Score

Marc Sabat

String Quartet 2

(Cucumber Variation)

for 2 violins, viola, cello and electronic tones

PLAINSOUND MUSIC EDITION

String Quartet 2 (2010/11)

for 2 violins, viola, cello and electronic tones

co-commissioned by The Formalist Quartet (Los Angeles) and The Penderecki Quartet (Kitchener) with the assistance of the Canada Council

'String Quartet 2 (Cucumber Variation)' acquired its rather unusual title because of how the piece initially came about. In a number of recent projects I have collaborated with the visual artist Lorenzo Pompa, and he has a series of sculptures in which a straight cucumber is sliced off at the bottom and then placed vertically, like a cactus, in a bed of pickling salt inside a glass vitrine. Over the course of several weeks, a gradual transformation takes place, as the cucumber slowly becomes dessicated, in the process releasing a small drip of fluid and a sweet delicate perfume. Lorenzo invited me to compose a piece of music as a counterpoint to his cucumber vitrine sculpture, a kind of 'moaning serenade'.

Thinking about the action taking place between the two elements, salt and cucumber, I saw a possibility of creating a kind of music sculpture, a slow process of harmonic transformation mirroring that of the cucumber. The resulting piece, 'Cucumber Serenades' (2009) for violin, violin choir, and electronic tones, continues a series of Just Intonation works based on what I call the 'Koan cantus firmus', in hommage to James Tenney: a rising glissando rastered into a sequence of precisely tuned pitches.

In this case, the initial material arose by calculating the set of possible tuneable 23-limit JI intervals from the first seven natural harmonics of the open strings of the violins, viola and cello. The texture juxtaposes a changing element (the gradually rising microtonal line shared among the four musicians) and a relatively static element (the natural harmonics), creating a gradually shifting perception from a fixed set of harmonic intervals as the solo line shifts register. The material is presented as relatively steady and quick sequence of tones, grouped in shifting patterns of (up to) 3 pulses, delicately reminiscent of a dance, sometimes graceful, but with occasional missteps. The initial indication to the players: *Sweetly flowing along, well tuned but somewhat roughly articulated, folk.*

Berlin, 18 July 2010
Rome, 11 September 2011

An informal introduction to the Helmholtz-Ellis Accidentals
by Marc Sabat

Berlin, April 2009

In learning to read HE accidentals, without having to rely on an electronic tuning device, it is important to be familiar with three things:

First, to keep in mind the natural tuning of intervals in a harmonic series, which deviate from the tempered system.

Second, to get to know how the accidentals refer to these overtone relationships.

Third, to observe that each written pitch may be related to many other pitches by natural intervals, and to tune it accordingly.

In most cases, this approach will allow the player to quickly and intuitively play just intonation (JI) pitches quite accurately. Any remaining adjustments can be made by ear, based on the specific sound of JI intervals.

Just intervals are readily learned because they are built up from simple, tuneable harmonic relationships. These are generally based on eliminating beating between common partials, finding common fundamentals and audible combination tones, and establishing a resonant, stable sonority which maximizes clarity: both of consonance and of dissonance.

A well-focussed JI sound is completely distinct from the irregular, fuzzy beating of tempered sounds. Just consonances, when marginally out of tune, beat slowly and sweetly and may be corrected with the most subtle adjustments of bowing or breath. Just dissonances produce a sharply pulsing regular rhythm and have very clear, distinct colors.

To become familiar with the notation and sounds of JI, the fundamental building blocks are prime number overtones 3, 5, 7, 11 and 13, each of which is associated with a specific pair of accidentals and a basic musical interval.

3 is associated with the signs flat, natural, sharp and refers to the series of untempered perfect fifths (Pythagorean intonation). Generally, A is taken as the tuning reference, and the central pitches C-G-D-A-E can be imagined as the normal tuning of the orchestral string instruments. The just C is rather lower than tempered tuning because of the pure fifths. The further this series is extended, the greater the deviation from tempered tuning: the flats are lower, the sharps higher.

5 is associated with arrows attached to the flat, natural, sharp signs and refers to the pure major third. These arrows correct the Pythagorean intervals by a Syntonic Comma, which is approximately 1/9 of a wholetone or 22 cents. So, for example, the note E-flat arrow-up is a just major third below G, and the note F-sharp arrow-down is a major third above D. In most music, flats are often raised by a comma and sharps are lowered. Because of the open string tuning, it is common to sometimes raise F and C (to match A and E) and to sometimes lower A and E (to match F and C). Corrections by one Syntonic Comma have been used throughout Western music history and are relatively familiar to the ear. However, traditionally these corrections have been hidden by players, for example in Meantone Temperament where fifths are mistuned narrow by ¼ comma so that the third C-E ends up sounding pure. More recently, the currently prevailing Equal Temperament has made us accustomed to beating thirds, so at first the pure intervals may seem unfamiliar. To play the arrows accurately, one must carefully learn the sound of the consonant major and minor thirds and sixths, and learn to articulate comma differences clearly.

7 is associated with a Tartini sign resembling the numeral. It corrects the Pythagorean intervals by a Septimal Comma, which is approximately 1/7 of a wholetone or 27 cents. When the Pythagorean minor third is lowered by this amount, it becomes a noticeably low third often heard in Blues music.

11 is associated with the quartertone signs (cross and backwards flat). The accidental is used to raise the perfect fourth by 53 cents, producing the exact tuning of the 11th partial in a harmonic series. The sound is most easily learned by playing one octave plus one fourth and raising it by a quartertone.

13 is associated with the thirdtone signs (cross and backwards flat, each with 2 verticals). The accidental is used to lower the Pythagorean major sixth by 65 cents, producing the exact tuning of the 13th partial in a harmonic series. The sound is most easily learned as a neutral-sounding sixth, one-third of the way between the just minor and just major sixths (closer to minor than to major).

The following table presents the accidentals together with their associated ratios and cents deviations. To calculate the cents deviation from Equal Temperament of a specific written pitch (if desired) the following shortcut may be used:

1.) Find the cents deviation of the Pythagorean pitch, by calculating how many fifths it is away from A, multiplying by 2, and using a plus sign if it is on the sharp side and a minus if it is on the flat side.

2.) For each microtonal accidental, add or subtract its approximate cents value (as given above), keeping in mind whether the accidental is raising or lowering the pitch.

The resulting value should be a cents deviation within 1 or 2 cents accuracy, which is an acceptable starting point for fine-tuning by ear.

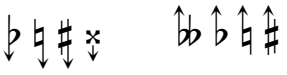
ACCIDENTALS

EXTENDED HELMHOLTZ-ELLIS JI PITCH NOTATION

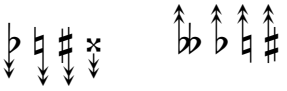
for Just Intonation
designed by Marc Sabat and Wolfgang von Schweinitz

The exact intonation of each pitch may be written out by means of the following harmonically-defined signs:

Pythagorean series of fifths – the open strings
(… c g d a e …)



lowers / raises by a syntonic comma
81 : 80 = ***circa 21.5 cents***



lowers / raises by two syntonic commas
circa 43 cents

lowers / raises by a septimal comma
64 : 63 = ***circa 27.3 cents***

lowers / raises by two septimal commas
circa 54.5 cents

raises / lowers by an 11-limit undecimal quarter-tone
33 : 32 = ***circa 53.3 cents***

lowers / raises by a 13-limit tridecimal third-tone
27 : 26 = ***circa 65.3 cents***

lowers / raises by a 17-limit schisma
256 : 255 = ***circa 6.8 cents***

raises / lowerss by a 19-limit schisma
513 : 512 = ***circa 3.4 cents***

raises / lowers by a 23-limit comma
736 : 729 = ***circa 16.5 cents***

In addition to the harmonic definition of a pitch by means of its accidentals, it is also possible to indicate its absolute pitch-height as a cents-deviation from the respectively indicated chromatic pitch in the 12-tone system of Equal Temperament.

The attached arrows for alteration by a syntonic comma are transcriptions of the notation that Hermann von Helmholtz used in his book "Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik" (1863). The annotated English translation "On the Sensations of Tone as a Physiological Basis for the Theory of Music" (1875/1885) is by Alexander J. Ellis, who refined the definition of pitch within the 12-tone system of Equal Temperament by introducing a division of the octave into 1200 cents. The sign for a septimal comma was devised by Giuseppe Tartini (1692-1770) – the composer, violinist and researcher who first studied the production of difference tones by means of double stops.

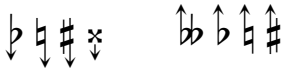
VORZEICHEN

EXTENDED HELMHOLTZ-ELLIS JI PITCH NOTATION

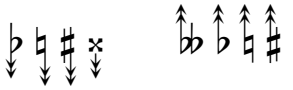
für die natürliche Stimmung
konzipiert von Marc Sabat und Wolfgang von Schweinitz

Die Stimmung jedes Tons ist mit folgenden harmonisch definierten Vorzeichen ausnotiert:

Pythagoreische Quintenreihe der leeren Streicher-Saiten
(… c g d a e …)



Erniedrigung / Erhöhung um ein Syntonisches Terzkomma
81 : 80 = ***circa 21.5 cents***



Erniedrigung / Erhöhung um zwei Syntonische Terzkommas
circa 43 cents

Erniedrigung / Erhöhung um ein Septimenkomma
64 : 63 = ***circa 27.3 cents***

Erniedrigung / Erhöhung um zwei Septimenkommas
circa 54.5 cents

Erhöhung / Erniedrigung um den undezimalen Viertelton der 11er-Relation
33 : 32 = ***circa 53.3 cents***

Erniedrigung / Erhöhung um den tridezimalen Drittelton der 13er-Relation
27 : 26 = ***circa 65.3 cents***

Erniedrigung / Erhöhung um ein Siebzehner-Schisma
256 : 255 = ***circa 6.8 cents***

Erhöhung / Erniedrigung um ein Neunzehner-Schisma
513 : 512 = ***circa 3.4 cents***

Erhöhung / Erniedrigung um ein Dreiundzwanziger-Komma
736 : 729 = ***circa 16.5 cents***

Zusätzlich zu der harmonischen Definition der Tonhöhe durch das Vorzeichen für jeden Ton ist auch der Cents-Wert der Abweichung der gewünschten Stimmung von der Tonhöhe des jeweils bezeichneten chromatischen Tons der gleichstufig temperierten Zwölfton-Skala angegeben.

Die attachierten Pfeile für die Alteration um ein Syntonisches Terzkomma sind eine bloße Transkription der Notation, die Hermann von Helmholtz in seinem Buch "Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik" (1863) verwendet hat. Die kommentierte englische Übersetzung "On the Sensations of Tone as a Physiological Basis for the Theory of Music" (1875/1885) stammt von Alexander J. Ellis, der auch eine enorme Verfeinerung der Tonhöhendefinition innerhalb des Zwölftonsystems der gleichstufig temperierten Stimmung durch die Unterteilung der Oktave in 1200 Cents eingeführt hat. – Das Vorzeichen für die Alteration um ein Septimenkomma wurde von Giuseppe Tartini (1692-1770) erfunden, der als Komponist, Geiger und Wissenschaftler die durch Doppelgriffe erzeugten Differenztöne untersucht hat.

Score

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(Cucumber Variation)

co-commissioned by The Formalist Quartet (Los Angeles) and The Penderecki Quartet (Kitchener)
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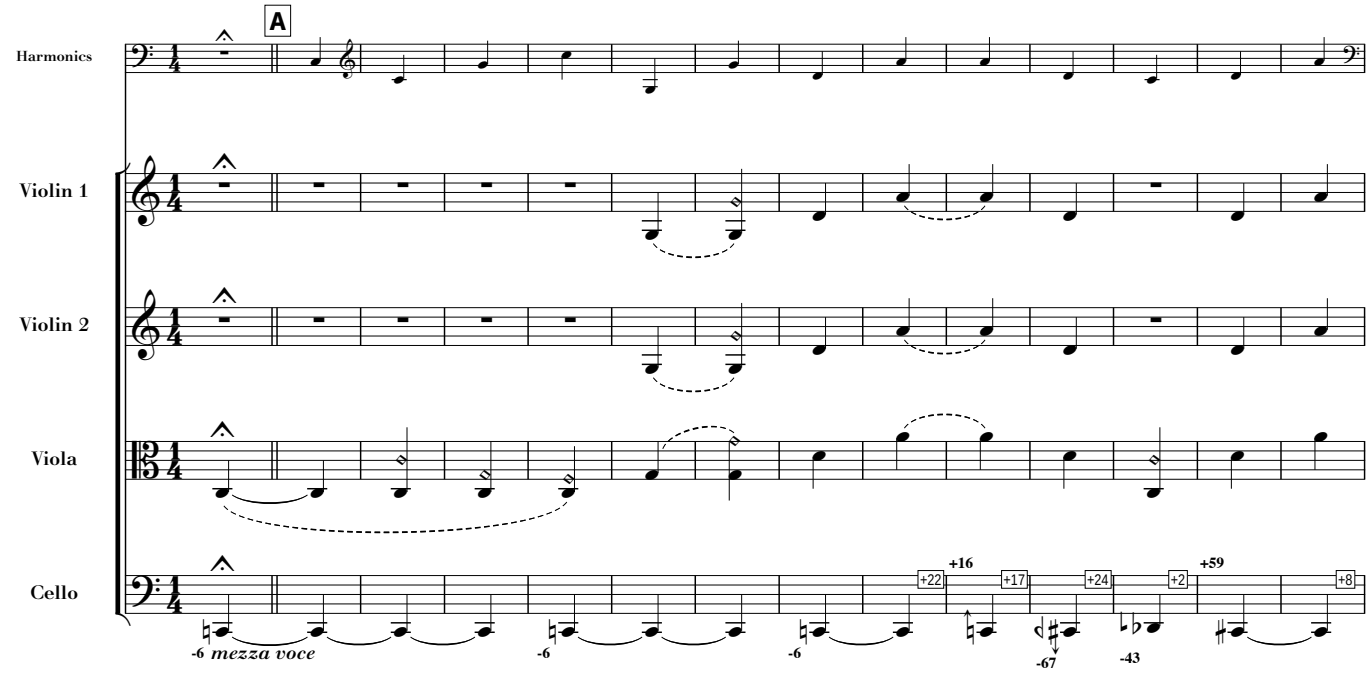
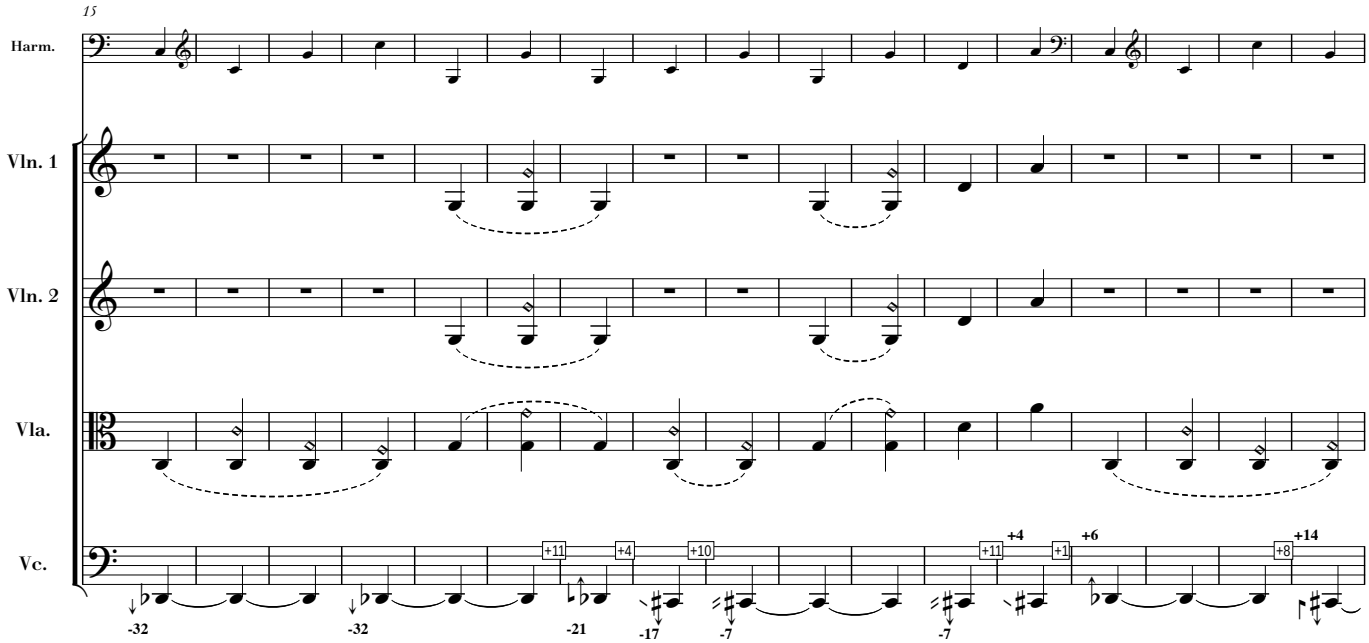
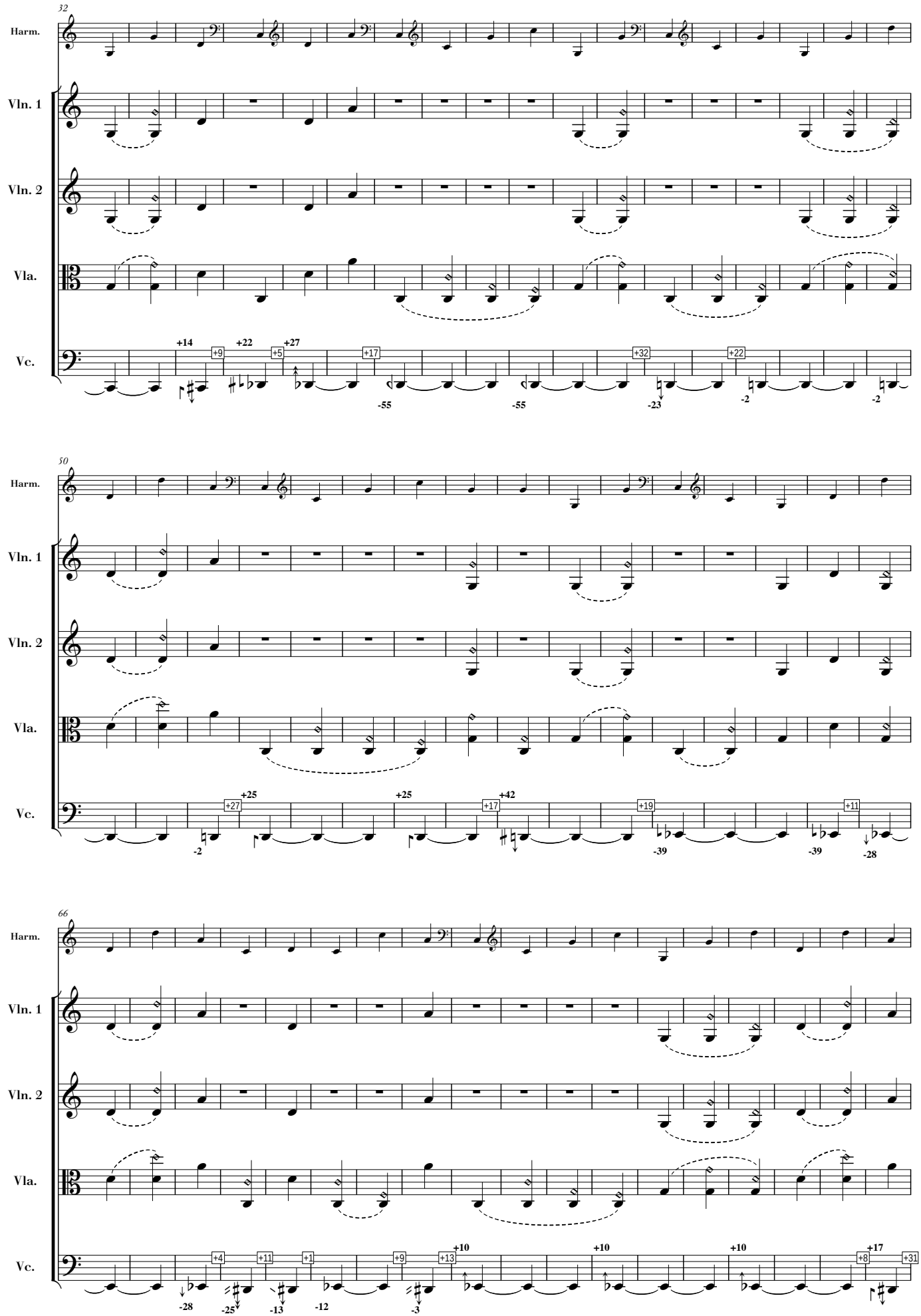
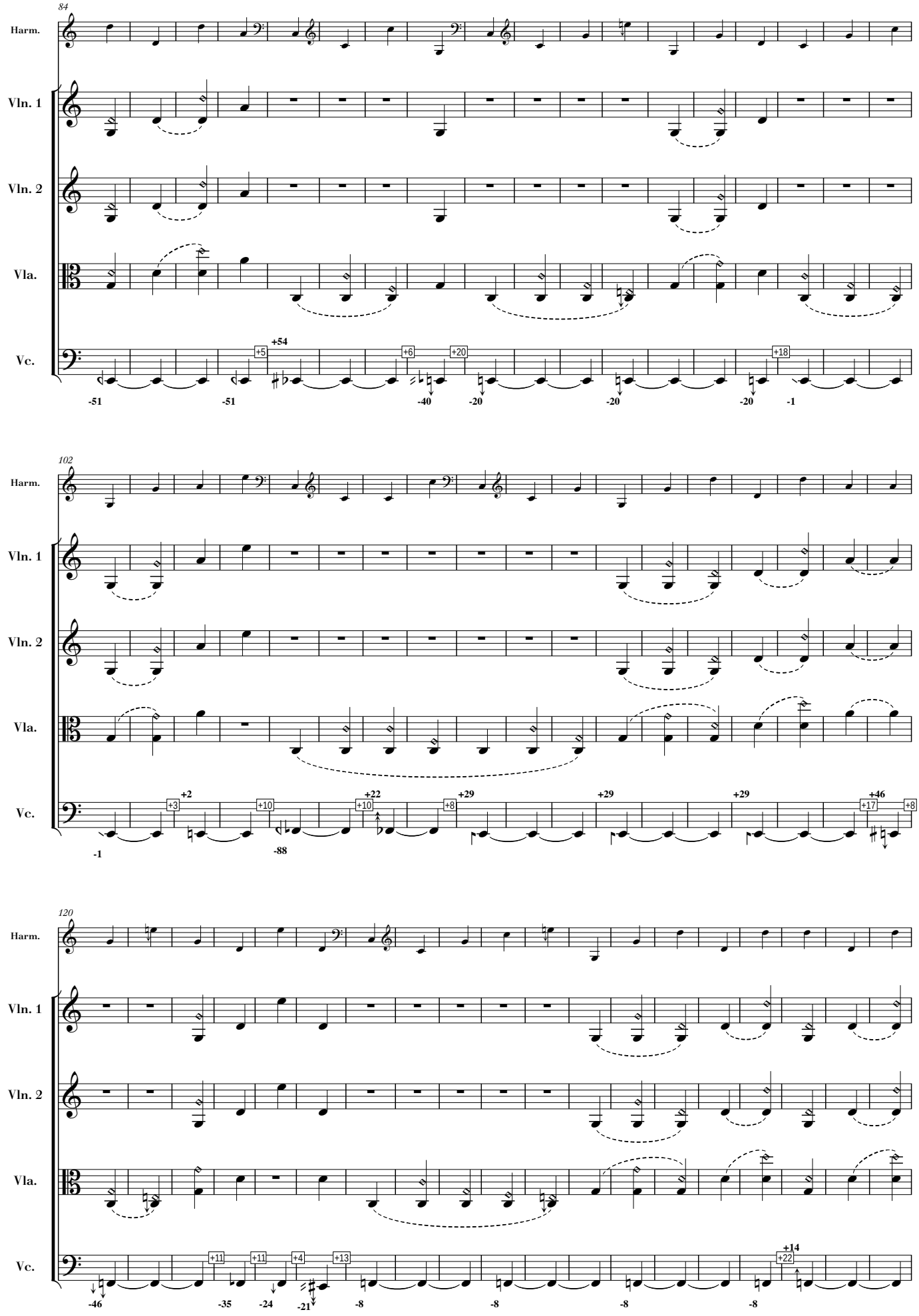
Sweetly flowing along, well tuned but somewhat roughly articulated, folk

