

# Audio Watermark Listening Test

This survey will test your ability to detect a digital audio watermark embedded in music files.

Digital audio watermarks hide extra information in an audio signal, usually for copyright enforcement purposes. The watermarks are designed to be inaudible, but necessarily add some distortion to the original audio.

## Training Phase

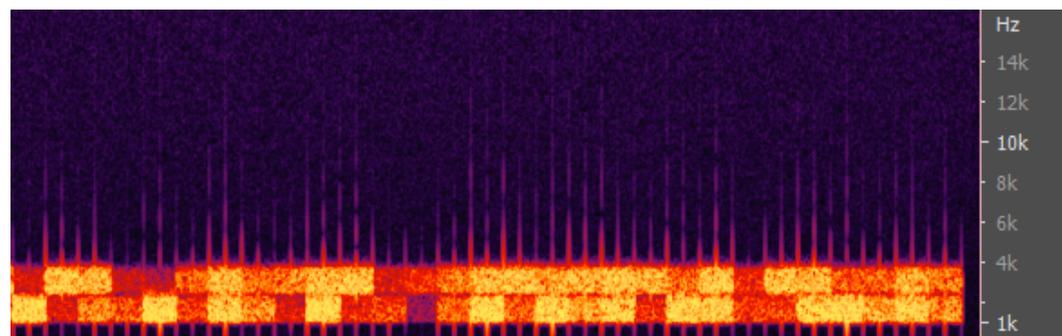
The information below is meant to familiarize you with the sound qualities of the watermark before taking the test. Take your time with this material before you begin answering questions.

The following sample demonstrates a greatly exaggerated version of the watermark applied to a noise signal. The watermark starts after 2 seconds.



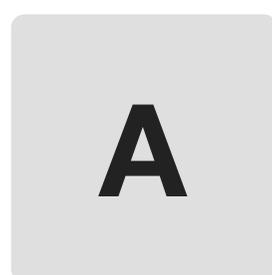
Audio sample containing an exaggerated watermark.

This distortion is visualized in the figure below, showing discrete blocks of noise that fluctuate in intensity over time.



A spectrogram of the watermark by itself. The distortion lies in the region from 1 to 3 kHz.

In the following example, sample **A** is the original, and sample **B** is watermarked. The distortion is most audible during the loudest portion of the watermarked sample (**B**). Focus your attention on the voices of the choir. Listen for the rapid fluttering distortion, similar in character to the exaggerated example above. Switch back to the original sample (**A**) and notice that the fluttering is absent.



Original

Toggle ↔

Rewind ⏮ 3 sec

Toggle and Rewind ⏮ 3 sec



Watermarked

# Testing

Below, you will find 16 groups of audio samples. In each group, you are presented with two versions of the same music sample. One contains a digital watermark, and the other does not. Switch back and forth between the two audio samples using the control buttons. Listen closely and try to determine which sample in each group contains a watermark. **For best results, use headphones and take the test in a quiet environment.**

Your score will be reported after you submit your answers.

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## 1. Bored With Four - Powerless Together

[CC BY-NC-ND 3.0 2013 Bored With Four](#)

A is Watermarked

Toggle ↔    Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec

B is Watermarked

## 2. Beethoven - Moonlight Sonata

Copyright ©2005 Naxos Rights International Ltd.

A is Watermarked

Toggle ↔    Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec

B is Watermarked

## 3. Debussy - The Engulfed Cathedral

Copyright ©2006 Naxos Rights International, Ltd.



A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec



B is Watermarked

## 4. XXYYXX - Fields

Copyright ©2012 XXYYXX, ©2012 Relief in Abstract Records



A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec



B is Watermarked

## 5. Ravel - Daphnis et Chloe

Copyright ©1992 EMI Records Ltd.

