

## Instructions for: `convert_plx2mat.m`

Copy the file `convert_plx2mat.m` into your Matlab folder. You must also copy `mexPlex.mexw32` or `mexPlex.mexw64` (for 32-bit and 64-bit Windows) into your Matlab folder. The latter files only run on Windows.

This function converts a single PLX file to a MAT file. It takes one argument, the name of the PLX file. If you omit the argument (as in the example below), you will be prompted to select a PLX file with a dialog:

```
>> convert_plx2mat()
```

After selecting the file, you will be prompted with two options:

Please select a mode:

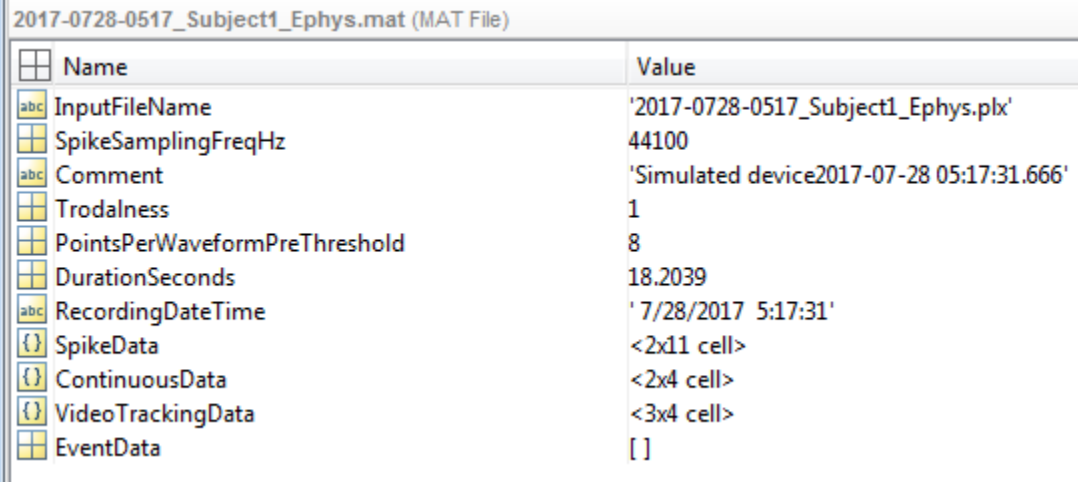
- (1) Easy mode - saves all data, including waveforms and unsorted spikes, to a single file
- (2) Advanced mode - will prompt you to allow selective saving of data, and/or saving to multiple files

Type selection, or press ENTER to accept default (1):

Most users should type “1” (or hit enter) to accept defaults. This saves contents of the PLX file to a single .MAT file.

Some users may want option “2”, which prompts for advanced options, e.g. to omit saving unsorted spikes, or omit spike waveforms, or save each channel into a separate file. These options are helpful for managing large files.

After conversion, the resulting .MAT file contains the following fields:



| Name                          | Value                                     |
|-------------------------------|---|
| InputFileName                 | '2017-0728-0517_Subject1_Ephys.plx'       |
| SpikeSamplingFreqHz           | 44100                                     |
| Comment                       | 'Simulated device2017-07-28 05:17:31.666' |
| Trodealness                   | 1   |
| PointsPerWaveformPreThreshold | 8   |
| DurationSeconds               | 18.2039                                   |
| RecordingDateTime             | '7/28/2017 5:17:31'                       |
| SpikeData                     | <2x11 cell>                               |
| ContinuousData                | <2x4 cell>                                |
| VideoTrackingData             | <3x4 cell>                                |
| EventData                     | []  |

The fields are as follows:

1. `InputFileName` The name of the original source PLX file.
2. `SpikeSamplingFreqHz` The sample rate, in Hz, of *spike* data. Continuous EEG/LFP sample rates will be lower
3. `Comment` Additional text information provided by some acquisition programs.
4. `Trodealness` This will either be 1 (single wires), 2 (stereotrodes), or 4 (tetrodes)
5. `PointsPerWaveformPreThreshold` For spike recordings, this specifies how many of the points in each spike waveform occur prior to the voltage reaching the threshold for spike detection. This allows part of the recorded waveform to precede the moment when the voltage crosses the detection threshold.

6. DurationSeconds Total duration of the recorded file, in seconds.
7. RecordingDateTime The time and date when recording began.
8. SpikeData Cell array of spike timestamps and waveforms (see details below)
9. ContinuousData Cell array of EEG/LFP continuous data (see details below)
10. VideoTrackingData Cell array of X-Y video tracking data, if available.
11. EventData Cell array of event timestamps.
12. DataGaps (Not always present) Timestamps of JAGA recording interruptions, e.g. from lost WiFi packets.