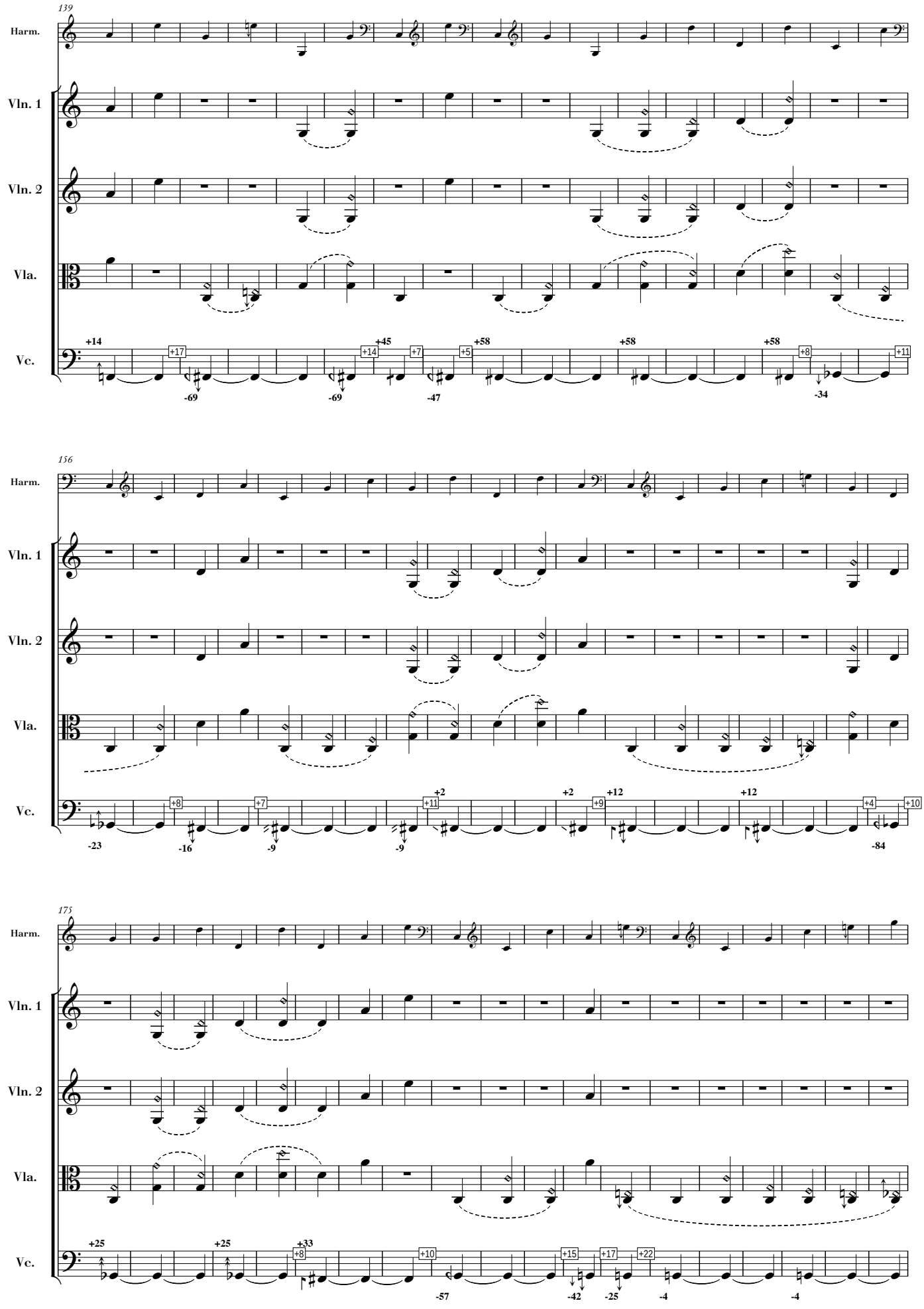
Marc Sabat

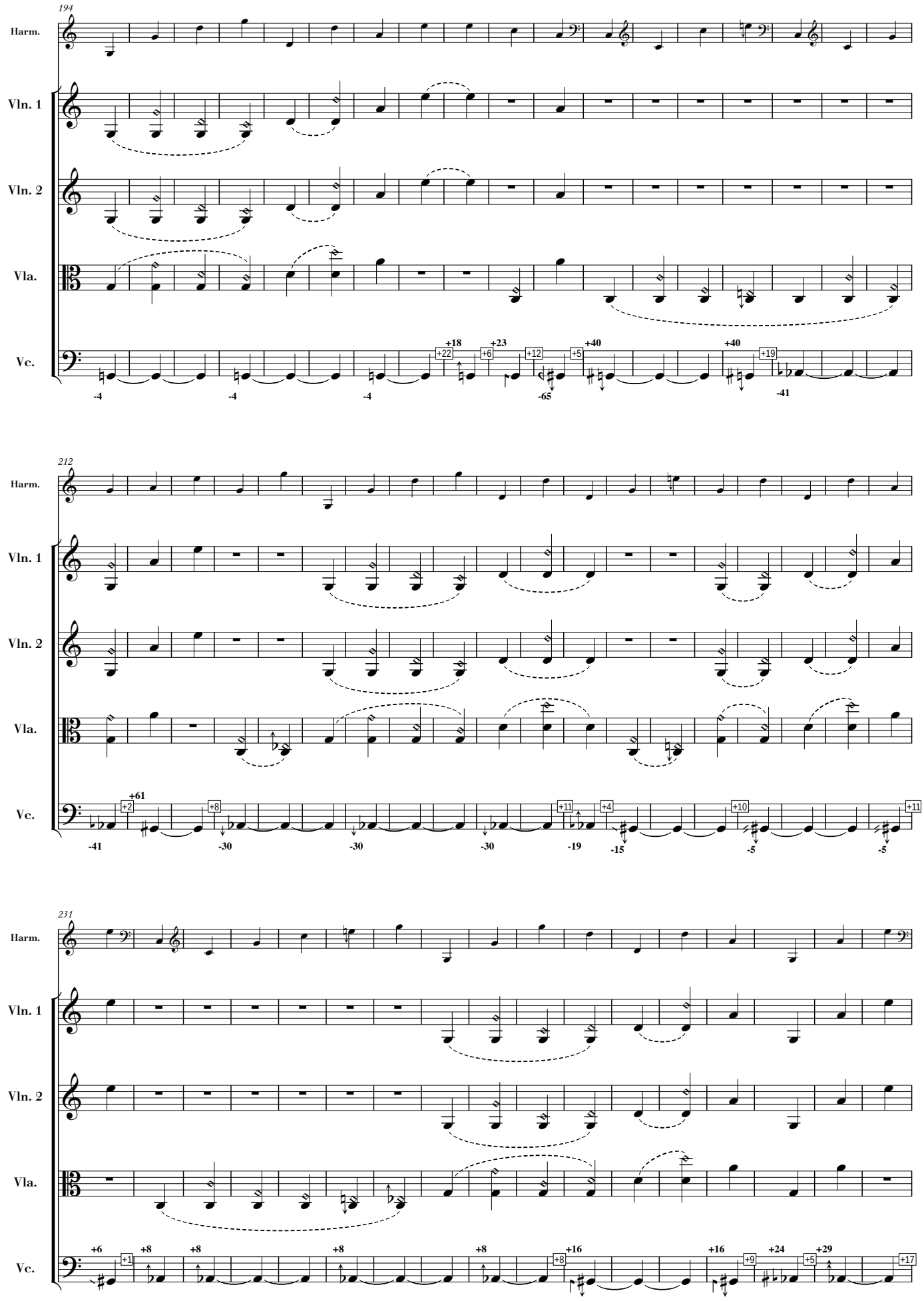


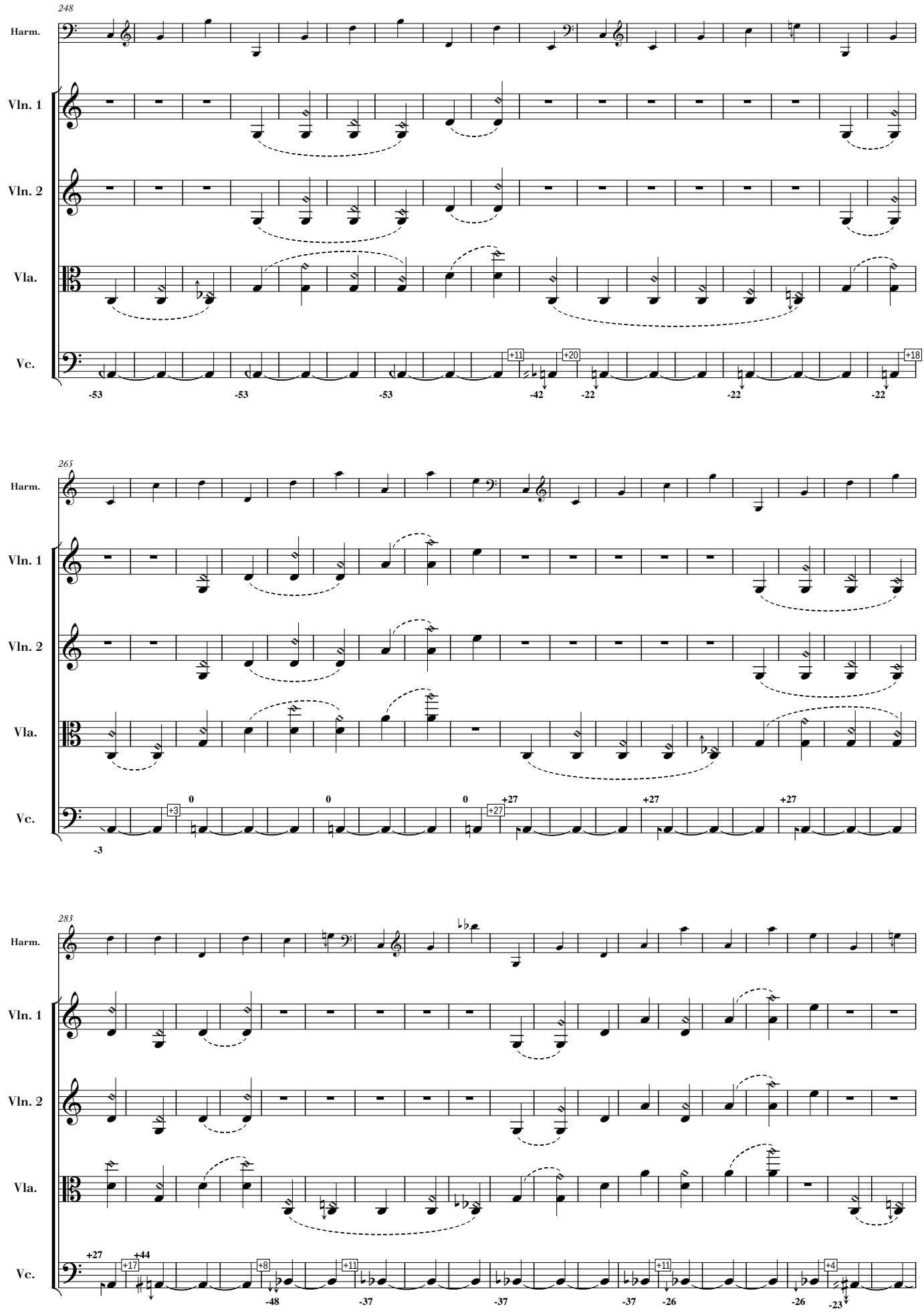


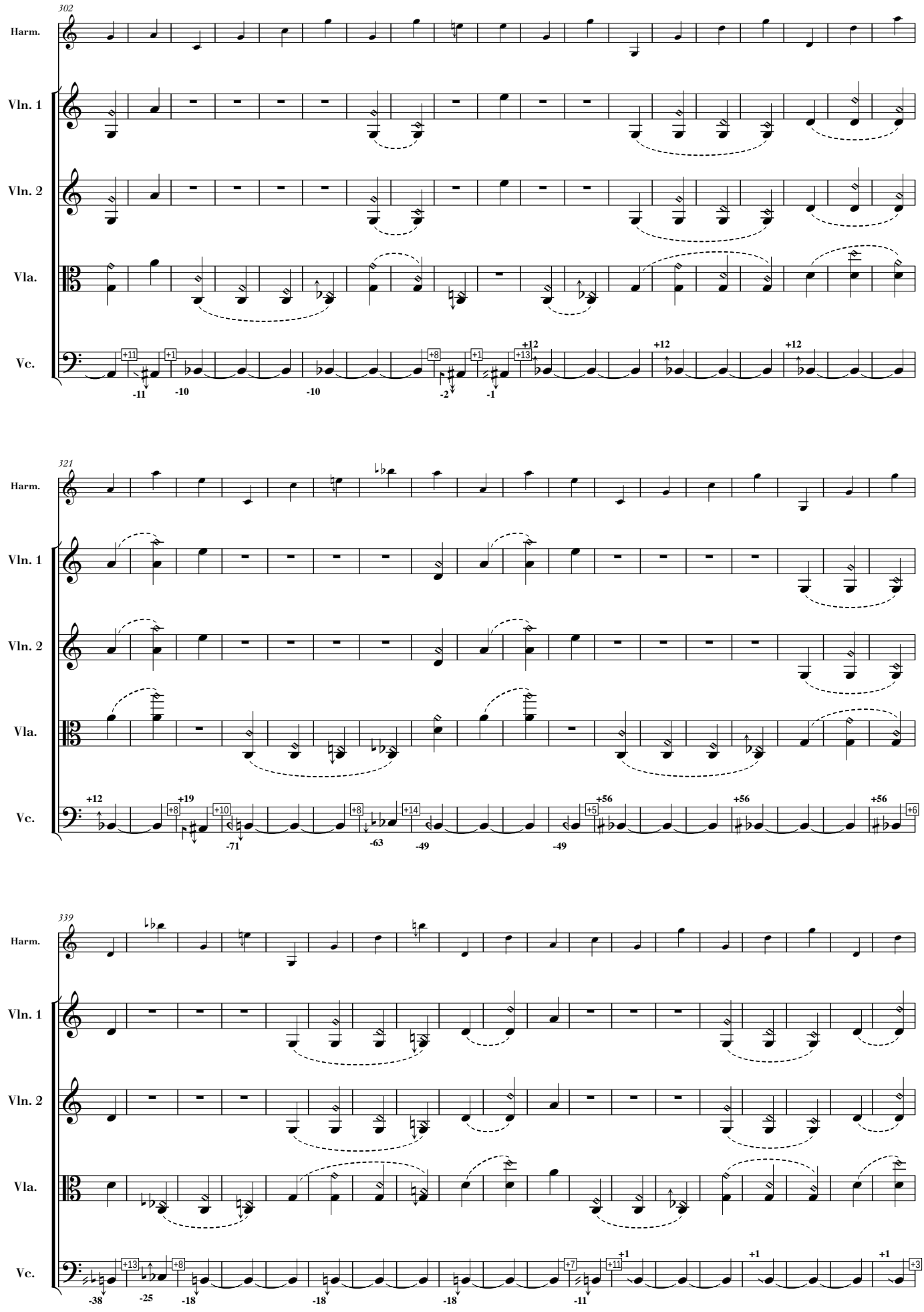

32
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+14
+9
+22
+5
+27
+17
-55
-55
+32
-23
+22
-2
-2
50
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+27
-2
+25
+25
+17
+42
+19
-39
-39
+11
-28
66
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+4
-28
+11
-25
+1
-13
-12
+9
+13
-3
+10
+10
+10
+17
+8
+31

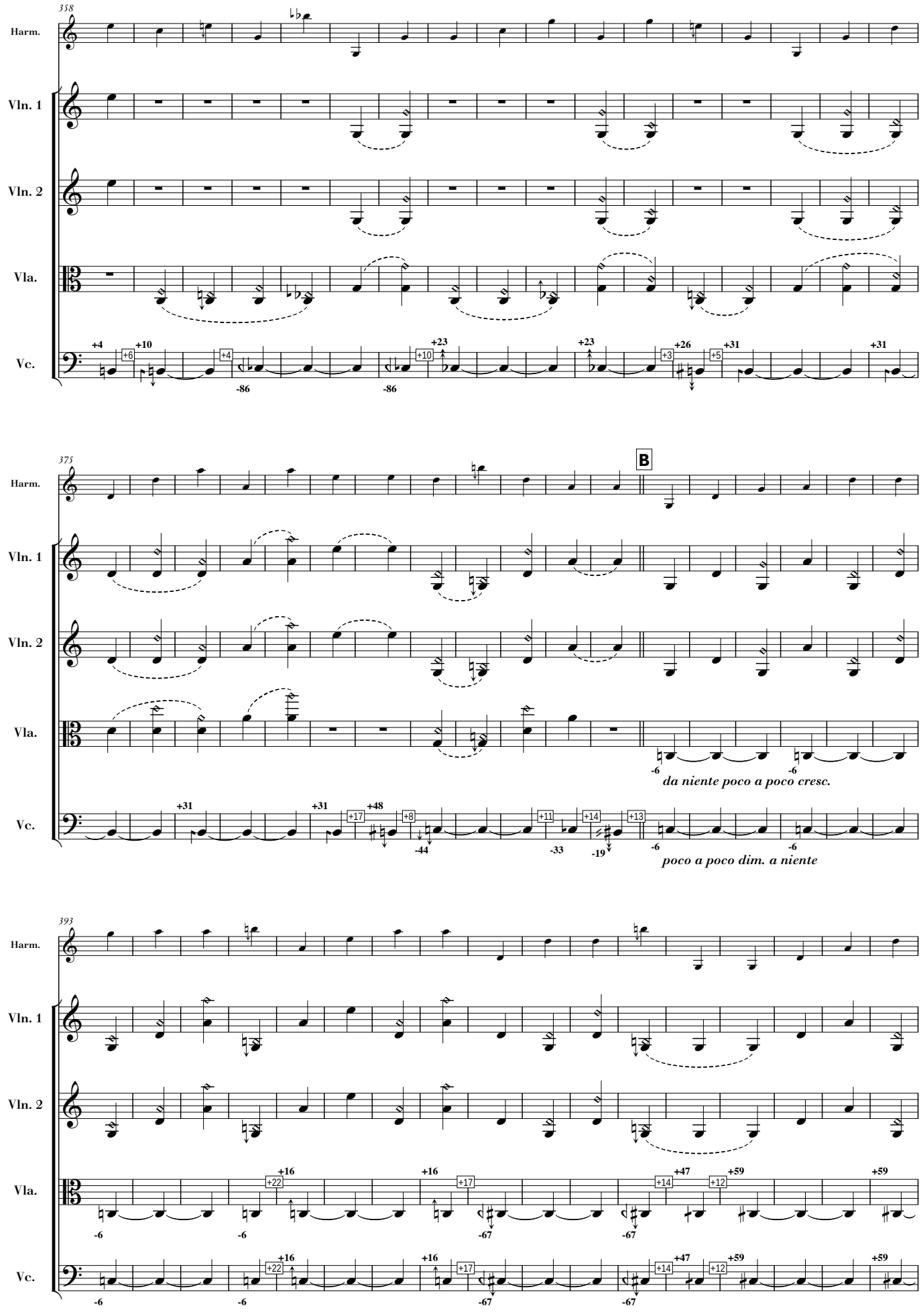

84
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+54
+5
+6
+20
+18
-51
-51
-40
-20
-20
-20
-1
102
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+2
+3
+10
+10
+22
+8
+29
+29
+29
+46
+17
+8
-1
-88
120
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+11
+11
+4
+13
+14
+22
-46
-35
-24
-21
-8
-8
-8
-8

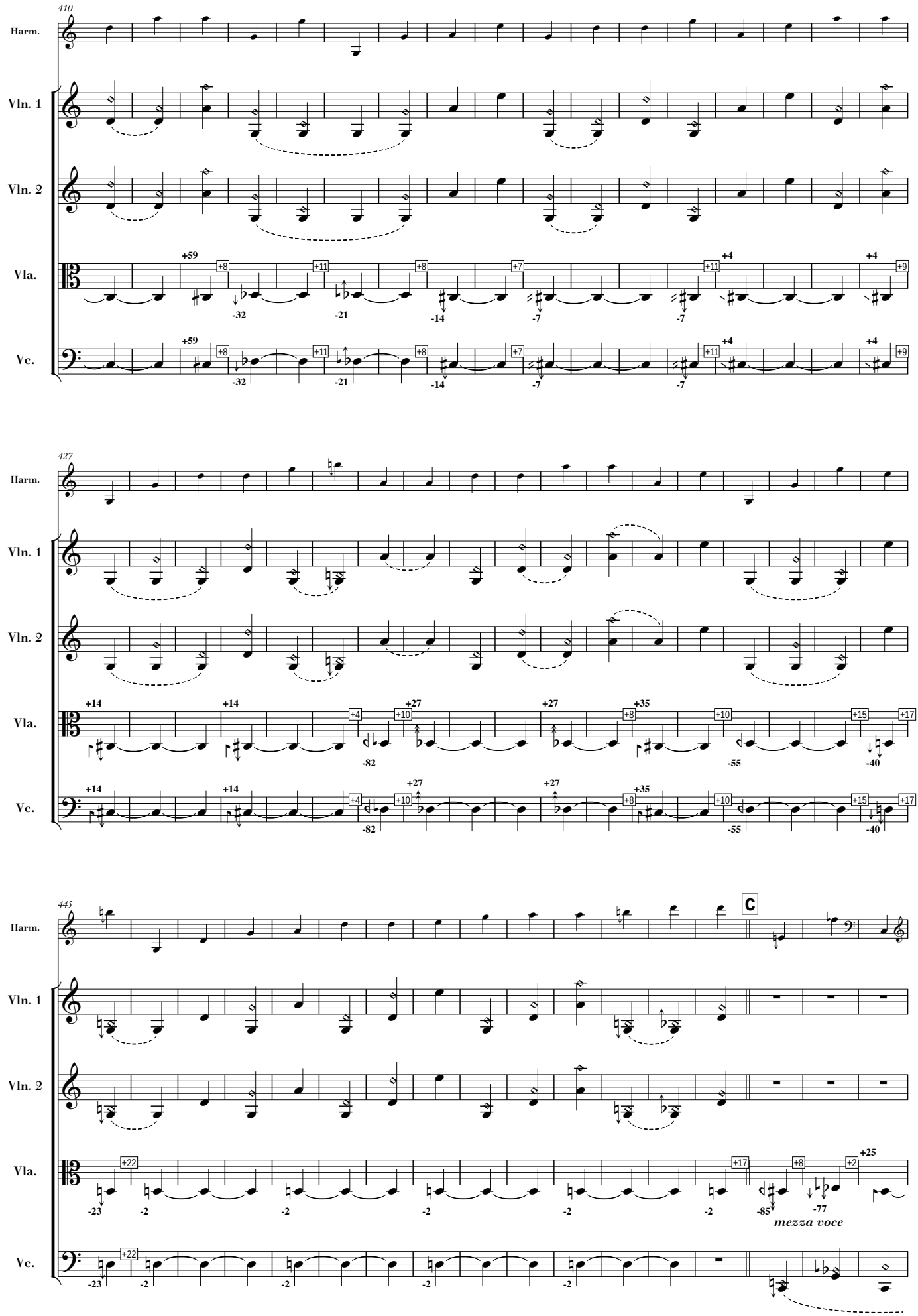

139
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+14
+17
-69
-69
+45
+14
+7
-47
+5
+58
+58
+58
+8
-34
+11
156
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-23
+8
-16
+7
-9
-9
+2
+11
+2
+9
+12
+12
+4
-84
+10
175
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+25
+25
+33
+8
+10
-57
+15
-42
+17
-25
+22
-4
-4

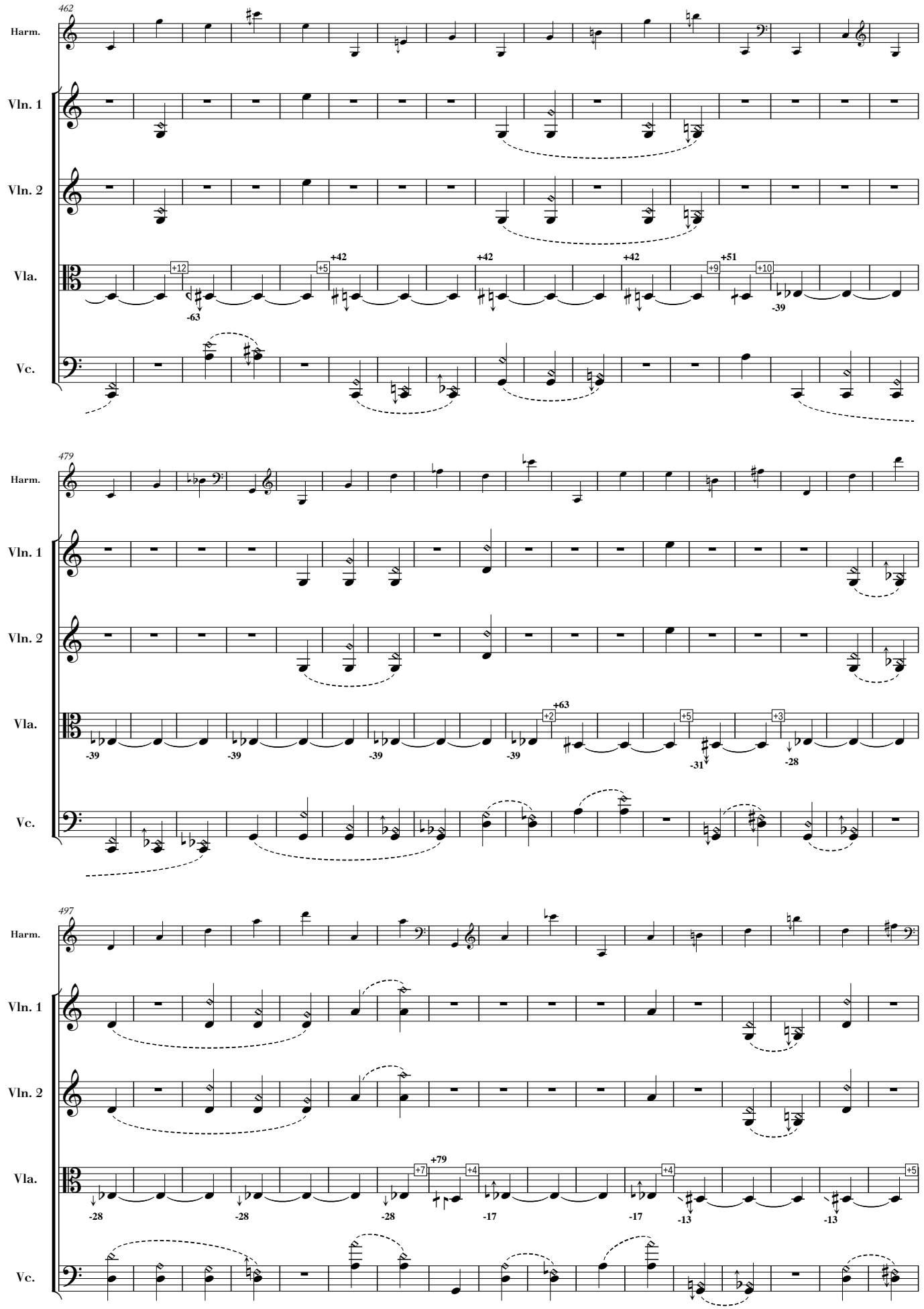

194
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-4
-4
-4
+22
+18
+6
+23
+12
-65
+5
+40
+40
+19
-41
212
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-41
+2
+61
-30
+8
-30
-30
-19
+11
+4
-15
+10
-5
+11
-5
231
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+6
+1
+8
+8
+8
+8
+16
+8
+16
+9
+24
+5
+29
+17

