

Offline Sorter Change Log (Last updated 3/31/10)

Version 3.1.0

New Features

- Added support for PLX file format version 107, which includes support for large channel counts
- Added control of the directory for output files, added the Set OutputDir batch command

Improvements

- Box sorting boxes are now saved/restored to TPL files
- Scan files saved during batch now named for the saved output file instead of the input file
- Improvements to batch syntax and reporting

Bug Fixes

- Fix crash problem that occurred if the Control Grid window was closed
- Fix problem with saving/restoring custom key assignments
- Fix problem where remapping a PLX file to stereotrode/tetrode would result in extra copies of the events
- Fix potential problem with loading strobed events from NEV, NLS, and Neuroshare files
- Export as PLX now writes out the modified spike threshold resulting from re-thresholding
- Files with 16-bit waveform data now always use the non-MAP fit tolerance for template sorting, ignoring the 'Use MAP-Compatible Fit Tolerance' setting
- Fix issue with invalidating waveforms for file formats where the timestamp frequency is not the same as the waveform digitization frequency
- Fix potential issue with SortEnd not being properly read in from trodal PLX files
- Fix issue with the full-scale voltage edit box on the timeline view not being updated after a waveform extraction
- Fix problem with exporting to PLX when file containing only continuous channels was imported from certain formats
- Fix issues with handling gains/voltages from MCS files

Version 3.0.1

Bug Fixes

- Fix issues with exporting upsampled continuous data to Nex
- Export functions now compatible with latest releases of Matlab
- Can no longer circle clusters when in box sorting mode
- Fix issues with events during Export to New .plx when data was read in from Neuroshare.

Version 3.0.0

New features and changes for version 3.0

Time Segments

- The Select Time Segment function has been replaced by the much more extensive ability to divide the file into time segments, with support for viewing and using only a specific segment in all operations. Added an option to automatically create time segments when loading a file.
- Added a new Clusters Vs Time view that shows how clusters evolve as a function of time
- Added Sort Quality vs Time Segment graph to display how sort quality changed through the file

Sorting Changes

- Added ability to sort with adaptive template
- Added box sorting
- Added a new Templates vs Time view to display how the template adapted through the file
- Added ability to quickly save and recall sortings for a channel, which is useful for comparisons
- Added a new Scan Graphs view that graphically displays the contents of the Scan View
- Scan results can be saved to and loaded from .SCAN files. A new option exists to automatically load the companion .SCAN file for each channel as it is loaded. Together with the new batch scan commands, this enables a useful mode of operation where you set up a batch OFS job to do sorting scans all night, then manually review the sorting and choose the most appealing sort for each channel.
- Added new sorting methods based on scanning a parameter and picking the best sort according to a selected sort quality metric

Continuous Data Handling

- Added upsampling, with linear or spline interpolation
- Can now (optionally) save upsampled and filtered continuous data in the Export To New .PLX operation
- Added an FFT view to show the frequency spectrum of continuous data
- Waveform detection/extraction will now appropriately treat differences in voltage scales between waveform and continuous data.
- The Channel Parameters and File Summary views show more information related to gains and voltage ranges. The Channel Parameters view allows modification of the continuous or spike channel gains if they are not correct in the data file, and there is a new Adjust Gains tool

General UI Changes

- A new user interface toolkit has been used, which provides for added flexibility and customizability.
- The buttons on the Waveform and Cluster views have been turned into toolbars.
- The bottom Timeline View has been enhanced so that it can show continuous and waveform data simultaneously with a resizable splitter. The controls have been simplified. Added an option to show dots at the sample locations for continuous data.
- The Contours and W/f Crossing sorting methods have been combined into one, and this sorting method is always in effect no matter which other sorting method you have selected. Crossing in the waveform view is now symmetric with circling in the cluster views for all operations.
- The views showing waveform or continuous data show the time and voltage corresponding to the mouse position in the status bar.
- The currently selected unit is always drawn on top in the Waveforms view.
- New Select main menu item to select the next/previous channel, unit, waveform, or segment
- The electrode enable checkboxes have moved into the control grid
- New Run menu allows easily starting other applications from with Offline Sorter

General Changes

- Performance enhancements for loading data files
- Batch enhancements
 - New commands for scanning
 - Added a menu item to edit batch files with a user-selected editor
 - OFS remembers previous batch file locations
 - New Quick Batch Reference showing all batch commands
 - Added a menu item to show the log file resulting from the last batch run
- There are new options to automatically load the first channel after opening a new file (on by default), and to automatic load companion scan results
- The following features have been deprecated
 - 3D Phase Space view
 - The Sort toolbar
 - The Show 0 to scroll pos feature of the waveform display
 - The ability to time-magnify just the spikes (without zooming the time range) in the waveform display
 - The Control cluster display and iControl Waveform display are no longer independent, it is just Control Displays now.
- Added options for handling sort start/end imported from .plx files
- Can now save and restore all Offline Sorter options and settings to/from a file. Can also reset all options to the factory defaults.
- Dumping PowerPoint slides now creates the output ppt file in the data directory to work around a file protection issue in Vista.
- Now available as a true 64-bit executable

Improvements:

- Matlab export functions now work with Matlab R2009a

Version 2.8.8

Improvements:

- Can now save Neuralynx files
- Handles 16-bit Neuralynx files
- New batch command ForEachFile InvalidateArtifactsAfter, which does the same artifact removal as 'ForEachFile InvalidateArtifacts', except it does it after the processing loop over all channels has finished. This is useful for invalidating artifacts after waveform detection was done on all channels.
- made the invalidation of incomplete tetrode waveforms an option, so that tetrode data collected with disabled electrodes can be more easily loaded
- can now select a unit to export when exporting waveform data, added the ability to write out raw channel numbers and channel names (to text only)
- Dumping PowerPoint slides now creates the output ppt file in the data directory, to work around a file protection issue in Vista.

