

 **COULBOURN INSTRUMENTS**

Human Startle Software

V 5.100-00

Users' Guide

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Allentown, PA
USA

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Software Installation

The Human Startle System software is distributed on two CD's.

Place the CD labeled *Human Startle* into your CD drive. Click on the **Start** button and select **Run**. Select your CD drive and run the program **SETUP.EXE**.

Follow the setup instructions to close any other applications you have running.

Click on the large button, and allow the installation to proceed using the default program directory.

Next, remove this CD and replace it with the one labeled *Human Measurement System Utilities*. This contains a set of utility routines that are used by *Human Startle* and also by other human measurement software products.

Follow the same procedure to run the **SETUP.EXE** on this CD.

Hardware Installation

The ISA interface card:

Follow the instructions in the L18-16S/C manual for setting the address switches. The timer resolution must be set to 1 msec. The interrupt jumpers may both be set to the OFF positions.

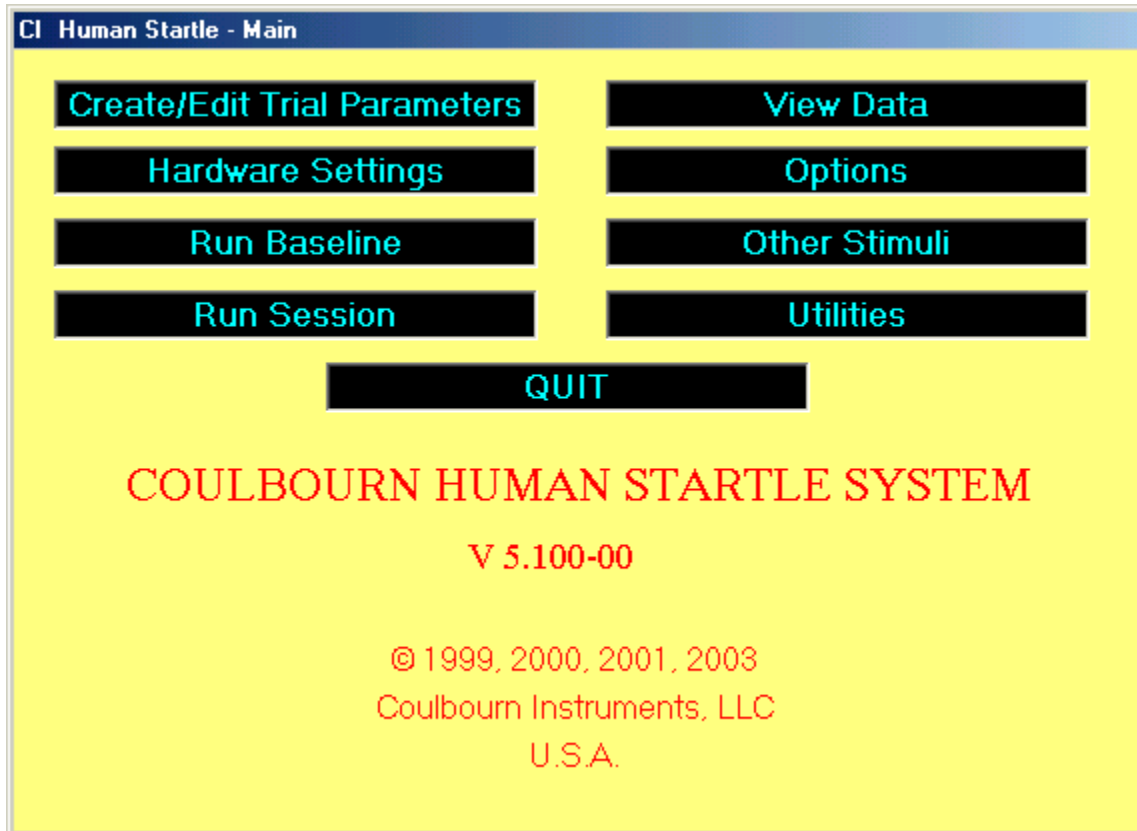
Install the card in an available ISA port in your computer.

The LabLinc V modules:

Please see Appendix 1 for a description of the hardware setup.

The Main Menu

Start the program by double clicking on its icon. The program begins by displaying the main menu screen. Following is a brief description of each of the menu items; the remainder of this manual will provide detailed explanations of the functions of each of the items on the menu.



Create/Edit Trial Parameters

This is the portion of the program that will be used to specify the nature of stimuli to be presented on each trial and to arrange their temporal aspects. An experiment file is created trial by trial and then stored on disk for future retrieval. These files may also be edited in this section of the program.

Calibrate Sound

It is necessary to calibrate the transducer to be used for the presentation of the auditory stimuli. These routines will allow the user to adjust the frequency and amplitude of tones and the amplitude of white noise so that the calibration may be accomplished. In addition, values required for stimulus specification are provided by this part of the program. (Note: Do not click on this item if the interface address has not been properly entered.)

Calibrate Integrator

The EMG signals are integrated before they are digitized. This part of the program allows the user to precisely calibrate the contour-following integrators.

Hardware Settings

It is necessary for the system to include information concerning the gains and offsets set on the data acquisition hardware so that voltages may be correctly converted to appropriate units of measurement. This portion of the program is the entry point for these settings.

Interface Address

The entry point for the address of the L18-16S/C interface board.

Equipment Test

This routine is provided so that the user may check the integrity of the signals from the data acquisition hardware and so that adjustments may be made to amplifiers and couplers to bring these signals into appropriate ranges. Following the equipment test, the user is provided the opportunity to modify hardware settings.

Run Baseline

Some protocols include the acquisition of baseline data prior to an experimental session. This routine provides the capability to collect baseline data and to store these data in a separate disk file. Data for EMG, SCR, and heart rate are collected and written to the file in 15-second blocks.

Run Session

This is the section of the program that runs a session. The user specifies the needed input files and the name to be used for the data files. The program runs the session according to the specifications in these files and collects and stores data in disk files.

View Data

An analog data review capability is included in the software; it is accessed via this routine. EMG and SCR waveforms are displayed for each trial in the session.

Options

The user may specify whether one or two channels of EMG data are to be collected and displayed and the temporal position of the EMG waveforms to be used as baseline against which the EMG responses will be assessed.

Other Stimuli

Other (“contextual”) stimuli may be scheduled to occur during a session. This section of the program allows the user to create and edit files that will indicate the onsets and offsets of these contextual stimuli. When these files are appropriately named, they will be automatically located and loaded by the session control software.

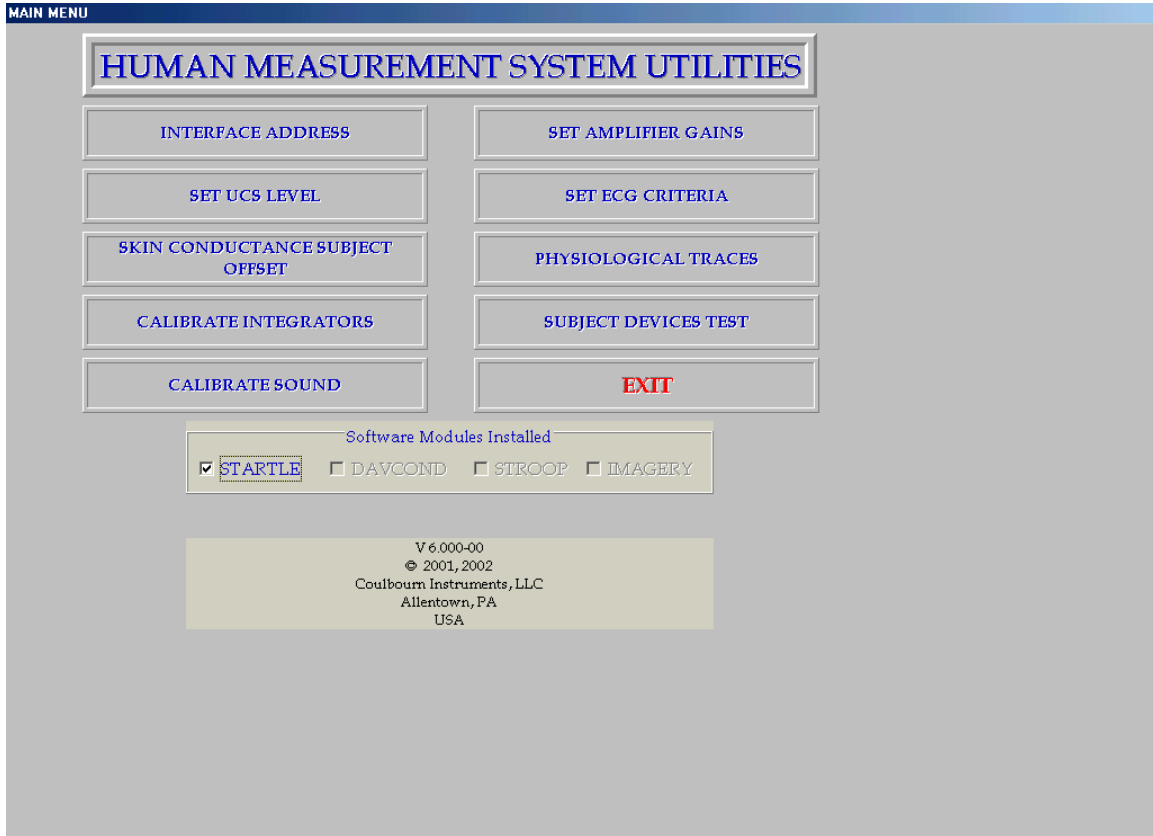
Quit

Selection of this option causes an exit from the Human Startle System software.

