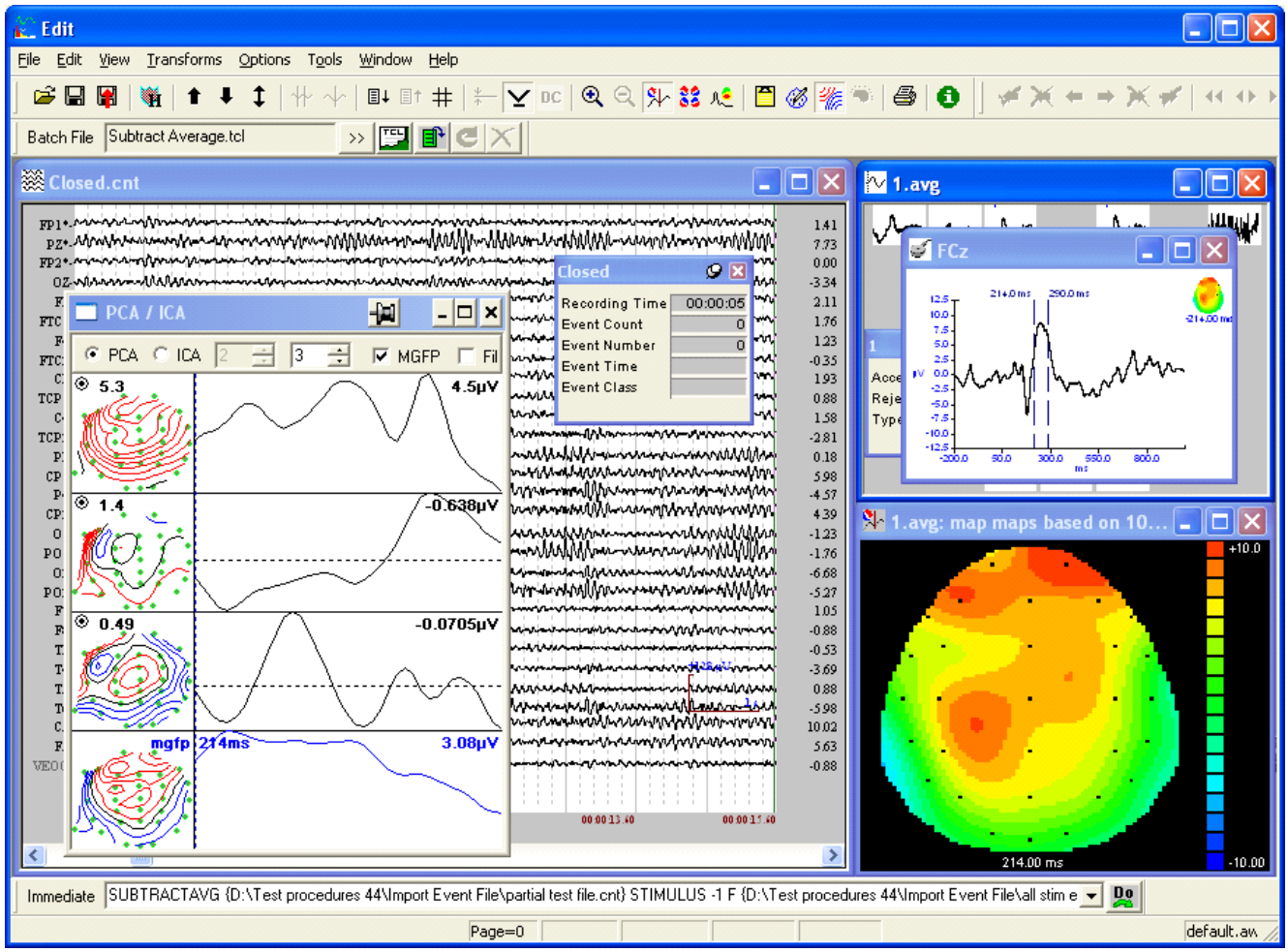
Scan Release Notes 4.5



The Latest Changes in the V4.5 Software

COMPUMEDICS NeuroScan

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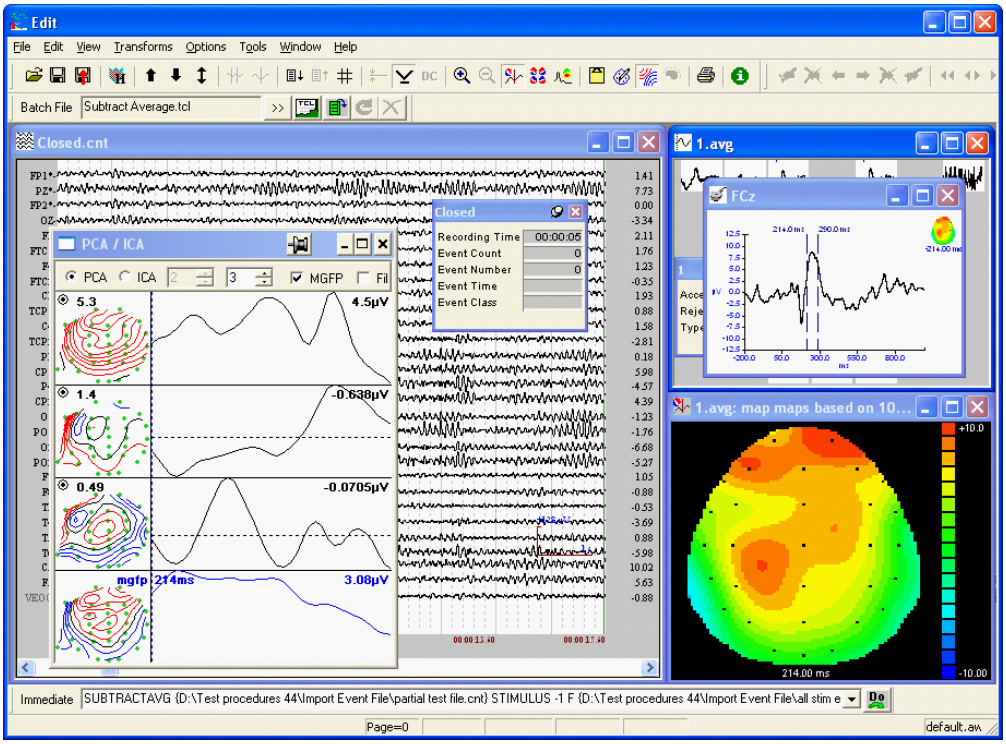
Scan 4.5 Release Notes



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1.1 Contact Information

For Technical Support...

If you have any questions or problems, please contact Technical Support through any of the following routes.

If you live outside the USA or Canada, and purchased your system through one of our international distributors, please contact the **distributor** first, especially if your system is under warranty.

In all other cases, please use **techsup@neuroscan.com**, or see the other Support options on our web site *(http://www.neuroscan.com*).

Or, if you live in the USA or Canada, please call **1-877-717-3975**. International callers should use **1-704-749-3200**.

For Sales related questions, please contact your local distributor, or contact us at **sales@neuroscan.com**.

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1.2 Scan V4.4 and V4.5 Release Notes

The latest version of the Scan software is V4.5. The 4.4 version was recently released, so both are described in these Release Notes.

