

## Excel Macro – IO sample from Performer

11/4/05

### 1. Purpose of this macro

This macro re-calculates IO curves from data obtained at “normalized” tab. The macro is able to read data exported from Performer, re-draw the responses and calculate the amplitude of the fiber volley and the initial slope of post synaptic responses.

### 2. Detail Procedures

#### 1) Export Performer data as CSV file

Under the Performer software, review the recorded data and click [Export arbitrary traces] to open export window (figure below). Then, select all the sweeps recorded at “normalize” tab and click [export] button. Make sure to select CSV file output and name it, then export the traces. After export, please note the sampling length and total number of sweeps.

NOTE: ONLY one channel CAN be selected for export

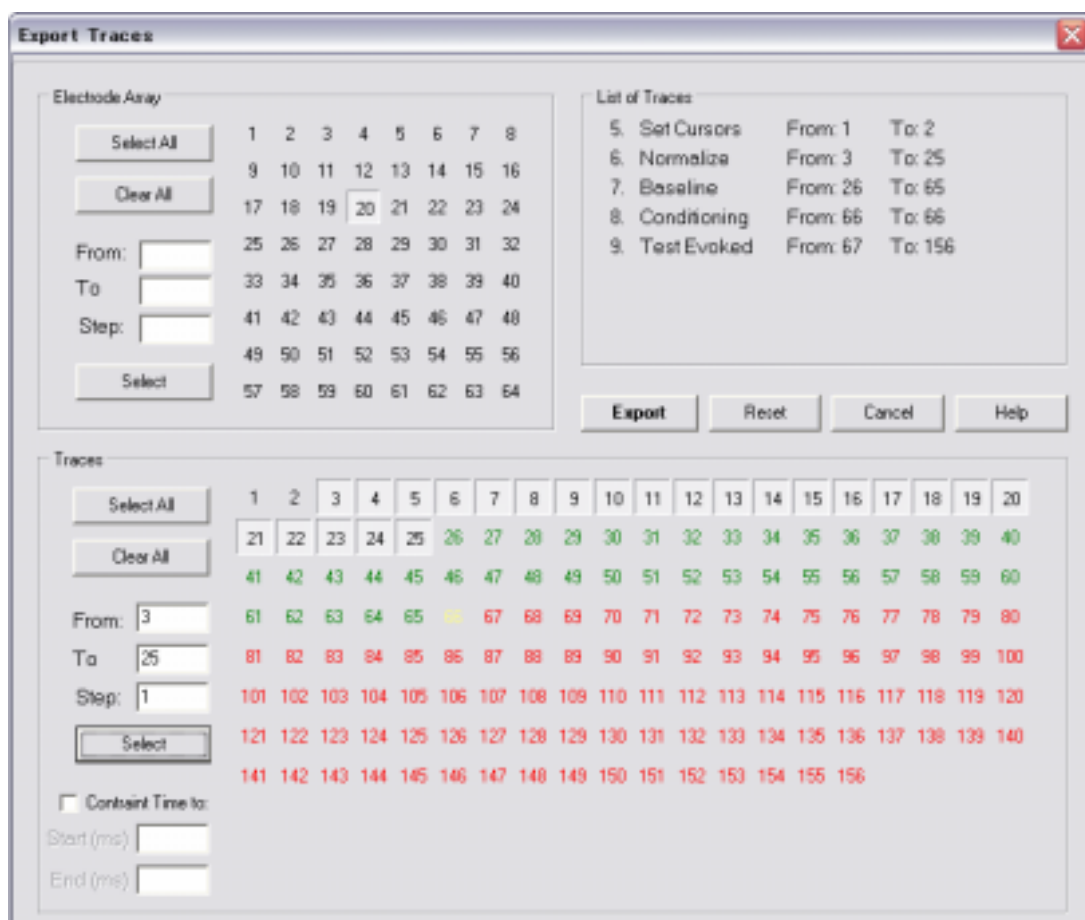


Figure 1: “Export Arbitrary Traces” window

- 2) Run Excel macro – [Draw Graph]; to draw overlaid responses for each pathway  
Run Excel macro “IO sample from Performer” and click [Draw Graph] to start reading CSV data and drawing graph.

