THE PASSION OF

- ALAN TURING -

THE GAY MATHEMATICIAN WHO SAVED 14 MILLION LIVES

JORDAN ALEXANDER KEY

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"THE PASSION OF ALAN TURING"

FOR

WOODWIND TRIO

Oboe – Clarinet in B-flat - Bassoon

Written for

~ TRIO DE BOIS ~

Summer, 2020

1. The Young Love of Christopher Morcom (c. 4'00") 1
2. "Profs Book" and the Enigma Machine (c. 4'50") 11
3. The "Bombe" that Broke Enigma (c. 9'10") 25
4. We Give Thanks to the One that Saved 14 Million Lives (c. 4'20") 57

Program Note:

At the age of 13 in 1926, Alan Turing (1912 – 1954) began high school at the Sherborne Boarding School in Britain. Turing's love for knowledge and education, even at a young age, was so much that, despite the 1926 General Strike, which effectively shut down the country's railroad systems and prevented Turing from getting to school, Turing was so determined to attend that he rode his bicycle unaccompanied overnight for 60 miles to get to Sherborne and promptly start his education. His passion for learning and discovery would persist for the next and last 28 years of his life.

At Sherborne, Turing formed a significant friendship with his fellow classmate, Christopher Morcom (1911-1930), who is often described as Turning's "first love." This first love - its companionship of the mind, compassion for the spirit, and tragic end - would inform the fervor of Turing's work for the rest of his life. Morcom was the one student at Sherborne with whom Turing felt most himself and could speak freely and equally about his thoughts on mathematics and science, which were prodigious for one so young, having already taught himself advanced mathematics well beyond calculus as well as read and annotated Einstein's Essays on Special and General Relativity before the age of 16. Morcom and Turing spent many of their holidays together and were inseparable. Tragically, Morcom died very suddenly in 1930, having contracted bovine tuberculosis. Turing was 18.

Turing was significantly heartbroken but coped with his grief by working more fastidiously on those studies and projects that he had shared with Morcom. In an archived letter Turing wrote to Morcom's mother:

> "I am sure I could not have found anywhere another companion so brilliant and yet so charming and unconceited. I regarded my interest in my work, and in such things as astronomy (to which he introduced me) as something to be shared with him and I think he felt a little the same about me ... I know I must put as much energy if not as much interest into my work as if he were alive, because that is what he would like me to do."

The first movement of this Passion, ***The Young Love of Christopher Morcom,*** is in memory of this love story: an ebullient, passionate, cerebral, and possibly forbidden physical love that was cut too short but ultimately inspired a life of world changing work from Turing.

In 1936, Turing published his first seminal paper: "On Computable Numbers." In this paper, Turing reformulated Kurt Gödel's 1931 results on the limits of proof and computation, replacing Gödel's universal arithmetic-based formal language with the formal and simple hypothetical devices that became known as "Turing machines," essentially laying the ground work for what would become the modern computer, as recognized by seminal mathematician and computer scientist John von Neumann To this day, Turing machines are a central object of study in the theory of computation. Turing was 24 years old.

Beginning in September of 1938, Turing worked part-time with the Government Code and Cypher School (GC&CS), the British codebreaking organization. His primary project was to decipher the German NAZI war code machine, called “Enigma.”

While at Bletchley Park’s Cypher research Lab, Turing had a reputation for eccentricity. He was known to his colleagues as "Prof" and his treatise on Enigma was known as the "Prof's Book.” This book of Turing’s various attempts to decipher the NAZI code machine’s mechanisms, sometimes employing his own base-36 system of numbers, became the central treatise and textbook to ultimately design the device that would significantly help end the Second World War on the European Stage. The second movement, ***Prof’s Book and the Enigma Machine****,* attempts to signify one of Turing’s more simple base 36 deciphering algorithms. While the interior perpetual augmentation canon is simply a whimsical representation of the mathematical mind of Turing at work, the outer portions of the movement compress a simple base-36 numerical algorithm to a base-12 pitch and rhythm transformation that slowly changes the opening material from an atonal confusion to a delicate and pristine modal construct.

The machine that Turing was instrumental in designing and which would ultimately crack Enigma was called, “the Bombe.” The Bombe, with an enhancement suggested by mathematician Gordon Welchman, became the primary rapid automated tool used decrypt and counter NAZI Enigma-enciphered messages. The machine immeasurably changed the course of the war. Today, Turing is recognized as having played a crucial role in cracking intercepted coded messages that enabled the Allies to defeat the Nazis in many crucial engagements, and in so doing helped win the war for the Allied Powers. Mathematicians, statisticians, historians, and biographers have reasonably estimated that Turing’s work shortened the war in Europe by more than two years and saved over 14 million lives on both sides of the conflict. The third movement, ***The Bombe that Broke Enigma*****,** is a musical fantasia that attempts to capture the sounds and processes of trial and error in creating one of the first electronic computers to decipher life-altering wartime messages. There are many starts and stops, changes in speed and texture, builds and decays, steps forwards and steps back, to ultimately arrive at the surprising and triumphant end of cracking the code of Enigma, presaged in the prior movement via the “Enigma Canon.”

After the war, Turing’s work did not end or diminish in importance. He worked on the first commercial computers in the late 1940s as well as began to tackle the question of artificial intelligence. He returned to one of his old passions, mathematical biology, wherein he outlined in a series of papers the first mathematical basis for biological processes, later incorporated into the study of the human genome and genetics generally, effectively founding a completely new field of mathematics essential to medical research today.

On 23 January 1952, Turing's house was burgled. Turing reported the crime to the police. During the investigation, he acknowledged that he was living with another man, with whom he was having sexual relations. Homosexual acts were criminal offences in the United Kingdom at that time, so, rather than continue the investigation of the burglary, the police arrested Turing and his lover and charged both with "gross indecency," one of Britain’s sodomy laws of the time.

The case of *The Queen vs. Turing and Murray* was brought to trial on 31 March 1952. Turing was convicted and given the options of imprisonment or probation, for which he would undergo chemical sterilization and hormonal "therapy" designed to "cure" him of his homosexuality and "overactive" libido. He accepted the option of "therapy" so that he could continue his work on computers, artificial intelligence, and mathematical biology. The chemical injections persisted for the course of one year, rendering Turing impotent and likely severely depressed, given his subsequent suicide following this year of "treatment."

On 8 June 1954, Turing's housekeeper found him dead at the age of 41; he had died the previous day by cyanide poisoning. When his body was discovered, an apple lay half-eaten beside his bed, and although the apple was not tested for cyanide due to the lackadaisical treatment of his death by authorities, it has been speculated that this was the means by which Turing had consumed the fatal dose. Many biographers now think that Turing was re-enacting the death scene from the Walt Disney film *Snow White and the Seven Dwarfs* (1937), his proclaimed favorite fairy tale.

He was cremated without ceremony and without honors. The man that should have been a national and world hero, the one whose mind saved millions of lives and arguably began our computer age was ignored and forgotten by most for decades due to his homosexuality. It is heartening that in the past decades of the 21st century, Turing is finally being recognized for his work. Through the efforts of many gay and allied politicians, mathematicians, and scientists Turing was given a posthumous pardon for his "crimes" and an official apology from the British government. In September 2016, the British government announced its intention to expand Turing's retroactive exoneration to other men and women convicted of similar historical indecency offences, in what is now described as the "Alan Turing Law,". which to date has given pardons to over 75,000 other gay and lesbian people adversely effected by the past sodomy laws of the United Kingdom. Thus, with the final movement of this Passion, ***We Give Thanks to the One Who Saved 14 Million Lives,*** I wish to honor Turing and his work with a moving canon – poetic and cerebral – and recognize that many of us are here today because his work saved so many lives.

Alan Turing was a brilliant mathematician, a war hero, and an admitted homosexual in the 1950s United Kingdom. This placed him squarely amongst the most despised minority of the time: sodomites. Turing's contributions to end World War II saved millions and possibly tens of millions of lives. He broke the German Enigma Code by reverse engineering the mechanical computer that created it and creating decryption algorithms to apply to it. His contributions to mathematics were far-reaching and included the creation of many active and important fields of mathematics including computer science and mathematical biology. Yet, his life was cut ignominiously short by a small-minded legal system and enforced "cures" for fabricated mental ailments by dangerous, nonsensical pseudoscientific quackery. Such myopic injustice ultimately plunged this genius into a suicidal depression at the very height of his mathematical prowess in his late 30s and early 40s. We can only imagine what else he might have given the world if the world had been more kind to him.

This is the Passion of Alan Turing, savior in the 20th century.

About the Composer:

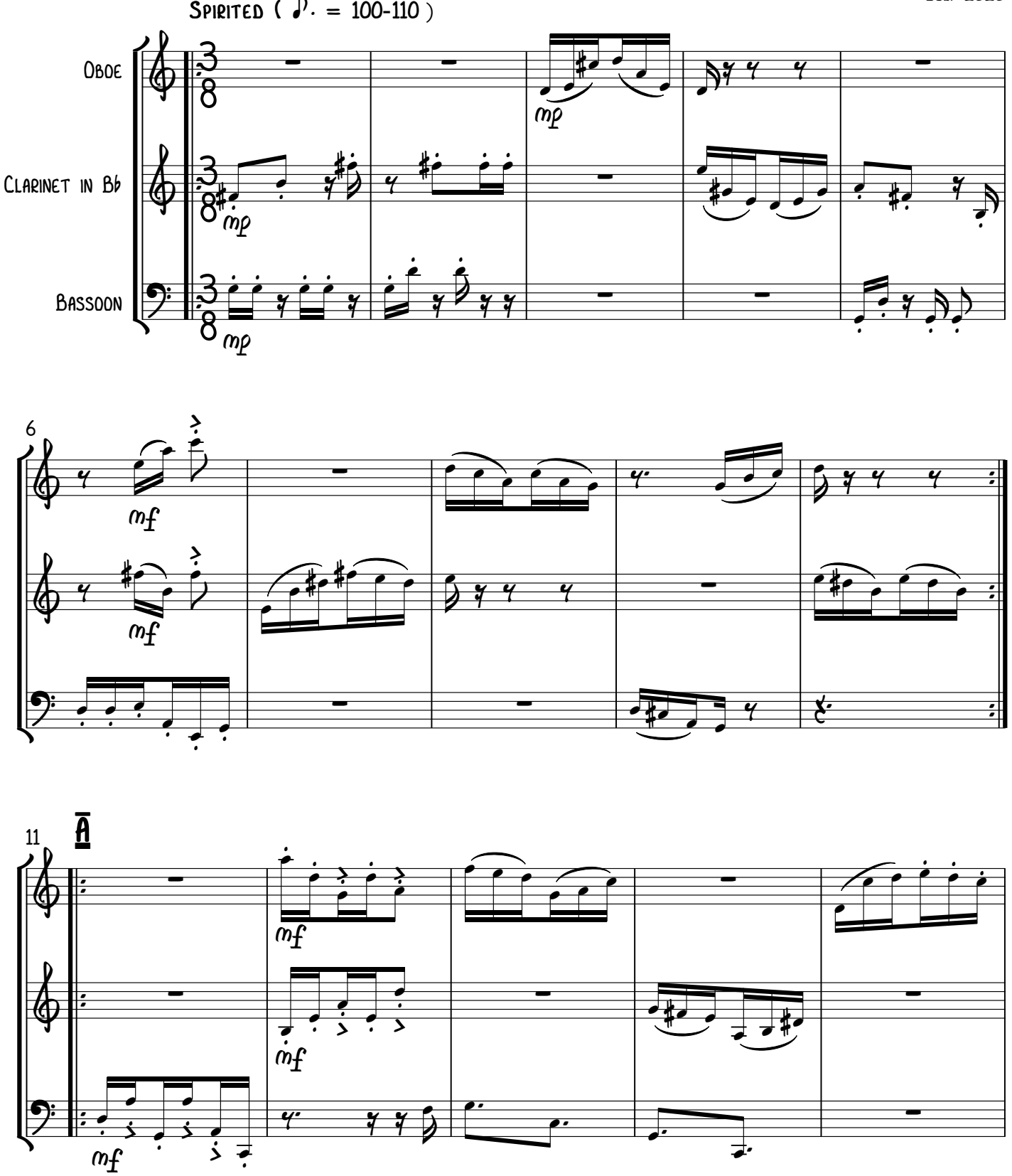
Jordan Alexander Key (b. 1990) - blind, gay, composer of contemporary and classical music - has studies the intersections of music, art, philosophy, math, and science for all of his adult life, receiving bachelor's degrees in music composition, mathematics, and philosophy from The College of Wooster (2013), a master's degree in music composition from the University of Arizona (2015), as well as his PhD in composition from the University of Florida (2021). His significant recent projects that deal with the intersections of math and music include his Kennedy Center premier of his ballet, To Say Pi, as well as his residency at the Harn Museum of Art and the production of music for its various exhibitions including his Black-MIDI dance, "Nachi No Taki." Political and social activism is present in much of his music, which attempts to confront many issues of the present from LBGTQ+ rights, gun violence, as well as atheism and disability awareness and empowerment. Such socially oriented pieces include his octet, "Threnody on the Death of Children;" his sextet, "Verses from the Scroll of Sondering;" his trio, "March for the 12th Hour;" as well as his various collaborations with the Vancouver Queer Arts Festival and Calliope's Call for the premiers of his queer art songs, "God Ourselves," "Last Night I Touched Him," "Dream Season's Done," and "The Doctrine You Desire." His academic research has been featured around the world, most recently in the exhibition of some of his audio-visual projects as part of the Wolfsburg Kunstmuseum's exhibit, "Never Ending Stories: The Loop in Art, Film, Architecture, and Music, in Germany." Jordan is an active advocate for and member of the disabled and LBGTQ+ community of central Florida, frequently called upon to give guest talks at universities, museums, and public secondary schools across Florida about disability and queer studies and accessibility in the arts as well as the intersections of music, art, math, and science.

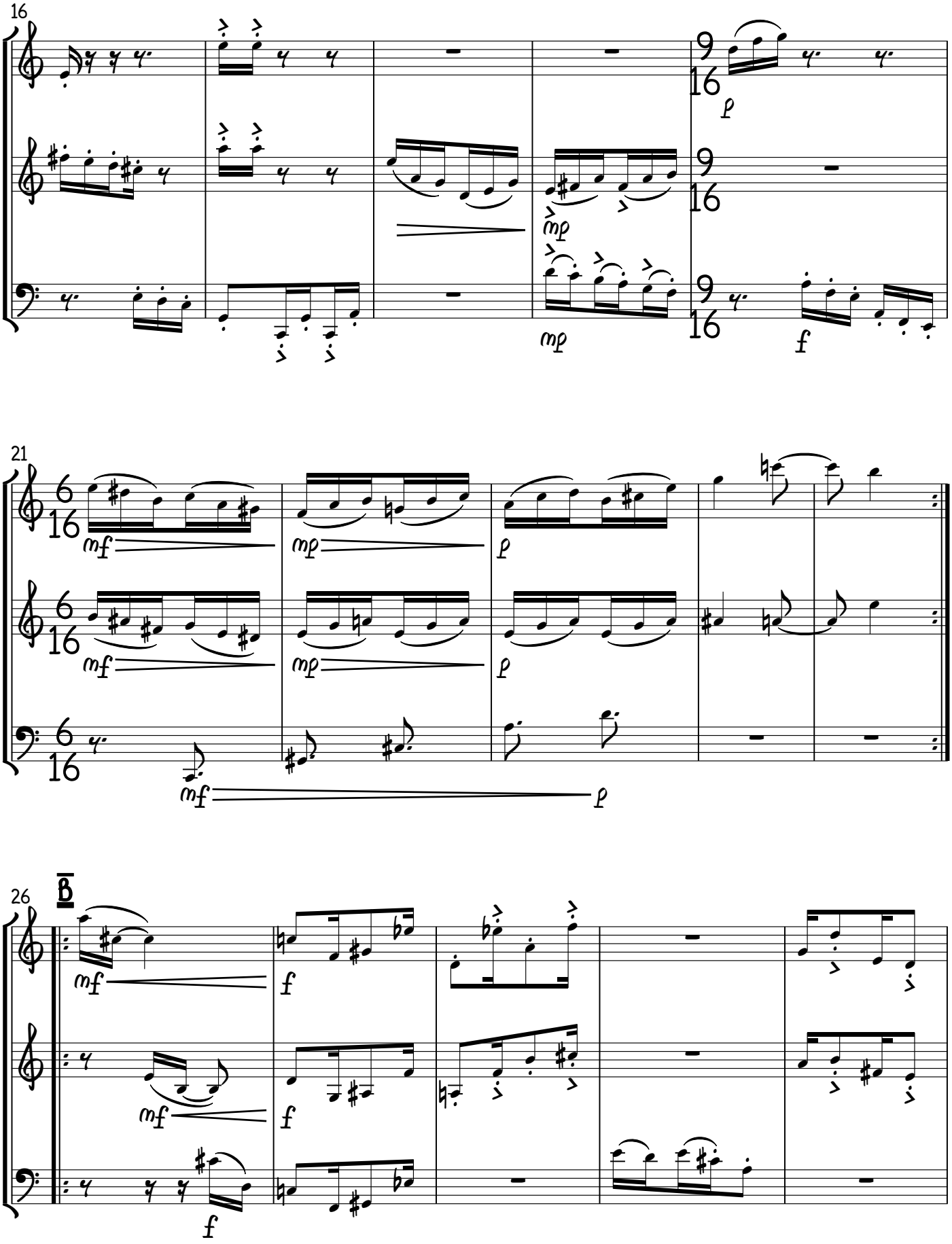
Transposing Score

THE YOUNG LOVE

OF CHRISTOPHER MORCOM

Jordan Alexander Key
July 2020

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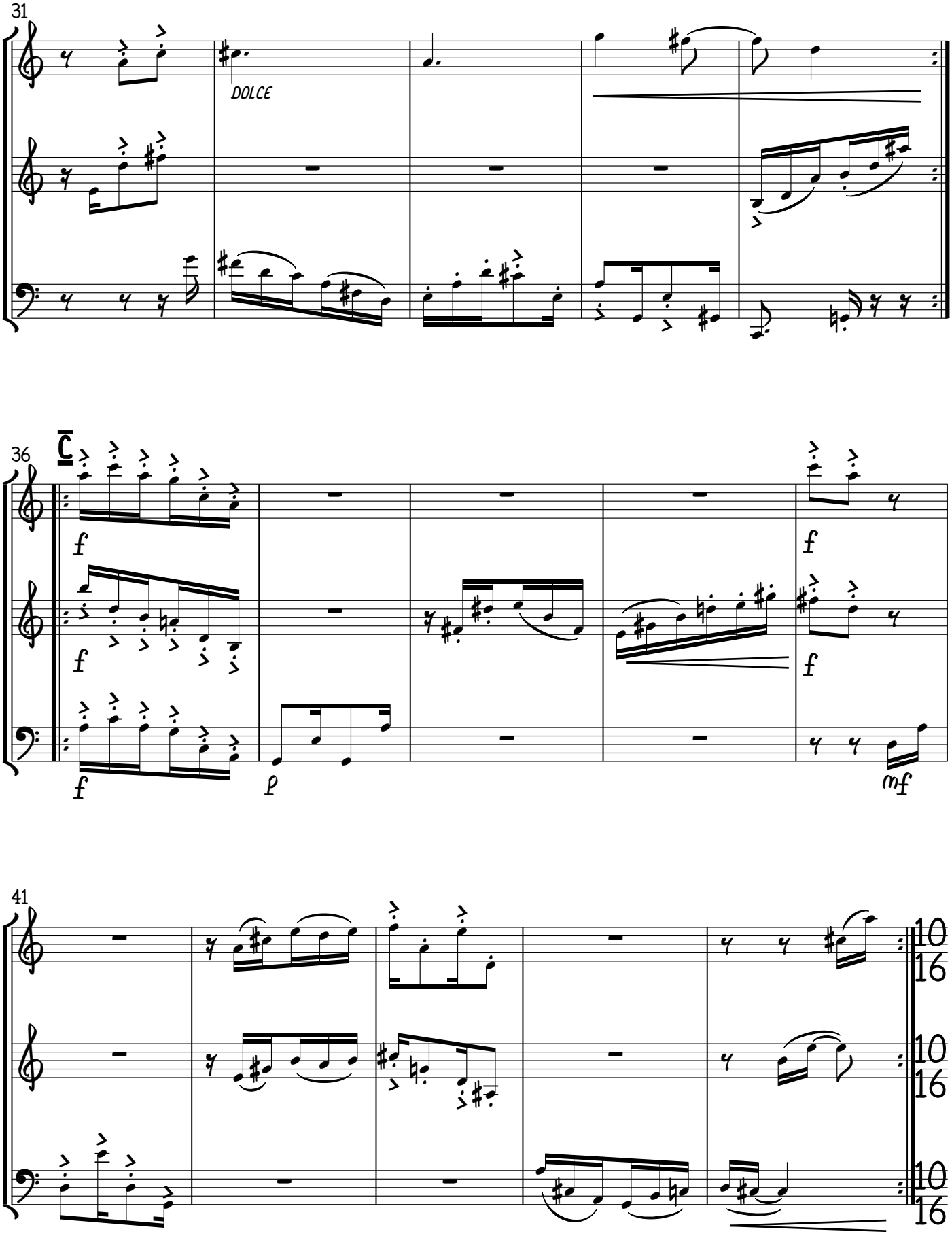
9/16
mp
f
21
6/16
mf
mp
p
26
B
mf
f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DOLCE
36
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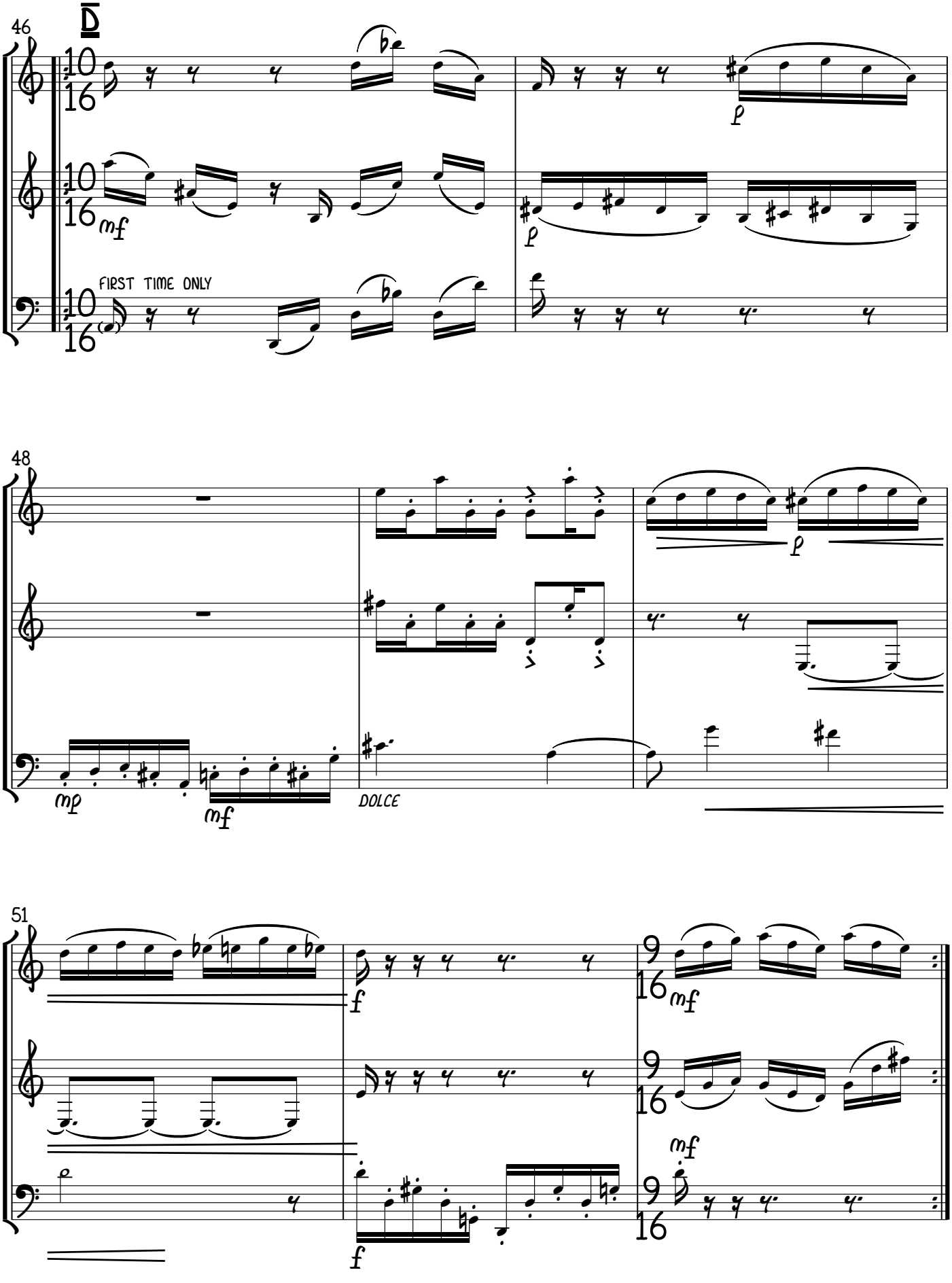
f
f
f
p
mf
41
10
16
10
16
10
16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D
FIRST TIME ONLY
mf
p
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mf
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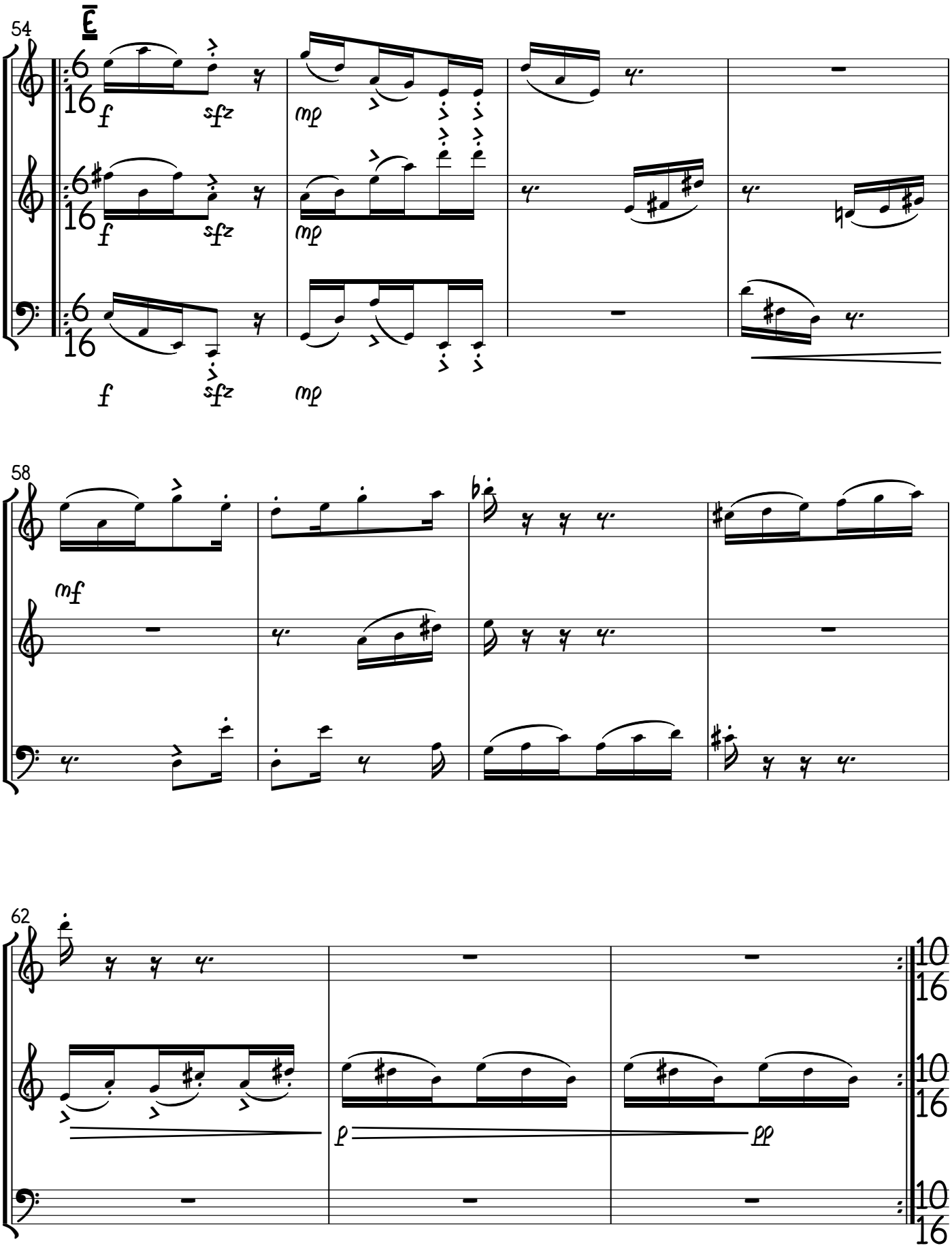
51
f
mf
f
mf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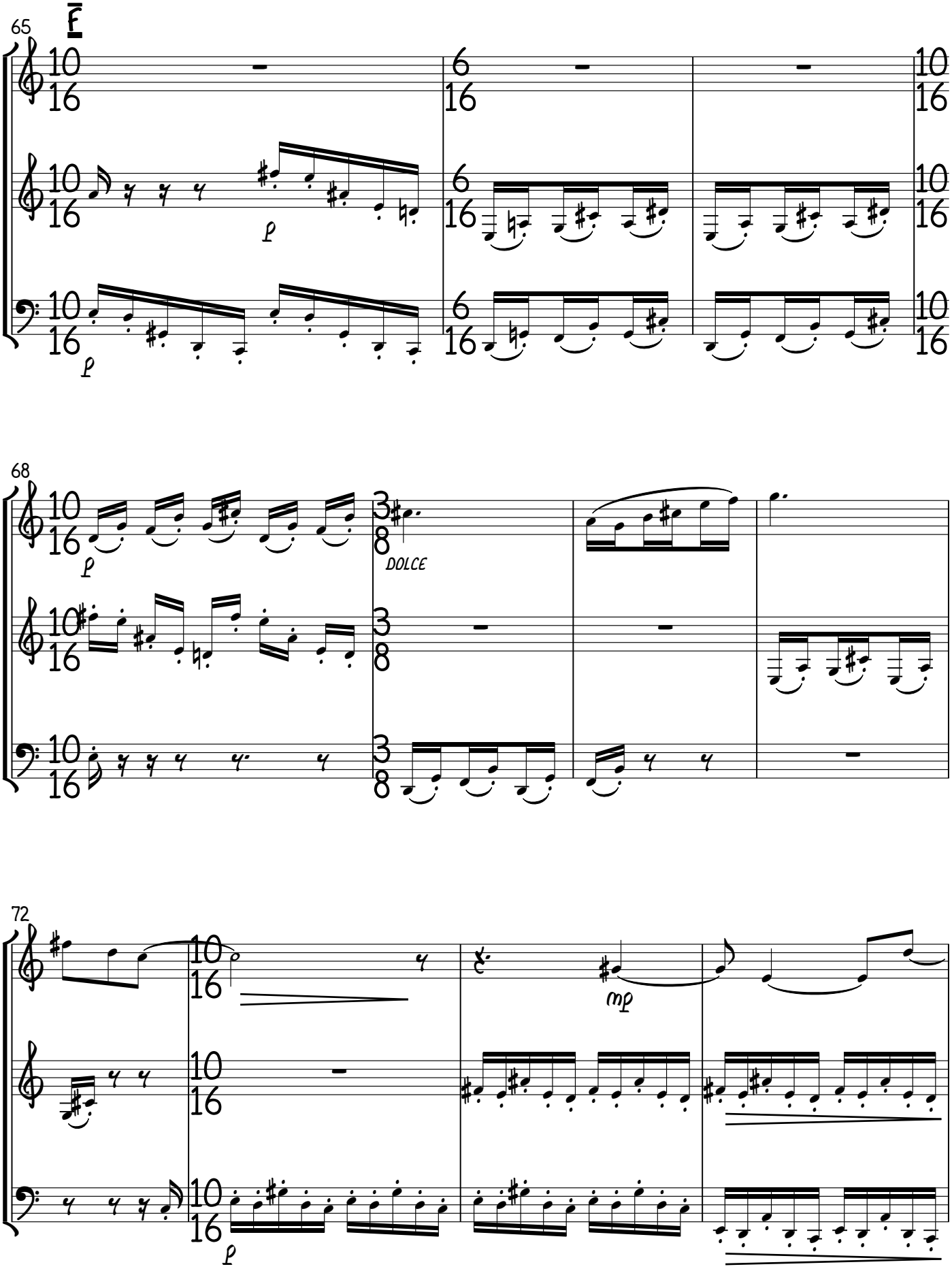
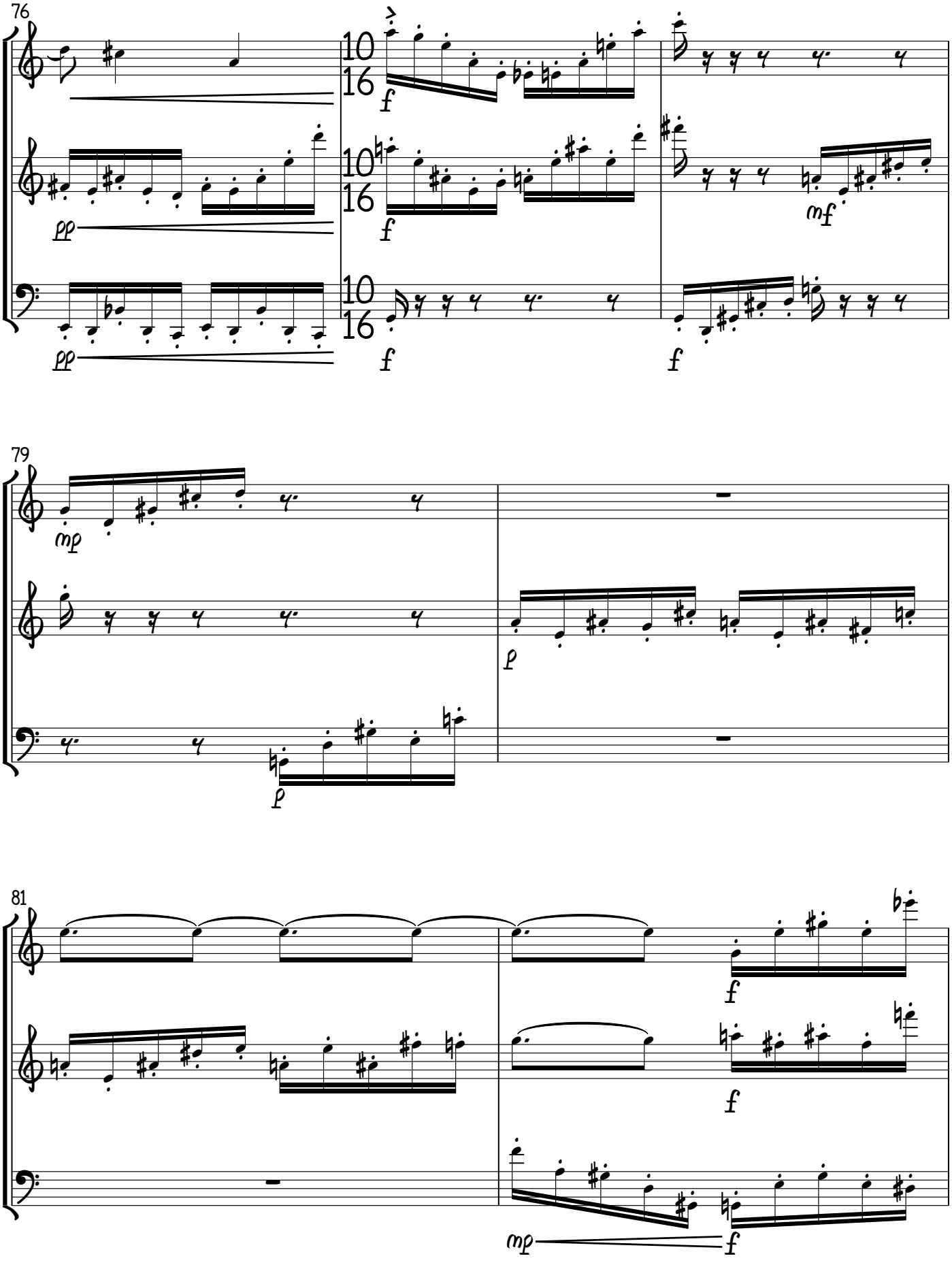
E
f
sfz
mp
58
mf
62
p
pp


