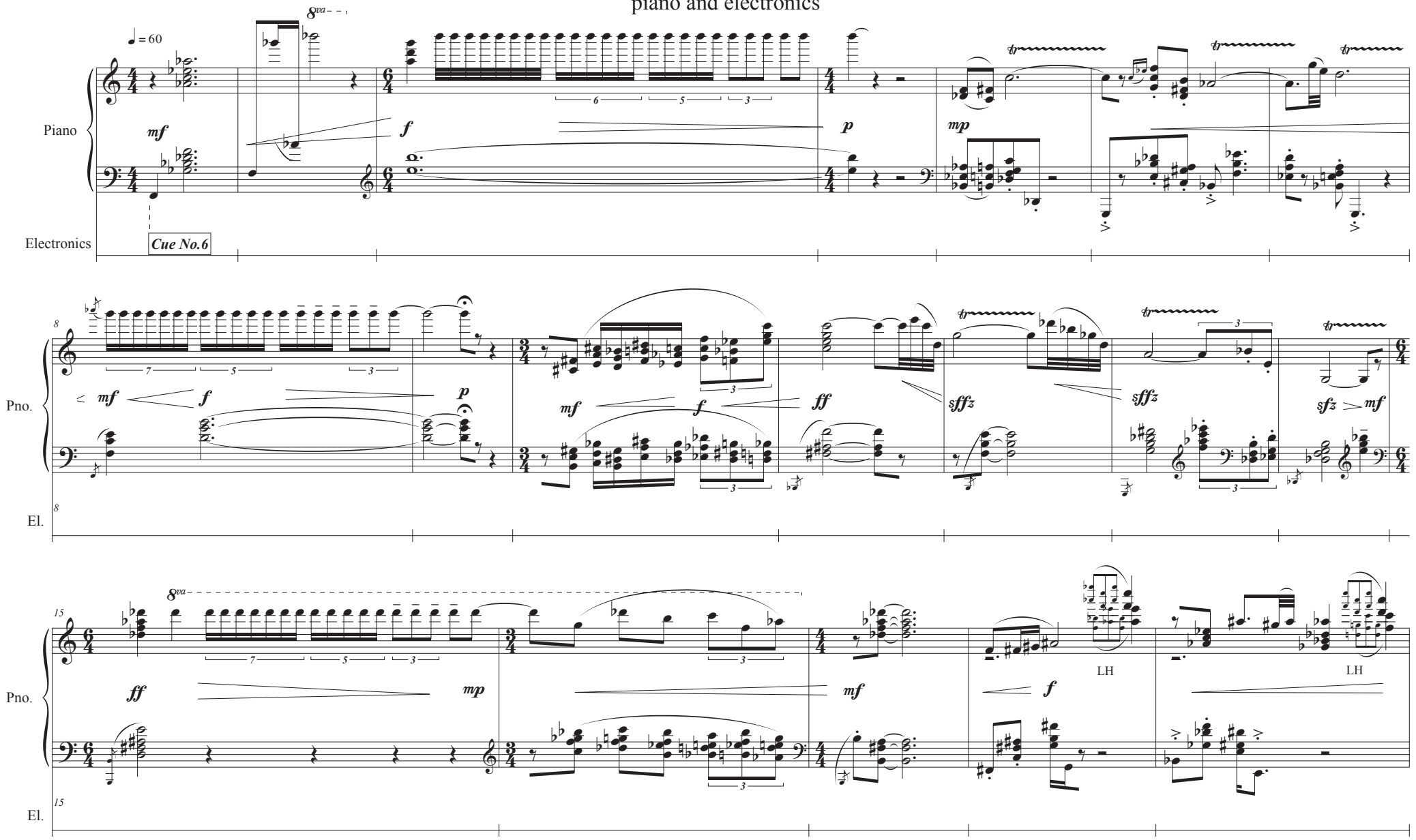

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