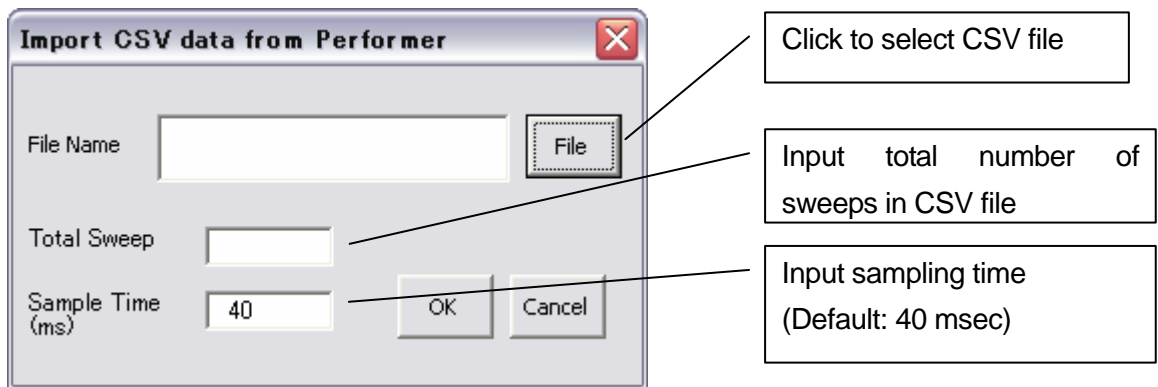


Figure 2: Setting at [Draw Graph] macro

3) Sort sweeps into IO\_Data\_1 and IO\_Data\_2 using the shape of signals as a guideline.

Using the overlaid signals, it's not difficult to sort the sweeps to 1<sup>st</sup> pathway (IO\_Data\_1 worksheet) or the 2<sup>nd</sup> pathway (IO\_Data\_2 worksheet) as illustrated in the figure below. The key for sorting is the shape of fiber volley or stimulus artifact as the signals recorded on same pathway should have similar shape.

**NOTE:** Unless the I/O curve was obtained by alternately stimulating pathway 1 and 2, the responses may initially be mixed up on the two worksheets. Within a single worksheet (e.g. – 1<sup>st</sup> Pathway; IO\_Data\_1), columns can be moved using the Cut and Insert Cut cells commands for a single column. It is important to use copy and paste to transfer columns of data (responses) between sheets IO\_Data\_1 and IO\_Data\_2, then clear the column in the original worksheet.

After sorting, please note the parameters needed for measuring the fiber volley (baseline: start & end, peak: start & end) and post synaptic response (initial slope: start time & duration)

