RS-ERP System

System Includes

1. IX-ERP Data Recorder and Laptop Clip
2. C-USBC Cable
3. Recording Leads and Electrodes
    Option a. C-ISO-SL3 Snap Leads (3) with A-ELEC-P-30 Disposable Adhesive Electrodes
    Option b. C-ISO-SC3 Silver Cup Electrodes (3) with Gel and 2x Headband
5. Headphones for ERP-Audio recordings
6. LabScribe Software and ERP Analysis Module

Overview

The IX-ERP System from iWorx is designed specifically for recording and analyzing Event-Related Potentials (ERPs) in educational and research laboratory settings. It includes built-in macros that automate stimulus presentation for both auditory and visual “oddball” paradigms, enabling quick setup and reliable acquisition of the P300 response.

Background

Event-Related Potentials (ERPs) are voltage fluctuations time-locked to a sensory, cognitive, or motor event. One of the most widely studied ERP components is the P300, a positive-going waveform that typically occurs around 300 ms after an infrequent or significant stimulus.

The P300 is most clearly elicited using an oddball paradigm, where the subject is presented with a series of frequent “standard” stimuli and rare “oddball” stimuli. By averaging many trials, the P300 response becomes clear due to the brain’s detection of novelty or change. The IX-ERP macro is configured to deliver 50 oddball events, ensuring sufficient averaging to reveal a distinct P300 peak.

Downloading Labscribe

New Users: The equipment comes with a Temporary User Name and Password, so that you can immediately get started with your system by downloading and installing the software. You must register as a User with your own UN and PW. The one that comes with the system may be shared with your IT department as needed.

Important*: Labscribe must be installed under the administrator's account to enable data saving.*

Note: iWorx has an open site license, permitting the software to be installed on any number of computers within the licensed site. This benefits researchers by enabling access from any location, allowing for off-site data analysis.

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Directions:

1. Navigate to www.iworx.com on your computer.

2. In the toolbar at the top of the iWorx web page, select ‘Support’.

3. Select ‘Software Download’.

4. Select ‘Research’.

5. Select ‘Complete Installer’ for either Windows or Mac OS.

***Note**: On the LabScribe Software Download Page, there is a tutorial video titled “LabScribe101 – Basic Training” This video is a basic introduction to LabScribe to learn how to set-up, record and analyze your data.*

Recorder Setup

1. Connect the USB cable to the recorder and the computer.

2. When the IX-ERP receives power from the USB cable, a light pattern will flash on the recorder. The light pattern will flash Red, Green, Blue.

3. Open LabScribe software. A Device Status Dialog will pop up recognizing the device.

- From the Main window, select the **Settings** tab and then click **Load Group**.

Locate the **Research Settings** folder: C:\Program Files\iWorx\LabScribe\Research Settings

- Open the IX-ERP folder which contains the settings group IXERP.iwxgrp. Select this group and click Open.
- Now that the settings group is loaded, select the **Settings** tab. Below “**Default Setting**” is a list of settings. Select the **IX-ERP** settings file from the list.
- LabScribe will be configured by the **IX-ERP** settings file, and a pdf setup document will open.

***Note**: Once the research settings are loaded, they will open the same every time LabScribe is launched. If you do not see the Research Settings folder in the LabScribe folder, reinstall LabScribe, making sure that the Research settings are installed.*

4. Connect the safety connectors to the inputs on the IX-ERP. The opposing ends will snap onto the adhesive electrodes. If you are using silver cup electrodes, they will be attached to the subject with gel.

- Positive – Red
- Negative – Black
- Green – Ground

5. If performing the Audio-ERP test, connect the headphones to the audio input on the IX-ERP. If performing the Visual-ERP test, set up the recorder in front of the subject, using the IX-ERP laptop clip, as shown below. The recorder should be approximately arms distance from the subject’s face. Ensure there are minimal visual distractions in the room.

