Nicolet EEG

Pocket Guide

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natus neurology

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Prepare the Nicolet EEG system

Turn the system on

NOTE: Please review all Safety Information in the *Nicolet Information For Use Guide* 269-604503 and *Additional Information and Safety Reference Guide* 269-594705 before applying power to the system.

1. **Desktop** system - press the green power switch recessed on the right side of the cart to the **On** (|) position.

   - or -

   Portable system - press the laptop power switch to the **On** position.

Switching off the system

To close down the system, click on **File > Exit**.

Log on

2. If a password is required, type in your **password**. If no password is required, press the system's keyboard **Enter** button.
3. Click **OK**.

NicVue

*From the NicVue window, click on **Help > Help Topics** for additional information concerning NicVue.*

For Study Room users, please see the next page.

1. Double-click **NicVue** icon 

.

Create the patient file

1. From the NicVue window, click **New**  .
2. On the Patient Information window, highlight the Examiner's folder, then enter the **patient information**.

Schedule the patient

1. Click **New Appointment**.
2. From the Schedule a Patient panel, select the **Examiner** and the reading **Physician**.
3. Enter the **Schedule Date** and **Time**.
4. Enter the exam **Location**.
5. If your system is multi-modality, click on 

.
6. Click **OK** to close the Schedule a Patient panel.
7. Click **OK** to close the Patient Information panel.

Study Room

1. Choose **New Patient**.
2. Click on the **Next** button. The wizard displays the **Enter New Patient** dialog.
3. Fill in patient information as appropriate.
4. Click **Next** to open the Test Info dialog.
5. Fill in the test information.
6. After you have completed the New Test Wizard, click **Finish**. The test is added to the list on the Record List tab.

EEG recording

Prepare the patient

1. Abrade and apply the electrodes to the patient.

NOTE: Make sure you include the reference (common reference) and neutral (ground) electrodes; they are mandatory!

2. From the Examiner (technician's) folder, click on the patient's **name**.

Open the Nicolet EEG Recorder software

3. Click on 

.

4. Click **Acquire**  .

Either the Recorder window appears with a 'Not Recording' watermark displayed or the Impedance Test panel appears. See the Note on the next page.

Select a Protocol

5. Click on **Protocol** on the menu bar, then click on the desired **Protocol** at the bottom of the menu.

Check the Impedance

NOTE: Skip step 6 if the **Startup in Impedance mode** checkbox was checked (**Tools > Options > Acquisition tab**), which causes the Impedance window to appear automatically when you open the **Recorder software**.

6. Click on **Impedance**  .

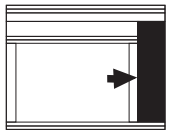
7. The acceptable impedance range is selected by clicking on the **Threshold** show menu button and then clicking on the desired **threshold value**. The acceptable range should be **5K ohms or less**.

   Electrodes with acceptable impedances are displayed in green. Those that are not acceptable are displayed in red.

8. When the impedances are acceptable, click **Start**.

9. Click **Record** to start the recording unless the EEG was initiated using "Quick Start."

Display the Control Panel



10. Click **Panel**.
11. Click **View > Panel > Format** to display the Format palette.

Select the Montage

12. Click on the **Montage** button and then click on the desired **montage**.

Select the Sensitivity

13. Click on the **Sensitivity** button and then click on desired **sensitivity**.

Select the Timebase

14. Click on the **Timebase** button and then click on the desired **timebase**.

Select the High Cut/Low Cut filters (*optional*)

15. Click on the **High Cut** or **Low Cut** button and then click on the desired **filter settings**.

Turn the Notch filter on (*optional*)

16. Click on **Notch**.

Display the Reader window (*optional*)

17. Click **Review**  to display the Reader window to the left of the Record window if you want to review the EEG (or look back in the EEG) while it is being recorded.

NOTE: The Reader window does not update automatically. To view the latest EEG, click the **End**  button.

Start recording EEG

18. If the Impedance Check panel was enabled to appear automatically when the Recorder application was started, the system begins recording as soon as you close the Impedance Check panel.

    If the feature was not enabled, click on **Record**  .

NOTE: Click on **Record** button again to stop recording.

Start recording video (*optional*)

NOTE: The system must be recording data to start recording video.

19. Click **View > Control Panel > Video** to display the Video palette.

20. Click **Video**  to start recording video.

NOTE: Click the **Video** button again to stop recording video.

Controlling the Video camera

21. Click **View > Panel > Camera Control** to display the Camera Control palette.

22. Click on a **Camera Direction** button and hold down the mouse button until the desired effect is reached and then release the mouse button.

23. Repeat step 22 as necessary until the camera is pointing in the desired direction.

Steps 24 through 29 are for the Sony camera only!

24. Click on the **Zoom**  buttons until the desired zoom level is reached.
25. To move the video camera in small steps by clicking on the Camera Direction buttons, check the **Step Video** checkbox.
26. To preset the position of the video camera, click on the **Set Presets** button.
27. There are three presets you can choose to use. Type in a **label** for the preset you want to use (or accept the 'Not Assigned' default).
28. Click on the corresponding **Set** button.
29. Click **OK**.

NOTE: On the Video Control palette, click on the **Go** button at any time to position the video camera automatically.

Calibrate the inputs (*optional*)

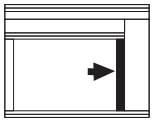
NOTE: It is NOT recommended to use the Calibration mode for validation of Brain Symmetry Trend calculations.

30. Click **Acquisition > Calibration** to calibrate the system.
31. Record about one full screen of calibration.
32. When satisfied with the trace display, click **Acquisition > Calibration** to stop calibrating.

The starting montage returns on the Recorder window and the system continues recording EEG.

If the calibration signal is not the size or duration that is expected, it can be changed by clicking on  and then on **Amplifier** at the bottom of the Montage Editor panel.

Mark the events



33. If the Event palette is not displayed to the right of the trace display, click on **View > Event Palette**.

Transient events

Transient Event buttons have a single point  . They are used for events that have no particular duration, such as a cough.

a. When a Transient event appears, click and drag the corresponding **event** from the Event List into the EEG.

b. To annotate an event that is not present in the Event List, just left click in the EEG recording area and a text box will appear. Type in your comment. The annotation will appear above the Event Marker when reviewing EEG.

Duration events

Duration Event buttons have two points  . They are used for events that last over a period of time, such as a seizure.

a. When the start of a Duration event appears, click on **Duration Event**. The start of the Duration event is marked on the EEG.

b. When the Duration Event ends, click on **Duration Event** again. The end of the Duration Event is marked on the EEG.

c. To enter free text about an event that occurs over time, click and drag the duration annotation to the beginning of the event. When the event ends, click that duration annotation again. A text box will appear allowing you to type in a description of the duration event.

Annotation events

You can choose to

a. Display the Event Annotation dialog automatically when you place selected Event Markers (click on **Edit Settings**  , click on **Events** at the bottom of the Montage Editor panel, checkmark **Annotation Event**, click **Save**).

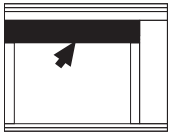
- or -

b. Leave **Annotation Event** unchecked to display the dialog only when you click on the Event marker.

Adding a missed Annotation while recording

34. Click **Review**  . The EEG trace display divides in half, with the Reader window on the left and the Recorder window on the right.
35. Scroll to the **event** you want to annotate.
36. Click **Annotation** in the Event List panel to the right of the EEG display area.
37. Click on the **event** and type in the **annotation**.
38. Click **OK**.

Display the Overview (optional)



39. Click **Overview**  .
40. Click **View > Overview** and then click on the desired **Overview pane**.
41. Repeat step 40 for each additional **Overview pane** you want to use.