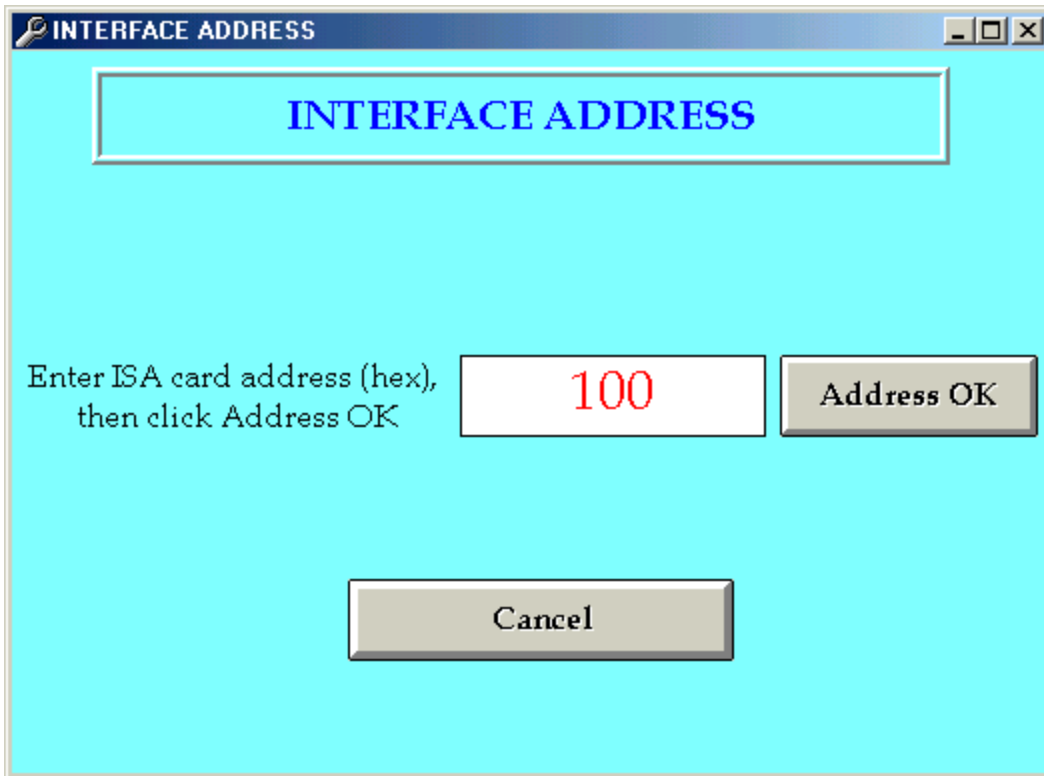
The following sections of the manual will discuss each of the menu options in detail. The options are not discussed in the order in which they appear in the menu so that the user may gain familiarity with the software in a more instructive manner.

Setting the Interface Address

Before attempting to use any feature of the software, the interface address must be stored in a disk file. Click on the *Utilities* item on the menu. This will take you to another main menu.

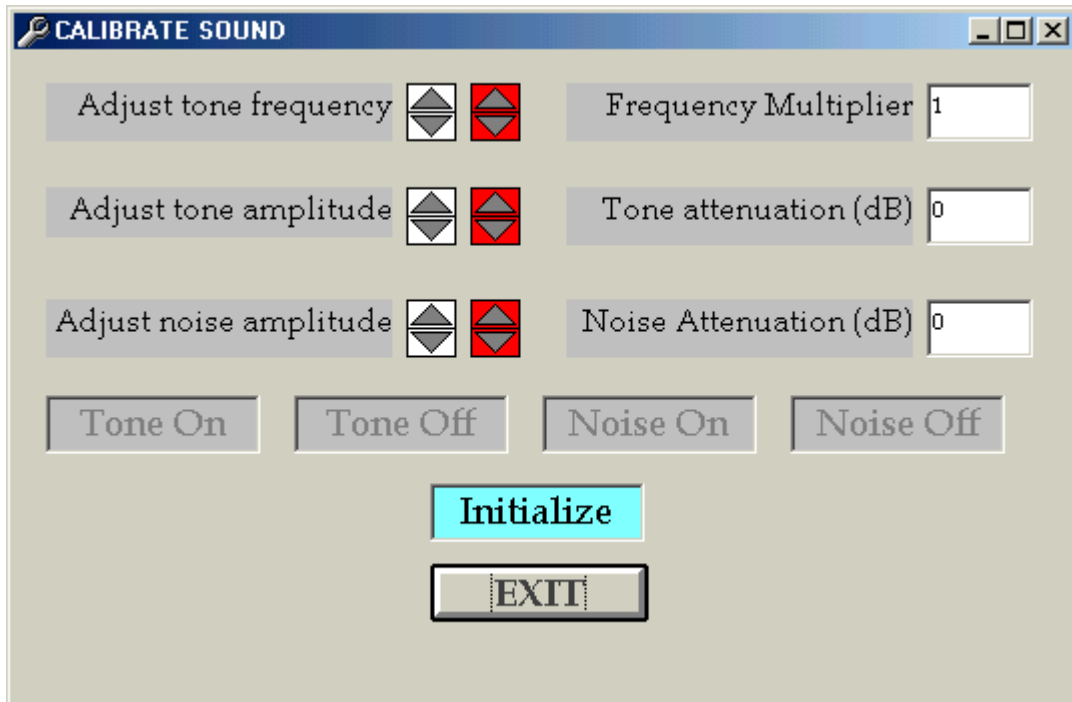


Now click on the *Interface Address* item on the menu. The window that opens will show the current address (most likely 0) and will provide an entry point for the address set on the interface board. Enter the address (most likely 100) and then click on *OK*.



Calibrating the Audio Signals

Click on the *Calibrate Sound* option. The window that is shown will provide the options of turning the tone and noise signals on and off and for adjusting their characteristics. Clicking on the *Tone On* and *Noise On* bars should turn these signals on. The *Tone Off* and *Noise Off* bars should turn them off. It is possible to have both signals on simultaneously.



The spin buttons to the right of the adjustment bars enable the user to raise and lower the frequency of the tone and to raise and lower the amplitude of both the tone and the noise. To test these features, first turn on the tone. You will note that the *Tone Frequency Multiplier* is 1 and the *Tone Attenuator Setting* is 0. Now click the up arrow in the white spin button associated with the tone frequency. Each time this button is clicked, the frequency multiplier increases by 0.01 and the frequency of the tone rises. The multiplier indicates by what value the base frequency set on the Audio Source Module will be multiplied. Thus if the base frequency is 2000Hz and the multiplier is 1.5, the frequency of the tone will be 3000Hz. The down arrow in the white spin button lowers the frequency multiplier in steps of 0.01. The red frequency spin button also produces steps of 0.01 but its repeat rate is much faster. If you need to make large adjustments, double click and hold one of the red spin buttons.

The white amplitude spin button raises and lowers the attenuator setting in steps of 1 dB. The down button increases the attenuator value, thus decreasing the tone amplitude. The attenuator setting is shown in the *Tone Attenuator Setting* box.

The spin buttons associated with noise have parallel effects on noise amplitude. As you calibrate the audio signals, make note of the attenuator and frequency multiplier settings. These are the values that will be required when stimulus specifications are entered into experiment files.

The *Initialize* bar returns all settings to their starting values and turns off both tone and noise signals.

The *Exit* bar is used to return to the main menu screen.

Options

Return to the main menu screen (yellow screen) of the Human Startle application. Then click on the *Options* bar to display a window with two data entry locations dealing with EMG data acquisition. The first of these is used to enter the number of EMG channels in use (legal entries are 1 and 2). The second window is used to enter the time period that will be used as the baseline for EMG measurements

CI Human Startle - Options

Number of EMG Channels:

EMG Baseline Period (msec):

Continuous IBI recording:

Continuous SCR recording:

Image File:

During each trial, the last five seconds of the intertrial interval are used as a prerecord data acquisition period. Data acquired during this time are used as the baseline for SCR and heart rate. If the number entered for EMG baseline period is negative, the final *n* milliseconds of the pre-record period will be used as the baseline period. If the number is positive, the first *n* milliseconds following the

startle stimulus will be used as the baseline.

Also presented in this window are the options for continuous recording of interbeat intervals (IBIs) from the ECG channel and continuous recording of the SCR level. Clicking on the *name* portion of either option will change its status.

When continuous IBI recording is enabled, the program will monitor the ECG waveform throughout the session and will write each IBI to a data file. Paired with each IBI will be a code that will indicate whether it was recorded during an ITI (code 0), during a pre-record period (code 1), or during a post-record period (code 2). Only IBIs that *begin and end* during each of the periods will be recorded.

If continuous SCR recording is indicated, the SCR signal will be sampled at 2Hz during the entire session. The SCR level and a code for its time of occurrence will be written to a file. (Note that while data are being written to disk following each post-record period there may be some variability in the sampling rate. This will depend upon the computer system in use.)

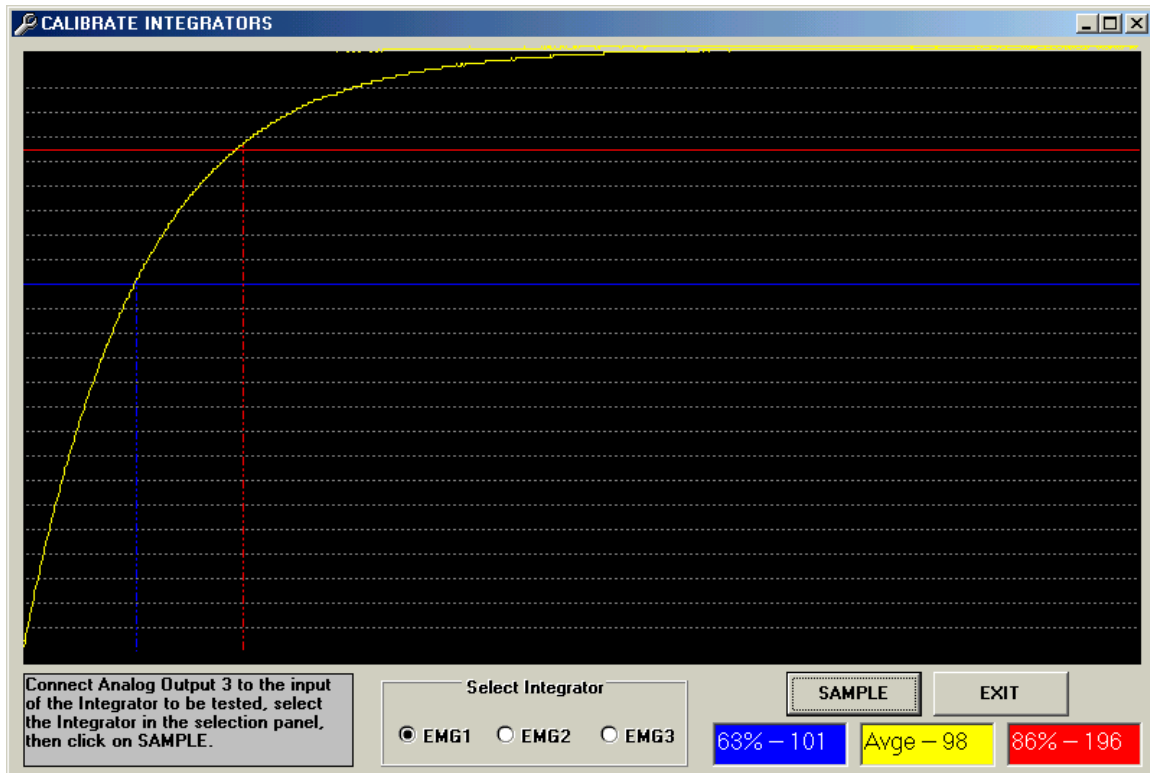
The Image File text entry is used only in cases in which .bmp images are presented on a separate monitor. See Appendix 2 for details.