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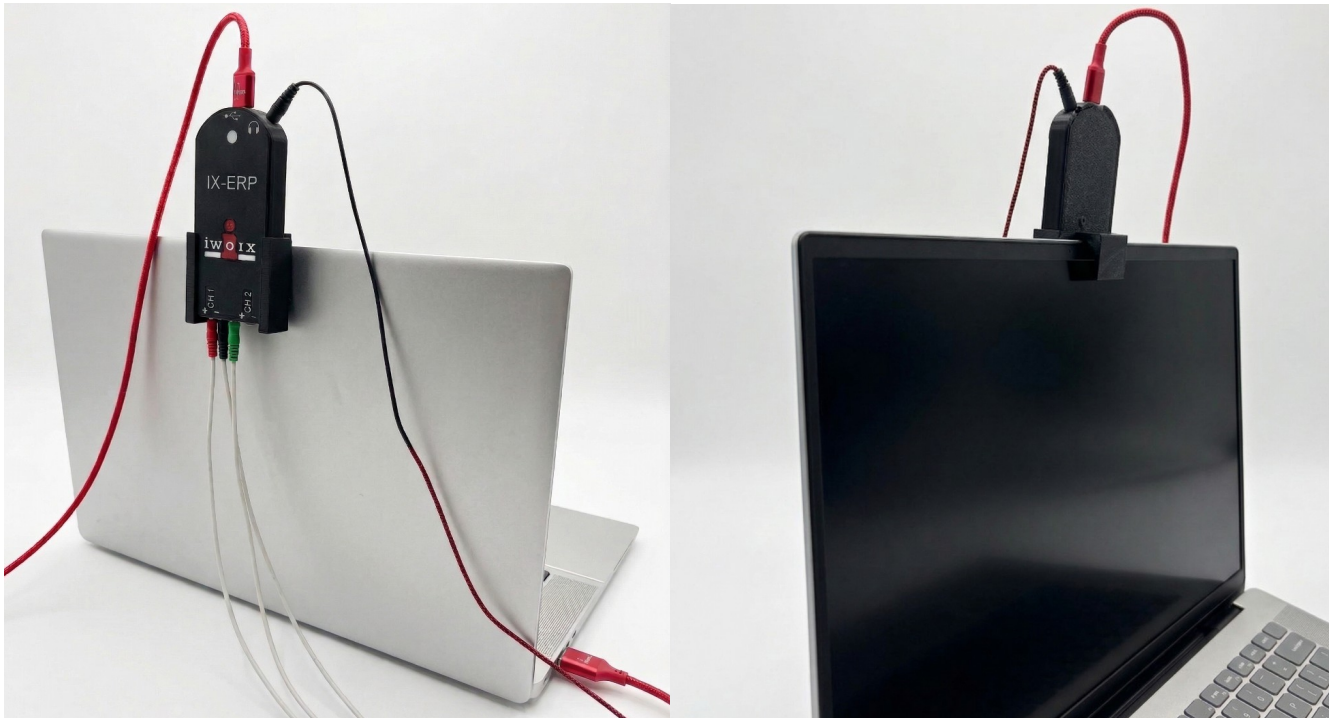


Figure 1: The IX-ERP recorder clipped onto the back of a laptop. The clip offers two width settings: one at 0.5 cm and another that fits laptop screens up to approximately 1 cm thick.

Electrode Placement

Option a. Using C-ISO-SL3 Snap Leads (3) with A-ELEC-P-30 Disposable Adhesive Electrodes

The adhesive electrodes are used on the forehead for a quick and easy setup. Ensure the skin is prepped (clean and dry) before attaching the adhesive electrodes.

- Red (Positive) Electrode – placed in the center of the forehead, as close to the hairline as possible.
- Black (Negative) Electrode – approximately 1 inch lateral to the positive electrode (close to the temple).
- Green (Ground) Electrode – placed underneath the red (positive) electrode in the center of the forehead.

