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...and the songs of another... for Six Voices & Live Electronics

Matthew David Becker, *The University of Western Ontario*

Supervisor: Daniel, Omar, *The University of Western Ontario*

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Abstract

…and the songs of another… is a composition of five songs for six voices and live electronics. Voice is the principal tool of sound generation, and the sounds produced by voice are transformed using extended and non-conventional vocal techniques plus electronics. I hence use voice in this manner with electronics to create unique sound development in a new work.

The text in the composition is generated using phonemes through which syllabic sounds are constructed. The electronics are pre-installed modules that come with the software Max/MSP, and each of the five songs applies different processing. These modules are: a spectral harmonizer, a harmonizer, a tapped delay object, a tape delay module that emulates the Roland RE-201 synthesizer, a pitch shifter, and a noise multiplier.

The discussion document outlines the methodology, use of text, electroacoustic modules, and an analysis of key areas in the work. Each of the five movements is discussed in detail, including how text, electronics, and musical elements are applied and transformed. Annotated musical examples accompany the analysis.

Keywords

Electronic music, electroacoustic music, contemporary music, vocal music

Acknowledgments

I want to first thank my loving husband Joshua Lovell, who has supported me during the highs and lows of both this project and this degree. Joshua kept me grounded and guided me to recognize available solutions when I doubted they existed.

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My dear friends Kristen Wallentinsen and Chantal Lemire, with whom I started the PhD program at Western, probably deserve more thanks than I could ever give them. Their friendship cannot be understated. They supported my music ever since we first met, and their genuine interest in my work gives me reason to keep creating. Above all else, they are terrific people and my life is evermore enriched for having met them.

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Part I: Score

…and the songs of another…

For Six Voices & Live Electronics

MATTHEW DAVID BECKER

Total length: approx. 33’48”

…and the songs of another…

Matthew David Becker

PERFORMANCE NOTES

This is a piece for six vocalists and live electroacoustic processing, during which multiple timbres produced by vocalists and electronics alike will be heard. Each of the five songs contains different applications of vocal techniques and electronics, the details and instructions of which will be deliberated upon below.

Each voice will receive its own dedicated microphone. A pianist for rehearsals and a conductor are recommended.

Required:

- 6 dynamic microphones
- Audio interface, or mixing board, with at least 6 XLR inputs
- Computer with Max/MSP version 7 or later installed
- 2 amplified speakers connected using 2 balanced line output cables
- Technician

PHONEMES

Unpitched Consonants	**Pitched Consonants**	**Vowels**
F	L	ɑ (“f<u>a</u>ther”)
K	M	ɛ (“<u>e</u>nd”)
P		ɘ (“b<u>oo</u>k”)
S		ɪ (“sh<u>e</u>”)
ʃ (“<u>sh</u>oe”)		O (“<u>o</u>ver”)
T		ʊ (“m<u>oo</u>n”)
X (German: “bu<u>ch</u>”)		

Notation (Meter):

This piece implements combinations of time notation and standard meter. Notably, the first and final songs make considerable use of time notation. In these instances, measure duration is indicated by total seconds.

Songs 1 and 5 feature voices whose parts are written on one-line staves. For these parts, all vocalized sounds are to be purely non-pitched.

Percussive Notation (Non-Pitch)

× Stemless in regions with time notation (Songs 1 and 5); refer to measure length to determine duration.
In metered sections, stems will determine duration (quarter note, eighth note, etc.).

⊗ Appears in metered sections only (stemmed). Denotes duration of a half note, or longer if dotted.

𝅝 Appears in metered sections only. Denotes duration of a whole note.

VOCAL TECHNIQUES

Breathing:

For extended unpitched syllables, as in songs 1 and 5, the sound should be continuous. Ergo, when a breath is needed, inhale while still producing the sound on the written syllable before exhaling. For the extended pitches of song 4, breathe as needed.

I. Song of Awakening

This is an unsung song, as all vocalists will be generating non-pitched, percussive sounds on select syllables, notably “S” and “ʃ.” The shaping of these syllables will require differences in countenance, the two of which are:

“with smiling countenance:” This will brighten the produced sound.

“with frowning countenance:” This will darken the produced sound.

Vocalists should produce these vocalizations at levels that are comfortable to them. Since all vocalists are connected to microphones, there is no need to heavily force the sound. If short breaks are required to take a proper breath, take them.

Notation: Most of this movement is composed using time notation, and as such, noteheads during time notation are written without stems. For duration, refer to the length of each measure, since that will indicate how long each note entry is. Metered sections will have stemmed notation, with duration values ranging between an eighth note and a half note.

II. Song of Morn

Where glissandi are indicated, immediately apply them until reaching the notated destination pitch on the beat.

Dotted slurs: First shown in m. 113 in Bass 2 and in m. 123 in Bass 1. Between two vowel sounds, apply diphthongs gradually.

“Husked timbre; almost growling:” Found in m. 132 in Bass 2 and m. 135 in Bass 1. The desired sound should be somewhat unpitched. Attempt to sing the written pitch as closely as possible, though an approximate tone is suitable to simulate the “growling” timbre. Use as much chest voice as possible, and apply more breath to achieve pitch approximation.

It is not expected for singers to actually growl, as this is uncomfortable and can cause serious damage.

III. Song of Morn

Sprechstimme: For longer passages with this technique, try to maintain some degree of pitch.

 – Apply heavy vibrato on vowel phonemes and unmeasured tremolo on consonant

phonemes.
Vibrato with glissandi: First heard m. 41 in Soprano. Maintain the integrity of the glissando regarding pitch as much as possible. If intensity of the vibrato needs to be decreased to help solidify the glissando, do so.

IV. Song of Morn

Maintain as legato as possible, and do not apply too much vibrato. A rehearsal pianist is recommended to help tune discrete trichord, tetrachord, pentachord, and hexachord activity as needed.

V. Song of Traversal

“Apply diphthongs on connecting vowel syllables:” Treat this as in song 2.

Bass 2 – “Pitch is approximate to singer’s lowest possible note; should sound like a soft growl:” Treat this similarly to the husked timbre in song 2.

Pitch bend: First seen in m. 8 in Bass 2. The bend should be no higher than a semitone. Attempt a quartertone if possible.

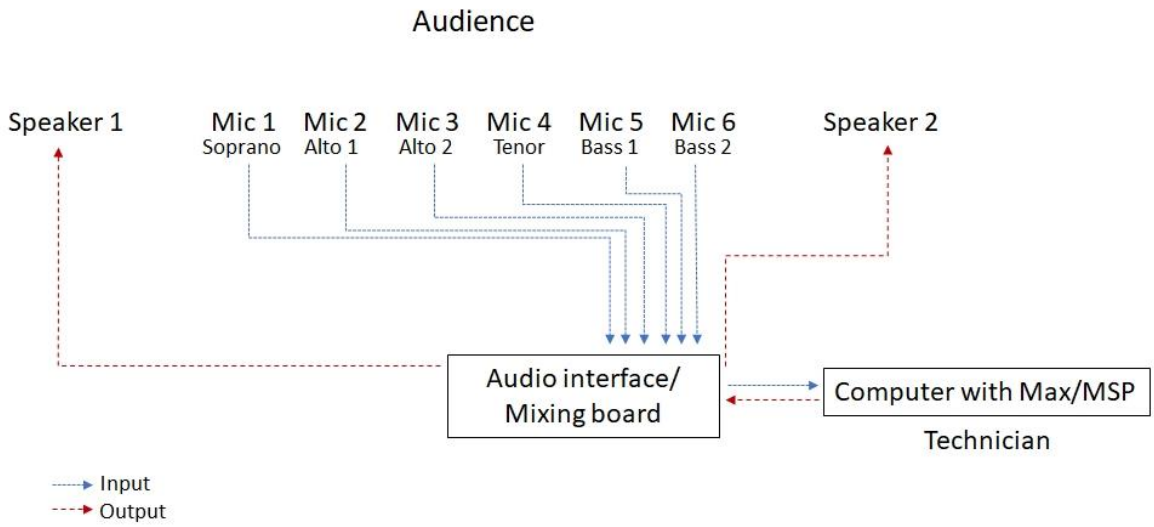
Notation: The only voice with a five-line staff is Bass 2. The remaining voices are on one-line staves, meaning that all of their vocalizations are non-pitched.

ELECTRONICS

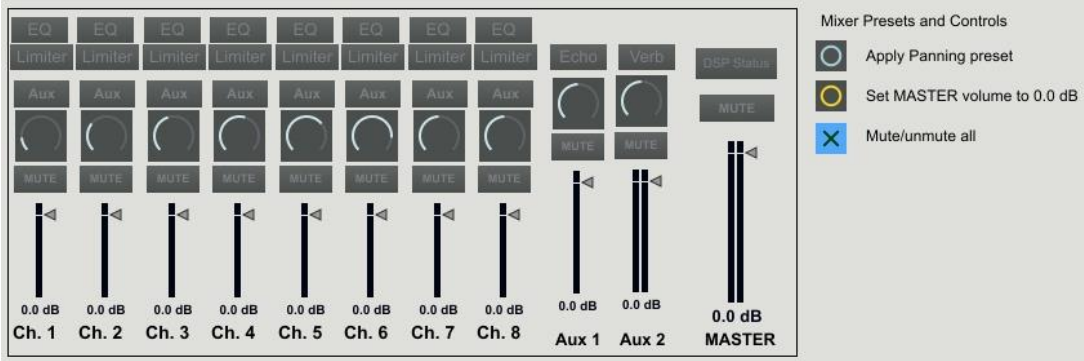
Use of electronics requires installation of Max/MSP and access of the master patch "Becker - and the songs of another.maxpat". The master patch contains a subpatch for each song. Electroacoustic settings should be available come application launch, but if not, consult these instructions to apply what is needed.

All inputs and outputs will be live upon application launch. This means that before performance, it will be required to mute inputs from subpatches not currently being used. Only the current song being performed should have its inputs unmuted. Then, when performance of one song is complete, mute the inputs before closing the subpatch and moving to the next one.

Arrangement & Signal Flow:



A panning mixer in the Max patch will emulate the "direction" of the stereo sound that mimics the placement of the speakers. For instance, Bass 2's settings will be far to the right, while the Soprano will be far to the left. Tenor and Alto 2 will be closer to center. Note that each subpatch has its own panning mixer (or two mixers for movements with manual bypass switches). A toggle is provided in each subpatch so that the settings of the mixer can easily be set. This includes an option to mute and unmute all voices. See image below:



The mixer is an external component which must be installed separately, and is required in order for the patch to fully function. The provided “mixer-0.0.3” folder must be copied/moved to the “Packages” folder in the Max installation.

For unprocessed, amplified sound, it is recommended to use a reverb preset supplied by a plugin, a mixing board, or an interface, etc. Reverb should be minimal; adjust accordingly to suit concert hall acoustics. Do not apply reverb to song 4. See below example:

Max/MSP Patches:

The information below indicates the name of each plugin, as well as screenshots of their settings. If the settings in Max/MSP do not match the screenshots shown in this document, they can be recalled at the top-right corner of each plugin. Information in each patch will tell you which settings to load, and also includes settings that can be inputted manually, if needed.

Snapshots

Each of the plugins below will have their information saved in “snapshot” form. These snapshots will have to be copied/abstracted from the provided “Snapshot.zip” file into the “Snapshot” folder/directory in the Windows/Mac installation of Max 7 (or later).

Score

In each song, the opening staff system provides some information about the electronic settings, notably which settings (or presets) will change throughout. This does not include complete information about the electroacoustic settings. The snapshots and screenshots provided below should instead be consulted to ensure the settings in each plugin are complete prior to performance.

I. Song of Awakening

Alto 2 and Tenor will be connected to a plugin called "Max SpectralHarm" (Spectral Harmonizer). The remaining voices will be dry. No changes to the settings of the electronics will occur in this movement.

If the below settings are not present upon program launch, do the following:

For Alto 2, load "Max SpectralHarm.amxd[1]"
For Tenor, load Max SpectralHarm.amxd[2]"

II. Song of Morn

Plugin: "Multi Harmonizer" applied to all voices, with five different pitch presets applied during the movement. A manual bypass is also connected to each voice, with the score indicating when bypasses are to be enabled or disabled. Keystrokes within Max/MSP will allow the technician to enable or disable bypasses quickly.

If the below settings are not present upon program launch, load “Multi Harmonizer.amxd[1]”

Keyboard Presets:

Keyboard presets 1-5 have the following settings which will need to be input manually after loading the snapshot:

1. Clear (nothing depressed), or C_4 (“Root;” recommended, as leaving this preset clear will not necessarily negate the sounds being processed when moving from another preset).
2. $B\flat_3$ (one whole tone down)
3. $A\flat_3$ (two whole tones down) and E_4 (two whole tones up)
4. $E\flat_3$ and F_3
5. $D\flat_3$

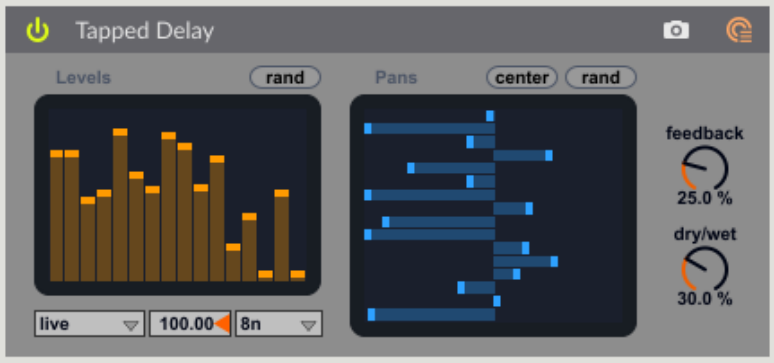
III. Song of Solicitude

Plugin: “Tapped Delay,” an elaborate delay with feedback network that allows to randomize the levels of amplitude, as well as their panning.

There are four different presets saved as snapshots that can be accessed at the top-right of the module. These presets are listed as follows:

- Tapped Delay.amxd[1]: Feedback 20%; Dry/Wet 35%; 100 BPM, 8th note value (8n)
- Tapped Delay.amxd[2]: Feedback 25%; Dry/Wet 30%; 100 BPM, 8th note value
- Tapped Delay.amxd[3]: Feedback 30%; Dry/Wet 35%; 100 BPM, 16th note value (16n)
- Tapped Delay.amxd[4]: Feedback 20%; Dry/Wet 40%; 100 BPM, 8th note triplet value (8nt)

Note that the score will also call for the gain levels and panning to be randomized on occasion. Each has their own dedicated “rand” button.



IV. Song of Loss

Plugin: "Space Echo," an analog tape echo emulator which applied randomized "warble" effects. Adds real time fluctuations in pitch, like a slow wave where pitch detunes downwards, then back up.

The score will call for manual changes to feedback, dry/wet, revtime, and duration.

If the below settings are not present upon program launch, load "Space Echo.amxd[1]"

V. Song of Traversal

Two plugins will be used in this movement, and no changes to the settings of either module will occur. The first is "Simple Pitch Shifter."

Soprano to Bass 1 will be connected to their own pitch shifter. The settings are as follows:

- Soprano: +550 Cents ("Simple Pitch Shifter.amxd[1]")
- Alto 1: +330 Cents ("Simple Pitch Shifter.amxd[2]")
- Alto 2: +200 Cents ("Simple Pitch Shifter.amxd[3]")
- Tenor: -100 Cents ("Simple Pitch Shifter.amxd[4]")
- Bass 1: -520 Cents ("Simple Pitch Shifter.amxd[5]")

The remaining settings will be the same among all voices: 100% wet with a glide value between 125-130 ms, at “best” quality. All of these settings can be recalled from the necessary snapshots.

Bass 2 has a different plugin: “Noyzckippr” (Noise Skipper). This module transforms the sound by multiplying the input signal by bandpass-filtered white noise. The settings between left and right speakers should be the same. Bass 2’s settings are stored in “Noyzckippr.amxd[1]”

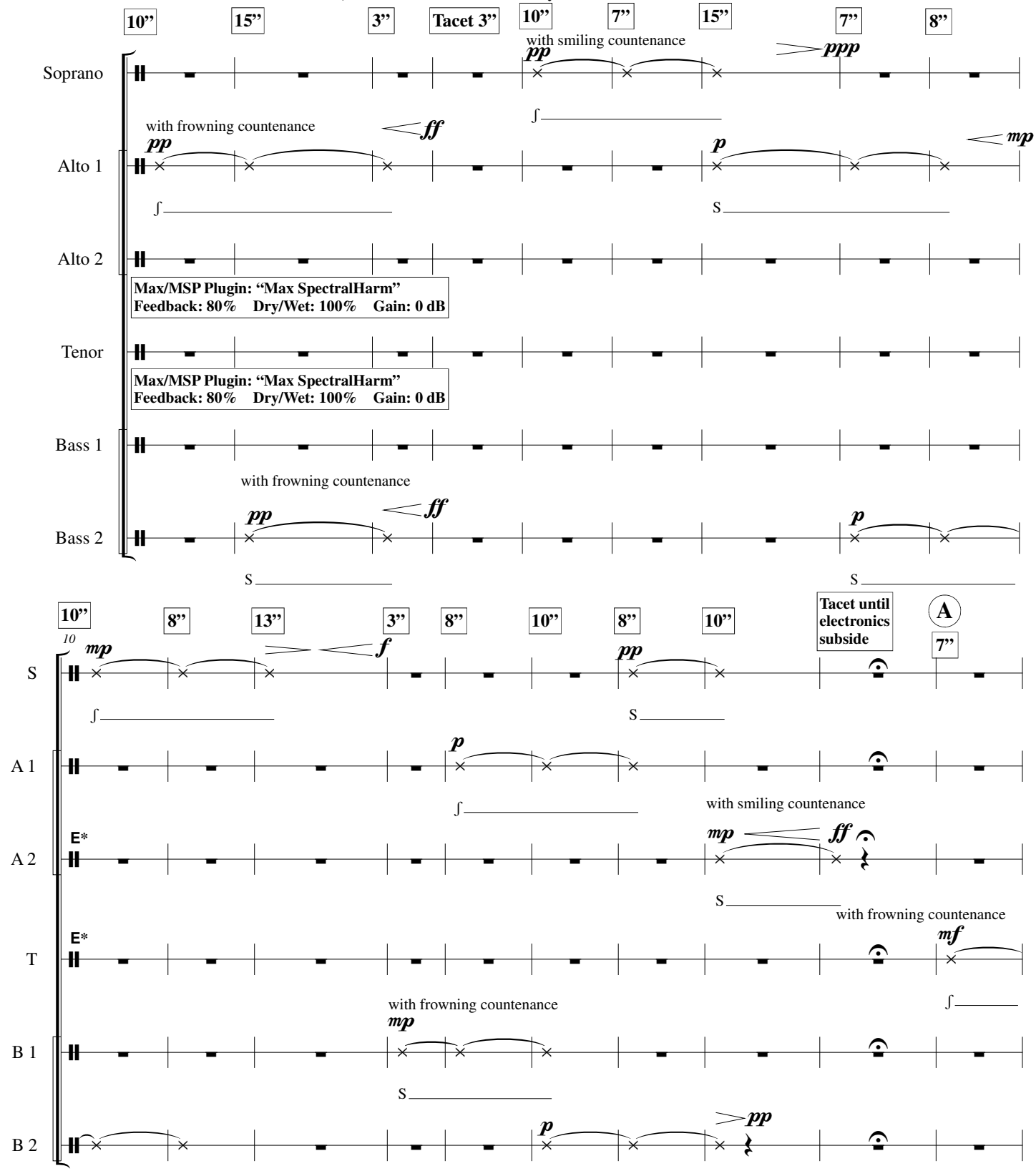
...and the songs of another...

I. Song of Awakening

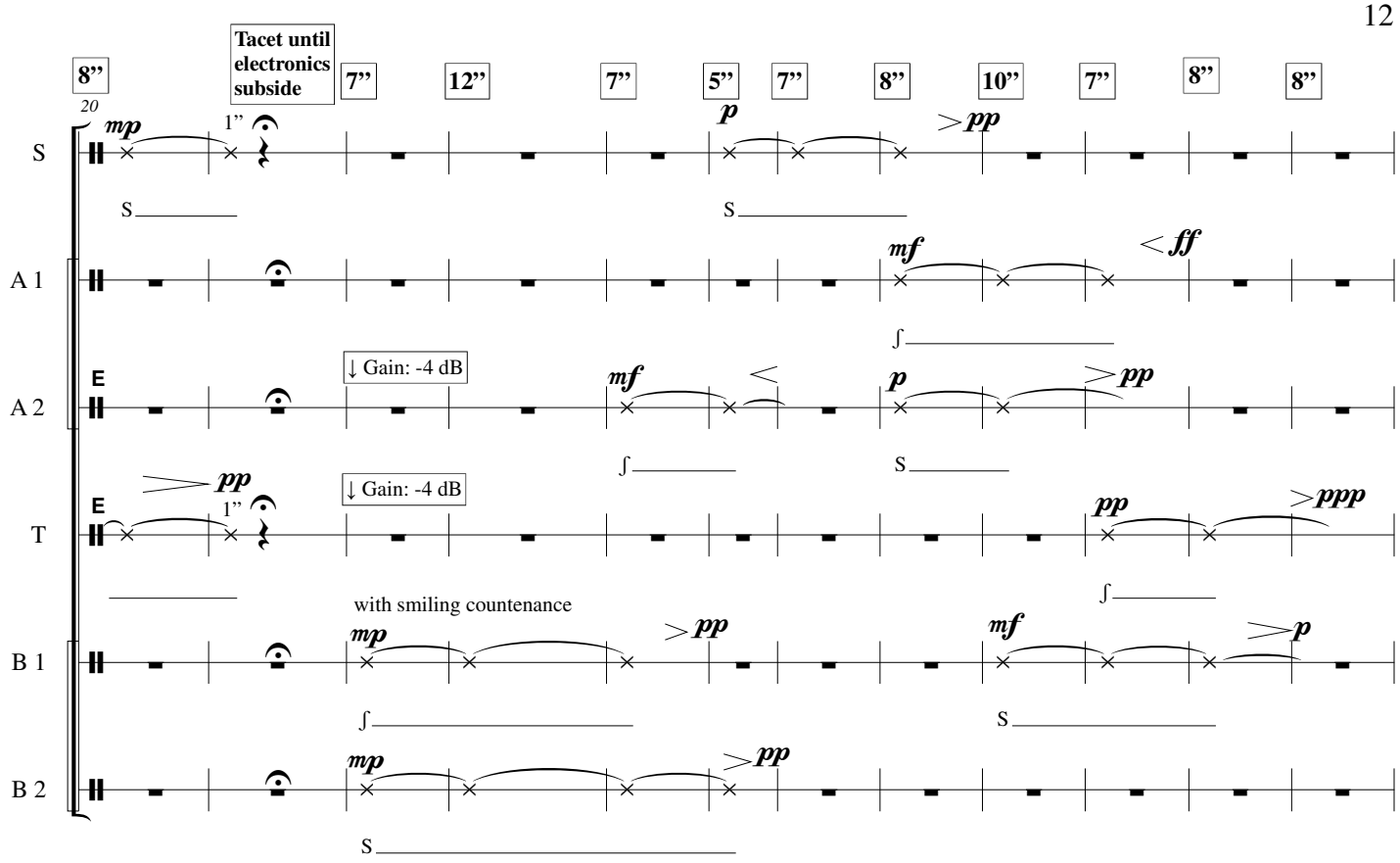
Matthew David Becker

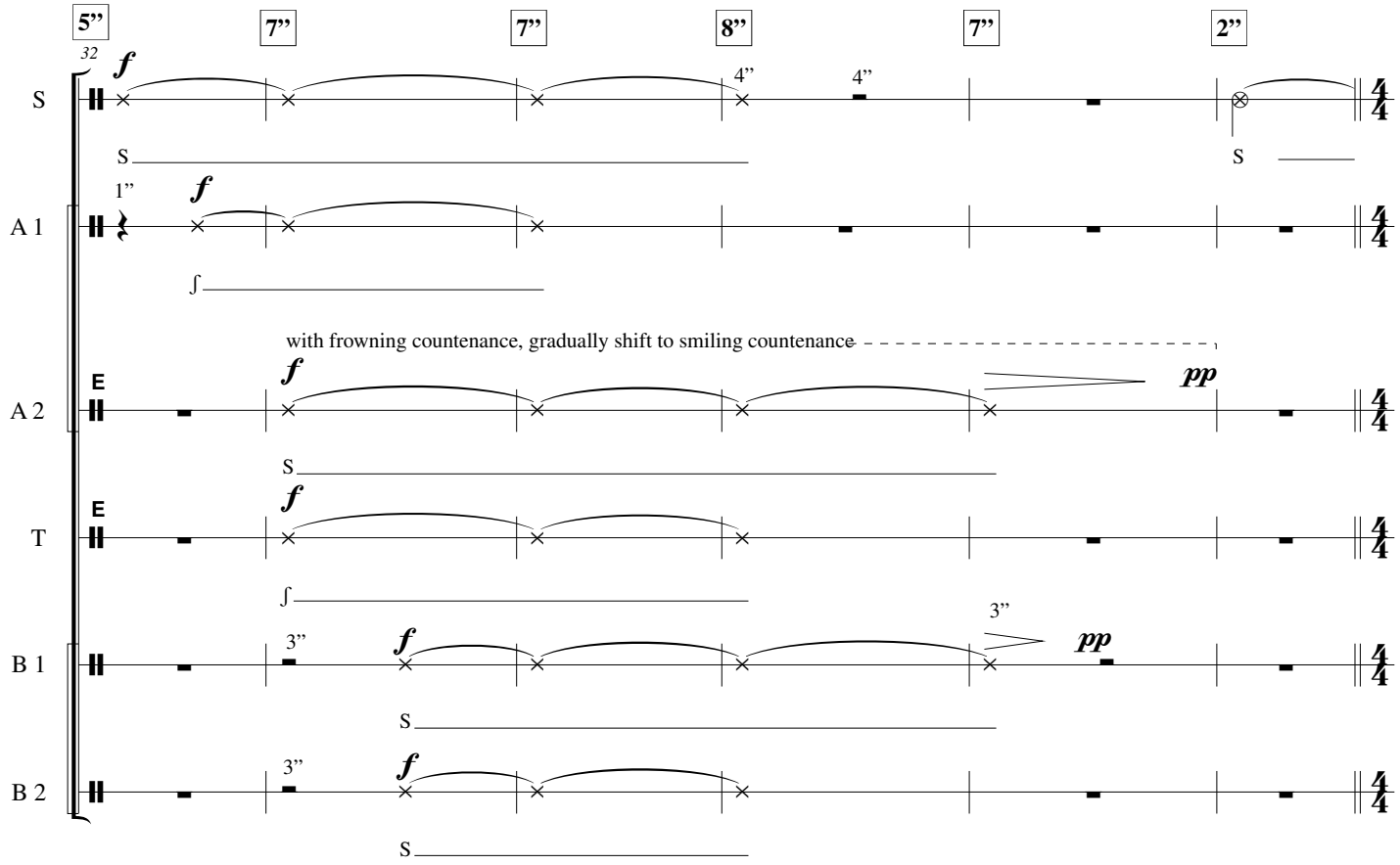
Tempo quasi ad libitum

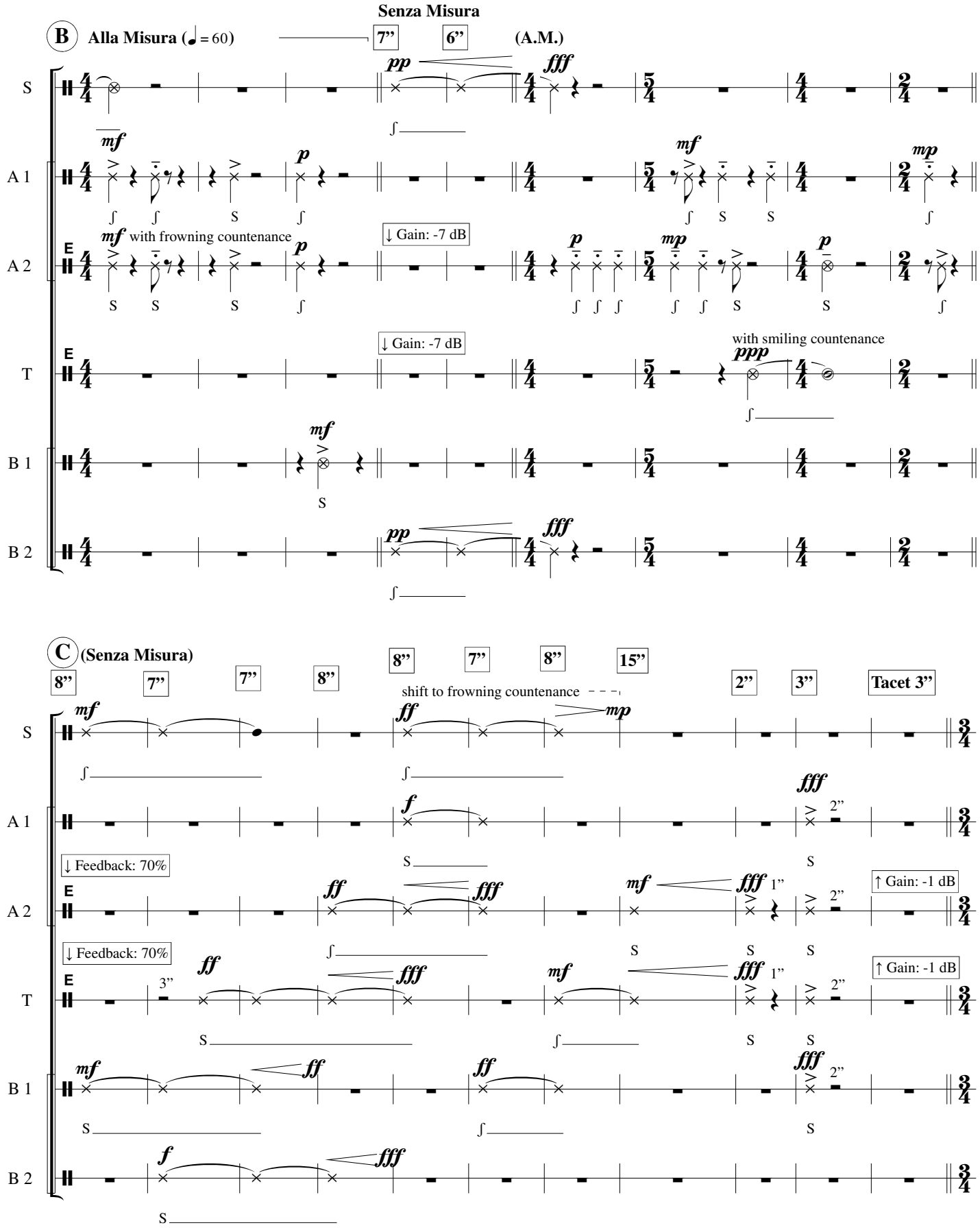
All voices: Apply indicated countenance until a change is requested
Sound should be continuous; inhale and exhale on written syllable

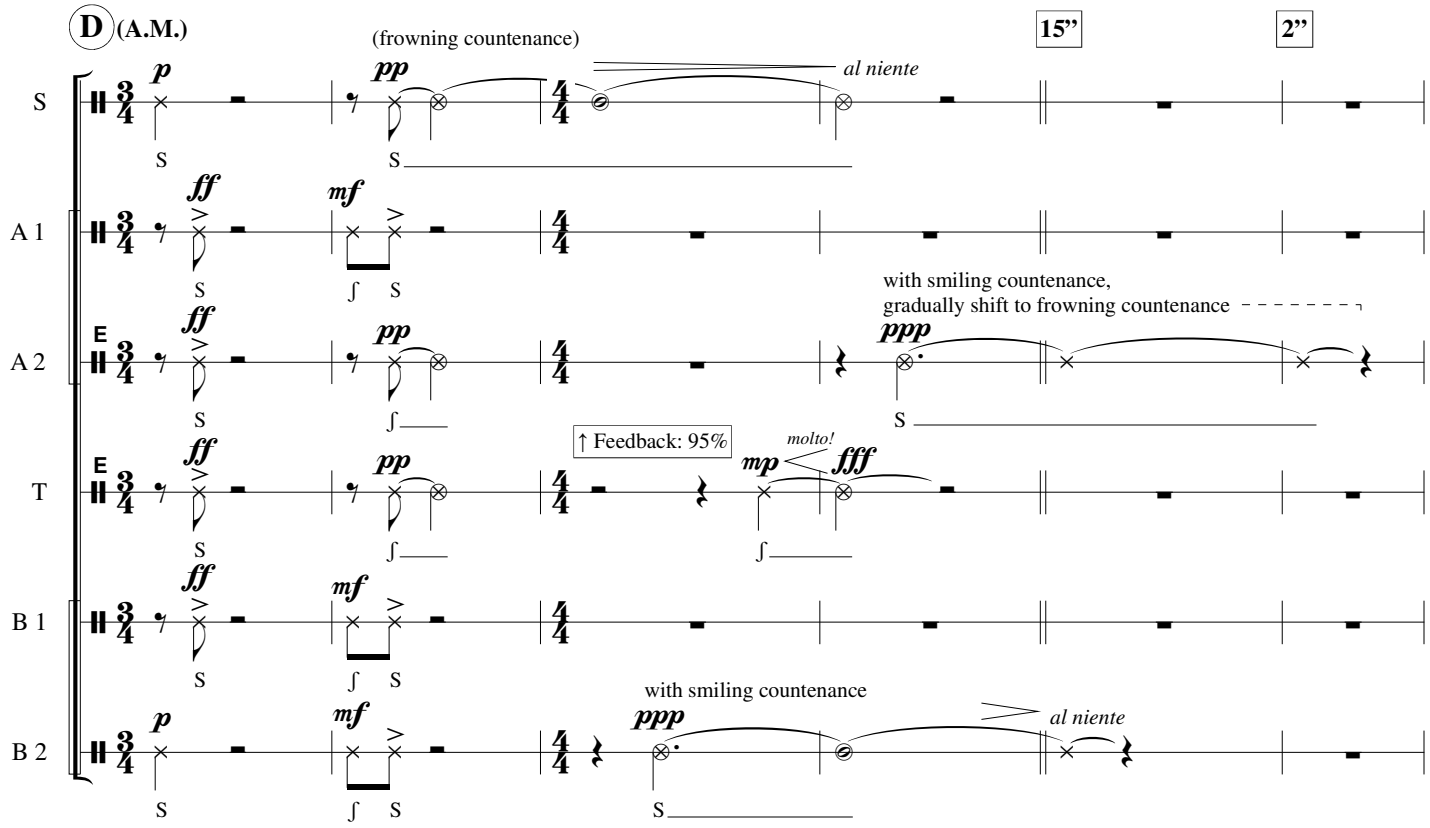


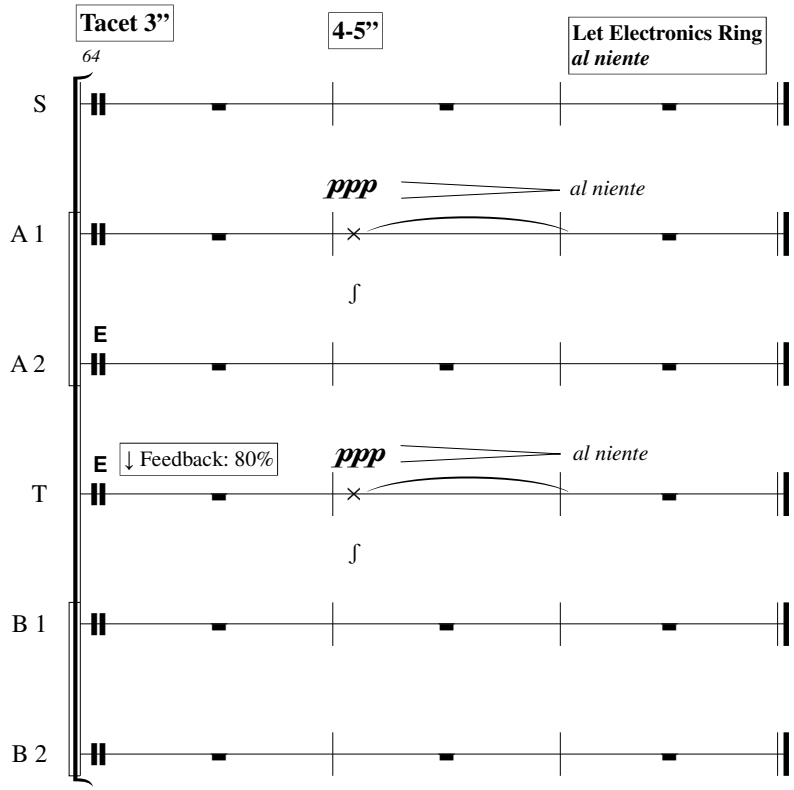
* - Indicates which voice is being actively processed by electronics


8”
Tacet until electronics subside
7”
12”
7”
5”
7”
8”
10”
7”
8”
8”
20
S
A 1
A 2
T
B 1
B 2
mp
1”
p
pp
mf
ff
↓ Gain: -4 dB
pp
ppp
with smiling countenance


5”
7”
7”
8”
7”
2”
32
S
A 1
A 2
T
B 1
B 2
f
4”
1”
3”
with frowning countenance, gradually shift to smiling countenance
pp


Senza Misura
B
Alla Misura (♩ = 60)
7”
6”
(A.M.)
S
A 1
A 2
T
B 1
B 2
mf with frowning countenance
↓ Gain: -7 dB
with smiling countenance
C
(Senza Misura)
8”
7”
8”
15”
2”
3”
Tacet 3”
shift to frowning countenance
↓ Feedback: 70%
↑ Gain: -1 dB

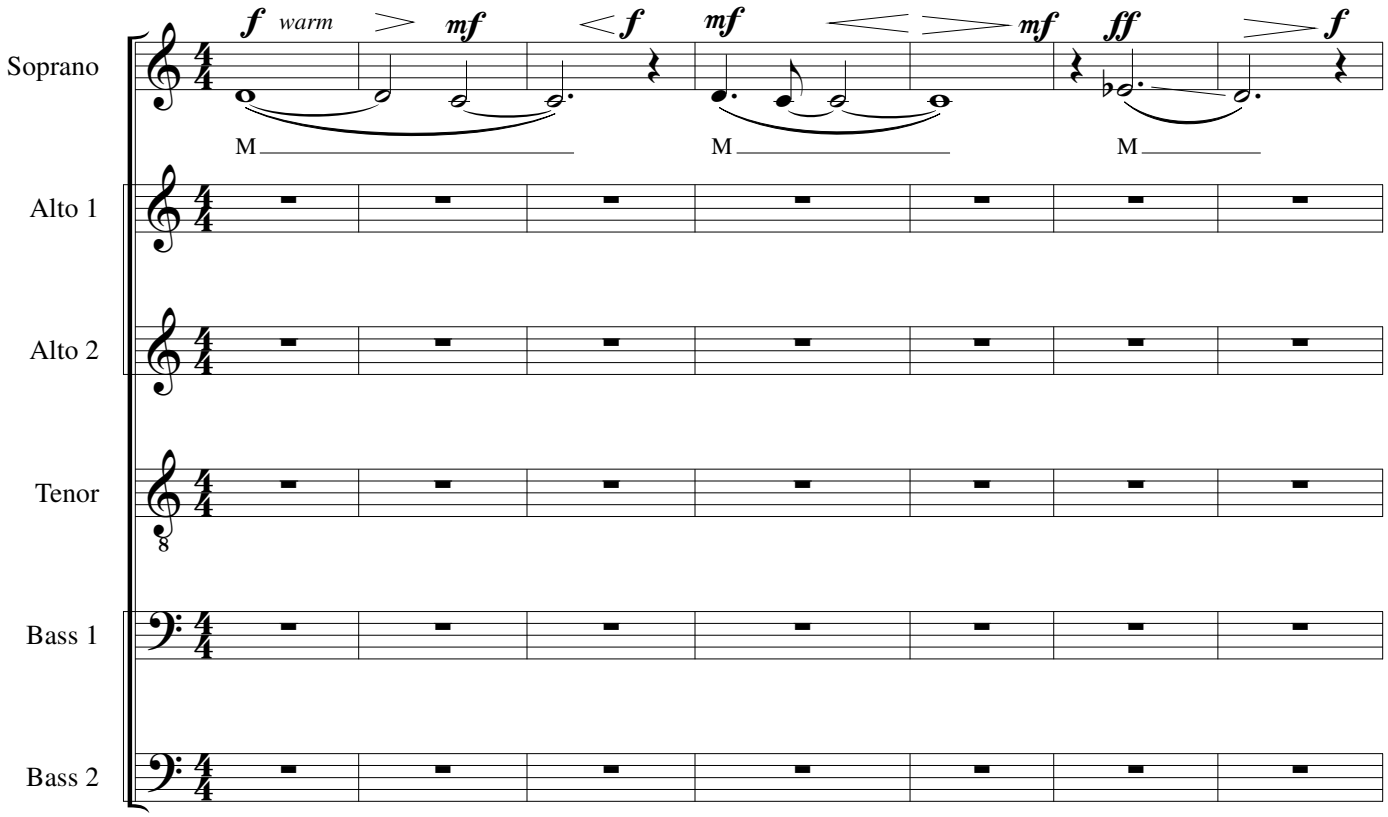

D (A.M.)
(frowning countenance)
15"
2"
S
A 1
A 2
T
B 1
B 2
p
pp
al niente
ff
mf
with smiling countenance,
gradually shift to frowning countenance
ppp
↑ Feedback: 95%
molto!
mp
fff
with smiling countenance
al niente


Tacet 3"
64
4-5"
Let Electronics Ring
al niente
S
A 1
A 2
T
B 1
B 2
ppp
al niente
↓ Feedback: 80%

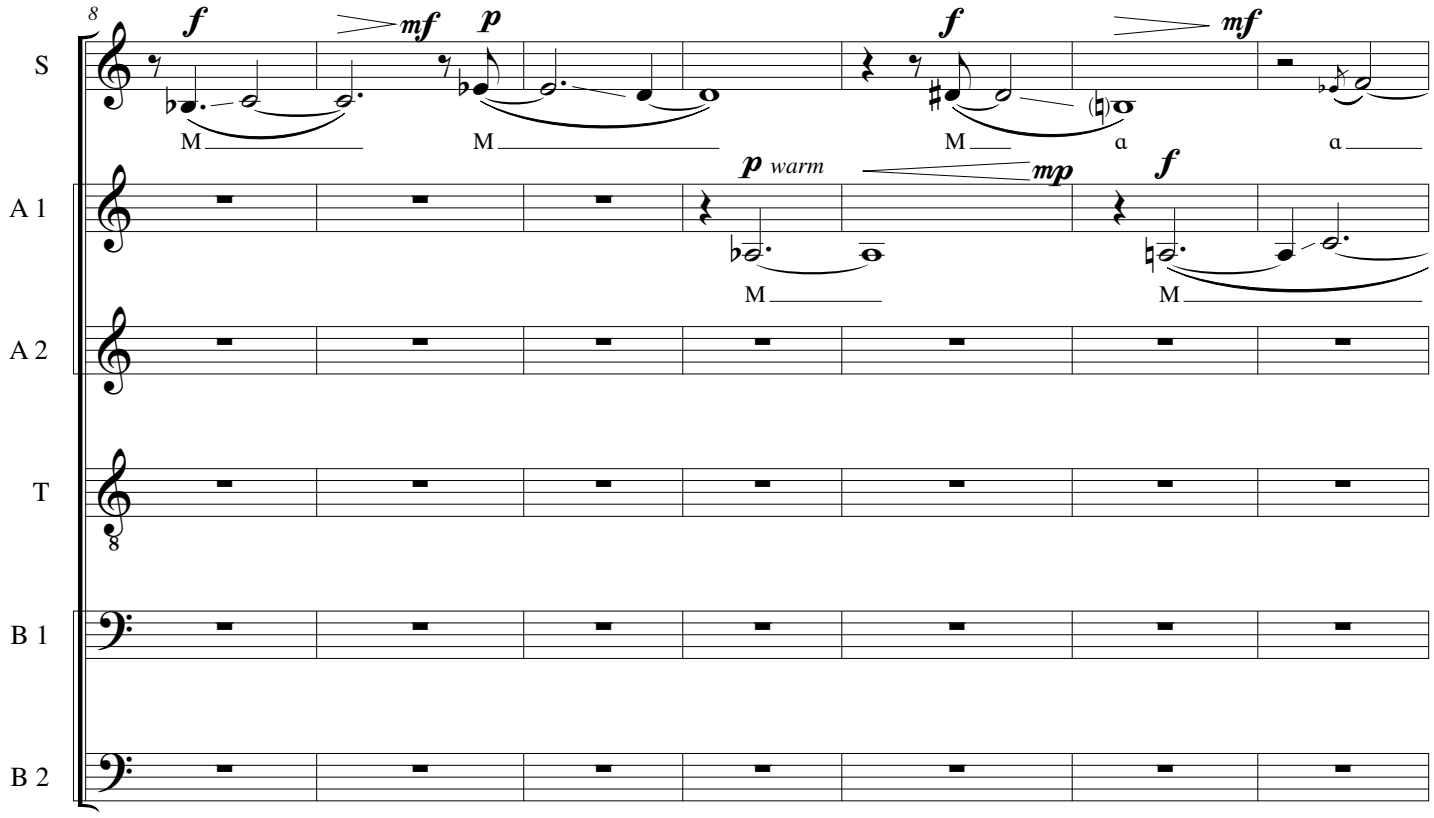
II. Song of Morn

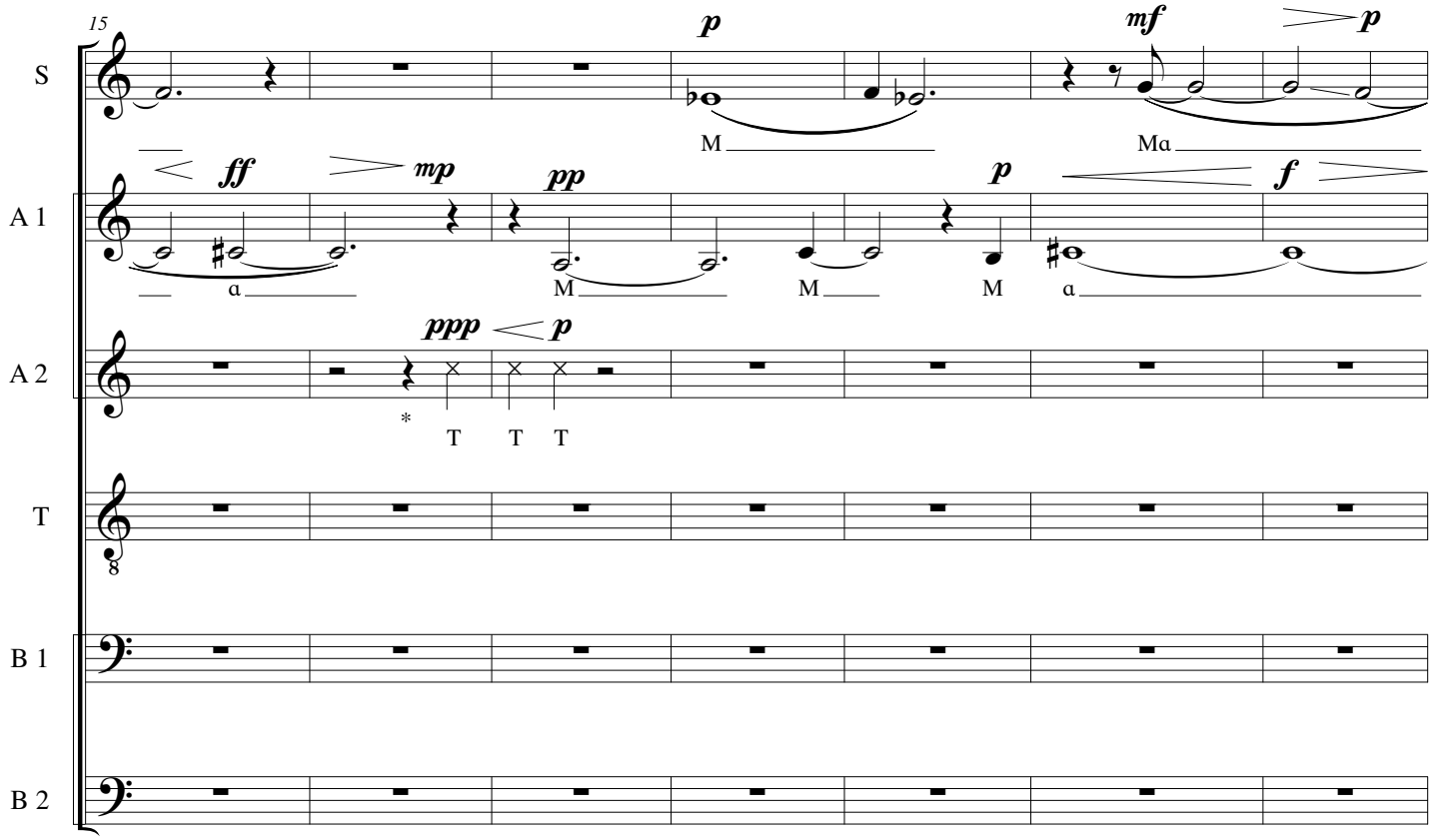
Moderato espressivo ♩ = 90

Max/MSP Plugin: "Multi Harmonizer" PRESET 1 – All voices: Bypass ON

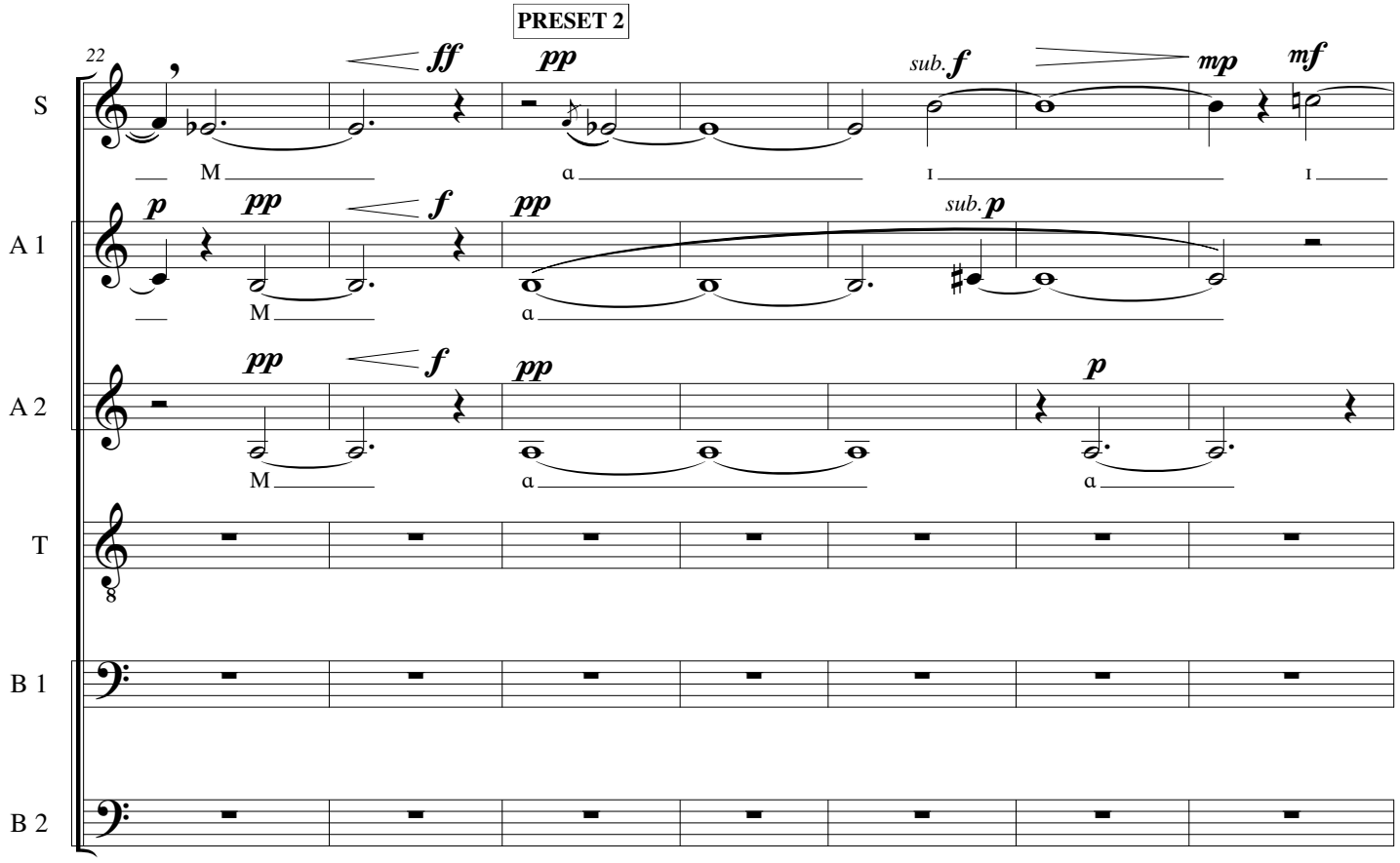


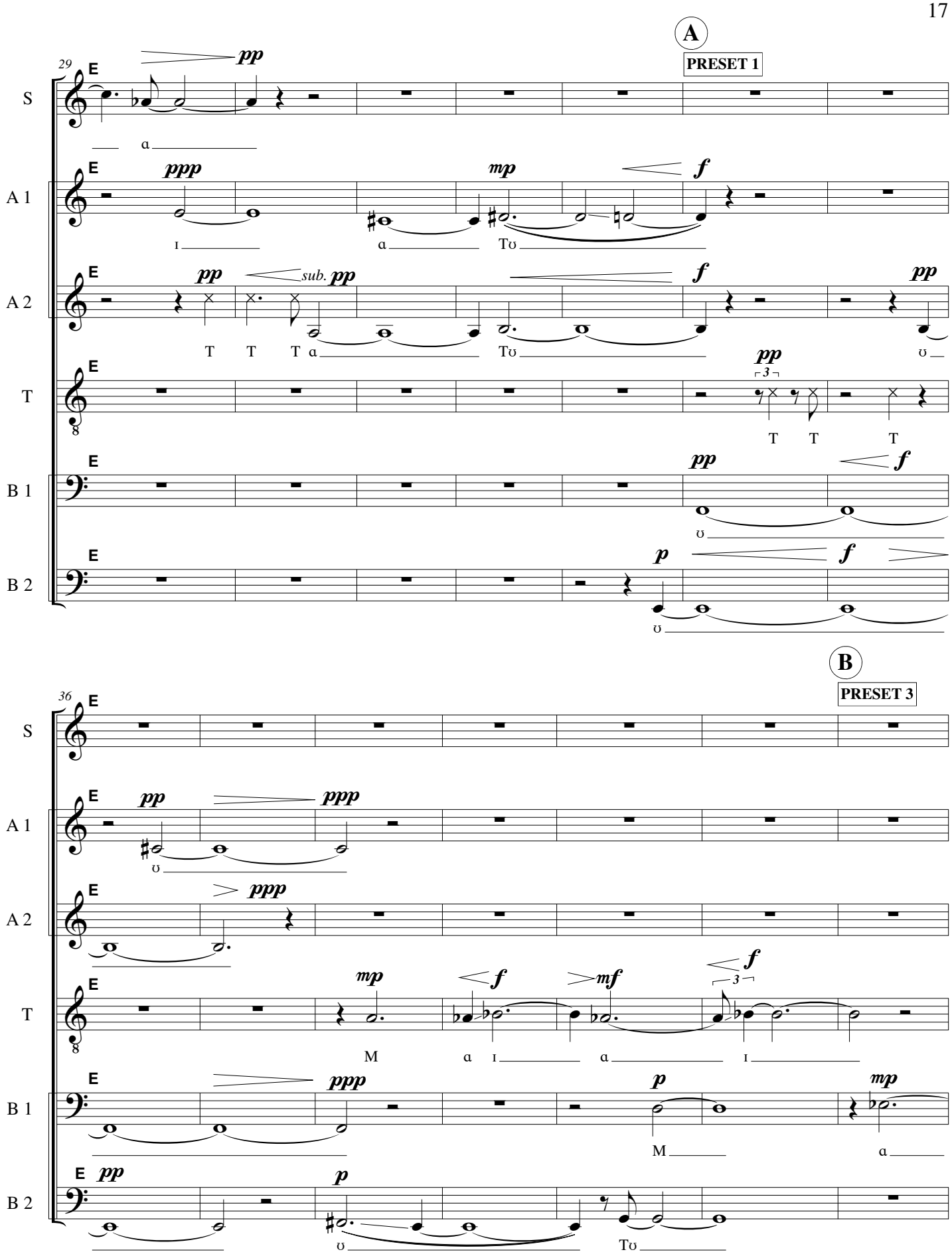
In this movement, preset settings are global, but bypasses are local (voice specific)

