Roomtone Variations **(2013-14)**
For any combination of instruments and live computer score
Nicolas Collins

In *Roomtone Variations* the resonant frequencies of the concert hall are mapped by computer, in real time, through acoustic feedback, and projected as staff notation. The strongest, most resonant pitches appear first, at the left; the weakest at the far right. Once the staves are filled, musicians improvise variations on the notes as they are highlighted, gradually stepping through a site-specific "architectural tone row". Every iteration of *Roomtone* manifests itself in two forms: the initial live performance that moves through the opening section of sonic analysis and into an unrehearsed exploration of the resulting pitch material within the room that produced it; and subsequently, readings done from the notation that arose in that first performance, which becomes a document for study, practice and improvisation – a portable portrait of a place.

The software runs on any Macintosh computer. A microphone is connected to the computer's audio input, via a mixer or microphone preamplifier; the computer output is connected to a good-quality loudspeaker. The gain of the sound system is set just at the level of feedback when the program begins its analysis phase. The computer's video output is connected to a projector or monitors that can be seen clearly by the musicians.

The program determines the room's resonant frequencies by slowly increasing system gain to the point of feedback, measuring the pitch of that feedback, then nulling out that pitch with a narrow notch filter (figure 1); this pitch is then displayed as the corresponding note on a musical staff (figure 2). The gain continues to be raised until the 24 strongest frequencies have blossomed into feedback, been suppressed by the filters, and notated on the staves (figures 3 and 4). This typically takes less than two minutes.

Once the notation is complete the conductor uses keyboard commands on the computer to highlight sets of notes on the staves, moving gradually from the left to the right (occasional reversals are allowed). The musicians play the highlighted pitches (in red), in various rhythmic permutations; when the highlighting shifts to blue they also play octaves on the same side of middle C as the original note (i.e., same clef). Duration is open, but typically in the range of 12 – 18 minutes.

Subsequent to the first performance the pitch set is saved and can be printed out. This site-specific paper/pdf score can then be used as the basis for future performances.

The sample notation (p. 4 on) is from the 2013 performance at Mills College (video here: https://www.youtube.com/watch?v=JrqMmY8ikuA), but the screen shots included in Figures 1-4 (p. 3) do not correspond to the same performance.

Performance Instructions

Red notes = play only these pitches (actual measured room resonances).
Blue notes = play these notes (actual resonances) and all possible octaves on the same side of middle C.
(Software has option for displaying permitted octaves as well as root pitches.)

Play as many permutations of available notes as possible, in parallel (chords) or sequence (melodies).
Generally play mf and slow, with occasional group crescendos/decrescendos.
Occasional glissandos and de-tunings.

Emphasize the "chord change" when the highlighted block shifts forward, whether there is significant harmonic movement or not.
Play legato over changes -- don't cut off notes prematurely/disruptively.
Don't be tentative.