65
F
p
68
p
DOLCE
72
p
mp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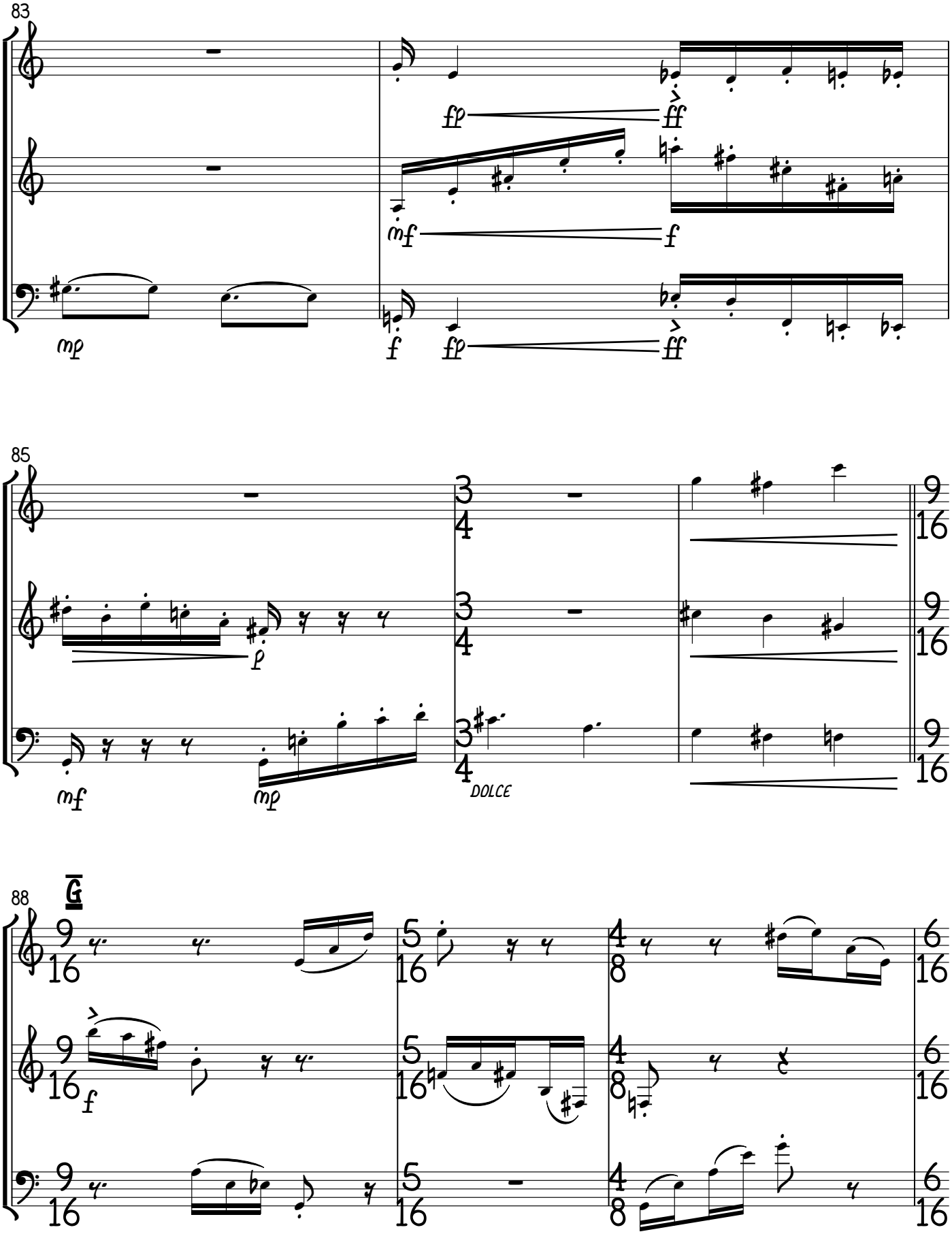
10
16
79
81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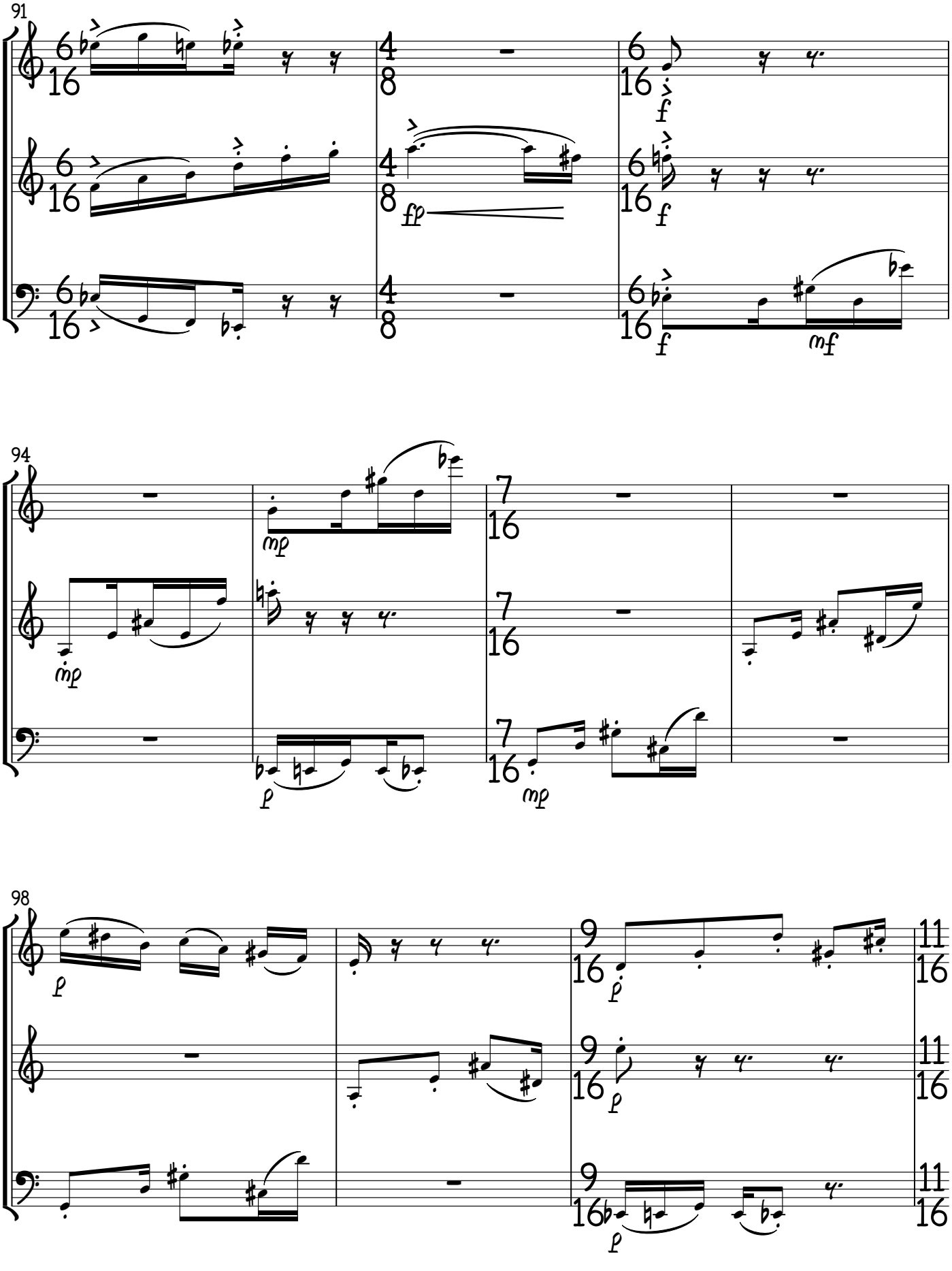
mp
f
ff
mf
f
ff
85
mf
p
mp
DOLCE
88
G
f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94
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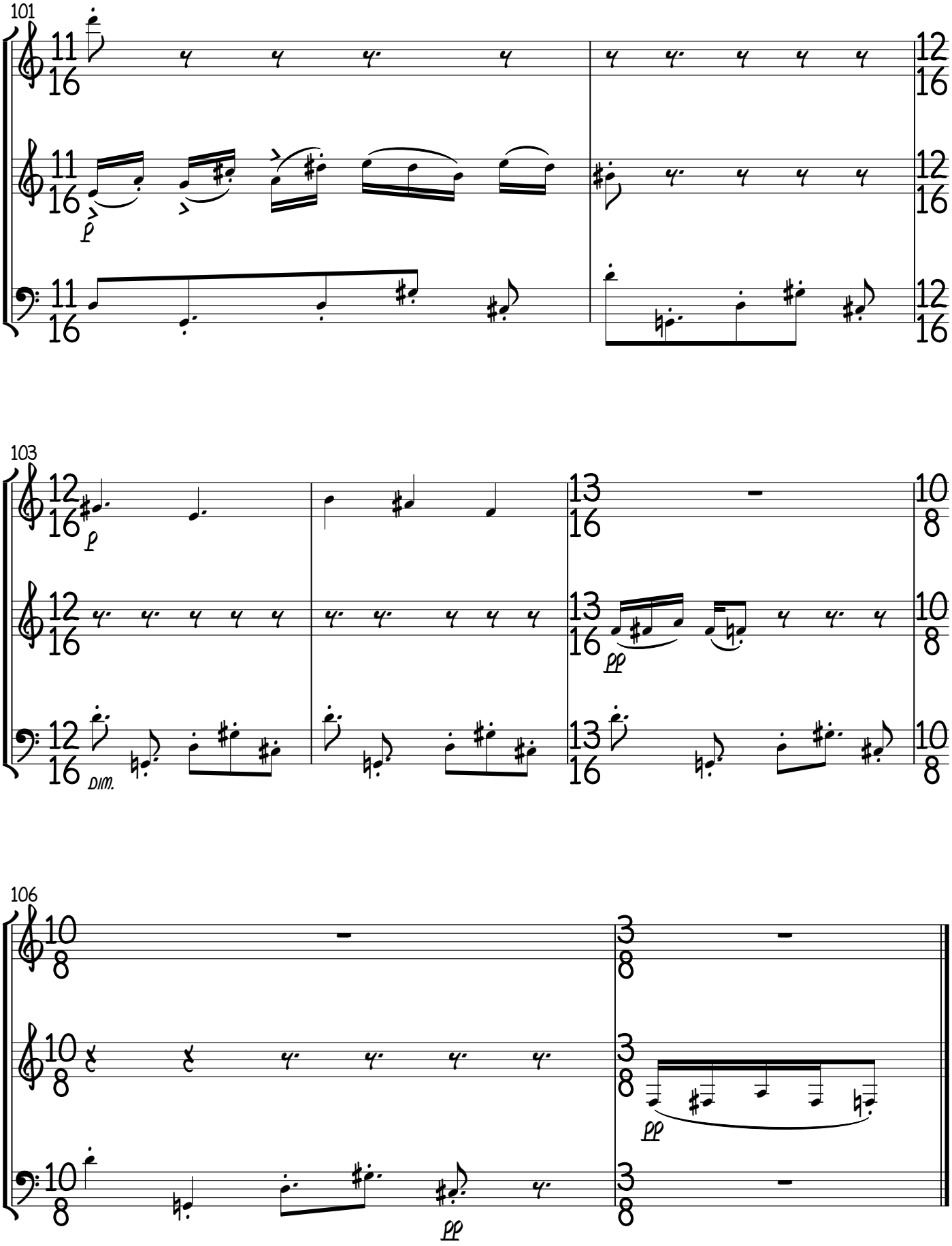
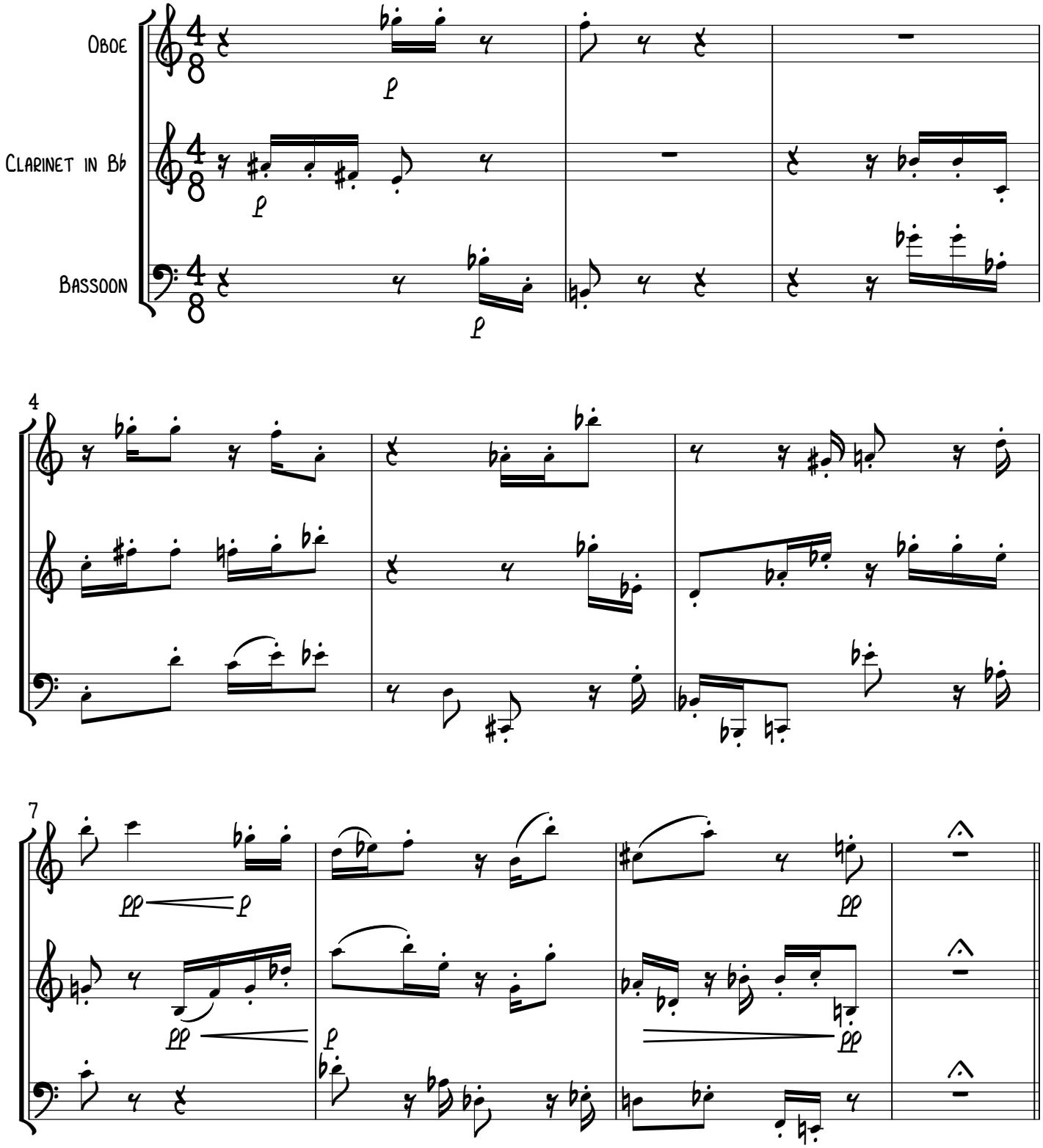

101
p
103
p
dim.
pp
106
pp
pp

PROF'S BOOK

AND THE ENIGMA MACHINE

Jordan Alexander Key
July 2020

Algorithm Music, Cryptic (♪ = c. 150 - 160)