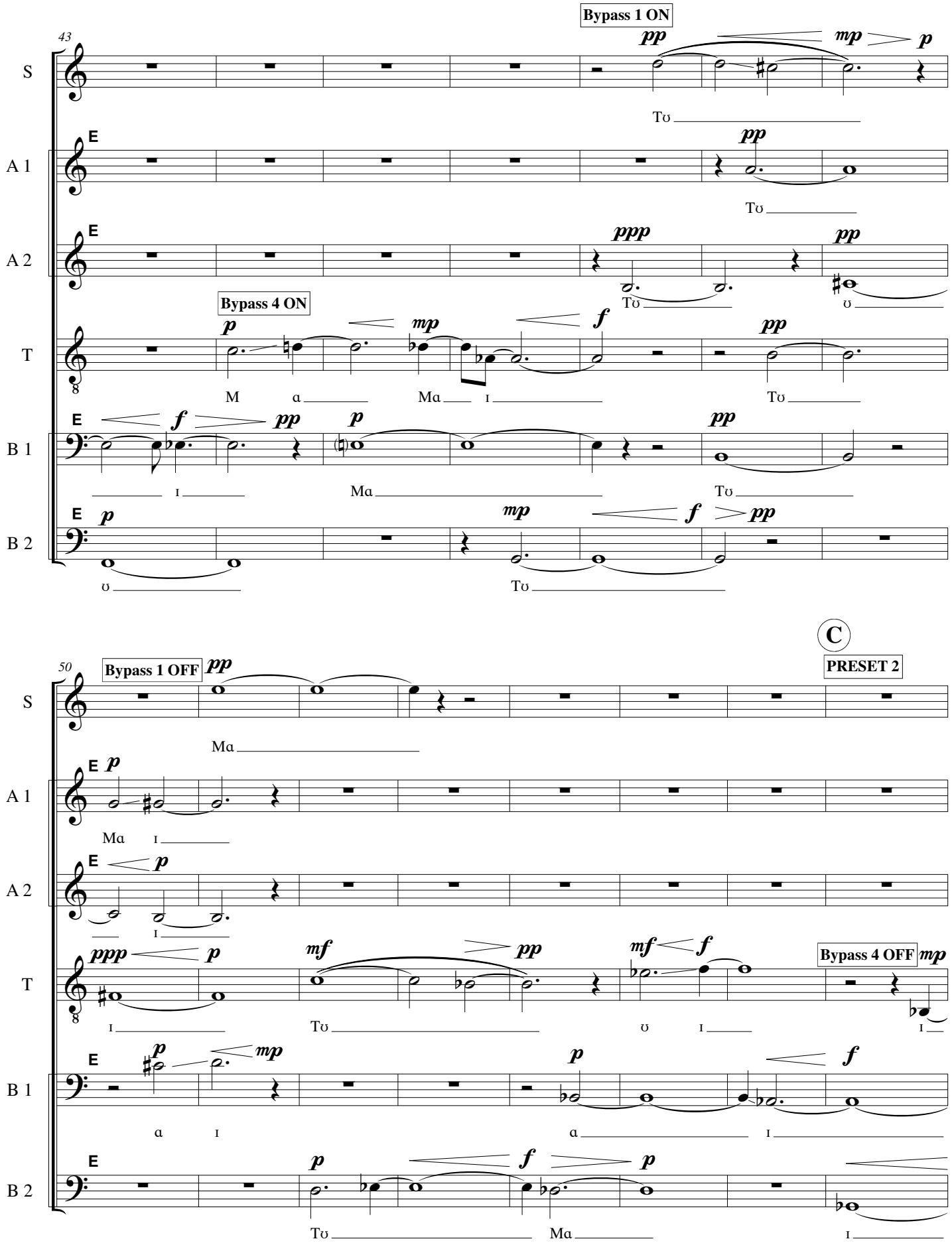


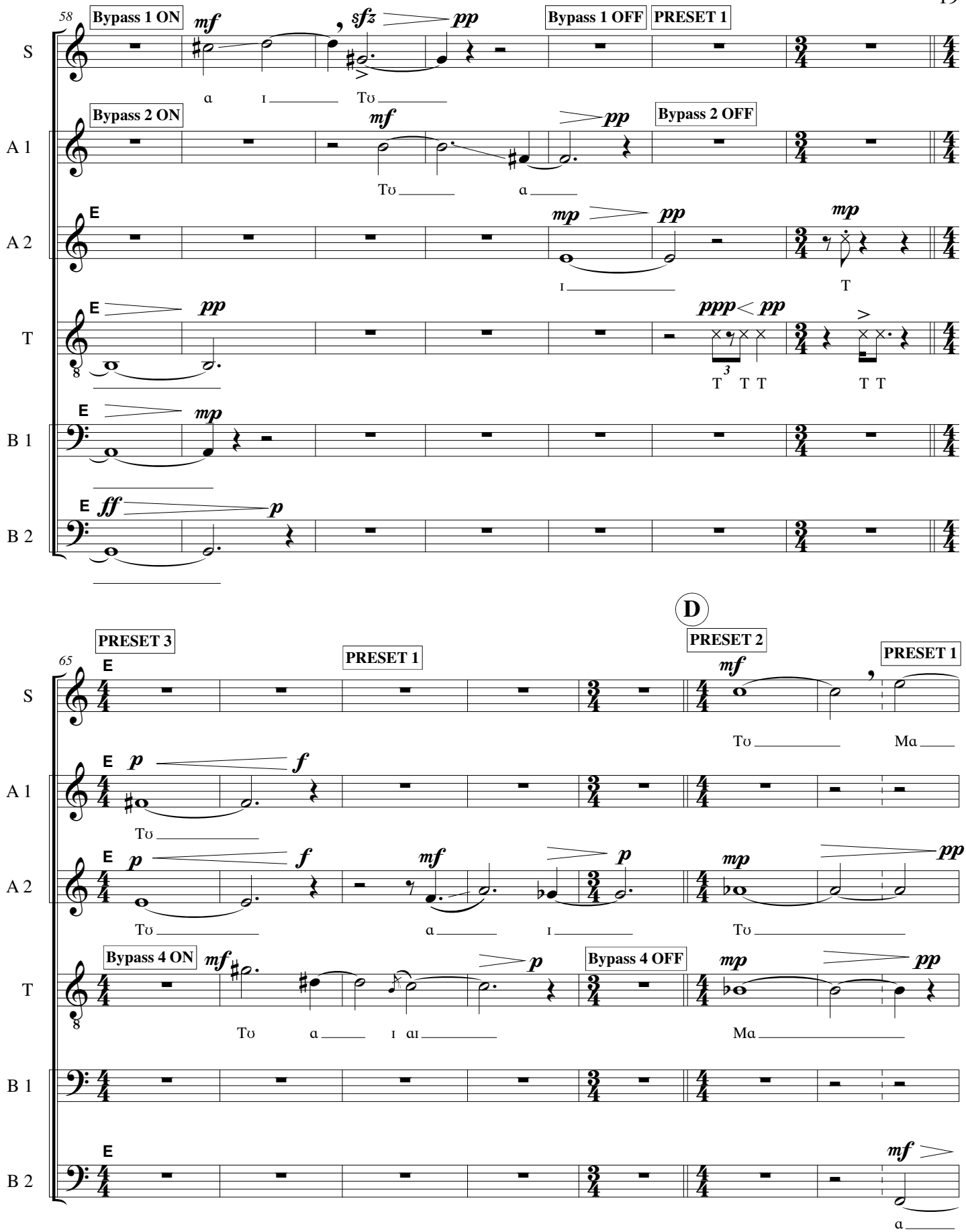


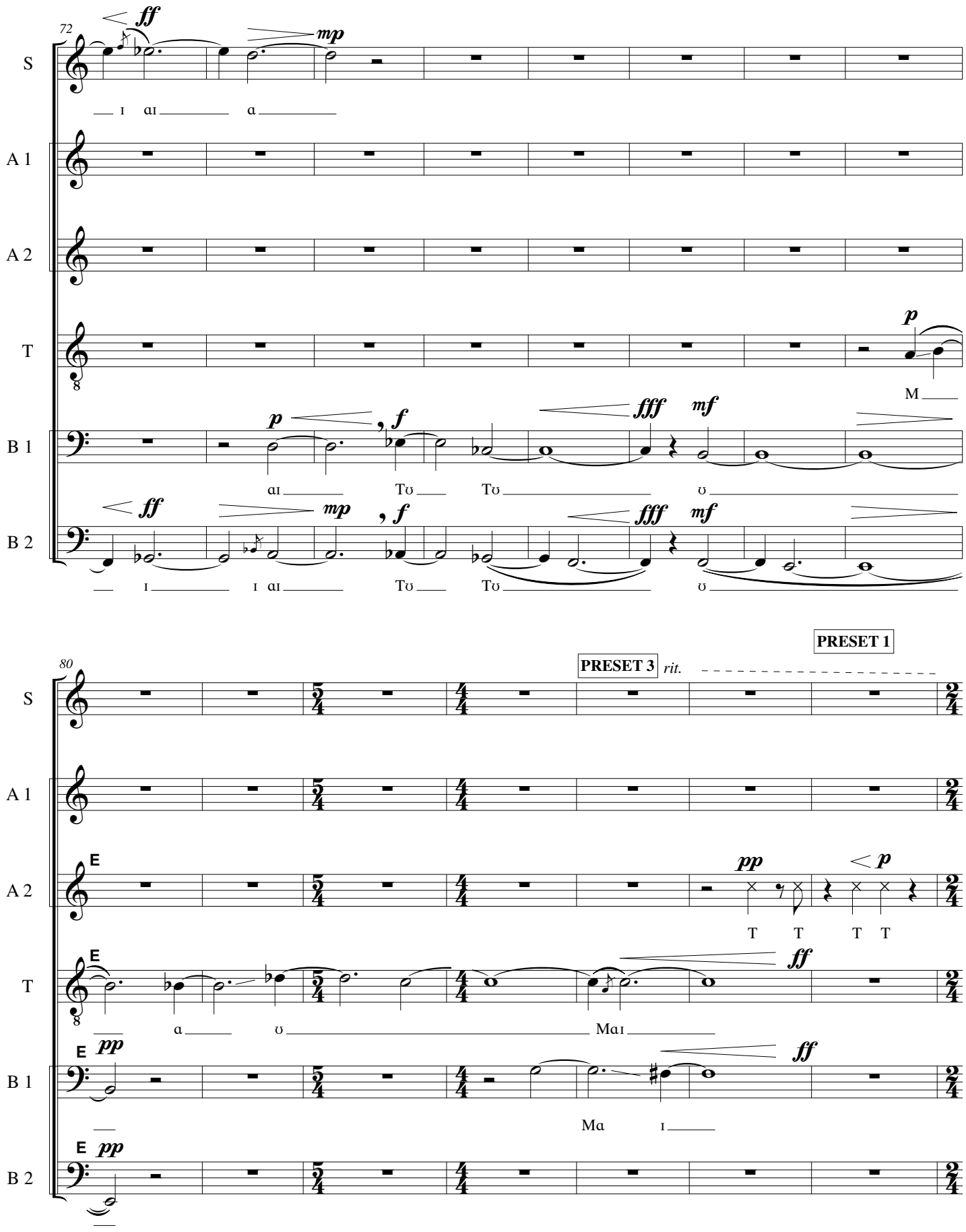
* - all X noteheads are to be non-pitched sound

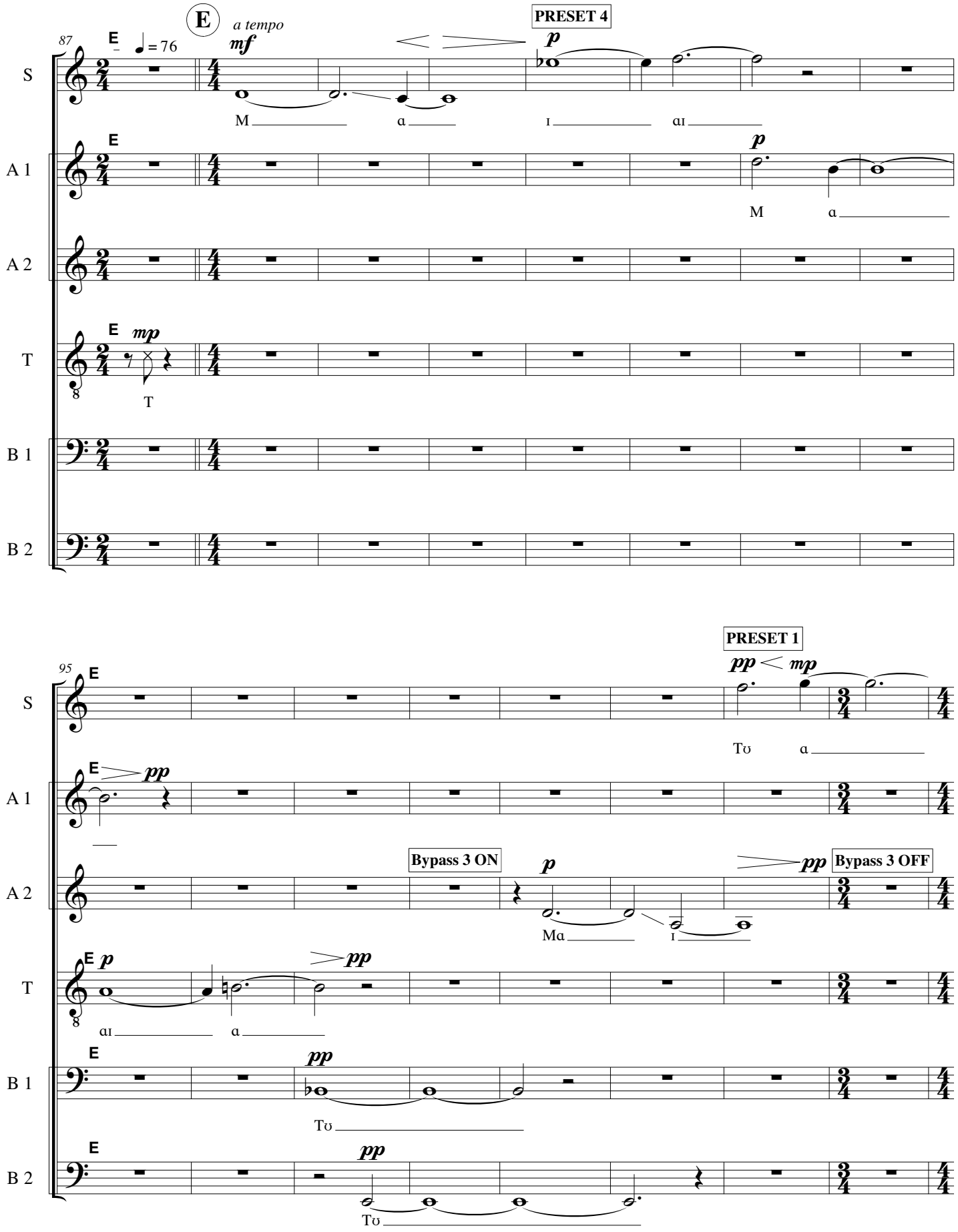


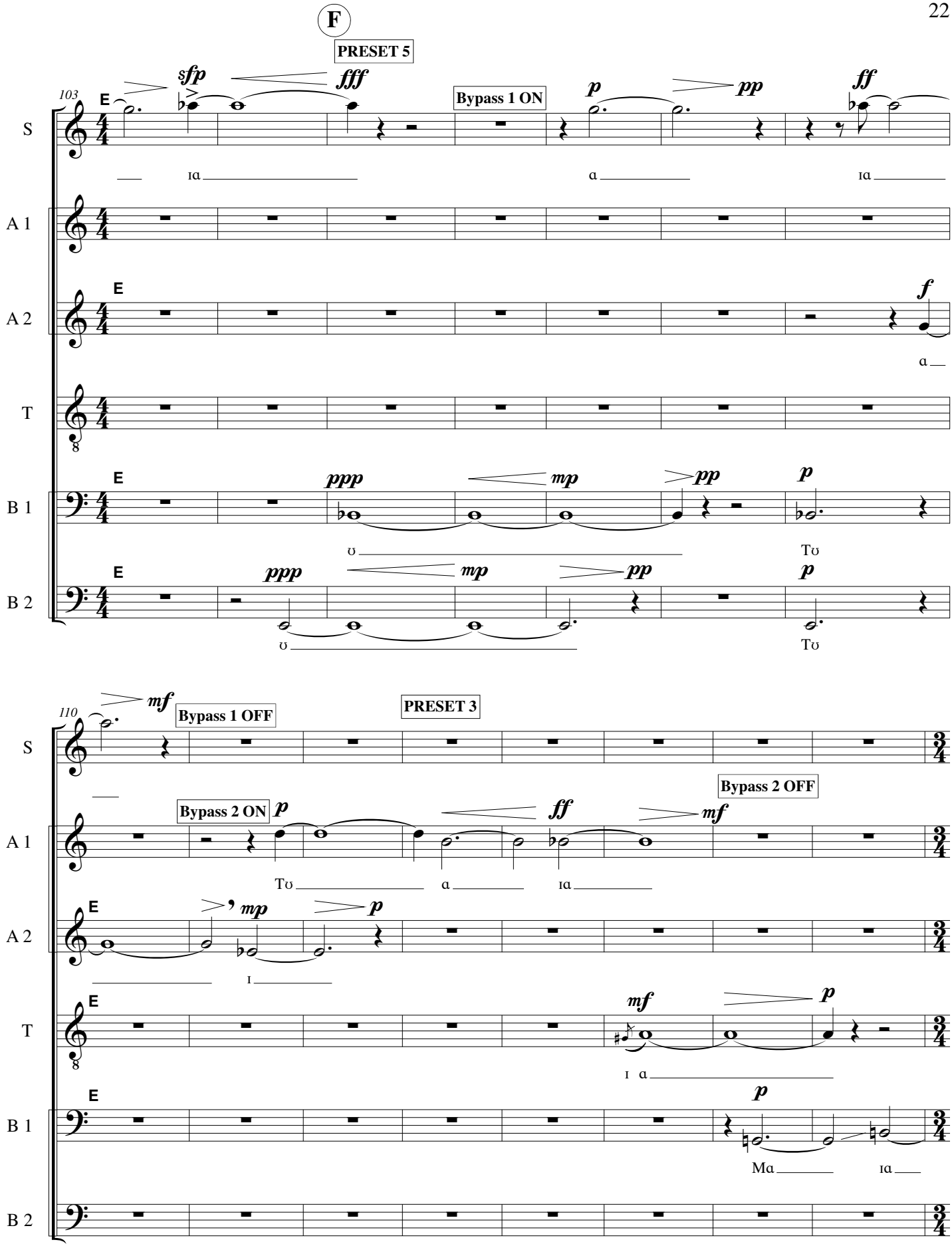

A
PRESET 1
29
S
A 1
A 2
T
B 1
B 2
E
pp
ppp
mp
f
sub. pp
p
B
PRESET 3
36
mf
3

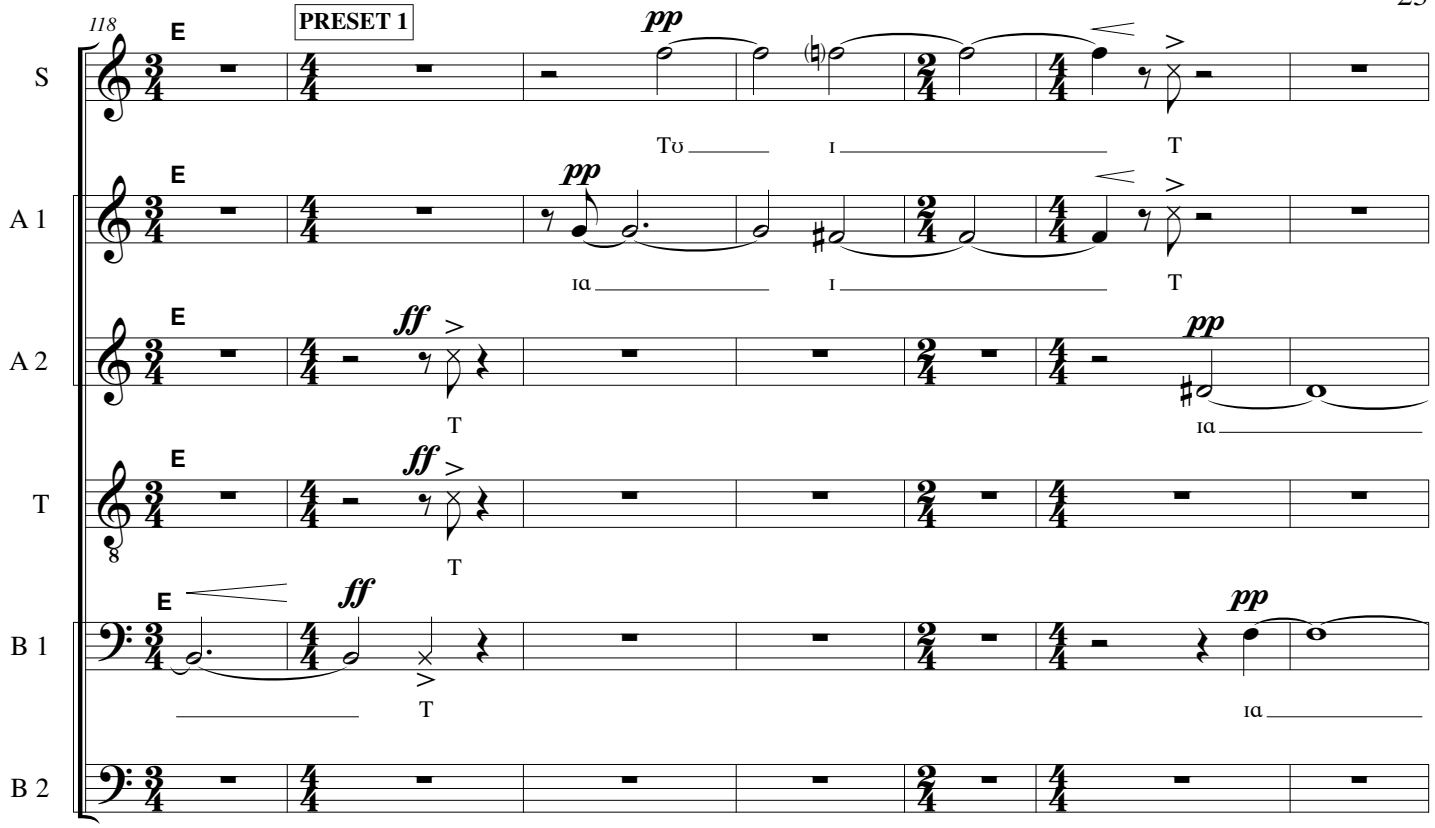

Bypass 1 ON
43
S
A 1
A 2
T
B 1
B 2
Bypass 4 ON
C
PRESET 2
50
Bypass 1 OFF
Bypass 4 OFF

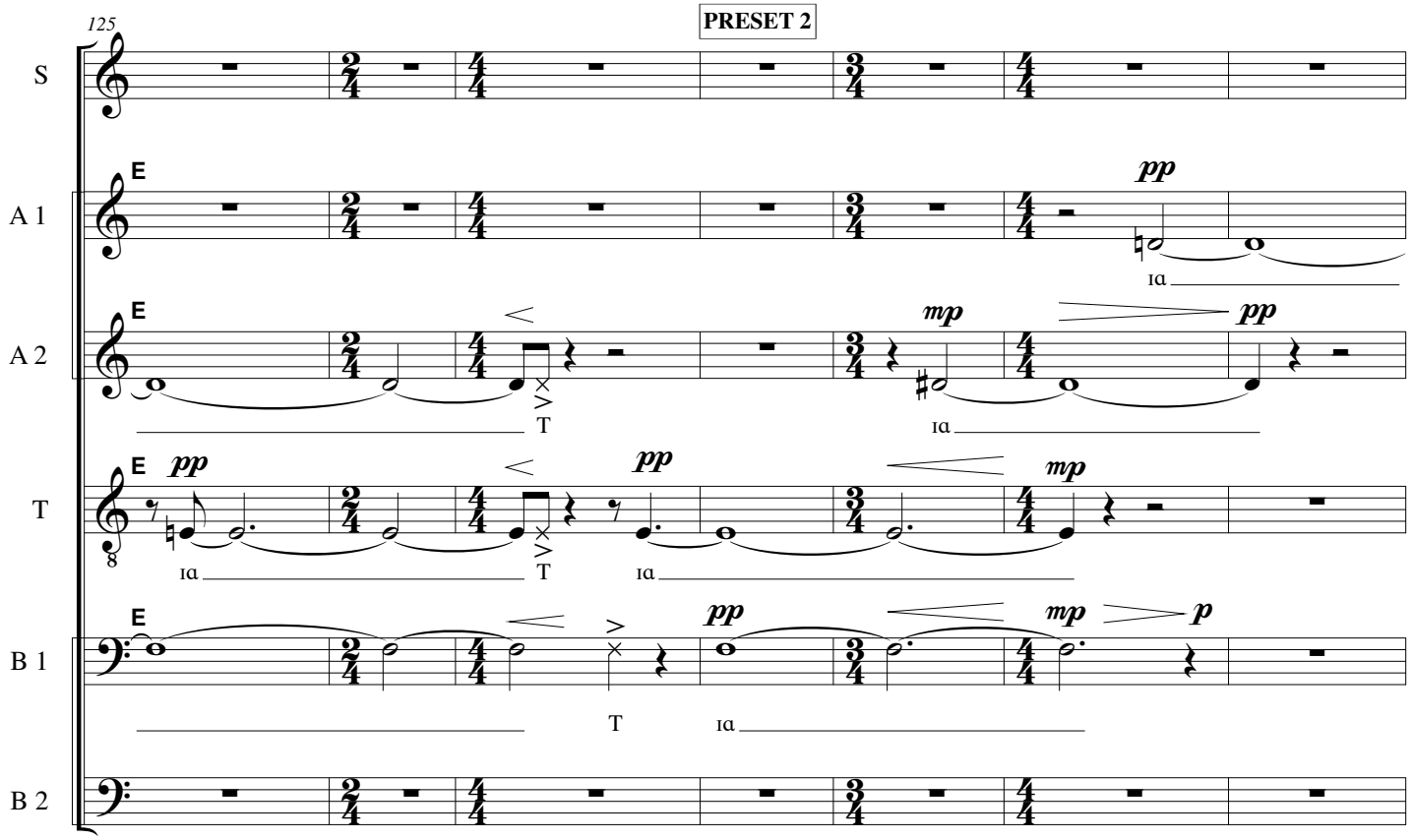

58
Bypass 1 ON
mf
sfz
pp
Bypass 1 OFF
PRESET 1
S
a ı Tʊ
Bypass 2 ON
mf
pp
Bypass 2 OFF
A 1
Tʊ a
E
mp
pp
mp
A 2
ı
T
E
pp
ppp < pp
T
T T T T T
E
mp
B 1
E
ff
p
B 2
D
65
PRESET 3
E
PRESET 1
PRESET 2
mf
PRESET 1
S
Tʊ Ma
E
p
f
A 1
Tʊ
E
p
f
mf
p
mp
pp
A 2
Tʊ a ı Tʊ
Bypass 4 ON
mf
p
Bypass 4 OFF
mp
pp
T
Tʊ a ı aı Ma
B 1
E
mf
B 2
a

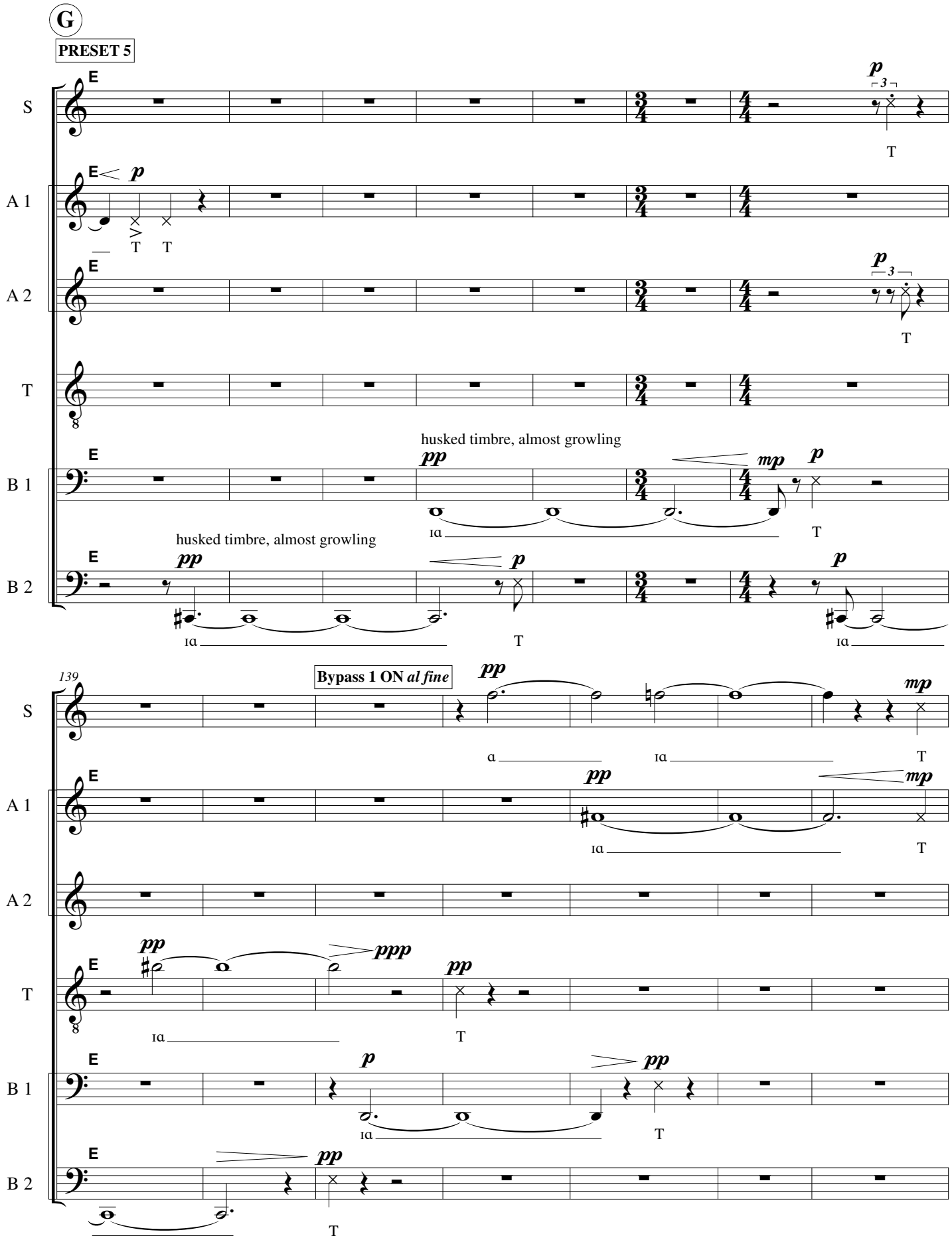

72
S
A 1
A 2
T
B 1
B 2
ff
mp
p
f
fff
mf
M
80
PRESET 3
rit.
PRESET 1
E
pp
ff

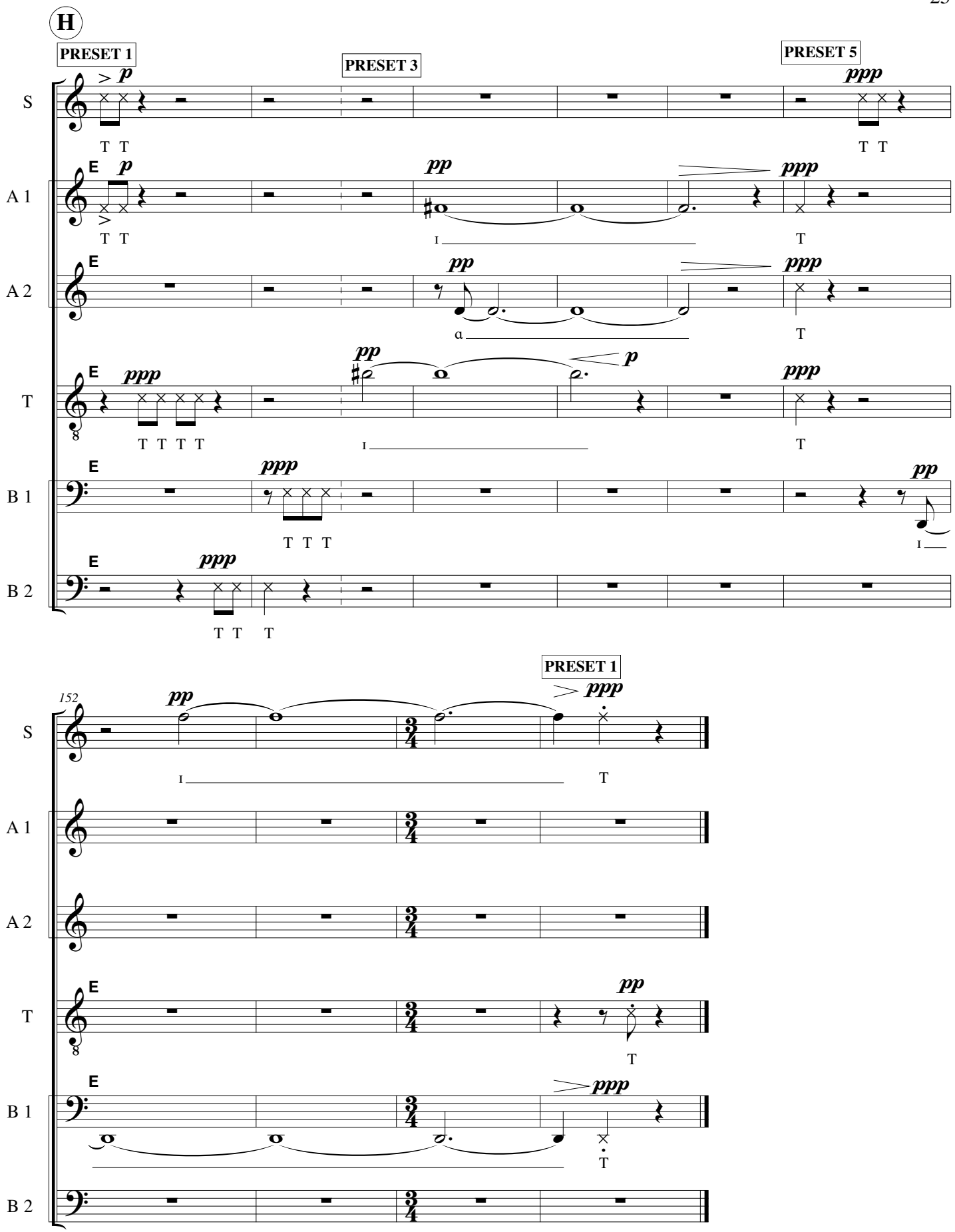

87
E
a tempo
mf
= 76
PRESET 4
p
S
A 1
A 2
T
B 1
B 2
M
ɑ
ɪ
ɑɪ
mp
T
95
PRESET 1
pp
Tʊ
Bypass 3 ON
Bypass 3 OFF
Mɑ
ɑɪ


F
PRESET 5
103
E
S
A 1
A 2
T
B 1
B 2
sfp
fff
Bypass 1 ON
p
pp
ff
f
ppp
mp
Bypass 1 OFF
PRESET 3
110
mf
Bypass 2 ON
Bypass 2 OFF

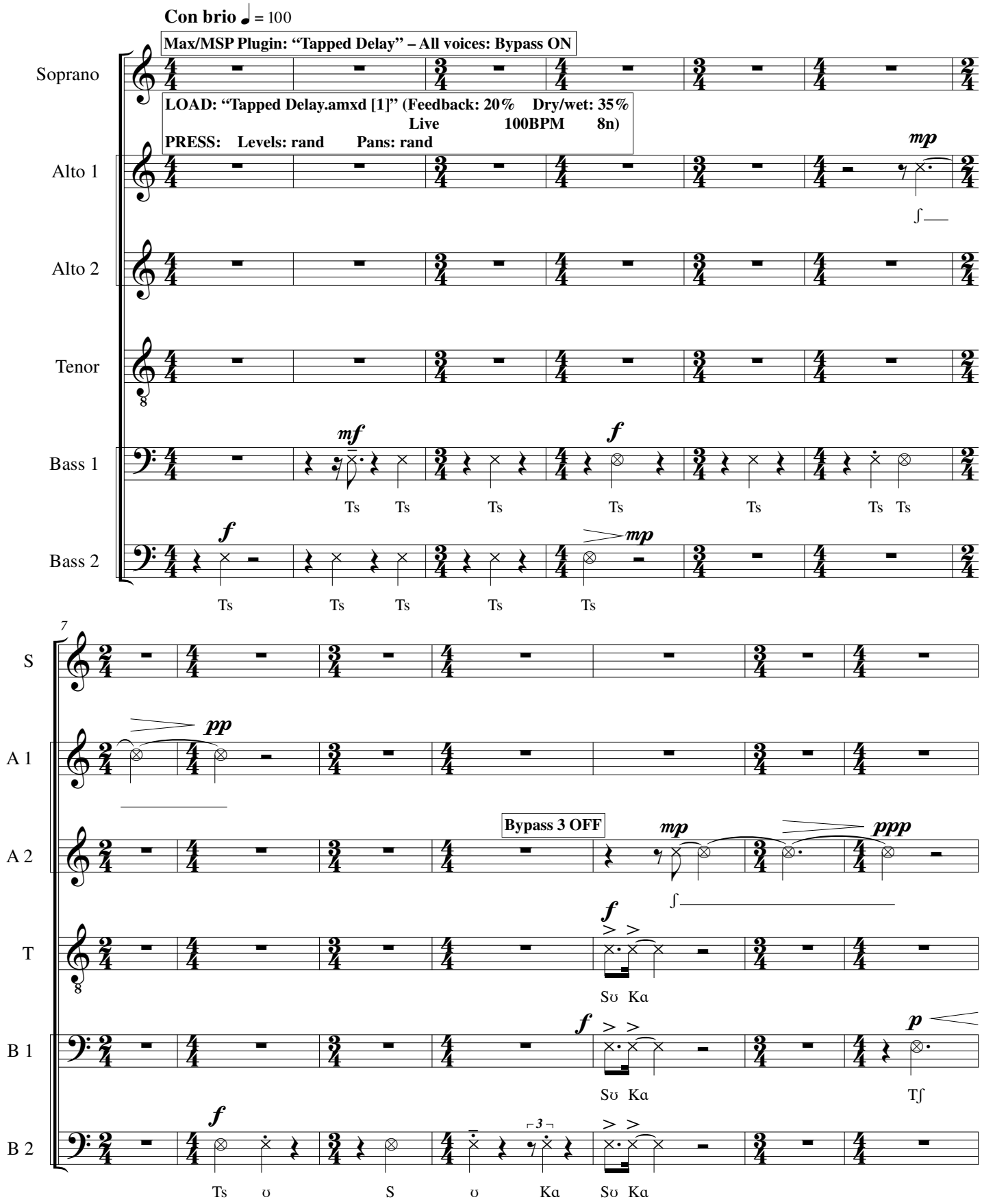

118
PRESET 1
S
A 1
A 2
T
B 1
B 2
E
pp
ff
T
ord

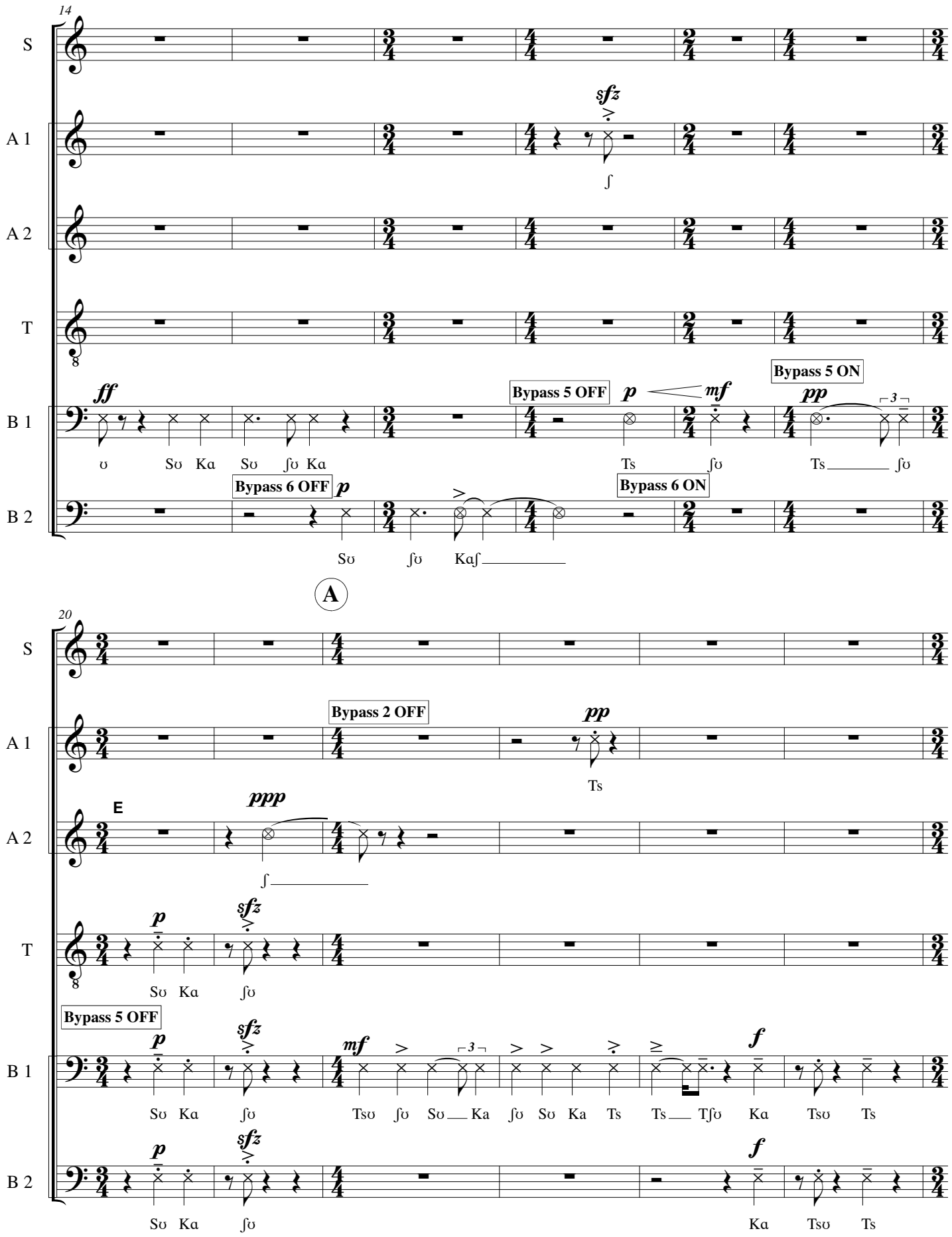

125
PRESET 2
S
A 1
A 2
T
B 1
B 2
E
pp
mp
p
T
ord

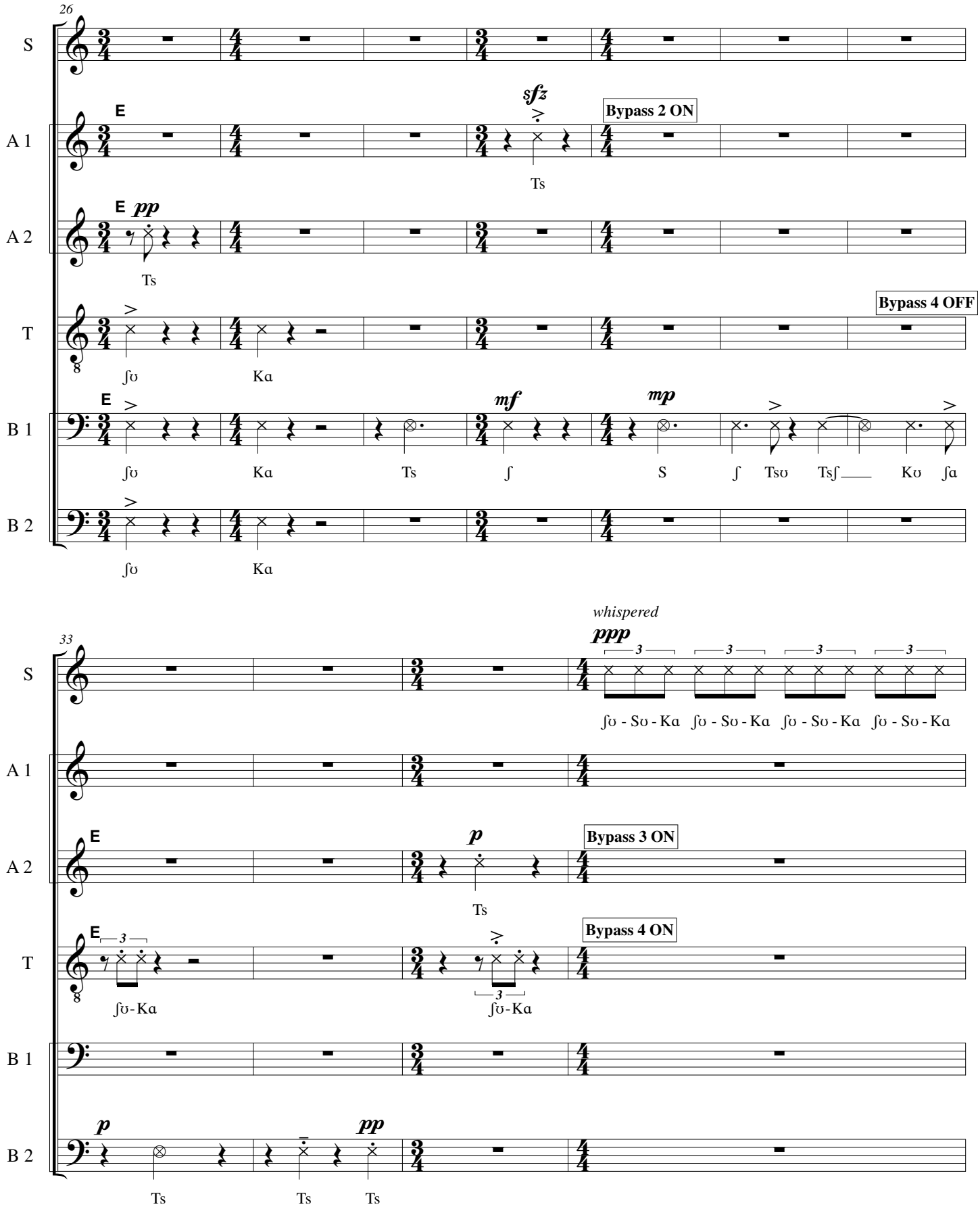

G
PRESET 5
S
A 1
A 2
T
B 1
B 2
E
husked timbre, almost growling
Bypass 1 ON al fine
139

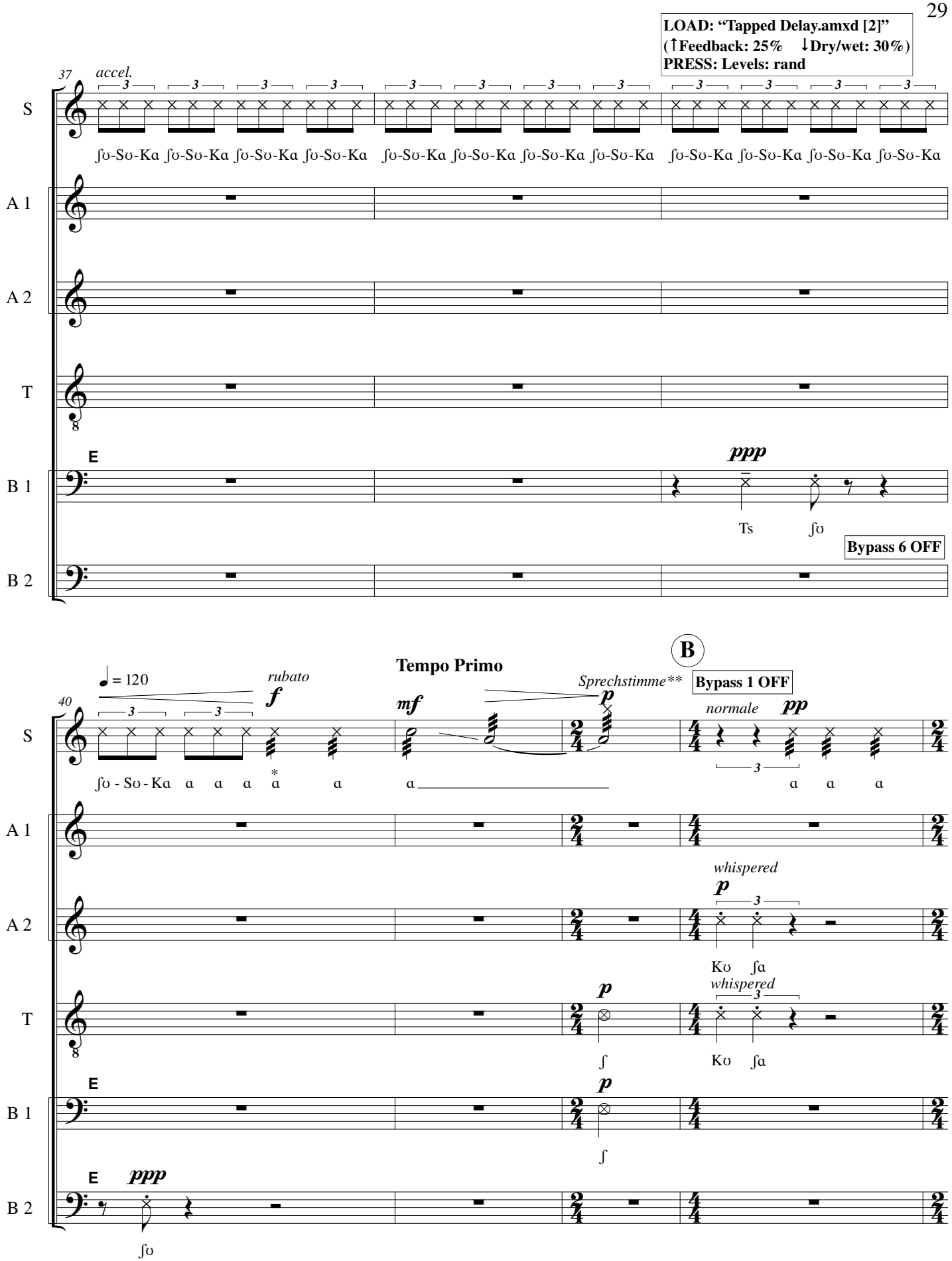

H
PRESET 1
PRESET 3
PRESET 5
S
A 1
A 2
T
B 1
B 2
E
p
pp
ppp
T T
T T T T
T T T
T T
T
I
a
152
PRESET 1

III. Song of Solicitude



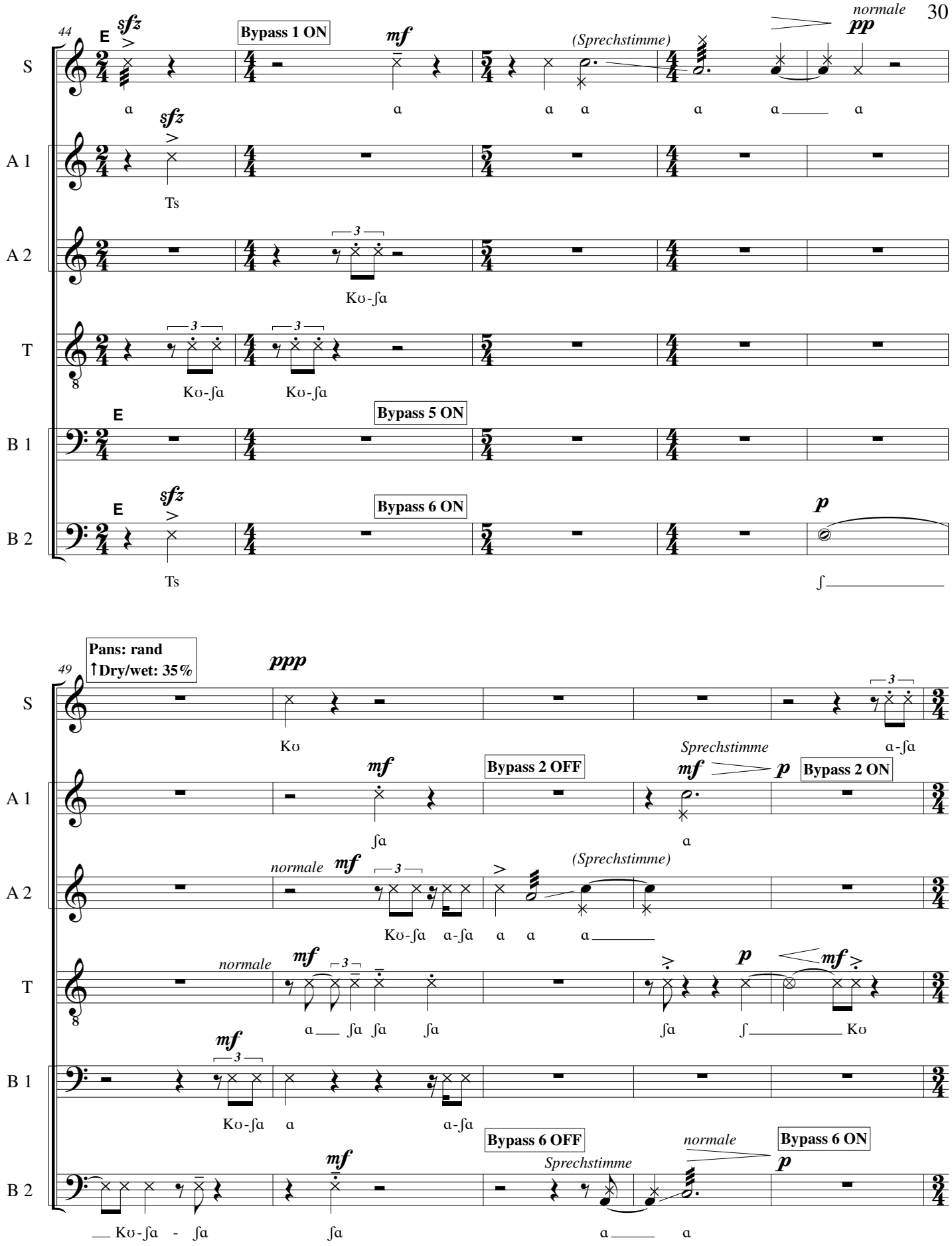

14
S
A 1
A 2
T
B 1
B 2
sfz
ʃ
ff
ʊ Sʊ Kɑ Sʊ ʃʊ Kɑ
Bypass 5 OFF
p
mf
Ts ʃʊ
Bypass 5 ON
pp
Ts ʃʊ
Bypass 6 OFF
p
Sʊ ʃʊ Kɑʃ
Bypass 6 ON
A
20
Bypass 2 OFF
pp
Ts
E
ppp
ʃ
p
sfz
Sʊ Kɑ ʃʊ
Bypass 5 OFF
mf
Tsʊ ʃʊ Sʊ Kɑ ʃʊ Sʊ Kɑ Ts Ts TʃʊKɑ Tsʊ Ts
f
Kɑ Tsʊ Ts

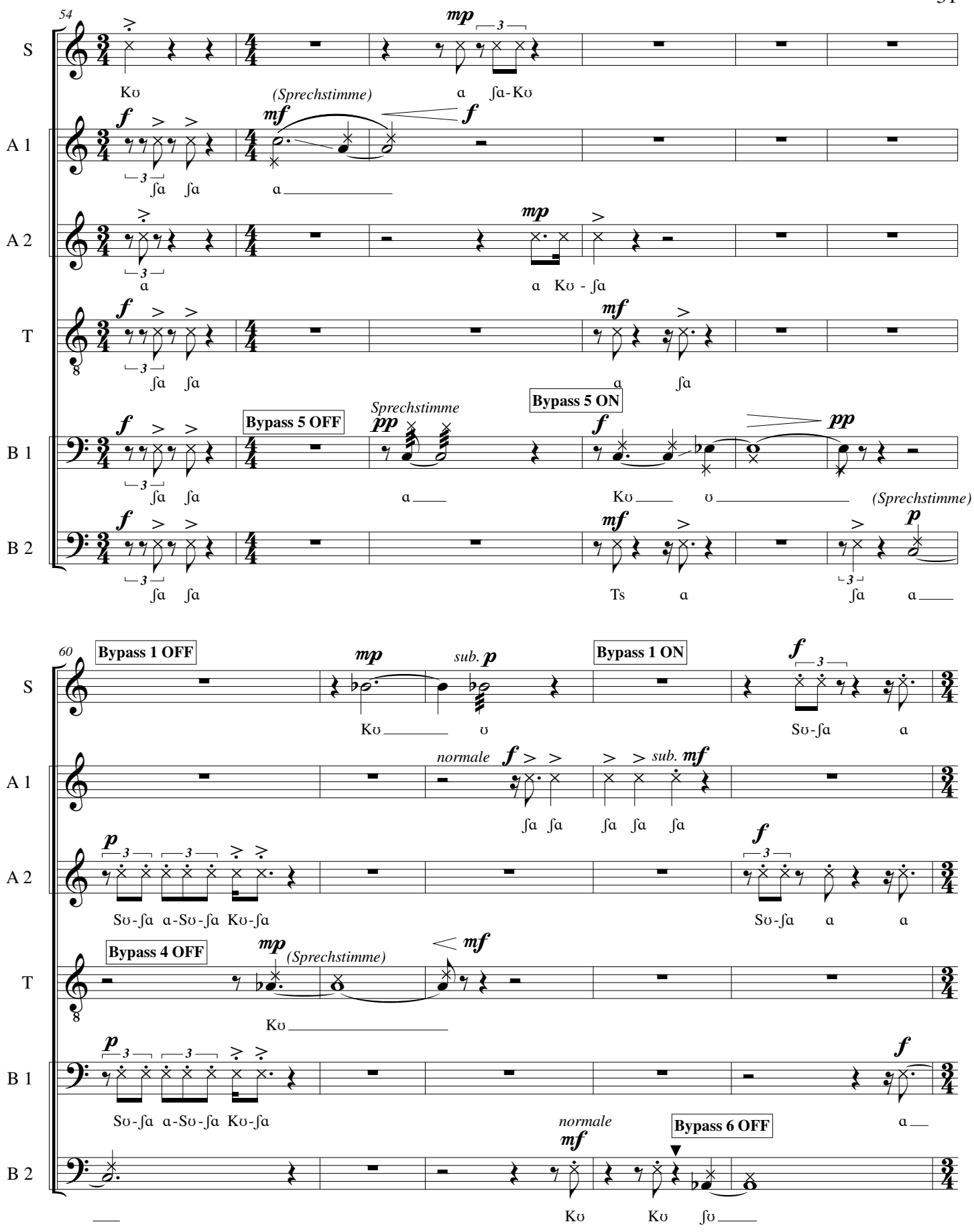

26
S
A 1
A 2
T
B 1
B 2
E
sfz
Bypass 2 ON
pp
Ts
Bypass 4 OFF
ʃʊ
Ka
mf
mp
Ts
ʃ
S
ʃ
Tsʊ
TsʃKʊ
ʃa
33
whispered
ppp
ʃʊ - Sʊ - Ka
ʃʊ - Sʊ - Ka
ʃʊ - Sʊ - Ka
ʃʊ - Sʊ - Ka
p
Bypass 3 ON
Bypass 4 ON
ʃʊ-Ka
ʃʊ-Ka
p
pp
Ts
Ts
Ts

