GEORGE CRUMB

CELESTIAL MECHANICS

(MAKROKOSMOS IV)

Cosmic Dances for Amplified Piano, Four Hands

Commissioned by the Chamber Music Society of Lincoln Center

recording: Smithsonian Collection NO27
(Re-released by Pro Arte Records)

duration: ca. 25 minutes

Facsimile printing from the manuscript by the composer.

C. F. PETERS CORPORATION
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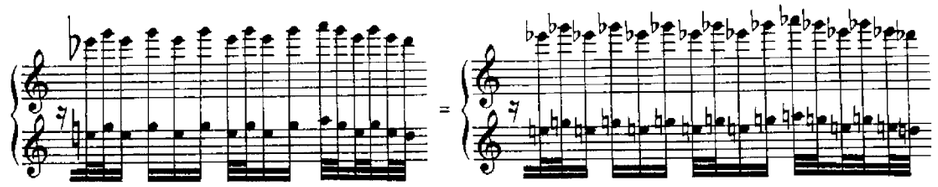
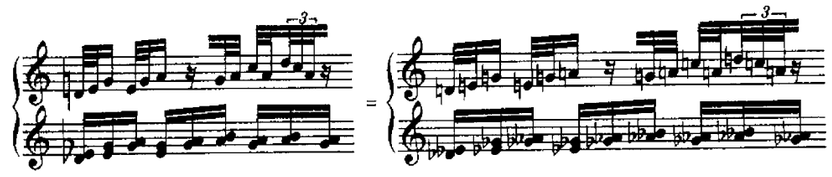
PERFORMANCE NOTES

1. Accidentals apply only to the notes they precede except in case(s) of immediate repetition of pitch or pattern of pitches. Larger accidentals apply to all the tones indicated, in both the horizontal and vertical sense. Therefore note in the *primo* part at [25]:



Note also in the *secondo* part at [42]:



2. All metronomic indications are approximate and may vary slightly, depending on the acoustical properties of the hall, etc.

3. *Celestial Mechanics* requires several special techniques such as *pizzicato* playing, muted tones, production of harmonics, etc. In order that the execution of these effects be accurate, it is important that the strings be clearly marked by bits of drafting tape. Some pianists prefer to mark only those strings which correspond to the black keys; in this way the sense of "keyboard" is replicated and the player's orientation is more immediate.

4. Since the construction of pianos varies considerably among the various manufacturers, and even among different models produced by the same firm, the performers should choose an instrument which facilitates the execution of all the special effects. It is critically important, too, that the piano be equipped with a correctly functioning sostenuto pedal.

5. When *pizzicato* playing is indicated, the string should be plucked with the fingertip (f.t.), unless specifically marked "at end of string" (for a more nasal, metallic timbre). Normal playing on the keyboard is indicated by the instruction "on keys."

6. Glissandos over the strings are to be played with the fingertip (f.t.), the fingernail (f.n.), the thumbnail or the end of a metal ruler (see the conclusion of *Gamma Draconis*), as indicated in the score. The strings may be strummed in front of the dampers (i.e., between the front structural beam and the pins) or behind the dampers; the choice, depending on considerations of timbre and ease of performance, is left to the discretion of the pianists. The precise duration and approximate range of the glissando is always given in the score.

7. *Celestial Mechanics* utilizes harmonics of the 2nd, 4th, and 5th partials. The precise nodal points can be indicated by affixing tiny slivers of tape to the strings. The finger(s) touching the nodes should come off the string(s) immediately after single harmonics or groups of harmonics are struck so that the harmonics ring more luminously.

8. Muted tones (indicated by the symbol "+") are used extensively in *Celestial Mechanics.* The string(s) should be muted (with firm pressure) at the very end (next to the bridge) in order to produce the maximum resonance and beauty of tone. Passages involving rapid alternations of muted and non-muted tones (as in *Alpha Centauri*) are precisely marked in the score and should be carefully studied. (Non-muted tones in such passages are marked "n," i.e. "normal.")

9. All boxed notes are to be silently depressed (see *Delta Orionis*).

10. Three metal rulers (with cork stripping glued to one side) are required for *Gamma Draconis.* One of the rulers should be 15 inches in length; the other two, 12 inches in length.

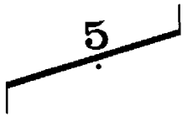
11. The pedal instructions are precise and should be followed exactly. The damper pedal is controlled by the *primo* player, the *sostenuto* and *una corda* pedals by the *secondo* player. The following special symbols are used to indicate the pedals:

    PI = right (damper) pedal
    PII = middle (*sostenuto*) pedal
    PIII = left (*una corda*) pedal

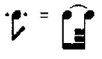
    N.B. PI sempre = keep damper pedal depressed throughout (let sound vibrate through pauses).

12. A conventional microphone (suspended over the bass strings) should be used for the amplification of the piano. The level of amplification should be set rather high so that the loudest passages are very powerful in effect, but without distortion. The level of amplification should not be adjusted during the performance.

13. SB = strike the soundboard (through the circular opening in the metal frame) with the fingertips. CBI, CBII, CBIII = the metal crossbeams of the piano. CBI is the leftmost beam; CBII and CBIII are the next beams to the right.

14.  = five seconds (approximately)

= three seconds (approximately)



15. The composer would suggest that the movement titles be included in the program listing. The following form is recommended:

    CELESTIAL MECHANICS [MAKROKOSMOS IV] (1979)
    (Cosmic Dances for Amplified Piano, Four Hands)
    I. Alpha Centauri
    II. Beta Cygni
    III. Gamma Draconis
    IV. Delta Orionis

I. Alpha Centauri

II. Beta Cygni

III. Gamma Draconis

IV. Delta Orionis

PROGRAM NOTE

Celestial Mechanics, completed in April, 1979, is the fourth in a series of works entitled (or subtitled) *Makrokosmos.* The first two works were scored for solo piano and the third (*Music for a Summer Evening*) for two pianos and percussion.

I had long been tempted to try my hand at the four-hand medium, perhaps because I myself have been a passionate four-hand player over the years. The best of the original four-hand music—which includes, of course, those many superb works by Mozart, Schubert, and Brahms—occupies a very special niche in the literature of music. The idiom, a strange hybrid of the pianistic and the orchestral, lends itself readily to a very free and spontaneous kind of music—one thinks of the many collections of dances of various types and of the predilection for the "fantasy" genre. The present work, therefore, comprising a suite of "cosmic" dances composed in a rather "fantastic" style, falls squarely within the tradition.

My sole departure from tradition occurs at two points in the score where I have enlarged the medium to six-hands; and so, in the whimsical manner of Ives, the page turner must contribute more substantively to the performance than is his wont.

The title *Celestial Mechanics* was borrowed from the French mathematician Laplace. The titles for the four movements (added after the music was completed!) are the beautiful names of stars of the first through the fourth magnitude. The majestic movement of the stars does indeed suggest the image of a "cosmic choreography" and, in fact, I briefly considered opting for an alternate title (proposed by my brother, punster that he is)—*The Celestial Ballroom.*

GEORGE CRUMB

Premiere: Gilbert Kalish, Paul Jacobs, pianists; November 18, 1979; Alice Tully Hall, New York City.

Premiere of complete *Makrokosmos* Cycle: Ivar Mikhashoff, Aki Takahashi, Stephen and Frieda Manes, pianists; Jan Williams and Lynn Harbold, percussionists; June 12, 1980; Buffalo, New York.

for Gilbert Kalish and Paul Jacobs

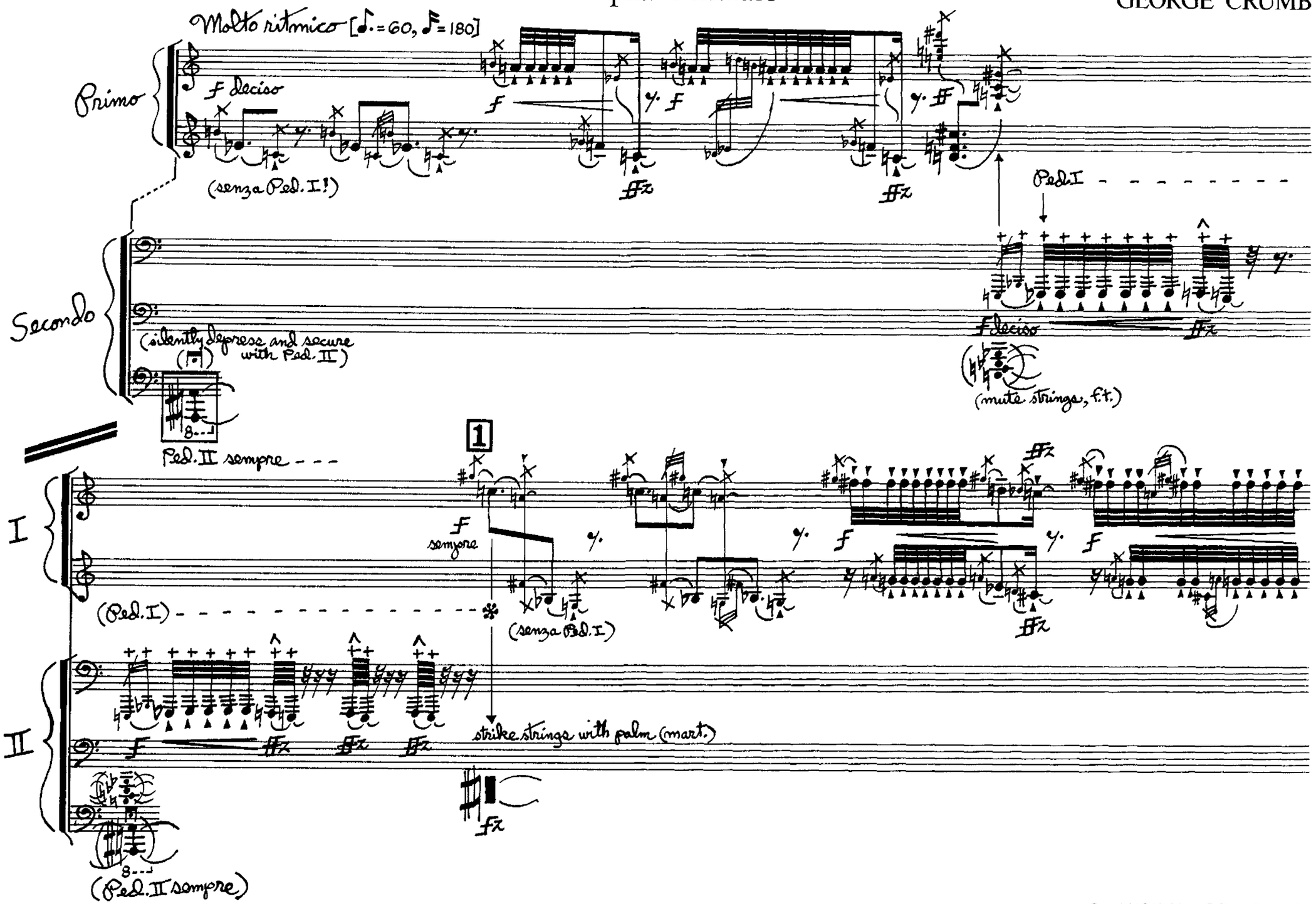
Celestial Mechanics

[MAKROKOSMOS IV]

Cosmic Dances for Amplified Piano, Four Hands

I. Alpha Centauri

GEORGE CRUMB



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Edition Peters 66788

I

II

2

Ped. I

(on keys)

(grace notes always together)

(mute strings, f.t.)

8

(Ped. II sempre)

*) scrape metal winding of strings (a cluster, f.n.); a single rapid stroke

3

(loco)

(scrape strings, sim.)

psub.

Fsub.

mute string (f.t.)

*) If the indicated effect does not sufficiently project, a rapid fingernail glissando across several strings may be substituted:

(f.n. on str.) (gliss.)