Performing Photic sequences

42. Click **View > Panel > Photic**.

▶	Starts Photic timing.
↺	Resets the Photic sequence.
▶‖	Stops/Starts the Photic session.
✹	Sends a single flash.

Performing Hyper-ventilation

43. Click **View > Panel > Hyperventilation** to display that palette.

▶	Starts Hyperventilation (HV) timing.
■	Starts Post Hyperventilation (HV) timing.
↺	Resets the timers.

End the EEG recording

44. Click **Record**  from the toolbar.

Close the Recorder window

45. Click **Close**  in the upper right corner of the Recorder window.

46. Click **OK** to close the window.

The Nicolet EEG Recorder window closes and the NicVue window appears if the Nicolet EEG application was launched from NicVue.

Move the session to the Physician folder for review

47. Display the NicVue window.

48. Click on (highlight) the patient's **file**.

49. Click on the **Acquisition Done** button

.

50. On the *Move session for review* dialog, click on the **Physician**  button.
51. Click on the **Physician's folder name** in which you want to move the session.
52. Type in any comments you want included.
53. Click **OK** to close the dialog. The session is now located in the selected Physician's folder in NicVue awaiting review.

Archiving to DVD

For NicVue users

See the online NicVue manual for archiving instructions.

For Study Room users

See the following instructions on this page.

1. Each time you archive to DVDRAM or DVD+RW, start by formatting the DVD media.
2. Move the EEG record to the **Archive List** tab in Study Room.
3. Archive your **EEG files** directly onto the DVD media.

Formatting DVDRAM and DVD+RW Media

You need to do this each time you start using a new DVD disk.

1. Insert a blank DVD+RW into the drive to start the Roxio software, or start the software from the **Start** menu on the task bar.
2. Click **Format**.
3. Click **Next**.
4. Type a **name** for the disk.
5. Click **Next**.

   The disk will format in 2 to 3 minutes.

NOTE: Please note the handling and usage instructions printed on the insert accompanying the HP DVD-RW media.

Archiving EEG Files to DVD with Study Room

1. Move the **EEG files** to the Archive List tab in the Study Room.
2. Select a **file** and click **Archive**.
3. Check **Remove Local Copies** if you do not want to keep a local copy of the file.
4. Click **OK**.
5. Select the **Device** from the list.
6. Click **OK**.
7. Type in the **name** that will be used to label the disk, e.g., Disk 001 or November EEGs, and click **OK**.

Subsequent EEGs

When subsequent EEGs are selected for archiving, follow the same steps as above. Instead of the Enter Media Name dialog box being shown, a message will be displayed asking whether you want to use the inserted medium or not.

When the disk is full or there is not sufficient space to store the next EEG file to be archived, a warning message is displayed. Insert a new disk in order to continue archiving.

The first time a disk is used, you are prompted for a new media name.

Archiving EEG Files to CD R/W with Study Room

Summary

1. Move the EEG files to the **Archive** tab.
2. Click **Archive**.
3. Write the EEG files to a CD using third-party software.
4. Verify that the EEG files are accessible from the CD.
5. Delete the contents of the **Archive** folder.

Archiving EEG files to CD

1. Move the EEG files to the Archive List tab in the Study Room.
2. Select a **file** and click **Archive**.
3. Check **Remove Local Copies**, if you do not want to keep a local copy of the file.
4. Check **Archive Video** if you want the video archived (only seen if video has been recorded).
5. Click **OK**.
6. Select the **CD R/W Device** from the list.
7. Click **OK**.
8. In the Enter Media Name, type in the **name** that will be used to label the media, e.g. Disk 001 or November EEGs, and click **OK**. This is the name that the Study Room will use to track where the EEG files are stored. A message will be shown reminding you to label the disk itself with this name.

   The EEG file has now been moved to a temporary file called Archive.

Subsequent EEGs

When subsequent EEGs are selected for archiving, follow the same steps as above. Instead of the Enter Media Name dialog box being shown, a message will be displayed asking whether you want to use the inserted medium or not.

When the disk is full or there is not sufficient space to store the next EEG file to be archived, a warning message is displayed. Insert a new disk in order to continue archiving.

Writing EEG Files from the Archive Folder to CD with Study Room

1. Run the third-party software provided with the system.
2. Follow the instructions provided with the software.
3. When the EEG files have finished writing to the CD, check that the EEG files can be opened from the CD.
4. Empty the Archive folder in preparation for the next set of files to be archived. To do this,
    a. Click **Start > Programs > Accessories >Windows Explorer**.
5. Click the **Archive folder** on the C drive, and delete the **contents** but NOT the Archive folder itself.

Creating reports

NicVue users

1. For **NicVue** users, click on the desired **Exam** and then click on the **Review** button.
2. Click **Tools > Create Report**.
3. Click on the desired **type of report**.

Study Room users

1. Select a **test** and click **View Report**.

   Patient and Test information will be entered into the report automatically, which uses either an HTML template or a Word template. This is selectable in the Administrator Center.
2. Click the **Environment Variables** tab.
3. Click the **HTML Report**.
4. Click the **Modify** button to change the status. These templates can be edited if necessary.

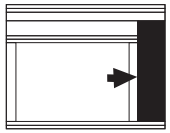
You can also choose to include any patient information stored via NicVue and/or exam specific information stored in the exam as well as the date and time when the report was generated.

1. Click **Edit > Copy EEG** in Reader.
2. Move to the report and click on **Edit > Paste** in Word.

Setup the EEG screen view

The Panel and Overview settings described below can be set independently per protocol for both acquisition and review.

The Panel



The Panel can display some EEG settings, controls for photic and hyperventilation, the video window (if a video system), and the event list. The various options in the Panel can be expanded or collapsed by clicking the **blue name**. If you click the **blue <**, the portion of the Panel will float out as a separate minature window. Default Panel settings can include:

- Timebase
- Sensitivity
- High Filter
- Low Filter

Displaying the Panel

Typically, the Panel is displayed on the right side of the EEG screen.

If you do not see it,

1. Click the **Panel** icon in the toolbar across the top.

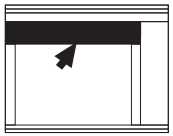
Customizing the Panel layout

Each new option you add to the Panel will be displayed at the top of the Panel. If you want to completely reconfigure the order of the options in the Panel, first deselect all the options, then add them back in, one by one, starting with the option you want displayed at the bottom of the Panel.

To customize the Panel,

1. Click **View > Panel**.
2. Click on the option you want displayed in the Panel.
3. Repeat as necessary.

The Overview Area



The Overview area spans the top of the EEG. It commonly displays events (comments, montage and settings changes, activations, etc.). It can represent the entire recording or a segment of it which is another Overview setting. The time can be displayed as time-of-day or elapsed time. In Review, the Overview area also has a review progress bar that allows you to quickly move from one area of the EEG recording to another. If you hover over an event, the event name will appear.

To access the various options for the Overview Area,

1. Right-click the **Overview bar**

   - or -

2. Click **View > Overview**.

3. If the Overview bar is not displayed, just click the **Overview**  icon in the toolbar at the top of the screen.

The Overview area can also be display at the bottom of the EEG area.

1. Right-click the **Overview bar**

2. Click **Position > Bottom**.

3. To save this change, click **Protocol > Save**.

In Reader, Review Progress now has progress bars for both EEG and video. To enable this feature,

1. Right-click on the **Overview bar**.

2. Click **Review Progress > Show**. They cannot be defined independently. T

3. To always display the Review Progress bar, once it is displayed, click **Protocol > Save**.

Options

1. Click **Tools > Options**.

Options encompass a number of other settings for the EEG software. They are found under the tabs displayed across the top of the Options window and can include:

- Regional settings
- EEG screen calibration
- Paths for data
- Acquisition settings
- Miscellaneous settings, and…
- Display settings

These setting partly control how your EEG screen looks.