Bug Fixes:

- Fix regression introduced in 2.8.7 that broke the loading of tetrode .ddt files
- Batch command Set FilterFreq did not allow setting a frequency of 500 hz, even though it is valid.
- Setting a filter frequency in batch did not apply correctly to subsequent waveform extraction
- fix potential hang bug with calculating PCA with disabled electrodes for tetrode data
- fix bug when exporting waveform data to excel when not exporting every waveform
- fix bug where batch tetrode waveform extraction only set the threshold on the first electrode

Version 2.8.7

NOTE: This version of Offline Sorter REQUIRES that the new version 7.4.0 of the Sentinel drivers be installed. The installer for Offline Sorter will run the Sentinel installer that will upgrade the Sentinel drivers to version 7.4.0. Do not cancel out of this Sentinel installation, or Offline Sorter will not unlock. After the installation, the Sentinel installer will be in the Common subdirectory named Sentinel Protection Installer 7.4.0.exe, it can be executed from there.

Improvements:

- Cleaned up Export to New .PLX and Export to .NEX dialogs, remembered their last-used settings, and now the 'Max Waveform Count Exceeded' dialog will no longer come up during these operations.
- Added an option that will optionally persist the 'View w/f' settings in the control grid between invocations of Offline Sorter. Be careful when using this, it can easily lead to blank displays.
- In the waveform view, when a slice line falls directly on top of a sort start/end line, and you click on it to move it, you will grab the slice line unless you click near the top/bottom triangles for the sort start/end lines, in which case you will grab the sort start/end lines.
- Added right-click menus to the waveform display and the cluster display, it brings up the Waveforms and Units main menus respectively
- Made dialogs more consistent
- Added a ForEachChannel KeepWfsOutsideSpan batch command

Bug Fixes:

- Fixed a problem that could scramble channel numbers for .ddt files with disabled channels.
- Version 2.8.6 would not unlock if you were logged into a licensed system via remote desktop.
- Fixed a problem that can result in bad unit counts in the header of exported .plx files whenever there is a non-simple mapping between channel offsets and channel numbers, which can happen when the "Remove Empty Spike Channels" data import option is selected. The header counts being off is a minor error that does not affect reading the file in OFS or Nex, and it can be repaired in PlexUtil.
- Fixed potential crash when importing tetrode .nlx files
- Fixed spurious warning when importing some .smr files

Version 2.8.6

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New Features:

- Added ability to edit comments for plx files
- Now reads and writes version 106 plx files
- Added ability to limit ISI histograms and cross-correlograms to the time range being displayed in the continuous data views.
- Added a new option to tie the cluster view display range for the Timestamp feature to the displayed time range in the continuous data views.
- Added new ISI features that can be selected as axes in the 2D or 3D feature space, which can be useful for analyzing bursts

Improvements:

- Added a new option to always have a mouse right click pull up the context menu (instead of Alt-right-click)
- Added mouse-wheel zooming to the 3D displays
- MCS importer now handles files with multiple analog streams
- Added an optional channel name to the end of each line in an .ofm file. If present, the channel will be renamed to the supplied name when the .ofm file is applied.
- Added various optimizations to increase rendering speed
- Changed some defaults to be more realistic
- Changed order of appearance of tetrode feature vs feature plots to be consistent with SortClient

Bug Fixes:

- Fixed a possible crash when 2d Cluster View was rendering ellipses for units, which could happen following alignment
- Fixed an issue where dialogs would pop up during batch file execution following a SortUsingTpl batch command
- Fix a problem with the auto-incrementing of .plx0 file names for subsequent saves
- Fixed some cases where having incomplete tetrode waveforms (e.g. the waveform from the first electrode in the tetrode was missing) in .plx files would cause problems for things like exporting to .nex files. Also if the very last spike in a tetrode channel was incomplete, it was not being marked invalid.
- Fixed problem with updating an .exp file when more than 4 units were present on a channel. It now only exports the first 4 units. It also writes the .exp in an order that makes more sense.
- Recalculating fit tolerance for existing units now takes into account whether MAP-compatible fit tolerance is selected
- For large .smr files with continuous data, offsets could be introduced into the continuous data
- Fixed a problem in reading Neurolynx files written with Cheetah v5

Version 2.8.5

New Features:

- Added new installation package for Windows x64

Improvements:

- Added 'SaveInvalidated' and 'SaveUnsorted' commands (analogous to 'SaveCont' command) to further control exporting to .plx from batch files.
- Allowed changing the feature being used in the 2x3 tetrode display in the Feature vs Feature view by selecting from the feature combo box.
- Added an option to disable loading of Events in the native .nev loader

Bug Fixes:

- The Neuroshare loader now handles gaps in continuous data (e.g. loaded from .nex files), and also files whose timestamps do not start at 0
- Cleaned up display of multi-line comments from .plx files
- Fix some cases where loading 16-bit continuous-only non-Plexon files would result in 12-bit spikes.
- Fix some cases for non-Plexon file formats where timestamps generated for spikes during extraction could have the wrong time-base.
- Fix problem where sometimes the threshold slider did not match the threshold line for continuous data channels
- Fix problem with auto zoom with 16-bit data
- Fix problem with Neuroshare import of some .nev files that could cause a crash when exporting to .plx

- No longer allows doing File Save or Save-As after a channel remapping has been performed
- Fix problem with saving .nev files when spikes were invalidated.

Version 2.8.4

New Features:

- Added new option to interpret the fit tolerance for template sorting exactly as the MAP does. This is now the default. To get the behavior of previous versions, uncheck 'Use MAP-compatible fit tolerance' in the Sort tab of the Options dialog box.
- Template sorting now honors 'Use Only Visible' and 'Use Only Unsorted' selections.
- Rearranged some items in the options tabs.
- For MCS import, 'filter' streams are now handled.
- Added ability to export the per-sample standard deviation for each unit template during Export Per-Unit Data.