4

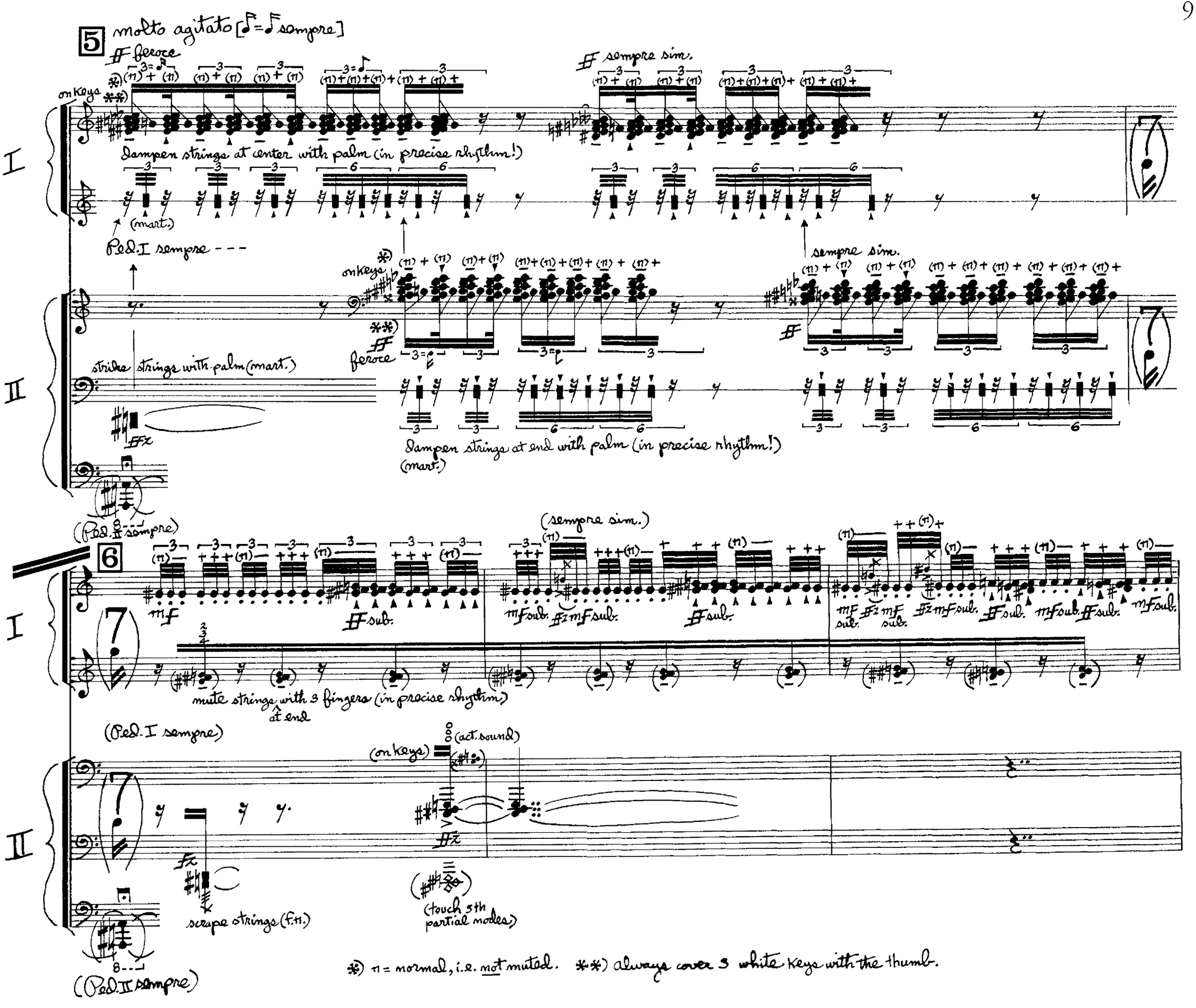
I

II

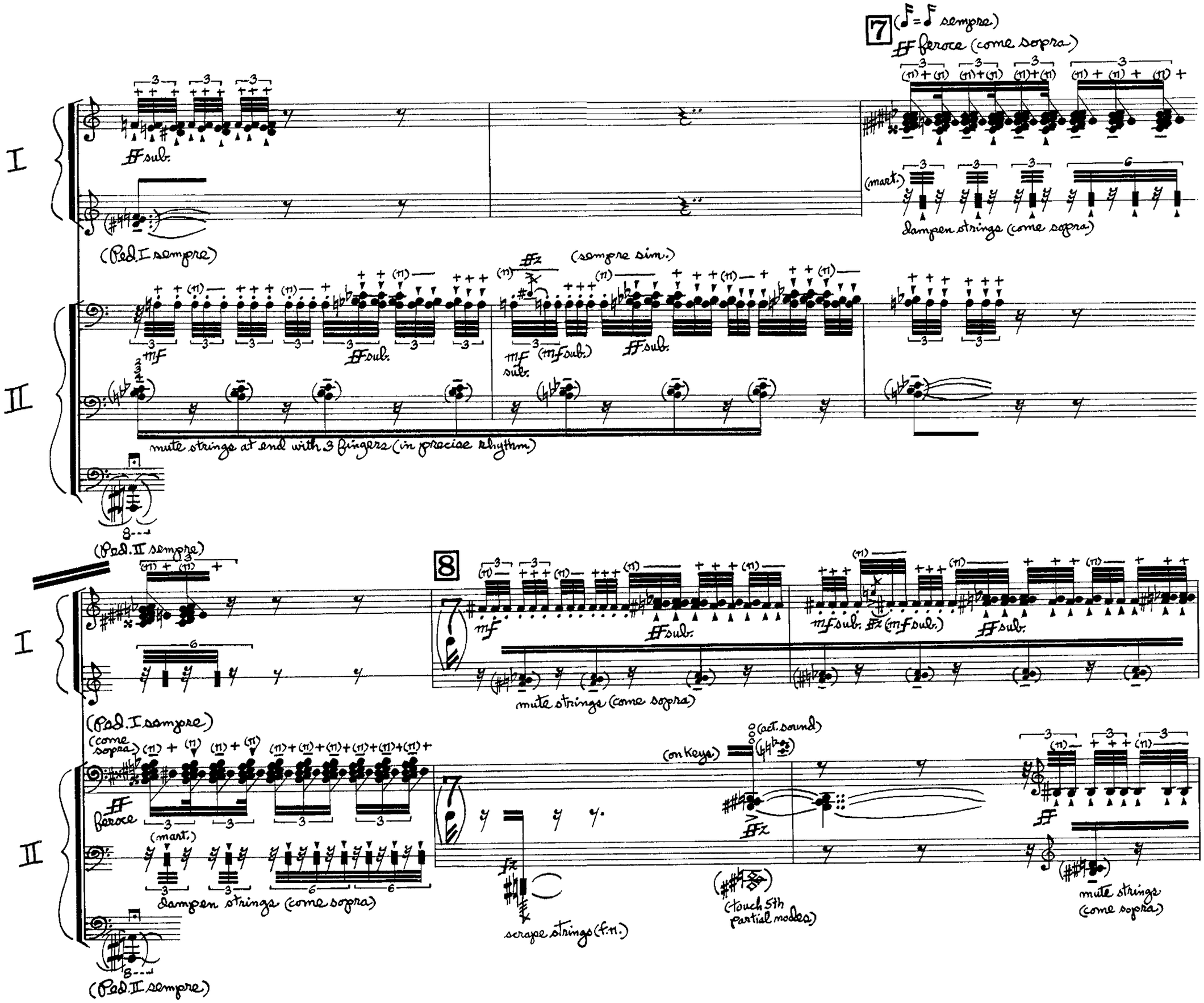
(mute string, sim.)

(Ped. II sempre)

(Ped. II sempre)



*) n = normal, i.e. not muted. **) always cover 3 white keys with the thumb.


7
(♪ = ♪ sempre)
ff feroce (come sopra)
I
ff sub.
(mart.)
dampen strings (come sopra)
(Ped. I sempre)
(sempre sim.)
II
mf
ff sub.
mf sub.
(mf sub.)
mute strings at end with 3 fingers (in precise rhythm)
(Ped. II sempre)
8
mf
ff sub.
mf sub.
ffz (mf sub.)
mute strings (come sopra)
(Ped. I sempre)
(come sopra)
ff feroce
(mart.)
dampen strings (come sopra)
(on keys)
(act. sound)
ffz
scrape strings (f.n.)
(touch 5th partial nodes)
ff
mute strings (come sopra)
(Ped. II sempre)

I

II

(Ped. I sempre)

ff sempre

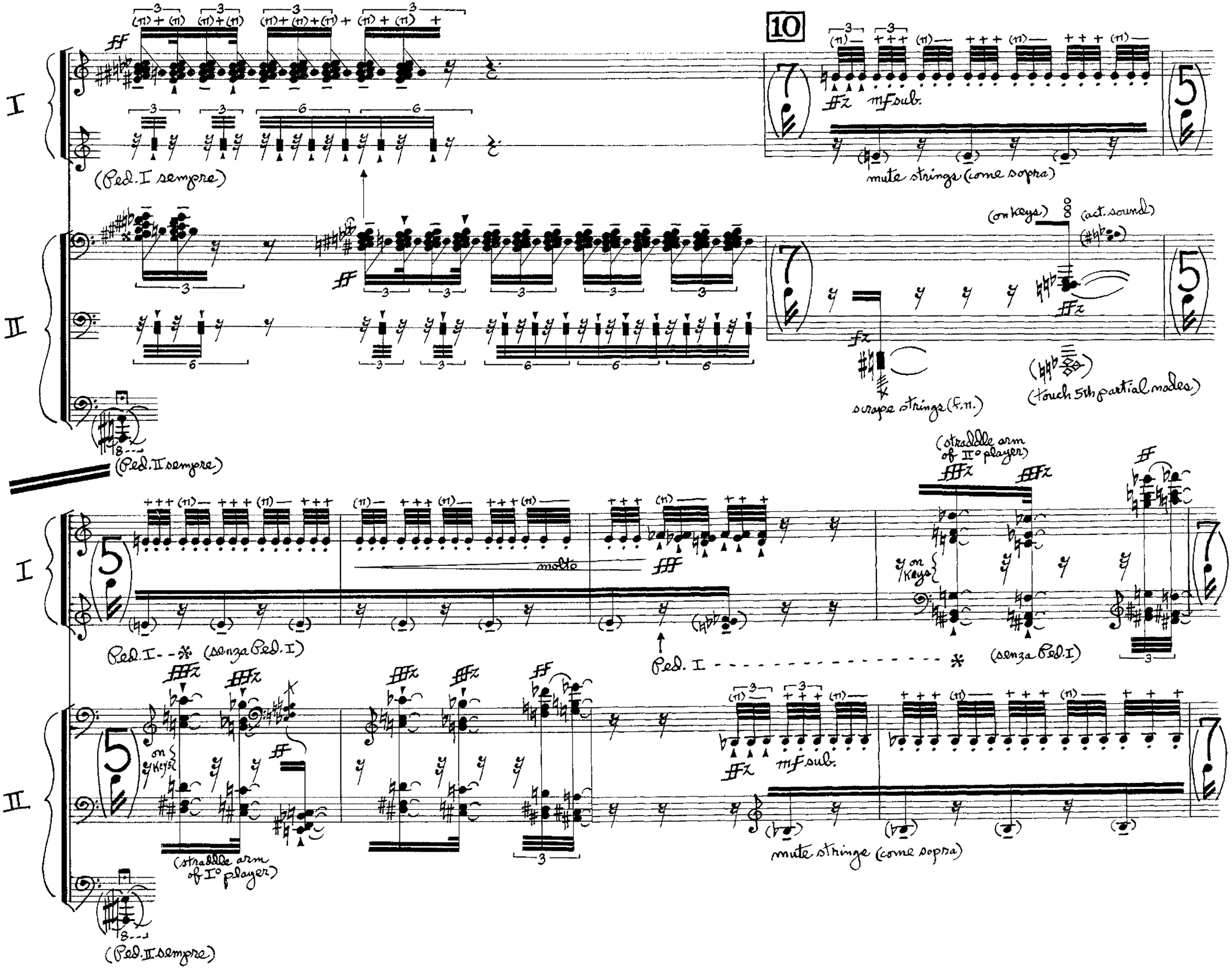
(Ped. II sempre)

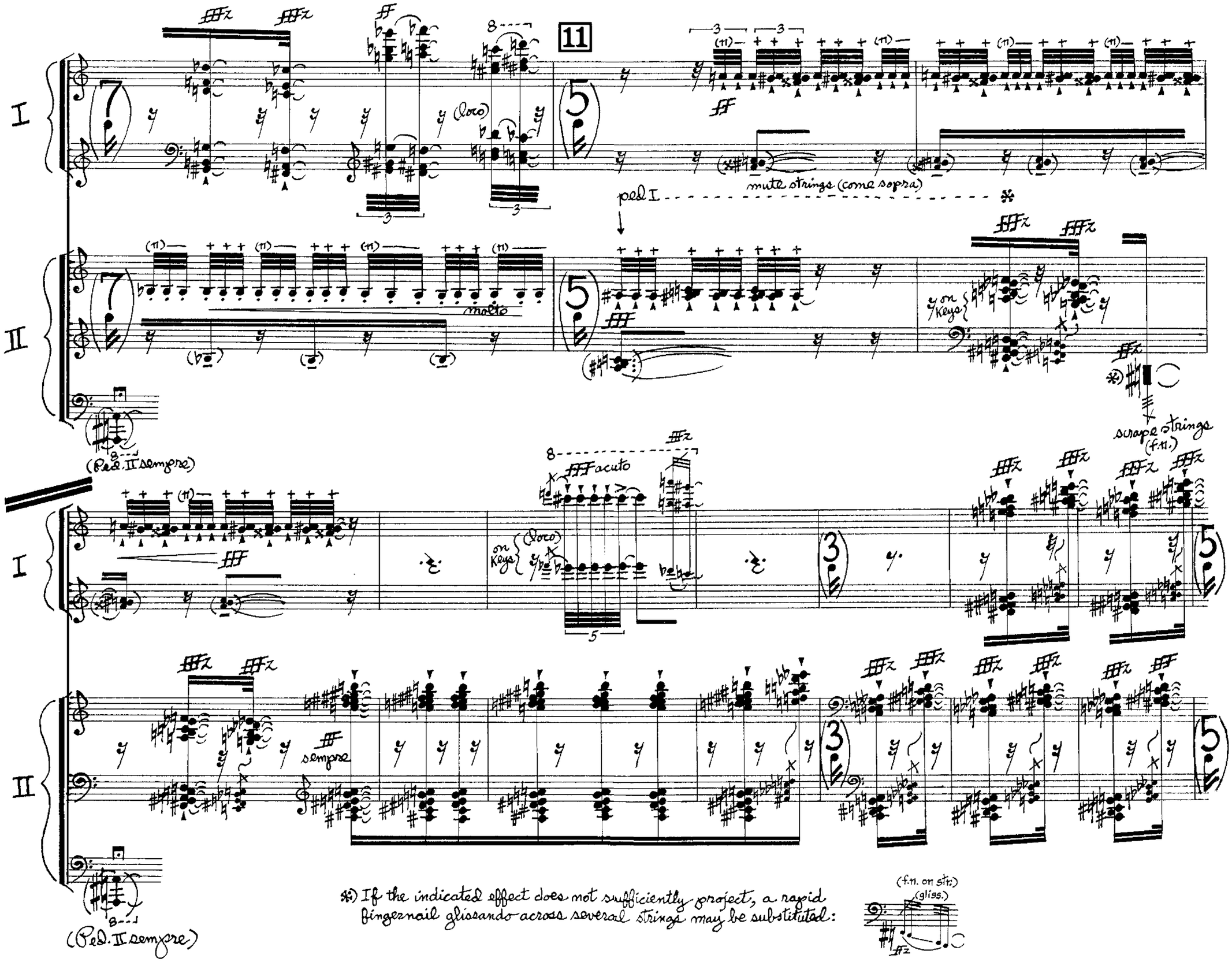
9 (♪ = ♪ sempre)