11 **A**

p

p

p

15

pp

p

mf

mf

19

p

mf

mp

mf

p

mp

mf

p

mf

22

mf

mf

f

mf

p

p

p

25

B

mp

mp

mp

f

f

mf

f

29

p

p

p

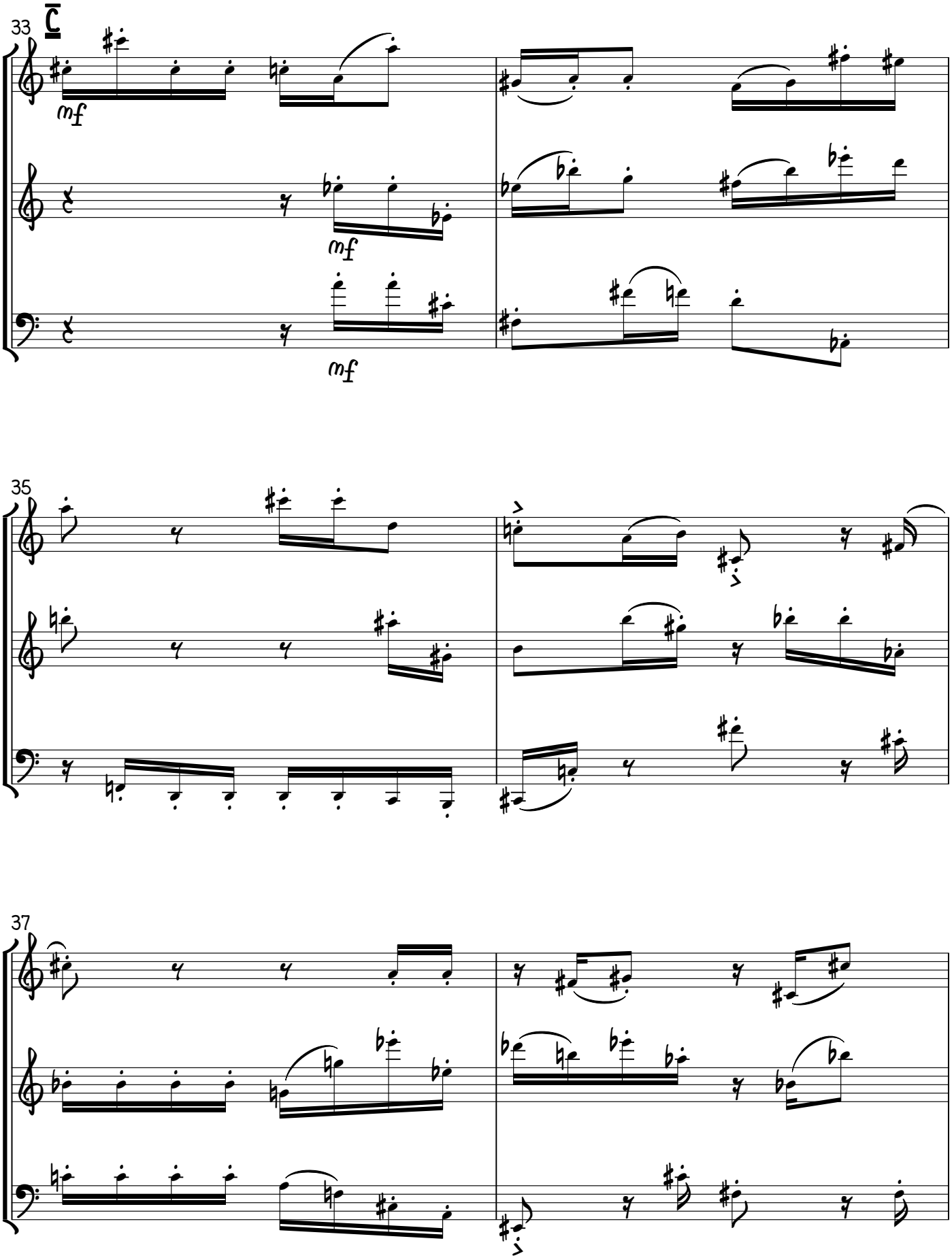
mp

mp

mf

mf

mf


33
C
mf
mf
mf
35
37

39

p

p

p

42

mp

mp

mf

mf

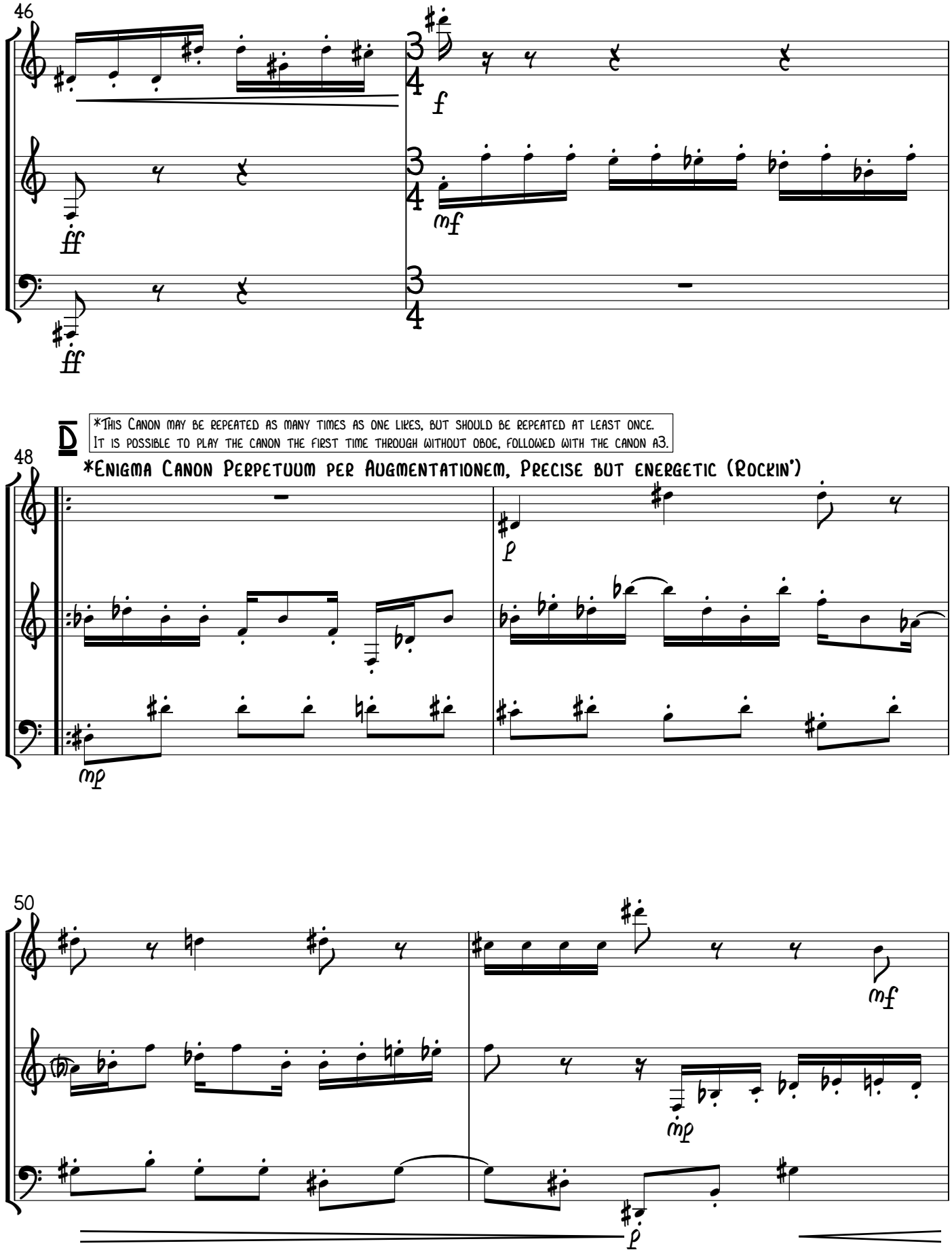
mf

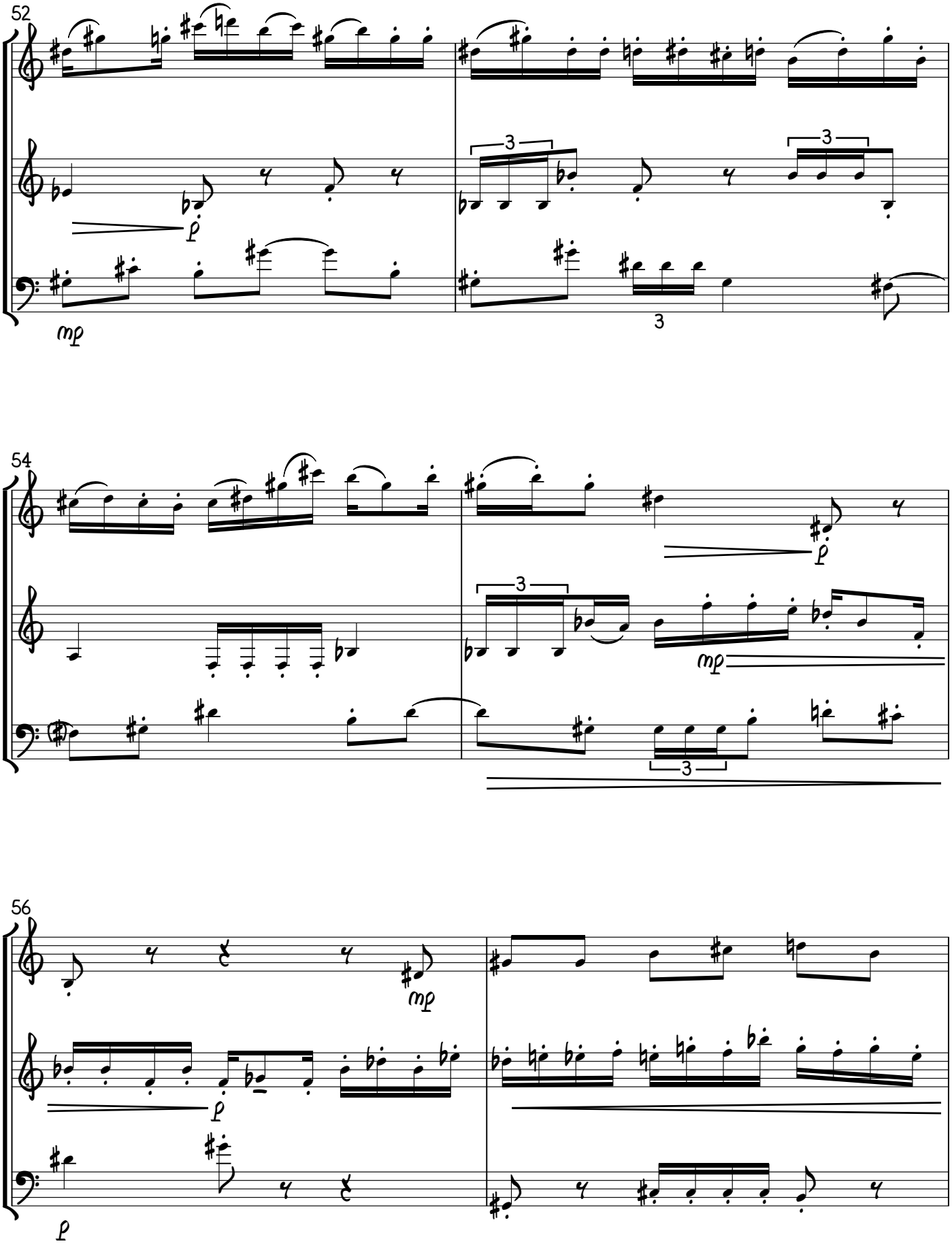
44

f

f

f


46
48
50
D
*This Canon may be repeated as many times as one likes, but should be repeated at least once.
It is possible to play the canon the first time through without oboe, followed with the canon a3.
*Enigma Canon Perpetuum per Augmentationem, Precise but energetic (Rockin')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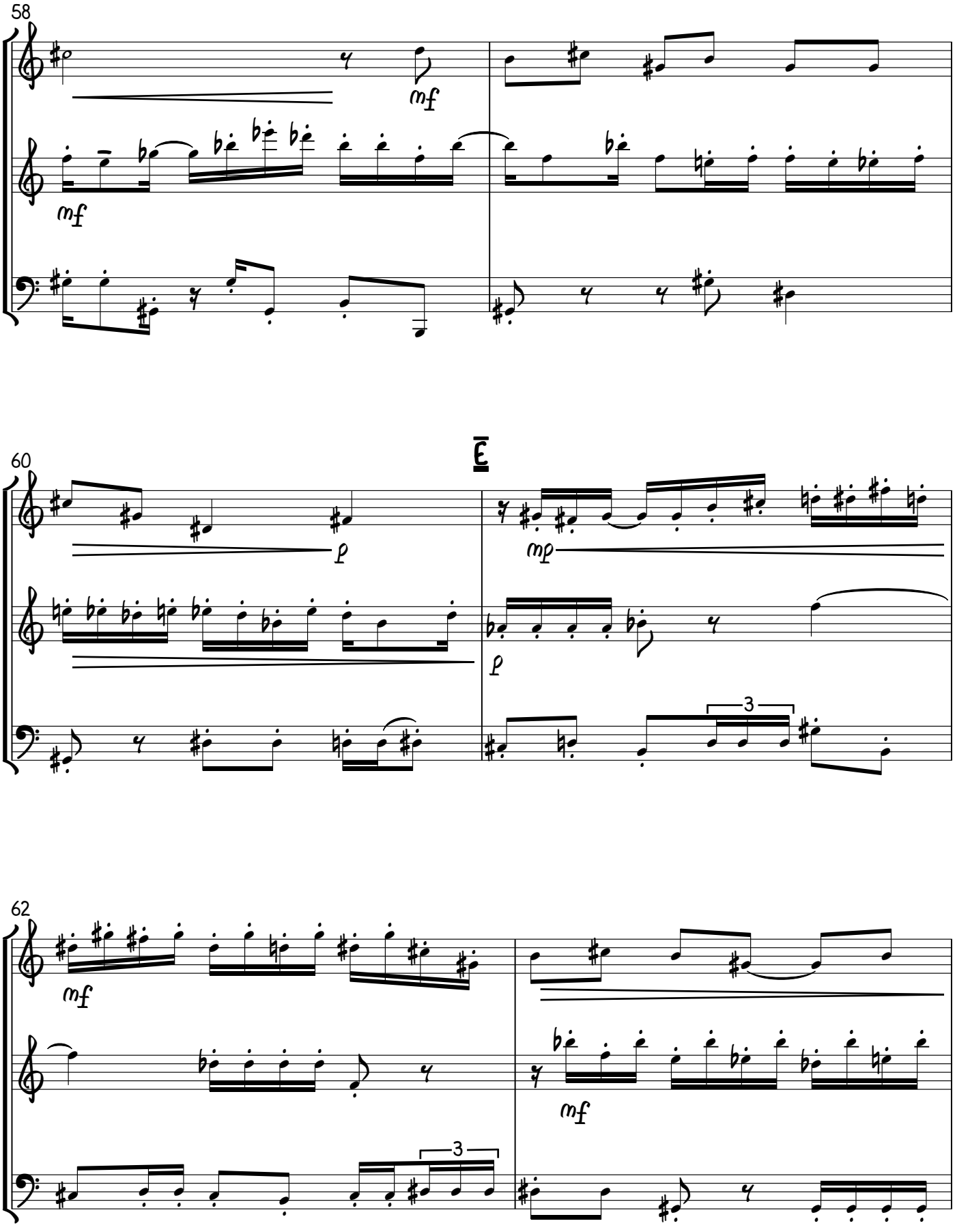
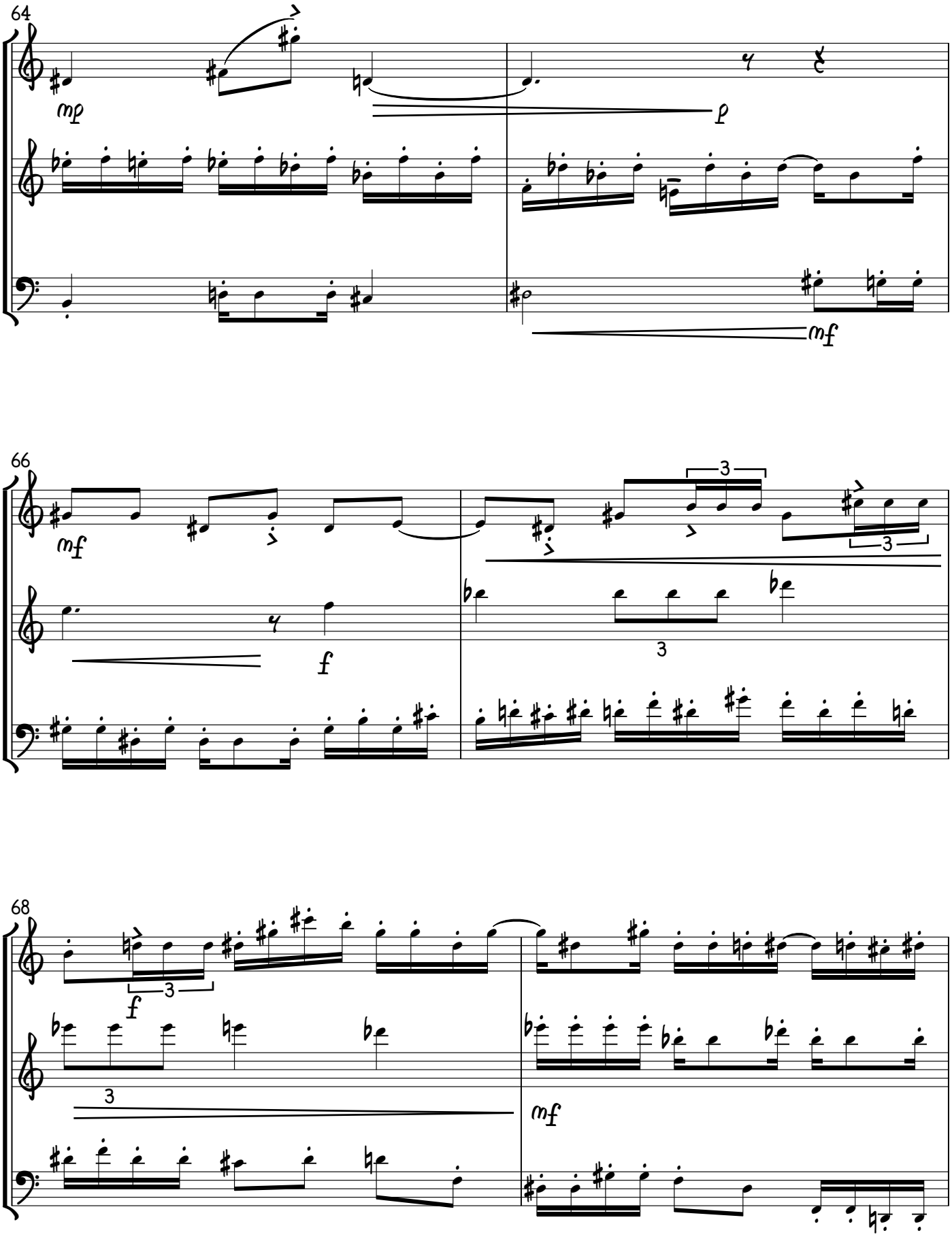
3
3
3
54
3
3
56


58
mf
mf
60
E
p
mp
p
3
62
mf
mf
3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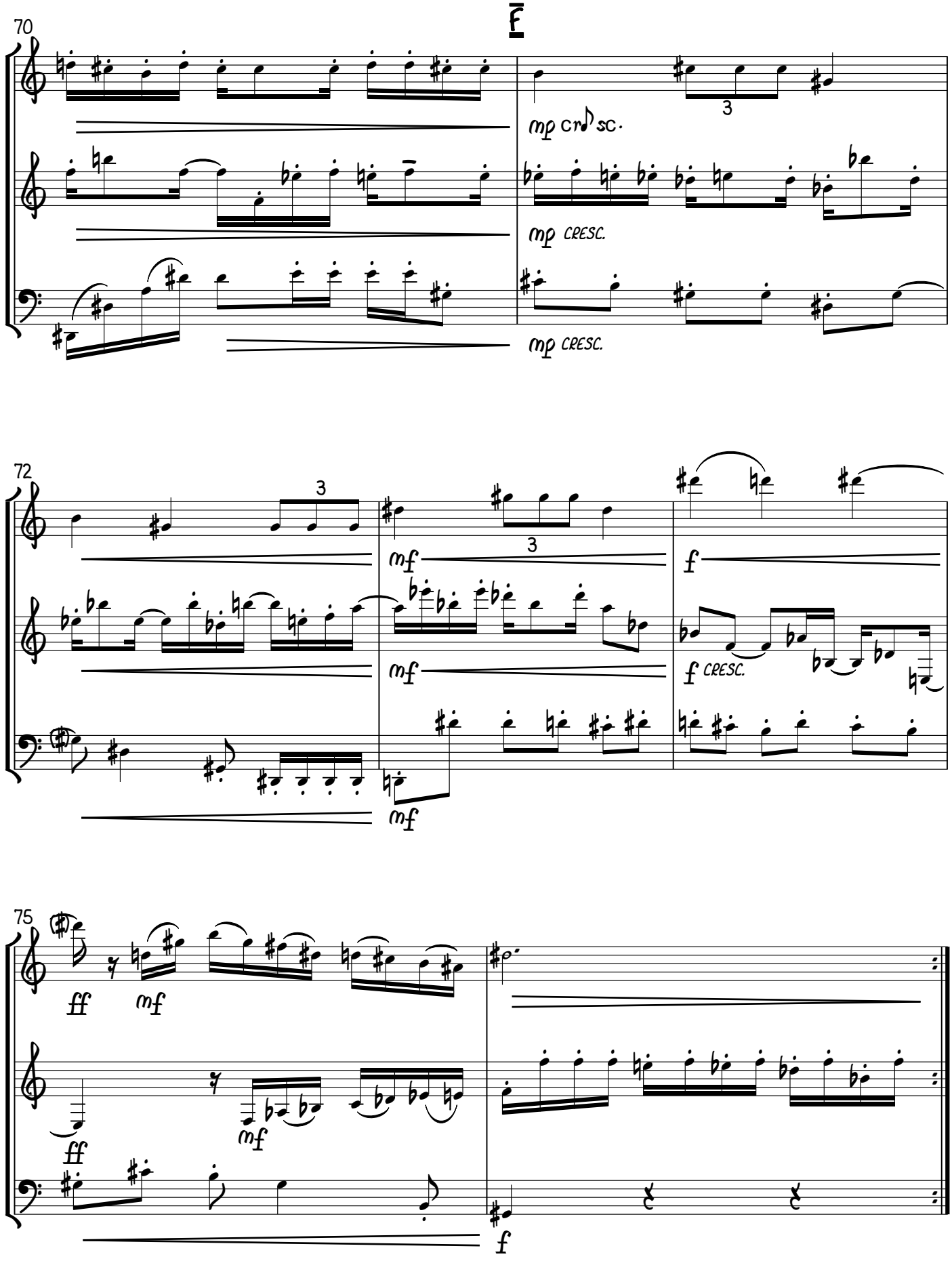
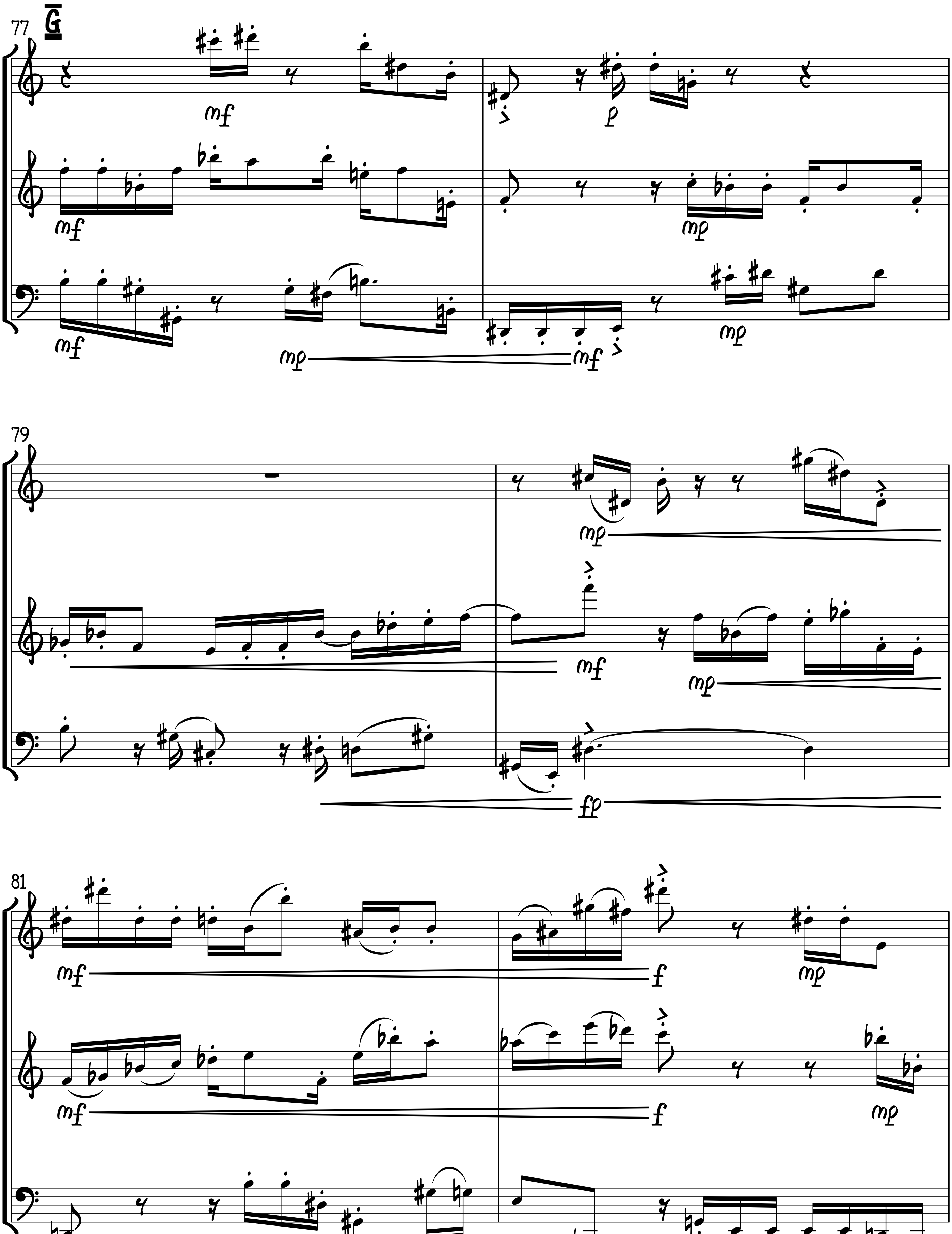
mp
p
mf
66
mf
f
3
3
3
68
f
3
3
mf

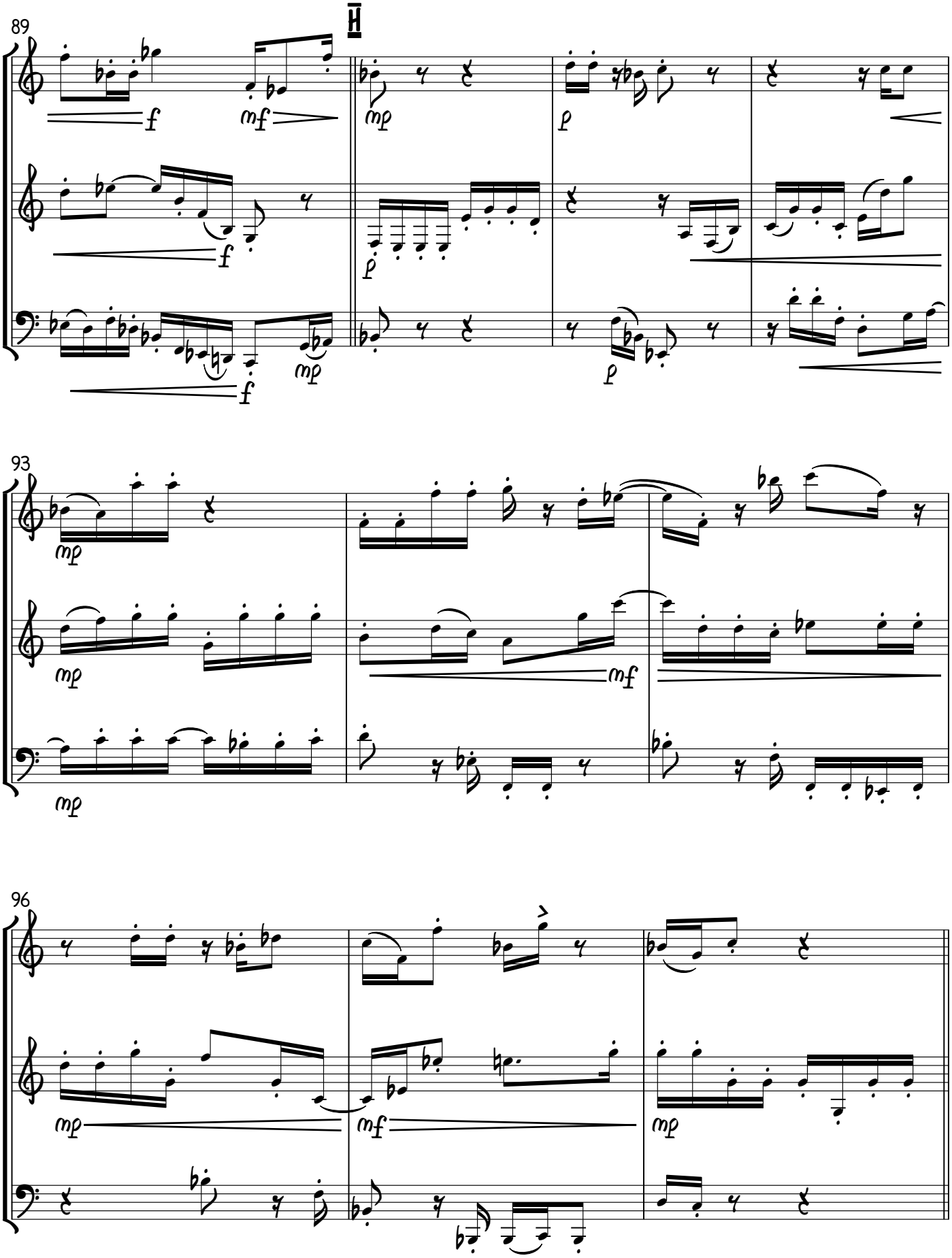

70
f
3
mp cresc.
mp cresc.
mp cresc.
72
3
mf
3
f
mf
f cresc.
mf
75
ff
mf
ff
mf
f

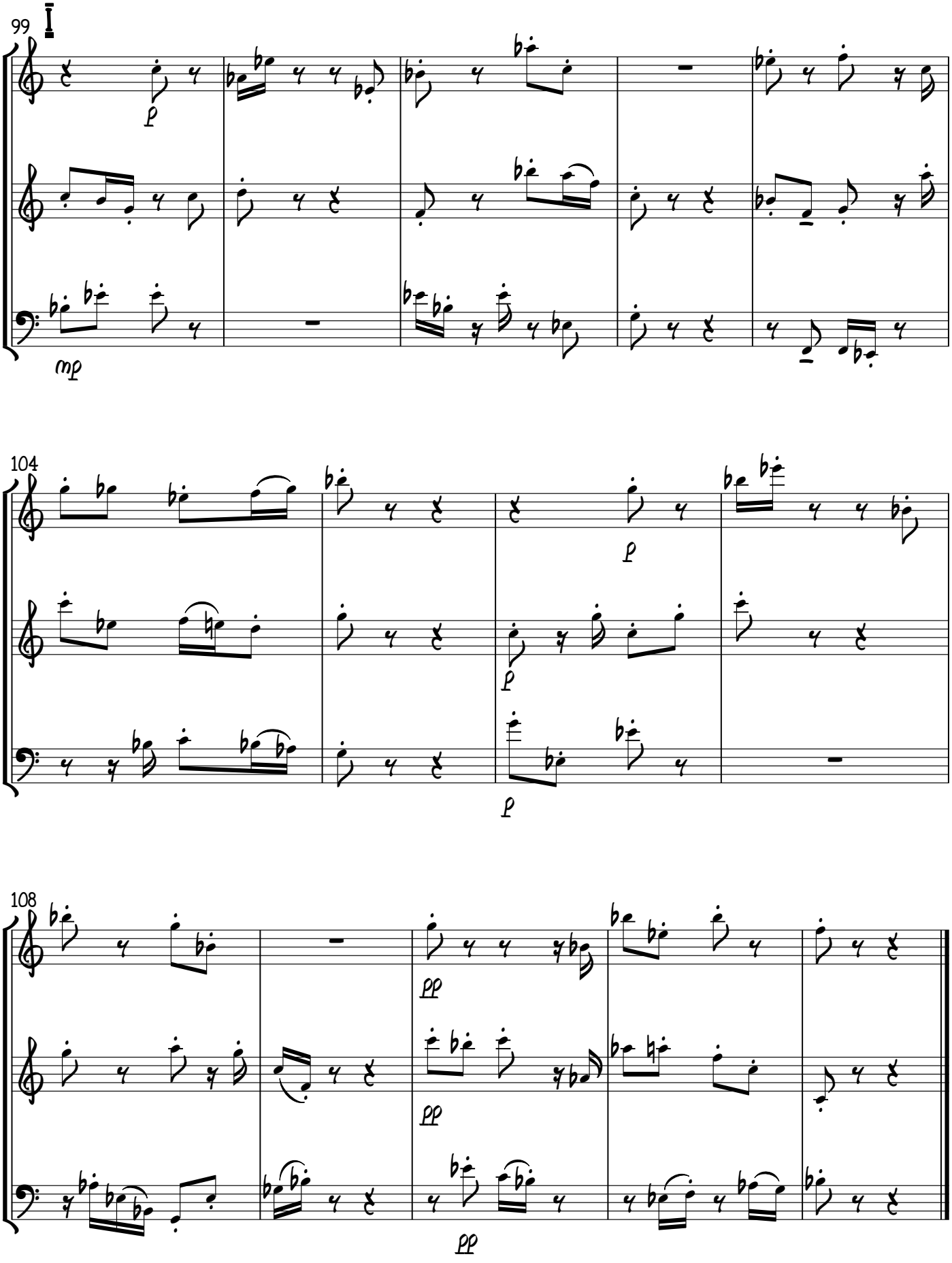

G
77
mf
mf
mf
mp
mf
p
mp
mp
79
mp
mf
mp
fp
81
mf
f
mp
mf
f
mp
mf
mf
f
f

83

85

87


89
H
93
96

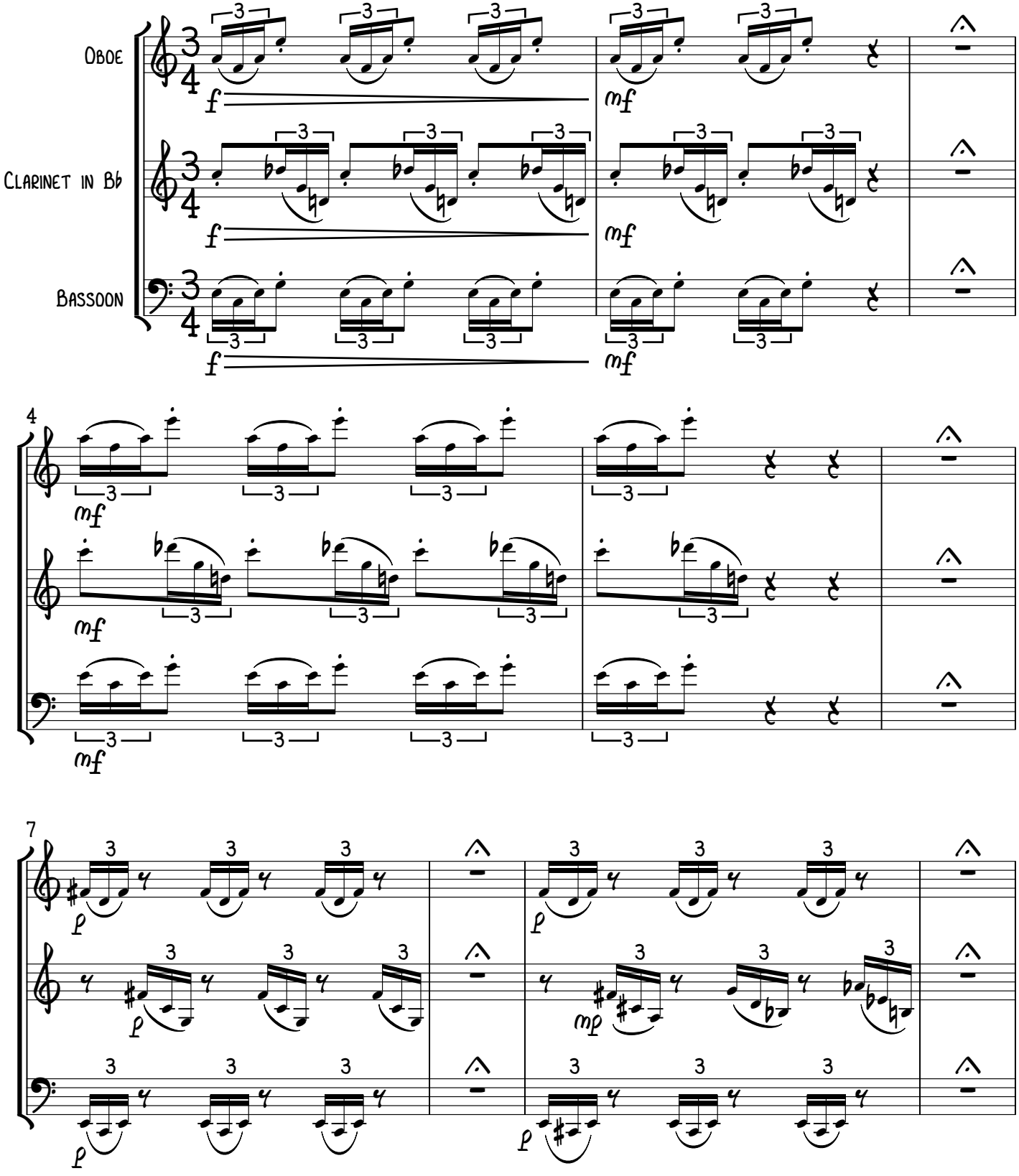

99
I
p
mp
104
p
p
108
pp
pp
pp

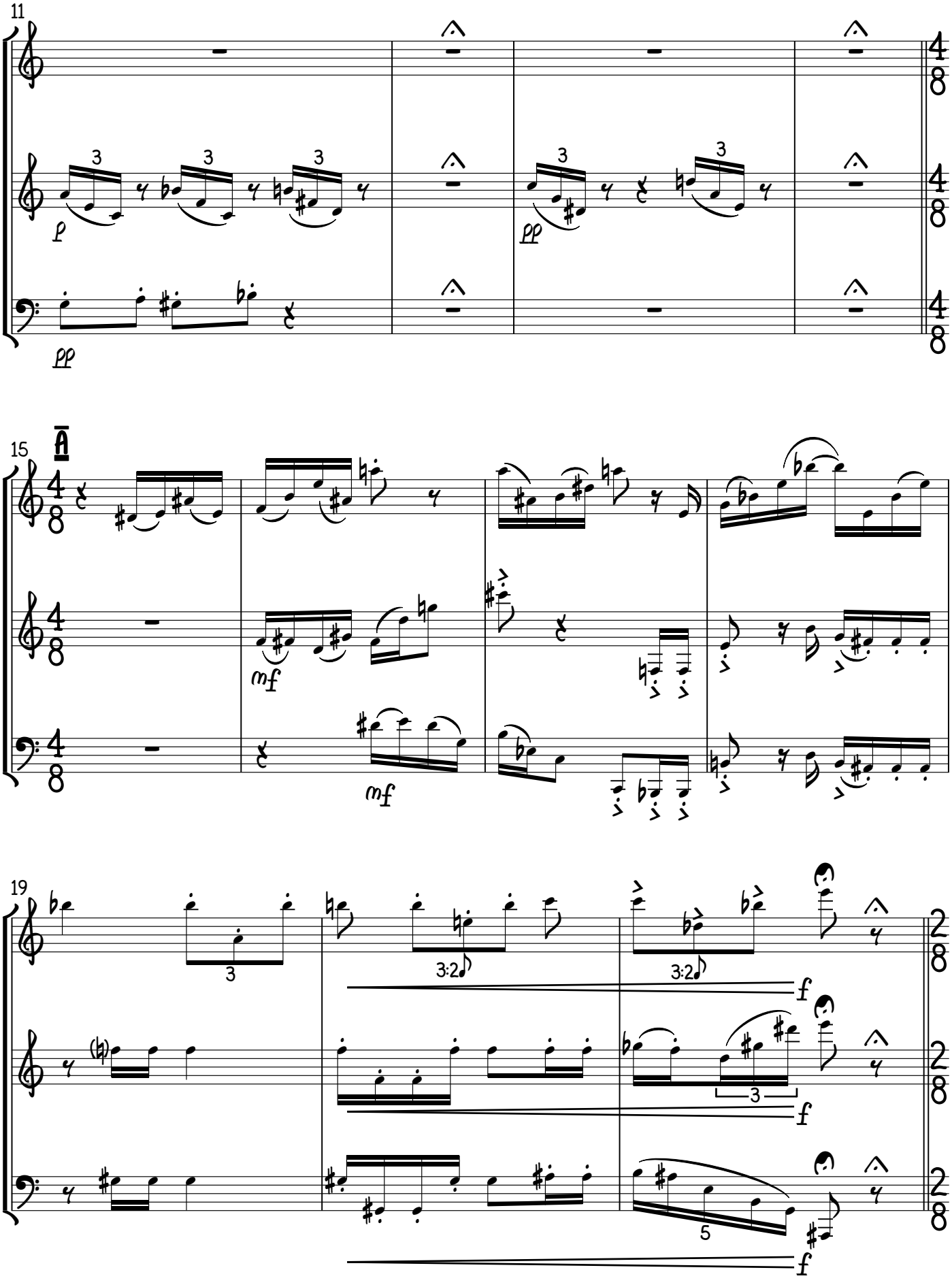
THE BOMBE

THAT BROKE ENIGMA

Jordan Alexander Key
July 2020

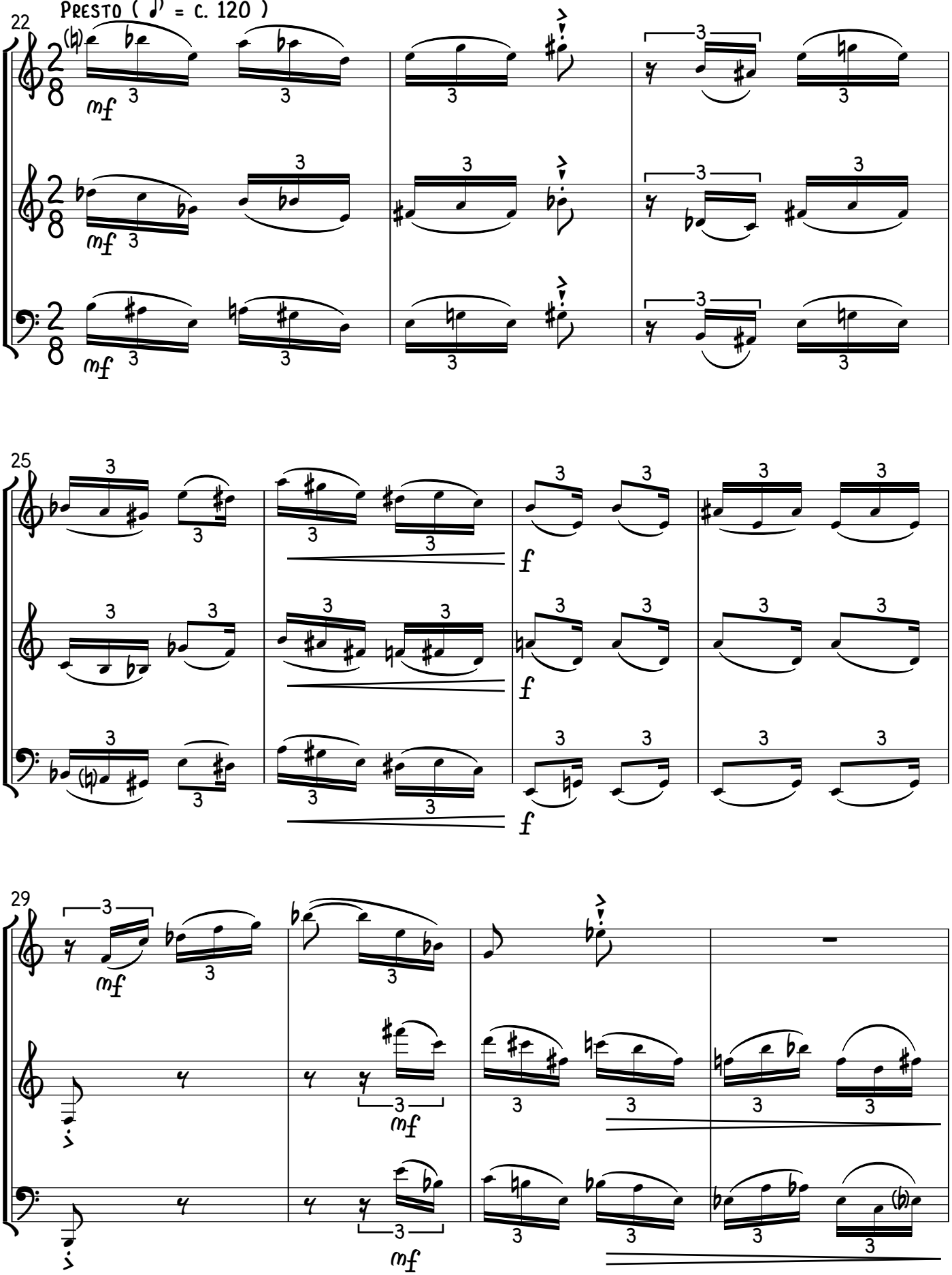
Furtive and Mechanical (♩ = 88)