Click on *OK* to write the options specifications and return to the main menu.

Calibrating the Contour-Following Integrators

Follow the instructions in Appendix 1 for setting up the hardware to perform the calibrations.

From the *System Utilities* menu, click on *Calibrate Integrators*. Click on the *Sample* object and the program will provide the appropriate signal to the integrator and plot its output on the screen



The blue horizontal line represents the 63% point (first time constant) and the red line the 86% point (second time constant). The program will display these values in the objects at the bottom of the screen as well as the average of the first and second time constants. Each time the *Sample* object is clicked, another sampling will be initiated. Adjust the integration time setting on the face of the module and continue sampling until the desired integration time has been achieved. Click on the *Exit* object to return to the main menu.

Restore the hardware connections to their normal configuration prior to proceeding with other operations.

Entering Hardware Settings

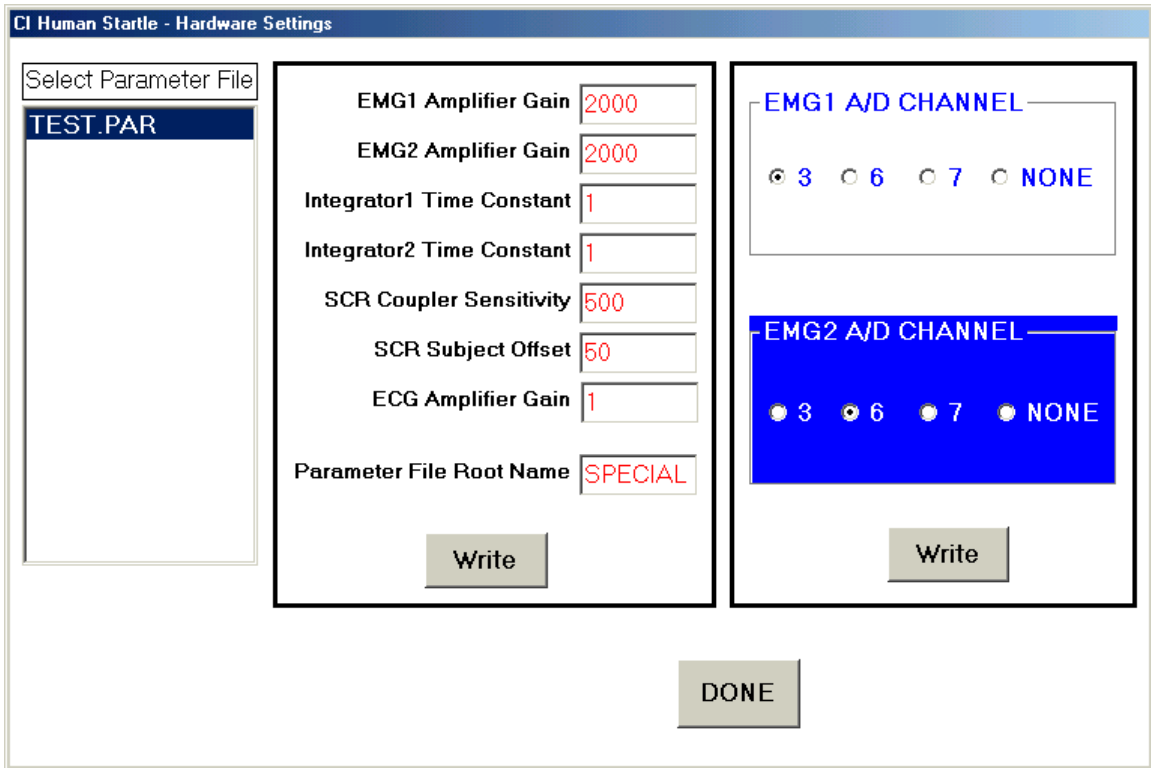
From the *System Utilities* menu, click on *Set Amplifier Gains*. This will display a window with data entry areas for the gains set on the EMG, SCR, and ECG amplifiers.

Section	Parameter	Value
STARTLE	EMG1	1000
	EMG2	1000
	SCR (sens)	500
STROOP	EMG	
	SCR (sens)	
DAVCOND	EMG	
	SCR (sens)	
IMAGERY	EMG1	
	EMG2	
	EMG3	
	SCR (sens)	

Write **Cancel**

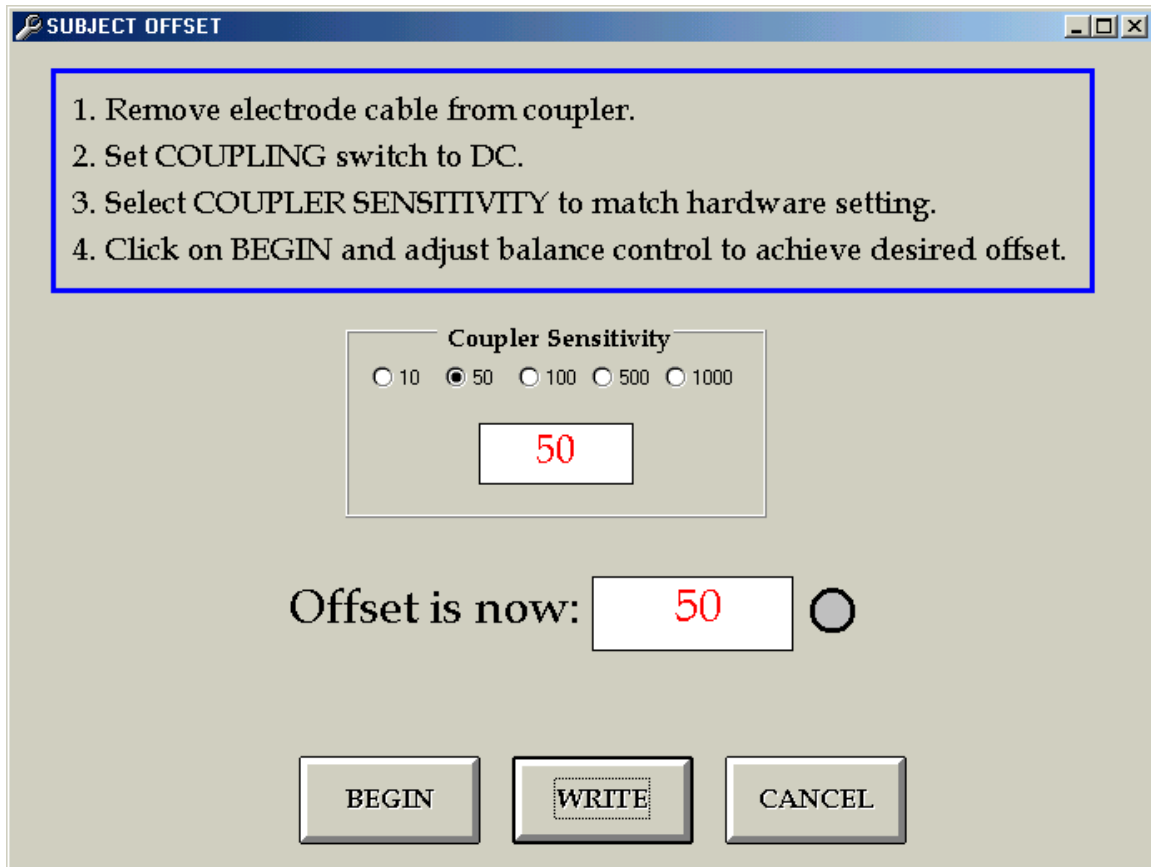
Make entries into these objects and save the file (click on *Write*). This updates the default parameter file.

To make changes for individual subjects, if necessary, use *Hardware Settings* from the main (yellow) screen. You may select the default parameter file and modify it.



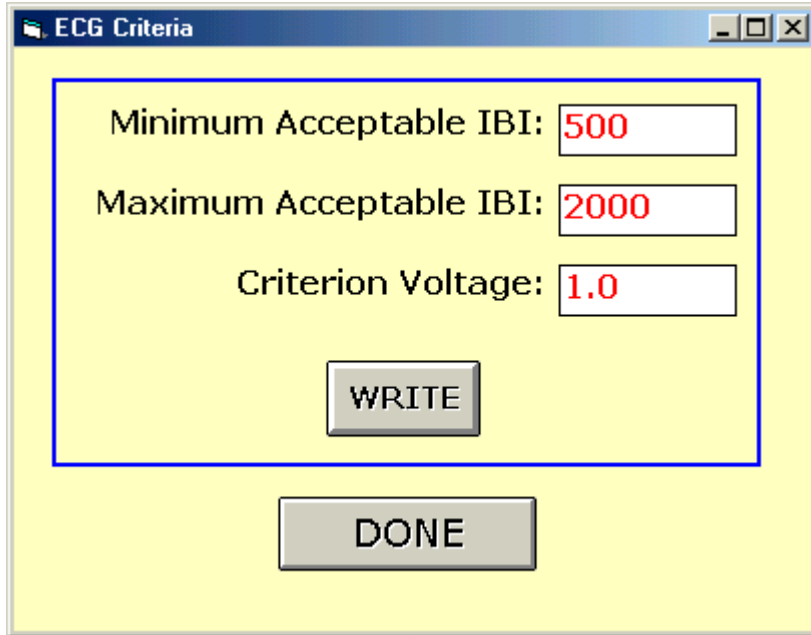
Enter any eight-character name as the root portion of the file name. Do not include an extension; the program will automatically add an extension that identifies the file for future use. Click on *Write* to save this parameter file for later use.

Next, from the *Utilities* menu, select the *Skin Conductance Subject Offset* menu item to bring up the following screen.



Follow the connection directions on the screen, click on the *Begin* button and adjust the balance control until the offset value is as high as it will go. With this setting you will probably never need to change it. Click on *Write* to save these parameters.

From the main (yellow) menu, select the *Set ECG Criteria* menu option.