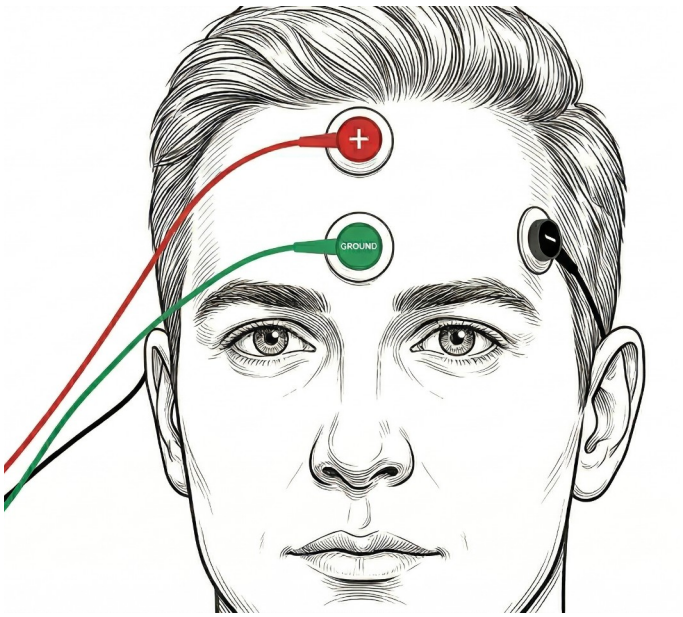


Figure 2: Snap lead to adhesive electrode placement on forehead.

Option b. Using C-ISO-SC3 Silver Cup Electrodes (3) with Gel and Headband

The silver cup electrodes can be used to record the P300 response from the scalp. The silver cup electrodes require gel, and can be held in place using a headband.

Prepare the electrodes:

1. Locate three silver cup electrodes.
2. Plug the safety connectors of the leads into the IX-ERP recorder.
3. Fill each silver cup electrode with a small amount of electrode gel.
4. Locate placement sites on the scalp: Part the hair at each site so the cup can make direct contact with the skin.
    - Red (Positive) Electrode – at the Pz location.
    - Black (Negative) Electrode – placed at the P3 location.
    - Green (Ground) Electrode – at the Cz location, or behind the ear using a snap lead to adhesive electrode.
5. Place the gel-filled cup electrodes on the parted areas of the scalp.
6. Wrap the headband under the chin and over the back of the head to secure the cup electrodes in place.
7. Ensure each electrode is firmly touching the skin and the gel is making a complete connection.

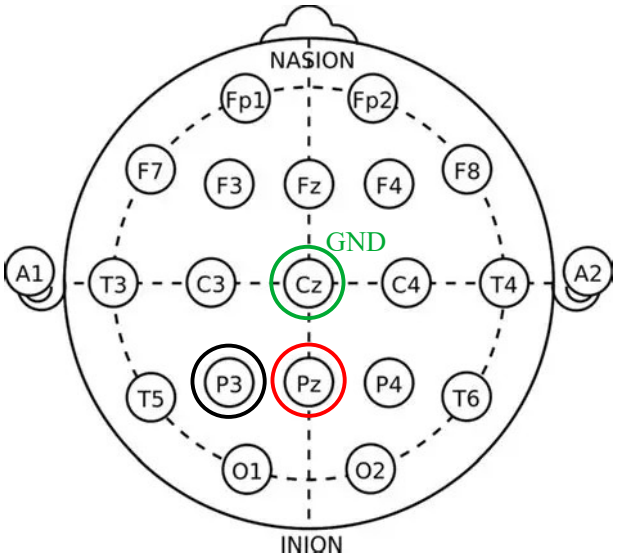


Figure 3: Silver cup electrode placement on scalp.

