

## SutterPatch® Software Release Notes

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### Version 2.0.1 (build 204); February 20, 2019

#### *New Feature Highlights*

- Free update for all existing users.
- Welcome Screen now lets you open an existing Experiment
- Hardware control:
  - Added "Lock-in Adjustments" window to allow easy calibration of LockIn computation.
  - Added "cap. Reset" LED to indicate capacitor resets in capacitive feedback mode during data acquisition (dPatch System only)
- Scope Window:
  - Added Marquee menu
  - The status of Autoscale button in Membrane test Scope Window and Free run Scope Window is retained now.
- Membrane Test:
  - Lock-in algorithms available for dPatch System
- Paradigms and Paradigm Editor:
  - "Write to Log" step now accepts a comma-separated list of equations.
  - Added Paradigm Step type: "Set Metadata"
  - Added paradigm step "Pause"
  - Paradigm editor window can be resized.
  - Added multi-selection in list of paradigms for "New Pool..." and "Delete"
  - Added routine pool and paradigm pool performing "semi-automatic" LockIn calibration
- Routines and Routine Editor:
  - Routine Pool Listbox now allows selection of multiple Routines using the Shift key:
    - Single-button action to create a new Routine Pool from selected Routines
    - Delete multiple Routines at the same time
  - New commands in the Files and Pools menu





- Variety of control changes, including hiding controls and improvements to tooltips to simplify operation
- Added individual cell help tooltips to listbox controls
- Added selection to display all output channels in the Preview
- Changes to Input Channels:
  - Added Nyquist factor selection (2,5, or 10) for dPatch, previously fixed at 10
  - Channel information is now available as a tooltip
  - Enabled capacitive integrator reset to Smooth and BesselFilter virtual signals for Routine acquisition
  - Auto naming of Virtual signals
  - Parent Out channel selection locked for input channels that are hardwired
  - Improvements to Virtual Signals, including:
    - Lock-in: Improvements to algorithm
    - SweepAverage: Provides cumulative or running average of the input sweep
    - BaselineSubtract: Subtracts a baseline value from the input sweep
- Changes to Measurements and Graphs:
  - Auto naming of measurements and analysis graphs
  - Auto unit selection for analysis graphs
  - Sorted Analysis types in alphabetical order
  - Added new Analysis type "max slope"
  - Start / End Ratio for segment based measurements can extent the segment boundaries
- Changes to Output Channels & Waveforms:
  - Expand window and P/N leak controls only when P/N is enabled
  - Added selection to use holding as start value in Value+Increment
  - Added Sweep Number selection to Value+Increment and Value List
  - Added scrolling value control to Value List entries
  - Changed waveform editor scroll bar for improved performance
- Data Navigator:
  - Improved export to .atf and .ibw files.
- Preferences:
  - Added gentle switch and file saving preferences.
  - Added option for faster data saving at end of Routine acquisition



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- Shortcuts:
  - The "Write to Log" step accepts a comma-separated list of equations.
- Event detection analysis: Now saves event integral, rise time and decay tau for each found event.

### **Bug Fix Highlights**

- Improved cleanup on closing an Experiment
- Certain amplifier settings were not written to Metadata
- Paradigm or Routine sequence numbers now correctly increment when acquiring new data in an existing Experiment
- Improved functionality of virtual signal Bessel filter.
- Many minor bug fixes

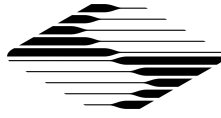
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## **Version 2.0.0 (build 200); September 1, 2018**

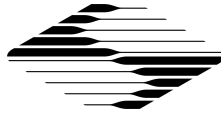
### **New Feature Highlights**

- Free upgrade for all existing users.
- SutterPatch 2 comes with Igor Pro version 8. All existing users receive a free upgrade. Support for Igor Pro 7 will be terminated in the future.
- Added support of the new [dPatch® Ultra-fast Low-noise Digital Patch Clamp Amplifier System](#)
  - Membrane Test
    - Two simultaneous channels, from either two headstages or one headstage and one auxiliary input channel
    - Separate Line Frequency Reduction options for each channel
      - Displayed in separate scope pane or as replacement of acquired signal
    - Test Pulse stimulus types (Single Pulse, Double Pulse, Triangle, Sine or RMS Noise)
    - Selectable 1, 2, 5 or 10 running average sweeps used in measurements calculations
    - Scope display of either acquired, running average or both
    - Real-time updates to settings made on Amplifier Control Panel
    - Audio monitor
    - Display Compression for optimal performance
  - Free run





