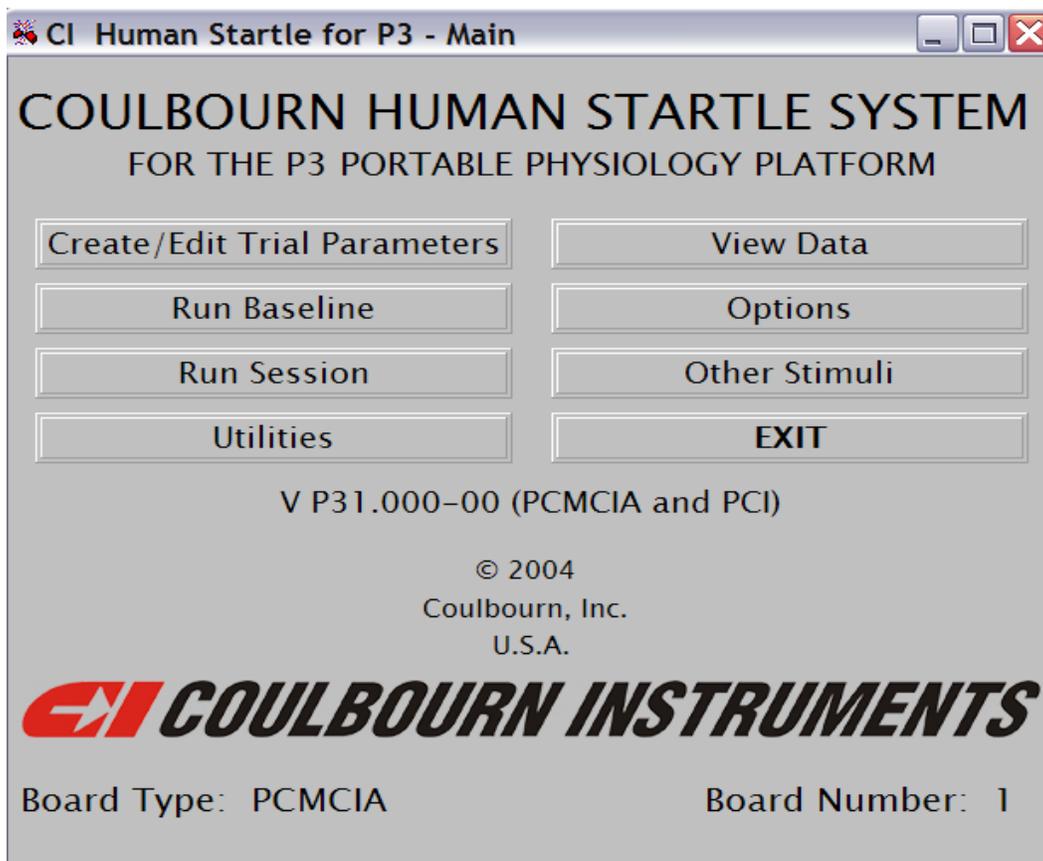


COULBOURN HUMAN MEASUREMENT SYSTEM

STARTLE SOFTWARE FOR THE PORTABLE PHYSIOLOGY PLATFORM



USERS' GUIDE (HMS-100-P3)

COULBOURN INSTRUMENTS



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Software Installation

Before installing the Startle System and the Human Measurement Software Utilities Software packages, be sure to install the PCMCIA (for laptop computers) or the PCI card for desktop computers. Refer to the Interface Card Installation manual included with your interface card.

To Install the Startle Software, insert the CD and from the Start menu select Run. Browse to your CD directory (e.g., [D:]), choose setup.exe, and then select RUN. The software will self install.

If you are using a notebook computer, you will need to configure your PCMCIA card. With the PCMCIA card installed in your laptop, select the Start menu, choose All Programs, then the Measurement Computing Group, and then select Instacal. The list of boards should include a PCMCIA board. If you just installed your PCMCIA card, wait a few seconds for the software to recognize your PCMCIA board. If the board does not appear, you may need to reinstall the Instacal software. Right Click on the PCMCIA board and choose Configure. On the right of the new window, select Counter 2 under Counter 3, then select Counter 1 under Counter 2, and choose 10 MHz under Counter 1. You must have administrative rights on your computer for these changes to take effect. Now exit Instacal. If you are not sure that you have administrative rights, open Instacal again, right click on the PCMCIA board in the list of boards and select Configure. If the settings are not as you selected previously, you will need to log onto your computer with an administrator password.

Start the application by running P3HSW.EXE.

After the P3 Startle software has been successfully loaded, the main menu shown on the cover page of this guide will be displayed. Note that this process may take several seconds since the interface board is detected and initialized at this time. The board type (PCI or PCMCIA) and the board number are shown at the bottom of this screen; the software used to install and configure the interface board assigns the board number.

The remainder of this guide will discuss each of the options presented in the main menu of the Startle program.

Utilities

This option loads and begins execution of the P3 Utilities software discussed in a separate manual.

Create/Edit Trial Parameters

The startle protocol is made up of individual trials. This option provides the utility to create the trials which define a session, to save these experiment files, and to edit files which were previously created and stored. The initial screen displayed by this option is shown below.

