

# **EEGer**

## **Neurofeedback Software**

Operator's Manual  
Version 4.2.2

Initial issue 30 July 2003  
4.0.1 issue 30 September 2003  
4.0.2 issue 18 November 2003  
4.0.3 issue 16 December 2003  
  
4.1.0 issue 31 March 2005  
4.1.0p update 2 May 2005  
4.1.1 update 16 June 2005  
4.1.1r update 10 October 2005  
4.1.2 update 20 October 2005  
  
4.1.3 update 03 January 2006  
  
4.1.4 update 13 April 2006  
4.1.4i update 5 July 2006  
4.1.4k update 12 Oct 2006  
4.1.5 update 22 Nov 2006  
  
4.2.0 Revision 31 August 2007  
4.2.0r Revision 11 February 2008  
  
4.2.1j Revision 28 July 2008  
4.2.1m Revision 19 August 2008  
4.2.1n Revision 3 September 2008  
4.2.1q Revision 19 September 2008  
4.2.1t Revision 16 December 2008  
4.2.1u Revision 24 February 2009  
  
4.2.2a Revision 26 March 2009  
4.2.2g Revision 17 August 2009  
4.2.2j Revision 15 January 2010  
4.2.2m Revision 4 May 2010  
4.2.2n Revision 2 August 2010  
4.2.2p Revision 23 August 2010  
Revision 5 October 2010  
Revision 18 February 2011  
Revision 13 May 2011

# Contents

## Table of Contents

Contents.....	iii
General Information and Cautions.....	vii
Indications for Use .....	vii
General Warnings .....	vii
Precautions to Observe.....	vii
Other Warnings and Contraindications.....	viii
Warnings .....	viii
Contraindications.....	viii
Possible Adverse Reactions.....	viii
Introduction.....	1
What's New in 4.2.2p from 4.2.2m.....	3
What's New in 4.2.2 from 4.2.1.....	3
What's New in 4.2.1 from 4.2.0.....	5
What's New in 4.2 from 4.1.....	6
What's New in 4.1 from 4.0.....	7
Therapist Software.....	9
Menus .....	9
Files Menu.....	11
Export.....	12
Consultation Import/Export.....	14
Archive.....	15
Dongle Telephone Updates.....	21
Client Menu.....	22
Create New Client ID.....	22
Create Client Class.....	24
Clinical Remote Use Actions.....	25
Initialize EEGer remote use storage device.....	25
Create EEGer remote use update file.....	28
Check Status of EEGer remote use drive.....	29
Create code for telephone update of remote sessions.....	29
Retrieve EEGer remote use data.....	30
Edit Client Data.....	30
Rebuild client index file.....	30
Remote-use client menu.....	30
Preferences Menu.....	32
Default session plans.....	32
Preset filter setups.....	33
Edit boilerplate file.....	35
Configuration.....	36
Devices.....	37
Device Options.....	39
Preferences.....	41
Setup.....	43

HIPAA.....	45
Data Locations.....	46
Time Constants.....	46
Synchrony.....	47
Fonts.....	47
Keyfile Settings.....	49
Tools menu.....	51
Tools.....	51
Tailor installed games.....	51
Change colors.....	54
Change background.....	54
Utilities.....	56
Print menu.....	56
Help menu.....	60
Buttons.....	61
Select Client .....	61
Choose Layout.....	62
Plan session.....	63
Autogoal settings.....	67
Begin session.....	69
Brainwave screen.....	71
Autogoal popup.....	75
Feedback Mode Popup.....	76
Volume popup.....	77
Tactile popup.....	78
Therapist display control popup.....	79
Peripheral control popup.....	80
Game Feedback Display Control popup.....	80
Game Control popup.....	82
Band Control popup.....	83
Expert Settings popup.....	84
Help screens.....	85
Control keys.....	87
Long-term display.....	91
Spectral Mirror display.....	92
ZScore display.....	93
Realtime Summary display.....	93
Review.....	96
Spectral.....	108
Replay Stored Data.....	113
Client software.....	116
EEGer Game Set.....	116
Score Screen.....	116
Beta/SMR Protocol Displays.....	117
Boxlights.....	118
Highway.....	119
Island.....	120



Mazes – Fixed Dots.....	121
Mazes – Variable Dots.....	121
Jumpbox.....	122
Theta-down Highway.....	122
4mation.....	123
Spectral Mirror.....	124
Long-Term Display.....	125
Support Programs.....	126
Alpha-Theta Display.....	126
Main menu.....	127
Game Initialization Tool.....	131
Appendix 1: How the Feedback process works.....	133
Appendix 2: Installation.....	135
EEGer Therapist Software Installation.....	135
EEGer Game Set Installation (for 2-computer systems).....	137
Appendix 3: Vocabulary.....	138
Appendix 4: Cable Diagrams.....	141
Appendix 5: InstaCal™.....	142
Appendix 6: Metrabyte.....	143
Appendix 7: DAS1600.....	144
Appendix 8: J&J devices .....	145
Appendix 9: Space Race Description.....	147
Appendix 10: Space Race Installation.....	148
Appendix 11: EEG Chomper Description.....	149
Appendix 12: EEG Chomper Installation.....	150
Appendix 13: EEGer Computer Performance Settings.....	152
Appendix 14: EEGer Remote Use Systems.....	155
Appendix 15: Identifying COM Ports.....	164
Appendix 16: Signal Problems with ProComp Systems.....	165
Appendix 17: Feedback and Reward Modes.....	168
Appendix 18: Fixed color codes.....	170
Appendix 19: Sound controls.....	171
Appendix 20: Zscore.....	174
Appendix 21: Editor.....	179
Appendix 22: (Manual) Alternate Images for 4mation.....	180
Appendix 23: Boat Race.....	184
Appendix 24: Game Tailoring Options.....	187
Appendix 25: Coherence.....	192
Appendix 26: Using Checktrode® .....	195
Appendix 27: dkgames for EEGer™.....	197
Appendix 28: DVD Game.....	201
Appendix 29: Protocol Transfer Utility.....	205
Appendix 30: Image Installer Utility.....	214
Appendix 31: Add 4mation selections.....	220
Appendix 32: Remote Flash Utility.....	221
Appendix 33: Special Startup Options.....	225
Hardware Requirements for EEGer™ .....	227



# ***General Information and Cautions***

## ***Indications for Use***

This device is to be used for general relaxation.

## ***General Warnings***

- US Federal Law restricts this device to sale by or on order of health care practitioners.
- Not suitable for use in the presence of a flammable anesthetic mixture with air or with Oxygen or Nitrous Oxide.
- Not to be immersed in water.
- To prevent static discharge from damaging the sensor and/or encoders, use anti-static mats or sprays in your working area. A humidifier may also be used to prevent static environments by conditioning hot, dry air.
- Do not apply any electrode gel or equivalent directly on the preamplifier sensor snaps. Always use electrodes as a medium between the sensor and the client.
- All encoders are totally isolated from line (110 or 220VAC) power due to battery operation and fiber optic connections to computers. **Do not plug into AC socket.**
- Do not operate this equipment within 10 feet of an operating cellular phone, similar radio transmitting device, other powerful radio interference producing sources such as arc welders, radio thermal treatment equipment, x-ray machines or any other equipment that produces electrical sparks, etc.

## ***Precautions to Observe***

- When using the EEG sensor, the result of the sensor's slight susceptibility to strong Radio Frequency Interference (RFI) could be to artificially increase the microvolt reading and, in almost every case, to obviously corrupt the raw waveform. By paying regular attention to the display on the PC screen of the raw EEG waveform, it should be possible to readily identify whether or not obvious extraneous artifacts are present or to confirm that the signal is “clean”. If you observe random or increased signal readings unrelated to user activity, move the encoder and client away from any radiating device.
- You can also test for susceptibility of the active sensors by clipping the three electrodes together and observing the display for non-zero readings or variations. If you are unable to resolve the conditions, contact Customer Support.
- A fiber optic cable not fully pushed into its receptacle may cause the unit not to operate. Make sure that both ends of the cable are fully inserted into their respective jacks and the nuts are tightened firmly but not so tightly that the plastic connections are damaged.
- It is recommended that a fully recharged set of batteries be used at the start of each day to avoid interrupting sessions if the battery voltage drops too low.

## ***Other Warnings and Contraindications***

### ***Warnings***

It has been noted that EEG biofeedback may engender a “rebound effect” in some clients, i.e., biofeedback training for relaxation may result, sometime later, in an elevated level of arousal, heightened sensory awareness and increased vigilance.

### ***Contraindications***

EEGer is contraindicated in clients with the following conditions:

Individuals who are unwilling or unable to understand the general principles and goals of the feedback used. This includes individuals with excessive behavioral problems or low IQ.

Individuals who experience anxiety or other unpleasant experience in connection with EEG biofeedback training.

Certain individuals may be unable to learn to control their EEG through biofeedback. Therapy should be discontinued if periodic monitoring of therapeutic progress indicates that the client is not learning despite adequate review of instructions for feedback.

Among those individuals who experience a “rebound effect”, some may find it mildly uncomfortable. In some of these cases it may be necessary to alter the level of relaxation being trained or discontinue biofeedback training altogether.

### ***Possible Adverse Reactions***

There have been some clinical reports of dizziness, drowsiness, fatigue, excitability and/or anxiety associated with EEG biofeedback.

# Introduction

EEGer is a software suite designed to provide visual and audible feedback based on electroencephalograph (EEG) brainwave signals. An EEGer System [See *Figure A: System Overview Diagram*], is comprised of a Therapist and Client station, each with its own computer, monitor, keyboard and mouse. The Therapist Station has a battery-powered Amplifier/Encoder Unit connected by a fiber optic cable with a serial (RS232 compatible) converter to the Therapist computer. In order to run the EEGer software, a software security device must be plugged into the Therapist computer. The Client Station has a set of amplified (stereo) audio speakers connected to the Client computer with its power supply. A serial (RS232) cable connects the Therapist to the Client computer. An optional laser printer is often added, usually with an automatic switch that allows both computers to share a printer. The client is connected to the Amplifier/Encoder Unit through an EEG Preamplifier. The EEG Preamplifier is connected with a cable to the Amplifier/Encoder Unit using either channel A or B. The EEG Preamplifier is connected to the client through extender lead cables with attached single electrodes: signal, ground, reference. The *signal* electrode is pasted to the client's scalp with conductive paste and the *reference* and *ground* electrodes are clipped to the client's earlobes.

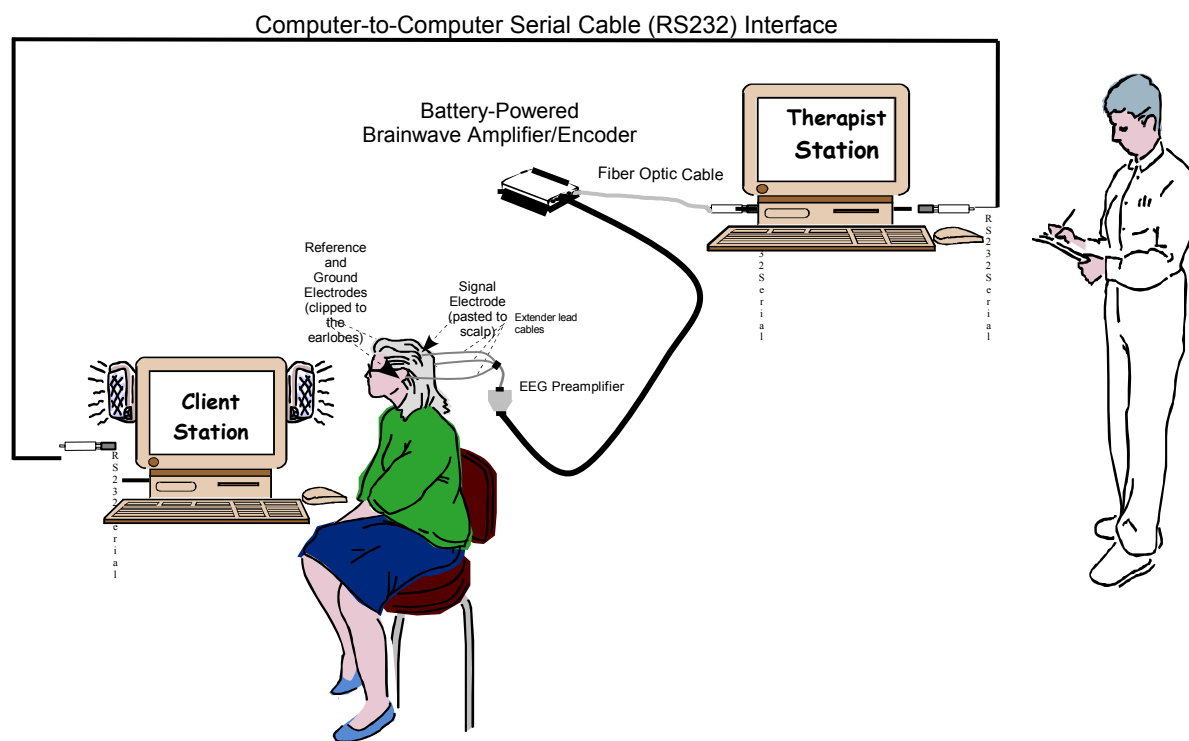


Figure A: System Overview Diagram

A continuous train of varying voltages comes from the client's brain, which the EEG Preamplifier senses through the *signal* electrode pasted to the client's scalp. The EEG Preamplifier, specially designed for sensing EEG signals, amplifies the EEG signals to boost the signal to noise ratio, and sends the signals to the Amplifier/Encoder Unit. The Amplifier/Encoder Unit magnifies the EEG signal (10,000 gain), converts the signal from Analog to Digital format, and sends it to the Therapist computer. The EEG signal samples are taken 256 times per second and digitized. The EEGer software processes the converted digital signal samples and stores, filters, separates them into several frequency bands and displays raw and filtered signals on the Therapist computer at 256 samples per second. The data about the amplitude of the brainwave in each of the frequency bands and its relationship to the amplitude targets (goals) is transmitted by the Therapist computer to the Client computer, where it is shown (in the form of a game) to the client.

The Therapist Station monitors the brainwave activity and sets goals that require the client to voluntarily produce more beneficial brainwave patterns, while the Client Station is displaying responsive feedback (in game form) to the client. As the client exercises the ability to voluntarily change brain activity, the signals are carried to the Therapist Station, where reward requirements can be adjusted and displayed back to the client screen. This process is called "feedback" because it informs the client about his or her momentary success in making the desired brain changes.

## ***What's New in 4.2.2p from 4.2.2m***

- \* Added “period”-length long term display width
- \* Added Protocol Summary display/printout in Review (showing groupings by site, frequency, mode, etc.)
- \* Added eyes open/closed to data stored and retrieved (assumed based on protocol class but changeable with Alt-E)
- \* Corrected Standard Deviation computation in realtime summary display
- \* Corrected tailoring bug that ignored tailored value of frequency step
- \* Added option to change frequency step size during realtime
- \* Added new sound control modes (managed by overall reward %)
- \* Jumpbox/Boxlights now have option to display images in reward box.
- \* Biological sex of client now recorded for later data correlation/analysis.
- \* Added menu and controls for double-blind study controls.
- \* Added message about incorrect raw artifact threshold settings.
- \* Removed floppy disk options
- \* Added display of raw values in review of screening data
- \* Corrected (crash) bug in Boxlights/Jumpbox
- \* Corrected (crash) bug in Variable-Dots Mazes
- \* Corrected Review graph logic so (red) lines show on long graphs
- \* Corrected recomputation of 2<sup>nd</sup> inhibit averages in Review
- \* Pdelta feedback mode changed so larger values reflect better coherence.
- \* Support for TTUSB interface
- \* Additional utilities added to base release
- \* Added Unity feedback mode
- \* Added spike detector display and optional sound
- \* Added support for 64-bit esiPro devices
- \* Added option for display of interperiod statistics during review
- \* Added display of dominant frequency during spectral postprocessing
- \* Added capability of multiple data pools for double-blind studies
- \* Allowed left/right arrows to change popup values during realtime
- \* Corrected bug that truncated large EEG signals when using ProSB interface
- \* Corrected Jumpbox timing bug if times changed from expert popup
- \* Corrected 4mation Weight mode display bug
- \* Added Ratio output in review

## ***What's New in 4.2.2 from 4.2.1***

- \* Autothreshold settings are now set by session plan stage
- \* A clinician can now enable a remote client to edit the remote session plan
- \* Several destination locations are now chooseable for Consultation Exports
- \* Option for peripheral outputs in metric units
- \* Option to preset FFT displays off at start of session

- \* Option to select fast brainwave display at start of session
- \* Hyphens now allowed in client ID
- \* Option added to automatically generate Consultation Export of sessions
- \* Option added to allow user selection of voltage/power for ratios
- \* Several new feedback modes (some experimental)
- \* A method to allow telephone updates to dongle sessions and remote sessions
  
- \* A message saying NOT RECORDING when users exceed 90 minutes.
- \* A minor fix in EDF+ export files.
- \* "updated" esiPro driver files.
- \* Debug display now shows input device along with any decoded subtype
- \* IOtest now shows esiPro decoded subtype
  
- \* Fixed erroneous review screen tabular selections that didn't match graphical selections
- \* Remove extraneous client index rebuild on new clients
  
- \* Add defensive correction for incorrectly-formatted MonitorAB summary files (single site!)
- \* Correct debug-only labels for 2nd device
  
- \* Updated help file to match documentation
- \* New version since there were SOOOO many versions
  
- \* Message about game termination added
- \* Stored dongle# and s/w version into raw file headers
- \* provisions for inhibiting volume control popup for unsupported games
- \* provisions for future EEG Software games
- \* debug method to inhibit loading of sub-Hz filters
  
- \* Flush received message queue after end-of-maze/picture received
- \* Resize birds/stars for 800x600 displays
- \* Decode print command messages for single-computer modes
- \* Kludge repair on incorrect Windows-DX9-created .BMP file headers
  
- \* Catchup on graphics library updates (but no functional changes)
- \* Fix game select/tailoring menu for two columns if many games installed
  
- \* Yet another set of J&J DLLs
- \* New communications DLLs which require only Therapist id of client
- \* Another fix for people who run longer than 90 minutes (bad period limits in summary file)
  
- \* Fix scale message to have scales matching the strand order
- \* Support decimation for sub-Hz filters
- \* Allow remote clients to status the remote flash drive



- \* Duplicate scale setting for both reward data channels
- \* Force sending of scales whenever there is a subchannel (green/blue) change
- \* Added method for feedback rewards within a range (band) of settings.
- \* Added in-session controls for various (expert) adjustments  
(minimum reward time, artifact lockout counts/times, on-task times/percentages).
- \* Added one-second running averages to export summary data.
- \* Corrected bug in using minus sign when entering sites during realtime.
- \* Put latest version of iotest in release.
- \* Added some debug methods for vendor game testing.

Note: the release will have a set of 1/100 Hz filters decimated to 64 samples/second (for the range below 1 Hz) but they must be manually enabled!!!

## ***What's New in 4.2.1 from 4.2.0***

Graphics redesigned to work with modern graphics chipsets.

Support for double-blind studies (special enable key required).

Study subjects are not discernible by technician from non-study subjects.

Additional review screen for zscore data.

Volume settings now 'sticky' by client.

Tailorable option to lock out rewards if too many artifacts in a time period.

Some management data is saved (number of sessions, etc.).

Option to disable zscore processing even if licensed (preferences option).

Messages when session plan contains unlicensed modes (but you can still save session plan).

Raw data format modified to support forensic tracebacks.

This means that versions prior to 4.2.1 cannot replay/spectral analyze sessions recorded with 4.2.1 and later.

Color set editor now shows which color sets have been tailored (load button is enabled).

New feedback modes RatioAB/RatioBA which are amplitude ratios (in reward frequency band)

of two channels of input.

Presets now have a feedback mode and reward modes shown and applied.

Game Initialization Tool and tailoring screen options now numerically ordered.

Each option has unique number displayed.

Number is unique to 'function' of option.

Appendix added with explanation of each option.

Support added for esiPRO2.2 amplifier.

Bug fixes:

- Remote user update now installs session plan before first run.
- Better control over disallowing games not suitable for single computer operation.
- Graphics overrun logic completely redone – no more messages.
- Session plan now correctly loads 'Down' reward mode at startup.
- New default reward sound minimizes popping on cheap speakers/sound chips.
- Game tailoring failure (tailor data did not always get to game) corrected.
- EGS now handles ports > 9 at startup.
- Green/Blue reward color options handled correctly from session plan.
- Remote session and dongle counts now always shown.

Added method for feedback rewards within a range(band) of settings.

Added in-session controls for various (expert) adjustments (minimum reward time, artifact lockout counts/times, on-task times/percentages).

## ***What's New in 4.2 from 4.1***

Editor - EEGer now contains a text editor for client notes which can be used during feedback sessions, the review process, or spectral review.

Dual screen mode - EEGer can operate using a single computer with two screens (an extended desktop) for selected games.

More devices are supported: (esiPRO4.3, Atlantis, PET2.0, QPET).

Saved data can be exported into EDF+ format (a standard for use with analysis tools).

A zscore feedback/display capability has been added (using the Applied Neurosciences zscore database).

More archive options (rename client, completely delete a client).

New realtime summary display (of averages, etc.) showing the last 16 periods of data.

New tactile feedback modes added.

Renamed old synchrony, comodulation, etc. modes to not "imply" other kinds of computations.

Many bug fixes (mazes, etc.).

Additional layout options.

Ratio feedback mode based on amplitude of a reward trace to an inhibit trace.

Phase tracking feedback mode based on deviation of single-cycle phase difference between two channels of input.

Works on Vista (if you must).