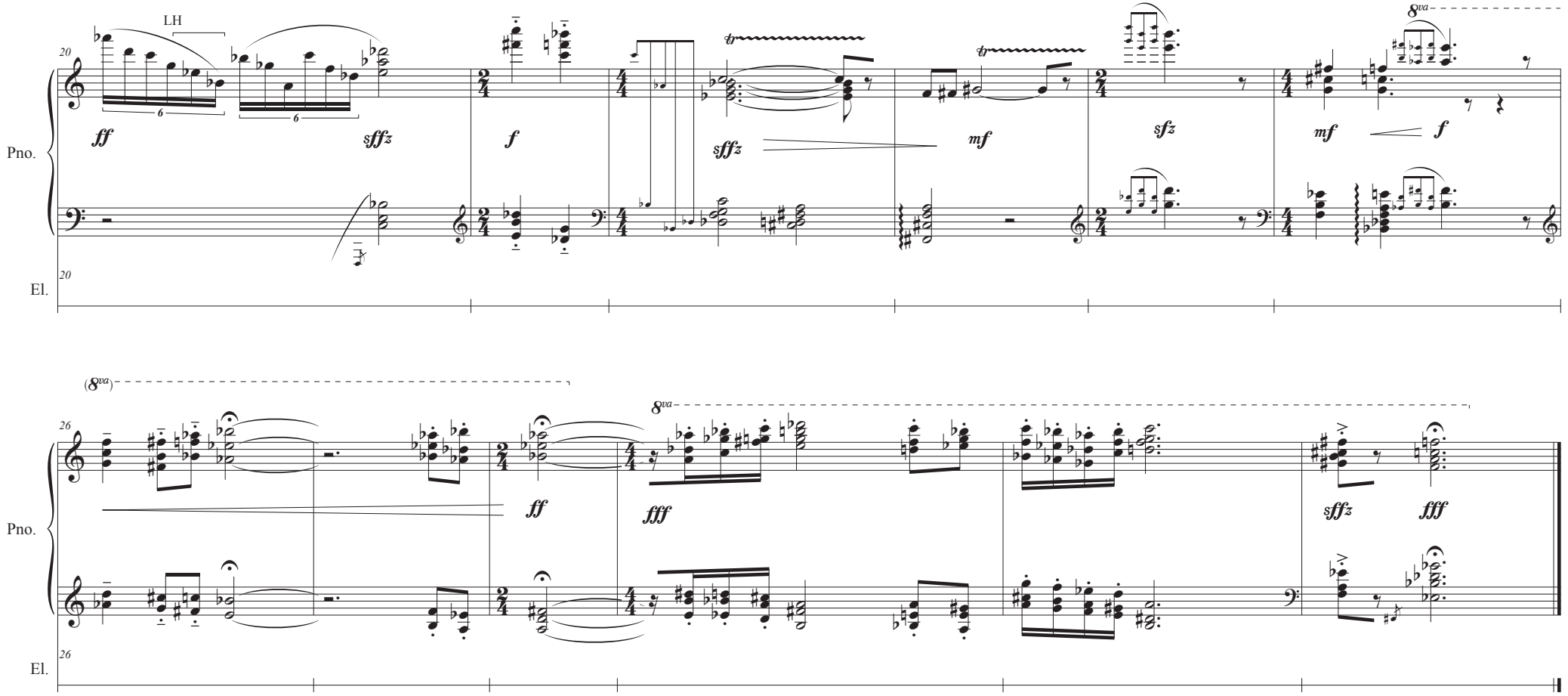
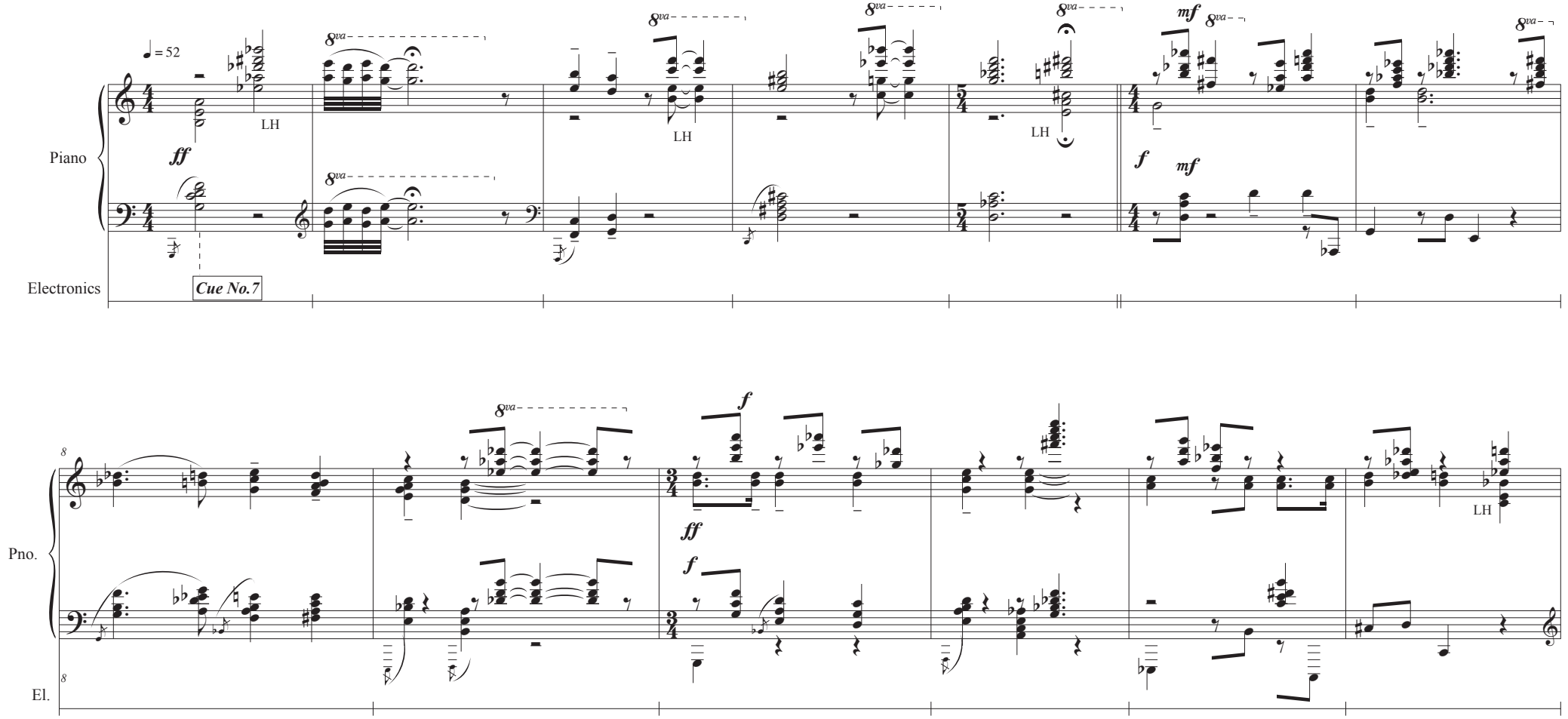

