Liam Carey

Two Systems

for tenor trombone and electronics

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Instrumentation: Tenor Trombone and Electronics

Duration: 5 minutes

Note on the electronics:

This piece requires one microphone, a computer running Max 6 (or later) and stereo speakers. The trombone should be miked and the signal run through the Max patch. Only the electronic output from the Max patch is to be played out, no 'dry' mix is required.

The Max patch is an FM synth with four carrier oscillators fixed at the frequencies 110Hz, 220Hz, 330Hz and 440Hz. The frequency of the modulator oscillators and the modulation index is taken from a live reading of the trombone signal using pitch and volume tracking software. The volume reading is taken continuously and is also used to control the output level of the electronics, so as the Trombone plays louder so the electronics will also increase in volume. The overall balance of the two should be pretty much equal. The pitch reading, however, is not taken continuously but is instead taken at specific points through out the piece. These points have been notated in the score on a single line below the Trombone part and need to be triggered by a separate person.

Also, as the purpose of the microphone is to provide a reading from the Trombone, bleed from the electronics should be avoided as much as possible, i.e. by using a highly directional microphone.

Note for the Trombone player on intonation:

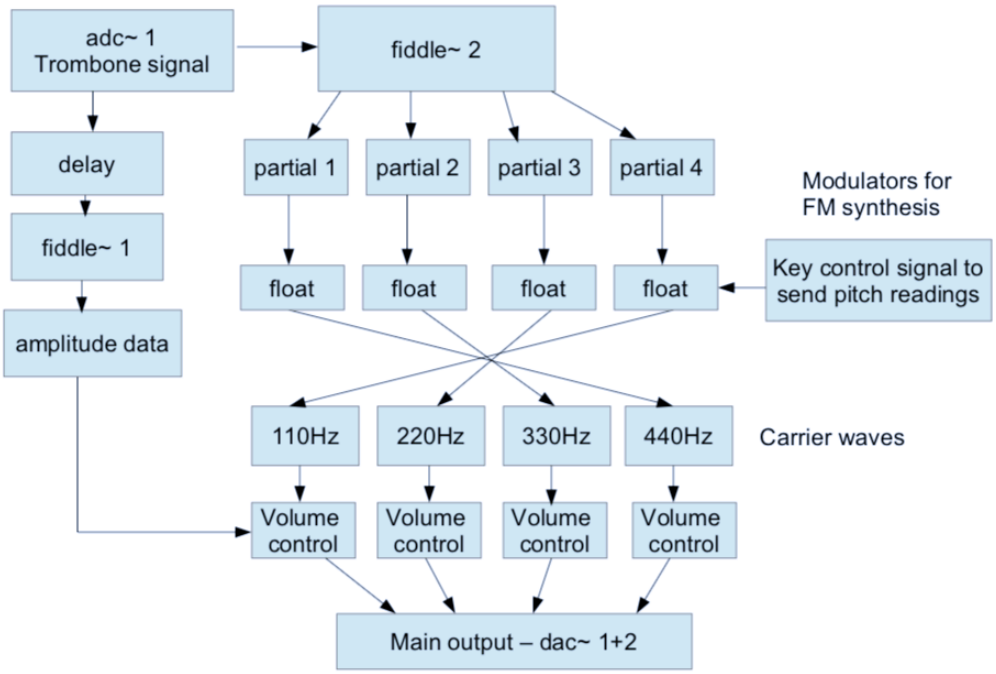
This piece deliberately uses contrasts between the 12 note equally tempered scale commonly used in Western music and the natural harmonic series. The sections marked "E.T." on the score should be played, as much as possible, in very even equal temperament. The sections marked "Harmonics in II" should be played as natural overtones all in this position and should sound, as much as possible, in their natural intonation, for example the 7th harmonic G in bar 24 should be noticeably flat of an equally tempered G. In these sections all the pitches are labeled with their position in the harmonic series, i.e. 5oe, 6oe, 7oe, etc. (the one exception here are the D quarter sharps in bars 23, 66 and 69, which are derived from the 11th harmonic but have been brought down an octave. This can be pitched as an equally tempered quarter tone and will still be 'harmonically' accurate.)

