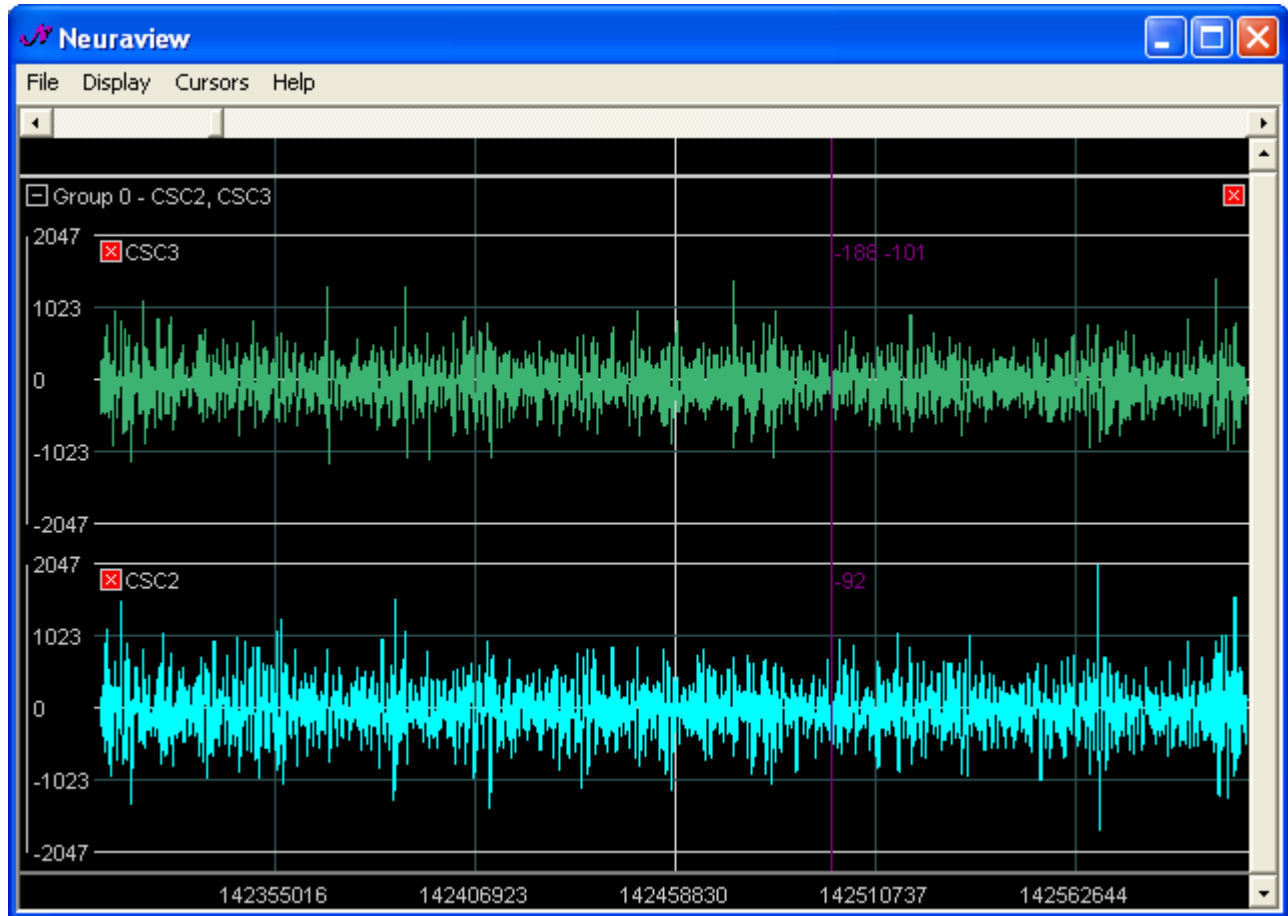




Neuralynx
High Density Electrophysiology Recording Systems



Neuraview Users Manual

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INTRODUCTION

Neuraview Description

Neuraview is a complete viewing environment for all previously recorded data within a Neuralynx or MClust file. The scope of this application solely covers the display of synchronous time series data. Neuraview is intended to provide an easy interface for evaluation of an already completed experiment. Neuraview also provides an interface for working with time markers (Cursors).

