

HARRISON BIRTWISTLE'S *CHRONOMETER*: AN UPDATE

Nicolas Hodges

Chronometer tapes
Smelling of mouldy basement –
Very important

While Harrison Birtwistle's house in Mere was being sorted out after his passing last year, his son Silas called me: 'I found some tapes in the basement. Are they important?' Once I had discovered the images below (see [Figures 1a, 1b](#)) in my email I called him back: 'Yes, they are important.' For what Silas had stumbled across between damp papers and spiders' webs were the original master tapes of Harrison Birtwistle's *Chronometer* (1971–72),¹ the 'two asynchronous four-track tapes' about which one has read in almost every catalogue of Birtwistle's work. Not only had these tapes been lost since their creation – only surfacing once in the 50-odd years of their existence (more on that below) – the idea had even been aired by Peter Zinovieff, who himself brilliantly realised the tapes and translated Birtwistle's composition into physical reality, that they had never existed.² Yet here they were.

Here is what is known for sure about these tapes:

1. They carry EMS labels (added later), and there is no doubt that they were made in Peter Zinovieff's studio in Deodar Road, Putney.
2. They are credited to 'Composer: Birtwistle, Studio Realization: P[eter] Z[inovieff]'.
3. They have markers physically stuck to the tape every two minutes, presumably marking the two-minute envelopes described by

¹ The work is published by Universal Edition AG, Wien, www.universaledition.com/sir-harrison-birtwistle-64/works/chronometer-8049 (accessed 14 June 2023). UE started promoting the work as early as June 1972, when an advert appeared in *Music & Letters* listing Birtwistle's *Chronometer* as a New Work in the catalogue of Universal Edition (London) Ltd. 'Front Matter', *Music & Letters*, 53, no. 3 (1972), p. 10. My thanks are due to all at Universal Edition AG, Wien, for generous help at every stage of this research.

² 'Zinovieff wonders whether the piece ever existed in this form and believes that the half-inch four-track version may have been mixed down from two asynchronous quarter-inch stereo tapes (Zinovieff, personal correspondence with Bertels, 18 October 2012).' Tom Hall, 'Before *The Mask*: Birtwistle's Electronic Music Collaborations with Peter Zinovieff', in *Harrison Birtwistle Studies*, eds David Beard, Kenneth Gloag and Nicholas Jones (Cambridge: Cambridge University Press, 2015), p. 80, n. 112. Tom Hall's overview of Birtwistle's collaboration with Zinovieff can most usefully be read in conjunction with James Gardner's response in this journal: James Gardner, 'Even Orpheus Needs a Synthi', *TEMPO*, 70, no. 276 (2016), pp. 56–70.



Figure 1a:
Harrison Birtwistle, *Chronometer*,
'double-master' tape boxes (front);
photo Silas Birtwistle.

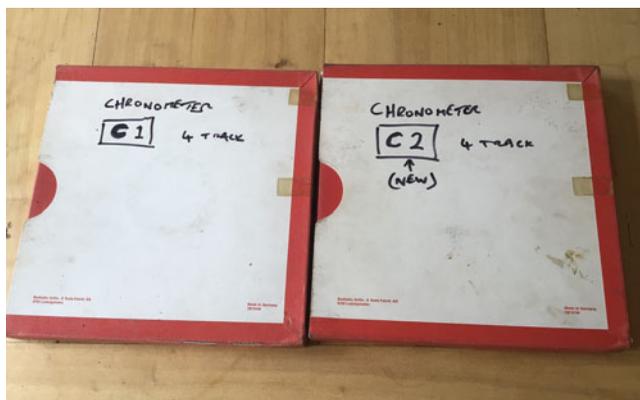


Figure 1b:
Harrison Birtwistle, *Chronometer*,
'double-master' tape boxes (back);
photo Silas Birtwistle.

Birtwistle in relation to his score of the work,³ and which are noted on reel C1, suggesting that they were the tapes realised in the studio during the composition process.

4. Tape C1 is marked 'Big Ben Master' on the reel, in Harrison Birtwistle's handwriting (see Figure 2a).
5. Tape C2 carries the extra information 'NEW' on the box, and 'THE NEW C2' on the reel, in unidentified handwriting (see Figure 2b).
6. They contain the eight discrete tracks of *Chronometer*, of which they are the only source.
7. They contain several minutes more music than any other source.
8. Being the earliest tapes containing the complete composition itself, as distinct from tapes containing raw source material, they have far superior sound quality to any previously known source.