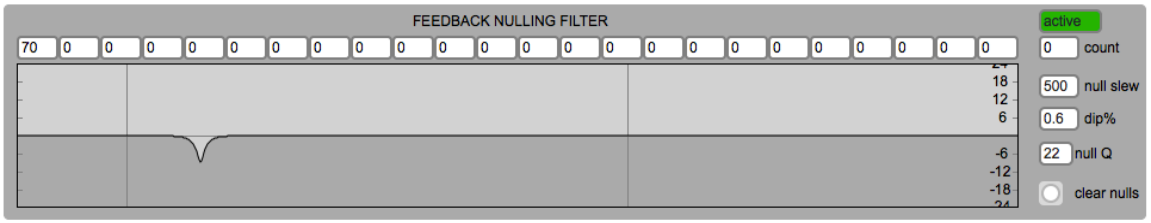


Figure 1

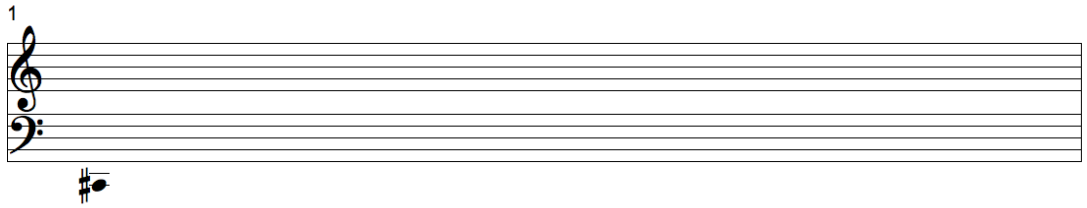


Figure 2

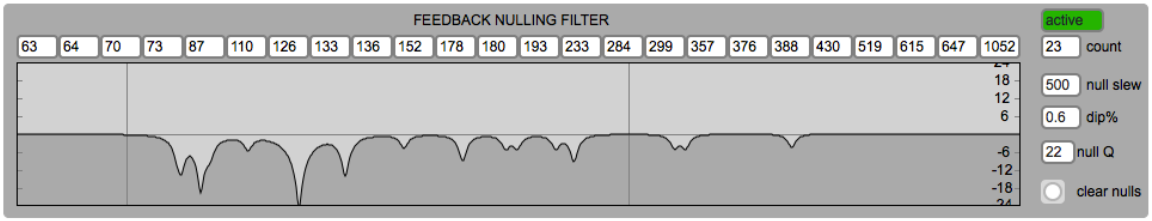


Figure 3

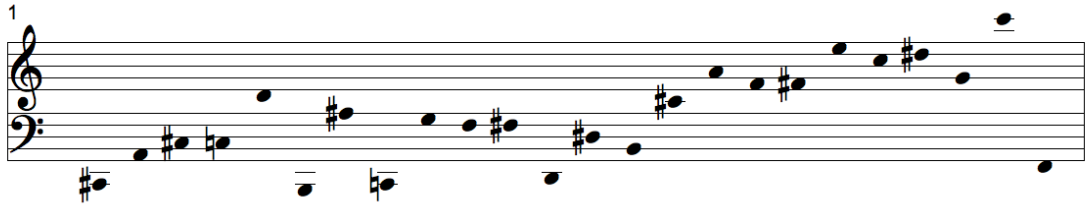
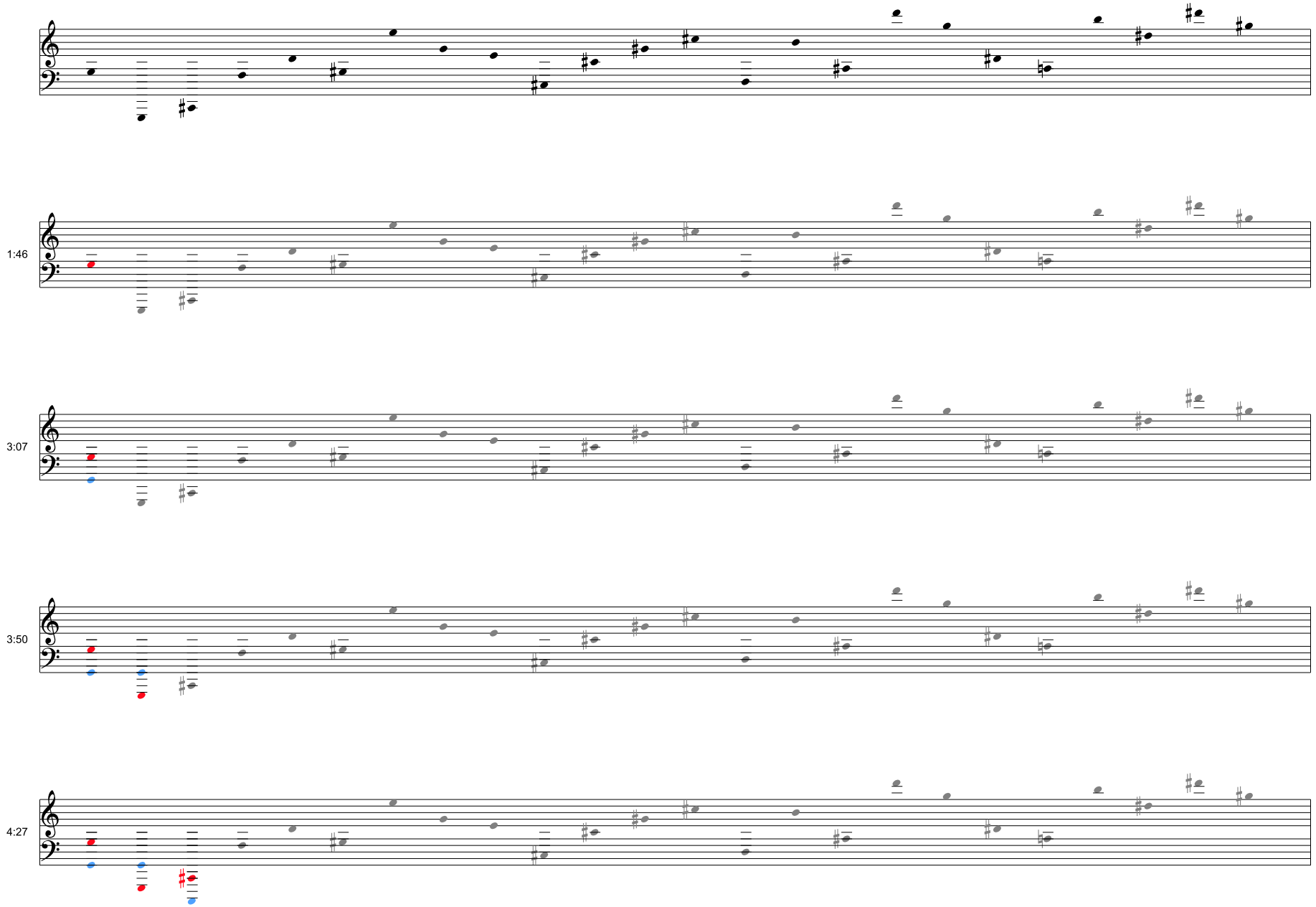