Default game settings changes (long term medium speed, A/T 6i, screening order)

Separate game configurations for single/2-computer mode

Added printout of trend graph

50/60 (software) Hz notch filter (option)

Traces labeled with color/frequency on long term display

Option in gamedef files for EMDR reward sounds (alternating)

Option in gamedef files for L/R/Both speakers for sounds and/or rewards

Allow selection of summary printout as either two pages or one page

Allow control over A/D gain and channels

Change spectral mirror displays to have 0 Hz at the bottom

Added tech support menus to simplify customer support

## ***What's New in 4.1 from 4.0***

This section describes (briefly) what is new or improved from the 4.0 version of EEGer (but not organized into any particular order).

### **Layouts**

EEGer now has the concept of 'layouts' which are the mapping of input, output, and screen display. Besides the 5-trace layout in 4.0, there are now 6-trace(with extra inhibit), 6-trace (with extra reward), and 8-trace layouts. There is a (unique) session plan for every layout/client. Additional layouts are available for special purposes (such as screening).

## Electrode site locations

10-10 and 10-20 head charts are user-selectable (and printable). You can now use 10-10 (modified) site locations.

## Game tailoring

Therapists have many options to tailor game actions and session parameters. These options can be persistent or single-session only changes.

## Filters

Filters now go up to 50 Hz in 1/8 Hz steps. Therapists can configure the lowpass (upper) limit to 30, 40 or 50 Hz. There is also an optional notch filter to remove powerline noise.

## Peripheral data input

Peripheral data input can now be selected (saved) and displayed from applicable input devices.

## New games

4mation is a picture grid filling game with a number of fill modes. You can even use your own pictures (BMP or JPEG).

Spectral Mirror is a client display of spectral data.

Long-term display is a moving graph of EEG and/or peripheral data.

## Therapist spectral mirror

This is a therapist display of spectral data.

## Tactile feedback

Tactile feedback works (using a sound card as the driver) with the T key bringing up a control menu.

## Single computer option

A single computer can be both the Therapist and Client/game computer (using only the EGS games). The space bar toggles between game and therapist graphics.

## Remote use

Remote use systems have user session controls set up by a Therapist. A USB memory device takes the place of a floppy so all the stored and summary data is returnable to the

Therapist.

#### Volume controls

Volume (for EGS games) is now controlled from the Therapist keyboard.

#### Overall reward percentage

A new measure is computed/displayed that shows the percent time spent in a rewardable (no inhibits) state. This resolves the problem of trying to eyeball-measure this condition, especially when you have lots of traces to watch.

#### Autothreshold goals

Autothreshold (F11) goals are now changeable while running (using the G key for a popup menu).

#### Devices

More devices are supported for input.

#### Export

Summary data (1-second samples) can now be exported to an ASCII file readable by Excel or other program.

Output in a special format is automatically/manually created for the Results! Program.

#### Bug fixes

- Too many to list
  - Printing
  - Timing monitoring/overrun detection
  - Reports
  - Filtering

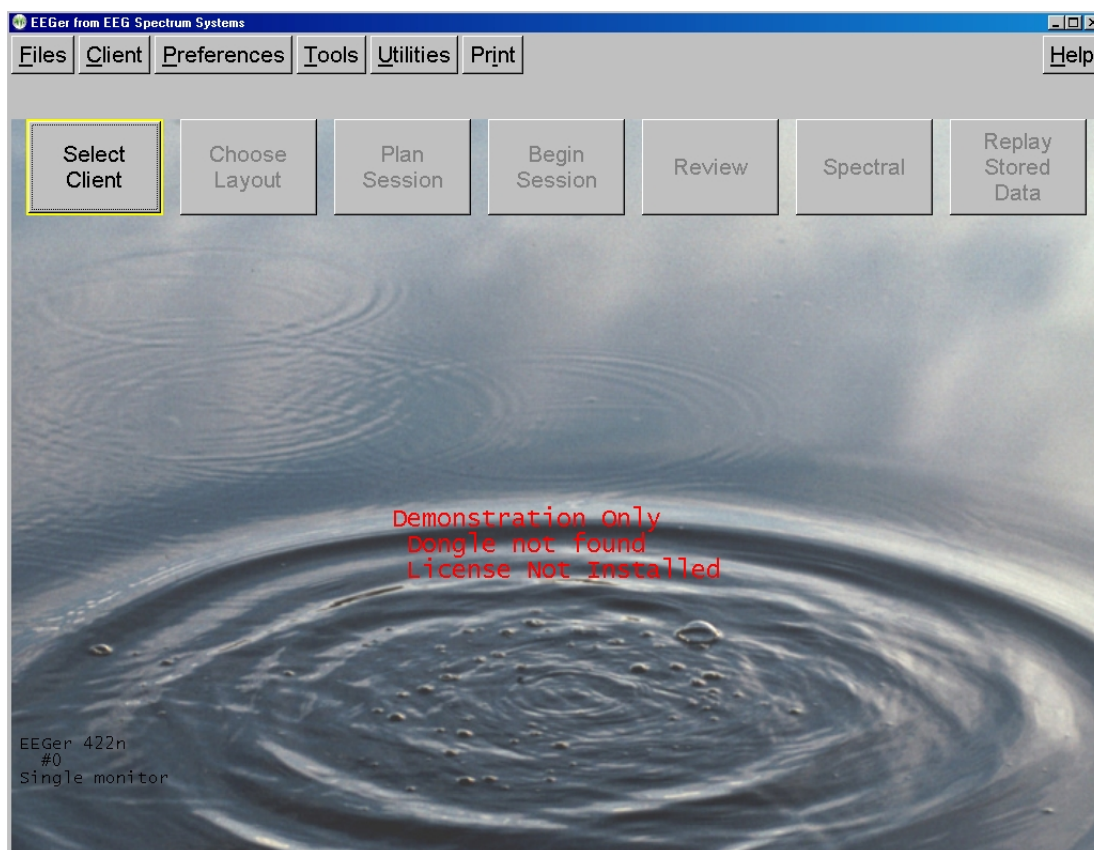
## ***Therapist Software***

### ***Menus***

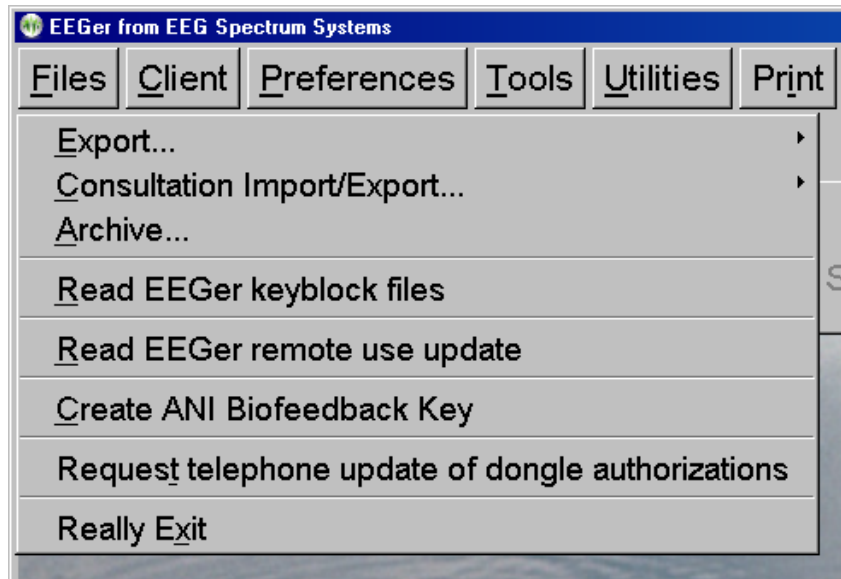
The EEGer main screen as shown at startup (no client selected). Notice the RED warning message (“Demonstration Only -...”) meaning a successful live session cannot be performed. YELLOW messages are information about upcoming limitations (expiration dates, session counts, etc.) . **F1** can be pressed at any time to show the help file. Also, **Alt-T** can be pressed at the main screen to bring up a tech support menu for aiding in customer support.

There are two rows of selections. The top row consists of Windows-style menus for program-

wide actions. The second row is a row of buttons for client-specific actions. Until a client is selected, only the leftmost button (**Select Client**) is active.



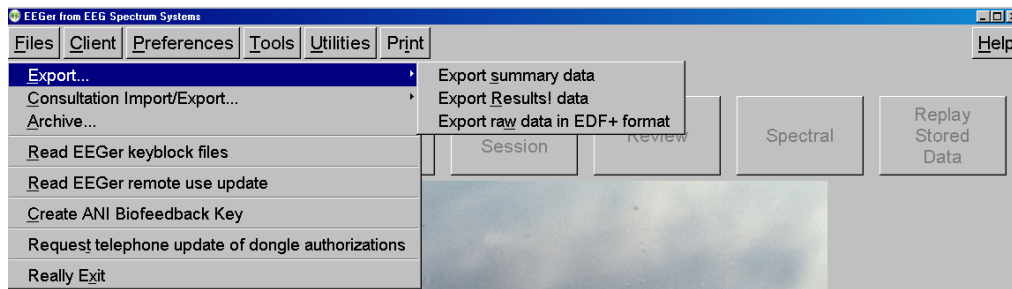
## • **Files Menu**



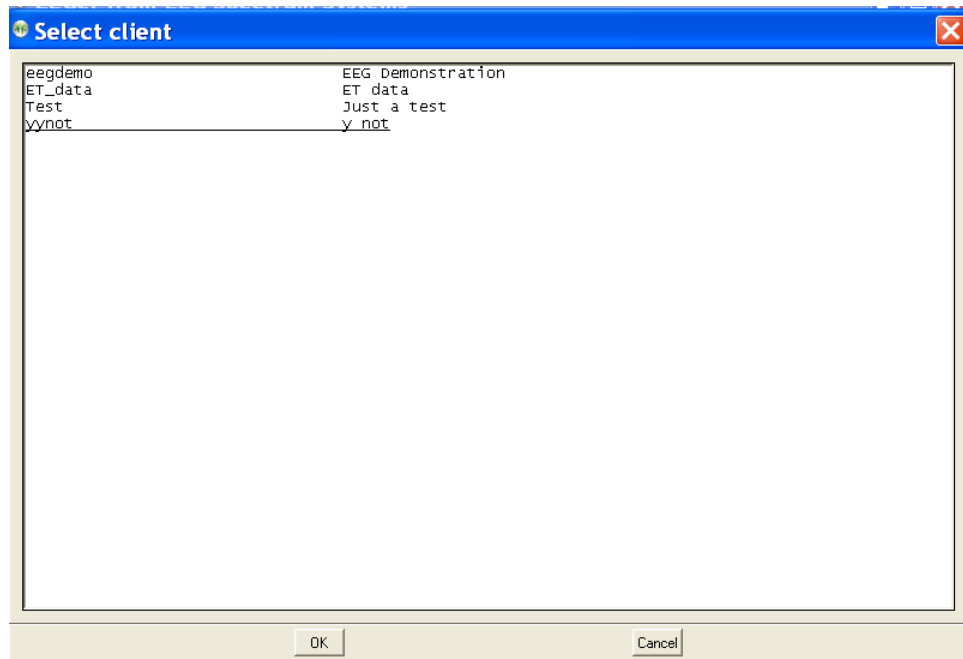
- **"Export"** exports summary data (one-second values) for use by external analysis programs and Results! data files.
- **"Consultation Import/Export"** allows sending and receiving client sessions for review by another Therapist (with EEGER).
- **"Archive"** allows clients/client data to be compressed and removed from daily access but still available (and restorable!) if needed.
- **"Read EEGER keyblock files"** processes new/updated enabling files for EEGER. The file format for these files was chosen so that they could be easily emailed and received (even by AOL). If the keyblock is NOT found on the floppy in the A: drive, click on **Cancel**. Then navigate to wherever you saved the keyblock file. Select the appropriate keyblock file. Do NOT attempt to unpack or extract the contents of the .EKB file as EEGER itself expects that specific format.
- **"Read EEGER remote use update"** processes remote-use update files for users with remote-use licenses, extending the number of sessions/expiration date. (Note: this option will only appear on remote-use systems).
- **"Create ANI Biofeedback Key"** allows entry of the special ANI key used to enable zscore processing. (Note: this option will only appear on systems that have an EEGER zscore key AND that have the ANI software installed using the EEGER ANI installation program)..

- **“Request telephone update of dongle sessions”** starts a request process for receiving additional dongle sessions from EEG Spectrum. This menu item only appears if the installed dongle is a session-limited dongle.
- **“Really Exit”** exits EEGer.

## Export

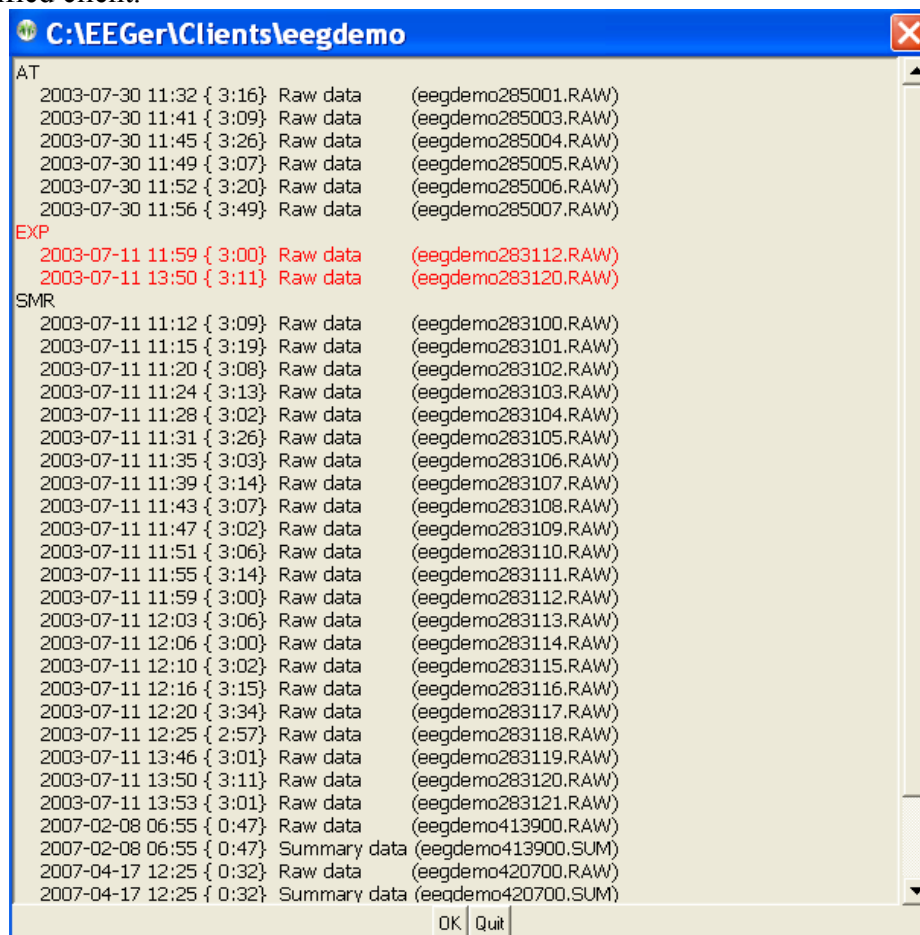


If **“Export summary data”** is selected, a client selection screen will pop up to allow specifying a client.





After selecting the client, a window will appear allowing the selection of multiple summary files for the specified client.



When the **OK** button is pressed, each of the selected summary files will be exported to the C:\EEGer\Export directory. Each file will have the same (root) filename as the summary file (identified by codename and a date-number unique code) but have a .CSV (comma-separated-variable) extension. These .CSV files are suitable for direct import/opening by Microsoft Excel or other similar programs.

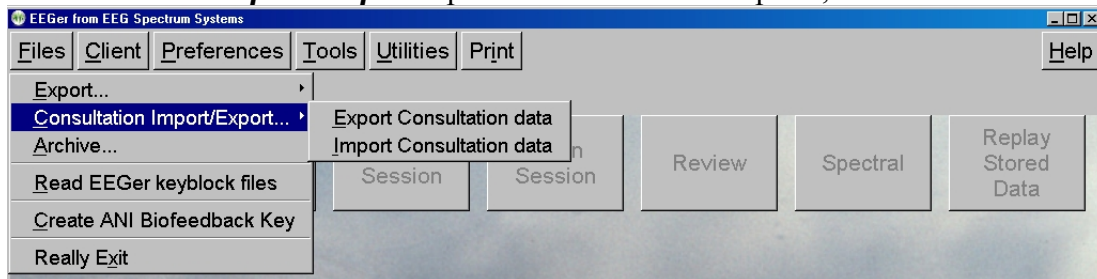
The .CSV files have one row of headers and one row for each second of data. Each row has as many columns as are defined in the headers. The structure comes from the layout/trace-count of the data as recorded.

If the **Export Results! Data** option is selected, the client selection window and session selection is made exactly like the **Export Summary Data** process (above) except that the output files go to the Results! directory specified in the setup configuration. The format of the .CSV files is specific to the Results! Program.

If the **Export raw data in EDF+ format** option is selected, the client selection window and session selection is made exactly like the **Export Summary Data** process (above). The output files are in EDF+ format. Filenames are related to the original raw file but have additional letters denoting which set of data is contained in the file. Please contact Customer Support for more information on the content and uses of the EDF+ data.

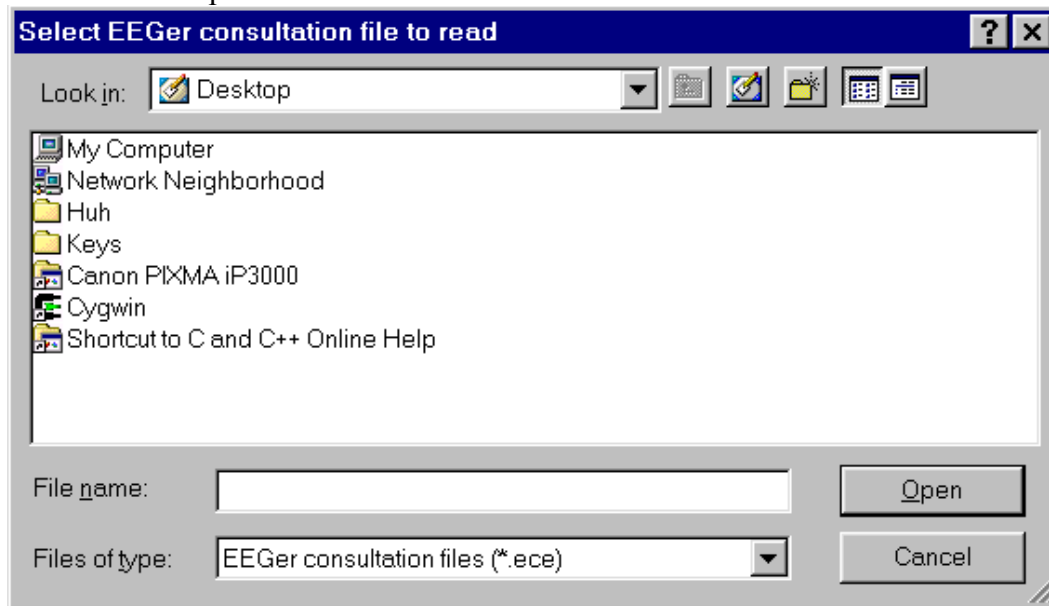
## Consultation Import/Export

If the **Consultation Import/Export** option is selected for “Export”,



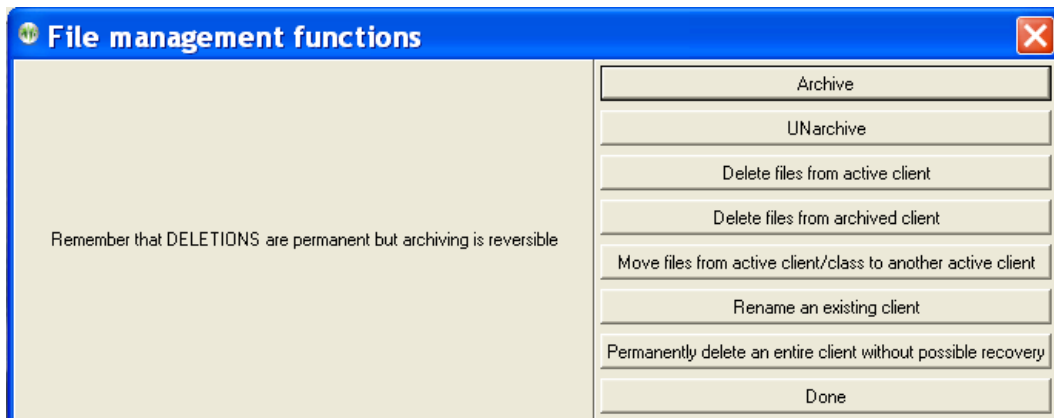
the process is similar to the “Export summary data” process (in the menus and selection of files). The consultation export places a special file (.ECE) on the desktop (or designated location) which can be transferred to another therapist. This file contains all the information needed for another therapist to import and review the client (summary and possible raw) data.

If the **Consultation Import/Export** import option is selected, a file locator dialog will be started to locate and import the .ECE file and create a 'client' from the data in the file.