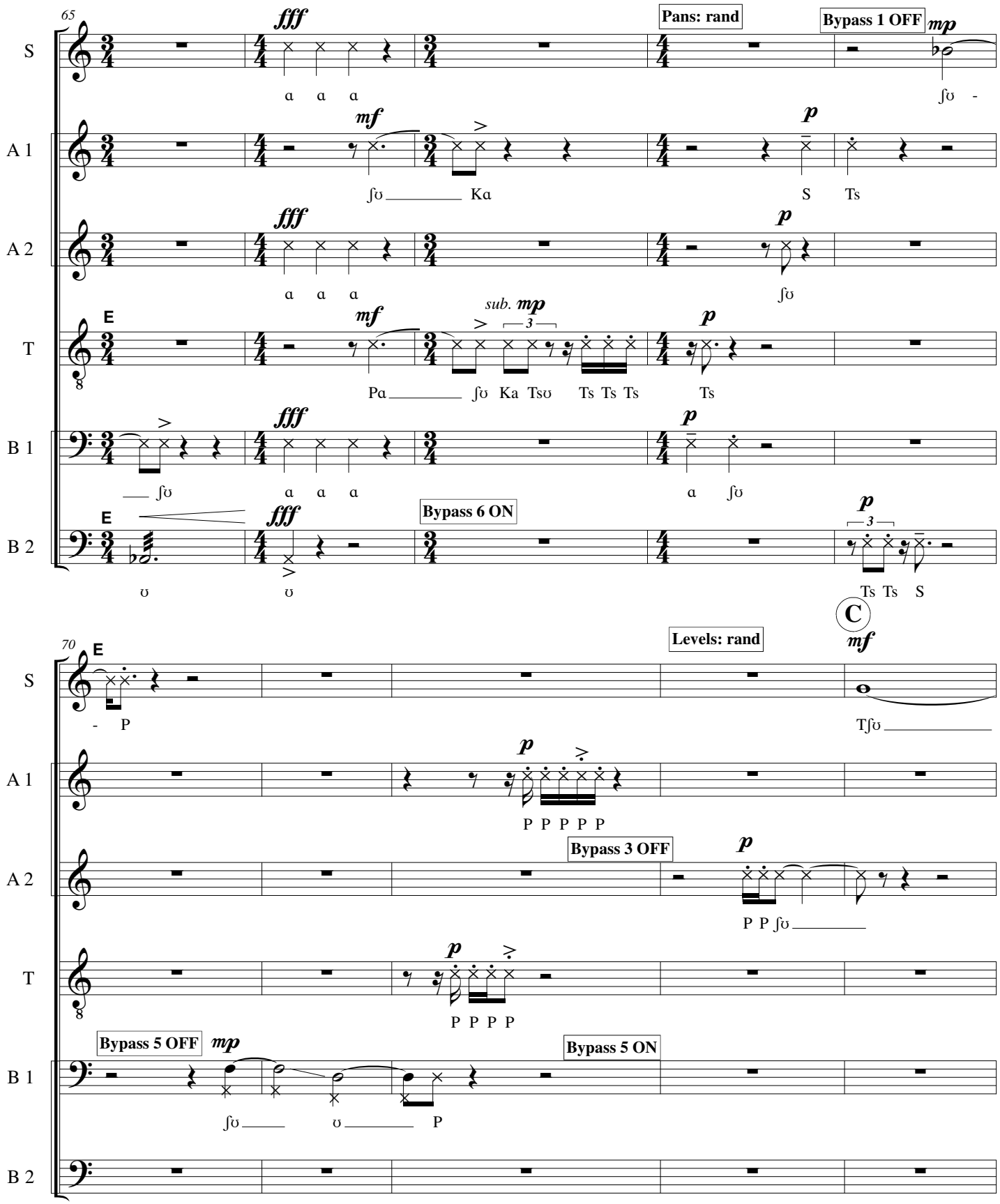


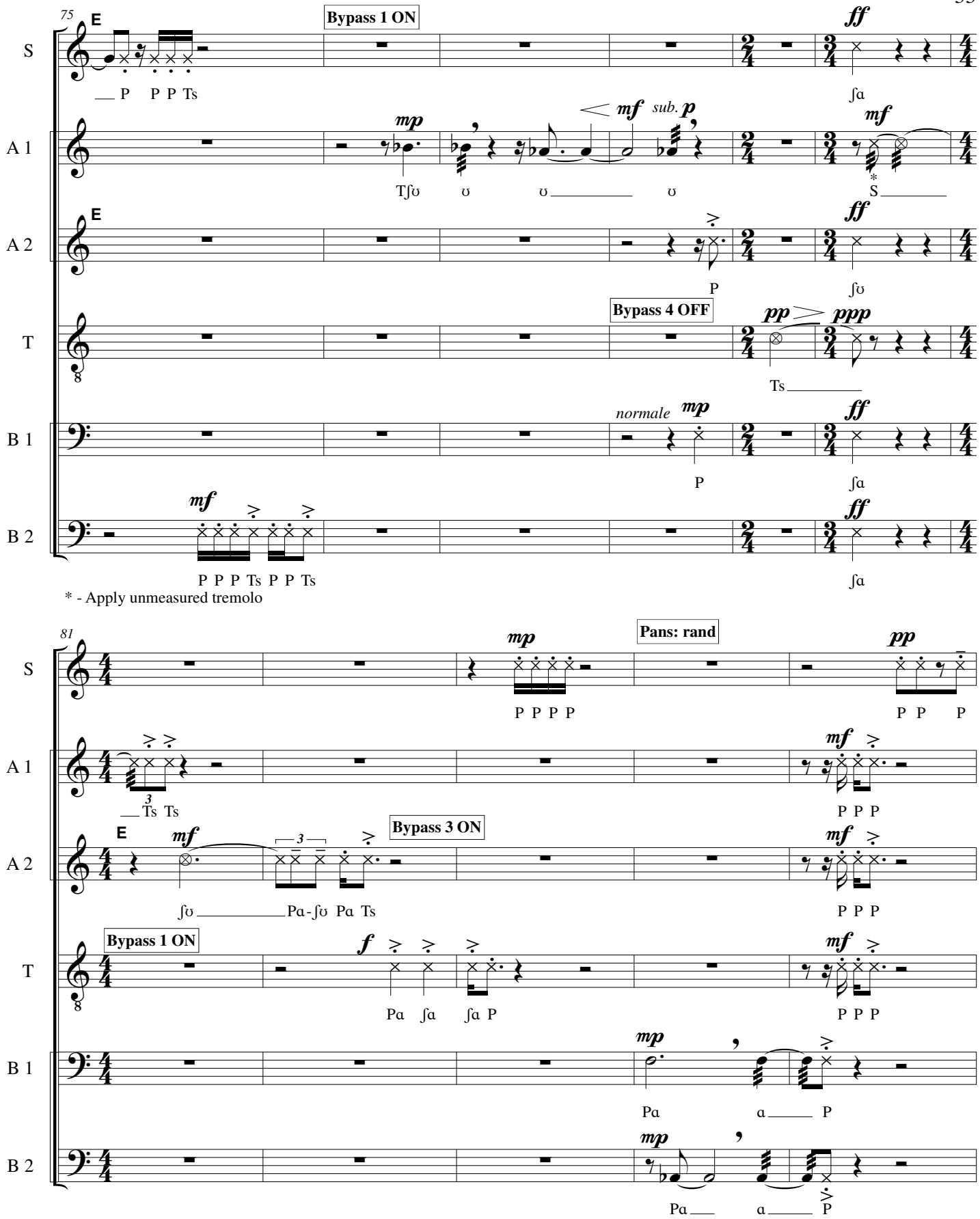
* - Heavy vibrato

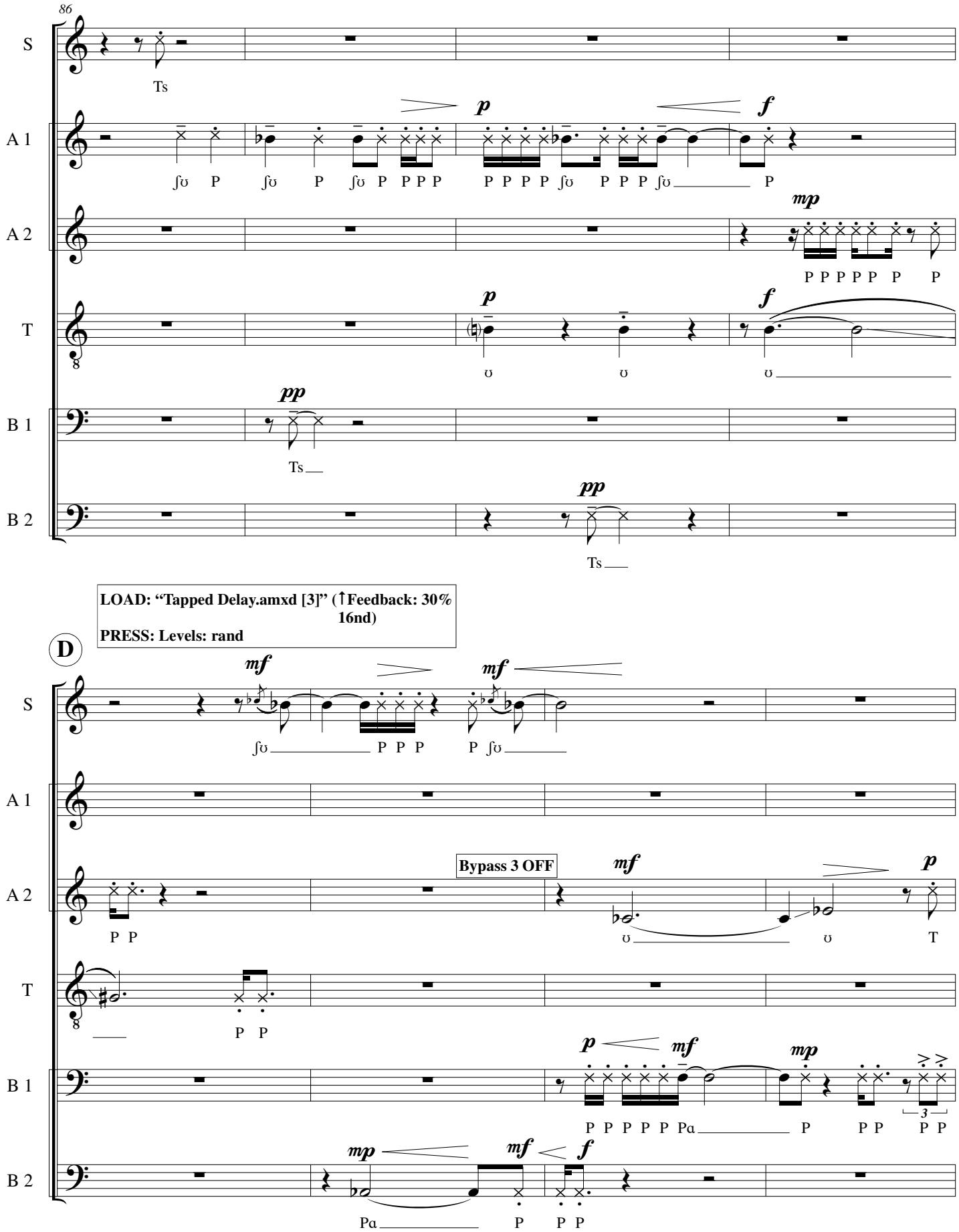
** - Pitch need not be exact. Heavy vibrato with approximate pitch is desirable.

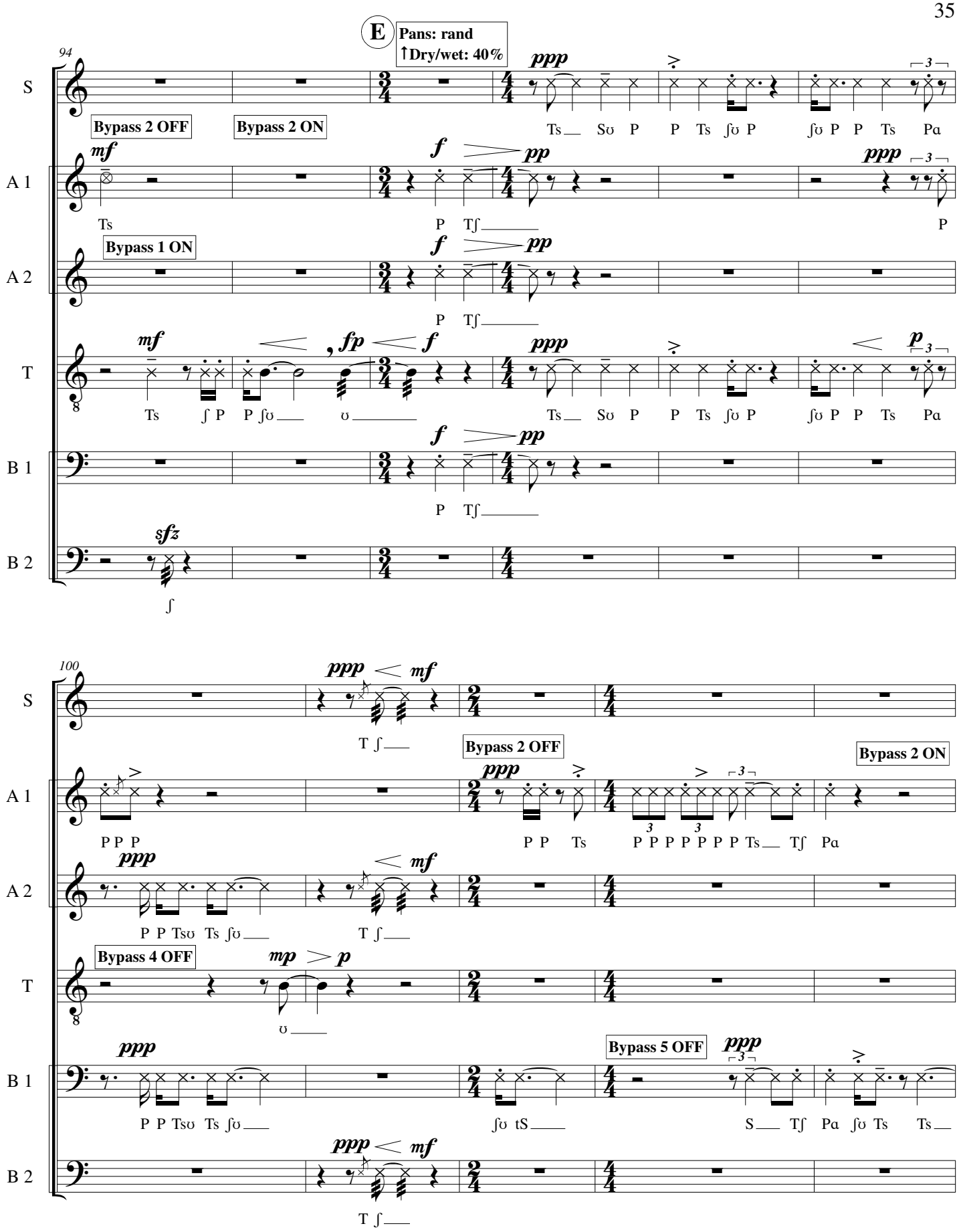

44
E
sfz
Bypass 1 ON
mf
(Sprechstimme)
normale
pp
S
a
a
a a
a
a
a
sfz
A 1
Ts
A 2
3
Kʊ-ʃa
T
3
3
Kʊ-ʃa
Kʊ-ʃa
B 1
E
Bypass 5 ON
B 2
E
sfz
Ts
Bypass 6 ON
p
ʃ
49
Pans: rand
↑Dry/wet: 35%
ppp
S
Kʊ
3
a-ʃa
A 1
mf
ʃa
Bypass 2 OFF
Sprechstimme
mf
p
a
Bypass 2 ON
A 2
normale
mf
3
Kʊ-ʃa
a-ʃa
a a
a
(Sprechstimme)
T
normale
mf
3
a
ʃa ʃa
ʃa
p
ʃa
ʃ
mf
Kʊ
B 1
mf
3
Kʊ-ʃa
a
a-ʃa
B 2
Kʊ-ʃa - ʃa
mf
ʃa
Bypass 6 OFF
Sprechstimme
a
a
normale
p
Bypass 6 ON

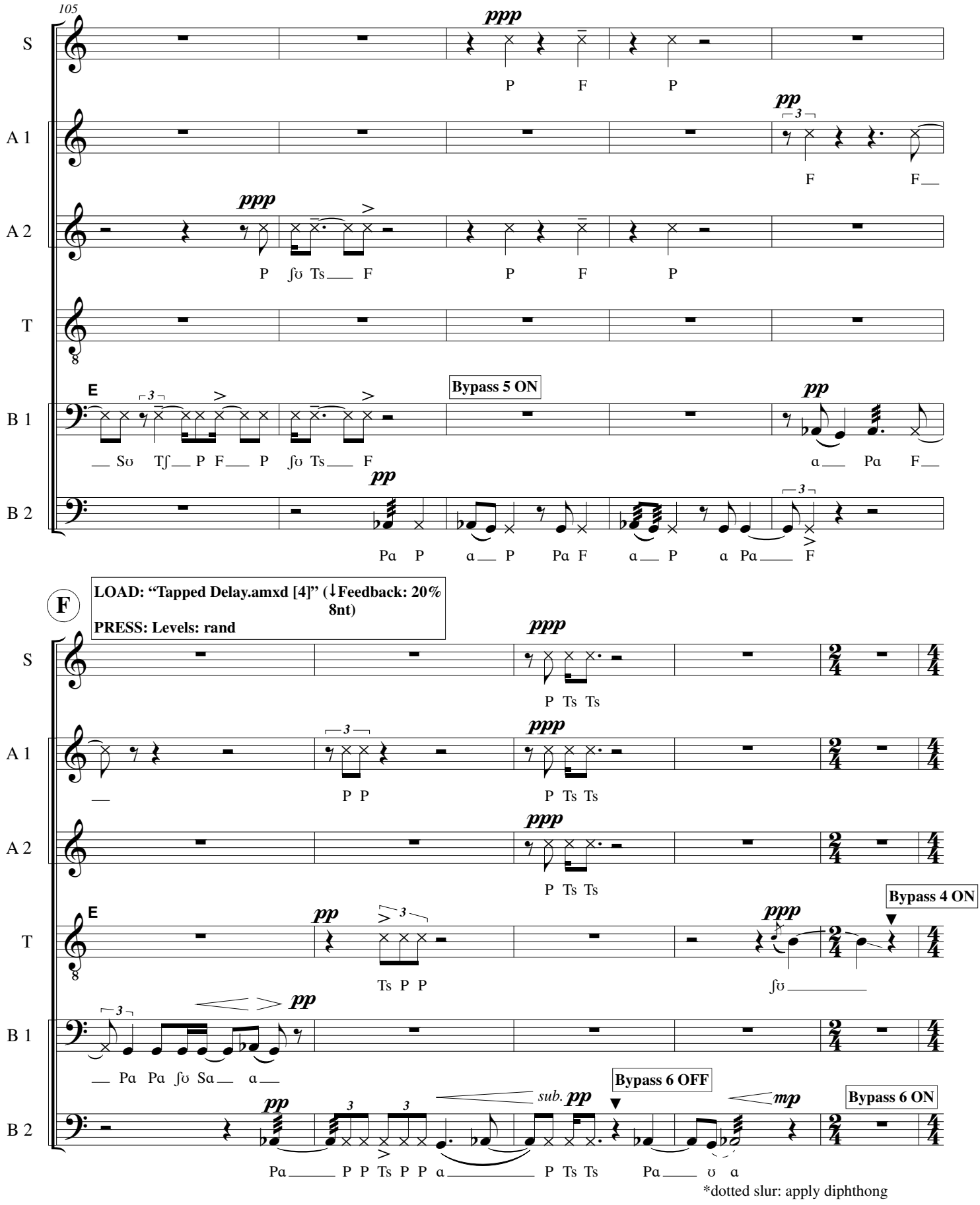

54
S
A 1
A 2
T
B 1
B 2
Kʊ
ɑ ʃɑ-Kʊ
(Sprechstimme)
ʃɑ ʃɑ
ɑ
ɑ Kʊ - ʃɑ
Bypass 5 OFF
Sprechstimme
Bypass 5 ON
Kʊ ʊ
(Sprechstimme)
Ts ɑ
ʃɑ ʃɑ
ʃɑ ɑ
60
Bypass 1 OFF
Bypass 1 ON
Kʊ ʊ
Sʊ-ʃɑ ɑ
normale
sub.
ʃɑ ʃɑ ʃɑ ʃɑ ʃɑ
Sʊ-ʃɑ ɑ-Sʊ-ʃɑ Kʊ-ʃɑ
Sʊ-ʃɑ ɑ ɑ
Bypass 4 OFF
(Sprechstimme)
Kʊ
Sʊ-ʃɑ ɑ-Sʊ-ʃɑ Kʊ-ʃɑ
ɑ
normale
Bypass 6 OFF
Kʊ Kʊ ʃʊ


65
S
A 1
A 2
T
B 1
B 2
fff
mf
p
mp
sub. mp
Pans: rand
Bypass 1 OFF
Bypass 6 ON
Bypass 3 OFF
Bypass 5 OFF
Bypass 5 ON
Levels: rand
C
E
70
ɑ ɑ ɑ
ʃʊ - Kɑ S Ts
Pɑ ʃʊ Ka Tsʊ Ts Ts Ts Ts
ʊ
Ts Ts S
- P
TʃʊP P P P P
P P ʃʊ
P P P P
ʃʊ ʊ P

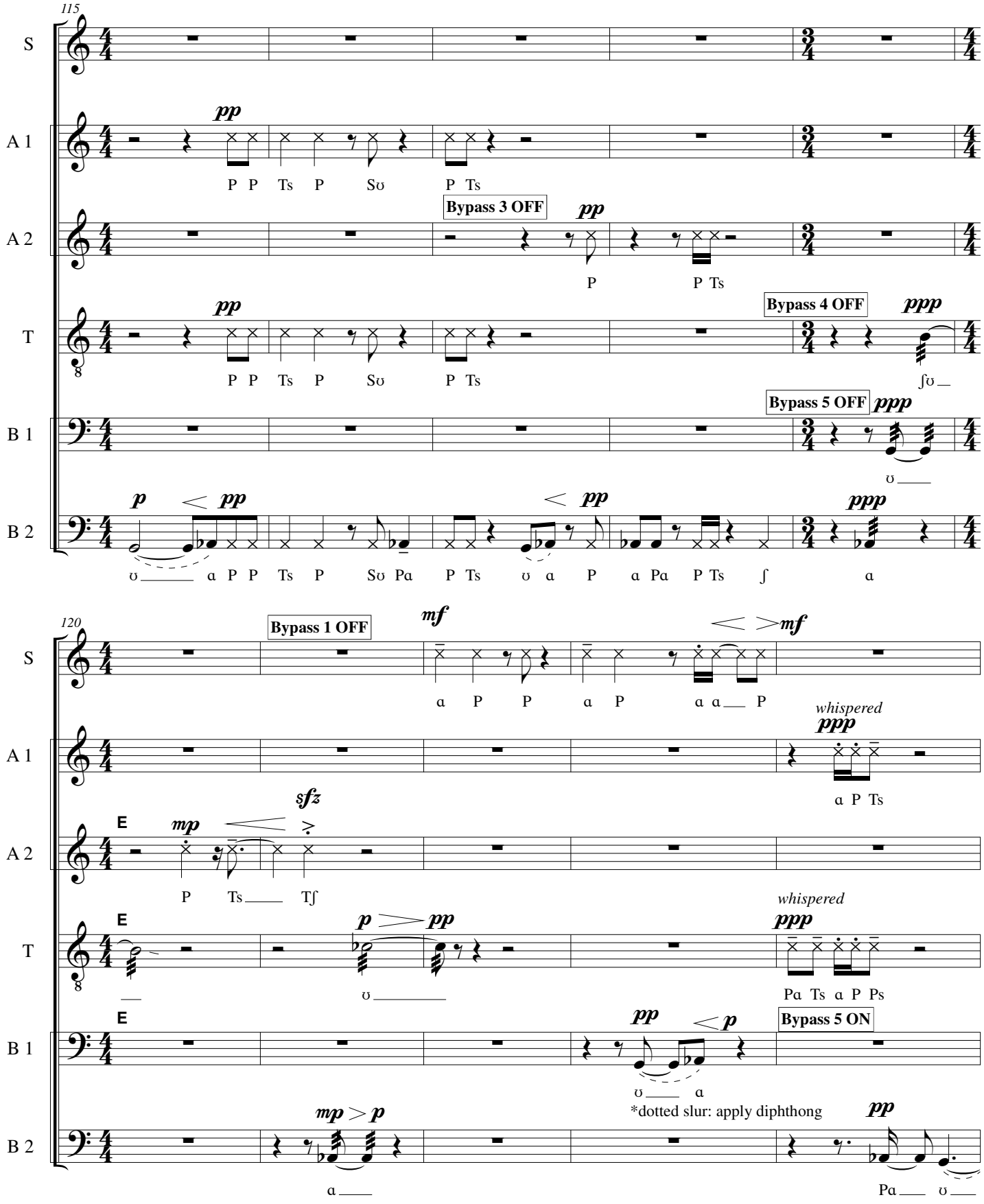

75
E
Bypass 1 ON
ff
S
P P P Ts
ʃɑ
mp
mf sub. p
mf
A 1
TʃʊʊʊʊS
E
ff
A 2
P
ʃʊ
Bypass 4 OFF
pp ppp
T
Ts
normale mp
ff
B 1
P
ʃɑ
mf
ff
B 2
P P P Ts P P Ts
ʃɑ
* - Apply unmeasured tremolo
81
mp
Pans: rand
pp
S
P P P P
P P P
mf
A 1
Ts Ts
P P P
E
mf
Bypass 3 ON
mf
A 2
ʃʊ Pɑ-ʃʊ Pɑ Ts
P P P
Bypass 1 ON
f
mf
T
Pɑ ʃɑ ʃɑ P
P P P
mp
B 1
Pɑ ɑ P
mp
B 2
Pɑ ɑ P

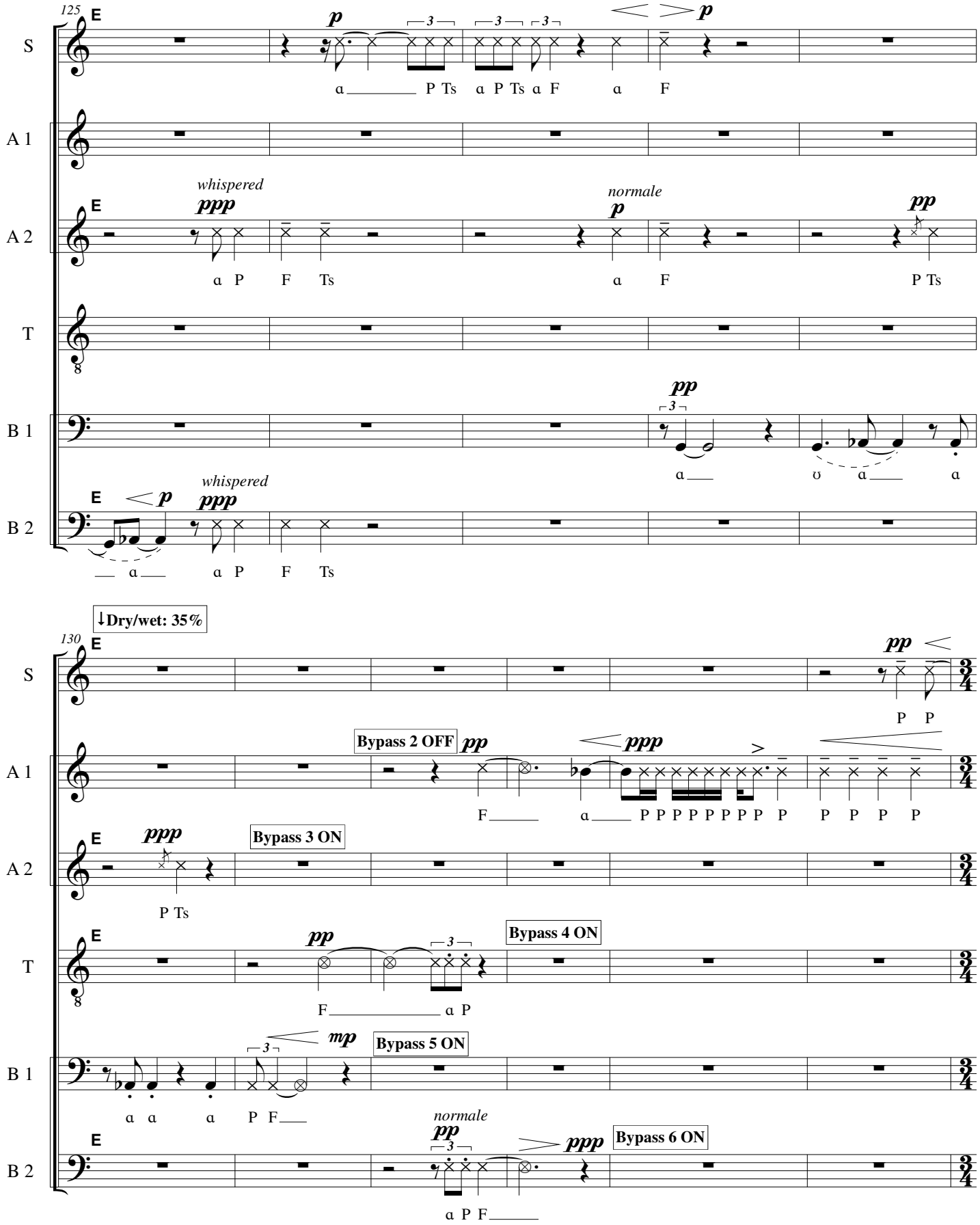

86
S
Ts
A 1
p
f
ʃʊ P ʃʊ P ʃʊ P P P P P P P P ʃʊ P P P ʃʊ P
A 2
mp
P P P P P P P
T
p
f
ʊ ʊ ʊ
B 1
pp
Ts
B 2
pp
Ts
LOAD: "Tapped Delay.amxd [3]" (↑Feedback: 30% 16nd)
PRESS: Levels: rand
D
mf
mf
ʃʊ P P P P ʃʊ
A 1
A 2
Bypass 3 OFF
mf
p
P P ʊ ʊ T
T
P P
B 1
p
mf
mp
P P P P P Pɑ P P P 3 P P
B 2
mp
mf
f
Pɑ P P P

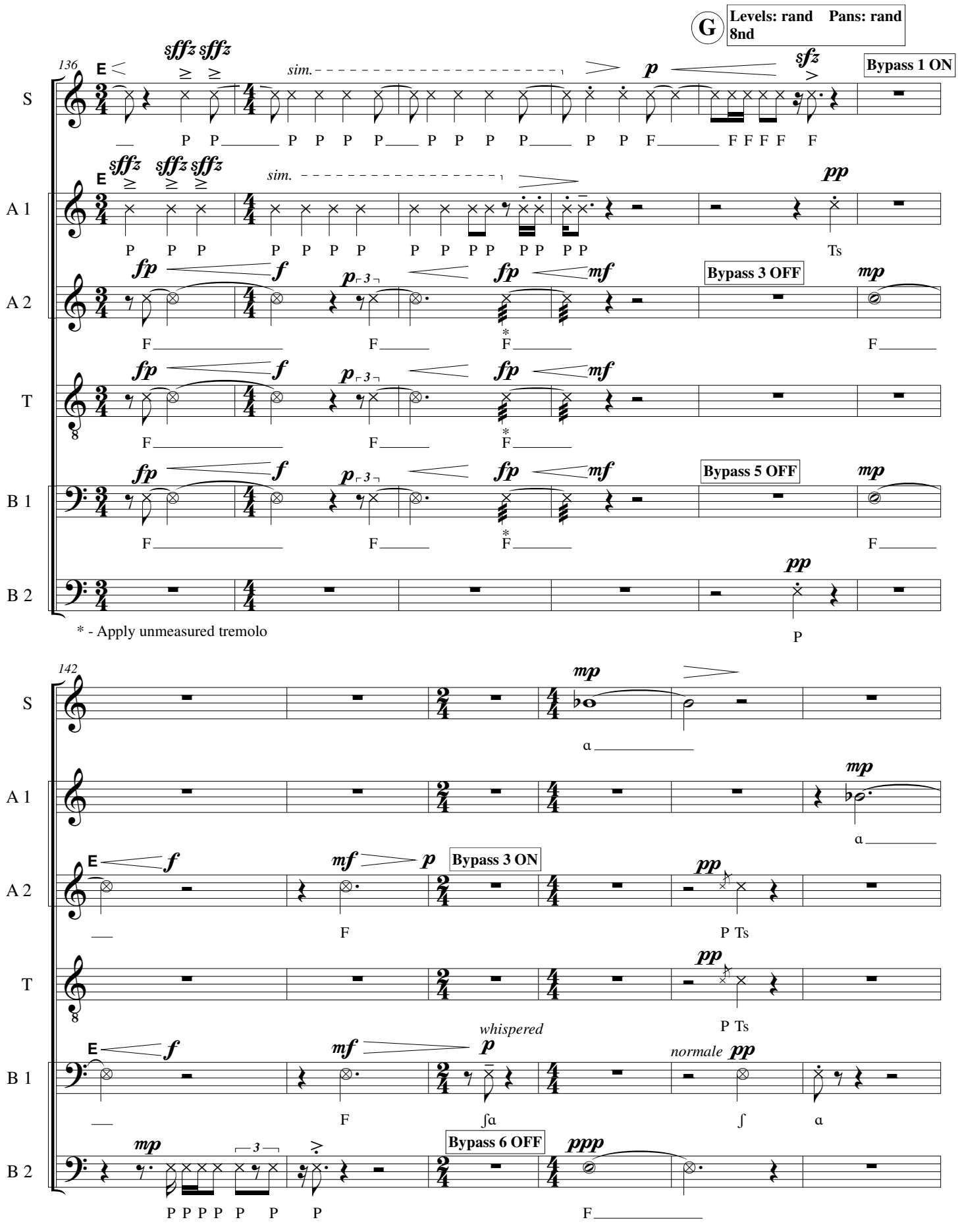

E
Pans: rand
↑Dry/wet: 40%
94
S
A 1
A 2
T
B 1
B 2
Bypass 2 OFF
Bypass 2 ON
Bypass 1 ON
100
Bypass 4 OFF
Bypass 5 OFF

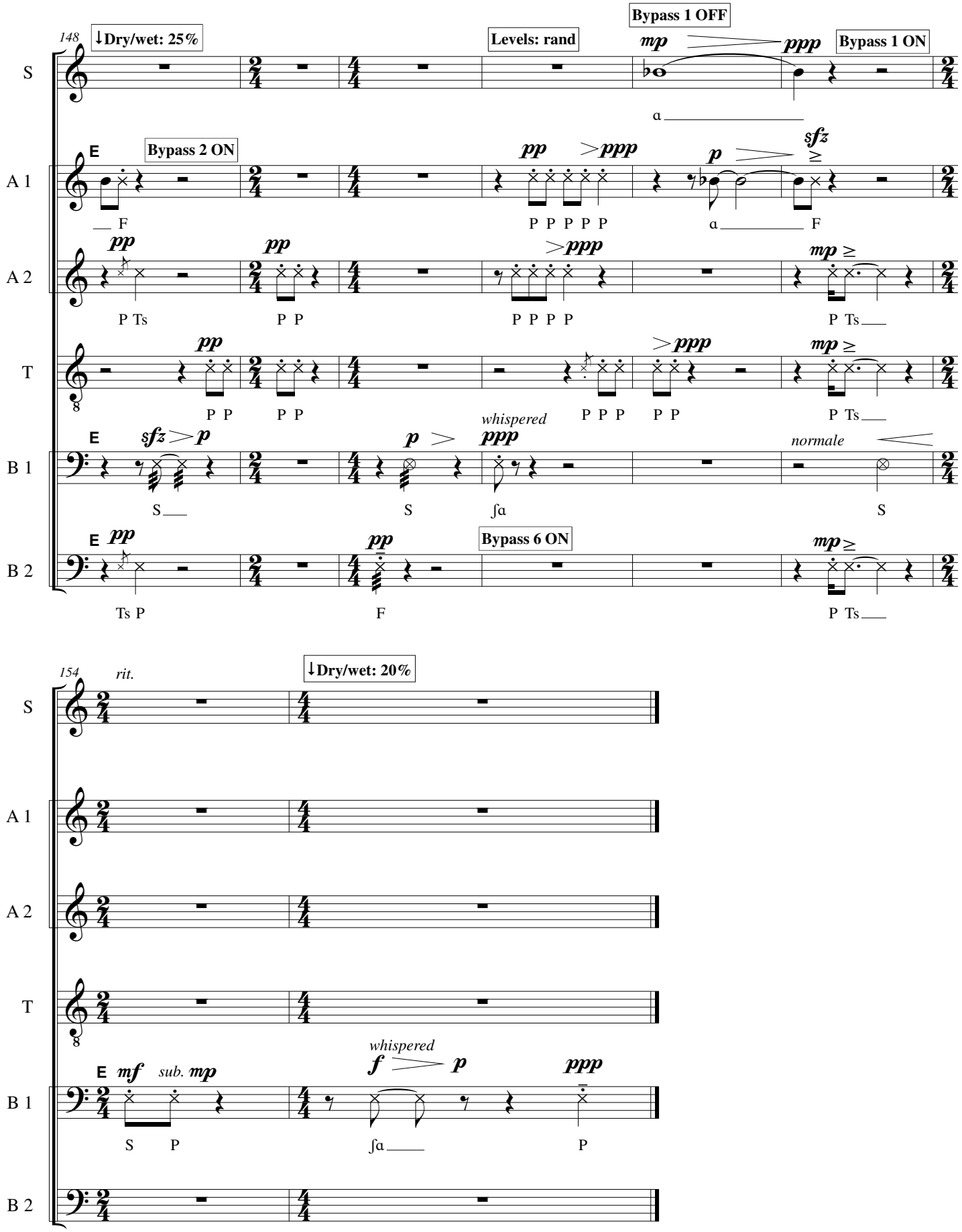


*dotted slur: apply diphthong

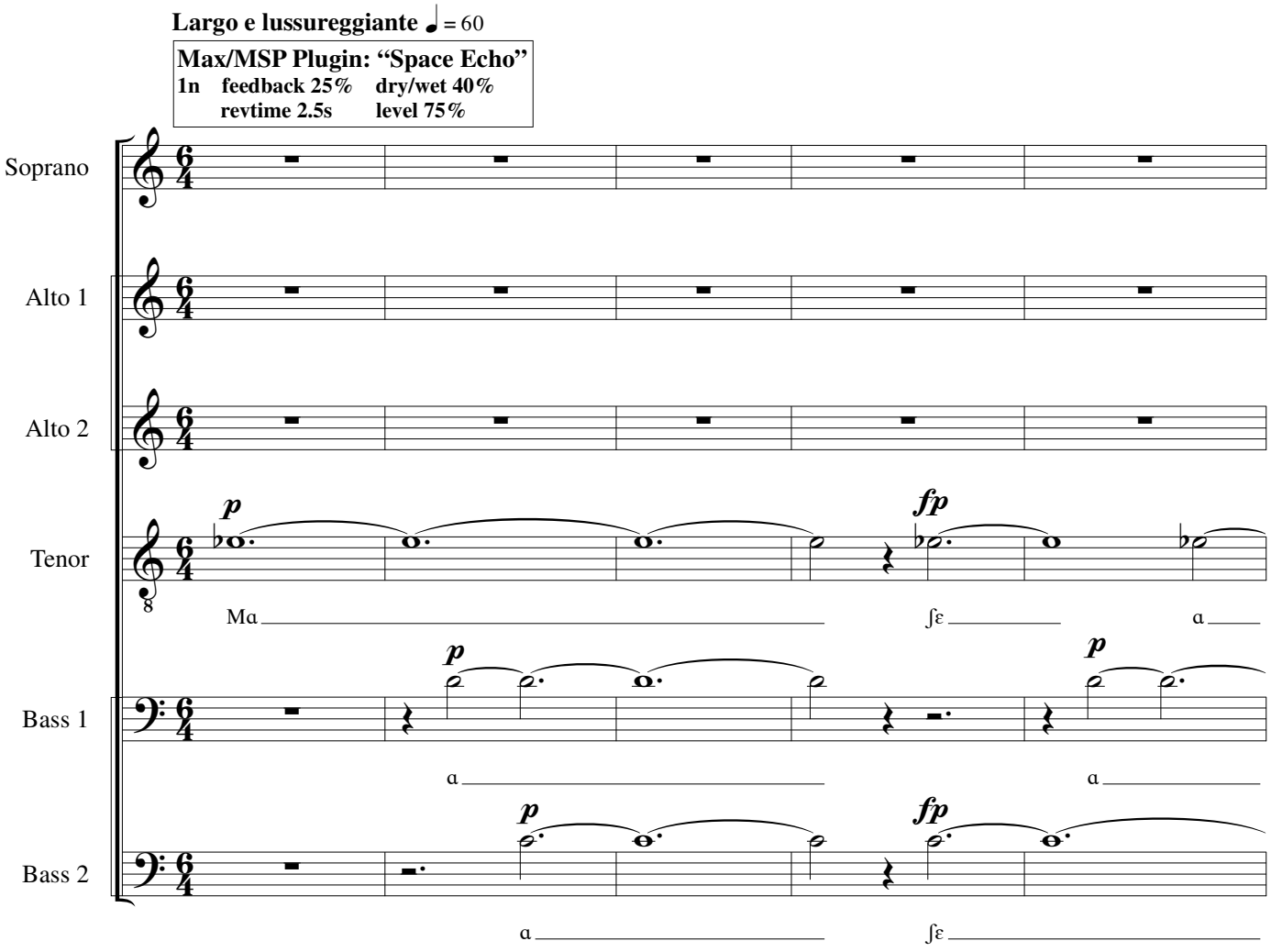

115
S
A 1
A 2
T
B 1
B 2
pp
P P Ts P Sʊ P Ts
Bypass 3 OFF
P P Ts
Bypass 4 OFF
ppp
ʃʊ
Bypass 5 OFF
p pp
ʊ ɑ P P Ts P Sʊ Pɑ P Ts ʊ ɑ P ɑ Pɑ P Ts ʃ ɑ
120
Bypass 1 OFF
mf
ɑ P P ɑ P ɑ ɑ P
whispered
ppp
ɑ P Ts
sfz
E
mp
P Ts Tʃ
p pp
ʊ
Pɑ Ts ɑ P Ps
Bypass 5 ON
ɑ
*dotted slur: apply diphthong
Pɑ ʊ


125
E
S
A 1
A 2
T
B 1
B 2
p
3
P Ts
F
whispered
ppp
normale
pp
130
↓Dry/wet: 35%
Bypass 2 OFF
Bypass 3 ON
Bypass 4 ON
Bypass 5 ON
Bypass 6 ON
mp

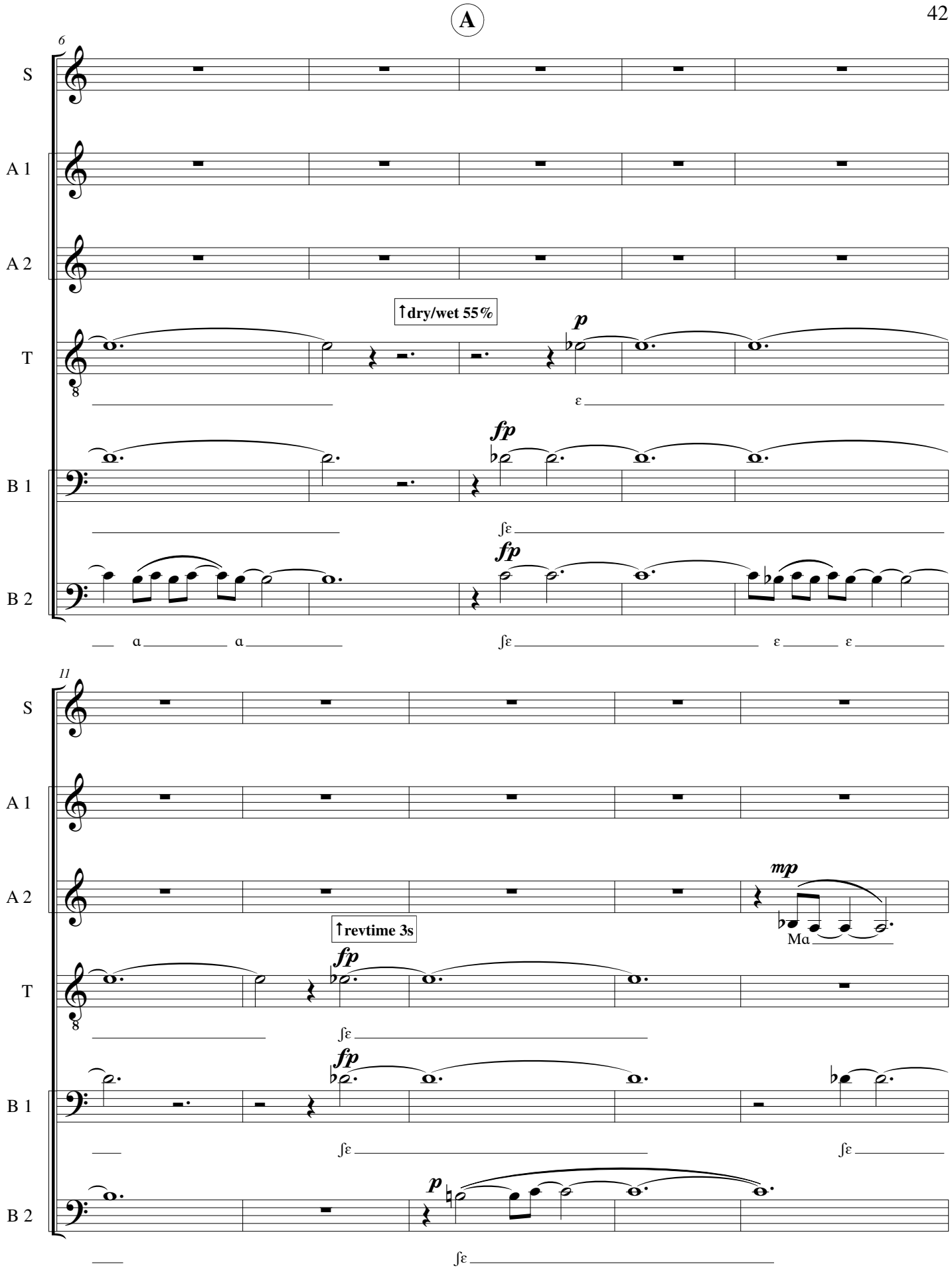

G
Levels: rand Pans: rand
8nd
136
E
sffz sffz
sim.
p
sfz
Bypass 1 ON
S
P P P P P P P P P P P P F F F F F F
A 1
sffz sffz sffz
sim.
pp
P P P P P P P P P P P P P P Ts
A 2
fp f p 3 fp mf
Bypass 3 OFF
mp
F F F F
T
fp f p 3 fp mf
F F F
B 1
fp f p 3 fp mf
Bypass 5 OFF
mp
F F F F
B 2
pp
P
* - Apply unmeasured tremolo
142
S
mp
a
A 1
mp
a
A 2
E
f
mf p
Bypass 3 ON
pp
F P Ts
T
pp
P Ts
B 1
E
f
mf
whispered
p
normale pp
F ∫a ∫ a
B 2
mp
3
Bypass 6 OFF
ppp
P P P P P P P F

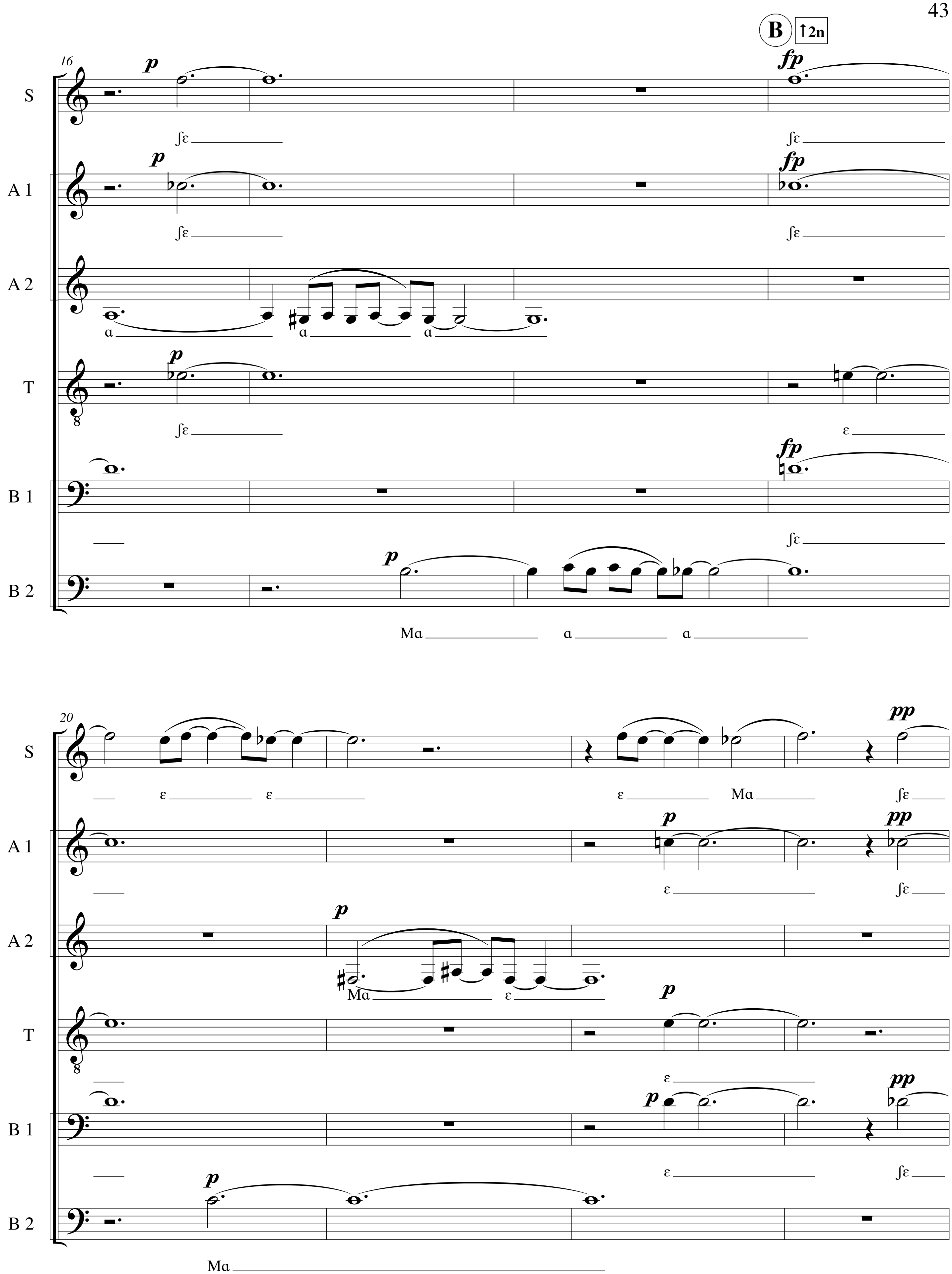

148
↓Dry/wet: 25%
Levels: rand
Bypass 1 OFF
Bypass 1 ON
Bypass 2 ON
Bypass 6 ON
S
A 1
A 2
T
B 1
B 2
E
mp
ppp
pp
sfz
p
P P P P P
P Ts
P P
P P P
whispered
normale
mf
sub. mp
f
154
rit.
↓Dry/wet: 20%

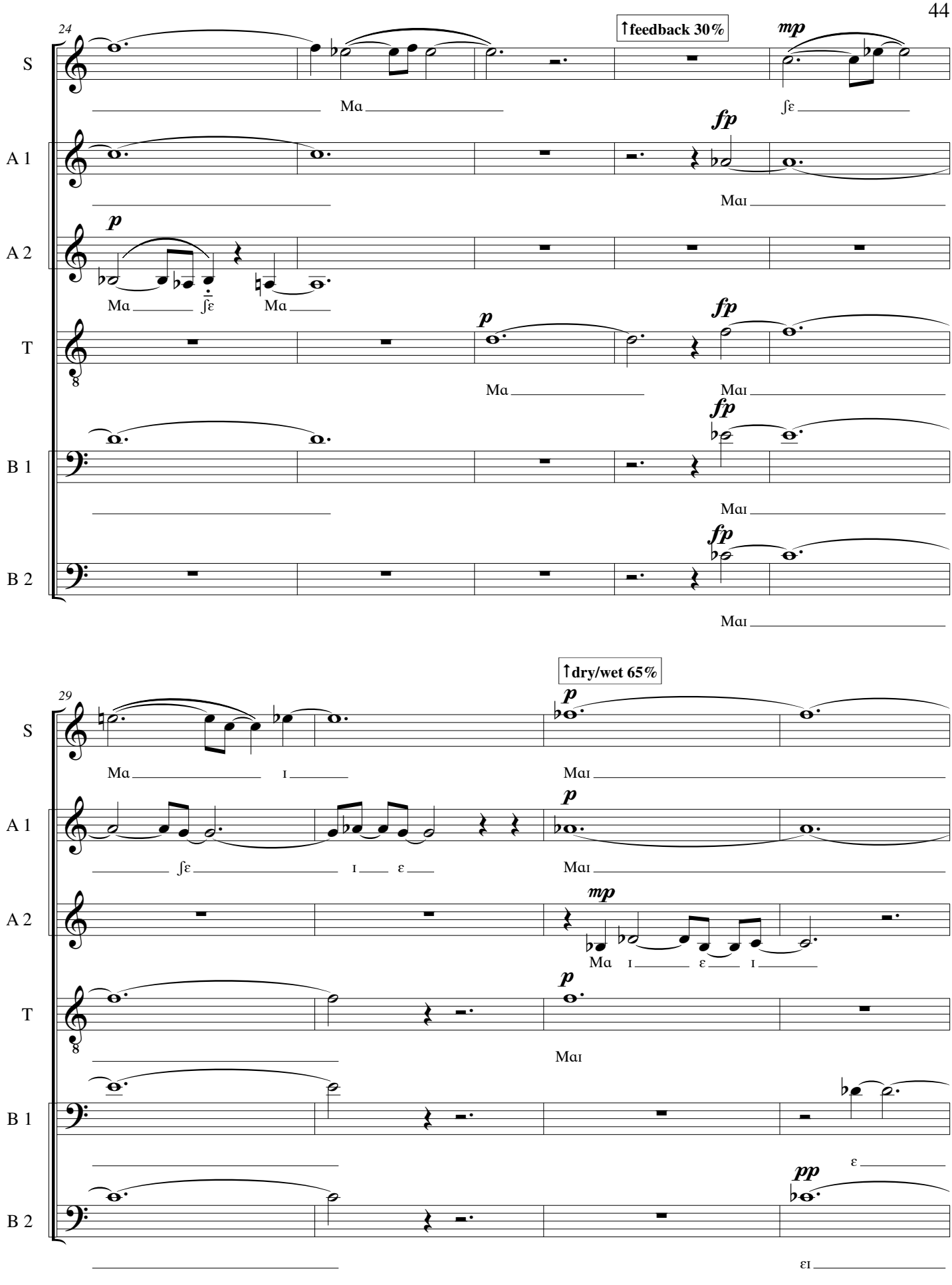
IV. Song of Loss



* - All changes to electroacoustic settings in this movement are global;
Breathing *ad lib.*


A
6
S
A 1
A 2
T
B 1
B 2
↑dry/wet 55%
p
fp
fp
ɑ
ɑ
ε
ε
11
S
A 1
A 2
T
B 1
B 2
mp
Mɑ
↑revtime 3s
fp
fp
p