Tri No	Tri Ty	S1 Ty	S1 Fre	S1 Amp	S1 Dur	ISI	S2 Ty	S2 Fre	S2 Amp	S2 Dur	ITI
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											

The text boxes at the top of the screen are for the entry of trial parameters. These are:

Trial Type (Tri Ty)

Stimulus 1 Type (S1 Ty)

Stimulus 1 Frequency (S1 Fr)

Stimulus 1 Amplitude (S1 Amp)

Stimulus 1 Duration (S1 Dur)

Interstimulus Interval (ISI)

Stimulus 2 Type (S2 Ty)

Stimulus 2 Frequency (S2 Fr)

Stimulus 2 Amplitude (S2 Amp)

Stimulus 2 Duration (S2 Dur)

Intertrial Interval (ITI)

The *Trial Type* entry is only a label to facilitate separation of trial types for post hoc analysis.

Entries must be in the range 1 through 999.

Stimulus Type (both S1 and S2) entries must be in the range 1 through 5; stimuli of Type 1 are tones, stimuli of Type 2 are white noise bursts, and the remaining stimulus types are reserved for user-defined stimuli (i.e. stimuli controlled by stimulus outputs on the P3). If a Type 1 stimulus is specified, both *Frequency* and *Amplitude* specifications must be included. Frequency is specified in KHz, and amplitude as per cent maximum output (1 through 100). If a Type 2 stimulus is specified, only its amplitude is required; the frequency entry for that stimulus may be left blank. Stimulus durations and *Interstimulus Intervals* are specified in milliseconds (msec).

CI Human Startle for P3 - Create/Edit Trial Table

1 1 20 35 150 200 2 85 50 30 << Clear

Tri No	Tri Ty	S1 Ty	S1 Fre	S1Amp	S1 Dur	ISI	S2 Ty	S2 Fre	S2Amp	S2 Dur	ITI
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											

Copy Trial
Add Trial
Delete Trial
Open...
Clear Table
Save
Save As...
Make ITIs
EXIT

Each trial must include a *Trial Type*, a *Stimulus 2 Type*, a *Stimulus 2 Duration* and an *Intertrial Interval*. In other words, each trial must include at least one stimulus and that must be in the S2 position since it is the presentation of that stimulus which triggers the onset of post-stimulus data acquisition. If you wish to run a "dummy" trial, simply specify an unused stimulus (e.g., stimulus type 3) as the "S2 Ty." The figure above below illustrates entries for a trial of Type 1 which includes two stimuli – a tone of 20KHz at 35% amplitude of 150 msec duration and a white noise burst at 85% amplitude of 50 msec duration. The interstimulus interval is 200 msec and the ITI is 30 seconds. (A note concerning interstimulus intervals: the ITI specified in trial 1 actually *precedes* trial 1. This fact will be critical during the discussion of contextual stimuli below.)

CI Human Startle for P3 - Create/Edit Trial Table

2 5 200 500 2 85 50 30 << Clear

Tri No	Tri Ty	S1 Ty	S1 Fre	S1 Amp	S1 Dur	ISI	S2 Ty	S2 Fre	S2 Amp	S2 Dur	ITI
1	1	1	20	35	150	200	2		85	50	30
2	2	5			200	500	2		85	50	30
3	1	1	20	35	150	200	2		85	50	30
4	2	5			200	500	2		85	50	30
5	1	1	20	35	150	200	2		85	50	30
6	2	5			200	500	2		85	50	30
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											

Copy Trial
Add Trial
Delete Trial
Open...
Clear Table
Save
Save As...
Make ITIs
EXIT

To record a trial in the experiment grid, click on any column in the appropriate row. In the example above, click on all rows (which correspond to trial numbers) which should include trials of type 1.

In the figure above, trials of type 1 have been specified for all odd-numbered trials, and type 2 trials occupy all even-numbered trials.

The *Clear* control clears all text-entry boxes.

If the same trial type is to occupy a block of trials, the *Copy Trial* control may be used to quickly accomplish this task.

CI Human Startle for P3 - Copy Trial

FROM

COPY FROM TRIAL NUMBER:

TO

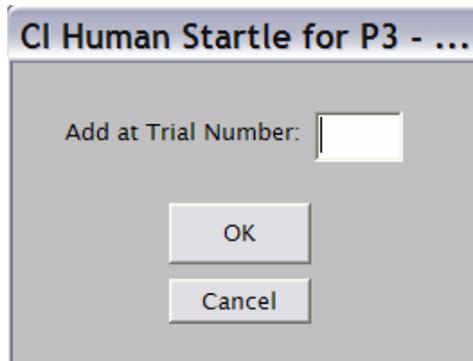
RANGE STARTING AT TRIAL NUMBER:

RANGE ENDING AT TRIAL NUMBER:

OK
Cancel

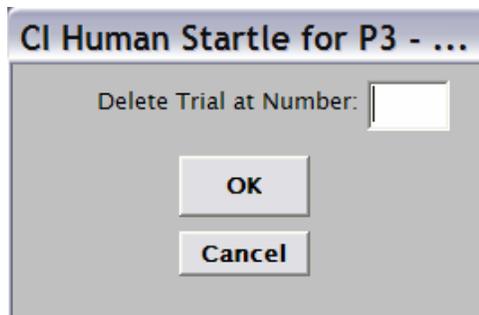
Enter the starting and ending trial numbers, and the program will copy the currently specified trial parameters into that block of trials.

A trial may be added among already-specified trials with the *Add Trial* control.