LH
20
Pno.
El.
ff
sffz
f
sffz
mf
sfz
mf
f
8va
(8va)
26
ff
fff
8va
sffz
fff

TIFFERET

for

piano and electronics



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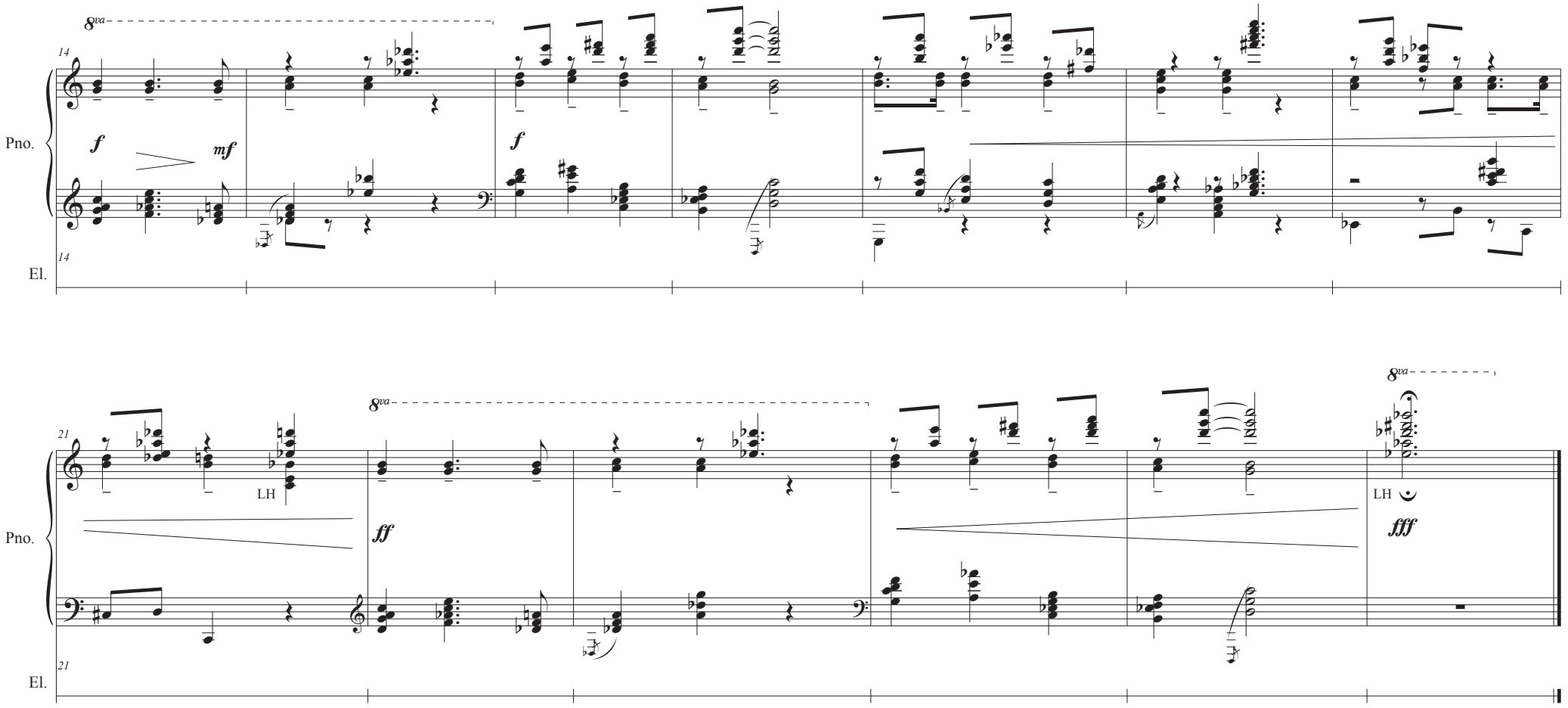
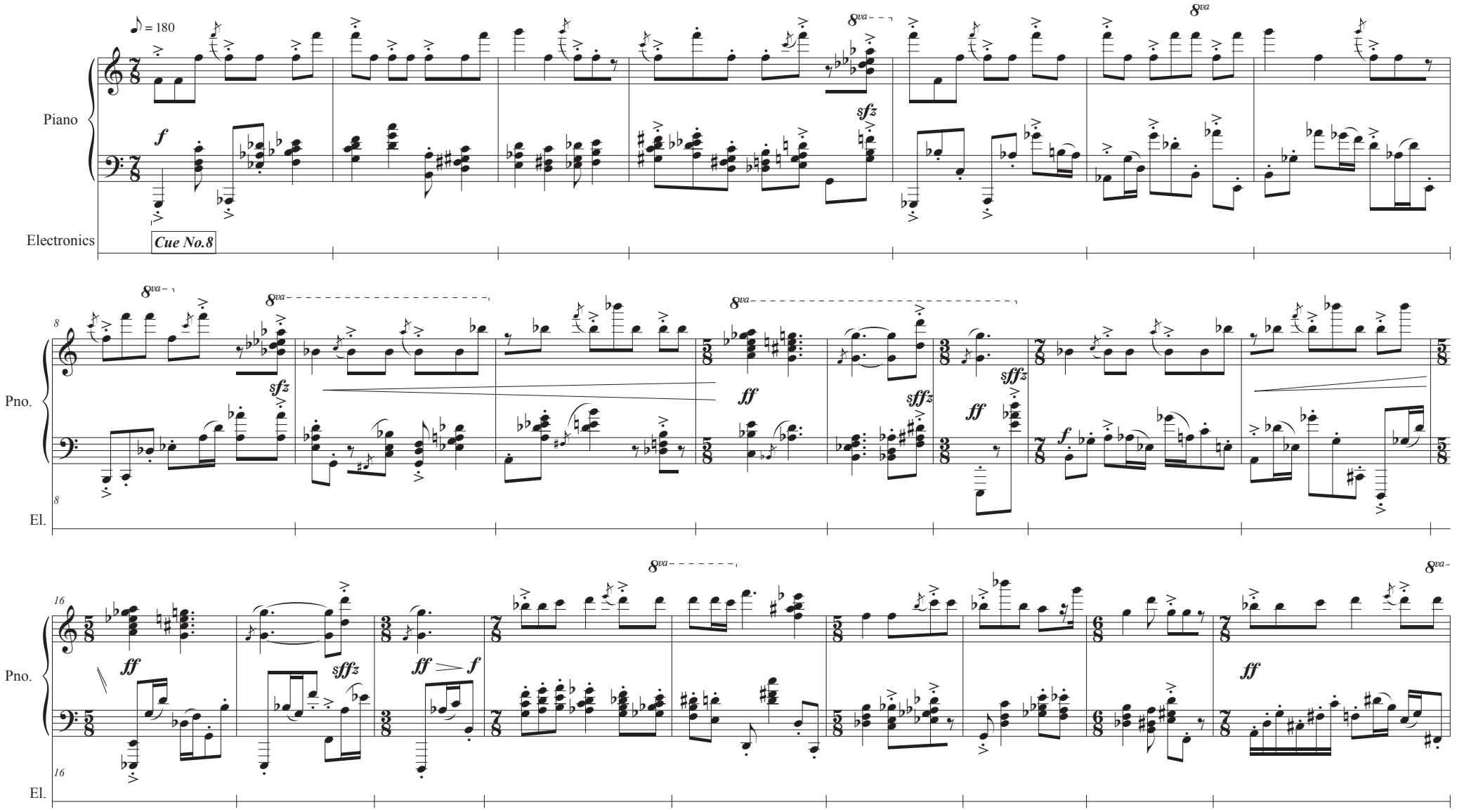

8va
14
Pno.
f
mf
f
14
El.
8va
8va
21
LH
ff
Pno.
LH
fff
21
El.