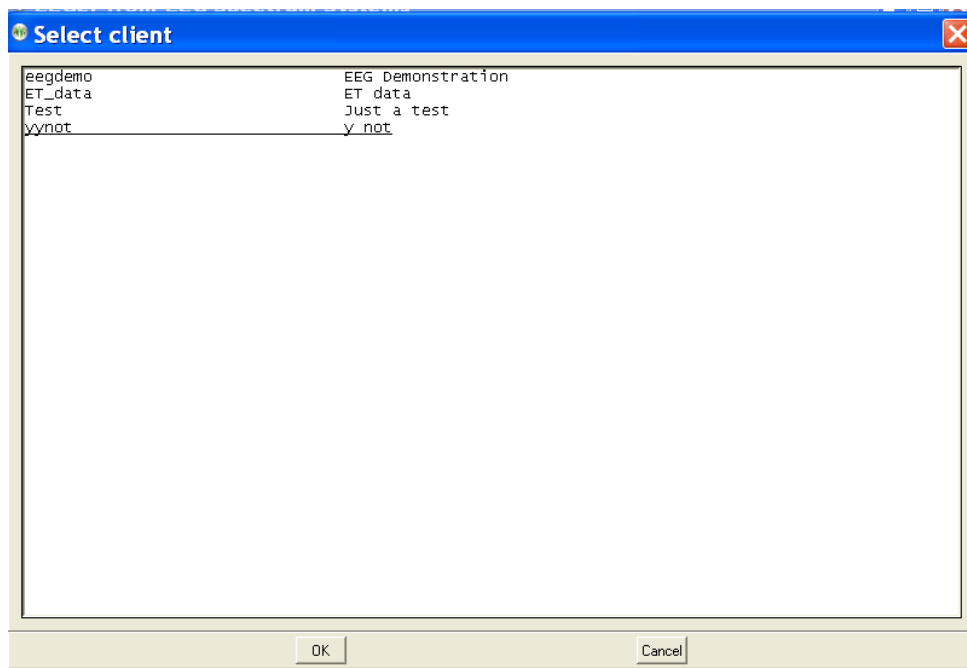


## Archive

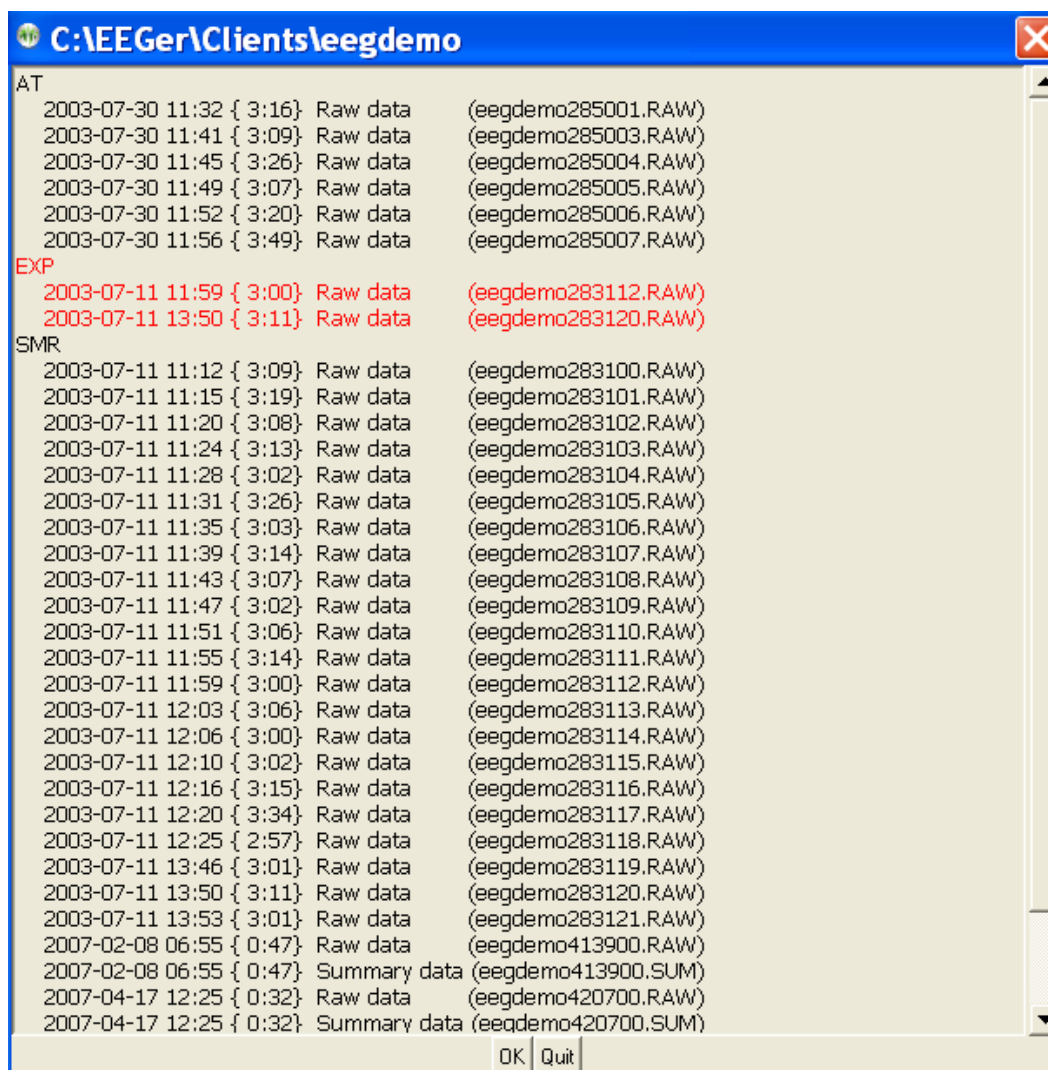
The **Archive** selection pops up the following menu:



Selecting **Archive** (for example) pops up the client selection screen:



After selecting a client, the client data is examined and a selection screen is displayed.



Shown here is the entire Exp protocol class selected. The date/time of each session is displayed.

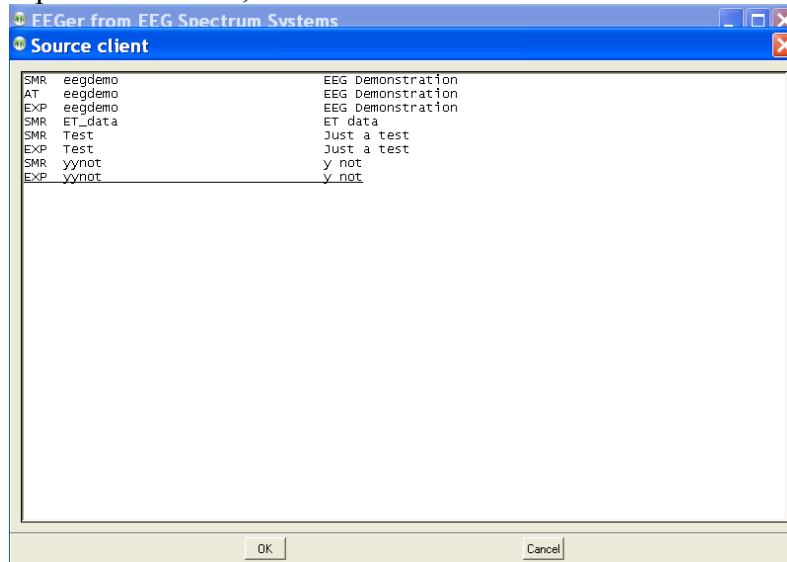
Clicking on **OK** causes the data to be archived. This means the data is compressed into the appropriate client-specific .ZIP file and removed from the active client section. **If the protocol class item was selected (red), the entire protocol class subdirectory is removed. You need to do this to remove the client completely from the client list.**

When data is **UNarchived**, the directory and subsidiary files are restored to the current client path but the data is left in the archive file.

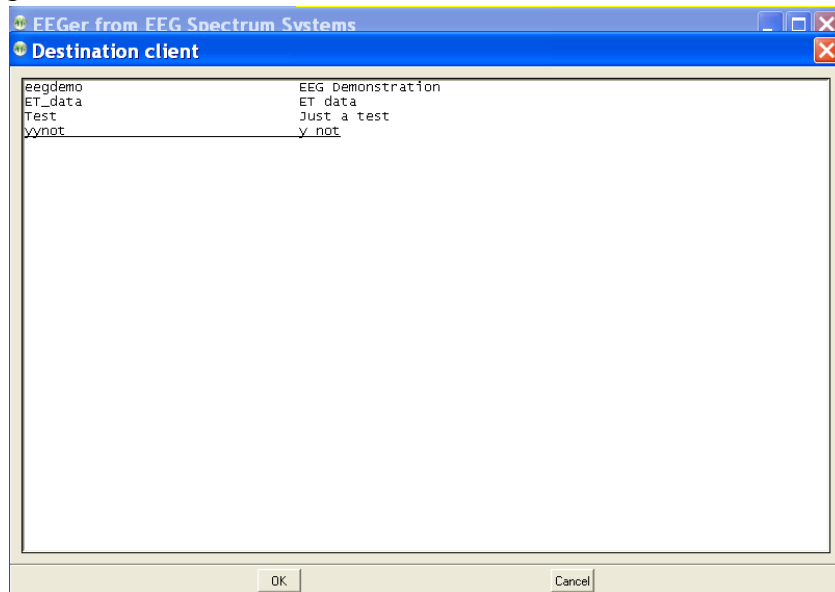
The archive/unarchive process is circular. You can archive an entire client, move the archive file to another computer, unarchive it, and have the complete client history, data, and setups available just as if it was always on the new computer.

Individual files can be deleted from either current clients or archived clients by selecting **Delete files from active client** or **Delete files from archived client** as applicable. The process of file selection is common to all the archive functions.

If the **Move files** option is selected, a source client selection screen is shown:

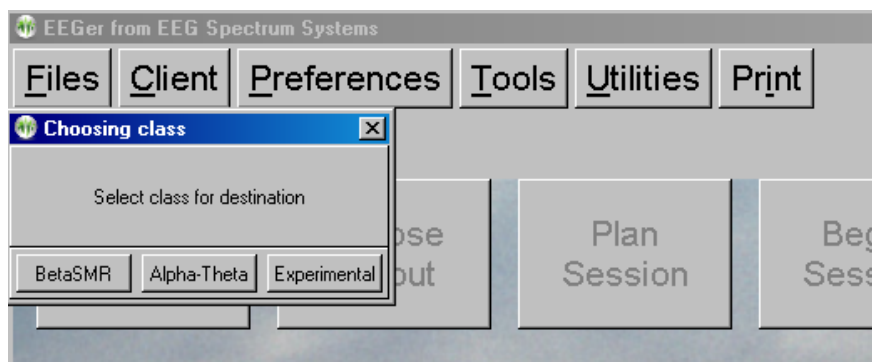


After a client is selected, a selection screen is shown (just like the **Archive** function above) to allow selecting which files are to be moved.

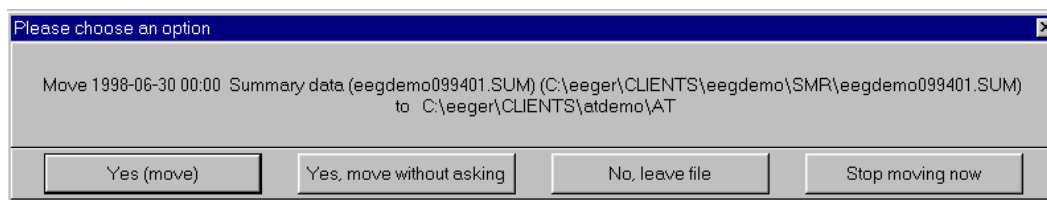


After picking the files, a destination client selection screen is shown.

Now a protocol class for the destination client must be chosen. Of course, you cannot move from the same client/protocol class onto itself. You can move files from one protocol class to another within the same client.

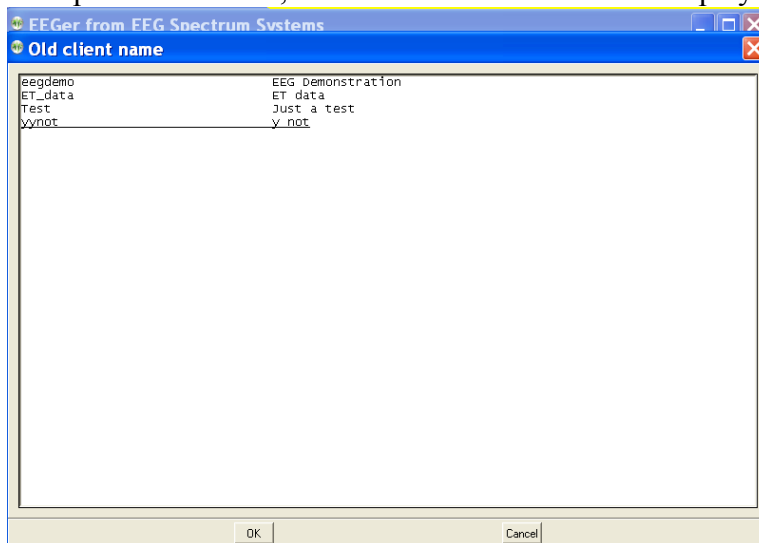


When moving files, the following screen shows the options for the move:

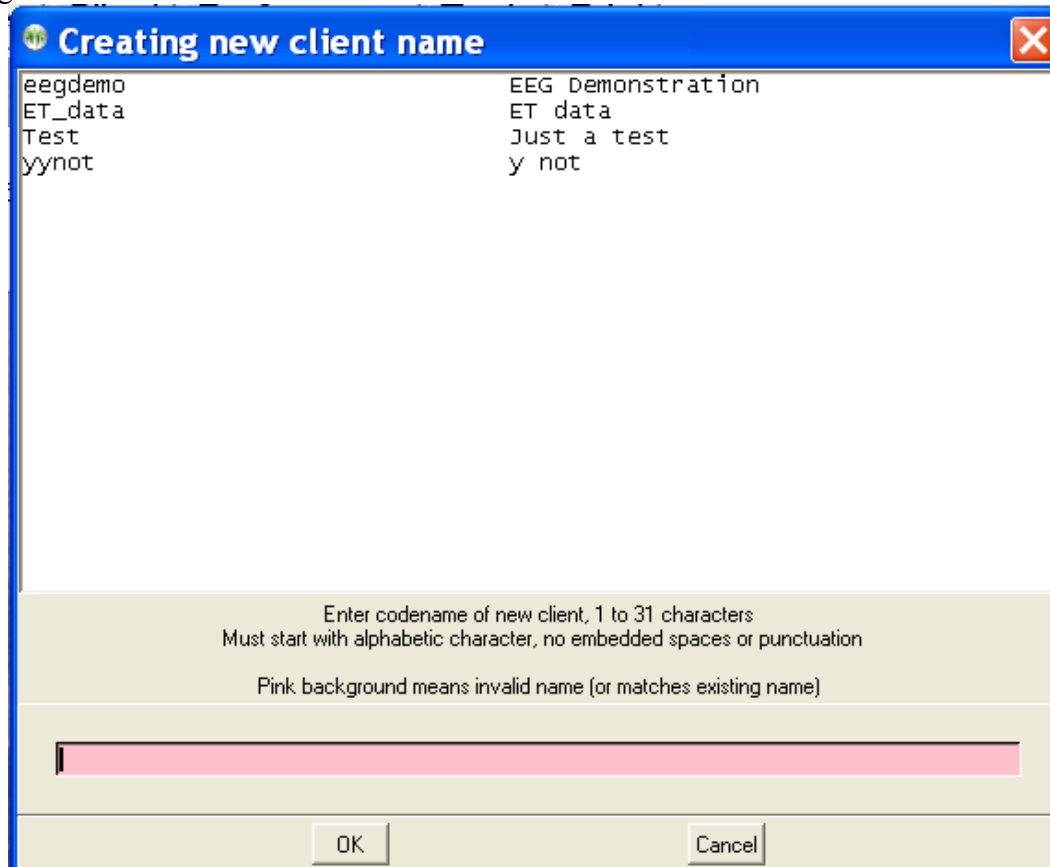


During the move, the source client codenames and fullnames will be replaced by the destination client codename and full name.

If the **Rename** client option is selected, the client selection screen is displayed:

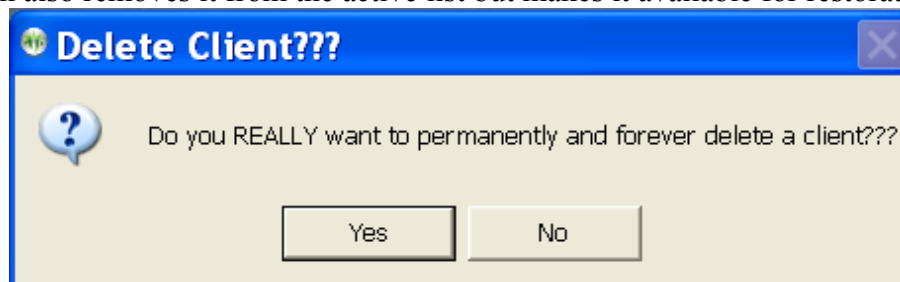


Once a client is selected, a new client name must be entered that does not conflict with any existing client.

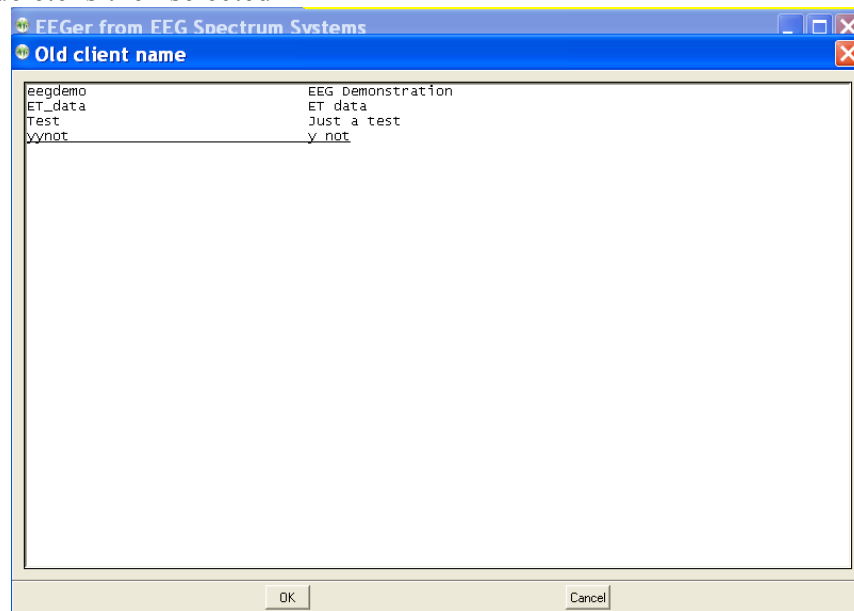


Once the full name, birthday, and biological sex are entered, all the "old" client files will be renamed to the new names including internal references.

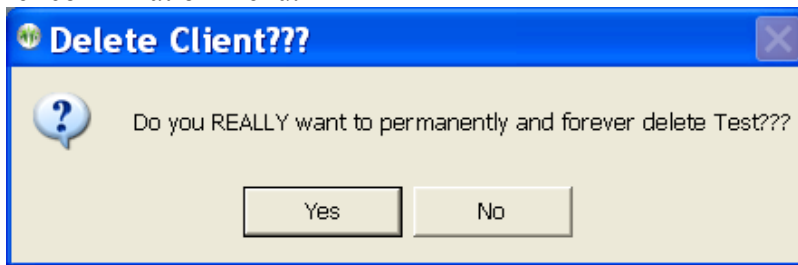
Permanently deleting an active client can be done by selecting the "***permanently delete ...***" option. The next step is to confirm you really want to delete a client forever. **THERE IS NO RECOVERY ON DELETED CLIENTS!** Perhaps archiving the entire client would be a better option (which also removes it from the active list but makes it available for restoration).



The client to delete is then selected



followed by another confirmation menu.



Deleting a client this way COMPLETELY and PERMANENTLY deletes the client and all information.



## ***Dongle Telephone Updates***

This process allows updating of dongle authorizations using codes (spoken) over the telephone. It is not intended to replace the emailed dongle update process (which has many other options) but only as an immediate method of adding authorizations or extending an expiration date.

**This process uses a time-sensitive code which is ONLY maintained DURING the display of the code values. Closing/re-initiating the the process gives/requires different code values.**

When the process is initiated (by “Request telephone update of dongle sessions”), the following screen is displayed:

**Telephone Requests**

Requesting DONGLE updates  
over the telephone:

Please call EEG Spectrum Systems at  
(800) 400-0334 (4000eeg)

The values on this screen are only valid  
while this screen remains displayed.  
You will have to read these values to ESS  
and wait until ESI reads back  
another string of numbers/letters  
There are NO zero, ell, v, or 2 digits

When a valid string is entered,  
the "Apply" button will be activated.  
Click on it then.

ptmp1-b8crt-wkffr-8pj6s-swp4h-c8

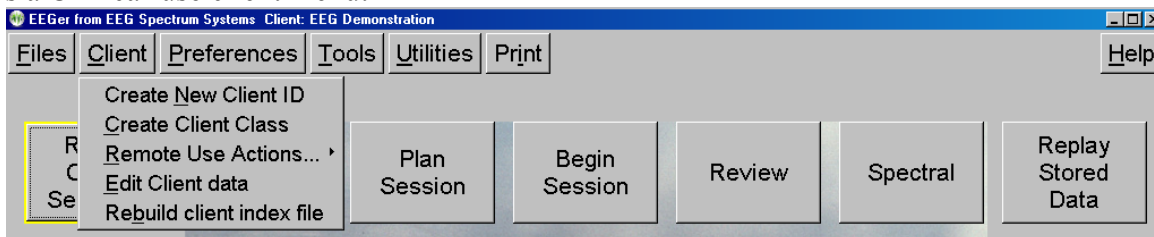
Apply Cancel

EEG Spectrum Systems must be called WHILE THE SCREEN IS DISPLAYED and arrangements made to purchase additional dongle authorizations. When the 26-character code is read off to ESS, they enter it into their program and generate a 26-character response code. The response code must be entered into the blank field. Dashes are automatically put in the correct places. When the entered code is valid (no transposed digits, etc.), the “Apply” button will become active. Clicking on “Apply” will cause the code to be further validated and the encoded changes made. There will be either a “Successful” or “Failed” message box. Failure is caused by an incorrect code (or dongle removal).

## Client Menu

The Client menu option brings up a list of client-related actions.

