COPWIN & COPWORKS Version 6.21
# Program and Data Functions Update

This program update primarily deals with COPWIN EA (Ensemble Averaged) data related program functions that have been requested by COPWIN users. Some of these features were first made available in Version 6.20 Build #10 in order to permit some users to have as early access to these as possible. The primary enhancement for Version 6.21 is the doubling of the number of EA data files that may be acquired during any one subject/session. The previous limit was 999 files, this has now been expanded to 1999 files. Another significant enhancement is the addition of the Acceleration Index to the computed indices. We hope to implement more suggestions in future versions. If you would like to recommend a COPWIN program modification please feel free to email (tobit@microtronics-bit.com) us or call us at (919) 960-7799.

Please note that any part of this documentation that is specific to the Acquisition Mode is not pertinent to the COPWORKS program.

Expansion of the Number of EA Data Files per Subject/Session (from 999 to 1999)

The increase in the number of possible data files that may be acquired during any one COPWIN subject/session from 999 to 1999 should improve the data acquisition process for users who wish to acquire very short duration EA files. Users using the Non-Stop Acquisition Mode to acquire short duration EA files were somewhat time constrained with a limit of 999 files. Hopefully the increase to 1999 files should help alleviate this problem.

Note for Short Duration Users: With the release of version 6.20, the acquisition duration for EA files may be as short as 2 seconds or 3 cardiac cycles. BIT has had a few users actually request cycle by cycle data values, however if each file only contained one cardiac cycle then we would no longer be ensemble averaging, and the COPWIN system was designed for this type of acquisition. If users really feel they need a shorter duration EA file, version 6.21 will permit the user to acquire EA files consisting of only two cardiac cycles. We have put this option in on a trial basis and would love to have user feedback if this option should be made permanent, and also any opinions you may have on single cycle acquisition files. To use the 2 cardiac cycle option you must of course select the "Cardiac Cycles" Ensemble Average Mode in the Acquisition Setup Window. Then in the Ensemble Average DURATION frame, enter a "minus 2" (-2) for the Number of cardiac cycles. The "–2" will have to be entered each time as entering only the number 2 will cause an error message.
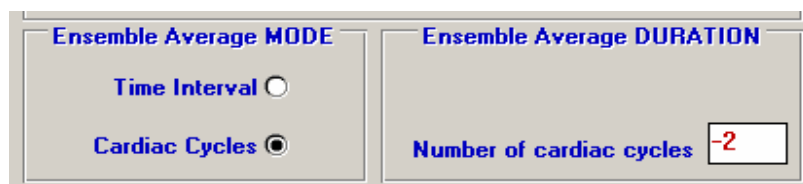
Acceleration Index (ACI)

Another significant enhancement to COPWIN Version 6.21 is the addition of the acceleration index (or **A**cceleration **C**ontractility **I**ndex) for each COPWIN EA file's dZ/dt waveform. The acceleration index is the peak value of the second derivative of the change in impedance divided by the thoracic impedance (in K ohms). ACI value is considered to be representative of the acceleration of aortic blood flow.

$$ACI = dZ^2/dt^2 MAX / TFI \qquad (TFI= Zo/1000)$$

Together with VI or Velocity Index (already available in COPWIN), these indices are believed to reflect cardiac contractility.