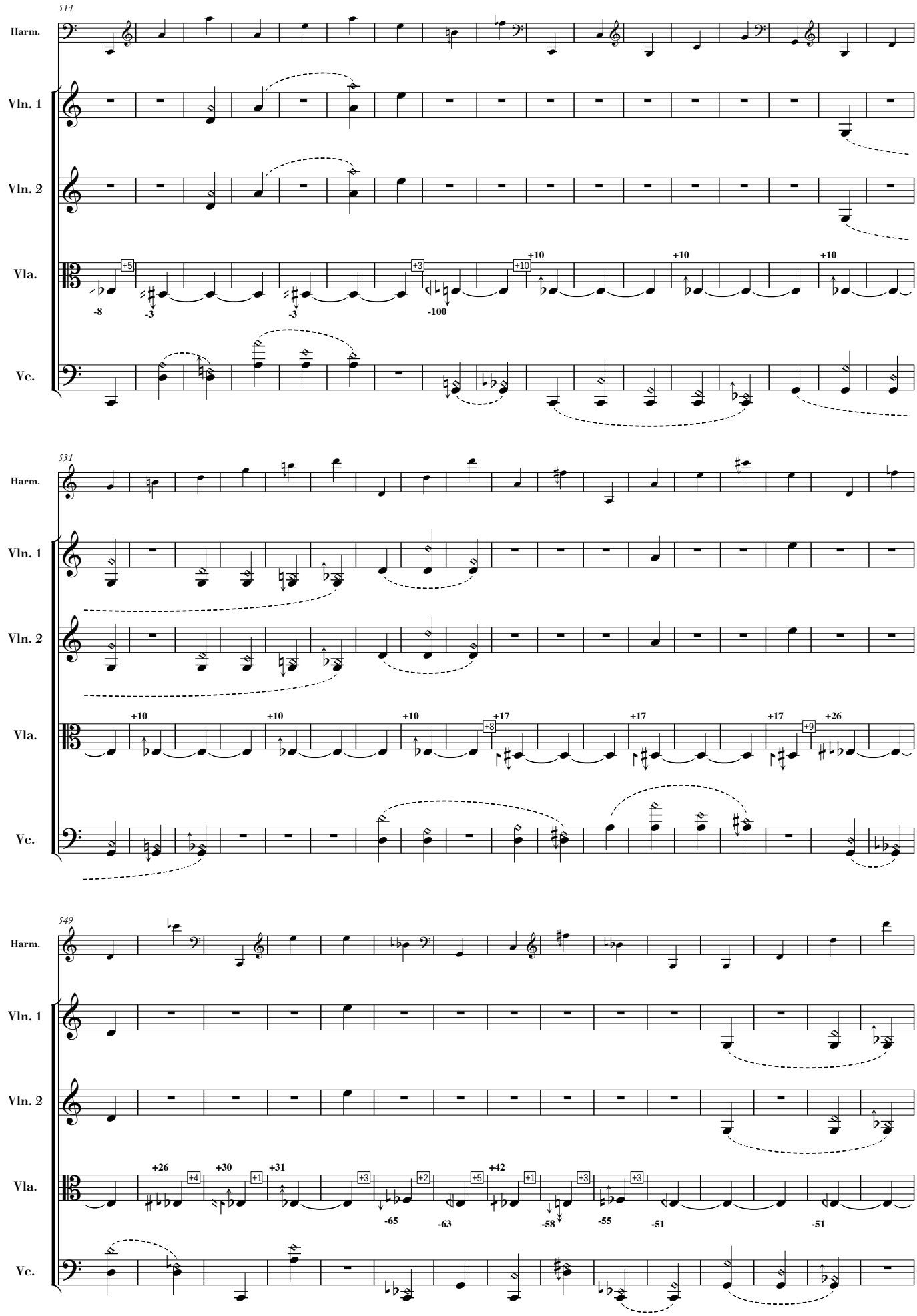

248
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-53
-53
-53
+11
-42
+20
-22
-22
+18
-22
265
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-3
+3
0
0
0
+27
+27
+27
+27
283
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+27
+17
+44
+8
-48
+11
-37
-37
-37
+11
-26
-26
+4
-23

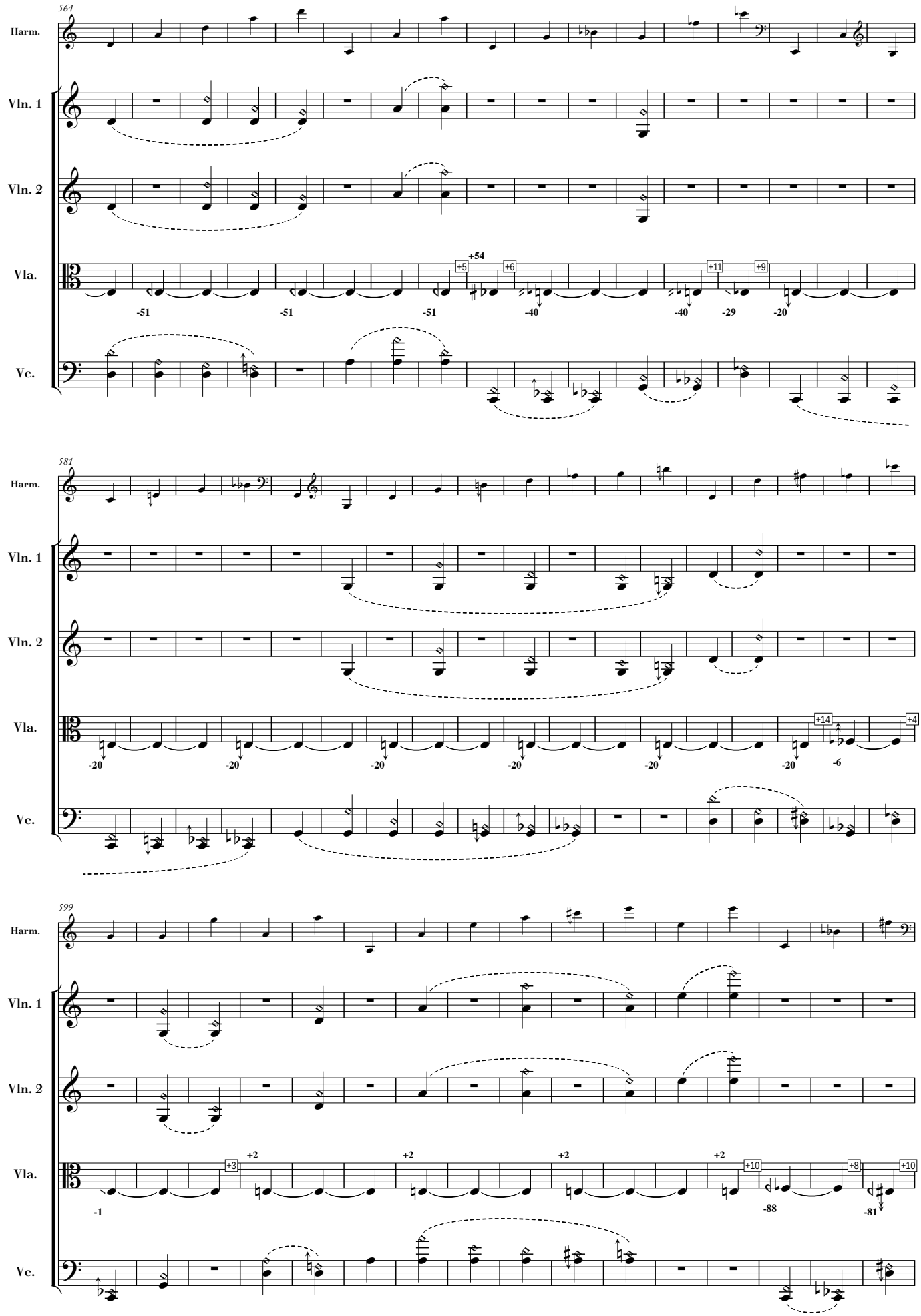

302
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
321
339

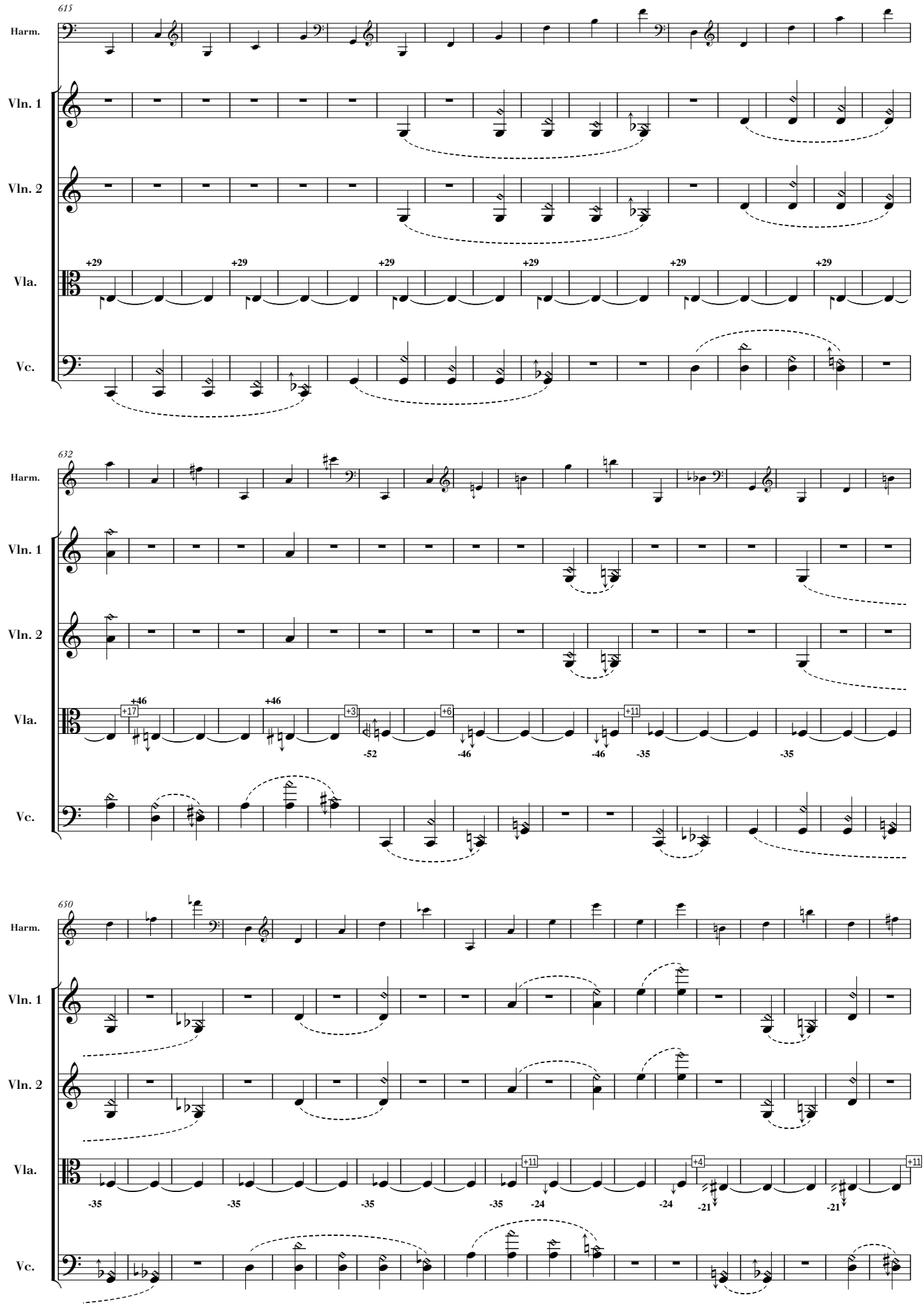

358
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
375
B
da niente poco a poco cresc.
poco a poco dim. a niente
393

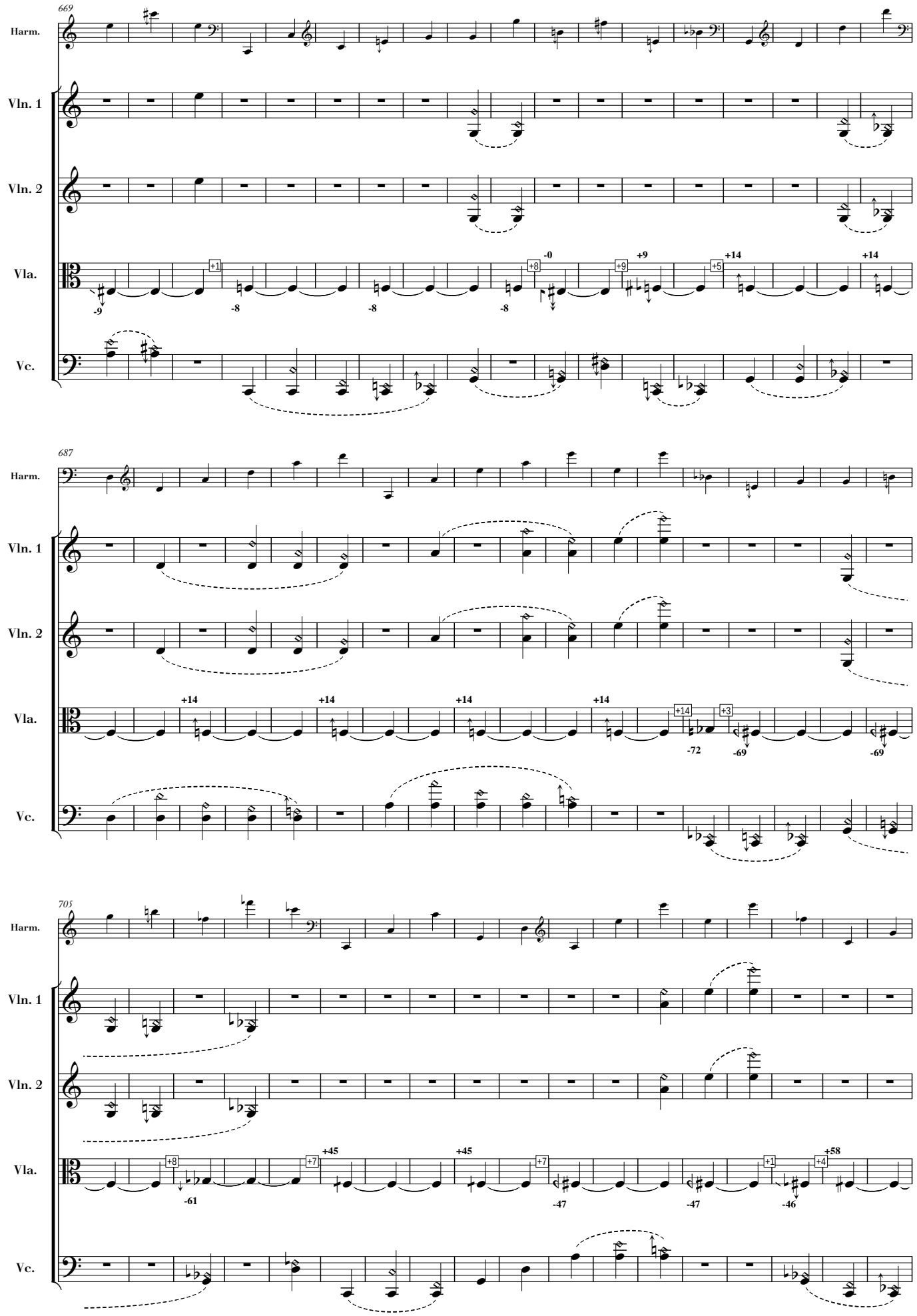

410
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
427
445
C
mezza voce

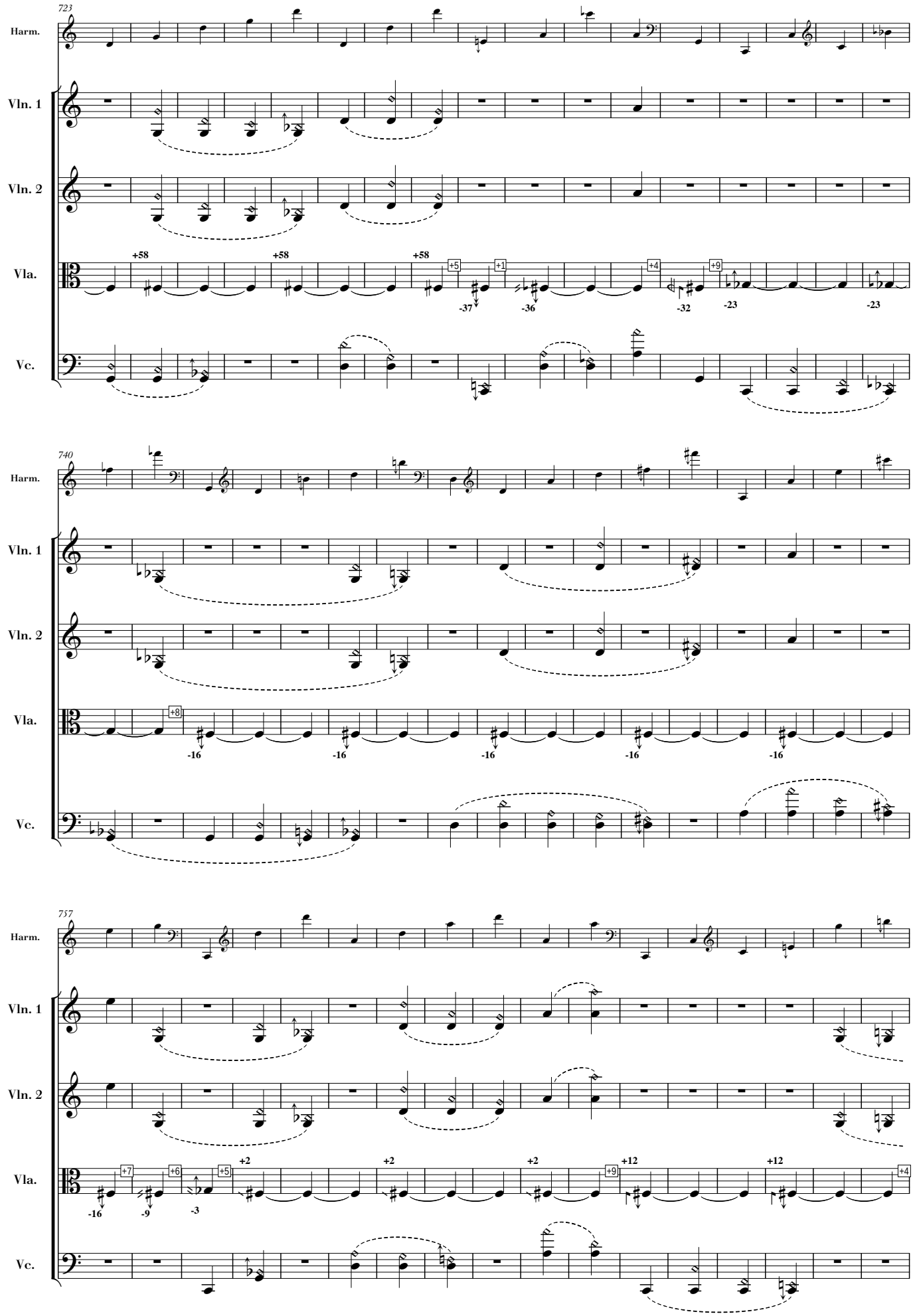

462
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+12
-63
+5
+42
+42
+42
+9
+51
+10
-39
479
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-39
-39
-39
-39
+63
+2
+5
-31
+3
-28
497
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-28
-28
-28
+7
+79
+4
-17
-17
+4
-13
-13
+5

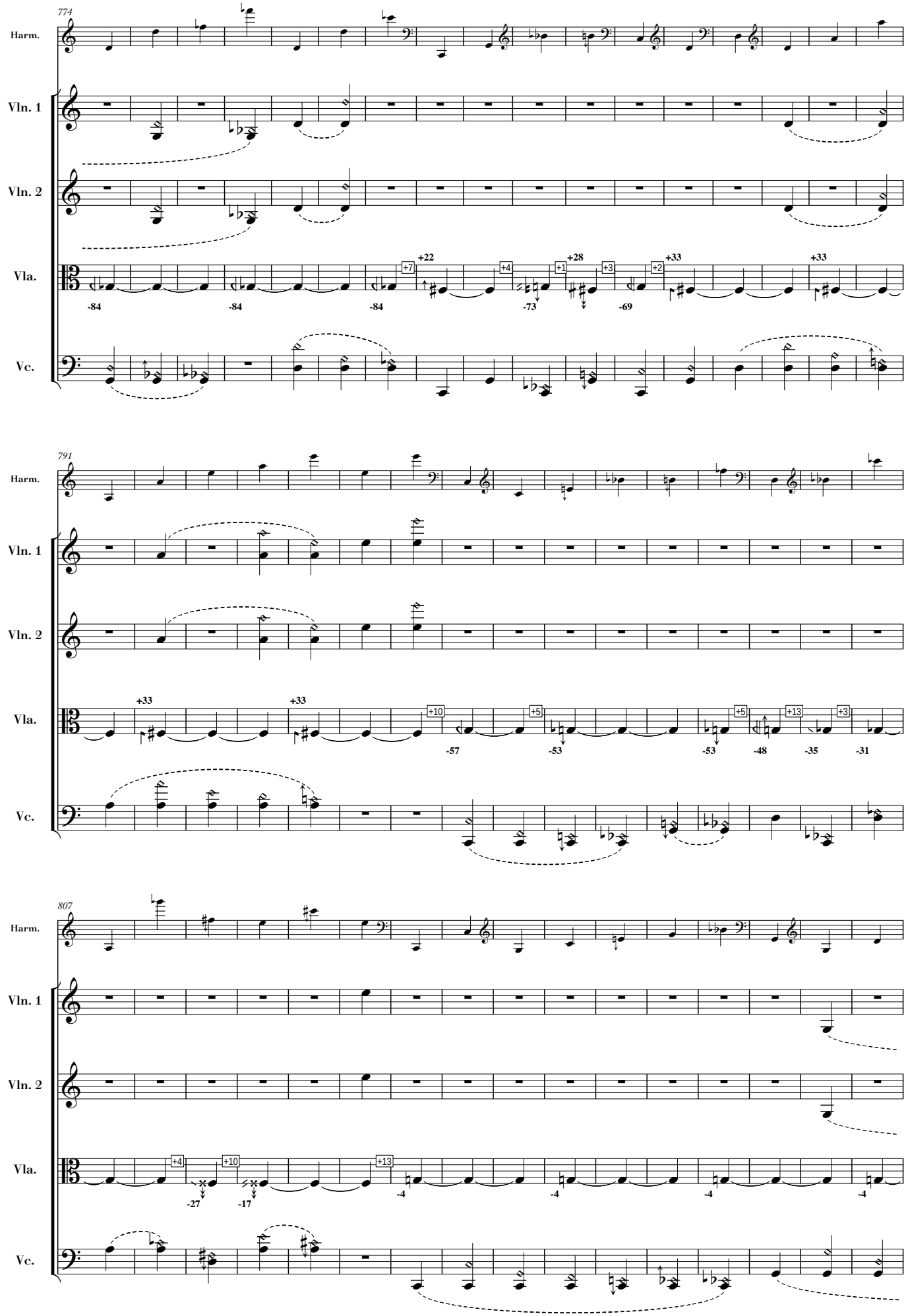

514
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+5
+3
+10
+10
+10
+10
-8
-3
-3
-100
531
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+10
+10
+10
+17
+17
+17
+26
+8
+9
549
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+26
+30
+31
+42
+4
+1
+3
+2
+5
+1
+3
+3
-65
-63
-58
-55
-51
-51