All in all, it can be said without reasonable doubt that these tapes – the 'double-master' as I shall call them – are the end result of the

³ In conversation with Tom Hall, Birtwistle described the score as made up of many 'envelopes', each on a single sheet of paper. He went on: 'I'm not very sure what the context was. It didn't mean they came in that order or anything, but then there would be a super-imposed super-score, a sort of time thing where we put these, and we gave them names.' Tom Hall, 'Before *The Mask*', p. 76.



Figure 2a:
Harrison Birtwistle, *Chronometer*,
'double-master' tape reel 1; photo
Andreas K. Meyer.



Figure 2b:
Harrison Birtwistle, *Chronometer*,
'double-master' tape reel 2; photo
Andreas K. Meyer.

collaboration on Birtwistle's *Chronometer* and are the primary source for the completed work.

Chronometer was first performed at the Queen Elizabeth Hall on 24 April 1972. On that occasion the piece was played from a 26-minute four-track mix-down, as detailed in the programme booklet.⁴ This four-track source, labelled 'Chronometer Final', survives and formed the basis of the 2008 restoration of the piece (see below). It is located in the Peter Zinovieff collection currently housed at Surrey University.⁵ The reason why this mix-down was used when the double-master was still easily available is unclear. It has been

⁴ In the programme note Zinovieff states that "The original version is for eight tracks which have been reduced to four". *Chronometer* programme booklet (24 April 1972), p. 10. The duration was indicated in the summary of the programme at the start of the booklet (p. 4).

⁵ At the time of writing, neither information about the collection's contents nor the possibility of access for independent researchers has been published.

speculated⁶ that one of the two four-track machines listed in the inventory of EMS Studios was faulty, and thus could not be used in the concert. But how, then, was this known so far in advance as to allow mention in the programme?

The tape parts Zinovieff realised with Birtwistle often use deep bass, and thus have extensive low-frequency energy. And while *Chanson de geste* has only occasional low bass,⁷ an excess of low-frequency energy and/or dynamic range had apparently caused problems in Alan Hacker's recording of *Four Interludes for a Tragedy*: the CD sleeve note describes how 'when recording them for an LP, one of them had to be abandoned, because a backing-track frequency made the needle jump grooves on the vinyl'.⁸ EMS's equipment was similarly challenged by the sound projection of *Chronometer*, both in its dynamic range and the sheer volume at its climaxes. It must have been clear to Zinovieff and his team that the equipment on hand was not up to the job of projecting *Chronometer* in the substantial and relatively dry acoustic of the Queen Elizabeth Hall, although there would probably have been no alternative at that time.⁹ It therefore seems entirely understandable that they would simplify the situation by doing a mix-down, well in advance, as a 'performance tape'. The double-master of *Chronometer* starts and ends with sections which have significant energy below 30 Hz. These passages were actively cut from all other sources, and in some sources low bass sounds were filtered out throughout the remaining duration of the piece, either during copying from the double-master or in mastering or restoration. This would have reduced considerably the strain on the equipment used for sound projection.¹⁰ But, even then, Robin Wood (a member of the team at EMS at the time) recalled that the Lockwood studio monitors being used 'really struggled to fill that [...] space'.¹¹ Later Birtwistle would complain that the performance was simply 'quiet, too quiet'.¹²

The next advertised performance of *Chronometer* was of a revised version in a London Sinfonietta concert of 'Birtwistle conducts Birtwistle', scheduled to take place on 14 April 1973, again at the Queen Elizabeth Hall.¹³ James Gardner's detective work has revealed

⁶ For example, 'In its first performance in the Queen Elizabeth Hall on 24 April 1972, equipment malfunction forced a four channel version to be played as a substitute'. John Whiting, YouTube, 25 April 2022, <https://youtu.be/1YvO6pDmEnc> (accessed 8 June 2023).

⁷ A good quality copy of the four-track tape for *Chanson de geste* has been found, in the archive of the TU Studio, Technische Universität Berlin. I take this opportunity to thank Henrik von Coler and Stefan Weinzierl for finding and making safe this copy.