Bug Fixes:

- OFS 2.8.3 was compiled to use SSE2 instructions, which do not exist on PIII and many AMD processors. This eliminated too many machines, so now OFS 2.8.4 is dependent only on SSE, which only eliminates PII machines.
- Fixed bug where trodal continuous-only PLX files would only show the data from the first electrode.
- Fixed bug with old pre-version 103 PLX files not properly setting trodalness to 1.
- When using toolbar button to initiate sorting immediately after changing values in the control panel, changes to values might not be put into effect for the sort.
- Surface view now shows 2D cluster quality metrics instead of 3D.
- Controlling waveform or cluster display when 'Show w/f from 0 to scroll pos' was clicked did not work.

Version 2.8.3

New Features:

- Added ability to start a new unit with the selected waveform without doing a template sort
- Added 'Peak to Valley Ticks' and 'Valley to Peak Ticks' features
- Added Sqrt(Energy) feature, which can provide better separation than just Energy in many cases

Improvements:

- Now uses XP themes, updated look-and-feel, misc. minor user interface improvements
- Added progress bar when loading MED and other file formats
- Misc. optimizations
- Note that the 'Feature Sets' toolbar is no longer shown by default. It is still available, but it has to be enabled using Tools | Customize Toolbars... before it will appear. If you are upgrading, your saved layout will likely still contain the 'Feature Sets' toolbar as before.
- Enabled SSE2 instructions. This speeds up certain operations (e.g. filtering) significantly. Note that this change means that Offline Sorter will no longer run on Pentium II or earlier CPUs.
- When showing only selected unit in the cluster views, the ellipses/ellipsoids for all units are no longer shown.
- After a scan in the Scan View, double-clicking on a scan result line or clicking the 're-sort with buttons' will no longer initiate a complete re-sort of the channel, it instead will recall a saved 'snapshot' of the original sorting result, which is much faster.
- Changed the way that the initial clusters are set for the T-Dist E-M algorithm. There is now an option to select either a circular (default) or a linear pattern (used in previous versions) of initial cluster centers. Also, only a single iteration of the K-Means algorithm is run, instead of letting it run to completion before starting the E-M sort.
- The KMeans sort can now be animated
- Better handling during waveform extraction of the odd case where the number of bits per sample for spikes and for continuous data is not the same.
- Removed confusing 'All unsorted waveforms' option for selecting the waveforms to use in PCA.
- Once a waveform has been invalidated, its unit assignment is irrelevant.
- Made showing the alignment report following waveform alignment optional

Bug Fixes:

- DDT loader could crash with .DDT files written by certain versions of Recorder.
- NEX export of continuous variables could write lots of fragments, even though there were no gaps in the continuous samples.
- Panasonic MED loader could crash when loading large files. The export of per-Waveform or per-Unit a/d values to a text file would overwrite the other quantities that were chosen for export, so that the output file consisted only the a/d values. Export to Excel or Matlab was unaffected.
- DDT and generic binary loader could not load files larger than 4GB.
- Problem with undo-ability of adding a new unit via selecting a waveform as the template
- Changed interpretation of single-digit years in Neuralynx files to avoid an error.
- Changing a unit assignment in the Waveform Inspection View failed to update all other views with the change
- Zooming/Unzooming in the Z direction in the 3D Clusters view only worked if the Z was PC3
- Exporting Events read from an .SMR file to a new .PLX file did not work properly
- Manually selecting cluster centers for KMeans and Std EM sorting when per-electrode features were selected
- Continuous data view could crash under some conditions if drawing was deferred.
- Changing the channel map did not reset everything, which could cause problems.
- Filter column of Chan Params view was always showing N/A for Spike+Cont channels from .PLX files, even when Filtering was relevant to the spikes.

Version 2.8.2**Improvements:**

- Added progress bar when initially opening CED files
- Avoided some prompting dialogs when in batch mode

Bug Fixes:

- Rewrote PLX file saving to be able to cope with the 'Remove empty spike channels' option.
- Fix problem with preserving continuous data with 'gaps' in PLX0 files.
- Fix possible off-by-one problem with associated spike + continuous channels in PLX0 files.
- Fix bug with saving invalidated waveforms into DataWave files.
- Fix bugs with exporting certain other file formats as new PLX - specifically those that start numbering the spike channels at 0 instead of 1.
- Fix sporadic crash that could happen when the 3D view was showing and some save/export operations were done.
- Fix crash that could happen when trying to export a file as NEX following exporting a file as PLX.
- Fix bug that would prevent loading 128 channel PLX or NEV files.
- Fix bug that could occur when waveform detection was performed on a few (not all) channels of a continuous-only file and the result was exported as a new PLX.
- Fix anomaly with Bionic NEV files showing an empty channel 0.
- Fix bug with reading DCF files that were larger than the buffer size.
- Fix bug when trying to export to NEX with a file read in from PLX0 format.
- Fix bug that left waveforms with their previous unit assignment when number of waveforms is greater than the waveform limit for valley seeking sorting.

Version 2.8.1**New Features:**

- Two new command line options are supported:
- /b batfilename - execute supplied batch command file then quit
- /plx0 inputfile - convert supplied input file to .plx0 format then quit

Improvements:

- Avoid reading in empty channels in batch mode, avoid putting up 'Discard Changes?' message box

Bug Fixes:

- Fix bug introduced in 2.8.0 concerning saving of tetrode .plx files
- Fix bug with saving certain Datawave files
- DDT files with disabled channels were not reading in properly

NOTICE: The new 'Remove empty spike channels' option on the Data Import Options dialog interferes with saving files. And by mistake, the option was set to checked by default in 2.8.0. The File Save and Save-As options are now greyed whenever this option is checked. This will be addressed in future releases: do not attempt to save any files that were read with this option checked.