Even though the acceleration index has only become available as of version 6.21, any data collected with previous versions of COPWIN 6.xx will have the ACI value computed automatically if that file is opened – viewed and saved using the COPWIN EDIT mode.
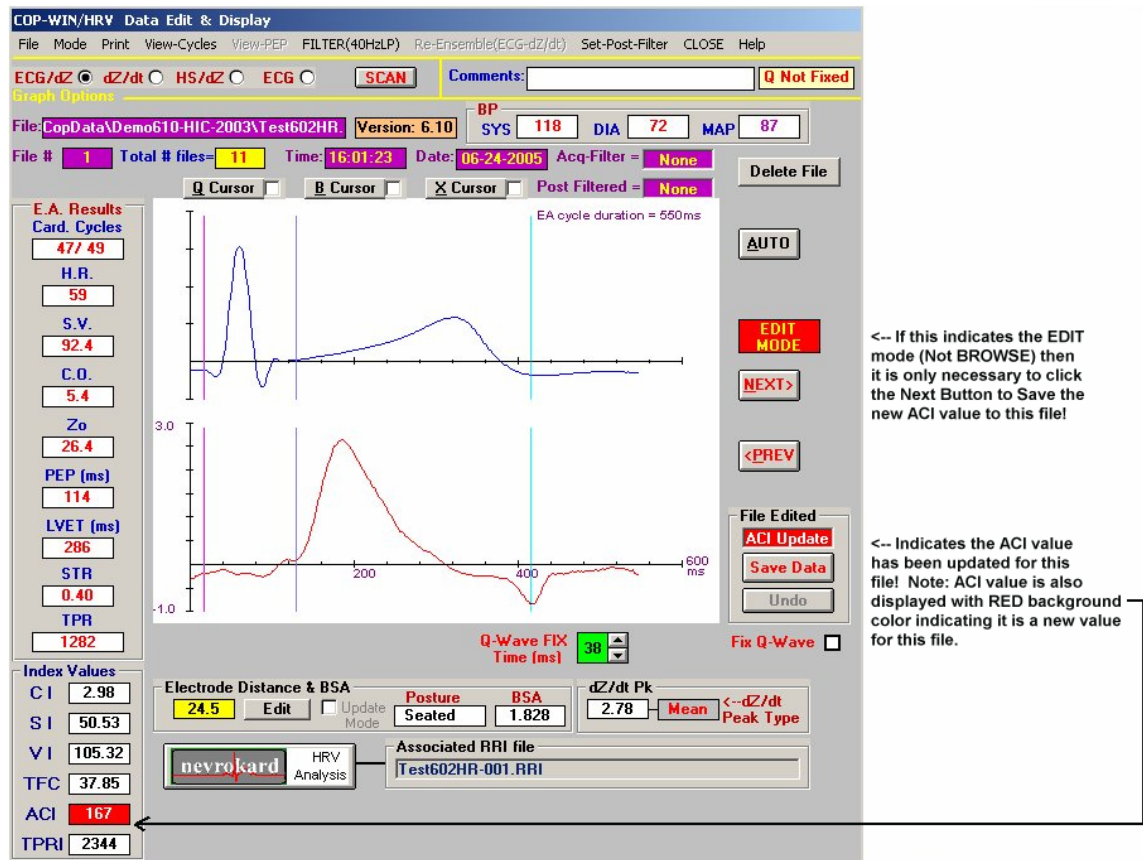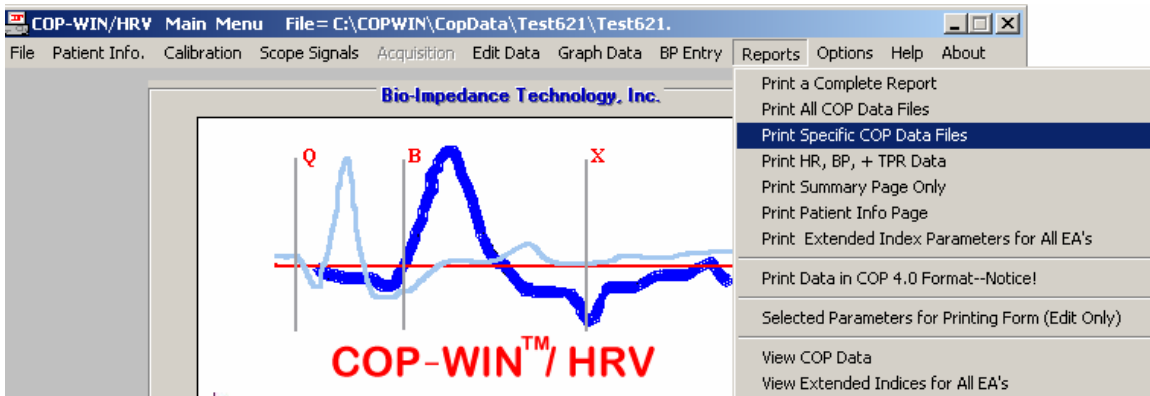
Edit Menu Option