ff feroce

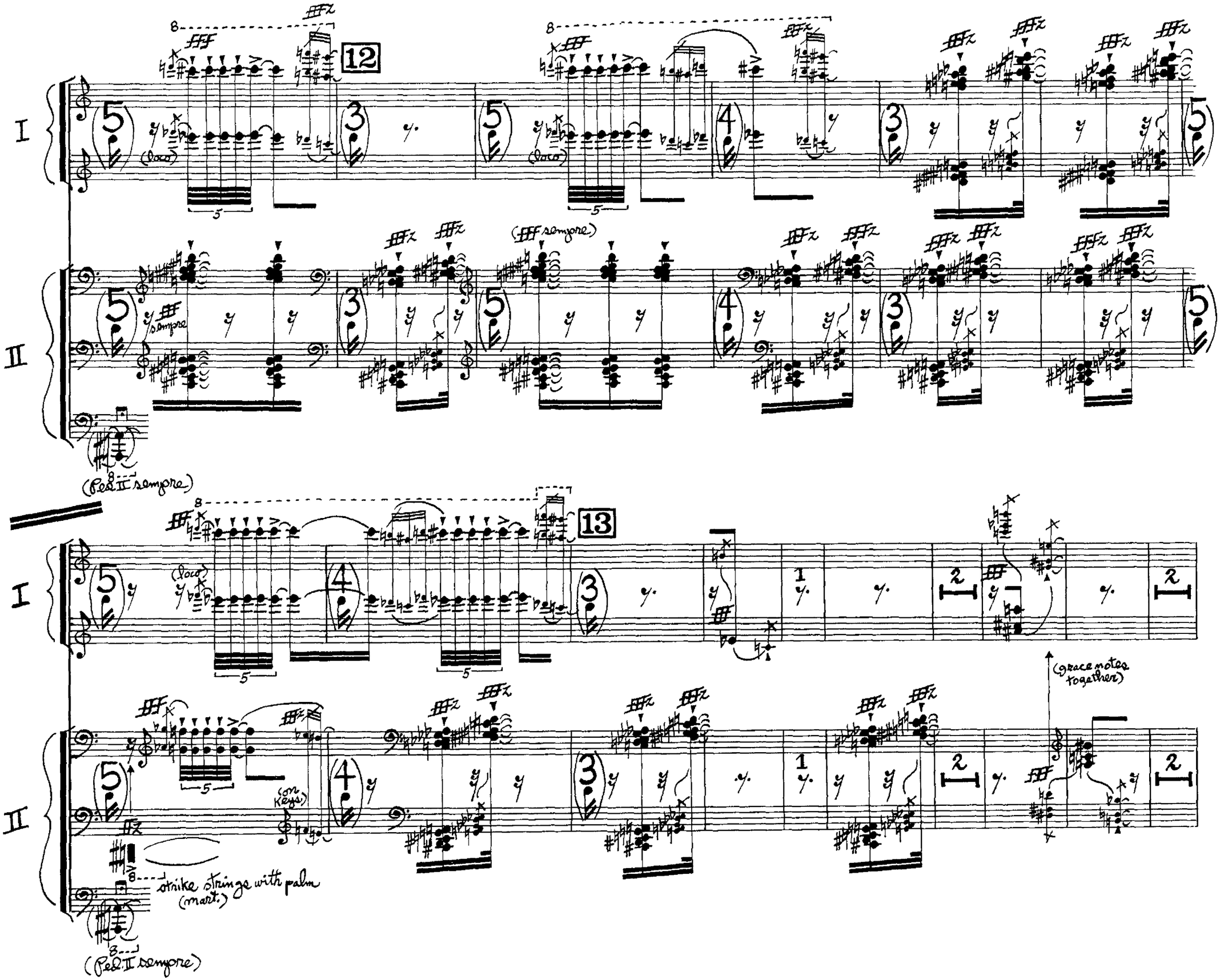
(mart.)

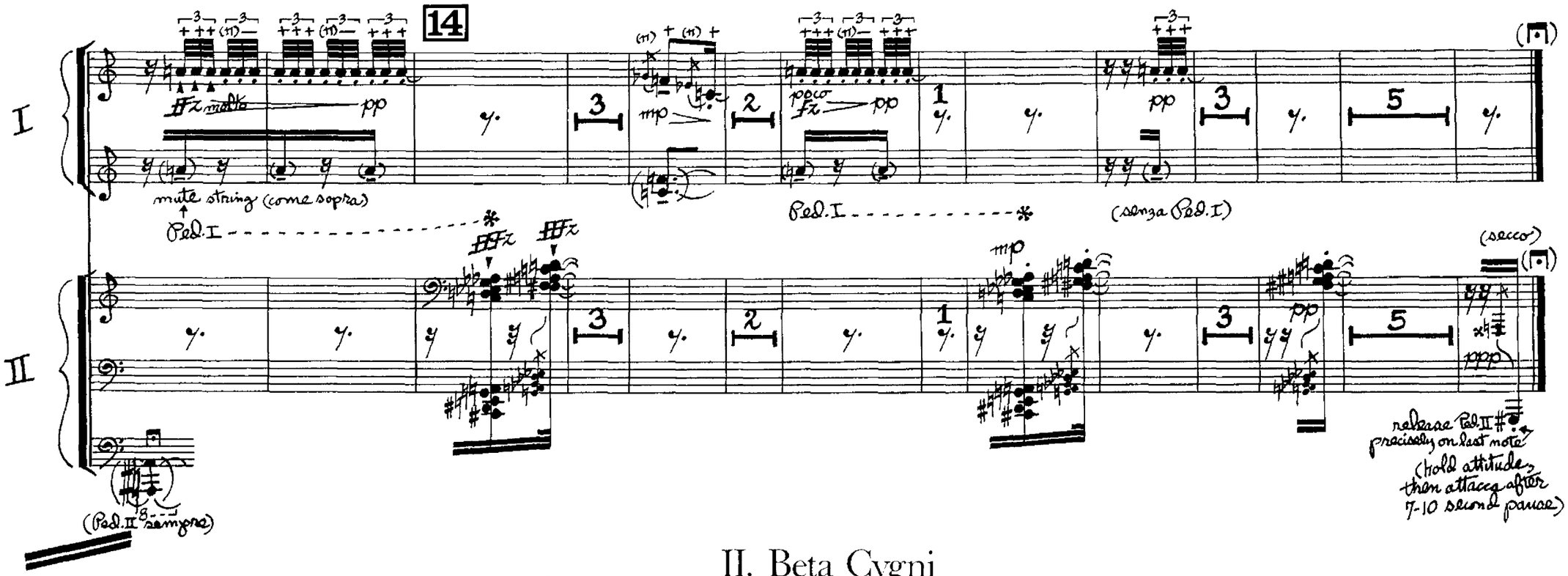
dampen strings (come sopra)


10
I
II
(Ped. I sempre)
(Ped. II sempre)
mute strings (come sopra)
(on keys)
(act. sound)
scrape strings (F.n.)
(touch 5th partial nodes)
(straddle arm of II° player)
molto
Ped. I - - - * (senza Ped. I)
Ped. I - - - - - - - - - - - - - - - *
(straddle arm of I° player)
mute strings (come sopra)