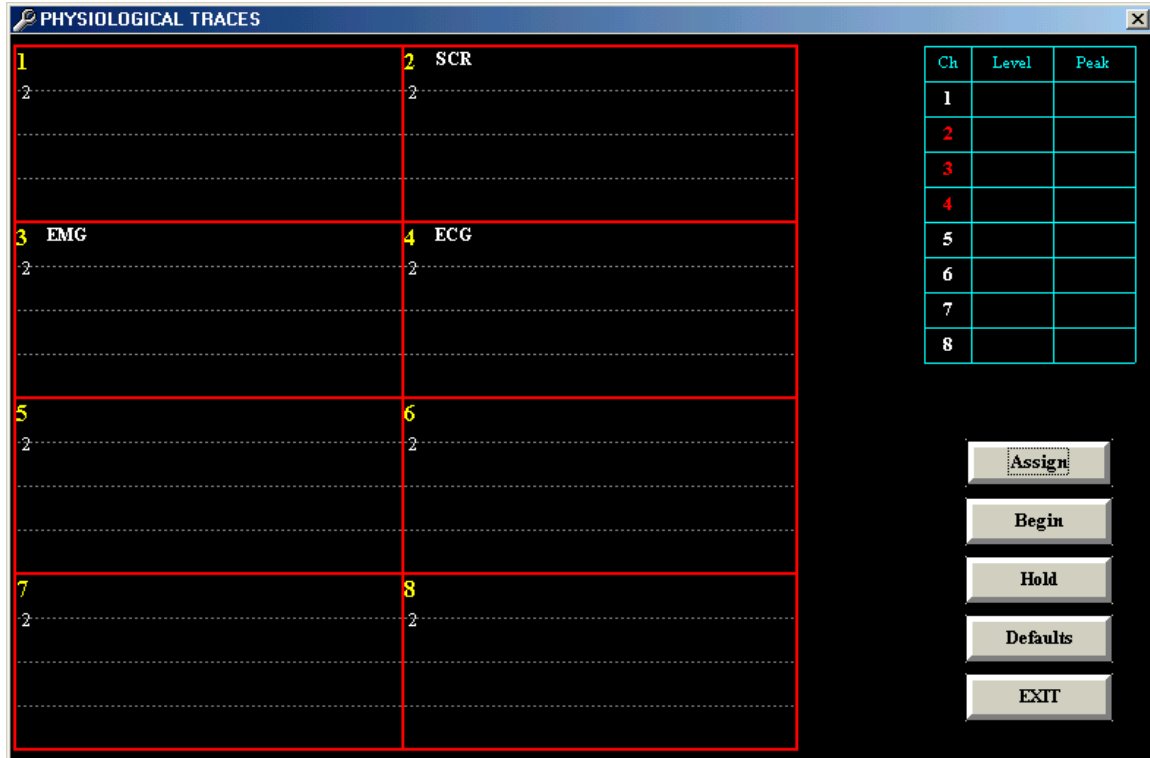


In order to minimize the effects on the IBI data of artifact in the ECG signal, it is possible to specify the minimum and maximum IBI values acceptable. The program will ignore any values that do not fall into the specified range.

Accept the default values for now (click on *Write*), but you may need to adjust them later after testing the hardware setup.

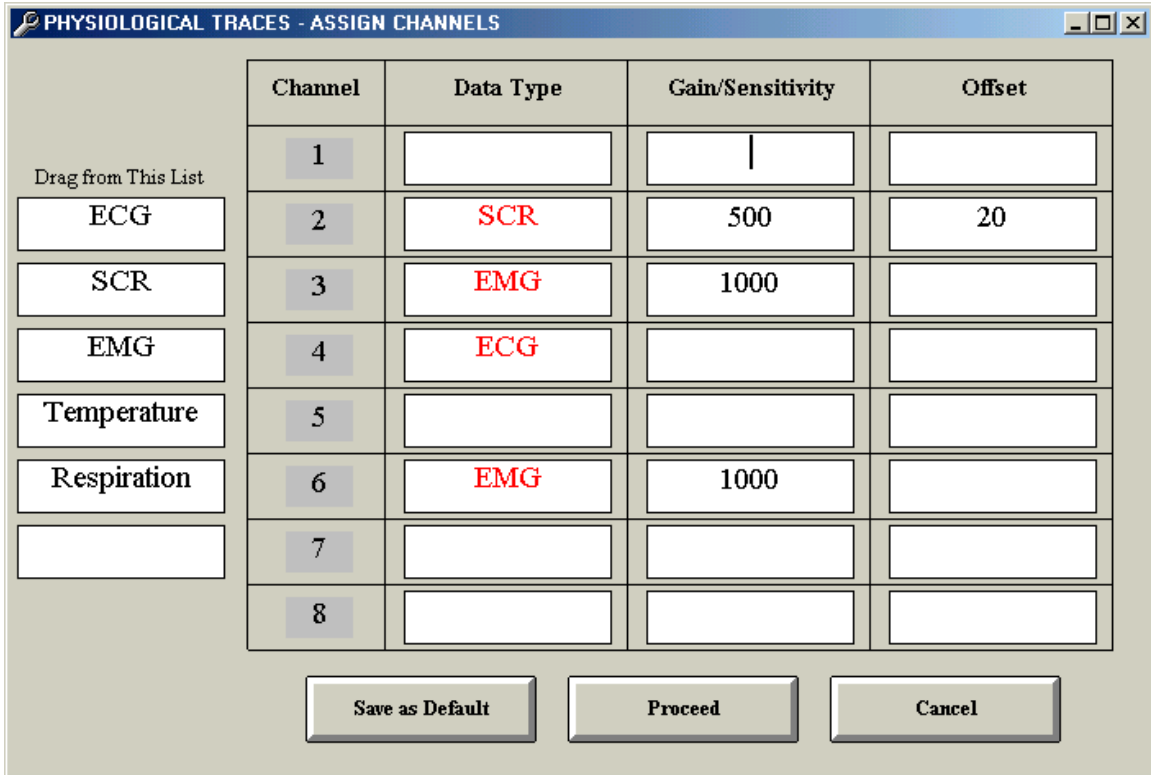
Testing the Hardware Setup

With all connections to the data acquisition hardware in place, go to the *System Utilities* menu and click on *Physiological Traces*.



The window that appears includes a plotting space that is divided into eight areas to support recording from eight data channels. We will want to use Channel 2 for SCR, Channel 3 for EMG1, Channel 6 for EMG2, and Channel 4 for ECG. This corresponds to the hardware connections described in Appendix 1.

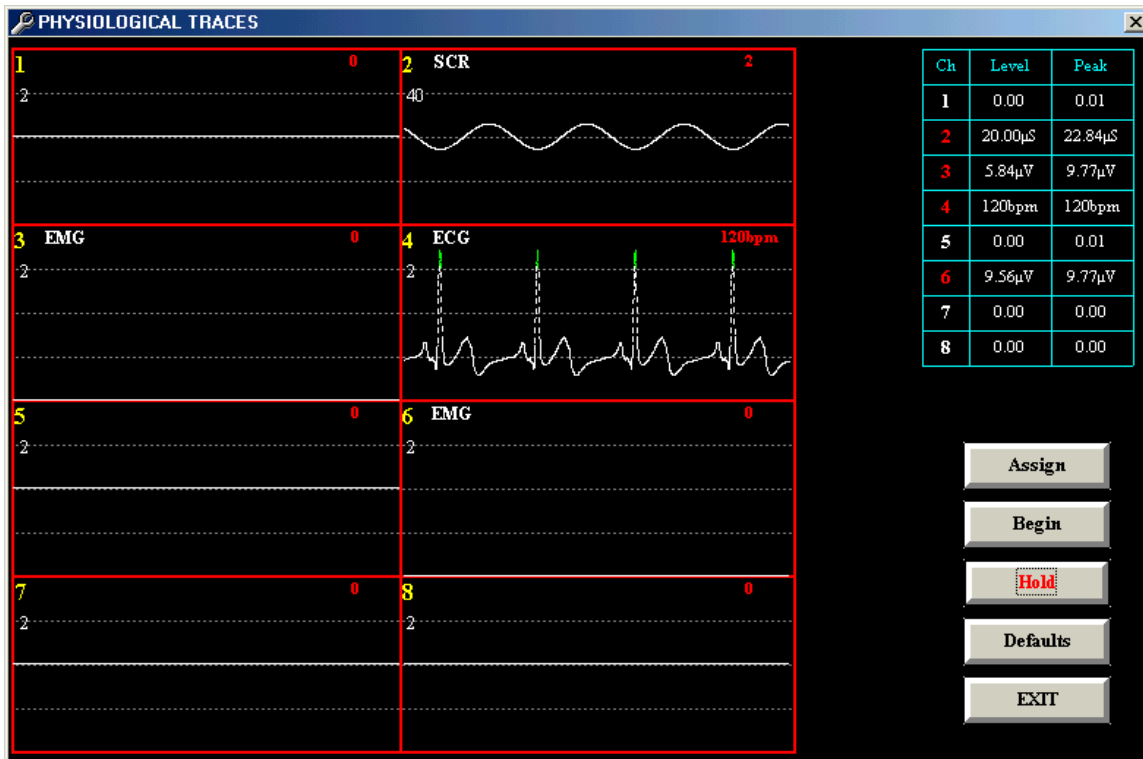
Click on the *Assign* button to assign these channels.



Drag the ECG, SCR and EMG boxes from the list on the left of the screen to the appropriate Channels and verify the Gain and Offset values.

Click on the *Save as Default* button to save these settings, and then click on *Proceed*.

Click on the *Begin* button to start sampling. The program will acquire data for two seconds and then plot the functions.



Special attention should be paid to the ECG plot. This waveform must pass through a 1V criterion during each heart cycle. It is this feature which will allow the software to calculate the heart rate, beat by beat, from the ECG signal. Each time the waveform passes through the 1V criterion and for as long as it remains above 1V, the program will draw green markers above the waveform. Be certain that this occurs for each heart cycle.

Adjust the ECG amplifier gain so that the function remains within its plotting space and passes through the 1V criterion reliably.