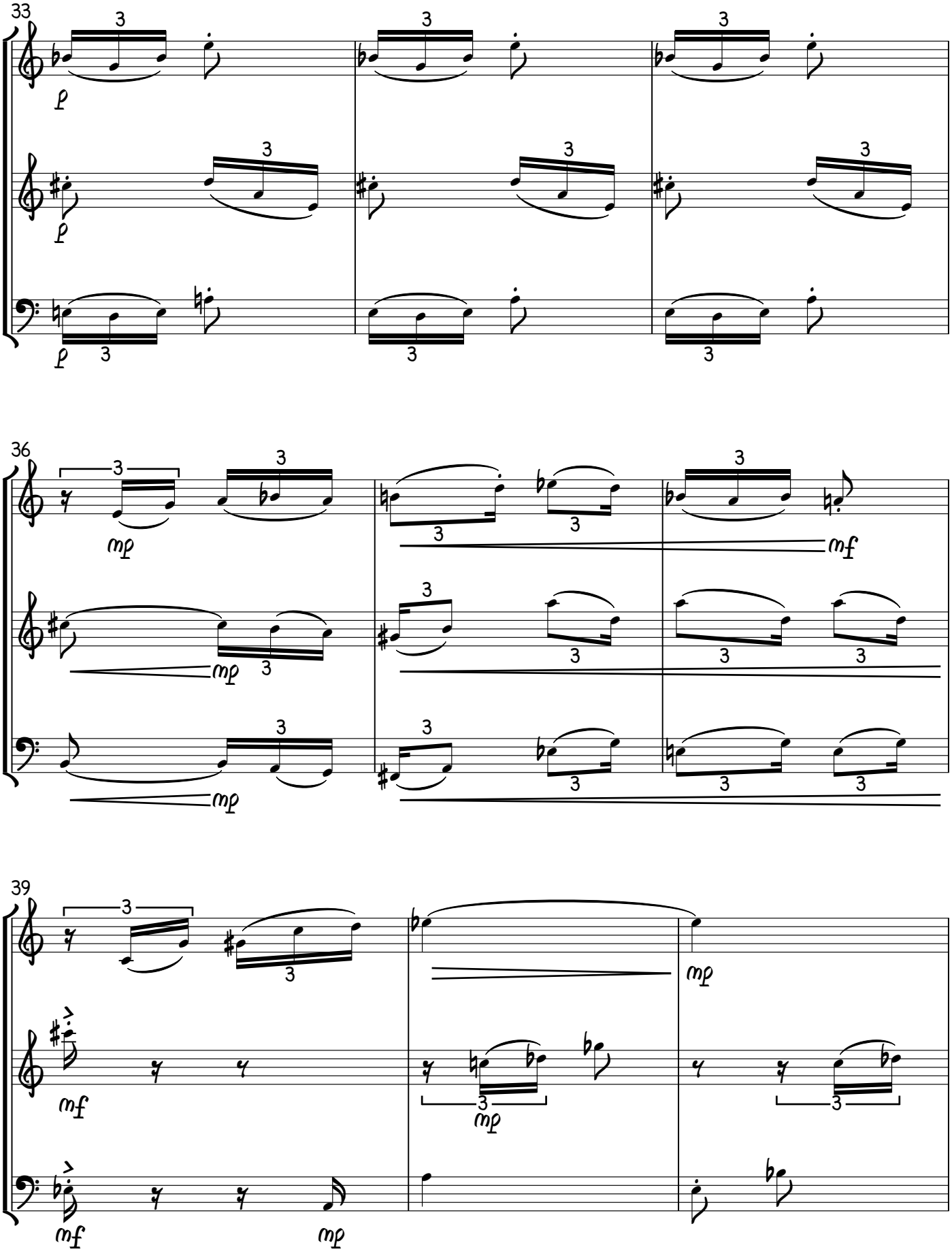



11
p
pp
pp
15
A
mf
mf
19
3
3:2
3:2
f
3
f
5
f

B

Presto (♪ = c. 120)

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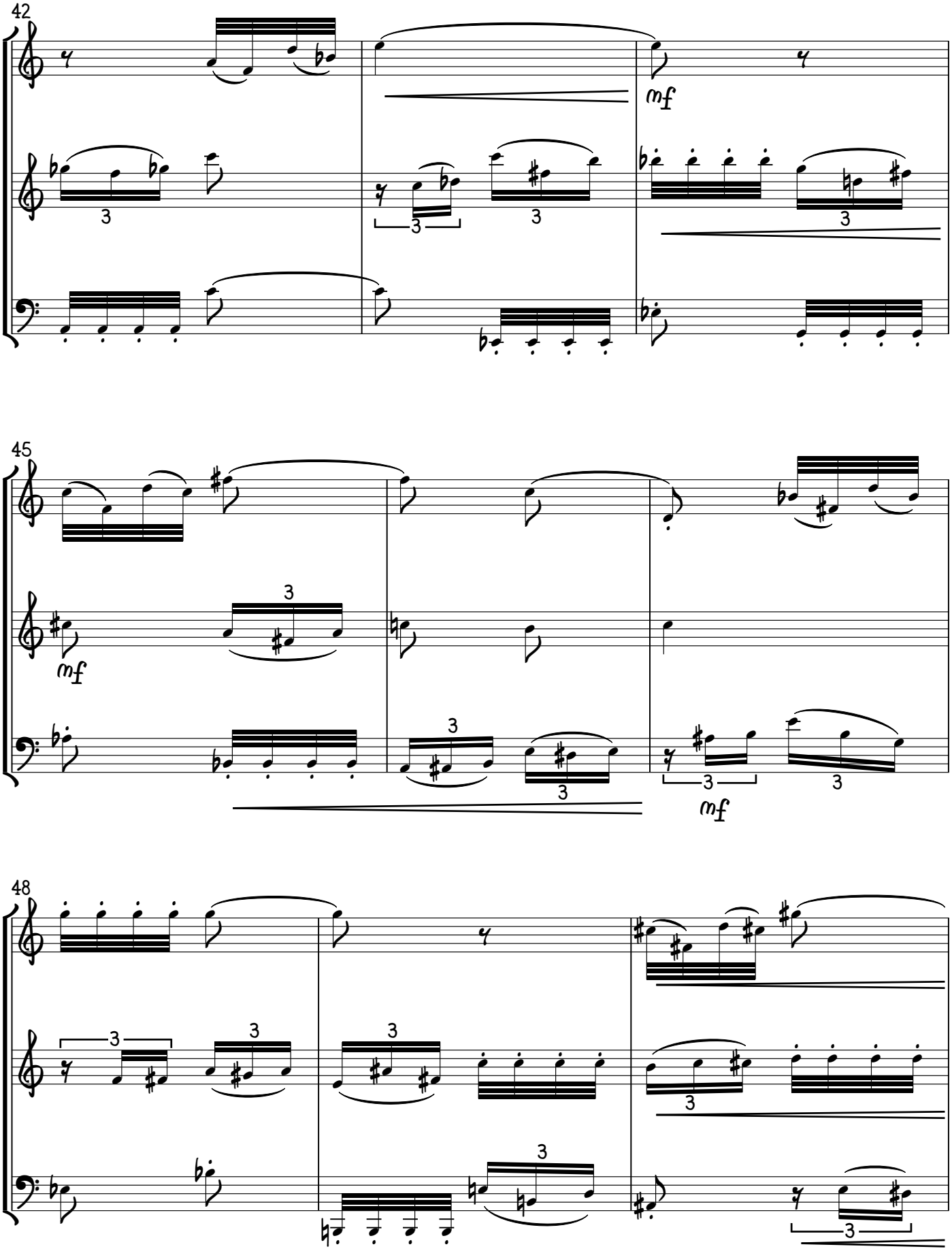
36
39
p
mp
mf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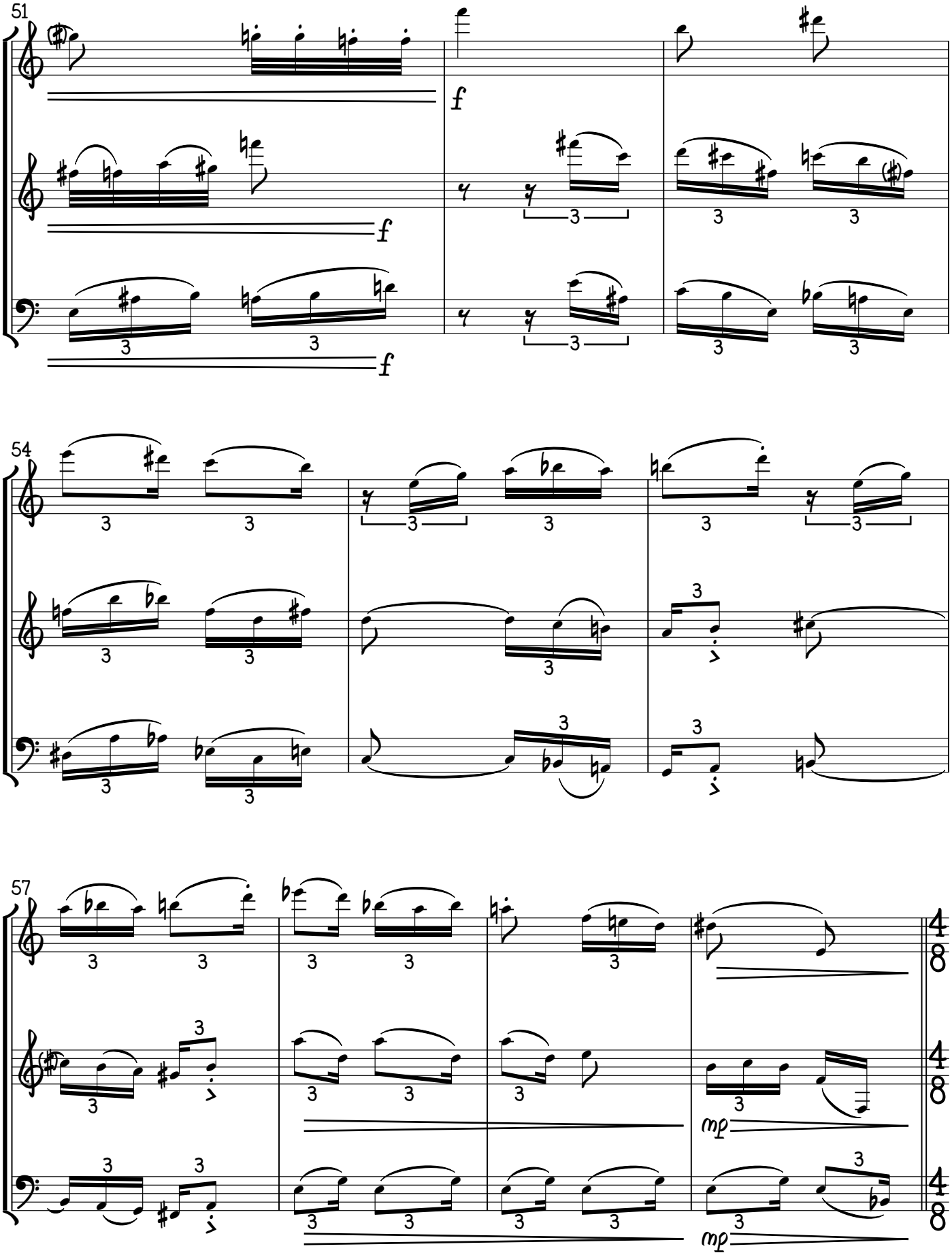
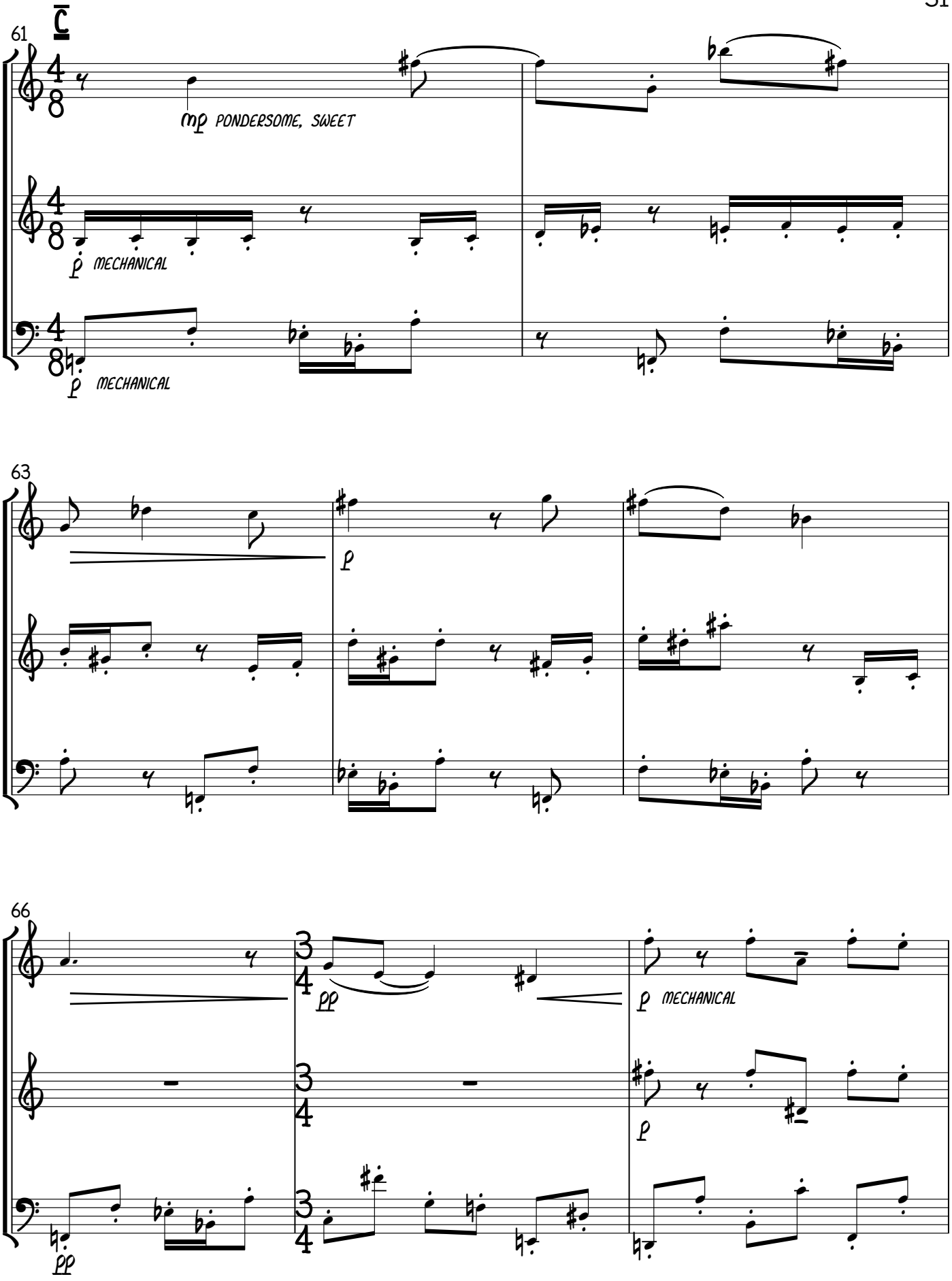
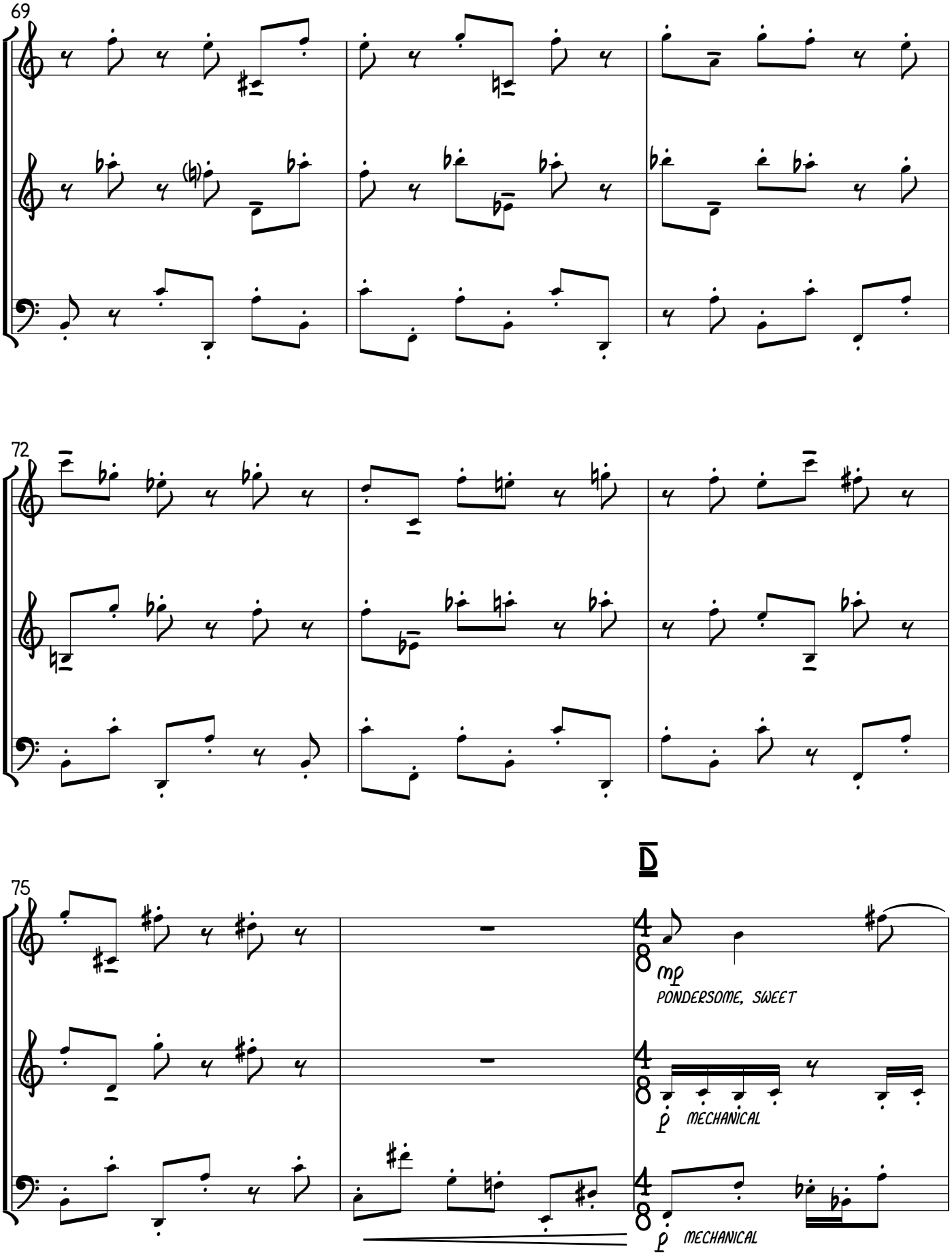
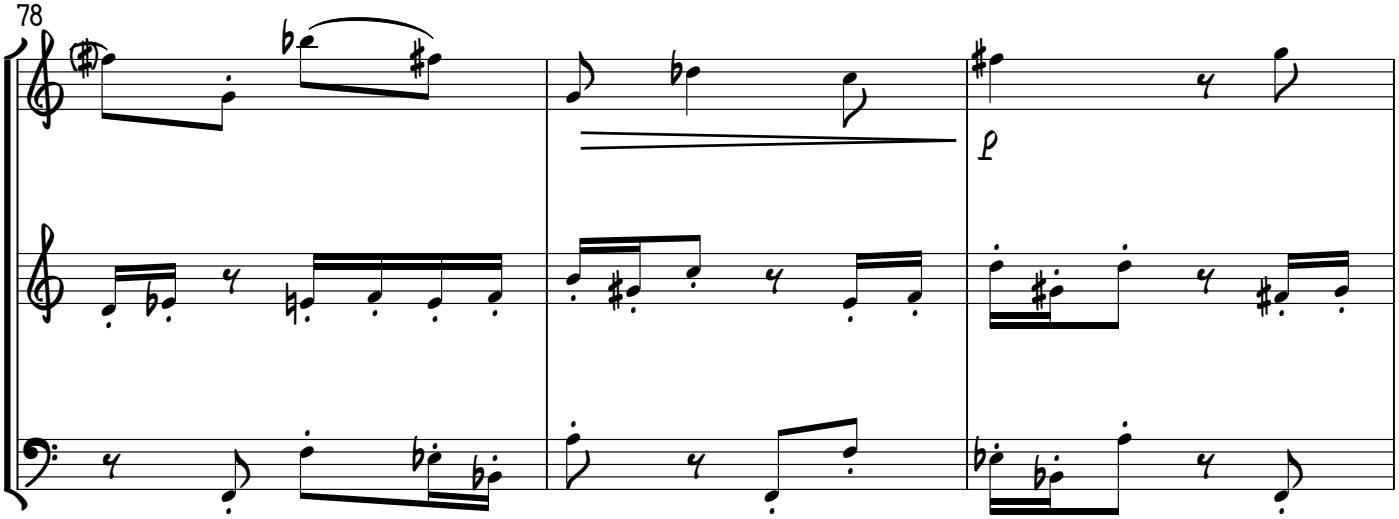
mf
45
mf
mf
48


51
f
f
f
54
57
mp
mp


61
C
mp PONDEROSOME, SWEET
p MECHANICAL
p MECHANICAL
63
p
66
pp
p MECHANICAL
p
pp


69
72
75
D
mp
PONDERSOME, SWEET
p
MECHANICAL
p
MECHANICAL

78



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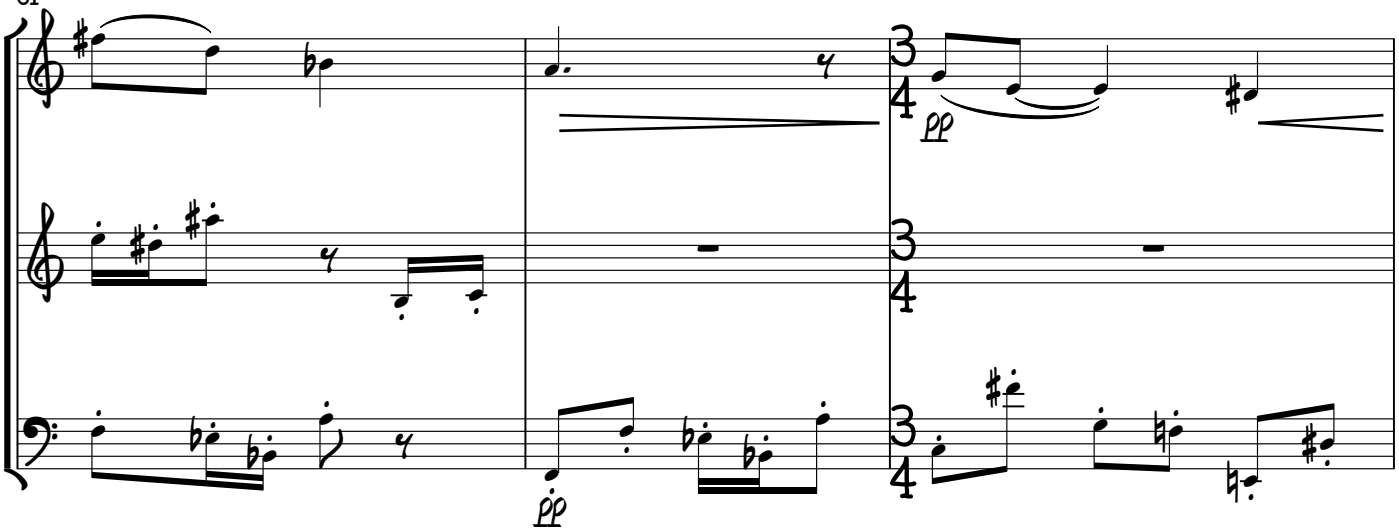