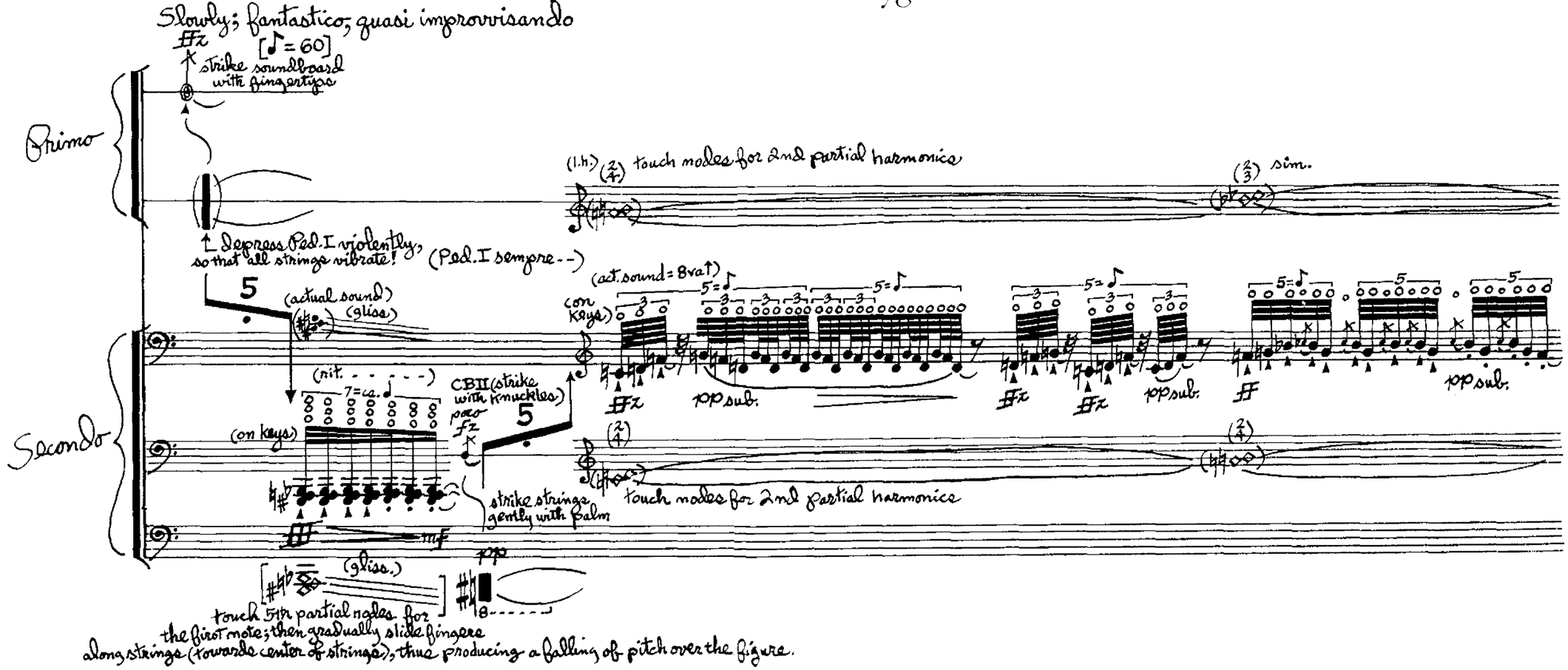


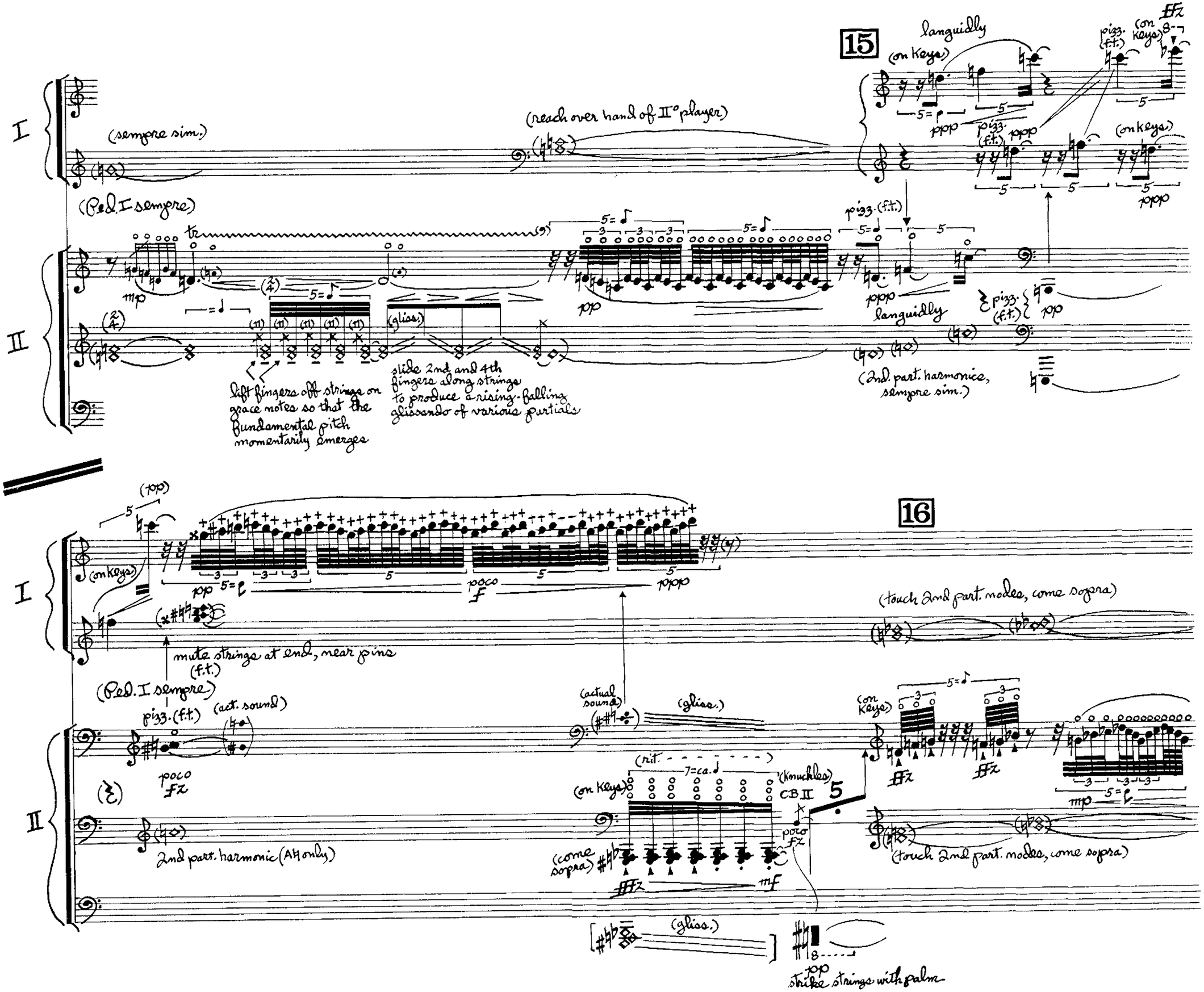
*) If the indicated effect does not sufficiently project, a rapid fingernail glissando across several strings may be substituted:

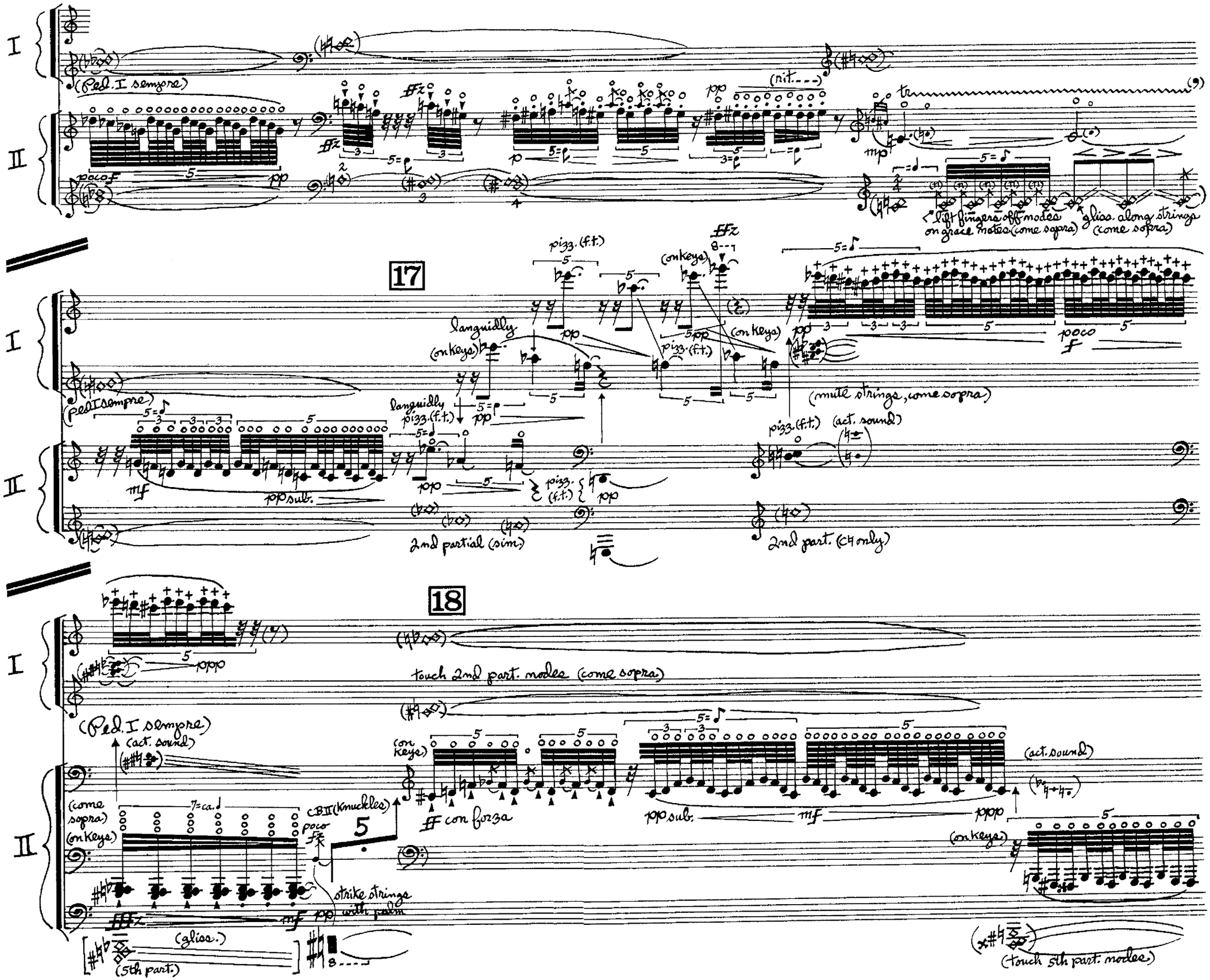

12
I
II
(loco)
(loco)
sempre
(fff sempre)
(Ped II sempre)
13
(loco)
(on keys)
strike strings with palm
(mart.)
(grace notes together)
(Ped II sempre)



II. Beta Cygni




15
I
II
(sempre sim.)
(reach over hand of II° player)
(Ped. I sempre)
tr
mp
pp
pizz. (f.t.)
ppp
languidly
(on keys)
(gliss.)
lift fingers off strings on grace notes so that the fundamental pitch momentarily emerges
slide 2nd and 4th fingers along strings to produce a rising-falling glissando of various partials
(2nd. part. harmonics, sempre sim.)
16
(pp)
poco f
mute strings at end, near pins
(f.t.)
(act. sound)
poco fz
2nd part. harmonic (A♮ only)
(actual sound)
(rit.)
(knuckles)
CB II
(come sopra)
mf
(touch 2nd part. nodes, come sopra)
strike strings with palm


I
II
(Ped. I sempre)
poco f
pp
ffz
p
(rit.)
mp
lift fingers off nodes on grace notes (come sopra)
gliss. along strings (come sopra)
17
pizz. (f.t.)
(on keys)
languidly
(on keys)
pizz. (f.t.)
(on keys)
poco f
(mute strings, come sopra)
(Ped I sempre)
mf
pp sub.
languidly pizz. (f.t.)
pizz. (f.t.)
(act. sound)
2nd partial (sim.)
2nd part. (C♮ only)
18
touch 2nd part. nodes (come sopra)
(Ped. I sempre)
(act. sound)
(on keys)
(act. sound)
(come sopra)
(on keys)
CB II (knuckles)
poco fz
5
ff con forza
pp sub.
mf
ppp
(on keys)
strike strings with palm
(gliss.)
(5th part.)
(touch 5th part. nodes)

I

II

(Ped. I sempre)

ff

pp sub.

pp

f

(act. sound)

p sub.

pppp

ff con forza

(touch nodes for 5th part. harmonics)

19

a tempo

inciso

ffz

(Ped. I sempre)

poco accel.

a tempo

(ff)

pp sub.

molto fff

mp

(glissando)

glissando along strings (come sopra)

lift fingers off nodes on grace notes (come sopra)

più p

(sim.)

ppp

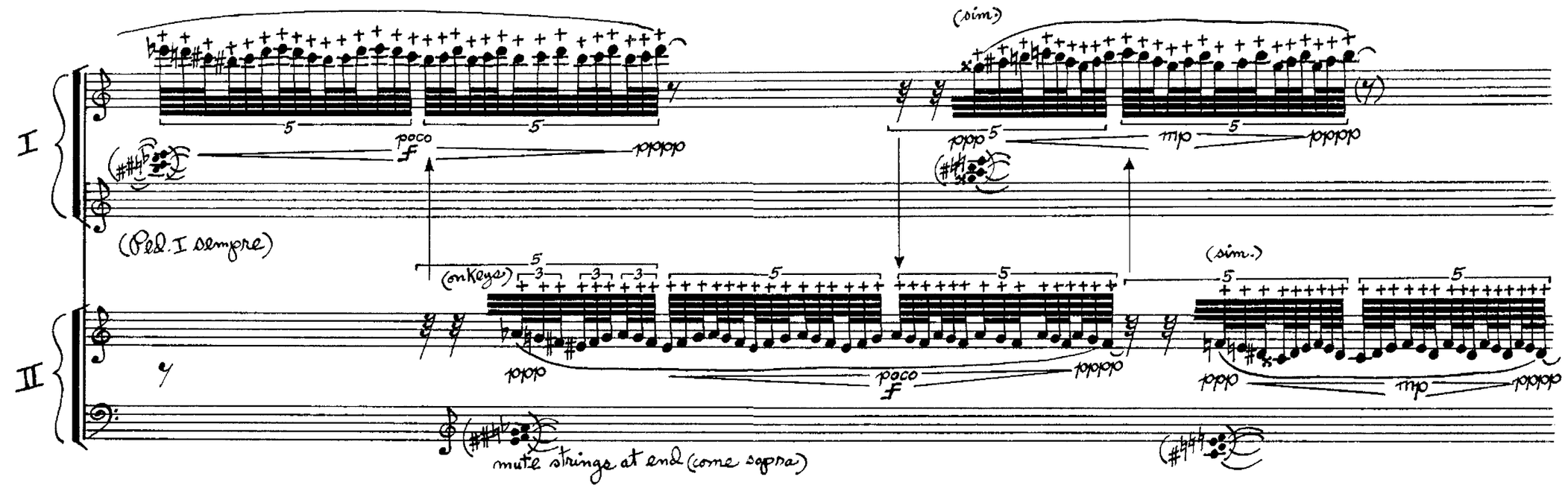
mute strings at end (come sopra)

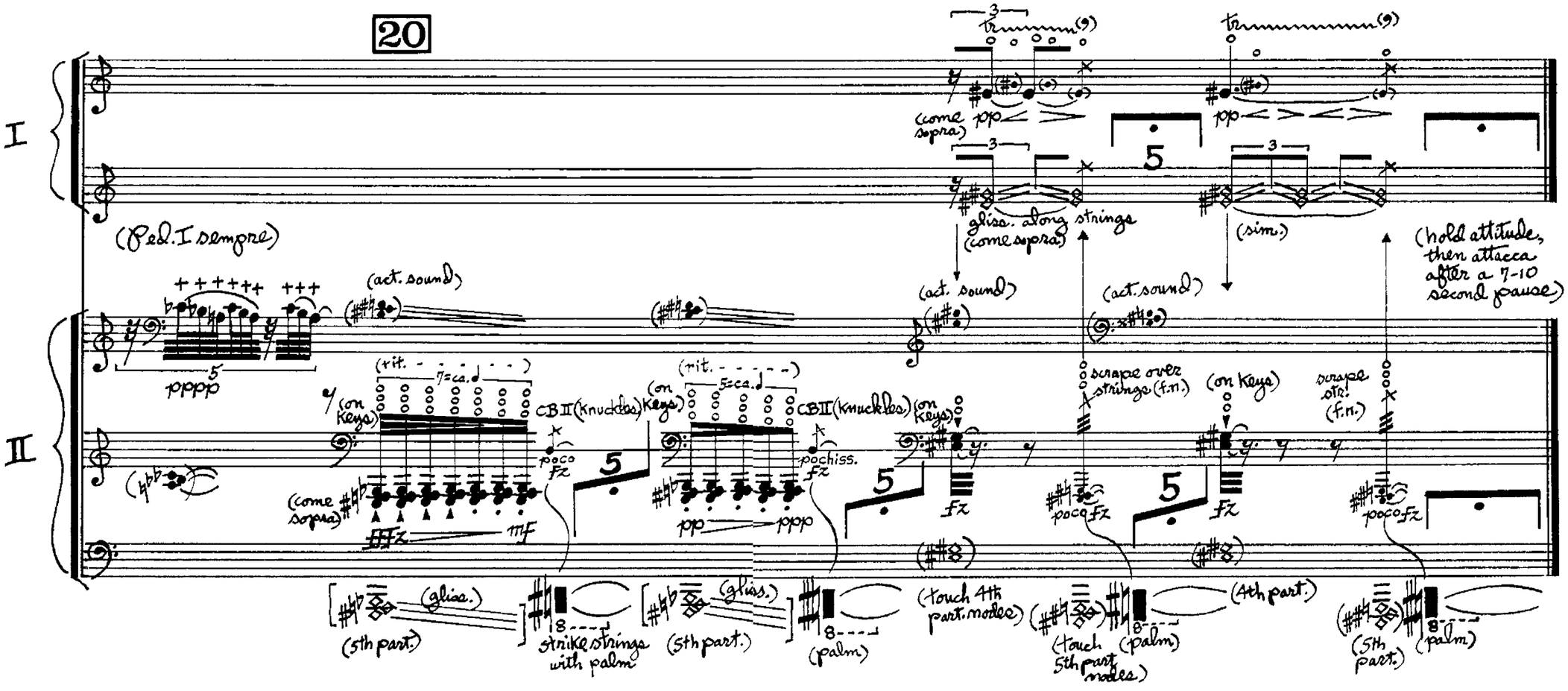
mp

strike strings with palm

mp

with palm (sim.)


