Idin Samimi Mofakham

Crystallum

for

string quartet and electronics

2021

Explanation of signs:

crescendo dal niente

decrescendo al niente

continuous repetition of the given pitches.

rapid rupture of the sound (on pages 10 and 13)

Bowing:

At each entrance, bowing should be as slow as possible, while repeating the same pitch, the speed of bowing should varied between slow and very fast, never in sync with others.

Technical equipment required:

- Four contact microphones for the amplification of each instrument
- a quadraphonic sound spatialization system

Amplification:

All four instruments should be amplified, and their sound should be defused into the playback system, including the fixed media material. If needed, a moderate reverb considering the size of the room should be added.

Tuning:

When tuning the strings of instruments, please take time to obtain clear, resonant, and beatless pure Pythagorean fifths, so the pitches of the open strings would be (from highest) : **E +2¢, A +0, D -2¢, G -4¢, C -6¢,** (Pythagorean tuning), considering that my music, is based on them. The concert pitch note for this piece is A4 = 442 Hz.

Duration: 12 minutes

The Helmholtz-Ellis JI Pitch Notation (HEJI) | 2020 | LEGEND

revised by Marc Sabat and Thomas Nicholson | PLAINSOUND MUSIC EDITION | www.plainsound.org

in collaboration with Wolfgang von Schweinitz, Catherine Lamb, and M.O. Abbott, building upon the original HEJI notation devised by Marc Sabat and Wolfgang von Schweinitz in the early 2000s

PYTHAGOREAN JUST INTONATION | generated by multiplying / dividing an arbitrary reference frequency by PRIMES 2 and 3 only

… 𝄫 ♭ ♮ ♯ 𝄪 …

*notate a series of **perfect fifths** above / below a reference* — $^{3}/_{2} \approx \pm 702.0$ cents *(ca. 2c wider than tempered)*
each new accidental therefore represents 7 fifths, altering by one apotome — $^{2187}/_{2048} \approx \pm 113.7$ cents

Frequency ratios including higher prime numbers (5–47) may be precisely written by adding the following distinct accidental symbols. Custom indications for higher primes or various enharmonic substitutions may be invented as needed by simply defining further symbols representing the relevant ratio alterations.

PTOLEMAIC JUST INTONATION | PRIMES up to 5

*includes the consonant **just major third*** — $^{5}/_{4} \approx \pm 386.3$ cents *(ca. 14c narrower than tempered)*

alteration by one syntonic comma — $^{81}/_{80} \approx \pm 21.5$ cents

alteration by two syntonic commas — $^{81}/_{80} \cdot {}^{81}/_{80} \approx \pm 43.0$ cents

~♯ = ♭ ~♭ = ♯

alteration by one schisma to notate an exact enharmonic substitution — $^{32805}/_{32768} \approx \pm 2.0$ cents

SEPTIMAL JI | PRIME 7

*includes the consonant **natural seventh*** — $^{7}/_{4} \approx \pm 968.8$ cents *(ca. 31c narrower than tempered)*

alteration by one septimal comma — $^{64}/_{63} \approx \pm 27.3$ cents *(Giuseppe Tartini)*

alteration by two septimal commas — $^{64}/_{63} \cdot {}^{64}/_{63} \approx \pm 54.5$ cents

UNDECIMAL | PRIME 11

*includes the **undecimal semi-augmented fourth*** — $^{11}/_{8} \approx \pm 551.3$ cents *(ca. 51c wider than tempered)*

alteration by one undecimal quartertone — $^{33}/_{32} \approx \pm 53.3$ cents *(Richard H. Stein)*

TRIDECIMAL | PRIME 13

*includes the **tridecimal neutral sixth*** — $^{13}/_{8} \approx \pm 840.5$ cents *(ca. 41c wider than a tempered minor sixth)*

alteration by one tridecimal thirdtone — $^{27}/_{26} \approx \pm 65.3$ cents *(Gérard Grisey)*

HIGHER PRIMES 17 – 47

alteration by one 17-limit schisma — $^{2187}/_{2176} \approx \pm 8.7$ cents

alteration by one 19-limit schisma — $^{513}/_{512} \approx \pm 3.4$ cents

alteration by one 23-limit comma — $^{736}/_{729} \approx \pm 16.5$ cents *(James Tenney / John Cage)*

alteration by one 29-limit sixthtone — $^{261}/_{256} \approx \pm 33.5$ cents

alteration by one 31-limit quartertone — $^{32}/_{31} \approx \pm 55.0$ cents *(Alinaghi Vaziri)*

alteration by one 37-limit quartertone — $^{37}/_{36} \approx \pm 47.4$ cents *(Ivan Wyschnegradsky)*

alteration by one 41-limit comma — $^{82}/_{81} \approx \pm 21.2$ cents *(Ben Johnston)*

alteration by one 43-limit comma — $^{129}/_{128} \approx \pm 13.5$ cents

alteration by one 47-limit quartertone — $^{752}/_{729} \approx \pm 53.8$ cents

CENTS HEJI accidentals may be combined with an indication of their deviation in cents from equal temperament as read on a tuning meter; A♮ 440 Hz is usually defined to be ±0 cents. If this deviation exceeds ±50 cents, the nearest tempered pitch-class may be added: e.g. A𝄳 (−65 cents from A♮) could include the annotation A♭+35 placed above or below its accidental.

TEMPERED NOTES | may be combined with cents deviations to notate free microtonal pitches

… 𝄫 ♭ 𝄳 ♮ 𝄲 ♯ 𝄪 …

indicate the respective equal tempered quartertone; show which pitch is assigned a deviation of 0c

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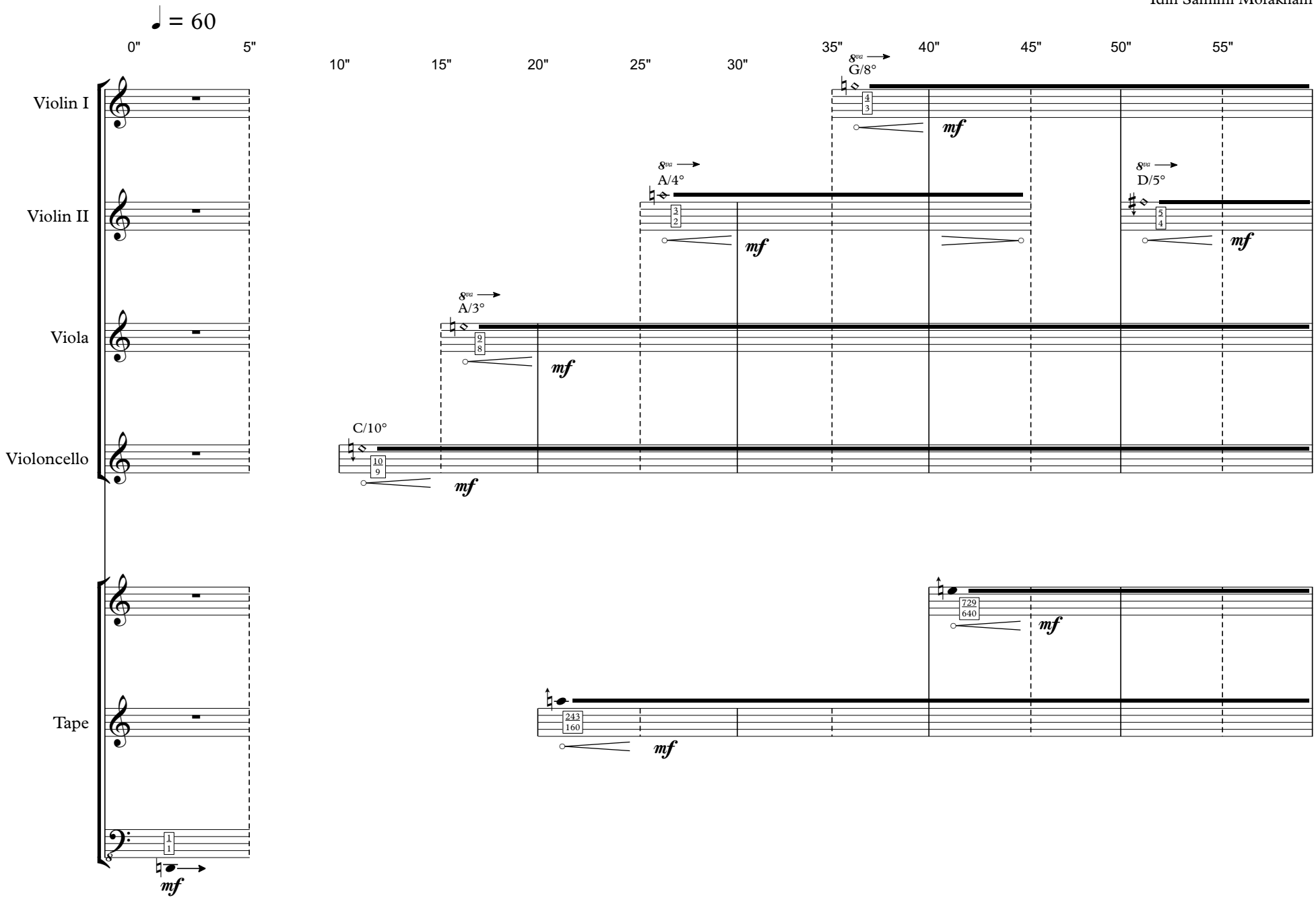