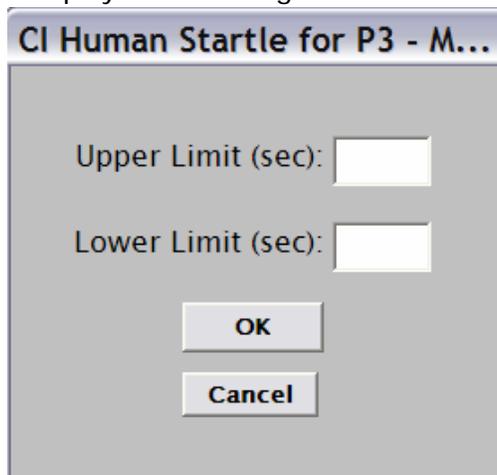
Specify the position at which the new trial is to be added, and the program will move the already-specified trials to allow space for the trial to be added.

The *Delete Trial* control simply deletes the specified trial without moving other trials. When the experiment file is saved, blank lines in the grid are ignored.



Use the *Open...* control to view or modify experiment files previously saved. This control opens a standard Windows dialog box which displays the available files of type .exp (experiment files). The data may then be modified and resaved under a new name or saved under the old file name (*Save As...* and *Save* controls). Note that all newly created experiment files must be saved using the *Save As...* control; care must be taken to ensure that the files are saved to the p3hsw folder under Program Files (the full path specification for experiment files is c:\Program Files\p3hsw).

You can enter the ITI values or the program can create a set of random ITIs; click the *Make ITIs* control and the program will display the following window.

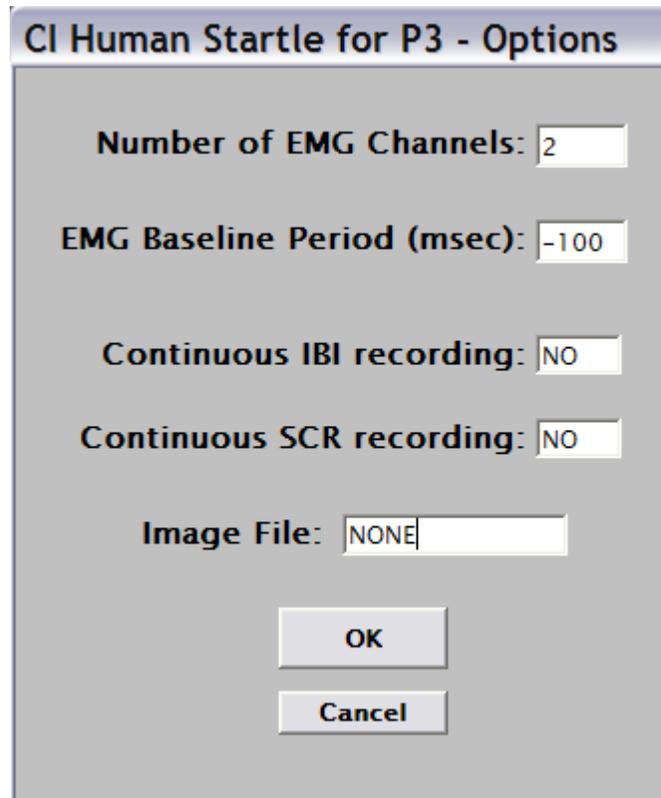


Enter the upper and lower limits for the randomization, and the program will fill in the values for all 250 trials in the grid. (Note: The minimum ITI should not be less than 10 seconds.)

Use the *EXIT* control to return to the main menu.

Options

The *Options* control is used to specify several aspects of the startle protocol.



CI Human Startle for P3 - Options

Number of EMG Channels:

EMG Baseline Period (msec):

Continuous IBI recording:

Continuous SCR recording:

Image File:

The protocol may include 1 or 2 EMG channels.

The baseline period (against which the EMG response is measured) is acquired on every trial. The duration of this baseline data collection and its position relative to the startle stimulus (*S2*) may be specified in this window. The duration is entered in milliseconds and the sign indicates whether baseline data are acquired before *S2* (if negative) or after the onset of *S2* (if positive). It should be recalled that the onset of *S2* also triggers the 200 msec of startle response data acquisition. If baseline measures are acquired following the onset of *S2*, care must be exercised in specifying the duration so that the baseline data are not contaminated by the onset of the startle response.

Heart rate (IBI) and skin conductance (SCR) data are acquired for 5 seconds following *S2*. If these data are to be collected during the ITI as well, click on the appropriate label (the cursor will change to a vertical arrow), and the associated text box will change from NO to YES. SCR data are acquired at 20 msec intervals (50 Hz) and the ECG signal is digitized at 1KHz to produce IBI data accurate to 1 msec.