I
II
(Ped. I sempre)
(sim.)
(on Keys)
poco
mp
pppp
mute strings at end (come sopra)


20
I
II
(Ped. I sempre)
(come sopra)
gliss. along strings (come sopra)
(sim.)
(hold attitude, then attacca after a 7-10 second pause)
(act. sound)
(rit.)
(on Keys)
CB II (knuckles)
poco fz
pochiss. fz
scrape over strings (f.n.)
scrape str. (f.n.)
(gliss.)
(5th part.)
strike strings with palm
(palm)
(touch 4th part. nodes)
(touch 5th part nodes)
(4th part.)

III. Gamma Draconis

Molto ritmico, meccanicamente [♩.=100]

Primo

Secondo

(Ped. I sempre)

drop a 15-inch metal ruler onto strings (cork stripping down)!

gliss. over strings (f.t.)

drop a 12-inch metal ruler onto strings (cork stripping down)!

gliss. over strings (thumbnail)

drop a 12-inch metal ruler onto strings (cork stripping down)!

(act. sound)

on keys

(touch 5th partial nodes)

molto

poco pressando

21

I

II

(ped. I sempre)

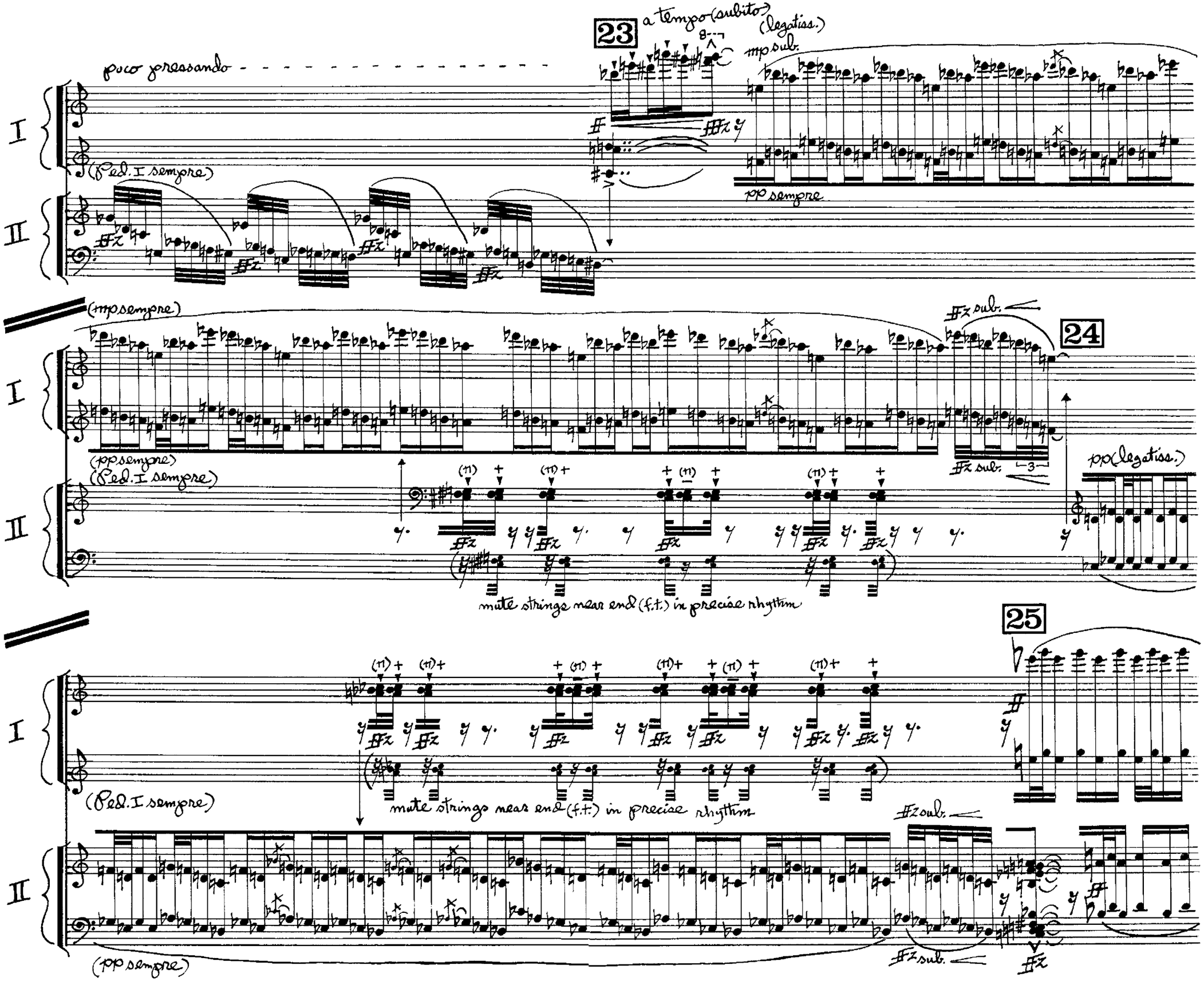
on keys { f con brio

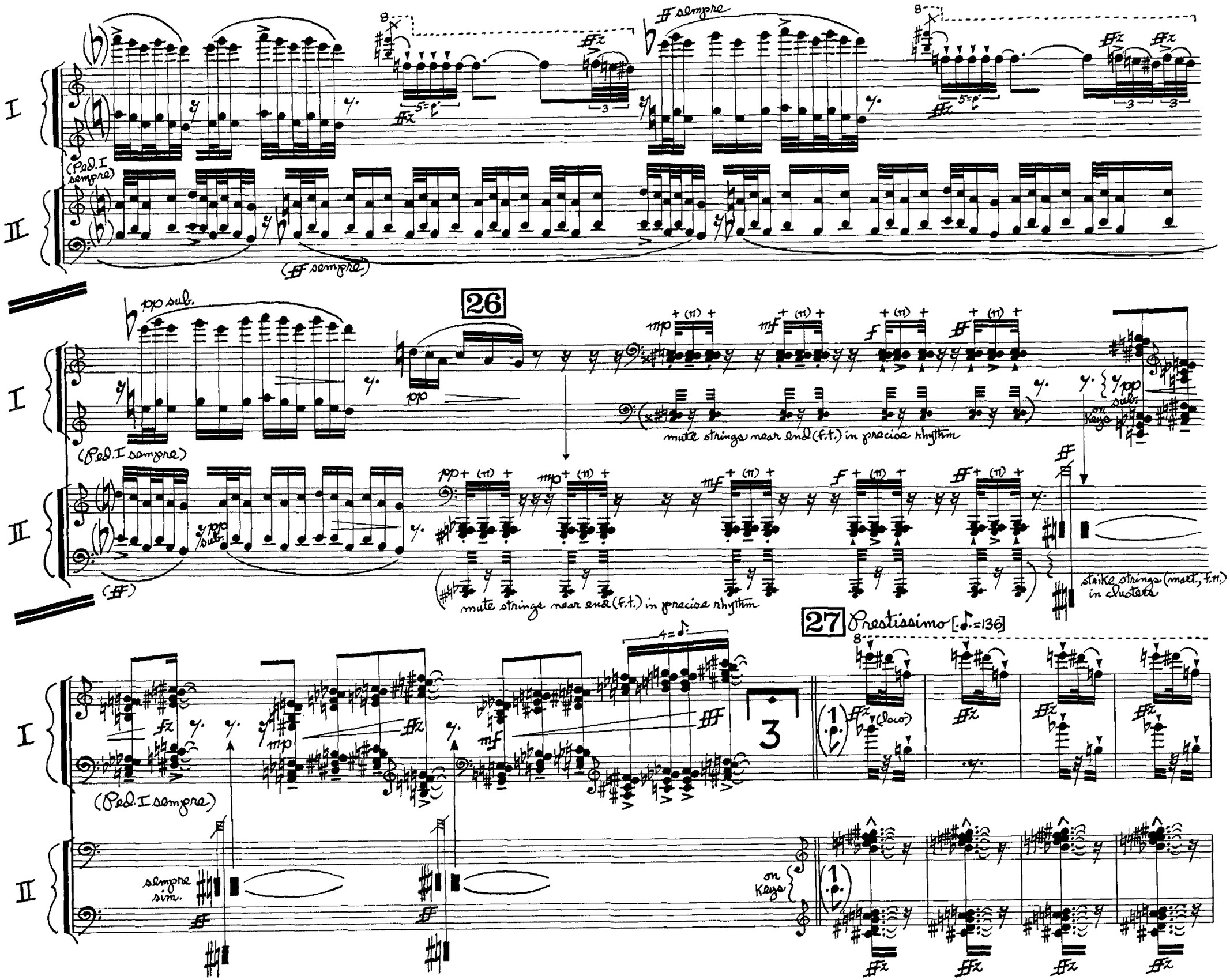
cresc.

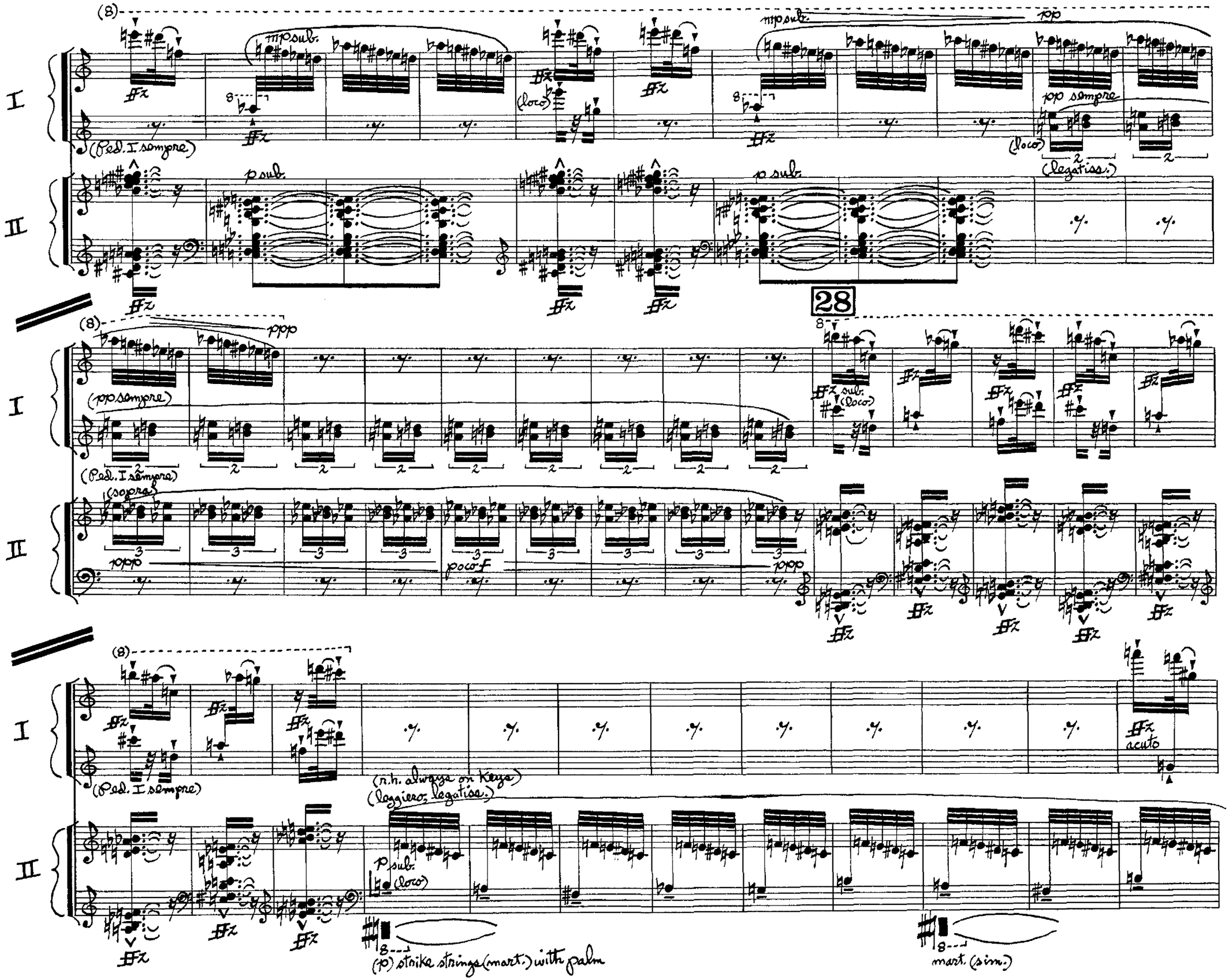
22

a tempo

f con brio


poco pressando
23
a tempo (subito)
(legatiss.)
mp sub.
pp sempre
(Ped. I sempre)
(mp sempre)
(pp sempre)
(Ped. I sempre)
24
pp (legatiss.)
mute strings near end (f.t.) in precise rhythm
25
mute strings near end (f.t.) in precise rhythm
(Ped. I sempre)
(pp sempre)