- Two simultaneous channels from any combination of headstages and/or Auxiliary input channels
- Real-time updates to settings made on control panel
- Display Compression for optimal performance
- Routine acquisition
  - Fixed output sampling interval – nothing to configure
  - Input sampling interval for amplifier channels automatically set by dPatch filter settings
  - Auxiliary input channel sampling interval automatically set by specified bandwidth
  - Additional parameter settings for “Smooth” and “Bessel Filter” virtual channels for handling integrator reset
  - Gap-free / precise sweep timing automatically set for all routines
  - Open-ended acquisition can be enabled to acquire indefinitely after a defined stimulus cycle, within the same series
- Redesigned Membrane Test
  - Allows immediate changes to stimulus
  - Separate Start / Stop buttons
- Improvements to Virtual Signals, including:
  - 4- or 8-pole Bessel high- and low pass filter
  - Subtract reference sweep
  - Explicit source channel for trace equation
- Scope Window:
  - Now continuous autoscale using right-click on Autoscale All button. Left click for momentary autoscale.
  - Added PVCam support to Camera Module
  - Improved responsiveness of the scope when drawing traces, clicking and dragging
  - Improved 3D view
  - Measurement regions can now be hidden, locked or edited
  - Separate Start / Stop buttons
  - Countdown for ISI > 5 s.
- Improved Amplifier Control Panel:
  - 2D dragging to adjust two connected parameters
  - Triple-mode sliders for dPatch
- Paradigms and Paradigm Editor:
  - Separate Start / Stop buttons



- Step Set Paradigm Variable now supports "All Variables" option for both Paradigm and Routine variables
- Equations:
  - Implemented IF operator
  - New variable "Stimulant" returns the last applied stimulant concentration.
  - New special identifier to trace equations:  
"s[SeriesNo,SweepNo,SignalNo,RoutineName]"
- Improved data handling
- Improved Solution Editor
- Template editor:
  - Added function "Define Template Properties" to set X-start, X-increment, and Y-unit to values usable by SutterPatch.
- Stimulus waveform updated during Routine runtime
- Added more options to the icons display of Dashboard. Now Dashboard can be configured to have small size icons or large size icons, expand vertically or horizontally.
- Data Navigator:
  - Now allows exporting single signal to ATF file
  - Improved Metadata Review
- Preferences:
  - File to be automatically saved as Unpacked Experiment (\*.uxp file) for large experiments
  - Color coding of headstages in Amplifier Control Panel background
- Display
  - Added support for dual-monitor mode and high-resolution screens under Windows
- Shortcuts: All Shortcut actions are now listed as sub-menu items.
- Minor errors and warnings are now reported in the new FeedbackNotice alert

### **Bug Fix Highlights**

- Axis rescaling with a marquee now keeps the times axes for all signals in sync.
- Many minor bug fixes

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## **Version 1.1.4 (build 180); February 13, 2018**



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### **Bug Fix Highlights**

- Improved functionality of Continuous Sweeps mode.
  - Addressed freezes that could occur in combination with certain power save settings on Windows computers.
  - Fixed a bug where switching off Persistence Display in Continuous Sweeps mode could lead to data loss.
  - Fixed scaling issue of Scope Window time axis for long sweeps in time course mode.
  - Several minor bug fixes.
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### **Version 1.1.3 (build 165); October 21, 2017**

#### **Bug Fix Highlights**

- Fixed acquisition-timing issue when acquiring from multiple IPA amplifiers in Continuous Triggered mode.
  - Fixed “Null String error” when performing a reanalysis for the first time.
  - Multiple minor bug fixes.
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### **Version 1.1.2 (build 164); Aug. 3, 2017**