Software Application Features

- Viewing of all Neuralynx and MClust file formats which include spike files, timestamp files, EEG or CSC files, video tracker files and event files.
- Creation and exportation of cursor data in event file format.
- Grouping of data plots into an organizational display.
- Time synchronous alignment for all data plots.
- Adjustment of time period display (zooming).
- Color event filtering for any combination of event fields.
- Color spike filtering through channel or cell numbers.
- Adjustment of time units display (microseconds, milliseconds, seconds, or minutes).
- Display view bitmap saving for main window.

Chapter 2 - File Opening

The first and most important part of Neuraview is to open a data file and view its contents. There are several ways to achieve this.

- From the *File* menu, select *Open Files*. This will bring up a standard open file dialog box in which multiple files may be selected.
- Select and drag file(s) from a windows explorer window or the desktop and drop them on the Neuraview program window.
- Use the hot key combination of *Ctrl-O*.

As long as the data file is a valid Neuralynx or MClust data file and contains at least 1 record, the file will be opened in Neuraview.

Chapter 3 - Viewing Data

As you may have noticed, the display window is the majority of the main program window. This was designed to give the user the maximum amount of space for viewing their data. As we now know, Neuraview is a time based viewing application. Thus there are not any bounds as far as the length of a plot is concerned. Neuraview will also open as many files as memory will allow for (currently set to 1 Gigabyte). There is not a limit to the maximum number of data plots that can be opened. These two features allow our view to grow infinitely to the right as well as up (new plots are added to the top of our plot display). Therefore, we must be able to move left and right as well as up and down in order to view large amounts of data and several different data plots. The following describes several ways for navigating your data.

- **Scroll Bars** – There are two standard scroll bars that can be used for moving through the data plots. The vertical scroll bar is a representation of the total height of all plots in pixels. Plots and groups can have various sizes and the vertical scroll bar is a representation of the sum of all plot and group heights. More on plots and groups properties later. The horizontal scroll bar is a representation of the total time for all plots being display. Not all plots may have the same time period and thus it will be possible not to see data for all plots in a current view. The two scroll bars contain the standard functionality that is common with scroll bars which includes dragging, paging and stepping. The two scroll bars will both step one pixel in the specified when selected. Each scroll bar will also page in the specified direction. The paging size may be set in the *Display Properties* (see below).
- **Hot Keys** – For perhaps somewhat quicker navigation through the data plots, there is a hot key for each direction one may move. The arrow keys are associated with the appropriate direction that the user may move. Each arrow key will page in the appropriate direction.

The page size for moving in any direction is adjustable on the *Display Properties Dialog Box*. From the *Display* menu select *Display Properties* or hit *Ctrl-P*. This will bring up the *Display Properties Dialog Box*. On the bottom of the dialog box, there are two fields labeled *Horizontal/Vertical Paging Percentage*. The value for these two fields is a percentage of a complete page. Therefore if one of the fields is set to 100%, a full page will be scrolled every time a page is selected.

Chapter 4 - Zooming

The user has the ability to control how much time will be displayed in the program window as well as zoom in vertically on anything that is not represented as a vertical line such as events or timestamp markers. There are several ways to incorporate this and they are as follows:

- **Box Zoom In** – Holding and releasing the left mouse button will allow the user to draw a box on the screen. The view will then update to show the amount of time that was enclosed in the box drawn. It will also zoom in on the Y axis as long as the box was contained inside a single plot window.
- **Point Zoom In** – Press the left mouse button while holding down the control key and the view will update itself to a new timescale as well as update the Y axis for the plot in which the point was located. The new timescale is calculated by dividing the old timescale by the timescale factor. The view will be centered at the point at which the mouse cursor was located at the time the button was clicked.
- **Resetting the Y Axis Zoom** – Press the right mouse button while holding down the control key and the Y axis zoom will reset to its default view for the appropriate plot.
- **Y Axis Zoom Only** – Press the up or down arrows while holding the control key and all plots will zoom in or out on the Y axis.
- **General Zoom In** – From the *Display* menu, select *Decrease Timescale* or press *Ctrl-Left Arrow* and the view will update itself to a new timescale.
- **General Zoom Out** – From the *Display* menu, select *Increase Timescale* or press *Ctrl-Right Arrow* and the view will update itself to a new timescale.
- **Setting The Time Scale Manually** – The timescale may be set manually on the Display Properties dialog box. From the *Display* menu, select *Properties* or press *Ctrl-P* and the Display Properties dialog box will appear. At the top of the *Properties* section, there is a field labeled *Timestamp Scale*. This is the current timescale for the display. Enter a new timescale and click the *OK* button and view will be updated in the display window.