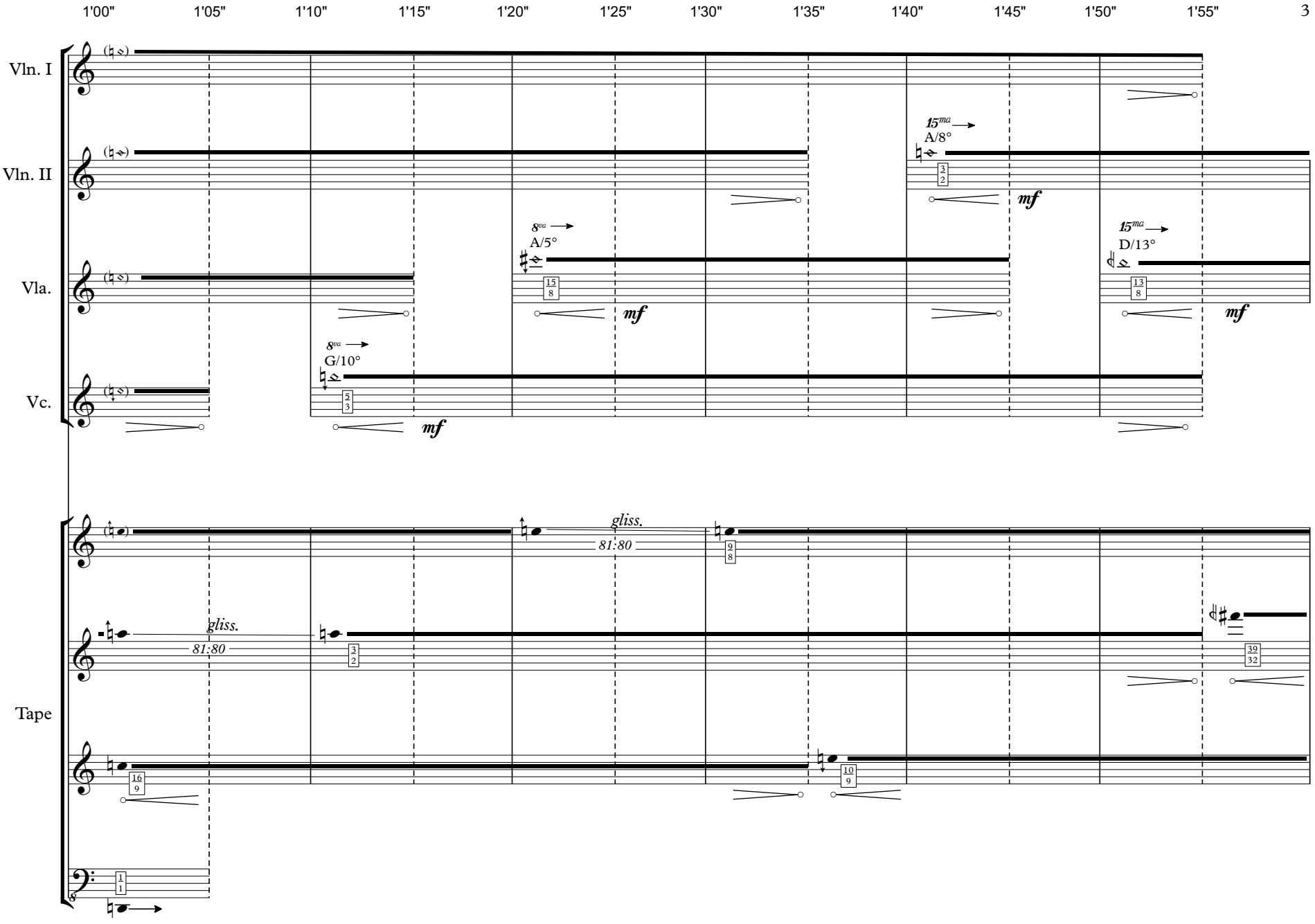
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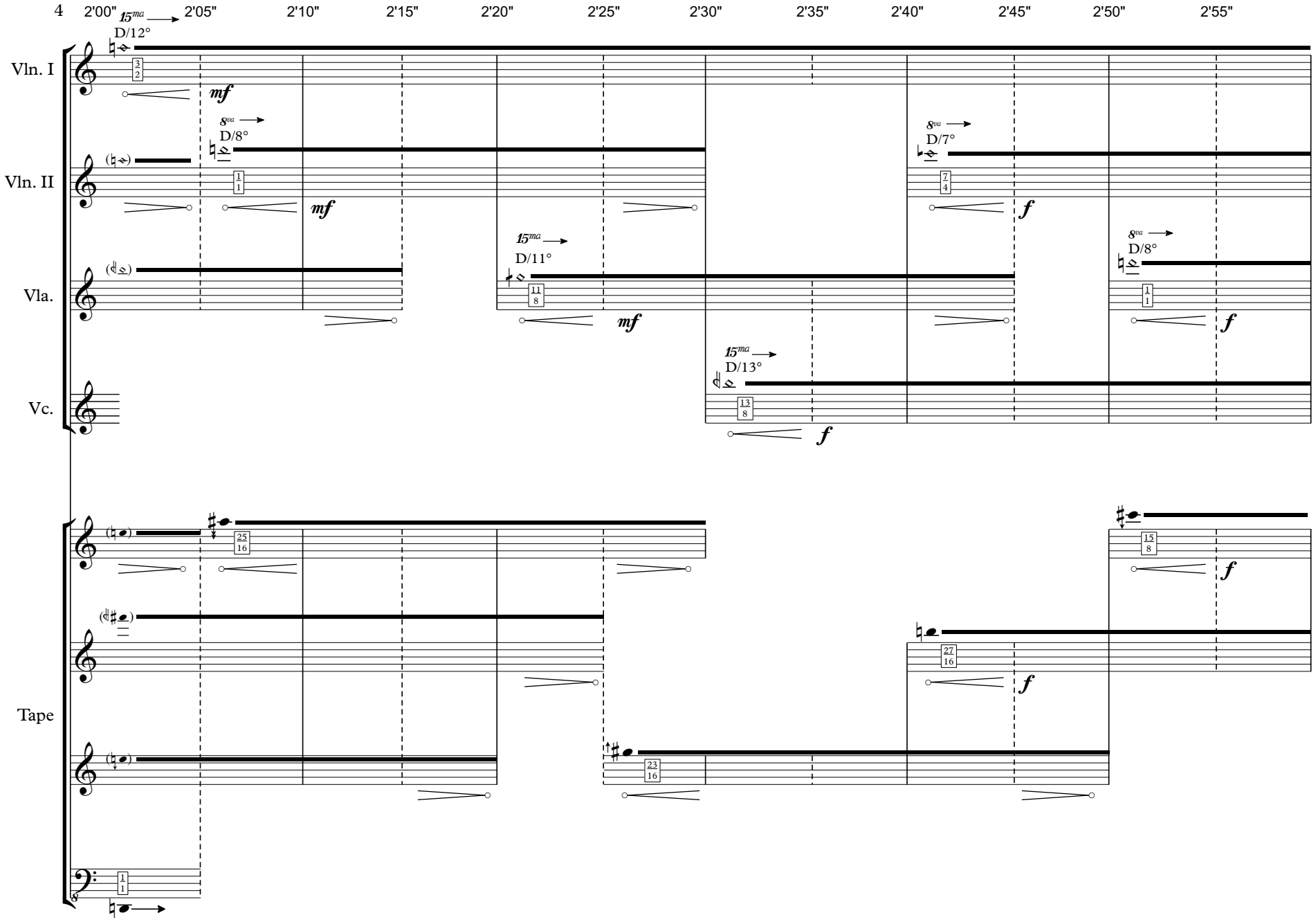
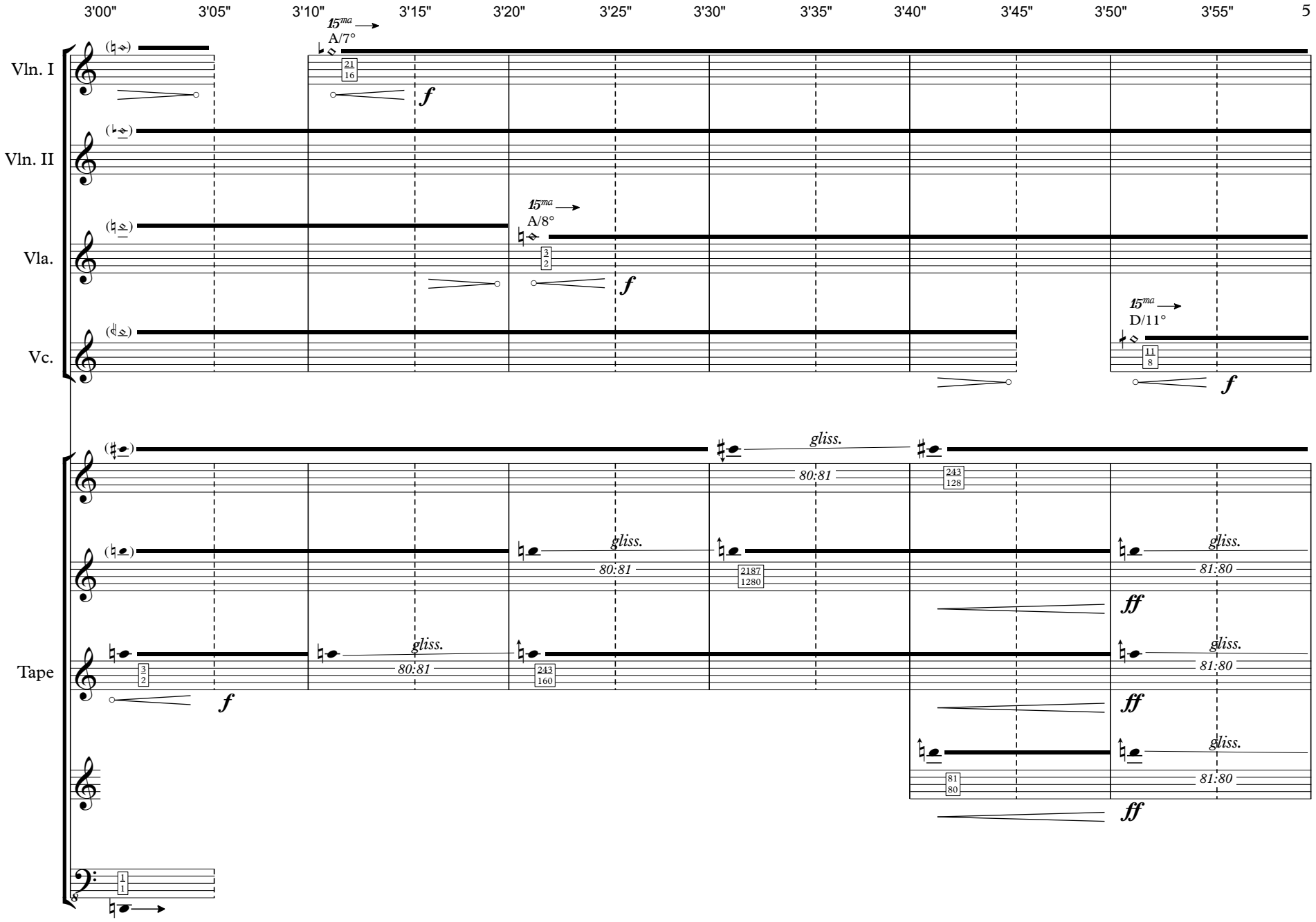
1'15"
1'20"
1'25"
1'30"
1'35"
1'40"
1'45"
1'50"
1'55"
Vln. I
Vln. II
Vla.
Vc.
Tape
15ma
A/8°
mf
8va
A/5°
mf
15ma
D/13°
mf
8va
G/10°
mf
gliss.
81:80
gliss.
81:80