Programme Note:

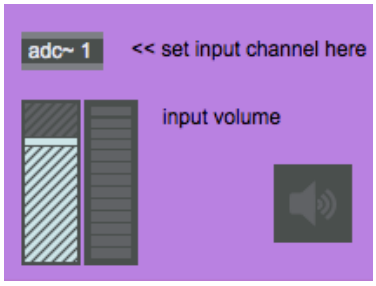
The aim of this short piece was to explore the tension between the symmetry of the whole tone scale and the asymmetry of the harmonic series. The whole tone scale provides the trombone with it's primary melodic material which is highly repetitive and, due to the structure of the whole tone scale, symmetrical. Against this we hear the the electronic drones which are based on the harmonic series, which due to it's structure are asymmetrical although harmonically very consonant. The idea is that as the piece progresses the electronic drones become increasingly louder causing dissonance between themselves and the trombone's melodic line. The two scales act like two independent systems which function well by themselves, but which cannot be resolved to each other - the music can either be melodically symmetrical or harmonically consonant, but not both at the same time.

Liam Carey – *Two Systems*

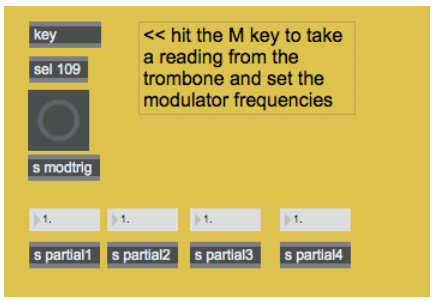
Max patch information



The electronics for this patch are controlled by the incoming trombone signal. The input comes from the [adc~ 1] object. This input and its volume control can be found in the purple section of the presentation screen:

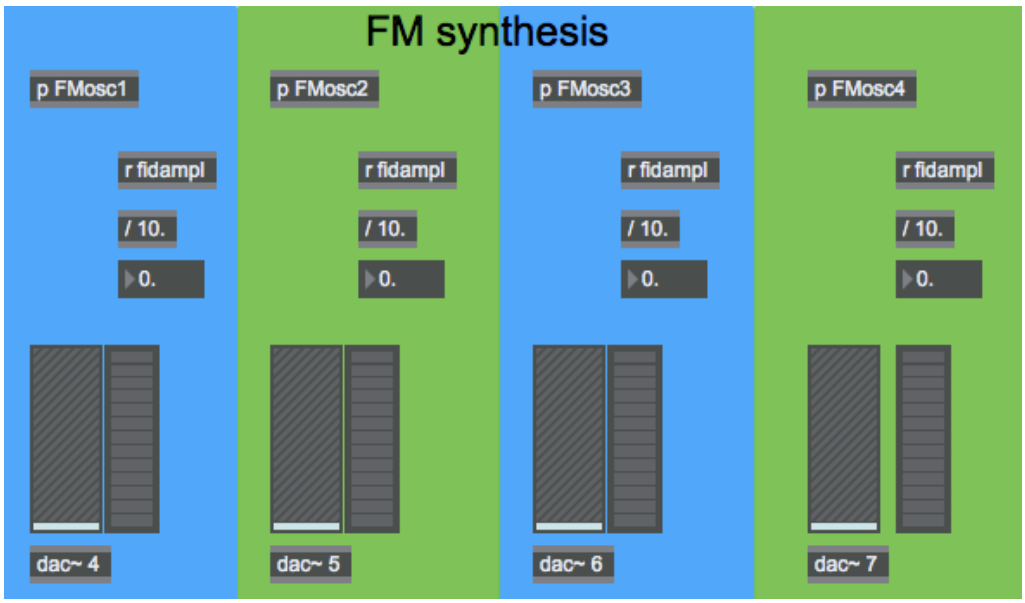


The trombone signal is then sent to two [fiddle~] objects. One [fiddle~] gives out readings of the first four partials of the trombone signal. The readings for these four partials are then sent to four synthesizers, but only when triggered, either by press the bang button, or by pressing the ‘M’ key on the computer keyboard:



A second fiddle object is also set to give out readings of the volume of the incoming trombone signal. This is used to control the output volume of the four oscillators so that they follow the live trombone part. This signal has a delay added to it so that the decay of the electronics is longer than that of the live trombone.