NETZAH

for

piano and electronics



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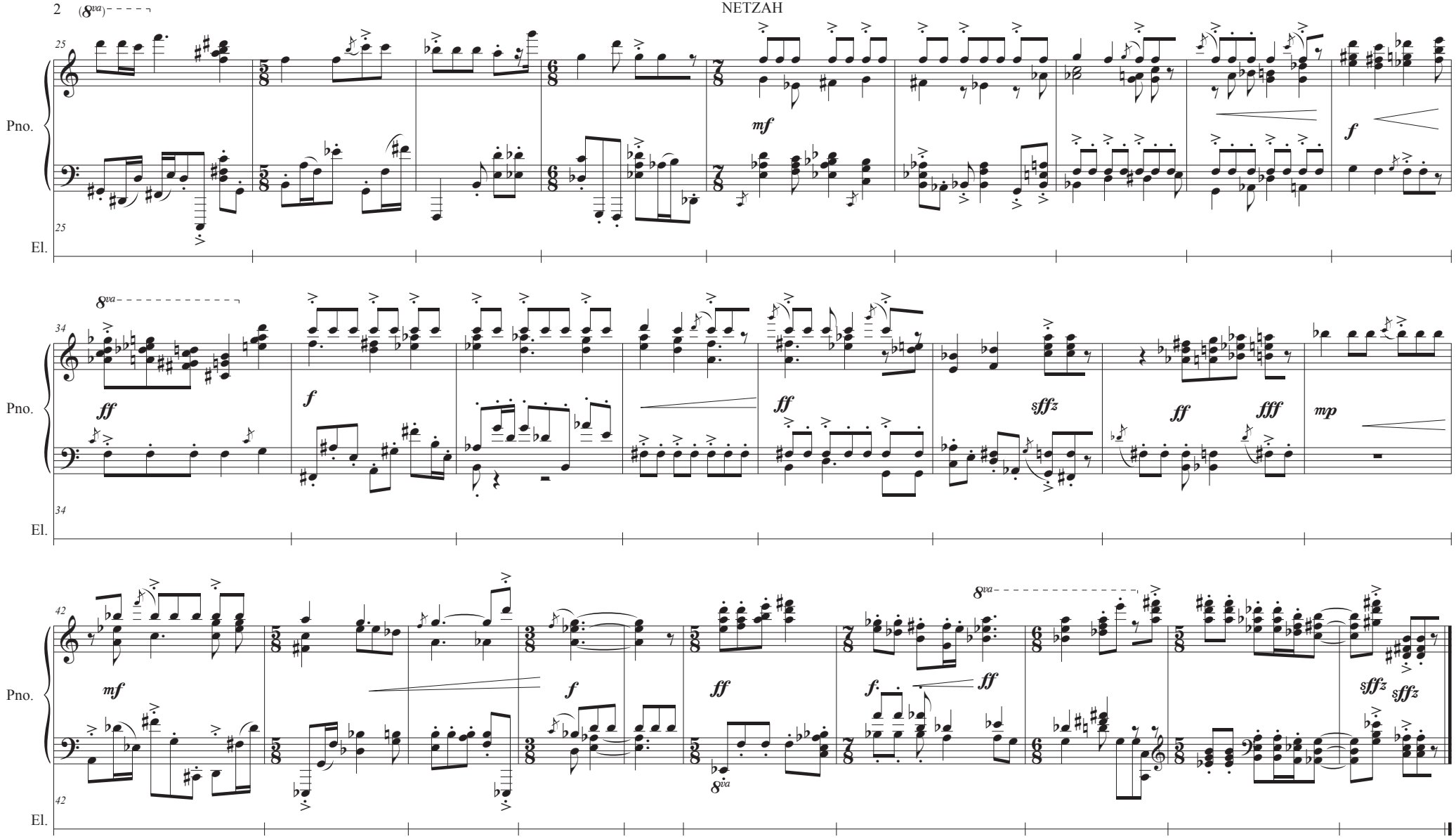
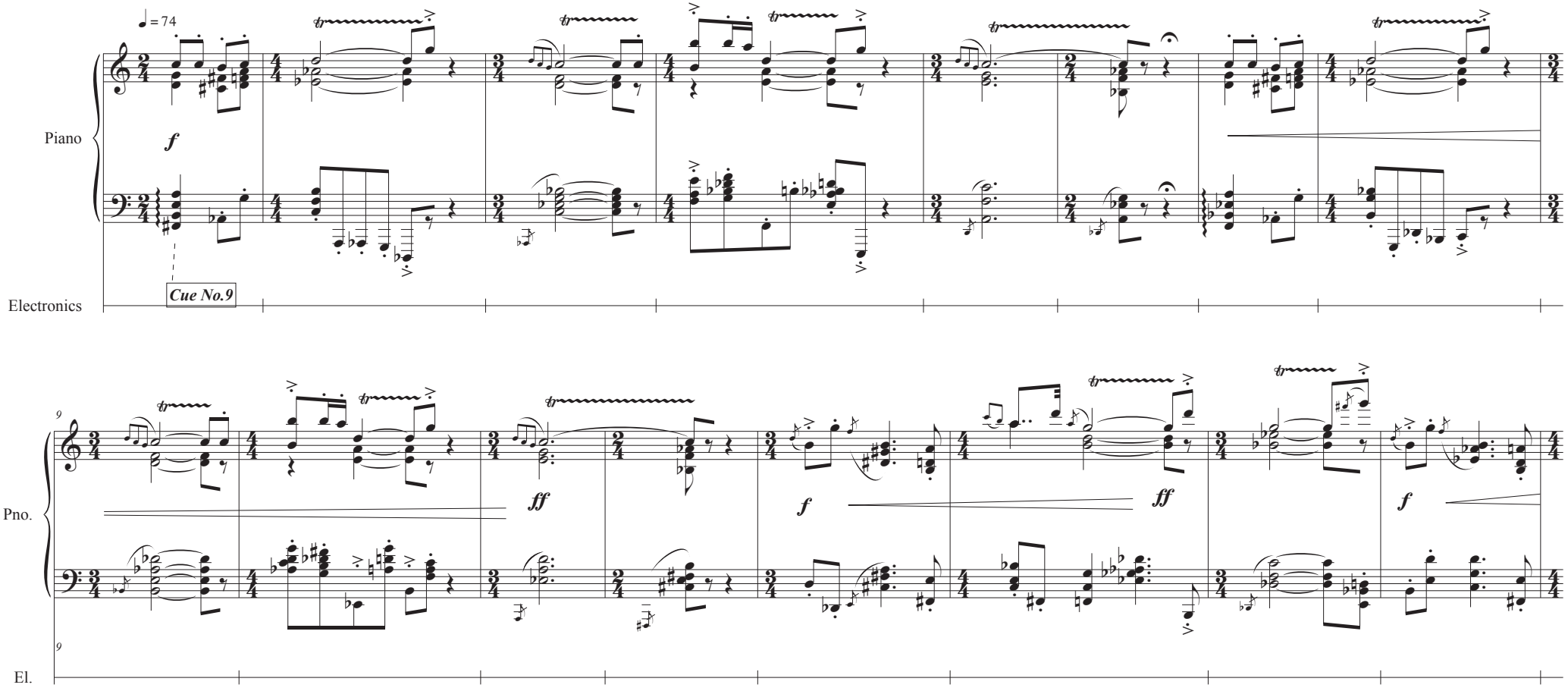