B
↑2n
16
S
A 1
A 2
T
B 1
B 2
ʃε
α
Μα
20
ε


24
S
A 1
A 2
T
B 1
B 2
↑feedback 30%
mp
fp
p
Ma
ʃɛ
Maɪ
↑dry/wet 65%
29
ɪ
ɛ
pp
ɛɪ

C

↑8n ↑feedback 35%

33

S

A 1

A 2

T

B 1

B 2

38

S

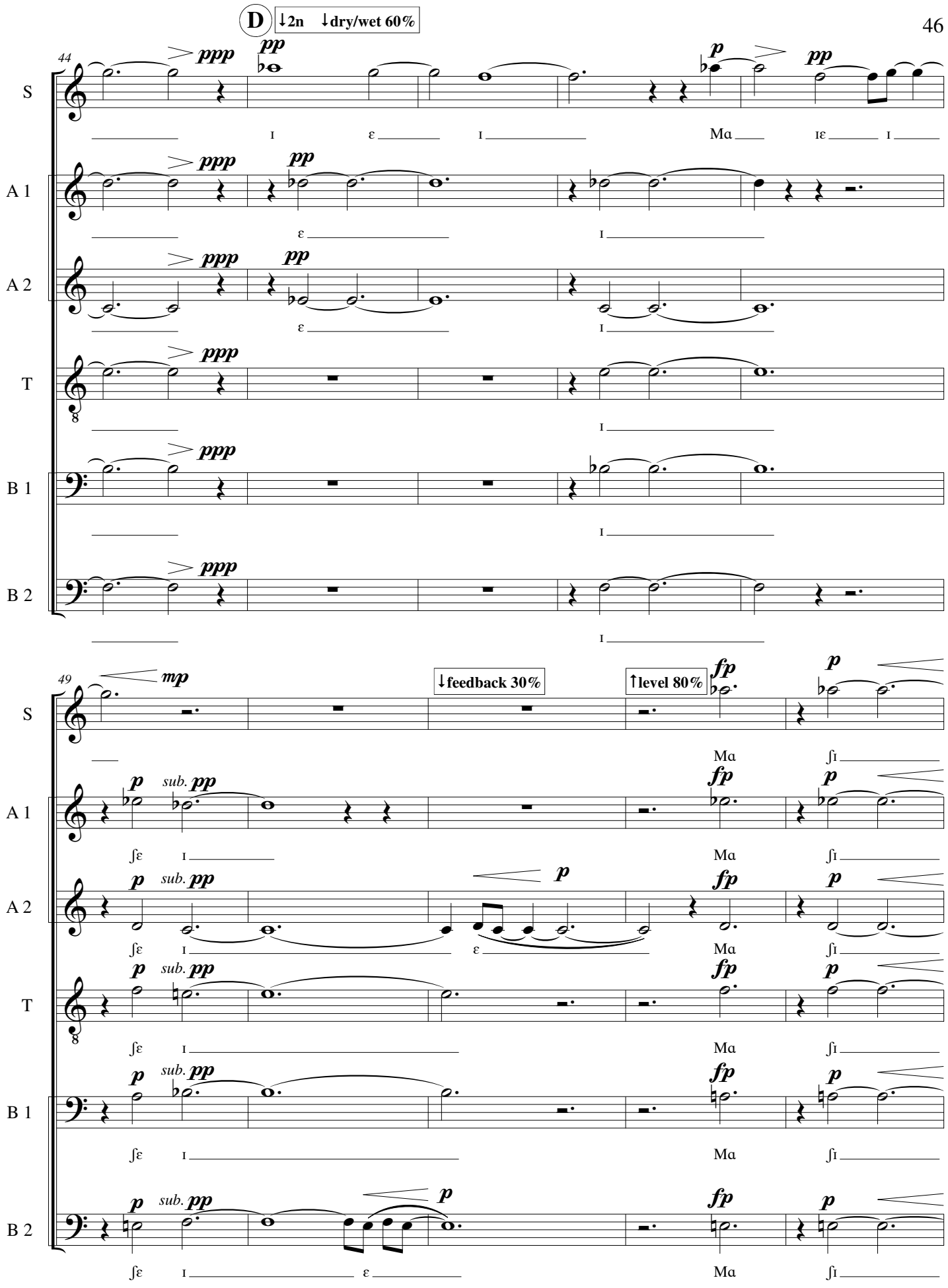
A 1

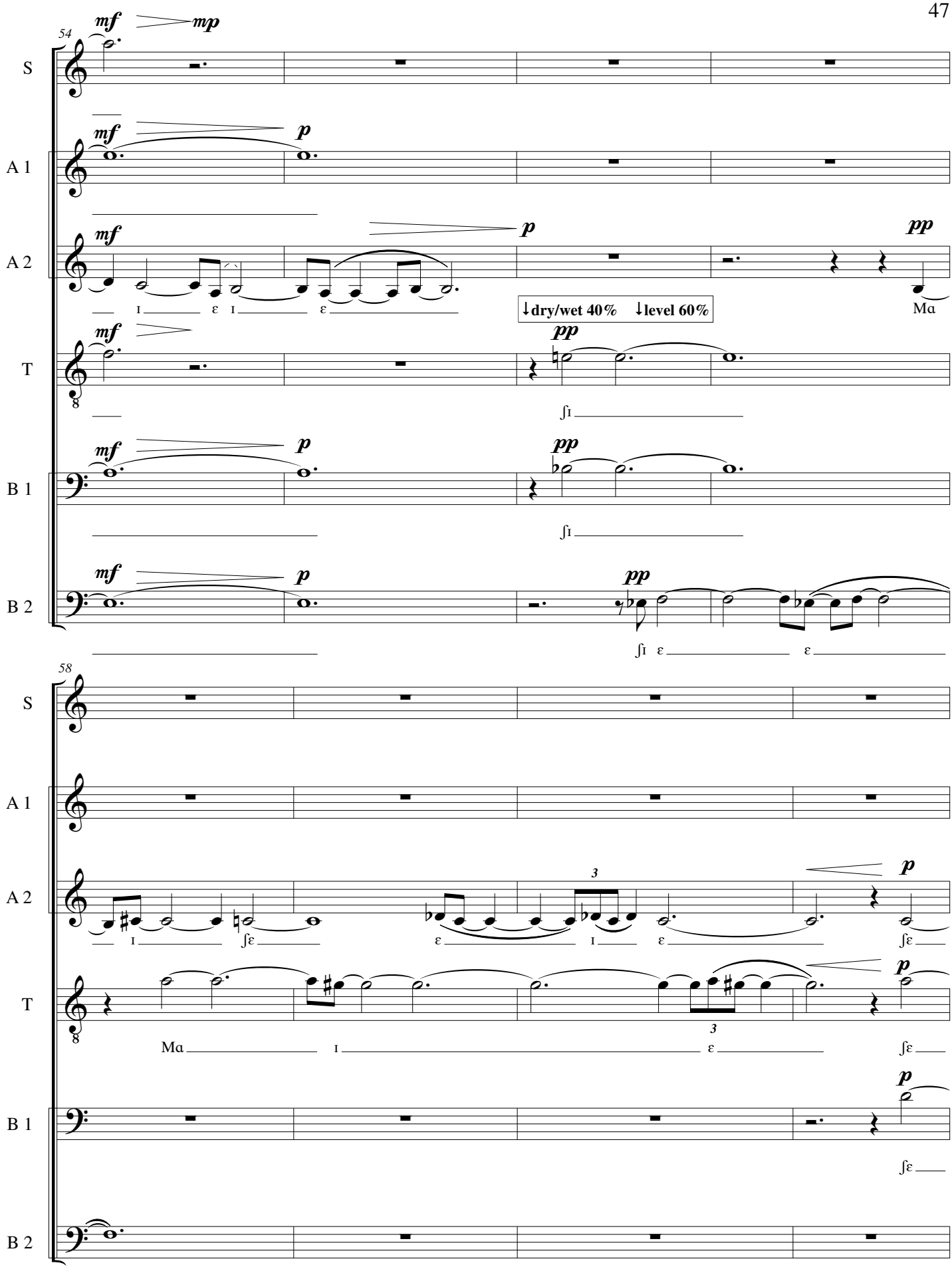
A 2

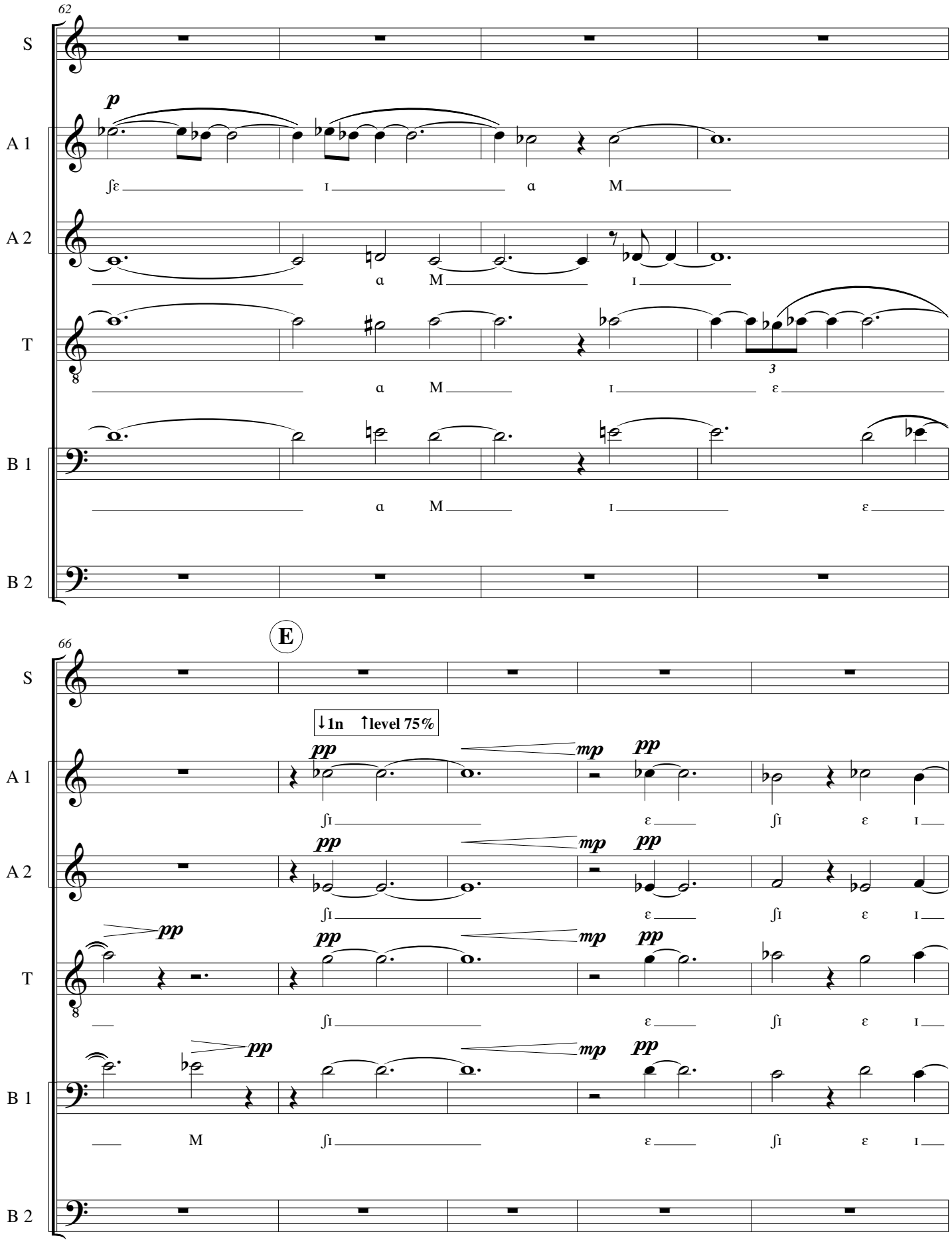
T

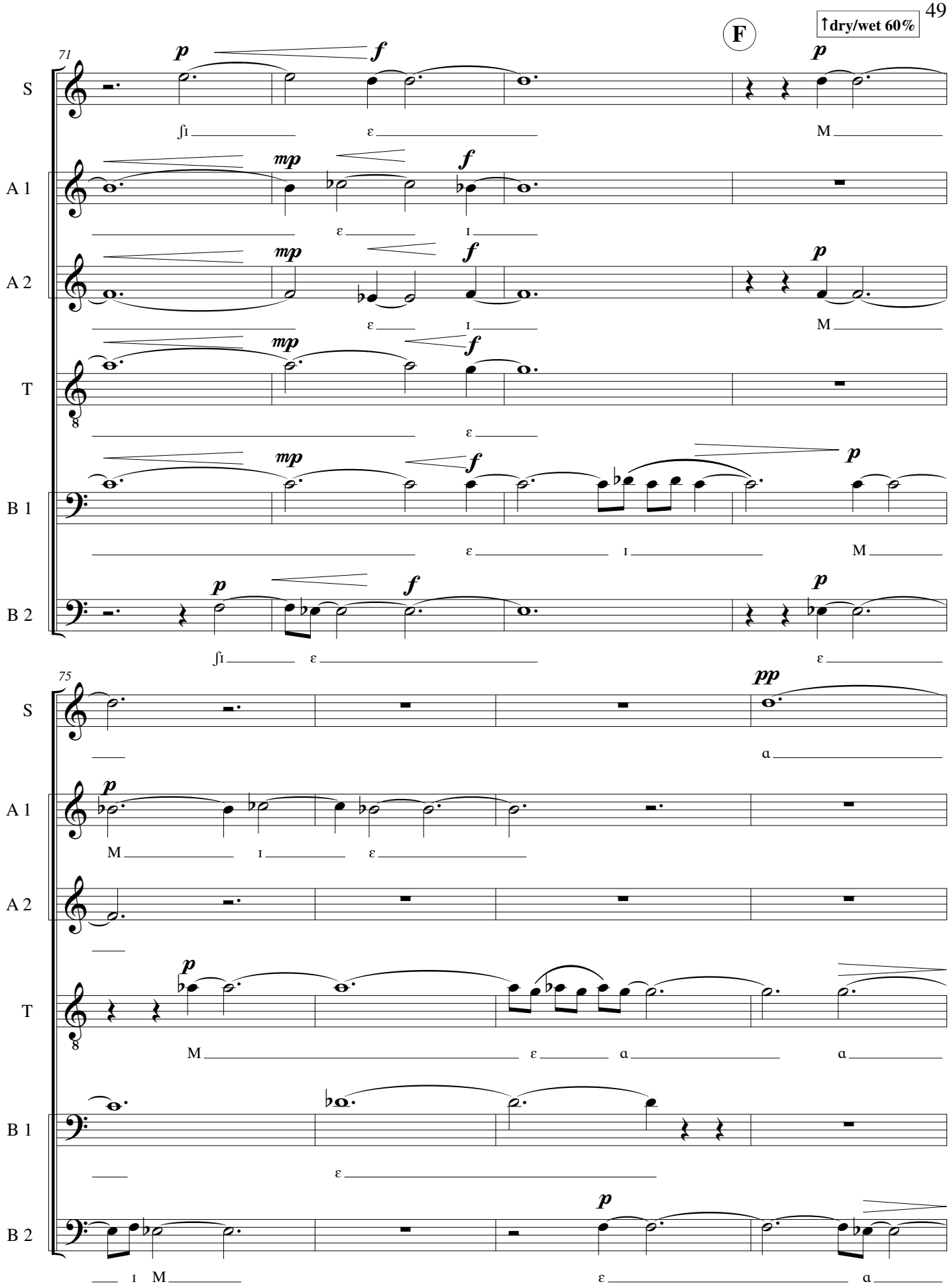
B 1

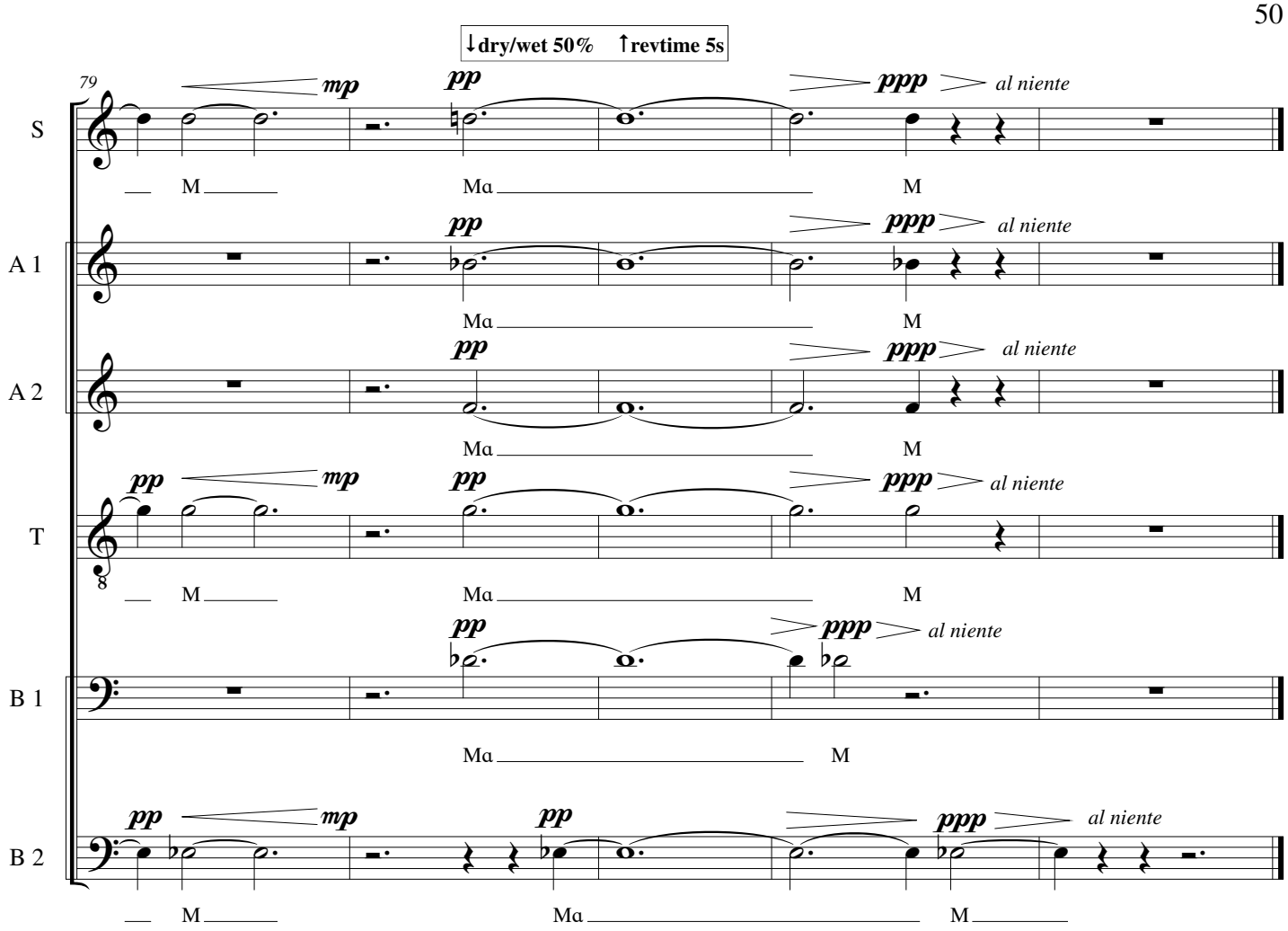
B 2


D
↓2n ↓dry/wet 60%
44
S
A 1
A 2
T
B 1
B 2
ppp
pp
p
49
mp
↓feedback 30%
↑level 80%
fp
sub.

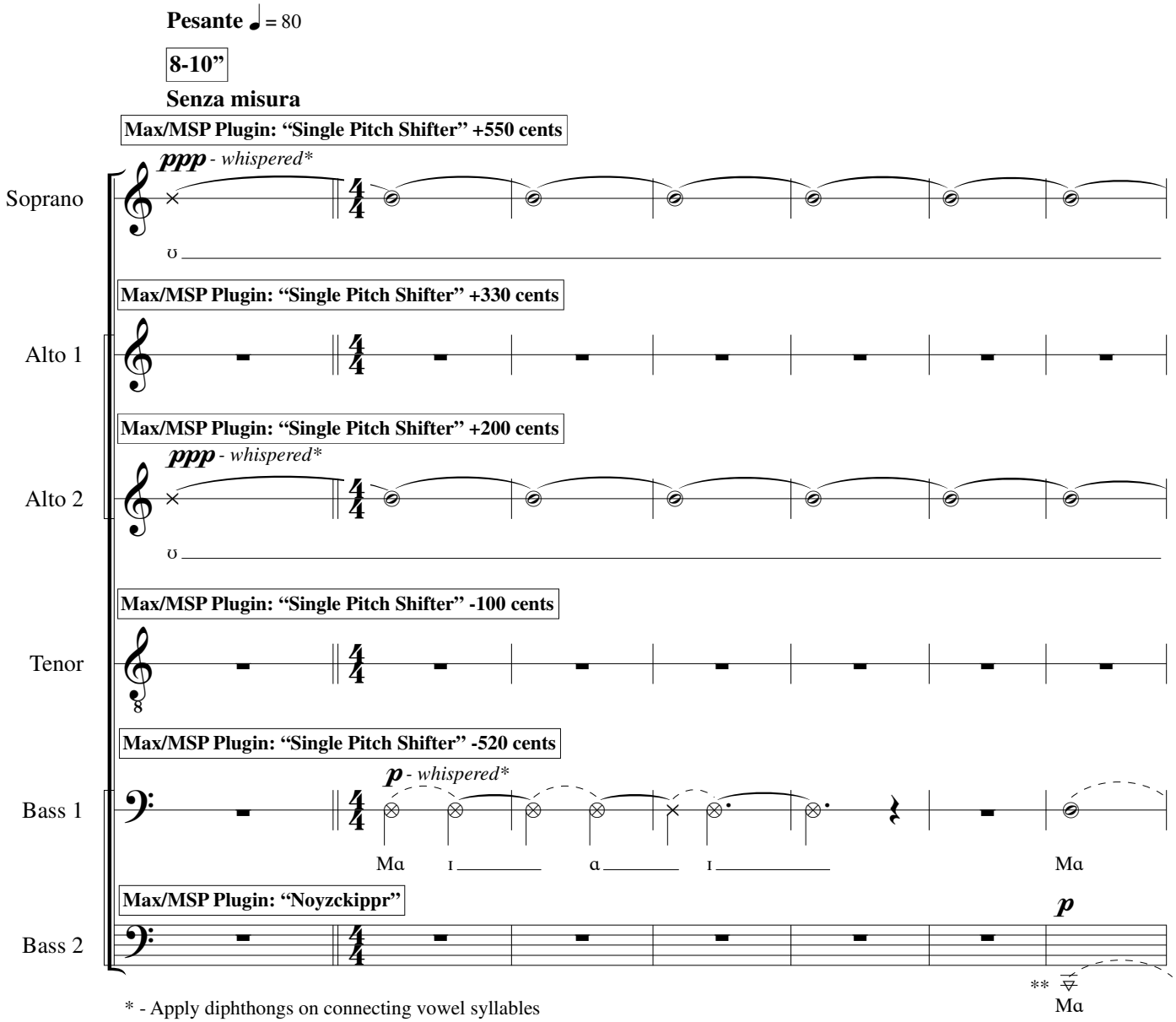

54
S
A 1
A 2
T
B 1
B 2
mf
mp
p
pp
↓dry/wet 40%
↓level 60%
Mɑ
58
3


62
S
A 1
A 2
T
B 1
B 2
p
ʃɛ ɪ ɑ M
ɑ M ɪ
ɑ M ɪ ɛ
ɑ M ɪ ɛ
3
E
66
↓1n ↑level 75%
pp
mp
ʃɪ ɛ ʃɪ ɛ ɪ
M ʃɪ ɛ ʃɪ ɛ ɪ


F
↑dry/wet 60%
71
S
A 1
A 2
T
B 1
B 2
p
f
mp
M
ɛ
ɪ
ʃɪ
75
pp
ɑ

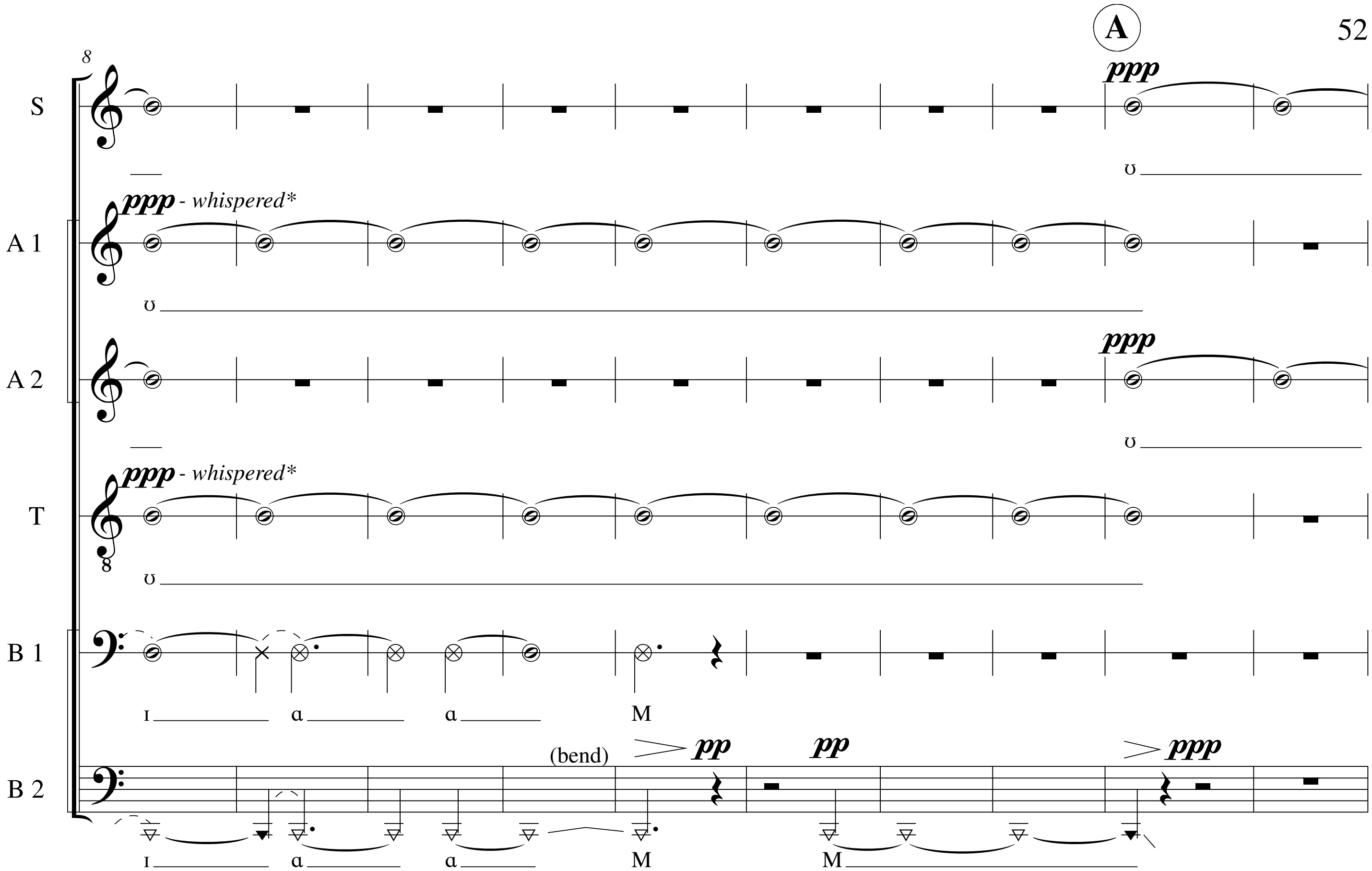

↓dry/wet 50% ↑revtime 5s
79
S
A 1
A 2
T
B 1
B 2
mp
pp
ppp
al niente
M
Ma
M

V. Song of Traversal

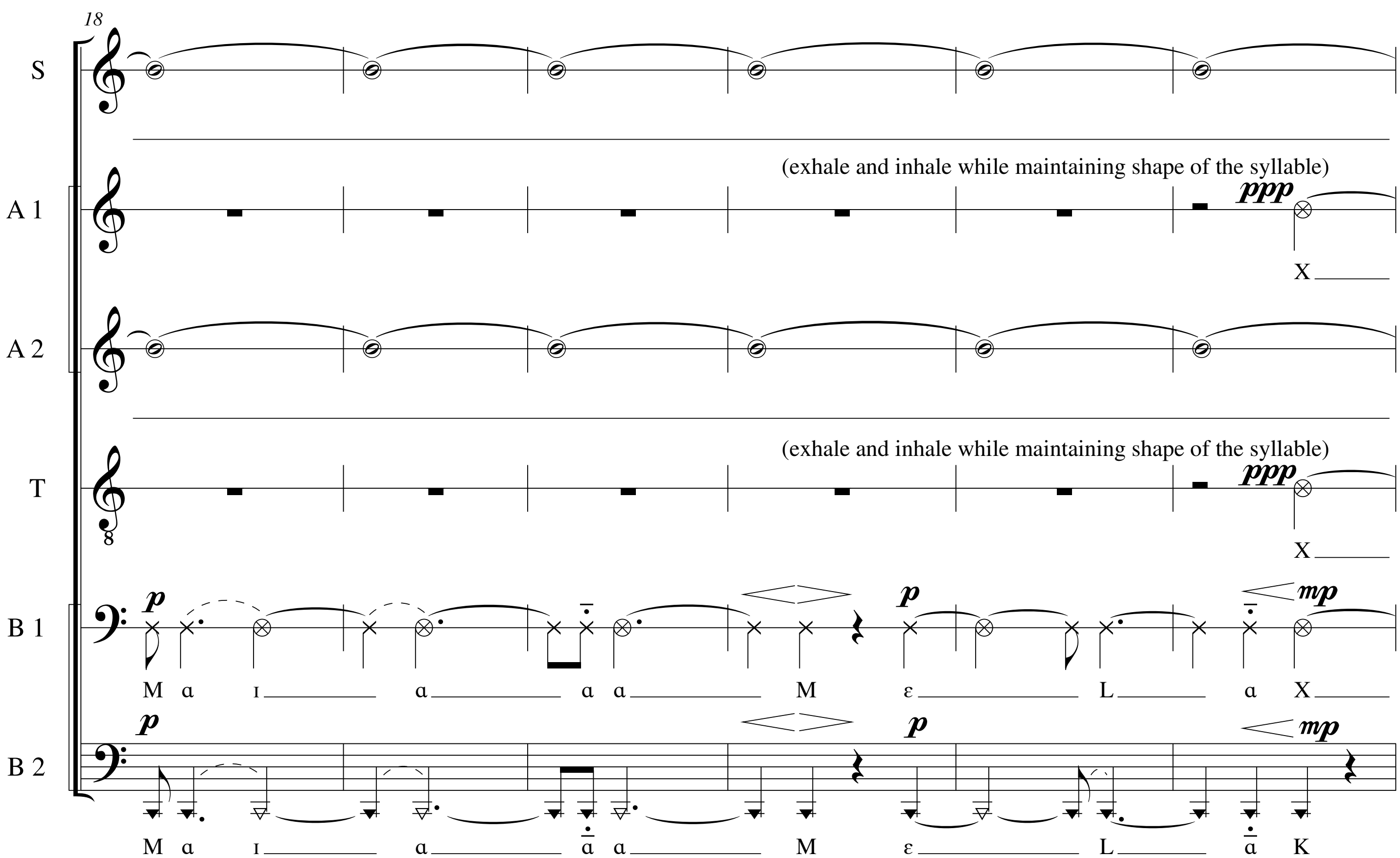


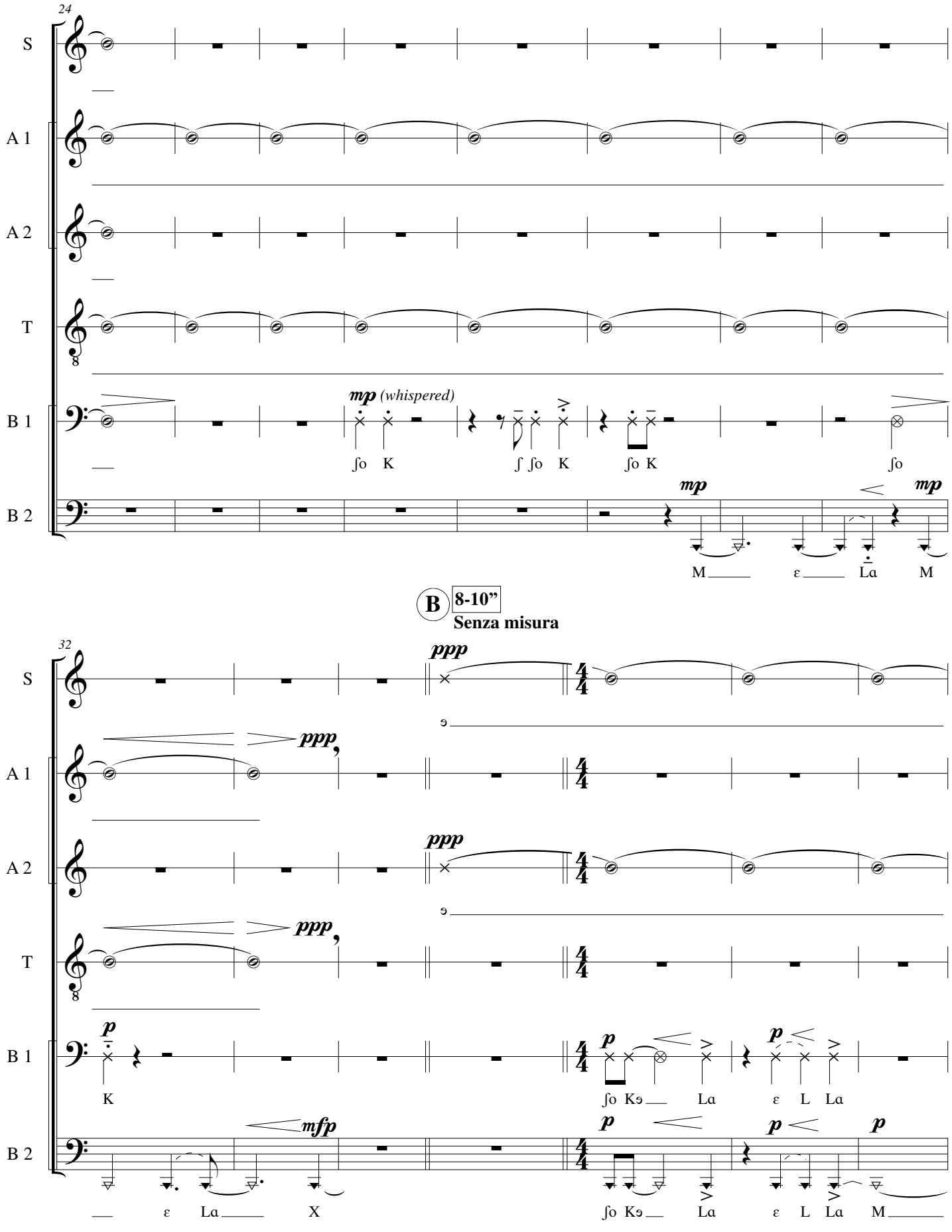
* - Apply diphthongs on connecting vowel syllables

** - Pitch is approximate to singer's lowest possible note; should sound like a soft growl
Apply diphthongs on connecting vowel syllables



* - Apply diphthongs on connecting vowel syllables




24
S
A 1
A 2
T
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B 2
mp (whispered)
ʃo K
ʃ ʃo K
ʃo K
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mp
M
ɛ
La
M
B
8-10”
Senza misura
32
ppp
ppp,
ppp
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p
K
p
ʃo Kɔ
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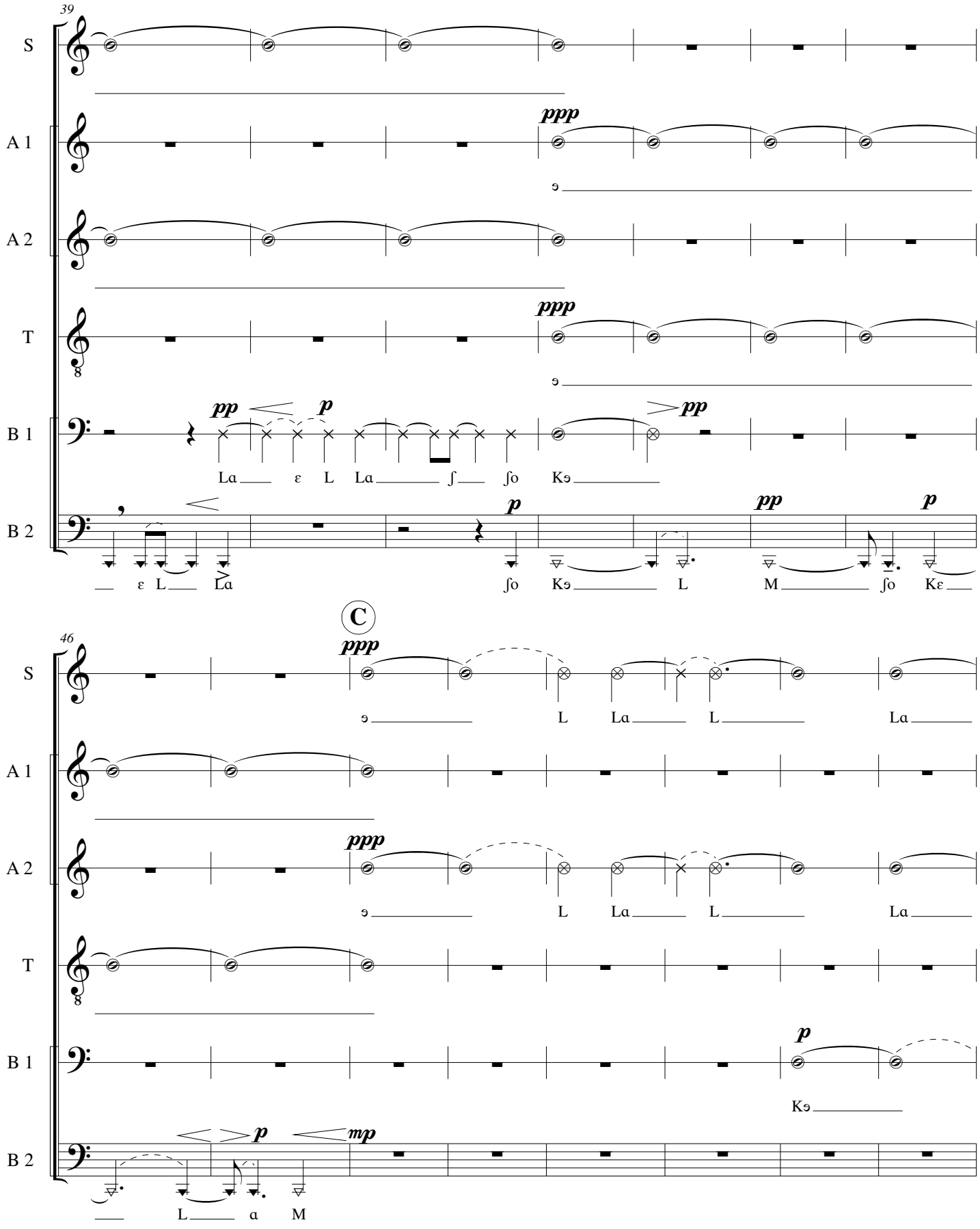
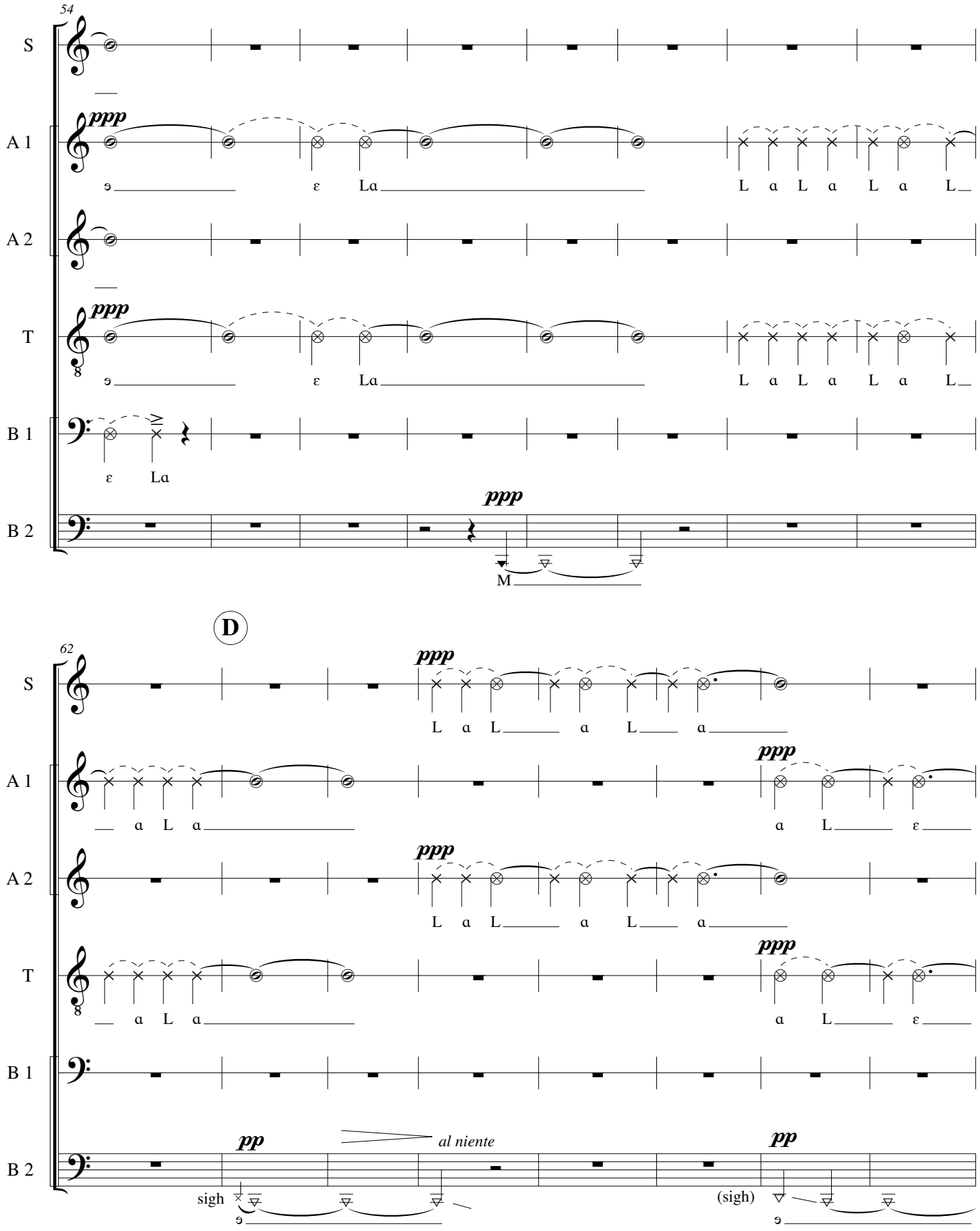
La
p
ɛ L La
p
M


39
S
A 1
A 2
T
B 1
B 2
ppp
ɔ
pp
p
La ε L La ʃ ʃo Kɔ
ε L La
ʃo Kɔ L M ʃo Kɛ
C
46
L La L La
Kɔ
mp
L a M


54
S
A 1
A 2
T
B 1
B 2
ppp
ɔ ɛ Lɑ
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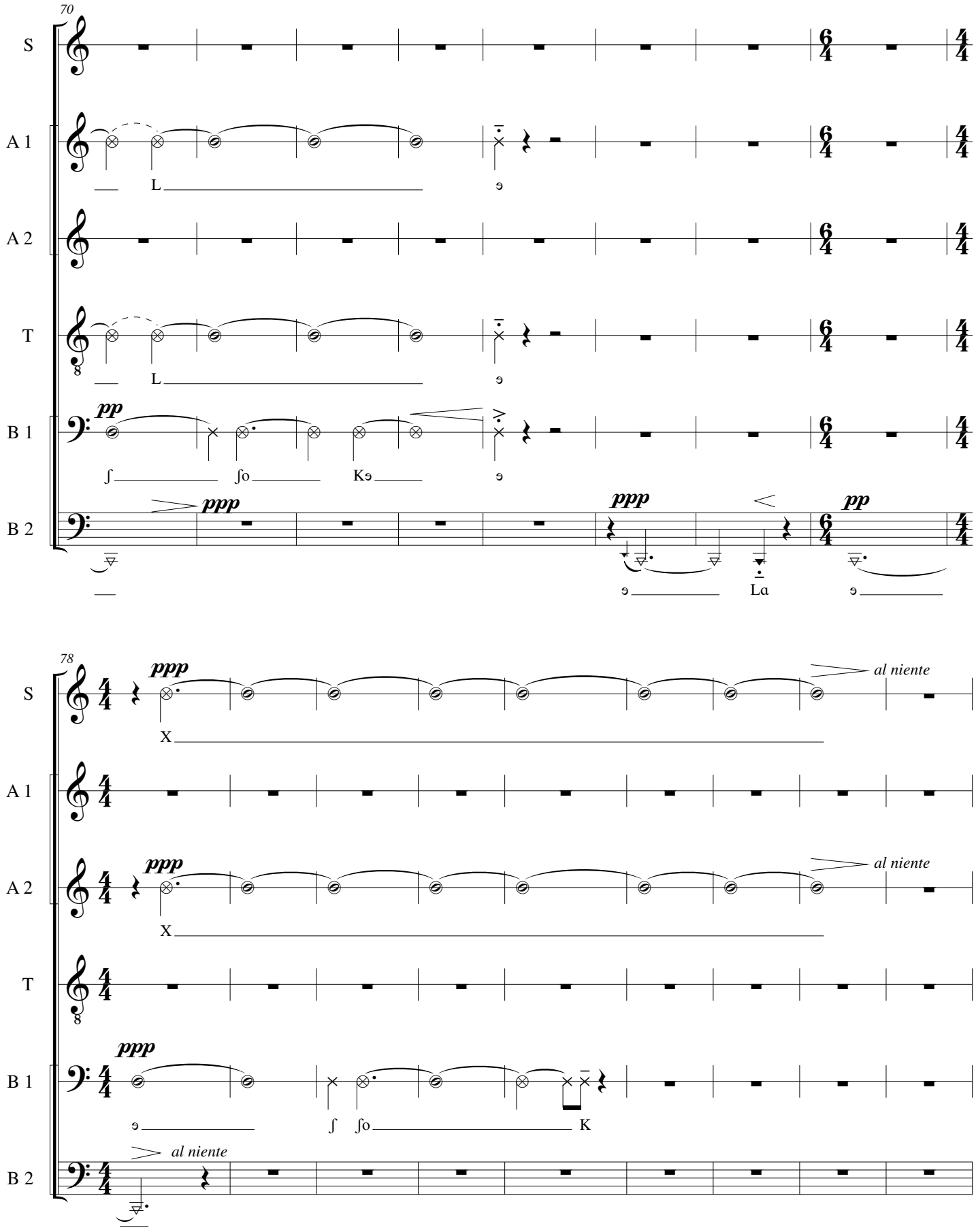
ɛ Lɑ
M
D
62
L ɑ L ɑ L ɑ
ɑ L ɛ
pp
al niente
sigh
(sigh)


70
S
A 1
A 2
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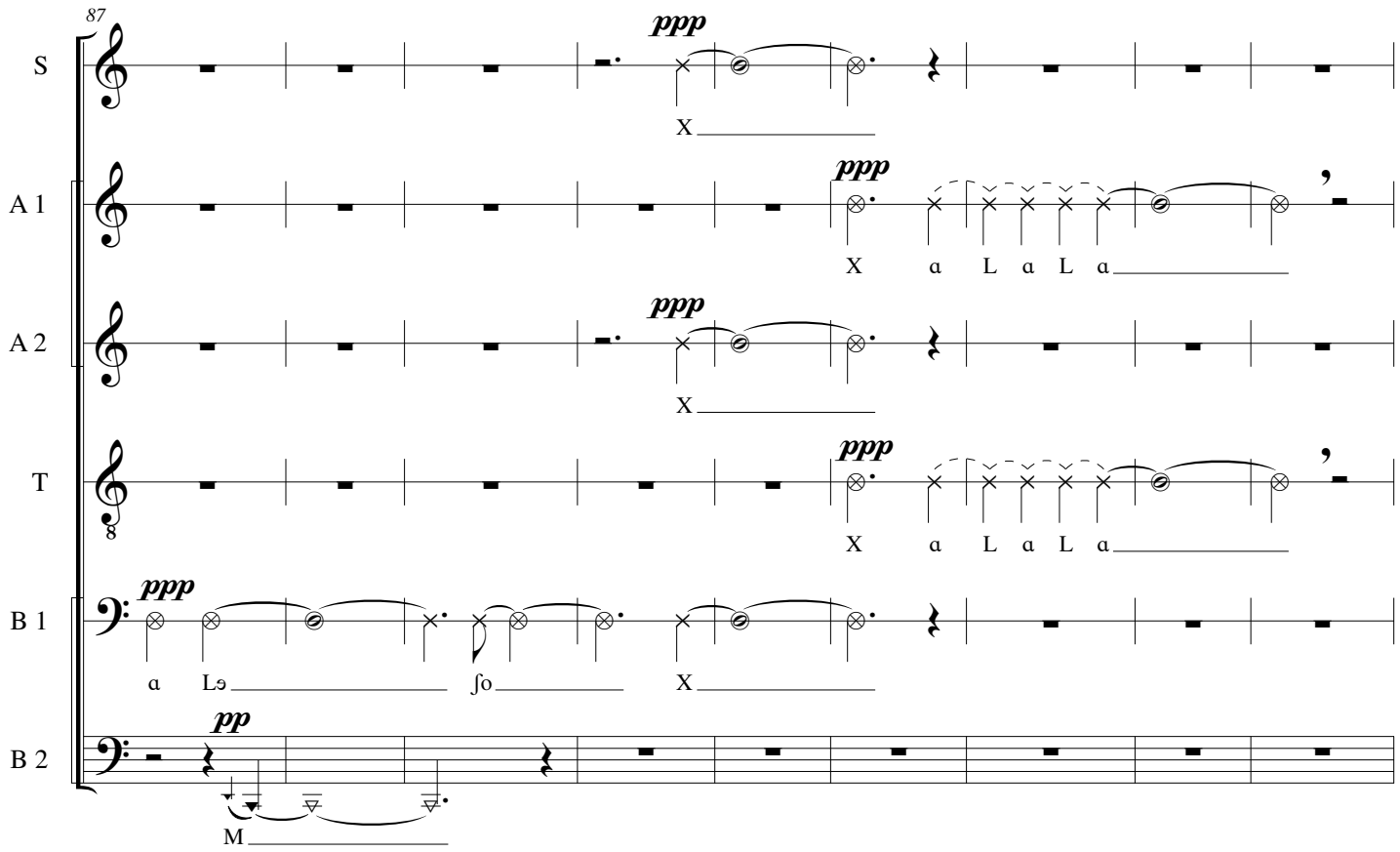
B 1
B 2
pp
ppp
L
ɔ
ʃ
ʃo
Kɔ
La
78
al niente
X
K


87
S
A 1
A 2
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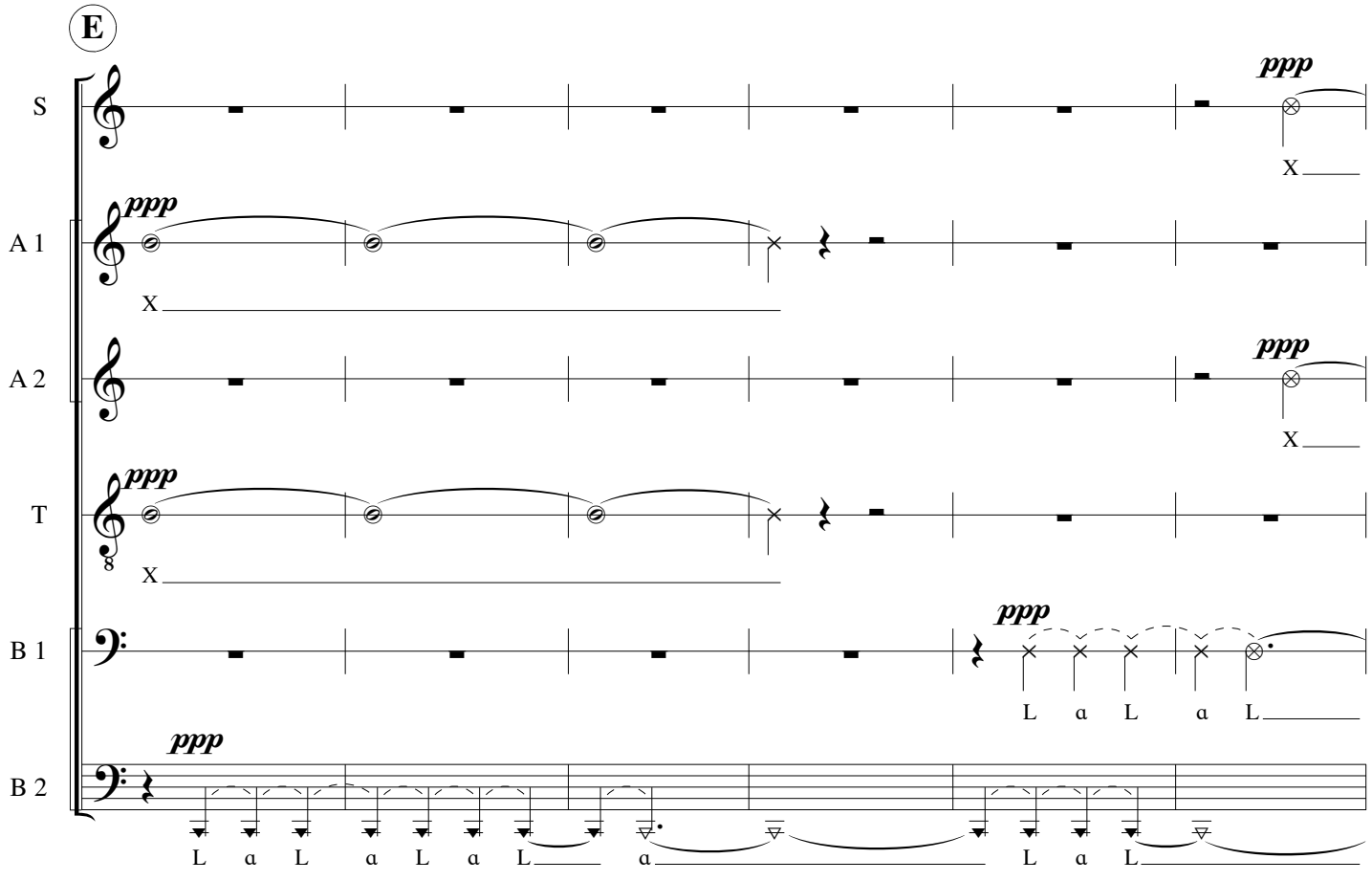
B 1
B 2
ppp
X
X a L a L a
ɑ Lɔ ʃo X
pp
M


E
S
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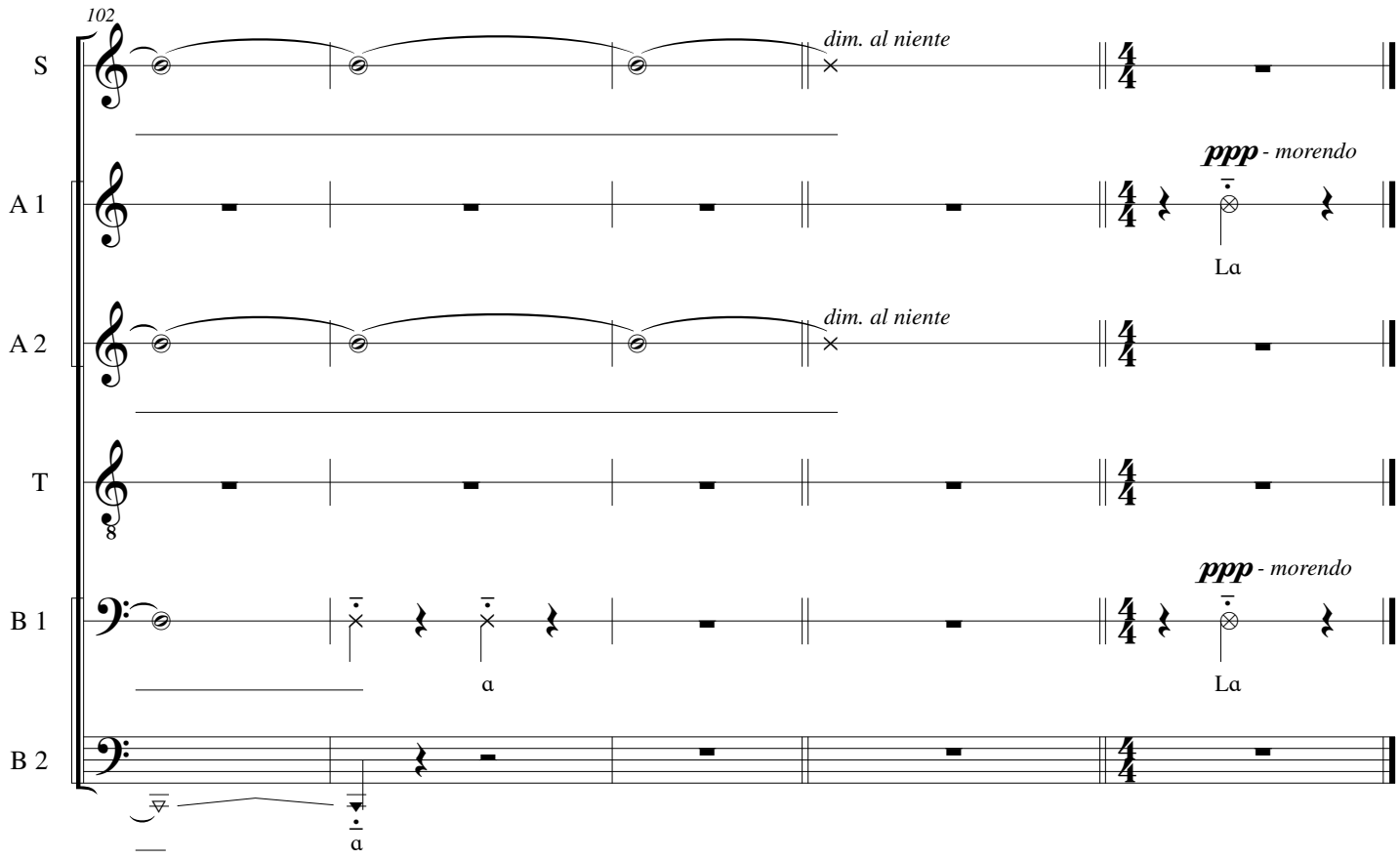
B 2
ppp
X
L a L a L

10-12”

Senza misura



Part II: Discussion Document

Introduction

This discussion document consists of the analysis of my composition for six voices and live electronics entitled *...and the songs of another…*, and focuses on techniques I employ in a unique work. The first chapter describes the sound development in this composition, which also details how I incorporate techniques from previous works into this new piece. This chapter also includes a brief discussion of other compositions I have studied which influenced this work, as well as the inspiration of heavy metal. The second chapter outlines the methodology applied in my composition, including: a description of the text used, various vocal techniques employed, and the electronic modules implemented to process live sounds. The third chapter is an analysis of the key areas in each song, where I outline developments regarding sound generation and transformative components in texture and timbre. The conclusion summarizes the analysis and reiterates the composition's success in the use and transformation of sonic events via my methodology and use of electronics.

1 Sound Development, Vocal Music & Heavy Metal

1.1 Discussion of Sound Development in my dissertation

My dissertation composition, entitled *…and the songs of another…*, consists of five songs for six singers and live electronics. I construct sonic events using voices, occasionally manipulating their timbres with live electronic processing. Many of these vocal timbres are produced through a combination of pitched and non-pitched phonemes; they are sometimes transformed through variations in breathing, use of *Sprechstimme* and other non-sung vocal techniques,[1] and countenance modulation, where changes in facial expression alter the frequency spectrum of uttered sound. In addition, I explore concepts of pitch, motivic, and harmonic development through standard singing techniques, non-pitched sounds, and notions of approximate pitch turning to non-pitch. The aural design of my composition consists of sections and entire movements that concentrate on either non-pitched sounds, pitched elements, or combinations of both. Sound development occurs when, for example, I place pitched elements against non-pitched parts within a movement. By juxtaposing contrasting sounds within a composition, I can build tension and create dramatic moments in the piece; this has been part of my methodology as a composer since my 2012 Master's thesis, *Collage Suite*. *Collage Suite* contained referents of classical forms or processes designed via discrete uses of pitch and rhythm which I manipulated through "contrasting material"—that is, musical elements that are external to the inserted referents. Combining opposing ideas within each of the composition's three movements created a dramatic molding between referents and contrasting material. In my thesis, I called this a "conceptual collage."[2] This dramatic

[1] *Sprechstimme* is related to the vocal technique of *Sprechgesang* (speech-song), whereby vocalists create the notion of approximate pitch by transitioning between singing voice and spoken voice. One of the most notable uses of this technique is in Arnold Schoenberg's *Pierrot Lunaire* (1912).
[2] Matthew David Becker, "Thinking Through Collage: An Approach in 'Collage Suite'," Master's thesis, University of Saskatchewan, 2012: https://ecommons.usask.ca/handle/10388/ETD-2012-11-797.

molding often included dialogues between referents and contrasting material, where the outcome of many of these dialogues caused a referent to be no longer discernable. I found these dialogues to be captivating, and as such I looked for ways to create similar meaningful interactions in my dissertation composition.