#### **New Feature Highlights**

- Support for multi-amplifier mode:
  - A combination of any two IPA® or Double IPA® Amplifiers can be connected.
  - Up to 16 input channels are supported.
- The full installers come with the latest Igor Pro version (7.0.5). If you updated Igor when you were prompted, you should now run the SutterPatch Updater.
- Preferences:
  - Added options for automatic window positioning in multi-monitor operation or on small displays.
  - Added graphic format options for copying Analysis Editor and Template Editor to the clipboard.
- Added shortcuts:
  - Start and Stop Acquisition.
  - Paradigm Pause and Resume.
- Copying to Layout now supported from:
  - Analysis Editor (graphs and tables)
  - Template Editor





- Measurement algorithms: The threshold values for "Time to threshold" and "Frequency" analyses can now be defined by equations.
- Data Navigator:
  - Added Series "Export as ATF File" function in Data Navigator.
  - Added preview to routines and paradigms.
- Improvements to Event Detection module, including a bug fix to the algorithm that calculates the amplitude when the event is riding on the decay phase of the previous event. Template values and detection settings are now remembered.
- Shorter inter-stimulus interval during membrane test.
- Right-click zero baseline option for displaying sweeps in reanalysis scope window.
- New virtual trace options include differentiation and integration of input sweeps.

### **Bug Fix Highlights**

- Driver installation now supports more Chinese language versions. This could cause an error with certain language settings (Windows only). Contact Sutter Tech Support if you encounter language compatibility issues.
- Metadata: Addressed several issues in incrementing behavior.
- Multiple minor bug fixes.

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## **Version 1.1.1 (build 160); Apr. 13, 2017**

### **New Feature Highlights**

- Added Solution Editor and Solution Pools:
  - Definition of solutions used during an experiment.
  - Assigning solutions to reservoirs in a solution switcher.
  - Direct control of a solution switcher through the Solution Editor with automated tagging in Metadata.
- Added Stimulant Concentration as a special identifier for equations.
- Improved IPA control panel functionality, including increased resolution for electrode compensation, and cleaner switching between current clamp and voltage clamp modes.
- Metadata: Added several new parameters based on user requests.
- Standard dialogs with "Ok" or "Yes/Cancel" buttons can now be dismissed using the "Return" key for "Ok" and "Yes", and the Esc key for "Cancel".
- Added the identifiers "gx[n]" and "gy[n]" to the equation parser. They return the analysis graph 'X' and 'Y' values of the specified equation "n".
- Routine Editor: Usability improvements in several areas



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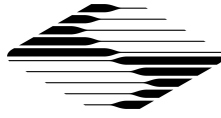
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- Streamlined scaling factor assignment for Auxiliary In- and Outputs, as well as Virtual Signals.
- Definition mode of Digital Outputs moved to Outputs section.
- Measurements and Graphs can now be disabled for the Routine.
- Easier use of sweep-based measurement regions.
- Automatically convert an entire routine pool to the active amplifier type.
- Paradigm Editor
  - Paradigm window can be kept in front while running Routines.
  - Paradigm step "Make Picture":
    - Renamed to "Camera".
    - Supports control of live viewing and taking snapshots.
  - Paradigm step Export to layout with enhanced functionality:
    - Create and append graphs from Scope and Analysis windows.
    - Define which graphs are to be placed into the layouts.
    - Control number of graphs per page.
  - Added option to mark a step to be skipped during Paradigm execution.
- Shortcuts and Shortcut Editor
  - Added "Stop Paradigm" as one of the choices for the "Paradigm" action.
  - Added "Stop Acquisition" as one of the choices for the "Routine" action.
  - Added "Save" button".
- Refinements to the demo data emulator.
- Dashboard
  - Removed Preferences button. Preferences are now accessible through the SutterPatch menu.
  - Moved Set Metadata button to upper level.
  - Added Control Panel button and Free Run button to Acquire Data section.
- Improved Camera module. Images captured by camera module are now linked with electrophysiology data.
- Data Navigator
  - Updated Info panel. Images captured by camera module are now listed.
  - Added Action Menu button as a visual analog to the right-click menu.
- Improved Window Handling
  - Automatic Window Repositioning as an option in Preferences.
  - Support for multi-screen setups in Mac OS. All windows are now entirely positioned in the visible region of their respective monitors.
- Moved Preferences Defaults button into General tab in Preferences setting.