(8va)
Pno.
El.
mf
f
ff
sffz
fff
mp
8va

HOD

for piano and electronics



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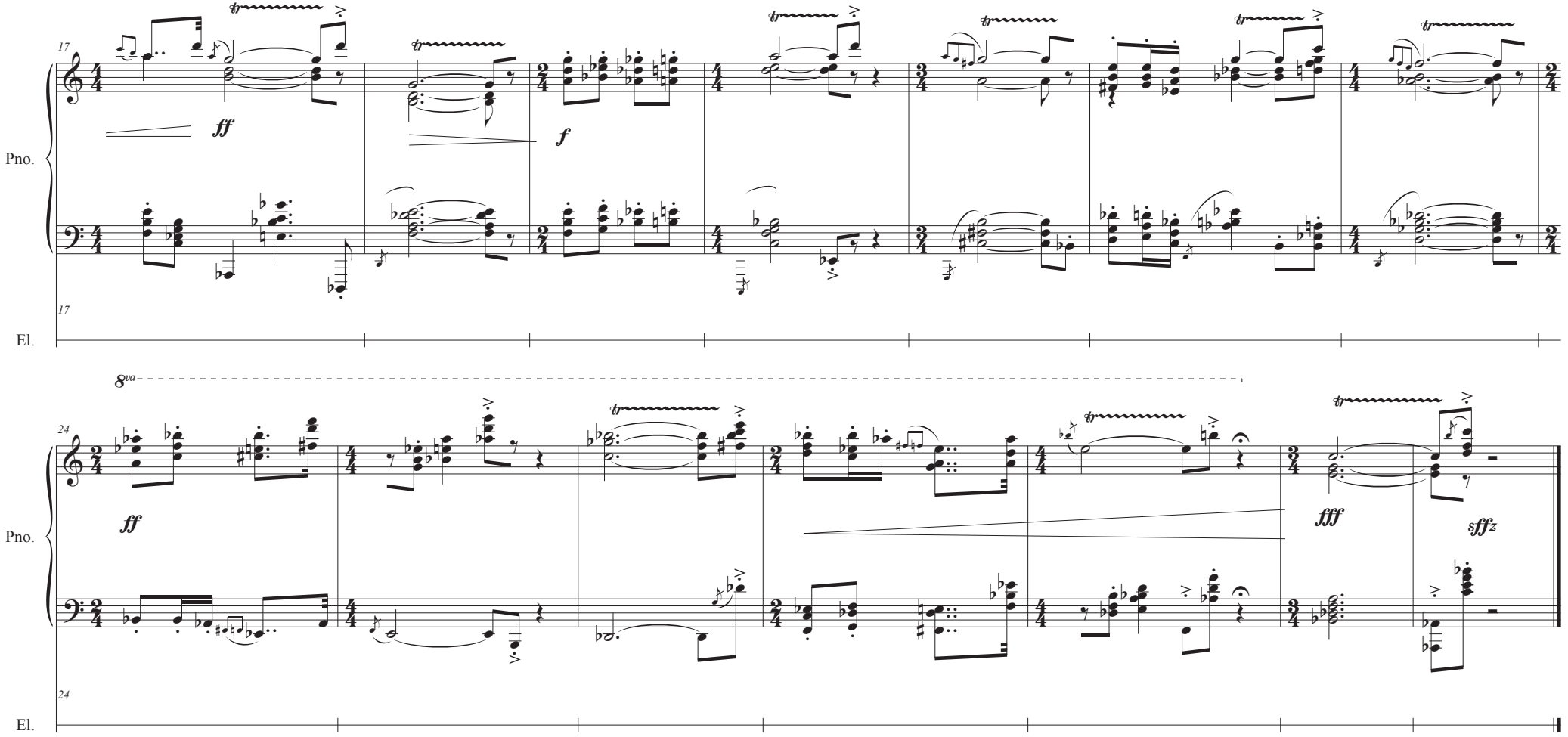
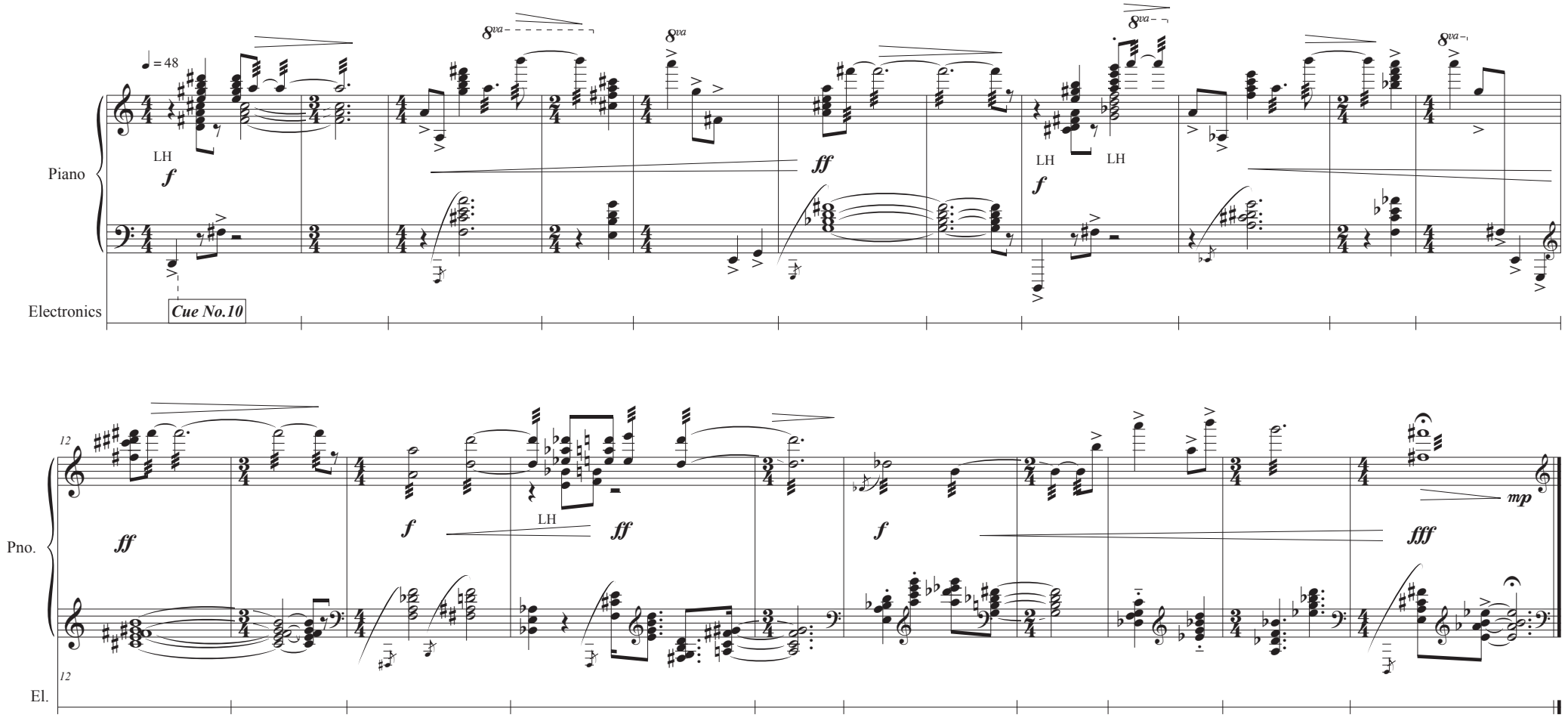