Version 2.8.0

New Features:

- Added support for continuous data in stereotrode/tetrode ("trodal") situations, including trodal spike extraction.
- New Surface Plots view
- Data file loading has been completely changed, added the ability to use Neuroshare DLLs. See the manual for more details.
- Revamped channel map view, added ability to load a channel map from a file or with the batch command 'Set ChanMap fname'.
- Revamped binary file import, added ability to save/read import parameters from a file or with the batch command 'Set ImportParameters fname'
- Revamped .PLX0 file handling, built in a new Export to .PLX0 feature, which can also be done via a batch file. PLX0 files now also handle continuous data.
- Made the Info - Channels and Info - Chan Params views more consistent across all file types
- Added ability to apply a filter to all channels in the GUI
- Added options for automatically recalculating templates and template fits
- Added new Signed Waveform Energy waveform extraction, which can be more useful than normal Waveform Energy
- Added new alignment option to align to first local extremum after the pre-threshold. Also moved Align All Channels operation from the Tools menu to the Align Dialog.

Improvements:

- Removed the distinction between Slow Continuous and Spike Continuous channels because it was too confusing. You can now extract spikes from any continuous data channel, although you may not be able to save those spikes to a .PLX file. The maximum number of samples per spike for extracted spikes has been increased.
- Closed several loopholes in Export As New .PLX by rewriting it. Saving continuous data will now always re-block continuous data. Astute users might notice that how this function behaves with respect to saving trodal data has changed. It no longer saves the 'concatenated' waveform, as it was was not possible to properly maintain spike-continuous channel associations using this method.
- Revamped the default file type selection, moved it to Data Import Options General options page
- Print channel name on Sort Summary instead of just channel number (which doesn't always match the name)
- Added the following batch commands ForEachChannel DeleteAllUnits Set DetectNPW 32 Set DetectNPre 8 Set DetectDead 32
- Added new scan mode on the Scan View to investigate how the 'Max Waveforms to use in PCA' setting affects the PCA
- Can now extract much longer waveforms in non-trodal modes
- Improvements to the licensing dialog to make it more obvious when multiple keys exist
- Added ability to customize color for invalidated waveforms

Bug Fixes:

- Fix bug introduced in version 2.7.2 that could cause strange PCA results but only when the 'Max Waveforms to use in PCA' setting was small (< ~100).
- Fix problem that prevented exporting continuous data imported from a generic binary file as a new .PLX file.
- Don't allow creating more than 26 units via the right-click menu on the continuous data view
- Can now read .PLX files with 26 units
- Fix problem where continuous Neuralynx data would not be properly paged in when needed
- Fix problems with scrollbar behavior in continuous data view
- Fix bug when reading DataWave continuous data with a small continuous data buffer size
- Fix some anomalies when opening files of a different type via the Recent Files menu entries.
- Right-click menu items now enable properly if continuous data view is undocked
- Fix issues where undocked windows re-dock themselves after certain operations

- Fix issue with threshold value on 16-bit .PLX files
- Fix redrawing bug when resizing the floating Current Channel pane

Version 2.7.3

Improvements:

- Rewrote the artifact removal algorithm
- Allowed for some timestamp slop when reading tetrode CED files, tally and display dropped counts
- Added support for importing 16-bit Neuralynx files
- Changed default of 'Allow Designation of Spike Continuous Channels at Load Time' option to true
- Handle more cases where the spike digitization frequency is not the same as the timestamp frequency (e.g. CED files)

Bug Fixes:

- Fixed issue with filtering continuous data channels on CED and other file formats
- Fix crash bug that could happen when attempting to export some CED files to new .PLX
- Fixed issue with exporting .NEX files while in Demo mode
- Fixed the invalidated waveform count on the channels grid view which was not always updating properly
- Now warn when saving a .TPL file where units are marked as sorted with the Contour method but no contour is present.
- Now prevent the export to MATLAB functions from using variable names that are illegal in MATLAB
- Fixed bug where the amount of RAM used to store continuous data was actually 10 times the amount entered in the 'Channel Buffer size for continuous data (MB)' entry of the File Import options page. This is now fixed. The default value for the continuous data buffer size was made 10 times larger to compensate for this fix.

****IMPORTANT** Note that since the Channel Buffer size value is remembered between OFS invocations, using this version will only store 1/10th as much continuous data into RAM as compared to what a customer was storing before. This just means that Offline Sorter will have to load continuous data from the file more often. Existing customers may want to increase their specified buffer size by a factor of 10 in order to get the same behavior they were getting before they upgraded to this new version.**

Version 2.7.2

Improvements:

- Rewrote the Export to .PLX algorithm to remove the requirement that the entire file must fit in RAM. It now uses temp files on disk instead. It is probably slower for small files, but it makes exporting large files possible.
- Added batch mode commands for cross-channel artifact invalidation: Set ArtifactWidth2 Set ArtifactPercentage 80 ForEachFile InvalidateArtifacts along with other minor batch-related improvements
- Added new batch command: Set Savecont 0 to prevent OFS from saving continuous data during a SaveAsPLX command
- Added new batch commands for filtering of continuous data: Set FilterFreq 30 ForEachChannel Filter
- Added new batch commands for applying .tpl files: Set TplFileName filename.tpl ForEachFile SortUsing Tpl
- Do not allow filtering if sampling frequency is less than 10 Khz (filtering algorithm is not suited for this)
- Added new option to Interval Selection tool: "Occur outside of a time span around Event A"
- Save As now writes out the latest version (105) of plx files. Before it automatically upgraded to at least version 103, but left the version alone if it was ≥ 103 .
- Got rid of do-nothing Apply button on Options dialog box
- Efficiency improvements in PCA calculation and waveform view
- Display warning if cluster quality or stats display is selected on cluster views, but 'Calculate Advanced Stats' is not enabled
- Do not allow 'Max waveforms to use in PCA' to be less than 2 (as the PCA will always fail in this case)
- Prevent Pseudo-F stat display from going into scientific notation so often
- The importer for MCS files now imports triggers as external events
- The T-Dist sorting algorithm will now attempt to automatically reduce the D.O.F. multiplier if it is too large relative to the number of waveforms. This should only affect sorting channels with a small cluster ($< \sim 100$) waveforms.
- New tool to recalculate template fit tolerances from the existing clusters