⁸ 'A Personal Note from Alan Hacker', Alan Hacker, *A Portrait of Alan Hacker* liner notes, 2006, Clarinet Classics, CC0052, p. 6. This information is missing from the sleeve note to the original LP. Alan Hacker, *Hymn to the Sun*, 1977, Decca/L'Oiseau-Lyre, DSLO17.

⁹ Even now, projecting the full frequency range of *Chronometer* at an appropriate volume is no small task, as an ultimately successful test projection over eight full-range speakers, which took place in the Hochschule für Musik und Darstellende Kunst in Stuttgart, proved. I would like to thank Prof. Piet Meyer for his assistance and advice on that occasion and otherwise regarding this research project.

¹⁰ Problems with sound projection plagued not only *Chronometer* but other works. For example, during the double premiere of Justin Connolly's *Poems of Wallace Stevens III* the tape 'worked fairly well the first time, but not at all the second', according to Desmond Shawe-Taylor in his review. 'Wagner's Rich Creation', *Sunday Times*, 24 January 1971. I am grateful again to James Gardner for sharing this source.

¹¹ James Gardner, interview with Robin Wood, 18 June 2018. I am grateful to James Gardner for sharing some of the unique source material cited here and for his extraordinary detective work into all things EMS.

¹² Harrison Birtwistle quoted in Tom Hall, 'Before *The Mask*', p. 77.

¹³ Anon, 'London Diary for April', *The Musical Times*, 114, no. 1561 (March 1973), p. 333.

that this concert did not take place, due to funding issues,¹⁴ but this is no reason to think that a revision of *Chronometer* was not undertaken for the occasion. If we accept Zinovieff's assertion that the still extant four-track mix-down was used as a performance tape in the premiere, it would represent the only source for the unrevised version of *Chronometer*, albeit an incomplete one. The double-master could equally represent the revised version, marked as it is with 'THE NEW C2' on the second tape.¹⁵ A comparison between the two could represent a comparison between unrevised and revised version, and would in any case be illuminating.

The whereabouts of the double-master after April 1973 are unclear, although it can be presumed that for some of that time it was in the hands of EMS/Peter Zinovieff. It was eventually passed to John Whiting, by persons unknown,¹⁶ in order that he could make a new stereo mix-down for broadcast by the BBC, initially in the 20 October 1982 edition of *Music in Our Time*.¹⁷ Whiting then took the opportunity afforded by an invitation from the London Sinfonietta to present it live, in all eight tracks for the first and only time, at the church of St John's Smith Square, London, on 14 February 1985.¹⁸ With the caution of a seasoned professional he played it from a safety copy made in the studio at City University, London.¹⁹ After the concert both the double-master and the safety copies remained in near-ideal storage at Whiting's studio, a situation which lasted almost two decades and undoubtedly enhanced their chances of survival.²⁰

The tapes reappeared (in a plastic bag) on 9 January 2013, at Kings Place, London. I was there to give an all-Birtwistle concert, followed by an interview with the composer, and John Whiting attended the concert in order to catch Harry and return the tapes. Thus I witnessed serendipitously the tapes being passed to Harry's team, one of whom remarked that *Chronometer* had already been restored, referring to the 2008 restoration by Abbey Road (see below). The assumption was that the tapes in the plastic bag were either the same or inferior to

¹⁴ Meirion Bowen wrote in *The Guardian*, 10 March 1973: 'how infuriating to learn that their next concert in this series (Birtwistle conducting Birtwistle) is cancelled for financial reasons. I'd deduct tenpence each from the Arts Council salary cheques'.

¹⁵ James Gardner comments of the four-track that it 'pre-dates the source of "Chronometer '71", which is a copy of the master prepared for the 1975 vinyl release and may or may not also be the "revised version" advertised for a Queen Elizabeth Hall performance in April 1973'. Gardner, 'Even Orpheus Needs a Synthesizer', n. 48.

¹⁶ It could have come from Peter Zinovieff or one of his associates, but the tape may already have been in the hands of Universal Edition or reached Whiting via the BBC.

¹⁷ This new two-track mix-down was also broadcast during the programme *Birtwistle at 50*, BBC Radio 3, 27 September 1984, 22:15, <https://genome.ch.bbc.co.uk/a0c9b38bee9e46fb80dc3af1aea77d06> (accessed 8 June 2023). I have not yet heard this version, although it is known to have survived.