17
Pno.
ff
f
17
El.
8va
24
Pno.
ff
fff
sffz
24
El.

YESOD

for
piano and electronics



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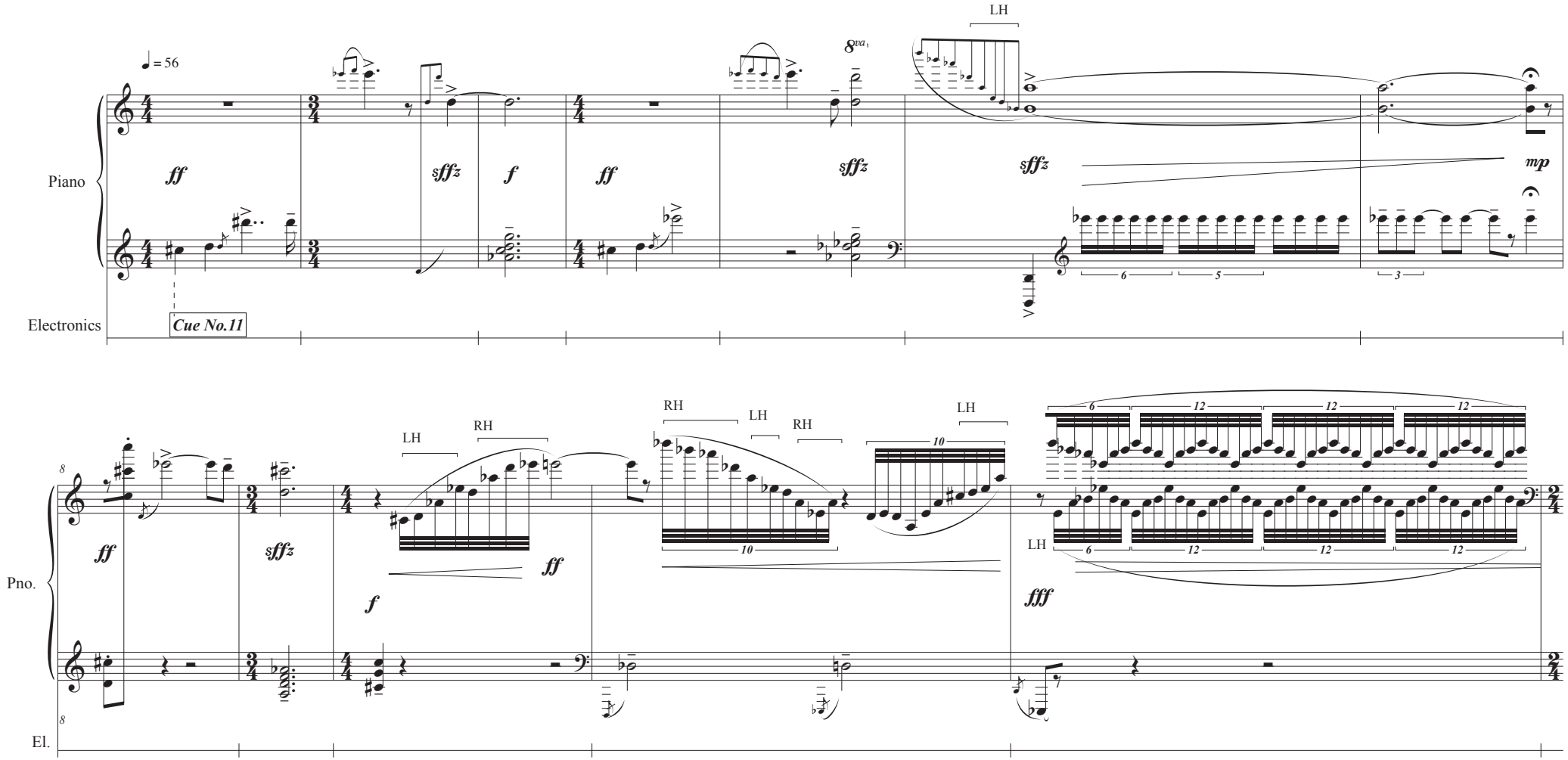
MALCHUT