I
II
(Ped. I sempre)
(ff sempre)
pp sub.
26
mute strings near end (f.t.) in precise rhythm
on Keys
strike strings (mart., f.n.) in clusters
27 Prestissimo [♪.=136]
(loco)
sempre sim.
on Keys


I
II
(8)
mp sub.
pp
pp sempre
(loco)
(legatiss.)
(Ped. I sempre)
p sub.
28
ppp
(pp sempre)
(sopra)
poco f
sub.
(loco)
(Ped. I sempre)
(r.h. always on keys)
(leggiero, legatiss.)
acuto
(p) strike strings (mart.) with palm
mart. (sim.)

29

I

II

(Ped. I sempre)

(p sempre)

(mart. palm, sim.)

on Keys

(loco)

acuto

mp sempre

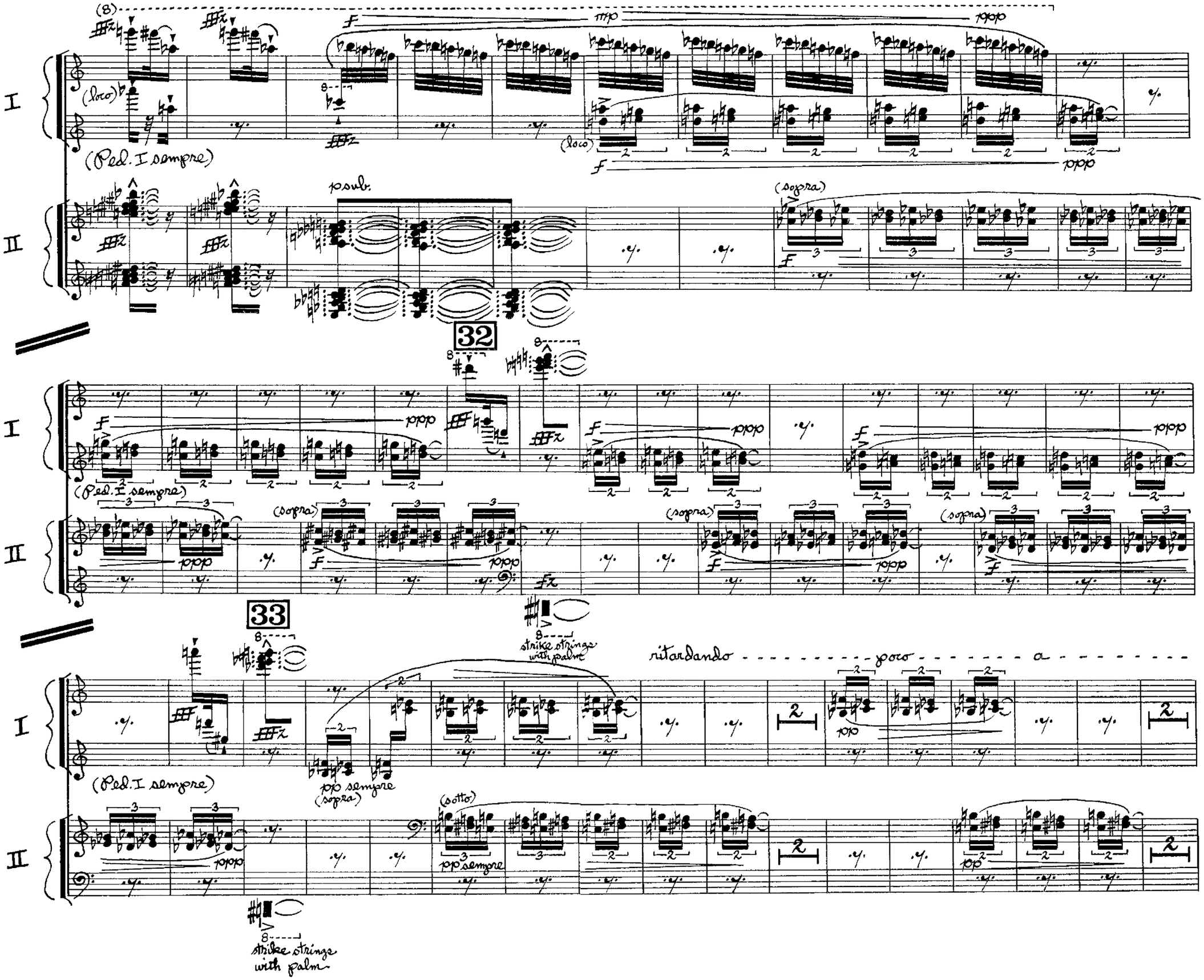
(mart. palm, come sopra)

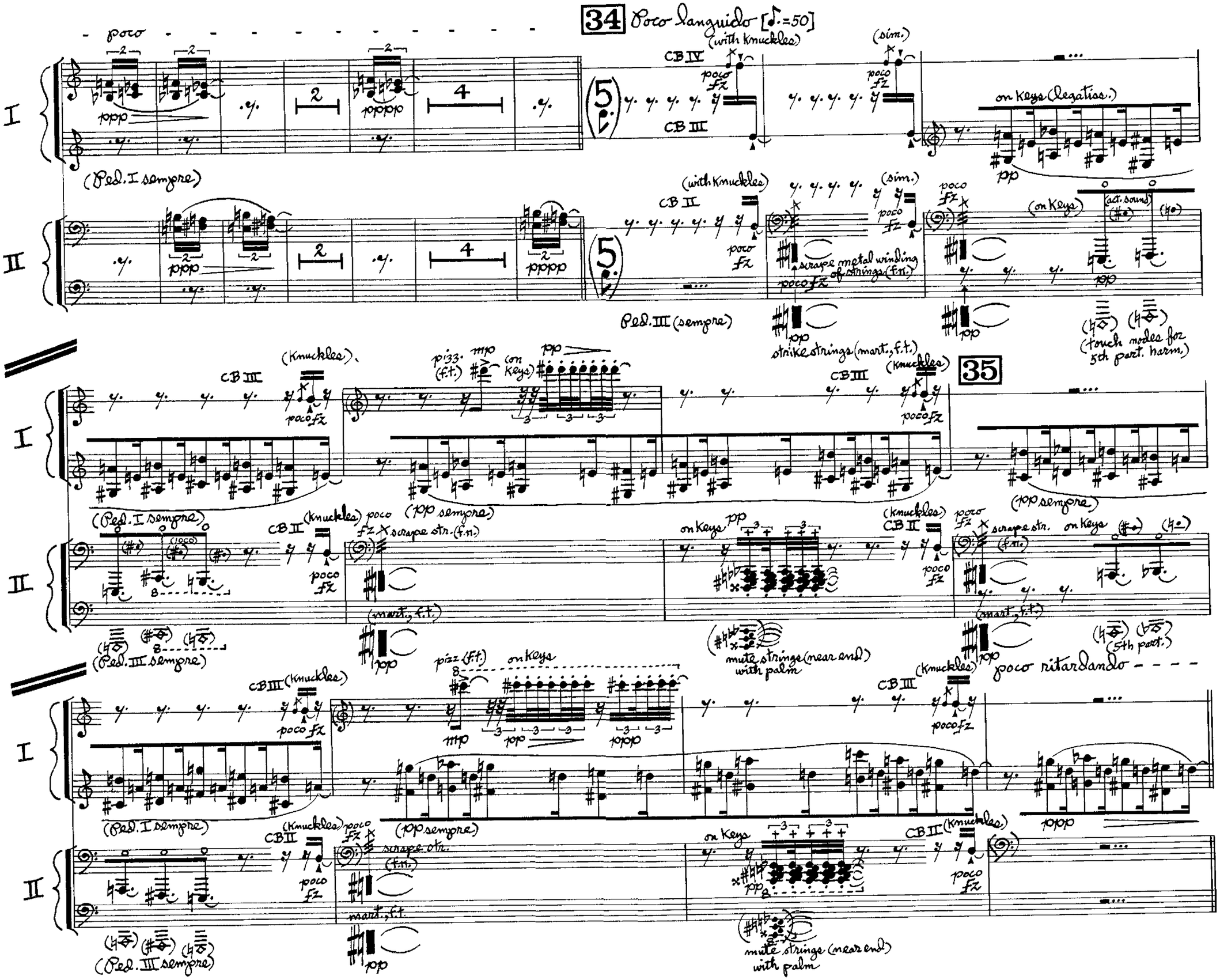
30

31

mp

fz


(8)
I
II
(loco)
(Ped. I sempre)
p sub.
(sopra)
32
33
strike strings with palm
ritardando - - - - - - - - - poco - - - - - - - a - - - - - - -
pp sempre
(sotto)
pp sempre
strike strings with palm


34 Poco languido [♪.=50]
poco
I
II
ppp
pppp
(Ped. I sempre)
CB IV
CB III
(with knuckles)
poco fz
(sim.)
on keys (legatiss.)
pp
CB II
(with knuckles)
(sim.)
poco fz
scrape metal winding of strings (f.n.)
(on keys)
(act. sound)
Ped. III (sempre)
strike strings (mart., f.t.)
(touch nodes for 5th part. harm.)
35
CB III
(knuckles)
poco fz
pizz. (f.t.)
mp
(on keys)
(pp sempre)
(Ped. I sempre)
CB II
(knuckles)
poco fz
scrape str. (f.n.)
(mart., f.t.)
on keys
mute strings (near end) with palm
(5th part.)
(Ped. III sempre)
poco ritardando
pizz (f.t.)
on keys
mp
pp
ppp
(pp sempre)
scrape str. (f.n.)
mart., f.t.
mute strings (near end) with palm

36 Tempo primo (quasi alla marcia)
[♩.=100]

I (Ped. I sempre)

trill with 2 fingers on top of ruler while making indicated gliss. along ruler

(sim.)

II on Keys

pp ma molto ritmico

(touch 5th partial nodes precisely in rhythm!)

strike center of ruler with fingertips

(pop sempre)

(come sopra)

strike ruler (come sopra)

fz

(mute strings with palm [near end] precisely in rhythm!)

(senza Ped. III)

I (Ped. I sempre)

mute strings with palms of both hands

trill on ruler (come sopra)

on Keys

pop

poco

37

II on Keys

pp

molto

strike ruler (come sopra)

38

I (Ped. I sempre)

mute strings with palms of both hands

(on Keys)

pop

poco

II (come sopra)

fz molto

mute strings (come sopra)

strike ruler (come sopra)

39

I

(Ped. I sempre)

p

cresc.

II

p

1 5 1

p

(sopra)

p cresc.

(8)

40

I

poco

a

8

5=4

3

poco

(Ped. I sempre)

II

poco

a

poco

(8)

41

I

8

5=4

3

8

5

8

5

ff

(Ped. I sempre)

molto fz

mp subito

molto ffz

II

1 5 1

ff

(ff sempre)

(8)

42 (♪ = ♪)

Piano, 6 hands

I

II

III

mf sub. molto fffz

metallic, quasi Glockenspiel

(Ped. I sempre)

(F)

(8)

(Page turner=) III

strike ruler with fingertips

(fff sempre)

(l.v.)