NOTE: Also located on the *Display Properties* dialog box is a field labeled *Increment/Decrement Factor (Zoom)*. This field is the timescale factor and may be adjusted at the users' discretion.

Chapter 5 - Data Plots

Definition: A data plot is a visual representation of a Neuralynx or MClust data file.

Note: The user may not directly change the size of a data plot. The user may only change the size of the group that the plot resides in.

A data plot has the following properties:

- Data Axis (if applicable) – The data axis can be turned on or off by selecting *Show Data Axis* from the *Display Properties* dialog. The axis is in AD counts unless otherwise selected in each plots specific plot properties dialog.
- Data Plot Name – This is a name given to the plot. The plot name is displayed in the upper left corner of the plot window.
- Data Source Name – This is the name of the file that the plot is associated with.

Data Plot Icons

There is one data plot icons located in the upper left hand corner of the data plot display.

- Close Plot Icon – This icon will close the data plot and remove it from the groups list of plots.

Plot Properties Dialog

The *Plot Properties* dialogs' main functionality includes adding, copying, deleting and moving plots. The *Plot Properties* dialog can be accessed by selecting *Plot Properties* from the *File* menu or by using the *Control-P* keyboard combination. There are three sections of the dialog that are of concern. They are as follows:

- Plot List – On the left side of the dialog box there is a list box labeled *Group Plot List*. This is a list of all our data plots organized by group. By clicking the plus or minus next to the group name, the list of plots for that group will either expand or be hidden. Other than viewing the only functionality that can be done through the list is the ability to drag and drop plots from one group to another. To perform this action, click on a data plot and drag it to another group. The data plot must be released over the group name in order for it to be moved to the new group.
- Plot Buttons – There are six buttons located under the *Group Plot List* that deal with data plots. Those buttons are *Add Plot*, *Copy Plot*, *Delete Plot*, *Properties*, *Add Group* and *Delete Group*. All buttons except the *Add Plot* and *Add Group* button require the user to have selected a plot from the list.
- Plot Properties – On the bottom right side of the dialog, there is a section of grayed out edit boxes labeled *Plot Properties*. These are the main properties of a plot as described above. These are updated anytime a plot is selected from the plot list.

Data Plot Sub Menu

A right mouse click over any data plot will bring up a sub menu with the following options:

- Create New Cursor Here – Create a new cursor at the location where the right click was initiated.

- Add New Plots Group – Open up a dialog box allowing the user to add more plots to the current group.
- Delete Group – Delete the current group.
- Move Group Up – Move the current group up.
- Move Group Down – Move the current group down.
- Delete Plot – Delete the current plot.
- Move Plot Up – Move the current plot up within the current group
- Move Plot Down – Move the current plot down within the current group.
- Show Plot Properties – Bring up an individual plots properties dialog.

Chapter 6 - Plot Groups

Definition: A plot group is a container for any number of data plots. A plot group may be empty. A plot groups' purpose is simply to help organize a users data plots.

A Plot Group has the following properties:

- **Group Name** – This is a unique identifier for the plot group. The name contains the number in which the group was created to help with organization. The group name is displayed in the upper left corner of the display window.
- **Group Height** – This is the height of the group in pixels. The height of a group may be changed in two ways. First at the top of each group there is a white separator bar used to distinguish one group from another. This separator bar may be dragged via the mouse up or down until the group height becomes favorable. All data plots within the plot group have the same height which is determined by the group height.
- **Group Overlay** – This option may be turned on or off within the *Plot Properties* dialog (See above). When this option is turned off, the amount of space within the group is divided evenly amongst the number of plots within the group. When this option is turned on, all plots are overlaid such that each plot uses the maximum amount of space within the group.

Plot Group Icons

There are two plot group icons. One is located in the upper right hand corner of the plot group display, the other in the upper left hand corner.

- **Close Group Icon** – This icon is located in the upper right hand corner of the plot group display and will close the plot group as well as all the data plots within the group and remove it from the groups list.
- **Collapse Group Icon** – This icon is located in the upper left hand corner of the plot group display and will collapse the group down to where only the group name can be shown. The icon is a standard plus/minus icon used to denote if the group is collapsed or not.