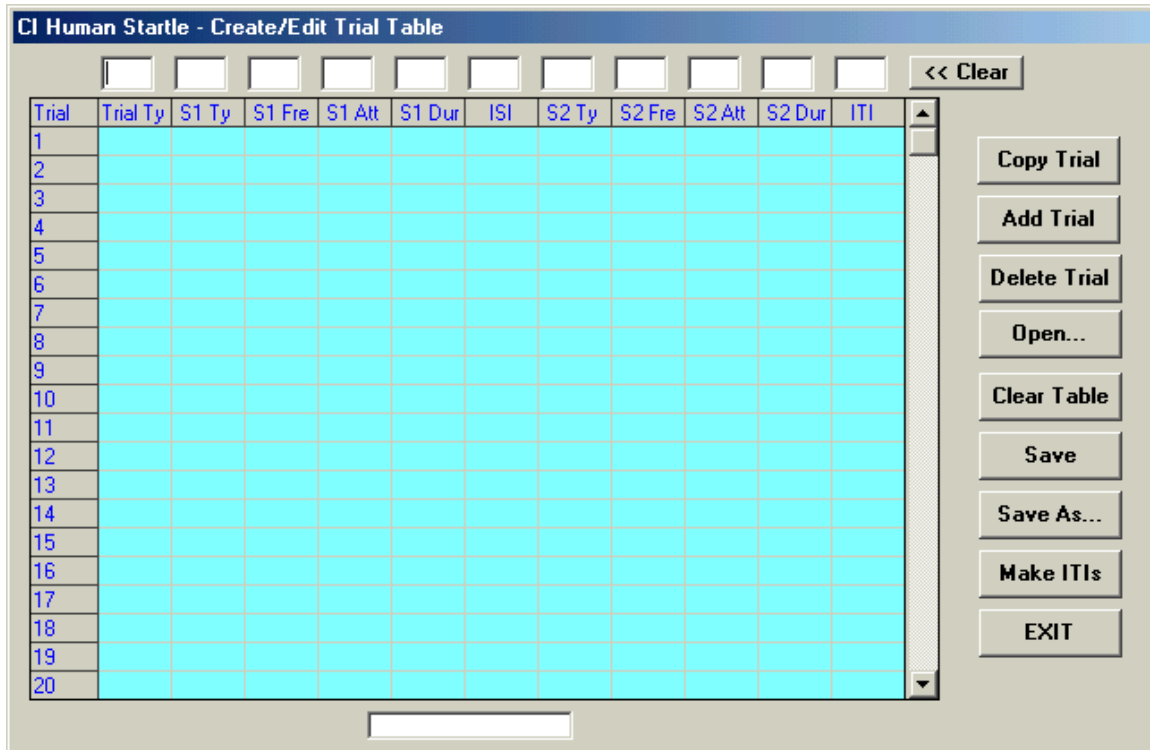
The display for each channel may be modified to make it easier to observe in case adjustments to the hardware are required. At the top of the display for each channel are the channel number, the data type, and (under the channel number) the maximum voltage value that is currently displayable. Clicking with the left mouse button on the maximum voltage value causes it to decrease (and the sensitivity of the display to increase). Clicking with the left mouse button on the channel number causes the maximum voltage value to increase (and the sensitivity of the display to decrease). The entire trace may be moved up in the display area by clicking with the left mouse button on the data type name. The trace may be moved down by clicking with the right mouse button on the data type name.

The data acquisition and plotting cycle will continue until the *Hold* button is clicked. Data acquisition will terminate following the next data interval. Click on *Exit* to return to the *System Utilities* screen.

If adjustments to the hardware were made during the testing, click on the *Hardware Settings* button on the main menu. The program will display a window listing the names of all the available parameter files. Select the file to be edited by clicking on its name. The program will retrieve the file and display its contents. Make the necessary changes and click on *OK* to rewrite the file. This will return the program to the main menu.

Creating Experiment Files

The first option in the main menu, *Create/Edit Trial Parameters*, is used to create, edit, and store experiment files. When this option is selected, the program will display a window containing a central grid, an upper text entry row, and ten control buttons.



The values for each trial are entered in the text boxes at the top of the window. Each of the boxes corresponds to the label just below it in the grid. The meanings of these labels are as follows.

Trial Ty (trial type) A number used only as an identifier so that different types of trials may be separated for analysis.

S1 Ty (stimulus 1 type) Determines if the first stimulus will be tone (1), white noise (2), or absent (blank or 0).

S1 Fre (stimulus 1 frequency) If stimulus 1 is tone, the frequency multiplier. If stimulus 1 is noise, this may be left blank

S1 Att (stimulus 1 attenuator setting) The value to be used to determine the amplitude of stimulus 1.

S1 Dur (stimulus 1 duration) The duration, in milliseconds, of stimulus 1.

ISI (inter-stimulus interval) The duration, in milliseconds, of the interval separating the offset of stimulus 1 from the onset of stimulus 2.

S2 Ty (stimulus 2 type) Determines if the second stimulus will be tone (1), or white noise (2).

S2 Fre (stimulus 2 frequency) If stimulus 2 is tone, the frequency multiplier. If stimulus 2 is noise, this may be left blank.

S2 Att (stimulus 2 attenuator setting) The value to be used to determine the amplitude of stimulus 2.

S2 Dur (stimulus 2 duration) The duration, in milliseconds, of stimulus 2.

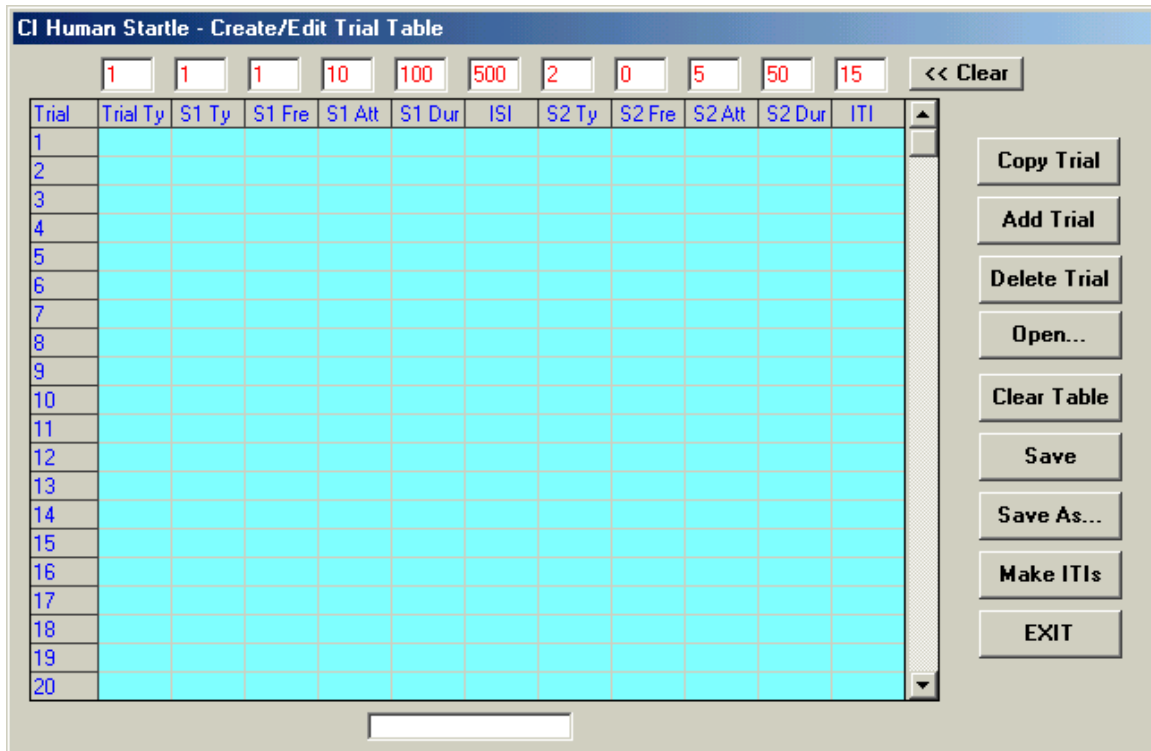
ITI (inter-trial interval) The duration, in seconds, of the interval separating the end of trial n to start of trial $n+1$.

As an exercise, we will create an experiment consisting of three trial types. Trial type 1 will be a pre-pulse trial in which a tone of 100 msec duration set to the base frequency and attenuated by 10 dB will be followed, after an interval of 500 msec, by a white noise 50 msec long attenuated by 5 dB. To create these trials, Make the following entries in the text boxes at the top of the window.

1 1 1 10 100 500 2 0 5 50 15

(Note: either the mouse or the Tab key may be used to move from box to box in this row.)

The 0 (in the S2 Fre) column may be omitted as a blank entry is equivalent to 0.



In our example, we will create an experiment in which the three trial types will be presented in blocks of four trials each. Trial type 1 will be presented on trials 1 through 4, trial type 2 on trials 5 through 8, and trial type 3 on trials 9 through 12.

With the values for trial type 1 showing in the entry row, click on any box in the first row of the grid. This will copy the values from the entry row to the grid; these then become the values for trial 1.

Two methods are available for creating trials 2 through 4. Clicking on each of the appropriate rows will replicate trial 1, since the values are still showing in the entry row. Trials (data in the grid) may also be copied by using the *Copy Trial* object. When this object is clicked, a window will open with entry areas for the trial to be copied from and the range of trials to which the data are to be copied.

In our present example, we would enter 1 as the trial to be copied from, 2 as the start of the range, and 4 as the end of the range.

Trial type 2 will contain only noise as stimulus 2, and we will use the same values for this stimulus as in trials of type 1. Begin by clicking on the << *Clear* object to clear the entry row. Then enter the values for stimulus 2; since there is no stimulus 1, all entries referring to this stimulus, as well as the ISI, may be left blank or specified as 0.

2 0 0 0 0 2 0 5 50 15

Either method described above may be used to copy these data into trials 5 through 8.

Finally, trial type 3 will consist of two noise presentations. The first stimulus will be a noise attenuated 30 dB. The stimulus will be 75 msec long and will be separated from the second stimulus by 250 msec. The second stimulus will be the same noise used in trial types 1 and 2

Without clearing the entry row, change the first entry to 3 and make the following entries in columns 2 through 6

2 0 30 75 250

Now use these values to create trials 9 through 12.

Trial	Trial Ty	S1 Ty	S1 Fre	S1 Att	S1 Dur	ISI	S2 Ty	S2 Fre	S2 Att	S2 Dur	ITI
1	1	1	1	10	100	500	2	0	5	50	15
2	1	1	1	10	100	500	2	0	5	50	15
3	1	1	1	10	100	500	2	0	5	50	15
4	1	1	1	10	100	500	2	0	5	50	15
5	2						2		5	50	15
6	2						2		5	50	15
7	2						2		5	50	15
8	2						2		5	50	15
9	3	2		30	75	250	2		5	50	15
10	3	2		30	75	250	2		5	50	15
11	3	2		30	75	250	2		5	50	15
12	3	2		30	75	250	2		5	50	15
13											
14											
15											
16											
17											
18											
19											
20											

This completes the table for the experiment, and it may be saved as a disk file by clicking on the *Save As* object. Use any name up to eight characters long. Do not include an extension, as the program will add an extension for purposes of identification. Make sure you are saving the file in the main HSW directory.

To continue the exercise, save the experiment file at this point.

Click on the *Clear Table* object. The program will ask for verification that the table is to be cleared; click on *OK*. The remainder of this exercise will consist of making modifications to the first experiment file. To begin, open the file by

clicking on the *Open* object and selecting the experiment file. Note that the path to the selected file is now shown in a small text box below the grid.

If we wish to add a trial of type 3 between the current trials 2 and 3 we first need to make space for the additional trial. Click on the *Add Trial* object, and enter 3 as the location for the new trial. The grid is changed so that a blank trial now appears at trial 3. To complete the task, we will use an additional feature of the *Copy Trial* object. Click on this object and indicate that the data from trial 10 should be copied to trial 0 (specify only that 0 is the starting range). The data from trial 10 are copied into the data entry row. We may now simply click on the blank row of the grid to insert the data into trial 3. This method is far easier to use in cases in which a particular trial type is to be added in many places in an already existing experiment file.

The *Delete Trial* object is used to delete a trial from the grid. Click on the object and indicate which trial is to be deleted.