Event Marker Height changes the size of you annotations. 6-7mm is easy to read.

Event Draw Mode allows you select **Fill**, **Border**, **Mixed**, **Text only**, or **Hide**. This affects how annotations are displayed.

- **Fill** places the annotation into a colored box (based on event color).
- **Border** puts a colored border around the annotation,
- **Mixed** is a combination,
- **Text only** has no box around the annotation, and then Hide.

Print Line Weight controls the thickness of the EEG waveforms.

High Resolution Trace Display provides the ability to display the EEG in a high resolution mode or (when deselected) a smoother, cleaner display.

Show Flat Trace on Deflection Limit shows a "pen" deflection limit with a flat line at the top or bottom of a large waveform. This mimics the behavior of analog pen machines. It defaults to off.

Show Target Label enables/disables the focus point in the upper left area of the EEG waveform area.

Place Events Between Signals places events can be placed on EEG waveforms or over them based on this setting. Note: this also affects measurements.

Force Events to Top, when selected, all events will be placed at the top of the EEG area.

Minimum Event Area selects the amount of space that is allocated to the top of the EEG area for events.

Label width selects the width of the montage bar at the left edge of the EEG area. If the Label Font is increased, you might also need to increase this width.

Label Font selects the font and size for the Montage Bar.

Overview Marker Color selects the color of the bar you can drag in the Overview Bar to quickly move from one area of the EEG to another.

Overview Display selects whether the Overview Bar is displayed across the top or to the right of the Events.

Calibration Bar

A calibration bar can be displayed in the EEG recording (similar to Alliance/BMSI). This bar can be picked up and dragged to a location on the EEG to get measurement estimates.

1. The calibration bar is enabled or disabled from the **Calibration Bar** icon in the toolbar or by clicking on **Tools > Calibration Bar**.
2. The time and amplitude of the Calibration Bar is defined by right-clicking the Calibration Bar.

   If a channel has independent settings, the calibration bar will reflect the all-channel settings. The calibration bar is available for both acquisition and review.

Saving the settings to your Protocol

Once all these settings have been defined, you can save them as part of the protocol that is currently being used. Once saved, this protocol should then always startup with this same appearance.

1. Click **Protocol > Save**.

   This same process will need to be done for each protocol in Acquisition and Review.

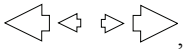
Pruning EEG

Multiple Prune Templates can be created if you want specific events pruned separately (e.g., seizure events pruned separately from routine events). Also see *Creating a Prune Template* later in this guide.

Select the exam

1. From the NicVue window, locate and click on the **patient name**.
2. Click on the desired **EEG exam** (NicoletOne or nEEG) and then click **Review**  .

Marking areas of interest for pruning

3. Page through the EEG until the start of the EEG you want to prune is displayed.
   - To auto-page one page at a time, click the **Play** buttons  . To stop auto-paging, click on the button again.
   - To set the auto-paging speed, drag the small speed control  until the desired speed is achieved.
   - To page one page at a time manually, click on the **Page** arrows  , which appear when you hover the mouse pointer over the EEG display.
   - To move to a specific event, drag the Event Bar (**View > Overview > Events**) in the Overview pane.
4. From the Event Palette to the right of the EEG trace display, click on **Prune**. The mouse pointer turns into an Event Marker symbol  . If Prune is not listed in the Event Palette, go to **Protocol > Settings > Event Palette Editor**.
5. Position the **Marker** towards the top of the EEG display, identify the start of the event you want to prune and click the mouse button.
6. If necessary, page to the **end** of the event you want to prune.

7. Identify the end of the event you want to prune and click the mouse button.

   If the **View > Overview > Events** is enabled, a predefined colored bar appears across the top of the EEG display, spanning the pruned event.

8. If you want to annotate the prune marker, double-click the **Prune marker** and type in the desired annotation.

Previewing pruned events

1. If you used multiple Prune Templates for the recorded EEG, click **File > Prune Preview**.
2. Click on the desired **prune template** from the list.

   The EEG is pruned accordingly for the Event Types in the selected template.

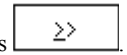
3. To return the normal EEG display, click **Toggle Prune Preview**  .

Saving pruned events

To save the pruned events as a separate file in NicVue:

1. Click **Toggle Prune Preview**  to enter the Prune Preview mode.
2. Click **File > Save Prune** or **File > Save Prune As**.
3. Type in a **name** for the pruned file.
4. If the recording has video and you want to include it in the prune, leave the **Save Video** checkbox checked. If you want to exclude it, remove the checkmark.
5. Click **OK**.

Creating a Prune Template

1. To create a Prune Template, click on the **Edit Settings**  button.
2. Click on **Prune** at the bottom of the Montage Editor panel.
3. Click on the **New**  icon in the lower left corner of the Prune Settings Editor panel.
4. In the Prune Template list, type in a **name** for the Prune Template you are creating.
5. In the Event Types list, click on the **Event** you want added to the template and then click on the right pointing arrows  .
6. Repeat step 5 until all of the desired events have been moved to the Event Types in Template list.
7. If you want a specific period of time before and/or after an event, click on the Event in the Event Types in Template list and then type in the desired period of time(s) in seconds.
8. Repeat step 7 as required.
9. If you want to prune the video only, check the **Prune Video Only** checkbox.

Step 10 is optional or you can create a different Prune Template for proof of recording.

10. You can prune for routine activity using time samples.
    a. At the bottom of the Prune Settings Editor panel, check the **Prune** checkbox.
    b. Type in the number of **minutes** you want to prune out of the specified number of **hours**. For example, prune **5** minutes every **1** hour. This type of template will automatically prune periodically; i.e., 5 minutes out of every 1 hour.
11. When completed, click on **Save**.

Creating EEGtoGo Data files

1. Open **NicVue**.
2. In NicVue, click on the **patient's name** to highlight it.
3. Locate and double-click on the **EEG exam** in the lower half of the screen.

NOTE: If you want to save only pruned events, see *Pruning EEG* in this Pocket Guide and then return to step 4 below.

4. From the EEG screen, click the **EEGtoGo**  icon.
5. Type in a unique **name** for the file. This will appear in NicVue in the **Title** column.
6. Click **Save**. The EEGtoGo file will be registered in NicVue. Archive according to your version of NicVue. (Archiving instructions are explained under the NicVue **Help** menu.)

Exporting the EEGtoGo to CD-R

From NicVue, the exam will be burned as an executable study that can be reviewed on a Windows 2000 or Windows XP PC.

In NicVue, you will find an “EEG2Go” entry added to the patient’s exams.

1. Right-click the **EEGtoGo exam**.
2. Select **Export Exam**, and then the “system name’s” CD-R.
3. A progress window appears and near the end of the export and the CD drawer will open/close. When the progress window disappears, the export is complete. This is the CD you will give to the physician.

   Notice that nothing has changed in NicVue.

Deleting the EEGtoGo file (may be several days later)

Since the EEGtoGo file is essentially a copy of an acquired EEG, you can safely delete it once the EEG has been reviewed.

1. To delete, right-click the **EEG2Go exam**.
2. Select **Delete Data Completely**.
3. Select **Yes** to the “are you sure” window.

Creating an EEGtoGo file from an archived EEG

Prior to creating the EEGtoGo file, you should first Restore From Archive. This will copy the EEG back to your hard drive.