There are three significant changes associated with the release of SCAN *V4.4*: new or modified features in the **SCAN software**, the release of the **MagLink RT System**, and modifications to the **Toolbox** add-in software. The *Release Notes* here describe the changes to SCAN. The MagLink RT System has its own documentation, which includes features that are specific to MagLink RT. The Toolbox has its own documentation, which describes the features associated with it. Therefore, in addition to the Release Notes, you may also have received the MagLink RT and Toolbox documentation, depending on what system you have. MagLink RT and the Toolbox require additional software licenses (described below).

The V4.5 version has two significant changes. The first is that this version will run in the Vista operating system. Second is the addition of the *SynAmps Wireless* amplifiers. The *SynAmps Wireless* recording unit is a multi-functional, ambulatory recording device that enables recording, monitoring, storage and transfer of up to 32 physiological data inputs, including EEG, EMG, VEOG, and EKG. It is a wireless system in which the data may be stored directly to a removable memory card in the amplifier unit, or transferred via wireless network to the Scan PC hard drive. Remote recordings to the flash drive are in excess of 24 hours.

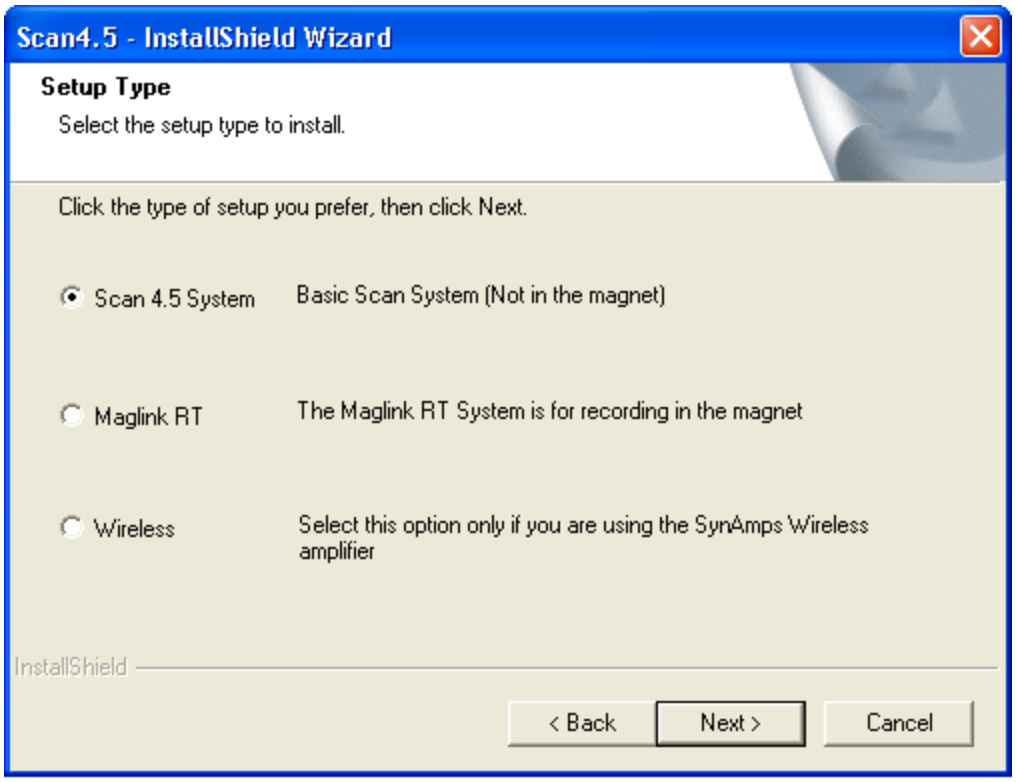
Note

The e-mail addresses for Neuroscan Sales and Technical Support have changed. Please use sales@neuroscan.com and techsup@neuroscan.com for e-mail.

Installation Notes

The Scan 4.5 version is a stand-alone version, not a patch. **You should uninstall your existing version of Scan, if there is one, before installing V4.5**. If you have received the software on a CD, insert it as usual into your CD drive, and the installation should begin automatically. If it does not begin, go to the CD drive and Run the *setup.exe* file. Follow the directions on the screens to install the new files. If you have downloaded the new version, the steps are basically the same. Run the *setup.exe* file and follow the directions on the screens.

Note that on the Setup Type screen, you will be asked to select the proper system: **Scan 4.5**, **MagLink RT**, or **SynAmps Wireless**. Be sure to select the option that matches the system you have.



Special Note for XP 64 bit Systems
When installing Scan 4.5 on XP 64 bit systems, it is necessary to install the sentinal drivers manually. Otherwise, you will encounter a message saying that either the dongle was not found or that you do not have a valid license.

1. Reboot as directed after installing the Scan 4.5 software. Remove the USB dongle.
2. Go to the …\Scan4.5\Drivers\Sentinel folder.
3. Run the SentinelProtectionInstaller.exe program.
4. Do a custom install and remove the options to install the Protection Server and the Keys Server, then continue with the installation.
5. Insert the USB Dongle.

You should now be able to run the software without any dongle related messages.

Modifications to the SCAN Software

The last full release of the SCAN software was *V4.3.1*. Since *V4.3.1* was released, Neuroscan Research and Development has been advancing in several directions, one of which has focused on the artifact reduction procedures necessary for extracting the relatively small EEG signals from the large noise background in MR recordings. There are several sources of artifact in the MR, but the two major ones are the gradient sequencing artifact that is recorded during MR imaging, and the other is ballistocardiogram (BCG) artifact that results from micro-movements associated with the EKG pulse. Reducing these artifacts while leaving the EEG signals intact is one of the most challenging tasks in human electrophysiology, and we are constantly making improvements in the methods we provide (thus the several Hot Fixes).

Scan *V4.3.2* was a Hot Fix release designed primarily for researchers recording EEG in the

MR. The most important addition was the *offline fMRI Artifact Reduction* transform. The release also included some new and modified features, and fixed all known bugs.

The *V4.3.3* Hot Fix extended the artifact reduction methods to include *online fMRI Reduction*. Additionally, EKG/BCG Artifact Reduction was modified (online and offline), and offline fMRI Artifact Reduction was modified.

The *V4.4* version adds several new transforms and features, and adds further functionality to the EKG Noise Reduction transform (e.g., addition of QRS Detection), to provide a more accurate reduction of EKG and BCG. The EKG Noise Reduction transform, in most cases, is extremely effective in reducing EKG and BCG artifact. In more difficult instances, it may be more effective to apply its algorithms manually and independently. Therefore, in *V4.4*, new transforms have been created by splitting out the operations performed in the EKG Noise Reduction transform. EKG/BCG reduction, therefore, may be accomplished via the single EKG Noise Reduction transform, or by using the components of that transform separately. You may find that both approaches work equally as well, or that one has advantages over the other. The new transforms were developed for EKG/BCG, but they may have additional applications as well. Any artifact that can be detected using events or a voltage threshold may be reduced significantly with the new methods.

The *offline EKG Noise Reduction* transform remains part of the Toolbox plug-in software for SCAN, and you need a Toolbox license to access it.

The new and modified transforms for *SCAN V4.4* are as follows:

- **Correlate Peaks** (new; part of EKG Noise Reduction transform)
- **DC Drift Correction** (modification)
- **Export in EDF Format** (modification)
- **Grid Layout** (new)
- **Import Event File** (new)
- **Insert Multiple Events** (new)
- **QRS Detection** (new; part of EKG Noise Reduction transform)
- **Subtract Average** (new; part of EKG Noise Reduction transform)

The latest V4.5 version permits access to the *SynAmps Wireless* amplifiers, and runs in the Vista operating system.