Stimulus Options – Macros

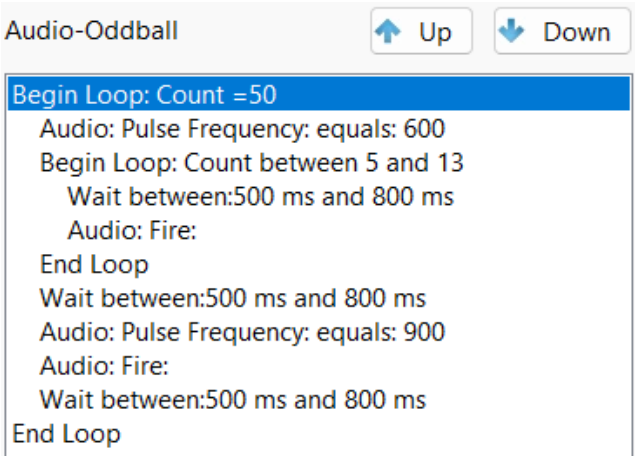
1. Audio-Oddball Paradigm Macro

The auditory macro automates tone presentation:

Standard Stimulus: 600 Hz tone

Oddball Stimulus: 900 Hz tone

Instruct the subject to close their eyes during the recording to minimize artifacts.



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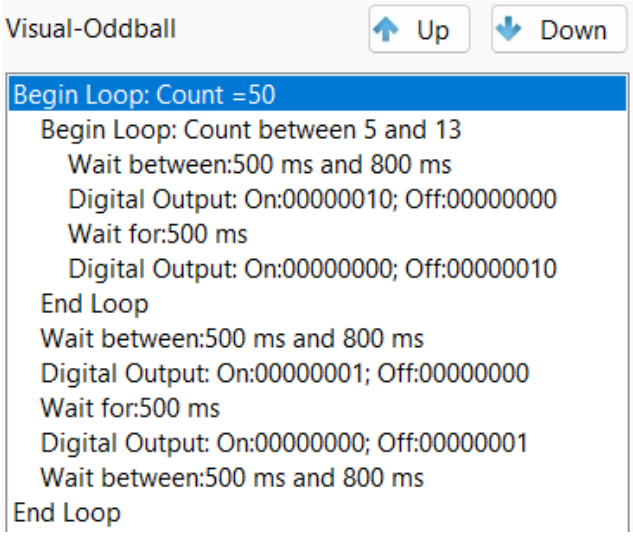
2. Visual-Oddball Paradigm Macro

The visual macro presents colored flashes on the IX-ERP:

Standard Stimulus: Green color flash

Oddball Stimulus: Red color flash



The recorder should be set up approximately arms distance from the subject. Minimize visual distractions in the surrounding environment.

Note: *Both Macros automatically deliver 50 oddball trials, which is sufficient for a clear P300 waveform after averaging. All stimuli are delivered at randomized intervals. Each Macro automatically places text marks at each stimulus, which are used for alignment during ERP averaging.*

Recording in LabScribe

1. Set the View based on the P300 test that is being performed (Audio or Visual).
2. Press the red REC button to start the recording.
3. Record a stable baseline for 3-5 minutes.
4. Start the desired Macro by clicking it on the top toolbar.

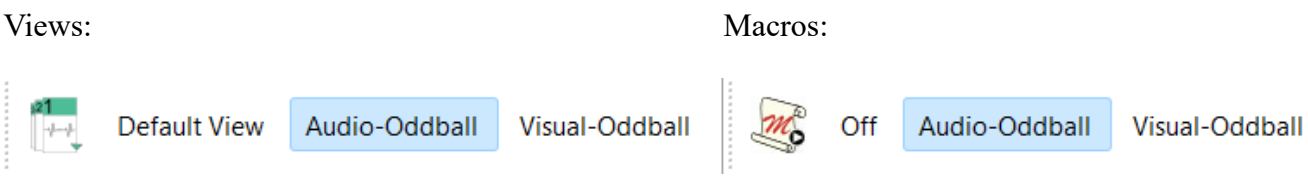


Figure 4: View and Macro settings for Audio-Oddball P300 test. To perform the Visual test, select the Visual-Oddball view and the Visual-Oddball Macro.