1. Place the CD or DVD with the archive in the drive.
2. In NicVue, right-click the **exam** and select **Restore From Archive**.

   Notice in the Status column the icon has changed to an **CD+hard drive** icon.
3. Now proceed with creating and exporting the EEG2Go as described on the previous page.
4. Once the EEGtoGo file has been created, the restored file can be cleared from the hard drive. Right-click the **restored EEG** and then select **Clear/Remove Original Data From Hard Disk**.

   The icon in the Status column will then return to a CD.

NOTE: EEGtoGo files can also be opened in Reader, if you have the review software. This will give the reviewer more options. To open, double-click **Reader** on the desktop, then go to **File > Open** and browse to the **EEGtoGo** file.

5. You can also print from an EEGtoGo file.

Review with EEGtoGo Quicksheet

Starting the EEGtoGo file

1. Place the **EEG data CD** in your PC.
2. Go to **My Computer**.
3. Double-click the **CD drive folder**.

   You might see a list of patient directories. The patient name and date might be incorporated into the directory name to help you find it.
4. Double-click the patient's **directory folder**.
5. Double-click the **NicOne EEGtoGo** icon  to start the review.

   The EEG software will begin to load.

Starting the EEG review

The montage is displayed on the left.

The Event List is usually displayed on the right.

Controls for sensitivity, filters, etc., are displayed at the top right of the EEG area.

The controls for playing the EEG are displayed in the upper left region of the screen.

Paging through the EEG takes place by clicking on the actual tracing.

Using the EEG controls.

- To play the EEG, single-click either the **forward** or **backward arrow**. To stop playback, click this icon again or press the **Spacebar**.
- To control the speed of playback, click the small **arrow** just to the right of the play button and then select a new **playback speed**.
- To page back one page, use the **left arrows**. The large arrow moves 1 page, the small arrow moves ½ page.

- To page forward one page, use the **right arrows**. The large arrow moves 1 page, the small arrow moves ½ page.

  - or -

  page through the EEG using the keyboard.
- **Left** or **Right arrow** keys moves 1 second/ keystroke.

Page Up or **Page Down** moves 1 page/keystroke.

Montages

Commonly, the EEG will playback "As Recorded." Montage changes will occur as during the recording.

If you wish to change the montage, click the **Montage** pull-down list near the top of the window and select the desired montage. Once a montage has been selected, the remainder of the recording will be displayed with that montage unless it is changed or reset to "As Recorded."

Display and use the Event List

Usually the Event List is displayed at the right edge of the EEG.

If the Event List is not displayed,

1. Click the **Panel**  icon at the top of the screen.
2. From the Panel area on the right, single-click **Event List** to expand it.
3. To quickly move to a specific event, single-click it in the Event List. The EEG will jump to that moment.

Comparing EEG events in the recording

To compare two different moments in the EEG,

1. Click **Window** in the menu bar and then select **New Window**. A second copy of the EEG appears.
2. You can view the two windows using **Window** in the menu bar and then select **Tile Vertically** to display the recordings side-by-side.

   - or -

   You can switch between the two full-screen displays by using **Window** in the menu bar and selecting the **recording** from the bottom of the pull-down window. To close the second window, click the small black **X** in the upper right area.

Closing the EEG recording

When reviewing is completed, click the **Exit** arrow to close the exam. The system will return to NicVue.

Shutdown

1. Click the exit **X** icon in the upper right corner of the NicVue screen.
2. Go to the **Start** button and select **Turn Off Computer**.
3. From the window that appears, select **Shut down**.
4. Select **OK**.

   The system will shut itself down, BUT . . . Turn off the power using the **green rocker switch** that's recessed on the right side of the cart.

Using the Grid/Strip Editor

The Grid/Strip Editor allows you to create sensor, amplifier inputs, and montages based on specific grid strips and/or depth electrodes.

IMPORTANT: Make sure you save your most frequently used input file in case an error occurs before continuing. To do this:

1. Start the EEG acquisition software and load your most commonly used protocol.
2. Click on the **Edit Settings**  button.
3. Click on **Amplifier** at the bottom of the Montage Editor panel.
4. From the Amplifier Setup Editor panel, look at the **inputs** to ensure these are the ones most commonly used. If not, select a different protocol.
5. When you see the inputs you want, click the **Save Default** button.
6. Click **Close**.
7. When prompted if the changes should be saved, click **Yes**.
8. If at a later time the inputs should need to be retrieved, click **Load Default** on the Amplifier Setup Editor panel.

Creating a Grid/ Strip Protocol

1. Click on the **Edit Settings**  button.
2. Click on **Protocols** at the bottom of the Montage Editor panel.
3. Click on the **New**  icon in the lower left corner of the Organize Protocols Editor panel.
4. In the Protocols list, type in a generic 'GridStrip' **name** to start the Grid/Strip Protocol creation.

NOTE: This is only a protocol you will use to create your custom/new Grid/Strip Protocol. The purpose of this is to preserve and protect your other protocols. Once it is created, you will save it with a new, unique name such as the patient's name or procedure name.

---

5. Click **Save**.

Constructing the Grid/Strip Editor

IMPORTANT: There is no industry standard for grid and strip electrode numbering. It is your responsibility to verify that the grid layout and numbering match for all selected implants.

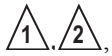
6. Using the Grid/Strip Protocol you created above, click on **Grid/Strip** at the bottom of the Edit Settings panel.
7. To select an appropriate brain image view, click on the **View** arrow buttons. It is recommended to select the brain image view prior to selecting the grid strips.

Build a list of Grid/Strips that might be used during the procedure

8. Click the **Edit** button on the upper right area of this panel.
9. From the Grid/Strip Definition Editor dialog, click on the **Edit List** button.

10. From the Grid List Editor panel, click on the **Generic Implant Examples** show menu button.
11. Click on the **Grid/Strip** you intend to use.
12. A graphic of the selected grid is displayed. If this is the grid you want, click on the **Add** button in the middle of this panel.
13. Repeat steps 8 through 12 for each additional grid you want to add.
14. When finished adding electrodes, click **OK**.
15. If you intend to use any depth electrodes, be sure to include some one dimensional strips such as a 1x10.

Selecting Grid/Strips for a specific patient or procedure

16. From the Grid/Strip Definition Editor panel, click the **Implant List** show menu button.
17. Click on the **grid/strip** you want to use and then click on **Add**.
18. From the Implant Name Editor dialog, type in a **unique name** for the Grid/Strip, such as a brief description of the strip's location on the brain, and then click **OK**.
19. If you want to make a selected one dimensional Electrode into a Depth Electrode, check the **Depth** checkbox. When you return to the Grid/Strip Editor panel later, the Depth Electrodes will be identified on the brain image with a 

, etc., and the Depth Electrode(s) images will appear below the brain image.
20. Repeat steps 16 through 19 for any other grid/strips you want to use.

21. The amplifier inputs start by default at Input #1. If you want the inputs to start at a different number, click on the **Assign First Electrode To Amplifier Input** show menu button and then click on the desired **starting input**.
22. Click **OK** at the bottom of the Grid/Strip Definition Editor panel.

Positioning the Grid/Strip(s)

23. To move a Grid/Strip, click and drag it to the desired location.
24. Right clicking a strip on the brain image view will allow you to rotate, scale, edit, delete, move to a different view, and label the selected Grid/Strip. The Label can be either the grid's numbering scheme (“Show Grid Inputs”) or the channel (input) number (“Show Amp Inputs”).
25. When the Grid/Strip(s) are to your satisfaction, click **Save**.
26. On the Montage Name dialog, type in a unique name for the new Montage. If you do not create a name, Implant Referential will be assigned by default.
27. If you want to apply this Montage immediately, leave the Apply Montage checkbox checked.
28. Click **OK**.
29. Click on **Montage** at the bottom of the Grid/Strip Editor panel to view the Montage Editor panel.
30. If you want to view the electrodes on the brain image, click on the **Select View** show menu button and click on **Implanted Grids**.
31. When finished making your settings on the Montage Editor panel, click **Save**.
32. Click **Close** to return to the EEG screen display.