These Release Notes contain not only the information for *V4.5*, but also include the information from the *V4.3.2, V4.3.3 and V4.4* Release Notes. If you are upgrading from *V4.3.1* to *V4.5*, for example, all of the changes since *V4.3.1* are listed here.

Updated Documentation

All of the SCAN documentation (ACQUIRE, EDIT, amplifiers, etc) has been updated to include the functionality in Scan 4.5. See the ACQUIRE, EDIT, Tcl Batch, or other user manuals for details of the new features described below. Beginning with V4.5, all of the user manuals are provided in electronic form, in place of the printed manuals used in the past. The electronic form uses a standard compiled help file format (.chm), which should be read easily within Windows. The files are found in the Help Files folder under the Scan4.5 folder. *For printing purposes, PDF versions of all of the manuals are provided in the Pdf folder under the Scan4.5 folder*.

MagLink RT System

Simultaneous with the *V4.4* release, we are releasing the MagLink RT (Real Time) System. This is a complete system for acquiring and analyzing EEG data recorded from the MR chamber. It includes a specially designed electrode cap, non-ferrous connection cables, the *SynAmps RT* amplifiers, and additional software for reducing gradient and BCG artifact.

SynAmps RT Amplifiers

SynAmps RT amplifiers are the latest generation of AC/DC amplifiers designed to record a wide variety of multichannel neurophysiological signals. The *SynAmps RT* are intended for the researcher who needs both a broadband amplifier and a high speed digital acquisition system. A *SynAmps RT* contains the analog components needed to amplify low level neurophysiological signals and the digital components needed to digitize, digitally filter, log external events, and transfer data to a host computer. This design allows for high speed acquisition of signals from multiple electrode sites. This distributed processing approach allows data to be acquired at much higher rates with greater precision from more channels than could be obtained from a single computer performing the same task.

The *SynAmps RT* differ from the previous *SynAmps*^{2} amplifiers in several ways. Headbox modifications include changes in the capacitors and resistors, as well as changes in the sequence of data processing steps. These changes eliminate spectral spiking that was found under certain conditions with *SynAmps*^{2}, further reduce the overall noise level, and match the filtering effects in DC and AC modes. The functional result is to make ABRs easier to record. Testing has shown that stable ABRs can be detected in as few as 200 to 400 sweeps, using a compressed bandwidth of 100 to 2500Hz, in either DC or AC modes, using a bipolar channel. The larger change is more of a product conception one, in which the *SynAmps RT* System Unit will be used with a family of Compumedics EEG systems. This modular approach allows for selecting amplifiers (headboxes) to better fit individual needs, where each amplifier uses the same System Unit.

As far as the SCAN software is concerned, the *SynAmps RT* and *SynAmps*^{2} are treated the same and are interchangeable. For example, there is no special designation for *SynAmps RT* in the ACQUIRE software - you will see only *SynAmps*^{2}. The drivers are the same.

Toolbox Modifications

In the prior Hot Fixes, most of the artifact reduction software was included in the **Toolbox**, which requires a separate license in order to access it. The relevant software is now included with the **MagLink RT System** (MagLink RT license required; contact sales@neuroscan.com or techsup@neuroscan.com for details). Those transforms include the *online* and *offline fMRI Artifact Reduction* and *online and offline EKG/BCG Artifact Reduction*. (MagLink RT includes all of the regular SCAN software, as well, including the Toolbox programs). If you have an earlier version of MagLink, you should now refer to the *MagLink RT User Guide* to find the descriptions of the transforms specific to MagLink RT.

As mentioned, the Toolbox used to include the *online* and *offline fMRI Artifact Reduction* and *online EKG/BCG Artifact Reduction* transforms. These have been moved to the **MagLink RT System**. Remaining in the Toolbox are the offline **EKG Noise Reduction**, online and offline **Blink Reduction** transforms (not to be confused with the offline Ocular Artifact reduction transform, which is included with SCAN), the **Export to Excel** option, the **Interface with MATLAB** option, and **PCA/ICA** (Principle and Independent Component Analysis). The Toolbox requires its own license (contact sales@neuroscan.com or

techsup@neuroscan.com for details). Please see the Toolbox manual for details.

2 Changes in the V4.5 SCAN software

The release of Scan 4.4 and 4.5 are occurring fairly close in time. The major software changes occurred in Scan 4.4, and these are described in the next section.

Vista Operating System
The Scan 4.5 software now runs in the Windows **Vista** operating system (as well as XP) . Scan 4.5 will run with XP 32 bit, XP 64 bit, and Vista 32 bit operating systems. (Analysis will work with Vista 64 bit, but not acquisition). See the note 3 in the previous section for special installation instructions with XP 64 bit systems.

SynAmps Wireless Amplifiers
Scan 4.5 was developed to make use of the *SynAmps Wireless* amplifiers that have been in use clinically with the Compumedics sleep products (known as *Siesta* amplifiers). There are no physical connections between the amplifiers and the host computer, rather, a wireless network is used. The *SynAmps Wireless* amplifiers can be used in two ways: transmit the data from the amplifiers to the host computer as long as they are within the range of the wireless network; or store the data directly on a flash drive contained within the amplifiers. In the latter case, you need only the software to initiate data acquisition, and the subject can then be anywhere. Data storage will continue until the battery dies (24 hours or more, depending on the configuration), the flash drive is filled (flash drives have 2GB capacity), or until the amplifiers are turned off.

The details for configuring and using *SynAmps Wireless* are found in the *SynAmps Wireless User Guide* help file.

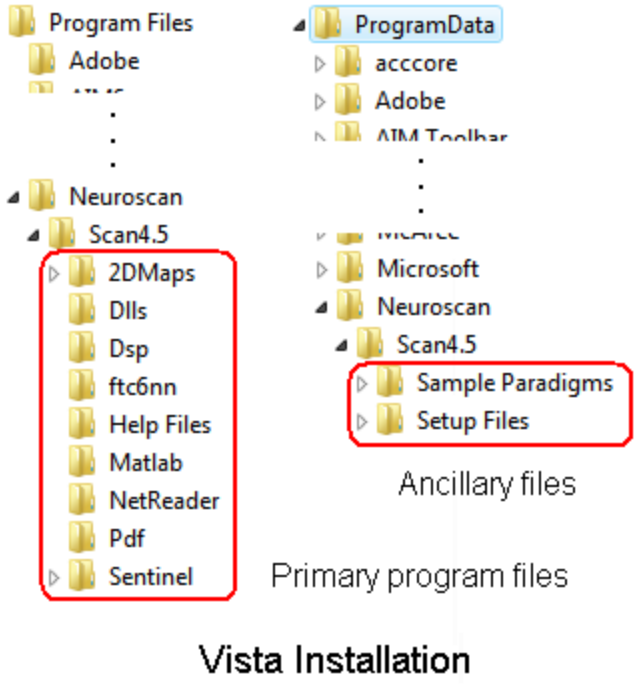
Electronic Help Files
Another noteworthy change in the Scan 4.5 installation is that we have gone paperless. All of the Scan documentation is now provided in two forms. The first are standard .chm (Compiled Help Manuals) files that can be accessed easily from Windows. They are all contained in the *Help Files* folder under the *Scan4.5* folder. For printing purposes, PDF files are preferable over CHM files. Therefore, if you wish to print the manuals, in whole or in

part, the PDF files may be found in the *Pdf* folder under the *Scan4.5* folder.