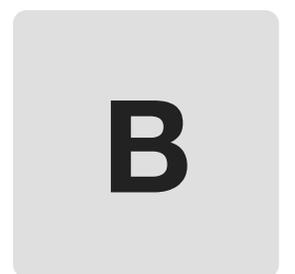


A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec



B is Watermarked

## 6. Drake - Take Care

Copyright ©2011 Cash Money Records Inc.



A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec



B is Watermarked

## 7. Shakey Graves - Unlucky Skin

Copyright ©2011 [Shakey Graves](#)

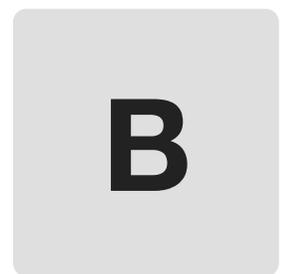


A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

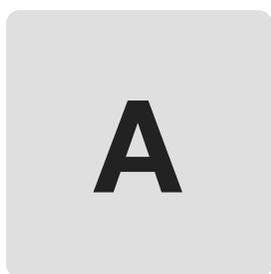
Toggle and Rewind ↶ 3 sec



B is Watermarked

## 8. Builders - Synthetic Flight

Copyright ©2013 [Builders](#)

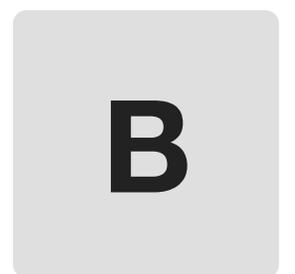


A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec



B is Watermarked

## 9. Lady Gaga - Just Dance

Copyright ©2009 Interscope Records



A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec



B is Watermarked

## 10. Shirley Bassey - Diamonds Are Forever

Copyright ©1988 EMI Records Ltd.



A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec



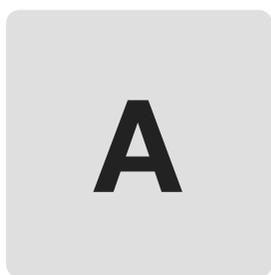
B is Watermarked

## 11. Pink Floyd - The Great Gig In The Sky

Copyright ©1973 Capitol Records, Inc.

©1973 The Gramophone Company Limited

All lyrics © Pink Floyd Music Publ. Ltd./Chappell Music Ltd.

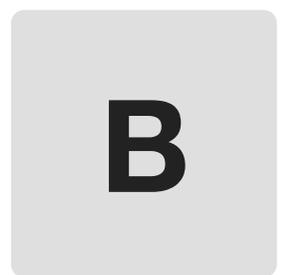


A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec



B is Watermarked

## 12. Santana - Every Day I Have The Blues

Copyright ©2000 Purple Pyramid



A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

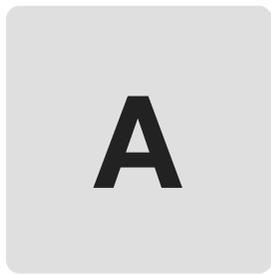
Toggle and Rewind ↶ 3 sec



B is Watermarked

### 13. Nirvana - Smells Like Teen Spirit

Copyright ©2011 Geffen Records



A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec



B is Watermarked

### 14. Electric Light Orchestra - 10538 Overture

©1972, 2003 Sony BMG Music Entertainment



A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec



B is Watermarked

### 15. Kettel - Jongebeer

Copyright ©2013 [Kettel](#)



A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec



B is Watermarked

## 16. Debussy - Arabesque

Copyright ©2006 Naxos Rights International, Ltd.

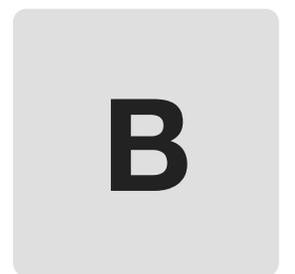


A is Watermarked

Toggle ↔

Rewind ↶ 3 sec

Toggle and Rewind ↶ 3 sec



B is Watermarked

I am listening with:

- Headphones
- Speakers
- Laptop Speakers

My listening environment is:

- Quiet
- Normal
- Loud

Submit My Answers