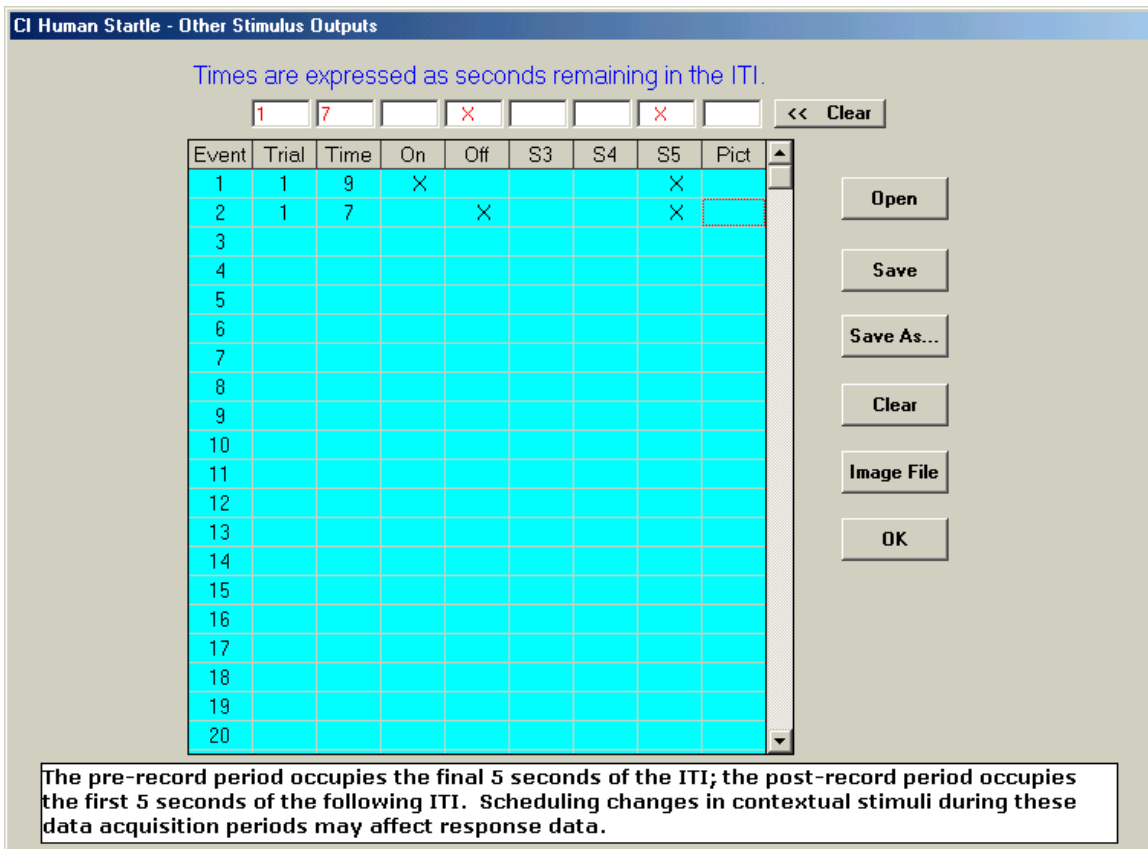
The *Make ITIs* object may be used to determine the intertrial intervals for all trials in the grid. Click on this object and enter the upper and lower limits for the intervals. If all ITIs are to be the same, use the same value as the upper and lower limits. If the upper and lower limits are different, the program will select random values within the bounds specified and fill in the ITI column of the grid. Any entry may be changed manually via the data entry row. If only the ITI is to be changed, it is easiest to first copy the trial data into the data entry row, make the change to the ITI, and then copy the data back to the trial row in the grid.

Click on the *Exit* object to return to the main menu.

Adding Contextual Stimuli

The *Other Stimuli* option on the main menu is used to schedule contextual stimuli that will be presented during the course of a session. Click on this object and the program will display a grid and a data entry row above it. In the data entry row, the trial number, the starting time, the action, and the stimuli to be affected will be entered.

The stimuli correspond to digital outputs 6, 7, and 8 of the V19-16 I/O port respectively. (Note: The column headed Pict is reserved for using picture files as contextual stimuli; see Appendix 2, *Using Bitmap Files as Contextual Stimuli* for details.)



CI Human Startle - Other Stimulus Outputs

Times are expressed as seconds remaining in the ITI.

1 7 X X << Clear

Event	Trial	Time	On	Off	S3	S4	S5	Pict
1	1	9	X				X	
2	1	7		X			X	
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Open
Save
Save As...
Clear
Image File
OK

The pre-record period occupies the final 5 seconds of the ITI; the post-record period occupies the first 5 seconds of the following ITI. Scheduling changes in contextual stimuli during these data acquisition periods may affect response data.

For illustrative purposes, we will assume that the device to be controlled is connected to output bit 8 and is therefore specified as S5. We wish to turn this device on 9 seconds before the onset of the startle stimuli for trial 1 and its operate time is to be 2 seconds.

Enter 1 as the trial number and 9 as the time. Click in the ON box and in the S5 box. All time entries refer to time remaining in the ITI preceding the named trial. Click in the first row of the grid and the data in the top row will appear as Event 1.

Now enter 7 as the time and click in the OFF box. Then click on the second row of the grid and the new data will be entered as Event 2. S5 will be turned on with 9 seconds remaining in the ITI preceding trial 1 and will be turned off 2 seconds later (i.e., with 7 seconds remaining in the ITI).

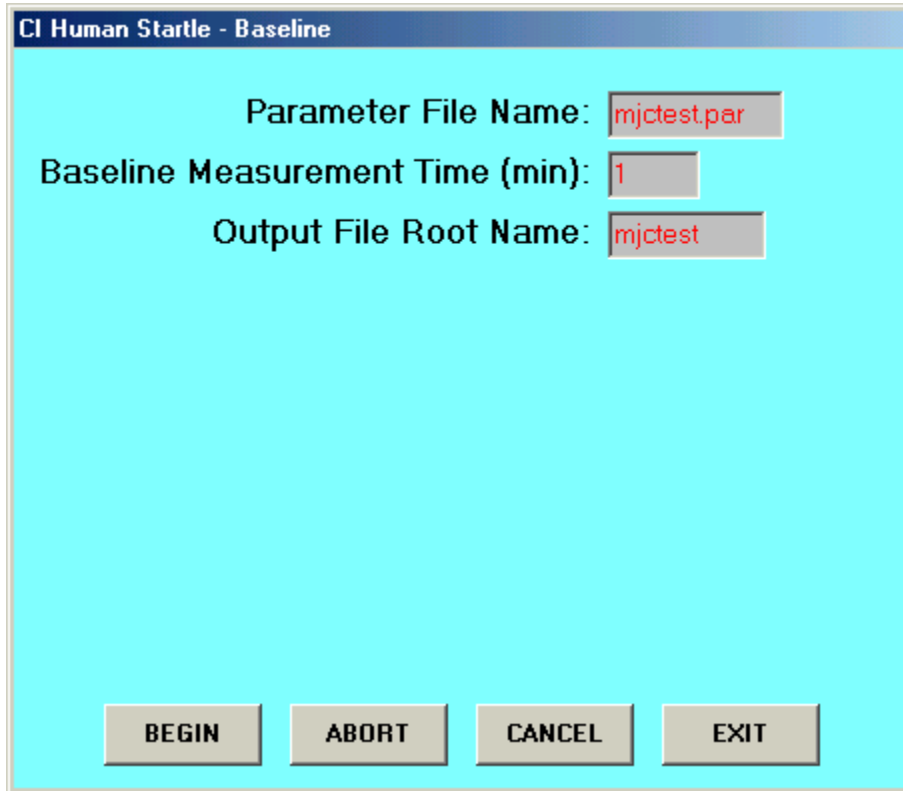
It is important to recall that pre-record data are acquired during the final 5 seconds of the ITI and that post-record data are collected during the first 5 seconds of the ITI. Changes in contextual stimuli during these data acquisition intervals may affect subjects' responses.

More than one stimulus may be controlled by an event. For example, a single event can turn on all three stimulus outputs and another event may be used to turn off S3 and S5 while leaving S4 unaffected.

The key to using a contextual stimulus file lies in naming it properly. Use the same root name for the stimulus file as was given to the experiment file. The program will append a different extension to the file name. When the experiment control program is loaded, it will search for a contextual stimulus file based upon the experiment file name that you provide at that time. If such a file is located, it is read and its contents are used to schedule contextual stimuli. It is essential that both files be located in the main HSW directory.

Collecting Baseline Data

The *Run Baseline* option of the main menu is used to acquire baseline data. Clicking on this object will cause the program to display a window in which you will select the name of the parameter file (the file which contains the hardware settings) if one already exists. If not, you can make one now. Enter the baseline measurement time in minutes, and the root name to be used for the output data file. Once again, do not include an extension; the program will append an extension (.BSL) to identify the data as coming from a baseline session.



CI Human Startle - Baseline

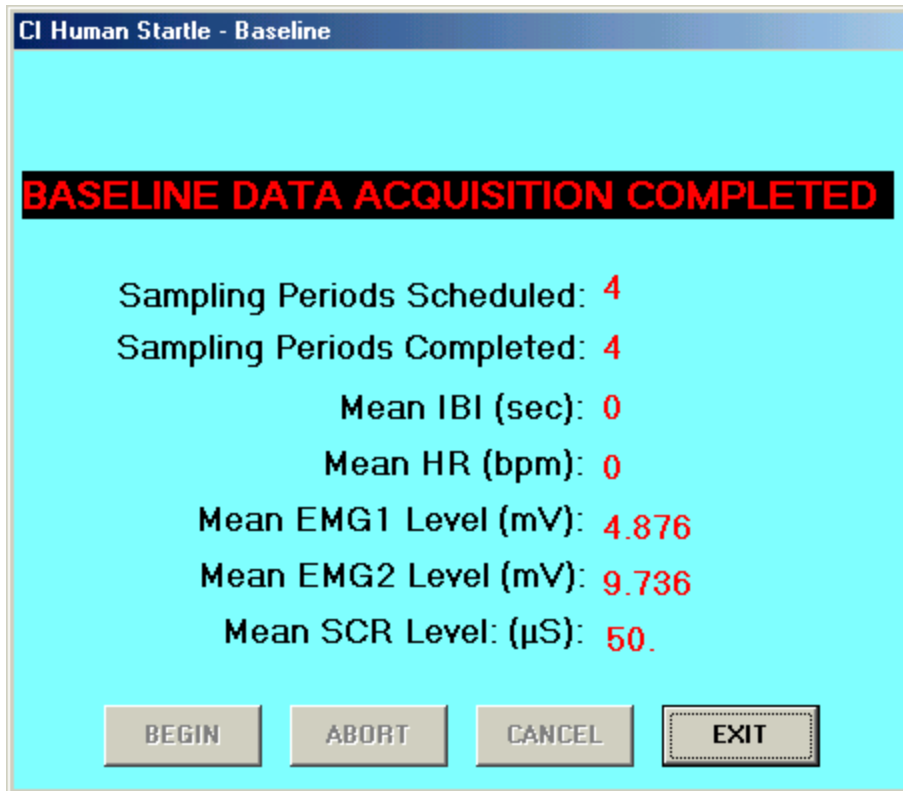
Parameter File Name: mjctest.par

Baseline Measurement Time (min): 1

Output File Root Name: mjctest

BEGIN ABORT CANCEL EXIT

Data are logged to the disk file and displayed on the screen in 15-second blocks. The on-screen data include the number of scheduled sampling periods and the number of sampling periods completed. At the end of each 15-second block the following data are displayed on the screen: mean IBI, mean heart rate, mean EMG level (EMG channel 1), mean EMG level (EMG channel 2), and mean SCR level.