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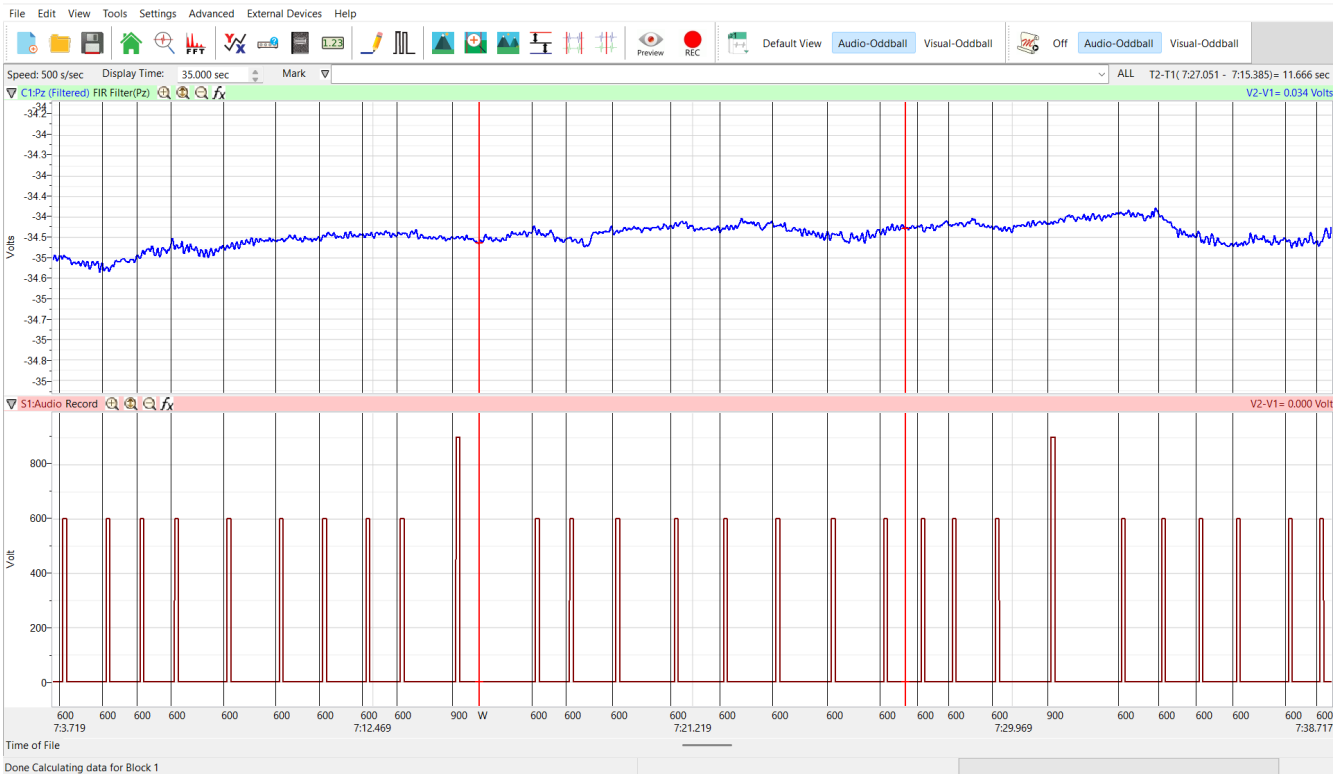

Figure 5: Sample data from Audio-Oddball test.

Marking Artifacts for Exclusion

If noise, eye blinks, or movement occur during data collection, these segments can be excluded from averaging by using the *Add Artifact Region* feature.

1. Place the 2 red cursors around the section of data you would like to mark as an artifact. This can be done to multiple segments of the recording.