File Recovery
From time to time acquisition of data files can be interrupted for any number of reasons. Prior to Scan 4.5, trigger events (stimulus, response, etc.) were written to the event table at the time the file was closed. If termination of acquisition was halted abnormally, those events were lost. From Scan 4.5 on, events are written as they are encountered. If acquisition is abruptly halted, the triggers will be saved. See **Opening Corrupted Data Files** in the **Open data file** section of the Edit manual for details.

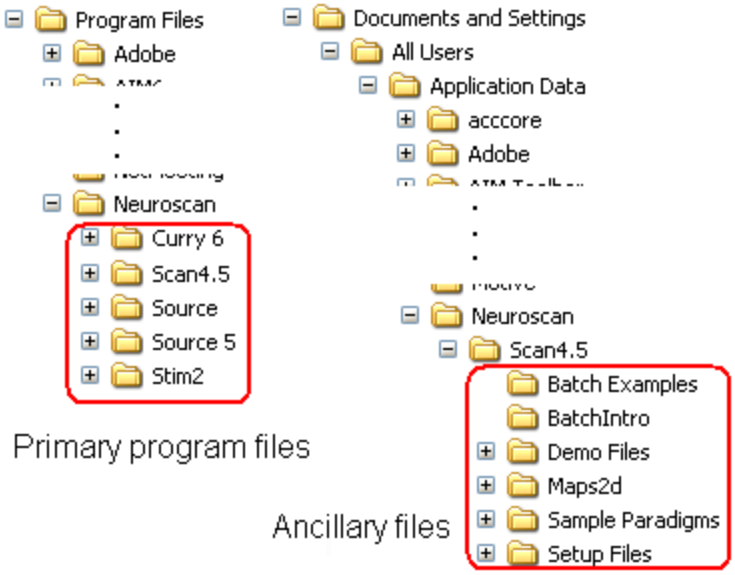
Software Installation
Please refer to the *Overview* help file for installation directions. Scan 4.5 is a complete installation, not a patch. *Please uninstall any prior versions of Scan before installing Scan 4.5*.

XP and Vista Installation of Folders
Because of certain constraints specific to Vista, some of the installed folders and files appear in the *c:**ProgramData**\Neuroscan\Scan4.5* folder, rather than under *...**Program Files**\Neuroscan...* These include the *Sample Paradigms* and *Setup Files* folders. The main program files are installed under *...\Program Files*..., as usual. The **Scan Data** demo files are installed in the root.



Vista Installation

In the **XP** version of the installation, folders are created in the following locations shown below. You may move the ancillary files to more convenient locations, if desired.



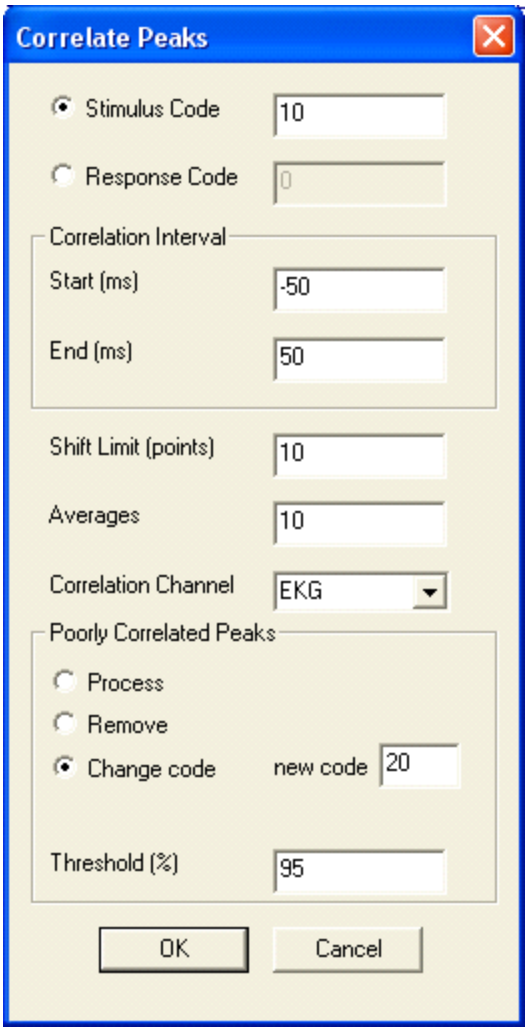
XP Installation

3 Changes in the V4.4 SCAN Software

The sections below describe the additions to the SCAN software that are included with V4.4, followed by the details for changes in the prior V4.3.2 and V4.3.3 releases.

3.1 Correlate Peaks

The Correlation Peaks transform is used (with CNT files only) to align detected peaks not by the event marks at the peaks, but rather by the waveform morphology. The transform was split out from the offline EKG Noise Reduction transform. Basically, the event marks at the peaks are repositioned based on the maximum correlation between the current sweep and the average of the user defined number of preceding sweeps. Poorly correlated peaks can be removed from the rolling average.

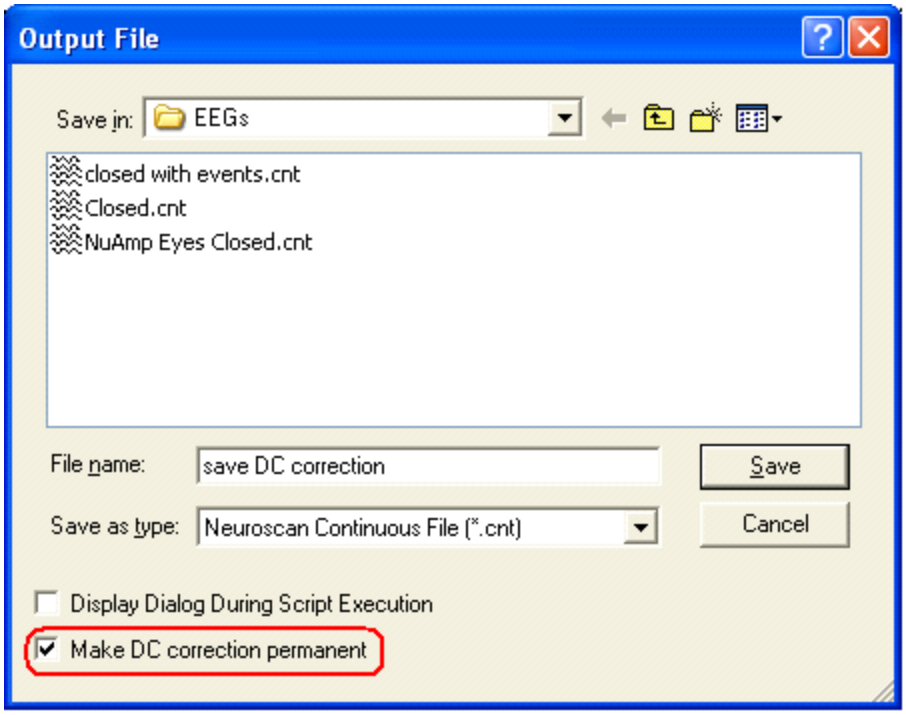


You also have the option to change the event codes of the artifacts that are not correlated. You can then run the transform again using only those artifacts. Any instances that do not correlate can be given a new type code. In this way, you can identify different classes, or categories, that exist within the same artifact (BCG can sometimes change over time, and there can be different classes that correlate well with themselves, but not among other classes). The EKG Noise Reduction transform can then be used in several passes to correct the different classes of artifact (this can improve BCG artifact reduction).
Complete details are found in the EDIT manual. The batch command is in the Tcl Batch manual.