### **Bug Fix Highlights**

- Improved functionality for initialization of Double IPA Amplifier.
- Certain amplifier parameters, such as the compensation settings, were not written to the metadata in v1.1.0. Fixed.
- Under certain conditions, Routine acquisition controlled by a Paradigm step did not execute. Fixed.
- With P/N enabled, the holding level during the "leak delay" period BEFORE the main pulse is now the holding level from the IPA Control Panel. Previously, the holding level was the Routine Editor 'Leak Hold' amplitude, which is still used for AFTER the main pulse.
- Streamlined opening of SutterPatch Experiments in native Igor Pro.
- Fixed building stimulus as input trace, when output and input sampling rates were different.
- The SutterPatch full installer for Windows now installs the IPA driver before Igor Pro 7. This allows launching Igor Pro 7 straight from the last screen of the installer.
- Multiple minor bug fixes.

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### **Version 1.1.0 (build 154); Feb 9, 2017**

#### **Notes and Warnings (Windows only)**

- The last screen of the Igor Installer has a checkbox to launch the applications. If you check it, Igor launches while the IPA driver is being installed. This may cause the driver installation to fail. Make sure this checkbox remains unchecked. We are working on a solution.

#### **New Feature Highlights**

- SutterPatch version 1.1.0 supports the newly released Double IPA<sup>®</sup> Dual-Channel Integrated Patch Amplifier.
- The full installers come with the latest Igor Pro version (7.02). If you updated Igor when you were prompted, you should now run the SutterPatch Updater.
- Shortcut Editor for assigning Keyboard shortcuts to quickly access windows or perform more involved tasks.
- Analysis Editor for reviewing and handling of analysis results, either as a graph or table.
- Add "Average Signal", "Show Data in Data Browser", "Event Detection" and "Action Potential Analysis" to right-click menu of Data Navigator.
- Enable access to analysis results through Data Navigator info panel.
- Added Routine conversion functions to easily migrate from a single to a double IPA



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amplifier, or vice-versa.

- Added Routine conversion options to Preferences.
- Routine copies now store real time measurements and graphs used when the Series was acquired and the last used during reanalysis.
- Paradigm Review scope window shows tags between Series.
- Autoscale on Y axis now autoscales to the subset of the data defined by the current X axis range.
- Added support for retrieving timer time during re-analysis
- Added measurement types SegmentDuration and SegmentAmplitude
- Template editor: Added "To Clipboard" function
- Routine
  - Added analysis-name, x- and y-labels to the measurements
  - Added virtual signal "stimulus"
- Paradigm Editor
  - Added the paradigm steps "View Last", "Analysis", "Front Window", and "Hide Window"
  - Added argument "format" to the write-to-log step, allowing to specify the format of the equation result written to the log

#### **Bug Fix Highlights**

- Performance issues in combination with high-resolution displays on Mac.
- Fixed bugs related to file auto naming.
- Killing the Layout Window no longer kills individual graphs.
- Fixed bugs related to Set Axis step in Paradigm Editor.
- The Scope Window no longer opens outside the Igor application frame on Windows.
- Many minor bug fixes.

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## **Version 1.0.9 (build 146); Nov 01, 2016**

### **Notes and Warnings**

- Igor 7.01
  - Cryptic characters may appear in certain text entry fields (Igor SetVar controls). If you observe this on a Windows machine (where it seems more frequent), download the latest nightly Igor build (Help > Igor Pro Nightly Builds). On a Mac, run the SutterPatch full installer, which will install an Igor build that has this bug fixed.
- Mac OS X



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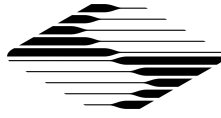


- Sierra compatibility (OS X 10.12)
  - Apple introduced a new safety feature in Sierra, which may cause issues with older SutterPatch installers. If you want to install an older SutterPatch version on Sierra, please contact Sutter Tech Support for a workaround. SutterPatch 1.0.9 is not affected.
  - Limited testing suggests that SutterPatch is fully compatible with OS X Sierra. An existing installation is not affected by the new safety feature when OS X is updated to Sierra.