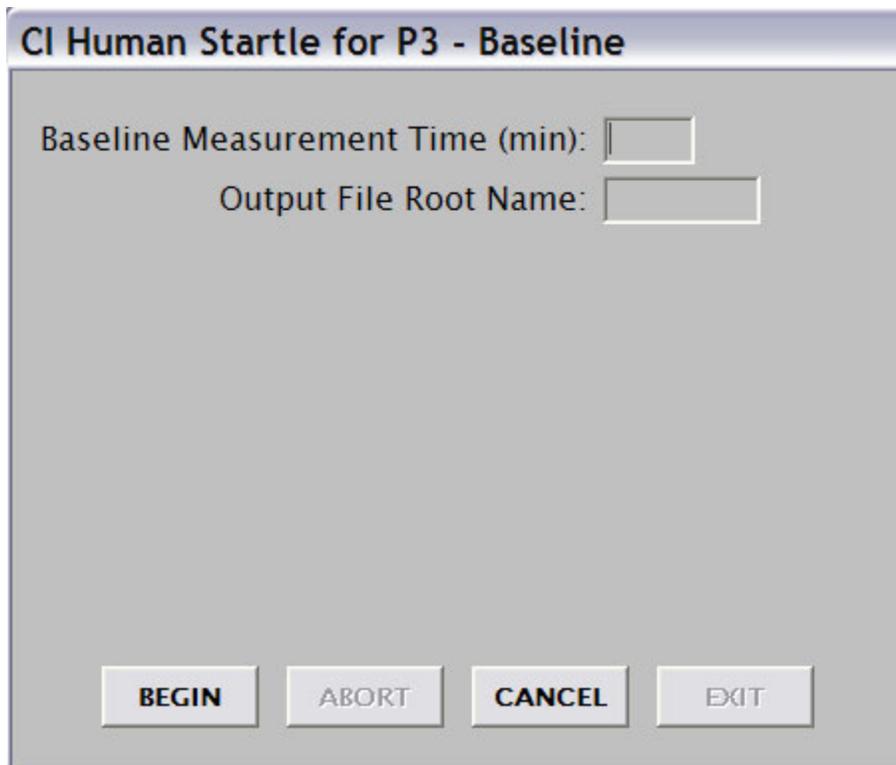
If screen images are to be included as contextual stimuli, the name of the file specifying which images will be shown is entered as the *Image File*. If you are not using contextual stimuli, the default "NONE" must be included in this entry box. This topic will be fully discussed in the *Other Stimuli* section.

Click *OK* to record the new list of options, or *Cancel* to return to the main menu.

Run Baseline

This option is provided to accommodate startle protocols in which baseline data are collected prior to exposure to the startle trials.

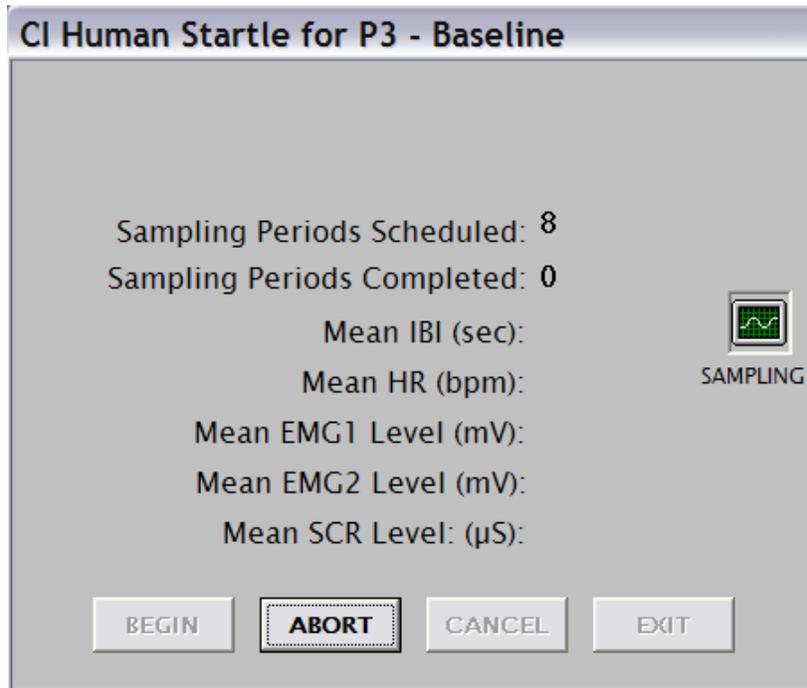
The screen below is displayed when the *Run Baseline* control is clicked.



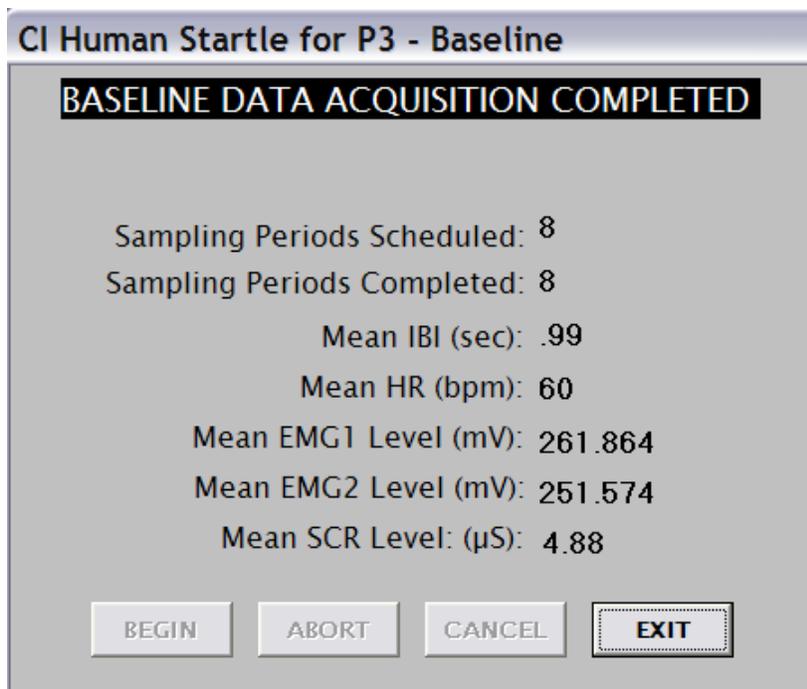
The screenshot shows a dialog box titled "CI Human Startle for P3 - Baseline". Inside the dialog, there are two input fields. The first is labeled "Baseline Measurement Time (min):" and has a small rectangular input box next to it. The second is labeled "Output File Root Name:" and has a larger rectangular input box next to it. At the bottom of the dialog, there are four buttons arranged horizontally: "BEGIN", "ABORT", "CANCEL", and "EXIT".