A record is also written to the data file following each 15-second block. The data written to the file are:

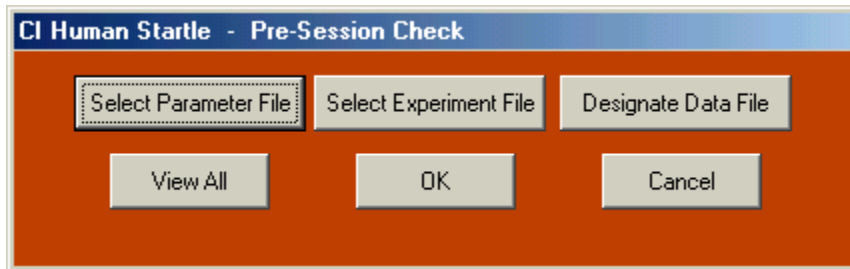
- mean EMG1
- mean EMG2
- mean SCR
- mean IBI

Following the final record of this type there will be a listing of each of the IBIs recorded during the baseline period.

Note that in order for the baseline acquisition routine to function correctly, the *Options* item should have been used to specify the number of EMG channels in use.

Running a Session

Clicking on the *Run Session* button on the main menu will cause the program to display a window in which the user specifies the files to be used during the session. These include the parameter file containing the hardware settings, the experiment file containing the trial by trial specifications, and the root name for the data files to be created.



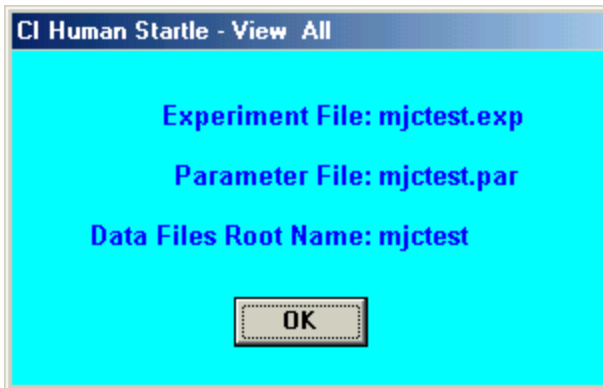
Click on the *Select Parameter File* object to display a window that lists all of the parameter files that were located. Click on the file name to specify which is to be used (the program will display the contents of the file for verification), then click on *OK* to return to the pre-session check window.

Click on the *Select Experiment File* object to see a list of the experiment files that are available. When a file is selected its contents will be displayed in a grid for verification. Click on *OK* to complete file selection.

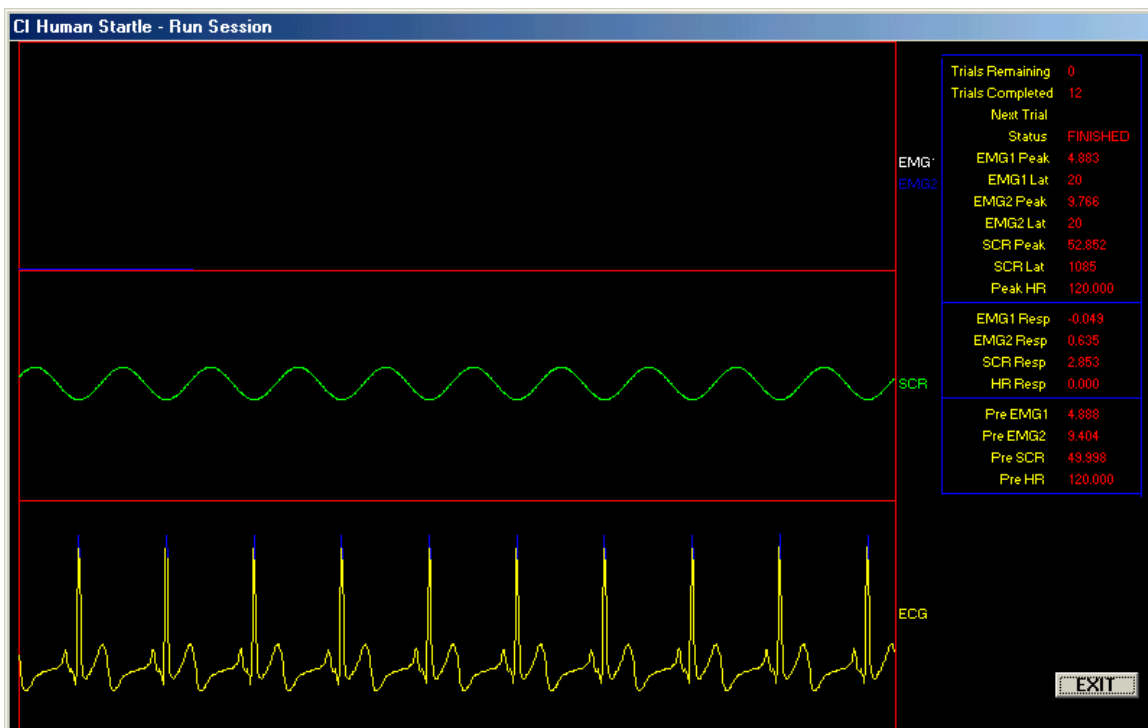
Click on *Designate Data File* to see a list of the data files which can be located. The file name display is presented in two windows. The left window shows the numeric data files (.DAT extensions) and the right window shows the raw analog data files (.A2D extensions). The contents of these files will be discussed below.

Enter the root name to be used in the text box, then click on *OK*. The program will disallow the use of a duplicate file name for either file type. If continuous recording of IBI data is enabled, an output file for these data will be created; its name will be the root name with .IBI as its extension. In the case of continuous SCR recording, .SCR will be used as the extension.

To review the selections, click on the *View All* object. If any selections are incorrect, use the appropriate object to modify the selection. When all selections are correct, click on *OK* in the pre-session window.



The experiment monitor window contains an area for the display of the trial-by-trial data as they are collected, and buttons to control the start and abort functions.



When the *Begin* button is clicked, the experiment begins with the presentation of an ITI. On this, as on all trials, the final five seconds of the ITI are dedicated to pre-record data acquisition. The status indicator on the screen will show the appropriate message (ITI, PRE-REC, POST-REC, FINISHED) as the experiment proceeds.

Following the pre-record period, the stimuli are presented as specified in the experiment file. The post-record period begins with the onset of S2. Data are acquired for five seconds on all channels and are then graphically displayed on the screen. The upper trace shows the two EMG channels (only one will be

plotted if the Options file indicates that only one channel is in use). The center trace displays the SCR signal, and the bottom trace is the ECG waveform. The numeric data shown after each trial are enumerated below.

EMG1 Peak – the largest EMG1 value detected in the 200 msec following the onset of S2.

EMG1 Lat – the latency to the EMG1 peak

EMG2 Peak – the largest EMG2 value detected in the 200 msec following the onset of S2.

EMG2 Lat – the latency to the EMG2 peak

SCR Peak – the largest SCR value detected in the time window 1 through 4 seconds following the onset of S2

SCR Lat – the latency to the SCR peak

Av HR – the average heart rate detected in the time window 1 through 4 seconds following the onset of S2

HR Resp – the difference, in beats per minute, between the post-record and prerecord heart rates

EMG1 Resp – the difference between the post-record peak EMG1 and the mean baseline EMG1

EMG2 Resp – the difference between the post-record peak EMG2 and the mean baseline EMG2

SCR Resp – the difference between the post-record peak SCR and the mean SCR recorded during the last pre-record second

Pre EMG1 – the mean EMG1 for the last pre-record second

Pre EMG2 – the mean EMG2 for the last pre-record second

Pre SCR – the mean SCR value for the last pre-record second

Pre HR – the mean heart rate for the pre-record period

These data are updated on the screen after each trial.

Data are also written to the numeric data (.DAT) file after each trial. These data, in order, are:

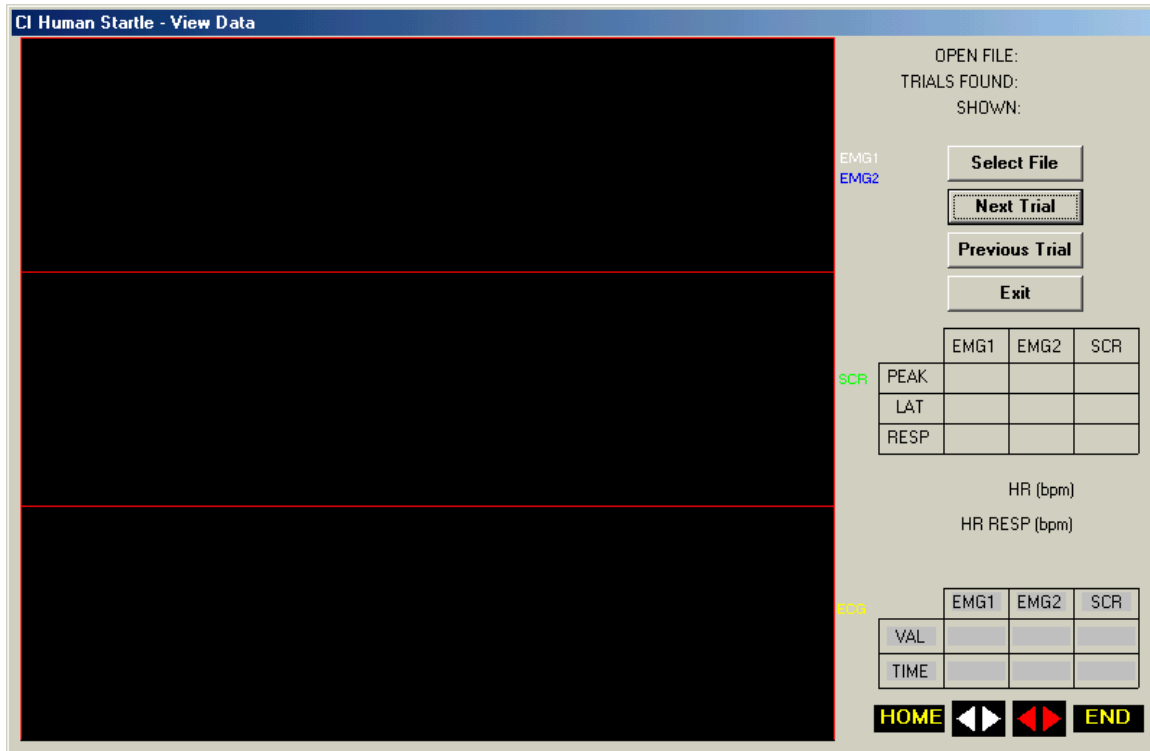
- trial number
- trial type
- pre-record EMG1 level
- post-record EMG1 peak
- post-record latency to the EMG1 peak
- pre-record EMG2 level
- post-record EMG2 peak
- post-record latency to the EMG2 peak
- pre-record SCR level
- post-record SCR peak
- post-record latency to the SCR peak
- pre-record heart rate
- post-record minimum interbeat interval
- post-record latency to the minimum interbeat interval
- post-record maximum interbeat interval
- post-record latency to the maximum interbeat interval