### SpikeData cell array.

This array has 11 columns:

| SpikeData <16x11 cell> |           |                       |                   |          |          |          |                      |                    |               |          |          |
|------------------------|-----------|-----------------------|-------------------|----------|----------|----------|----------------------|--------------------|---------------|----------|----------|
|                        | 1         | 2                     | 3                 | 4        | 5        | 6        | 7                    | 8                  | 9             | 10       | 11       |
| 1                      | 'Name'    | 'Timestamps unsorted' | 'Unit 1'          | 'Unit 2' | 'Unit 3' | 'Unit 4' | 'Waveforms unsorted' | 'Unit 1'           | 'Unit 2'      | 'Unit 3' | 'Unit 4' |
| 2                      | 'Spike1'  | <285960x1 double>     | <7751x1 double>   | []       | []       | []       | <285960x25 double>   | <7751x25 double>   | []            | []       | []       |
| 3                      | 'Spike2'  | <426252x1 double>     | <47588x1 double>  | []       | []       | []       | <426252x25 double>   | <47588x25 double>  | []            | []       | []       |
| 4                      | 'Spike3'  | <390379x1 double>     | <114821x1 double> | []       | []       | []       | <390379x25 double>   | <114821x25 double> | []            | []       | []       |
| 5                      | 'Spike4'  | <368630x1 double>     | <32785x1 double>  | 194.6633 | []       | []       | <368630x25 double>   | <32785x25 double>  | <1x25 double> | []       | []       |
| 6                      | 'Spike5'  | <658187x1 double>     | <165574x1 double> | []       | []       | []       | <658187x25 double>   | <165574x25 double> | []            | []       | []       |
| 7                      | 'Spike6'  | []                    | []                | []       | []       | []       | []                   | []                 | []            | []       | []       |
| 8                      | 'Spike7'  | <329436x1 double>     | <75400x1 double>  | []       | []       | []       | <329436x25 double>   | <75400x25 double>  | []            | []       | []       |
| 9                      | 'Spike8'  | <182783x1 double>     | <45639x1 double>  | []       | []       | []       | <182783x25 double>   | <45639x25 double>  | []            | []       | []       |
| 10                     | 'Spike9'  | <199012x1 double>     | <39916x1 double>  | []       | []       | []       | <199012x25 double>   | <39916x25 double>  | []            | []       | []       |
| 11                     | 'Spike10' | <563613x1 double>     | <26300x1 double>  | []       | []       | []       | <563613x25 double>   | <26300x25 double>  | []            | []       | []       |
| 12                     | 'Spike11' | []                    | []                | []       | []       | []       | []                   | []                 | []            | []       | []       |
| 13                     | 'Spike12' | <729423x1 double>     | <100773x1 double> | []       | []       | []       | <729423x25 double>   | <100773x25 double> | []            | []       | []       |
| 14                     | 'Spike13' | []                    | []                | []       | []       | []       | []                   | []                 | []            | []       | []       |
| 15                     | 'Spike14' | <326611x1 double>     | <27643x1 double>  | []       | []       | []       | <326611x25 double>   | <27643x25 double>  | []            | []       | []       |
| 16                     | 'Spike15' | <606376x1 double>     | <85867x1 double>  | []       | []       | []       | <606376x25 double>   | <85867x25 double>  | []            | []       | []       |

The first row is a “header” row. After this, each subsequent row corresponds to one spike channel. Hence, if there are n spike channels, there will be n + 1 rows in the cell array.

The columns in the cell array are as follows:

1. Channel names.
2. Timestamps of unsorted spikes, in ascending order.
3. Timestamps for first sorted unit.
4. Timestamps for second sorted unit.
5. Timestamps for third sorted unit.
6. Timestamps for fourth sorted unit.
- 7-11. Waveforms corresponding to spikes in columns 2-6. Waveforms are also sorted in ascending temporal order, in order to exactly match the timestamps in columns 2-6.

**ContinuousData cell array.**

This array has 4 columns:

| ContinuousData <2x4 cell> |        |                    |                  |                  |
|---------------------------|--------|--------------------|------------------|------------------|
|                           | 1      | 2                  | 3                | 4                |
| 1                         | 'Name' | 'Sample Rate (Hz)' | 'Timestamps'     | 'Voltages'       |
| 2                         | 'LFP1' | 1.0023e+03         | <17920x1 double> | <17920x1 double> |

The columns are as follows:

1. Channel names

2. Sample rate in Hertz. This rate will generally be lower than the spike sample rate.

3. Timestamps. Timestamps of each datapoint, in ascending order.

4. Voltage values. Voltage values for each datapoint, matching the timestamps in column 3.

The arrays in columns 3 and 4 will always have the same number of elements. Timestamps are always in ascending order. If there are gaps in acquisition, e.g. if packets were lost, there may be corresponding gaps in the timestamps.

**VideoTrackingData:**

If video tracking data is available, then this cell array will contain X and Y location data formatted the same way as the continuous datastreams. The frame rate will typically be 30 Hz.

| VideoTrackingData <3x4 cell> |               |                   |                |                |
|------------------------------|---------------|-------------------|----------------|----------------|
|                              | 1             | 2                 | 3              | 4              |
| 1                            | 'Name'        | 'Frame Rate (Hz)' | 'Timestamps'   | 'Values'       |
| 2                            | 'VideoTrackX' | 30                | <460x1 double> | <460x1 double> |
| 3                            | 'VideoTrackY' | 30                | <460x1 double> | <460x1 double> |