The Correlate Peaks transform does not have to be used solely with EKG/BCG Artifact Reduction. It aligns by waveform morphology rather than by event codes. It therefore acts like a Woody filter, and can be used with any waveforms that have event marks for the peaks.

3.2 DC Offset Correction Modification

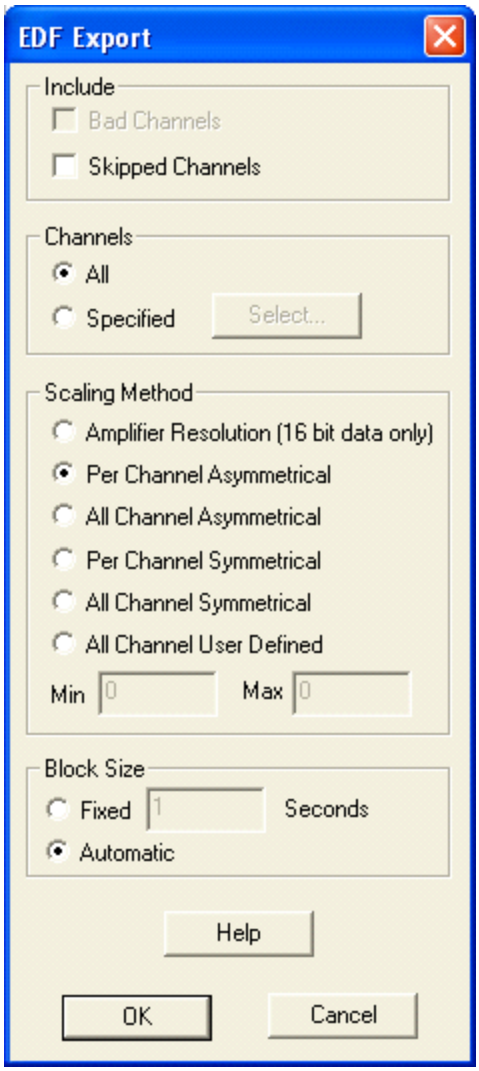
The SCAN 4.4 version restores a capability in the DC Offset Correction transform that was present in the older 4.2 version. You now [again] have the option to save the corrected file as opposed to just a display correction. After performing the DC correction, click the button and enable the **Make DC correction permanent** option to make the change permanent.



After performing the correction, the DC button lets you toggle the correction on and off (display only). The button will not be active after retrieving a file in which the correction was saved. The SAVEAS_EX batch command contains the new parameter.

3.3 EDF Export

While SCAN has had the option to export data files in EDF format, the relatively recent acquisition change to 32 bits has presented a problem, since EDF files are only 16 bits.



When you save a file now in EDF format, the Export EDF dialog appears. The EDF Export dialog provides options for scaling the output data. As with all digital representations of analog signals, there is a tradeoff between amplitude resolution and dynamic range (the largest or smallest number that can be represented). The goal is usually to choose parameters that represent the full dynamic range of the signal so that no "clipping" occurs at the extremes.

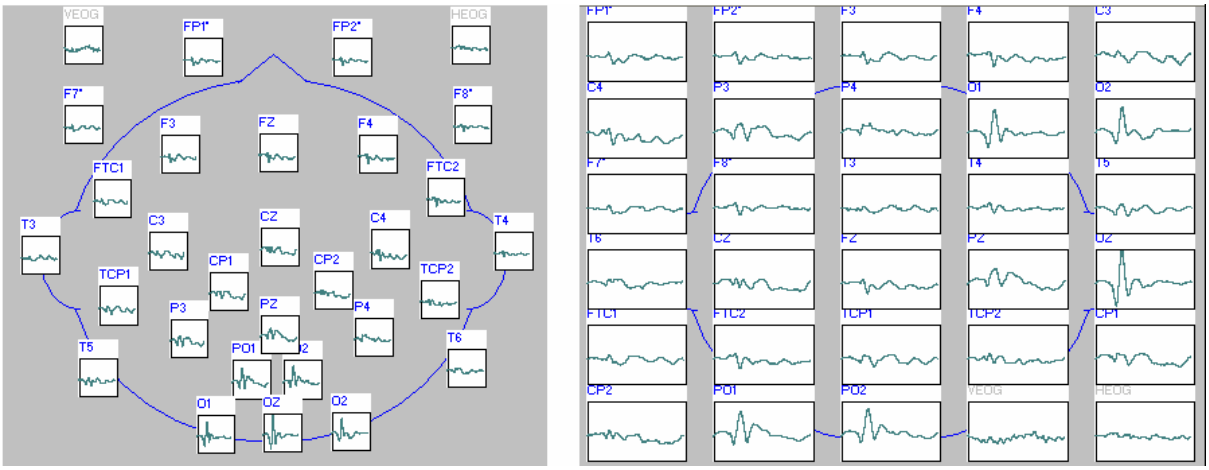
Most amplifiers in existence use 16 bits of digital resolution and this is adequate for most situations. Filters on the front-end of AC amplifiers help restrict the values that are seen at the amplifier inputs. *SynAmps*, *SynAmps*^{2}, and *NuAmps* are capable DC recordings. DC recordings, however, present issues. Since the signal is allowed to drift away from the 0 baseline, the values can become very large. The original *SynAmps* used a DC correction that would re-center when it came too close to the limit of the dynamic range. *SynAmps*^{2} and *NuAmps*, however, employ 24 bits of data, allowing the data to exist in a huge range of values, thus eliminating the need for DC correction. The data files that are created use 32 bits of storage on the disk.

Unfortunately, the EDF specification assumes that 16 bits of resolution is sufficient for

all recording of neurophysiologic potentials. There is no provision for larger bit counts, and so a 32-to-16 bit conversion is required. We must be careful in how these bits are used in order to maintain a careful balance between resolution and range when compressing 32 bit data into 16 bits. You also have the option to export Bad and Skipped channels, as well as selected EEG channels. (See the EDIT manual for details, and the Tcl Batch manual for the batch command).

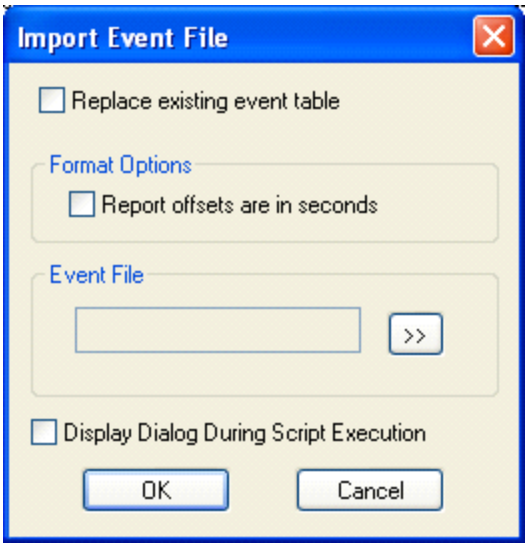
3.4 Grid Layout

The Grid Layout is a new option accessed from the  button on the Toolbar. It is used with Multiple Window data files (.eeg, .avg, .coh) to reorganize the windows in the display. When enabled, all position information is removed and the windows are arranged in a grid or matrix pattern, based on the order in the Channel Assignment Table (right side in the figure below). Deselect the button to return to the original layout (left side).