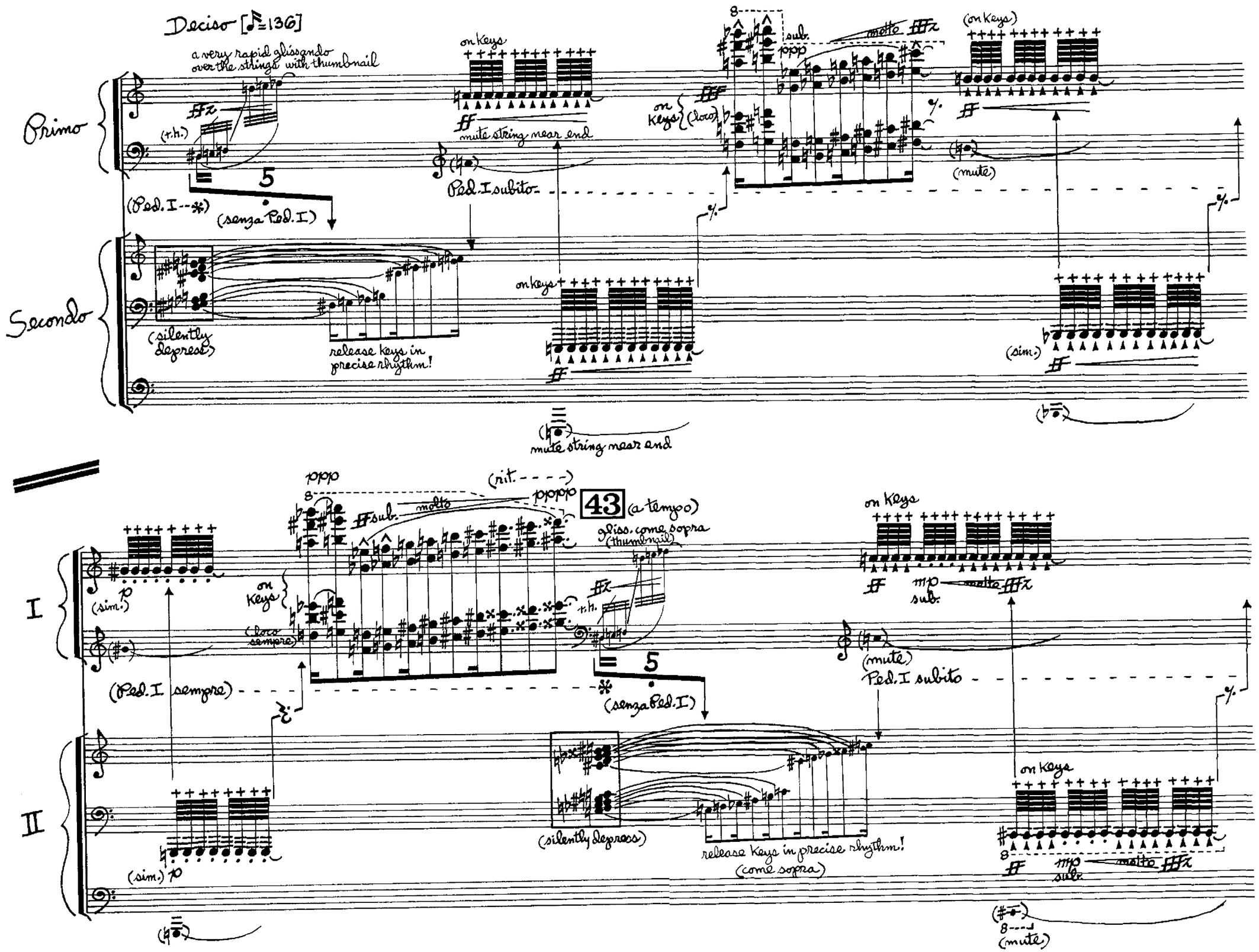
gliss.

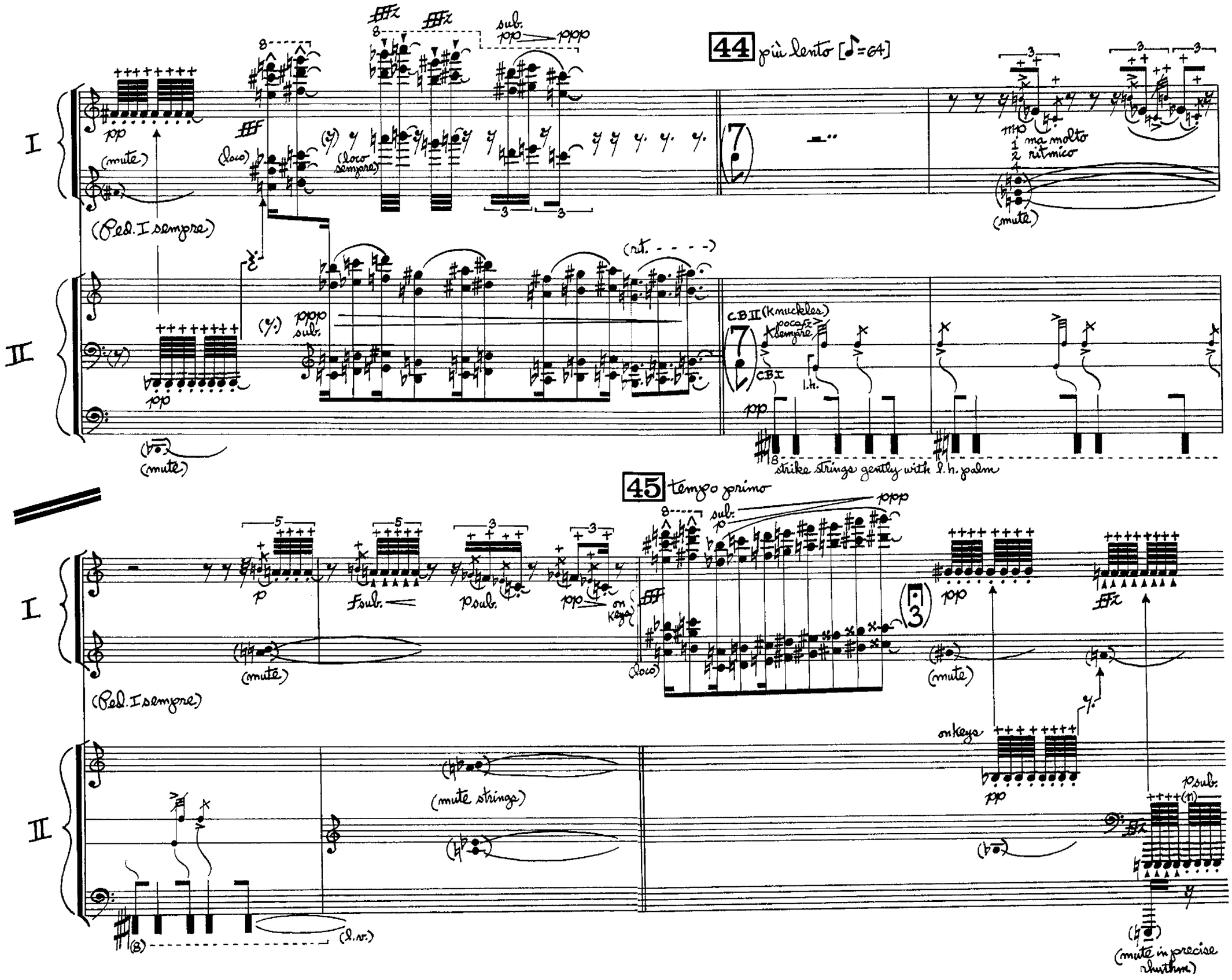
pull ruler off strings, letting the end drag over strings to produce a glissando.

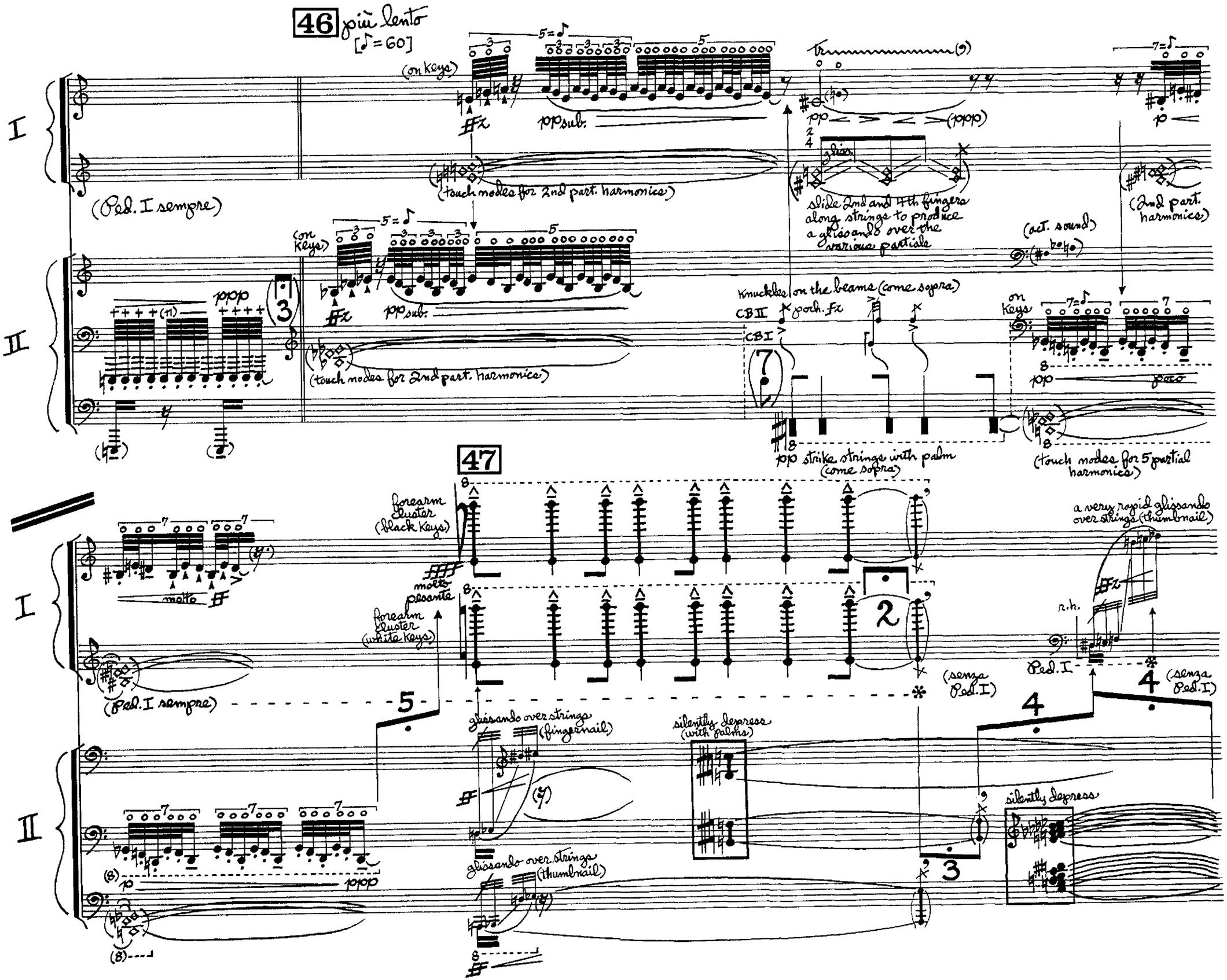
(attacca after a pause of a few seconds)

scrape the strings with edge of ruler (a single rapid stroke) while removing it.

IV. Delta Orionis




44 più lento [♪=64]
45 tempo primo
I
II
(Ped. I sempre)
(mute)
(loco)
(loco sempre)
(rit.)
CB II (knuckles)
CB I
l.h.
strike strings gently with l.h. palm
(mute strings)
(l.v.)
on keys
(mute in precise rhythm)


46 più lento
[♪ = 60]
(on keys)
ffz
ppsub.
(touch nodes for 2nd part. harmonics)
pp
(ppp)
glissando
slide 2nd and 4th fingers along strings to produce a glissando over the various partials
p
(2nd part. harmonics)
I
(Ped. I sempre)
II
ppp
(on keys)
(act. sound)
knuckles on the beams (come sopra)
CB II
CB I
pp strike strings with palm (come sopra)
on keys
pp
poco
(touch nodes for 5 partial harmonics)
47
forearm cluster (black keys)
molto pesante
forearm cluster (white keys)
a very rapid glissando over strings (thumbnail)
r.h.
Ped. I
(senza Ped. I)
glissando over strings (fingernail)
glissando over strings (thumbnail)
silently depress (with palms)
silently depress
molto ff
p
ppp

48

I

II

on keys

(mute)

Ped. I subito - - - (sempre) - -

release keys in precise rhythm

(sim.)

pizz. f.t. (quasi chitarra)

pizz. (f.t.) (near pins)

(act. sound)

(touch 5th part. node)

49 Adagio molto [♩. = 40] ("Cosmic Canons")

SB strike soundboard with fingertips

(Ped. I sempre)

sempre pizz. (f.t.) near end of string

(act. sound)

(Ped. III sempre)

CB III strike with knuckles

CB II

on keys (act. sound)