Enter the duration of the baseline measurement period and the root portion (the part of the file name to the left of the period) of the data file names; the program will provide the appropriate extensions for these files. Click *BEGIN* to initiate data collection or *CANCEL* to return to the main menu.

The screen below will be displayed during data collection.



The *Sampling Periods Completed* will be updated as 15-second data blocks are acquired. The other measures will likewise be refreshed to indicate the data collected during the most recently completed data block. The *ABORT* control is enabled during baseline data acquisition and is used to terminate program execution.



When the final sample interval has been completed, the screen above will be displayed. Click the *EXIT* control to return to the main menu.

Characteristics of the stimuli are entered in the text boxes at the top of the screen. Entries are trial number (*Trial*), the time at which the event is to occur (*Time*), the nature of the event (stimulus onset or offset – *On* or *Off*), and the stimulus (or stimuli) to be turned on or off (*S3*, *S4*, *S5*, or *Pict*). Times are specified as seconds remaining in the ITI *preceding* the trial identified in the *Trial* column. For example, if the trial number specified is 3, the entry under *Time* is 10, and the *On* column is selected, the specified stimulus will be activated 10 seconds prior to the onset of trial 3. Care must be taken to ensure that the ITI is of a length appropriate to accommodate the specified time. Also take note of the message at the bottom of this screen. Stimulus changes during the pre-record and post-record data acquisition periods may affect the data collected during these intervals.

Enter the trial number and time (in seconds; fractional parts are allowed) in the usual manner. Specify stimulus onset or offset by clicking the *On* or *Off* text box, and which stimuli are to be affected by clicking in the appropriate box or boxes. (The *Pict* box will be fully explained below.) When these entries are complete, click in the row of the grid appropriate to this event.

It is possible to present (or turn off) more than a single stimulus as a single event. The screen shown below illustrates this point.

CI Human Startle for P3 - Other Stimulus Outputs

Times are expressed as seconds remaining in the ITI.

4 6 X X << Clear

Event	Trial	Time	On	Off	S3	S4	S5	Pict
1	2	12.1	X		X		X	
2	2	9.3		X			X	
3	2	8		X	X			
4	3	10	X			X		
5	4	6		X		X		
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								

Open
Save
Save As...
Clear
Image File
OK

The final 5 seconds of the ITI are devoted to pre-record data acquisition; the first 5 seconds of the following ITI are devoted to post-record data acquisition. Programming changes in contextual stimuli during these periods may affect response data.

This grid specifies that stimuli 3 and 5 will be turned on with 12.1 seconds remaining in the ITI preceding trial 2. With 9.3 seconds remaining in this ITI, stimulus 5 will be turned off. With 8 seconds remaining, stimulus 5 will be turned off.

If a stimulus or stimuli should remain on during the presentation of the startle stimulus (and prepulse if programmed), the event onset and offset are designated in different trials. This strategy is illustrated by events 4 and 5. Stimulus 4 is turned on with 10 seconds remaining in the ITI preceding trial 3, and is turned off with 6 seconds remaining before the onset of trial 4. Note that the actual duration of stimuli which bridge trials depends upon the duration of the ITI of the second trial since the offset is specified as time remaining (rather than time elapsed) in the second ITI.

The *Pict* column is used if a screen image (on a second monitor) is to be included as a contextual stimulus. The names of the bitmap (.bmp) files containing the images are entered in the screen shown below. This screen is accessed by clicking the *Image File* control.

CI Human Startle for P3 - Create/Edit Image File

Image Number	Image Name	Background Color
1	image1	1
2	image2	4
3	image3	8
4	image4	8
5		
6		
7		
8		
9		
10		

Color Codes

- 1 - white
- 2 - light grey
- 3 - dark grey
- 4 - black
- 5 - red
- 6 - yellow
- 7 - green
- 8 - blue
- 9 - magenta
- 10 - brown

Next Previous Open... Save As...

Clear Cancel

The image files must be saved in a subfolder of the root folder named *images* (typically c:\images). Enter the names of the image files in the text boxes and select a background color for each image from the list. Use the *Next* and *Previous* controls to scroll the image list. When the image list is complete, use the *Save As...* control to save the image file. Take care that the file is saved in the *images* folder.

Use the *Open...* control to open an already-existing image file for editing. The *Clear* control clears the image file list. The *Cancel* control returns to the Other Stimuli entry screen.

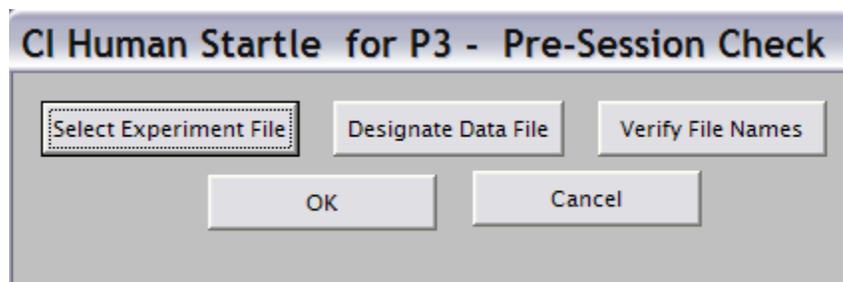
If screen images are used, the name of the image file must be provided to the software on the *Options* screen. Refer to the Options section of this manual and note that the final option is Image File; the name of the file to be used must be entered here. Use only the root name of the file and do not specify the folder.