This a Clinical-use client menu:

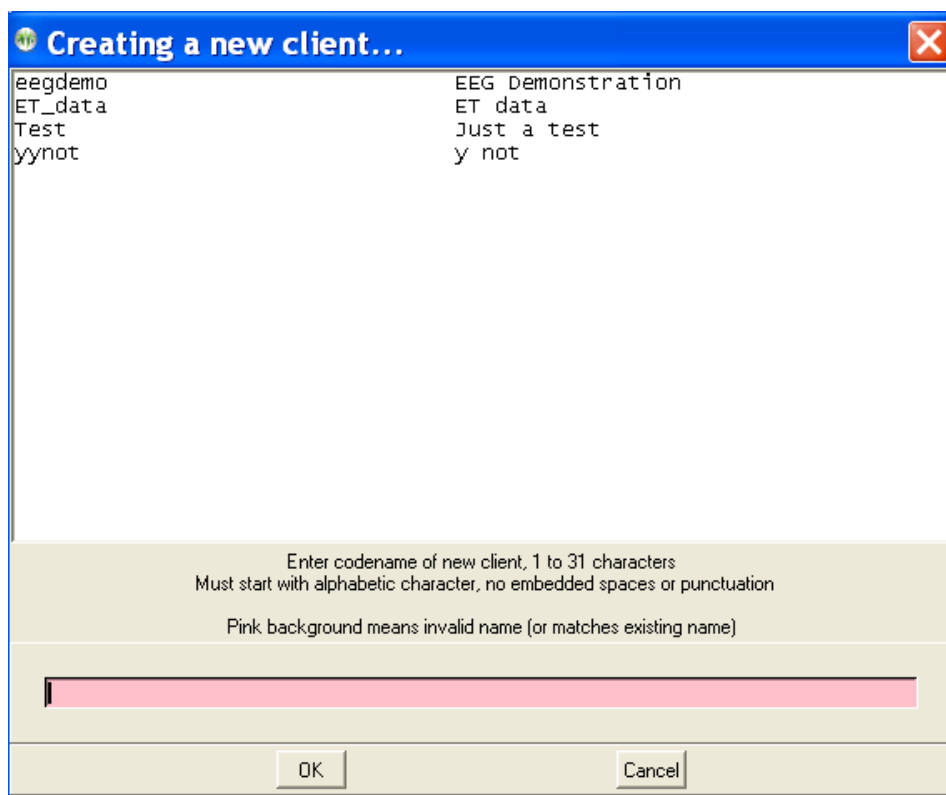


The Remote-use client menu is shown at the end of this section.

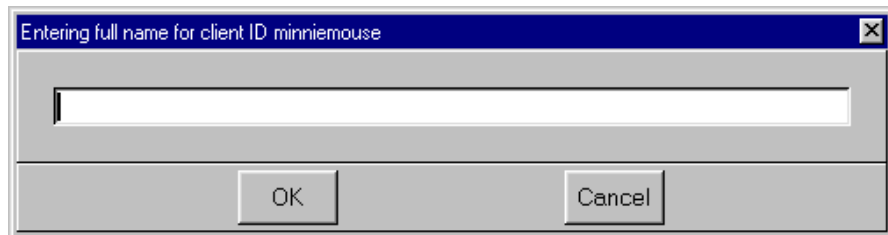
## Create New Client ID

Suppose we want to create a "New" client. The same client name/code can be used for any and all protocol classes (Alpha-Theta, BetaSMR, etc.).

After selecting **Create New Client ID**, we get the screen below:



Here are shown existing client codes (and corresponding full names). Client codes are 1 to 31 characters with no embedded spaces or special characters (except a hyphen). The desired client codename is entered into the (initially pink) box. You cannot create a client code name in incorrect format (the pink background will let you know it is incorrect/not allowed). When you have created a code name, the following window will pop up to allow entry of a full name:



A dialog box titled "Entering full name for client ID minniemouse" with a close button (X) in the top right corner. It features a large text input field with a pink background. Below the input field are two buttons: "OK" and "Cancel".

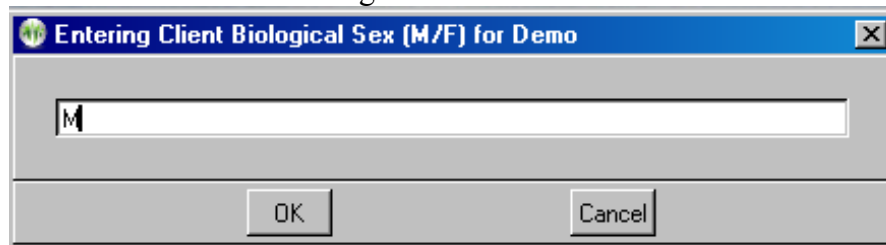
Here you can enter up to 64 characters (with spaces if desired) as the full name of the client.

Next, you must enter the birthdate of the client (in MM/DD/YYYY format).



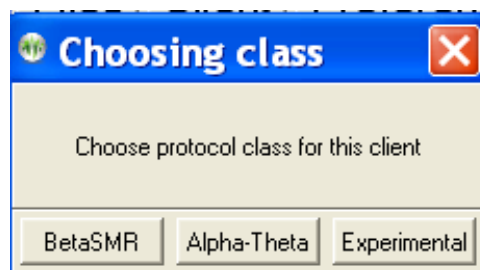
A dialog box titled "Entering Client Date of Birth (MM/DD/YYYY) for minniemouse" with a close button (X) in the top right corner. It features a text input field containing the date "01/03/1925". Below the input field are two buttons: "OK" and "Cancel".

Next you must enter a selection for biological sex:



A dialog box titled "Entering Client Biological Sex (M/F) for Demo" with a close button (X) in the top right corner. It features a text input field containing the letter "M". Below the input field are two buttons: "OK" and "Cancel".

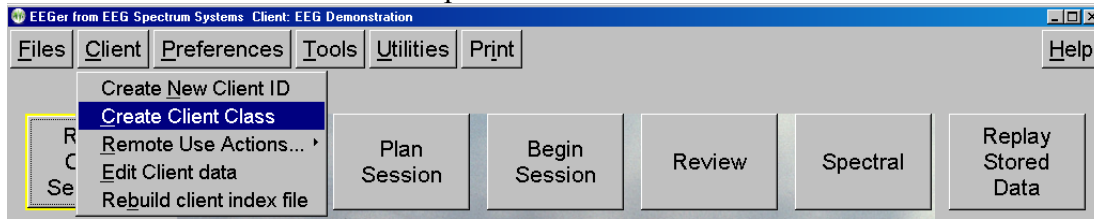
You must then select the first Protocol Class for the client.



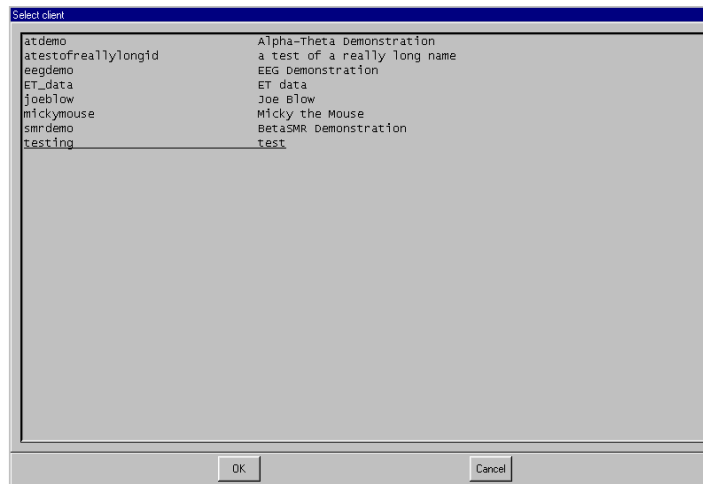
A dialog box titled "Choosing class" with a close button (X) in the top right corner. It contains the text "Choose protocol class for this client". Below the text are three buttons: "BetaSMR", "Alpha-Theta", and "Experimental".

## Create Client Class

To use a client for a session, a "protocol class" (like SMR, Alpha-Theta, etc.) must be created for the client. Select **Client** from the top menu and choose **Create Client Class**.

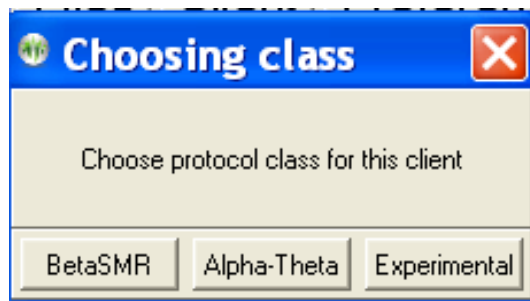


This menu will pop up to allow selecting the desired client from a list of existing codenames previously created.



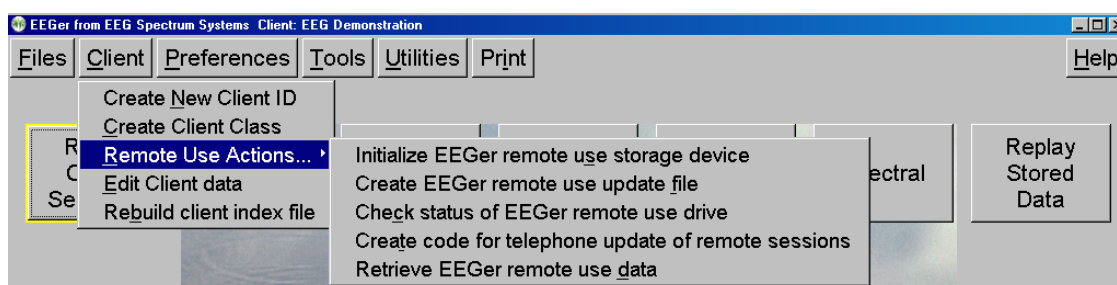
After choosing the client (select and click **OK** or double click on client line), you must choose the protocol class. The protocol class can now be selected from the following menu:

The "**Experimental**" protocol class allows you to create separate BetaSMR protocol options from normal BetaSMR usage. Note that the data, histories, and reports are separate for each protocol class (although they may be combined using the Archive/Move option ). After the protocol class is chosen, the appropriate subdirectory, defaults, etc. are created on the hard drive in the path selected in Preferences.



## Clinical Remote Use Actions

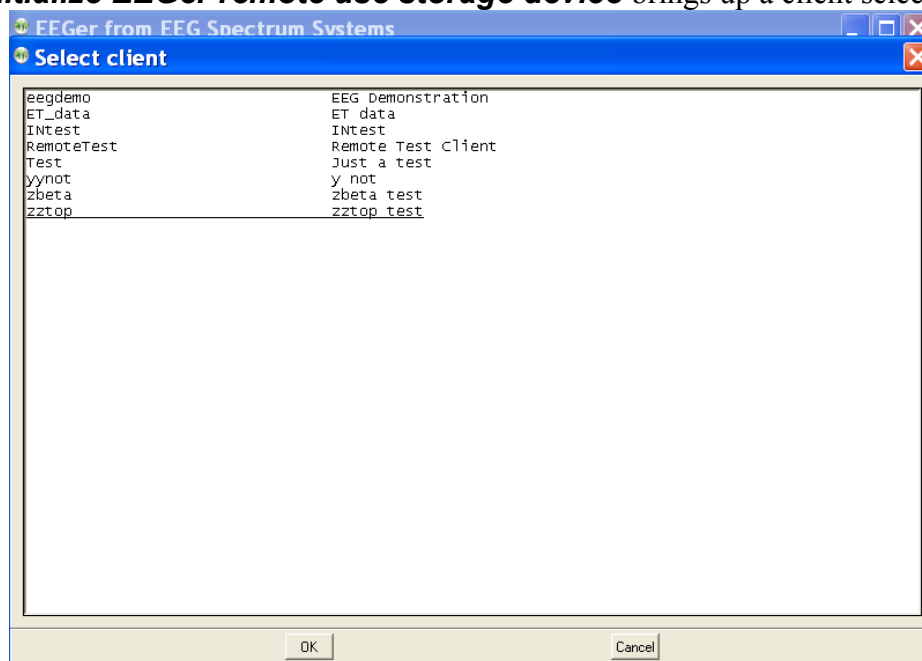
Remote use is a method by which clinicians can allow clients to train at home and still have control over the number of sessions and treatment period. In EEGer, the clinician provides a session plan which is ALWAYS used for a session (independent of any local editing done by a client). The limitations are contained on a removable device which the end user must have to run a session (along with a dongle and license!).



The EEGer method for remote use is somewhat complex due to the additional amount of data recorded by EEGer. Remote users in EEGer require a removable storage device with storage capacity in the range of 30 megabytes to 1500 megabytes. Typically, a USB flash memory of some kind is used. EACH remote user must have his/her own storage device (although multiple protocol classes can coexist for a single client).

### Initialize EEGer remote use storage device

Selecting **Initialize EEGer remote use storage device** brings up a client selection window.

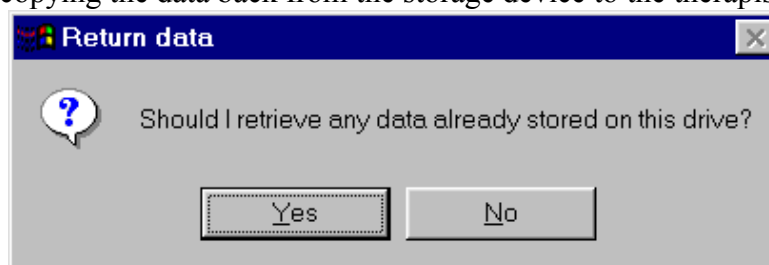


After a client is selected, the computer is searched for a suitable storage device. The following menu then pops up to allow the clinician to specify the storage device:

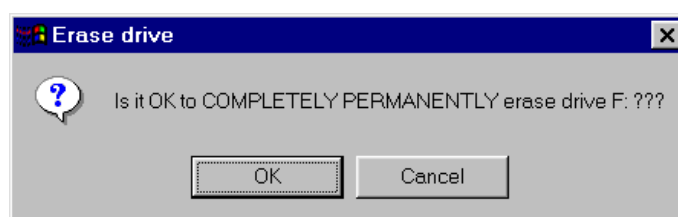


Notice that the H: drive (in this example) contains a suitable device. Also, notice the rescan button which performs another scan (in case you forgot to plug in the USB storage device). A drive is selected by clicking on it.

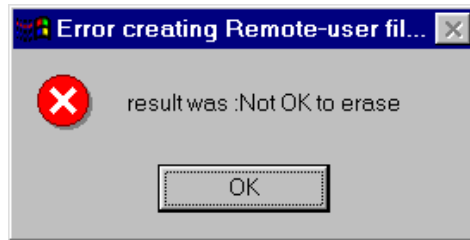
Then the drive is examined for its contents. If it contains a valid EEGer storage device structure and client, a test is made for any data stored on it. In normal use the client would bring the device back to the clinician at intervals (for more sessions or a time extension). It is at this time that the option of copying the data back from the storage device to the therapist machine is given:



If there is NOT a valid structure/data on the storage device or after retrieving the data, a cautionary menu pops up:

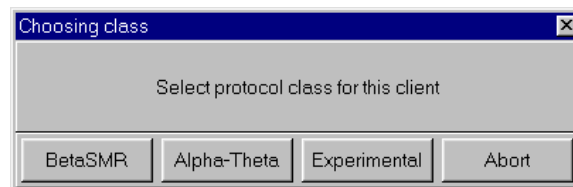


CAUTION: this process really DOES completely and permanently erase the contents of the drive. If you say Cancel, you get a message like this:



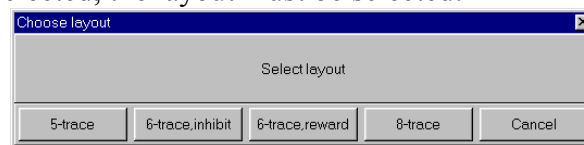
and the process terminates without erasing the storage device.

The device is now initialized with the basic client data. At this time, the clinician selects which protocol classes to permit the remote user to use. Each protocol class enable file embeds the

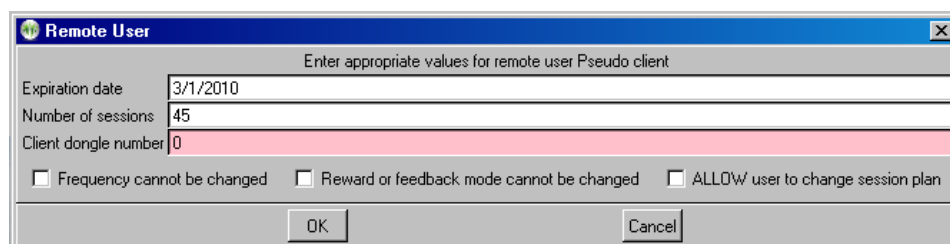


CURRENT session plan for the selected client, class, and layout.

After a protocol class is selected, the layout must be selected:



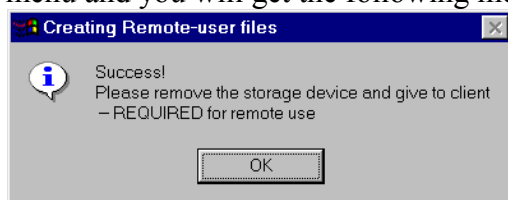
Once the layout has been chosen, the limitations must be selected:



An expiration date is REQUIRED. The client dongle number must be known (but is remembered once you enter it). Checking the “Frequency cannot be changed” or “Reward or feedback mode cannot be changed” checkbox means that the remote client cannot alter

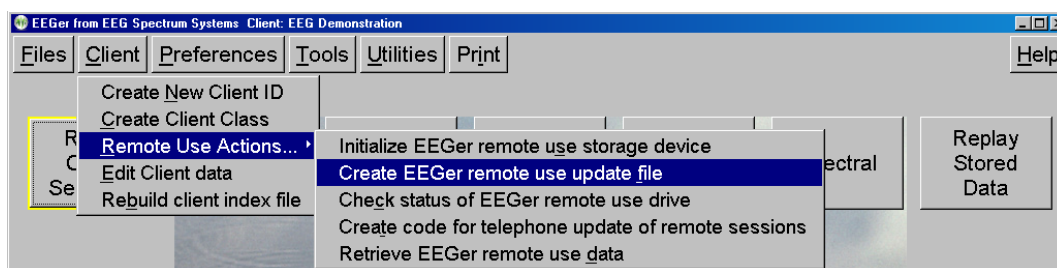
the session-plan setup values during a session. If the “ALLOW user to change session plan” option is checked, the remote user will be allowed to alter the session plan at the remote computer (and have it used).

The process of selecting a protocol class and layout can be repeated for different protocol classes. Of course, only the LAST selection for a protocol class is saved. When done, press the Done button on the class selection menu and you will get the following message:

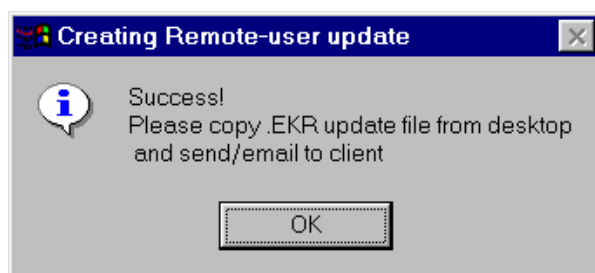


### **Create EEGer remote use update file**

This remote use option is a method of building the session plan/expiration date/session count files so they could be mailed/emailed to a remote client if they cannot get to the clinician's office.



Selecting this option is very similar to the Initialize option except that no storage device is involved. After selecting a client, the process goes immediately to the protocol class selection screen (and layout screen) and the same limitation screen. Upon completion, the following message will be seen:

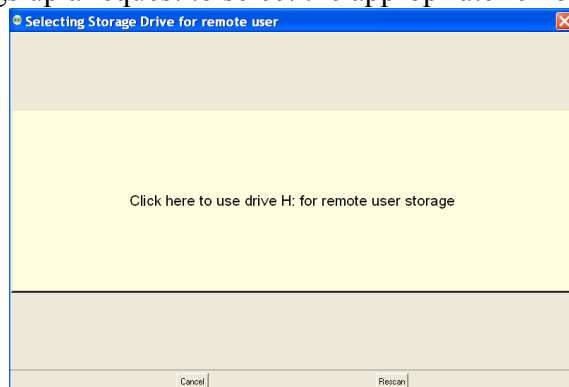


The clinician will discover a file named *remotedonglenunder\_yymmddhhmm.EKR* (where *remotedonglenunder* is the user's dongle number and the yy... number makes for uniqueness) on the computer desktop. The filename thus does NOT contain any client-identifying data although the internal contents of the .EKR file does (client name and birthdate). Please observe HIPAA rules. This file is designed to be transferable over email and is read and verified by EEGer itself.

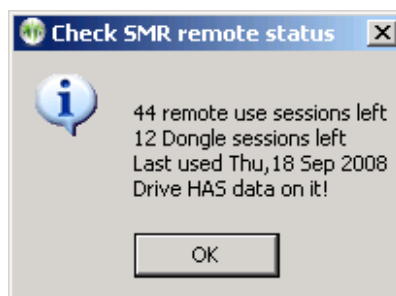


### ***Check Status of EEGer remote use drive***

Selecting this option brings up a request to select the appropriate remote use drive.



After selecting the drive, the status of the drive will be displayed in a message box like this:



### ***Create code for telephone update of remote sessions***

Selecting this option brings up the following screen:

A Windows-style form titled "Telephone Requests". It has a blue title bar with standard window controls. The form contains several input fields and buttons. At the top is a large text box containing "ptmp1-b8crt-wkffr-8pj6s-swp4h-c8". To its right is a "Validate" button. Below this are three input fields: "SW/version" with "4.2.2.f", "Dongle" with "50001", and "Dongle sessions" with "16". Below these are two rows of input fields: "Existing remote sessions" with "0" and "Additional sessions" with "0"; and "Existing remote expiration date" with "07/31/2009" and "New expiration date" with "10/1/2009". At the bottom is a large text box containing "nocod-e". To its right are two buttons: "Generate client code" and "Cancel".