2'00"
15ma
2'05"
2'10"
2'15"
2'20"
2'25"
2'30"
2'35"
2'40"
2'45"
2'50"
2'55"
D/12°
Vln. I
mf
8va
D/8°
Vln. II
mf
15ma
D/11°
Vla.
mf
8va
D/7°
f
8va
D/8°
f
15ma
D/13°
Vc.
f
Tape
f
f
f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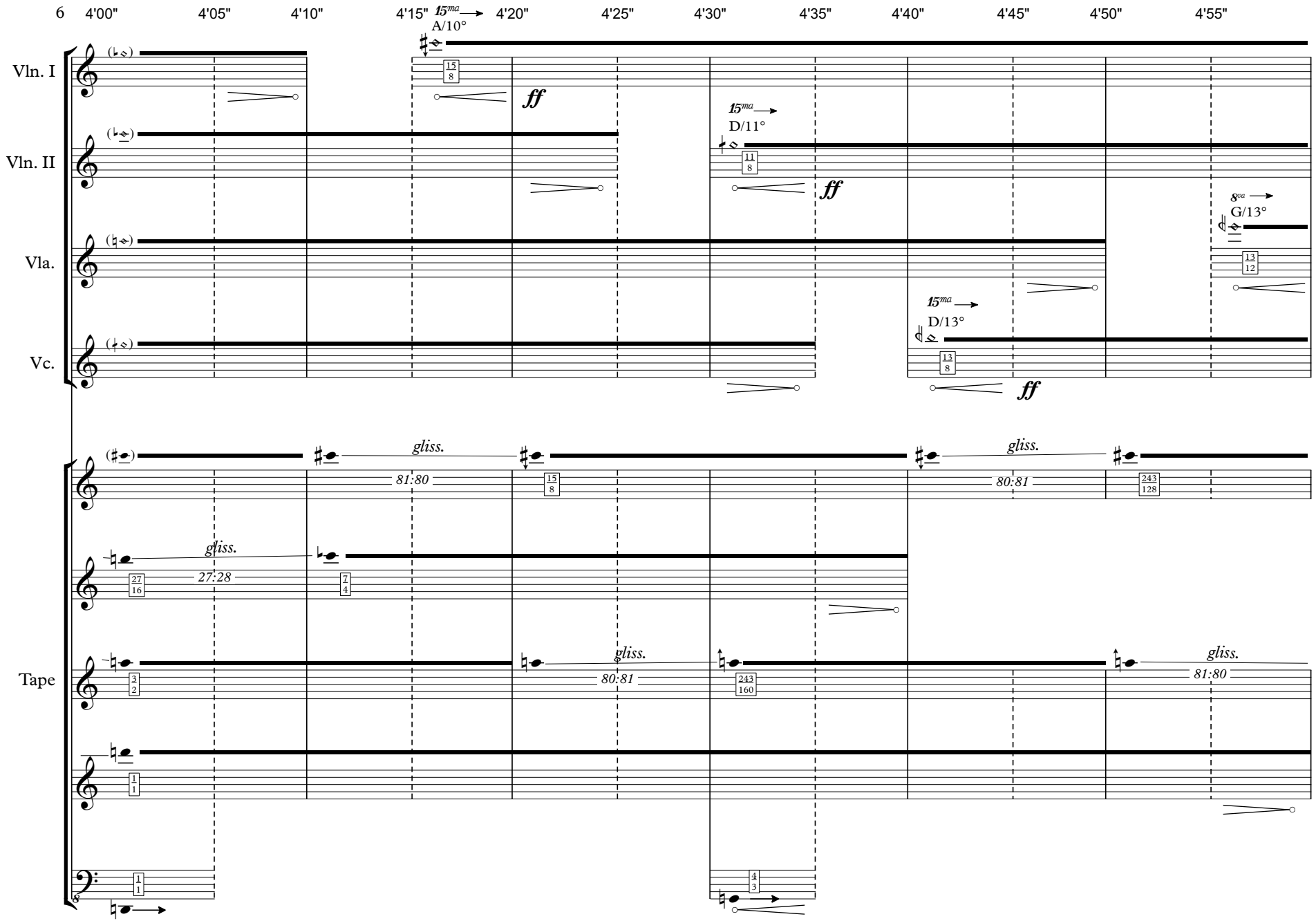
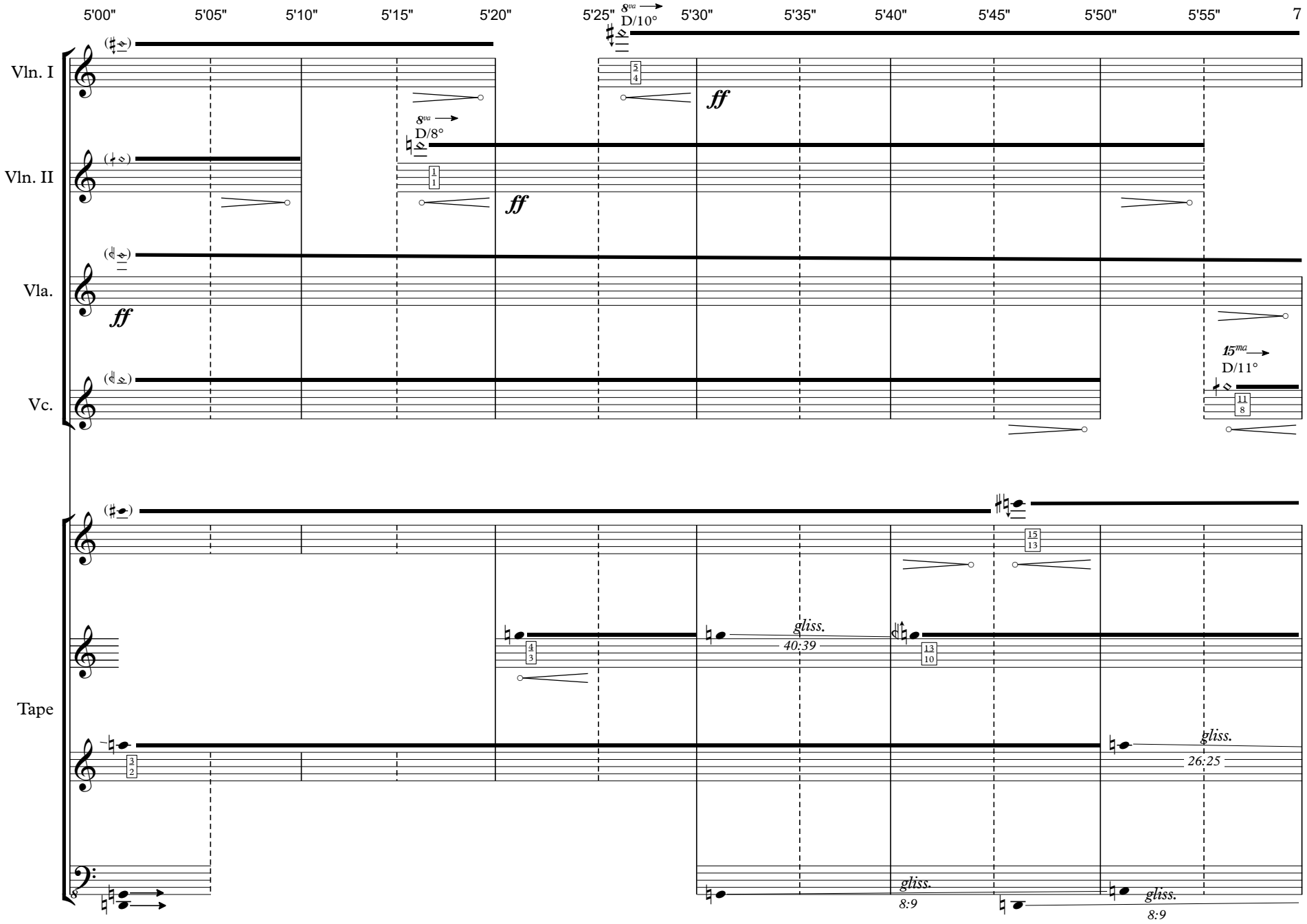
3'50"
3'55"
Vln. I
Vln. II
Vla.
Vc.
Tape
15ma
A/7°
A/8°
D/11°
f
ff
gliss.
80:81
81:80