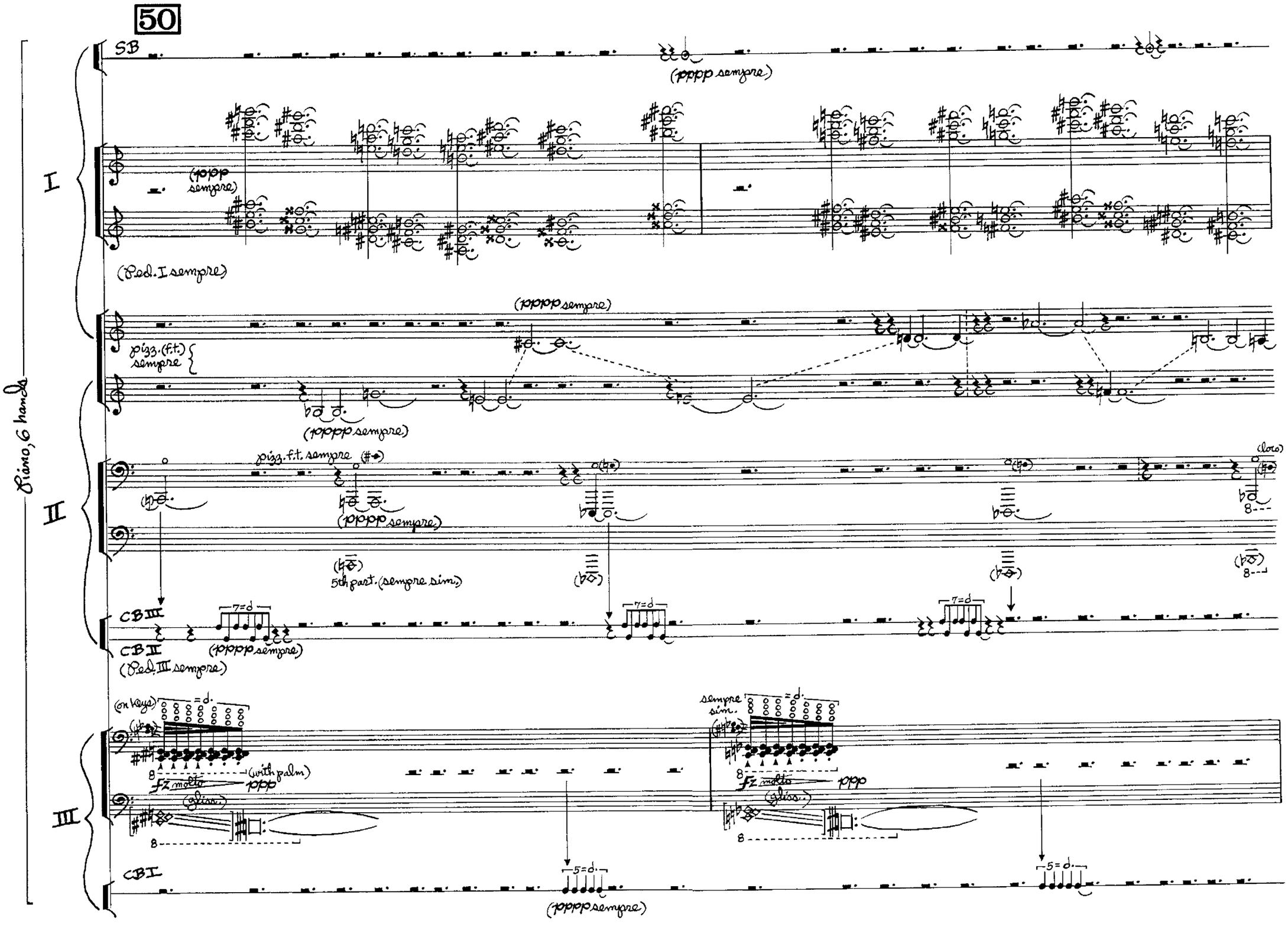
gently strike strings with palm

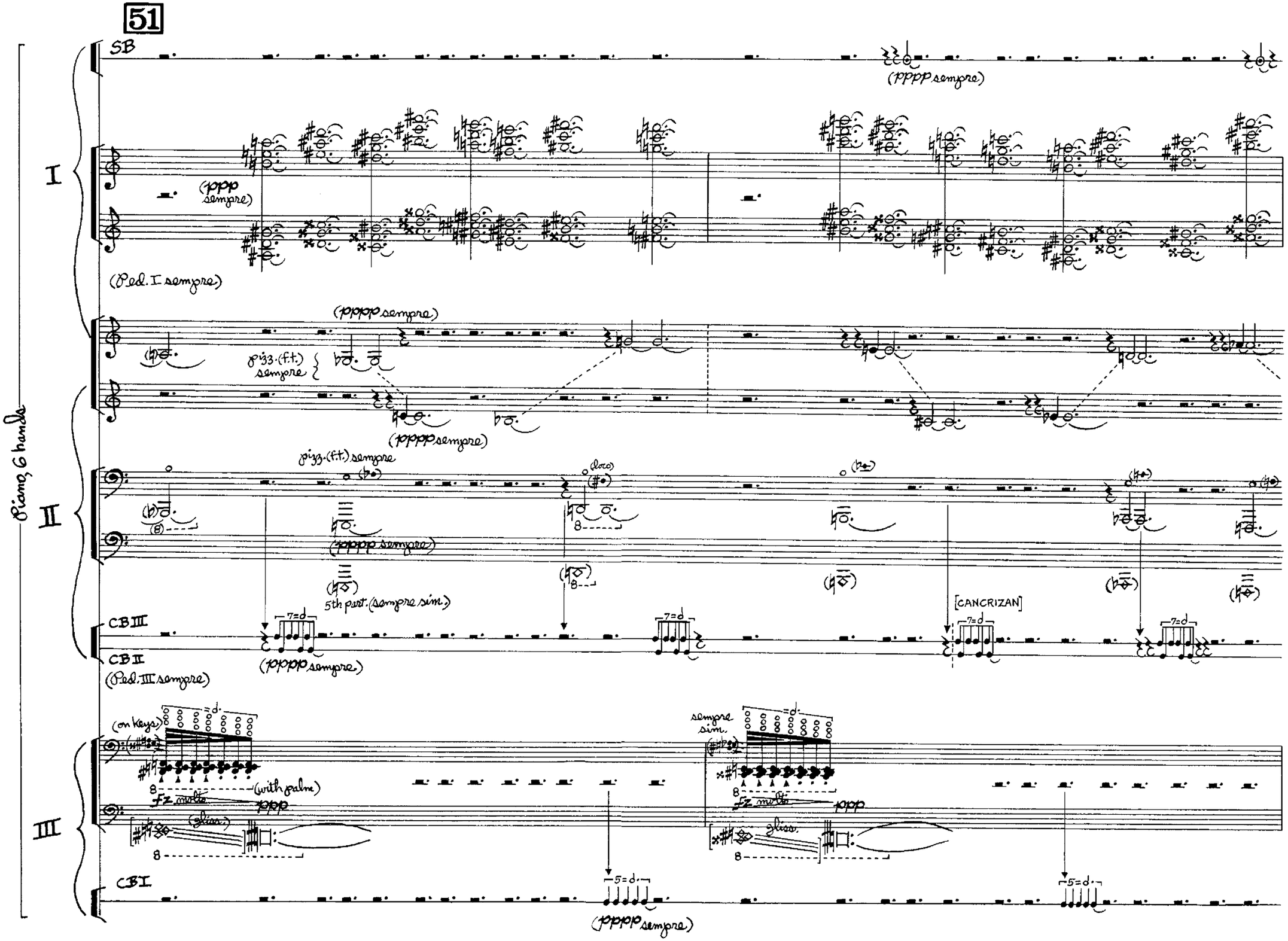
CB I strike with knuckles

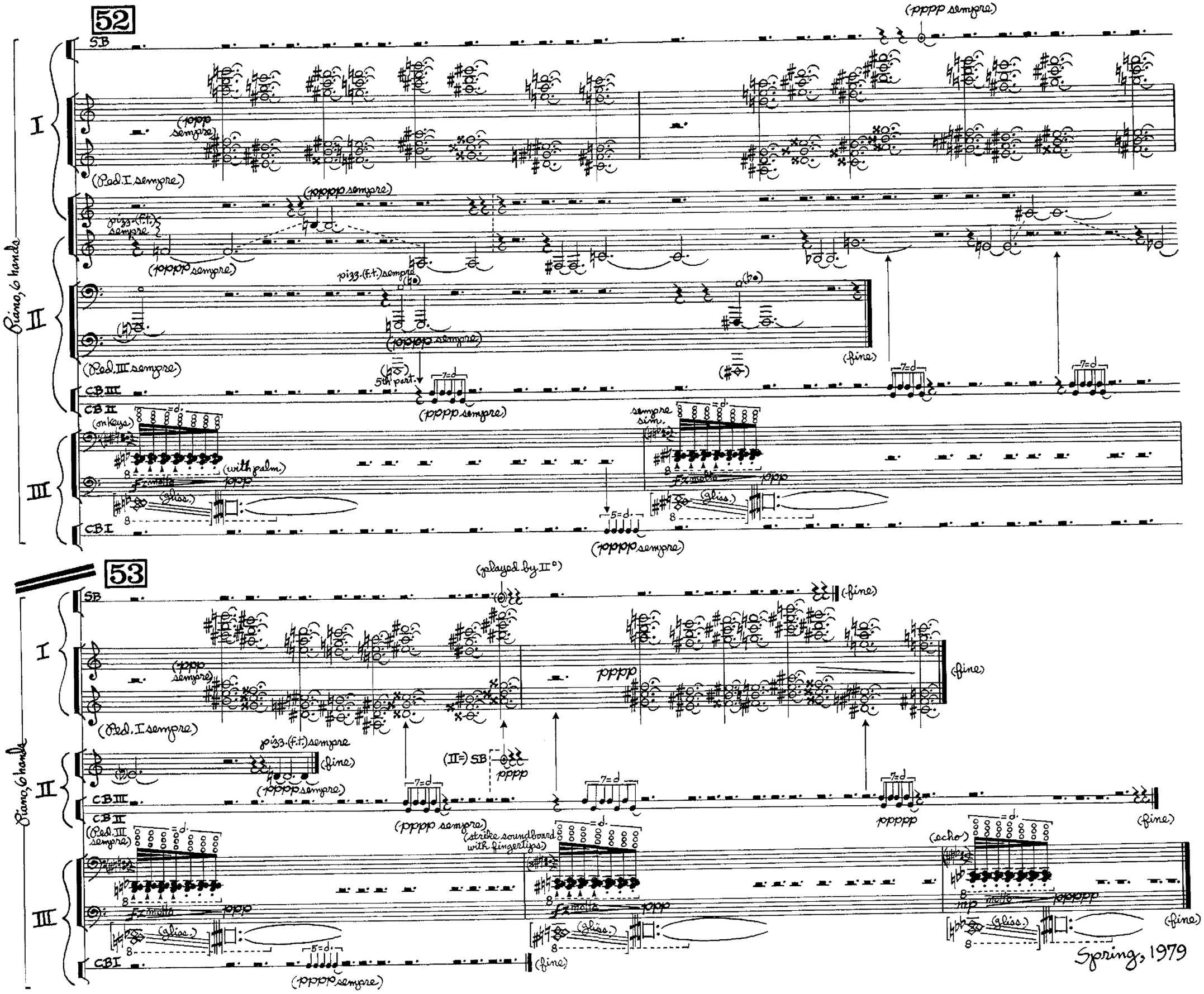
Piano, 6 hands

III (page turner)

*) See note on page 10


50
Piano, 6 hands
I
SB
(pppp sempre)
(ppp sempre)
(Ped. I sempre)
(pppp sempre)
pizz. (f.t.) sempre
(pppp sempre)
II
pizz. f.t. sempre
(pppp sempre)
5th part. (sempre sim.)
CB III
CB II
(Ped. III sempre)
(pppp sempre)
III
(on keys)
(with palm)
fz molto
ppp
(gliss.)
sempre sim.
CB I
(pppp sempre)


51
SB
(pppp sempre)
I
(ppp sempre)
(Ped. I sempre)
(pppp sempre)
pizz. (f.t.) sempre
(pppp sempre)
Piano, 6 hands
II
pizz. (f.t.) sempre
(loco)
(pppp sempre)
5th part. (sempre sim.)
CB III
CB II
(Ped. III sempre)
(pppp sempre)
[CANCRIZAN]
III
(on keys)
(with palm)
fz molto
ppp
(gliss.)
sempre sim.
fz molto
ppp
gliss.
CB I
(pppp sempre)


52
SB
(pppp sempre)
I
(ppp sempre)
(Ped. I sempre)
(pppp sempre)
pizz. (f.t.) sempre
(pppp sempre)
Piano, 6 hands
II
pizz. (f.t.) sempre
(pppp sempre)
(Ped. III sempre)
(fine)
5th part.
CB III
7=d
(pppp sempre)
CB II
(on keys)
sempre sim.
(with palm)
fz molto
ppp
(gliss.)
III
CB I
5=d
(pppp sempre)
53
(played by II°)
(fine)
(ppp sempre)
pppp
(Ped. I sempre)
pizz. (f.t.) sempre
(II=) SB
pppp
(pppp sempre)
(pppp sempre)
ppppp
(Ped. III sempre)
(strike soundboard with fingertips)
(echo)
mp molto
ppppp
(pppp sempre)
Spring, 1979