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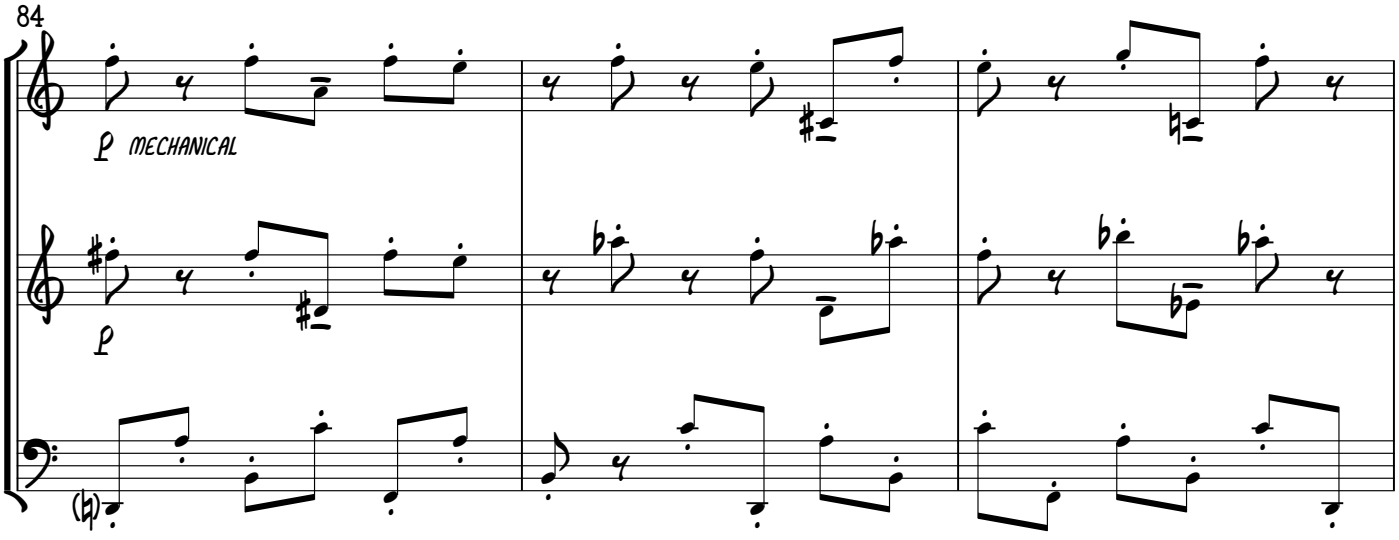
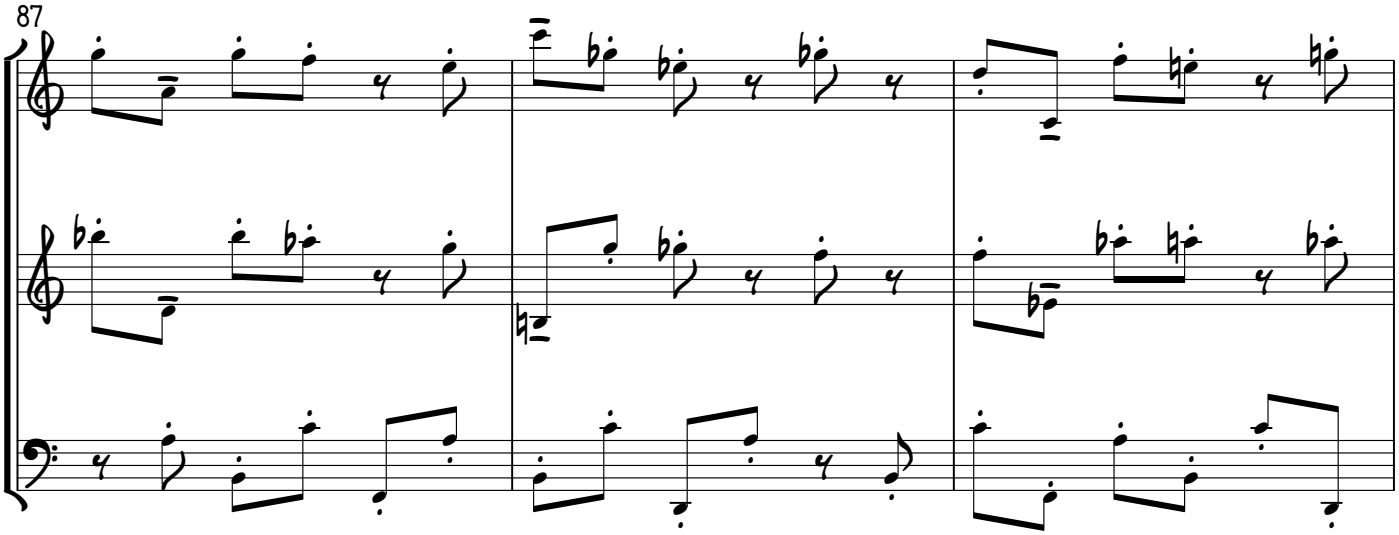
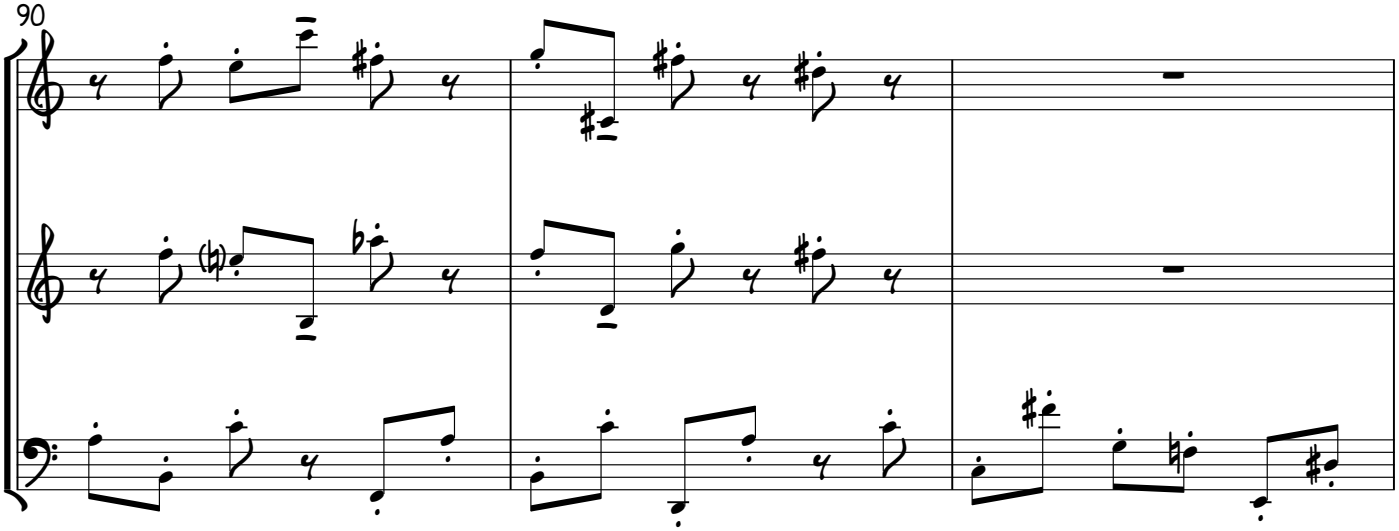


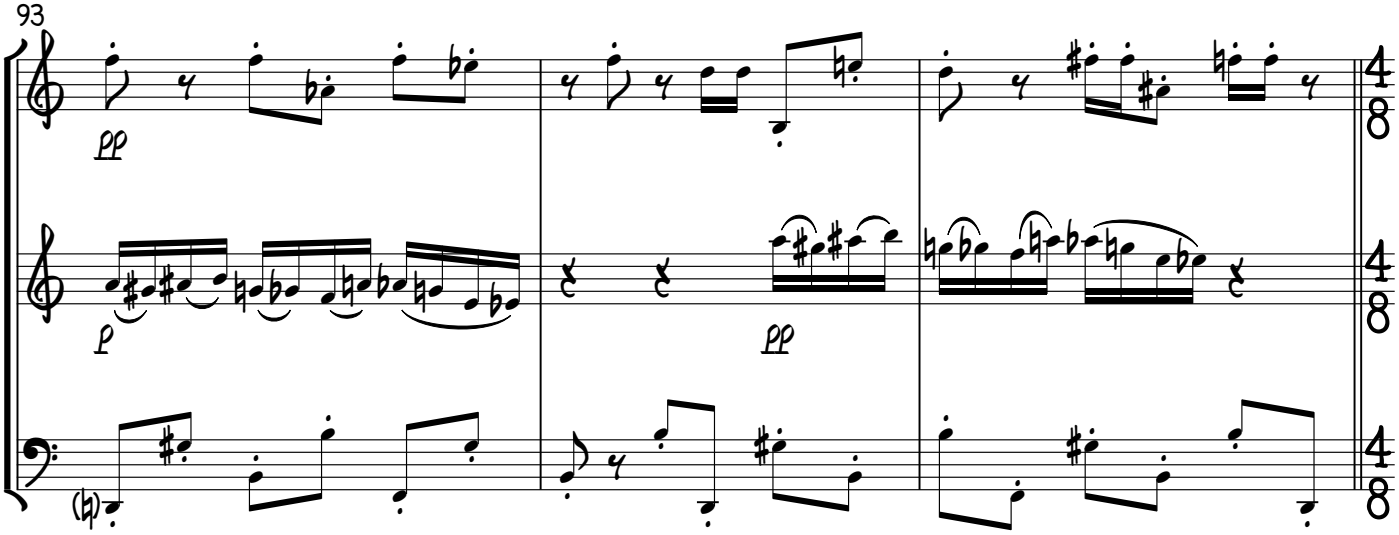
87



90



93



E

96

p

mp PONDEROSOME, LYRICAL

99

p

mp

p MECHANICAL

102

3

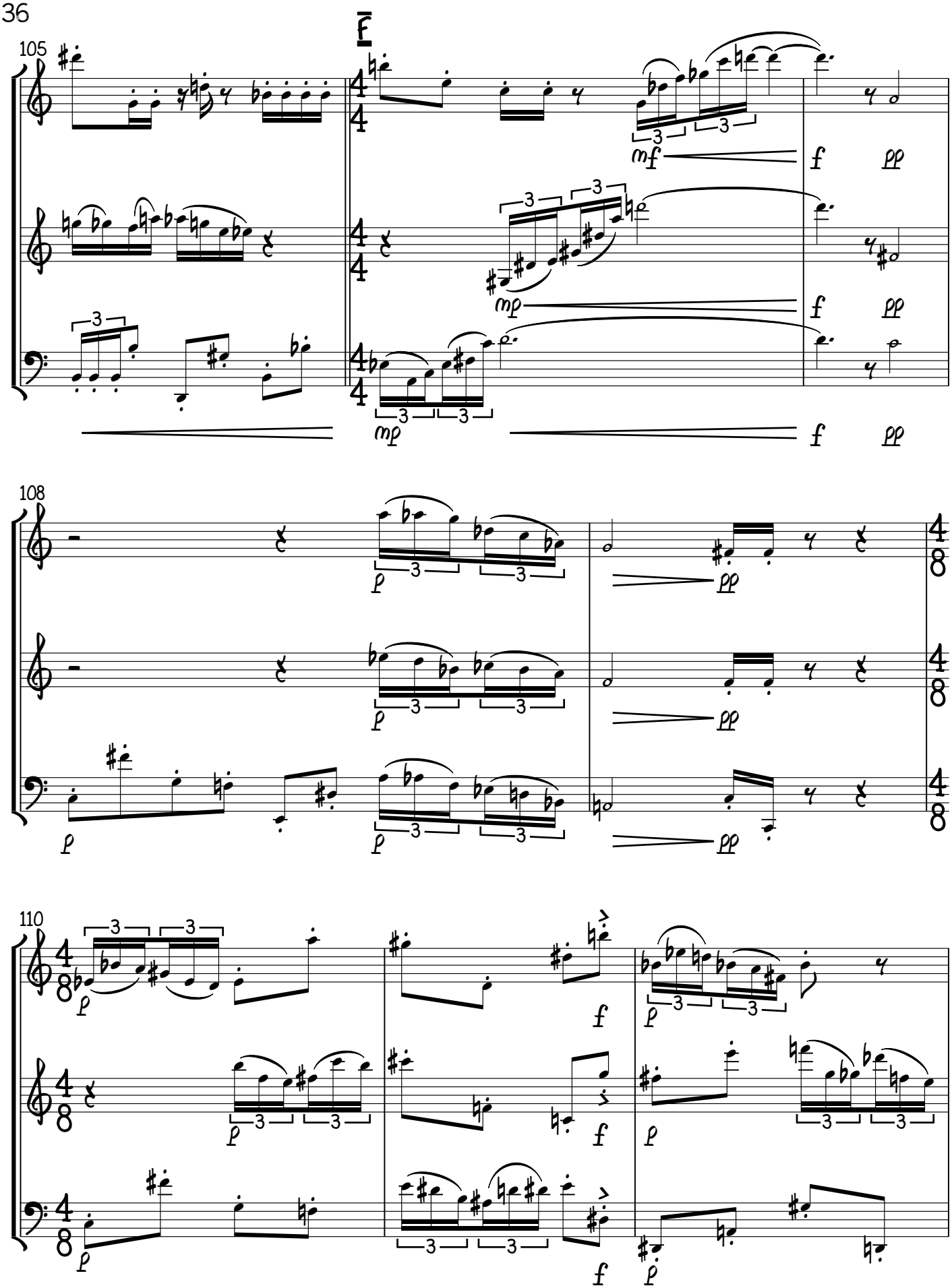
3

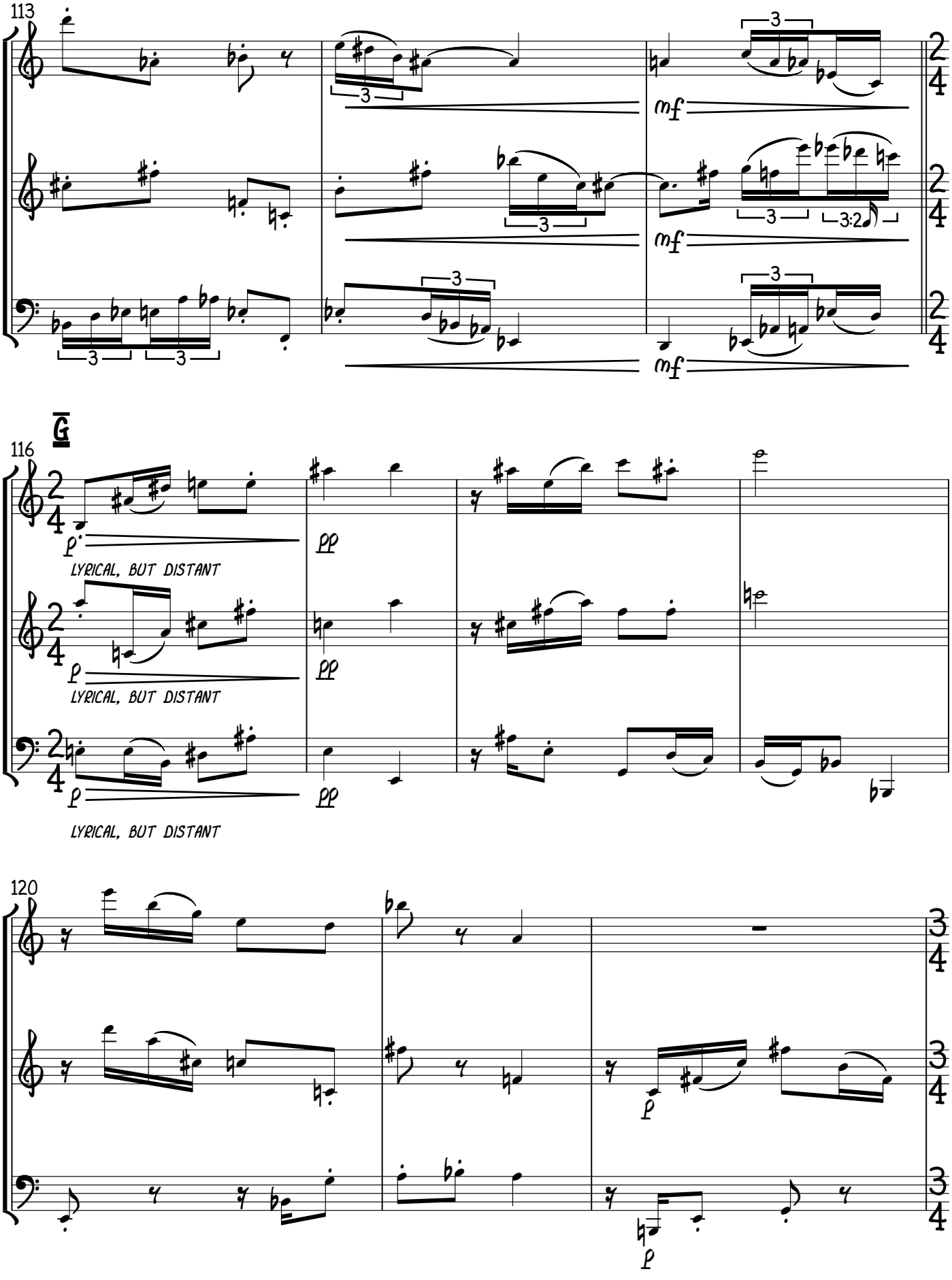
3

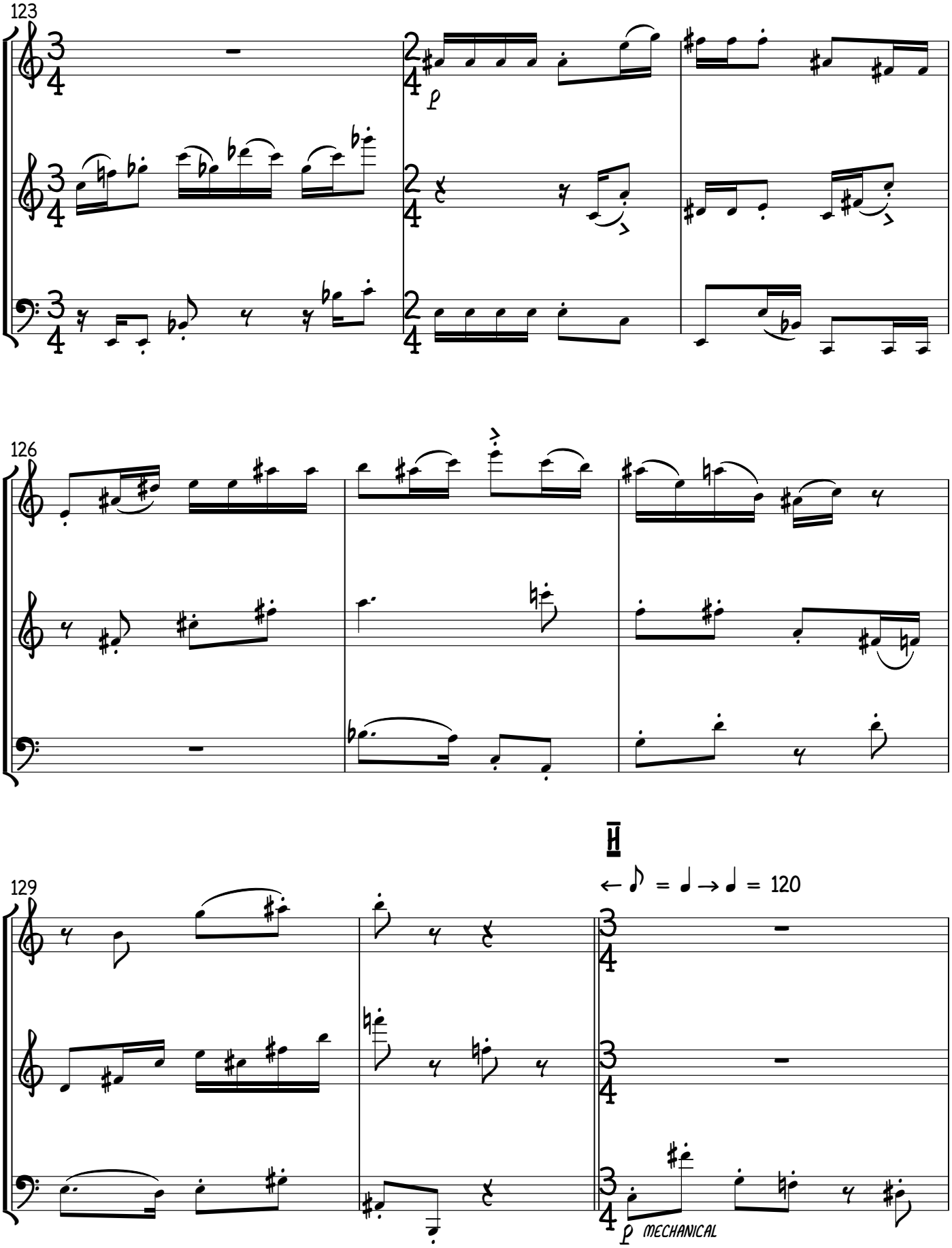
3

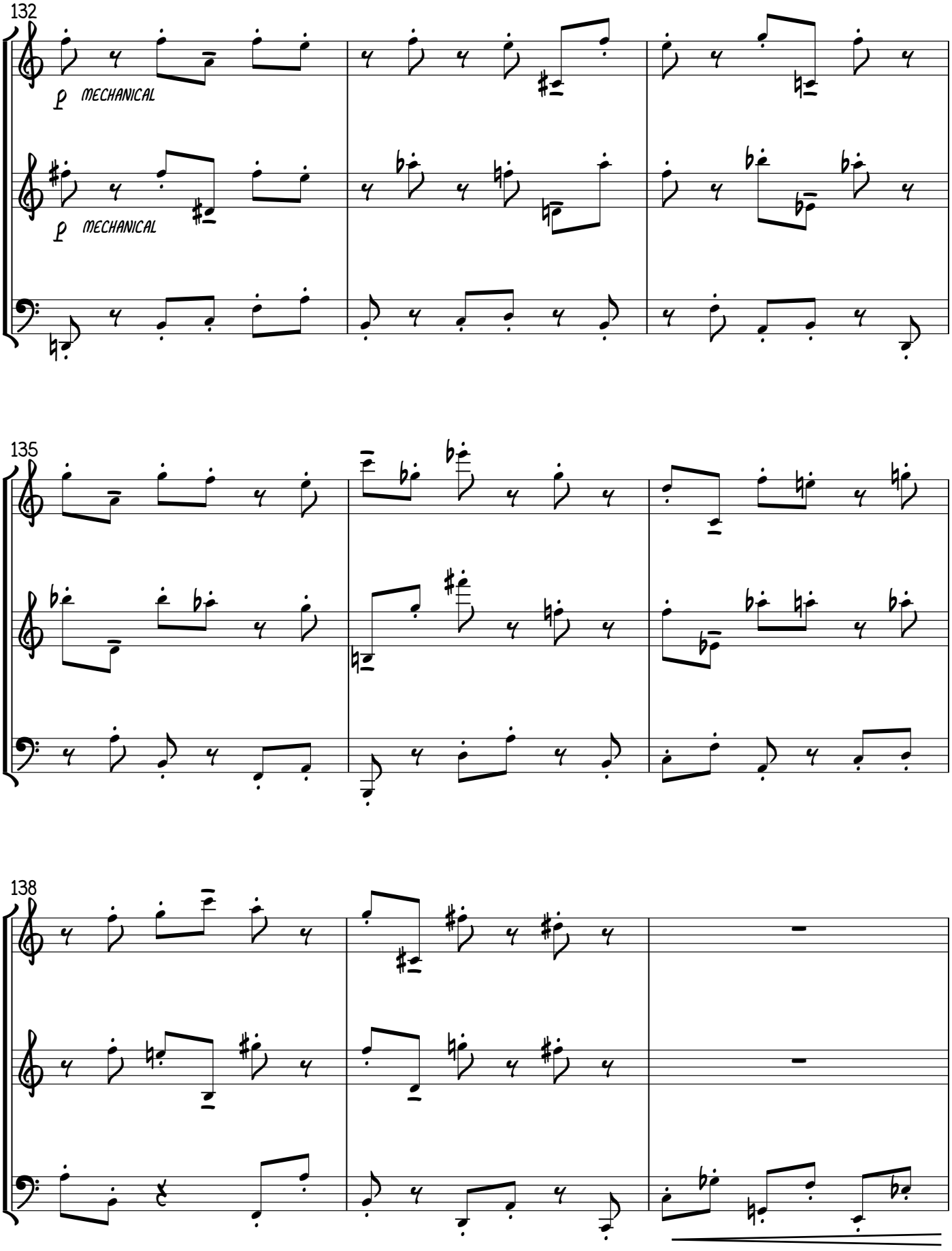
p

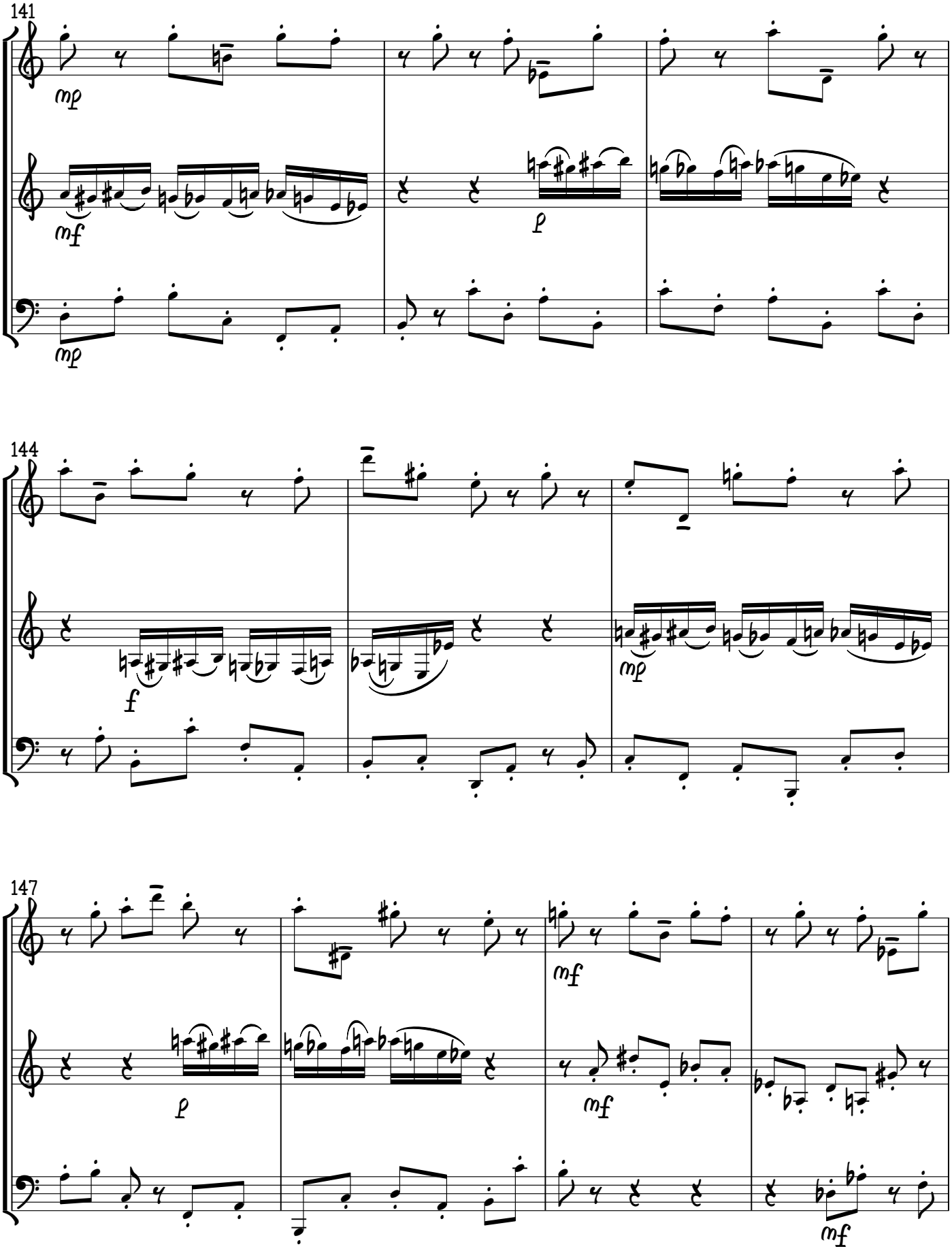
pp

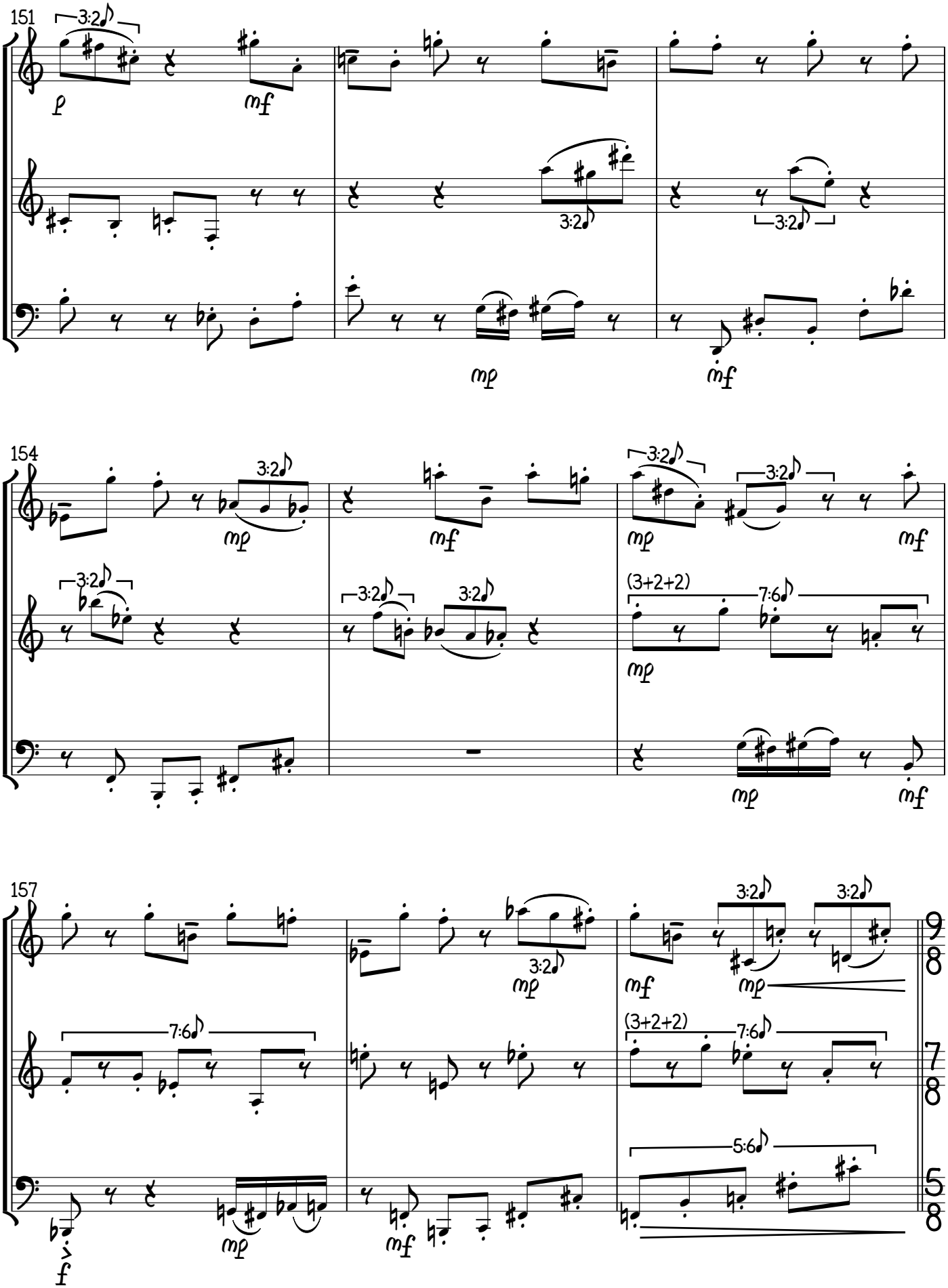

105
F
mf
f
pp
mp
108
p
pp
110


113
mf
mf
mf
3
3:2
G
116
p
pp
LYRICAL, BUT DISTANT
120


123
126
129
H
← ♪ = ♩ → ♩ = 120
MECHANICAL


132
p MECHANICAL
p MECHANICAL
135
138


141
mp
mf
p
144
f
mp
147
p
mf
mf
mf


151
154
157
3:2
7:6
5:6
(3+2+2)
9/8
7/8
5/8

I

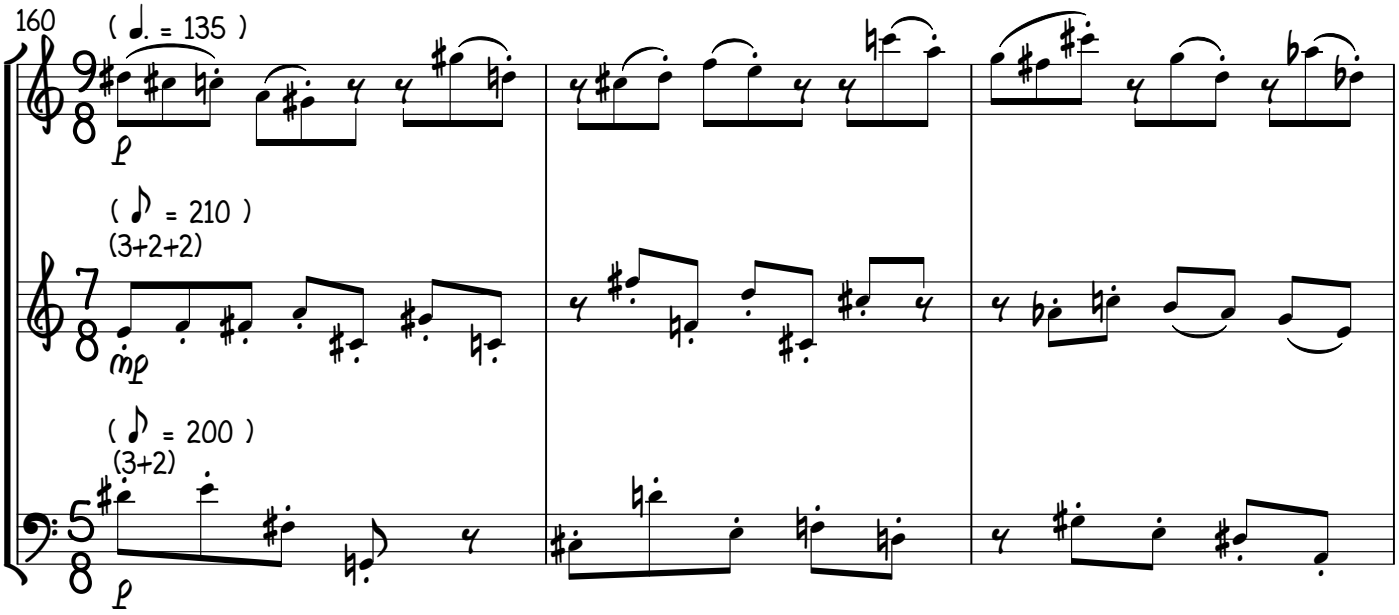
Furtive, Like a Machine (♩ = 120)