¹⁸ '[A]t the time I was closely involved with London Sinfonietta. They had determined that the concert was to consist of electroacoustic music and I suggested that *Chronometer* and [Varèse's] *Poème Électronique* be included. I had no communication with Harry and I have no recollection of how the master tapes came into my possession. I do remember that I was not asked to return them.' John Whiting, email correspondence with Nicolas Hodges, 12 June 2022. John is mistaken that there was a whole concert of electroacoustic music; it seems rather that the Sinfonietta offered John an electroacoustic slot in the programme, and he made those two suggestions. The rest of the programme was conducted by Elgar Howarth and consisted of the world première of Simon Bainbridge's *A Cappella* (1985), for six solo voices, Mauricio Kagel's *Pas de cinq* (1965), for five actors, and the world première of Iannis Xenakis' *Thallem* (1984), for 14 instruments. 1955 → *Music of the Last 30 Years* programme booklet (14 February 1985), p. 3. I would like to extend my thanks to Percy Leung at St John's Smith Square for providing a scan of the original programme booklet.

¹⁹ 1955 → *Music of the Last 30 Years*, p. 78.

²⁰ In fact, the half-inch eight-track version which John Whiting used proved beyond the grasp of even Andreas K. Meyer, recorded as it was on a tape stock known for its propensity to deteriorate rapidly beyond repair.

the four-track mix-down. No-one looked hard enough to dispel this assumption and so the tapes in the bag were relegated to Harry's cellar.

That 2008 restoration of *Chronometer*, made from what Peter Zinovieff identified as the four-track tape from which the premiere was played, owed its existence to the energies of Lieven Bertels, who describes the sequence of events thus:

When I wanted to program Sir Harrison Birtwistle's only strictly electronic work *Chronometer* at a concert in 2006, I discovered that much to my surprise, his publisher could not tell me where the tape could be obtained. Despite being clearly listed in his official catalogue, the work itself, which as one of the first major quadraphonic or 'surround' electronic pieces in the UK had a unique status in British music history, seemed lost, less than 35 years after its première.

Luckily enough, the composer remembered that some years ago music programmer and composer John Woolrich had undertaken a quest for *Chronometer* and had indeed discovered a stereo version of the piece which was played in a Birtwistle concert at London's Almeida Theatre in 2000. I made contact with Peter Zinovieff, the 'animateur' of *Chronometer* and the founder of the EMS studio where the piece was realized. . . The latter confirmed that he had entrusted what remained of his EMS tape library to electronic music artist Peter Kember. . . Zinovieff identified²¹ one 4-channel ½" master tape labelled 'Chronometer Finale' [sic] as the 'final' quadraphonic mix played at the public première of *Chronometer* at a Queen Elizabeth Hall concert on 24 April 1972. It was this tape that was subsequently transferred into the digital domain and carefully restored by mastering and restoration specialist Simon Gibson at the EMI Abbey Road studios, London, in April 2008.²²

This restoration was published the same year on a DualDisc, with a four-channel version on one side of the disc and a stereo version on the other. Until now this has been the only practical way of hearing *Chronometer* in surround sound.²³ The comparison between this restored version and the rediscovered double-master is, however, dizzying for many reasons. First, the original arrangement of the material over eight tracks multiplies the spatialisation content of the piece and presents its counterpoint in all its original refinement and transparency. Second, the sound quality is dramatically better. The double-master has less of the distortion at climaxes which mars the 2008 restoration, and the levels of hiss are also much lower with a consequent increase in transparency.²⁴ Third, and most dramatically, there is about three minutes more music on the newly discovered double-master than on any other source: it lasts about 28 minutes, rather than 25 minutes,²⁵ with about one extra minute at the start and about two at the end. The extra time at the end is filled with a powerful but quiet heartbeat,²⁶ which is first detectable under the

²¹ John Woolrich has confirmed that the tape he used was the four-track mix-down and was provided by Peter Kember. Private email from John Woolrich to Nicolas Hodges, 8 June 2023.

