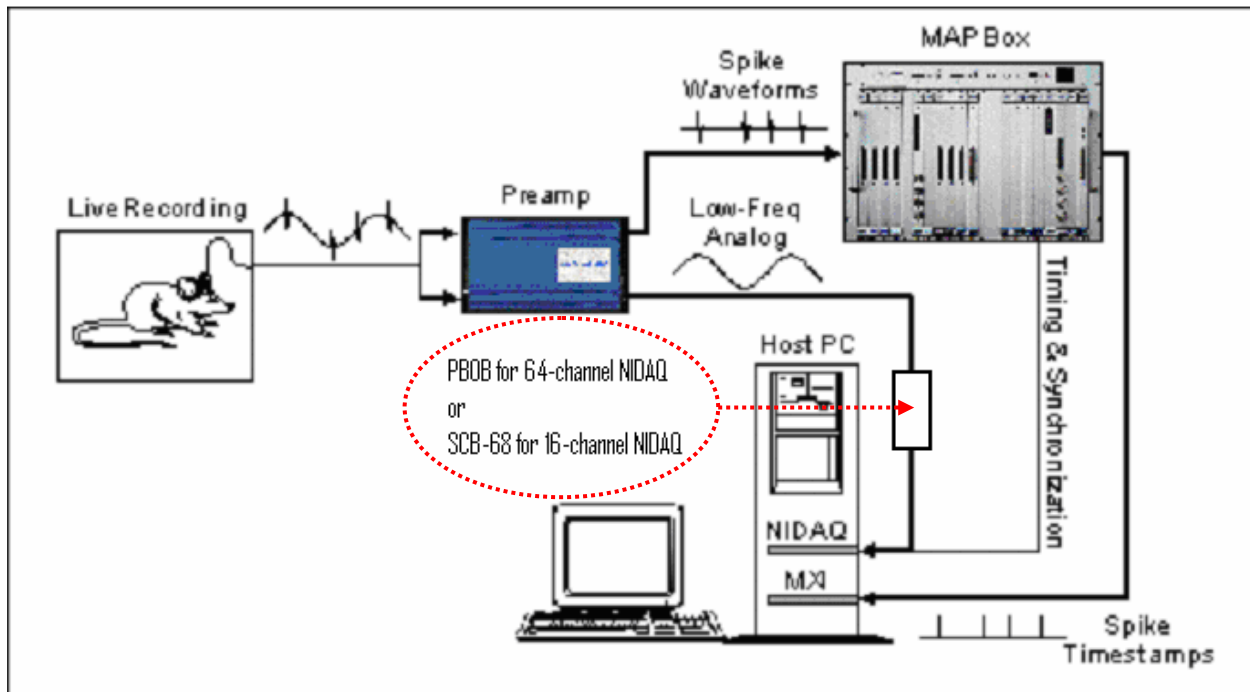


## Continuous Signal Recording and Analysis

### Description

Non-spike analog signals can be recorded simultaneously with spike data using a National Instruments A/D (NIDAQ) card in the host computer. A connection between the TIM board in the MAP box and the NIDAQ card synchronizes the timing of the spike and analog signals.



Supported NIDAQ cards include:

- PCI-6040E [PCI-MIO-16E-4] (250 kSamples/sec, 16 channel, 12 bit resolution)
- PCI-6052E (333 kSamples/sec, 16 channel, 16-bit resolution)
- PCI-6070E [PCI-MIO-16E-1] (1.25 MSamples/sec, 16 channel, 12 bit resolution)
- PCI-6071E (1.25 MSamples/sec, 64 channel, 12 bit resolution)


Preamp filtering for the non-spike analog signal is typically 0.7 Hz - 170 Hz, 2-pole 4-pole, although others can be specified. Analog signals that can be recorded include:

- Field potentials off same electrodes as used for spike recording (shown above) – additional boards with different filtering are used in the preamp.
- Physiological variables such as blood pressure, EKG, EMG, etc.
- Behavioral variables such as eye position, arm angle, head direction, etc.