The pull down menu for the **Edit Data** option on the COPWIN Main Menu Bar has been modified for version 6.21. The option to enter the BROWSE Mode at a specific file has been added to this menu. This option allows the user to start the BROWSE with their file of choice, previously the user would have to start with the 1st file and then jump to the file of choice if he/she wished to begin viewing files with a file other than the first available file.
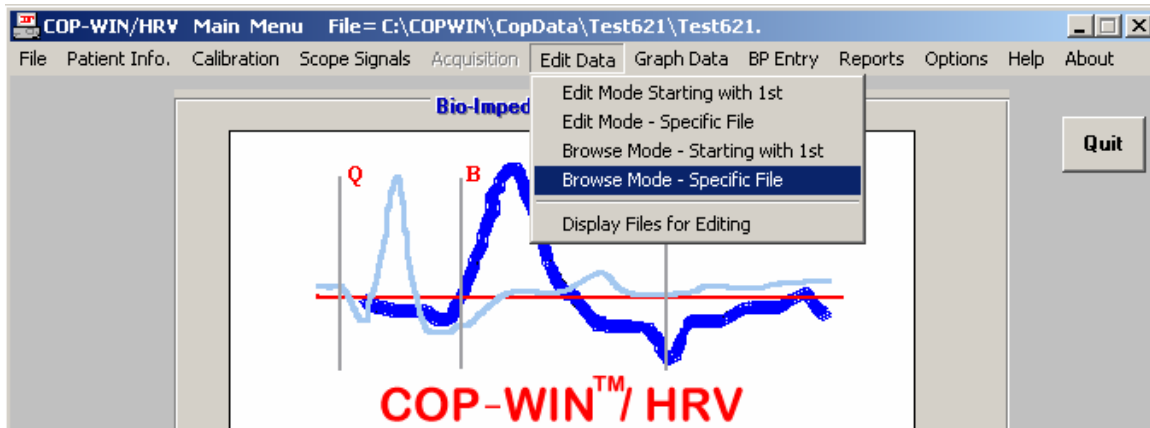
Selecting Specific Data Files for Printing (Reports Menu Option)

On the MAIN Menu Bar of COPWIN, selecting the **Reports** option offers a menu various options to print or view the acquired COPWIN data. The functionality of the option to "Print Specific COP Data Files" has been significantly improved with version 6.21.

The pop-up form for this menu option offers the ability to select a specific range of files or to select various files or groups of files for printing.

Other Minor Improvements

The BP Edit mode has been improved to accept faster editing of BP data. Previously, entering data values too rapidly could generate a "NO COP Data Files Beyond This One" error message when this was not the case.

From the **Reports** Option on the Main menu bar, the selection of "View Extended Indices for All EA's" will no longer display a column of zeros for respiration values under the "RESP" label. The respiration value column will only be displayed for data files where respiration was actually acquired.

Version 6.21 Data Function Enhancement
(Previously released in Version 6.20 Build#10)

1. Exporting raw ECG and Dz/dt waveforms to a text file:

The COPWIN/HRV program (beginning with Version 6.10) stores the raw ECG and Dz/dt waveforms that make up the ensemble averaged COPWIN data file. However it must be noted that these waveforms are "windowed" to the cardiac cycles. That is to say the waveforms are not a continuous recording. BIT had been requested to offer the option to export these data to a text file so that these waveforms could be imported into other programs in order to graphically display them in a higher resolution than that offered by COPWIN. This option has been made available in the COPWIN Version 6.20 Edit Window. The option to export waveforms to a text file is found under the File menu option on the Edit Mode Window menu bar. The option is labeled "Export raw cycle data to .csv file". The ".csv" file is a text format that is readily compatible with EXCEL and other programs.