At times, in *…and the songs of another…*, I incorporate a growling vocal style inspired by heavy metal music (hereafter "heavy metal"). In parts of the second movement and in the final movement, for example, a bass vocalist employs a sound like a growl that creates an effect similar to that heard in many subgenres of heavy metal (e.g., goth, death, black, thrash, symphonic, etc.).[3] Many iterations of the growl are non-pitched, though pitch approximations are possible. Examples of growling can be found in the Dutch symphonic metal band After Forever's 2001 track "Zenith" at 0:28, and the Norwegian death-doom/goth metal band The Sins of Thy Beloved's 1998 track "Worthy of You" at 2:48. Growling vocal timbres are also present outside of heavy metal in Peter Maxwell Davies' classical 1969 monodrama *Eight Songs for a Mad King*. A notable vocal feature in this work is the volatile use of register, whereby the baritone frequently moves between very high and very low registration alongside fluctuations between pitch and non-pitch.[4] Some of the sounds in the extreme low register resemble growling to the point where pitch is almost indiscernible. The detriment of this vocal style is that the sung text is often unclear, though this is more likely the product of intent rather than error. To this end, it is worth noting that since my piece employs growling timbres, there are moments in which the enunciation of text is subdued. Moreover, I understand that this vocal technique is not one that can be easily emulated by classically trained vocalists. While the sound of the low register in Davies' piece is faint and

[3] This vocal technique goes by several names, including: death growl, death grunts, and growled vocals.
[4] Peter Maxwell Davies, *Eight Songs for a Mad King* (London: Boosey & Hawkes, 1971).

difficult to hear due to its very low register, the vocalized sounds in heavy metal bands are typically much more prominent because they are captured by microphones and enhanced with recording studio technology. As such, I do not reasonably expect vocalists in this work to match the timbre produced by heavy metal singers. I do, however, believe it is possible to achieve the growling effect to some degree since I am a bass vocalist and can produce the sounds in my dissertation composition with success.[5]

1.2 Reference to Existing Pieces

For this dissertation, I used the MIDI/audio processing software program Max/MSP. I have used this program for two earlier compositions: *Soliloquia* (2015) for solo viola with both pre-recorded and live electronics, and *Of Space and Mime* (2015) for violin and viola with live electronics (and an optional pre-recorded region in the second movement). Consistent in both my earlier works and my dissertation composition is the way that the electronics serve to complement the live sound through processing, which, in turn, shapes these works. To prepare for this work, I studied Polish composer Katarina Glowicka's *Kyrie for Voices and Computer* (2004-5), which uses live Max/MSP processing. In particular, Glowicka's piece uses discrete harmonizer settings.[6] This composition demonstrates the versatility of sound creation and manipulation afforded by Max/MSP. The electronics in *Kyrie for Voices and Computer* allow Glowicka to enrich live sounds via a wealth of harmonized sounds, ranging from subtle processing to heavy processing, which in turn results in stark differences in texture. Some of the changes in processing are gradual, while

[5] It is important to note that singers are not expected to heavily growl. In all instances where a timbre similar to a growl is expected, electronics will apply necessary aid in producing this sound. Singers can still, however, husk their voices in a comfortable manner.
[6] Katarina Glowicka, *Kyrie for Voices and Computer*, 2004-5.

others are sudden. In my dissertation composition, I also aim to create a variety of textures with the help of electronics. For instance, as the analysis will detail, many textures in my piece feature lightly processed sounds, though there are also textures in which processing is substantial.

I draw inspiration for my dissertation composition not only from heavy metal and the possibilities of Max/MSP, but also from music in the classical repertoire like Georges Aperghis' 1977-78 *Récitations: Pour Voix Seule* and Karen Rehnqvist's 1988 *Puksånger-Lockrop*. Aperghis' piece employs interesting relationships between voice and text, and includes some unique, conceptual scoring features in certain movements. Some movements make use of phonetic texts, for example, while the seventh movement specifically implements thick consonant or vowel sounds with diphthongs.[7] The seventh movement incorporates broad changes in register, where motivic gesturing in the low register is slow and quiet, while the upper register is quick and loud. These are broadly contrasting elements which are effectively dramatic. This specific gesturing is somewhat influential in how I composed vocalizations in my piece, as the first movement, for example, applies durational contrasts (long vs. short) to create a dialogue. Similar to the conjoined relationship between voice and text in Aperghis' piece, Renqvist incorporates two different singing styles into *Puksånger-Lockrop*. The first is in a traditional Finnish folk style that Rehnqvist describes should be sung as "a traditional, unsentimental mode of expression – senza vibrato […]."[8] The other vocal style, a herding call, is called *Kulning*. This piece appealed to me because of how these two discrete vocal styles shape the composition. The *Kulning* is bright, loud, and in a very high register, while the folk song vocal style is quieter, more subdued, warmer, and

[7] Georges Aperghis, *Récitations: Pour Voix Seule* (Paris: Salabert, 1982).
[8] Karin Rehnqvist, *Puksånger – Lockrop. Timpanum Songs – Herding calls: For Two Female Voices and Percussion* (Stockholm: Reimers, 1989), 4.

in a lower register.[9] Rehnqvist uses these contrasts in timbre, register, and dynamics to shape the work accordingly via these two vocal styles. In addition to Aperghis' and Rehnqvists's pieces, György Ligeti's 1964 *Aventures* and 1966 *Nouvelles aventures* offer an intriguing approach to vocalized sounds and textual development. In these works, Ligeti uses a small vocal ensemble to implement a variety of different phonetic and non-word syllabic sounds by using the International Phonetic Alphabet (hereafter "IPA") as text.[10] Specifically, Ligeti's works feature considerable counterpoint between the three voices (Soprano, Alto, Bass) which takes place over a variety of vowel and consonant sounds. My piece is somewhat similar in design, particularly with the use of IPA, and in this sense Ligeti's works have been formative in my approach to phonetic sound development. Ultimately, I suggest the use of phonetic texts allows listeners to concentrate more on the specific sounds that are produced through a variety of consonant and vowel phonemes rather than *what* is being said or sung.

[9] Rehnqvist, *Puksånger – Lockrop*.
[10] Ligeti, György, *Aventures, for 3 singers and 7 instrumentalists* (New York: C.F. Peters, 1964); and *Nouvelles aventures: für drei Sänger und sieben Instrumentalisten* (New York: C.F. Peters, 1966).

2 Methodology

2.1 Use of Text

The text of my dissertation piece is comprised of phonemes from the IPA. The text created from these phonemes carries no linguistic meaning, but the combination of various vowel and consonant sounds are key to the various vocalizations that develop the piece's sonic events. The phonetics in my composition are outlined below in Table 1.

Non-pitched Consonants	**Pitched Consonants**	**Vowels**
F	L	ɑ ("father")
K	M	ɛ ("end")
P		ɘ ("book")
S		ɪ ("she")
ʃ ("shoe")		O ("over")
T		ʊ ("moon")
X (German: "buch")		

Table 1: Non-pitched consonants, pitched consonants, and vowel sounds[11]

As the table indicates, I use a greater variety of vowels and non-pitched consonants than pitched consonants. I either use the phonemes on their own or in combinations of two or more; when combinations are used, they vary from movement to movement. For example, I both use /ʃ/ on its own and combine it with other vowel sounds to create /ʃo/, /ʃɪ/, or /ʃʊ/. Some combinations of three or more phonemes that frequently appear in my piece are /Mɑɪ/ and /Tsʊ/. Typically, the combinations I use either involve two vowels or two consonants,

[11] While phonemes are not capitalized in IPA, the letters that are capitalized in the score are also capitalized in this document for the sake of consistency. In my composition, consonant phonemes that appear either on their own or at the beginning of the words are capitalized.

with the former type of combinations potentially creating a diphthong between /ɑ/ and /ɪ/. At times, I place some combinations in reverse so that, for example, /ɑɪ/ becomes /ɪɑ/.

Within each movement of my piece, I concentrate on a certain series of vowel or consonant sounds, and shape the material based on their use. Generally, the treatment of vocal sounds in my dissertation composition relates to my own appreciation for wordplay. In "Sound Check," the first song in my composition *The Fulminations* (2014), the lyrics consist of remarks one might say during a sound check for a microphone: "Test, Testing, One, Two, Three, Sibilance." While the lyrics' light-hearted nature is apparent, I use the word "Testing" as a dramatic catalyst. At first, the singer utters "Test, testing." Gradually, the text engages in wordplay as "Test, testing" becomes "Testing my resolve." The wordplay makes the light-hearted nature of the text somewhat serious, if not humourous, due to the text's unexpected shift in tone. As the text in my dissertation composition neither carries nor creates meaning, I defer instead to iterations of pitch, rhythm, articulations, and/or dynamics to help shape and create dramatic moments. While these various iterations will be discussed at length later in this document, it is necessary to pause here and reflect on the special vocal techniques employed by my piece.

2.2 Special Vocal Techniques

The principle tool of sound creation and manipulation in this composition is the voice. To reflect this, I use a series of established extended techniques in combination with other techniques to alter timbres and/or textures as necessary. Firstly, in certain regions of movements 3, I apply *Sprechstimme*. Since this composition frequently explores pitched and non-pitched regions, I selectively use *Sprechstimme* to provide a middle ground from which pitch is approximate and has the potential to become non-pitched. Secondly, in the first and

final movements of this piece, vocalists sustain consonant or vowel sounds for long periods of time, as the ambience requires this continuous presence of sound.[12] To sustain continuous sound, vocalists breathe in and out during their vocalizations; inhaling produces a different sound than exhaling, particularly when paired with different countenances (smiling, frowning). While smiling, lower frequencies are attenuated that causes sounds to seem lighter, whereas frowning filters out higher frequencies and produces heavier sounds. Since singers are encouraged to breathe in and out whenever necessary, this allows the performer to somewhat control when to transform the sound of their voice.[13] Lastly, there is the aforementioned heavy metal-inspired technique: the growling timbre heard in movements two and five. For this, vocalists can impose a growl-like sound to non-pitched or pitched material; the technique generally works best at a singer's lowest possible pitch.

2.3 Explanation of the electronic module design

All chosen electronic modules in Max/MSP are tasked with enriching timbres and textures. They complement the sounds the singers produce by generating overlays of pitch by processing non-pitched sounds with a frequency shifter or pitch shifter, densifying harmonies by using a harmonizer, adding degrees of echo through a tapped delay network, or adding white noise. The majority of the modules used in this composition come pre-installed in Max/MSP, and are available to any user.[14] A more detailed discussion of how electronics enhance the sounds in my composition will follow in the analysis section of this document.

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[12] I define ambience in this piece as the "mood" or effect created by specific voices, sometimes in the background. In cases like this, changes in phonemes, dynamics, or even pitch reflect how these background sounds develop.

[13] Naturally, there will be some gaps in sound as the singers shift between inhaling and exhaling. They should perform these vocalizations by breathing naturally, however, and can adjust their delivery as necessary to avoid discomfort (e.g., fainting).

[14] See appendix (p. 147) for details on how to access this patch.

The chosen panning module, designed by Jon Bellona,[15] controls the location of the stereo sound defined by the placement of the speakers. For instance, Bass 2's settings (channel 6) are far on the right, while the Soprano (channel 1) is far on the left. Tenor and Alto 2 are closer to the center. The panning module accepts these inputs and then mixes them down to a stereo output (master), as shown below in Figure 1. The specific location of sound and its amplitude can then be modified as needed. For the most part, the panning setup of the mixer will reflect the location of sound based on where the singers are standing, shown in Table 2 below.

Audience		
L Speaker	Mic 1 – Mic 2 – Mic 3 – Mic 4 – Mic 5 – Mic 6	R Speaker
	Soprano – Alto 1 – Alto 2 – Tenor – Bass 1 – Bass 2	

Table 2: Seating arrangement

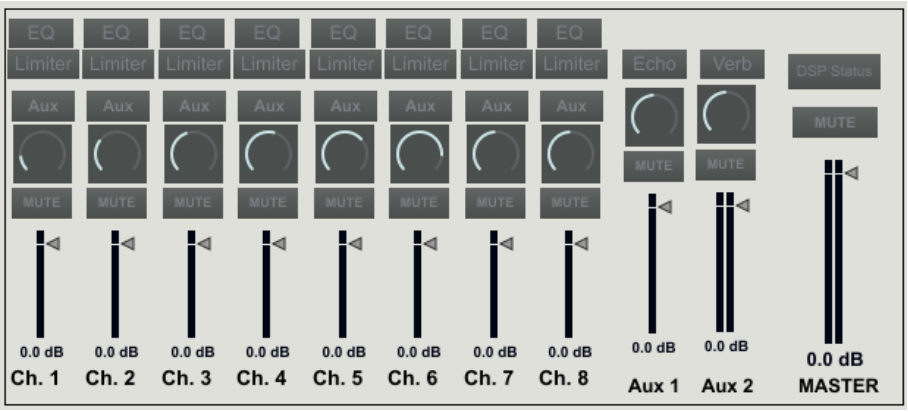

Figure 1: Mixer Module

For movements 2 and 3, I constructed a set of manual bypass toggles in Max/MSP for each of the six voices, because the plugins, if available, only allow a complete bypass of the

[15] Jon Bellona, "Mixer, a Max/MSP package," Vimeo video, 1:24, posted 29 December 2015: https://vimeo.com/150280590.

module. At times, there are certain voices that I did not want processed, so the manual bypass allowed the selected voice(s) to instead go directly to the audio output as unprocessed amplified sound.[16] Many electronic settings apply globally across all voices, while others only affect select voices. For instance, the first and final movements have discrete electroacoustic settings applied to each processed voice, while all voices in the second, third, and fourth movements are connected to the same electronic module.

2.3.1 Song of Awakening

In the opening movement, Tenor and Alto 2 are patched through a Max Plugin called "Max SpectralHarm," meaning Spectral Harmonizer, shown below as Figure 2. This is an FFT (Fast Fourier Transform) -based frequency shifter,[17] which "converts a signal into individual spectral components and thereby provides frequency information about the signal."[18] I use this module to generate a pitch overlay to non-pitched sounds like /S/ and /ʃ/. Both the left and right speakers are affected by two frequency shifters, labeled "ShiftL" and "ShiftR." These frequency shifters affect the sound of the signal that adds, or subtracts, Hz to produce artificial partials. "TransL" and "TransR" refer to transposition of the immediate sound that is output in semitones. For "DelayL" and "DelayR," one can choose the delay network to correspond to meter (from whole notes to sixteenth notes) by selecting the "Sync" option. Otherwise, the display indicates "Time" through which one can adjust the delay in milliseconds.

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[16] This excludes the light reverb applied to each microphone so that the amplified sound is not entirely dry.
[17] "Max 7 - Audio Effect Tools" *Cycling '74*, accessed 22 January 2018, https://docs.cycling74.com/max7/vignettes/live_audioexamples.
[18] "FFT Fast Fourier Transform," *NTI Audio*, accessed 22 January 2018, http://www.nti-audio.com/en/functions/fast-fourier-transform-fft.aspx.

Figure 2: Spectral Harmonizer Module

Comparing the processed sounds of Alto 2 and Tenor, it is worth noting that Alto 2 has slightly lower transposition levels at -8 (left speaker) and -6 (right speaker), compared to -2 (left) and 0 (right) in the Tenor. Regarding the frequency shifter settings, Alto 2 has a broader overall gap between two speakers (-50 Hz left, 70 Hz right) than Tenor (25 Hz left, -65 Hz right). Feedback is high in both voices (80%), meaning an extended echo follows each original sound. Processed sounds are also fully wet in both voices (100%).[19]

[19] Wetness refers to how much of an applied effect to a sound is heard in output. A high wetness setting means that processed sounds are highly audible, while low wetness means that processed sounds are not as audible.

2.3.2 Song of Morn

The processing in the second movement applies a Max plugin called "Multi Harmonizer" to all voices, with settings that change during the performance. This plugin is shown below in Figure 3. Cycling '74 explains that this module "uses the pitchshift~ object in a polyphonic patch structure, thus allowing multiple harmonizations. The DSP [Digital Audio Processing] part of the patch is embedded into a poly~ container, allowing [one] to load an open number of instances of a patcher file, and thus allows the use of polyphonic audio synthesis, audio processing, or even control tasks."[20] For "Vibrato," the settings indicate how vibrato is applied through differences in tuning, waveform type, and rate (depth, direction, type, amount). In the "Transp" section, one may connect a MIDI keyboard to activate different changes, with C_4 as "root." Pitches applied above or below the root harmonize the sound by that interval. Ten presets can be stored, as shown in numbers 1-10 above the keyboard, including the option to clear the "depressed" keys if needed. "Shift" allows the user to apply microtones on depressed keys measured through cents. The "Fade" setting indicates how long changes to the output sound are applied once new "keys" or presets are chosen.[21] "Spread" widens or narrows the stereo image of the sound where 0% is mono and 100% is very broad. Finally, the "Gain" fader on the far right controls the amplitude for the plugin, while the "Gain" dial underneath the keyboard sets the amplitude for the harmonizations specifically.

[20] "Max 7 Pitch and Time Machines," *Cycling '74*, accessed 22 January 2018, https://www.ableton.com/en/packs/max-7-pitch-and-time-machines/. The "~pitchshift" and "~poly" instructions are commands that users can type to initialize pitch shifting or polyphonic sound output options.
[21] This is also known as "Glide."

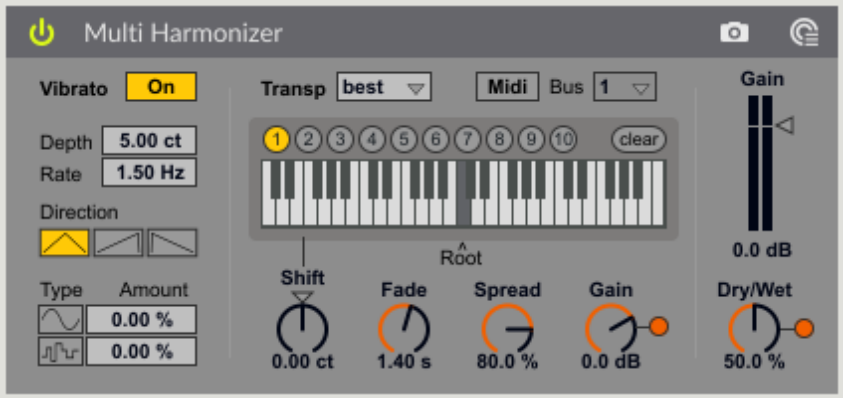


Figure 3: Multi Harmonizer Module

In this movement, my vibrato settings are minimal. I keep the default triangle wave, but set the depth and rate to low levels (5 cents and 1.50 Hz).[22] Fade at 1.4 seconds allows a smooth and slightly gradual transition from one preset to the next. The spread is high at 80%, meaning that the stereo signal will be broad. Harmonizations are 50% wet, meaning that the overall processed sounds should complement the live sounds but not overpower them. I apply five distinct harmonized presets applied for this movement:

1. Clear (nothing depressed, or C_4)
2. One depressed ($B\flat_3$, or one whole tone down)
3. Two depressed ($A\flat_3$, two whole tones down; E_4, two whole tones up)
4. Two depressed ($E\flat_3$, F_3)
5. One depressed ($D\flat_3$)

2.3.3 Song of Solicitude

The third movement makes use of the "Tapped Delay" Max plugin, which its designer Adam Schabtach describes as a "delay line with 16 equally spaced output taps [through which one] can adjust the output level and stereo position of each tap

[22] This ensures that the output sound mostly matches the input sound with regards to vibrato. Since there will be multiple pitches harmonized, less vibrato is better so as not to negatively affect each singer's tuning.

independently."[23] This plugin allows randomization of the amplitude levels and stereophonic panning. Please refer to Figure 4 below for a representation of this. For note values (shown as "8n" in Figure 4), the rhythmic response of the delay network is reflected specifically by the tempo inserted ("100.00").

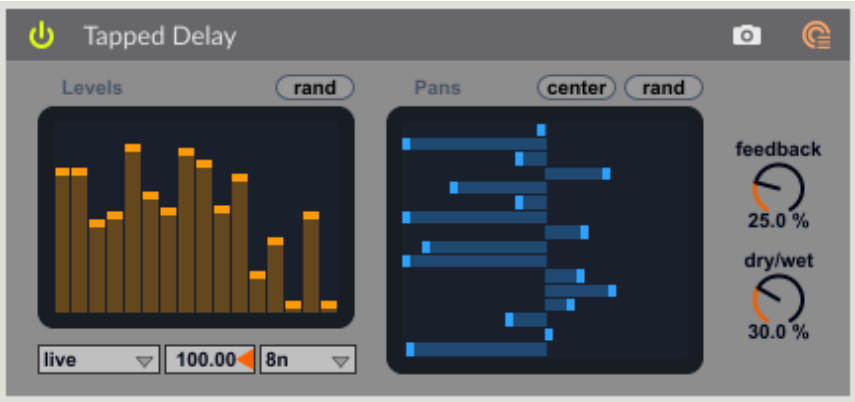


Figure 4: Tapped Delay Module

In this movement, I occasionally utilize specific off-beat note values such as dotted quarter notes (4nd) or half note triplets (2nt), while there are other values that are less disruptive to the pulse, such as eighth notes (8n) and quarter notes (4n). "Pan" (stereo) and "Levels" (amplitude) will be randomized ("rand") in certain sections to shape how sound is processed and output. Feedback and wetness settings are moderately low so as to prevent the electronics from becoming too overbearing.

[23] "Tapped Delay," *Pluggo Plug-in Reference Guide* (2003), http://cycling74.s3.amazonaws.com/download/Pluggo31PlugInsRef.pdf, pp. 215-216.

2.3.4 Song of Loss

In the fourth movement, I apply the "Space Echo" plugin, which was inspired by the tape delay/reverb capabilities of the Roland RE-201 (also known as "Space Echo").[24] This plugin simulates the analog echo effects produced by the Roland RE-201, whereby "a small loop of tape records an incoming signal and immediately plays the recorded sound back over a couple playback heads before being erased over by new incoming audio."[25] This plugin has adjustable settings for a "warble" delay network which adds randomized fluctuations in pitch. This module is shown below as Figure 5. The "Delay" section contains dials that affect what is captured and processed. "Clipping" refers to how much clipping takes place in the tape delay feedback, with up to a maximum of one second between each clip. The clipping in this module is "analogous to the saturation that occurs with analog tape."[26] "Tape inertia" refers to the rate tape speed changes, with up to a maximum of eight seconds between each speed change. The "Warble" section signifies parts of the sound that are randomized. "Warble speed" denotes the rate at which tape playback speed is randomized, while "Warble amount" indicates the randomization of tape playback speed.[27] Like the "Tapped Delay" object used in movement three, these settings are also affected by tempo and note value, which are shown at the top of the module.

[24] "Space Echo," *Pluggo Plug-in Reference Guide*, p. 188.
[25] "Roland RE-201 Space Echo," *Vintage Synth Explorer*, accessed 22 January 2018, www.vintagesynth.com/roland/re201.php.
[26] "Space Echo," p. 188.
[27] Ibid.

Figure 5: Space Echo Module

Changes to the settings that occur throughout the movement involve the feedback rate, dry/wet levels, reverb time, reverb levels, and note duration. In this movement, I use 1n (whole note), 2n (half note), and 8n (eighth note).

2.3.5 Song of Traversal

I use two plugins in the fifth movement. Five of the voices are processed with the "Simple Pitch Shifter" plugin, which is shown below as Figure 6. For the Soprano, Altos 1 & 2, Tenor, and Bass 1, discrete settings create a specific ambience. The transposition applied to non-pitched sounds generates overlays of pitch similar to the way that electronics add pitch to non-pitched vocalizations in the first movement. The upper four voices (S, A1, A2, T) have the following settings: Soprano at +550 cents, Alto 1 at +330 cents, Alto 2 at +200 cents, and Tenor at -100 cents. Basses 1 and 2 have the most active parts; moreover, to enrich the low register, Bass 1 sounds at -520 cents. All parts share the same "Glide" settings, which at 125 milliseconds are brief. This affects the time it takes to move from one processed sound to another, mildly smoothing the transition from pitch to pitch.

Figure 6: Simple Pitch Shifter Module

Bass 2 has a separate set of processing applied through the "Noyzckippr" module ("noise skipper"), which is shown below as Figure 7. This module multiplies the input signal times bandpass-filtered white noise in order to produce diverse non-linear effects.[28] The plugin thus adds white noise to Bass 2, whose part consists of very low pitch material to the point that the sound should be nearly non-pitched. The "Noise Input Gain" setting (between 0-7) refers to the noise's amplitude before it is filtered through the bandpass, where both it and "Noise Output Gain" (between 0-1200) must have settings greater than 0.[29] "Noise Center Freq." (between 0-4000 Hz) sets the center frequency of the bandpass filter that is applied to the white noise. "Noise Q" (between 0-80) sets the amount of resonance, also known as "Q Factor" of the bandpass filter. Lower settings distort the clarity of the incoming source signal which also heavily increases the output levels.[30] "Noise Output Gain" refers to the strength of the output noise, since it sets the gain on the noise filtered through the bandpass before multiplying the input signal.[31]

[28] "Noyzckippr," *Pluggo Plug-in Reference Guide*, p. 130.
[29] Ibid. If one of these settings is at 0, then the sound will not be affected.
[30] Ibid.
[31] Ibid. This setting also seems to add background noise separately from the above-mentioned settings.

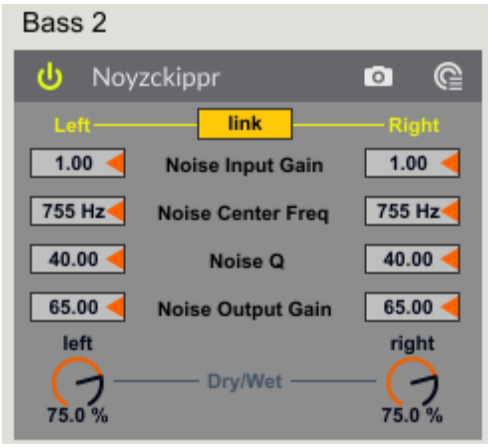


Figure 7: Noyzckippr Module

For this movement, "Noise Input Gain" is set to 1, which means that the amplitude of noise is minimal before it is filtered through the bandpass. I set the "Noise Output Gain" to 65, which is also low. "Noise Q" is set to 40, demonstrating moderate resonance of the filtered noise. I have set "Noise Center Freq." to 755 Hz, meaning that processed sounds will occur either near or on that frequency. The overall sound is mostly wet, set to 75%. Although it is possible for the user to have separate settings for each speaker, I have set both speakers to carry identical settings.[32]

[32] The Mixer module already takes the placement of Bass 2 into consideration, and any adjustments that offsets one speaker in this module will likely not create as impactful a result unless there are considerable extremes in the settings of each speaker setting in the Noyzckippr module. This would otherwise disrupt the balance of ambience I look to create in this movement. I discuss the specific ambience in this movement in Chapter 3.2.5.

3 Analysis of Composition

3.1 Overview

This analysis discusses the compatibility of my piece with my chosen methodology, and offers a breakdown of important salient events within each movement. First, I address the piece's formal design, including the breakdown of the timbres and vocal techniques each movement explores. The analysis of the composition follows.

3.2 Song Structure and Analysis

The composition consists of five distinct songs, each of which carries its own theme. The songs are titled "Song of Awakening," "Song of Morn," "Song of Solicitude," "Song of Loss," and "Song of Traversal." Together, the titles suggest a narrative: someone or something awakens, becomes active in the morning, shows concern, loses something or someone of importance, and moves on. Who or what experiences this progression is something I intentionally left ambiguous, leaving listeners to draw their own conclusions. Each song contains discrete sonic events as relates to motive, pitch, harmony, rhythm, etc., the specifics of which I discuss in the analysis below. As pertains to my composition, there are three sound types that I apply: non-pitched, pitched, and somewhere in between (*Sprechstimme*, for example). In each movement of my piece, I cover at least two of these types, with sound types not covered by voices produced instead by electronics, and sound types not covered by electronics produced by voices. Table 3 below is an overview of the sonic events I explore in each movement, as well as remarks on the vocal techniques and sound types I applied.

1. Song of Awakening
    a. Timbres consist of mostly non-pitched vocalizations, with pitch overlay provided by electronics.
    b. Vocal techniques include: breathing (both inhaling and exhaling) on non-pitched phonemes; countenance, which affects the sound of certain phonemes to shape the timbre.
2. Song of Morn
    a. Timbres consist of mostly pitched vocalizations, with added harmonic content through use of the harmonizer.
    b. Vocal techniques include: glissandi, plus a husked, growling-type sound heard in bass voices towards the end.
3. Song of Solicitude
    a. Timbres consist of mostly non-pitched vocalizations, with added pitch elements, combined with a delay network that randomizes panning and amplitude levels.
    b. Vocal techniques include whispering, breathing, *Sprechstimme*, glissandi, heavy vibrato, some tremolo, and a combination of non-pitched vocals plus tones that carry unstable pitch/tuning.
4. Song of Loss
    a. Timbres consist of pitched vocalizations, harmonic language composed using trichords, tetrachords, and hexachords, combined with a warble delay network that densifies and detunes various harmonies.
    b. Vocal techniques include: conventional singing on staggered entries with discrete regions of homophony.
5. Song of Traversal
    a. Timbres consist of mostly non-pitched vocalizations except for Bass 2; non-pitched vocalizations containing discrete electroacoustic settings which add an overlay of pitch as Bass 2's electronics apply noise.
    b. Vocal techniques include: breathing, whispering, and a husked, growling-type timbre in Bass 2 throughout.

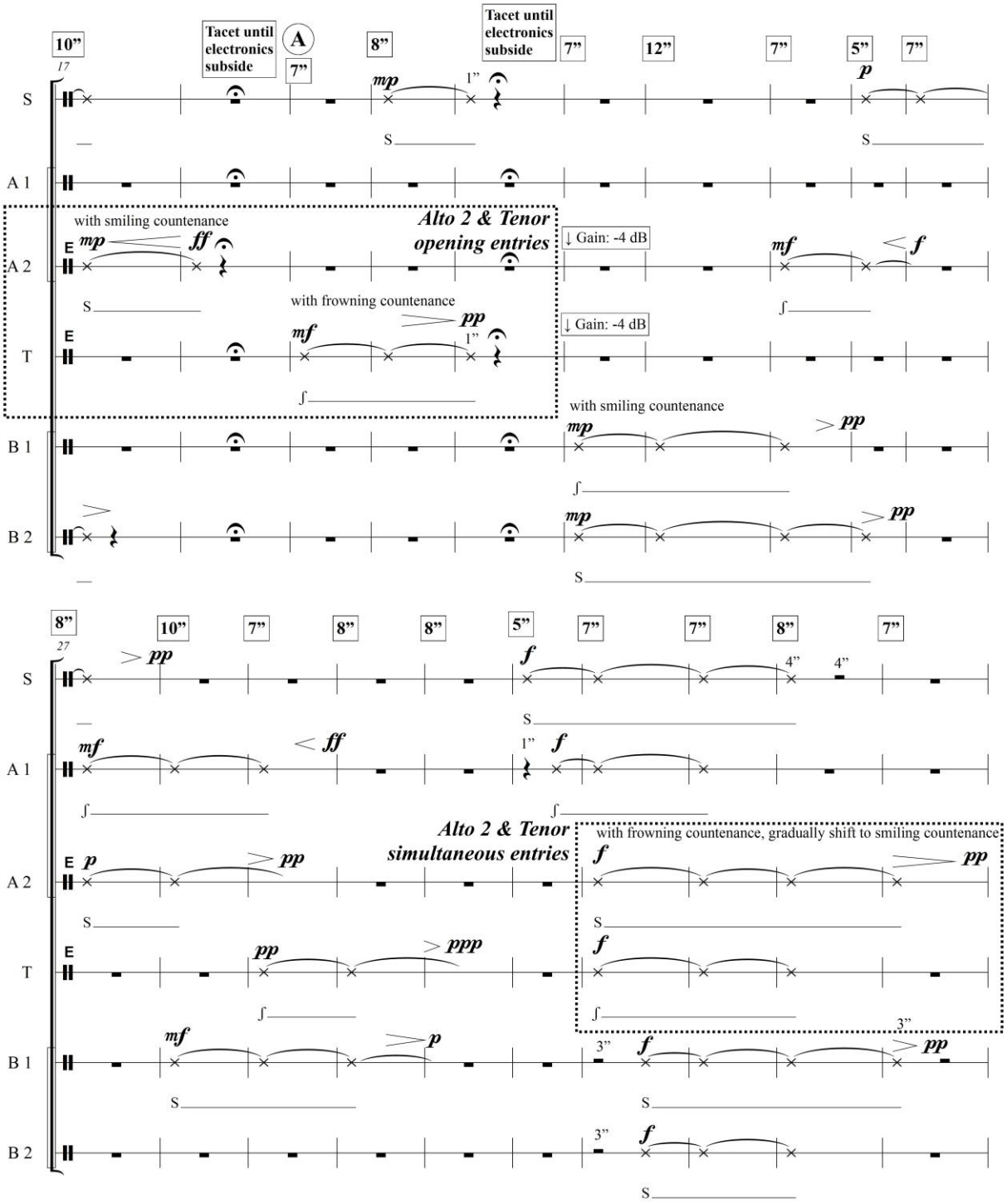
Table 3: Outline of sonic events in each movement

3.2.1 Song of Awakening

The opening movement is a prelude, insofar as “awakening” suggests an emerging or summoning. This movement uses exclusively non-pitched vocalizations, and builds an ambience with pitch overlay that is generated by live electronics in two of the six voices (Tenor and Alto 2). The only phonemes used in this movement are /ʃ/ and /S/. This song is built with sustained, unremitting sound, which requires the singers to incorporate continuous breathing; they produce sounds on their written phonemes while inhaling and exhaling. This ensures continuous sound and transforms timbre, as inhaled sounds produce a different colour than exhaled sound. Singers also apply modulations in facial countenance, a technique I use in only this movement. Together, breathing and countenance bring shape to these phonemes, which affects the timbre. The score design is comprised of both time notation (in seconds) and standard meter. This design illustrates two contrasting ideas of duration. For the time notation, sounds are sustained for long periods of time, while metered sections are mostly comprised of shorter durations. I emphasize many attacks in the metered sections through accents and articulations, while entries in time notation go through gradual, progressive changes in dynamics.

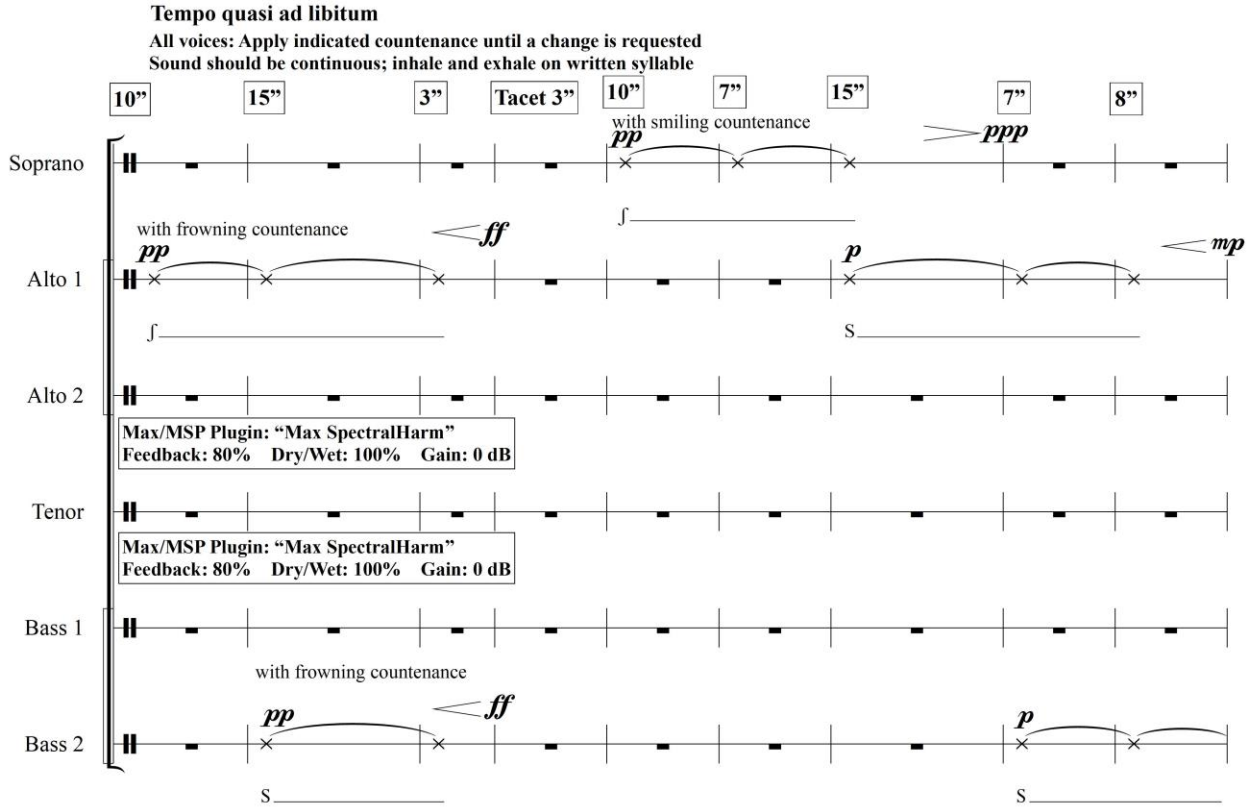
The electronics in this movement transform select non-pitched sounds by generating an overlay of pitch, affecting both the live sound (modified with transposition), and the background sound (processed through feedback and frequency shifter settings [in Hz]). The feedback settings also allow sounds to resonate for extended periods of time, allowing continuous sound to linger longer in the texture. As Example 1 shows, Alto 2 and Tenor first sound separately (mm. 17-21), but they later enter simultaneously (mm. 33-36). The staggered entries with electronics affect the music by eventually leading to processed sounds, which results in the temporary unification of pitch and non-pitch (as all voices are present

between mm. 33-35). For this three-measure period, these simultaneous entries create the richest texture in the movement.



Example 1: Song of Awakening, mm. 17-36

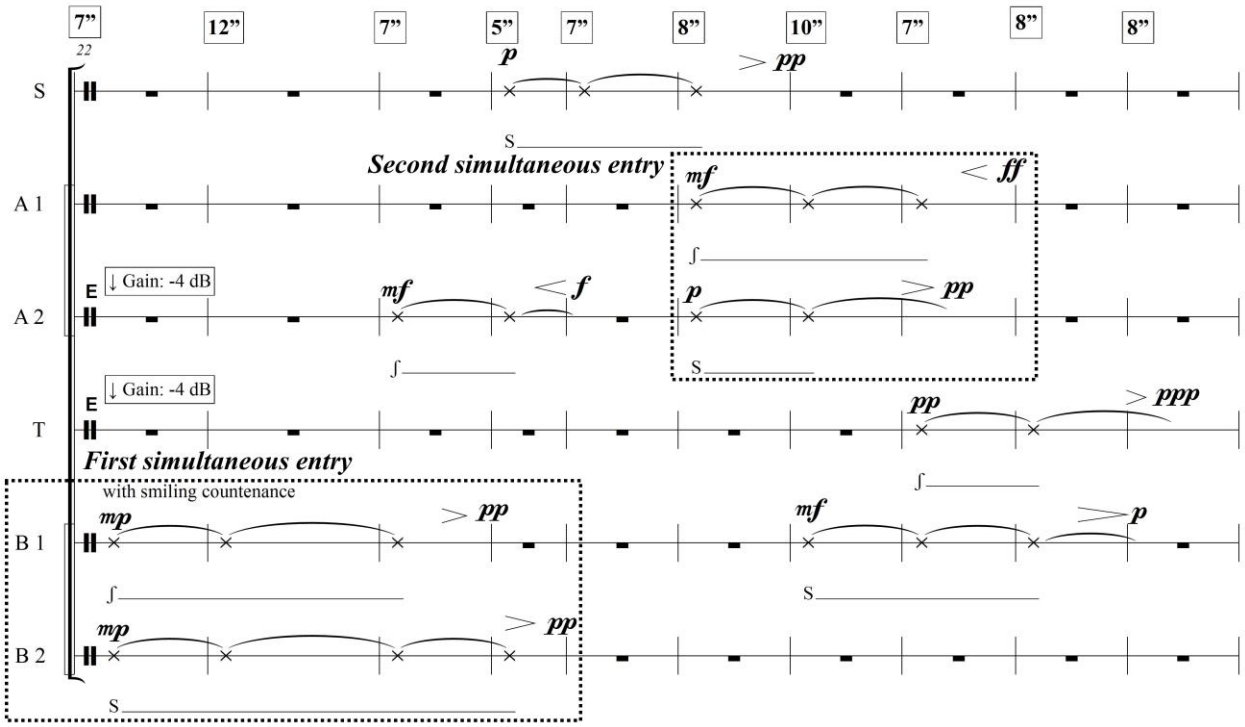
The movement opens with Alto 1 sounding on /ʃ/ for the first 10 seconds. Alto 1 is then joined by Bass 2 on /S/ for the following 18 seconds. Both voices are on a frowning countenance, which produces a sound that is deficient in upper frequencies (compared to a smiling countenance). Not long after, Soprano is alone on /ʃ/ on a smiling countenance, creating a brighter sound than Alto 1's and Bass 2's. Immediately, both phonemes and both countenances demonstrate the vocalized sounds I develop in this movement. Moreover, these opening measures allude to the general ambience expected in this movement before the electronics enter. See Example 2 for the first nine measures of this movement.



Example 2: Song of Awakening, mm. 1-9

Simultaneous entries first occur in m. 22 in Basses 1 and 2. These entries contrast with the staggered entries to further transform the ambience. Together, they act as a harbinger of metered sections that are also comprised of simultaneous entries. This simultaneity is illustrated in Example 3 below. Example 3 also illustrates how Altos 1 and 2 mimic the

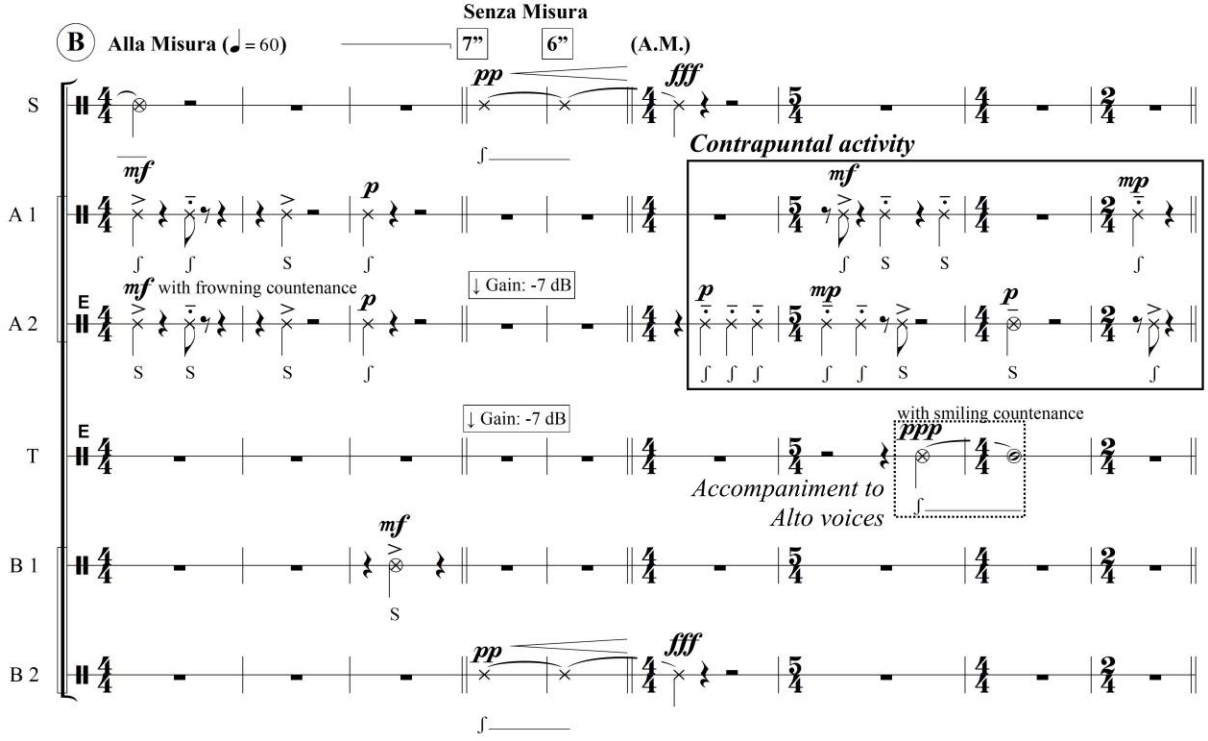
simultaneous entries of Basses 1 and 2, with their entry taking place one measure after Bass 2 finishes (m. 27). The simultaneous entry reveals considerable differences in dynamics, insofar as Alto 1 begins on *mf* and applies a *crescendo* until it reaches *ff* two measures later, and Alto 2 starts on *p* and reaches *pp* by the end of their passage. By contrast, the Bass entries do not have this type of shaping, as they each start on *mp* and finish on *pp*. The simultaneities of Alto 1 and 2 demonstrate how the electronics in Alto 2 apply a quiet pitch overlay to accompany the dry sound in Alto 1, thereby enhancing the texture in ways that the dry Bass voices cannot.



Example 3: Song of Awakening, mm. 22-31

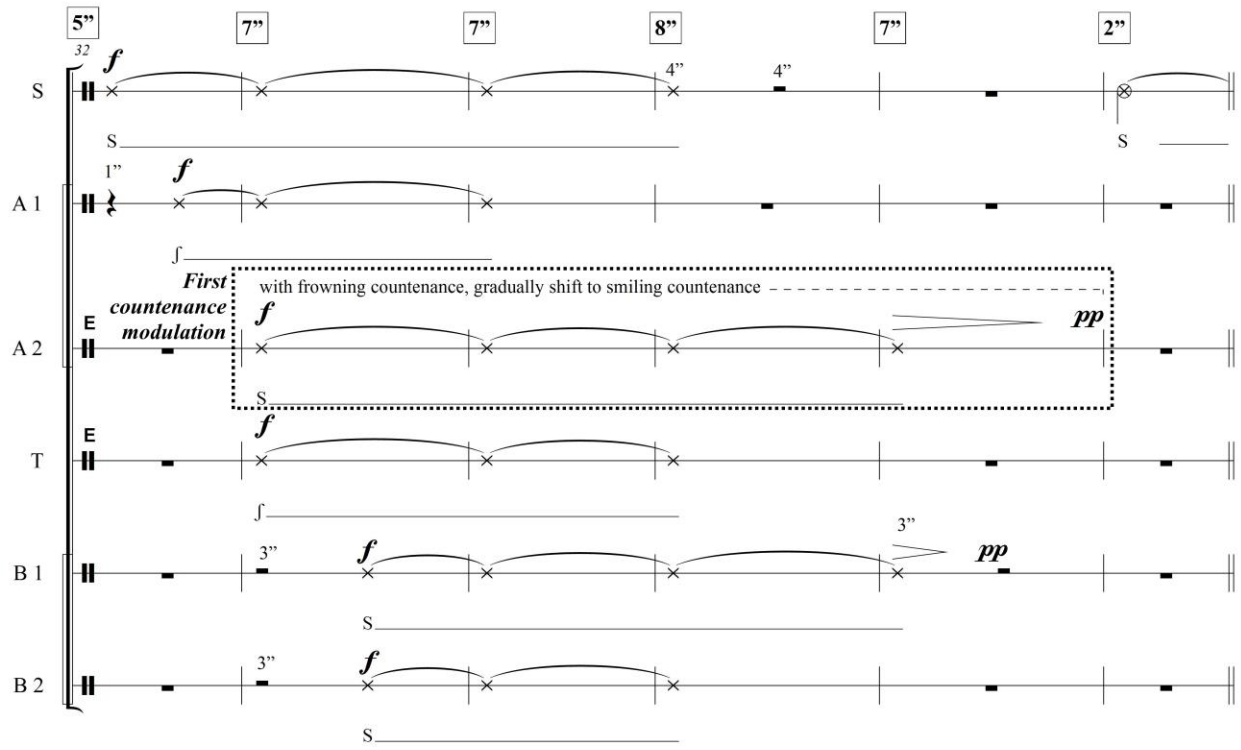
The first metered section of this movement is in m. 38, which consists of homophony between Altos 1 and 2. Both voices gradually diverge into counterpoint, as shown in m. 43, which alludes to the opening, staggered entry of the voices. This is illustrated in Example 4, and warrants comparison with Example 2. As Example 4 shows, many attacks in the metered section are short and have very specific articulations (such as accents, for example).

Furthermore, Example 4 also demonstrates the dialogue between metered and unmetered sections of the movement. After three metered measures between mm. 38-40, there are two unmetered measures (mm. 41-42), followed by another four metered measures (mm. 43-46). The short attacks in the metered sections are critical because they counteract the longer durations of unmetered sections, thereby allowing slight counterpoint to emerge. For example, during the second metered passage (mm. 43-46), longer notes in the Tenor in m. 44 take place alongside emerging counterpoint between the two Alto parts. These differences in duration affect the ambience in mm. 44-45, as the Tenor is at a very quiet dynamic level (*ppp*) compared to both Alto voices (*p*). In turn, this very low dynamic level in the Tenor causes the notes of longer duration to be temporarily allocated to the background while the shorter durations in counterpoint are brought to the fore. In this instance, the long notes function to accompany the counterpoint in both Alto voices.



Example 4: Song of Awakening, mm. 38-46

For the most part, countenances in this movement are set to either smiling or frowning, with a few instances in which one modulates into the other. I implement these modulations at key moments in the movement. The first example is in mm. 33-36 in Alto 2—shown below in Example 5—in which the vocalist starts with a frowning countenance and gradually transforms to a smiling countenance by the end of her entry (just under 30 seconds), while also applying a *diminuendo* in the final seven seconds. Here, the heavy sound slowly becomes lighter as the change in countenance allows higher frequencies of the phoneme (/S/) to pass through. This is a critical arrival point in the movement, because during this countenance change all voices are present (recall Example 1) at a loud dynamic level *(f)*, which they sustain for a relatively long time. These measures also function as transitional material, since they are soon after followed by metered sections (m. 38). In this way, the countenance modulation helps signal the conclusion of this movement's first section.

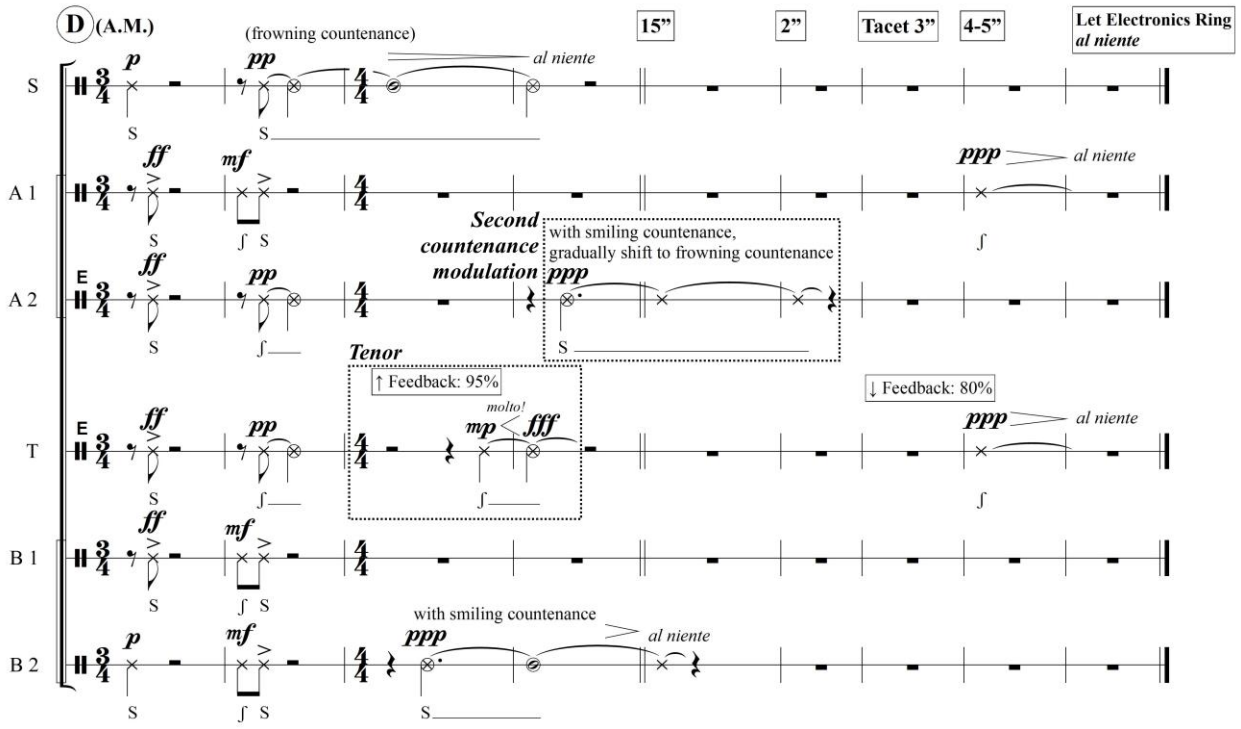


Example 5: Song of Awakening, mm. 32-37

The second moment of countenance modulation in this movement also signals an impending conclusion. This time, however, it indicates that the movement is about to end. Again, Alto 2 is the catalyst, albeit on a very quiet dynamic level (*ppp*). As Example 6 below demonstrates, the singer begins on a smiling countenance in m. 61 and slowly changes to a frowning countenance by m. 63. As such, the countenance filter gradually allows lower frequencies to emerge.

At this point in the movement, there are few voices present to counteract the short metered rhythmic attacks that take place between all voices in mm. 58-59. Moreover, this second countenance modulation is predicated upon a bold Tenor entry in mm. 60-61. In the Tenor, feedback settings increase to 95% (from 70% in m. 47), and his passage concludes on a very loud dynamic level (*fff*). The countenance change in Alto 2 may not be audible at first because it is in play while the Tenor's processed sounds fade away. However, m. 62 lasts for

15 seconds, so as the energy of the electronics dies down, Alto 2 becomes more noticeable. Alto 2 eventually becomes the only voice sounding (until it finishes in m. 63), and the change in countenance is apparent. This second countenance modulation comes at the dramatic climax of the movement, as increased feedback settings and very loud dynamics from the Tenor provide a considerable outburst of energy.[33] The following countenance modulation from Alto 2 brings a sense of calmness to the music while also signaling that the movement is about to conclude. One brief, final entry occurs between Alto 1 and Tenor in m. 66. Importantly, this final entry between a processed and non-processed voice denotes a decline in energy, as its duration is shorter (five seconds maximum) and very quiet (*ppp*) with both voices applying a *diminuendo* until silence. This marks the end of the first song.



Example 6: Song of Awakening, mm. 58-66

[33] In relation to the title of the movement, this intends to show the "awakening" is complete, as this is the loudest point of the movement and it ends shortly hereafter.

3.2.2 Song of Morn

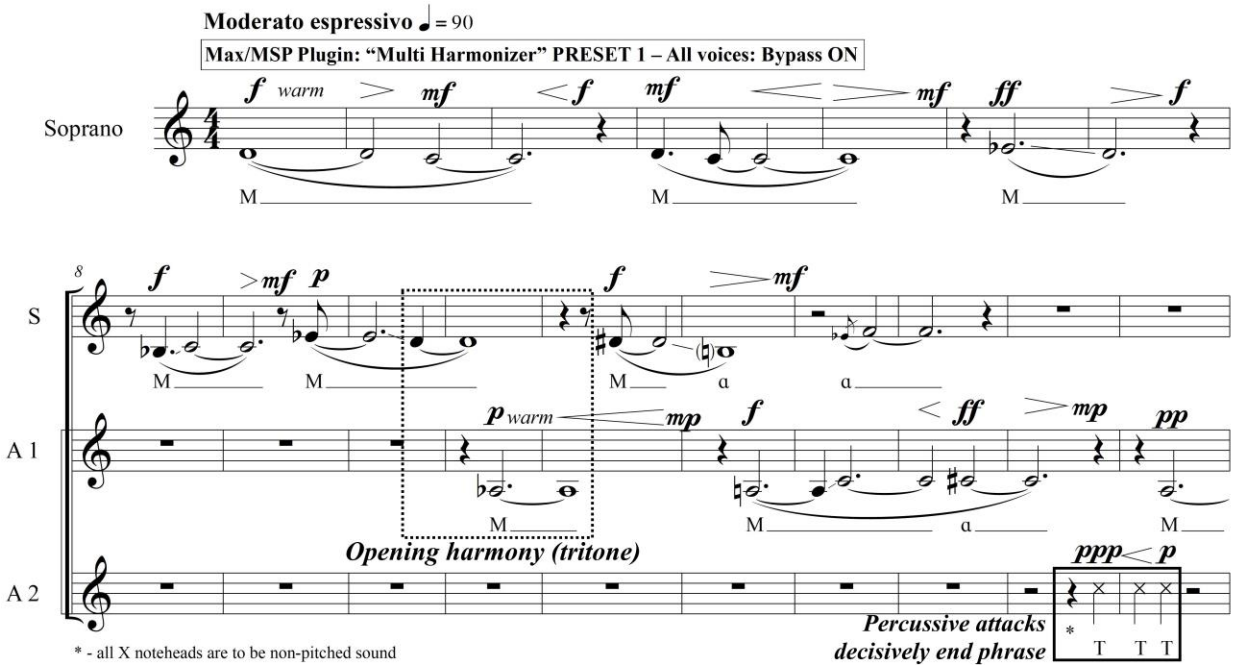
The term "Morn," employed in this movement's title, is a Middle English word meaning "morning."[34] I use "morn" in place of the modern "morning" because it conveys a sense of mystery that suits the abstract aesthetic of this composition. Structurally, "Song of Morn" features staggered entries that concentrate on vocalized pitch, with extra pitch produced by the harmonizer. Because of the six-voice ensemble, I was careful with my use of the harmonizer. I did not want clear melodic regions of the movement to be harmonized, so I created a manual bypass in the Max patch. The harmonizer works best when it is used on sustained notes more so than melodic regions. As such, most melodic sections of this movement are not processed.

