

*Post-digital III*  
*The Miners*

*Enrique Tomás*

*Alto Sax, Electric Guitar, Drum Set, Violin, Cello, Bitcoin Miner and Electronics*

## Concept and Instructions:

*Bitcoin is communication protocol and a P2P network which can be used as a cryptocurrency. The bitcoin network is run by miners, computers making transactions that maintain the central shared transaction ledger called the blockchain.*

*A new study estimates that the mining process consumes at least 2.6GW of power every year—almost as much electric power as Ireland consumes. This figure could rise to 7.7GW before the end of 2019—accounting for almost half a percent of the world's electricity consumption. By July 2022, the bitcoin network will require more electricity than more 150 individual countries. Following this progression, it will use as much electricity as the entire world does today.*

*'The Miners' is an work in which five performers play a musical score and each individual note played is used to mine at the bitcoin network in realtime. The software accompanying this score (a python script connected to Internet, please contact the author) follows the score and uses the pitch and velocity parameters of each corresponding note to calculate the numerical nonce (a 32 bytes number) used to mine. This process is visualized during the work with a beamer. If during the performance the ensemble results in mining a bitcoin, performers and author will divide its value in equal parts.*

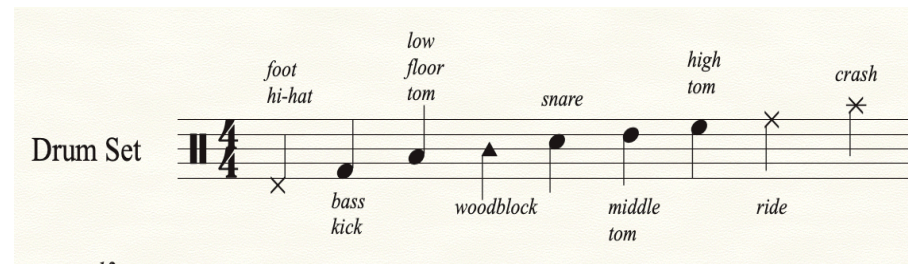
## Score

- The system at the bottom of the score represents the notes played by a MIDI track accompanying the ensemble.
- The score is mostly rhythmic, there are no melodies. This score is made of rhythmic patterns which are 4 measures long.
- The performance starts when the audio track is triggered by the mining program (python script). The mining program will show a few slides informing the audience about the work, adding 1 minute to the duration of the work.

## Instrumental Notes

Percussion:

- The Drum Set is a standard 5 pieces drum set (bass, 3 toms, foot hi-hat, ride and crash).
- A woodblock has to be added to the drum set.
- Notation: see picture on this page



## Stage Setup

- The computer mining, playing the MIDI track and visualizing the process can be on stage or not. It will be connected to the PA system and to a beamer.
- The beamer must be set on the stage in a way that it is possible to follow the visualization and the work interplay.

# Post-digital III

## The miners

Enrique Tomás

Alto Sax

Electric Guitar

Drum Set

Violin

Cello

Audio

$\text{♩} = 140$

*f*

A. Sax.

E. Gtr.

D. S.

Vln.

Vc.

Audio

18

28

A. Sx.

E. Gtr.

D. S.

Vln.

Vc.

Audio

*Bell ride*

*f*

38

A. Sx.

E. Gtr.

D. S.

Vln.

Vc.

Audio

48

A. Sx.

E. Gtr.

D. S.

Vln.

Vc.

Audio

58

A. Sx.

E. Gtr.

D. S.

Vln.

Vc.

Audio

6

A. Sax. *67*

E. Gtr. *67*

D. S. *67*

Vln. *67*

Vc. *67*

Audio *67*

A. Sax. *79*

E. Gtr. *79*

D. S. *79*

Vln. *79*

Vc. *79*

Audio *79*

*mp*

*mf*

*mf*

*mf*

*mf*

92

A. Sax.

E. Gtr.

D. S.

Vln.