Plot Properties Dialog

The Plot Properties Dialogs' main functionality includes adding, deleting and adjusting properties values. The Plot Properties dialog can be accessed by selecting *Plot Properties* from the *File* menu or by using the *Control-P* keyboard combination. There are three sections of the dialog that are of concern. They are as follows:

- **Group List** – On the left side of the dialog box there is a list box labeled *Group Plot List*. This is a list of all our data plots organized by group. By clicking the plus or minus next to the group name, the list of plots for that group will either expand or be hidden.
- **Group Buttons** – There are two buttons located under the *Group Plot List* that deal with plot groups. Those buttons are *Add Group* and *Delete Group*.
- **Group Properties** – On the upper right side of the dialog, there is a section labeled *Group Properties*. These are the main properties of a group as described above. To modify the group height, simply enter a value

into the edit box and click the *Save* button. In order to overlay all plots within a group, click the checkbox labeled *Overlay All Plots*.

Chapter 7 - Cursors

Definition: A cursor is a time event marker used for book marking and viewing data values at a specific time.

A Cursor has the following properties:

- Timestamp – the current time at which our cursor resides.
- Description – a description or name for the cursor.
- Value – integer value with no stated purpose.
- Type – integer value with no stated purpose.

Cursor properties may be modified on the *Cursor Properties* dialog box. The dialog box may be accessed by selecting *Properties* from the *Cursors* menu or by pressing *Ctrl-Shift-P* on the keyboard. Once the dialog box has been accessed, select the cursor from the cursor list on the left side of the dialog box. This will populate the cursor field edit boxes on the right. After a field has been modified the *Save Changes* button must be pressed in order for those changes to be set.

Cursor Manipulation

Cursors have standard operations that may be preformed on them, they are as follows:

- Add or New Cursor – Adding a cursor may be done from the *Cursors* menu, the *Cursor Properties* dialog box or by pressing *Ctrl-Shift-N* on the keyboard. This will add a new cursor to the cursor list with an initial starting timestamp equal to the current center timestamp in view. A cursor may also be added to a specific location by right clicking with the mouse on the intended location and selecting *Create New Cursor Here* from the popup menu.
- Copy Cursor – Copying a Cursor may be done from the *Cursor Properties* dialog box or by right clicking on a cursor and selecting *Copy Cursor*.
- Delete Cursor – Deleting a cursor may be done from the *Cursor Properties* dialog box or by right clicking on a cursor and selecting *Delete Cursor*.
- Moving a Cursor – A cursors position may be adjusted by dragging the cursor. Place the mouse pointer over a cursor until a new icon appears that has two opposite facing arrows on it, depress the left mouse button and drag to the desired location.

Active Cursor Manipulation

An active Cursor is the last Cursor that was accessed in any way. Therefore, if a new cursor is created, it automatically becomes the active cursor until another cursor is selected or created. The active cursor has all the same manipulation as described above with the addition of a few more menu and hot key operations. One extra piece of functionality that the active cursor has is the ability to move the cursor from then menu or through the use of hot keys. Under the *Cursors* menu select either *Move Active Cursor Right/Left*, this will move the active cursor one pixel to the right or left as a means to fine tune cursor location.

Opening and Saving Cursor Files

Cursor files may be saved or opened by selecting the appropriate item from the *Cursor* menu. An important idea to recognize is that a cursor is stored in the same format as an event in an event file. Therefore, cursor files and event files are interchangeable. The user may open or save either file type.

Chapter 8 – Other Features

Saving a Display Snapshot

The user may save a snapshot of the main program window to a bitmap file by selecting the *Save Current Display as Bitmap* item under the *File* menu.

Viewing Raw File Data and Headers

The user may look at the raw file data and the file header by selecting the *Data Properties* item under the *Data* menu or by pressing *Ctrl-Alt-P* on the keyboard. This will display a dialog box that will allow the user to view the majority of fields within all Neuralynx and MClust files.

Color Coding Spike Waveforms

There are two ways to color code spike waveforms. The user may color code by channel number or by cell number. This can be done in the *Spike Properties* dialog box. The user also has the option to auto color waveforms for either cell or channel number coloring.

Event Filtering

The user may use colors to filter event based on any combination of event fields. First the user must create a filter. This can be done from the Event Properties dialog box. A filter may be modified or deleted at any time. A filter is pretty straightforward. There is a listing of the event fields in the Filter dialog box. Select the field you wish to filter. Then click the *Use for Filtering* check box and type in a value. The user must hit the *Apply* button in order for that value to be saved. Once that is complete, click the *OK* button and you will be back to the *Event Properties* dialog box. Select the filter from the list and select a color to be associated with that filter. Now any event that matches that filter will contain the new color.

Changing the Time Axis Units

The user may change the time axis units by accessing the *Display Properties* dialog box. On the dialog box there is a combo box labeled *Time Units*. The user may choose from four different units for what fits best with the users experiment.