The four synths use FM synthesis. The carrier frequencies are set to 110Hz, 220 Hz, 330Hz, and 440Hz (each carrier also has a second frequency added to add a small amount of chorus effect). The modulator frequencies are taken from the [fiddle~] readings from the trombone signal. These have been crossed over so that partial 1 is sent to the 440Hz carrier, partial 2 is sent to the 330Hz carrier and so on. The individual volumes for the four oscillators can be found in the blue and green section labelled 'FM synthesis':



The balance of the trombone and the electronics should be even throughout the performance.

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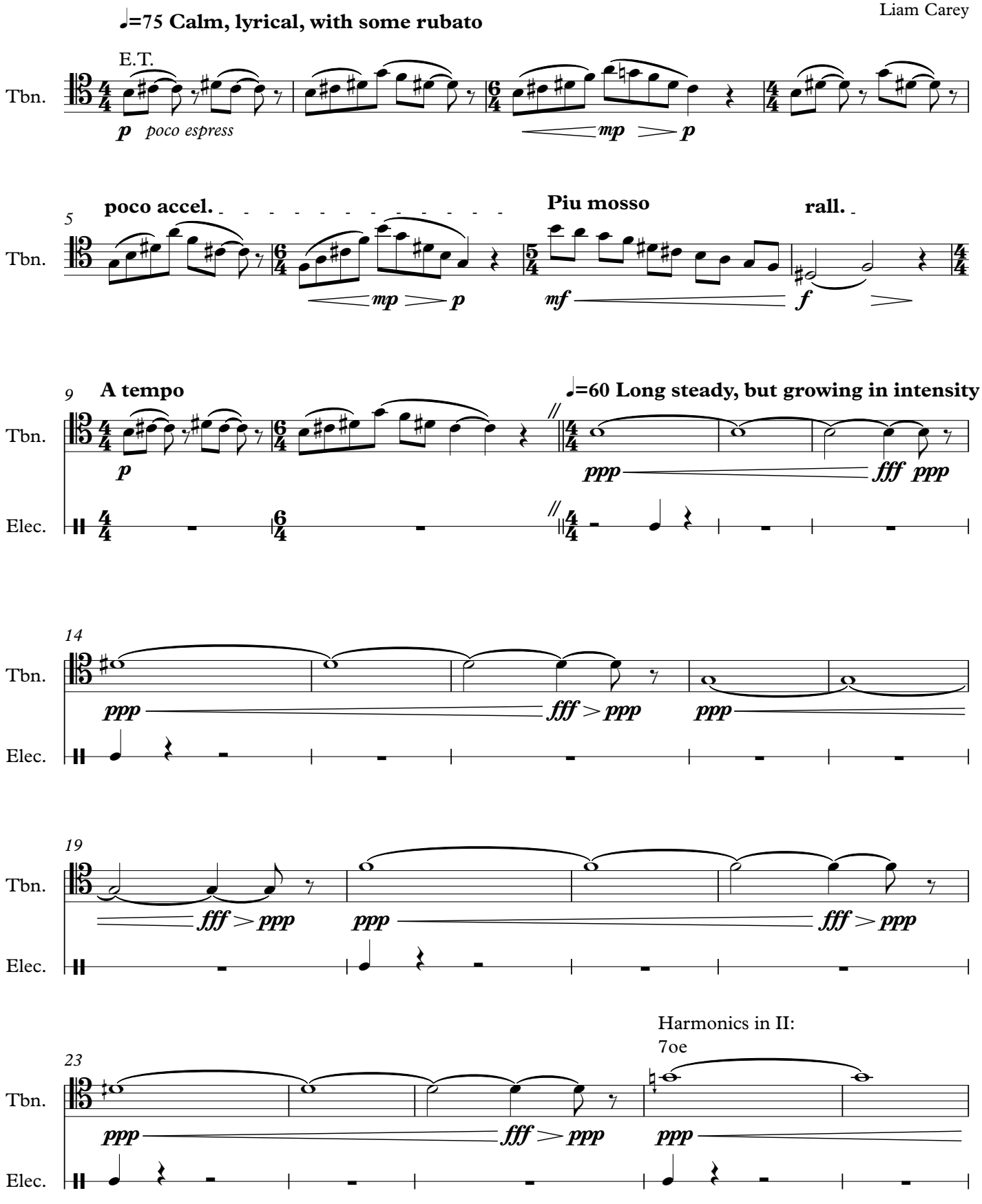
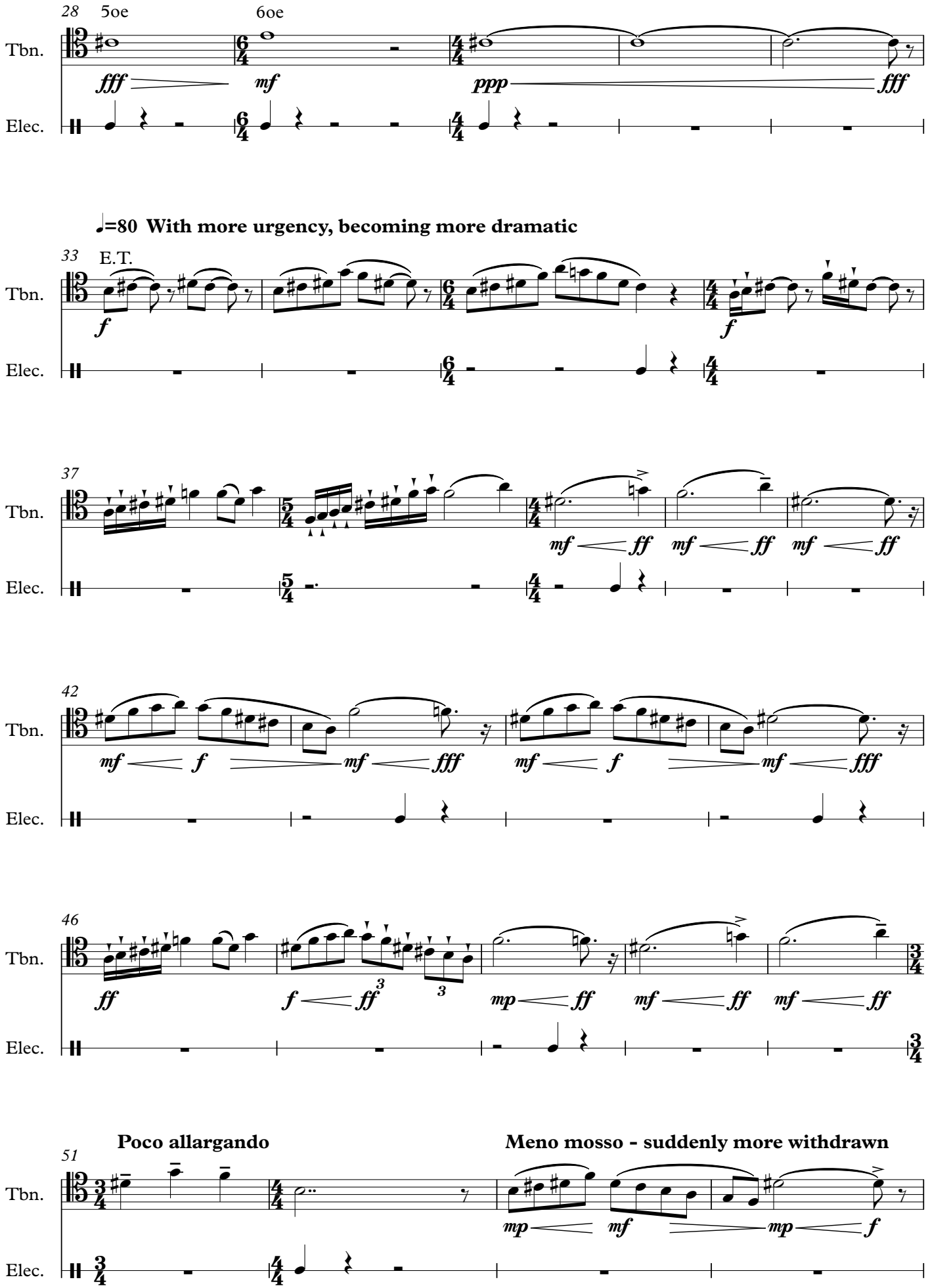
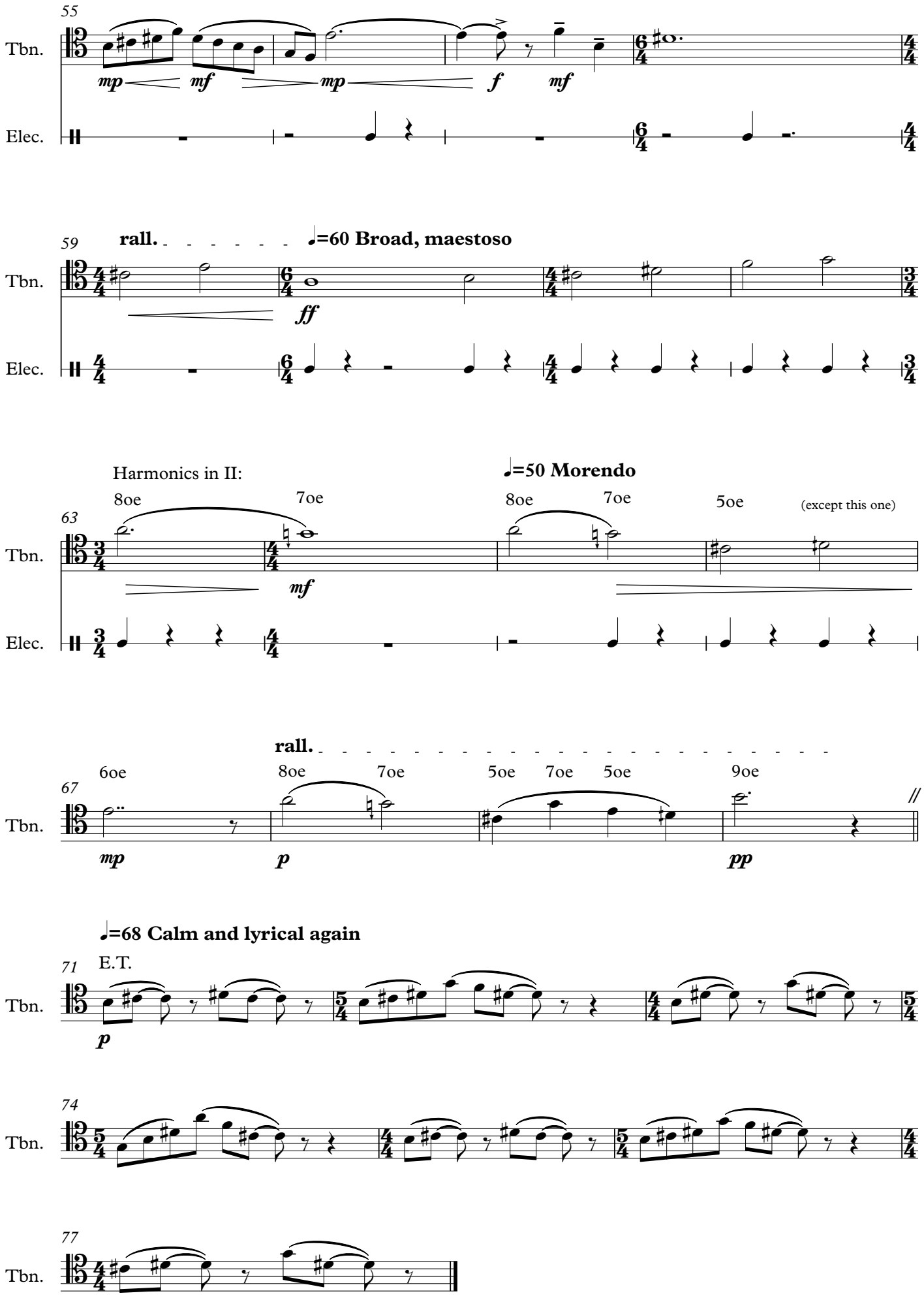



28
5oe
6oe
Tbn.
Elec.
fff
mf
ppp
fff
♩=80 With more urgency, becoming more dramatic
33
E.T.
f
f
37
mf ff
mf ff
mf ff
42
mf f mf fff
mf f mf fff
46
ff
f ff
mp ff
mf ff
mf ff
51
Poco allargando
Meno mosso - suddenly more withdrawn
mp mf mp f


55
Tbn.
Elec.
mp
mf
mp
f
mf
59
rall.
♩=60 Broad, maestoso
ff
Harmonics in II:
8oe
7oe
♩=50 Morendo
8oe
7oe
5oe
(except this one)
63
mf
rall.
6oe
8oe
7oe
5oe
7oe
5oe
9oe
67
mp
p
pp
//
♩=68 Calm and lyrical again
E.T.
71
p
74
77