The text in this movement consists of two nonsense words, /Maɪ/ and /Tʊ/. Most of the phonemes, except for /T/, are pitched, and much of the formal shape in this movement occurs via the development of a small number of pitches at a time. This allows me to develop melody and harmony in tandem with changes between phoneme or word. In addition, I use /T/ on its own to generate short percussive sounds, typically at the end of phrases. One feature of this movement is the use of brief motivic gestures (two to three pitches at a time), which develop into complete melodies when paired with consequent gestures.[35] This feature involves a technique that I have used for many years, in which I introduce a few pitches, and work with those before slowly adding other pitches either to one idea or as part of a different one. For example, I only use two pitches in the first five measures of this movement, D_4 and C_4 in the Soprano, before gradually implementing others. Many harmonies help build

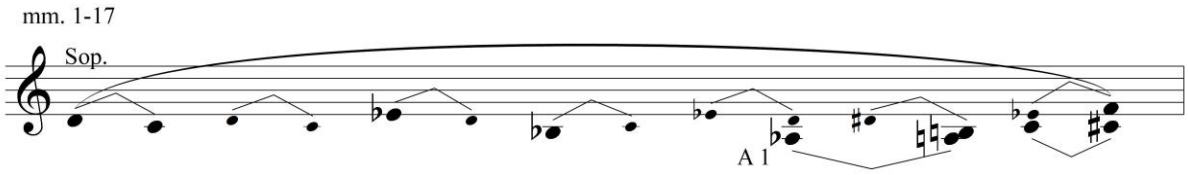
[34] *Oxford Dictionaries, s.v.* "morning," accessed March 15, 2018, https://en.oxforddictionaries.com/definition/morning.
[35] To extend, or enhance, some of the gestures, I apply glissandi on occasion, either in one voice or in succession with other voices. These in turn help build tension, particularly once the harmonizer is in play.

tension, as the opening harmony in m. 11 illustrates. Tritones, 2nds, 3rds, and 4ths are prevalent throughout and are often emphasized by two to three voices at a time. Generally, the types of harmonies heard in this song are contingent on how many voices are present. With more voices, the harmonies become richer and the texture becomes thicker. Likewise, with more voices comes greater tension.

The first complete phrase of this song takes place in mm. 1-16, illustrated as Example 7a. In this phrase, Soprano, which is low in register, highlights two pitches (D_4 and C_4) at first. Soprano is solo until the Alto 1 joins in m. 11 with an appearance that produces dissonant harmonies with the Soprano: $A♭_3$-D_4 in m. 11, and $A♮_3$-$B♮_3$ in m. 13. These all sound on /M/ until m. 13, when the first vowel phoneme appears on a new pitch: /ɑ/ on B♮. The appearance of this vowel sound is then used to push to the end of the phrase, which is solidified with three percussive attacks on /T/ in Alto 2 in mm. 16-17. Many phrases in this movement end with these percussive attacks, offering a slight respite before beginning another phrase. Example 7b outlines the pitch schematic that shows pitch development in Soprano and Alto. For example, the Soprano first concentrates on D_4-C_4 (mm. 1-5). In m. 6, a new pitch appears, $E♭_4$, which falls to D_4 in m. 7. Another new pitch appears in m. 8, $B♭_3$, which resolves upwards to C_4. I introduce $B♮_3$ in m. 13, which arrives via glissando on $D♯_4$, before eventually progressing to an ornamented $E♭_4$ (grace note) that then resolves to F_4 in the following measure. Example 7b also outlines similar activity in Alto 1, whereby its $A♭_3$ in m. 11 eventually rises to A♮ in m. 13, then applies an ascending glissando to C_4 in m. 14 before it ends the phrase by resolving upwards to $C♯_4$.



Example 7a: Song of Morn, mm. 1-17



Example 7b: Song of Morn, pitch schematic in Soprano and Alto 1 for mm. 1-17; larger noteheads denote new pitches introduced. Brackets show motivic gesturing on two pitches at a time, and the complete phrase is shown through phrase markings.

The next phrase in mm. 18-33 brings change, as there is now the inclusion of a third voice: Alto 2. As shown in Example 8a below, the Soprano voice in this second phrase focuses on long notes on E♭4 and G4 in mm. 18-20. After Soprano reaches another long note on E♭ in m. 22, Alto 2 enters with a long note of its own on A_3 while Alto 1 arrives on B_3 after producing a very long note on C♯4. All three voices then apply a crescendo to either *f* or *ff* before resting for one beat. This is a brief arrival point, but is crucial insofar as it produces the first heard trichord (A-B-E♭). Since a brief pause follows this trichord, I consider mm.

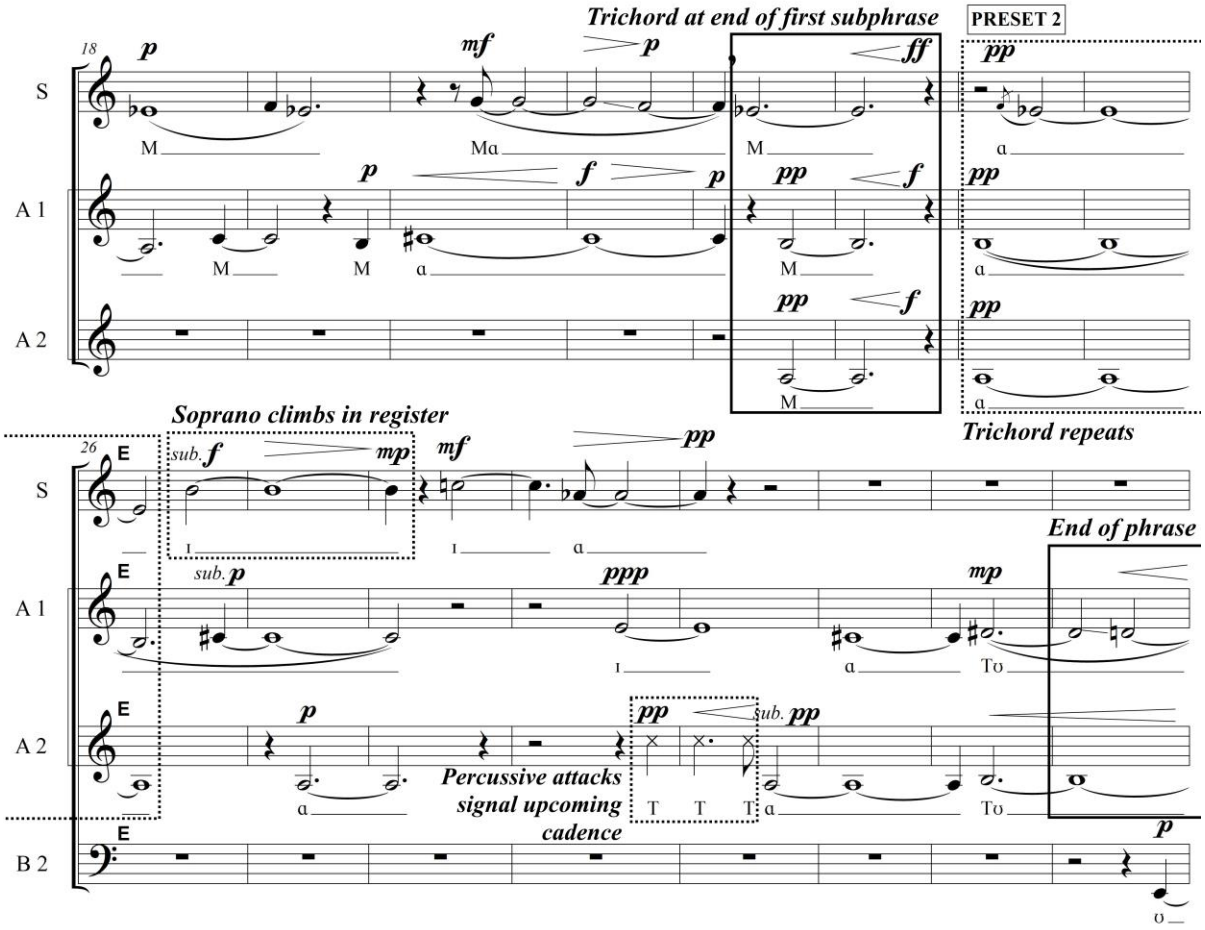
18-23 to be one subphrase, and mm. 24-33 a second subphrase. Because of the pertinence of the trichord introduced in m. 22, I immediately repeat it in m. 24 in order to start the next subphrase and sustain it until the second half of m. 26. This trichord involves further textual development, as the phoneme /ɪ/ first appears in m. 26 of the Soprano line. The appearance of /ɪ/ is emphasized by a leap in register to B_4, which is the highest note at this point in the song.

In Alto 2, mm. 29-30, the phrasing shifts with three attacks on /T/. Since they enter during long notes in Alto 1 and Soprano (E_4-$A♭_4$), these percussive attacks appear to signal the end of the phrase. However, Alto 2 continues the phrase by immediately sustaining A_3 on a long note until m. 31. This deceptive continuation leads to the simultaneous introduction of the syllable /Tʊ/ between both Alto voices in m. 32, which is sustained until the end of the phrase at the end of m. 33. The underlying pitch relationship and structure of the second phrase are shown in Example 8b. During mm. 18-33, the Soprano voice now includes up to three pitches per motive compared to just two in the opening 17 measures. The first notable instance of this takes place in mm. 20-22 where a long G_4 descends to F_4 and resolves to $E♭_4$ to end the first subphrase and introduce the trichord.[36] Example 8b shows both Alto voices concentrating on two-pitched motives, which, when combined, produce harmonies underneath the Soprano's melody after the trichord appears in m. 22. Harmonically, it outlines A_3-B_3 (mm. 22-26), A_3-$C♯_4$ (mm. 26-28 and 31-32), B_3-$D♯_4$ (mm. 32-33) and B_3-$D♮_4$ (mm. 33-34).[37] Comparing Example 8b to Example 7b, it is clear that many of these harmonies consist of recurring pitch material; as such, the Alto voices further integrate these

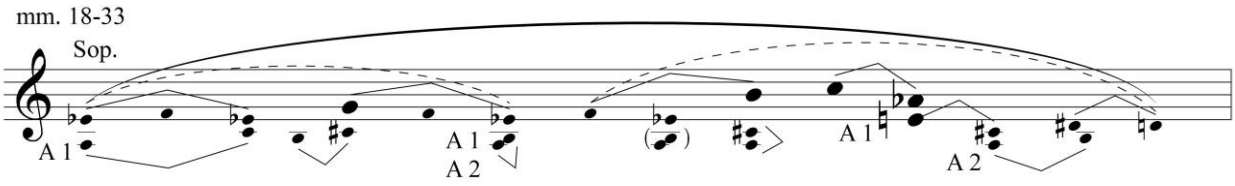
[36] The schematic outlines other instances of three-pitched motives in the Soprano, such as the neighbouring motion in mm. 18-19 ($E♭_4$-F_4-E_4), and the introduction to a register leap in mm. 24-26 (F4 [grace note]-$E♭_4$-B_4). I include the neighbouring motion since it is the first motive of its kind that is different from two-pitched motives.

[37] The schematic also considers horizontal activity between Alto 1 and Alto 2, although the resulting harmonies are likely more salient because their material mostly consists of long notes.

recurring pitches into the framework of the music, while the Soprano gradually introduces new pitches.



Example 8a: Song of Morn, mm. 18-33

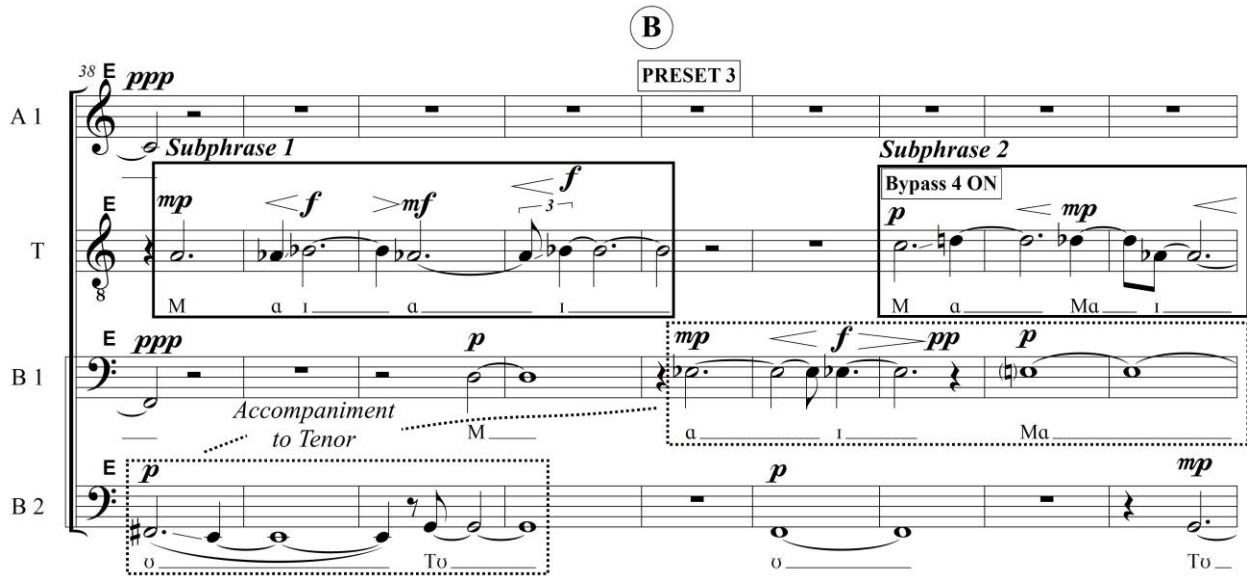


Example 8b: Song of Morn, pitch schematic in Soprano and Altos 1 and 2 for mm. 18-33.

The second section of this song begins in m. 34 with the appearance of more voices and electronics, resulting in greater development of harmonies. Here, Basses and Tenor enter for the first time. In mm. 38-39, contrary motion occurs between gestures in Tenor and Bass 2, both of which produce glissandi during their passages; this builds tension. The Tenor is the

most active in mm. 38-47, and has multiple glissandi during its melody; this is illustrated in Example 9. Much like the Soprano's opening melody, the Tenor's melody concentrates on select pitches: A_4, $A♭_4$, and $B♭_4$ in mm. 38-42, and C_5, D_5, and $D♭_5$ in mm. 44-45. These are all pitches that have been previously introduced, though the Tenor does make greater use of B♭ and A♭ compared with earlier phrases. With regards to the phrase structure, all active voices (Tenor and Basses 1 and 2) are mostly independent of one another and are generally in counterpoint. However, the bulk of this phrase is led by the Tenor voice, with the first subphrase in mm. 38-42, and the second, shorter subphrase in mm. 44-46. As the Tenor rests, Bass 1 applies considerable dynamic shaping, making an immediate push to *f* in the last half of m. 43, and then dropping down to *pp* in m. 46. In the second subphrase, Bass 1 attempts to resume or "take over" the Tenor's line, but its immediate dynamic descent shows that the Tenor's melody is not yet complete. This creates a brief dialogue between the two voices, introducing dramatic moments to the movement. Electronics (with Preset 3) enhance Basses 1 and 2 starting in m. 42. Each sung tone simultaneously generates a major 3rd below and a major 3rd above, resulting in an augmented triad.[38] These triads are particularly salient because of the dynamic shaping in Bass 1 and the low register of Bass 2, which sustains an F_3 between mm. 43-44[39] and sings G_3 from m. 46.[40] Effectively, the electronics harmonically transform the second subphrase, which thickens the texture and creates tension. Added harmonies (augmented triads) occur mid-phrase among increasing counterpoint to demonstrate the changing phrasing of this movement.

[38] Since Tenor carries the main melody, its line is not harmonized.
[39] This generates a D♭ augmented triad.
[40] This produces an E♭ augmented triad.

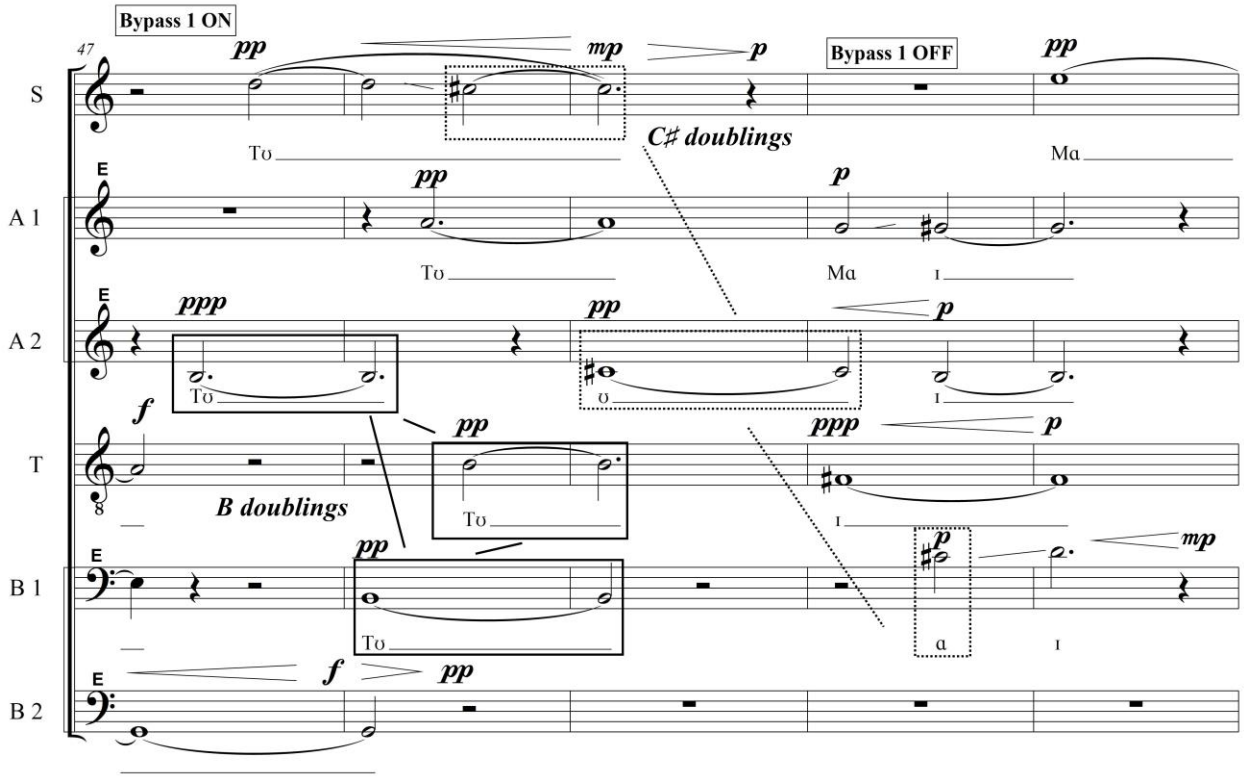


Example 9: Song of Morn, mm. 38-46

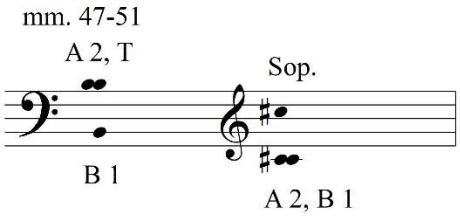
The emerging dialogue between the Tenor and Bass voices leads to a critical moment in mm. 47-51, the only region in the work in which all voices are active at once. Since Preset 3 is still active during this region, the harmonizer also creates some potent harmonies. This region is a significant arrival point that demonstrates the full intensity of harmonies, staggered entries, and electronics. In addition, in this region the Soprano is more consistently in the upper range (compared to earlier in the movement, like mm. 1-16), and the vocal lines are generally less melodic. Among these stronger harmonies, I compose doublings among certain voices.[41] For instance, in mm. 47-49, Alto 2 is on B_3 while Tenor and Bass 1 share B_2, and in mm. 48-50, Soprano is on $C\sharp_5$ (mm. 48-49), Alto 2 is on $C\sharp_4$ (mm. 49-50), and Bass 1 is on $C\sharp_4$ (m. 50). Example 10a shows these measures and indicates the doublings of B and C♯. Many of the intervals between the voices are 3rds, 4ths, or 6ths, which produce a small cluster of augmented triads (minus the Tenor, which bypasses processing, and Soprano, which bypasses processing until m. 50). Overall, this section emphasizes B and C♯, although

[41] The reason for this is to prevent the augmented triads from becoming too strong of a cluster, while at the same time helping the vocalists find their notes.

their significance may be subdued by the more prevalent harmonies. Indeed, it is likely that the difference in register between these two pitches becomes more distinct, as the relationship between the B_3 in Alto 2 and $C\sharp_5$ in the Soprano is a major 9th (m. 48), and the B_2-$C\sharp_4$ interval Bass 1 sings in mm. 48-50 is also a major 9th. Example 10b outlines all doublings. This section becomes the most harmonically intense of the movement, as all voices are present and many of them are processed by the harmonizer. Having all voices present creates an immediate impact in the music, resulting in building tensions. Because of the electronics, the texture becomes harmonically rich and intense, even at quiet dynamics (*mp-ppp*).

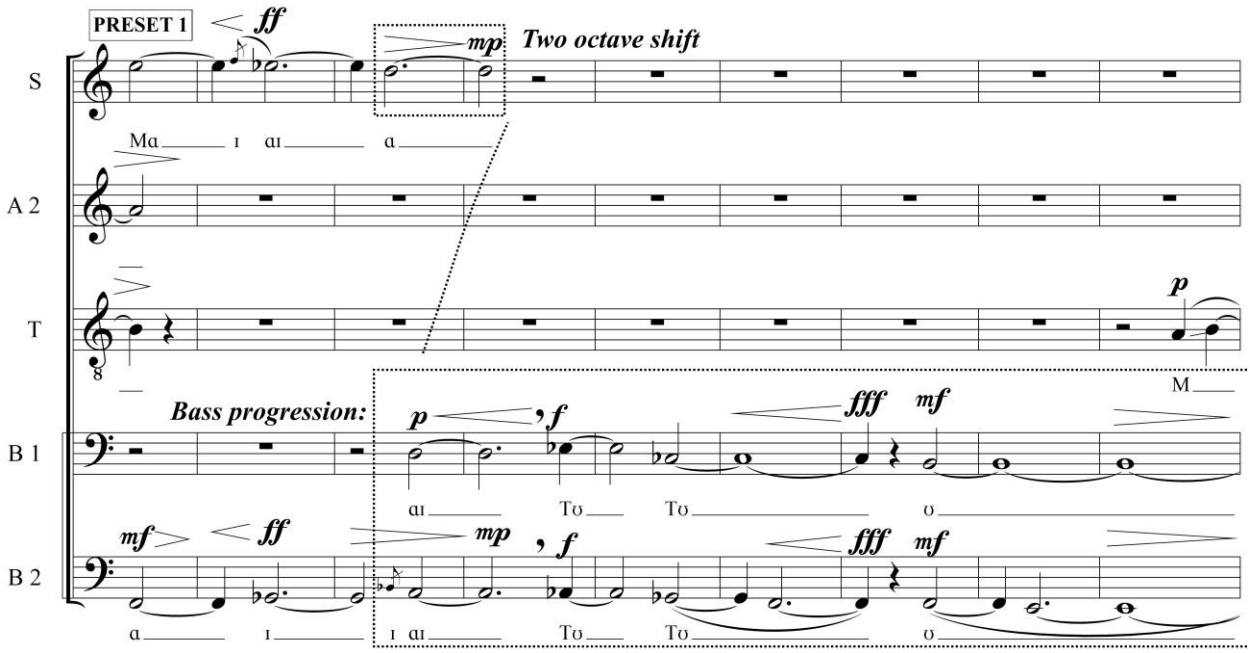


Example 10a: Song of Morn, mm. 47-51

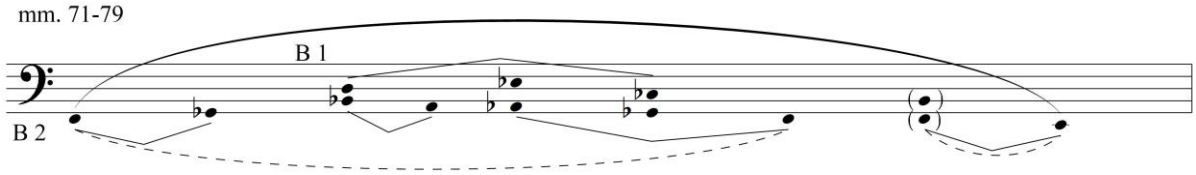


Example 10b: Song of Morn, pitch schematic for mm. 47-51 involving B and C♯ doublings

Measure 71, shown below as Example 11a, demonstrates registral extremes between Soprano 1 and Bass 2 as they move chromatically in contrary motion. Eventually the Soprano is interrupted and its part is continued by Basses 1 and 2. Both Bass voices then produce a series of 4^{ths}, 5^{ths}, and tritones in mm. 73-79. While Bass 1 was previously unable to continue a melodic passage (see Example 9), it is successful here. This is critical as now both Bass voices shape the phrasing. In addition, the phrasing includes open 4^{ths} and 5^{ths} which transform the harmony of the movement. The pitch schematic and phrasing for mm. 71-79 is outlined in Example 11b, and is similar to others with its short break between two subphrases. In this case, the break is between the tritone F-C♭ (or B♮) in mm. 76-77. This is an interval that I feel important to emphasize because of its intense quality, so I repeat it immediately after the quarter rest in m. 77 before resolving it by step down to E. However, as the schematic shows, the duration of these subphrases is shorter than those in Examples 8a/b and 9; this is a result of the structure of the song constantly transforming. It is also important to note that this is perhaps the most stable region of the movement, as there are no glissandi in either Bass voice and no processing from the harmonizer. Most harmonic tensions that arise resolve by step, thereby providing a resolution to the dramatically building tensions that have been persistent until this point of the work. Emphasis on the low Bass, therefore, resolves these tensions, and the section concludes shortly after as such.



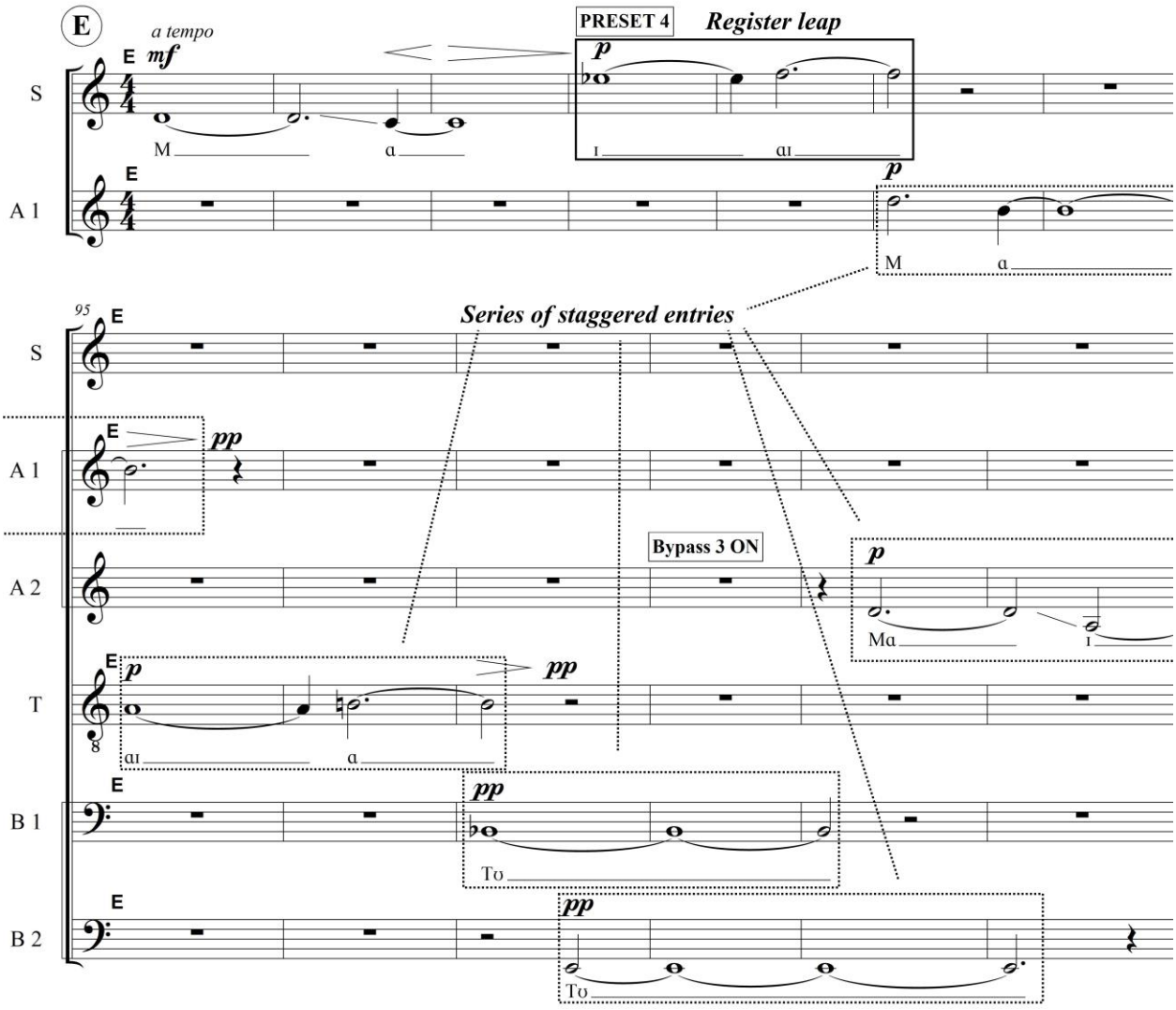
Example 11a: Song of Morn, second half m. 71 to m. 79



Example 11b: Song of Morn, pitch schematic for Basses 1 and 2 in mm. 71-79; repeated notes are placed in parenthesis.

The next section opens with a brief allusion to the opening gesture in m. 88 as Soprano sings D_4, and slides down to C_4. This descent alludes to the possibility of a recapitulation; however, in m. 91, the Soprano leaps upward near the top of her range on $E\flat_5$-F_5, and remains there until the end of the song. Staggered entries follow, with the Soprano passing to Alto 1 in m. 93, who then passes to the Tenor in m. 95, and finally to Bass 1 in m. 97, which is joined by Bass 2 on beat 3. The Basses sustain a single note in 97-100, and while there have been single entries of longer notes in this movement, this is the first time these particular notes have been sustained for an extended period. These long notes

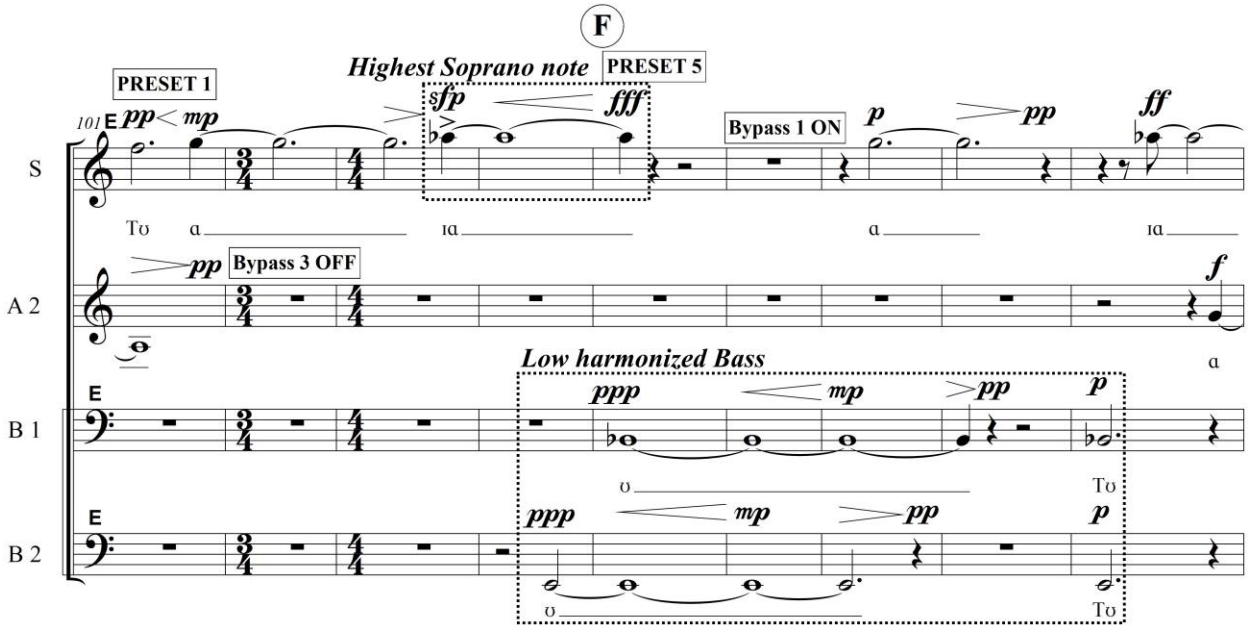
demonstrate a transformation to the texture, as the total number of pitches that are sung by vocal lines are considerably reduced. These are illustrated in Example 12.



Example 12: Song of Morn, mm. 88-100

The Soprano line reaches a focal point in m. 101, as it is in the highest part of its range on $A\flat_5$ in m. 103. This is shown in Example 13. This high point is significant since in mm. 104-105, the Basses join and use the lower parts of their register to emphasize a range gap not unlike what appeared in mm. 71-79 (Example 11a). This time, the range gap is much larger, and the Basses do not resolve the tension. Instead, they now build tension as new harmonizer

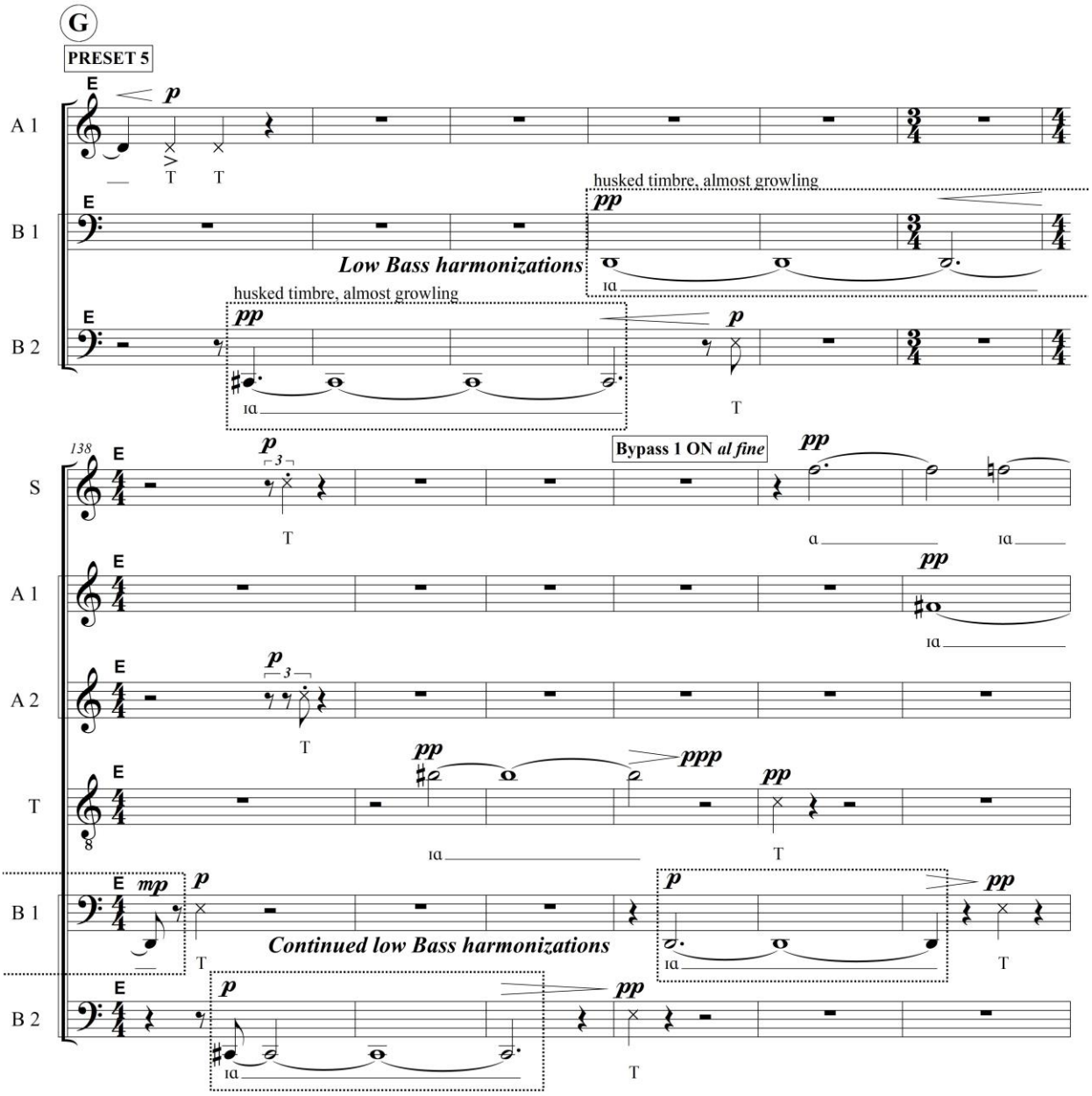
settings produce sounds a major 7th down (Preset 5), which significantly extends the low register.



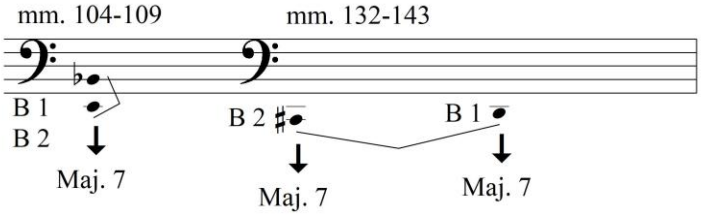
Example 13: Song of Morn, mm. 101-109

The harmonizer enriches low registers in mm. 105-112 and mm. 132-145. Preset 5 is active in the harmonizer in these regions during which all processed sounds produce a major 7th below the sounding pitch. These are most notable in the Bass voices since Preset 5 generates sounds below the range of both voices. This very low register helps build tension, particularly in mm. 105-109 (see Example 13 above), because of the considerable register gap between Bass 1 and Soprano. The E_2 in the Bass 2 simultaneously produces F_1, while the $B♭_2$ in Bass 1 simultaneously sounds B_1, and the Soprano bypasses processing. Moreover, the electronics also emphasize the notated tritone in mm. 105-107 and 109, which is a harmony commonly heard in this movement. The notion of low harmonized sound transforms somewhat in mm. 132-143 in the Basses. First, they are at their lowest in this region: $C♯_2$ and D_2. Second, the Basses do not produce these low sounds in harmony. Instead, they demonstrate a condensed idea of two pitches: each Bass voice concentrates only on one

pitch, but together they generate a complete idea of two pitches (excluding electronics). Importantly, the Basses apply a husked timbre that imitates growling, a new timbre which ultimately helps shape the texture. Paired with the harmonizer, the added major 7^{th} below enhances this desired growling effect, which may be more prominent due to its profound deepness. See Example 14a and the accompanying schematic in Example 14b which, in Basses 1 and 2, shows the harmonized tritone in mm. 104-109 and the staggered harmonized notes in mm. 132-143.



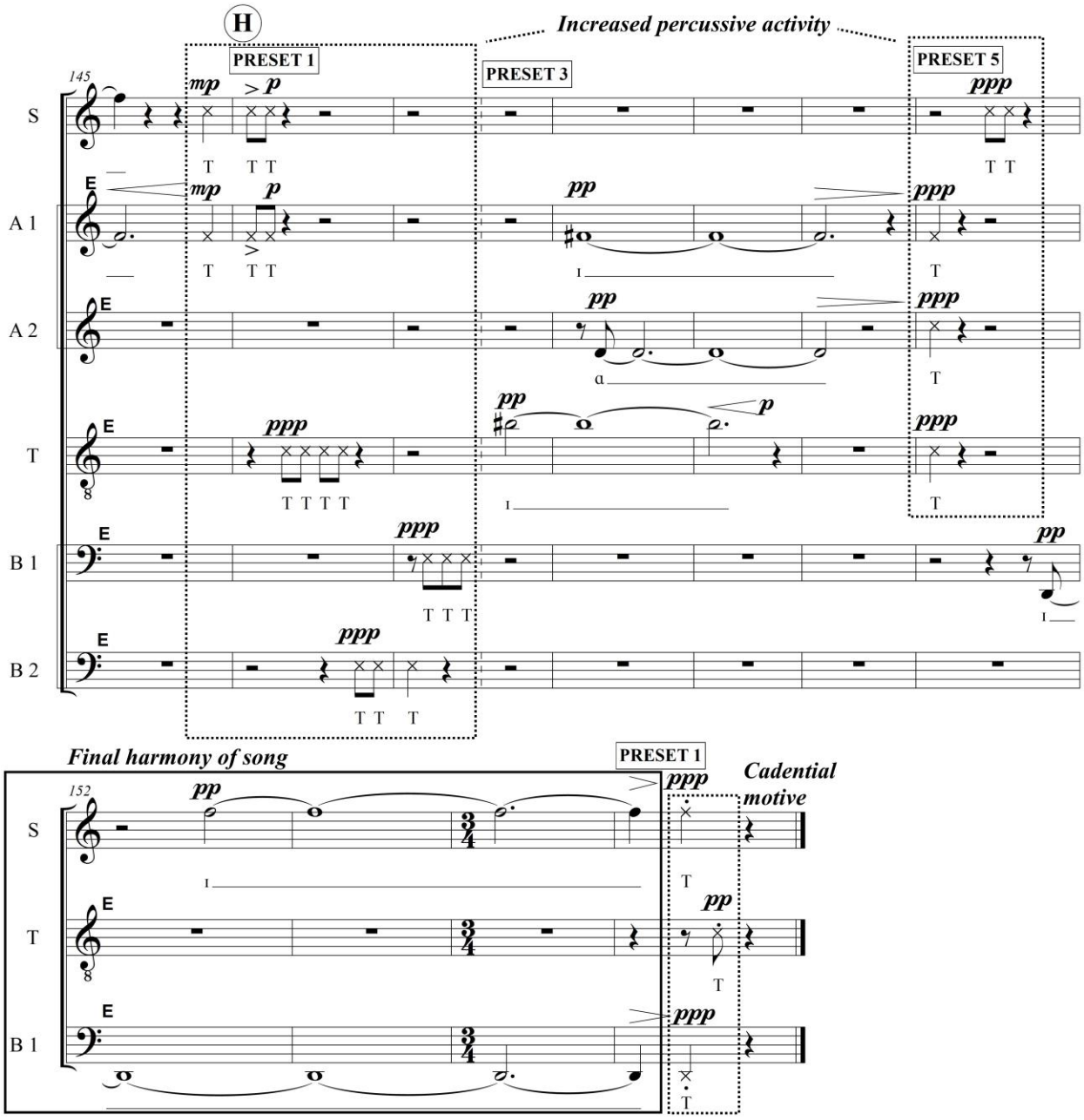
Example 14a: Song of Morn, mm. 132-143



Example 14b: Song of Morn, pitch schematic for Basses 1 and 2 in mm. 104-109 (Example 13) and 132-143. Each pitch shown is harmonized a major 7th down through electronics.

This near-growl sound is the first of its kind shown in this work, which signifies an important change in timbre and texture. This change is further emphasized by the sudden increase of percussive gestures in five of the six voices in mm. 146-147. These specific rhythmic gestures normally appear at the end of phrases, though here they appear with greater frequency and in quicker succession, which I use to transition into the movement's final measures. This is illustrated in Example 15. The conclusion of this movement continues to apply staggered entries on long notes that first became prominent in m. 88 (Example 12). The movement ends with a large range gap between Soprano and Bass 1 in mm. 152-155 that is not dissimilar to those in mm. 104-105 and mm. 142-143. It is important to note the final two pitches in this movement: F_5 in Soprano and D_2 in Bass 1 (mm. 152-155). The D in the Bass is slightly more prominent than the F, since its dynamic level at *pp* is slightly louder than *ppp* in the Soprano. This harmony is particularly long, and I return to Preset 5 (a major 7^{th} below) in the harmonizer settings to bring out lower bass tones. In addition, the extended harmony between Bass 1 and Soprano here slows the pace of the song as no other voices are present during these long notes. To solidify the end of the phrase and the movement, both voices end with a percussive attack on beat 2 in mm. 155, which is met with a single percussive attack in the Tenor on the second half of the same beat. The building percussive activity in mm. 145-147 and 151 is dramatically misleading, however, as it suggests a forthcoming climactic moment. Instead, the percussive activity helps conclude the movement. This is not necessarily anticlimactic, though, because the bass activity of mm. 71-87 has already resolved some of the movement's most intense melodic and harmonic sections.[42]

[42] It is possible to interpret this non-pitched activity on /T/ as foreshadowing, as the mostly non-pitched third movement is related to the flurry of activity here.



Example 15: Song of Morn, mm. 145-155

3.2.3 Song of Solicitude

This movement concentrates on mostly percussive vocalizations paired with a tapped delay network in the electronics. There are also moments where I particularly emphasize standard singing, *Sprechstimme*, and glissandi. One electronics aspect in this song is the randomness of stereophonic panning and amplitude levels. During some of the passages that

are processed, the rates at which sound repeats and moves from one speaker to the other will vary, since these settings are randomized at several points in the movement. Other parameters of the electronics will also go through periodic manipulations throughout, making this the busiest movement for the technician as they must also frequently implement manual bypass.

"Solicitude"—the title of this song—is meant to evoke a sense of anxiety. Any creative work provokes in its author a sense of self-reflection, which is an innately anxious state. Solicitude evokes in me a sense of overwhelming persistence, of feelings and impressions that recur ceaselessly; in this movement, I sought to replicate that effect on an aesthetic level. The randomness of the panning and amplitude levels reflect the sudden and destabilizing ways anxiety manifests itself, breaking down expected patterns and behaviours. Regarding the structure of material in this movement, I follow the gradual development and shaping as I did with the second movement. It starts with a single motive alluding to what this movement will explore, and immediately builds through the addition of more voices which are then enhanced by electronics.

I implement considerable wordplay with the phonemes in this movement. Here, I apply different combinations of sounds from the following phonemes: /T/, /S/, /K/, /P/, /F/, /ʃ/, /ʊ/, and /ɑ/, introducing the phonemes /K/, /P/, and /F/ into the composition. I combine many consonant phonemes in this movement, such as /Ts/ and /Tʃ/. Likewise, I combine consonant and vowel phonemes, such as /Tsʊ/, /Tʃʊ/, or /Kɑʃ/ to broaden the types of syllabic sounds I wish to develop. Much like movement two, I at times use single non-pitched consonants in repetitive scenarios. At first most of these sounds are on /P/, but later we also hear the /F/ phoneme. Important to note is my use of /F/ in this movement which is

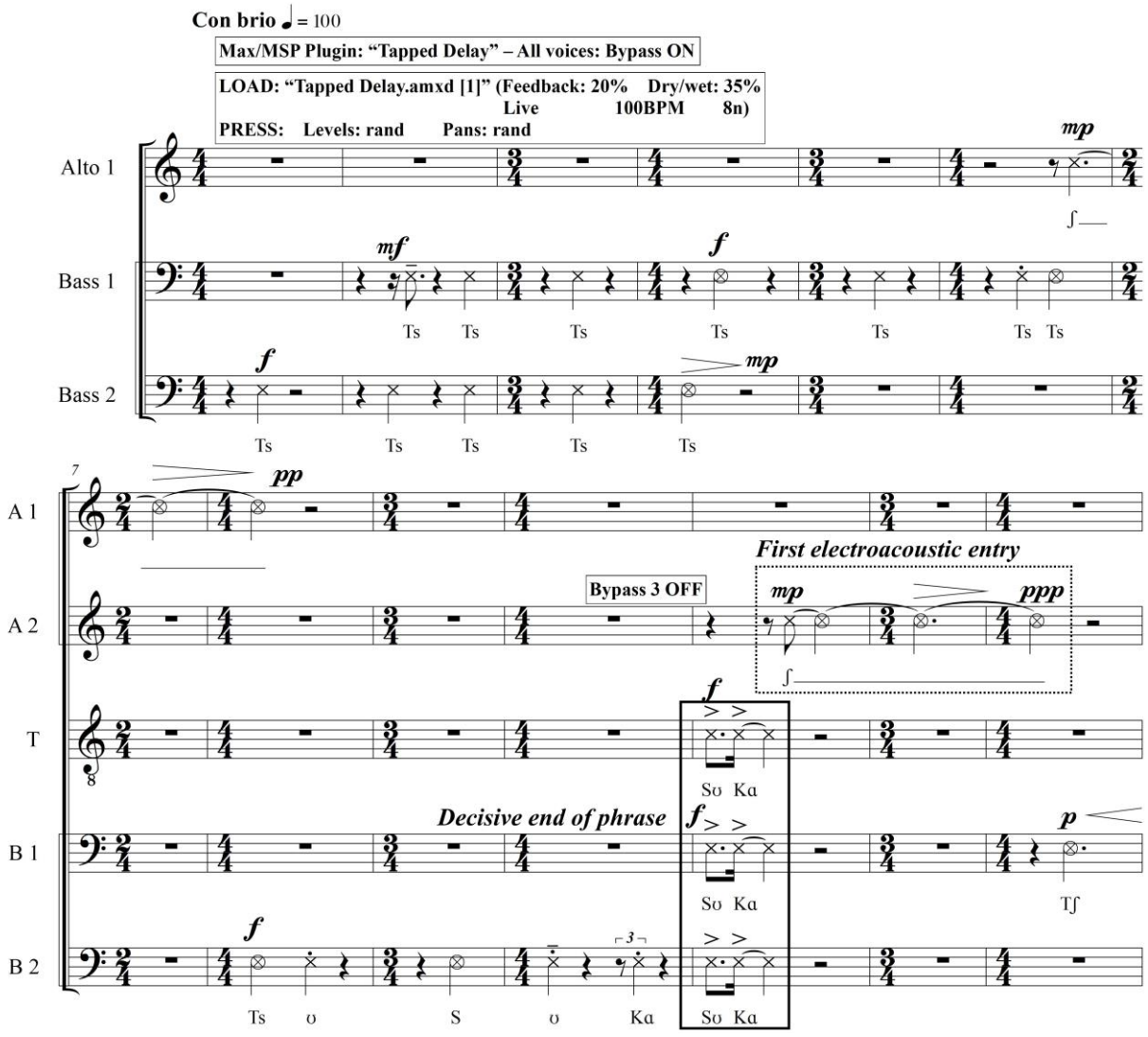
never used to create words with other phonemes; I use /F/ to help create transitions in this movement.

This movement is comprised of single entries, unison entries, and staggered entries not unlike other movements. Many of the attacks are brief, and some of the staggered entries create intricate counterpoint among more than one voice at a time. My focus on counterpoint combines elements of pulse and disruption of pulse to shift the pace and build dramatic tension. I build tension further by applying sudden changes in dynamics and adding articulations such as staccato and accents. This is a mostly non-pitched movement, with considerable syllabic and rhythmic repetitions that occur throughout. When pitch elements are present, they generally appear as gestures concentrating on two notes at a time. At first, these gestures appear as glissandi combined with *Sprechstimme* or heavy vibrato, but later, they are clear, normal tones.[43] Overall, the purpose of pitch is to contrast with non-pitched material.

The movement's opening consists of simple entries among a few voices, creating a pattern of pulsed single-note attacks with rests in between. Counterpoint takes place almost immediately after the opening entry, as shown below in Example 16. In the second measure, after the attack in Bass 2, Bass 1 responds on the off-beat causing a disruption in pulse. Alto 1 alters the texture upon its entry, because in mm. 6-8, they produce the /ʃ/ phoneme on a long duration.[44] This phoneme connects the end of one passage with the beginning of the next: once Alto 1's entrance completes in m. 13, Bass 1 begins the next phrase. A transformation involving /ʃ/ occurs in m. 11, and comes immediately after the unison

[43] This treatment of pitch is in line with how I use it in the second movement, though the total number of discrete pitches is considerably less.
[44] This can be heard as an allusion to the opening movement where long durations on this phoneme are prominent.

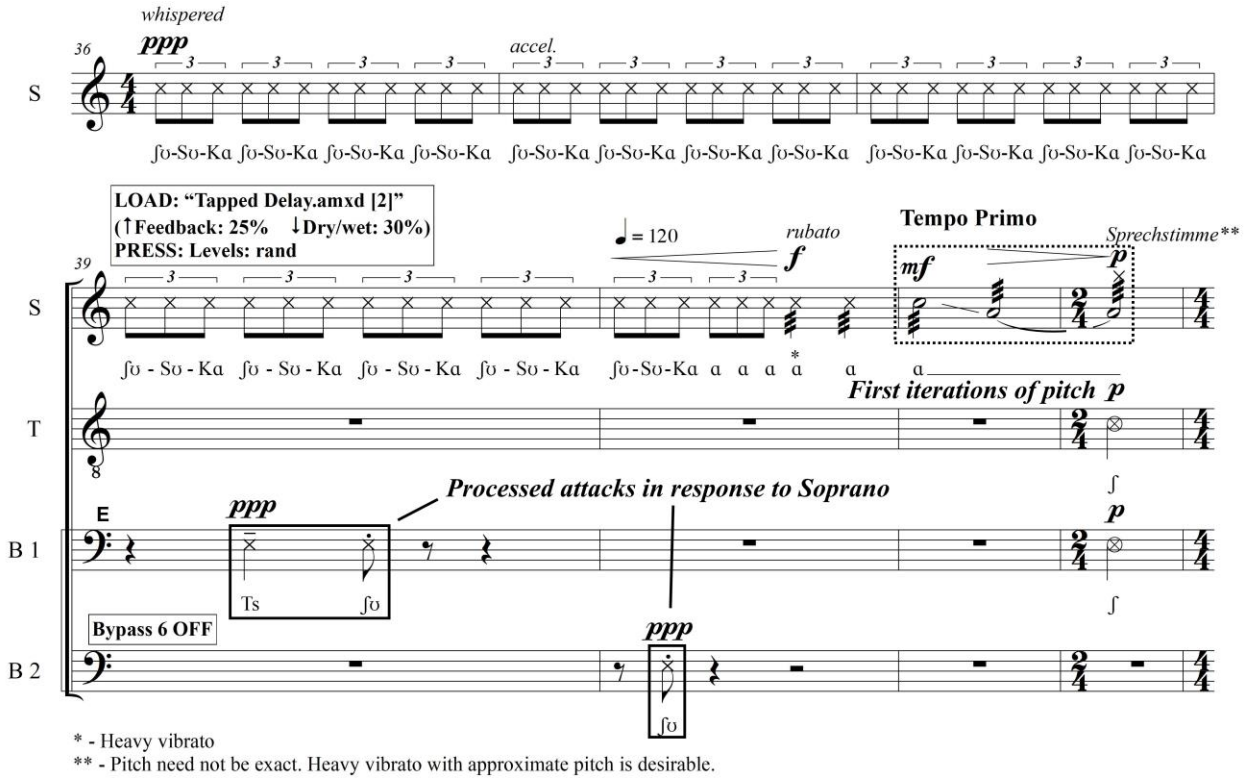
accented entries citing /ʃʊ/ and /Kɑ/ on the first beat of the bar. Three voices are used in this declaration (Tenor and the two Basses), but I immediately introduce the first processed sound of this movement on /ʃ/ in Alto 2. This measure functions as the catalyst that invokes electroacoustic activity, and thereby transforms the sound.



Example 16: Song of Solicitude, mm. 1-13

Alterations in texture continue as I introduce the first pitched elements of the composition. An example of this effect is shown in mm. 36-40 of Example 17. There the Soprano, while whispering, recites /ʃʊ-Sʊ-Kɑ/ on consecutive eighth-note triplets while applying *accelerando*. On the second beat of m. 40, the Soprano recites the /ɑ/ phoneme

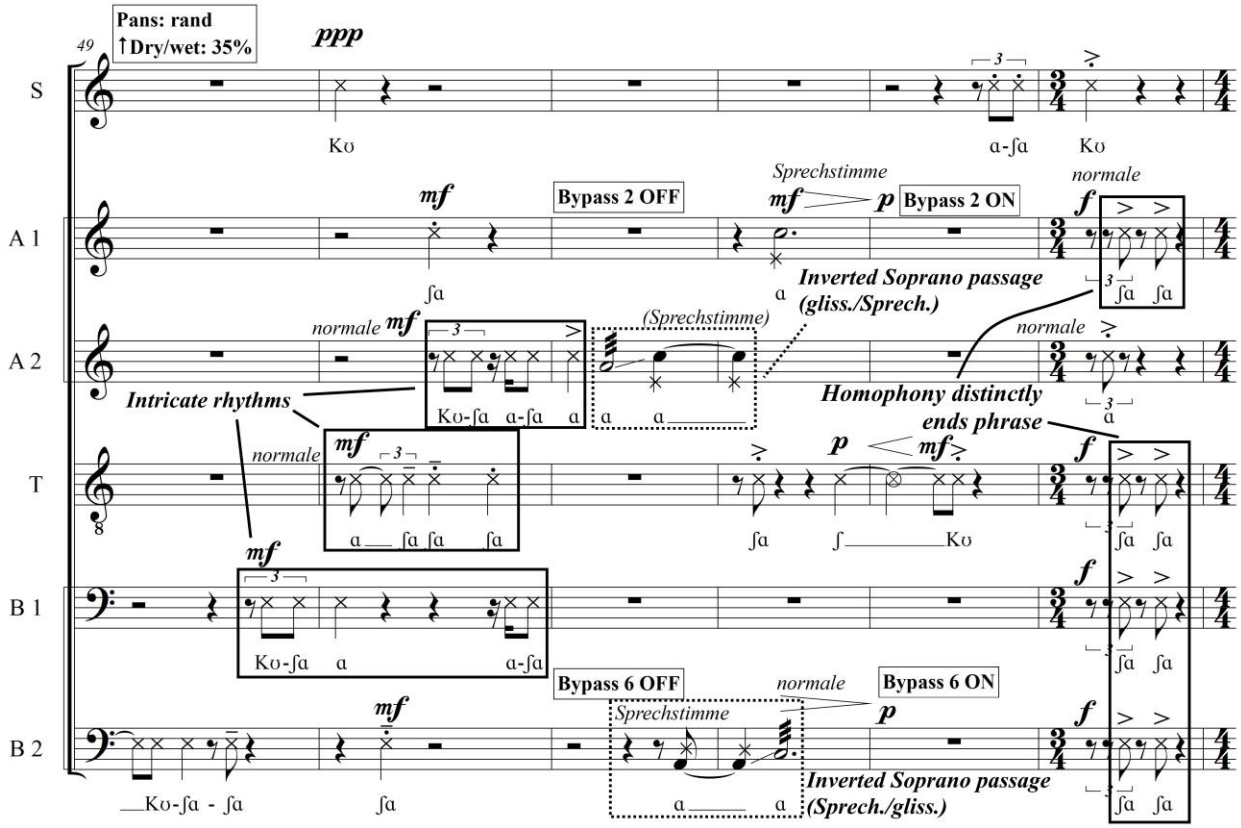
repeatedly before applying heavy vibrato on the latter two beats of this measure, creating an impression of sudden and tremendous intensity. The immediate consequence of this vocalization is the first sung passage in m. 41: a motive appears on C_5 which then slides down a third to A_4, all on heavy vibrato leading into the *Sprechstimme* in m. 42. For this passage, pitch is distinct and adds richness to the texture. Notably, the Soprano voice is not processed during this passage, but the quiet interjections in the Bass voices in mm. 39-40 are. The Bass 1 entry in m. 39 provides a "counter" to the Soprano voice, but it is immediately superseded when the Soprano grows quickly in dynamics in m. 40, and effectively speaks over the short Bass 2 entry in that bar.