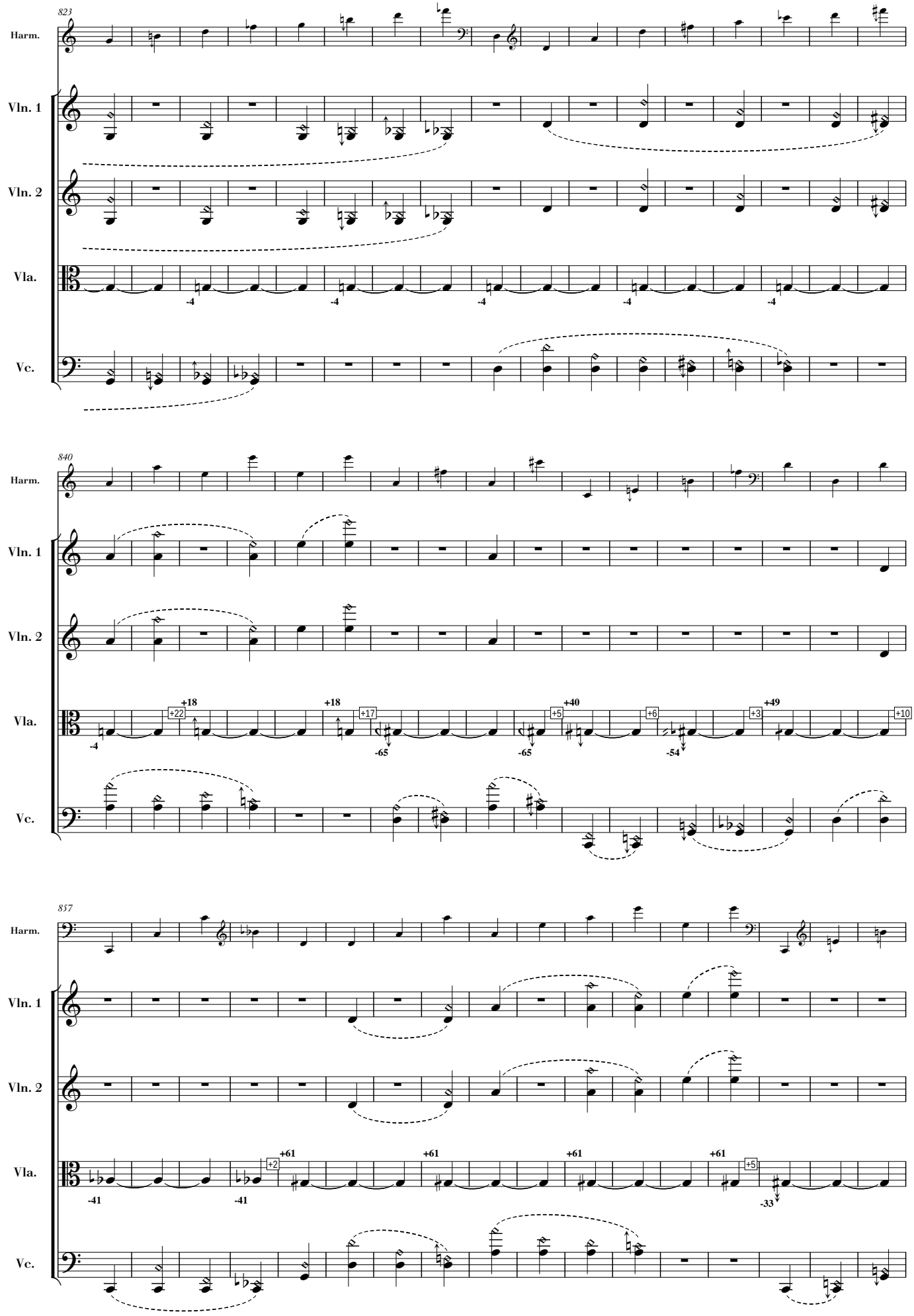

564
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+54
+5
+6
+11
+9
-51
-51
-51
-40
-40
-29
-20
581
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+14
+4
-20
-20
-20
-20
-20
-20
-6
599
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+3
+2
+2
+2
+2
+10
+8
+10
-1
-88
-81

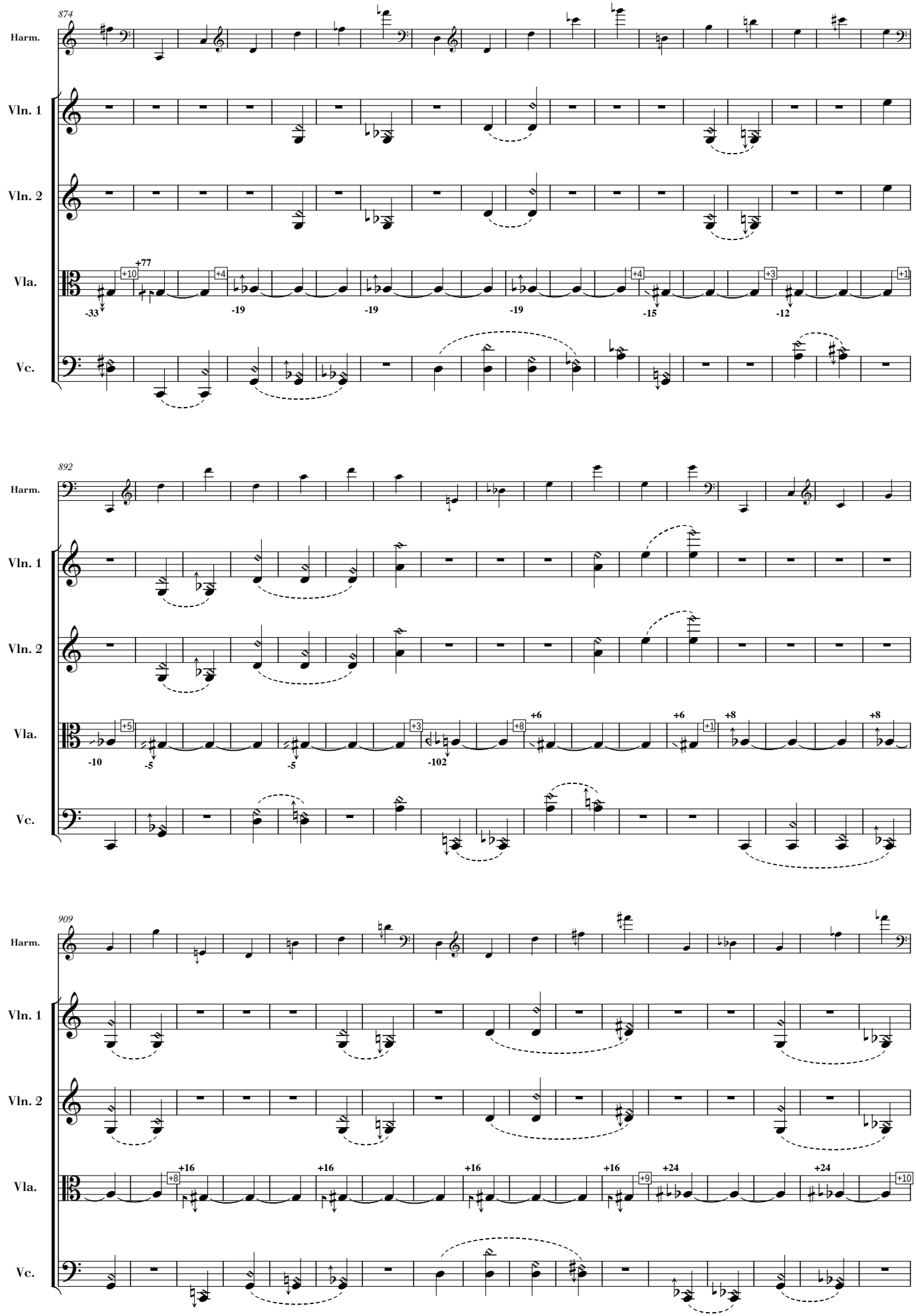

615
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+29
632
+46
+17
+3
+6
+11
-52
-46
-35
650
+4
-24
-21

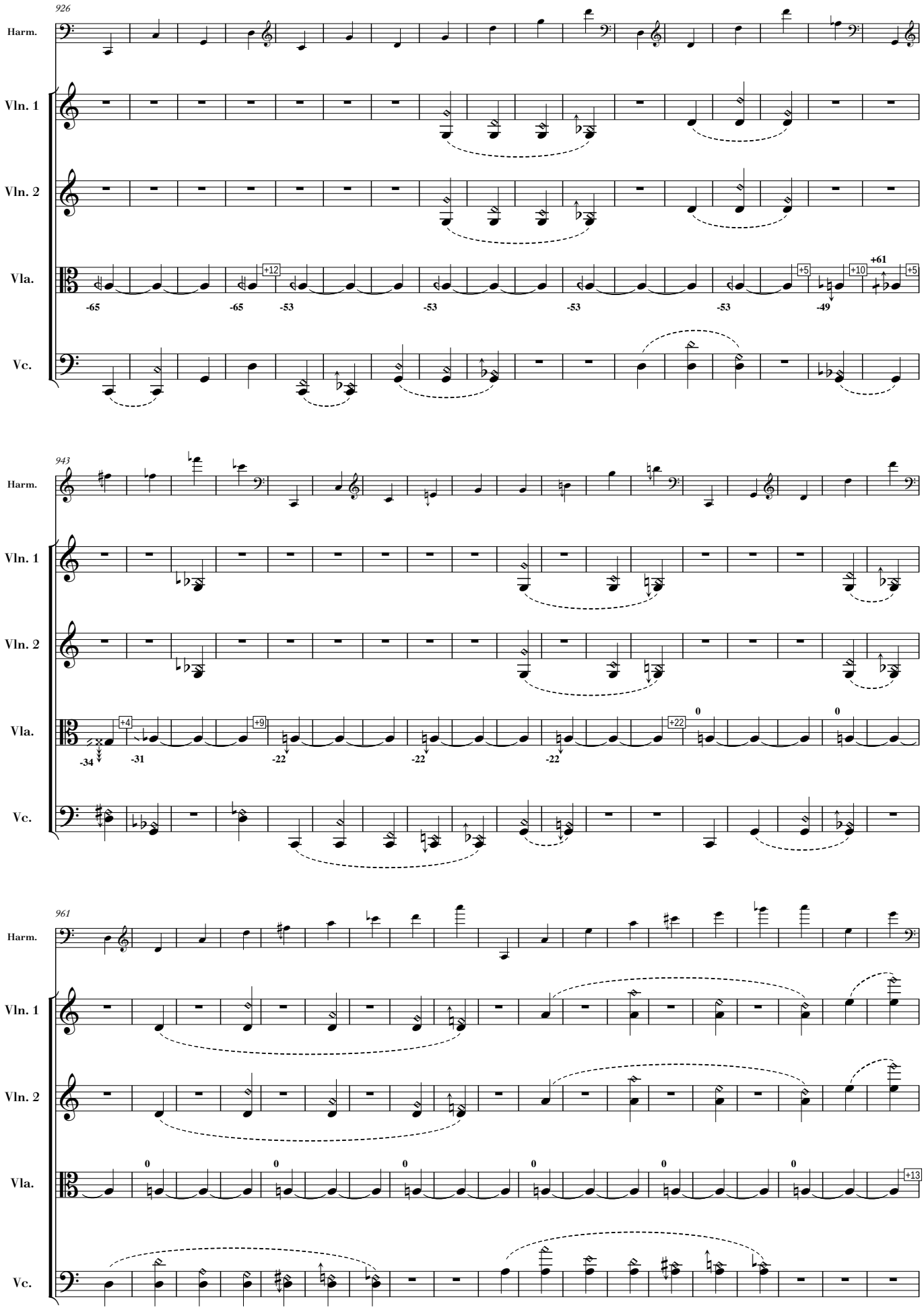

669
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
687
705

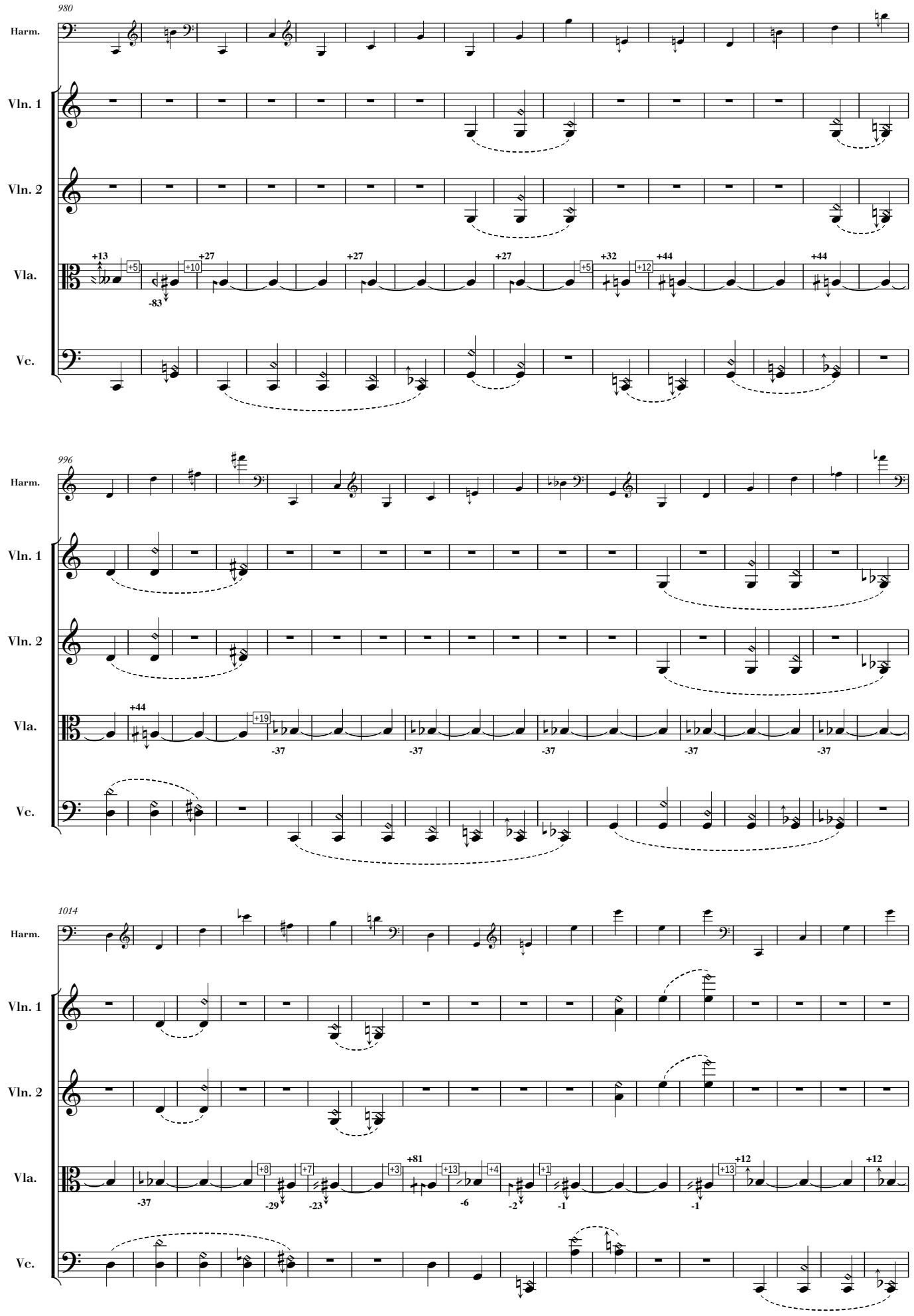

723
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+58
+58
+58
+5
+1
+4
+9
-37
-36
-32
-23
-23
740
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+8
-16
-16
-16
-16
-16
757
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+7
+6
+5
+2
+2
+2
+9
+12
+12
+4
-16
-9
-3

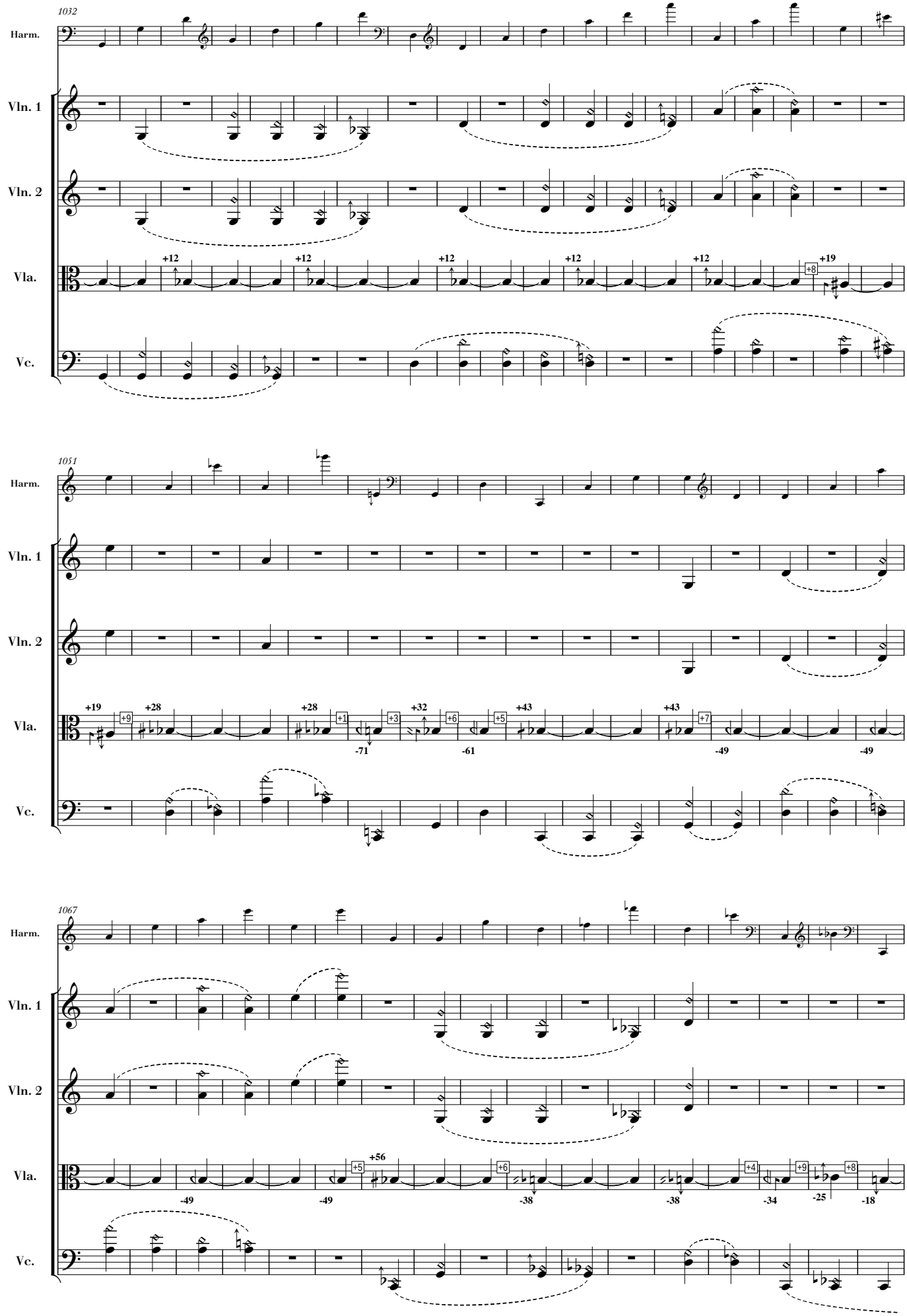

774
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-84
-84
-84
-73
-69
791
-57
-53
-53
-48
-35
-31
807
-27
-17
-4
-4
-4
-4

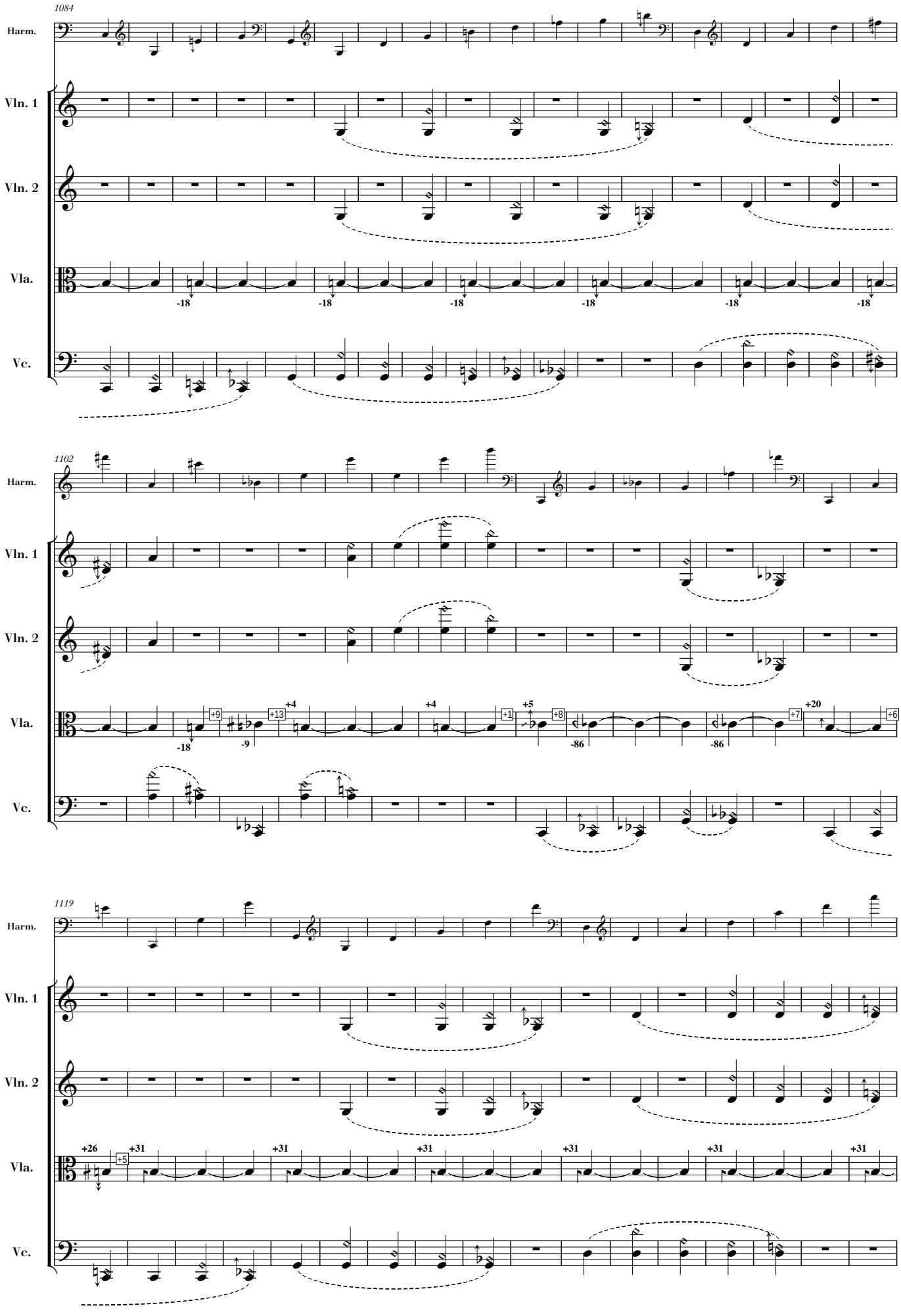

823
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-4
-4
-4
-4
-4
840
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-4
+22
+18
+18
+17
-65
-65
+5
+40
+6
-54
+3
+49
+10
857
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-41
-41
+2
+61
+61
+61
+61
+5
-33

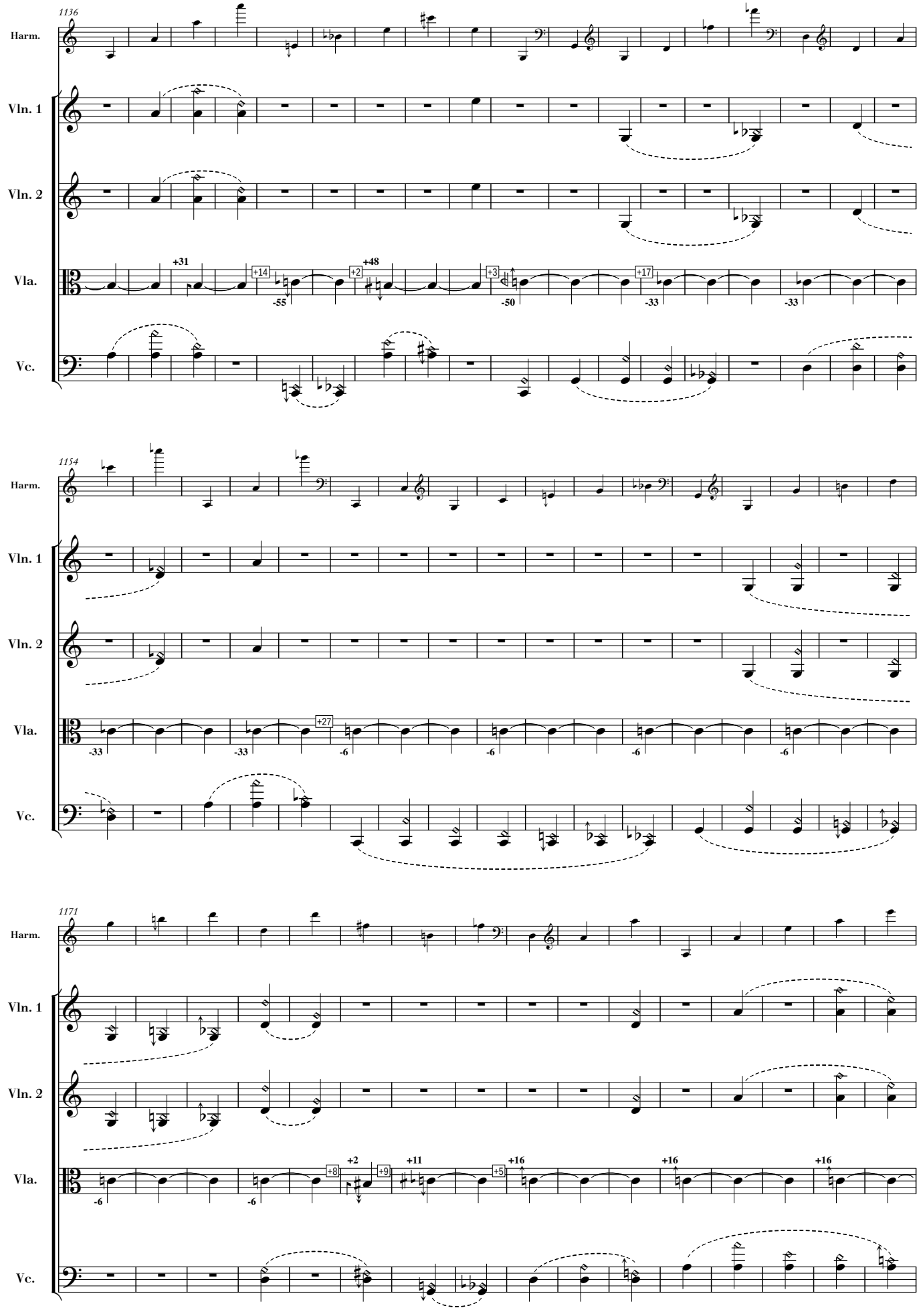

874
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+77
+10
+4
+4
+3
+1
-33
-19
-19
-19
-15
-12
892
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+5
+3
+8
+6
+6
+1
+8
+8
-10
-5
-5
-102
909
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+8
+16
+16
+16
+16
+9
+24
+24
+10