6
4'00"
4'05"
4'10"
4'15"
15ma
A/10°
4'20"
4'25"
4'30"
4'35"
4'40"
4'45"
4'50"
4'55"
Vln. I
Vln. II
Vla.
Vc.
Tape
ff
15ma
D/11°
ff
8va
G/13°
15ma
D/13°
ff
gliss.
81:80
gliss.
80:81
gliss.
27:28
gliss.
80:81
gliss.
81:80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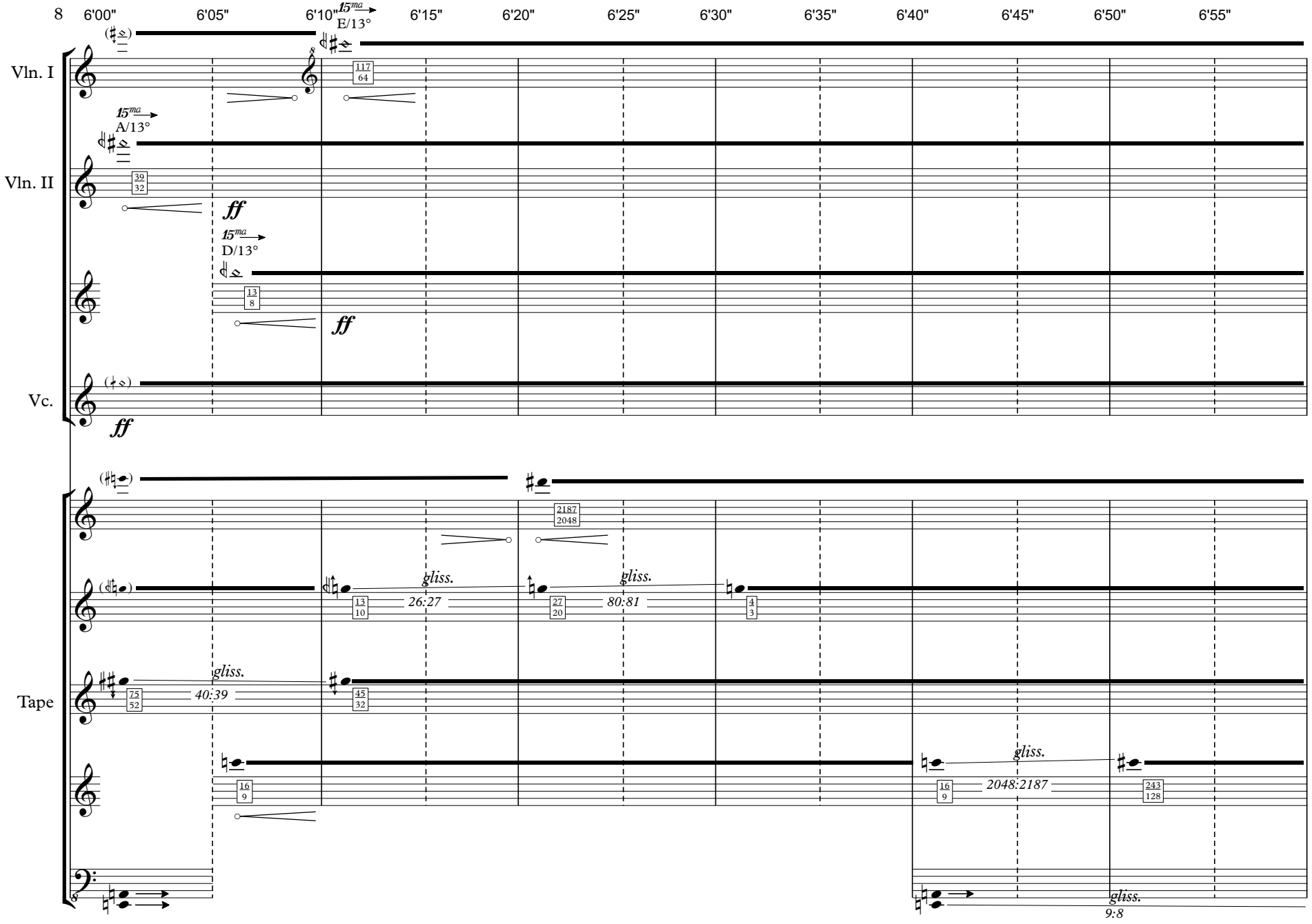
5'45"
5'50"
5'55"
Vln. I
Vln. II
Vla.
Vc.
Tape
8va
D/10°
8va
D/8°
15ma
D/11°
ff
ff
ff
gliss.
40:39
gliss.
26:25
gliss.
8:9
gliss.
8:9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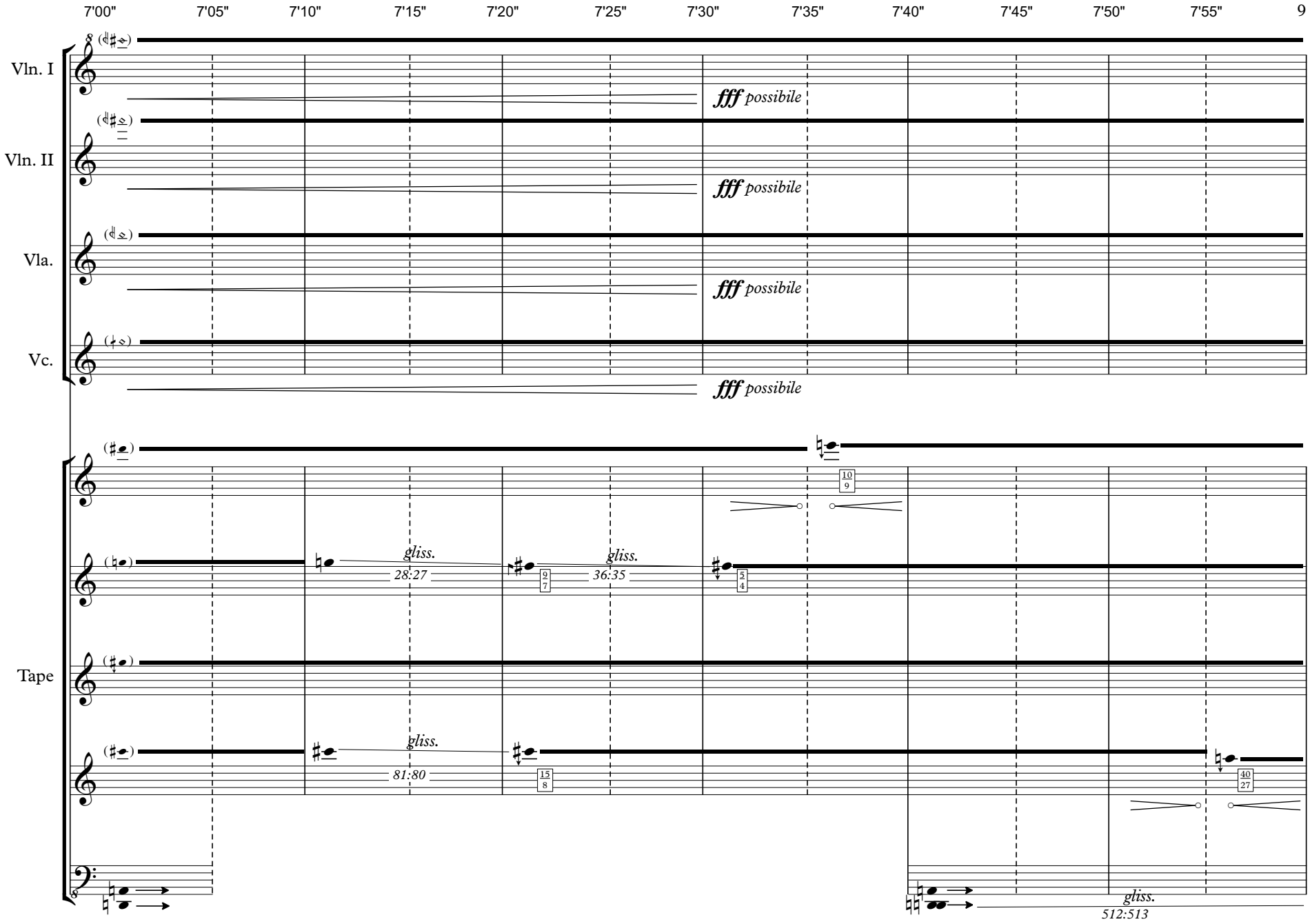
6'50"
6'55"
Vln. I
Vln. II