- The dot frequency display in the 2D cluster view now responds to the 'Control cluster display' checkbox

Bug Fixes:

- Fixed problem in 3D cluster view where the highlight box for selected waveform could be hidden behind ellipses
- Fixed bug with tetrode Neuralynx files
- 'Set DetectSigmas' batch command would not be parsed properly
- Fixed bug that could cause the pre-alignment timestamps to be exported to .nex following a timestamp-altering alignment operation. Doing any sorting or other operations on the data following alignment would prevent this problem from occurring.
- Fixed bug that could corrupt exported .nex file if units had been deleted
- Fixed crash bug that could occur when exporting continuous data from a non-.plx file format to a new .plx file
- Fixed potential crash bug when reading .dcf files with a small buffer size, and also a data interpretation problem for DCF files that represent the data as double precision values
- Closed views after .tpl file was applied, as they should not be open when no channel is selected
- Loading all rasters from the rasters view could leave Deferred Drawing mode enabled
- Dropped count is now properly reset to 0 when loading a new file
- PCA with max number of waveforms limiting now works properly
- Fixed several bugs where the code checked for 'has PCA been done on a channel?' when it really meant 'has this channel been loaded?'
- Fix issues in filtering code when timestamp freq is not the same as waveform freq (which is never the case for plx files)
- The Export As New .plx function could write out garbage in the unit number field of continuous data blocks. This was harmless since that field is not assigned a meaning for continuous data blocks, but it was a bit disconcerting to see. It is now always filled with 0s.
- File size now reported properly for MCS files in Global Info tab, and the number of waveforms in a file is displayed in the Channels tab
- The right-click operations from the bottom Continuous Data view for waveforms are now undoable

Version 2.7.1

Improvements:

- Selecting Waveforms - Re-threshold... (or the equivalent selection under the Tools menu) now brings up a dialog that allows specifying the new threshold explicitly by typing

Bug Fixes:

- Fixed possible data corruption problem of tetrode data after Export to .NEX
- Doing a normal Save operation on tetrode data after doing a timestamp-adjusting alignment operation is no longer allowed, as this can corrupt the output file. Use Export to New .PLX instead.
- Fixed problem if you clicked in the continuous data view at a time later than the last ExtEvent
- Fixed problem where strobed data read in from .NEV file would not be written during Export As New PLX
- Added a check for improper time range specifications in the cross-correlograms view properties
- Opening a new file will now offer to save the currently-open file if it has been modified

Version 2.7.0

New Features:

- Added ability to export unit template waveforms in the Export Per-Unit Data function
- Added support for PLX version 105 files
- New Waveforms - Extract menu option, which provides the ability to set thresholds in units other than % of ADC range, and to run extraction on all channels
- Added new batch commands to support batch extraction: For Each Channel Detect - sets up to perform waveform detection each channel; Set DetectSigmas s - sets the detection threshold as a number of sigmas away from the mean of the Peak Height Histo, can be negative for negative thresholds
- Added tool to invert waveforms
- Added a tool to detect and invalidate cross-channel coincident artifacts

Improvements:

- Changed confusing file menu entries 'Save As New .PLX' to 'Export to New .PLX', and 'Save As .NEX' to 'Export to .NEX'. The 'Save' now only refers to saving out the file that was read in.
- Waveform extraction from PLX continuous channels is much faster now
- Improved error messages for parsing errors on interval files for interval selection tool
- Detector Options dialog now shows extraction window/prethreshold/deadtime as number of samples in addition to number of microseconds
- Perform an auto-zoom after applying a low-cut filter to continuous data
- Add (keyboard bindable) menu option to show/hide lines between short ISI waveform pairs

Bug Fixes:

- Swap Units function now also swaps templates and template fit tolerances
- No longer re-calculates templates from waveforms when a previously-loaded channel is revisited
- Adding a new unit after deleting a unit would result in the new unit getting the old one's template fit tolerance
- Dumping of raw waveform value in microvolts in the Export Waveform Data option would be off by the Zoom factor, fixed mV -> microVolt label on radio button
- Fix ability to type into threshold spin box on continuous data view, and can now paste threshold values into the Chan Params view
- Fix several bugs with associating spike + continuous channels
- Fix problems that happen because when there are already Spike channels present, cannot freely set a new number of samples per waveform; the Spike channels have already determined that
- Fix update problems in grid-based views when channels are changed
- Fix problem when using File - Sort Using .NEX on Neuralynx files
- Doing sorting from a batch file sometimes would not work because PCA was not re-run
- Put in correct prethreshold for Bionic .nev file, which fixes an issue with timestamp adjustment during alignment

Version 2.6.2

New Features:

- Support for version 103 DDT files
- Added option to import only a single Neuralynx file (as opposed to reading all files in the directory containing the opened file)
- Added Tool to make Events based on times of unit firings
- Can now have Sort All Channels operations only sort a subset of channels

Improvements:

- Gain is also shown on Chan Params tab for most imported file formats
- When T-Dist sorting fails to find a solution, it no longer leaves the sorting in an intermediate state
- Can specify a default preamp gain for old revisions of .plx files (before preamp gain was explicitly specified in the .plx file)

Bug Fixes:

- Spike channels in MCS files were not reading in correctly
- The 'Use only unsorted' option no longer applies when removing waveforms from a unit
- The voltage values for the templates in the template view were off by the zoom factor
- Continue sorting for K-Means and Std E-M was not working when invoked from the 3D cluster view

Version 2.6.1

Bug Fixes:

- Fixed problem with spike extraction on .plx continuous data channels (did not affect DDT data files)
- Fixed problem where raster view could get stuck at very high zoom levels
- Fixed problem with calculated per-electrode PCA for stereotrode/tetrode data
- Fixed Microsoft problem that caused a 'The parameter is incorrect' error message when loading a file from a CDROM. (see <http://support.microsoft.com/default.aspx?scid=kb;en-us;828100>)
- Removed some debugging code

Version 2.6.0

New Features

- New view to show raster plots for all channels.
- New view to view and print ISI histograms, including linear and log scaling of axes
- New view to view and print cross-correlograms between units in a channel
- New view to plot the waveform points in phase space
- New function to remove all except selected w/fs from units
- Added ability to animate the passage of time
- Per-electrode enable toggles for trodal data. These toggles affect the PCA and feature value calculations for the concatenated waveforms, and are also used in alignment to limit where the alignment minima/maxima can be located.
- Support for files that contain associated spike + continuous channels. Support for .plx file format version 104, including up to 256 slow channels.
- Added facility to define up to 3 user-defined feature space combinations. Once defined, they can be quickly put into effect via menu selections or toolbar buttons.
- Interval selection can now be done across all channels instead of just for the current channel
- Time intervals for invalidating waveforms can now be read in from a text file
- Can now optionally export unsorted timestamps as a .nex variable
- Added a forward/back feature to enable easy back/forth between channels
- Added a Slice 4 position and feature; having 4 slices is handy when dealing with tetrodes
- Added back the View w/f option to view only unsorted, and the 'Do Not Use Sorted waveforms' option
- Added ability to sort the currently loaded file using the unit assignments read from a .nex file
- Added ability to export waveform AD values to a text file, matlab, or excel

Improvements:

- New default layout for toolbars, and added more toolbar buttons
- n,p keys to go to next,previous channel now work in the Detection view
- Show the freq for each channel in the Chan Params view
- Text color for the 3D views can be different than the text color for the other views
- Moved ClustHistMax from the Control Grid to the Dot Frequency Display Parameters dialog
- Added a non-linear scaling of the zoom spin control, so that it steps by 0.1 for small values and by 1.0 for large values
- Removed pointless DSP column from Channel Parameters grid view
- Display updates are now deferred while a tpl file is being applied
- All grid-based views now support a 'Select All' right-click menu function
- Added option to do byte-swapping when importing binary files
- Expanded size of MRU file list
- Added ctrl-click input of centers to make it easier to define centers in the 3D view
- Added option in Templates view to show templates in units of Microvolts (instead of A/D counts)
- Now remembers View w/f settings (all/selUnits/unsorted) between channels
- Options in the 'Recalculate Principal Components' dialog added to 'Feature Calc' options page, dialog appearing before the PCA recalculation is now optional
- Changed default of PCA so that it uses only valid waveforms, and only points between sort start/end
- Minor usage improvements in the Scan View
- Added spin control for Outlier Threshold in the control grid
- Info View sub-tabs that list channels now have a right-click menu option to make the selected channel the current channel
- Fixed analog channel numbers displayed in 'Chan Params' tab for .plx files to be 1-based, and displayed the number of samples instead of the number of fragments
- When showing only unsorted waveforms, the waveform display will overlay the template waveforms for existing units
- Various efficiency improvements and optimizations
- Moved PCA waveform limit from Large Files to Feature Calc property page, and onto Recalculate PCA dialog, and moved the remaining Large Files options into the File Import options pag
- Added new option during Save As New PLX function to completely disable saving all continuous data to the PLX file
- Added new option to control whether Remove Outlier tool affects all units (as before) or only the currently selected unit(s)
- When swapping or combining units and there are only 2 units, don't bother bringing up dialog or

requiring selected units

Bug Fixes:

- Fixed problem with waveform display showing all unit templates EXCEPT the selected units. Now it only does this when viewing unsorted waveforms.
- Fixed problem where strobe codes would not be properly saved during the Save As New PLX operation when a strobe code representation of hexadecimal or octal was in effect
- Fixed bug introduced in 2.5 that causes 3D contours from .tpl files to be mis-applied. Also fixed potential problems with 2D contour applications when feature space ranges were different.
- Fixed problem with OFS remembering the slice positions between channels
- The normal colors would be used instead of the print colors when printing several views
- Starting with 2.5.0 OFS would 'collapse away' empty units following a sort. While this is useful in most cases, it makes sorting by applying a .tpl file very confusing. Disabled this feature for the Template sorting algorithm.
- File size in Globals view was not correct for some file formats
- Customizing the Features toolbar is no longer permitted, as this could lead to a crash
- Fixed issues with slice positions not visually lining up with the sample positions in the waveform display
- Fixed problem with energy and non-linear energy display in continuous data view for slow channels in some file formats
- Fixed issue with DataWave file layout records for unused channels
- Fixed issue with applying .tpl files on extracted continuous channels for certain file formats (e.g. MCS)
- Fixed problem with adjusting slice positions for some file formats (e.g. Neuralynx)
- Fixed problem where superfluous scroll bars appeared on some grid-based views
- Fixed problem that occurred when NumPointsWave changed in mid-PLX file. A warning will now be displayed if the .plx file has this problem.
- Fixed cosmetic problem that could leave unit tolerance spin/edit controls on screen after closing a file
- Fixed possible problem with calculating PCA for trodal data
- Fixed bug that allowed crash in Scan View when >26 units were entered for K-Means scan
- Fixed broken print preview and printing the 3D cluster view
- When the 'Use Projected 2D space ...' checkbox was checked in the Sorting Options panel, the E-M-based sorting algorithms would sometimes fail to converge due to an issue with the initial conditions at the start of the E-M algorithm. When this happened, the algorithm would produce no units. A new method is now used to get the initial condition that is less prone to this problem.
- Fixed bug where doing a normal save on stereotrode/tetrode .plx files that had mismatched ("dropped") waveforms could misassociate units
- The Save As New PLX operation will now preserve gaps in continuous data
- The following operations now honor the 'Use Range' time range: Remove Outliers, Remove Short ISI, Assign Unsorted
- The 'Set WaveformLimit' option in batch files was being ignored
- Fixed some anomalies concerning erasing 'stale' contours from the cluster views after certain operations
- The suggested filename for Save As New PLX when working with a .plx0 had two '.'s in it. Also a harmless but unneeded 'cannot read file' message box could appear when Save As New PLX tried to save continuous data channels from a .plx0