Vc.

Audio

102

A. Sax.

E. Gtr.

D. S.

Vln.

Vc.

Audio

110

A. Sax. Musical staff for Alto Saxophone, treble clef, key signature of two sharps (F# and C#). It contains a melodic line with eighth and sixteenth notes, including triplets and slurs.

E. Gtr. Musical staff for Electric Guitar, treble clef. It contains a melodic line with eighth and sixteenth notes, including triplets and slurs.

D. S. Musical staff for Double Bass, bass clef. It contains a complex rhythmic accompaniment with many sixteenth notes, including triplets and slurs. Dynamics markings 'f' are present.

Vln. Musical staff for Violin, treble clef. It contains a melodic line with eighth and sixteenth notes, including triplets and slurs.

Vc. Musical staff for Violoncello, bass clef. It contains a simple bass line with quarter notes.

Audio Audio waveform track showing the overall sound of the passage.

118

A. Sax. Musical staff for Alto Saxophone, treble clef, key signature of two sharps. It contains a melodic line with eighth and sixteenth notes, including triplets and slurs.

E. Gtr. Musical staff for Electric Guitar, treble clef. It contains a melodic line with eighth and sixteenth notes, including triplets and slurs.

D. S. Musical staff for Double Bass, bass clef. It contains a complex rhythmic accompaniment with many sixteenth notes, including triplets and slurs. Dynamics markings 'f' are present.

Vln. Musical staff for Violin, treble clef. It contains a melodic line with eighth and sixteenth notes, including triplets and slurs.

Vc. Musical staff for Violoncello, bass clef. It contains a simple bass line with quarter notes.

Audio Audio waveform track showing the overall sound of the passage.



128

A. Sx.

E. Gtr.

D. S.

Vln.

Vc.

Audio

136

A. Sx.

E. Gtr.

D. S.

Vln.

Vc.

Audio

145

A. Sax. *mp*

E. Gtr.

D. S.

Vln.

Vc.

Audio

163

A. Sax. *f*

E. Gtr. *f*

D. S. *f*

Vln. *f*

Vc. *f*

Audio

177

A. Sax. 

E. Gtr. 

D. S. 

Vln. 

Vc. 

Audio 

187

A. Sax. 

E. Gtr. 

D. S. 

Vln. 

Vc. 

Audio 

198

A. Sax.

E. Gtr.

D. S.

Vln.

Vc.

Audio

208

A. Sax.

E. Gtr.

D. S.

Vln.

Vc.

Audio

218

A. Sx.

E. Gtr.

D. S.

Vln.

Vc.

Audio

228

A. Sx.

E. Gtr.

D. S.

Vln.

Vc.

Audio

*pp*

*pp*

14

241

A. Sx. *pp*

E. Gtr. *pp*

D. S. *pp*

Vln. *pp*

Vc.

Audio

Detailed description: This system of musical notation covers measures 241 to 252. It features six staves: Alto Saxophone (A. Sx.), Electric Guitar (E. Gtr.), Double Bass (D. S.), Violin (Vln.), Violoncello (Vc.), and an Audio waveform. The key signature is two sharps (F# and C#). The saxophone part begins with a whole rest, followed by eighth-note patterns. The guitar and bass parts play continuous eighth-note figures. The violin part has a whole rest until measure 244, then enters with eighth-note patterns. The audio waveform shows the combined sound of all instruments.

253

A. Sx.

E. Gtr.

D. S.


Vln.


Vc.

Audio


Detailed description: This system of musical notation covers measures 253 to 262. It features the same six staves as the previous system. The saxophone part continues with eighth-note patterns. The guitar and bass parts maintain their eighth-note figures. The violin part continues with eighth-note patterns. The audio waveform shows the combined sound of all instruments.

260


A. Sax. 


E. Gtr. 

260

D. S. 

260

Vln. 

Vc. 

Audio 