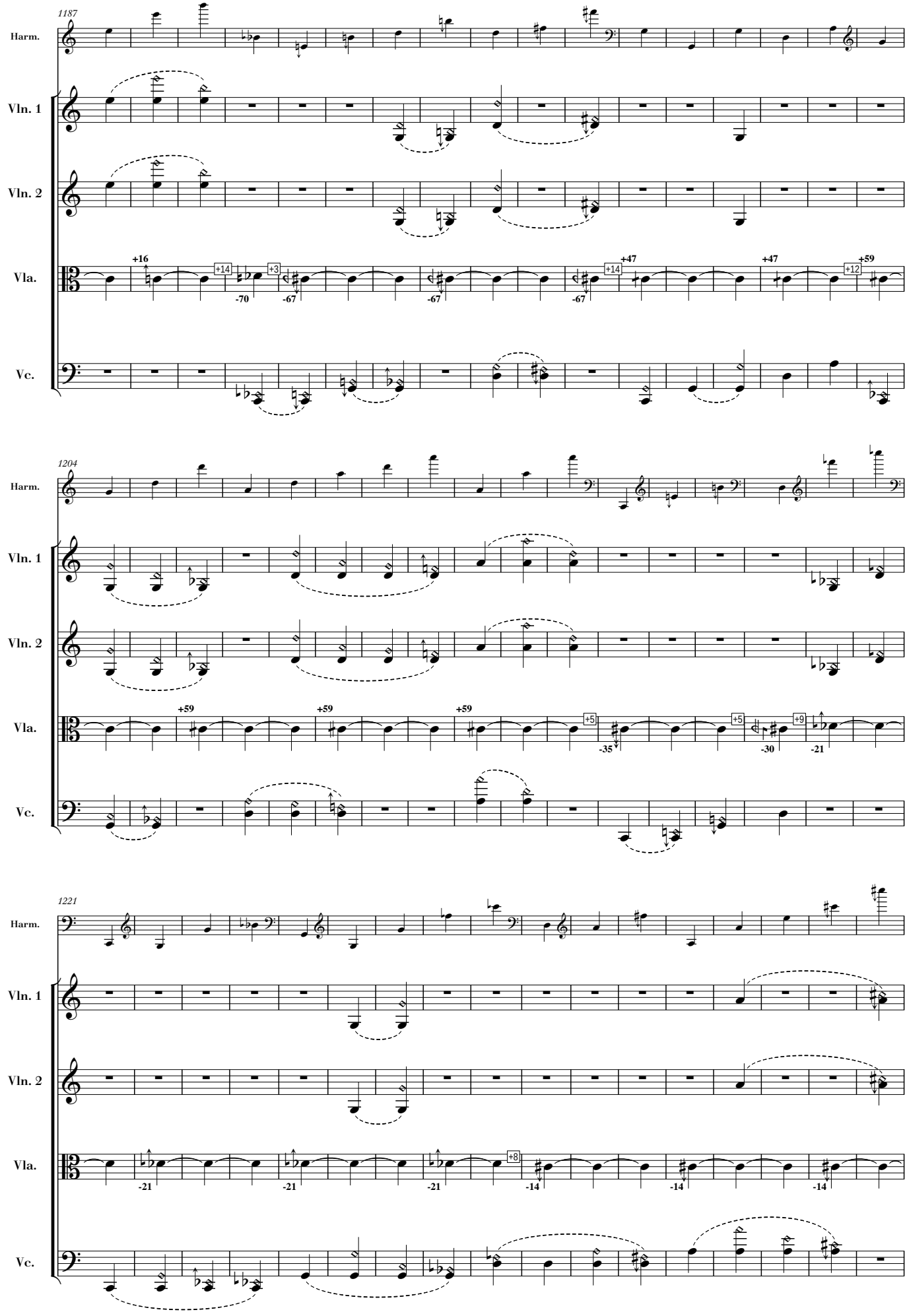

926
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-65
-65
-53
-53
-53
-53
-49
+12
+5
+10
+61
+5
943
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-34
-31
-22
-22
-22
+4
+9
+22
0
0
961
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
0
0
0
0
0
0
+13

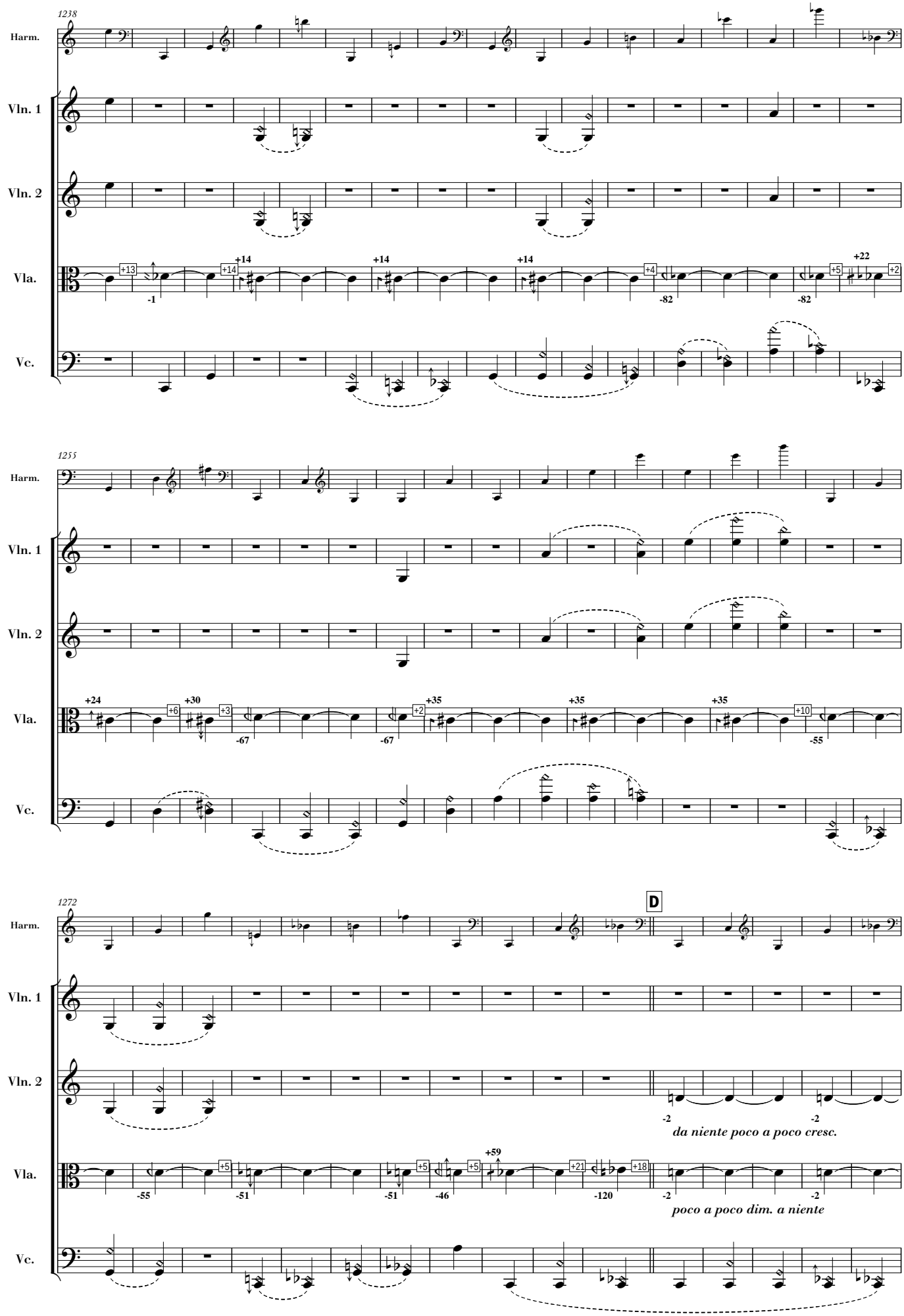

980
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+13
+5
-83
+10
+27
+27
+27
+5
+32
+12
+44
+44
996
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+44
+19
-37
-37
-37
-37
-37
1014
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-37
+8
-29
+7
-23
+3
+81
+13
-6
+4
-2
+1
-1
+13
-1
+12
+12

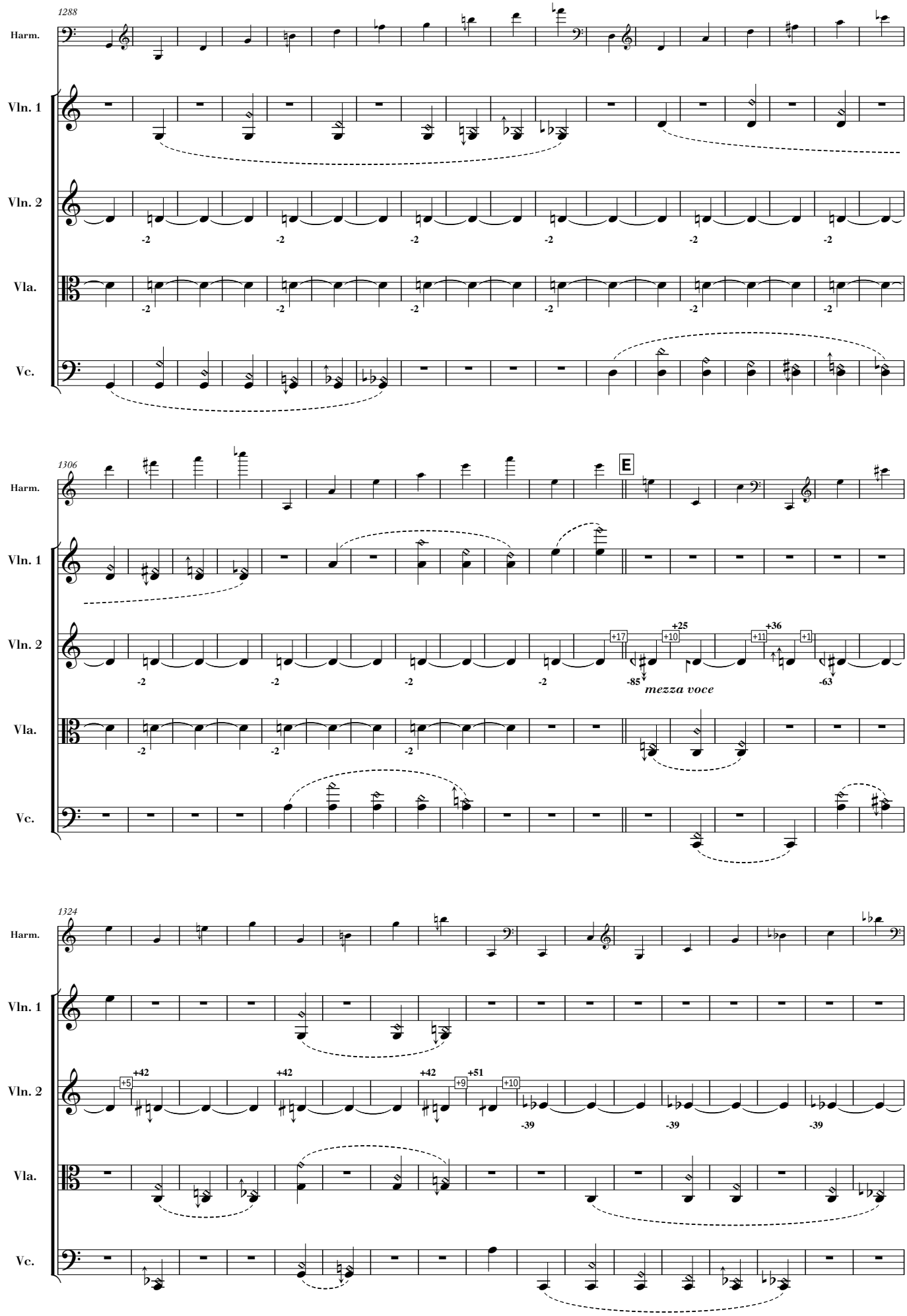

1032
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+12
+19
1051
+19
+28
+32
+43
-71
-61
-49
1067
+56
-38
-34
-25
-18

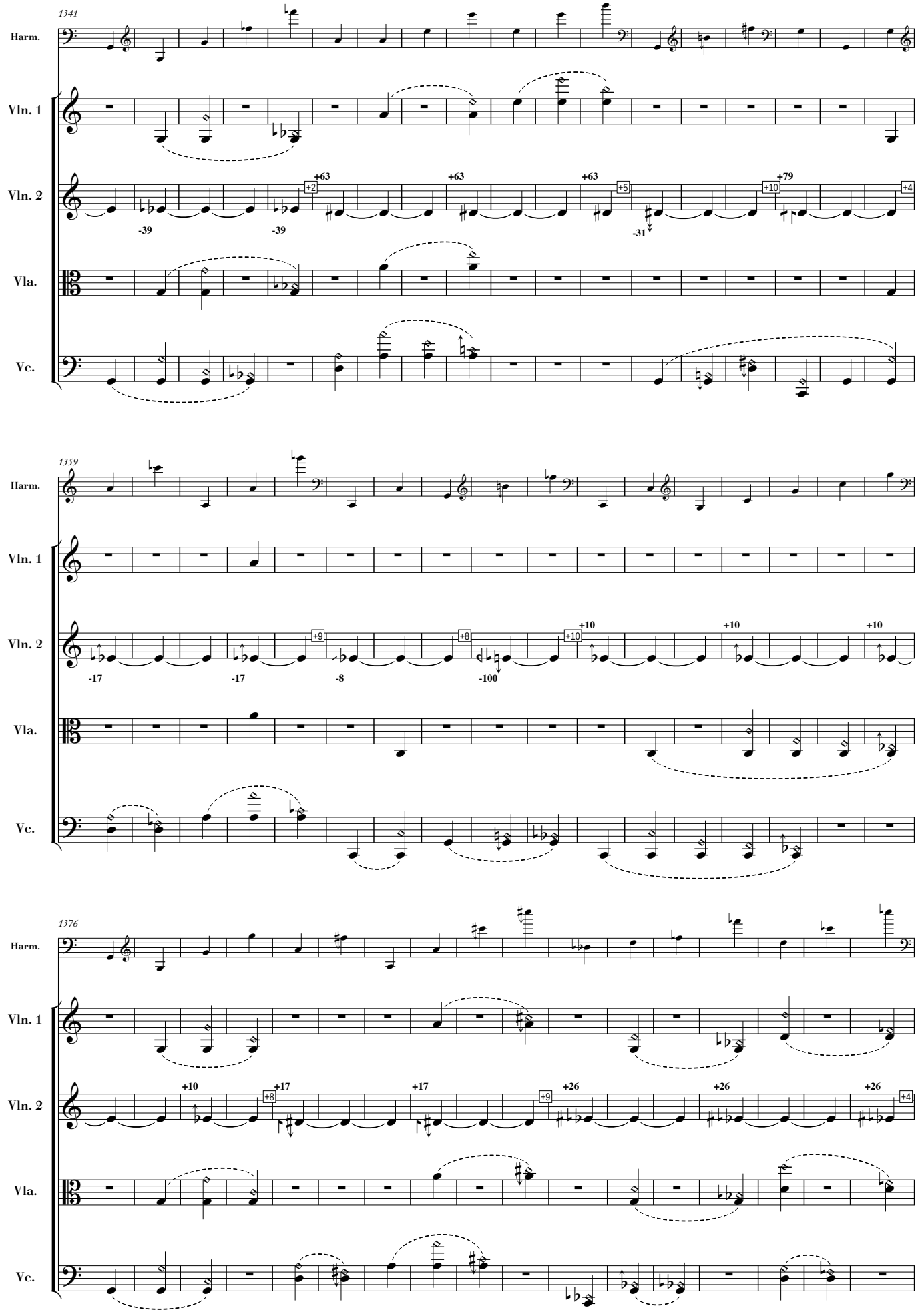

1084
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-18
1102
+9
+13
+4
+1
+5
+8
+7
+20
+6
-9
-86
1119
+26
+31
+5

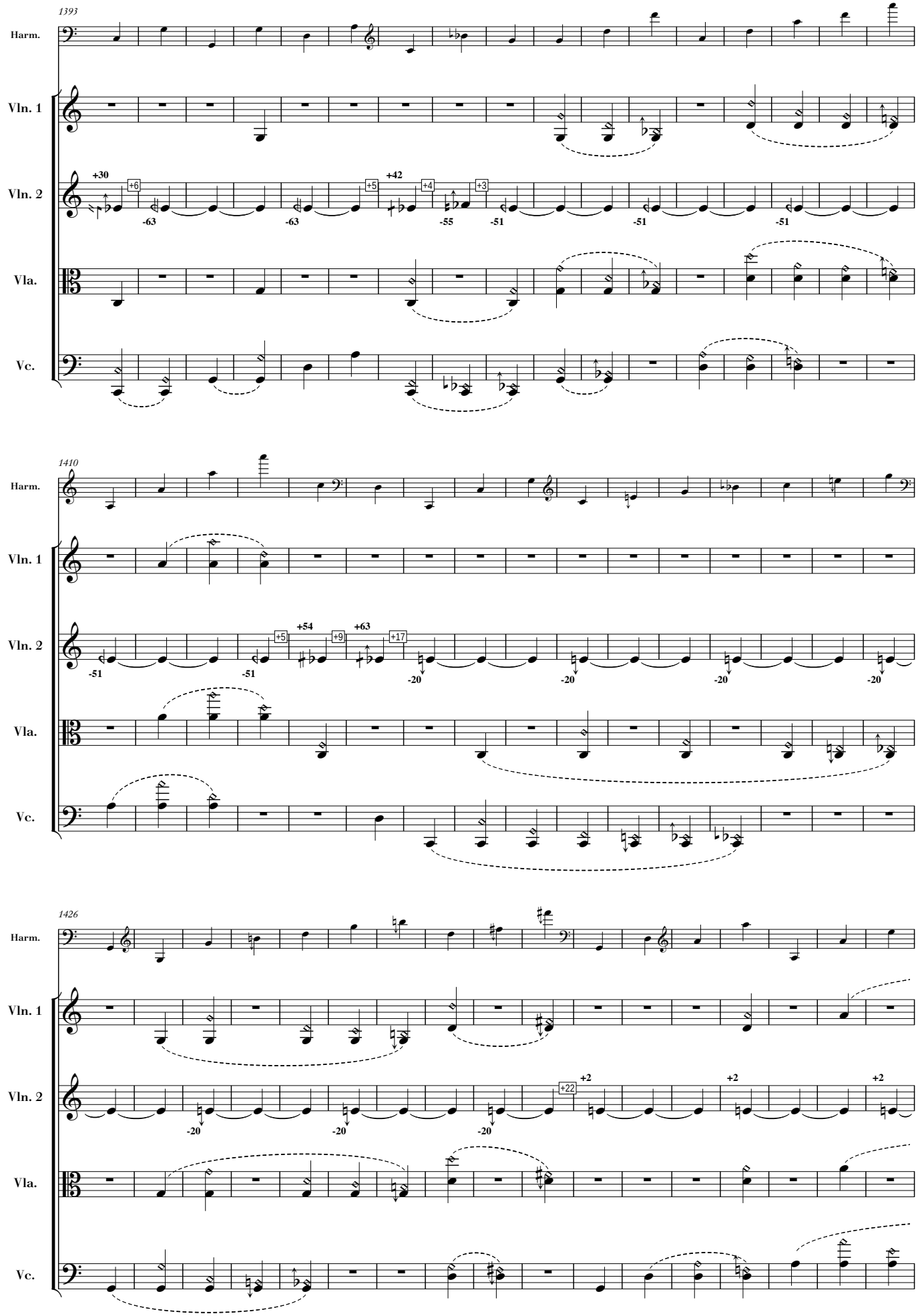

1136
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+31
+14
-55
+2
+48
+3
-50
+17
-33
-33
1154
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-33
-33
+27
-6
-6
-6
-6
1171
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-6
-6
+8
+2
+9
+11
+5
+16
+16
+16

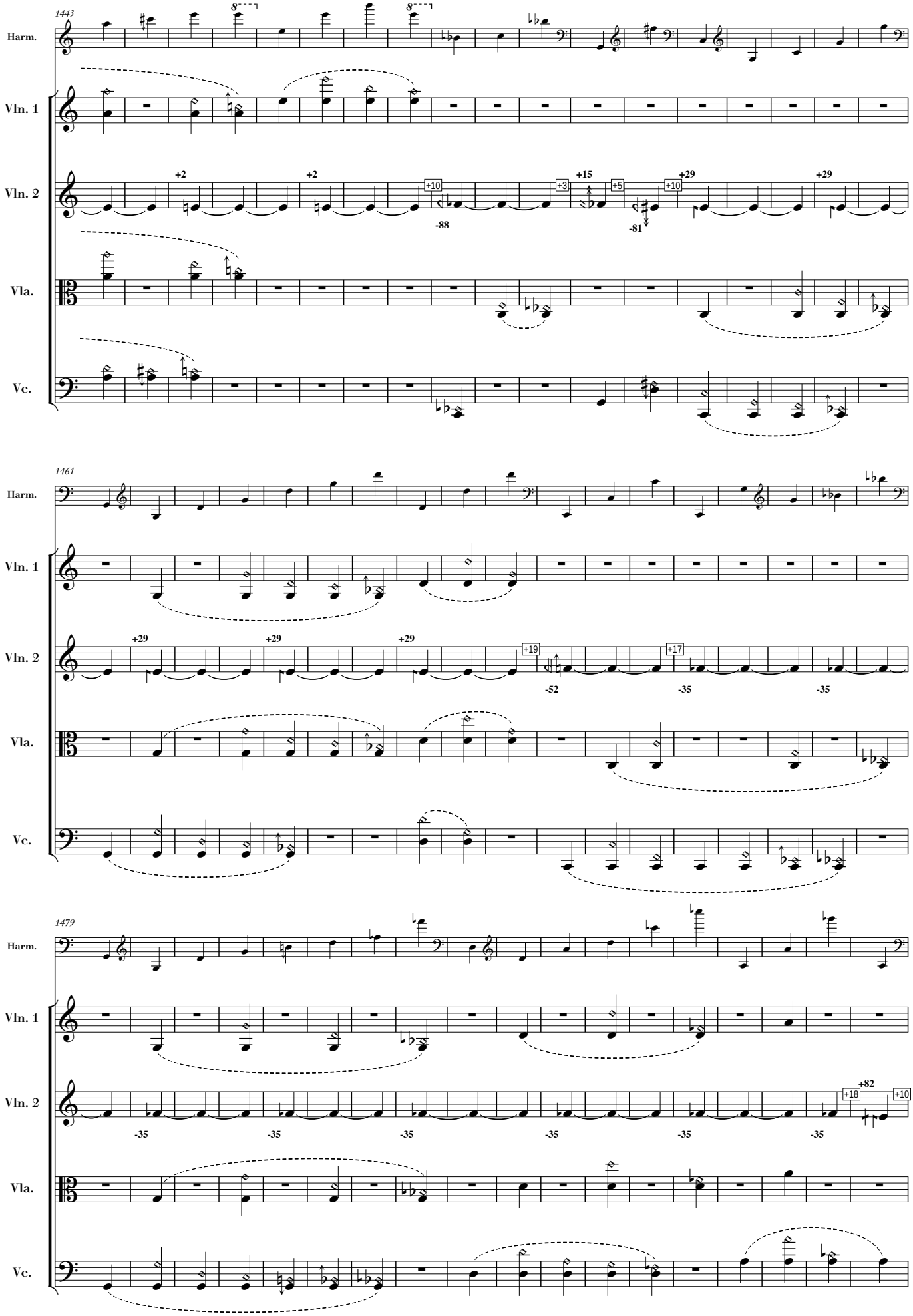

1187
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+16
+14
-70
+3
-67
-67
-67
+14
+47
+47
+12
+59
1204
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+59
+59
+59
+5
-35
+5
+9
-30
-21
1221
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-21
-21
-21
+8
-14
-14
-14