The .A2D file is also updated after each trial. This file will contain, for each trial, 200 EMG1 values, 200 EMG2 values, and 3000 SCR values. These are the samples taken from the windows during which the calculations are made for each channel. The .A2D files can be quite large, so care must be taken to avoid storing excessive amounts of data on the hard drive.

When the experiment is complete, click on *Exit* to return to the main menu. **An experiment may be aborted by using Ctrl-Alt F1 (hold down the Ctrl and Alt keys and press the F1 key).** The experiment will be terminated immediately during an ITI or at the end of a pre- or post-record period if one is in effect when the abort action is taken. Any data collected up to that point will be preserved. Note that this abort causes an end of program execution and a return to the Windows desktop.

Reviewing Analog Data

The *View Data* option is used to review analog data files.



The window displayed includes a *Select File* object. Click here to open a window showing the available .A2D files. Select a file by clicking its name. The screen will show the name of the selected file and the number of trials in the file. Click the *Next Trial* object and the EMG, SCR, and ECG data will be displayed. The current trial number will be shown in the *SHOWN* text box.

Use the *Next Trial* and *Previous Trial* objects to move through the data file. Note that moving backward through the data file may take some time, especially with long data files.

Two data matrices are displayed on the screen. The upper matrix displays the numeric data for the trial. For this reason, the .DAT file corresponding to the .A2D file being examined must be available to the program. The lower matrix displays data in conjunction with the controls displayed immediately below it. Use the spin buttons to move a cursor (a magenta vertical line) through the displayed data. The red buttons move the cursor ten steps per click; the white buttons move the cursor one step per click. The *HOME* and *END* controls move the cursor to the beginning and end of the data respectively. The data displayed in the *VAL* line of the lower matrix are the intersection points of the cursor and the data waveforms for the EMG and SCR data. Note that for the SCR and ECG data, only every third data point is plotted. The times, displayed in the *TIME* line of the matrix, will therefore be different for the SCR and EMG data. Also note

that the data are in Volts rather than in the converted form of the .DAT file.

Click on the *Exit* object to return to the main menu.

Appendix 1

Hardware Setup

Follow the instructions in the L18-16S/C manual for setting the address switches. The timer resolution must be set to 1 msec. The interrupt jumpers may both be set to the OFF positions.

The signals are connected to the analog inputs of the V19-16 port as follows

EMG1	Analog Input 3
EMG2	Analog Input 6
SCR	Analog Input 2
ECG	Analog Input 4

The EMG signals are routed from the amplifiers to contour following integrators and then to the analog inputs.

The analog outputs are connected as follows.

Analog Output 1	Tone Frequency Control
Analog Output 2	Tone Attenuator
Analog Output 4	Noise Attenuator

Digital Output 1 is connected to the Tone gate.
Digital Output 2 is connected to the Noise gate.

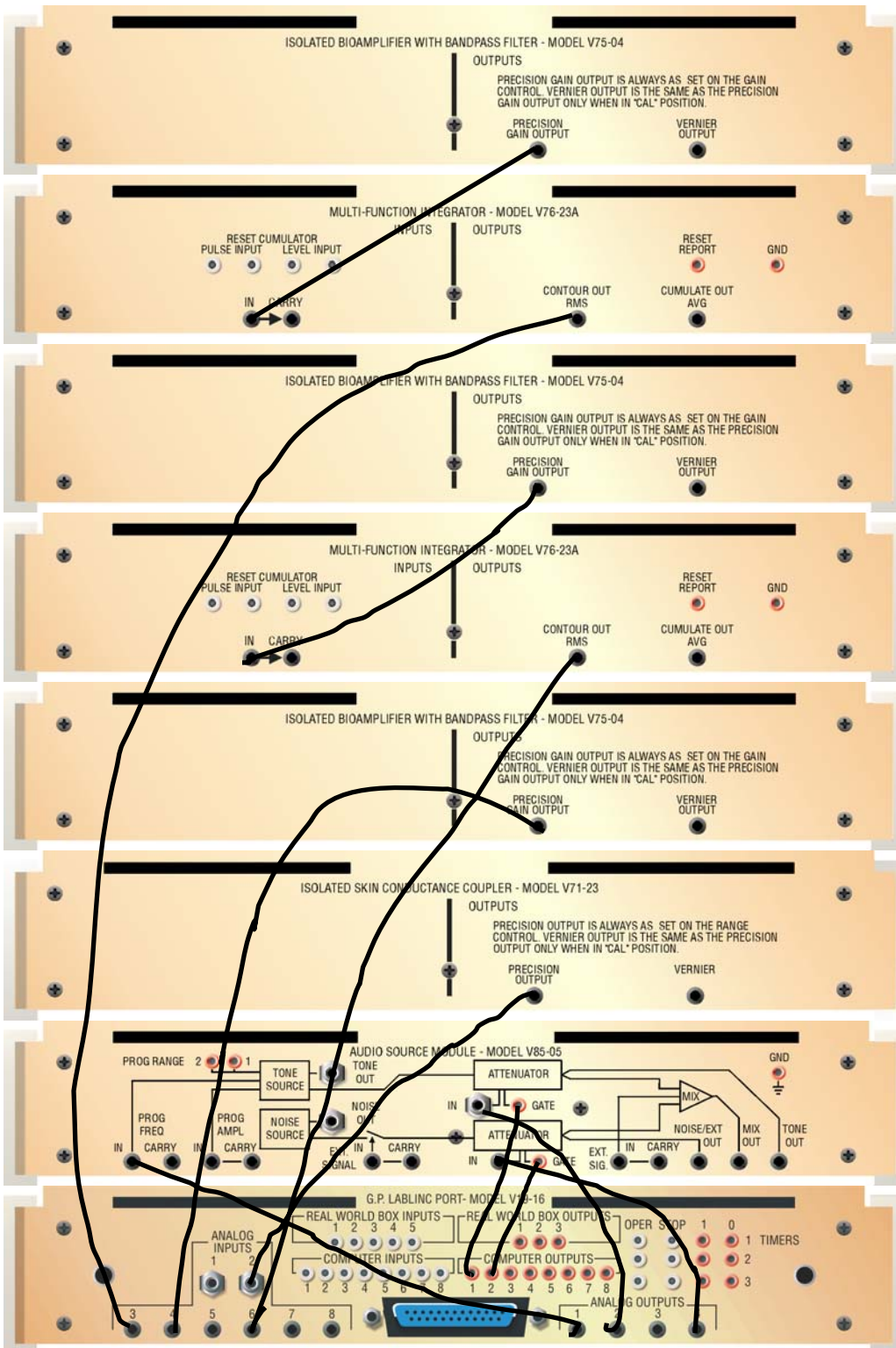
During integrator calibrations, the connections are changed as follows.

1. Analog Output 1 is connected to the integrator input
2. The integrator output is connected to Analog Input 8

Notes:

The digital to analog converter (DAC) used to control the tone frequency requires an operation time of approximately 65 msec. The appropriate value for S1 is written to the DAC during the pre-record period, so no special attention need be paid to S1. However, if both S1 and S2 are presented and S2 is tone, the DAC is addressed during the inter-stimulus interval. The 65 msec required by the DAC therefore limit the ISI in these cases to a minimum of 65 msec.

Parameter files, experiment files, and contextual stimulus files are written to disk as read-only files.



EMG1

EMG2

ECG

SCR

Appendix 2

Using Bitmap Files as Contextual Stimuli

The rightmost column in the contextual stimuli grid is used to schedule the presentation of bitmap (.bmp) files as contextual stimuli on a separate monitor in the subject room. The hardware system must include the V19-91 Real World Interface and the VGA-SPL-4 Video Splitter. Follow the provided instructions in setting up the splitter, and use Relay 5 on the interface to provide the control signal to the splitter.

All .bmp files to be used must be copied into a folder named IMAGES on the C: drive. You will need to create this directory before copying your images into it.

Click on the *Other Stimuli* option in the main menu, then on the *Image File* button. This will present a screen on which you will enter, in order, the names of the .bmp files to be used.

Image Number	Image Name	Background Color
1	spiders	5
2		
3		
4		
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

For each file, you will also specify a background color. The color key is displayed on the screen. Use the *Next* and *Previous* buttons to move forward and

backward through the list of files. A maximum of 100 file names may be entered. When all entries have been completed, use the *Save As...* button to save the list. Do not include an extension in the file name; the program will add .img as the extension to the file name. Make sure this file is saved to the main HSW directory (not to the IMAGES directory).

Use the *Cancel* button to return to the *Other Stimulus Outputs* screen, and enter the trial numbers and on/off times for each presentation as explained above under *Using Contextual Stimuli*. If the name of the file that you create this way matches the name of an experiment file, it will be automatically loaded when the session is run.

You must also enter the name of the .img file to be used in the *Options* screen (from the yellow menu); enter only the root portion of the file name.

CI Human Startle - Options

Number of EMG Channels:

EMG Baseline Period (msec):

Continuous IBI recording:

Continuous SCR recording:

Image File:

Since the software uses Relay 5 to control the splitter, do not schedule S5 events as these will use the same output bit of the V19-16 port. Note that the images will be drawn in order from the .img file and that the list will be started again from the beginning after the last image has been presented. This feature may be used to advantage if, for example, two images are to be used in strict alternation. Simply entering the two file names once will suffice since the list is restarted after its completion.

During the presentation of an image, both monitors will show the image. At other

times, the subject's monitor will be dark and the console monitor will display the usual experiment monitor screen.