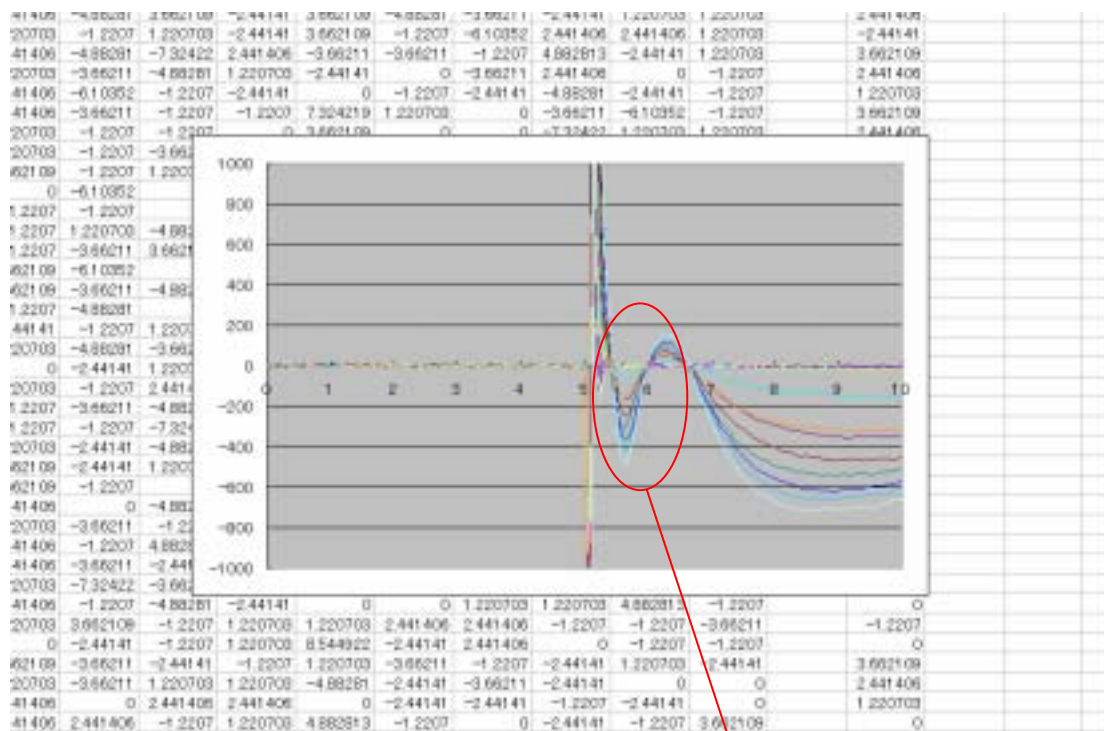


Figure 3: Overlaid responses after sorting

Shape of fiber volley and stimulus artifact

- 4) Run Excel macro – [Calc IO and Plot IO curves]; to calculate IO curves (amp of FV vs. slope of EPSP)

To calculate IO curves, input all parameters needed for measuring the FV amplitude and EPSP slope. Also input the name of the WORKBOOK (e.g. –Book1) that contains the worksheets IO\_data\_1 and IO\_Data\_2 for the 1<sup>st</sup> and 2<sup>nd</sup> responses, and enter the Total Number of Sweeps and correct sample time. Then, click OK to start calculation. Macro automatically calculates amplitude of FV and initial slope of EPSP, then plot them (see figure below). The results will be placed into a new worksheet called “IO\_Summary” in the Workbook containing the sorted responses (columns of raw data).

The dialog box is titled "Parameter for IO curve". It has the following fields and controls:

- Worksheet Name: [ ]
- Number of Total Sweep: [ ]
- Sample Time (ms): [ 40 ]
- Fit Pathway:
  - base for FV (ms): [ 6.0 ] [ 6.5 ]
  - Search range for FV (ms): [ 5.5 ] [ 6.0 ]
  - Initial slope: [ ]
  - Start Point (ms): [ 6.75 ]
  - Duration (ms): [ 1.0 ]
- Second Pathway:
  - base for FV (ms): [ 6.0 ] [ 6.5 ]
  - Search range for FV (ms): [ 5.5 ] [ 6.0 ]
  - Initial slope: [ ]
  - Start Point (ms): [ 6.75 ]
  - Duration (ms): [ 1.0 ]
- Buttons: [ OK ] [ Cancel ]

(Parameters for FV and slope of EPSP)