for

piano and electronics



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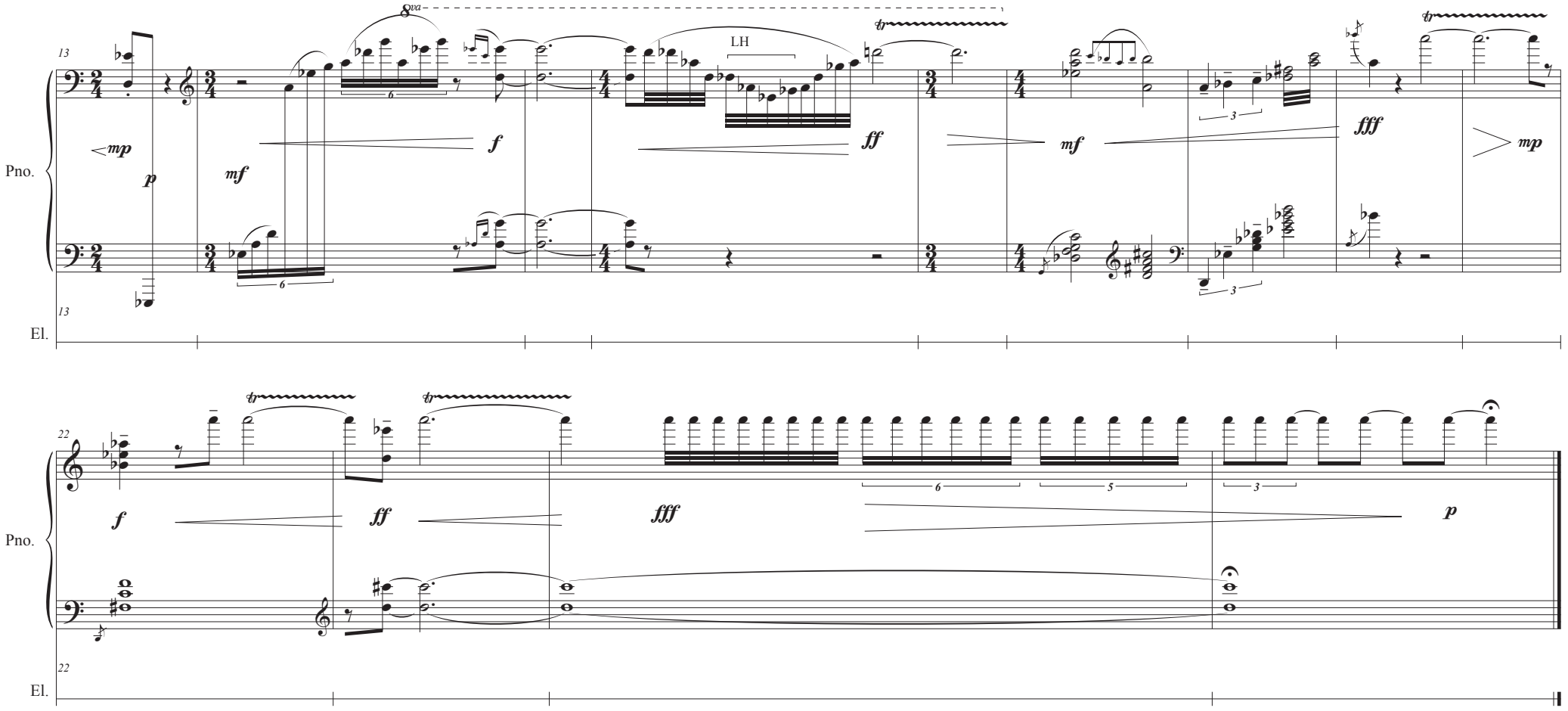
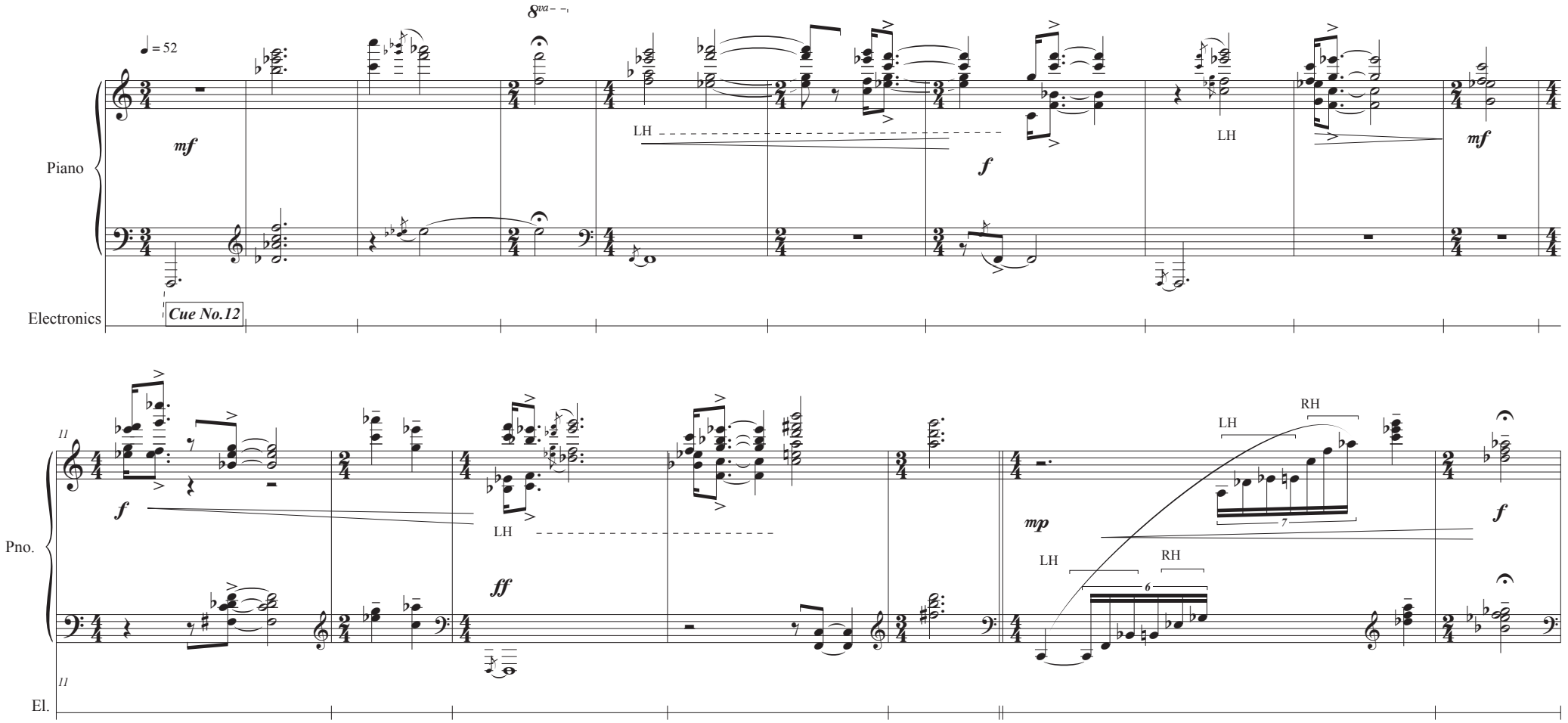