Saving the Grids/ Strips as a new Protocol

33. From the EEG screen display, click on **Protocol > Save As**.
34. From the Save Protocol dialog, type in a unique name for the new **Protocol**.

    Hint: If this protocol will be reused for multiple surgical patients, enter a surgical procedure name. If the protocol is unique to the patient, use the patient's name.
35. Click **OK**.

    The new protocol is now listed in the **Protocol** menu.

Recorder Toolbar buttons summaries

Labelling the Toolbar buttons

1. Click on **View > Toolbar > Label** to label the buttons.
2. Repeat step 1 to hide the labels

Following is a summary of the various Recorder toolbar button functions and the menu in which you can access the command if the toolbar button is not displayed (**Tools > Options > Customize Toolbar tab**).

Button	Summary	Menu Location
	Click to start recording data to disk. Click again to stop if the Preview button is not displayed.	Acquisition
	Click to stop recording and preview the EEG without storing it to disk.	Acquisition
	Click to stop recording and 'freeze' the traces on the screen display. Click **Record** to restart.	No menu option
	Trigger deblock on the amplifier.	Acquisition
	Open the Impedance Test dialog in the right pane of the Recorder window.	Acquisition
	Start recording video. Click again to stop. Note that the system must be recording and storing EEG for video recording to take place.	Video
	Record video only when user-defined events occur.	Video
	Apply notch filter.	Format

Button	Summary	Menu Location
	Click to calibrate the system. Click again to stop calibrating.	Acquisition
	Opens the Edit Settings dialog.	Format
	Click to display the Protocol Setup dialog.	Protocol
	Display the overviews selected on the Overview submenu of the *View Menu.*	View
	Display/hide the Panel.	View
	Toggles the Reader Pane on and off in Recorder. The size of the panes are adjusted by dragging the split bar.	View
	Jump to the end of the recording in the Reader Pane.	Navigate
	Locks out anyone from using the computer while in the Recorder mode. Click again and enter the password to unlock the computer.	File
	Click e-mail, print, or save a .jpg file of the screen display.	Tools

Creating a montage

Prior to creating a montage, you must also ensure the sensors are defined and assigned to an amplifier input. **Always** go to Protocols prior to closing the Edit Settings window to make sure your default montage is still correct.

The interaction of Sensors, Amplifier and Montage is *VERY* important. If there is an error among these 3 pages, when you apply the montage, the text in the montage bar on the left for the channels in error will be colored **red**.

Starting the Settings Editor

1. From the EEG waveform screen, click the **Edit Settings** icon in the toolbar near the top of the screen.

   A large window opens, typically displaying The blue text across the bottom of this window represents a page of settings. Click on any of these words to display that page of settings.

2. If you intend to include new, never before used sensors, click **Sensors**.

   The first settings page appears, which is used to define all the recording sites/devices you might ever use. This could include all the EEG inputs, respiration transducers, left & right EOG, EMG, EKG, photic marker, event button, spacers, etc. From this page you can also set default colors and sensor type.

Adding sensors

Most of the 10/20 inputs will be pre-defined unless you have a C-Series amplifier.

1. Scroll down to the bottom of the **Sensors** page.
2. Type in the **Name** you want assigned to this sensor. In the **Type** column, all inputs will be set to EEG, unless it is a specific device such as an oximeter or SPO2 monitor. Respiration, EMG, ECG, etc., can also be set to those specific Types.

NOTE: If colors are also assigned here, they will be assigned automatically in the montages. Also, if you see sequential numbers down the left edge of the sensors, they have *NOTHING* to do with the amplifier inputs. This is merely a way of helping you keep track of where you are in the sensor list.

If the sensors to be used are completely different from the typical 10/20 ones, you can click **New** to create a new sensor group.

1. Start with **sensor #1**.
2. Type in the **name**.
3. Press the **Tab** key and select **Type** if necessary.
4. Press the **Tab** key and select the **Color** if necessary.
5. Continue to build this list until every sensor you might ever use is entered. You can also just add these new sensors to the typical 10/20 one.
6. When completed, click **Save**.

NOTE: New sensor lists will only work if **Multiple Sensor Groups** has been enabled from **Tools > Options**.

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7. At the bottom of the Sensors page, click **Amplifier**.
8. On this page you will now assign your sensors to specific amplifier inputs. In the column labeled **Sensor**, click and select the **sensor name** as defined previously. This will set this input to automatically **On**.

9. Look at your amplifier to determine how you want your sensors (electrodes) assigned to the inputs. On the amplifiers that have 10/20 labels, you will also see small numbers to help you correlate the input numbers on the amp with the software. Poly inputs on the right side of the M-Series amplifiers allow for bipolar sensors. Other amplifiers (C-Series) assign bipolar inputs based on odd/even-numbered inputs, where the odd-numbered input is the active electrode and the even-numbered input is the slave electrode. The Nic36 amplifer does not have any bipolar or poly inputs.

   As already mentioned, some sensors are intended as bipolar inputs. That means when you select that sensor, it assumes there is another electrode plugged into its partner input as the reference. An example of this would be ECG. ECG should be assigned to poly (bipolar) inputs or the odd numbered inputs on the C-Series amplifier. On the M40, M24, V32 amps, when ECG is assigned to a poly input, no reference needs to be designated; it is assumed. On the C-Series amp, when ECG is assigned to an odd-numbered input, “Slave” automatically is assigned to the next even-numbered input. Once this is done correctly, you can then build your montage from the **Montage** page.

10. Of course, EKG can be selected instead and you will then need to define the reference (A1 or Ref). It is typically not a bipolar sensor.

11. When completed, click Save, then Apply.

Building a Montage

12. Click **Montage** at the bottom of the Amplifier page.

    The Montage Editor is dependent on the setup of the Amplifier page. All your montages will be defined here and they can then be grouped into Sets on a subsequent page.

13. To define a new montage, click the **New** icon. The screen will be cleared. The easiest way to enter the montage is to just click the inputs displayed on the head diagram in the lower half of the page. Colors will be assigned automatically depending on how they were setup on the Sensors page, but can also be changed here.
14. If this is a bipolar montage (Double Banana, Transverse), make sure **Bipolar** is selected at the top of this window in the Reference Mode pull-down menu. If creating some type of referential montage, make sure the appropriate one is selected before you begin selecting inputs. The bipolar mode will allow you to select electrodes for both inputs, Active & Reference. A referential mode will allow you to select the electrode for the active input and then automatically assign the reference.
15. If a channel, such as EKG, will have unique settings, then select the **Special** checkbox.

    Once this is done, settings for this particular channel will appear. For EKG, it is common for the polarity to be set to **Up**.

    If using any poly (bipolar) inputs, those sensors are typically preset as “special” and have unique settings. These settings, of course, can also be edited as described earlier. Typically, when the poly input is selected for the first input, “bipolar” appears automatically in the second input. You will not need to specify the second electrode. Therefore, for ECG, you will need to apply 2 electrodes: left and right chest or shoulder. When you create the montage, you will select ECG for the first input and then “bipolar” will appear in the second input. The special settings will appear automatically under that bipolar channel. For this channel to work correctly, you would want to have the left chest electrode plugged into the first of the pair of poly inputs and the right chest electrode plugged into the second input.