### ***New Feature Highlights***

- The full installers come with the latest Igor Pro version (7.01). If you updated Igor when you were prompted, you should now run the SutterPatch Updater.
- Data Navigator:
  - Performance improvement with large data sets
  - Import allows combining multiple Experiments into one.
  - Data hierarchy tree now displays data down to sweep level. Extract / Average Sweeps are allowed.
  - Preview panel shows information about selected Paradigm or Routine.
- Scope Window
  - Measurement cursor dragging has been improved, and resizing by dragging the edges is now supported.
  - Added Y axis center button brings the signal into the axis range without changing the scale.
- Virtual signals:
  - Apply a transformation i.e. Leak Subtraction, Digital Filter (Gaussian or Boxcar), Line Frequency Reduction or custom equation to an acquired or Virtual Signal.
  - Can be created in a Routine, for execution during data acquisition or as part of an analysis.
- Routines:
  - Template wave(s) used in a routine are now compressed and embedded in the routine structure.
  - Each output channel can have up to 16 different template waves.
  - Different or similar Template waves can be assigned to individual segments.
  - Measurement cursor dragging and resizing is now supported in the Routine preview cartoon.
  - Virtual signals can now be defined as input channels.
- Templates:





- New Template Editor for creating / managing pools of multi-use waves.
- Import Igor Binary files or use the marquee tool to grab data from a graph on the Scope, Data Navigator, Routine Editor or Template Editor.
- Transform waves by applying a Digital Filter or a linear interpolation
- Metadata:
  - New Summary panel to review all user-defined Metadata parameters and manage prompts.
  - Improved Metadata display during analysis
  - Added default values where applicable
- Preferences Settings:
  - Automatic naming for Experiment has been added to preferences
  - Added separate Scope Window preferences for Acquisition/ Reanalysis/Membrane Test Scope Window
  - Hardware calibration added
- Additional sample Paradigms and Routines

### **Bug Fix Highlights**

- Window positions and certain other preferences are now preserved, even if an Experiment is not saved when starting a new experiment.
- The Waveform Editor no longer hides behind other windows.
- Opening existing experiments could cause undesired behavior under certain conditions. Several issues have been addressed in this area.
- Waveform Preview Y axis unit display has been made more intuitive.
- Debug Mode was left enabled in Version 1.0.8, which could cause excessive logging.
- IPA offset correction algorithm improved for large offsets.
- Stopping data acquisition could be unreliable on Mac computers, particularly in demo mode. Improved dramatically, and we hope it is fixed.
- Many minor bugs addressed

### **Known Bugs and Limitations**

- On some Windows systems, 3D Display can cause Igor to crash. This will be addressed in the next Igor Pro 7 release. Contact Sutter Tech Support for a workaround if you do not want to wait.



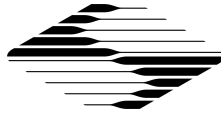
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## Version 1.0.8 (build 135); Aug 18, 2016

### *New Features*

- The SutterPatch Welcome Panel now has a progress bar. Previously the panel was hidden after clicking Start, which could give the false impression of a freeze or crash on slow computers.
- Data Navigator > Right-click > Show Metadata
  - Timestamps and several other parameters are now formatted to be more easily readable by humans.
  - Routine Start and End now indicated in By Parameter view.
- Right-click menu for multiple selections is enabled in Data Navigator.
- Improved the concatenated view of the Paradigm Scope Window.
- Membrane Test pulse amplitude now supports both positive and negative polarity.
- Several improvements to make behavior in Demo Mode more similar to real acquisition.