13
Pno.
El.
8va
LH
mp
p
mf
f
ff
mf
fff
mp
22
Pno.
El.
f
ff
fff
p

DAAT

for
piano and electronics



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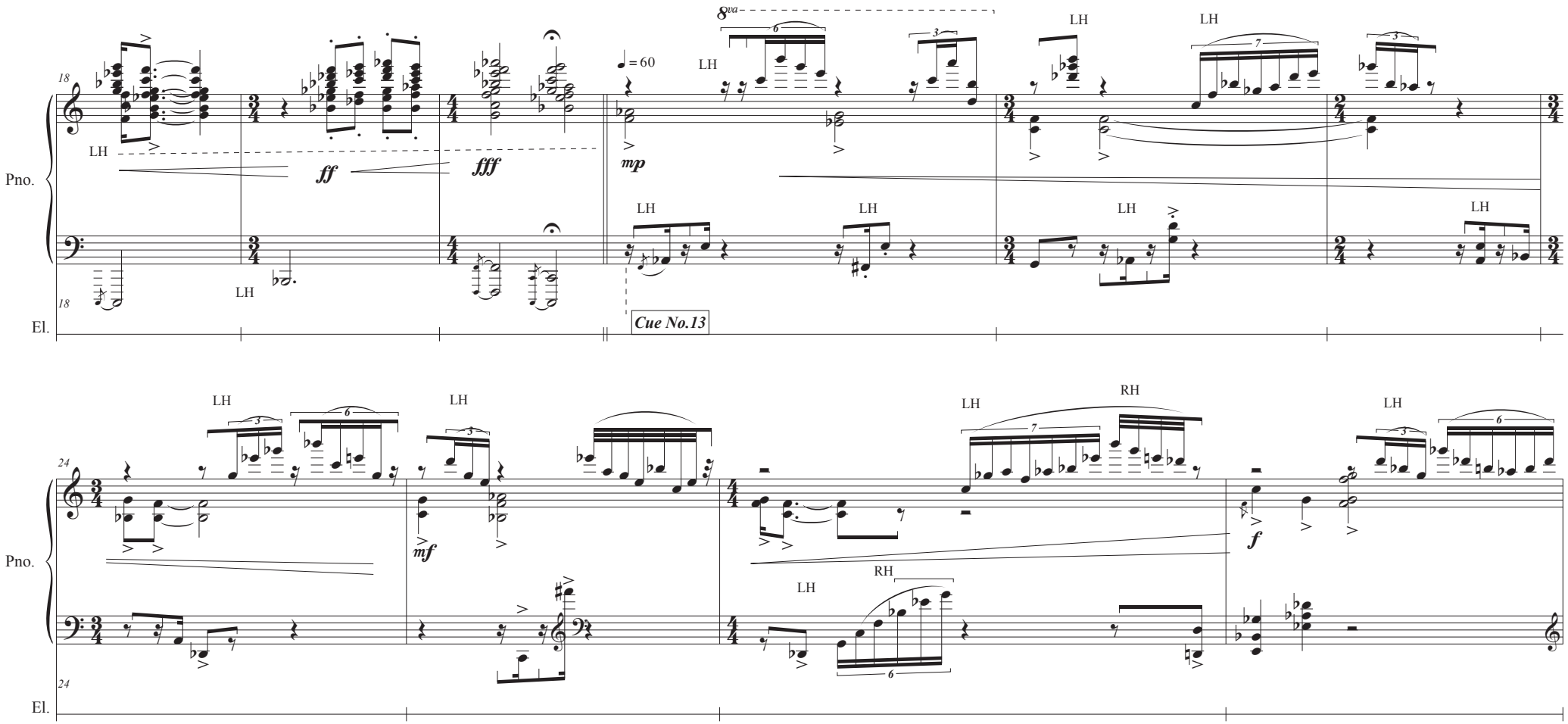
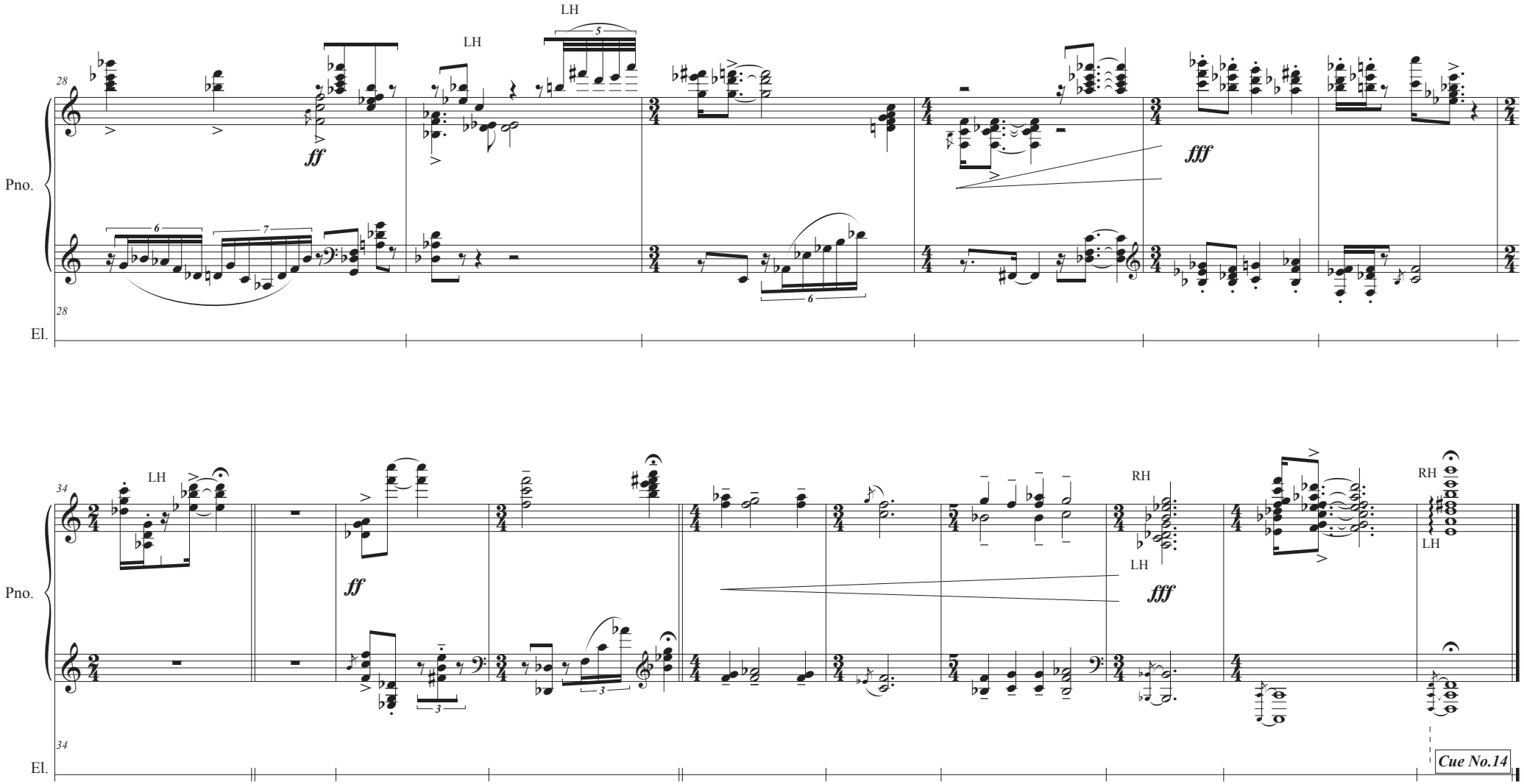

Pno.
El.
LH
ff
fff
mp
8va
♩= 60
Cue No.13
mf
RH
f


28
Pno.
28
El.
LH
LH
LH
ff
fff
34
Pno.
34
El.
LH
ff
RH
LH
fff
RH
LH
Cue No.14