Vc.
Tape
15ma
E/13°
A/13°
D/13°
ff
gliss.
26:27
80:81
40:39
2048:2187
9:8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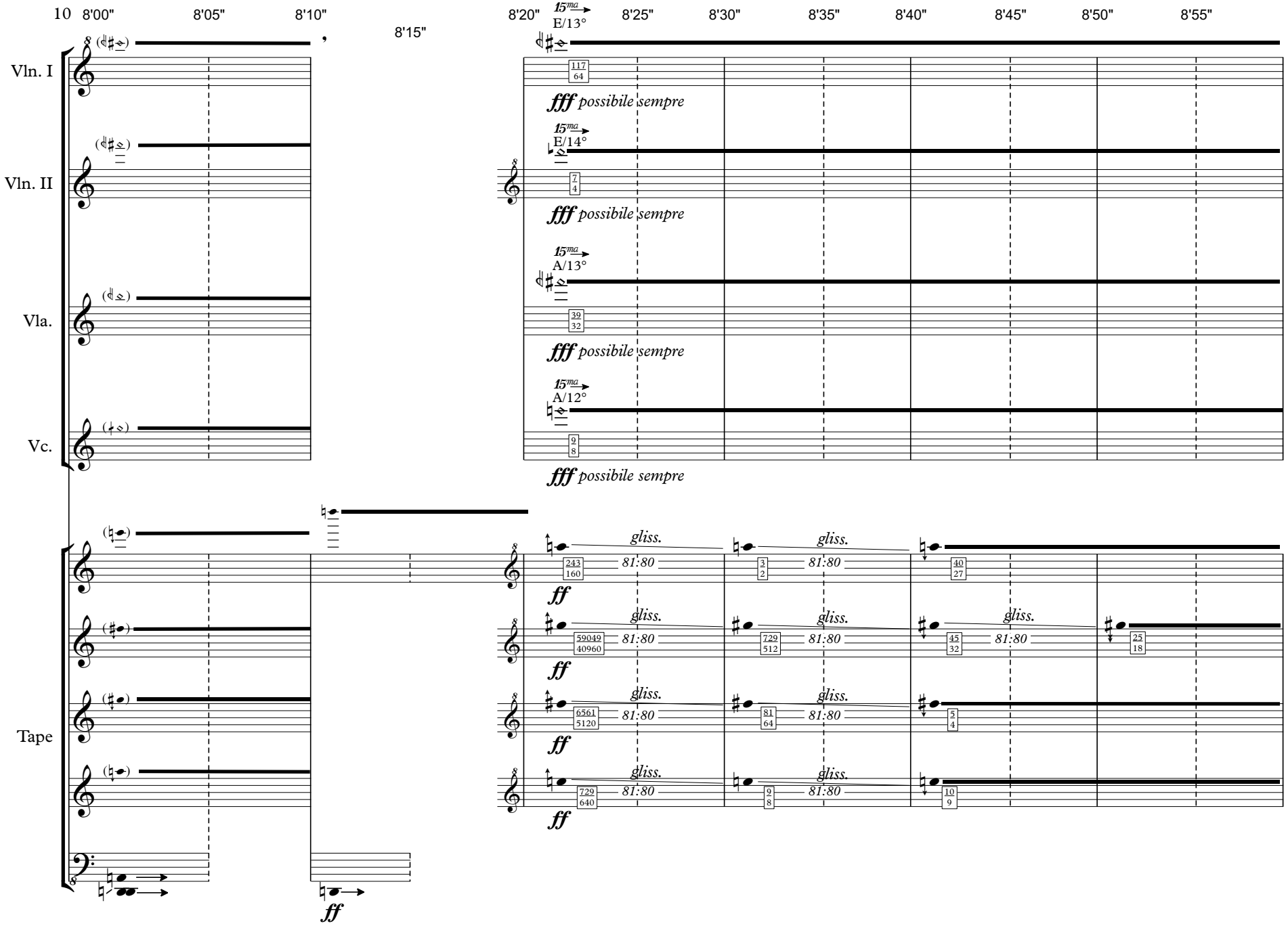
7'50"
7'55"
Vln. I
Vln. II
Vla.
Vc.
Tape
fff possibile
fff possibile
fff possibile
fff possibile
gliss.
28:27
gliss.
36:35
gliss.
81:80
gliss.
512:513
10/9
9/7
5/4
15/8
40/27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8'00"
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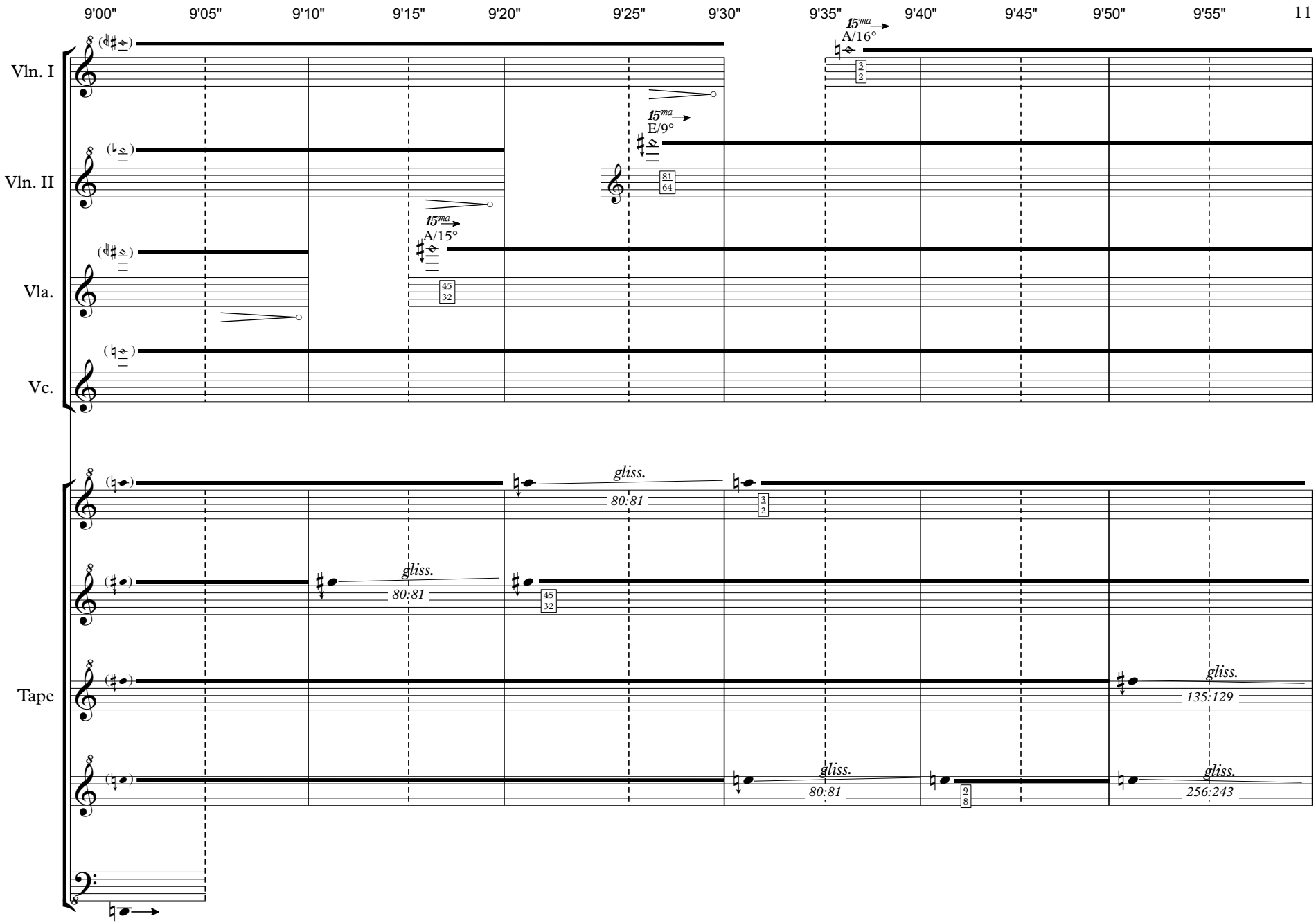
8'35"
8'40"
8'45"
8'50"
8'55"
Vln. I
Vln. II
Vla.
Vc.
Tape
15ma
E/13°