### *Bug Fixes*

- The installer and updater now reliably update SutterDAQ-64.xop.
- Waveform Editor: Amplitude > Value settings were not saved. Fixed
- Acquire > Set Metadata: Increment now behaves correctly. This could cause unexpected results in certain conditions.
- Log Window now resizes correctly.
- Corrected display of Stimulus Preview Cartoon. Display of the holding value could be misleading.
- Transferring an experiment to a different computer could cause confusing error messages. Fixed.
- Opening the Log Window from the SutterPatch menu caused an error. Fixed.
- Several minor bugs addressed

### *Known Bugs and Limitations*

- Metadata display: Readability improvements still in progress

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## Version 1.0.7 (build 134); Aug 1, 2016

### *Notes and Warnings*

- Windows only: On some computers, the file {ProgramFiles}\SutterPatch\SP\_Code\SP\_Extensions\SutterDAQ-64.xop is not





updated. Please rename or delete this file before running the SutterPatch Installer or Updater

- Existing Routines that cause errors related to redimensioning a wave need to be re-created.
  - You can create a new Routine within the existing Routine Pool.
  - Do not use the Duplicate feature on a Routine that causes errors, but re-create the Routine from scratch

### ***New Features***

- Data Navigator > Right-click > Show Metadata: Timestamps and several other parameters are now formatted to be more easily readable by humans.

### ***Bug Fixes***

- When creating a new Routine or enabling signals in an existing one, errors redimensioning a wave that underlies the Waveform Preview could occur. Fixed.
- Fixed polarity error in the command Waveform if Relative to Holding was used in an Equation.
- Prompt for MetaData now correctly executes before an Auto-triggered Paradigm.
- Several minor bugs addressed

### ***Known Bugs and Limitations***

- Metadata display: Readability improvements still in progress

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## **Version 1.0.6 (build 133); Jul 27, 2016**

### ***Notes and Warnings***

- Existing Routines are not compatible and have to be re-created.
  - Take note of your settings before installing the update.
  - Make a copy of the folder SutterPatch in your Documents folder.
- Requires Igor Pro 7.00 (the initial public release version)
  - Use the SutterPatch Full Installer if possible. Do not use the SutterPatch Updater, unless you have already installed Igor 7.00.
  - Avoid using Igor's native Update feature.
- You may see warnings in the History Window during the first launch after the update. Unless the warnings persist, there is no need to contact Sutter Instrument Tech Support.



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## New Features

- The Full Installer includes Igor Pro 7.00
- The Full Installer installs Windows driver support files in {ProgramFiles}\SutterPatch. These should only be needed for Windows 7.
- Paradigm Data and Series (=Routine Data) can now be discarded from an Experiment.
- Added 'Zap' button to Membrane Test window.
- Membrane Test window size and position are now independent of Acquisition and Analysis Scope windows.
- Line Frequency Reduction option available for Membrane Test
- Added special identifier 'lastsweep' to Equations and Paradigms
- Added 'Input' function to Paradigm Editor
- Added new Routine 'Amplitude Equations' to sample Routine Pool
- Demo mode now simulates clipping when the amplifier range is exceeded.
- Demo mode Acquisition Scope window now has "DEMO" watermark.
- Analysis Scope Window title includes the name of the Series (=Routine Data) currently displayed.
- Routine special waves (Sine, Squarewave, Chirp and Template) no longer share one set of parameters for the entire routine. They are now defined on a segment basis to match Step and Ramp.
- Added Real Time preview when entering special wave parameters.

## Bug Fixes

- Rewrite of Paradigm and Routine structure addresses multiple bugs and shortcomings
- Continuous Sweeps acquisition mode could cause issues. Fixed.
- Waveform segment durations of '0' are now allowed.
- Fixed the issue with measurement cursors caused by changing x axes scaling.
- Added a separator in bottom signal panel x-axis. A click on the x-axis no longer activates the signal.
- More consistent behavior of X axis scaling by click-and-drag
- Metadata Review now only displays metadata for the selected Routine
- Prompt for User Metadata
  - Could skip lines if changes in multiple parameters were made. Fixed.
  - Values could inadvertently be dragged between lines. Fixed.
- The Log Window now remembers whether it is visible between sessions.
- Multiple minor bugs addressed





### ***Known Bugs and Limitations***

- Prompt for User Metadata is not shown before Auto-triggered Paradigms.
- Resizing of the Log Window can create blank space in the window and other unexpected effects.
- Metadata are displayed in raw, sometimes cryptic form. Formatting and grouping is needed to make Metadata Review more readable and useful.



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