3.5 Import Event File

The Import Event File transform allows you to retrieve and apply an event file (.evt or .ev2) to a CNT file. The new event file can replace an existing event table, or be added to it. (The event table is that section at the end of a CNT file that contains the event information for the file). Therefore, if you have an event file that has, for example, stimulus type codes at every 1250ms, you could import the event file to one or more CNT files and thereby place the events automatically. If you are importing a CNT file from ASCII - which does not contain the event information - you can add the events from an event file you have created. Complete details are found in the EDIT manual. The batch command is in the Tcl Batch manual.

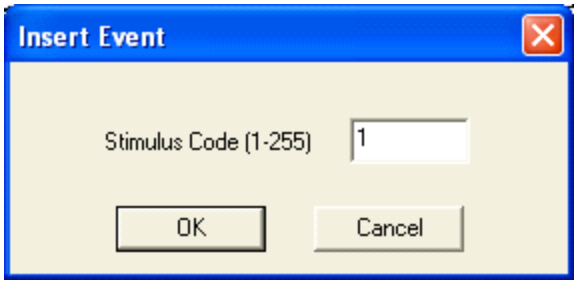


The Import Event File transform has a use in EKG artifact reduction, when not using the EKG Noise Reduction transform. In some cases (primarily involving BCG), it may be necessary to filter the trigger channel extensively in order for the **Voltage Threshold** transform be able to place events at the R wave peaks accurately. However, you might then want to use the correction with the unfiltered data. Therefore, you can create the event file from the filtered file, and the import the R wave peak events back into the original unfiltered file.

3.6 Insert Multiple Events

The Insert Multiple Events option provides an easy method for manually inserting Stimulus events into a CNT file. In some rare cases (such as extreme BCG), it may be impossible for the Voltage Threshold or QRS Detection transforms to place events automatically at desired peaks in the CNT file. The Insert Multiple Events option lets you place stimulus events at manually selected locations.

The option is accessed from the  icon on the Toolbar. Clicking it displays the Insert Event dialog screen.



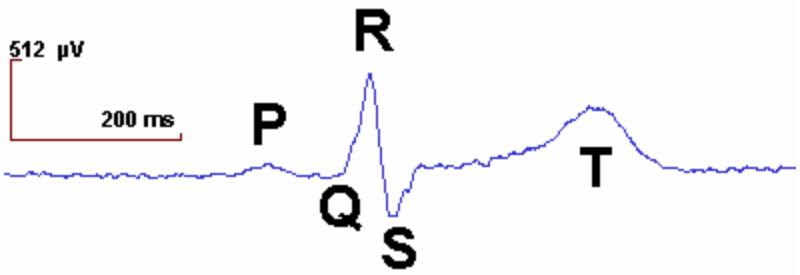
Enter a stimulus type code from 1 to 255. Be sure to use a code that does not overlap with any stimulus types codes (from Stim2, or other system). Then position the mouse where you want the type code to appear and click the left mouse button to add the event at that point. Continue clicking at each desired position. If you want to use more than one type code (to mark more than one type of waveform in the file), click

the icon again to deselect it, then click it again to reselect it and enter a new type code. Then place the events as desired. The Correlate Peaks transform can then be used to align by the waveforms, which will correct for minor misplacements of the manually inserted events.

For Batch, see the INSERTSTIMEVENT and INSERTRESPONSEEVENT commands.

3.7 QRS Detection

The QRS Detection transform is used to automatically detect QRS waveforms in CNT files. Recalling the major components of an EKG beat, the Q, R, and S waves are often the most recognizable and most stable components.



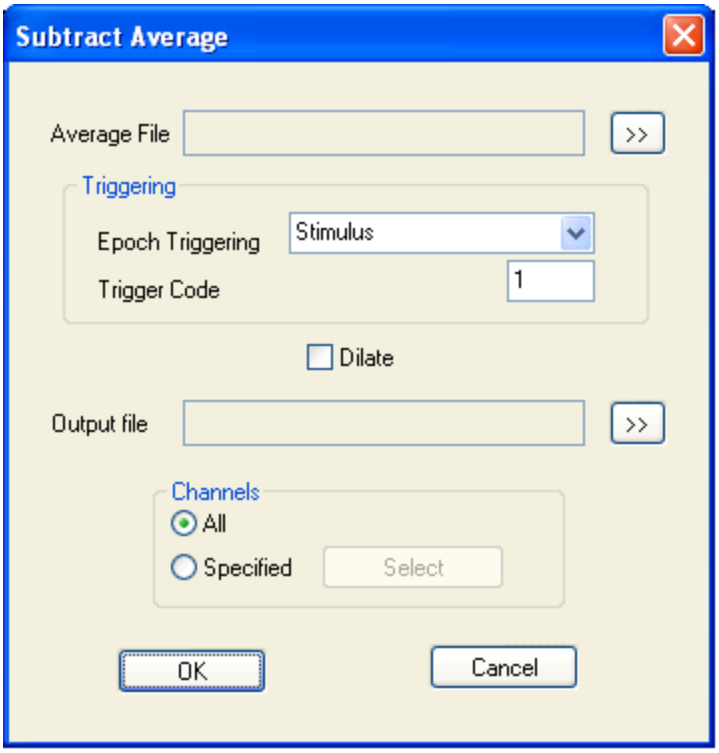
The transform will place events based on the detection of the QRS complex. You select the **Channel** that is to be used, and the event code that you want to insert.

The **QRS Detection** method uses a public domain algorithm for QRS detection (Open Source ECG Analysis Software Documentation; Copyright © 2002 Patrick S. Hamilton). It is used here as one method for placing events in the CNT file for each QRS waveform. (See the EDIT manual for details, and the Tcl Batch manual for the batch command).

3.8 Subtract Average

The Subtract Average transform lets you subtract an AVG file from sections in a CNT file. For example, if you have an averaged EKG or BCG artifact, you can subtract that average from detected artifacts in the CNT file. To use the transform, you must first have stimulus or response events placed for the artifact sweeps. The events can be placed using the **Voltage Threshold** transform, the **QRS Detection** transform, or

manually using **Insert Multiple Events**. (See the EDIT manual for details, and the Tcl Batch manual for the batch command).

