Focus on presentation, synchronization, response timing validation & event marking

Black Box ToolKit v2™

The gold standard for assessing millisecond timing accuracy and self-validation. Check experiments presentation accuracy, synchronization with other equipment and response timing independently of your computer. The BBTK v2 lets you tune your experiment generator's accuracy in a particular study by automatically simulating a human participant that is millisecond accurate. For example, it can respond to any stimulus and generate a response with a known RT as it steps through your psychology experiment. This enables you to modify onsets, delays and RTs so that they are accurate in the real world. Remember the BBTK v2 is a dedicated, self-contained hardware device that is designed to independently record stimulus onsets and reaction times in the real world as they occur with sub-millisecond accuracy. Simple to use with a range of external sensors. Be sure of your research results prior to publication.

mBlack Box ToolKit v2™ (event marking model)

The mBBTK v2 (event marking version) is a dedicated self-contained hardware device that can be used to event mark or produce TTL triggers in EEG, neuroscience, eye tracking and any psychology experiment or cognitive paradigm. It is the gold standard for any experiment where you need to independently TTL event mark stimulus onsets, synchronization signals or responses with sub-millisecond accuracy. All timing data and TTL triggers are logged in real time so that you can analyze performance later safe in the knowledge that your event marks were made at exactly the right time. Simple to use with a range of external sensors and intuitive software. For the ultimate in timing accuracy why not let your psychology experiment handle the presentation, but let the mBBTK v2 event mark and collect RT data using a BBTK USB response pad.

1-8 button USB response pad

Our millisecond accurate USB response pad is competitively priced and exceeds the specifications of any other response pad currently on the market. It appears to your experiment as a standard USB keyboard where a button response registers as a standard key press. What's more every button press also produces a TTL event mark/TTL trigger. Finished in an attractive carbon fiber effect, our response box houses up to 8 buttons in a range of colors and locations (can also have sockets for up to 8 external buttons). A truly fit and forget solution to help you improve your response time accuracy on any platform, with any experiment generator. If you can use a keyboard, you can use our response pad! Remember you can combine our USB response pad with either a BBTK v2 to check presentation and response timings or for when you need to TTL event mark stimuli and responses, the mBBTK v2 (event marking version).

Are you running psychology, neuroscience or vision experiments using a computer?

1. WHAT – If you are a psychologist, neuroscientist or vision researcher who reports timing accuracy in units of a millisecond, then it’s likely your timings are wrong! This can lead to replication failure, spurious results and questionable conclusions. Timing error can affect your work even when you use an experiment generator like E-Prime, SuperLab, Inquisit, Presentation, Paradigm, OpenSesame or PsychoPy etc.

2. WHY – Modern hardware may be faster but millisecond timing accuracy is becoming harder to achieve: "millisecond precision" does not equal "millisecond accuracy". Precision simply means timings are reported in units of a millisecond, not that they are accurate! Whatever experiment generator you use, it only knows when it requested a stimulus be shown and not the time when it physically appeared.

3. HOW – At the Black Box ToolKit we believe that you, the researcher, are the one best placed to detect and correct any timing errors in your own studies prior to publication. To enable you to accomplish this we have developed a range of easy to use hardware and software products that let you quickly improve your timing accuracy and consistency.

- Are you always carrying out the experiments you assume you are?
- Are you aware of millisecond timing error in your own experiments?
- Are you confident you can replicate experiments using different hardware and software in another lab?

The key question you should be asking yourself is, "Am I confident in my findings and would I be happy for a researcher in the same field to independently check my experiments?"

Are you putting your reputation at risk?

To find out more about how we could help you improve your research visit:

www.blackboxtoolkit.com

Serious about science: Serious about timing
The Black Box ToolKit
Measurement & Calibration Tools for Professionals
# Products that help you improve your millisecond timing accuracy

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### Main function
- **BBTK v2**: Presentation, synchronization, and response timing validation.
- **mBBTK v2**: Complex real time timestamping and TTL event marking/TTL triggers.
- **USB TTL module**: Basic event marking.
- **TTL to USB keys module**: Turns a TTL signal into a key press.

### Example usage
- **BBTK v2**: Independently check the onsets and durations of stimulus images, sounds or event marks against responses. Also lets you tune your experiment generators accuracy in a particular study by automatically simulating a human participant that is millisecond accurate. This enables you to modify onsets, delays and RT’s so that they are accurate in the real world.
- **mBBTK v2**: Timing critical independent TTL event marking of stimulus images, sounds, TTL inputs or response pad button presses on EEG machines or eye trackers. Create TTL triggers quickly, easily and reliably in EEG, fMRI or any cognitive paradigm.
- **USB TTL module**: Acts as a USB parallel port replacement to allow basic TTL event marking/TTL triggers from any experiment generator that supports a serial port.
- **TTL to USB keys module**: Converts any TTL input into a keyboard keystroke or value if a TTL pattern is detected.

### I/O options
- **BBTK v2**: 2-4x Opto-detectors, 1-2x Mics, 1-2x TTL trigger in, 1-2x TTL trigger out, Optional 16x TTL I/O module, 2-4x Active Switch Closure, 1-4x button response pad, 1x Robotic Key Actuator (press keys or touchscreens).
- **mBBTK v2**: 2-4x Opto-detectors, 1-2x Mics, 1x Audio in/out pass-through, 36x TTL trigger in (24 bit + 8 bit port), 24x TTL trigger out (24 bit event marking port), 1-8x button response pad, 1x shared TTL in for voice key trigger or patient button.
- **USB TTL module**: 8x TTL trigger in (8 bit port), 8x TTL trigger out (8 bit port).
- **TTL to USB keys module**: 8x TTL trigger in (8 bit port), USB A lead with option to use an adapter on tablets or phones running Apple iOS or Android.

### Connection to PC
- **BBTK v2**: USB 2/3.
- **mBBTK v2**: USB 2/3 & Bluetooth.
- **USB TTL module**: USB 2/3.
- **TTL to USB keys module**: USB 2/3.

### Software
- **BBTK v2**: Full wizard-driven PC suite for programming, control and timing analysis. API available for advanced users.
- **mBBTK v2**: Full wizard-driven PC suite for programming, control and event marking and response monitoring. Can also be used independently without a PC using 10 onboard profiles stored in RAM. API available for advanced users.
- **USB TTL module**: Basic configuration and latency testing PC software. Basic API available for event marking.
- **TTL to USB keys module**: PC keyboard configuration utility (once configured stored on TTL to USB keys module).

### Timing characteristics
- **BBTK v2**: Onboard timing chip for real time accuracy. Sub-millisecond accurate. Timing accuracy independent of PC or experiment generator used.
- **mBBTK v2**: Onboard timing chip for real time event marking accuracy. Sub-millisecond accurate. Timing accuracy independent of PC or experiment generator used.
- **USB TTL module**: Hardware capable of sub-millisecond accuracy. Timing accuracy tied to PC and experiment generator used.
- **TTL to USB keys module**: Full Speed USB keyboard HID with 1 ms latency (1,000 Hz). TTL event mark sent in real time with sub-millisecond accuracy. Response accuracy tied to PC and experiment generator used.

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## Response devices

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<td>Accept responses on up to 8 buttons.</td>
<td>Accept responses on up to 8 buttons or vocal response via voice key mic.</td>
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