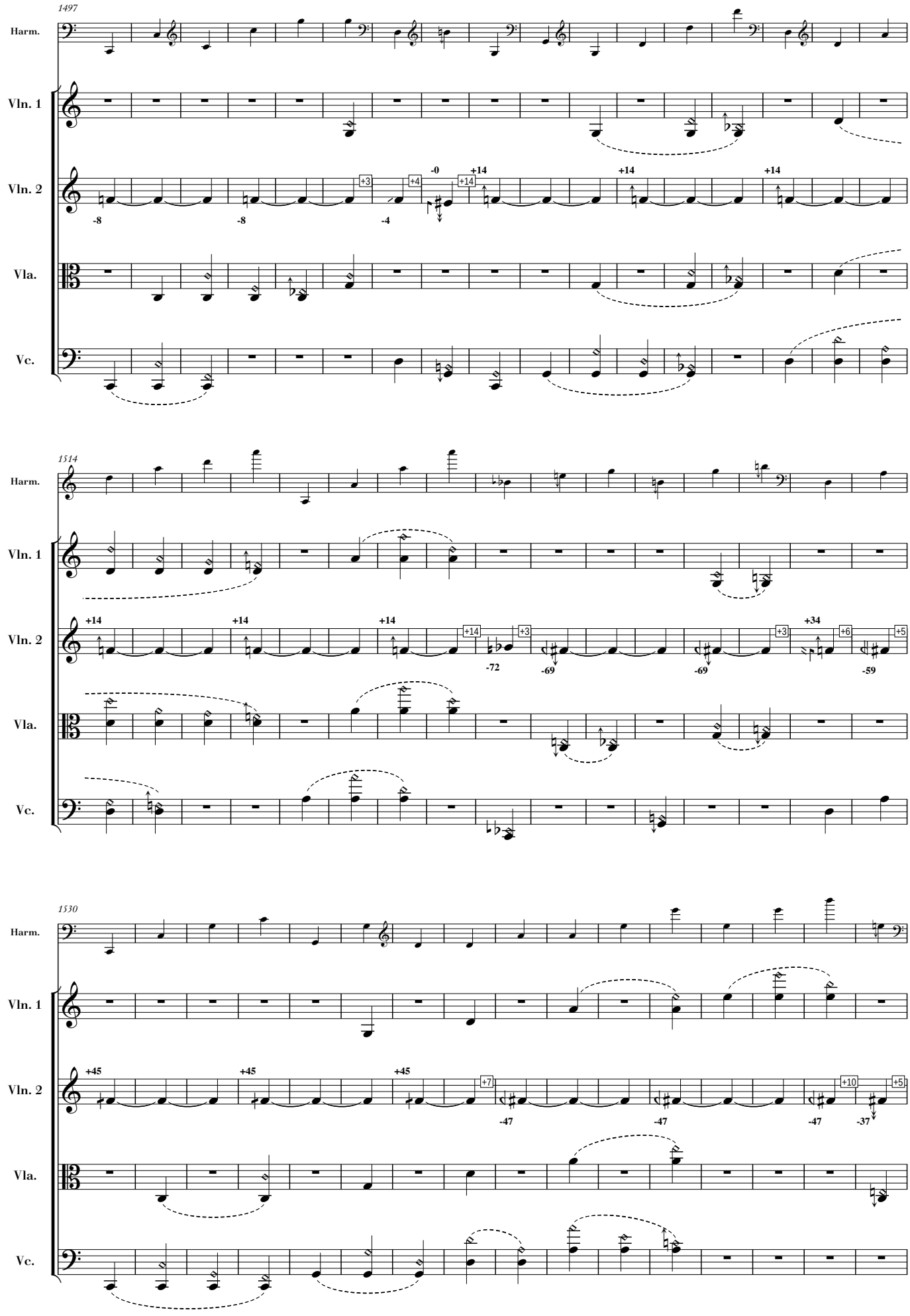

1238
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
1255
1272
D
da niente poco a poco cresc.
poco a poco dim. a niente

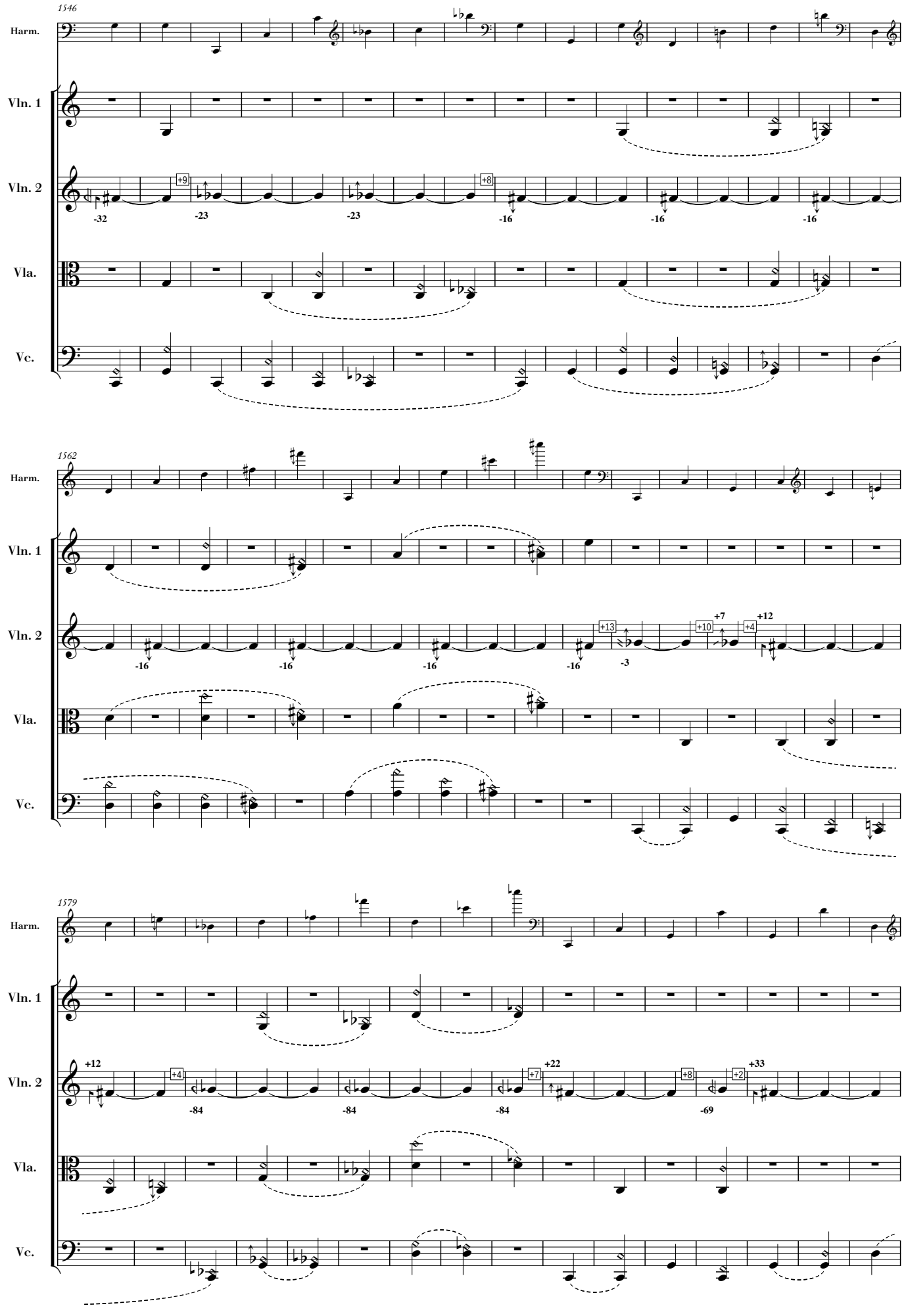

1288
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-2
1306
E
+17
+25
+10
+36
+11
+1
-85
-63
mezza voce
1324
+5
+42
+9
+51
-39

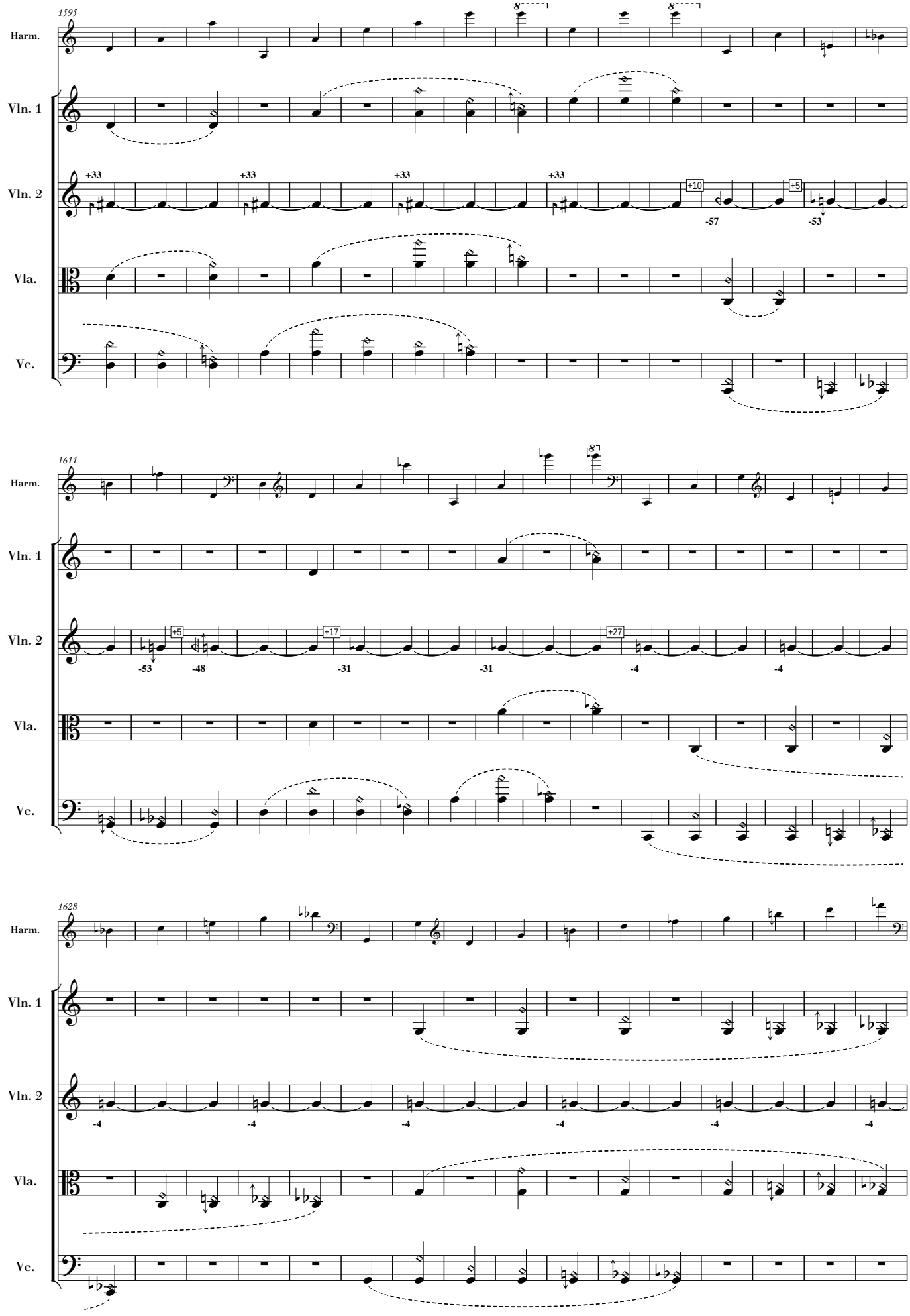

1341
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+63
+63
+63
+79
-39
-39
-31
1359
-17
-17
-8
-100
+10
+10
+10
1376
+10
+17
+17
+26
+26
+26

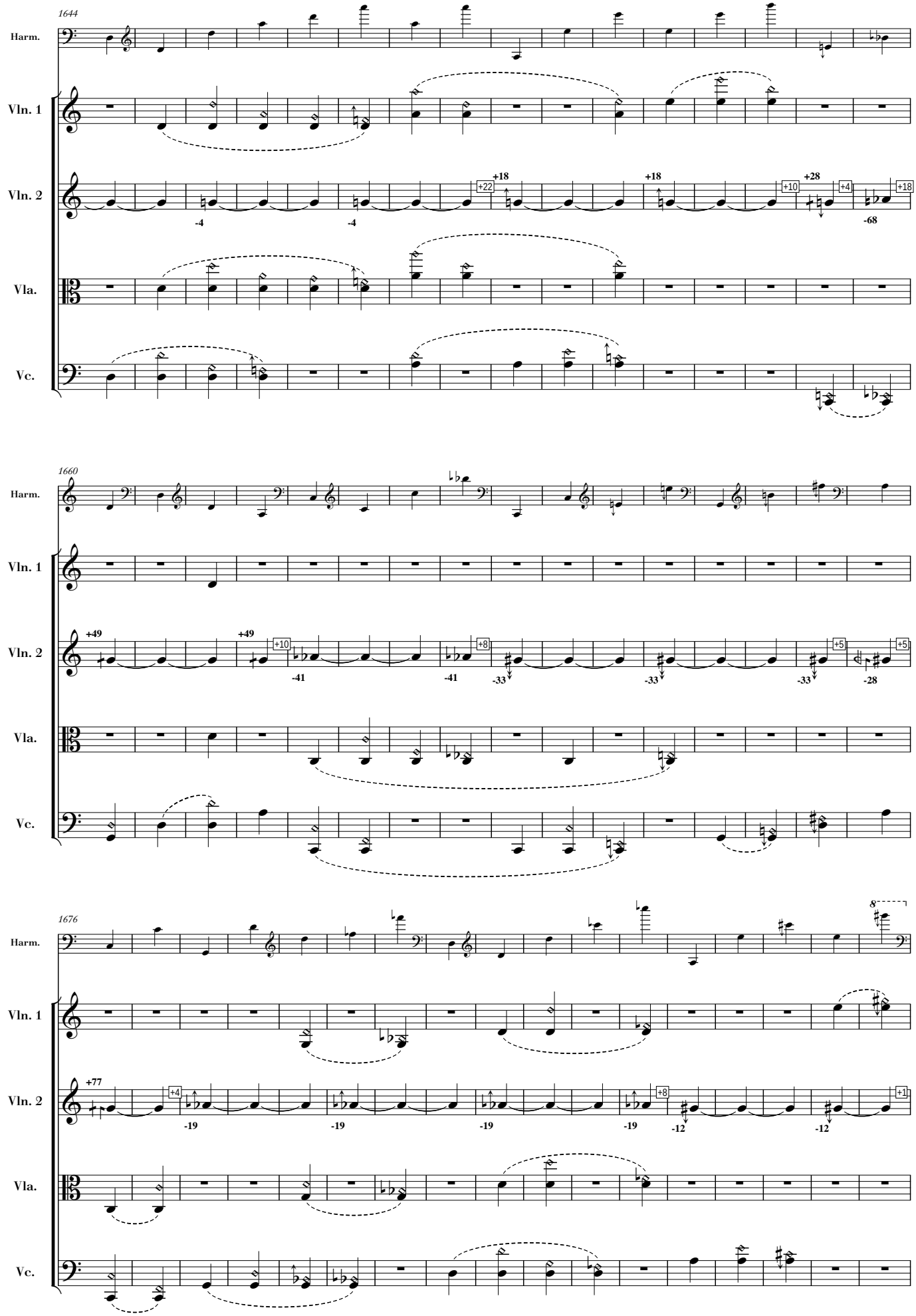

1393
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+30
+6
-63
-63
+5
+42
+4
-55
+3
-51
-51
-51
1410
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-51
-51
+5
+54
+9
+63
+17
-20
-20
-20
-20
1426
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-20
-20
-20
+22
+2
+2
+2

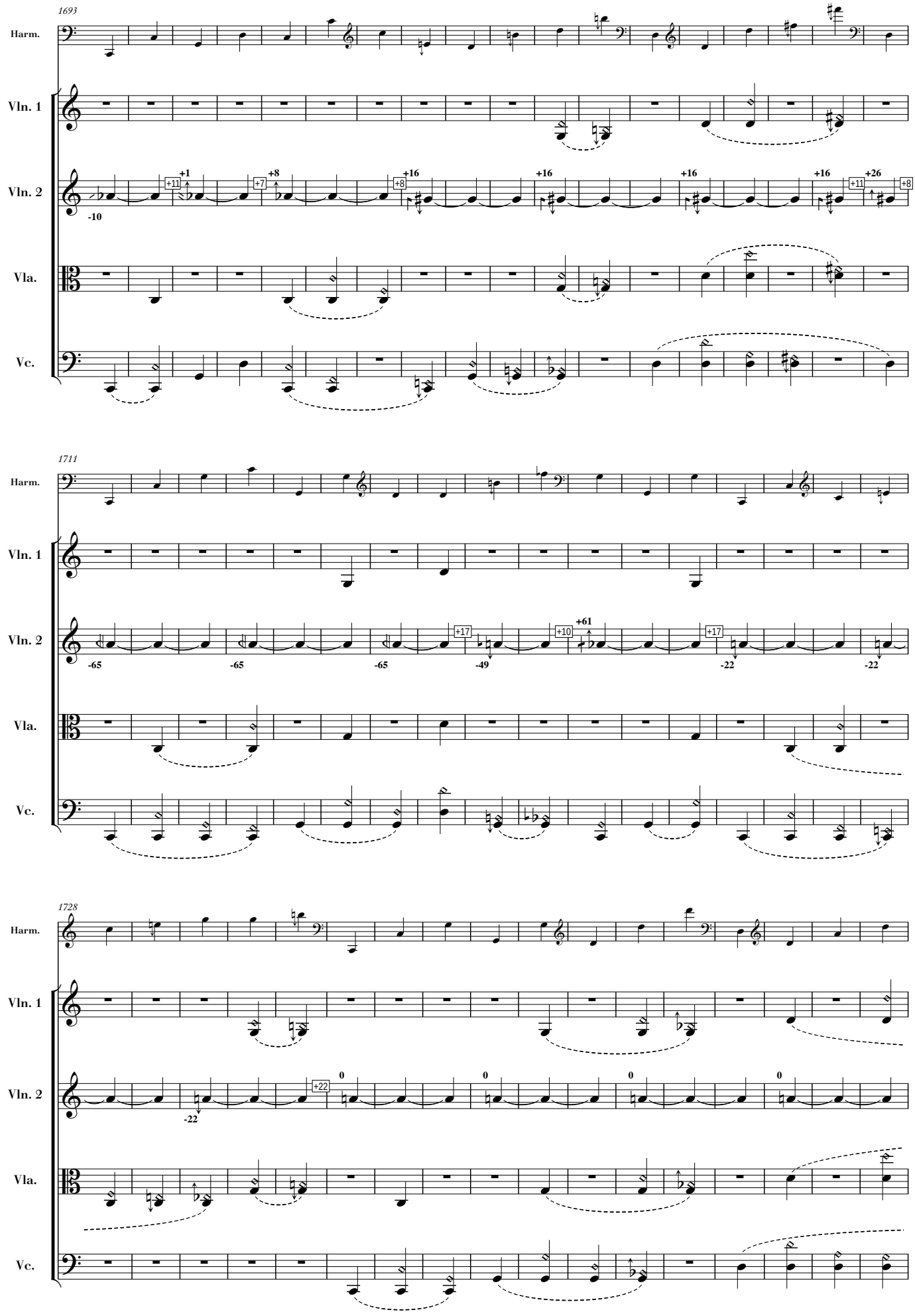

1443
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+2
+2
+10
-88
+3
+15
+5
-81
+10
+29
+29
1461
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+29
+29
+29
+19
-52
+17
-35
-35
1479
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-35
-35
-35
-35
-35
-35
+18
+82
+10

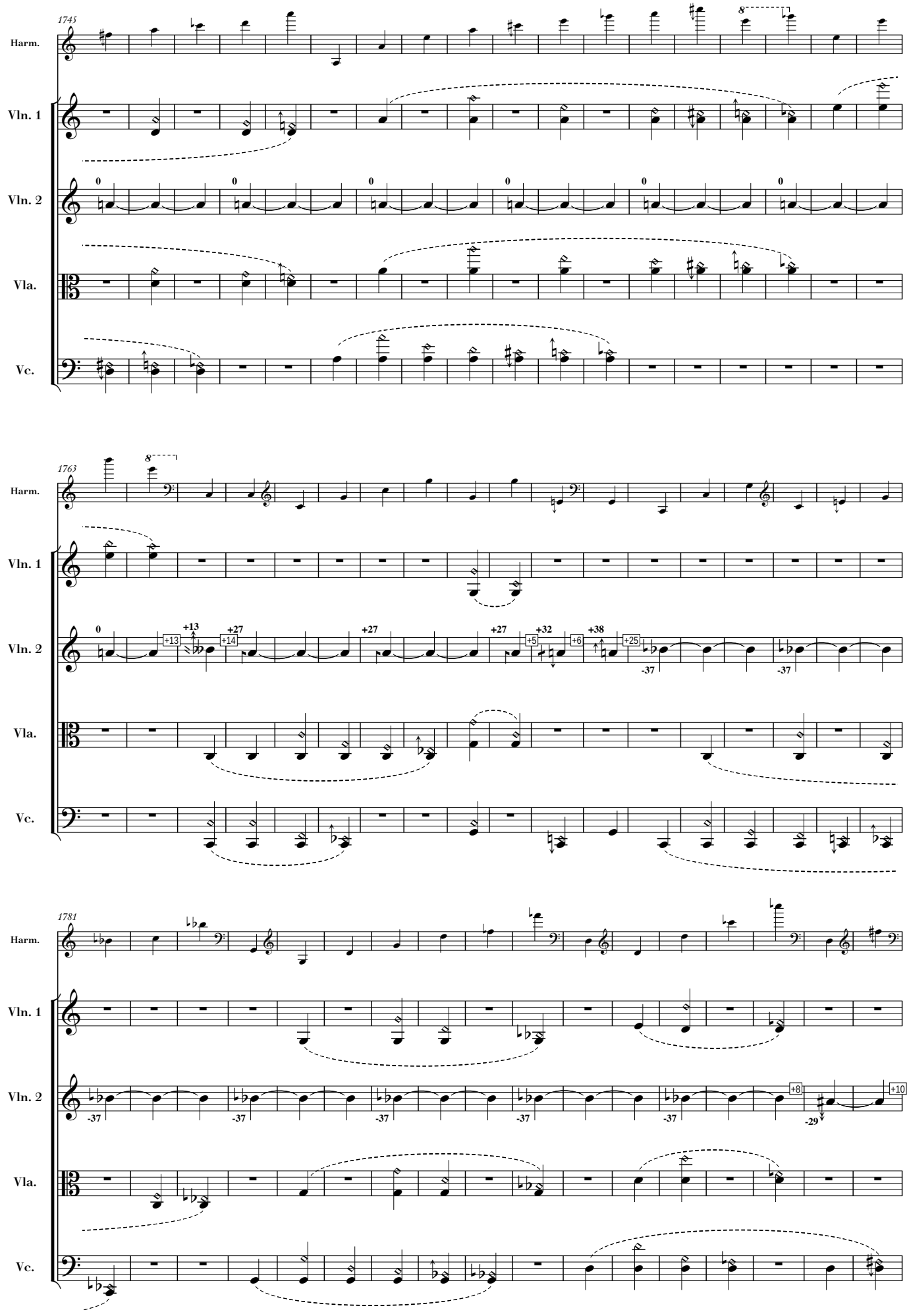

1497
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-8
-8
-4
-0
+14
+14
+14
+3
+4
+14
1514
+14
+14
+14
+14
+3
+34
+6
+5
-72
-69
-69
-59
1530
+45
+45
+45
+7
+10
+5
-47
-47
-47
-37

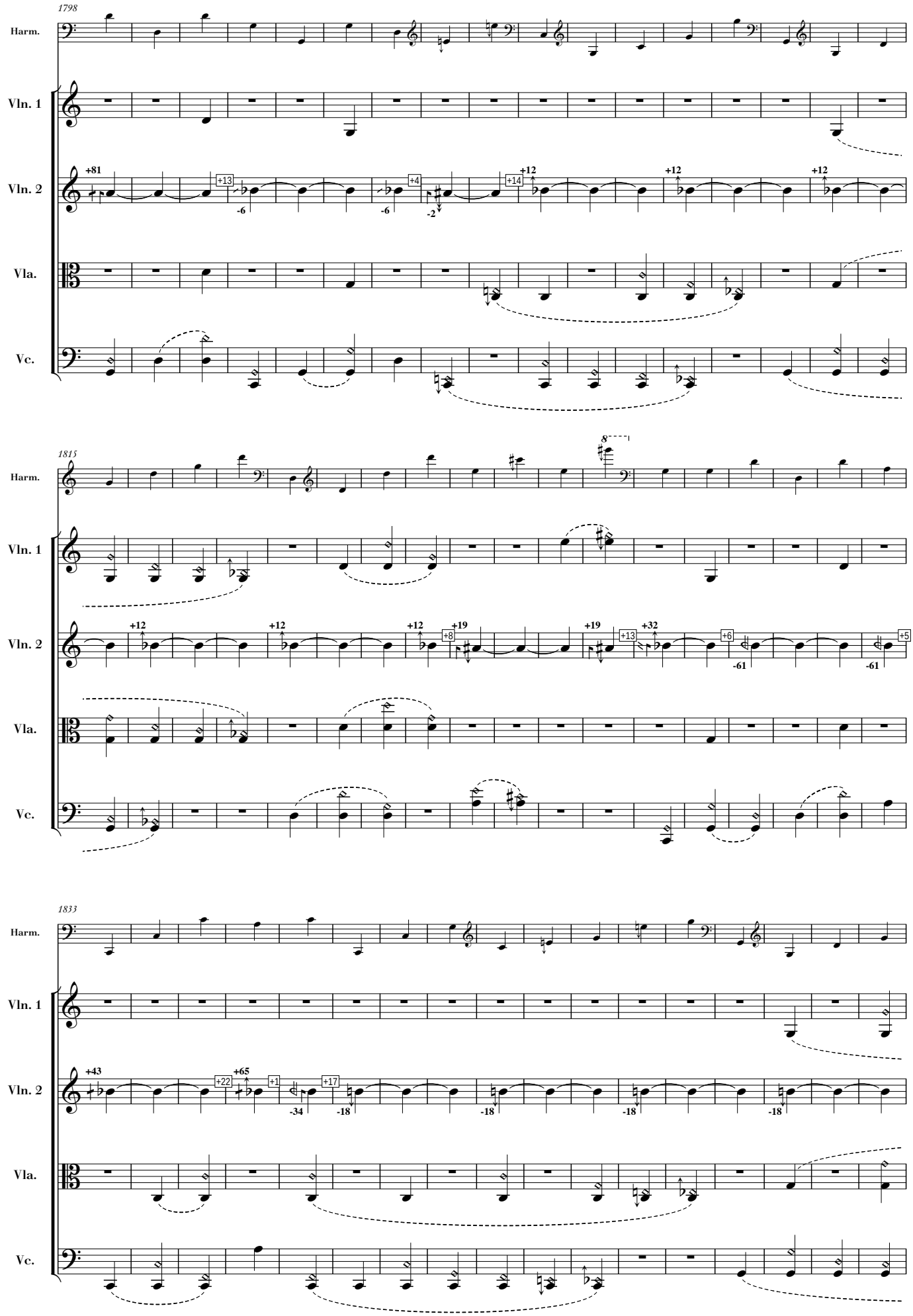

1546
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-32
-23
-23
-16
-16
-16
1562
-16
-16
-16
-16
-3
1579
-84
-84
-84
-69