16. When completed, click **Apply**. If there is an error in the montage, the text in the montage listed to the right of the Montage page will be colored **red**.
17. Make your corrections, then click **Save**.
18. Click **Sets** at the bottom of the Montage page.

    This page allows you to group your montages logically. Typically you may have montage sets for Routine, Sleep deprived, Neonatal, ECS, etc. A montage can be assigned to more than one set.

    - Column **1** is the list of sets you have defined.
    - Column **2** is the list of all montages (from the Montage page).
    - Column **3** is the list of montages that are included in the highlighted set (in column 1).
19. To create a new set, click the **New** icon in the lower left corner and then type the name of the set to be defined.
20. With your new set name highlighted, click the first montage to be used from column 2. Then click the right arrow to place it in column 3. Repeat this process until all the montages for this set appear in column 3.

    The order of the montages in the 3rd column determines placement on the montage buttons in the EEG toolbar. If you do not have Sets, then the order of the montages can be controlled on the **Montage** page by using the up & down arrows beneath the montages list.

NOTE: Not all systems have the capability for Sets.

21. When all your sets have been defined, be sure to click **Save** first and then **Apply**.

Basic settings for the Settings Editor

The Settings Editor allows you setup various features of the system such as the inputs (sensors), montages, photic sequence and comments (annotations). All these features are then grouped into Protocols. Protocols can be defined for Routine Adult, Pediatric, Neonate, LTM, Sleep, etc. The menu bar on the waveform screen display allows you to switch easily from one protocol to another.

Starting the Settings Editor

1. From the EEG waveform screen, click the **Edit Settings**  icon in the toolbar near the top of the screen. A large window opens displaying one of several settings pages.

   The blue text across the bottom of this window represents a page of settings. A single click on any of these words will display that page of settings. The first item to be defined is **Protocol**. After that, the remaining settings will mostly be defined in the order you see them here.

Protocols page

2. Click **Protocols** from the bottom of the Settings window to display the Protocols page.
3. From this page, click the **New** icon in the lower right corner. An additional entry will appear in the list of protocols.
4. Type a **name** for your protocol. If desired, your protocol can be moved to the top of the list by using the arrows.
5. Click **Save** and then **Apply**.
6. If you want to return to the EEG screen, click **Close**.

NOTE: Since one page is dependent on another, you will need to click **Save** and **Apply** after defining/ changing settings on each page. Always re-check your protocol when exiting the Edit Settings window to ensure your protocol(s) are correct.

Sensors page

7. Click **Sensors** (in acquisition only).
8. The first settings page will appear. On this page you will define all the recording sites/devices you might ever use. This could include all the EEG inputs, respiration transducers, left & right EOG, EMG, EKG, photic marker, event button, spacers etc. From this page you can also set default colors and sensor type.
9. Click **New** to create a new sensor group.
10. Starting with **Sensor #1**, type in the **name**.
11. Press the **Tab** key and select **Type** if necessary.
12. Press the **Tab** key and select the **color** if necessary.
13. Continue to build this list until every sensor you might ever use is defined. When completed, click **Save**.
14. The EKG type can be defined as 2 EEG inputs (EKG & EKG2) or the EKG type can be defined as EKG. Then when the montage is defined, it will be assigned to one of the poly or bipolar inputs and will automatically be set as a bipolar input in the montage.

NOTE: If you see numbers down the left edge, they have *nothing* to do with channel or input numbers. They merely represent where you are in the list of sensors that are being defined. You will assign these sensors to specific amplifier inputs on a subsequent page.

Sets page

15. Click **Sets**.

    This page allows you to group your montages logically. Typically you may have montage sets for Routine, Sleep deprived, Neonatal, ECS, etc. A montage can be assigned to more than one set.

    - Column **1** is the list of sets you have defined.
    - Column **2** is the list of all montages (from the Montage page).
    - Column **3** is the list of montages that are included in the highlighted set (in column 1).

16. To create a new set, click the **New** icon in the lower left corner and then type the **name** of the set to be defined.
17. With your new set name highlighted, click the **first montage** to be used from column 2.
18. Click the right arrow to place it in column 3. Repeat this process until all the montages for this set appear in column 3.
19. When all your sets have been defined, click **Save** and then **Apply**.
20. If you want to return to the EEG screen, click **Close**.

Events page

21. Click **Events**.

    On this page you will create events (comments) for all possible situations. The comments used to annotate the EEG recording. hese events will then be organized via the **Palettes** editor on a subsequent page.

22. To enter a new event, click the **New** icon. A highlight will appear in the Event Types list.
23. Type in your **comment** to add it to the list. You can also define a **color** (for quick search in review).

    You can define an event as a Duration Event. This means when you click the event during a recording, it begins marking the EEG and will

continue marking it until you click that event again to end it. This is especially useful for seizures and pruning (making selections). The event "Annotation" allows you to type in text for those comments that are not in the event list. There is also a duration event for "Annotation" that will present a text box at the end of the duration event.

Additionally, you can assign an event to a specific Sensor. When placed, the event will fall on the first channel where this sensor/electrode is used. You can also assign a specific duration to an event (Quick Insert Duration); this could be useful when pruning for periods of wakefulness or sleep. Lastly, you can make an event a Context event where the recording settings are saved with the event. On review, if this event is displayed with settings other than "As Recorded", the event will display with the additional information "Not in Context".

24. When completed, click **Save** and then **Apply**.
25. If you want to return to the EEG screen, click **Close**.

Palettes page

26. Click **Palettes**.

    This is the page where you can organize all your events. It is setup like the Sets page. You might want separate palettes for Routine, Sleep Deprived, LTM, Pediatric, etc.

    - Column **1** is the list of palettes you have defined.
    - Column **2** is the list of all events (as defined on the Events page).
    - Column **3** is the list of events that are included in the highlighted palette (in column 1).

27. To create a new palette, click the **New** icon in the lower left corner and then type the **name** of the palette to be defined.

28. With your new **palette name** highlighted, click the **first event** to be used from column 2.
29. Click the right arrow to place it in column 3.
30. Repeat this process until all the desired events for this set appear in column 3.
31. When all your sets have been defined, click **Save** and then **Apply**.
32. If you want to return to the EEG screen, click **Close**.

Photic page

33. Click **Photic**.

    This page is where you define the automated photic sequence.
34. Click **New** to create an automated sequence. A highlighted cell will appear in the left column.
35. Type in the **name** for that sequence. This will clear the table to the right so you can make new entries.
36. In the table, click the **Hz** cell in line one and then type in the **value** for the flash frequency.
37. Press **Tab**.
38. Enter the number of **seconds** the flash will be on.
39. Press **Tab** twice to move to line 2.
40. In this line, you will define the "off" time, so set the frequency to **0** and then enter the **duration** of this off time.
41. Continue to enter your flash frequencies and "off" times until you have completed your sequence.
42. When all your sequences have been created, click **Save** and then **Apply**.
43. If you want to return to the EEG screen, click **Close**.

View page

44. Click **View**.

    On this page you can set the display settings for both the acquisition and review windows.

45. **Timebase** can be set for mm/sec or secs/page. If mm/sec is selected and you want the screen to mimic paper, you will also need to calibrate your monitor. From the EEG menubar, click **Tools > Options > Screen Size** and follow the instructions.

46. Other settings on this page are self explanatory.

47. When completed, click **Save**, **Apply** and then **Close**.

48. If you want to return to the EEG screen, click **Close**.

Calculated page

49. Click **Calculated**.

    This page allows you to define reference that are comprised of a group of electrodes such as in an Average or Laplacian reference.