160

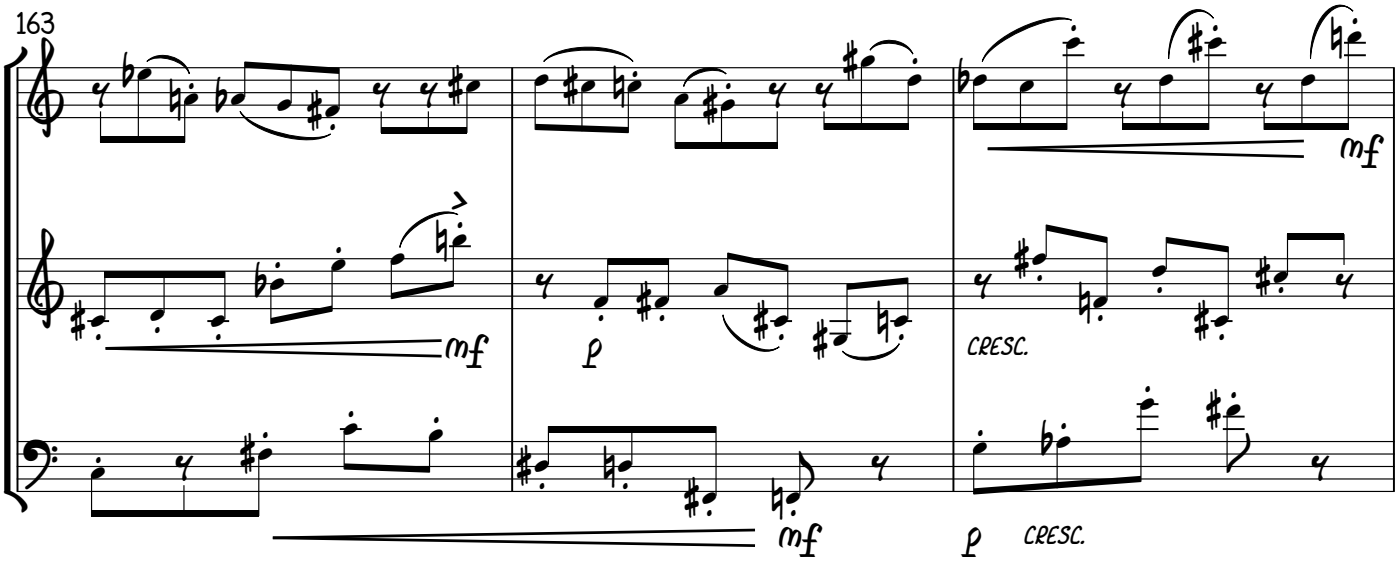
(♩. = 135)

(♪ = 210)
(3+2+2)

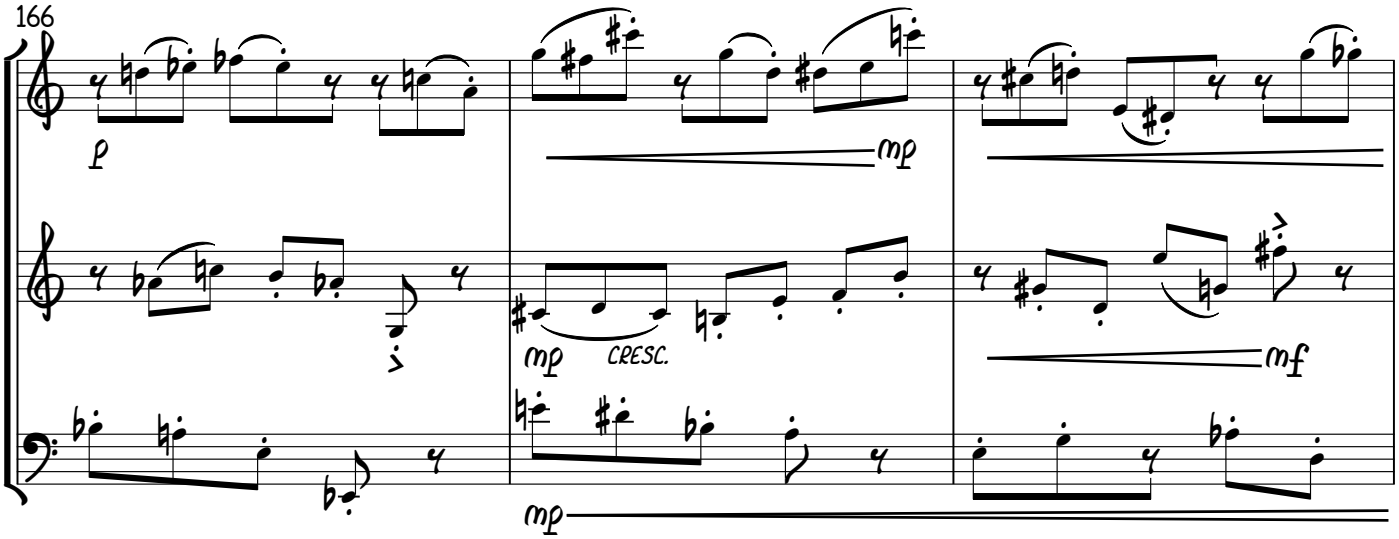
(♪ = 200)
(3+2)

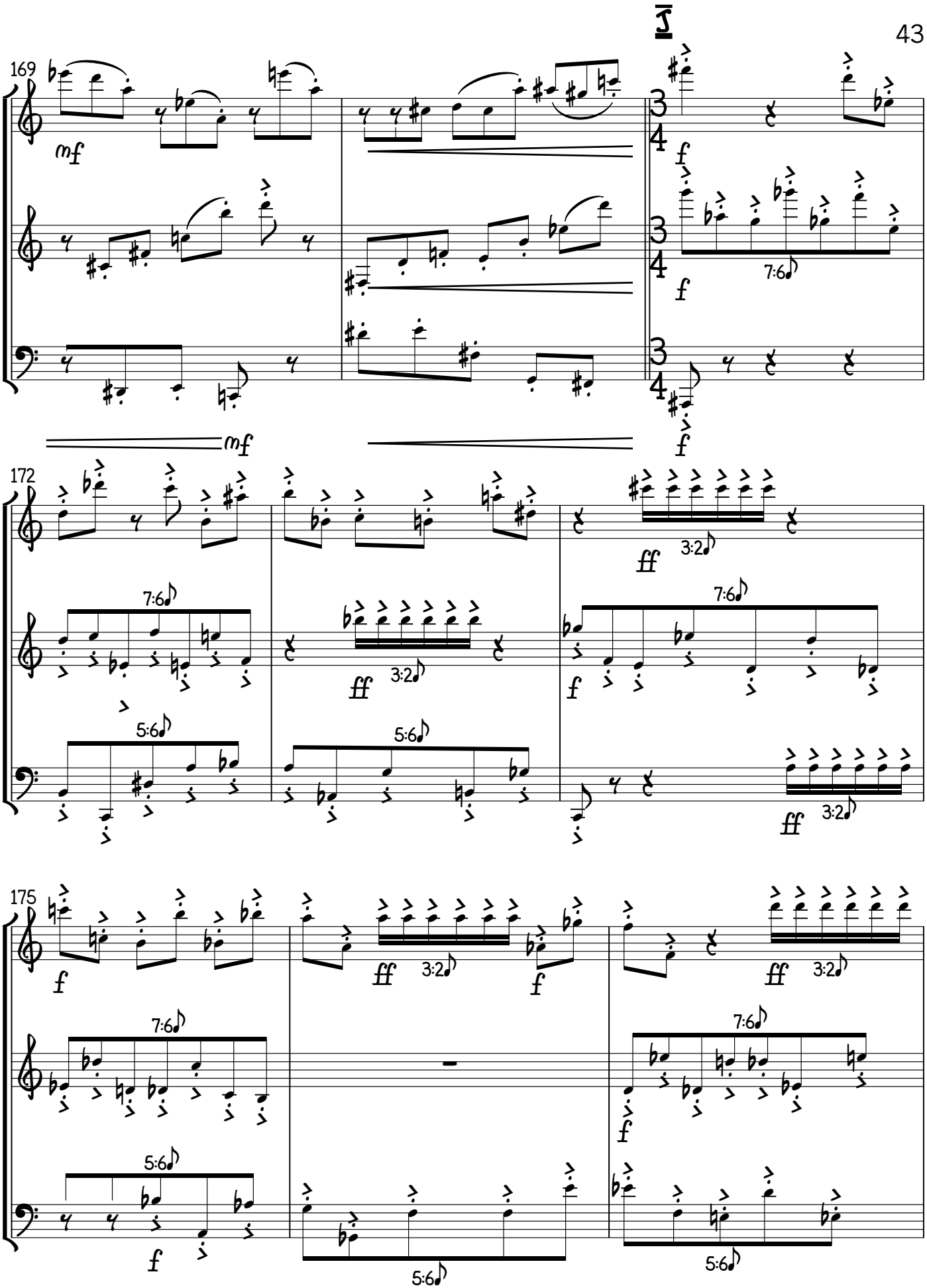


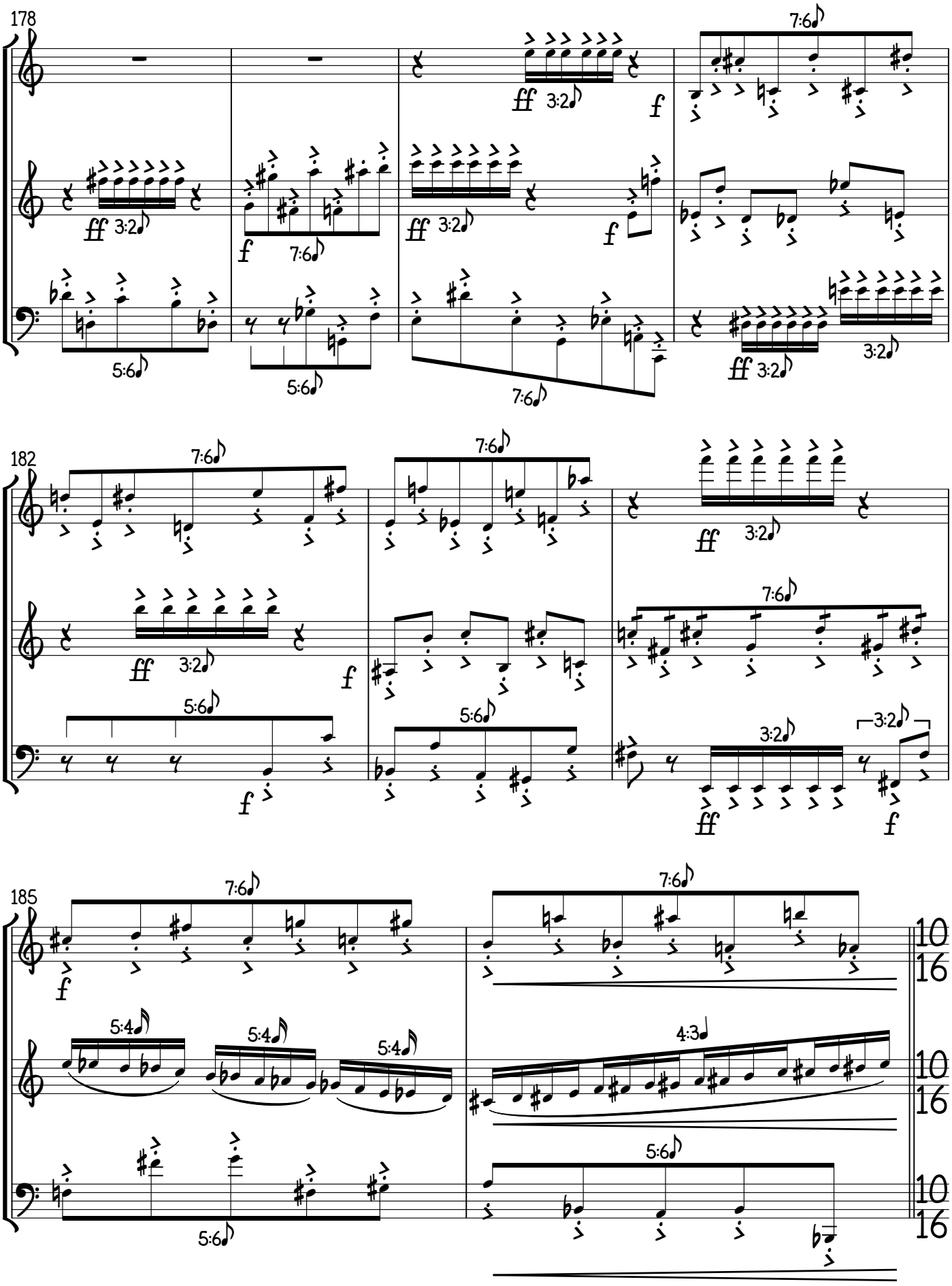
163



166




169
mf
3/4
f
7:6
mf
f
172
ff
3:2
7:6
5:6
f
175
ff
3:2
f
7:6
5:6


178
182
185
7:6
3:2
5:6
5:4
4:3
10
16

K

Driving (♪ = c. 300)

187

2+3+2+3

mf

2+3+2+3

mf

2+3+2+3

mf

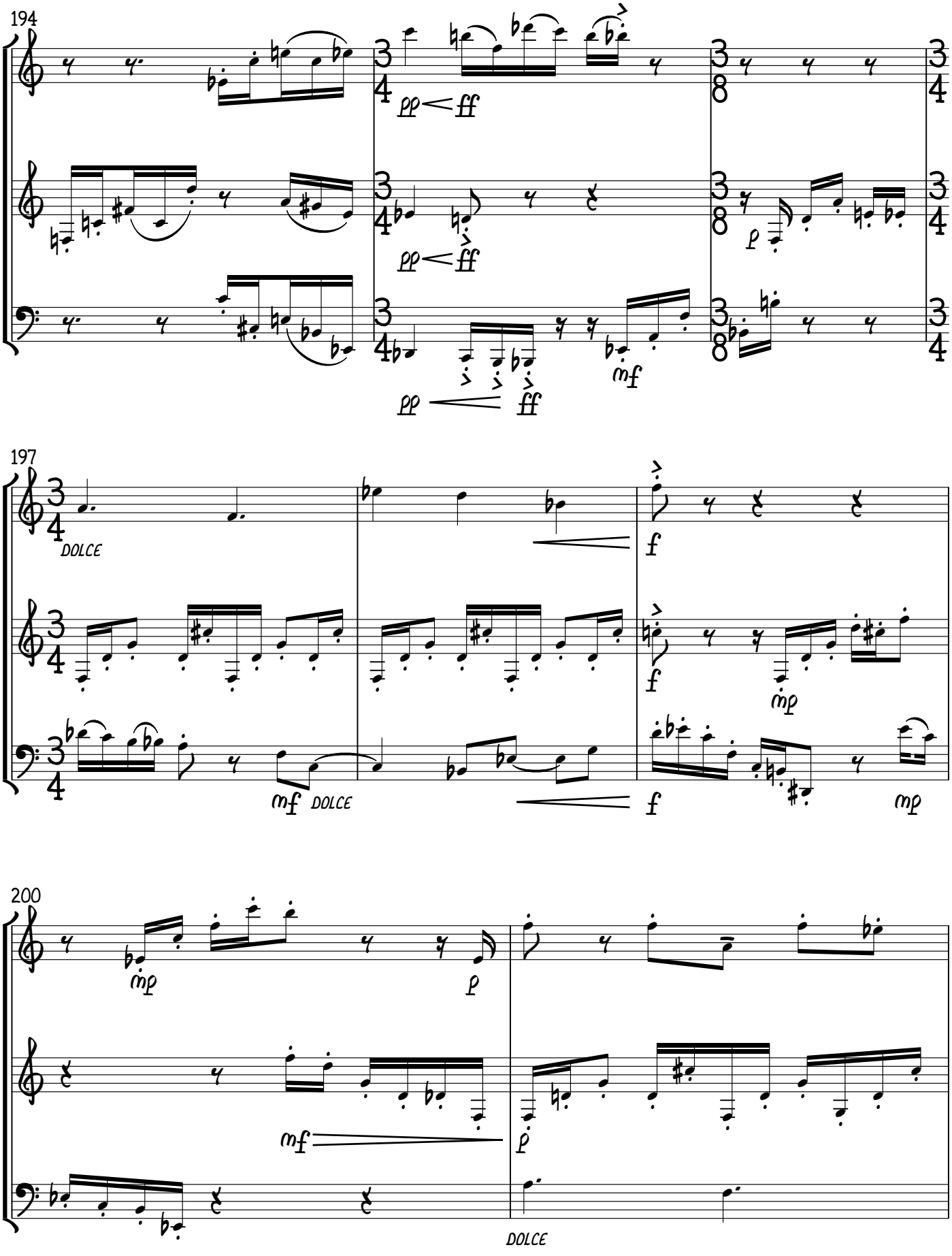
190

mp

mp

192

mp


194
197
DOLCE
mf DOLCE
200
DOLCE

202

mp mf

p

205

DOLCE

3 3 3

3 3 3 3 3 3

p

207

f

f

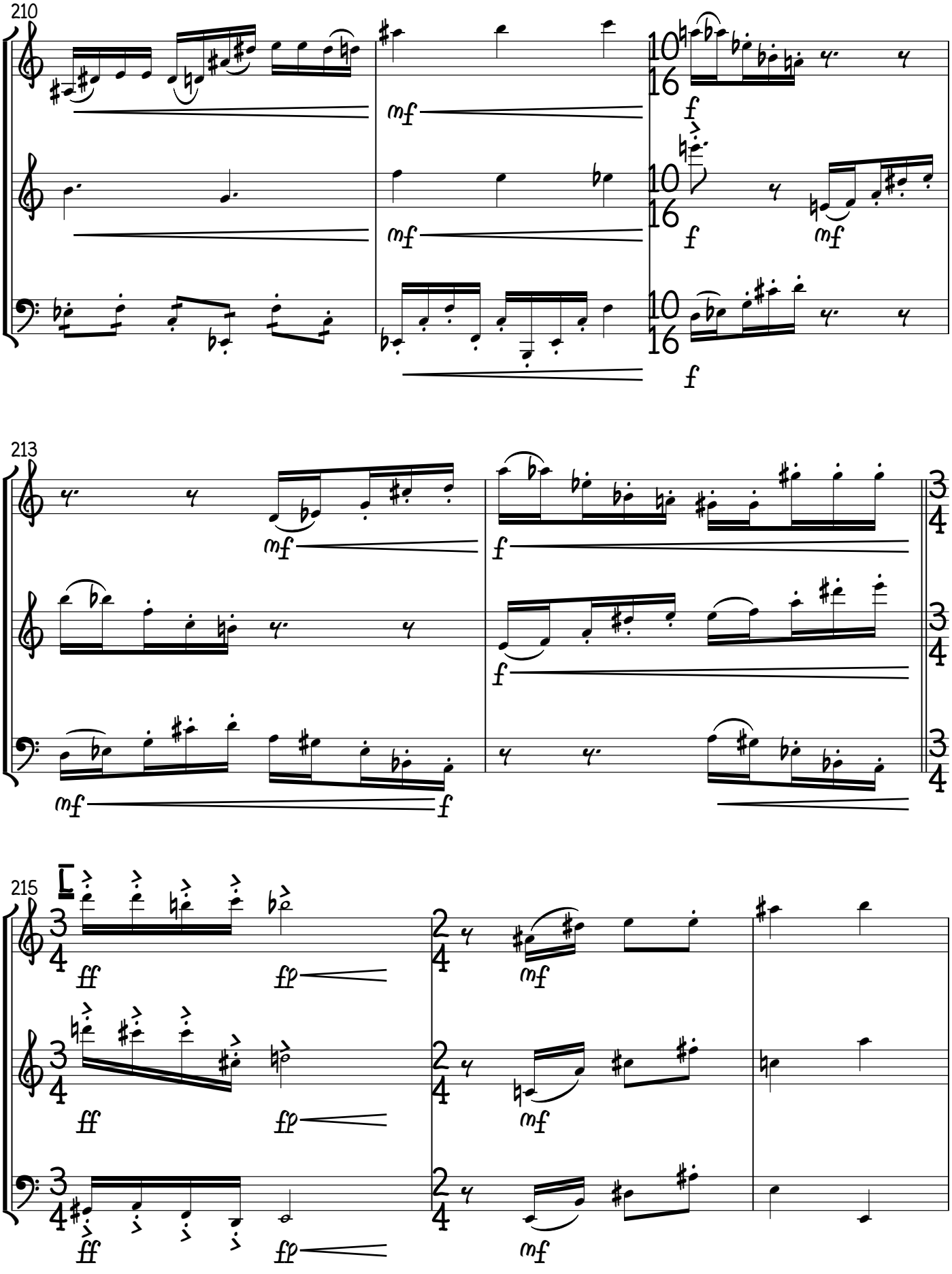
mp

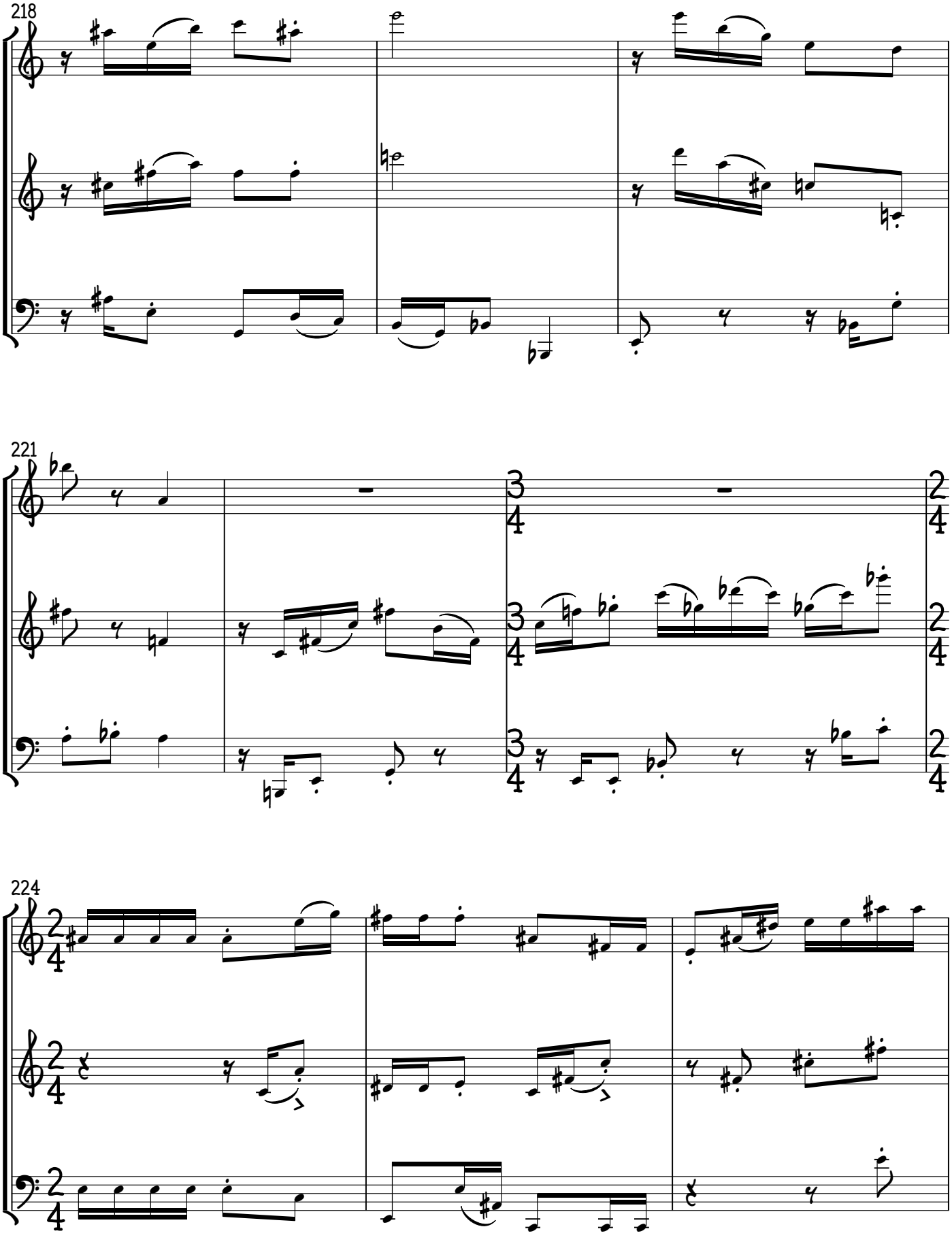
mf

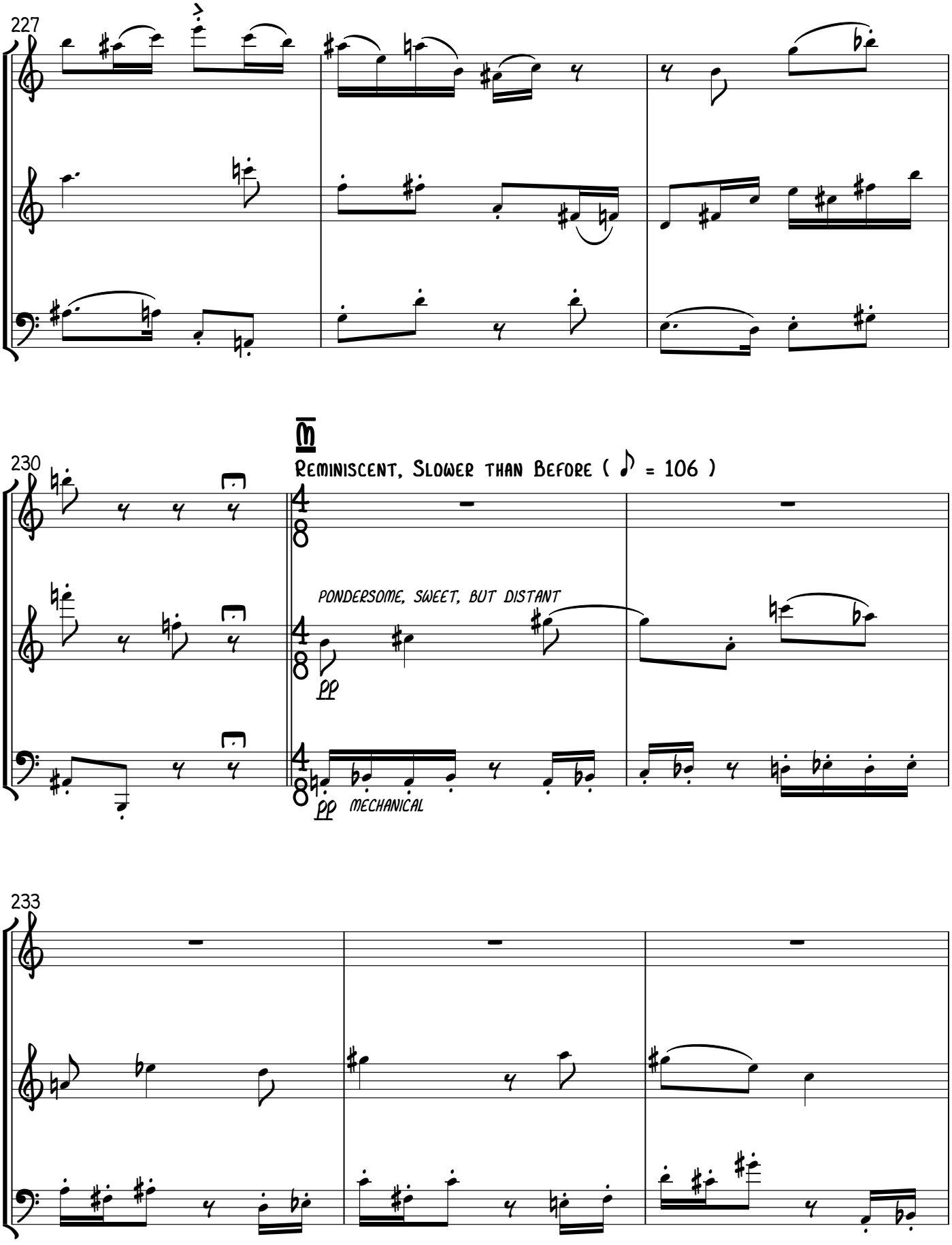
p

mp

mp

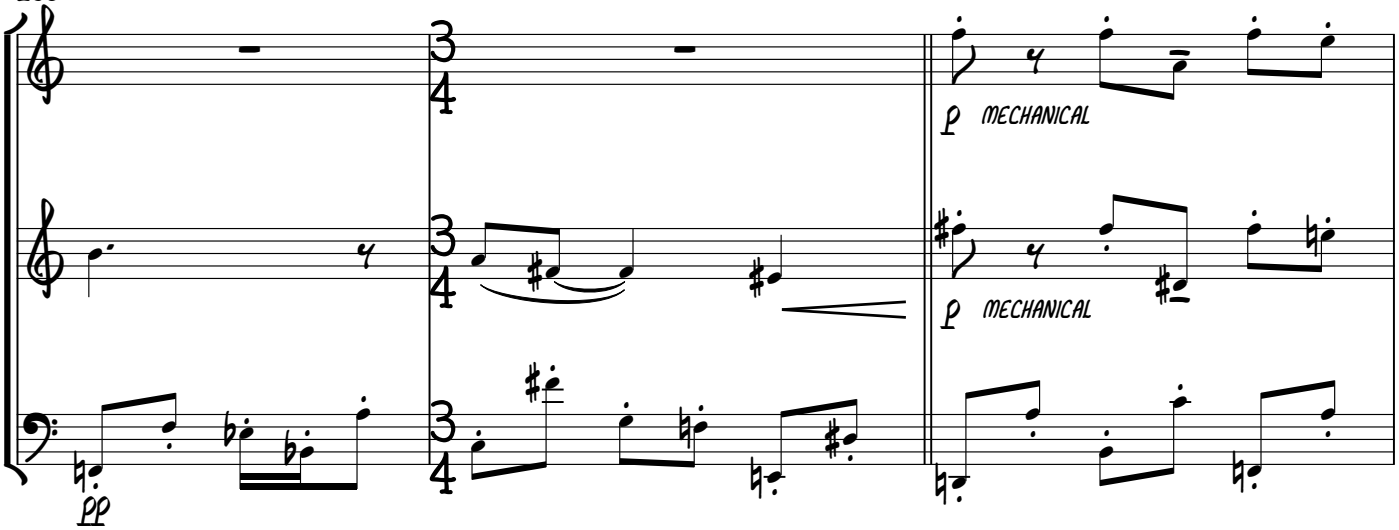

210
213
215


218
221
224

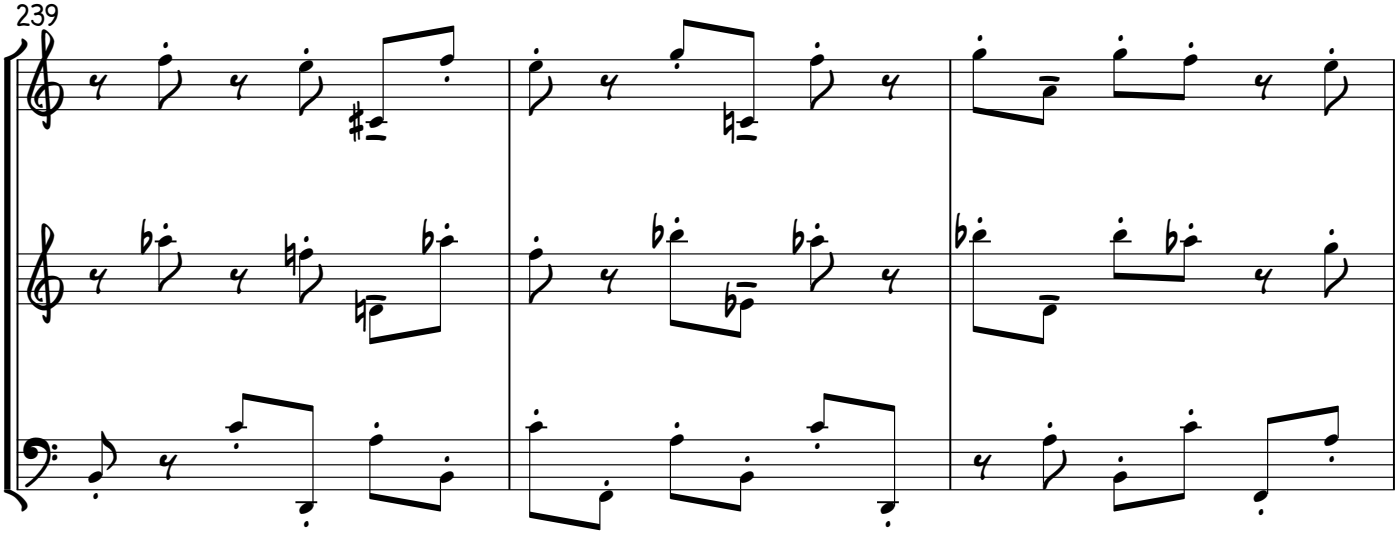

227
230
m
Reminiscent, Slower than Before (♪ = 106)
Pondersome, sweet, but distant
pp
pp
mechanical
233