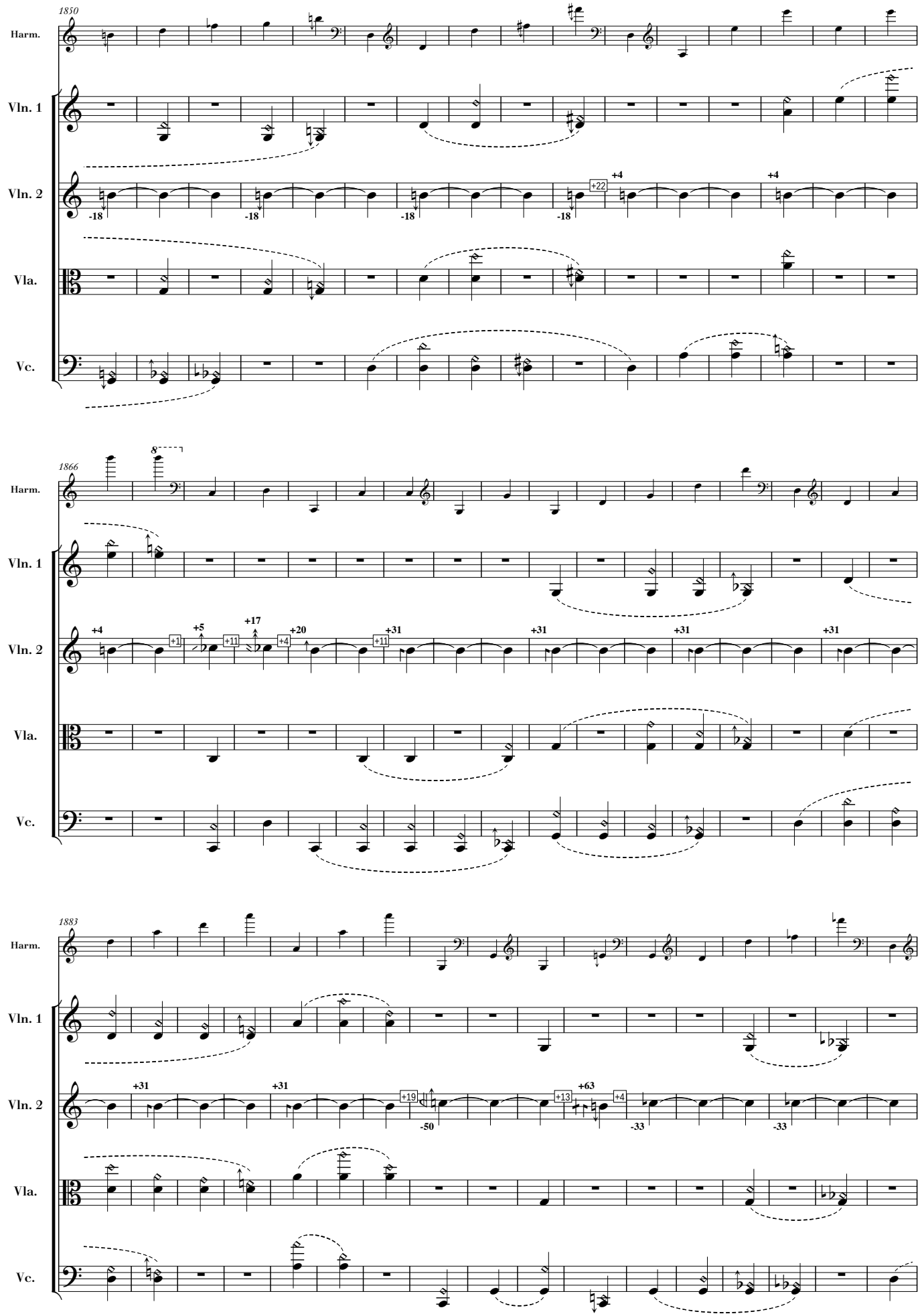

1595
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+33
+10
+5
-57
-53
1611
+17
+27
-48
-31
-4
1628

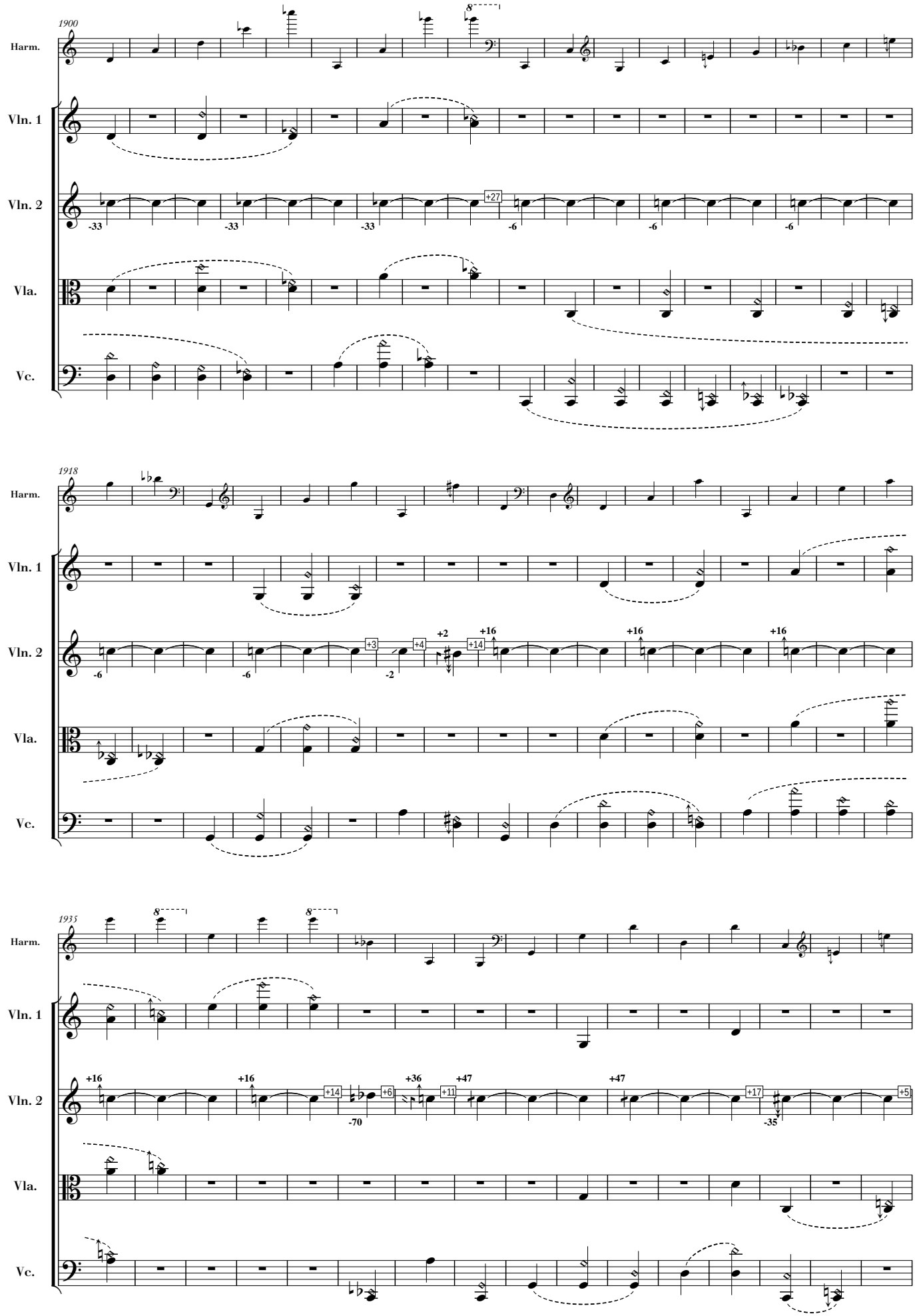

1644
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+22
+18
+18
+10
+28
+4
+18
-4
-4
-68
1660
+49
+49
+10
+8
+5
+5
-41
-41
-33
-33
-33
-28
1676
+77
+4
+8
+1
-19
-19
-19
-19
-12
-12

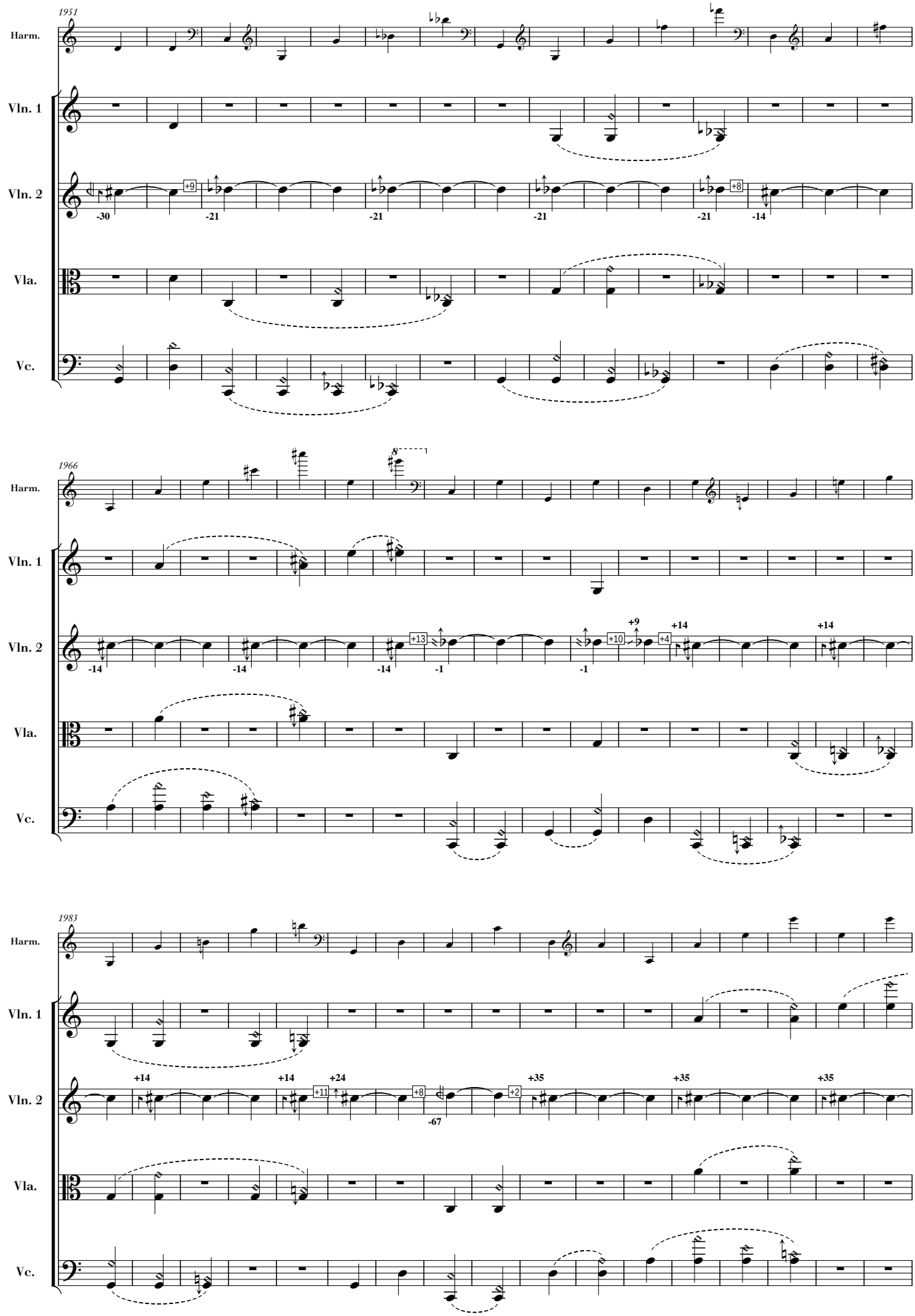

1693
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
1711
1728

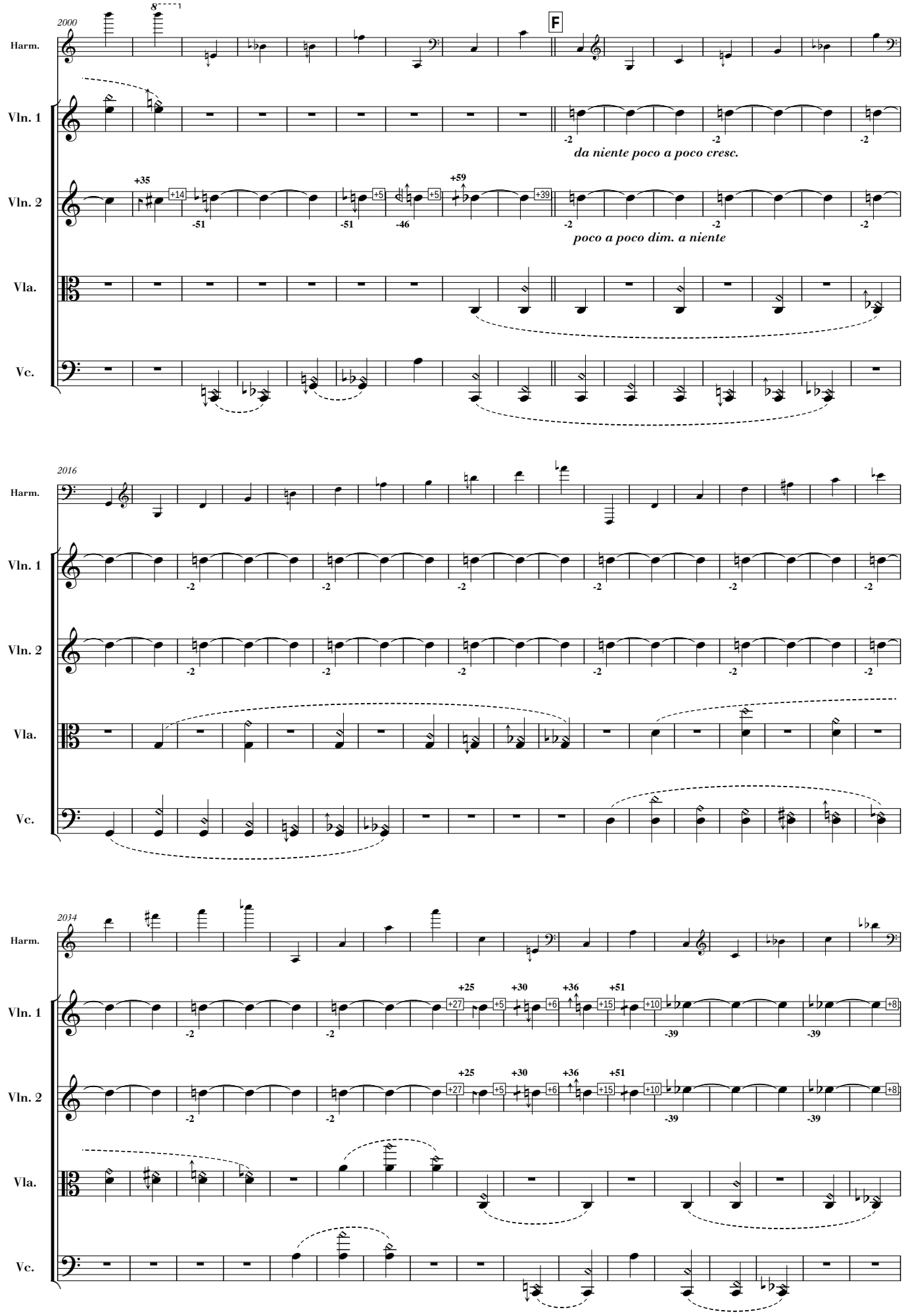

1745
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
1763
1781

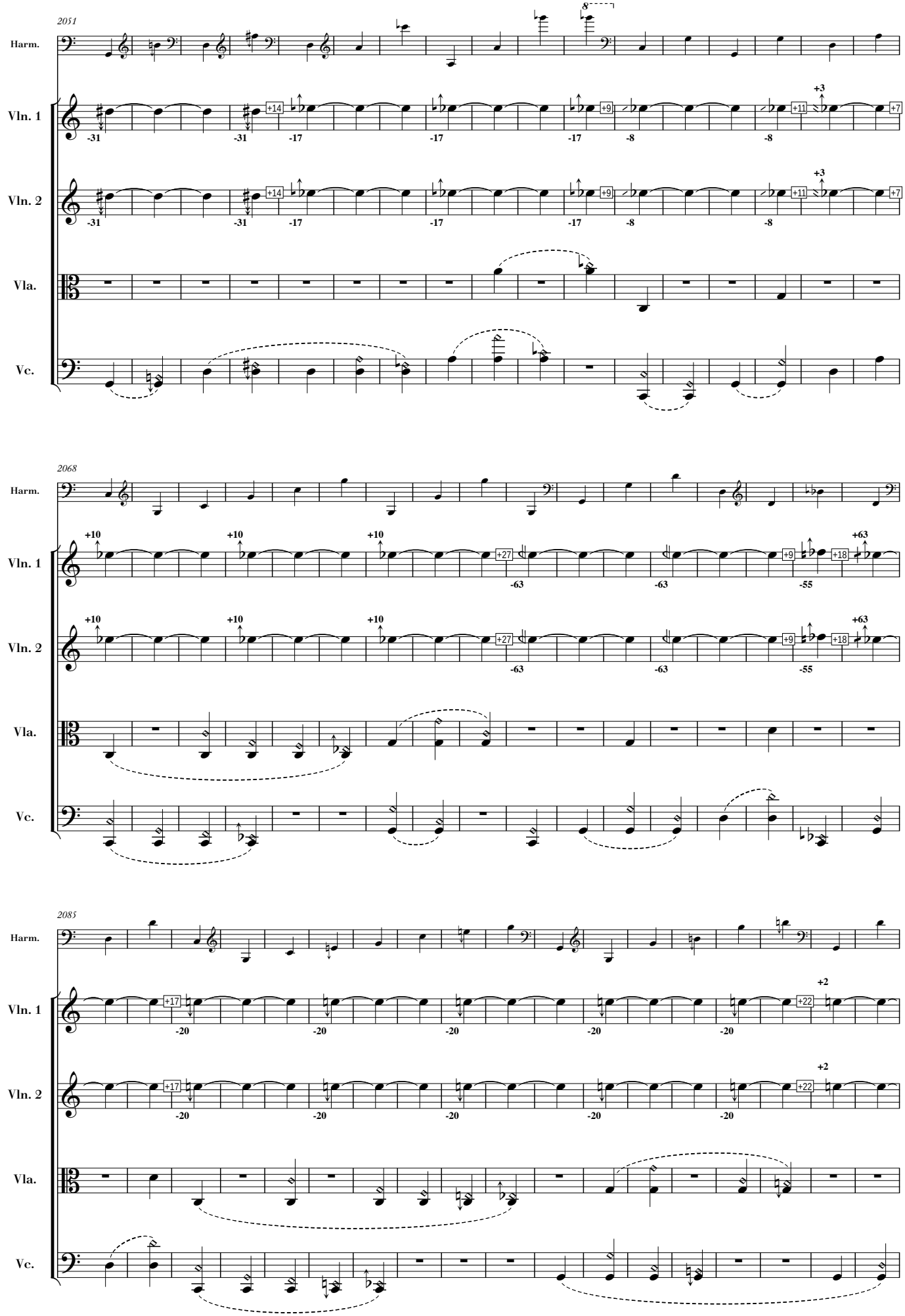

1798
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+81
+13
-6
+4
-6
-2
+14
+12
+12
+12
1815
8
+12
+12
+12
+8
+19
+19
+13
+32
+6
-61
-61
+5
1833
+43
+22
+65
+1
-34
+17
-18
-18
-18
-18

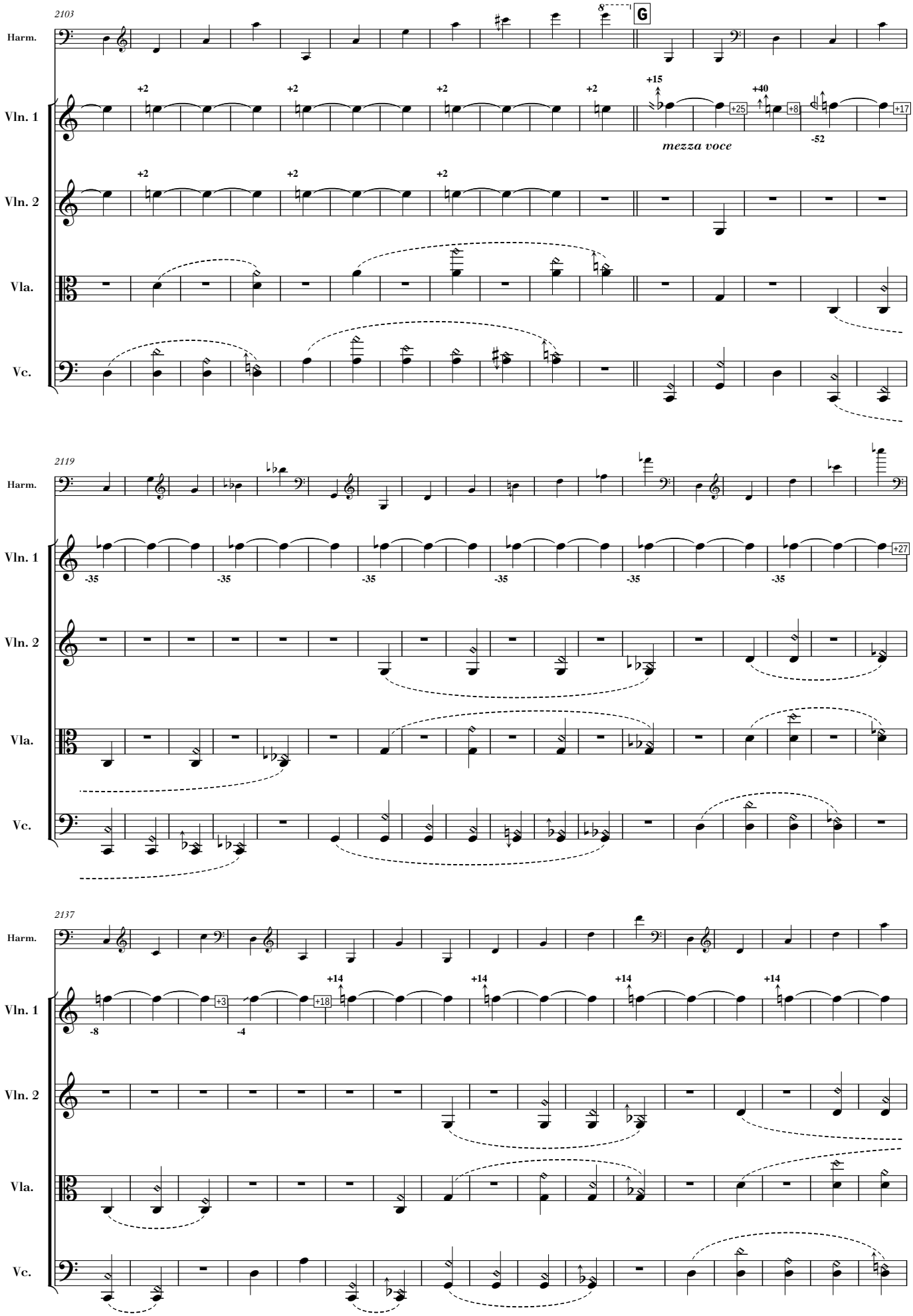

1850
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-18
-18
-18
-18
+22
+4
+4
1866
8
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+4
+1
+5
+11
+17
+4
+20
+11
+31
+31
+31
+31
1883
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+31
+31
+19
-50
+13
+63
+4
-33
-33