Version 2.5.0

New Features:

- Added new E-M sorting methods, with associated options, scans, and batch commands ('TDist' and 'TDist3D' for new T-Distribution based sorting, and 'set DOFMult' to control the D.O.F. multiplier parameter for the T-Distribution sorting algorithm)
- Can watch animated sorting progress, and can cancel sorting. Can cancel sorting parameter Scans and sort-all-channels operations also.
- Improved unit selection allows easily selecting multiple units, which allowed a simplification of the View W/fs options
- The selection of Features for 2D feature space is no longer independent from the features for 3D feature space - they share X and Y feature selections. This allows many simplifications and removed a tripping point for many users.
- Nicer interface for batch processing, can cancel batch file execution
- New PDF-based help system
- Added menu entries to dump Sort Summaries of all channels to PowerPoint and to the printer (or to a

- PDF file if PDF Distiller is installed)
- Added function to swap units
- Went to a more consistent, zoom-based approach to handling scaling in continuous data views
- Automatic zoom setting when loading channels
- New batch commands for interval-based waveform invalidation
- Added command to invalidate all except selected waveforms (inverse of invalidate selected waveforms function)

Improvements:

- Max W/f Draw, Sort Type, and selected features are now persisted between OFS invocations
- Improved the way that the bottom bar scrolling windows behaved; can now zoom in much more
- Moved Auto-Sort All Channels functions to Sort menu, also added Auto-Sort All Channels Using TDist E-M function
- Changed default of show waveforms for cluster and continuous views to be 'As Above', changed various other defaults to enable more advanced features "out of the box".
- Added options to either use or ignore the WaveformFreq .plx file header entry. This is needed to properly read in files saved from Recorder and for files that were written using the Save As New PLX function from other file formats
- Added support for handling disabled channels in DDT files
- Added label to display max voltage on bottom continuous data views
- Exporting 'Unit' in the per-waveform export now writes out -1 for invalidated waveforms. Previously there was no way to tell invalidated from unsorted waveforms.
- Added right-click 'Set All As Top' function to Events tab
- Removed 'Update Unit Statistics' menu item, as it wasn't useful
- Initial scaling of cluster views now does not consider invalidated waveforms.
- Strobed data values are now written out with the Save As New PLX function
- Rearranged sorting menus and buttons, introduced 'continue sort'
- Zoom from waveform view now tied in with bottom bar zoom
- New addition to interval-based waveform invalidation: invalidate all wfs within an interval
- New menu item to control 'Use only visible waveforms'; all sorting methods now honor this settings. This allows sorting methods to 'leave alone' existing units, or re-sort an existing unit into several.
- Removed confusing option to not include existing units in selection; same function can now be accomplished with revamped unit selection mechanisms
- Rewrote K-Means sorting algorithm to make it more efficient
- Rearranged options screens to make clearer
- Can now choose to not have the contours redrawn in the cluster views, this gets them "out of the way" for certain operations
- Can now change gain for Plexon DDT files
- Globals tab now shows file format version for selected file formats
- Deferred drawing now also applies to continuous data views
- Added a warning about saving new .plx files if the file was loaded when the 'Disable Loading of Continuous Data' option was in effect
- Allowed low-cut filters to be run on .plx slow channel data, but note that there is no good reason to do this UNLESS spike channels have been recorded on the continuous data channels.

Bug Fixes:

- Fixed problem entering Range in the bottom bar scroll window
- Added a check for unreasonably low timestamp / spike digitization freqs, which can cause several problems
- Fixed problem with calculating per-wire features following a manual conversion to stereotrode/tetrode data
- Using Save As New PLX on certain file formats would not save gain properly in .plx file.
- Crossing waveforms when Waveform view is showing 'Sel. Unit' did not work properly
- No longer insists on adding on a .uff extension when saving Datawave .act files.
- Fixed bug with automatically assigning unsorted following a waveform-limited Valley Seeking sort
- Saving a Sort Summary to PowerPoint for channels with a very large number of waveforms could run out of memory.
- Suggested file names when saving Sort Summary to PDF were off-by-one from the actual channel number
- Mouse-over amplitudes for bottom waveform display were not correct for stereotrode/tetrode data.

- Exporting NEV files to Neuroexplorer would result in an erroneous marker with timestamp 0 to be exported
- The batch file SaveAsPlx could make analog channels in the saved .plx file unreadable in Neuroexplorer
- PCA view could show wrong 'variance explained' numbers if the sort width was changed but PCA was not recalculated.
- Batch file 'Dir' command would only process every other file in the directory
- Gain for Neuralynx spike channels was not being handled. Also Events were not being read correctly, and slow channels were not being exported to Neuroexplorer.
- Undo of 'Invalidate All W/fs In Selected Unit' operation now works properly
- Invisible waveforms are no longer selectable in the continuous data views
- When doing Save As New PLX, analog data was always written out as starting from 0, even if it didn't start until later.
- Fixed problems with gain in several imported file formats
- Low-cut filter can now be run on MED files

Version 2.4.4

Bug Fixes:

- fixed problem reading CED and DataWave files that was introduced with version 2.4.3
- fixed problem that could cause 16-bit DDT files with low-amplitude signals to be interpreted as 12-bit DDT files.
- fixed problem with selecting points that were not visible in cluster views due to a limited time range

Version 2.4.3

New Features:

- Added a Tool menu entry to do alignment on all channels
- Save As New PLX can now save a window of adc samples (ticks) for each waveform (e.g. save samples 2 through 25 for each waveform)
- Can now print the Quick Reference dialog

Improvements:

- Treatment of the sort start / sort end times was re-done. For trodal data, the sort start/end are now per-electrode instead of for the entire concatenated waveform.
- All feature calculations now only use the portion of the waveform between sort start/end e.g. for the Peak Height feature, peaks outside of the start-end region are ignored. Features affected: Peak, Valley, Peak-Valley Difference Energy, Non-Linear energy Peak FWHM, Valley FWHM Peak Tick, Valley Tick and all per-electrode and inter-electrode ratio versions of the above
- Waveform alignment was revamped, it is now aware of trodal data, with two different options for how to align trodal data. Also the timestamp adjustment algorithm was changed and made optional.
- Contour and template sorting done via application of a .tpl file now honors the time range that is in effect at the time that the tpl file is applied. Also invalidated waveforms are ignored in these cases.
- The PCA view and Waveform Inspection view now show trodal dividing lines
- The setting for Show/Hide Invalid Waveforms is remembered between OFS invocations.
- For batch file processing, if a batch file is executed without any file directives, it is assumed that the batch file is to process the currently-opened file. This allows defining generic batch files that can run on all channels on the current file, without having to put the filename into batch file.
- When .plx files containing analog channels are loaded, the SIG Name column on the Chan Params grid now shows the raw a/d channel number (there was no other way to get this information before).
- Neuralynx importer can now handle filenames that do not conform to the Neuralynx DAQ system naming conventions, and can display initial unit counts.
- There is now a new option to remember Slice N positions across channels
- New menu entry for invalidating waveforms, which allows shortcut key binding for that operation
- More units displayed in Info panel
- Saving plx0 files is now much more memory-efficient
- Improved printing of sort summary view when printed to the PDF Distiller so that it suggests a .pdf file name with the channel encoded into the filename.
- Exporting data to text, MATLAB, or Excel no longer gives too-many-waveforms warning

Bug Fixes:

- Fixed serious problem in .plx0 file saving that could corrupt data if a channel had more than 4 units
- Saving/restoring a .plx0 will now preserve the invalidated state of waveforms
- Time range dialog was not correctly showing the time range state when it first came up
- Waveform display was not showing trodal dividing lines when displaying only selected waveform
- Under certain circumstances the display would not update correctly following Valley Seeking sorting
- Provided more room to display features in the features drop lists. Since the feature drop lists are not scrollable it may cause some features to not be displayed and thus not be selectable. This can still happen, especially for low screen resolution and when a large number of tetrode features are active. The workaround is to reduce the number of Active Features using Options - Active Features.
- Opening .NST and .NSE files from the recent files list now works
- The Chan Params tab was not showing the correct gain for Continuous channels
- The line on the Waveform display for Slice 1 was not being drawn properly sometimes, or being properly updated when changed from the control panel.
- Clicking without moving in the Peak Height Histogram for analog channels did not move the threshold line.
- Detail view now updates correctly when range in feature space changes.
- Fix problem in Save As PLX from file formats with different digitization and timestamp frequencies
- Fix cosmetic problem in continuous data time range display

Version 2.4.2

Improvements:

- New 'Waveform-Invalidate Waveforms in Selected Unit' menu selection to invalidate all waveforms that are currently assigned to the selected Unit, and subsequently delete the unit
- New 'Use only currently visible waveforms' checkbox option in Options - Sort panel to limit automatic sort methods to use only the waveforms that are currently visible on screen
- New 'Right-click Zoom in 2D Cluster View' options in the Options - Display panel for what a mouse right-click in the 2D Cluster View does; either brings up a context menu (as in older releases), zooms both axes together, or zooms the axes independently. Holding down Ctrl or Alt keys allows access to the other options.
- Neuralynx importer can now handle situations where the channels present are not contiguous
- Removed long sort-time warning for Valley Seeking algorithm
- Improved error handling when Valley Seeking algorithm runs out of memory
- Saving Datawave files now updates the 'L' records cut_clus array with the numbers of spikes in each unit, which some analysis programs expect
- When OFS encounters problems reading a .plx file, it will now show you whatever portion of the file it managed to read successfully

Bug Fixes:

- The Feature vs Feature view was incorrectly defaulting to displaying 6 PCA plots
- Gain for .plx file slow channels was being incorrectly exported to .nex files
- Waveform alignment now won't shift timestamps to be negative. This could potentially make .plx files unreadable.
- Fix problem with the a/d frequencies read from CED files
- Realized that it really isn't possible for the Save As New PLX function to handle file formats that allow different timestamp and digitization frequencies, without extending the .plx file format structures. Disabled this until a better solution can be found.

Version 2.4.1

Improvements:

- The channel units display now shows the number of invalidated waveforms in the short blank column (you have to pull it open to see it)
- The NEV importer now imports 'noise' waveforms as invalidated waveforms. Before it just ignored them.
- Waveform alignment now reports more information about the shifting that it did
- The Feature vs Feature view now honors the same point-visibility criterion that the cluster views use (e.g. can now be controlled via the continuous data view)

Bug Fixes:

- When doing Save as New PLX on file formats that allow different timestamp and digitization

frequencies, the timebase was wrong

- Fix problem in alignment that could result in aligned waveforms peaks landing in two different, adjacent ticks
- Views sometimes would not update properly following alignment or Mark All Waveforms Valid operations
- Empty DDT files (consisting of a header only) no longer cause OFS to crash
- When reading .plx files with strobed events, an empty strobed event would be mistakenly inserted at time 0
- When marking waveforms invalid using the Interval Selection tool, the unit numbers for the invalidated waveforms were not reset to 0 (unsorted). Saving the file with File - Save would then write out the original unit numbers.
- Feature vs feature view could sometimes go blank if the first operation done in it was a right-click zoom
- Fix problem in exporting to MATLAB for non-PLX files