The therapist enters the code from the remote client in the top box. When the entered code is valid (no transposed digits, etc.), the “Validate” button will become active. Pressing that button decodes the data from the user showing how many remote sessions are remaining and the remote session expiration date. Also, the dongle number, number of dongle sessions, and the client software version is displayed. Assuming the data was really valid, the clinician can now enter additional remote sessions and/or and extended expiration date. Clicking on “Generate client code” causes a reply code to be generated (the above sample shows “nocode” right now). The 26-character code must be read back to the remote client for entry into the client's request screen. If the client response was “Failure”, please verify the codes again. It may be necessary for the client to re-initiate the request option and generate a new code (which must then be entered in the top box and the validate button pressed again). You can see if new sessions were added or the date extended.

### ***Retrieve EEGer remote use data***

Selecting the "**Retrieve EEGer remote use data**" option will allow selection of the remote device and retrieval of any data on the device just as is automatically done when a new remote device initialization is done (as described above).

### ***Edit Client Data***

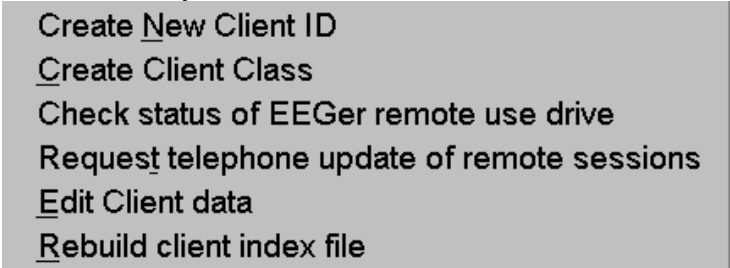
"**Edit Client Data**" allows editing of a client full name and birth date using the same screens as those used in the initial creation.

### ***Rebuild client index file***

"**Rebuild client index file**" is an option to force rebuilding of the client index file. This index is automatically maintained by EEGer but alterations to the client folder outside of EEGer (like manually deleting a client subfolder!) may change the index so it does not match the client data.

### ***Remote-use client menu***

The client menu on a remote-use system looks like this:

A screenshot of a menu interface with a light gray background. The menu items are listed vertically in a black, monospaced font. Each item begins with an underlined character, likely representing a mnemonic key. The items are: 'Create New Client ID', 'Create Client Class', 'Check status of EEGer remote use drive', 'Request telephone update of remote sessions', 'Edit Client data', and 'Rebuild client index file'.

```
Create New Client ID
Create Client Class
Check status of EEGer remote use drive
Request telephone update of remote sessions
Edit Client data
Rebuild client index file
```

The only two useful options are these:

- **“Check status of EEGer remote use drive”** retrieves data from the remote client USB drive and displays the values. They cannot be changed by the remote user.
- **“Request telephone update of remote sessions”** starts a dialog whereby the remote user can get telephone codes to add additional remote sessions and/or extend the remote session expiration date.

The following screen is used for session updates.

**This process uses a time-sensitive code which is ONLY maintained DURING the display of the code values. Closing/re-initiating the the process gives/requires different code values.**

Telephone Requests

Requesting REMOTE SESSION updates over the telephone:

Please call your supervising clinician

The values on this screen are only valid while this screen remains displayed. You will have to read these values to the clinician and wait until the clinician reads back another string of numbers/letters. There are NO zero,ell,v, or 2 digits

When a valid string is entered, the "Apply" button will be activated. Click on it then.

8umh9-qxy3m-qf44u-6qz1n-k61ah-h6

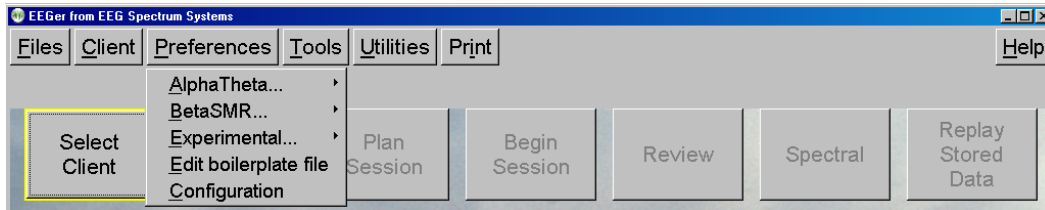
8umh9-qxy3m-qf44u-6qz1n-k61ha-h6

Apply Cancel

The top set of numbers is read off to the supervising clinician. They enter that character string into a screen on the therapist's computer and create a corresponding string of 26 characters that are read back and entered into the bottom entry box. When a valid string is entered, the “Apply” button will become active. Clicking on it will further validate the data and apply changes. Either a “Successful” or “Failure” message box will appear. Failures are due to incorrect code values.

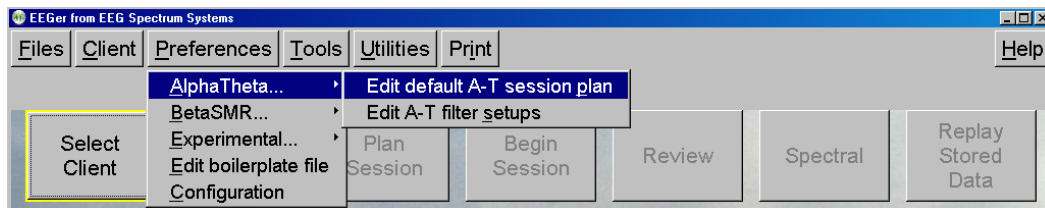
## Preferences Menu

Preferences can be selected for many of EEGer's features. The default settings will work for most clinicians. The exception is that the correct serial ports must be selected for the ProComp and for game computer communications (under Configuration).

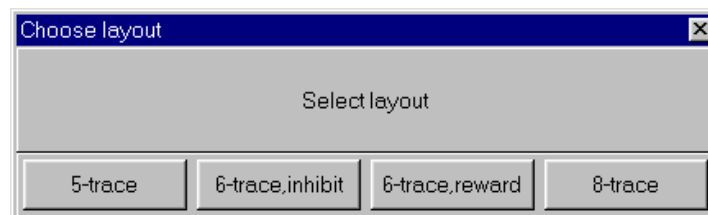


## Default session plans

The default session plan and default filter setups for each protocol class can be edited for each different protocol class.

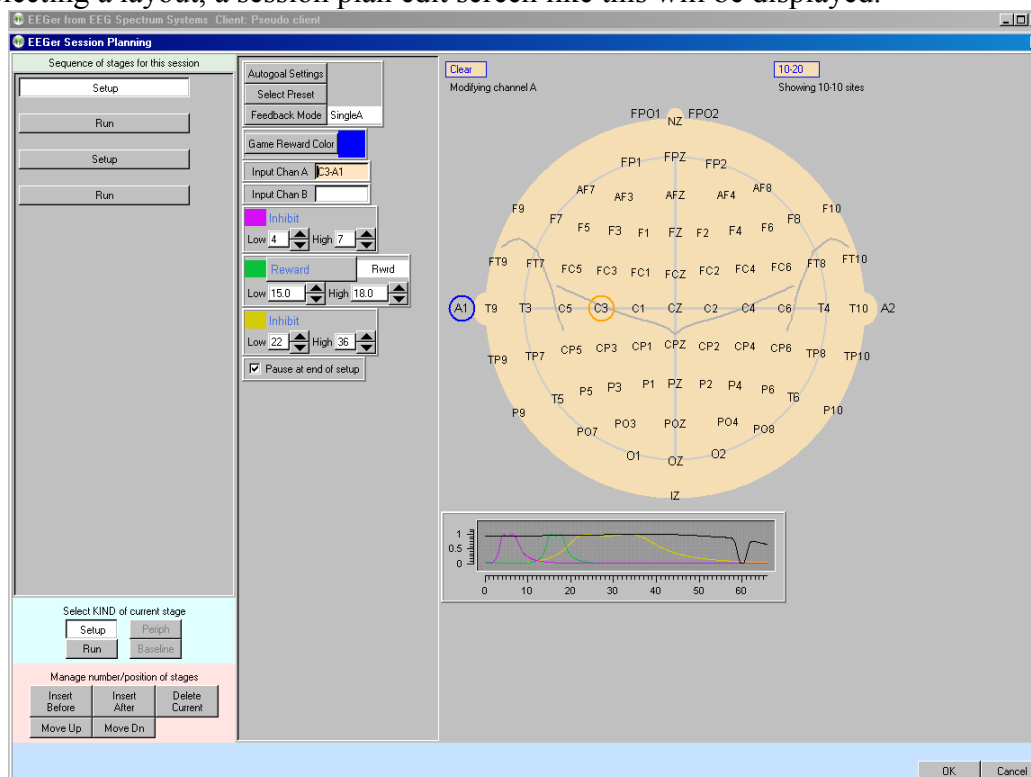


Choosing **Edit default** (protocol class) **session plan** brings up a layout selection menu like this:



Layouts control the session plan and real-time brainwave screen display and processing actions. The “5-trace” layout is the same layout as EEGer 4.0 used. The “6-trace,inhibit” layout adds a second (low) inhibit processing display/control. This layout specifies that any of the three inhibit streams can inhibit rewards. The “6-trace,reward” layout adds a second reward stream. In this mode, BOTH reward streams must be in a reward state for a score to be given. The “8-trace” mode has two sets of reward+2 inhibits, each driven by a different input stream. Again, BOTH rewards must be in a reward state for a score to be given. There are separate session plans for each layout. There may be additional layouts beyond the four specified above based on certain processing conditions.

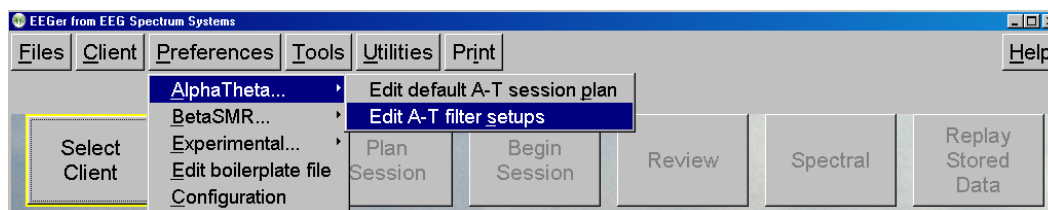
After selecting a layout, a session plan edit screen like this will be displayed.



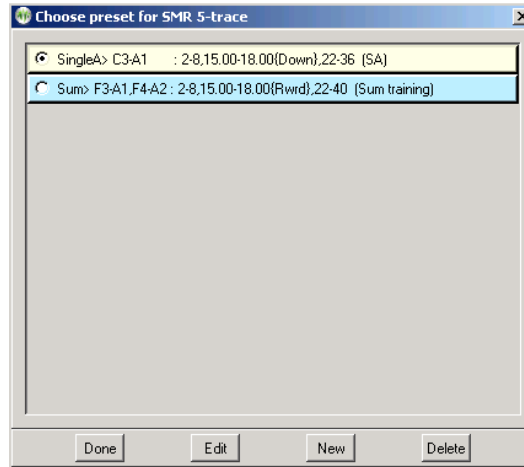
This is the same session plan editing screen that is explained later under **Plan Session**. These default session plans are only used when client/protocol classes are first selected. The default plan is copied to the specific client/protocol directory if no existing session plan exists. The plan can then be modified without affecting the default plan. Each client has a personal plan for each protocol class and each layout.

## Preset filter setups

You can also select **Edit** (protocol class) **filter setups**.



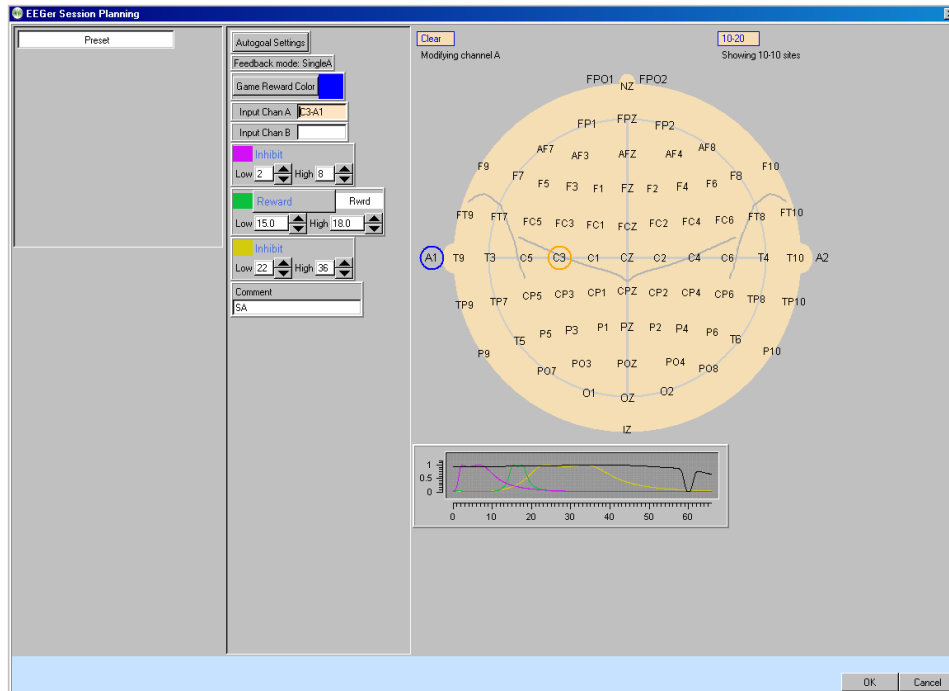
After choosing a layout, a screen pops up with existing presets for this protocol class/layout:



Selecting an entry and clicking on **Edit** brings up a session planning screen for editing. Clicking on **New** brings up a selection menu where a default processing mode must be chosen before continuing on to a session planning screen.



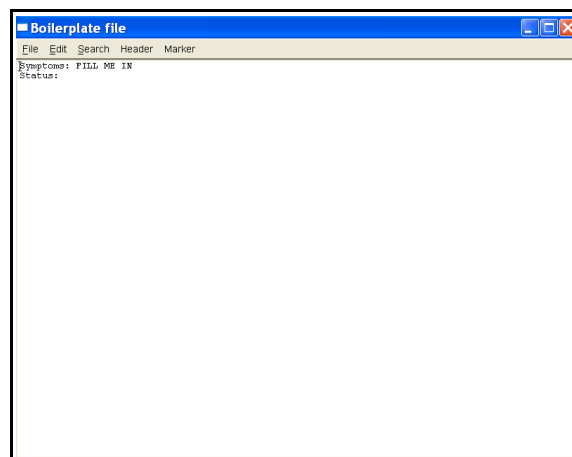
The session planning screen (limited to one stage; notice the stage is labeled “Preset”) allows creation of a set of filter frequencies, sites, and modes which are selectable from a normal session planning screen.



Notice the **Comment** field. Here you can enter a short description of the purpose of the preset as a reminder. (This will be shown on the preset selection menu.)

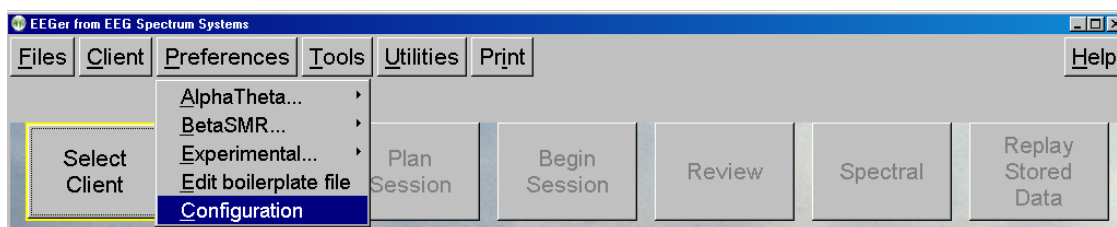
## Edit boilerplate file

This function brings up the editor to allow entering whatever common data/questions the therapist wants to be entered in the client's notes file (whenever the “Header” button on the editor menu is selected). The editor is exited by using F8, the Files->Exit menu, or the x in the upper right corner.

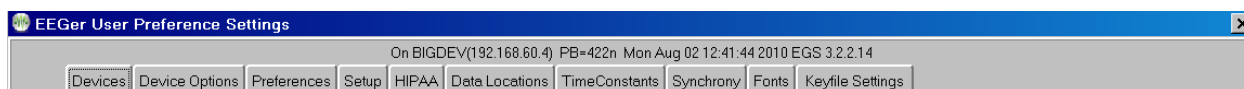


## Configuration

The **Configuration** preference dialog brings up a screen with a number of tab-selected subsidiary screens. Most settings will work for all users. Some changes may have to be made on the **Devices** tab depending on the amplifier used with **EEGer**.



Above the tabs is shown some data to help identify any problems. The software version (420g in this sample) and the current date/time are shown.



The **Devices** tab controls basic input and operations.

The **Device Options** tab controls options for selected data input devices.

The **Preferences** tab contains general EEGer preferences.

The **Setup** tab contains initial EEGer preferences.

The **HIPAA** tab contains general EEGer preferences.

The **Data Locations** tab selects the data and archive paths.

The **Time Constants** tab allows changing the smoothing time constants for display and averaging..

The **Synchrony** tab allows inspection/alteration of synchrony and comodulation settings.

The **Fonts** tab allows inspection of the current font settings.

The **Keyfile Settings** tab allows inspection (only) of the various licensing/enabling files.



## Devices

The **Devices** tab controls which connections are to be used for communications/data sampling.

On BIGDEV(192.168.60.4) PB=422p Mon Aug 23 11:13:04 2010 EGS 3.2.2.14

Devices | Device Options | Preferences | Setup | HIPAA | Data Locations | Time Constants | Synchrony | Fonts | Keyfile Settings

System display mode: Single monitor

Kind of connection to game computer: Ethernet

Serial port for game computer connection: None

Ethernet Client computer address/name:

Ethernet TCP/UDP port(integer): 5510

Source of EEG/peripheral data: Spectrum2

Serial port for data source connection: None

Tactile audio device: None

Audible alert audio device: Primary audio

Alert level percentage volume: 76

STORE settings | Reset to stored | Close preferences window

Values are only saved if the STORE button is pressed

- **“System display mode”** selects the mode of operations of the user interface. Changing this option makes EEGer exit since the value changes the kind of initialization needed. A special keyfile is required to select 2-computer or Dual-monitor operation.
- **“Kind of connection to game computer”** selects the particular interface style used to communicate with the game computer.
- **“Serial port for game computer connection”** allows the choice of a serial port.
- **“Ethernet Client computer address/name”** accepts either a name or (dotted IP) address of a Client computer if Ethernet style connection is desired.
- **“Ethernet TCP/UDP port(integer)”** allows selection of a port to be used for Ethernet connections. The default value is 5510.

- **“Source of EEG/peripheral data”** allows selection of an EEG/peripheral data source.
- **“Serial port for data source connection”** allows the choice of a serial port. Note that you cannot use the same port for both game computer connection and a data device.
- **“Tactile audio device”** specifies the desired port to use for tactile feedback. Two audio devices are required for tactile feedback in single-computer operation.
- **“Audible alert audio device”** selects a sound card to use for therapist audio alerts (from the session plan).
- **“Alert level percentage volume”** specifies the relative volume used for the alert when played. The default value is 75%.