E/14°
A/13°
A/12°
117/64
7/4
39/32
9/8
fff possibile sempre
243/160
3/2
40/27
59049/40960
729/512
45/32
25/18
6561/5120
81/64
5/4
729/640
9/8
10/9
gliss.
81:80
ff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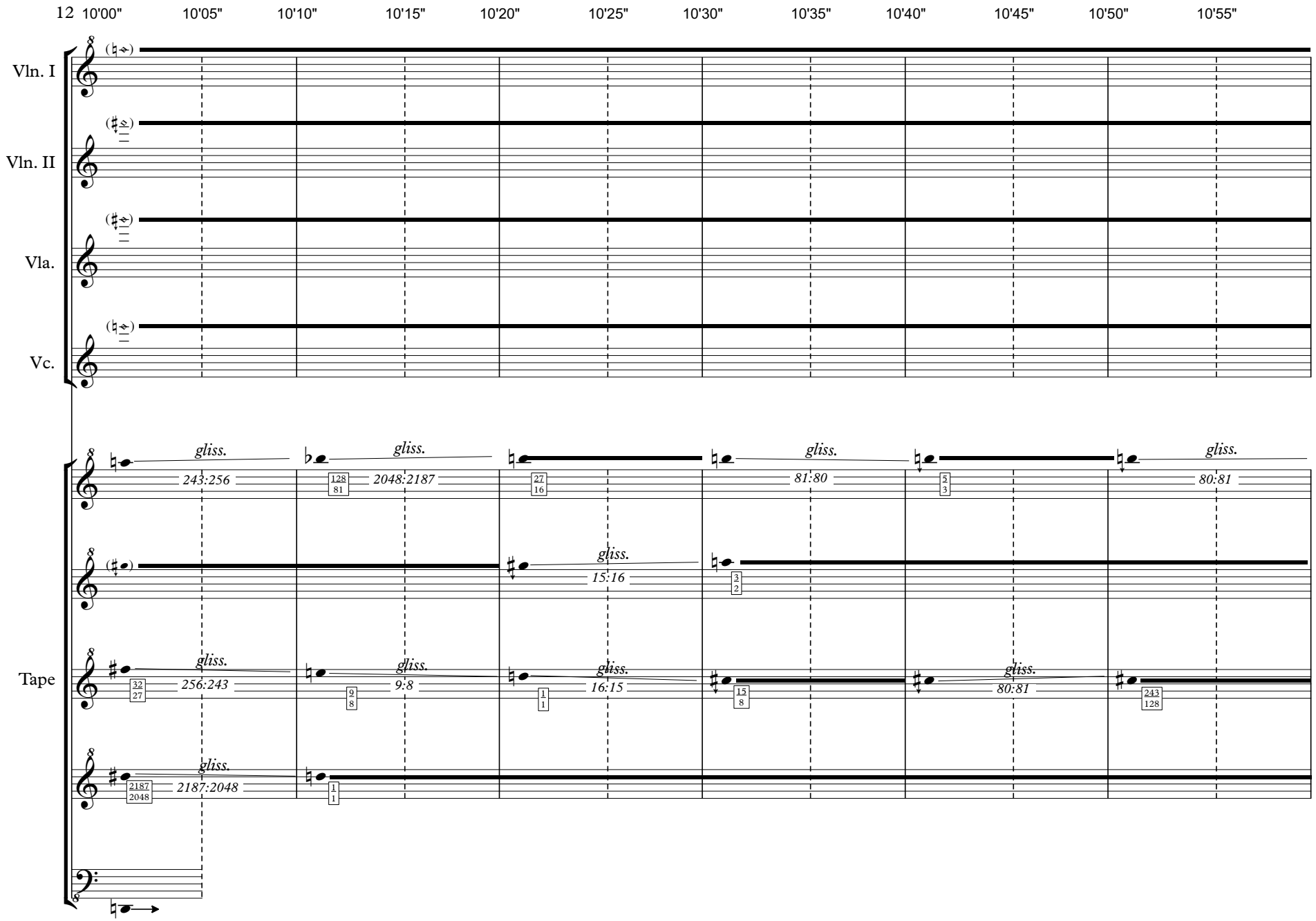
9'55"
Vln. I
Vln. II
Vla.
Vc.
Tape
15ma
A/16°
15ma
E/9°
15ma
A/15°
gliss.
80:81
gliss.
80:81
gliss.
80:81
gliss.
135:129
gliss.
80:81
gliss.
256:243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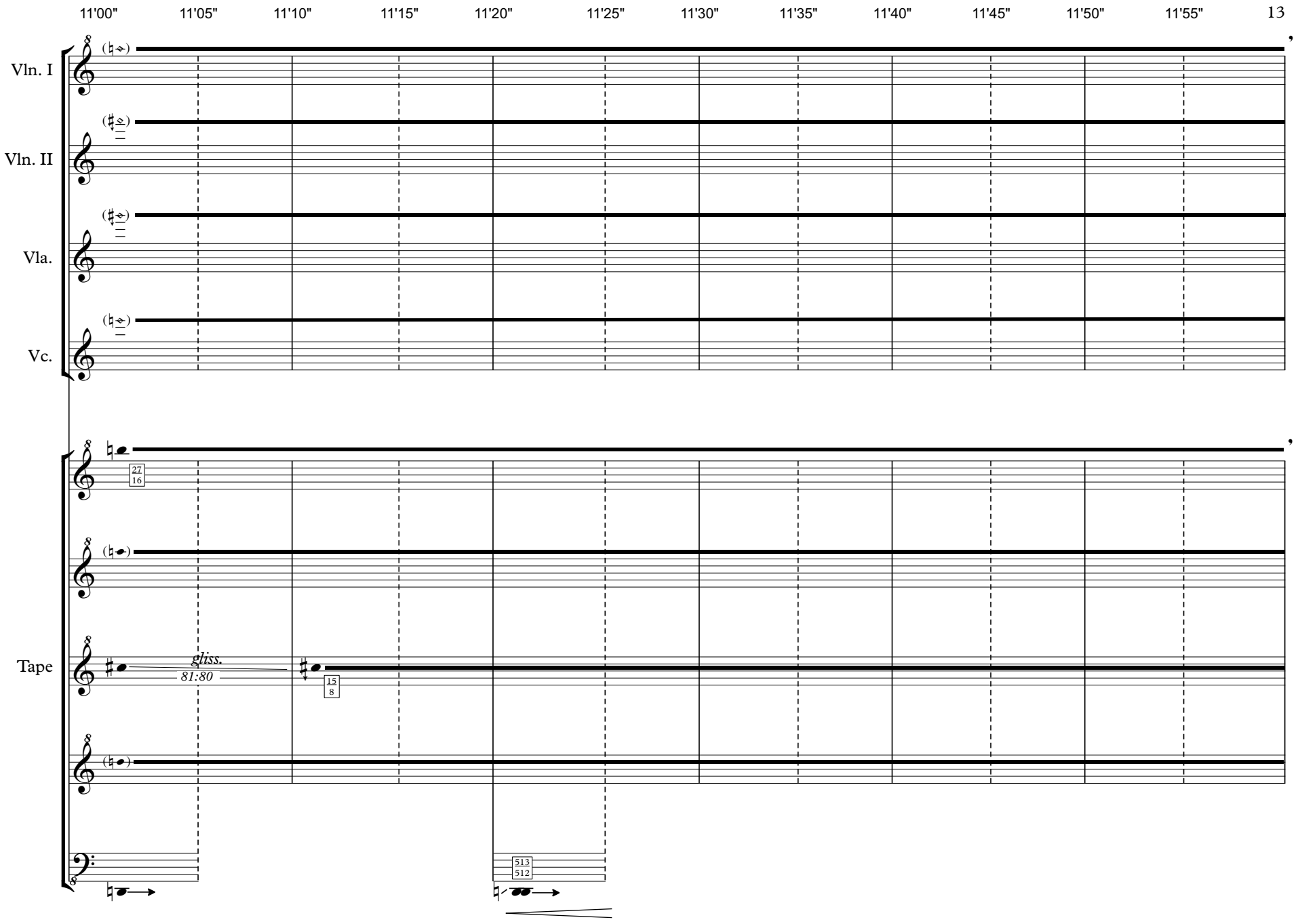
Vln. I
Vln. II
Vla.
Vc.
Tape
gliss.
243:256
128/81
2048:2187
27/16
81:80