N

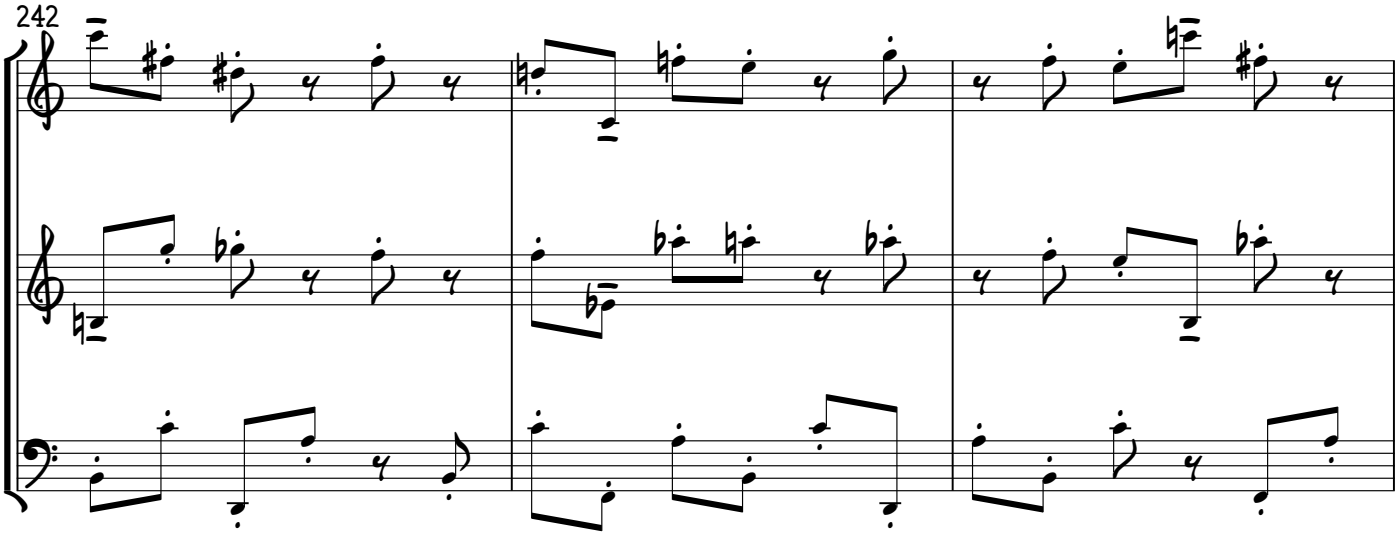
236



239



242



245

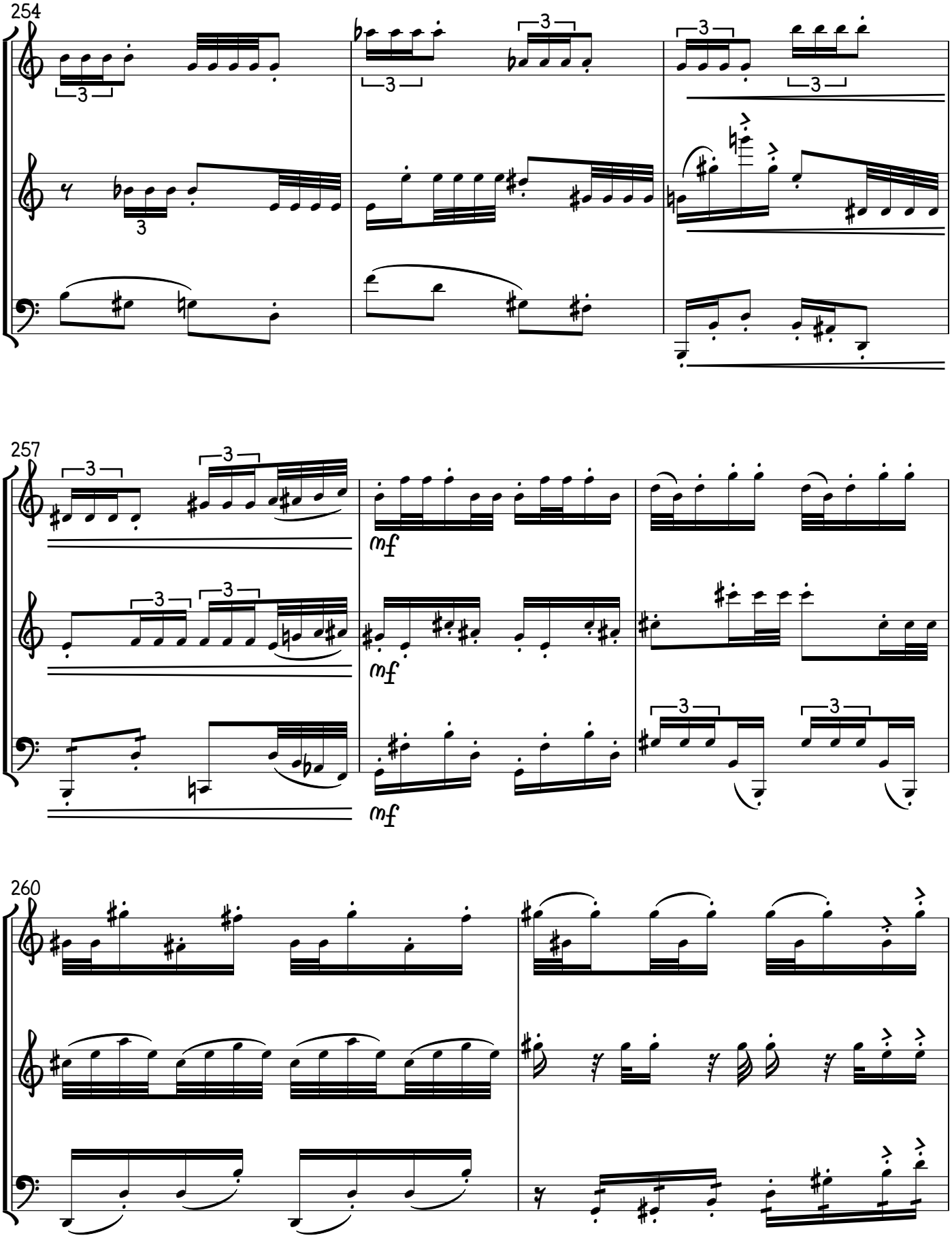
← ♩ = ♪ → ♪ = 106

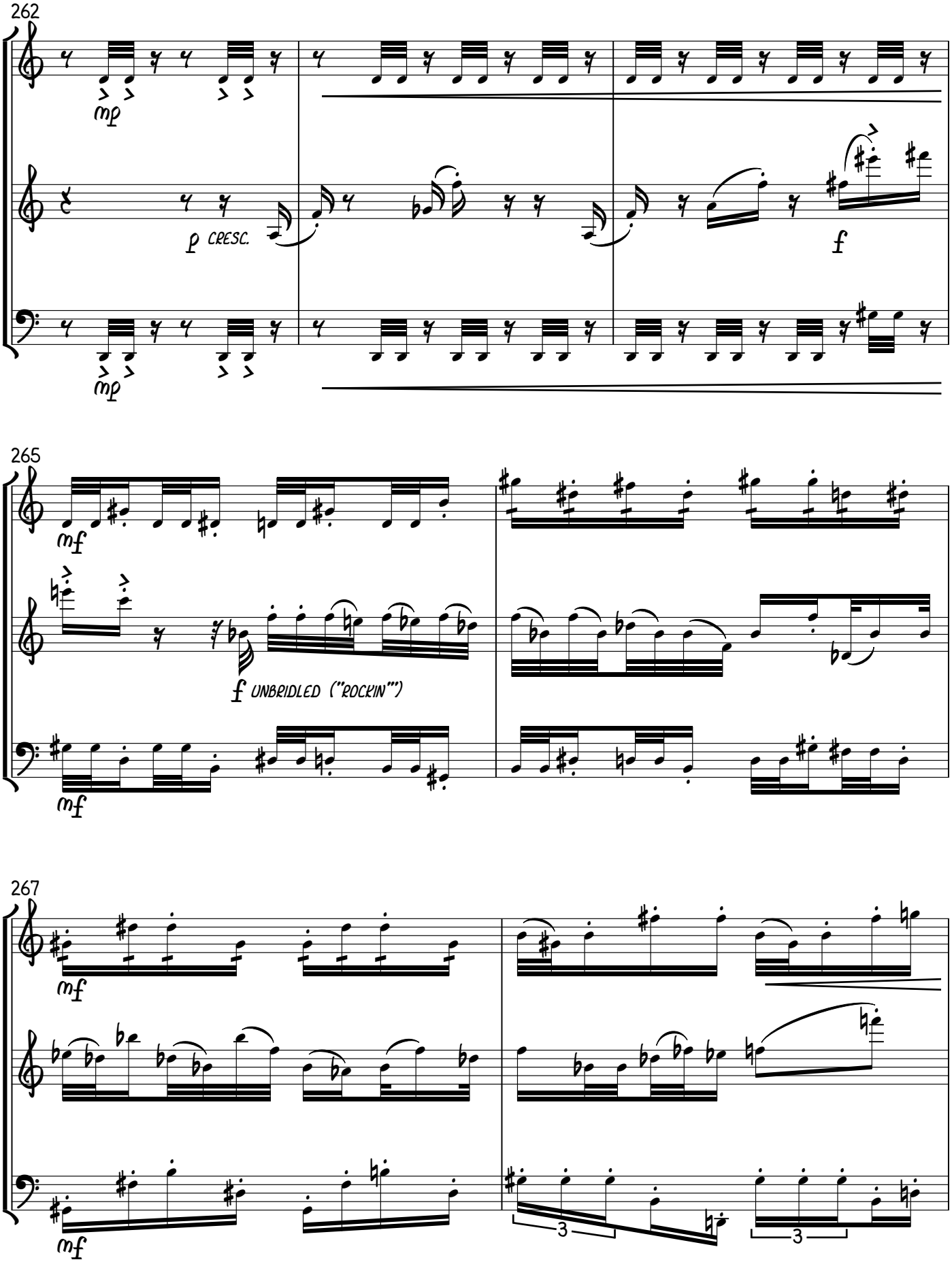
248

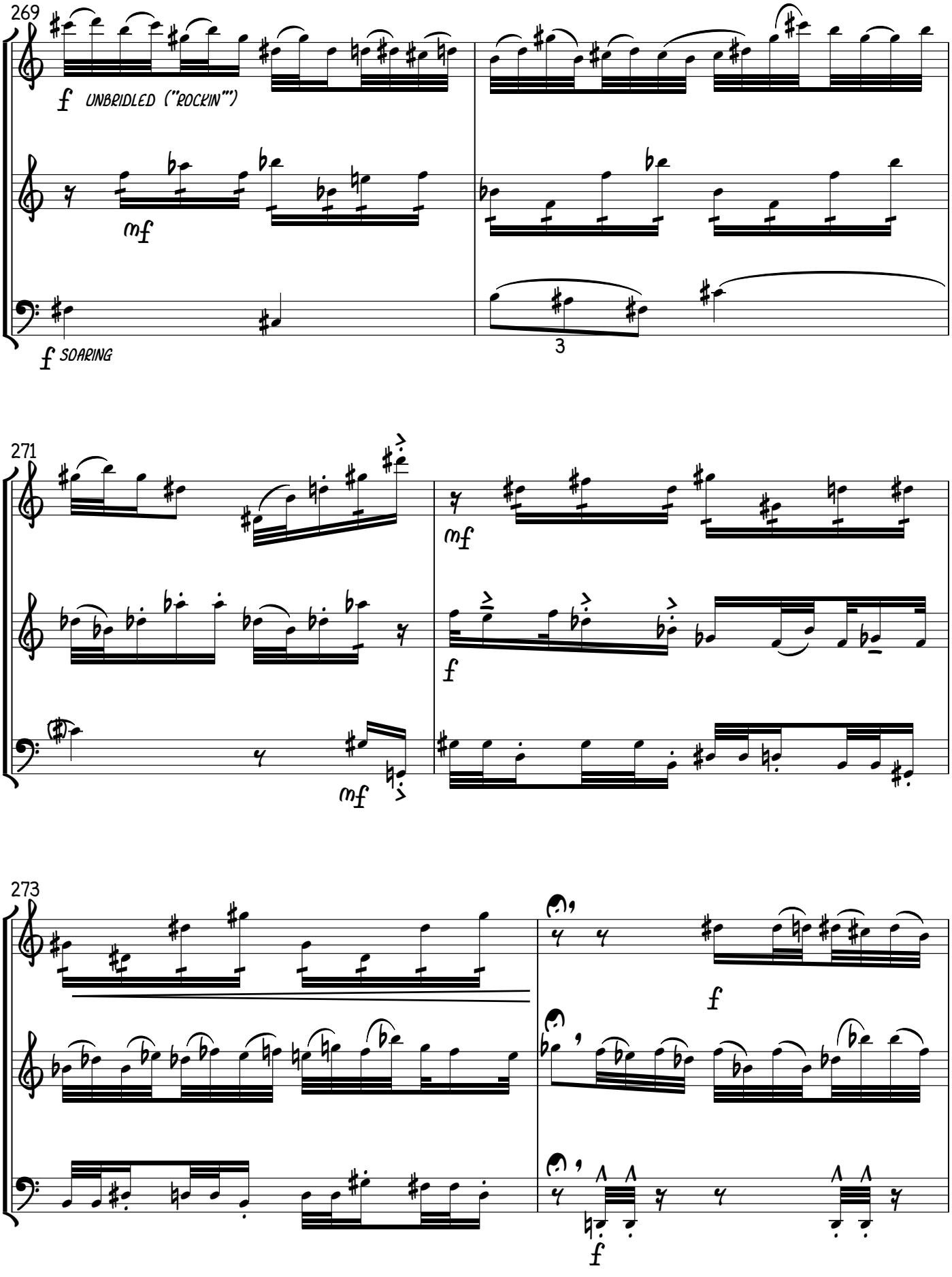
Mechanistic

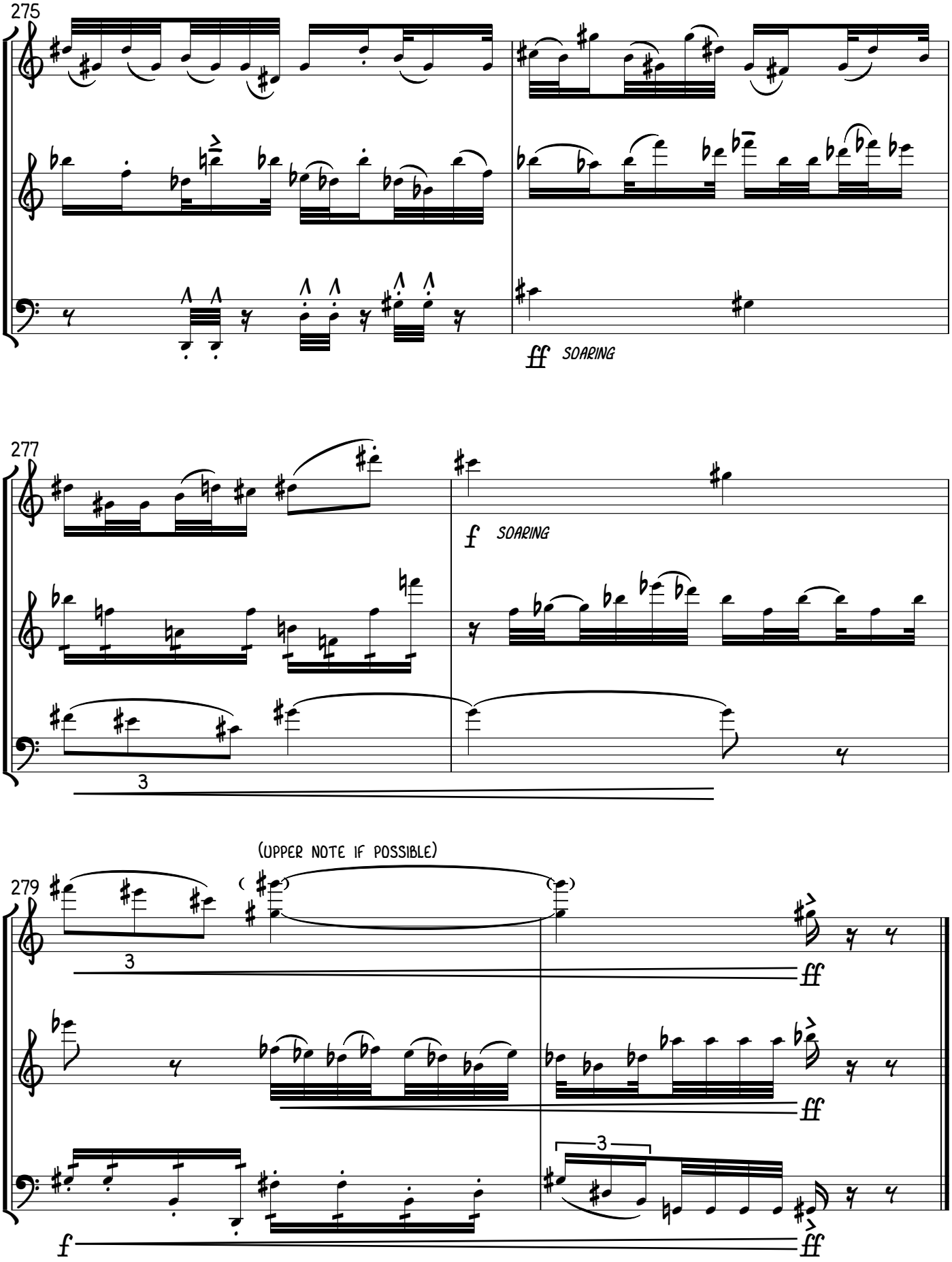
pp

251


254
257
mf
mf
mf
260


262
mp
p CRESC.
f
265
mf
f UNBRIDLED ("ROCKIN'")
mf
267
mf
3
3
mf

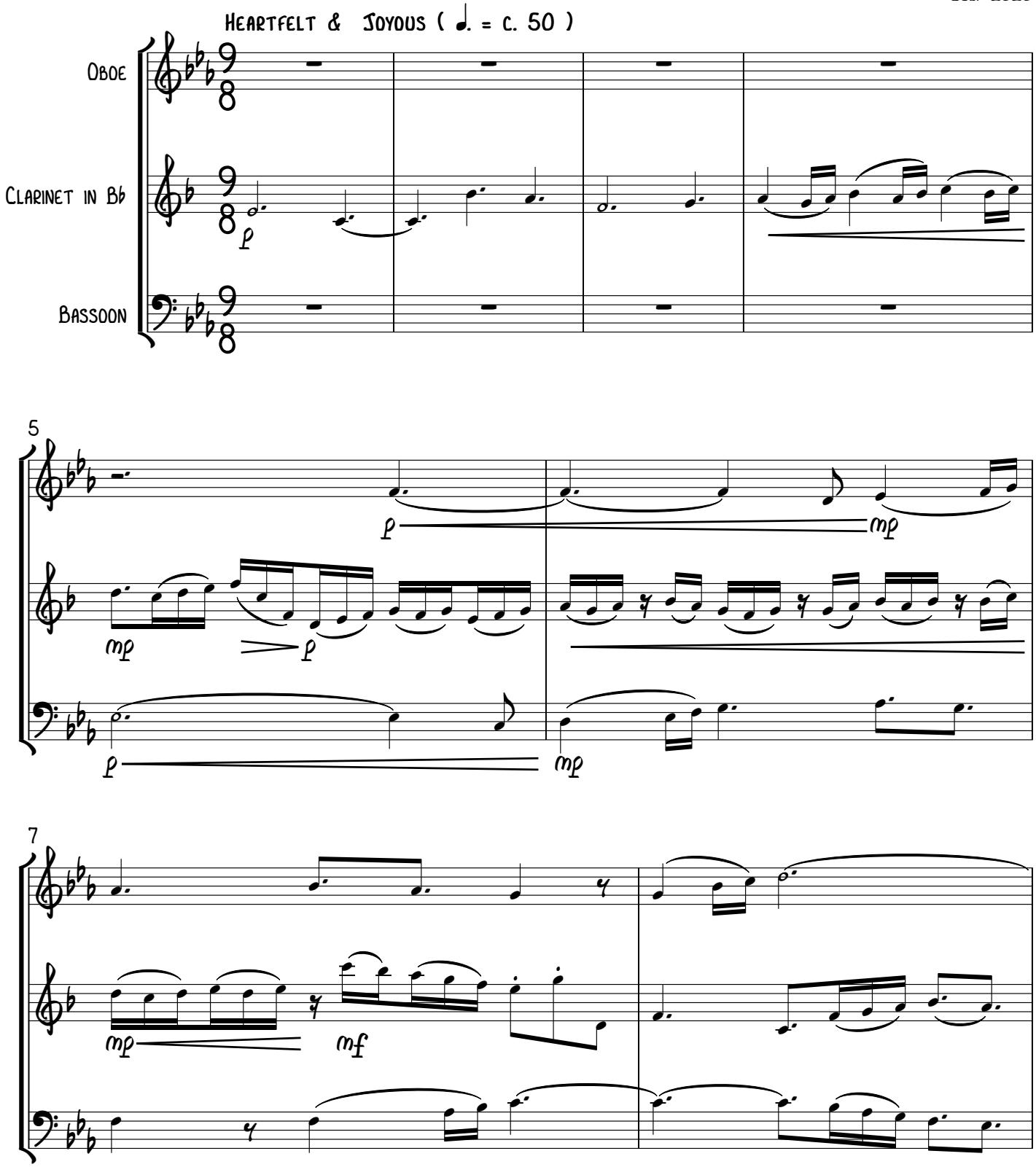

269
f UNBRIDLED ("ROCKIN'")
mf
f SOARING
3
271
mf
f
mf
273
f
f

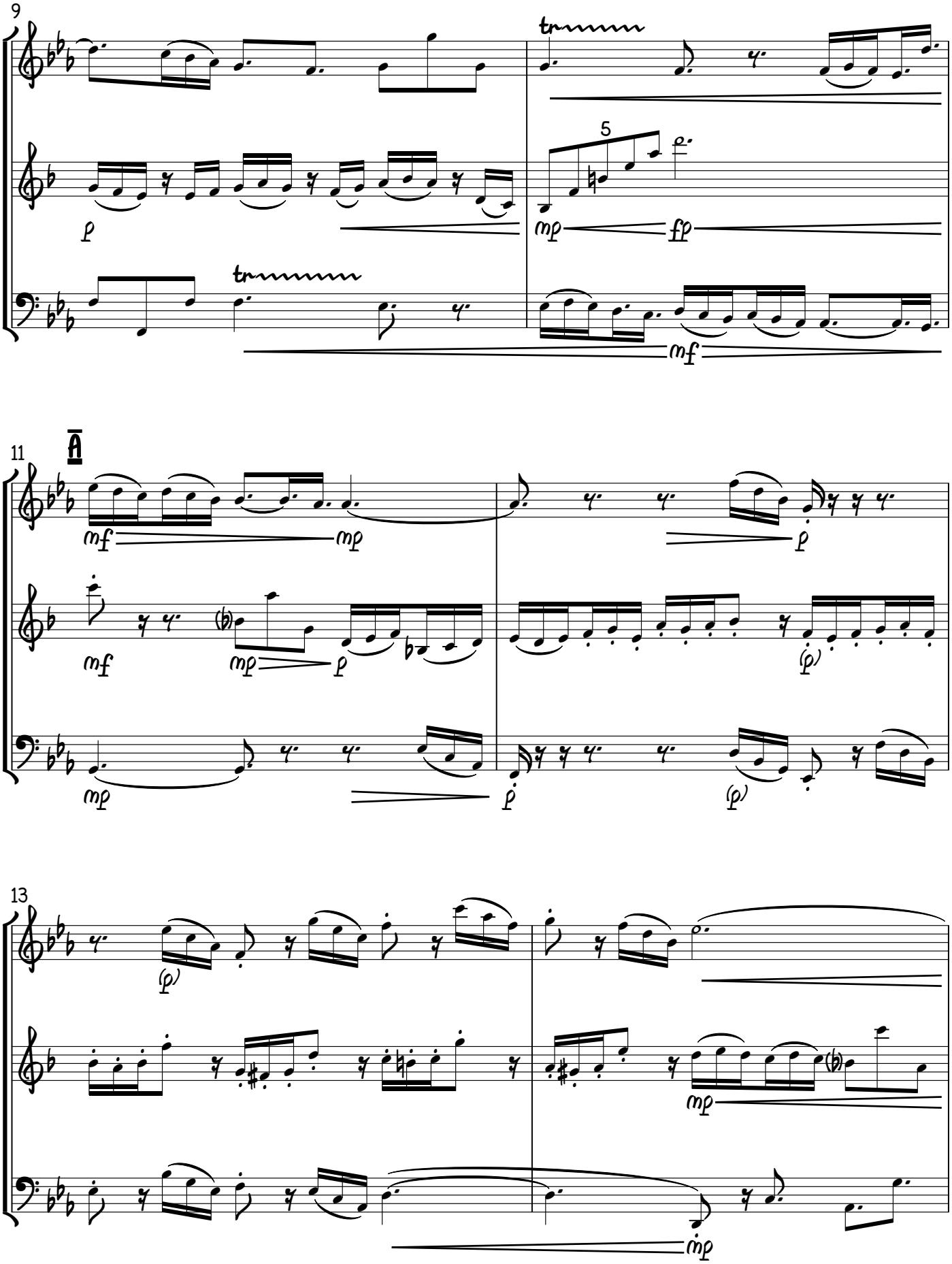

275
ff SOARING
277
f SOARING
3
(UPPER NOTE IF POSSIBLE)
279
3
ff
ff
3
f
ff

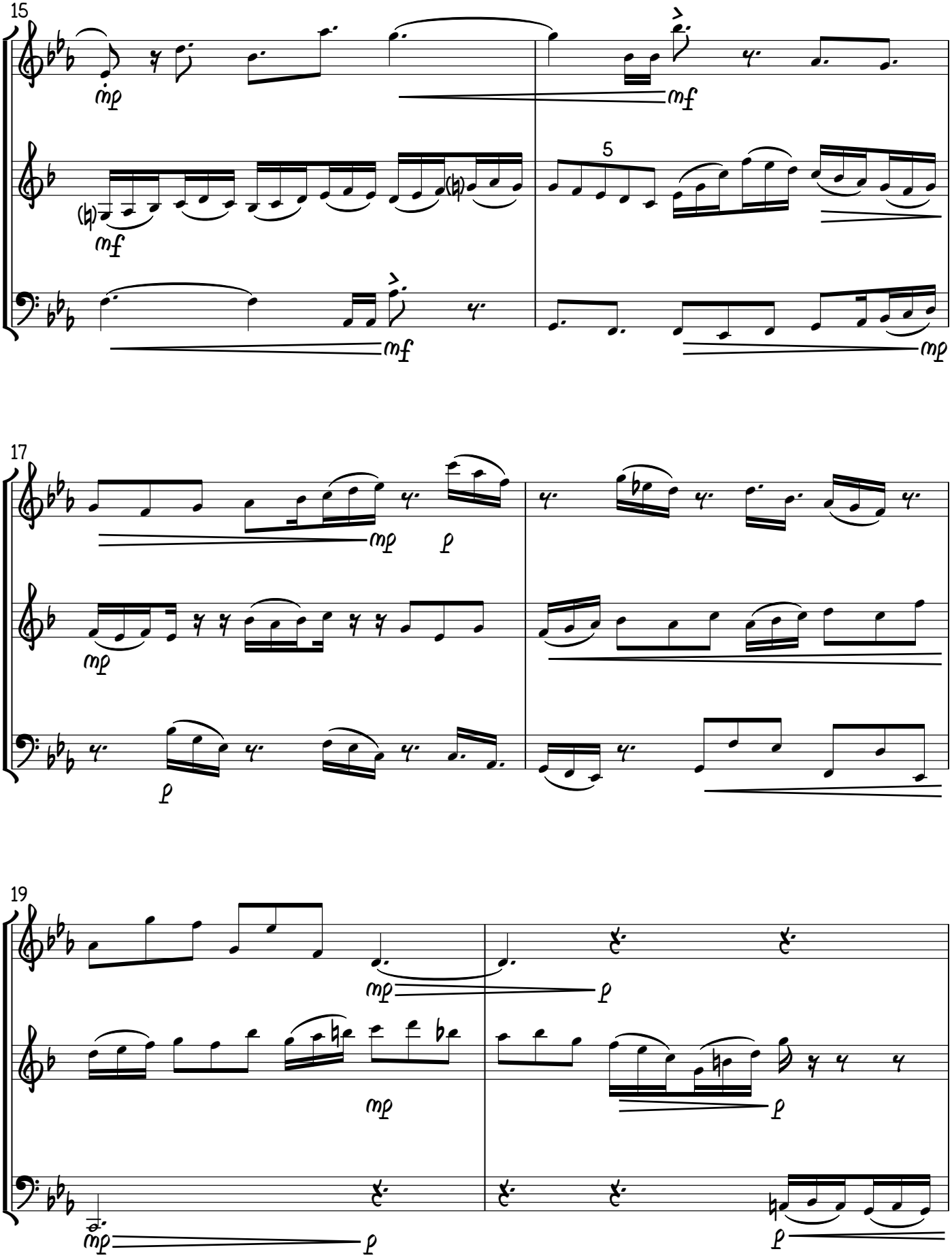
WE GIVE THANKS

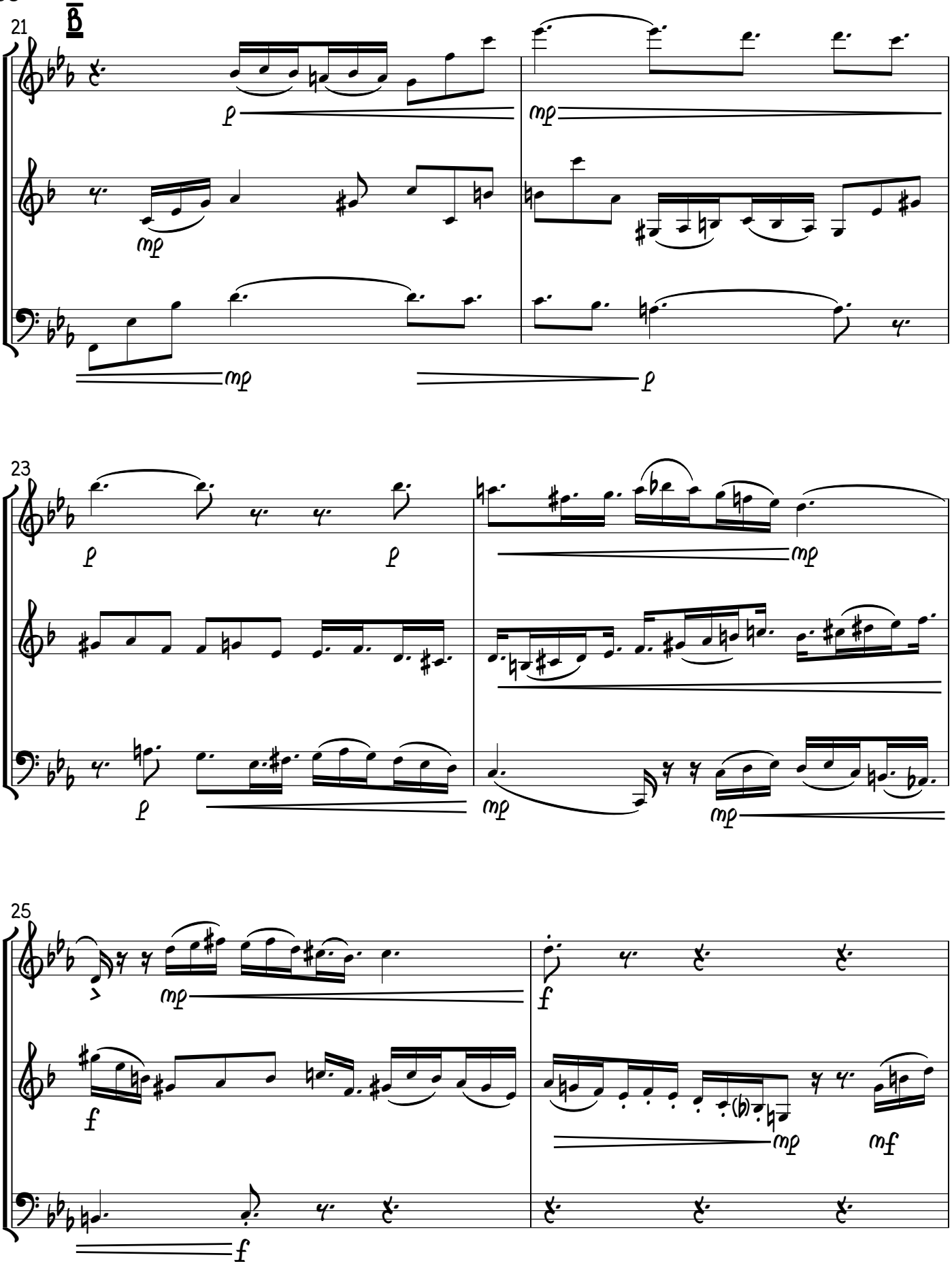
FOR THE ONE WHO SAVED 14 MILLION LIVES