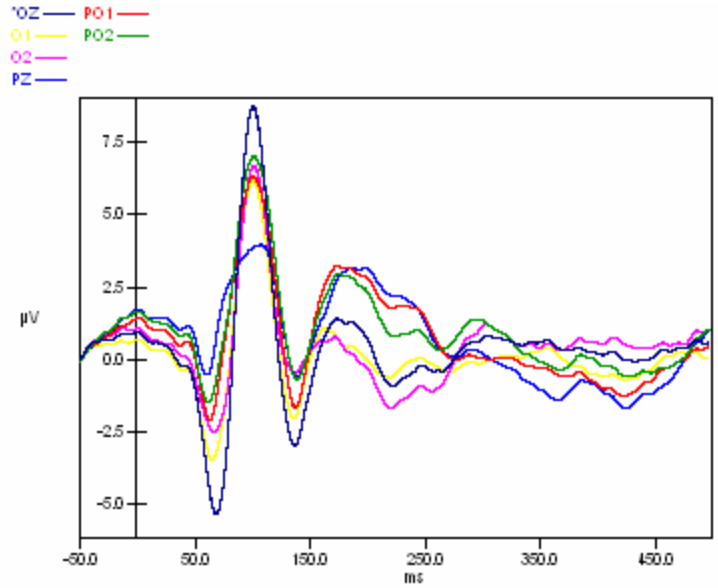


Subtract Average was split out from the EKG Noise Reduction transform to allow you more control in its use. Part of the EKG Noise Reduction transform involves creating a rolling average, and then subtracting that from subsequent artifact sweeps. The Subtract Average transform is similar in that an averaged artifact is subtracted from detected artifact sweeps. The average file, in this case, is not rolling - it is based on whatever sweeps you use to create the average.

The **Dilate** option provides another type of correction. A given artifact sweep may vary from the average artifact by overall amplitude - it may be somewhat larger or smaller than the average artifact. Enabling this option will direct the transform to fit the average to the current sweep by using a multiplier to dilate or constrict the average waveform until a best fit is obtained. On a per channel and per trigger basis, data points in the average waveform are scaled according to a minimized RMS value. The final subtraction will avoid over- or under-correction that may otherwise occur.

3.9 Compare Electrodes Batch Commands

New Batch commands have been added to let you compare up to 8 electrodes within the same AVG, EEG, or COH file (time and frequency domains). The command is COMPAREELECTRODES. Compared electrodes may be removed with the REMOVECOMPAREELECTRODES command. See the Tcl Batch manual for details.



3.10 Sample Paradigms

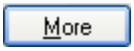
The Scan 4.5 installation now includes demonstration files that illustrate some of the more common sensory and cognitive paradigms, including P50, P300, N400, P600, MMN, etc. These are installed in subfolders under *C:\Documents and Settings\All users\Application Data\Neuroscan\Scan4.5\Sample Paradigms* (for Vista installations, go to *C:\ProgramData\Neuroscan\Scan4.5\Sample Paradigms*). The *Sample Paradigms - Readme.pdf* file summarizes the various paradigms and gives directions for installing the configuration, sequence, stimuli and instruction files for Stim^2. These are contained in separate zip files in each subfolder. The Sample Paradigms are intended to be a general guide for those interested in learning how Stim^2 and ACQUIRE can be configured to perform the studies.

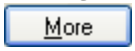
4 Other Changes Since V4.3.1

The most significant changes since V4.3.1 are the online and offline fMRI and EKG/BCG reduction transforms, most of which are included with the MagLink RT System (and are described in its User Guide). Additional changes have been included as well, and are listed below.

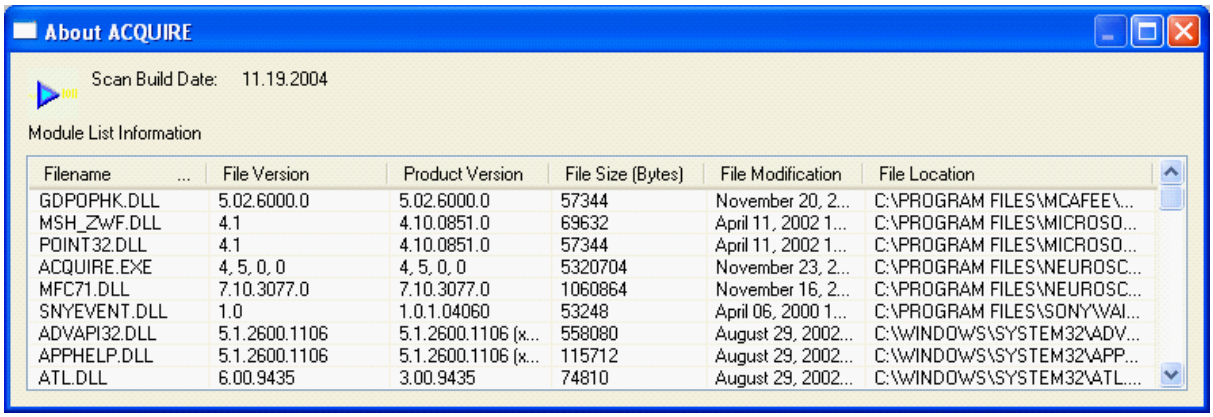
4.1 ACQUIRE and EDIT

About ACQUIRE and About EDIT



Under **Help**, the **About ACQUIRE** and **About EDIT** options now present additional information. Click the 

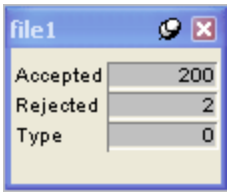
button to see a list of the DLL files currently being used.



You may be directed to this by Technical Support in order to help solve problems.

Display Status Window

Use this button on the Toolbar in ACQUIRE or EDIT to restore a Status Box that has been closed or is otherwise not found. If you have multiple windows open, switch the focus to the one with the missing Status Box, and click the button.



4.2 ACQUIRE

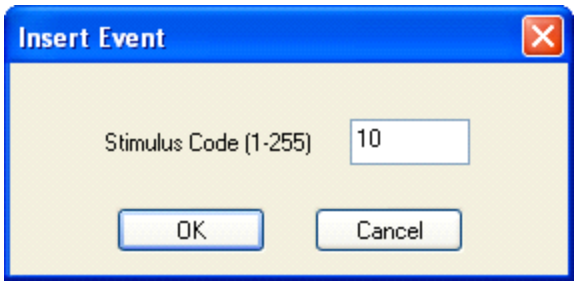
32-bit Acquisition (NuAmps only)

At the bottom of the **Edit** → **Overall Parameters** → **Amplifiers** display, there is a new option for 32-bit acquisition. To make full use of the DC capabilities of NuAmps, you should enable this option. Otherwise, the 0-0.8Hz band is stripped away. If you need true DC, or if you need to maintain compatibility with previous acquired 16-bit data, leave the option disabled. If you are using non-Neuroscan software (MATLAB, C programs, etc.) that uses 16-bits, disable the option.