5/3
80:81
15:16
3/2
32/27
256:243
9/8
9:8
1/1
16:15
15/8
80:81
243/128
2187/2048
2187:2048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11'55"
Vln. I
Vln. II
Vla.
Vc.
Tape
gliss.
81:80
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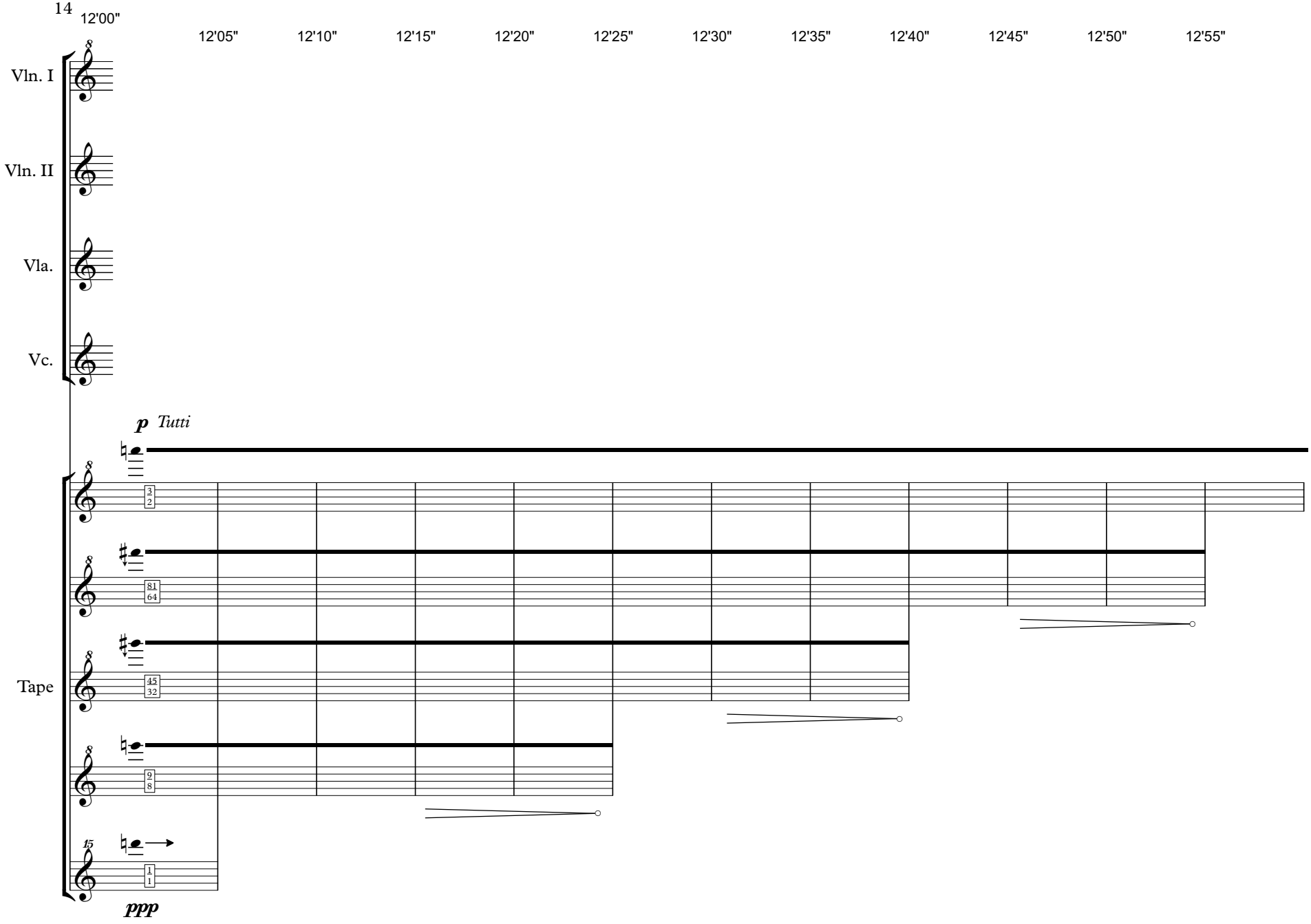
15
8
513
512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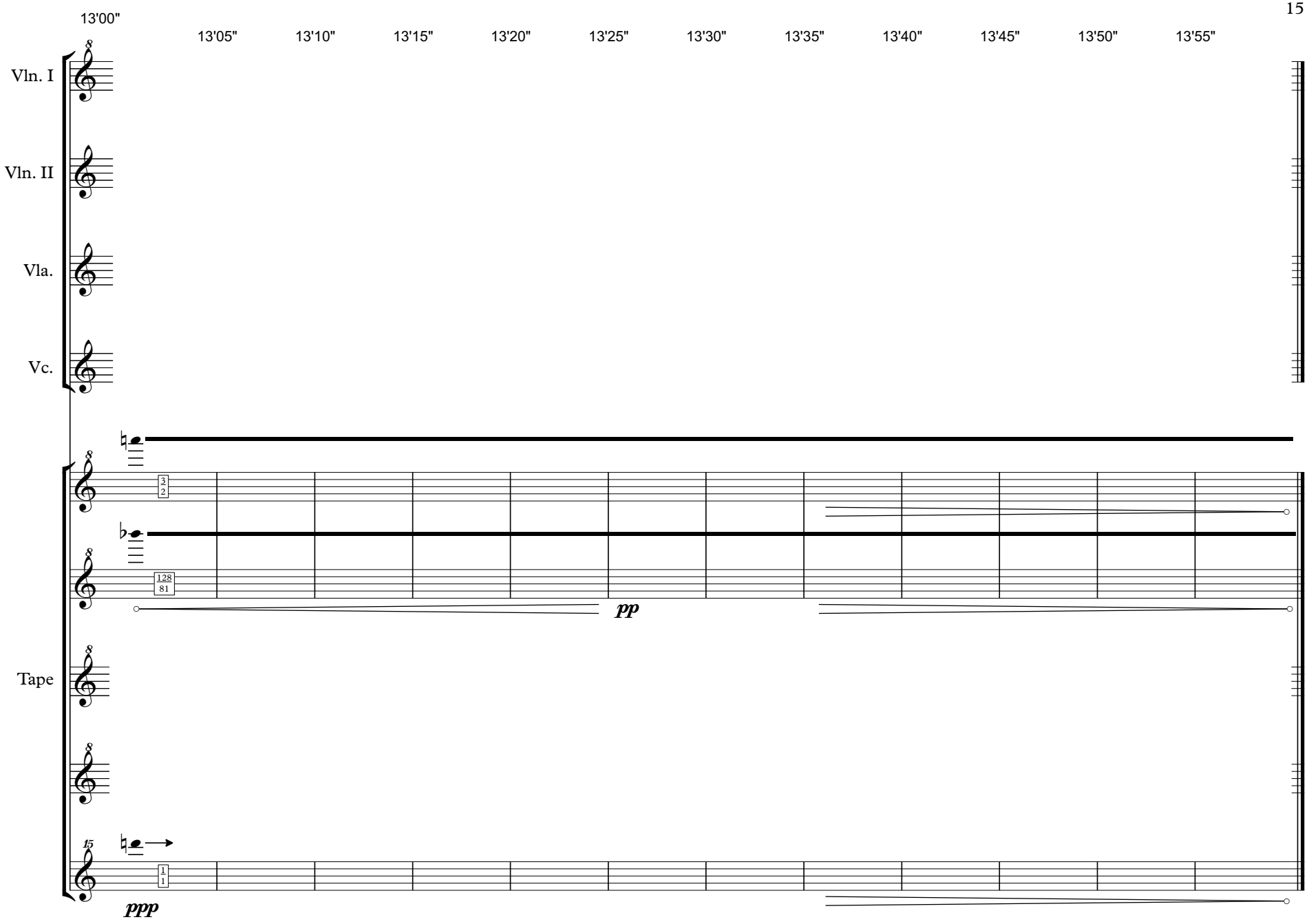
12'45"
12'50"
12'55"
Vln. I
Vln. II
Vla.
Vc.
Tape
p
Tutti
3/2
81/64
45/32
9/8
1/1
ppp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Vln. I
Vln. II
Vla.
Vc.
Tape
pp
ppp