When contextual stimuli are included in an experimental protocol, the name used to store the contextual stimulus file must match the name of the corresponding experiment file. The Save As... (for new files) and Save controls on the Other Stimuli screen are used to save these files. Provide a root name which corresponds to the root name of the experiment file. The experiment file will be saved in the application folder with a .exp extension, and the contextual stimulus file will be saved in the same folder with a .ctt extension.

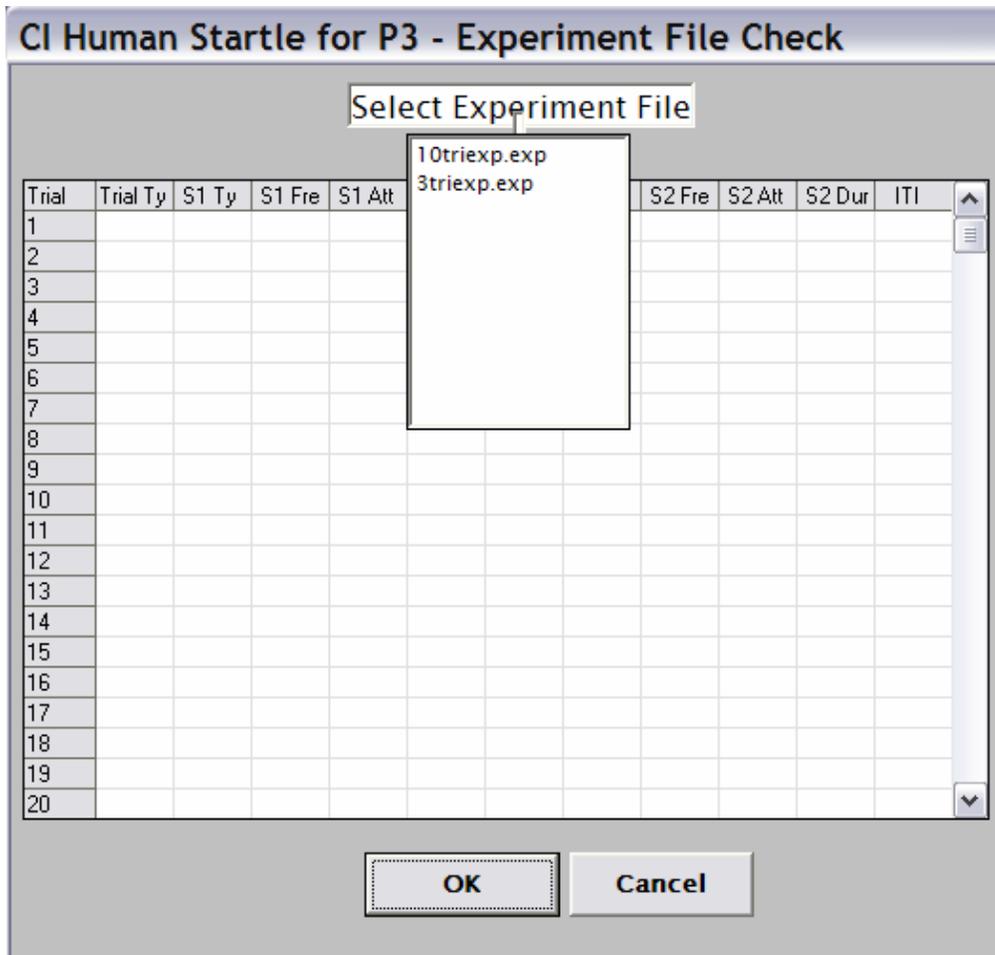
Use the OK control to return to the main menu.

Run Session

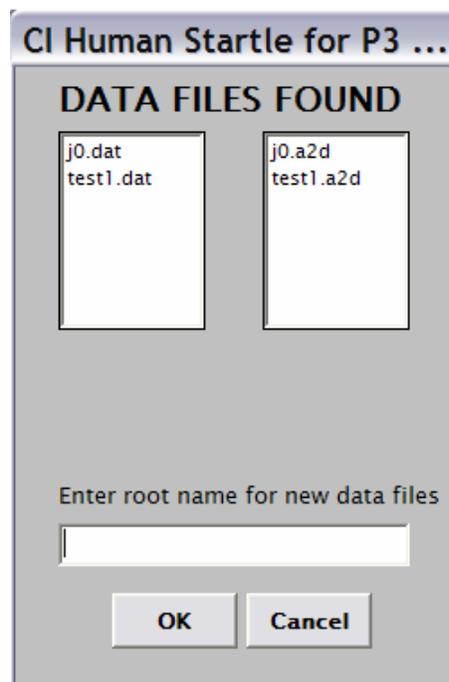
Preparing to run a session requires several steps. When the Run Session control is selected, the screen shown below is displayed.



Select the experiment file to be used by clicking the Select Experiment File control. The program will display the screen shown below.



Select the experiment file from the list box. The program will show the first 20 trials of the selected file for approval. Click the OK control to verify that the correct file has been selected. This action will return the program to the Pre-Session Check window.



Click on the Designate Data File control to enter the root names of the data files to be written. The program will show this screen for file name entry.