## Device Options

The “Device Options” tab contains:

On BIGDEV(192.168.50.4) PB=422p Tue Feb 08 17:22:09 2011 EGS 3.2.2.16

Devices	<b>Device Options</b>	Preferences	Setup	HIPAA	Data Locations	Time Constants	Synchrony	Fonts	Keyfile Settings
---------	-----------------------	-------------	-------	-------	----------------	----------------	-----------	-------	------------------

ProComp/Infiniti options

Thought Technology device type: ProComp2

ProComp/Infiniti Communications protocol: Spectrum

Channel for ProComp/Infiniti peripheral measures: E

Sensor type for ProComp/Infiniti peripheral measures: SC

J&J device options

Channel for J&J peripheral measures: None

Sensor type for J&J peripheral measures: None

Use unfiltered BrainLynx inputs - no peripheral data: ☐

A/D device options

A/D board selection: 0

External amplifier gain (usually 10000): 10000

Starting A/D channel for sampling (default 0): 0

BrainMaster device options

BrainMaster serial number: 40403

BrainMaster passkey: 42xh-hnjx-35bd

Atlantis peripheral channel: None

Atlantis peripheral channel type: DC

Use 24 bit data instead of 16 bit data: ☐

esiPRO device options

esiPRO max setting in microvolts: 500

esiPRO4.3 (only) links references internally: ☒

esiPRO peripheral channel: None

esiPRO peripheral channel type: None

QPET device options

QPET Gain values (64 is most sensitive): 64

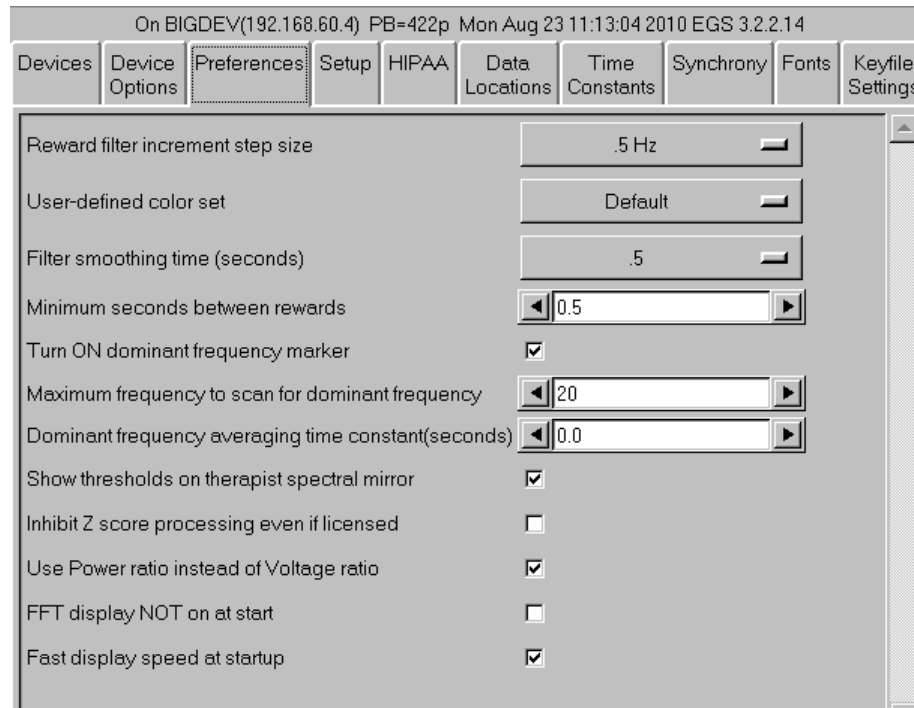
STORE settings    Reset to stored    Close preferences window

Values are only saved if the STORE button is pressed

- **“Thought Technology device type”** is the required selection for TTUSB interface usage.
- **“ProComp/Infiniti Options”** allows either Spectrum or Biograph communications protocol to be selected. This must match the switch settings on the ProComp.
- **“Channel for ProComp/Infiniti peripheral measures”** allows selection of the appropriate input channel for Procomp/Infiniti peripheral data.
- **“Sensor type for ProComp/Infiniti peripheral measures”** allows selection of the kind of sensor attached (and how to interpret the inputs).
- **“Channel for J&J peripheral measures”** allows selection of the peripheral input channel for appropriate J&J amplifiers.
- **“Sensor type for J&J peripheral measures”** allows selection of the kind of peripheral interface connected (and interpretation of inputs).
- **“Use unfiltered BrainLynx inputs”** selects inputs from the BrainLynx that are NOT lowpass filtered within the BrainLynx (and inhibits peripheral inputs!).
- **“A/D board selection”** allows selection of a which A/D board is to be used. The A/D board selection list must be prepared using InstaCal™.
- **“External amplifier gain (usually 10000)”** allows changing the gain of the external amplifier used. The default setting (10000) matches the “Neurocybernetics” amplifiers built by Picchiottino.
- **“Starting A/D channel for sampling(default 0)”** allows changing the base A/D channel for 2-channel sampling for use with amplifiers having “unusual” wired/programmed preferences.
- **“BrainMaster serial number”** is where the serial number of the connected BrainMaster device must be entered by the user.
- **“BrainMaster passkey”** is where the BrainMaster passkey must be entered by the user. This passkey allows but does not require dashes between fields and is case-insensitive. Note: passkeys for use with EEGer are different than passkeys for use with BrainMaster software.
- **“Atlantis peripheral channel”** allows selection of the appropriate input channel for Atlantis peripheral data.

- **"Atlantis peripheral channel type"** allows selection of the kind of sensor attached (and how to interpret the inputs).
- **"Use 24 bit data instead of 16 bit data"** allows selection of high-resolution unfiltered data.
- **"esiPRO max setting in microvolts"** selects the maximum gain setting for the amplifier.
- **"esiPRO4.3(only) links references internally"** links both reference jacks together internally in the esiPRO4.3.
- **"esiPRO peripheral channel"** allows selection of the appropriate input channel for peripheral data.
- **"esiPRO peripheral channel type"** allows selection of the kind of sensor attached (and how to interpret the inputs).
- **"QPET Gain values(64 is most sensitive)"** allows selection of a gain control for the QPET device.

## Preferences



- The "**Reward filter increment step size**" of the reward filter center frequency shift can be selected (here it is .5 Hz but .125 Hz (50 Hz set only) and .25 Hz are also available).
- The "**User-defined color set**" option allows specification of a custom color set (created using the color changer tool under **Tools**).
- "**Filter smoothing time (seconds)**" controls the smoothing time constant for filters. The default value is 0.5 seconds. The range is .1 to .9 seconds. This value is also controllable in game tailoring.
- "**Minimum seconds between rewards**" determines the rate at which rewards can be sent to whatever game is currently running. The default value is 0.5 seconds. The minimum value is 0.25 seconds. The maximum value is 30 seconds. This value is also controllable in game tailoring.
- "**Turn ON dominant frequency marker**" turns on the dominant frequency marker at the beginning of the realtime sessions. It can still always be toggled by using Alt-F10.
- "**Maximum frequency to scan for dominant frequency**" allows selection of a range of values to scan for a dominant (highest amplitude) frequency. Set to 0 means using the default of 15 Hz.
- "**Dominant frequency averaging time constant(seconds)**" allows selection of an averaging time for dominance determination.
- "**Show thresholds on therapist spectral mirror**" allows preselection of additional data on the therapist spectral mirror display. This can also be toggled on/off using the Therapist display options popup menu.
- "**Inhibit Z score processing even if licensed**" turns off zscore computations if performance issues exist.
- "**Use Power ratio instead of Voltage ratio**" selects which form of ratio rewards to use.
- "**FFT display NOT on at start**" turns off the FFT display on the brainwave screen. It can be turned on/off using the Ctl-F10 option.
- "**Fast display speed at startup**" sets the sweep rate of the brainwave screen to fast mode. The rate can be toggled using the Alt-F12 option during run.

## Setup

The tab labeled **Setup** contains:

The screenshot shows the 'Setup' tab selected in a software interface. The tab bar at the top includes: Devices, Device Options, Preferences, Setup (highlighted), HIPAA, Data Locations, Time Constants, Synchrony, Fonts, and Keyfile Settings. The main panel contains the following settings:

- Use 50 Hz 1/8 step filter set (additional memory required) ☒
- Lowpass filter in Hz: 50
- Power is 50 Hz (instead of 60 Hz) ☐
- Use software powerline notch filter ☒
- Use metric units for peripheral data ☒
- Default Processing Layout: 5-trace
- Display style: Swept
- Maximum minutes of data saved (range 45-90): 45
- Show advanced sites (10-10) on session plan ☒
- Anti-alias spectral raw data ☒
- DC compensation error report level (microvolts): 0
- Text for down/inhibit reward display: Down
- Hide unused trace data ☒
- Allow raw data files in Consult export ☒
- Print review files directly to default printer ☐
- Combine summary print onto single page ☐
- Not save Results! files ☒
- Automatically create Consultation Export of session ☐
- Destination for Consultation Exports: Exports

- The **“Use 50 Hz 1/8 step filter set (additional memory required)”** checkbox allows selection of the 50 Hz filter set (instead of the 40 Hz set) but requires an additional 12 MB of memory.
- **“Lowpass filter in Hz”** allows selection of the lowpass filter used on all data.
- **“Power is 50 Hz instead of 60 Hz”** selects 50 Hz as the local powerline frequency.
- **“Use software powerline notch filter”** enables a software notch filter to remove powerline interference. Some EEG amplifier/converters do not filter the correct powerline signals.

- **“Use metric units for peripheral data”** allows selection of metric units, notably for temperature data.
- The **“Default Processing Layout”** is set for 5-trace mode.
- The **“Display style”** can be selected to be either swept or scrolling.
- The **“User-defined color set”** option allows specification of a custom color set (created using the color changer tool under **Tools**).
- The **“Maximum minutes of data saved (range 45-90)”** can be set. This value is used to prescale/preallocate data storage. While a session can go on longer than this time, only this much raw data will be saved!
- **“Show advanced sites (10-10) on session plan”** controls whether the 10-10 or 10-20 site locations will show by default on the “head” displays during session planning. Clicking on the “right” spot on the head will make them show up anyway.
- **“Anti-alias spectral raw data”** controls how raw line segments are drawn. Some video modes/cards require different settings to make the “raw” graphs have a smooth appearance.
- The **“DC compensation error report level”** is a value that can be set to provide a (red) warning when the DC offset level correction exceeds a user-input value. If set to zero (the default), no warnings will be given (although the actual DC offset levels are reported on the debug screen).
- The **“Text for Down/Inhibit text display”** option allows selection of the text label for down/inhibit training. It is just a label and has no functional changes.
- The **“Hide unused trace data”** checkbox determines if currently-unused traces are hidden from view (to minimize therapist distraction). These traces include unused raw, filtered, and FFT displays. This setting can be turned on/off during realtime operation using Alt-F12.
- The **“Allow raw data files in Consult export”** option determines if raw data files are selectable for inclusion in consultation files.
- The **“Print review files directly to default printer”** option controls whether the review print buttons save files in the EEGer print directory (for later printing) or send them directly to the default Windows printer. Snap files and screen captures still only go to the print directory for later printing.
- The **“Combine summary print onto single page”** forces the summary data printout to be one page. The graphics and text are shrunk to fit and may not be readable.
- The **“Not save Results! files”** option disables the automatic creation of Results! files (for use with the optional Results! Program).
- The **“Automatically create Consultation Export of Session”** option causes a Consultation Export of the session just run to be automatically created on the desktop.
- **“Destination for Consultation Exports”** allows destination choices for the Consultation Export file. These choices are: “Desktop”, “My Documents”, or wherever the “Exports” filepath is specified.



## HIPAA

The **HIPAA** tab contains options used to obfuscate the client name. The options make NO alterations to the client ID which is used to identify files, etc. The display mode options are :

- **All** Show the entire full name field
- **First+initials** Show first name and just first letter of later name(s)
- **Initials** Show just the first letter of each name
- **GUID** Show Globally Unique Identifier of client

The screenshot shows the 'HIPAA' tab selected in a software interface. The tab bar at the top includes 'Devices', 'Device Options', 'Preferences', 'Setup', 'HIPAA', 'Data Locations', and 'Tir Cons'. The main content area of the 'HIPAA' tab contains several settings:

- 'Top screen name display mode' with a dropdown menu set to 'All'.
- 'Client selection screens name display mode' with a dropdown menu set to 'All'.
- 'Title bar/printout name display mode' with a dropdown menu set to 'All'.
- 'Export name display mode' with a dropdown menu set to 'All'.
- 'Show birthday on top screen' with a checked checkbox.
- 'Data encryption key' with an empty text input field.
- 'Data encryption mode' with a dropdown menu set to 'Not encrypted'.

- **“Top screen name display mode”** controls the large name on the top screen.
- **“Client selection screens name display mode”** controls what you see on selection menus.
- **“Title bar/printout name display mode”** controls what shows on window title bars and on printouts (or possible printouts).
- **“Export name display mode”** controls what gets exported.
- **“Show birthday on top screen”** controls display of month and day of client's birthdate on the top screen.
- **“Data encryption key”** is the field where a data encryption passphrase is entered (not implemented in this version).
- **“Data encryption mode”** selects the encryption mode for data storage/transmittal (not implemented in this version).

## Data Locations

The **Data Locations** tab selects the data and archive paths. **THESE PATHS MUST ALREADY EXIST!!!** Client session plans, general information, and summary data are stored under the client info path. Raw data (which can be one to two megabytes per session) is stored in the client raw data path. By default, these are the same (raw data is stored in the same hierarchy as the summary data). A separate path is provided for archived (non-active) data. Do NOT attempt to use one of the EEGer therapist machines as a common data repository. During a feedback session on that machine, other machines will be unable to access the data.

The screenshot shows the 'Data Locations' tab selected in the top menu bar. The interface contains six text input fields for specifying file paths:

Field Label	Default Path
Base directory for client info	C:\EEGer\Clients
Base directory for client raw data	C:\EEGer\Clients
Base directory for client archives	C:\EEGer\Archives
Directory for Print files	C:\EEGer\Print
Directory for Export files	C:\EEGer\Export
Directory for output files for Results	C:\EEGer\Results

## Time Constants

The **Time Constants** tab allows changing the time constants used for display and averaging.

EEGer has been extensively tested using the default time constants. Other values may be used but the user must understand the consequences of making radical changes in these values.

The screenshot shows the 'Time Constants' tab selected in the top menu bar. The interface contains five spin controls for adjusting time constants in seconds:

Parameter	Default Value (seconds)
Average values time constant	30.0
Overall percentage time constant	30.0
DC compensation time constant	10.0
Artifact hold time after end	0.25
Probability time constant	30.0

- “**Average values time constant (seconds)**” controls the smoothing time for the average values displayed.
- “**Overall percentage time constant(seconds)**” controls the smoothing time for the overall percentage value (shown in the upper right corner of the brainwave screen).
- “**DC compensation time constant(seconds)**” sets the averaging window for determining DC offset corrections.
- “**Artifact hold time after end(seconds)**” sets how long the artifact state is maintained after the artifact event has ceased (to prepare for more artifacts).
- “**Probability time constant(seconds)**” controls the smoothing window for maintaining the %over threshold values.

## Synchrony

The **Synchrony** tab allows inspection/alteration of synchrony and comodulation settings.

The screenshot shows the 'Synchrony' tab selected in the top menu bar. The settings are as follows:

Parameter	Value
Width of synchrony window (seconds)	0.5
Scale multiplier for synchrony/comodulation	10.0
Option flags for synchrony/comodulation	1
Width of comodulation window (seconds)	0.5
Depth of comodulation history (seconds)	0.5
Comodulation time constant	0.1
Comodulation moving window width (samples)	64

Please contact Customer Service for information on any changes to these parameters.

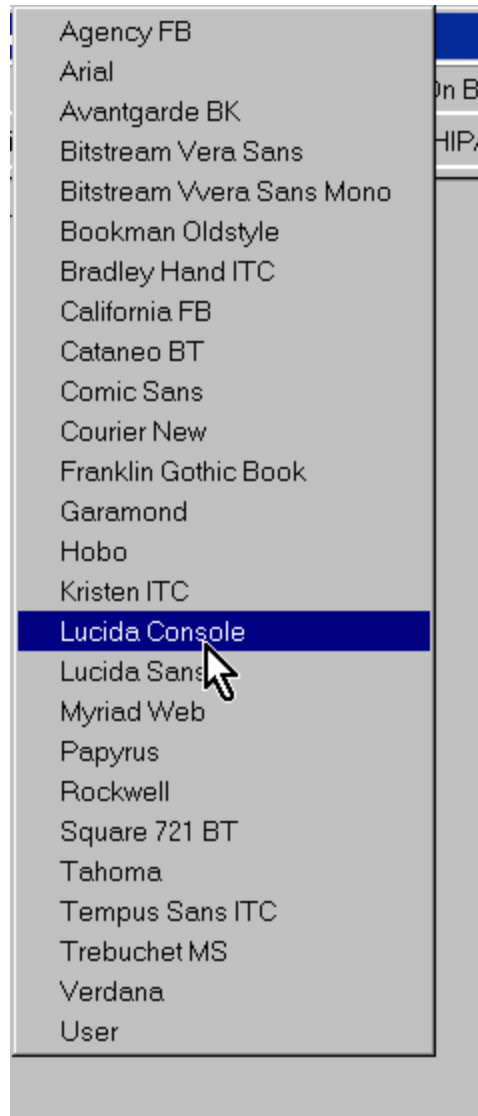
## Fonts

The **Fonts** tab allows inspection of the current font settings.

The screenshot shows the 'Fonts' tab selected in the top menu bar. The settings are as follows:

Parameter	Value
Font for realtime text	Lucida Console

Clicking on the selection menu button gives a list similar to this:



Please note that not all these font selections may not be the most readable or sized to your liking but the choices are yours.

## Keyfile Settings

The **Keyfile Settings** tab allows inspection (only) of the various licensing/enabling files. Displayed here is the dongle number read in from the hardware, various expiration dates (0 meaning non-expiring), remaining session counts (for session-limited dongles), etc.

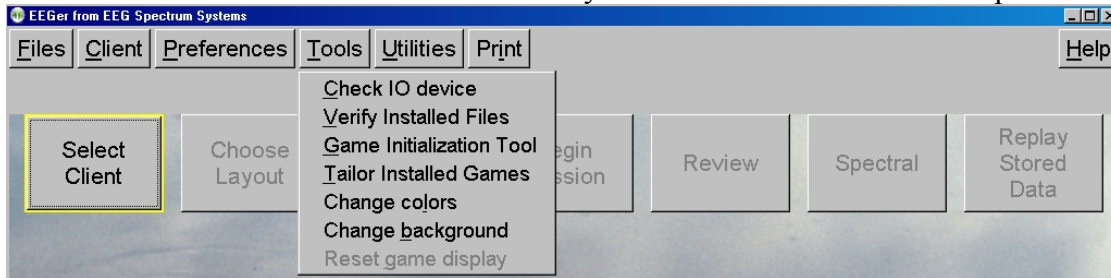
Dongle number	50024
Mode Code	0
Dongle Expiration date	
License type	Clinical
License Expiration Date	12/31/2010
Sessions remaining	0
Session limit enforced	0
Clients used	0
Client limit enforced	0
Maximum number of clients	0
Number of installations	0
Latest dongle update date	
BetaSMR status	1,exp=12/31/2010,build=01/10/2010
AlphaTheta status	1,exp=12/31/2010,build=01/10/2010
Multiple Displays permitted	1,exp=12/31/2010,build=01/10/2010
Synchrony status	1,exp=12/31/2010,build=01/10/2010
Tactile status	1,exp=12/31/2010,build=01/10/2010
EGS bypass allowed	1,exp=12/31/2010,build=01/10/2010
Feature 1 enabled	1,exp=12/31/2010,build=01/10/2010
ZScore enabled	1,exp=12/31/2010,build=01/10/2010
Feature 3 enabled	1,exp=12/31/2010,build=01/10/2010
Feature 4 enabled	1,exp=12/31/2010,build=01/10/2010
Feature 5 enabled	1,exp=12/31/2010,build=01/10/2010
Feature 6 enabled	1,exp=12/31/2010,build=01/10/2010
Feature 6 password	8424229CCB0A37D6C9D64D11A0263146
Peripheral measures display allowed	1,exp=12/31/2010,build=01/10/2010
Binary Data export allowed	1,exp=12/31/2010,build=01/10/2010
ProComp2 clinical use status	0
Allowed ProComp2 #s	

Further down in the same tab are the status of other enables such as game or mode enables. This screen is mostly for technical support.

Devices	Device Options	Preferences	Setup	HIPAA	Data Locations	Time Constants	Synchrony	Fonts	Keyfile Settings
Allowed ProComp2 #s									
Game enable	8310,1,12/31/2010,5130 Space Race								
Game enable	8311,1,12/31/2010,5130 Chomper								
Game enable	8312,1,12/31/2010,5130 Boat Race								
Game enable	8320,1,12/31/2010,5130 StarLight (ESI)								
Game enable	8330,1,12/31/2010,5130 StarLight (original)								
Game enable	8321,1,12/31/2010,5130 StarCubes (ESI)								
Game enable	8331,1,12/31/2010,5130 StarCubes (original)								
Game enable	8323,1,12/31/2010,5130 Kaleidoscope (NC)								
Game enable	8322,1,12/31/2010,5130 INtoIT (NC)								
Game enable	8324,1,12/31/2010,5130 StoneSoup (NC)								
Game enable	8350,1,12/31/2010,5130 Emotional Development								
Game enable	8351,1,12/31/2010,5130 Right Brain Exercise								
Game enable	8352,1,12/31/2010,5130 Perception Exercise								
Game enable	8353,1,12/31/2010,5130 Serenity								
Game enable	8354,1,12/31/2010,5130 Games for Adults								
Game enable	8355,1,12/31/2010,5130 Games for Kids								
Game enable	8308,1,,3126 Jumpbox								
Game enable	8309,1,,3126 Boxlights								
Game enable	8305,1,,3126 Highway								
Game enable	8306,1,,3126 Island								
Game enable	830a,1,,3126 Theta-Down highway								
Game enable	830e,1,,3126 Mazes, fixed-dots								
Game enable	830c,1,,3126 Mazes, var-dots								
Game enable	830b,1,,3126 A-T display								
Game enable	830d,1,,3126 4mation								
Game enable	8303,1,,3126 LongTerm display								
Game enable	8304,1,,3126 Spectral Mirror								
Game enable									

## Tools menu

The **Tools** menu item contains selections for many useful actions that EEGer can perform.