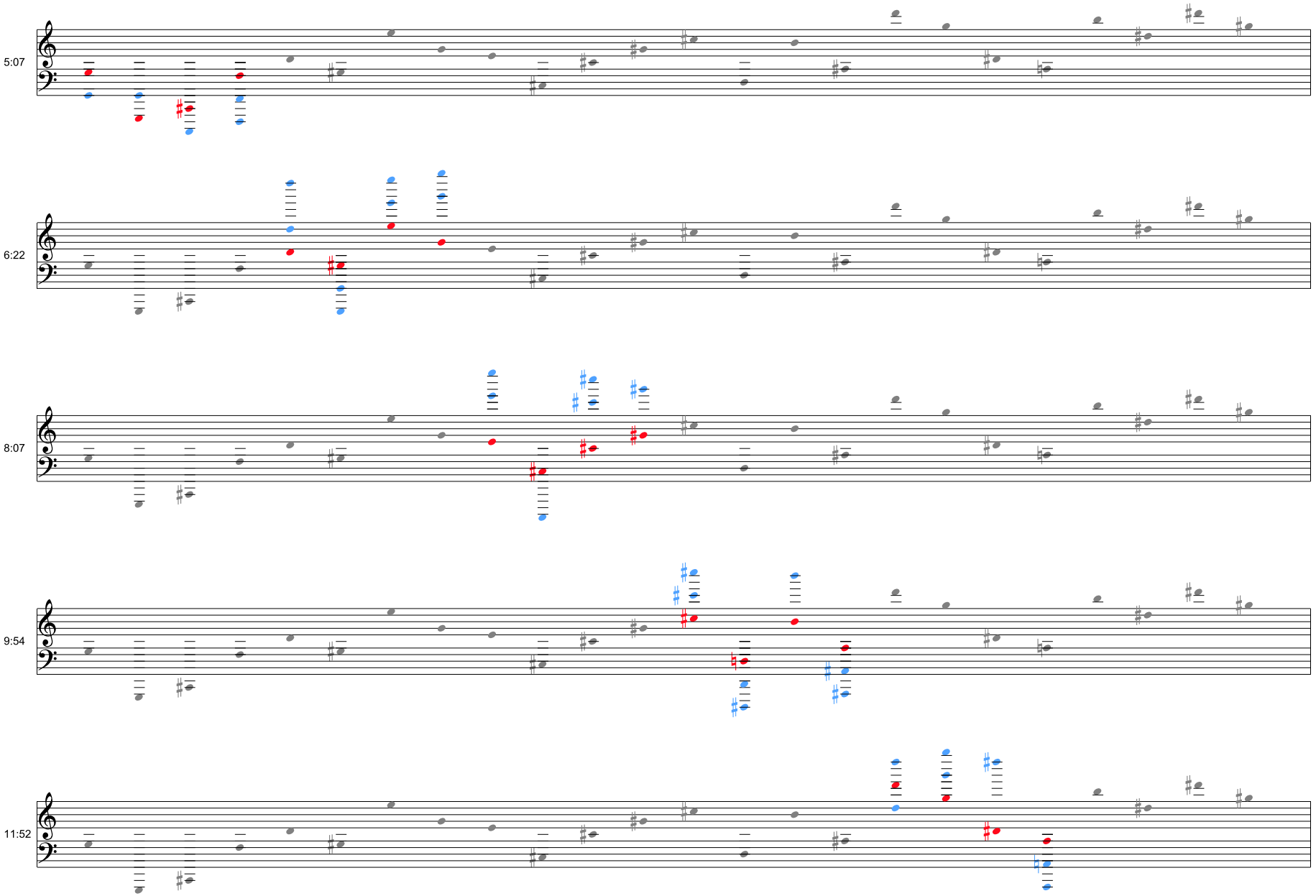
Figure 4

Roomtone

Mills College 5 October 2013

Nicolas Collins

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