The screen will show the names of the files found in the application folder. Enter the root name to be used for the new data files, and click the OK control. If a duplicate name is entered, the program will request verification that the older file is to be overwritten.

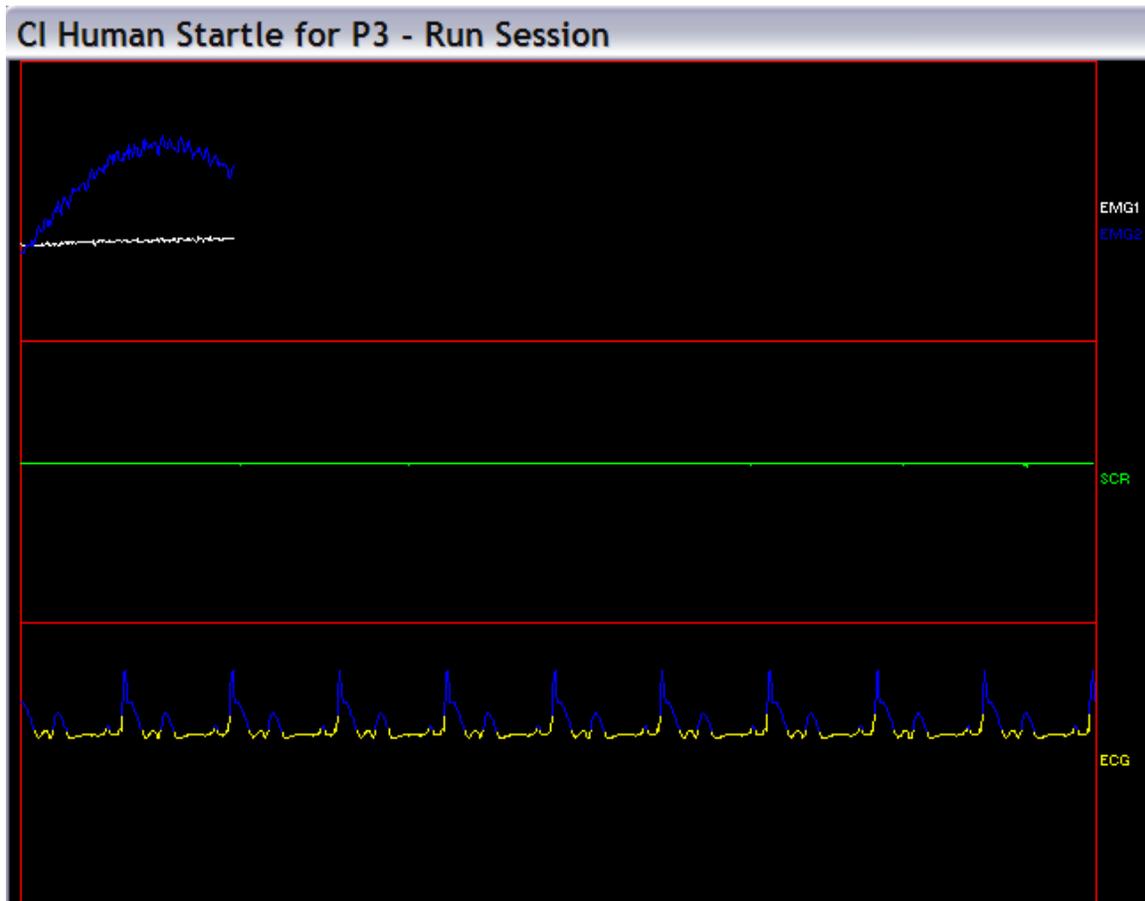
When the program returns to the Pre-Session Check window, the *Verify File Names* control may be used to show a list of the experiment and data file names to be used, the *Cancel* control may be used to return to the main menu, and the *OK* control may be used to proceed with running the session.

If a contextual stimulus file is located a label indicating that a CTT file was found will be included on the initial run screen. If SCR and ECG data are to be acquired during the intertrial intervals (refer to the Options section of this manual), this will be shown. Click the *BEGIN* control to start the session. The screen below illustrates program execution in the ITI before Trial 1.



The *Next Trial* counter will count down to 5 seconds before the trial is scheduled to begin. The *Status* label will then change to *Pre Rec* to indicate that the pre-record data acquisition period has begun. When this period is complete, the programmed stimuli will be presented, and the post-record data period will begin (the status will change to *Post Rec*). When the post-record data have been acquired, the data will be displayed in both numeric and graphic forms, the data files will be updated, and the time remaining in the next ITI will begin counting down. The screen below shows a representation of the graphic data display.

This sequence of events will be repeated until all scheduled trials have been presented.



Two data files will be written to the application folder (c:\program files\p3hsw) for each session. One will have a .dat extension and will contain scored data and the other will have a .a2d extension and will contain raw data.

The first record of the .dat file will consist only of the name of the file (root portion only). Following this record, the file will contain a record for each trial. These records will consist of the following data elements.

1. The trial number
2. The trial type
3. Average pre-record EMG1
4. Peak post-record EMG1
5. Latency to peak post-record EMG1
6. Average pre-record EMG2
7. Peak post-record EMG2
8. Latency to peak post-record EMG2
9. Average pre-record SCR
10. Peak post-record SCR
11. Latency to peak post-record SCR
12. Average pre-record heart rate (BPM)
13. Post-record minimum IBI (msec)
14. Latency to post-record minimum IBI (msec)
15. Post-record maximum IBI (msec)
16. Latency to post-record maximum IBI (msec)

For each trial, the .a2d file will include the following data.