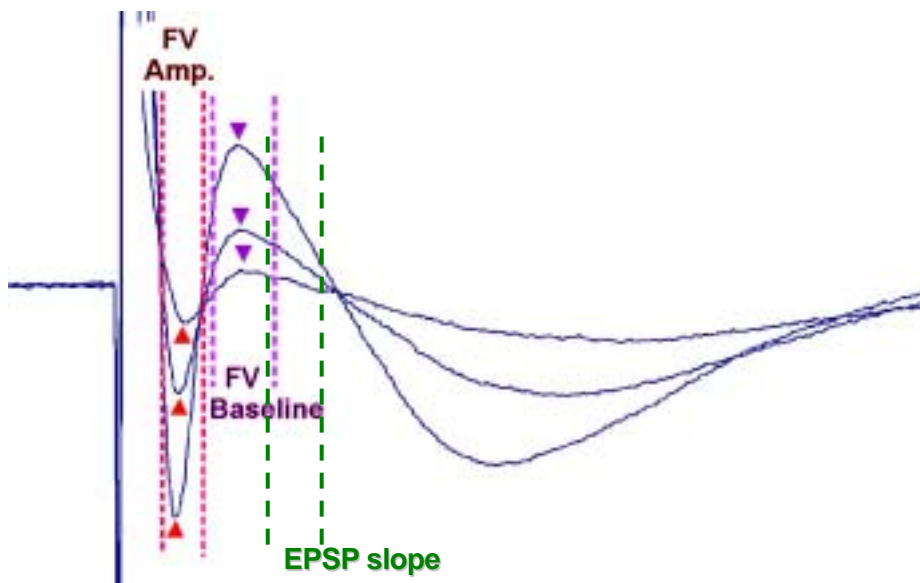


Figure 4: Setting at [Calc IO and Plot IO curves]

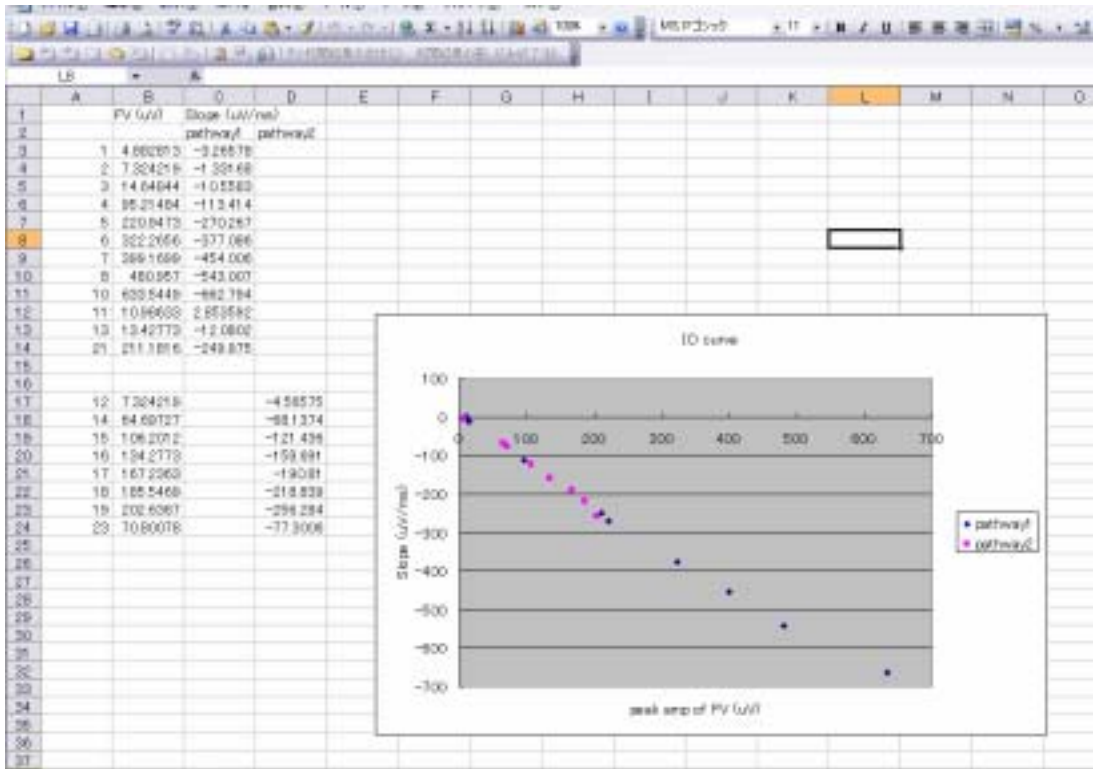


Figure 5: Result – IO curves; FV vs. Slope