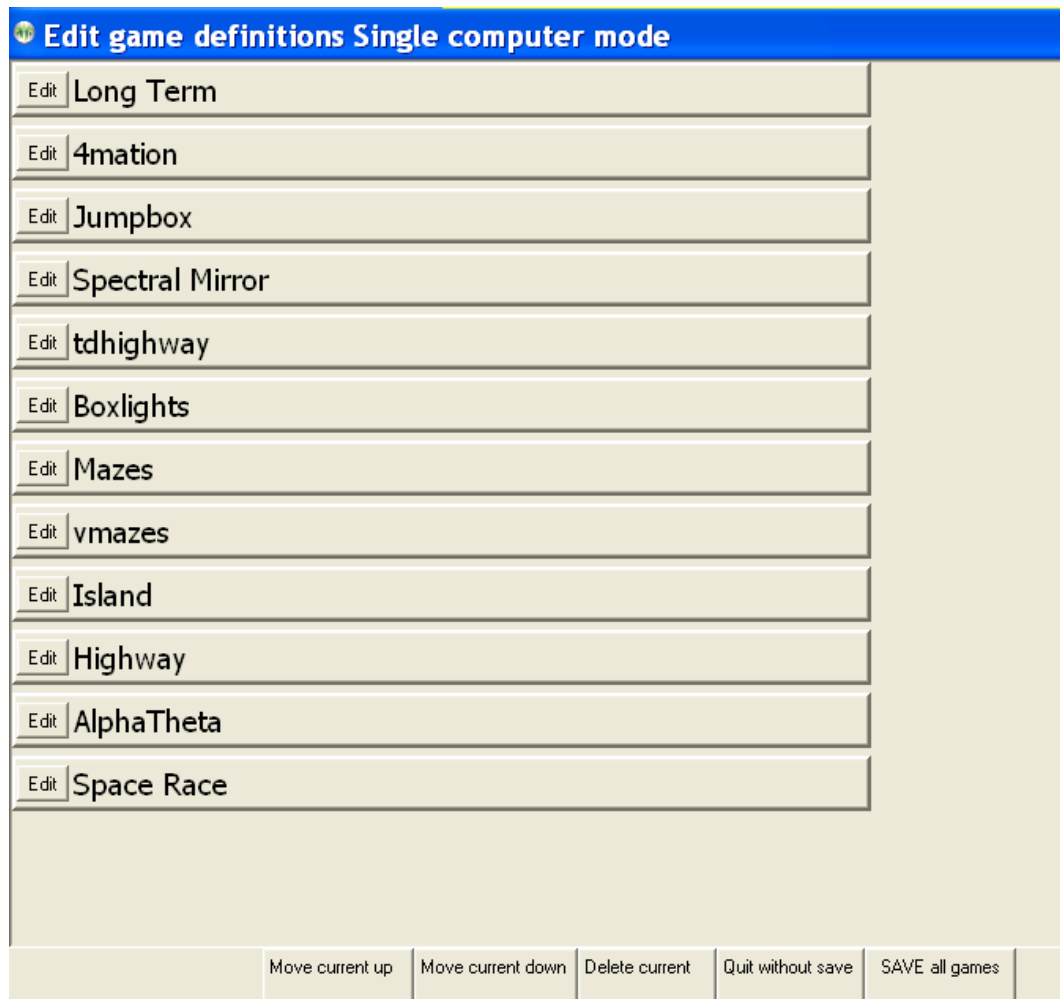


## Tools

- **"Check IO device"** runs the **IOtest** program. This can be used to validate device operation (or check battery voltages).
- **"Verify Installed Files"** examines the fileset used for EEGer to confirm that none of them have become corrupted (or missing).
- **"Retrieve Installed Game List"** queries the EEGer Game Set to retrieve the list of currently installed games. Note: this must be performed at least once to retrieve any user-installed games. This option only exists in 2-computer configurations.  
or
- **"Game Initialization Tool"** generates a list of installed games and possible options. Note: this must be performed at least once to retrieve any user-installed games. This option only exists in single-computer configurations.
- **"Tailor installed games"** allows the user to order the game list, to set special options, and to create multiple game variations with different options (described below).
- **"Change colors"** allows alteration of some of the colors used by EEGer (described later).
- **"Change background"** allows user selection of the background image on the main screen (described later).
- **"Reset game computer"** just sends a menu reset to the game computer. You can see the game screen flicker when it understands this command. In single computer mode, the menu option reads **"Reset game display"**.

## Tailor installed games

Tailoring the game list allows user flexibility in defining games and options for use. Retrieving a game list resets those games and variations whose basic definitions have changed on the game computer (different sound files, etc.). Selecting the **Tailor installed games** option brings up a selection screen for games to tailor:



The buttons at the bottom allow the game titles to be moved up or down, to be deleted (from the selection list until the next 'retrieve games'), or to be edited. Selecting the edit button gives something like this:



**Edit game options**

Internal game name=4mation  
Internal game code=830D (legacy=0, display= single,dual,2-comp)

2: What You want to call this tailored game	4mation
3: Protocol classes for this game	SMR,EXP
4: Run time in seconds for each period	170
5: Pause time in seconds between periods	10
9: Provide reward scoring	1
30: frequency step when using Ctrl-up/down arrows	Default
80: Minimum seconds between reward sounds/counts	
81: Minimum seconds on reward task before reward	
83: Percentage on-task time required for reward	
90: Maximum data recorded (in minutes)	
91: Seconds to lock out rewards after maxartifacts	0
92: Number of artifacts during holdofftime to trigger reward	0
101: Time constant for filter smoothing	Default
190: Show score count during periods	1
200: Show inhibit channels	1
210: Show score screen during pauses	1
1100: Image directory to use	C:/EEGer/Games/Images
1130: Filling last grid ends period	0
1131: Grid filling style	ORDERED

Create new selection    Replace selection with changes    Quit without saving changes

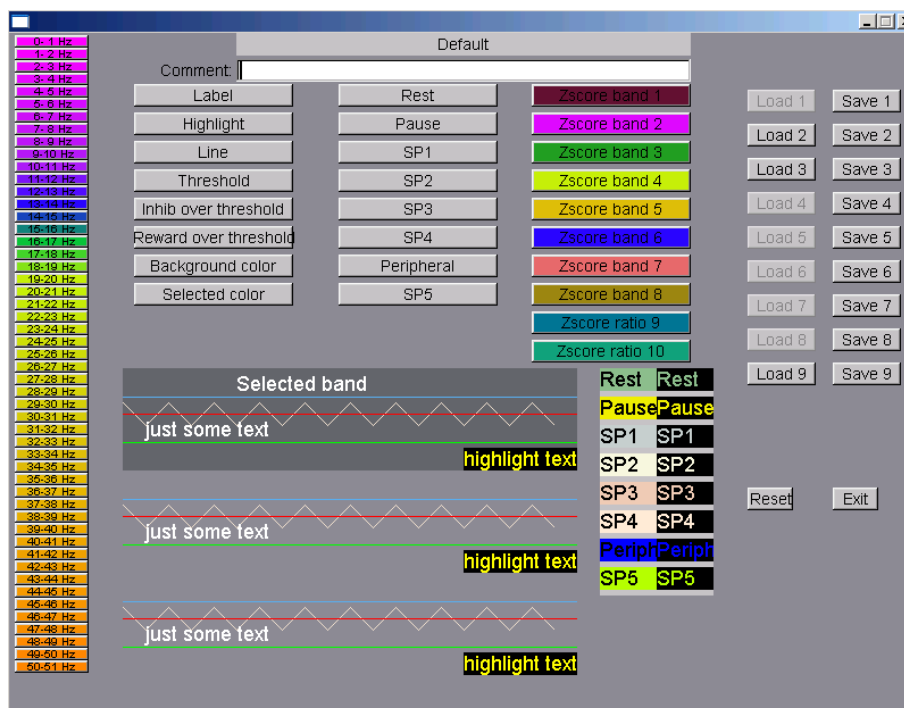
The “What You want to call this tailored game” field is what the “title” of the game will be on the therapist game selection menu. Options can be changed/specified by clicking anywhere on the applicable line. The buttons at the bottom allow modification of this selection or creation of a new selection (hopefully with a new legend and new options) to appear on the game selection menu.

The “Save all games” button on the tailoring screen saves a new game selection menu for later use in Begin Session or Replay modes.

## Change colors

You can run EEGer without ever changing the default colors. If you prefer different colors for EEGer, you can change the colors used to identify frequencies and some colors for the real-time feedback screen by selecting the **Change Colors** option of the **Tools** menu.

This screen will then pop up:



Clicking on any of the left-hand buttons brings up a color chooser window for that particular one Hertz frequency “color”. Clicking on the buttons at the top brings up a color chooser window for that particular real-time color use. The color use is shown by the examples below the buttons. SP1 through SP4 are “spare” colors in this version and are reserved for future use. You must click on the **Save** button for the specified color set to save the current color scheme for use. Of course, **Reset** will return you to the default color scheme. The color set actually used is specified in the Preferences settings. Colors 49-50/50-51 have special meaning as they are used by the FFT Highlight option (Alt-F10) described later. Currently defined colorsets can be seen by observing the 'active' Load buttons. You cannot load an undefined colorset.

## Change background

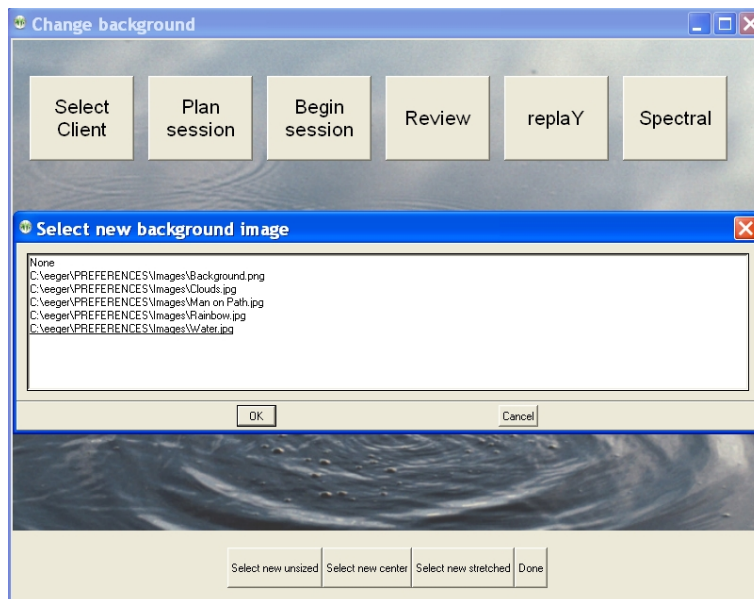
Selecting **Change background** brings up a screen similar to the main menu but with some colored text (and simulated buttons) to assist in determining the readability of the screen in the presence of a background image:



Images to display must be present in the C:\EEGer\Preferences\Images directory. Images can be of any kind that EEGer determines are images (currently .JPG, .BMP, .PNG, .GIF).

There are three image selection buttons at the bottom.

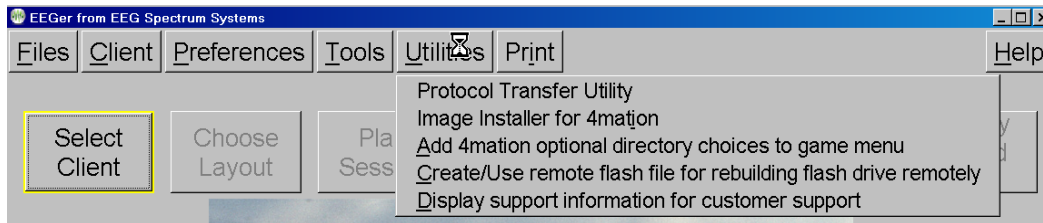
- |                       |                                     |
|-----------------------|-------------------------------------|
| Select new unsized -  | Select an image and not change size |
| Select new center -   | Select and stretch minimally        |
| Select new stretched- | Select and stretch to fill screen   |



When the appropriate image is selected (or None), the **Done** button saves it in the fastest drawing format for the current screen settings.

## Utilities

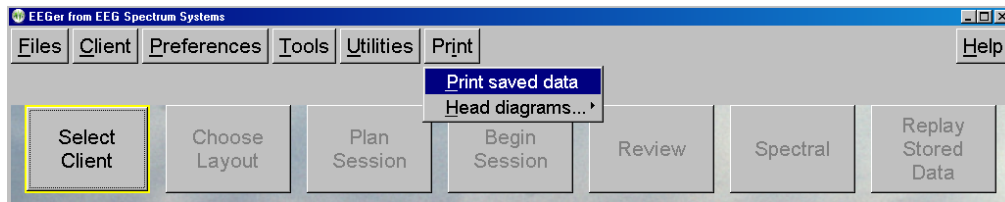
The **Utilities** menu item brings up a list of currently installed utility programs that supplement the internal EEGer operations.



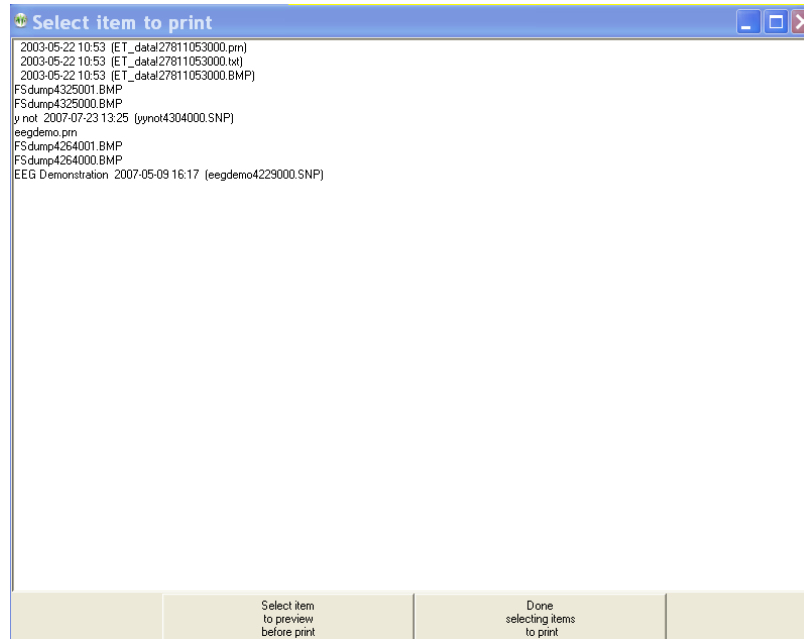
- “**Protocol Transfer Utility**” displays only if the Protocol Transfer Utility is installed. See instructions for use in the appendix.
- “**Image Installer for 4mation**” displays only if the Image Installer utility is installed. See instructions for use in the appendix.
- “**Add 4mation optional directory choices to game menu**” displays only if the Add4 utility is installed. This program adds all the possible 4mation image display sets as choices on the Therapist game selection screen.
- “**Create/Use remote flash file for rebuilding flash drive remotely**” displays only if the Remote Flash Utility is installed. This program allows saving/restoring the contents of a remote-user flash drive under certain conditions.
- “**Display support information for customer support**” displays only if the external utility is installed. For EEGer 422m and greater, this options is built-in and available from the **Help** menu.

## Print menu

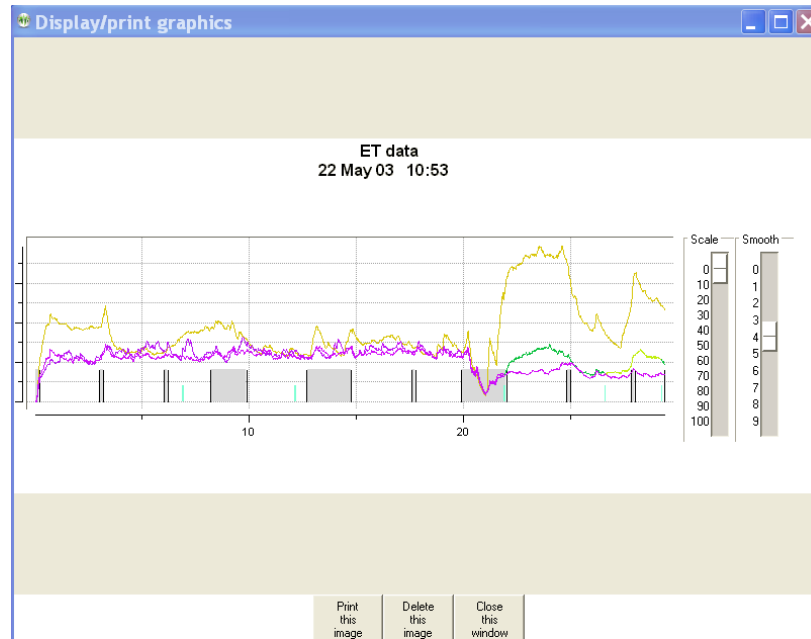
The **Print** menu item brings up the print manager screen to allow preview/printing/deletion of various graphical/textual outputs of EEGer.



The print manager screen:



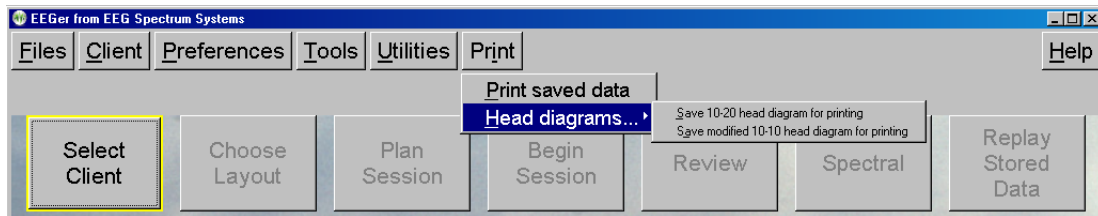
Double-clicking on one of the print menu items brings up a (preview) display screen with several button options (as shown in the sample below).



The **Print** button sends the printout to the current default Windows printer. The **Delete** button deletes the current file and returns to the print menu. The **Done** button just returns to the print menu (leaving the file still there). There may be more than one output file for the summary outputs (one for the graphics and one for the tabular data).

ET data 22 May 03 10:53												
Avg=average of measured average over period %=%over threshold for period, SDev=standard deviation												
Time Score			2 Inhibit			3 Reward			4 Inhibit			
			Avg	%	SDev	Avg	%	SDev	Avg	%	SDev	
PZ-A2			4- 7			7,000-10,000			22-40			
1	170	288	5.3	0	1.6	5.3	79	1.8	9.4	12	1.5	
2	170	298	5.6	0	1.6	6.6	86	2.4	6.2	0	1.9	
3	120	174	5.6	0	1.2	6.1	93	2.4	9.3	10	1.3	
SubT	460	760	5.5	0	1.5	6.0	85	2.2	8.2	7	2.1	
PZ-A2			4- 7			6,000- 9,000			22-40			
4	170	288	5.6	0	1.5	5.7	73	1.8	6.0	1	1.1	
5	170	286	6.2	1	1.5	6.4	78	2.0	7.2	2	1.4	
6	129	193	5.7	1	1.7	6.0	74	1.9	6.6	8	2.0	
SubT	469	767	5.8	0	1.6	6.1	75	2.0	6.6	3	4.4	
C3-A1			4- 7			15,000-18,000			22-40			
7	170	272	4.5	1	1.1	5.9	66	1.4	17.9	16	2.2	
SubT	170	272	4.5	1	1.7	5.9	66	2.1	17.9	16	4.2	
C3-A1			4- 7			18,000-21,000			22-40			
8	170	290	3.5	0	1.1	4.4	93	0.9	11.2	7	2.7	
SubT	170	290	3.5	0	1.7	4.4	93	2.0	11.2	7	4.2	
C3-A1			4- 7			15,000-18,000			22-40			
9	84	159	3.4	1	1.0	5.0	89	1.3	12.2	8	1.5	
Total	1353	2248	0.4	5	1.7	80.5	5	2.0	6.9	9	4.2	
	(22:33)											

The **Head diagrams** option under **Print** allows the saving of standardized 10-20 and (modified) 10-10 electrode placement diagrams in the print directory.



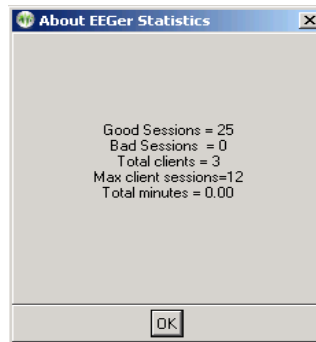
They are printed using the same **Print saved data** method previously described.

## Help menu

The **Help** button has a help file selection and an about box. The help file contains the same material as in this operator manual. This same data is shown whenever the **F1** key is pressed.

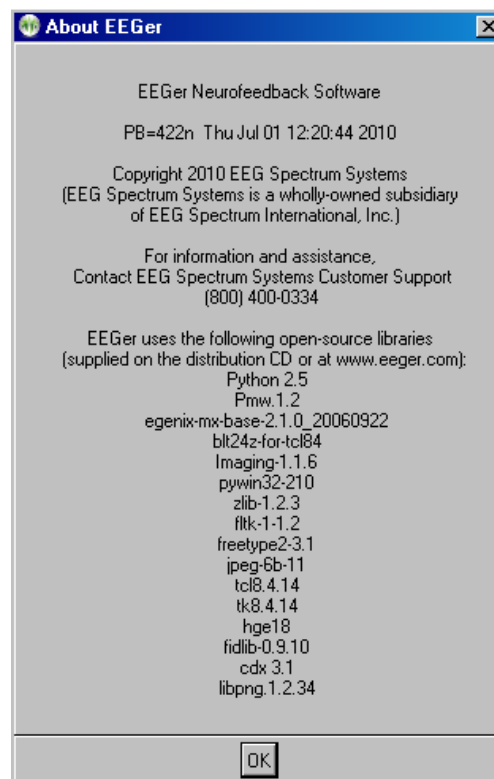
The "**Run tech support menu**" option brings up a menu with functions to assist in customer support issues.

The "**Statistics**" item shows a short summary of sessions run (since 4.2.1...) as shown below. Bad sessions are sessions that aborted for some reason or another.



The "**Keyfile Information**" selection brings up a screen showing the currently installed license and option files. This is primarily used to support Customer Service in determining license/option issues.

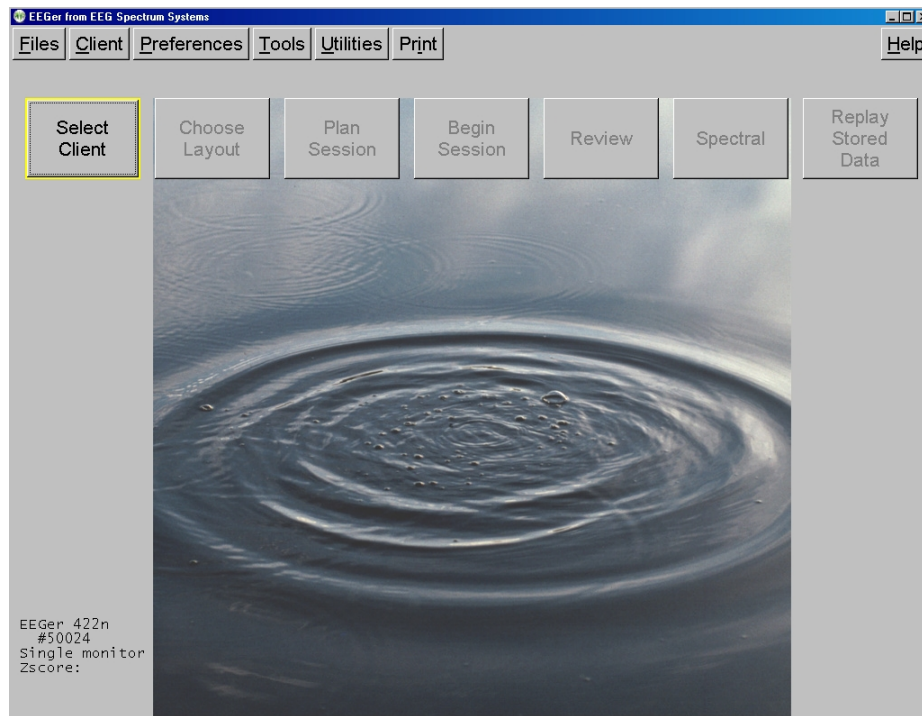
The **About** screen displays information about the version of EEGer and subsidiary files used.