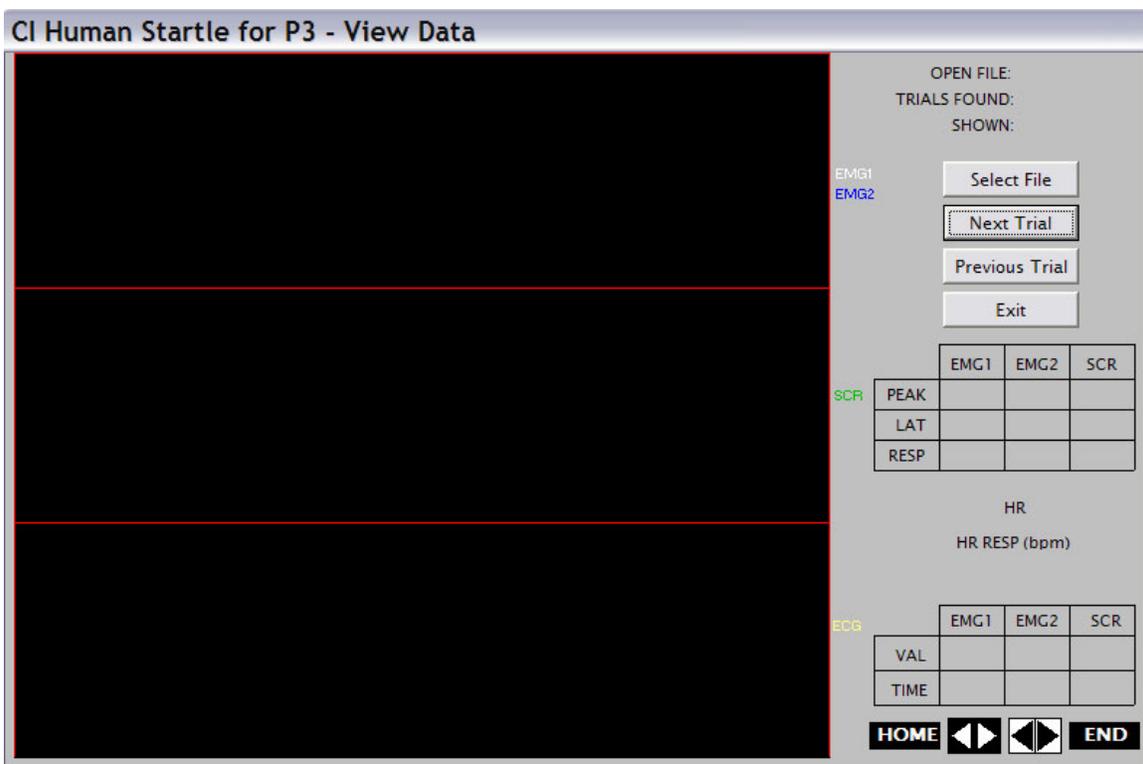
200 EMG1 samples

200 EMG2 samples
 3000 SCR samples (beginning 1 sec post S2)
 3000 ECG samples (beginning 1 sec post S2)

If continuous recording of SCR and/or IBI is enabled, additional data files, .scr and .ibi, will be written. The SCR file will include each SCR sample, a time stamp, and the experimental condition in effect when that sample was collected (0 for ITI, 1 for pre-record, 2 for post-record). The .ibi file will include each IBI and its time stamp.

Viewing Data Files

Clicking the *View Data* control will lead to a display of the screen shown below.



Click the *Select File* control to select the data file to be viewed from the drop-down list box. (Note that both the .dat file and the .a2d file must be in the application folder for data viewing.) At this point the program will display the file name and the number of trials found in the file.

Use the *Next Trial* and *Previous Trial* controls to move through the data file. As each trial is selected, the waveforms for each data channel will be plotted and the numeric data will be displayed in the upper matrix (for EMG and SCR) and just below it (for heart rate data).

The *HOME*, *END*, and horizontal spin button controls are used to insert and move a cursor through the displayed data. The vertical cursor may be moved to the beginning of the sampling period (*HOME*) or to the end of the sampling period (*END*). The cursor may be moved

in steps of one sample forward and backward (left set of spin buttons) or in steps of 10 samples (right set of spin buttons). The lower matrix shows the intersection points of the cursor with each of the waveforms and the temporal location of the cursor in the sampling period.

APPENDIX

Hardware Setup

The P3 must be set to device address 0. Check the pushwheel switch on the front panel of the P3 to check its address.

For the startle procedure, data are acquired from up to four channels. Input channels 1 and 2 are used for EMG data (channel 2 for the optional second EMG). Channel 4 is used for ECG data, and SCR data are acquired via the dedicated SCR channel.

User-defined stimuli (types 3, 4, and 5) correspond to stimulus output 3, 4, and 5 of the P3. When any stimulus output is active, the corresponding LED on the front panel of the P3 will be illuminated and the corresponding outputs at the rear panel are activated to operate user-provided hardware.

If screen images are used as contextual stimuli, the hardware must include the VGA splitter to selectively route the signal to the secondary subject monitor. Stimulus output 1 is used for activating the VGA splitter. Whenever a stimulus of type "Pict" is presented, the software will activate this output to enable viewing on the subject monitor.

Conditioned and unconditioned data are available on the rear panel of the P3 to enable data acquisition in parallel by other hardware.