Average Reference

50. To create a new Average Reference, click **New** just below the list of calculated references, and then type a **name** for your reference.

51. Click the **Average Sensor** button and all the electrodes will be selected as part of the average reference (highlighted in blue). To de-select an electrode from the average, click the **electrode** on the head diagram, the blue highlight will disappear and the selected electrode will be deleted from the list of average reference electrodes.

Laplacian Reference

52. To create Laplacian references, click **New** just below the list of calculated references and then type in a **name** for one of your Laplacian references.

    Keep in mind, each recording electrode will have a unique group of reference electrodes, so your reference name might be something like “lap C3” or “C3r”.

53. Click **Laplacian Sensor** and then the **source electrode** for the Laplacian reference.

    This electrode will highlight in pink on the head diagram.

54. Click the surrounding electrodes you wish to include in the Laplacian reference. They will highlight in blue.

55. Weighting is automatic, but can be overridden by typing in a different weighting value in the table above the head diagram. Automatic weighting is done based on the Hjorth method.

56. When completed, click **Save** and **Apply**.

57. If you want to return to the EEG screen, click **Close**.

Video page

58. Click **Video**.

    These are settings for the recording of video, if you have a digital video system.

59. On this page you have the choice of recording **No Video**, **Full Video**, or **Selective Video**.

No Video

Video does not record automatically, but you can preview the video image and start it manually from the EEG screen by clicking the **Camera** icon.

Full Video

Video starts recording automatically when you initiate an EEG recording. To halt the video, click the **Camera** icon in the EEG toolbar.

Selective Video

With Selective Video, you can highlight an event (seen in the long list just below Selective Video) and add this event to the column immediately to the right, “Event Type in Protocol”. You can also specify a period of time before and after the event that you would like recorded with video. When the event occurs, the video will start and then continue for the specified amount of time. You will need to specify a before and after time or use duration events.

60. Click **Save** and then **Apply**.
61. If you want to return to the EEG screen, click **Close**.

Misc. page

62. Click **Misc**.

    This page includes settings for electrode monitoring, basic file settings and some basic sleep settings.

    Under Electrode Monitoring you can choose to have an **automatic impedance test** with each montage change. You can also select **Continuous Electrode Monitoring**, which is not a continuous impedance test. Rather, this performs FFTs on each channel as a means of detecting amplitude and frequency changes. With Continuous Electrode Monitoring you can also set an **interference tolerance** (in uV).

File Settings allows you to control when the current recording is to be closed and a new one started. You can choose to set either a Maximum File Duration or a specific time of day.

You can also select the **file format** of the recording EEG, .e or .edf+. Defaults to .e.

63. When completed, click **Save** and then **Apply**.
64. If you want to return to the EEG screen, click **Close**.

Spike & Seizure settings

Detections can be defined for acquisition and will occur as an online process. Detections can also be defined for review and the recording can then be processed for detections as an offline process. In either case, this is an optional feature and is dependent on the licensing of the dongle attached to your system. Licensed software can be viewed via **Start > Programs > Viasys Healthcare > NicoletOne/ License Manager**.

NOTE: Once a template has been created, this will not need to be done again.

Starting the Settings Editor

1. Click the **Edit Settings**  icon in the toolbar near the top of the screen.

   A large window opens displaying one of several settings pages.

   The blue text across the bottom of this window represents a page of settings. Click on any of these words to display that page of settings.

2. Click **Detections** from the bottom of the Settings window to display the Detections page.

3. From this page, click a **detection template** (Epilepsy or LTM, for example) if you wish to edit/ change it.

   - or -

   Click the **New** icon in the lower right corner to create an additional, unique detection template. An additional entry will appear in the list of detection templates. Type a **name** for your template. If desired, your template can be moved to the top of the list by using the arrows.

   In this example, the “Epilepsy” template will be used.

Heart Rate

Heart rate allows you to establish thresholds for slow (bradycardia) or fast (tachycardia) heart rates. This is based on detections from a pulse sensor such as a pulse oximeter. If this device is not present, uncheck the **Heart Rate** checkbox.

Spike

Spike allows you to define parameters for amplitude, duration, and spike sensitivity. All three parameters must be met to be classified as a spike event. When this occurs, a Spike event will be entered into the recording.

Amplitude Threshold: You can enter a number that defines how large a spike event has to be relative to the average background size. The default of 4 means a spike has to be at least 4 times bigger than the average background activity.

Minimum Duration: This defines how fast the event has to occur to be classified as a spike event. The default of 35 milliseconds means the event has to be at least that fast (sharp) to be marked as a Spike event.

Spike Sensitivity: This setting can range between 0-100. The greater the number, the more sharp-events that will be identified as spikes. Use a low number (0 is ok) to avoid over detection.

Seizure

Seizure allows you to define parameters for amplitude, minimum and maximum frequency, maximum coefficient of variation, and length. All parameters must be met for an event to be classified as a seizure. When a seizure is detected, a duration event will be placed in the recording.

Amplitude Threshold: The number entered reflects the minimum required average amplitude relative to the average background amplitude. In this example, a seizure event must have an average

amplitude that is 4 times greater than the average background activity. If too many false events are detected, you can **increase** this number slightly.

Max Frequency & Min Frequency: These two separate parameters essentially define the required bandpass to qualify as a seizure event. Based on the default parameters, the frequency of the event has to be between 3.4-20Hz.

Max Coeff of Variation: This defines the required rhythmicity of the event. The lower the number, the more rhythmical the event needs to be for detection. The default is 60%. If too many false detections are made, this number can be **decreased** slightly.

Epoch Length: This is the minimum amount of time required for the event to be detected as a seizure. The default is 2 seconds.

Format

This establishes some general parameters for detection; montage, high filter, and low filter.

Montage: Use one that has been customized for your sensors. Usually a bipolar montage works best (double banana), but you can experiment with different montages. Regardless of the preset default, you will likely need to change it to one of your own montages.

High Cut: The default is 40Hz and this is sufficient. However, you can select a different high filter from the drop-down list.

Low Cut: The default is 0.3Hz and this is also sufficient. However, you can select a different low filter from the drop-down list.

Once all your parameters have been defined, you must save these changes before moving on to another settings page.

4. When completed, click **Save** and then **Apply**.

Saving the Detections Template as part of a Protocol

5. If the detections are to be used during acquisition, click Protocols.
6. From the Protocols page, highlight the **protocol** that will be used with your amplifier.
7. Click the entry for the detection template. A drop-down list will appear where you can then select your edited or newly created detection template.
8. When completed, click **Save**, **Apply**, and then **Close**.

   You now have a template that can be used for spike and seizure detection!

Offline Spike & Seizure detection

Once an EEG has been acquired (routine, LTM or ambulatory), it can then be processed through the optional event detection software.

NOTE: This is an optional feature. To determine if you are licensed to use this feature, go to **Start >Programs > Viasys Healthcare > NicoletOne > License Manager**. If this is an enabled feature, you will see a checkmark in front of **Spike and Seizure**.

Prior to running the detection software, make sure you have created an appropriate detection template. Please see the *Edit Spike & Seizure Settings* in this Pocket Guide.

Starting the detection process

1. Open the EEG for review.
2. From the menu bar at the top of the screen, click **Tools > Detections**, and then your detection template (e.g., "Epilepsy").

   A small "Detecting" window pops up indicating the EEG is being processed. Depending on the length/size of the recording, this might take some time. When the detecting is completed, the small window disappears and all the detected events can then be viewed either through the Event List or the Overview bar across the top of the waveforms.