Example 17: Song of Solicitude, mm. 36-42

Pitch becomes more prominent as the movement progresses. In mm. 41-42, rapid transformations to the first pitched motive occur. For example, Alto 2 inverts this gesture in mm. 51-52, first applying heavy vibrato on A_4 before sliding to a *Sprechstimme*-sung C_5.

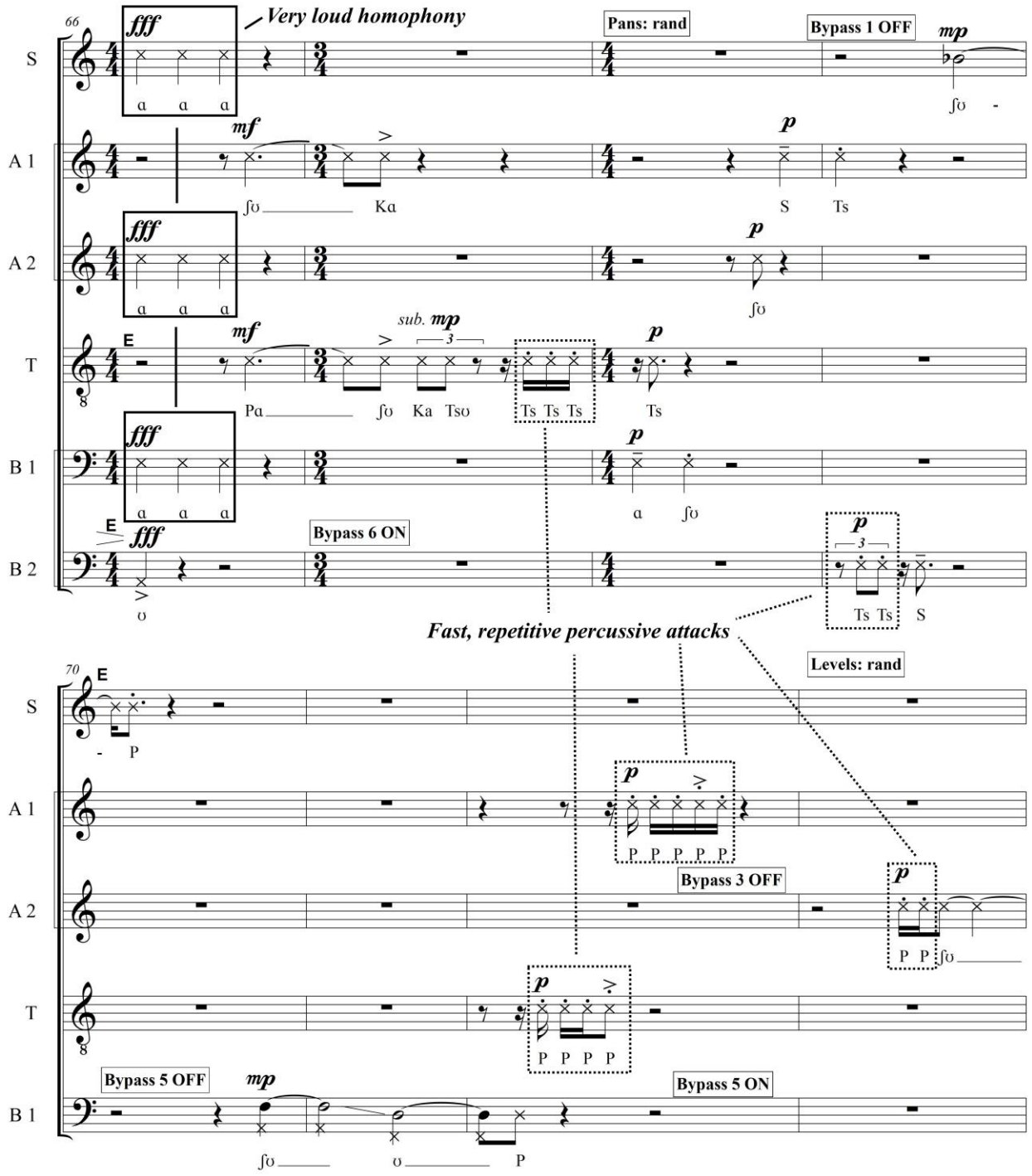
Bass 2 repeats this gesture down two octaves in the same measure span, this time beginning with *Sprechstimme* on A_2 and proceeds to a heavy vibrato on a normal singing voice on C_3. As Example 18 below shows, these two pitched elements are particularly emphasized as they are the only ones to undergo processing. Meanwhile, as pitch develops and transforms, changes to rhythm also occur. Intricate rhythms on non-pitched sounds take place in mm. 49-51 among Bass 1, Tenor, and Alto 2. Many attacks occur off the beat, undermining any sense of pulse. Measure 54 is an important arrival point, as all voices are present, four of which produce short attacks homophonically at a loud dynamic marking (*f*) and with accents. As is true with the opening of the movement (m. 11), the homophony in m. 54 ends the phrase.



Example 18: Song of Solicitude, mm. 49-54

The homophony among Soprano, Alto 2, and Bass 1 in m. 66 is important because not only are these voices at the loudest dynamic marking of the movement at *fff*, they also emphasize

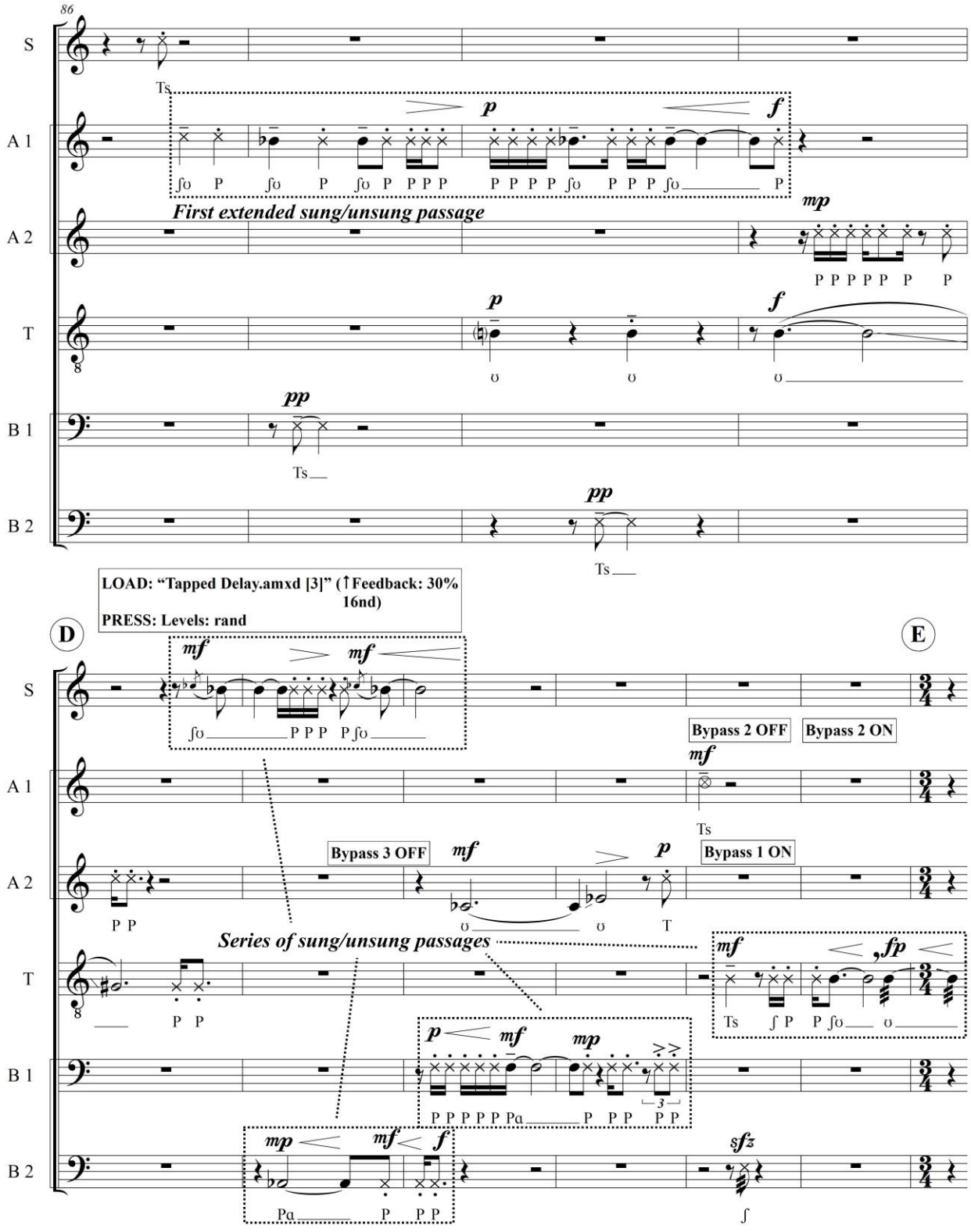
repetitions on a single phoneme: /ɑ/. As illustrated in Example 19, these phonemic repetitions lead to similar activity in other voices. Instances of these appear at the end of m. 67 in the Tenor line on /Ts/ and in the Tenor and Alto on /P/ in m. 72. Moreover, these repetitions occur on consecutive sixteenth notes and evidently lead into the third section of the movement where they will be developed further.



Example 19: Song of Solicitude, mm. 66-73

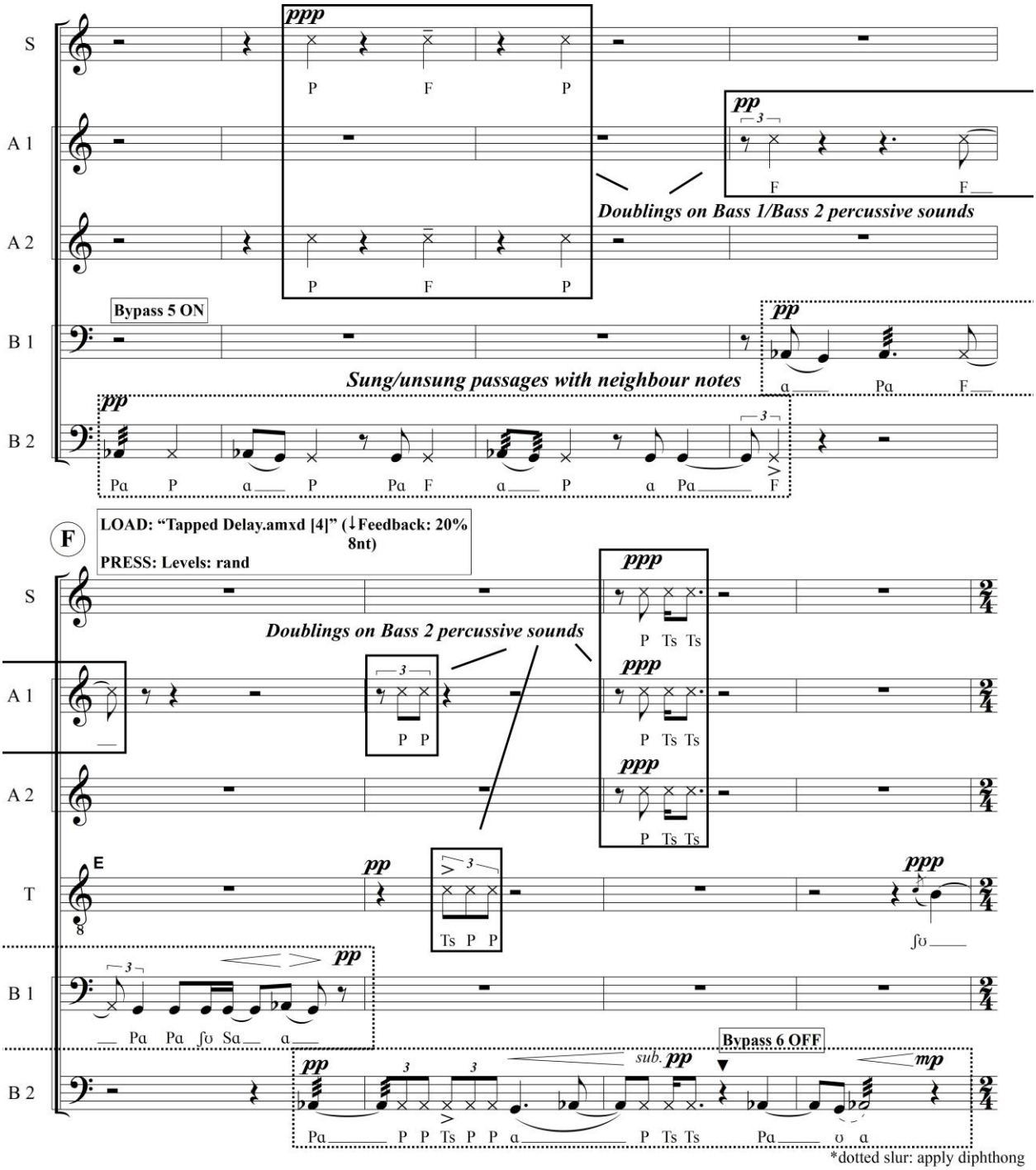
The third section incorporates sung passages which include non-pitched components, while also introducing considerable changes in the electroacoustic settings. Measures 86-89 in Alto 1 are important because they represent the first passage in this movement that

combines both pitched and non-pitched elements as part as a single motive. Many of the non-pitched elements are composed similarly to those first heard at the end of the second section (mm. 66-73). For instance, the non-pitched regions in the Alto 1 passage is comprised of sixteenth note repetitions on /P/ in mm. 87-88. The Soprano in m. 90 partially copies Alto 1, though it is briefer, with similar entries occurring contrapuntally in Bass 2 (mm. 91-92), Bass 1 (mm. 92-93) and Tenor (mm. 94-96). Among this counterpoint, the texture changes further because of new electronic settings. In m. 90, the feedback rate increases from 25% to 30%, and the repetition rate also increases to dotted sixteenth notes from eighth-notes. These shifts create more repetitions in the feedback network that sound at quicker intervals. The voices immediately affected by this are Alto 2 in mm. 92-93 and Alto 1 in m. 94, as other voices are under bypass. The glissando from C♭4 to E♭4 in m. 93 is particularly salient because of the increased feedback and decreased delay in the electronics, even among the counterpoint taking place between Soprano, both Basses, and Tenor during mm. 90-93. Example 20 outlines this activity. Overall, this counterpoint and change in electronics allow me to shift the pace of this work considerably and build momentum towards a climactic point.



Example 20: Song of Solicitude, mm. 86-96

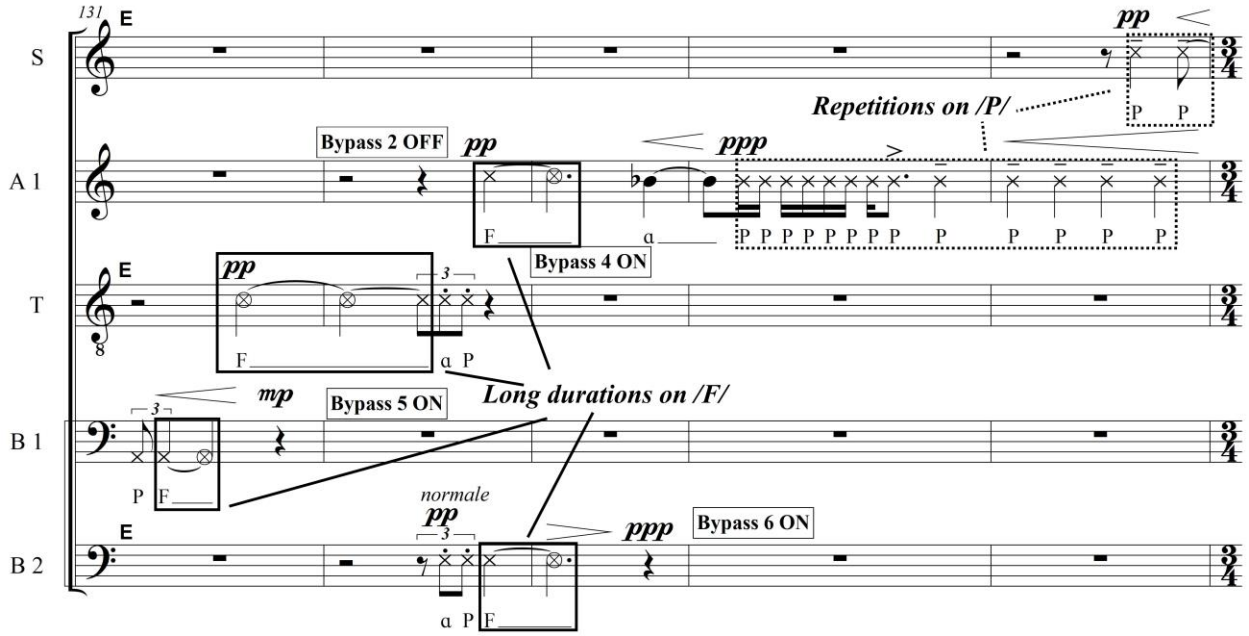
Starting in m. 106, Bass 2 vocalizes neighbouring gestures on $A♭_2$ and G_2, with interjections of non-pitched sounds on occasion (/P/ and /F/); Bass 1 continues this idea (m. 109) in response. Between mm. 107-116, the Soprano, Altos, and Tenor double non-pitched attacks that take place in Bass 1 or Bass 2. Many of these doublings are staggered among the Soprano, Altos, and Tenor although in m. 116, Soprano and Altos are in complete homophony. The homophony in this measure is meant to gesture toward an arrival, yet this suggestion is complicated by the quietness of the dynamic level, and the fact that Bass 2 has not completed its passage. Dramatically, the rhythmic homophony seeks to assert control over phrasing, but is unsuccessful. As demonstrated in Example 21 below, all non-pitched sounds are doubled in some capacity. This in turn produces a dialogue between pitched and non-pitched sounds, highlighting a change in texture which builds tension. Measure 114 (rehearsal F) changes the electronic settings once more; the feedback levels decrease to 20% while the delay increases to eighth-note triplets. The effects of this change are not heard until after the homophonic doublings in m. 116, when Bass 2 ends its passage on a neighbouring gesture, through which the final $A♭_2$ intensifies with added heavy vibrato. This gesture resonates clearly since Bass 2 is the only voice present.



Example 21: Song of Solicitude, second half of m. 106 to m. 113

In m. 126, the phoneme /F/ is sustained for long durations in Tenor and Bass 1 in mm. 131-132. It appears in combination with /P/ to transform the texture of these rhythmic passages. In m. 131, extended durations on /F/ presage the movement's climax. It starts off

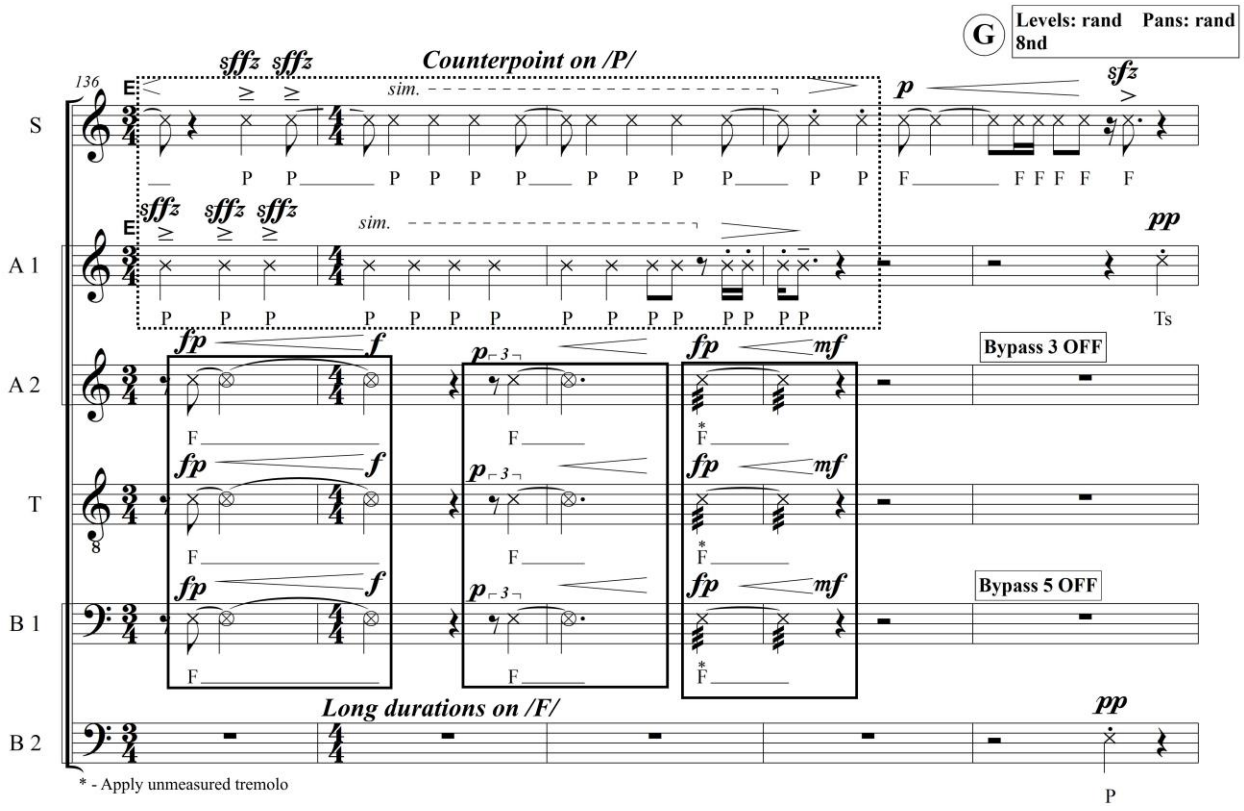
on a long duration in the Tenor, before passing its idea to Alto 1, with the transition between the two voices smoothed over by Bass 2 sounding homophonically with Alto 1. See Example 22. Also featured are repetitions on /P/ in Alto 1 and Soprano in mm. 134-135, with both passages being processed live. Notable here are considerable sixteenth note repetitions on /P/ through most of m. 134, but they rapidly slow to quarter notes by m. 135. The Soprano entry in m. 135 also takes place on quarter notes, but is off the beat and engages in a dialogue with Alto 1. This activity continues into the climax.



Example 22: Song of Solicitude, mm. 131-135

The climax occurs in mm. 136-141, where Alto 2, Tenor, and Bass 1 (unprocessed) sustain /F/ on long notes, while Soprano and Alto 1 (processed) are in counterpoint with one another on *sforzato* and accented-tenuto articulations. As illustrated in Example 23, the sustained durations on /F/ are in counterpoint to the short, loud bursts of the upper two voices. They also carry considerable shape with regards to dynamics as each attack either starts at *fp* or *p* before gradually growing louder. The point of highest tension arrives when these three voices sustain a long note on tremolo in mm. 138-139, capping off the most intense region of this

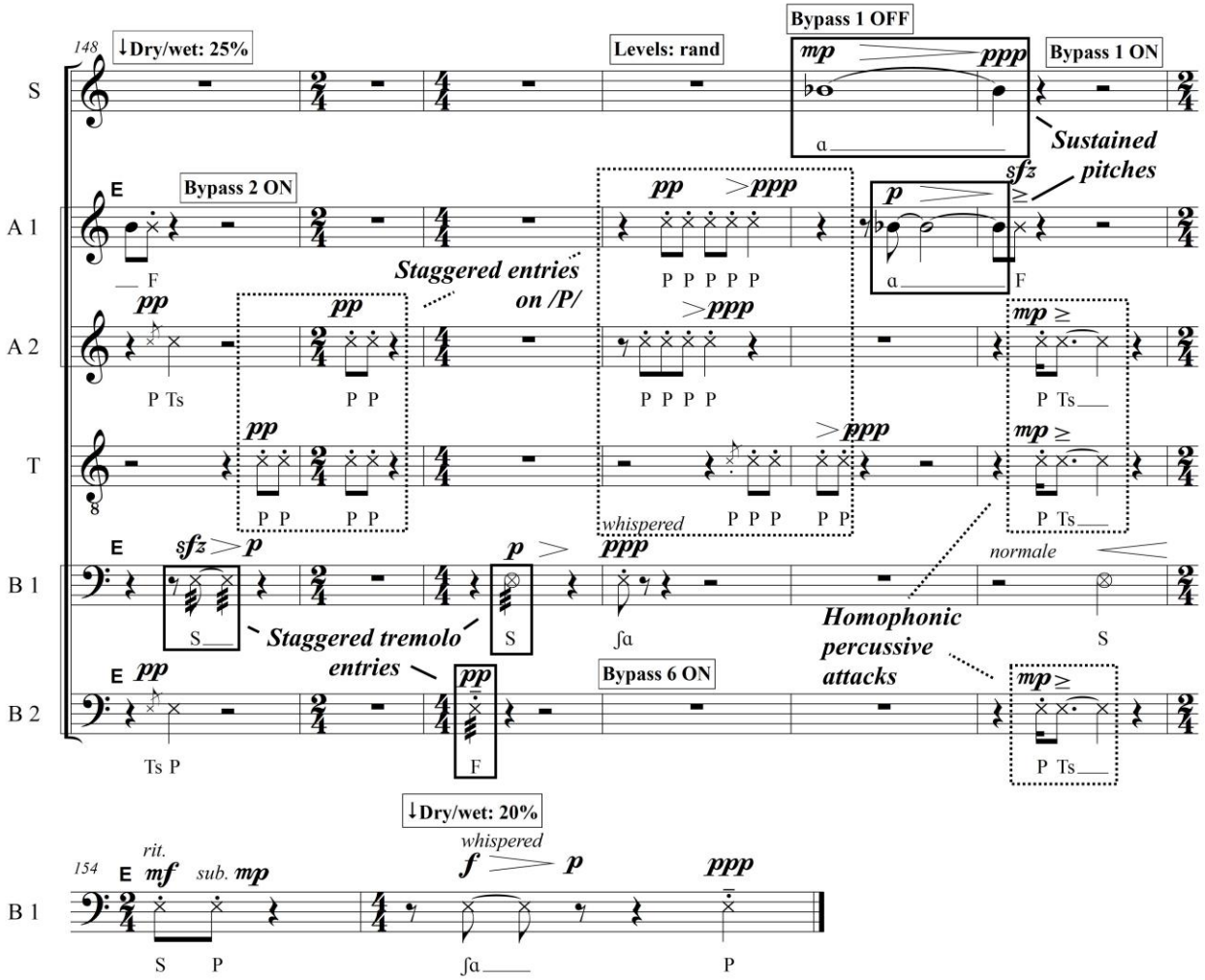
movement. In the measure immediately following, the Soprano, while the other voices rest, drops considerably in dynamics to *p* before gradually making their way back to *sfz*. There is some reprieve after this burst of energy, although the Soprano passage has not yet lost its momentum and continues. The slowing momentum in m. 140 creates a contrast in texture from the frantic pace of the previous measures; the electronics assist this shift by extending the delay to a dotted eighth note (from an eighth note triplet).



Example 23: Song of Solicitude, mm. 136-140

The final eight measures of this movement (mm. 148-155) continue the post-climax and are shown in Example 24. Here, all voices attempt to rebuild the same pace that led to the climax by repeating /P/ on consecutive eighth-note attacks paired with occasional heavy vibrato on /S/ and /F/ in the Basses (mm. 148, 150). However, they are too "disorganized" and only sound on fragments and on staggered entries at very quiet dynamic levels (*pp* or quieter). In the interim, there are long sustained notes in Soprano and Alto 1, a $B\flat_4$ in mm.

145-147 and 152-153. A notable aspect of these long passages is their *mp* indications, which are louder than most other entries in this region. Soprano and Bass 1 are the only voices undergoing active processing, while Bass 2 is under bypass from m. 151 until the end of the movement. The wetness drops from 35% to 25% in m. 148, and the overall processing effect diminishes. These adjustments signal the dissipation of the movement's energy and momentum and herald its ending. The final pitches in this movement, B♭ in Soprano and Alto 1, are met by homophonic non-pitched attacks in Alto 2, Tenor and Bass 2 in m. 153. Bass 1 invokes whispered sounds on /ʃɑ/ in mm. 144, 151, and the final measure, 155, with wetness settings dropping to 20%. The whispering of Bass 1 indexes the decrease in energy amid non-pitched regions in the aftermath of the climax. The whispering entries in Bass 1 in combination with lowered wetness settings close out the movement as all momentum and energy finally ceases. Solicitude is an ambiguous emotional state, and I conclude this movement in a similarly ambivalent fashion. Whether that solicitude has been resolved or has become completely overwhelming are intended for the listener to decide.



Example 24: Song of Solicitude, mm. 148-155

3.2.4 Song of Loss

This movement—as its title indicates—is structured around absences, gaps, and missing pieces. Structurally, this movement consists of extended staggered entries and homophonic regions using trichords, tetrachords, and hexachords with occasional counterpoint. There is considerable stepwise motion either from one pitch to another, or one chord to another. The rate of transformation in texture varies and is incorporated either through moments of polyphony, such as eighth-note gestures, or strict homophony. I open

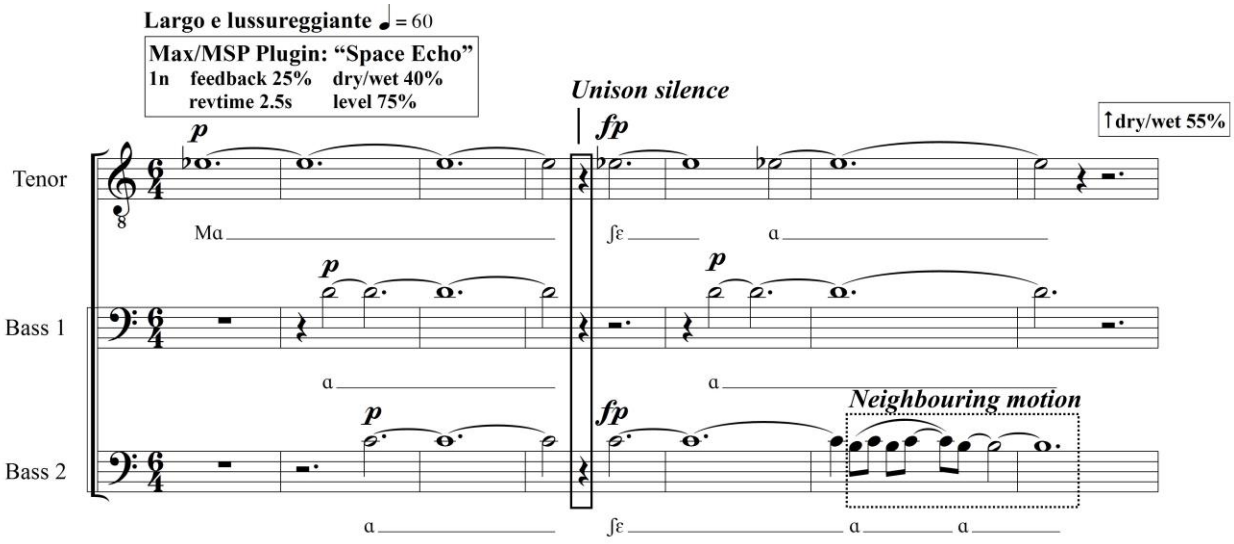
movement 4 on the same syllable I used early in movement 2: /Mɑ/. I return to the phonemes /ʃ/ and /ɪ/, while introducing the new vowel sound /ɛ/.

Between the vocal passages, I incorporate silences ranging from one to three beats. The rests become particularly salient during hexachord homophony where all voices enter and end in unison. Composed rests are integral to this movement, indicating a momentary surcease of tension. As well, these rests allow the electronics to come to the fore, as the tape delay effects are the main electroacoustic components for this movement. The electronics invoke a "warble," which randomly alters the tuning of sounding pitches during reverberation. I allow the electronics to apply the bulk of vocal transformations, which is particularly effective because this is the only movement where the vocalists sing with no extended techniques. One important compositional element I use here is voice crossing. For most of this movement, Alto 2 sounds lower than the Tenor, both of which are lower than Basses 1 and 2. Voice crossing creates a unique sound texture: Basses in their upper register do not sound as rich, thus allowing the Alto 2 the possibility to thrive at low registers.[45]

The design of this song involves a large-scale dialogue between polyphonic and homophonic textures. As the movement becomes more complex with regards to polyphony, there is often the direct "conflict" or "desire" among some parts to stay in unison, as is true at the ends of various entries and phrases. Changes to harmonies are invoked through eighth-note activity via neighbouring motion, stepwise motion, or short leaps. The opening trichord is on C_4-D_4-$E♭_4$ in the Tenor, Bass 1, and Bass 2, which is introduced in a staggered fashion. After this trichord repeats in mm. 4-5, the first transformation to the texture occurs with Bass 2 introducing a neighbouring gesture on C_4-B_3. This neighbouring gesture enriches the

[45] Naturally, the richness of an alto's lower register will vary from vocalist to vocalist.

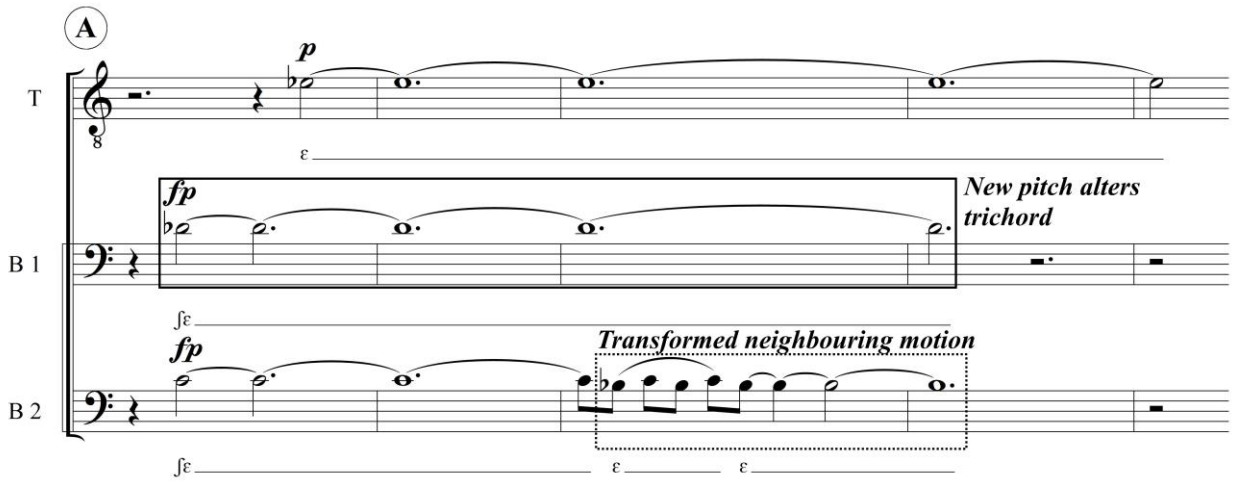
texture by inducing harmonic changes and building tension through pitch repetition. Example 25 below shows this progression.



Example 25: Song of Loss, mm. 1-7

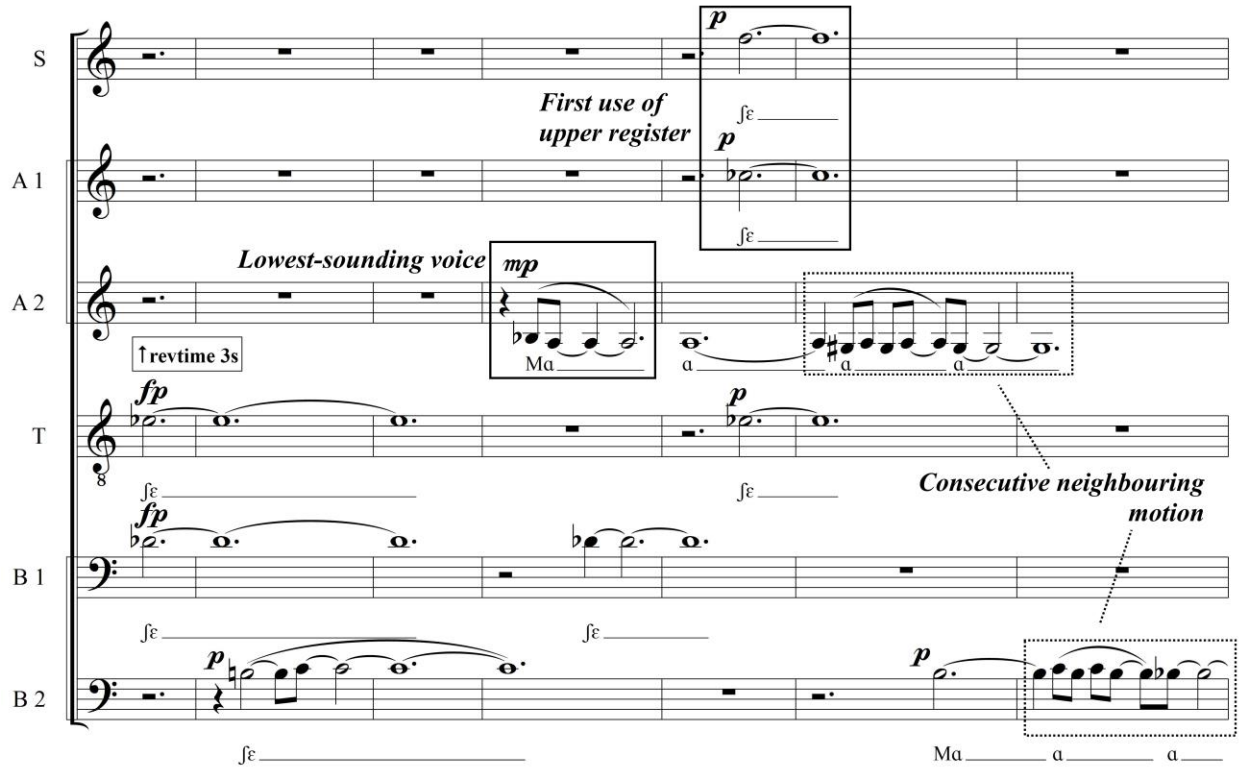
The neighbouring activity transforms upon its second appearance in m. 10. As I illustrate in Example 26, the gesture is now C_4-$B♭_4$, which comes in addition to the slight shift in the sounding trichord, now C_4-$D♭_4$-$E♭_4$. The wetness of the electronics increases considerably from 40% to 55% in m. 7, foregrounding the warble and delay networks. From m. 7 onward, the increased wetness enhances and further shapes the texture because the random pitch manipulation in the warble becomes more audible.[46]

[46] As described in Chapter 2.3.4, the warble speed indicates how quickly "tape" playback speed randomizes, while warble amount indicates how much of the "tape" playback speed can be randomized.



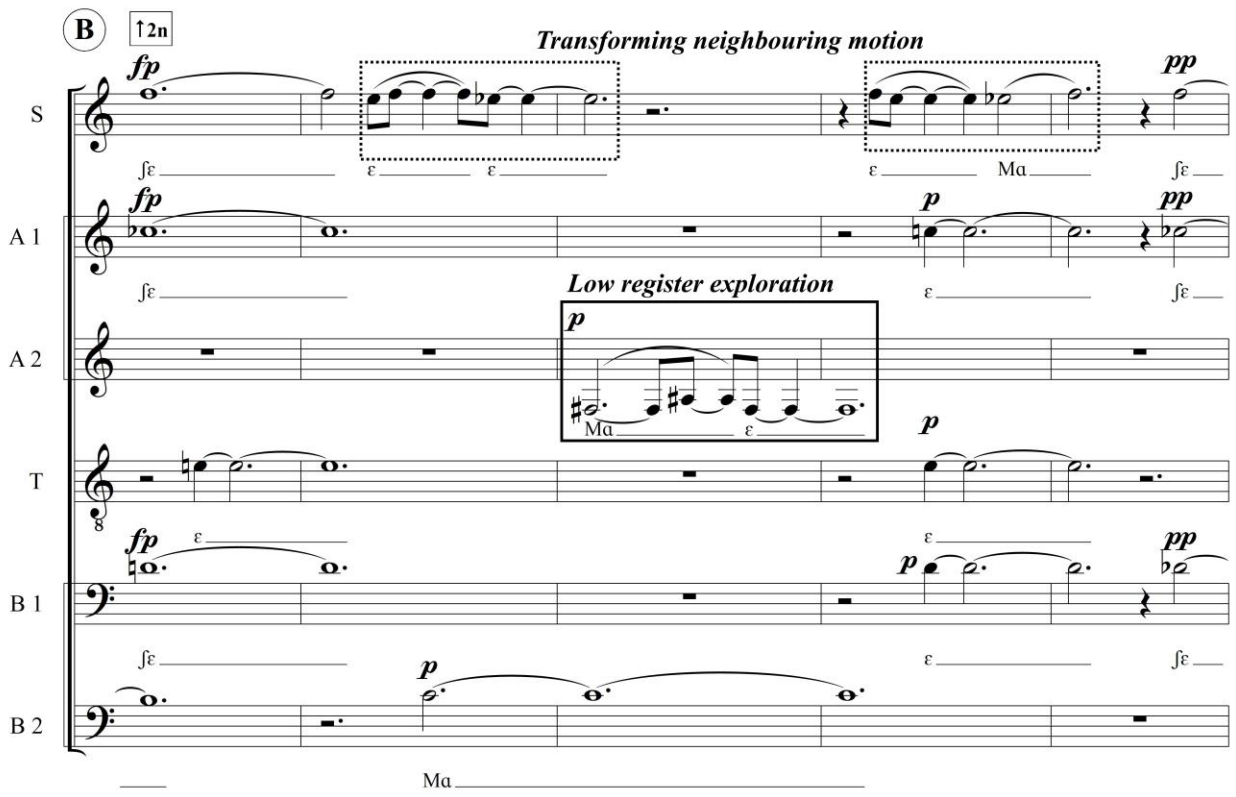
Example 26: Song of Loss, mm. 8-12

Alto 2, the lowest-sounding element of the voices, enters in m. 15. Its entry is distinct in that it introduces a B♭3 before immediately stepping downward to A3, while other entries until this point opened on a single sustained note. As Example 27 below shows, this Alto entry invokes an instability in the texture. While it is the lowest-sounding voice, it also immediately leads to the entry of voices in higher registers, with Soprano and Alto 1 both entering in m. 16 on F5 and C♭5. Alto 2 sustains its A before incorporating neighbouring gestures on A3-G♯3 in m. 17. This neighbouring activity takes place during the Soprano and Alto 1 entries, both of which produce long notes with the Tenor 1 in m. 16. The first tetrachord in the movement is introduced here, and its overall sound is notable due to the larger interval gaps in its spelling: A3-E♭4-C♭5-F5. The intervals within this tetrachord are a 4th, a 5th, or a 6th compared to the opening trichord which was built using only 2nds. The reverberation time also increases by a half second during this section, effectively extending the resonance of all sounding voices. This increase in reverberation in turn thickens the texture as brought upon by the Soprano, Alto 1, and Alto 2 entries, as this means the randomized effect of the warble also carries greater resonance.



Example 27: Song of Loss, beat 4 of m. 12 to m. 18

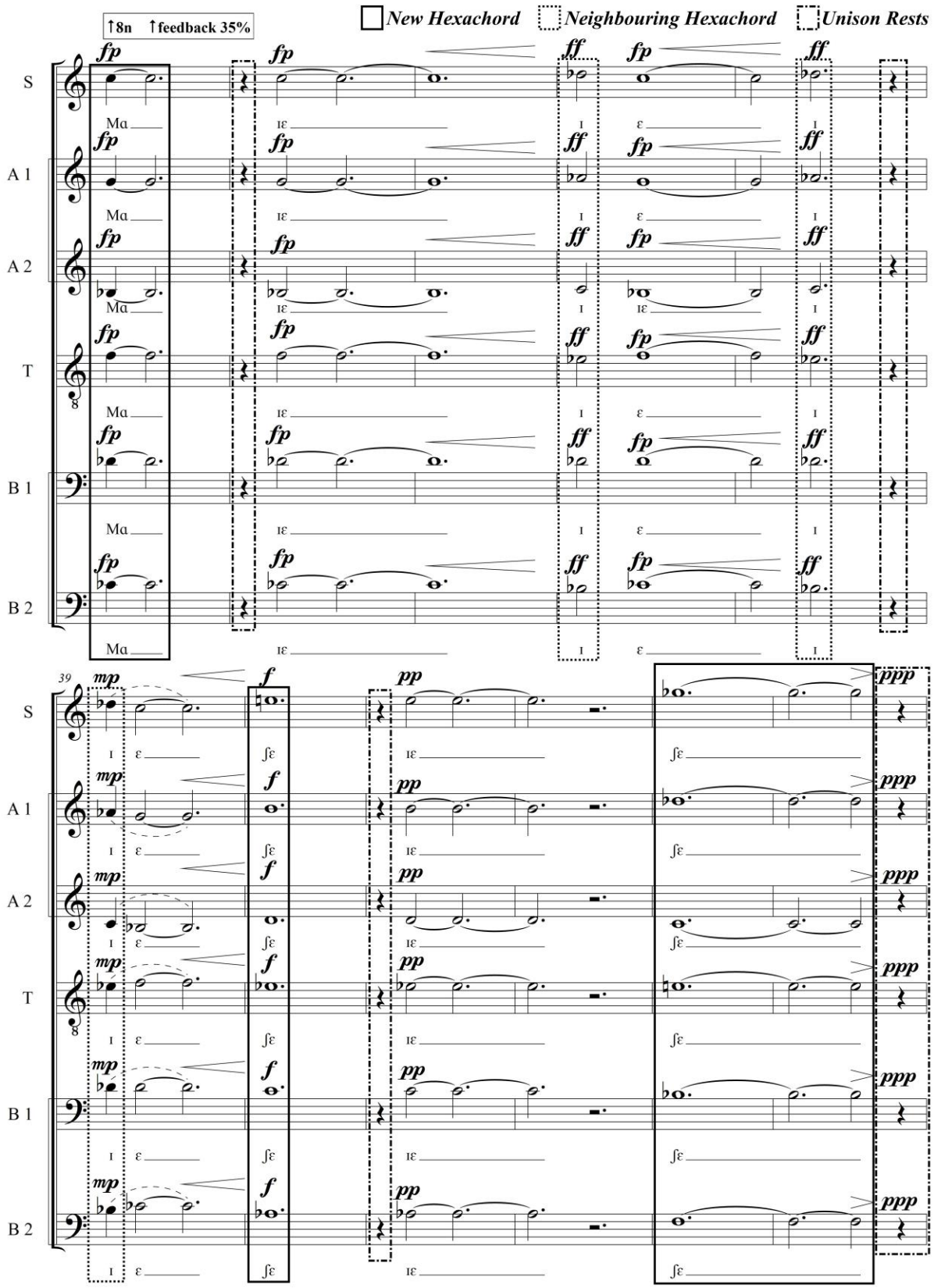
Neighbouring activity transforms in mm. 20-23, shown below in Example 28. In m. 21, the Soprano's activity is F_5-E_5-F_5-$E♭_5$, effectively introducing a third pitch during its neighbouring gesture. The change in Soprano neighbouring activity immediately affects the gesturing in Alto 2, as they implement a short leap in the lower part of their register: $F♯_3$-$A♯_3$-$F♯_3$. In m. 22, gesturing in the Soprano voice transforms further, progressing in a chromatic descent rather than a neighbouring motion (F-E-E♭-F). These gestural transformations in Soprano and Alto 2 correspond to an increasing polyphonic complexity in the movement. This transformation is reflected in the electronics as well. The delay times increase from a whole note pulse to a half note pulse, resulting in more immediate electroacoustic responses and a greater emphasis on the warble's randomization. These combined changes in gesturing and electronics emphasize the dialogue between Soprano and Alto 2 and thus amplify a sense of tension.



Example 28: Song of Loss, mm. 19-23

The movement's design appears to suggest a shift toward increasing polyphony; the exact opposite occurs. In mm. 34-44 (see Example 29), I introduce a series of homophonic hexachords, clarified by a shift in the electronics. Increased feedback levels (from 30% to 35%) and metric values (an eighth note, up from a half note) allow for earlier responses from electronics and greater repetitions from the delay network. Dramatically, the string of hexachords appears as a response to the growing polyphony. As activity builds both rhythmically and polyphonically, this strict homophonic region comes across as both sudden and assertive. Like the opening trichord, the first hexachord is built with many 2^{nds}: B♭$_3$-C♭$_4$-D♭$_4$-F$_4$-G$_4$-C$_5$. Neighbouring motion carries forward here, as there are also neighbouring hexachords in mm. 37-39, spelled B♭$_3$-C$_4$-D♭$_4$-E♭$_4$-A♭$_4$-D♭$_5$. Every instance of the neighbouring hexachord resolves to the first hexachord introduced in m. 34. As the

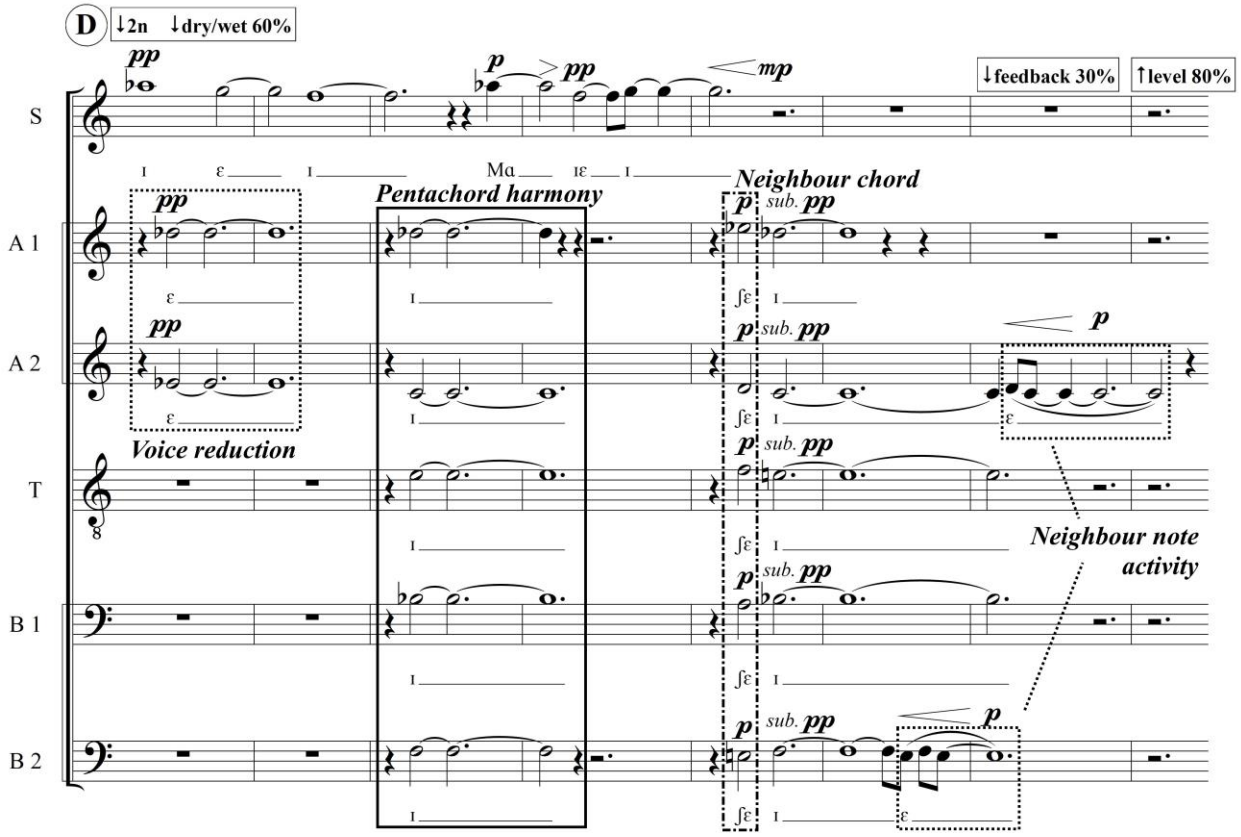
homophonic section progresses, louder dynamic markings (*ff*) are implemented, starting in m. 37. The use of very loud dynamics on homophonic chords that contain many 2^{nds} create a clear break from the preceding polyphony.



Example 29: Song of Loss, beat 3 of m. 34 to m. 44

Measure 41 denotes a dramatic shift. Since there is strict homophony, I apply a broad use of dynamics to further shape the music. Beginning in m. 41, the dynamics descend to *pp*, offering both a reprieve from the force of the homophonic hexachords as well as foreshadowing the end of this section in m. 44. Important to note as well are the composed silences heard in this region. These silences occur five times between mm. 34-44 and most of them last for only one beat. The most notable silences take place when all voices reach destination dynamics of *f* (m. 38) or *ff* (m. 40), and the ensuing hexachords are at much quieter dynamic markings (*mp* in m. 39 or *ppp* in m. 41). These silences hence can be heard as disruptive to the loud, growing eminence of these hexachords. Although composed silences are an integral part of this movement overall, here their disruptions begin to emphasize the sentiment of loss. The silences here demonstrate that even with the forcefulness of the homophonic hexachords, they are unable to sustain their potency and fall "victim" to the silences just as the staggered, polyphonic gestures do. Thus far, neither polyphony nor homophony can assert control, and both their influences succumb to disruption.

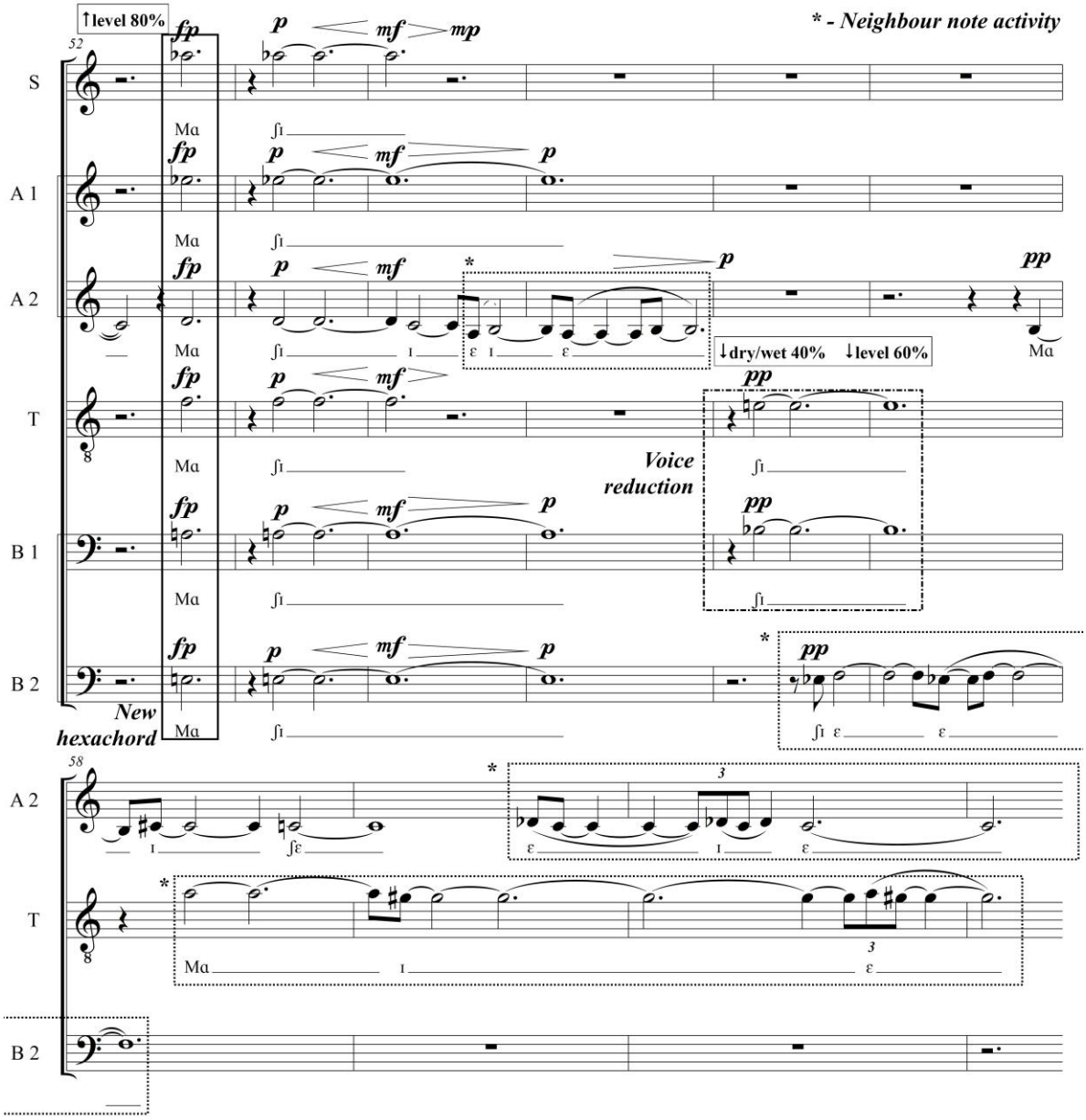
Polyphony remerges in mm. 45-46 with stepwise activity in the Soprano. This change in texture is also reflected in the electronics, which return to pre-homophonic levels. Wetness drops to 60% (from 65%) and duration values in the delay network return to a half note. Feedback levels remain unchanged. In m. 47, a pentachord sounds from Alto 1 to Bass 2 over which the Soprano responds polyphonically in the end of m. 47 and into 48. The effect of the homophony of the previous section still influences the movement, as a neighbouring pentachord responds in m. 49. That influence starts to fade with neighbouring gestures occurring in dovetailing fashion between Bass 2 and Alto 2 in mm. 50-51, as Example 30 shows.