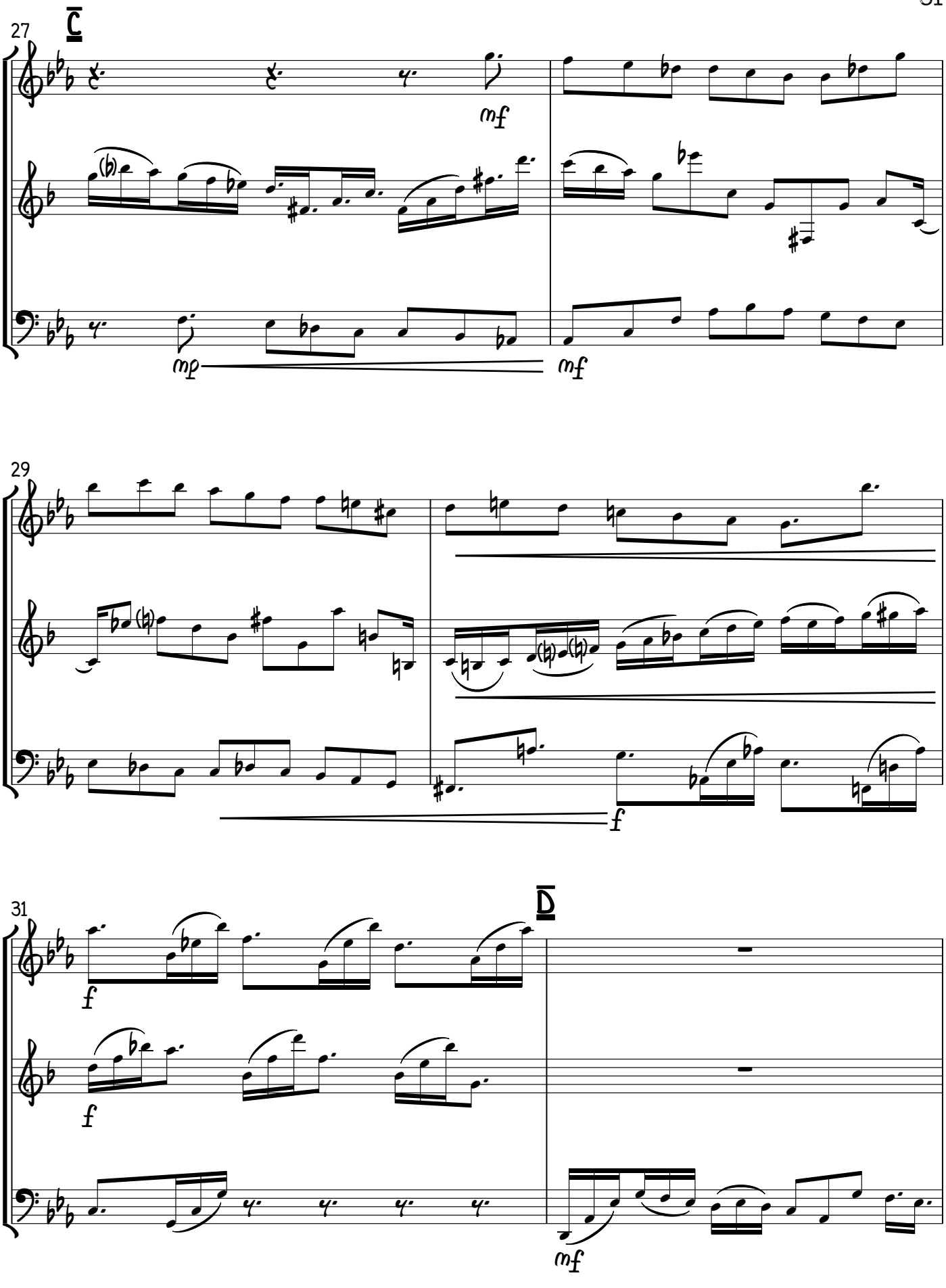
Jordan Alexander Key
July 2020

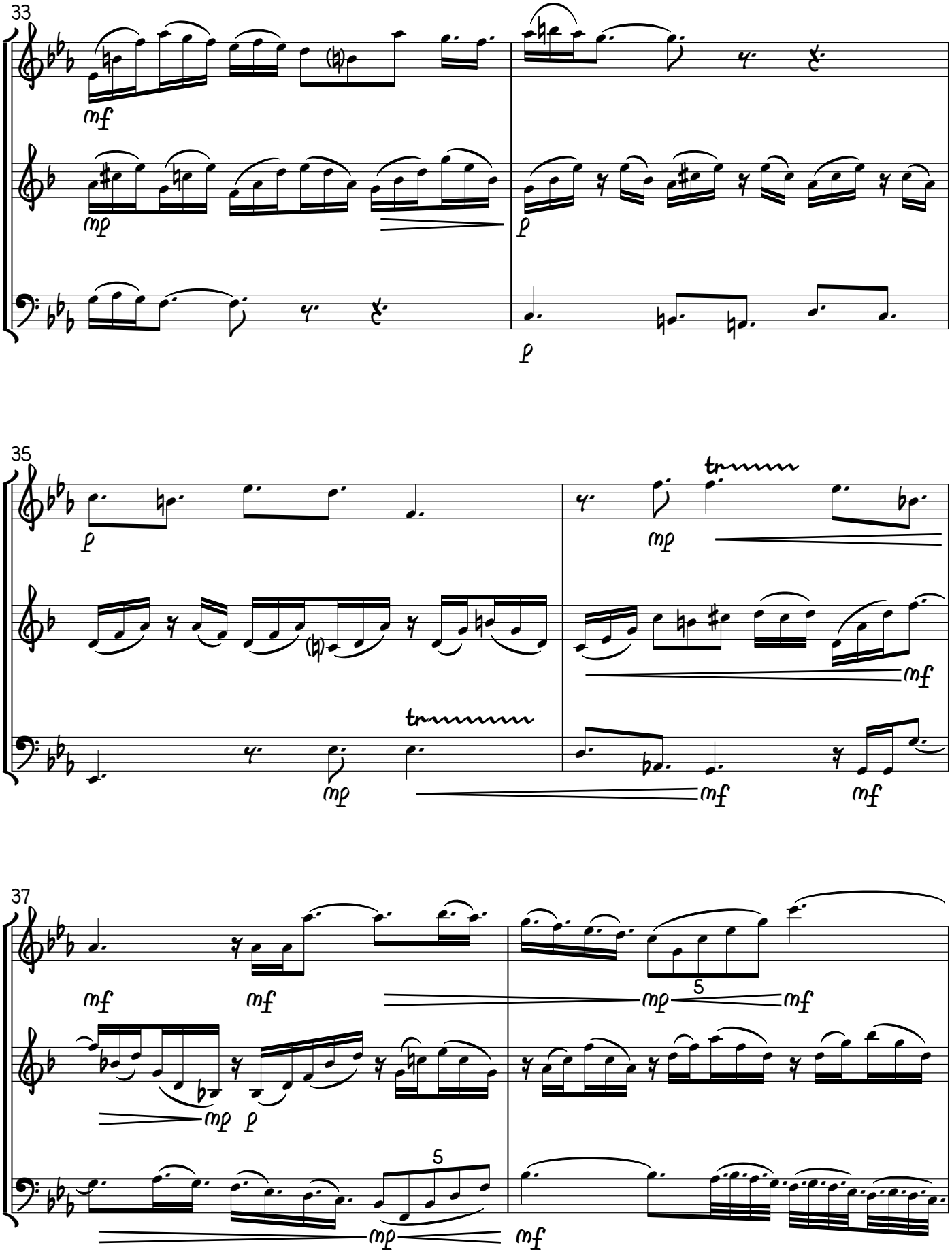


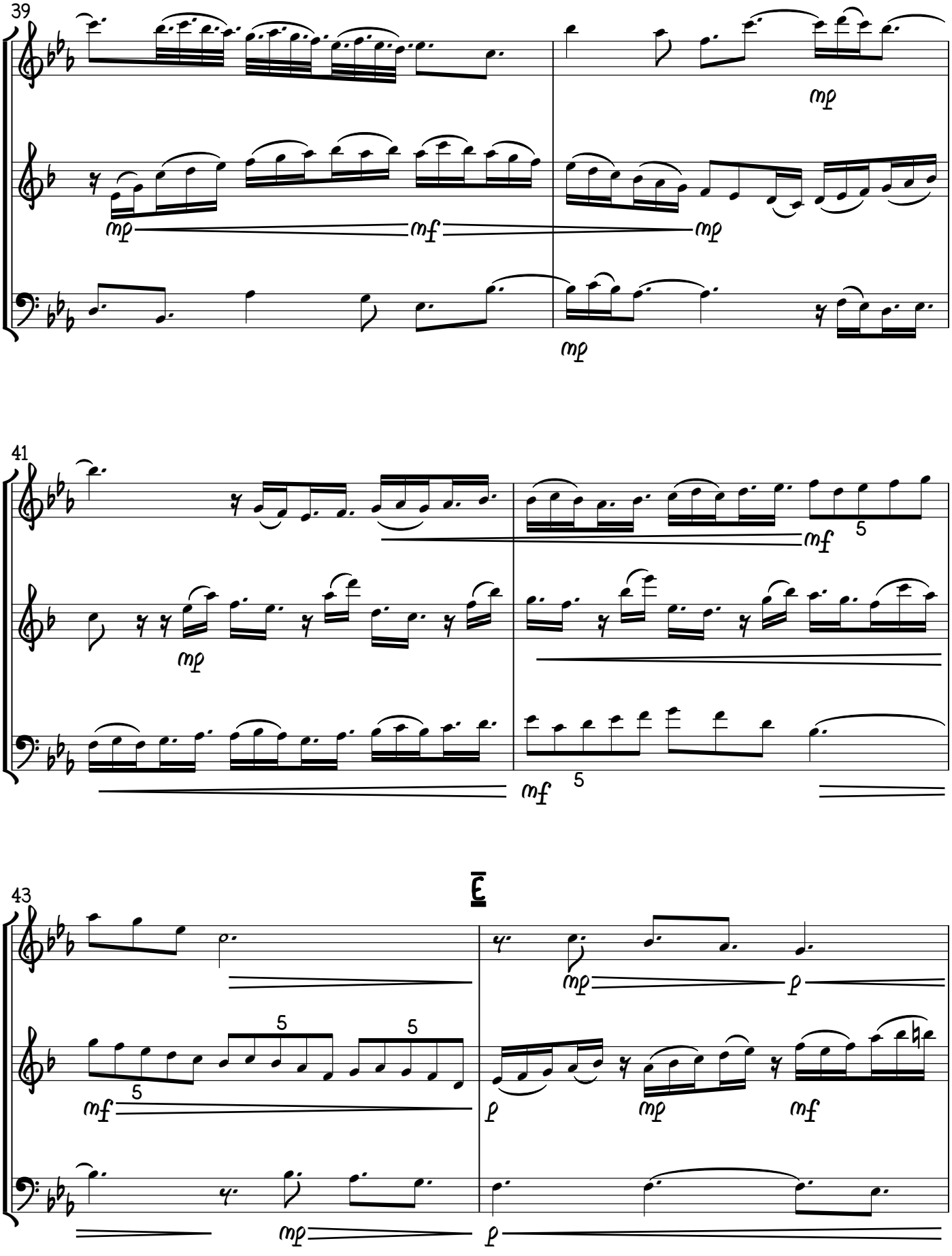

9
5
11
A
13

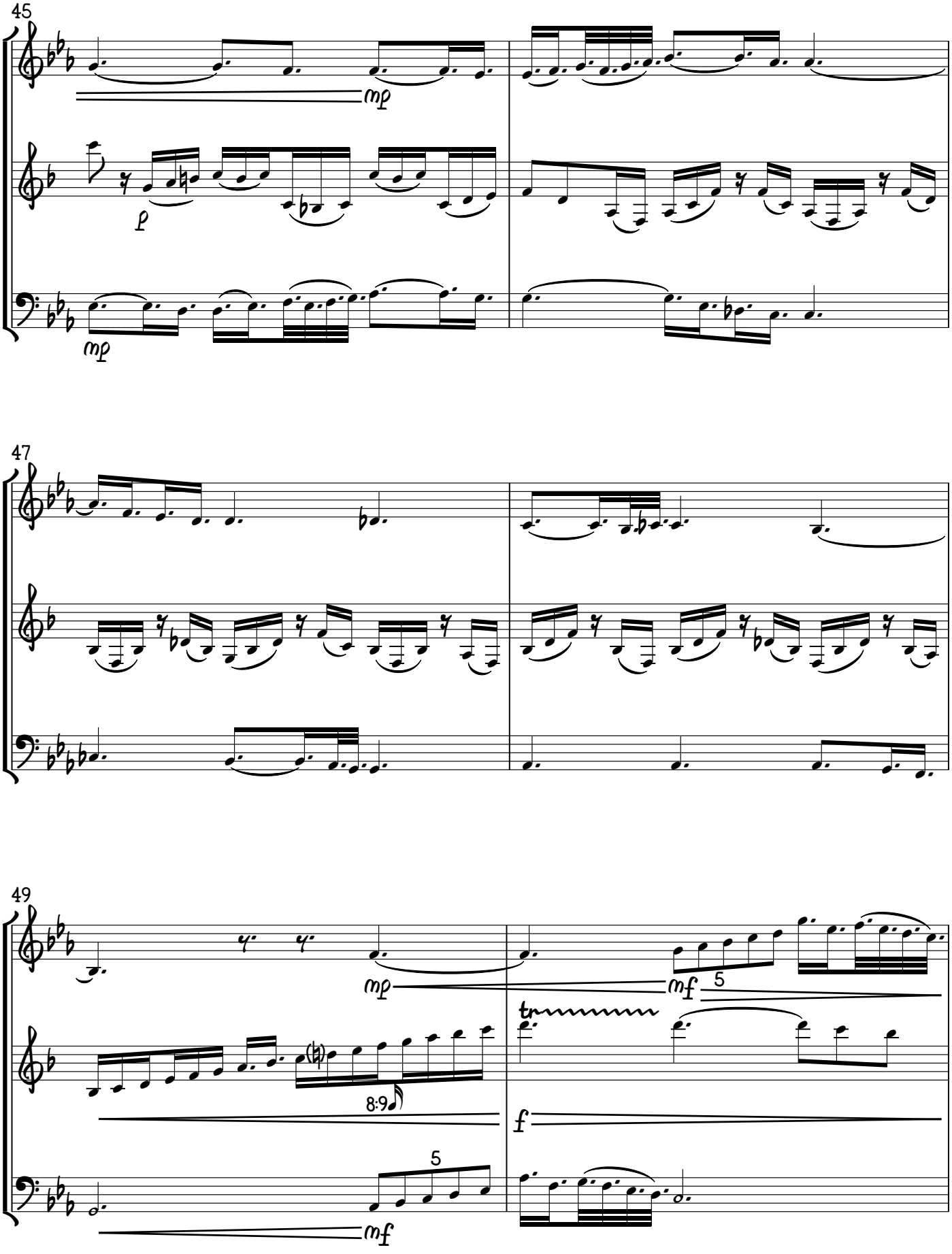

15
mp
mf
mf
mf
5
mf
mp
17
mp
p
mp
p
19
mp
p
mp
p
mp
p
p

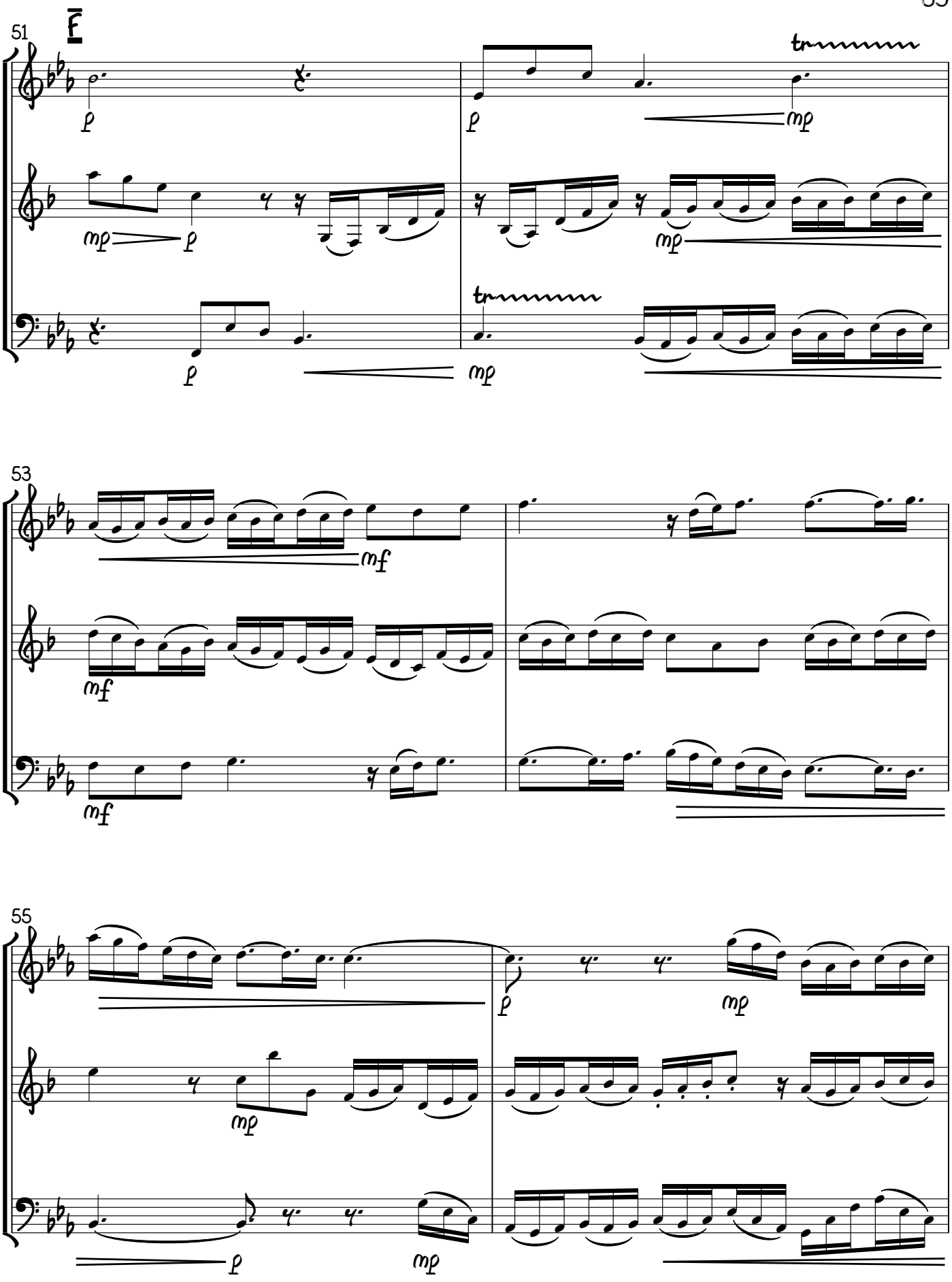

21
B
p
mp
mp
p
23
p
p
mp
p
mp
mp
25
mp
f
f
mp
mf
f

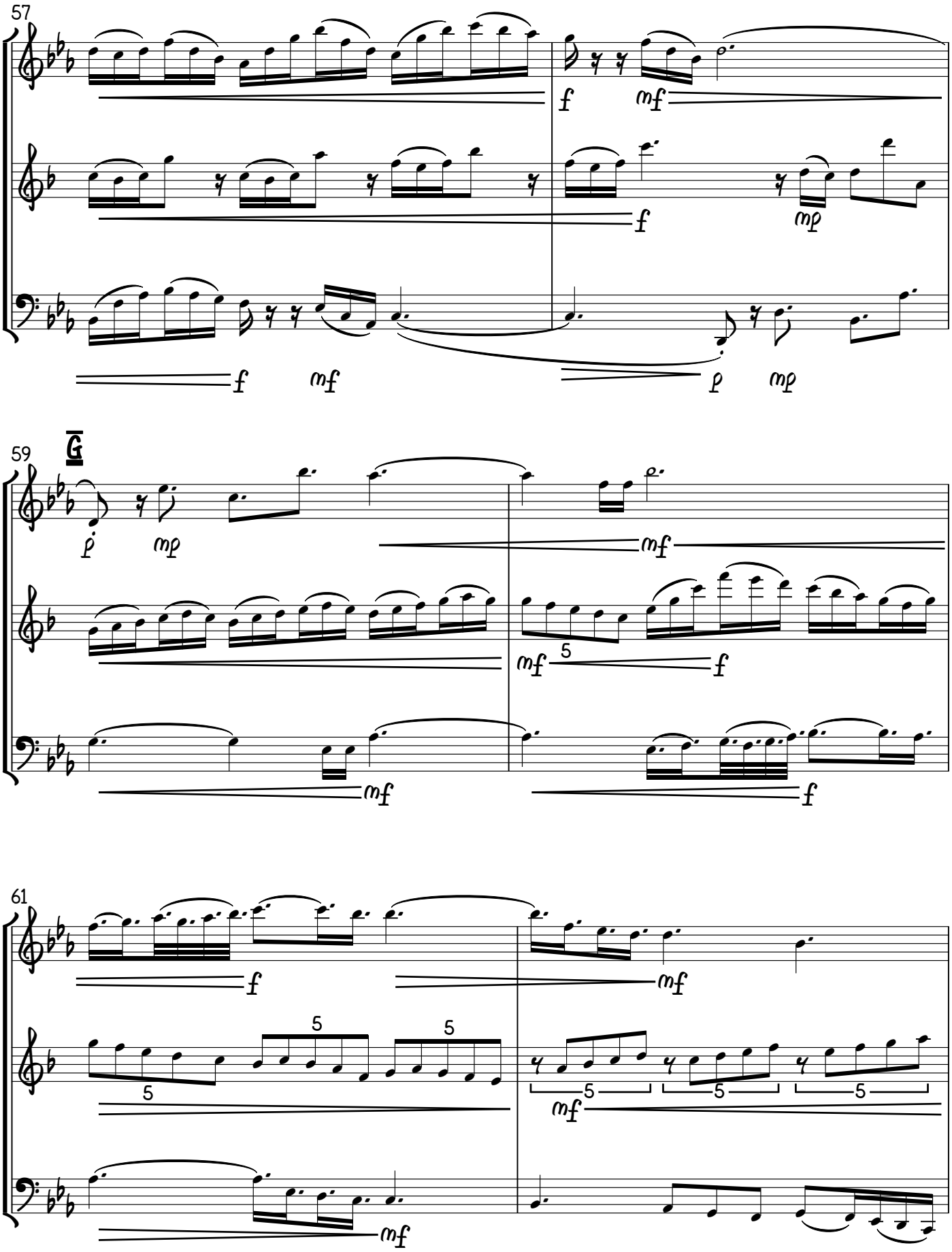

27
C
mf
mp
mf
29
f
31
D
f
f
mf

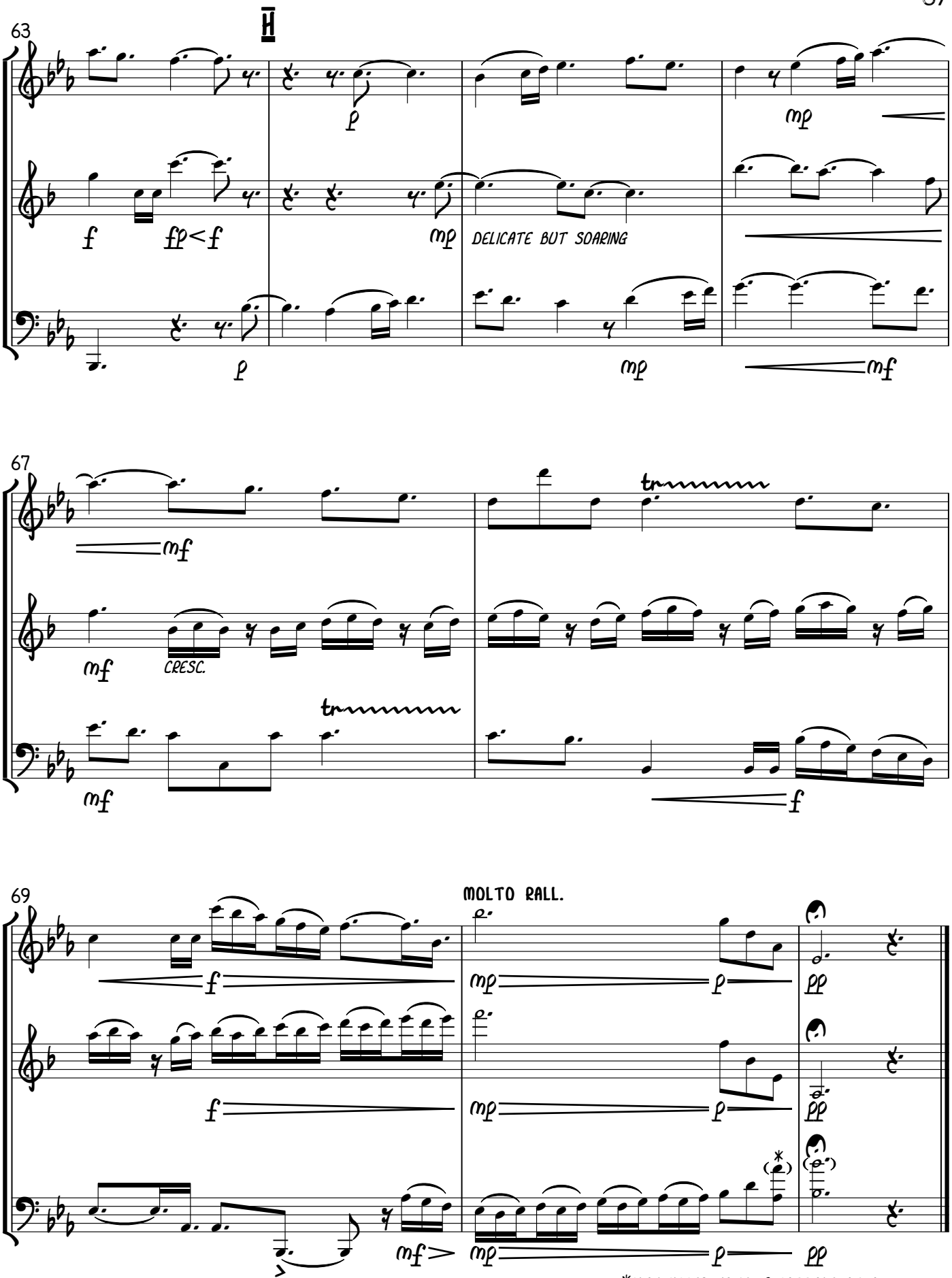

33
35
37
5
5


39
mp
mf
mp
mp
41
mp
mf
5
mf
5
43
E
5
5
mf
5
mp
mp
mf
mp
p


45
mp
p
mp
47
49
mp
mf
5
tr
8:9
f
5
mf


51
F
p
mp
53
mf
55
p
mp


57
59
G
61
5


63
H
DELICATE BUT SOARING
67
CRESC.
69
MOLTO RALL.
*PLAY UPPER NOTE IF POSSIBLE AT A COMFORTABLE AND DELICATE TIMBRE