4.3 EDIT

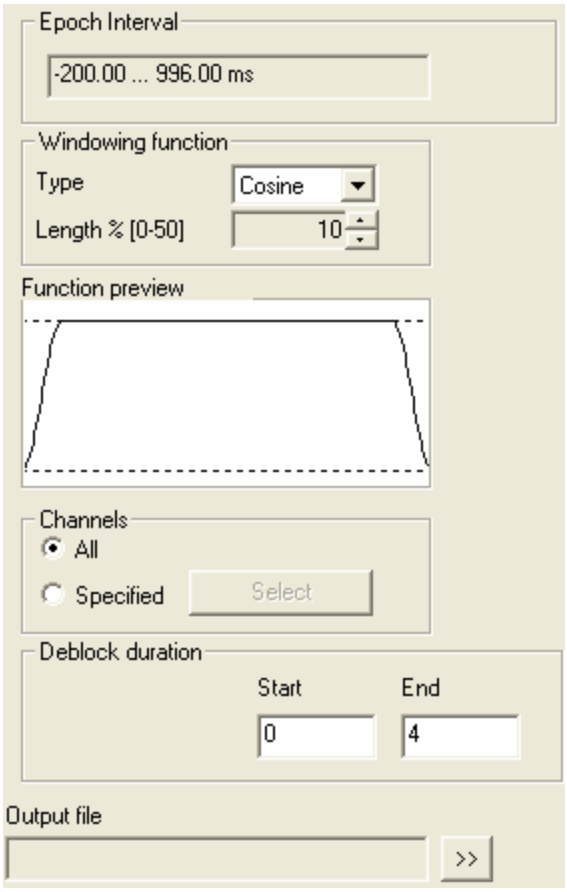
Manually Insert Stimulus Events in CNT Files

It is sometimes convenient to manually insert stimulus events in a CNT file. You can do this in BATCH with the INSERTSTIMEVENT command, and you can also do it manually by positioning the cursor at the desired time point, and clicking *Ctrl+V*. Enter the desired stimulus code (1-255), and click OK. Resave the file to make the change permanent. This feature has since become nearly obsolete with the addition of the **Insert Multiple Events** option, described above.



Deblock Transform

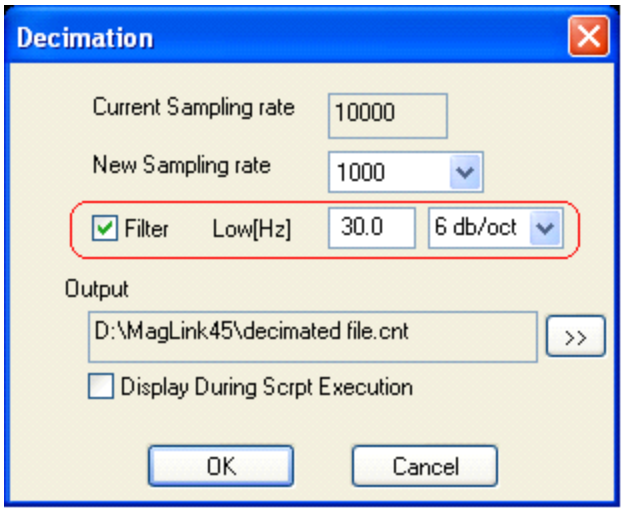
The **Deblock** transform has a similar function to Deblocking with the *SynAmps* amplifiers. It is used to replace SEP stimulus artifact, for example, with a flat line. Windowing is performed to minimize any abrupt transitions at the beginning and end of the flat lines. You can apply the transform to all of a selected group of channels, and you define the start and end points of the correction. The transform can be used with CNT, EEG or AVG file types. (See the EDIT manual for details, and the Tcl Batch manual for the batch command).



Decimate Modification

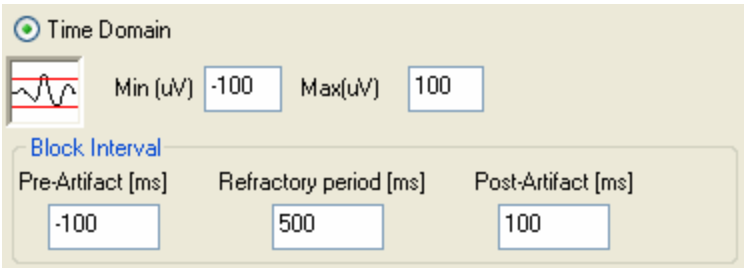
A Filter option has been added to the Decimate transform. This saves performing filtering as a separate step, as the two operations frequently go together (you should apply the filter when decimating to avoid aliasing). Enter a Low Pass[Hz] value, and select the slope. (See the EDIT manual for details, and the Tcl Batch manual for the batch

command).

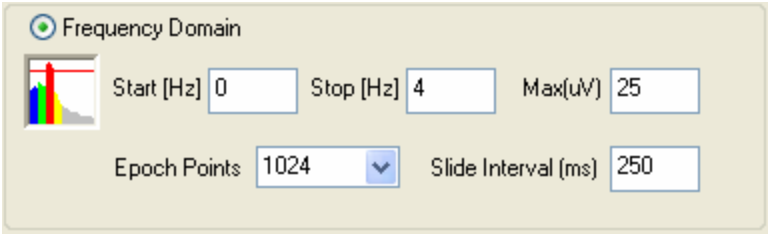


Artifact Rejection Modification for CNT Files

Artifact Rejection can be used with CNT files in three ways. Starting with Scan 4.3, you can set the voltage rejection criteria, as with EEG files. Then you define a Block Interval, using Pre-Artifact, Post-Artifact, and Refractory period time parameters.



Or, you can select artifacts based on the amplitude within a specified frequency range. This may be useful in case where EMG exceeds a selected threshold, or to remove sections with slow drifting artifact. This routine performs a series of FFTs, and then rejects epochs when the power in any frequency bin within the specified range exceeds the specified voltage threshold. The span of the epochs is determined by the Epoch Points field, and that will interact with the AD rate used when the file was recorded.



Beginning with the **Scan 4.3.2** release, event codes in the CNT file can be used to define the Block Interval. That block will be rejected about the events in the file.

Merge Task Data Modification

There has been a change made to the **Merge task data** transform, which is used to integrate the Stim^2 behavioral data file with the corresponding CNT file in EDIT. Previously, if the subject responded with the mouse or keyboard in Stim^2, the responses were registered as blue stimulus events in the CNT file. These are now converted to red response events when you merge the task data (you must be using Stim2 dat files).

Context Menu Options with Compared Files

When comparing multiple AVG files, you can now *right click* on a Compared File and change its color or delete the file.

REMOVEEVENT Batch Command

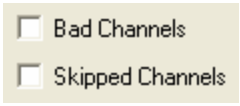
The **REMOVEEVENT** batch command was added. This command is used to remove events from CNT files, one event at a time.

1	int	Index of event (zero-based)

Example. REMOVEEVENT 25. The 25th event in the CNT file will be removed (the first event is 0).

Baseline Correction Modification

Baseline Correction has been modified to allow you to exclude Bad or Skipped channels. The new **BASECOR_EX2** batch command includes the new parameters.



ASCII Export/Import Modifications

Several Batch commands for ASCII Export/Import have been modified. The Export commands now include the option for **Comma Delimiting**, which separates the data points by commas, rather than tabs. This is useful for certain third-party software programs.

Tab Delimiting

```
[Average Data]
 -0.0992      -0.0268       0.1195
 -0.2597      -0.1877      -0.0154
 -0.2833      -0.2446      -0.1201
 -0.6013      -0.5308      -0.3512
 -0.7954      -0.7471      -0.5987
```

Comma Delimiting

```
[Average Data]
-0.0992, -0.0268, 0.1195,
-0.2597, -0.1877, -0.0154,
-0.2833, -0.2446, -0.1201,
-0.6013, -0.5308, -0.3512,
-0.7954, -0.7471, -0.5987,
```

The option is found in the ASCII Export dialog screen: 

. The new batch commands are EXPORTAVG_EX2, EXPORTEEG_EX2, EXPORTCNT_EX2, and EXPORTCOH_EX2 (see the Tcl Batch manual for details).

In the prior IMPORTEEG batch command, X Minimum was specified in *seconds*. A new batch command has been added: IMPORTEEG_EX. The parameters are the same as before, only with this command X Minimum is in *milliseconds*.