Displaying and using the Event List or Overview bar

The Event List and/or Overview bar can be used to quickly and easily edit any of the detected events.

1. If the Event List is not displayed, click the **Panel** icon at the top of the screen. If you do not see Event List in the Panel area along the right edge, click **View > Panel > Event List**.
2. From the Panel area on the right, click **Event List** to expand it, if necessary.

3. To quickly move to a specific event, single-click it in the Event List. The EEG will jump to that moment. If it is an event that you wish to remove, press the **Delete** key on your keyboard or right-click the **highlighted event** and then select **Delete**.
4. If you wish to use the Overview bar and it is not displayed, click **View > Overview > Show**.

NOTE: Make sure **Events** is checked in the Overview list.

Once the Overview Bar is displayed, you can move from one event to another simply by dragging the blue-grey cursor bar over an event (if you hover over an event, in the Overview Bar, it will display the event name). The EEG will jump to that moment.

If this is an irrelevant event and you wish to remove it, right-click the **event** in the EEG tracing and then select **Delete**.

Saving detected events

When you have completed detecting and editing events, you will need to save it as a separate file.

1. Click **File > Save As**.
2. A small window appears prompting you for a patient ID. You can type in some description of this file such as “detections.” It will be saved as a separate file and will appear in NicVue or Study Room as an additional line item. The new name appears as Title in NicVue or as Test ID in Study Room. If this is an ambulatory study, the file will also be converted from an .edf to an .e file.
3. You can now close the EEG.
4. While closing, you will be asked about saving changes. Since you have already saved changes in a separate file, it is not necessary to do so again,

   The EEG is now ready for physician review.

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Sleep

Nicolet body position calibration

Body position settings

The voltages for the body positions and the minimum duration for each position are user definable in the Detections Settings editor. The upper and lower limits (the midline between voltages) are then calculated for each position.

It is necessary to measure these values for each body position sensor:

1. Connect the sensor to the input you plan to use on the amplifier.
2. Enable the body position sensor in the Amplifier Setup editor for the input you plan to use.
3. Create a montage that includes the body position sensor and displays the values numerically.
4. Turn the sensor to each side and type in the output voltages in the Body Position Settings pane on the Detection Settings editor panel as appropriate.

Manual body position events

Body position events can also be inserted manually using Body Position event markers.

Sleep

Nicolet settings/calibrations

1. Connect the sensor.

   Plug the Body Position Phono into the amplifier transducer connector.

   - For V32/V44, use the DC input on the amplifier labeled **Ch32**.
   - For an amplifier without a DC input on the amplifier, use the connector on the analog cable (085-4610xx) labeled **I/P 0-3**.The 3.5mm male will need to use the adapter cable (085-4643xx) for the interface into the BNC connector of the analog cable ("I/P 0-3").

2. Confirm the Body Position sensor **Name** and **Type** in the Sensor editor.

   a. Click on the **Settings**  button.

   b. Click on **Sensors** at the bottom of the Editor panel.

   c. Confirm the sensor **Name** and **Type**.

   d. Click **Save**.

3. Turn on the sensor input in the Amplifier editor panel.

V32/V44 amplifier

a. Click on **Amplifier** at the bottom of the Editor window.
b. Click on the **VEEG 32** (or **VEEG V44**) check box.
c. Double-click on the **empty field** in the Sensor column to the right of the check box you just checked.
d. Click on **Body Pos** from the drop-down menu.
e. Click **Save**.

U24/32/C-series amplifier

a. Click on **Amplifier** at the bottom of the Editor window.
b. Click on the DC input **AI 1**, **2**, **3**, or **4** check box for the Body Position cable connection. See the Cable Key below. It needs to match the same input connector on the cable (085-4610xx).

Cable Key	
I/F 0	AI 1
I/F 1	AI 2
I/F 2	AI 3
I/F 3	AI 4

c. Double-click on the **empty field** in the Sensor column to the right of the check box you just checked.
d. Click on **Body Pos** from the drop-down menu.
e. Click **Save**.

4. Add the body position channel in the Montage editor panel.
    a. Click on **Montage** at the bottom of the Editor window.
    b. Double-click on the empty field at the bottom of the **Active** column.
    c. Click on the Show Menu button.
    d. Click on **Body Pos**.
    e. Click anywhere on the newly assigned **Body Position line**. If the Body Pos pop up does not appear, check the Body Pos **Special** checkbox and repeat this step.
    f. On the Body Pos pop up, set the parameters as desired.
    g. Click anywhere on the **Montage pane** to close the pop up.
    h. Uncheck the Body Pos **Special** checkbox.
    i. Click on the Body Pos. **Display Type** field and choose to display the output as numerical or as a trace.
    j. Check or uncheck the Body Pos. **Special** checkbox as desired.
    k. Click **Save**.
5. Enter the sensor's typical signal amplitude values and verify the output voltage.
    a. Click on **Detections** at the bottom of the Editor window.
    b. Click on **Sleep** in the Detection Templates pane.
    c. Click on **Body Position** in the Detections pane.
    d. Enter the **amplitude values** in the Body Position Settings pane.
    e. Click **Save**.

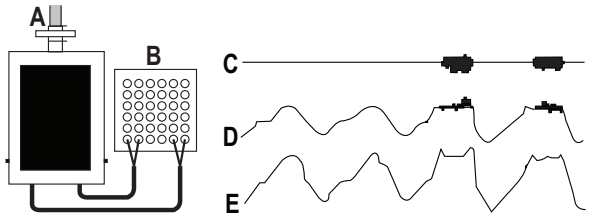
6. Verify the sleep positions.
    a. Turn the sensor to each side for the prone, supine, left, right and upright positions.
7. Connect the Airflow and Snore leads.
    a. Connect the **Airflow lead**s to the selected polygraph AC jackbox inputs.
    b. Connect the **Snore leads** to the selected polygraph AC jackbox inputs.
    c. Install the airflow sensor cannula onto the patient and insert the cannula tips into the nares.
    d. Place the cannula tubing over the patient's ears and chin.
    e. Slide the cinch tubing toward the neck to a comfortable fit and secure the cannula into position as needed using surgical tape.

    It is extremely important that the cannula sensor tips do not become blocked off during installation or recording.

    f. Plug the sensor cannula safety filter into the input of the PTAF Lite sensor module with a slight twist to make a secure connection.

g. Adjust the polygraph settings as shown below. These settings are recommended starting points. Polygraph and patient variables can significantly influence the settings.

Polygraph & PTAF Lite settings	Airflow	Snore
High Frequency Filter	5Hz or higher	70Hz or higher
Low Frequency Filter (Time constant)	0.05Hz or lower (3 sec. or longer)	10Hz or lower (0.015 sec. or longer)
Sampling Rate	10 Hz or higher	70Hz or higher
Sensitivity	50uV/mm	50uV/mm
PTAF Lite Hi/Lo Switch	Adjust for optimal signal amplitude	Adjust for optimal signal amplitude



A: Input from filtered Airflow Sensor cannula.

B: Polygraph AC Input box.

C: Snore output.

D: Airflow output, filtered to allow snore.

E: Airflow output, filtered to eliminate snore.

8. Select the desired **detections** and **parameters**.
    a. Make your selections from the Detection Settings editor.
    b. Click **Save**.
9. Select the desired **sleep staging**.
    a. Click on **Misc**. at the bottom of the Editor window.
    a. Select the desired sleep staging.
    b. Click **Save**.
10. Setup the **Review** and **Live** panes.
    a. Click on **View** at the bottom of the Editor window.
    b. From the View Settings editor, select the desired settings for both the **Review** and **Live** panes.
    c. Click **Save**.
    d. Click **Close**.

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