²² Lieven Bertels, 'The Quest for *Chronometer*', *Recovery/Discovery: 40 years of Surround Electronic Music in the UK* liner notes. 2008, Sound and Music, SAM 0801, pp. 7–9.

²³ This is now out of print. The DualDisc format was a double-sided optical disc released in March 2004, offering a CD layer (with limited compatibility) on one side and a DVD layer on the other. The DVD layer in music releases is usually DVD-A, but for *Chronometer* DVD-V was used; presumably, this was done to increase compatibility but it necessitated some loss of detail in the surround version.

²⁴ Presumably the distortion, hiss and general confusion on the published four-track surround version were present on the first four-track mix-down and were faithfully copied in the 2008 restoration.

²⁵ The Decca LP and SAM DualDisc versions both last 25 minutes.

²⁶ Prof. Michael Gramlich, head of the Institute of Cardiac Rhythmology at the University Clinic, Aachen, has examined the heartbeat at the end of *Chronometer* and assures me that there is no reason to believe that it is artificial; it has all the characteristics of a real heartbeat.

cacophony of clocks in the final minutes of the piece and continues when all else has stopped, always at a low dynamic level and presumably to be faded out slowly.

The opening two minutes are also quite different. What one previously knew as the start of the piece – the ticking of Big Ben, slowed down – appears at the two-minute point in the double-master, marking the second ‘envelope’; the opening consists almost entirely of sub-bass, from which the ticking of the previously known opening emerges. I hear it as an ‘inverse *Orfeo*’, starting as it does with nebulous and almost infinitely low and dark sounds, the direct opposite of the bright and energetic brass of the Toccata that opens Monteverdi’s *L’Orfeo*.²⁷ Later this was a typical opening for Birtwistle, used in many of his orchestral works, especially the trilogy of works concerned with ‘time and geology’²⁸ (the contemporaneous *Triumph of Time* (1971–72), *Earth Dances* (1985–86) and *Deep Time* (2016)).

Initially I found it difficult not to hear the retrieved top and tail of *Chronometer* as new, due to imprinting on the LP, but despite having now overcome that, the two-minute point after the inverse *Orfeo* still acts as the beginning in earnest of the drama. At the other extremity we have the (probably) real heartbeat which ends the piece, already heard throughout by Michael Hall as the result of the transformation of clocks:

[N]o clockwork mechanism, no tick, is absolutely regular (at least to the perceiver) and when Birtwistle exaggerates the irregularities they become more and more like heartbeats. After a while, the throb of Big Ben turns into that other definition of pulse: rhythmical contraction and expansion of an artery. The effect is like the throb in the ear heard in bed at night.²⁹

Cross hears heartbeats also³⁰ but it is Robert Adlington who takes Michael Hall’s ball and runs with it:

The transformation [from mechanism to heartbeat], though, is not complete: the clock sound remains identifiable. In emphasising the proximity of clock and heartbeat, *Chronometer* identifies the most pervasive way in which society projects measurable clock time as ‘natural’ – namely by reference to pulse.³¹

After a brief tussle with Hegel, he continues:

From an Adornian perspective, *Chronometer* hovers dangerously on the precipice of total submission to the rationalised time of industrial society.³²

The newly rediscovered heartbeat ending seems to have been almost predicted by these three commentators. What was ‘not complete’ is now complete; what ‘hovers dangerously on the precipice’ now makes clear the primacy, in this moment at least, of the human pulse. It brings closure musically through the looping back to the rhythm of the ticking clock³³ and psychologically by returning us to reality: the dream-drama of clashing clock-times gives way to the experienced time of our own bodies.

²⁷ Birtwistle cited the Monteverdi Toccata as a model for the opening of his *Variations from the Golden Mountain* (2014), for solo piano, during our rehearsal on the day of the premiere (14 September 2014). It has also been suggested by Jonathan Cross as the model for the opening of *Punch and Judy* (1967) and *The Last Supper* (1998–89). Jonathan Cross, *Harrison Birtwistle: Man, Mind, Music* (London: Faber & Faber, 2000), p. 240.

²⁸ Harrison Birtwistle, *Deep Time* programme note (2016), www.boosey.com/shop/catalogue/work_info?=&musicid=100197&langid=1 (accessed 13 June 2023).

²⁹ Michael Hall, *Harrison Birtwistle* (London: Robson Books, 1984), p. 105.