Consult the PBOB Data Sheet and the SCB-68 Data Sheet for the correct way to interface to 64 and 16 channel NIDAQ boards, respectively. The non-spike analog signals can be analyzed in relation to unit firing (e.g. spike-triggered average, etc.) using NEX, as described below.

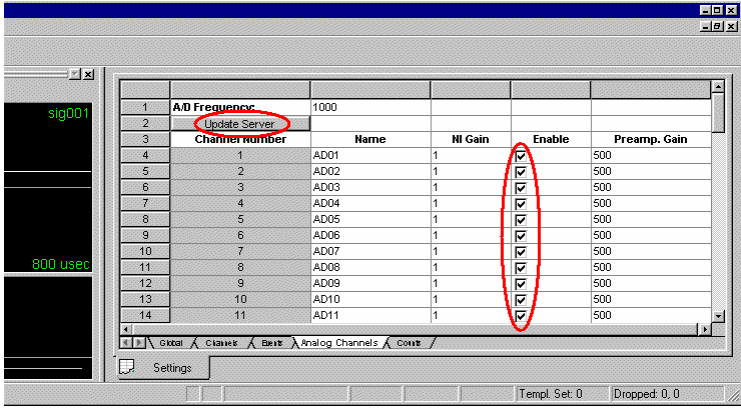
## Installation

Follow the procedure in the table below to install the NIDAQ boards and breakout boxes.

Step	Action	Diagram/Comments
1	Insert National Instruments A/D (NIDAQ) board in 32-bit (short) PCI slot – typically white)	See Chapter 2 of National Instruments PCI E-Series User Manual.
2	Connect the breakout box or BNC panel to the NIDAQ board.	SCB-68 for 16-channel NIDAQ boards SCB-100 for 64-channel NIDAQ board PBOB for 64-channel NIDAQ board BNC-2090 for 16-channel NIDAQ boards
3	Connect the analog inputs (from the field potential preamp card, or other sources) to the DB37 connector on the breakout box or BNC panel.	See specific instructions for the particular breakout box or BNC panel that you have.
4	Connect the cable from the TIM board in the MAP box to the DB9 TIM input connector on the breakout box (or to the 68-pin connector on the front of the BNC-2090).	
5	Insert the extra pin (yellow) into the center of the BNC connector on the TIM board labeled XS1. (The red arrow shows the location of the center pin of the XS1 connector.)	
6	Run the National Instruments installation program.	

Step	Action	Diagram/Comments
7	<p>Run the National Instruments Measurement &amp; Automation program.</p> <p>Select Devices and Interfaces.</p> <p>Right-click on the board and select Properties.</p> <p>(NOTE: The board name will depend on what you have installed.)</p>	
8	<p>Set the Analog Input to: Polarity/Range: <math>\pm 10</math> V Mode: "Nonreferenced Single Ended"</p>	
9	<p>Set the Analog Output to Bipolar (BNC connector on Breakout box – can connect to Oscilloscope).</p>	

Step	Action	Diagram/Comments
10	Select the appropriate Breakout Box or BNC panel as the Accessory (e.g. SCB-68, SCB-100, or BNC-2090).	
11	Run the Test Panel.	
12	Enable and Select the number of analog channels (16 for 16-channel NIDAQ boards; 64 for 64-channel NIDAQ boards) in the View   Options menu in the Server. Close and restart after enabling the NIDAQ board.	

Step	Action	Diagram/Comments
13	<p>Enable Analog channels in the Sort Client.</p> <p>Select individual channel boxes to enable A/D channels.</p> <p>Set the sampling frequency on the A/D channels (A/D Frequency)</p> <p>Set the desired gain on the A/D channels (NI Gain)                      Note: Normal default Preamp gain on Field Potential channels is 500.                      Press "Update Server".</p>	 <p>Note: The recorded analog signals are in units of millivolts, as measured at the National Instruments Breakout box. Therefore, to calculate the analog signal in millivolts at the electrode, one must divide by the Preamp Gain (typically 500).</p>
14	<p>View analog channels in the Sort Client Activity Display.</p> <p>Select the View   Activity Display Menu option or click the Activity Display Button on the toolbar.</p> 