Example 30: Song of Loss, mm. 45-52

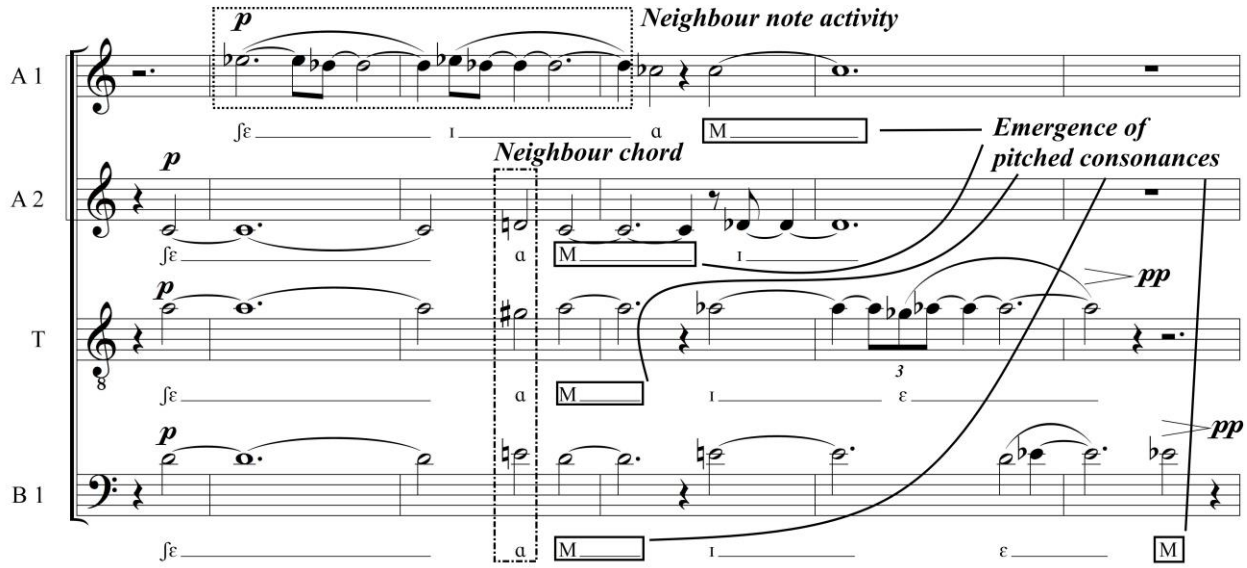
Hexachord homophony is momentarily restored with two attacks on a new chord in mm. 52-53 (E_3-A_3-D_4-F_4-$E♭_5$-$A♭_5$). Its influence is short, as the long notes in the Soprano and Tenor last only three beats in m. 54, while the Alto 2 produces neighbouring gestures in m. 55. Reverb levels increase slightly from 75% to 80%, which broaden the resonance of the electronics including the warble randomization. There are also fewer voices in m. 56, showing a reduction to trichords followed by a string of neighbouring activity during mm. 56-61. The rhythmic activity likewise increases in Bass 2 in mm. 56-58, which is eventually in polyphony with Alto 2 and Tenor in mm. 57-58. As Example 31 illustrates, this section becomes the most contrapuntally active of the entire movement, and the polyphony becomes more pronounced as the gesturing among Bass 2, Tenor, and Alto 2 (mm. 56-61) is longer than earlier polyphonic gesturing (mm. 19-23). The electronics undergo dramatic changes in

m. 56, with wetness levels decreasing from 60% to 40%, and reverb levels decreasing from 80% to 60%. The subdued electronics allow the clarity of the dialogue between Alto 2 and Tenor in mm. 57-61 to come to the fore. As a result, the ambience becomes less resonant, which means that the applied detuning from the randomized warble is also quieter. Ultimately, pitch itself stabilizes in the music, allowing some reprieve from the randomized pitch alterations the warble provides.



Example 31: Song of Loss, mm. 52-61

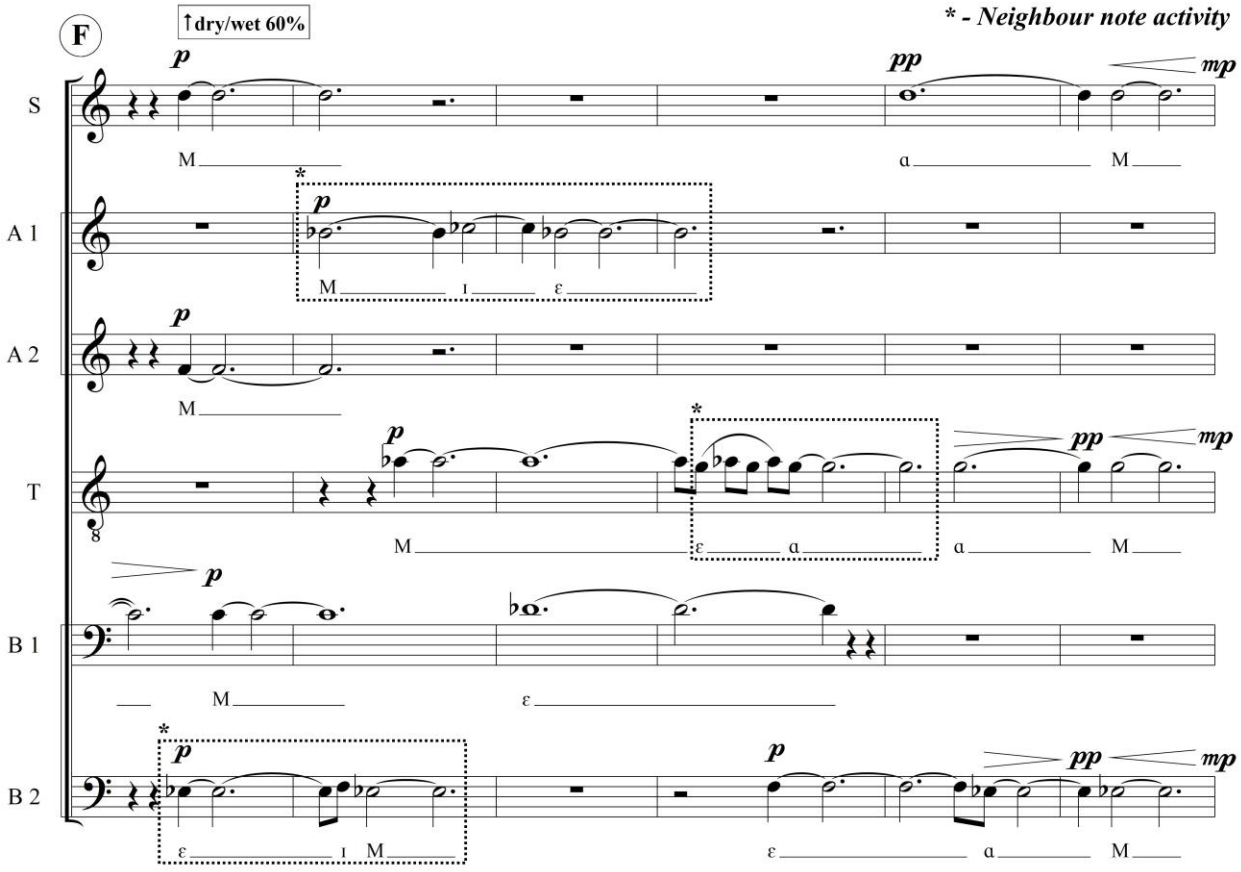
The use of single pitched consonants appears in m. 63, as /M/ predominates the final 20 measures of this movement. In these final measures, /M/ is sustained over longer pitches. These extended pitched consonants—new to this movement—create a sense of sonic progression by integrating themselves among vowel vocalizations. As Example 32 below shows, I introduce /M/ in Alto 2, Tenor, and Bass 1 to resolve a neighbouring trichord. In mm. 61-63, the trichord C_4-D_4-A_4 is heard on /ʃɛ/. The neighbouring trichord (D_4-E_4-$G\sharp_4$) then appears on beat three on /ɑ/, which resolves to C_4-D_4-A_4 on /M/ two beats later and continues into m. 64. On beat five in the same measure, Alto 1 applies /M/ and sustains it for eight beats, thus further integrating this pitched consonant in the texture.



Example 32: Song of Loss, beat 4 of m. 61 to m. 66

Long notes on /M/ grow more active in the final stages of this movement, and their appearances are often in counterpoint with neighbouring gestures. Starting in m. 74, entries become more staggered and polyphonic until m. 79 where all voices end on the /M/ phoneme in sync: beat two to the end of the bar. Wetness increases to 60% in m. 74 (up from 40%), which is the second-highest in the movement (its highest being 65%). Density and tension increase and the staggered entries produce more forceful resonance and warble. The result is

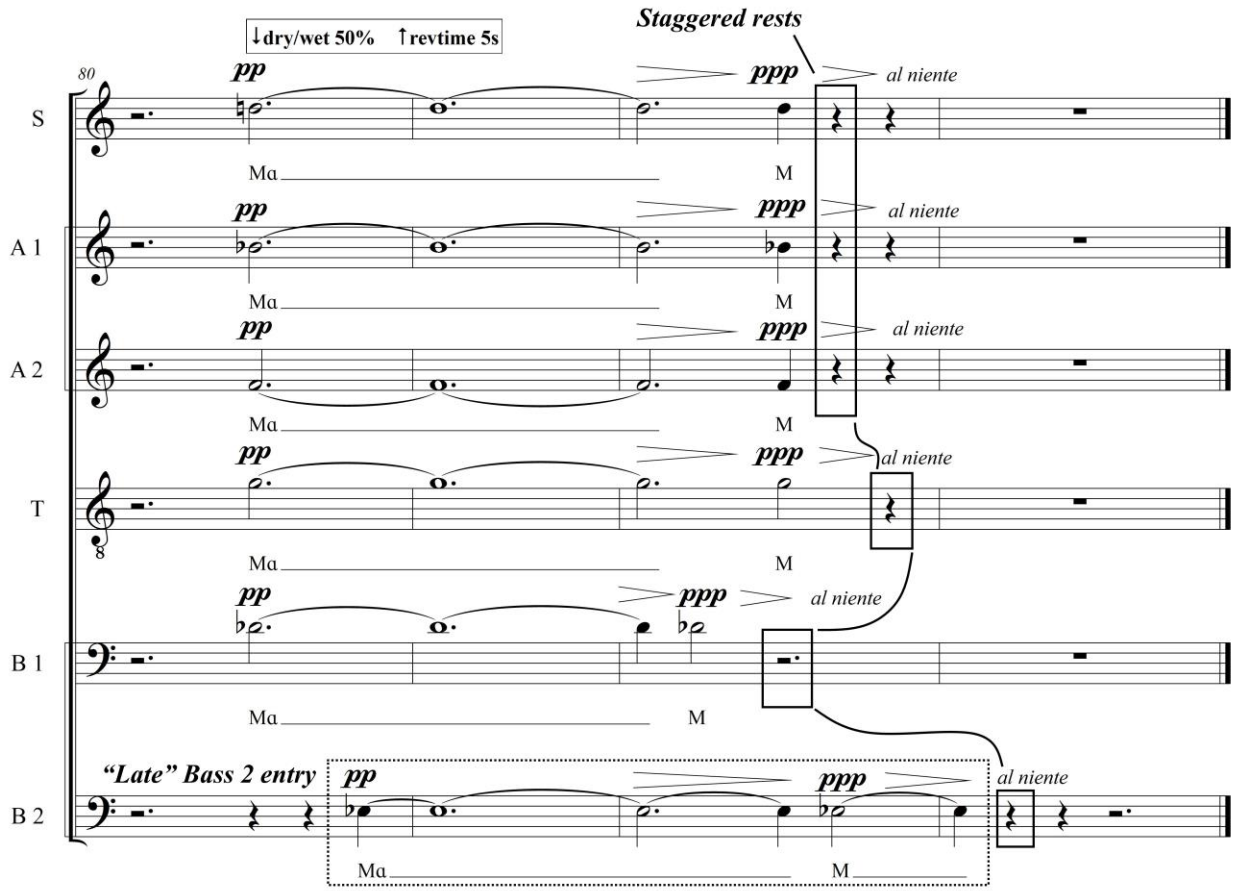
a sense that tension is rebuilding to the same levels that were predominantly heard during the homophonic hexachordal region. Example 33 below outlines both increasing polyphonic activity and greater use of the /M/ phoneme.



Example 33: Song of Loss, mm. 74-79

The movement ends on a hexachord, although the voices do not sound simultaneously. In m. 80, Soprano to Bass 1 project a pentachord which becomes a hexachord once Bass 2 enters at the end of the bar. The voices remain out of sync to the end of the final bar: Bass 1 is the first to finish, Soprano, Alto 1, and Alto 2 are second, Tenor is third, and Bass 2 is last. For this final chord, wetness drops to 50% while the reverberation time increases to 5 seconds, up from 3. This increase in reverb time gives greater depth to resonating sound, and helps achieve an ending in which all sounds gradually fade away. However, the decrease in wetness illustrates that the processed sounds are quieter than

before, meaning that the resonances in the electronics do not ring as loudly. The final measures are illustrated in Example 34 below.



Example 34: Song of Loss, mm. 80-83

Although these voices do not exist in homophony as the movement ends, the extended—albeit quieter—resonances reiterate the theme of loss as the final sounds decay slower than normal. These final sounds demonstrate that there are no further sounds to come in this song. The last entry is the staggered hexachord which carries the longest through electronics. Dramatically, it is as if the vocal "roles" of the vocal parts were somehow incapable of diverging into complete or complex polyphony: the yearning for a homophonic unity undergirds the movement. The desire for unity remains unfulfilled as the movement ends amid asynchronous voices. This ending clarifies and models the movement's title "Song of

Loss.” The homophonic hexachordal activity produced the greatest force, control, and strength of the movement, and the other regions are unable to recapture that sense of unity and synchrony. Moreover, silence proves to be the greatest enemy, as its presence previously disrupted the most unified region of this song. This is also true of silence in these last measures, as once the final sounds decay, silence wins.

3.2.5 Song of Traversal

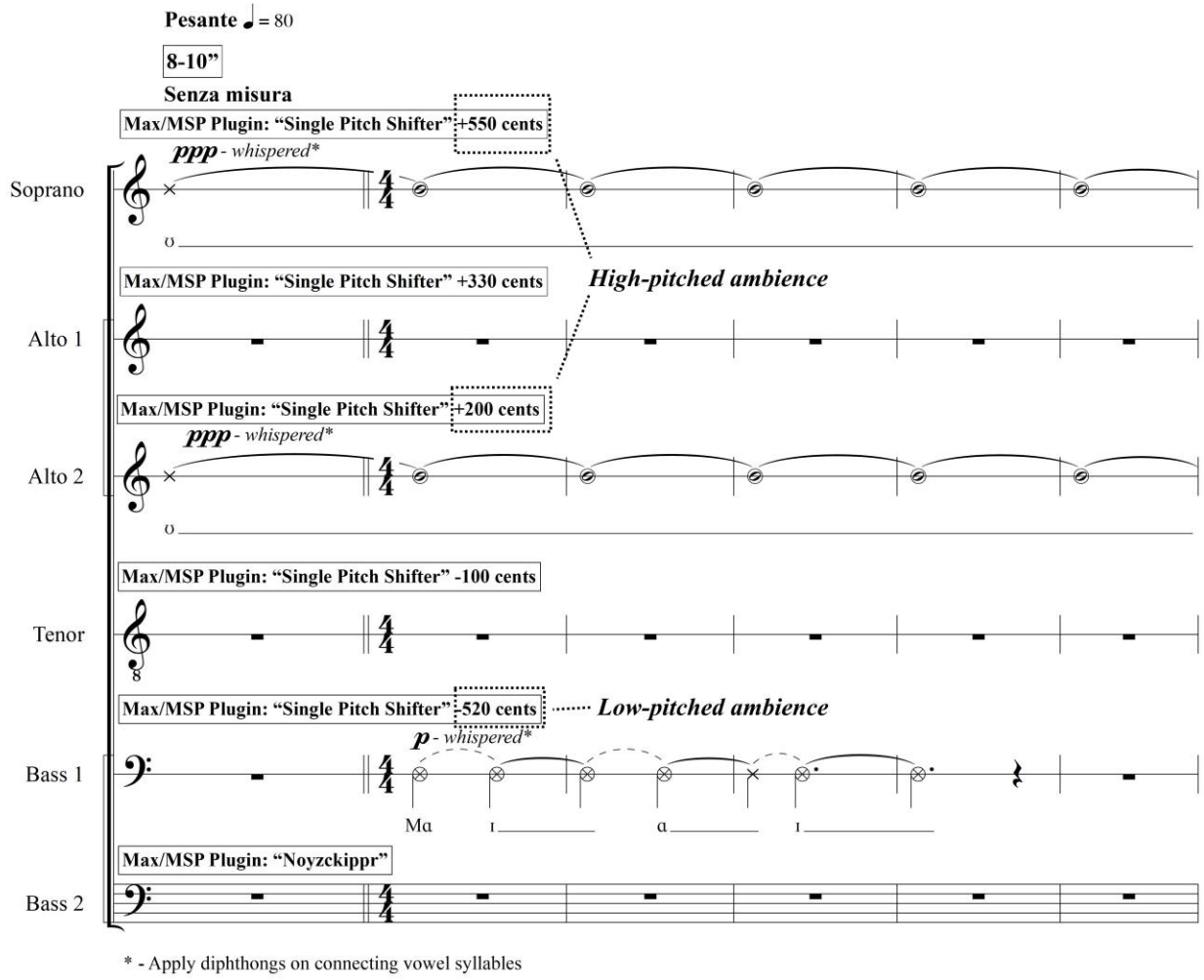
The theme of this movement is traversal, and dramatizes the act of “moving on.” In this case, this song is the successor to the prior song wherein there is reflection on what was lost before moving on and leaving the past behind. As such, I introduce new phonemes in this movement: /L/, /X/, /ə/, and /O/, while returning to the word /Mɑɪ/. I also include greater use of diphthongs in this movement, thus giving considerable shape to vocalized sounds. The reprisal of /Mɑɪ/ implies a sense of longing for what is lost in the prior movement. For the first eighteen measures, there are iterations of /Mɑɪ/ before the text eventually progresses to other syllables that then become more prominent, notably /Lɑ/, /ʃo/, and /Kə/.

I reprise the idea of extended single phonemes prevalent in the first movement, though this final movement is mostly metered and features very low pseudo-sung growling passages in Bass 2. All sounds are pitched in some capacity, the majority of which are provided by electronics. This movement makes use of two vocalized timbres which are then paired with additional electronic sounds. All voices except for Bass 2 deliver whispered, breathy passages that are connected to discrete pitch shifter settings, generating overlays of pitch to these passages. Bass 2, meanwhile, offers very low pseudo-sung parts that are affected by the application of white noise. I divide vocalists into pairs in this movement: Soprano is paired with Alto 2, Alto 1 with Tenor, and Bass 1 with Bass 2. Soprano/Alto 2

and Alto 1/Tenor pairs always present their material homophonically, and take turns delivering extended whispering material. Basses 1 and 2 are either in homophony or in a dialogue with one another. Bass 1 even joins in with the other voices in short instances. In general, Soprano to Tenor provide the ambient background of the texture while the Basses provide the main horizontal ideas.

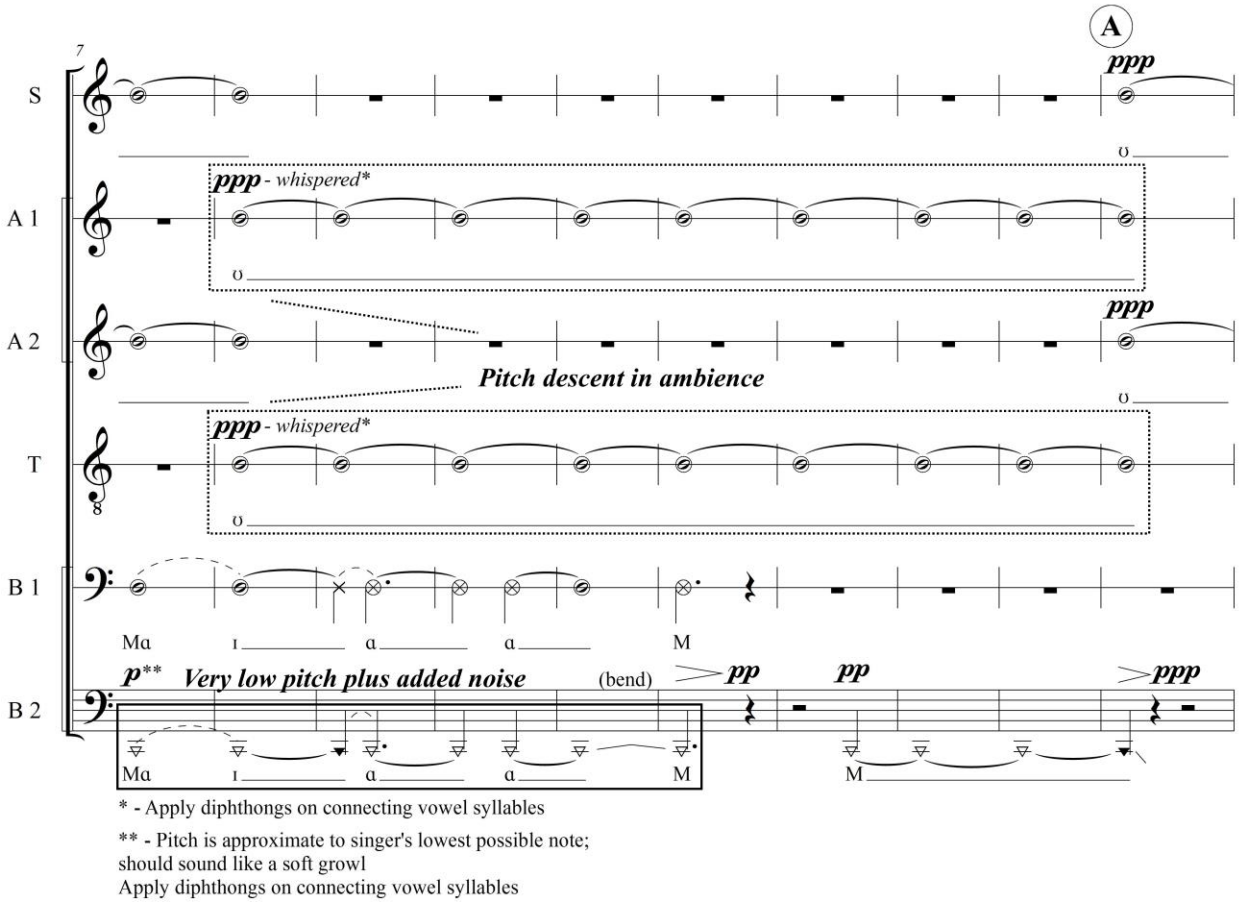
The first sixteen measures reference the loss in the preceding movement, evidenced by the frequent use of /Mɑɪ/ in the Bass voices. The whispered vowel entries in Soprano, Tenor, and Bass 1, plus the low added pitch in Bass 2 articulate a fading and ethereal sense of what has come before. It is as though whatever had been lost in movement 4 has receded even farther, becoming a spectral impression on the texture. This timbre sets both the ambience and the tone for the movement's overall sound. Example 35 below illustrates the first six measures. The texture of the whispering plus pitch overlay by the pitch shifters is heard immediately, as Soprano and Alto 2 open the movement and sustain this sound for a maximum of ten seconds before Bass 1 enters. The Bass 1 entry shows shaping on vowel sounds, with the vocalist applying diphthongs between /ɑ/ and /ɪ/. These diphthongs provide a framework through which the other vowel phonemes in this movement develop.[47]

[47] While other movements applied diphthongs, the ethereal sounds provided by the electronics here will make the shaping of these diphthongs prominent as they affect the overall ambience.



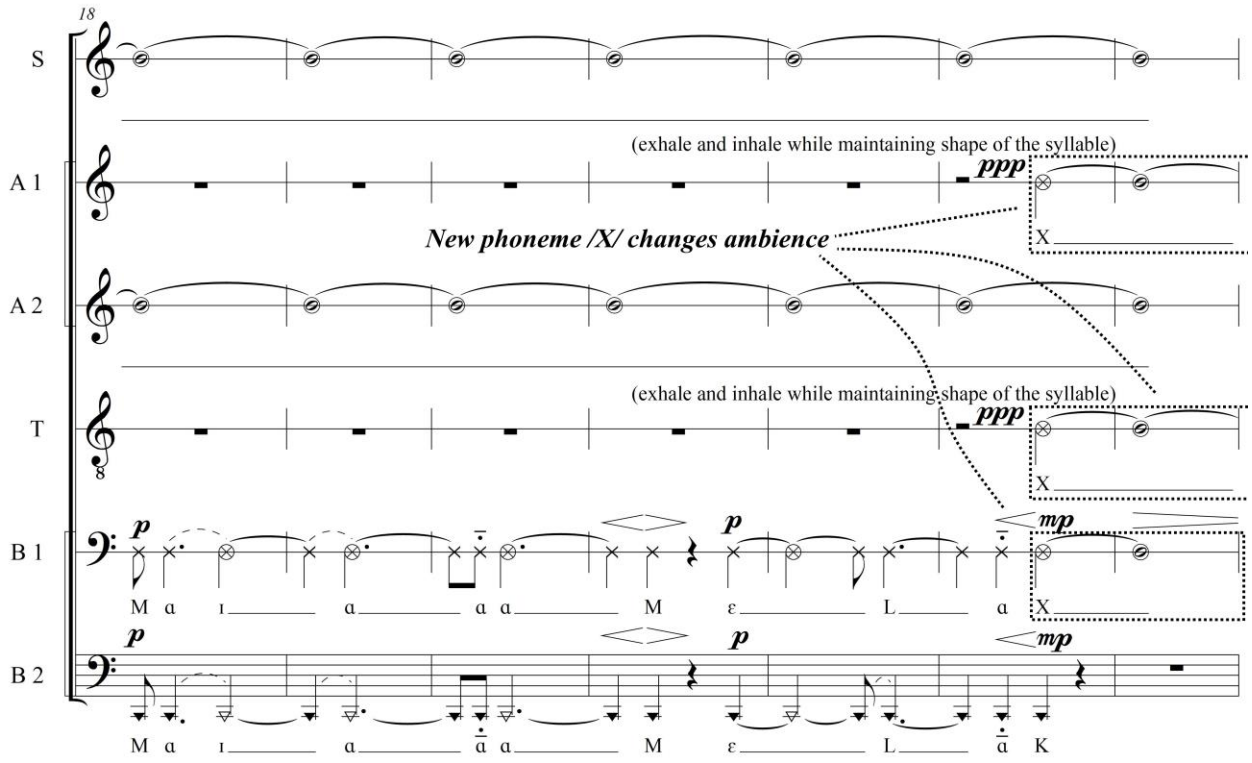
Example 35: Song of Traversal, mm. 1-6

The first Bass 2 entry is in homophony with Bass 1 in m. 7. As seen in Example 36 below, the passage in Bass 2 thickens the texture through its low sound and electronic noise. In the following measure, Soprano and Alto 2 pass their ambience to Alto 1 and Tenor. The pitch overlay in the ambience becomes lower, and is notably abrupt. Measures 11-12 are cadential in that Bass 2 bends the pitch upwards slightly in m. 11 before returning to its starting pitch in m. 12. This further transforms the texture, since the pitch bending builds tension through the introduction of an instability in tone. Four measures later, after sustaining a long note on /M/ in mm. 13-15, pitch slides downward on the downbeat of m. 16. Heard as a sigh or a moan, this descent signals the commencement of a new section.



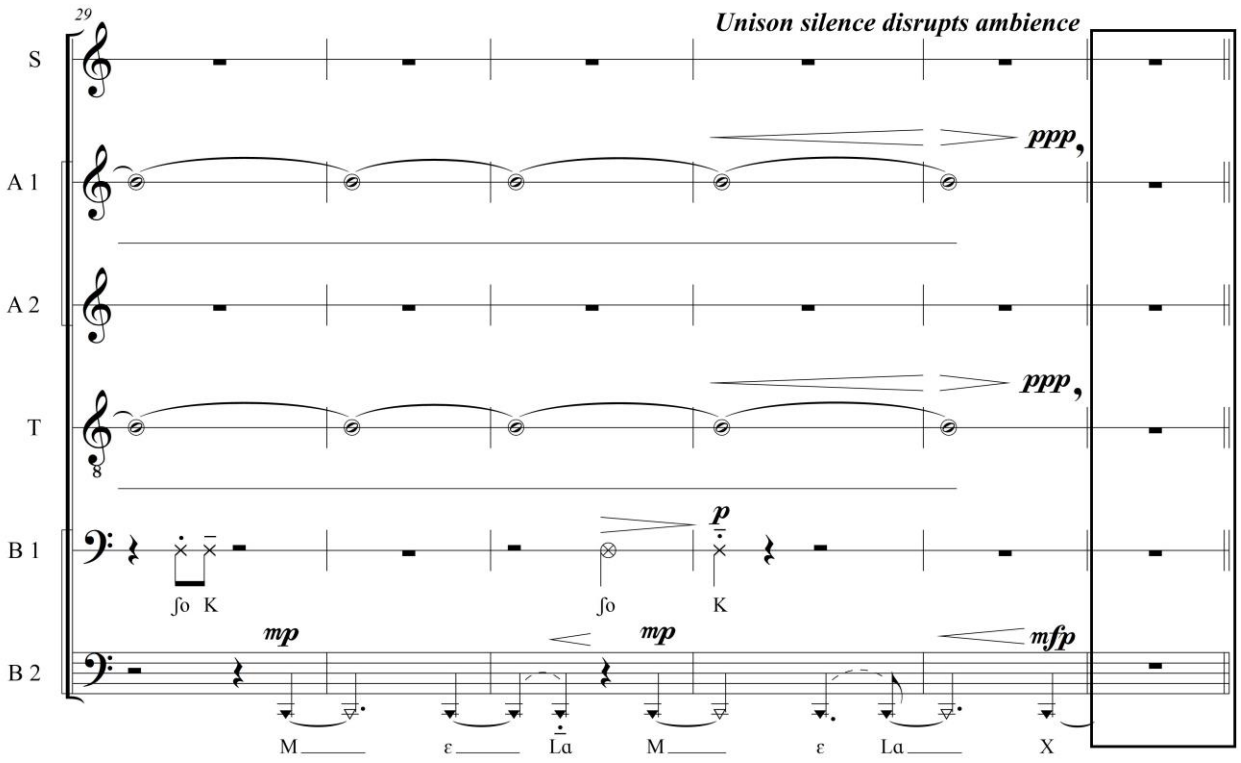
Example 36: Song of Traversal, mm. 7-16

Unable to remain in the past with what is lost, the movement transitions away in mm. 16-34. The rhythmic design changes slightly by showing attacks on various parts of the beat, while phrases demonstrate more frequent changes in dynamics, articulations, and/or text. For example, in Basses 1 and 2, the phrase beginning in m. 18 adds a crescendo on /ɑ/ in m. 21 before arriving on /M/ in the second beat and applying a slight diminuendo. Similarly, in m. 23 in Bass 2, there is a crescendo on a detached /ɑ/ before arriving on /K/ on *mp* in beat 3. As seen in Example 37 below, these changes in text, rhythm, and dynamics lead to a transformation in the music: Alto 1 and Tenor sound /X/ at the same time Bass 2 sounds /K/ in m. 23, joined by Bass 1 (thus breaking its pairing with Bass 2). The result is a shift in the ambience from a vowel sound to a consonant one, effectively producing a thicker texture.



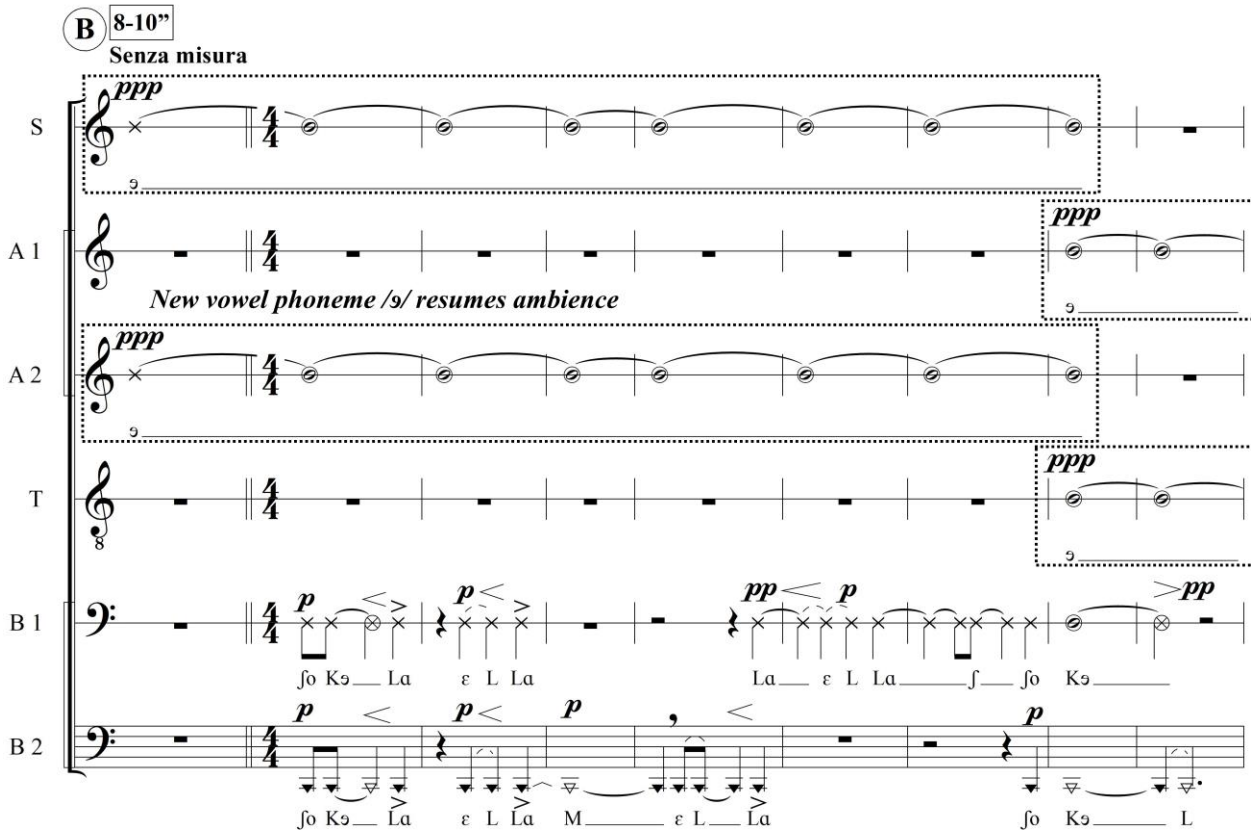
Example 37: Song of Traversal, mm. 18-24

The introduction of /K/ in m. 23 leads to a series of short attacks. An example of these short attacks appears in mm. 27-29 in Bass 1, where staccato markings and an accent on /K/ in m. 28 signal further shaping on this phoneme. As Bass 1 explores /K/, Bass 2 meanwhile resumes longer notes on /M/. /M/ initially suggests a repetition of earlier textual sounds; instead, Bass 2 sounds the vowel /ɛ/, ultimately articulating the new word /Mɛlɑ/. Bass 2 then joins the other voices in sounding /X/ on the final beat of m. 33. Maintaining this unity, every voice falls silent for an entire bar. As Example 38 below illustrates, this cessation disrupts the movement's ambience. The omnipresent background sound abruptly vanishes; the result is a dramatic sense of disruption and silence.



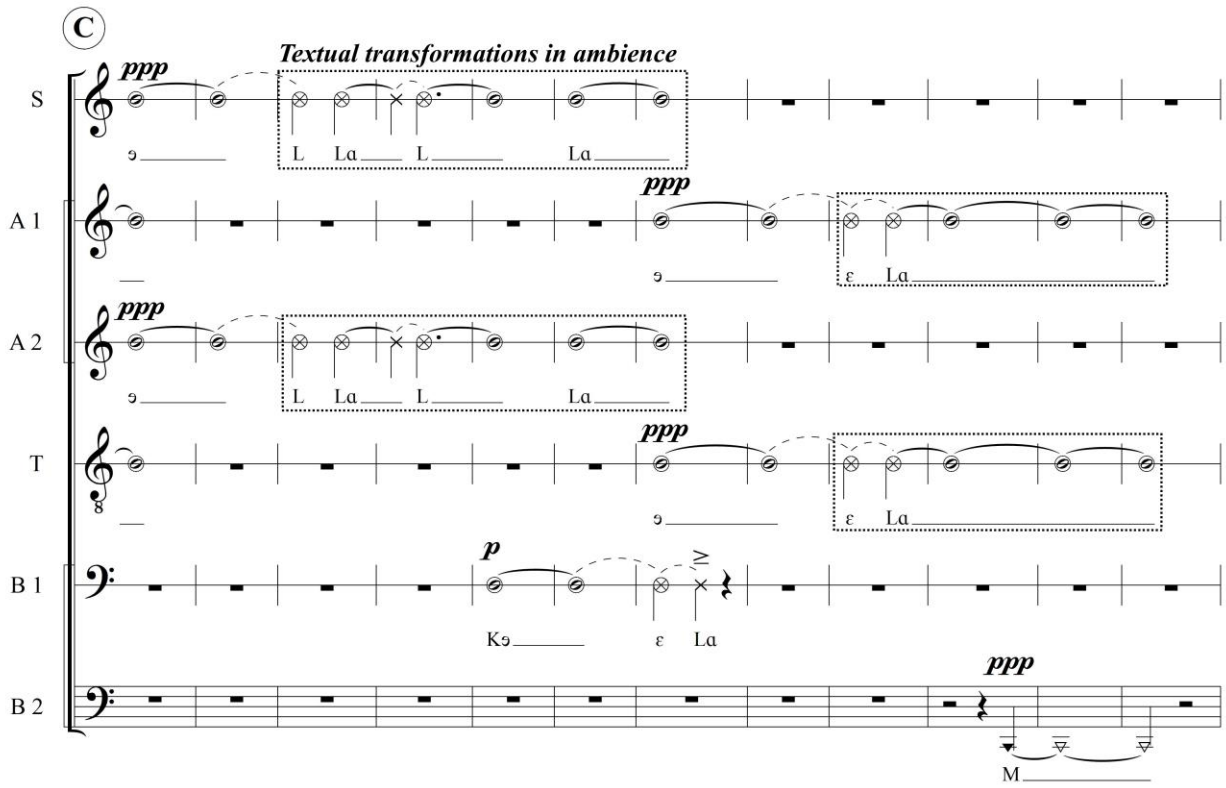
Example 38: Song of Traversal, mm. 29-34

Starting in m. 35, Soprano and Alto 2 alter the ambience by presenting vowel sounds on /ə/. Textually, Basses 1 and 2 explore the same syllabic content that they did prior to the end of the prior section, building off of Soprano and Alto 2 by introducing the new syllable /Kə/ in m. 42. As seen in Example 39 below, this word occurs as Soprano and Alto 2 pass their extended vowel sound on to Alto 1 and Tenor.



Example 39: Song of Traversal, mm. 35-43

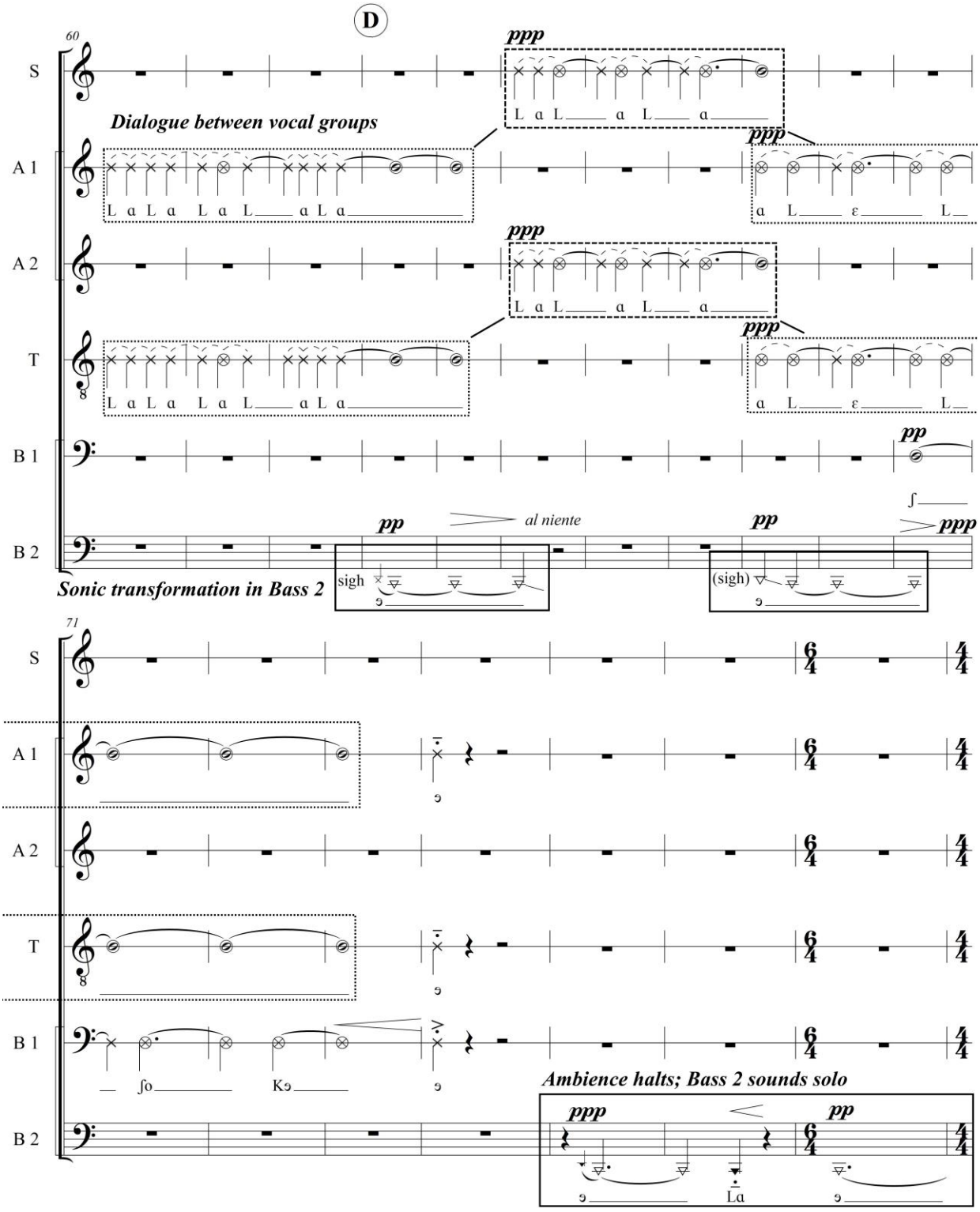
The ambience undergoes another critical transformation in m. 48. Soprano and Alto 2 become more rhythmically active, producing an increasing number of phonetic sounds. Starting in m. 50, they move back and forth between /L/ and /Lɑ/. Alto 1 and Tenor are affected by this increase in phonetic sounds. As demonstrated in Example 40, these voices also begin to produce multiple phonemes once they resume the ambience in m. 54.



Example 40: Song of Traversal, mm. 48-59

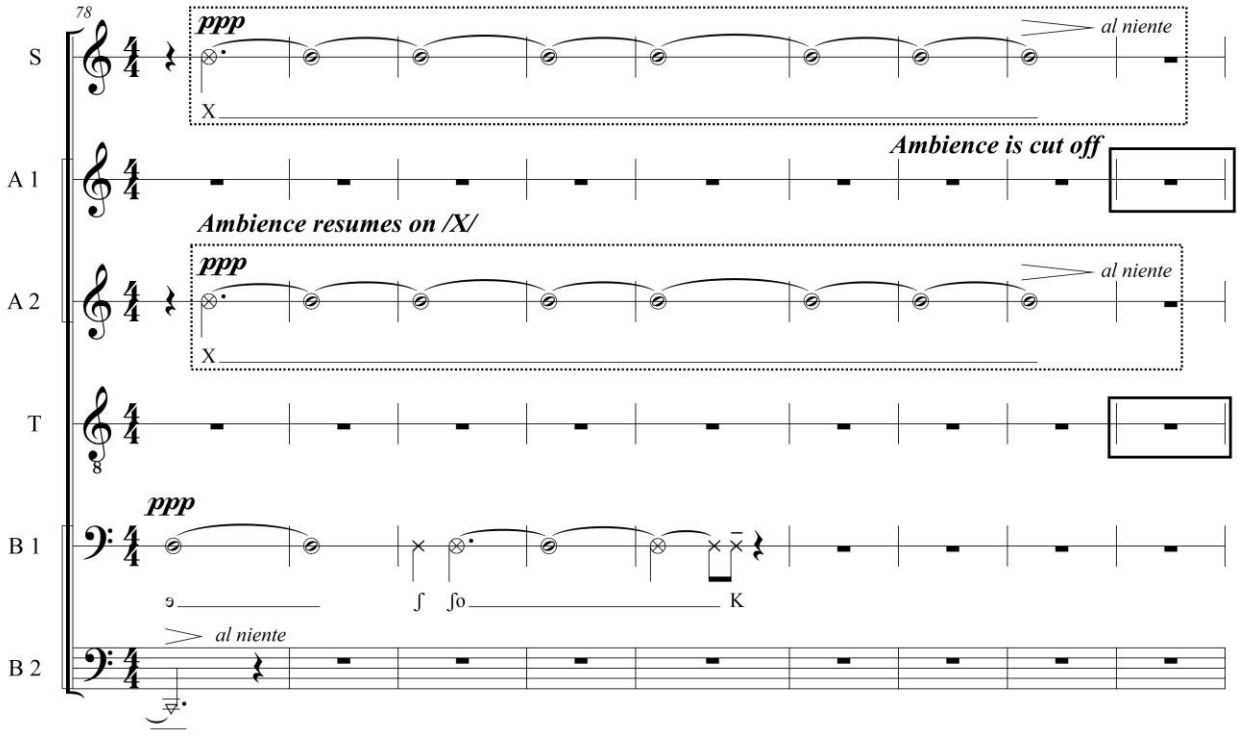
Alto 1 and Tenor alternate between /L/ and /ɑ/ on almost every beat in m. 60 and continue this activity until the end of m. 62. Soprano and Alto 2 mimic Alto 1 and Tenor in m. 64 and a dialogue between two vocal groups emerges. In distinction to these vocal pairings, I reintroduce "sighs" into Bass 2 in mm. 65 and 68. These sighs suggest further reflection of loss as also demonstrated earlier in the movement. Bass 1 responds to these sighs in mm. 70-74 by reciting the same text as earlier in the movement (/ʃo/ and /Kɘ/). Considerable tension develops in this section, as the dialogue between Soprano/Alto 2, Alto 1/Tenor, and Basses 1 and 2 demonstrate multiple changes in sounding pitch. In m. 74, Alto 1, Tenor, and Bass 1 each finish homophonically on /ɘ/, followed by silence for the remainder of the measure, mirroring the same cessation of voices from m. 34. Set against the backdrop of greater sonic activity, this disruption is even more impactful. Unlike in the previous iteration, the ambience

does not resume, and Bass 2 finishes this section solo on /ɔ/ and /Lɑ/ at very quiet dynamic levels, *ppp* (mm. 75-76) and *pp* (m. 77) as shown in Example 41.



Example 41: Song of Traversal, mm. 60-77

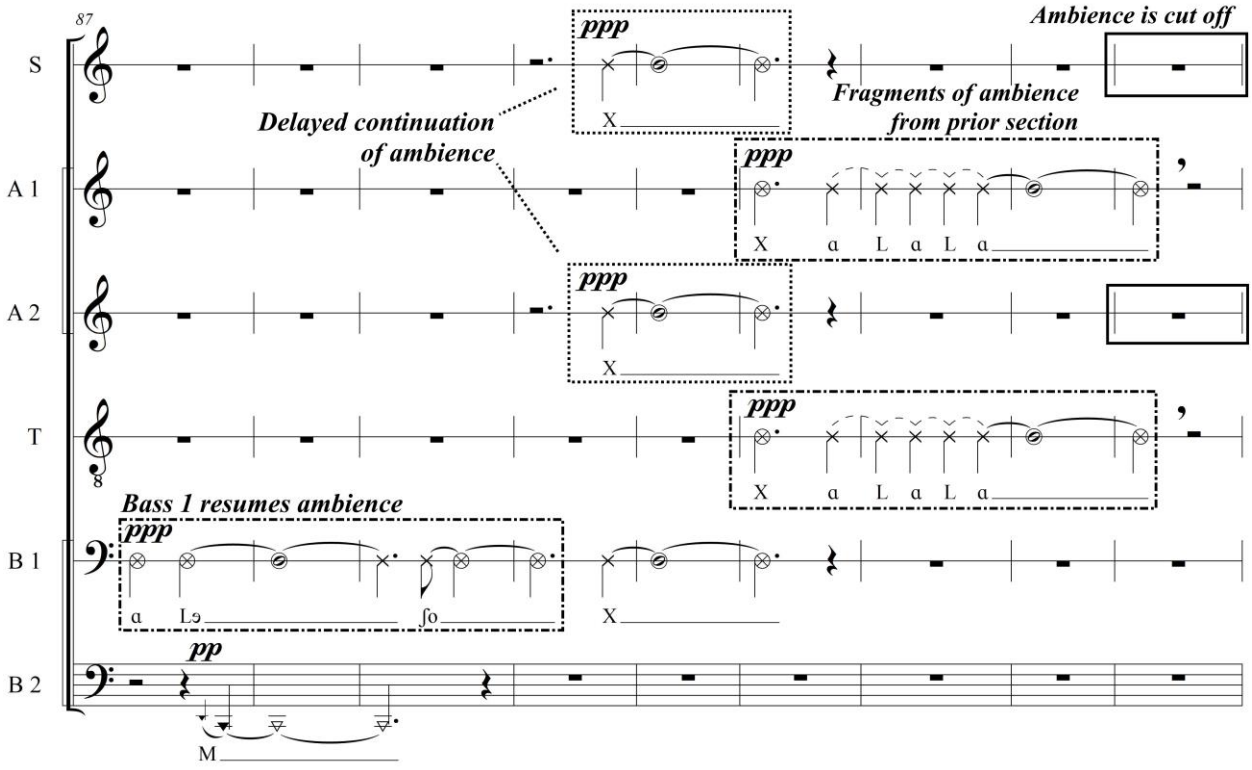
Disruptions proliferate as the movement reaches its conclusion. Beginning in m. 78, /X/ becomes a central feature in the ambience. As Example 42 makes clear, Soprano/Alto 2 sound this phoneme, but the Alto 1/Tenor group does not reply; another measure of silence results, as Example 42 illustrates. The wavering ambience points toward a growing instability in the music.



Example 42: Song of Traversal, mm. 78-86

As "Song of Traversal" enters its final measures, Bass 1 takes the unusual step of continuing the ambience in an attempt to reassert control. Its entry is met by a Bass 2 sigh on /M/ in m. 87 in response, signifying another instance of yearning. This reaction in Bass 2 introduces a conflict: Bass 1 wishes to resume the traversal while Bass 2 instead reflects on what is lost. Meanwhile, once Bass 1 finishes its entry on /X/ in mm. 90-92, Alto 1 and Tenor resume the ambience on this phoneme, but immediately revert to the /L/ and /ɑ/ gestures of the prior section. The dramatic significance of such a switch shows how these voices cannot maintain /X/. Since Bass 2 in this section shows yearning, Alto 1 and Tenor as well reflect on /L/ and

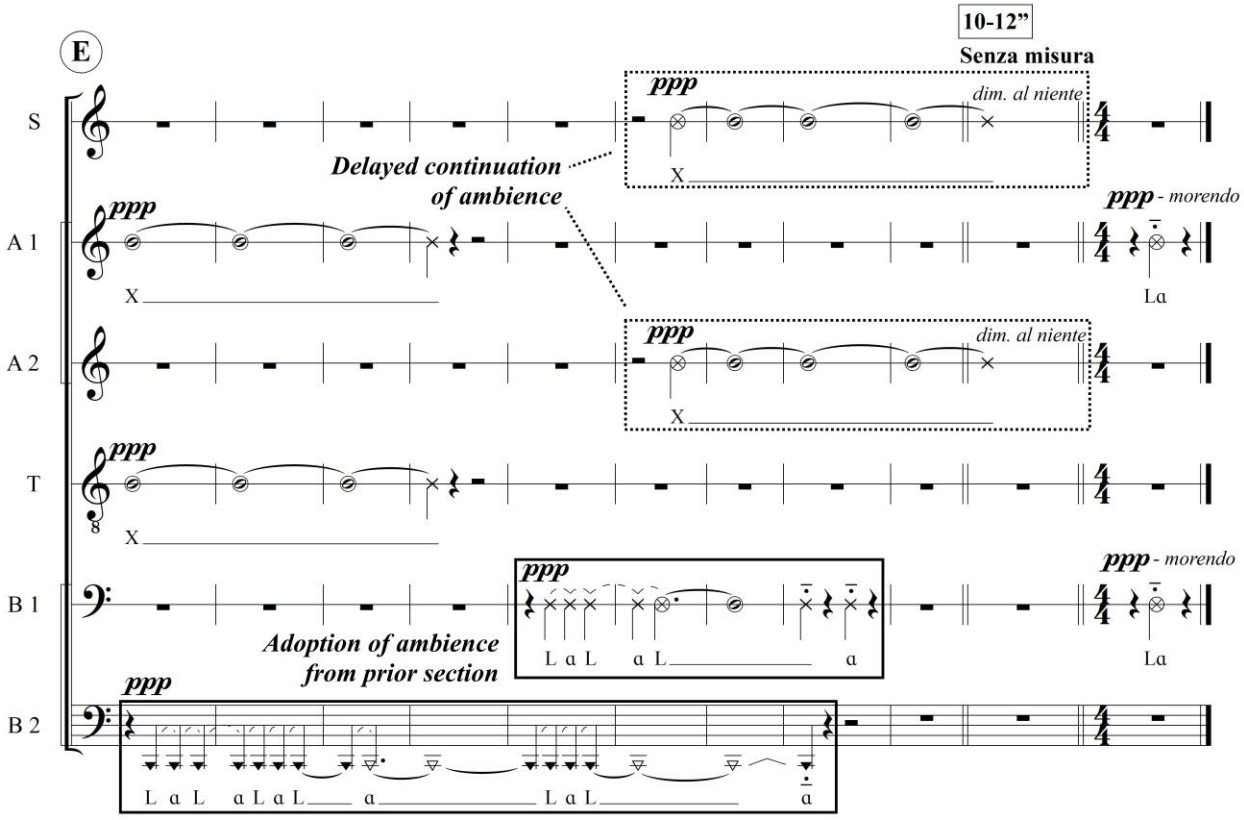
/ɑ/ instead of progressing with /X/. Another silence disrupts the ambience following m. 95, as Alto 1 and Tenor await a response from Soprano and Alto 2 that never arrives. The integrity of the ambience is so compromised at this point that the possibility of uninterrupted sound vanishes. Example 43 shows that periods of silence are now integrated into the fabric of the song.



Example 43: Song of Traversal, mm. 87-95

The final measures of this movement, mm. 96-106, reflect on ambiences of prior sections as the traversal completes. In mm. 96-103, Bass 2 adopts the /L/ and /ɑ/ phonemes that comprised the ambience in mm. 60-73. This adoption is important, as it shows a willingness of Bass 2 to no longer yearn on what is lost. Bass 1 tries to "encourage" Bass 2 and joins it in m. 100. After a pitch bend in m. 102—an allusion to the bend in m. 11 that ended Bass 2's first entry—Bass 2 exits the movement. Meanwhile, Alto 1 and Tenor both consistently produce /X/ on a long note in mm. 96-99. Soprano and Alto 2 sustain /X/ for a

very long time, from mm. 101-105—the last measure lasting twelve seconds—as their sound slowly decays. The fading sounds suggest that the ambience itself is "moving on." Alto 1 and Bass 1 end the movement with the entry /Lɑ/ in m. 106, which clarifies the traversal of the title: the reiteration of /Mɑɪ/ transforms over the course of the song to /Lɑ/, with assistance of /X/ as ambience. Pairing Alto 1 and Bass 1 underscores this ambient transformation, as these two voices have remained separate from each other throughout the song, demonstrating a gap of 850 cents (Alto 2 at +330 cents, Bass 1 at -520 cents). Example 44 below outlines these final measures.



Example 44: Song of Traversal, mm. 96-106

Conclusion

My composition *…and the songs of another…* and the accompanying analysis articulate a convincing trajectory of musical development from both vocalizations as well as electronics. I center this project around a desire to explore sonic manipulation with live electronics, and I discovered a number of ways one could create and transform unique timbres and textures. Aspects of my prior works, classical repertoire, and popular music (heavy metal specifically) helped provide me with a framework of sound types I explore in this piece. At the structural level of formal design, as well as with respect to the piece's smaller, more atomic elements, I show how components of voice, text, and electronics shape and transform the texture of each movement. As such, I believe this piece is successful in both creating dramatic moments and building unique ambiences. I show how specific feelings, like solicitude, develop and transform over the course of a movement though intrinsic manipulations of text, rhythm, dynamics, pitch, and electronics. Regarding certain ambiences, such as continuous sound, I also demonstrate the dramatic consequences that arise in halting or disrupting these ambiences. The result is a group of five songs that touch upon several aspects of sound development while forging relationships between pitched and non-pitched material.

Compositionally speaking, I enjoy the process of transforming sounds and applying unconventional sonic techniques. Electronics prove invaluable, as they offer elements of sound generation and manipulation not otherwise achievable; their presence effectively enhances and/or transforms textures in each movement as I illustrate in the analysis. In the future, I will employ innovative means of deforming and reshaping sonic events, either with or without electronics. In particular, I am intrigued at the many possible timbres the voice can produce, so it is likely that voice will be more common in upcoming works.

Technological advances allow for the creation of intricate, sophisticated processing using affordable hardware and software, which is why this dissertation composition and future likeminded projects are possible. I will also continue to draw inspiration from contemporary repertoire as well as commercial music, as I believe that a composer's greatest strength is versatility. Ultimately, I designed this piece with preexisting sound manipulation tools in mind, and future projects will make use of similar accessible materials. No matter the tool or equipment, my objective is to produce meaningful sound development. I feel that *…and the songs of another…* is a testament to this ambition.

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Appendix

Max/MSP Patch

The Max/MSP patch that accompanies this score is available via web link. To open this patch, installation of Max/MSP is required. The program offers a free trial, though a subscription must be purchased after this trial in order to save patches. Snapshots and the Mixer package are also included.

Please see performance notes attached in the score for instructions regarding how to get the patch to function.

Web link: https://1drv.ms/f/s!AubV0VPBe8W5pdgbIeW3ENDNhj9lcw

Curriculum Vitae

Name:	Matthew David Becker
Post-secondary Education and Degrees:	McMaster University Hamilton, Ontario, Canada 2004-2008 B.Mus The University of Saskatchewan Saskatoon, Saskatchewan, Canada 2009-2012 M.Mus The University of Western Ontario London, Ontario, Canada 2013-2018 Ph.D.
Honours and Awards:	Murray Adaskin Composition Award 2010, 2012 David L. Kaplan Music Scholarship 2011 Don Wright Graduate Entrance Award 2013 George Proctor Memorial Award 2014 Province of Ontario Graduate Scholarship 2015-2016
Related Work Experience	Instructor The University of Saskatchewan 2010-2012 Teaching Assistant The University of Western Ontario 2013-2016 Instructor The University of Western Ontario 2015-2017