³⁰ Cross, *Harrison Birtwistle*, p. 184.

³¹ Robert Adlington, *The Music of Harrison Birtwistle* (Cambridge: Cambridge University Press, 2000), p. 98.

³² *Ibid.*, p. 99.

³³ I also reminded of the opening and closing of Birtwistle’s *Silbury Air* (1977).

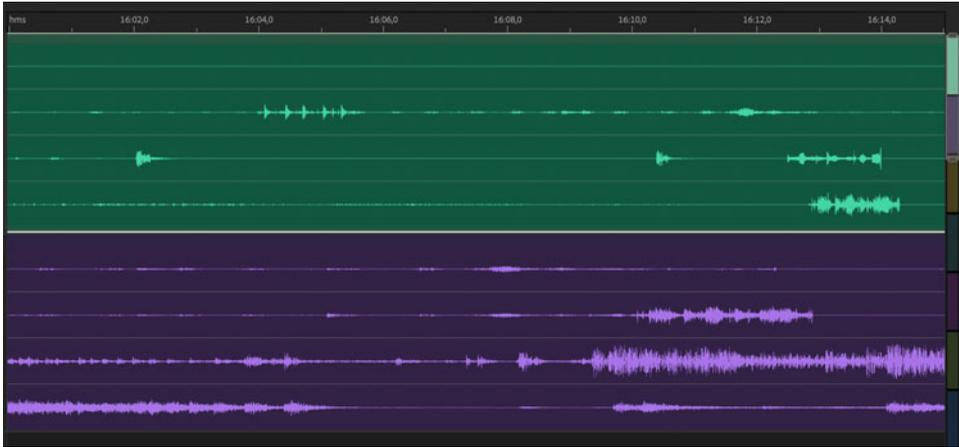
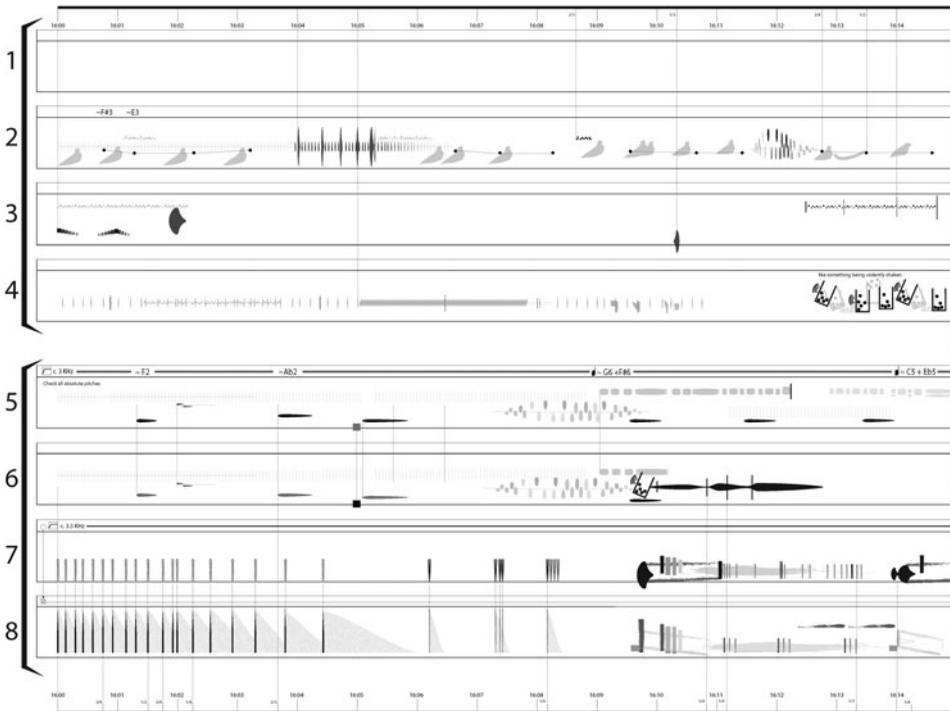


Figure 3:
Waveform of the double-master,
16:00–16:15.



Example 1:
Harrison Birtwistle, *Chronometer* in
an early draft of John Aulich's
listening score. © Universal Edition.