2. Using the HRV Session Timer as an optional Time Stamp for EA Data Files.

When HRV Data Acquisition was added to COPWIN(Version 6.0) a "Session Timer" that the user could control was added to the HRV data acquisition mode (because many study designs use time as a variable). The Session Timer gives the user the ability to have the Time Stamp value used for acquired HRV data start at a time "00:00:00" instead of the "Time of Day". With this update (Version 6.21) COPWIN users now have the option to have the HRV Session Timer assign its time value to EA data files or to continue using of the normal "Time of Day" time stamp. The control for this option is located at the bottom of the COPWIN/HRV Acquisition Setup Window:
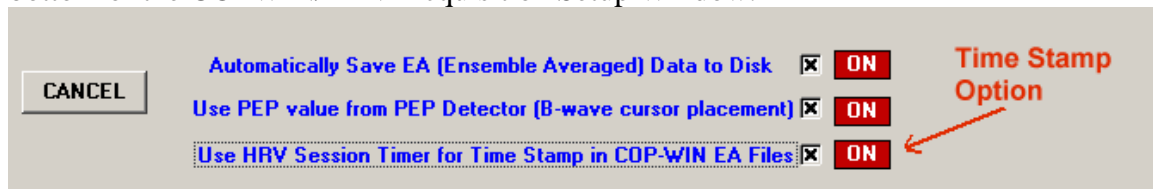

PLEASE NOTE! This option is only available when HRV data acquisition is enabled. **HOWEVER**, this does not mean that HRV data must be acquired, only that it be enabled so that the HRV data control frame will be visible at the bottom of the Acquisition

Window. This will give the user access to the HRV Session Timer (the Session Timer can function independently of HRV data acquisition).
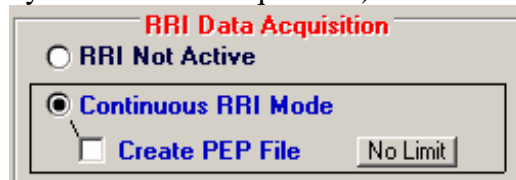
If HRV data acquisition is not part of your current study design, we recommend selecting the **HRV Continuous RRI Mod**e simply for the purpose of enabling access to the Session Timer.

When the OK button for the Acquisition Setup Window is clicked and the option to use the Session Timer to time stamp EA data files has been selected, a pop-up option window will appear. As this pop-up describes (see below), it offers the option to start the Session Timer at a preset value instead of starting at the default value of all zeroes (00:00:00).
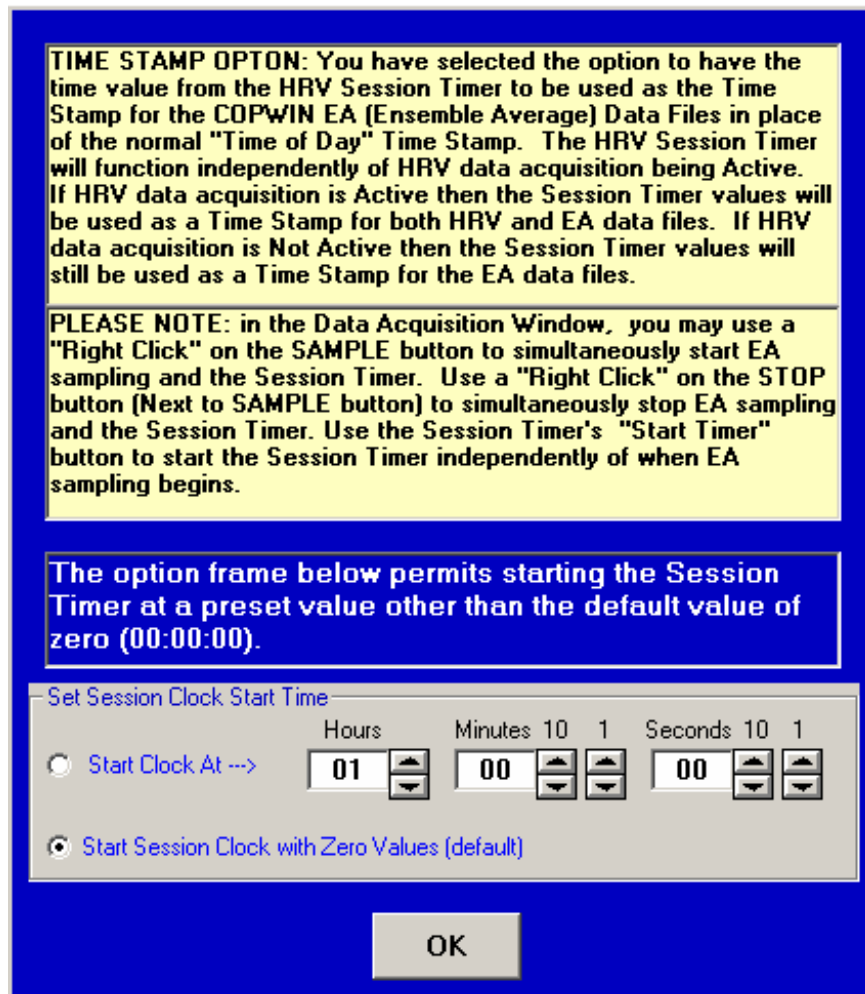
Also note that when the Acquisition Window is open there are additional options for starting and stopping the Session Timer. Use a "Right Click" on the **SAMPLE** button to simultaneously start EA data sampling and the Session Timer. Use a "Right Click" on