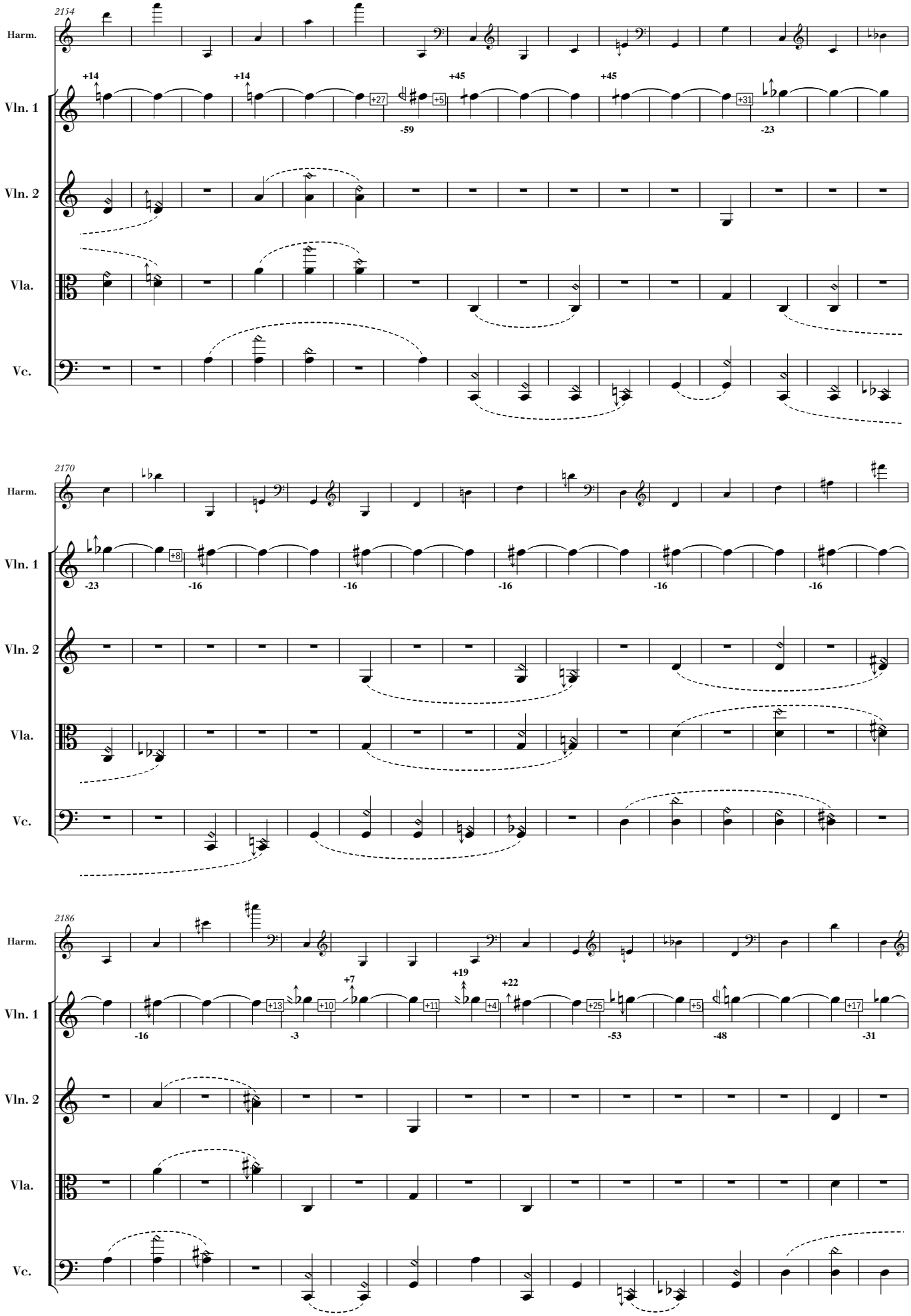

1900
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
1918
1935

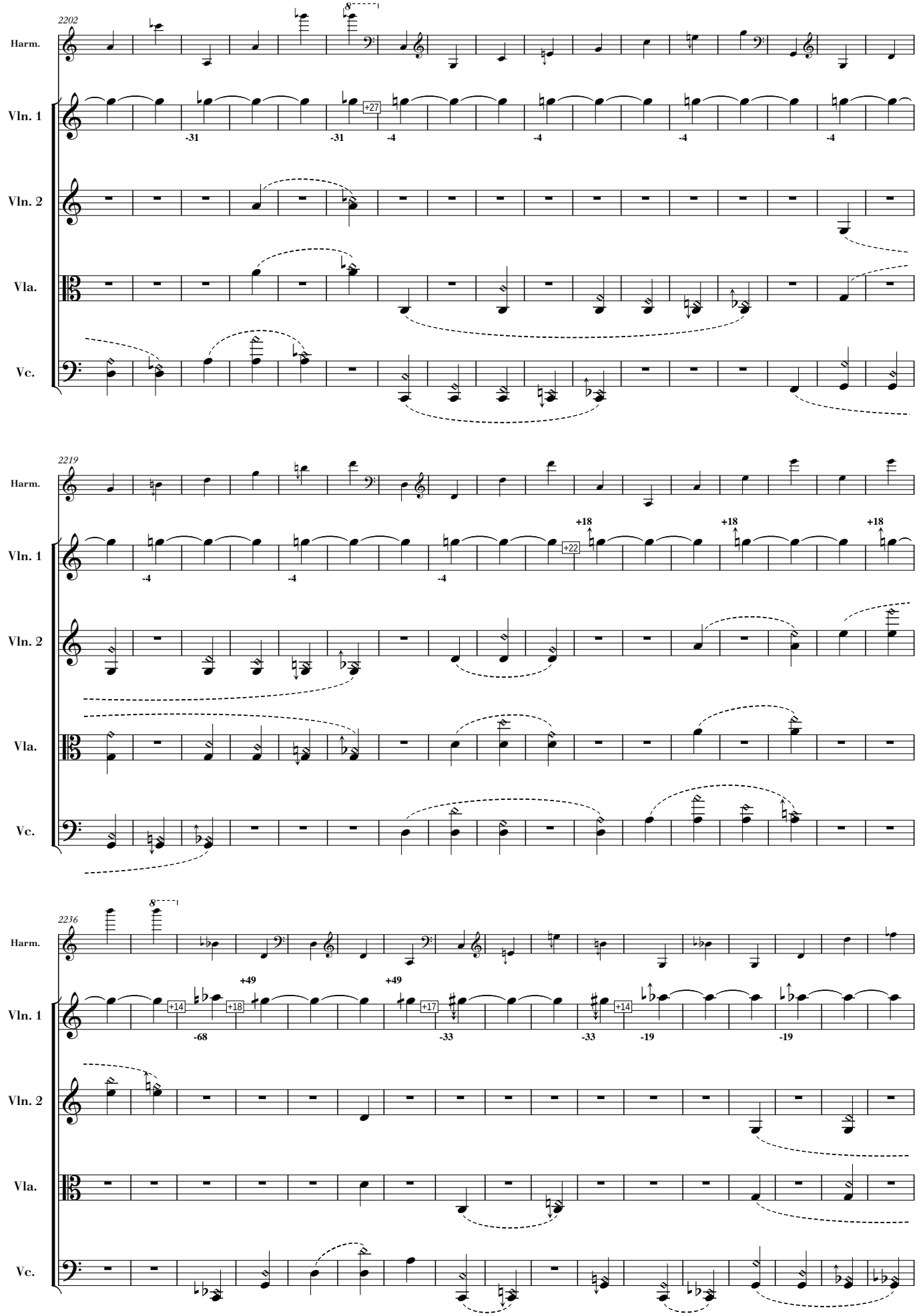

1951
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
1966
1983

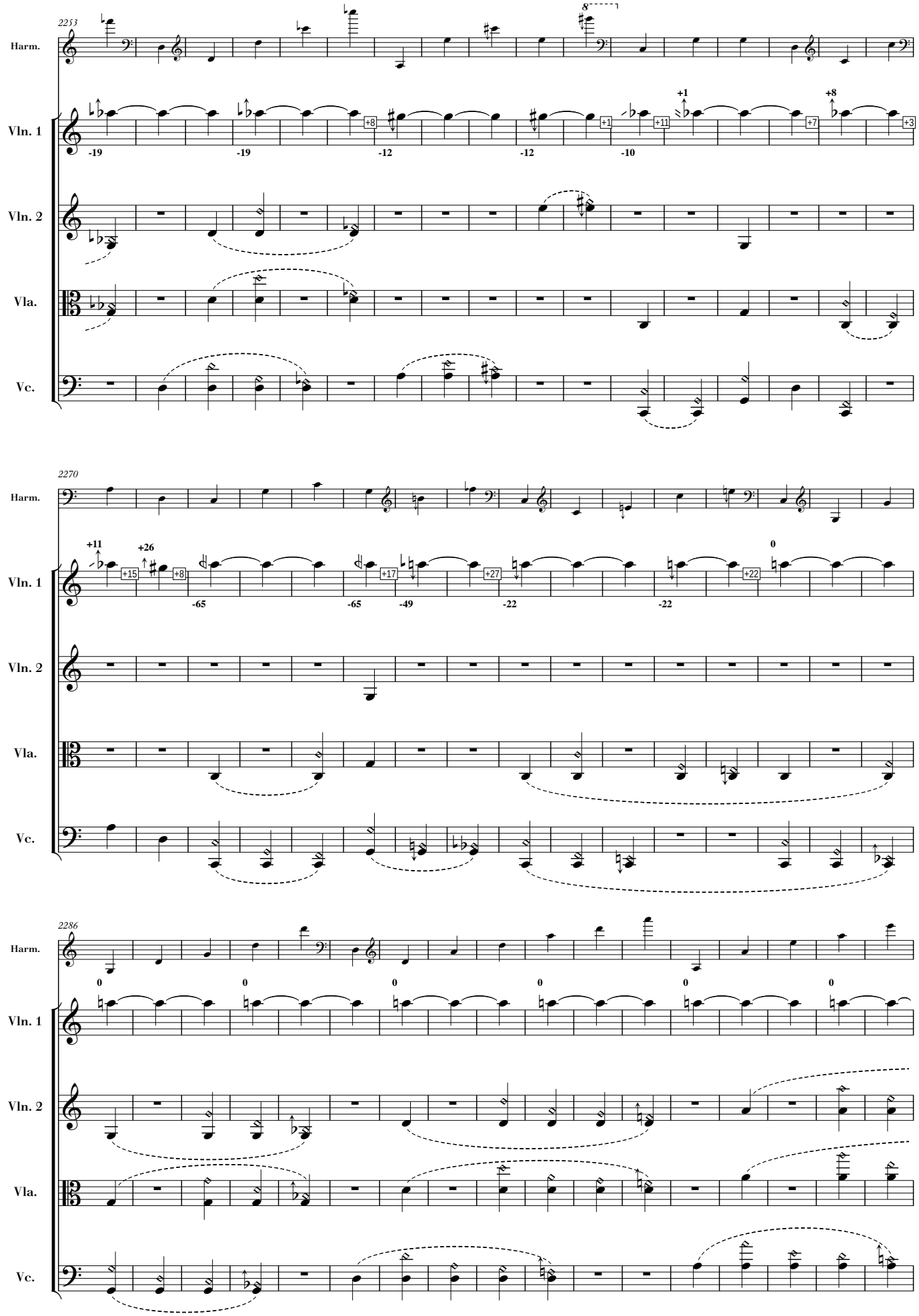

2000
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
F
da niente poco a poco cresc.
poco a poco dim. a niente
2016
2034

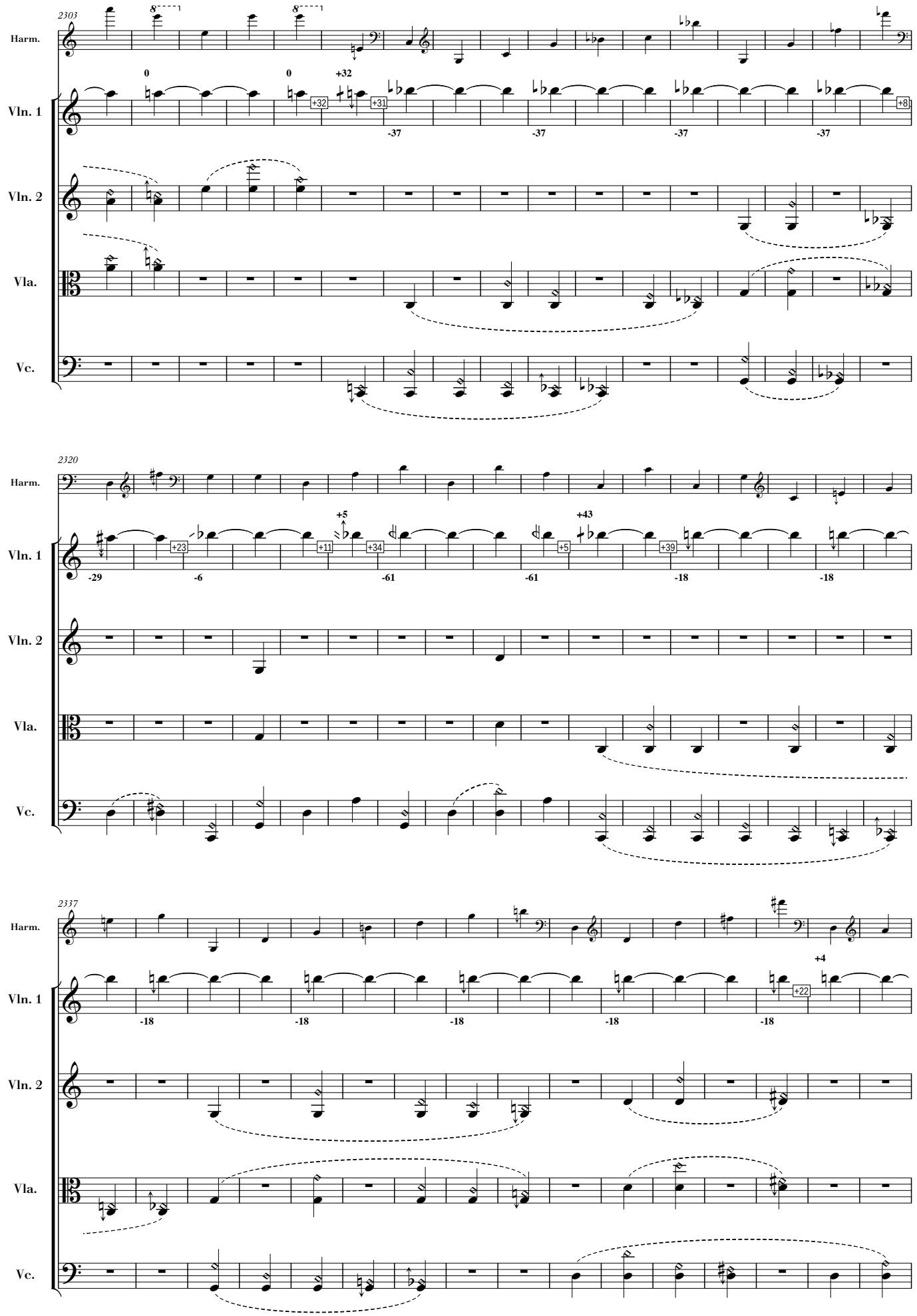

2051
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
2068
2085

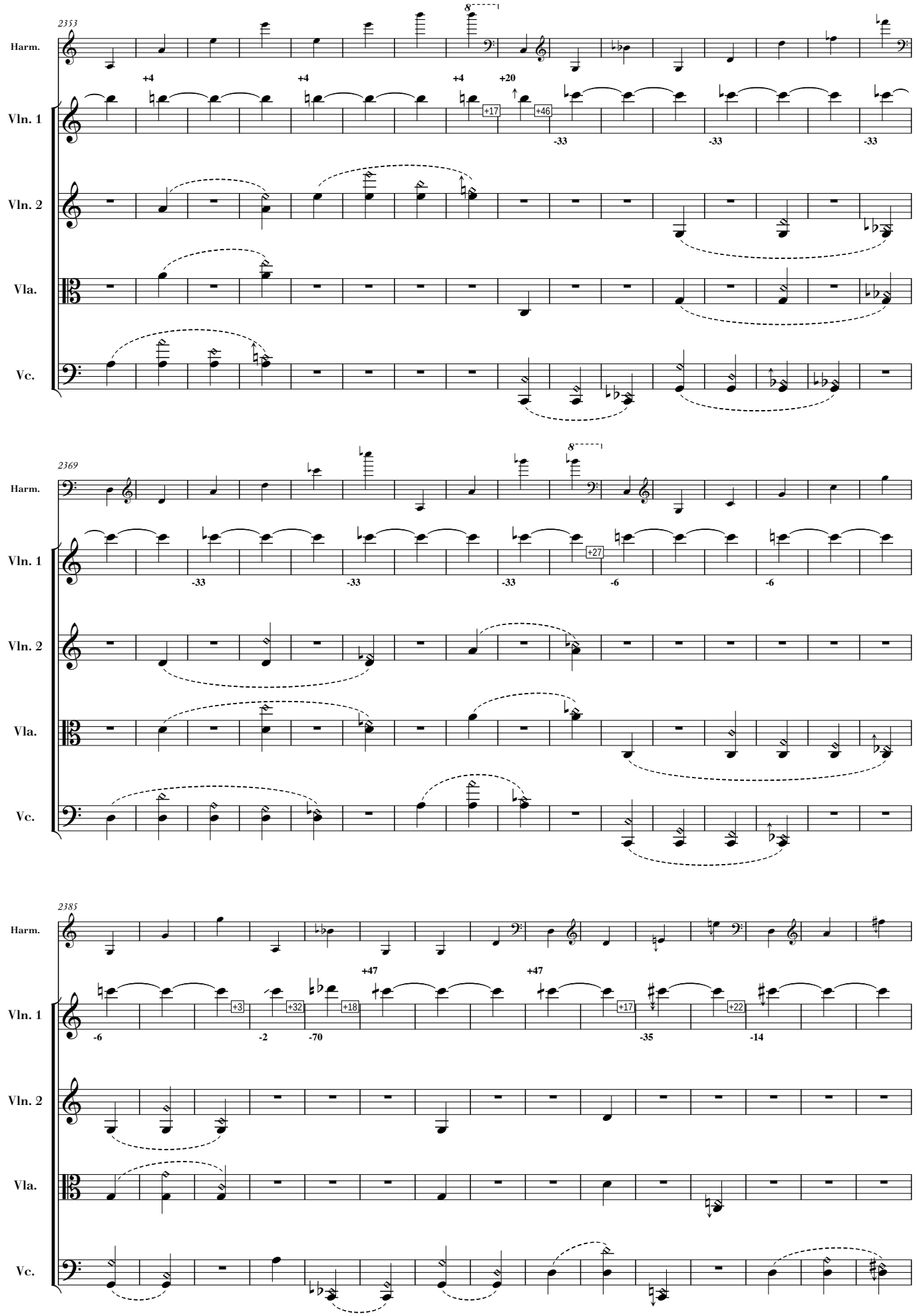

2103
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
G
mezza voce
2119
2137

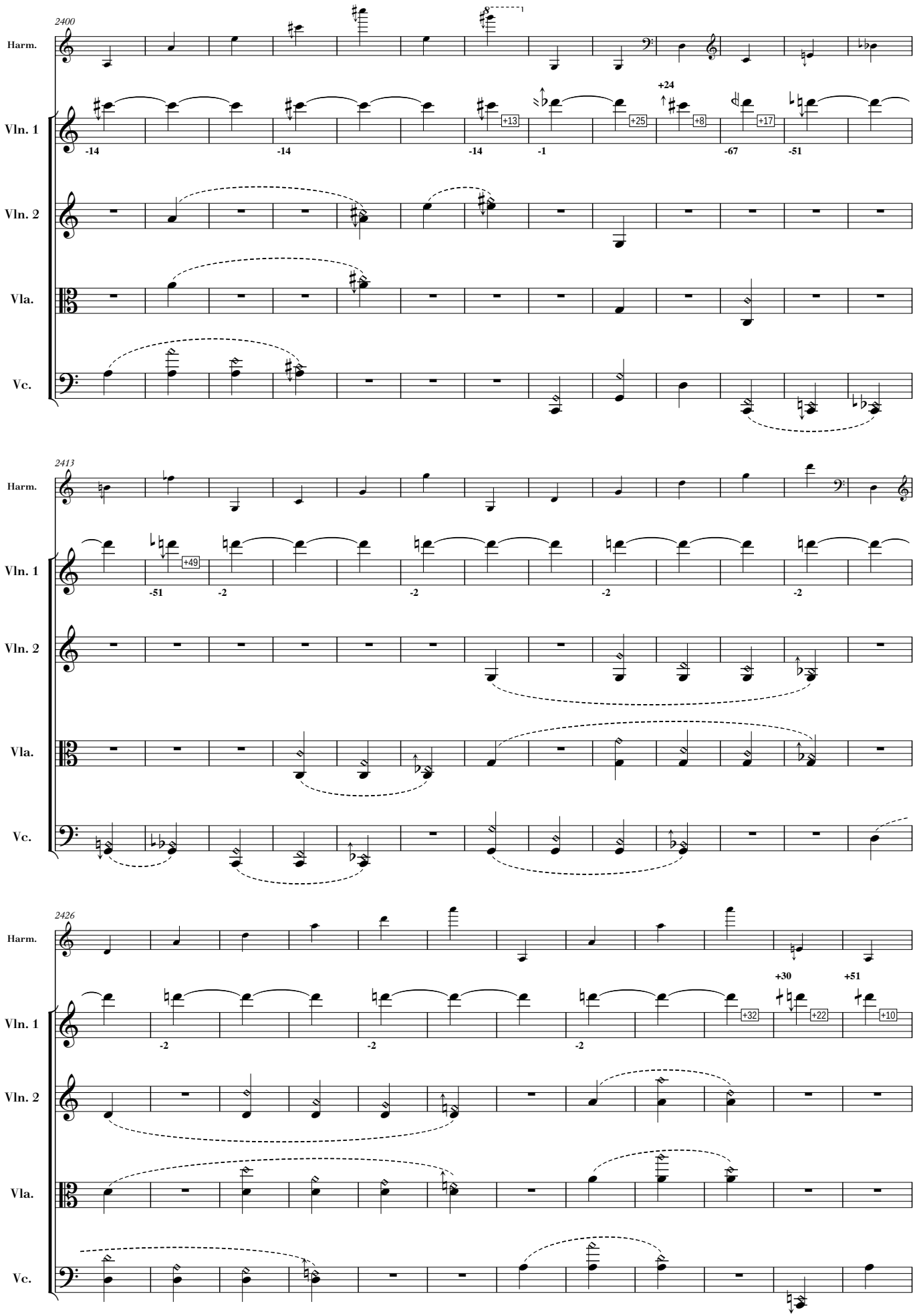

2154
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+14
+14
+45
+45
+27
+5
+31
-59
-23
2170
+8
-23
-16
-16
-16
-16
-16
2186
+13
+10
+7
+11
+19
+4
+22
+25
+5
+17
-16
-3
-53
-48
-31

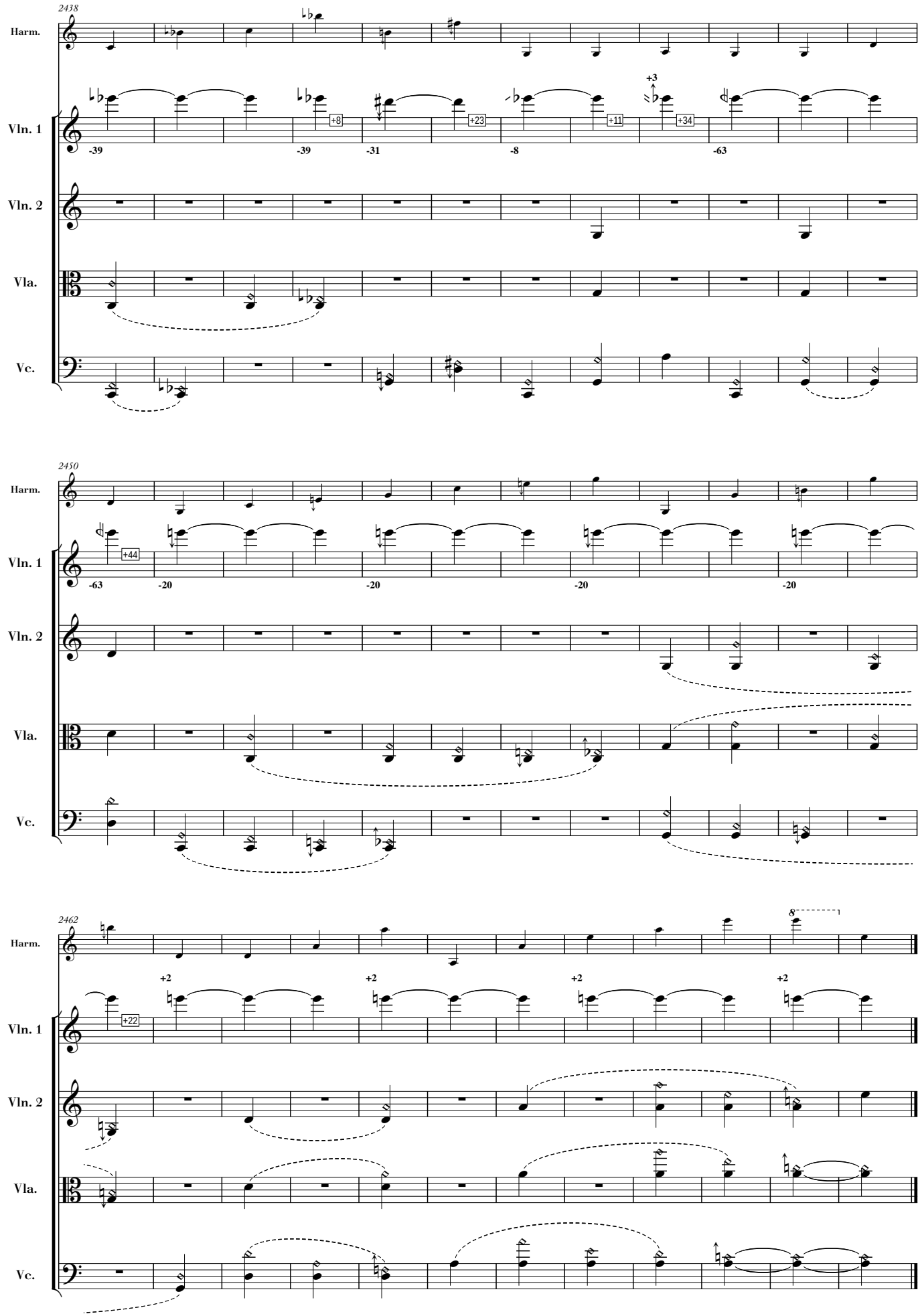

2202
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
8
+27
-31
-31
-4
-4
-4
-4
2219
+18
+18
+18
+22
-4
-4
-4
2236
+14
+18
+49
+49
+17
+14
-68
-33
-33
-19
-19


2253
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
2270
2286


2303
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
0
0
+32
+32
+31
-37
-37
-37
-37
+8
2320
+5
+43
+23
+11
+34
+5
+39
-29
-6
-61
-61
-18
-18
2337
+4
+22
-18
-18
-18
-18
-18


2353
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+4
+4
+4
+20
+17
+46
-33
-33
-33
2369
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-33
-33
-33
+27
-6
-6
2385
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
+47
+47
+3
+32
+18
+17
+22
-6
-2
-70
-35
-14


2400
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-14
-14
-14
-1
+24
-67
-51
+13
+25
+8
+17
2413
+49
-51
-2
-2
-2
-2
2426
+30
+51
-2
-2
-2
+32
+22
+10


2438
Harm.
Vln. 1
Vln. 2
Vla.
Vc.
-39
-39
-31
-8
-63
+8
+23
+11
+34
+3
2450
+44
-63
-20
-20
-20
-20
2462
+22
+2
+2
+2
+2
8