2. Right click on the channel

3. Select Artifact – Add Artifact Region to Channel *or* Add Artifact Region to All Channels

4. The segment will now appear with a gray background, indicating it has been flagged as an artifact. Each segment will now be automatically excluded from analysis. This helps improve the signal quality and enhances the visibility of the P300 peak.

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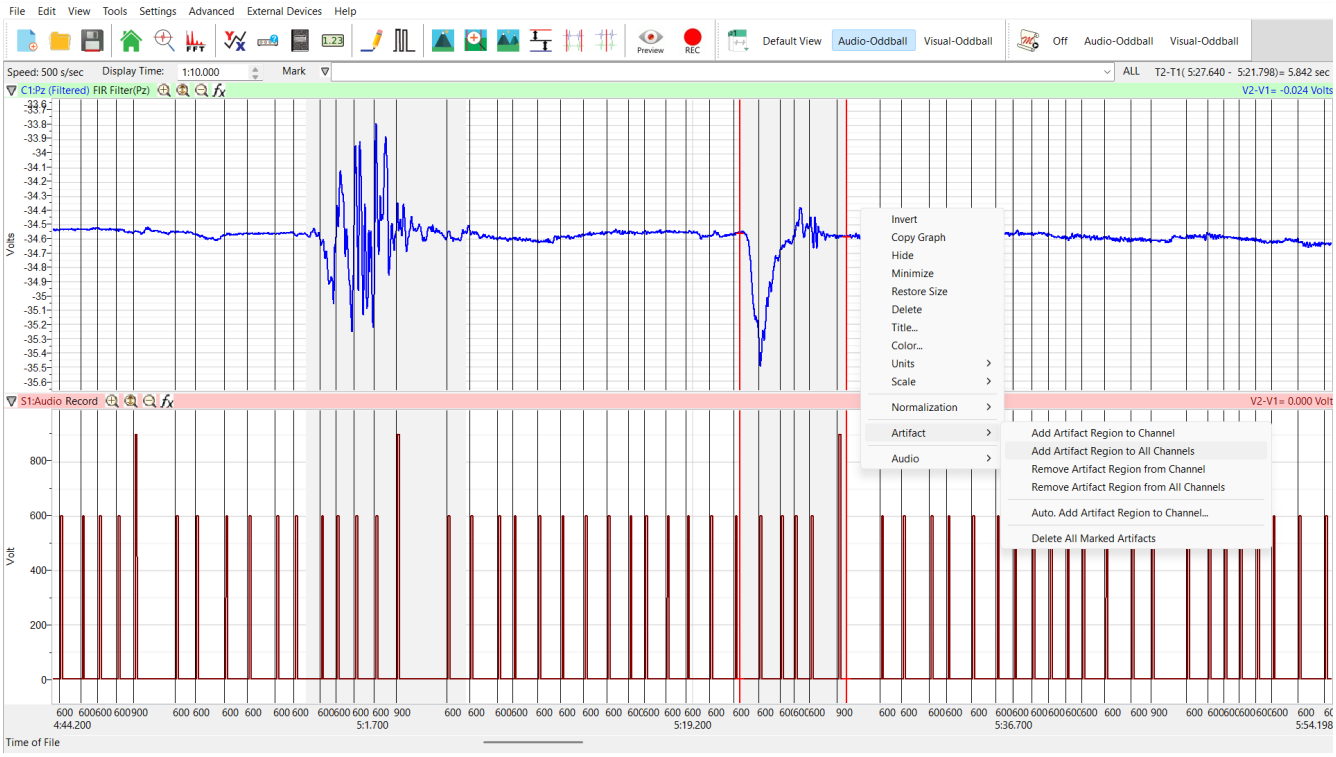

Figure 6: Marking artifact regions for exclusion from data analysis.

ERP Analysis

Access the ERP Analysis Module from the LabScribe Toolbar: Advanced – Event Related Potentials (ERP) – ERP Calculations

Enter the credentials provided with purchase to unlock the module.

Tutorial Video: [Event-Related Potentials (ERP) Module in LabScribe]