the **STOP** button (Next to SAMPLE button) to simultaneously stop EA data sampling and the Session Timer. You may also use the Session Timer's **Start Timer** button to start the Session Timer independently of when EA data sampling begins (for example: if EA data sampling is initiated by a BP monitor or an external Start Signal).

3. Addition of Subject ID to Text Data Storage

Previous versions of COPWIN and COPWORKS did not offer the user an easy method of adding a Subject ID variable to exported text data. This prohibited concatenating COPWIN text data files from multiple subjects in that there was not a variable available to that would permit a "by subject" analysis of the data. The option to export data to a text file is found in both the main COPWIN and COPWORKS window under the "File" menu bar option (see below).
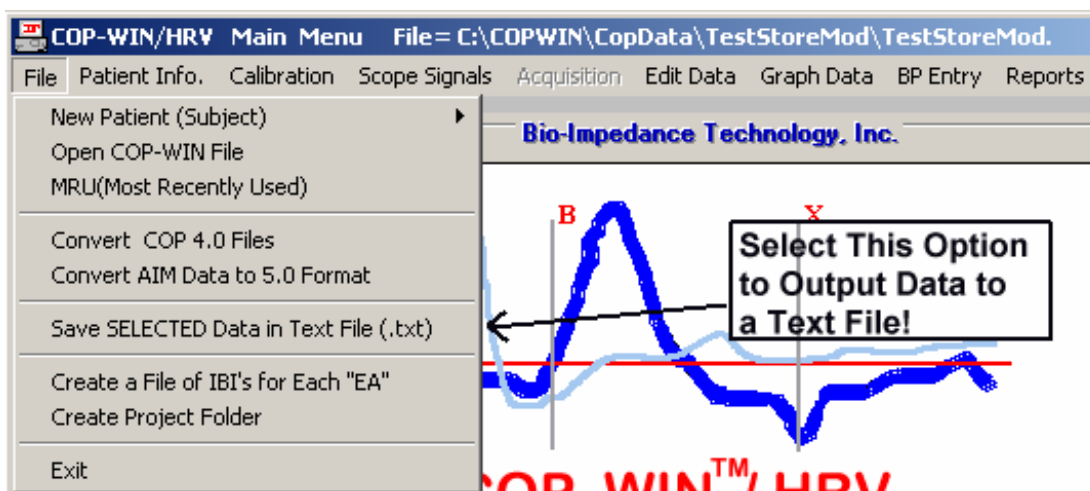
When this option is selected the "Text Data Storage Parameter Selection Form" will appear.   This form gives the user the option to decide which data parameters are to be exported to the text file. Option #22 on this form was previously just the option to print the Comment Field. This option has been expanded to offer a drop-down list box that offers the following options for this output data field.

1. Print the Comment Field Only (This is the default)
2. Print the Patient (Subject ID Only)

[This second option permits the substitution of the Comment Field (from the COPWIN EA Data Files) with the "Patient (Subject ID)" field that was entered in the Patient Information form. This will permit identifying each text data line in the text data file with a Subject ID.]

3. Print the Both the Patient (Subject ID) and the Comment Field
4. Insert the Patient (Subject ID) into the Comment Field and Print (This process is external and does not actually modify comment field in the EA data files.)

See the window graphic below for an example of the "Text Data Storage Parameter Selection Form".