A final comment: almost from the beginning *Chronometer* has been described as a work for two asynchronous tapes. The programme for the first performance does not contain this description, but Birtwistle later commented that Zinovieff 'had two four-tracks and randomly played them against each other. They weren't synchronised... But we accepted that, that it would have that element in it which was random.'³⁴

Now that we have the double-master the idea of two tapes full of music being started in some capriciously asynchronous manner can be discounted. Tape 1 begins with a whole two minutes of silence, measured out as 45.6 metres³⁵ of expensive blank magnetic tape, a very clear indication that both tapes were meant to be started together, with the required time difference achieved by the measured blank tape. That hardly counts as 'randomly played... against each other'; instead it was an attempt at synchronicity that was nevertheless somewhat rough and ready. (This begs the further question: what magnitude of effect would inaccurate splicing have on the relationship between the two tapes? Again, a little arithmetic suggests that, with an accuracy of about a third of a centimetre in splicing, and a tape speed of 38 cm/s, this yields an accuracy of 10 ms.³⁶ Asynchronicity is unlikely to have been significantly exacerbated by poor editing.)

Writing about the music of *Chronometer* was, until now, severely hindered by the disappearance of the original double-master. Tom Hall bemoans that for 'a piece which according to Cross has a "clear structure",³⁷ it is notable that no commentator has attempted to provide a more detailed account of how the work is structured'.³⁸ Tom Hall nobly makes just such an attempt, but clearly demonstrates the well-known difficulties inherent in analysing scoreless musical 'works' by presenting only an overview of a half-hour sonogram that tells us little, informed by modest input from Birtwistle and Zinovieff.³⁹

Now that we have all eight tracks again, we can hear the complete work in its original format, full of detail and texture, and we are also able to study it in many different ways. The composer John Aulich has been able to sketch a possible visual representation of the piece, along the lines of Rainer Wehinger's listening score for Ligeti's *Artikulation*,⁴⁰ and this may well open the doors to future commentators. Figure 3 and Example 1 show the eight-track waveform of the double-master and its representation in score (from 16:00 – corresponding to about 14:00 on *Electronic Calendar*, 14:08 on the SAM DualDisc and 14:20 on the Decca LP).

Finally, the best news of all is that the double-master (and several other EMS Studios tapes⁴¹) are in the hands of Andreas K. Meyer of

³⁴ Birtwistle in conversation with Tom Hall, 8 March 2013, quoted in Tom Hall, 'Before *The Mask*', p. 80.

³⁵ 120 seconds multiplied by 38 cm/s tape speed.

³⁶ $1000 \text{ ms} \times 1/38$, 26 ms if cut to an accuracy of 1 cm, 10 ms if cut to an accuracy of about a third of a cm.

³⁷ Cross, *Harrison Birtwistle*, p. 184.

³⁸ Tom Hall, 'Before *The Mask*', p. 83.

³⁹ See sonogram in Tom Hall, 'Before *The Mask*', p. 85, fig. 3.2.

⁴⁰ György Ligeti and Rainer Wehinger, *Artikulation: An Aural Score by Rainer Wehinger* (Mainz: Schott, 1970).

⁴¹ Meyer also has tape parts in hand for Birtwistle's *Four Interludes for a Tragedy* (1968), for clarinet and tape, and *Chanson de geste* (1973), for double bass and tape. He also has five different tapes for Justin Connolly's *Tesserae D* (1971), for trumpet and tape, including an incomplete tape part, which could provide insight into the working methods of the EMS Studios team. These were in the hands of the trumpeter Ronald Anderson (commissioner of Connolly's piece, as well as of Wolpe's *Solo Piece for Trumpet* (1966) and *Piece for Trumpet and Seven Instruments* (1971)), who I would like to thank for his generosity, both in digging them out, and in sending them to Andreas K. Meyer in Manhattan from his farm in upstate New York.

Meyer Media, New York.⁴² He and his team have copied them at the highest possible resolution and are undertaking the further restoration, in collaboration with myself and others. Later this year an eight-track performance file based on the double-master will be available from the publisher.

⁴² Andreas K. Meyer was a producer and engineer at Sony Music Studios NYC before establishing an independent studio. He is well known for his work remastering the complete recordings of Glenn Gould, among many others. In a former life as a composer, he studied electronic music at City University, London.