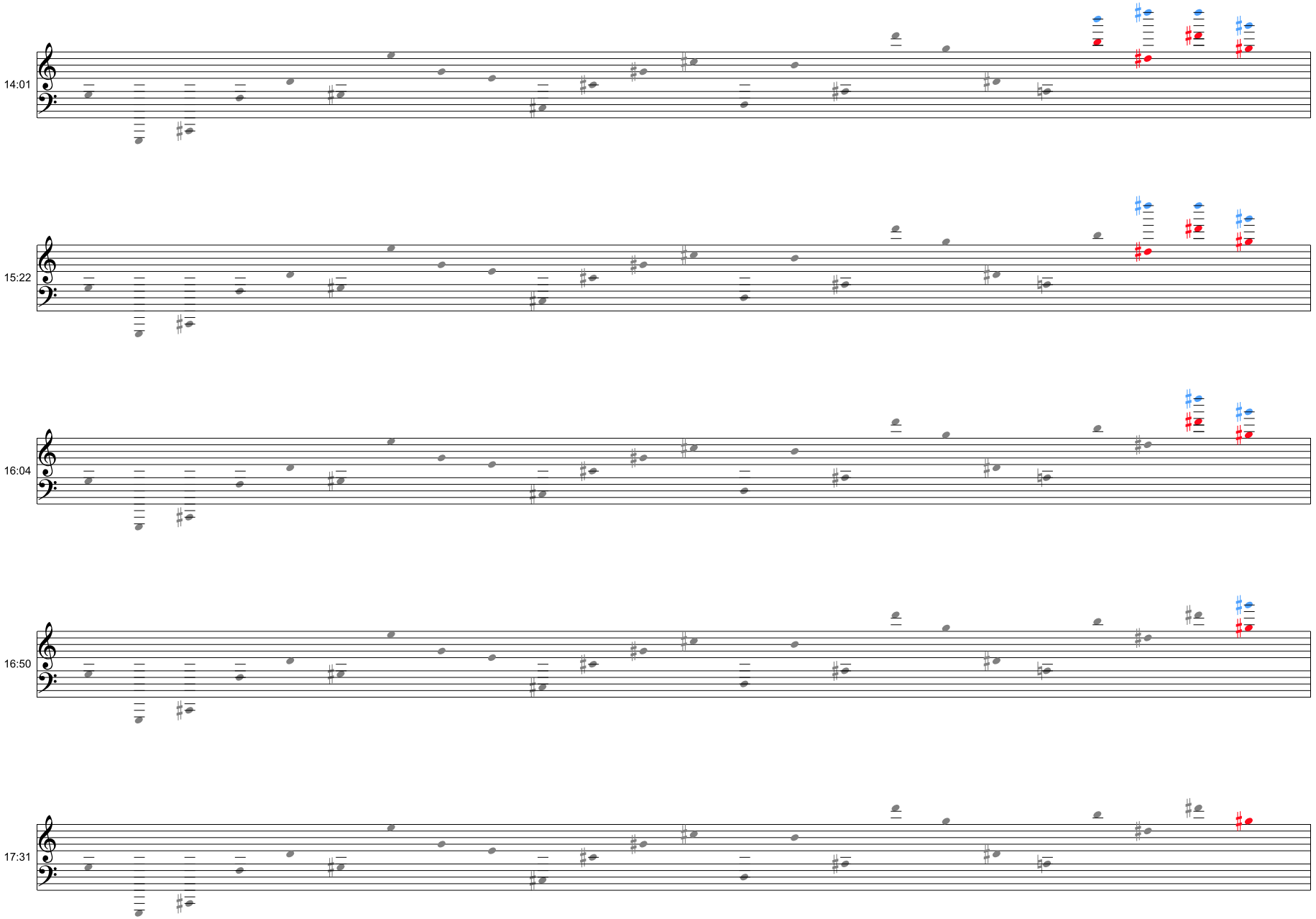
8:07
9:54
11:52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15:22
16:04
16:50
17:31