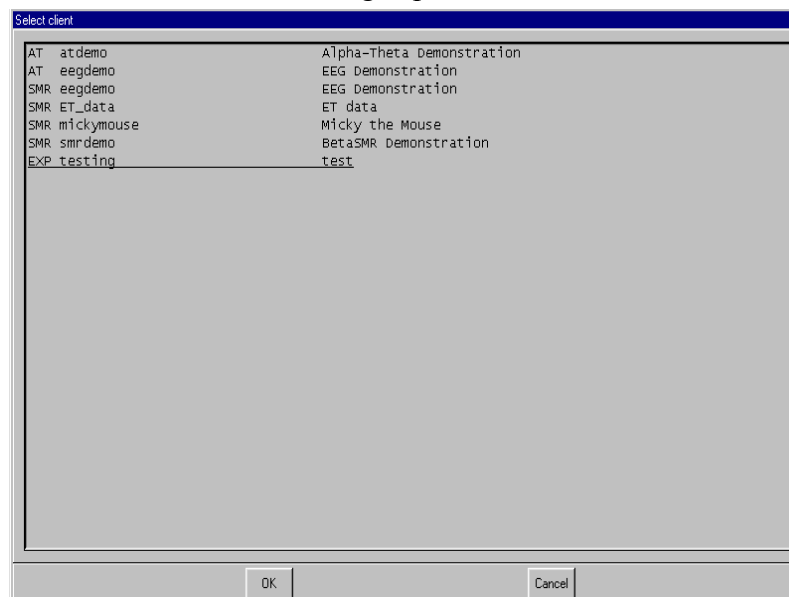
## Buttons

The screen prior to a client selection looks like this:



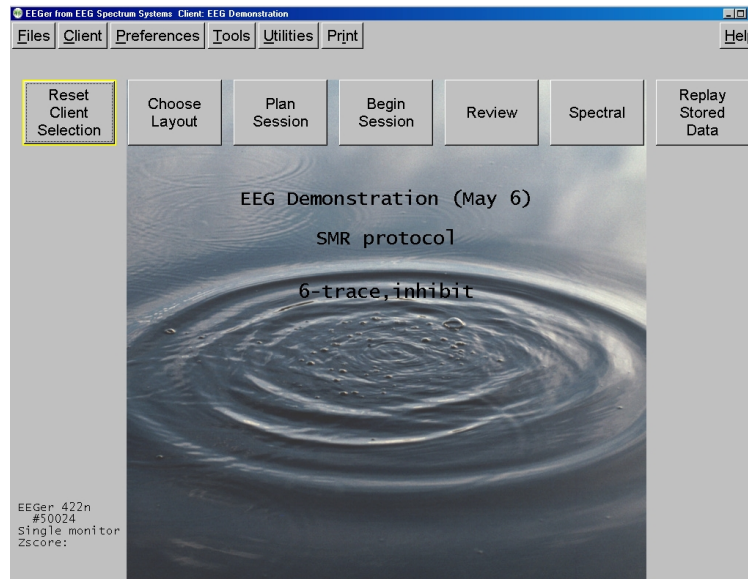
## Select Client

Clicking on the **Select Client** button brings up the client selection menu:



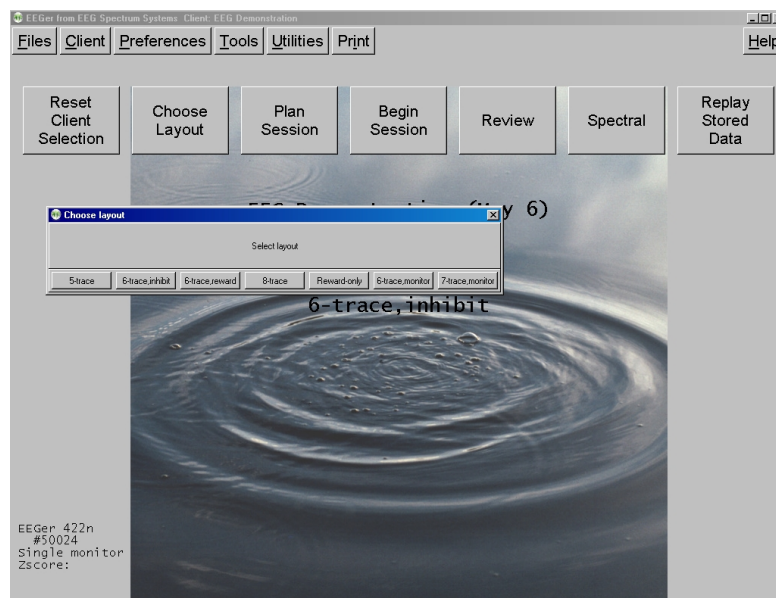
This screen is different from previous client selection screens in that you are now selecting both a CLIENT and a PROTOCOL CLASS.

Once a client/protocol is chosen, the buttons become active. Note that the current client, protocol class, and layout are displayed on the top screen. Also, the button formerly marked as **Select Client** is now labeled **Reset Client Selection**.



## Choose Layout

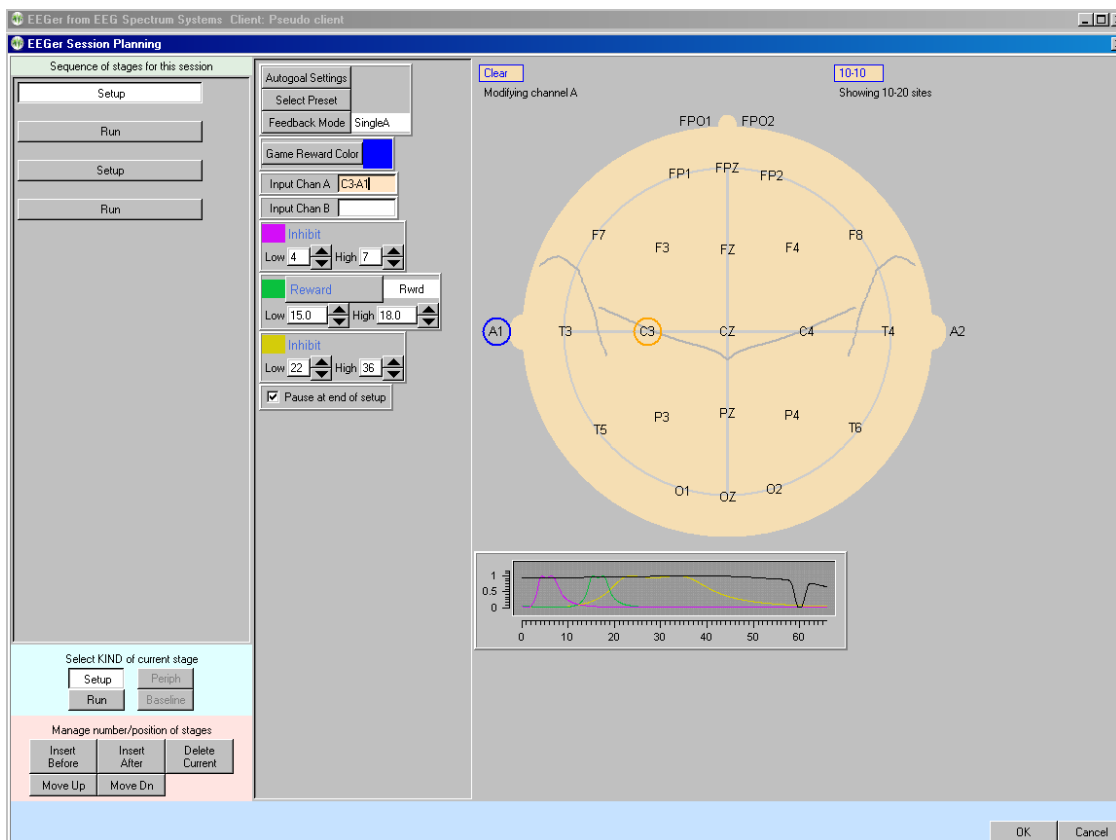
The layout for this client can be changed using the **Choose Layout** button.



## ■Plan session

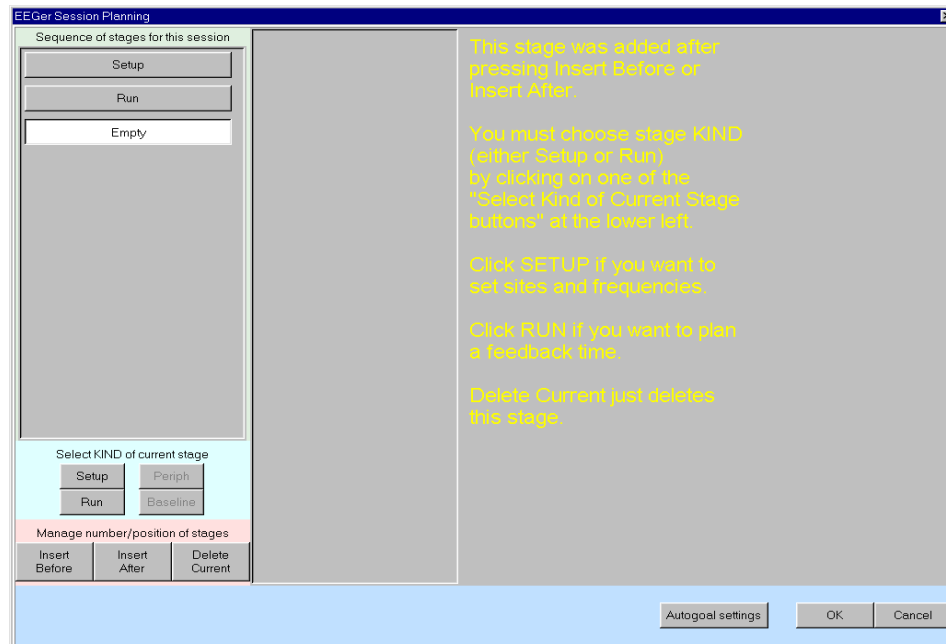
**Note: Remote-use clients cannot use Plan Session to alter the session plan established by the Therapist unless enabled by the Therapist. Changes made here are ignored when a session is started unless enabled.**

Every session requires a "session plan". This is the time/place that initial site locations, frequencies, feedback modes, and autogol selections are made. Most of these selections are changeable during a session but an initial plan is required. There is a separate session plan for each layout. A session plan is comprised of a number of "stages". Each stage is a particular action/operation such as electrode placement, providing feedback, etc. In this version of EEGer, there are two kinds of "stages": Setup stages (electrode placement, frequency/mode establishment) and Run stages (actual feedback for a planned time). A plan is saved for each client/protocol class/layout combination (Each client has a session plan for each protocol class created using the **Create client class** option). Clicking on the **Plan Session** button brings up the following screen:



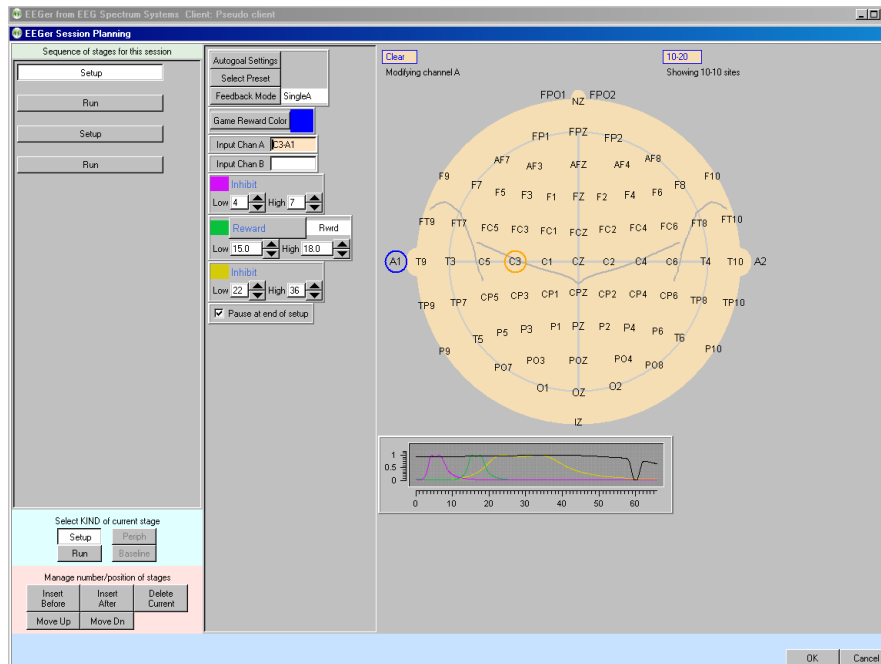
This display has three “panes”. The leftmost pane is where stages are created or selected. At the top of the left pane is a series of buttons showing which "stage" of a session is being modified. Clicking these buttons “selects” that stage for modification (and changes the display shown in the center and right panes). The bottom of the left pane has buttons allowing for creating and deleting stages or changing what kind of stage it is to be. In the center pane are the values for the currently selected stage. On the right pane (for Setup stages) is a symbolic head with electrode placements and a graph showing the frequency bands for the current filter frequency settings.

Clicking on the ***Insert Before*** or ***Insert After*** button adds a new stage with a type of “Empty”.

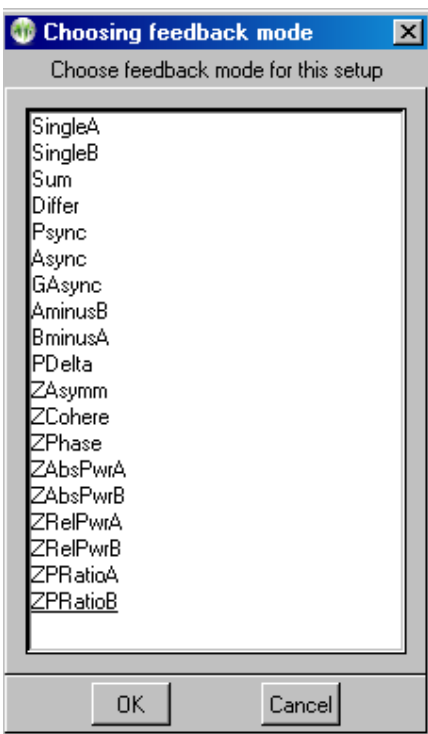


The Empty stage type must be set to a valid type by clicking on either ***Run*** or ***Setup***. The ***Delete Current*** button deletes a stage (in this case bringing us back to the original screen).

To change the site locations, you must click in one of the channels. You can then type in values or use the mouse to click on desired locations (or the ***Clear*** box to reset channel values). Clicking on the blue box labeled 10-10 (or 10-20) toggles between the 10-20 placement diagram and the 10-10 (modified) placement diagram.



Clicking on the **Feedback Mode** button (top center) pops up a menu of choices for (starting) feedback modes showing all the possibilities. It is possible to select a mode at the planning stage (now) that there is no license for. At actual feedback time, any unlicensed condition will cause **SingleA** (single channel, A input) to be selected. Of course, you can change the feedback mode (using F3) during the actual feedback process.



The modes work as follows:

**SingleA**- Single channel, source data from the "A" input channel

**SingleB**- Single channel, source data from the "B" input channel

**Sum** - Sum of A and B channels is used as source data

**Differ** - Difference of A and B channels is used as source data

**Psync**- Comparison between filtered A and B envelopes (formerly Synchrony)

**Async**- Comparison between filtered A and B envelope slopes (formerly Comodulation)

**GAsync**- Comparison between lowpass A and B envelope slopes (formerly Global Comodulation)

**AminusB**- Difference between filtered A and B envelopes

**BminusA**- Difference between filtered B and A envelopes

**PDelta**- Phase difference between A and B signals

**RatioA**- Ratio of reward to inhibit (A as source)

**RatioB**- Ratio of reward to inhibit (B as source)

**RatioAB**- Ratio of A channel reward band amplitude to B channel reward band amplitude.

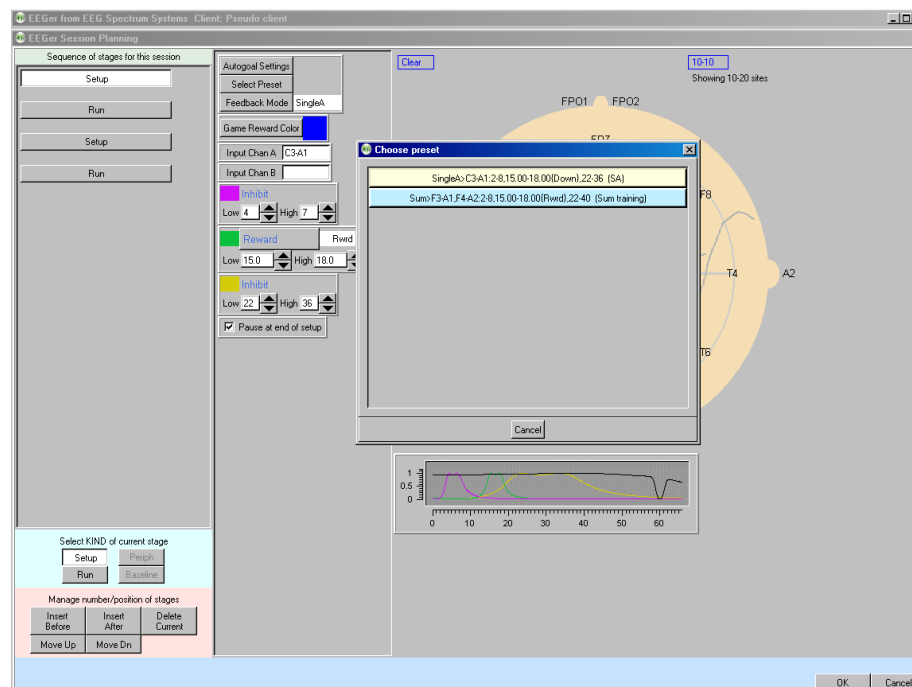
**RatioBA**- Ratio of B channel reward band amplitude to A channel reward band amplitude.

**D/S-Ratio**- Ratio of (A-B) to (A+B)

**Unity** - Compute  $1 - |(A-B)/(A+B)|$  similar to **D/S ratio** except absolute value

The remaining choices are only available if the ZSCORE module is installed. See the ZSCORE appendix for information about these modes.

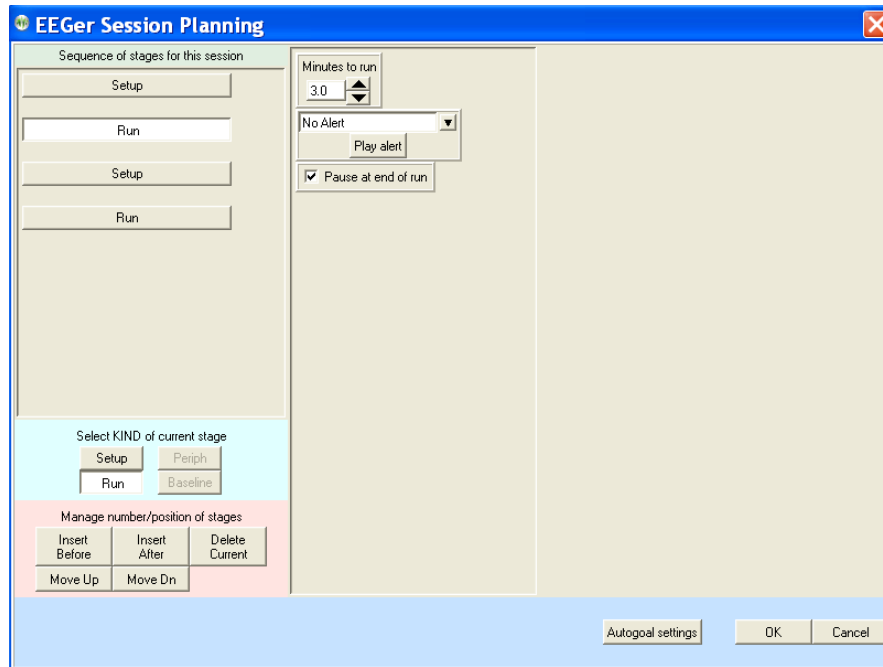
Clicking on the **Presets** button (top center) brings up a selection list of defined presets. These are the values set (changed) from the user-defined presets established as preferences using the **Preferences** menu (**Edit filter setups**).



Selection of one of the presets from the list causes the preset-stored filter and site values to replace the current setup stage values and the specified feedback mode and reward mode to be selected.

Clicking on a **Run** stage button brings up a slightly different screen. Notice there is no "head" shown. The important field on this screen is the run time (**Minutes to run**). If this value is zero, there is no limit on run time and a manual F5 or F4 will be required to end a particular

setup/session.



### ***Autogoal settings***

Clicking on ***Autogoal settings*** button in a setup stage of the session planning screen brings up a menu which allows adjustment of threshold values used when F11 is pressed (Alpha-Theta example shown). There is a separate set of settings for each setup stage.

Autogoal settings

Input channel - no auto-thresholding

Input channel - no auto-thresholding

Inhibit  
Desired % over threshold: 25 Minimum uv: 10 Maximum uv: 250

Inhibit  
Desired % over threshold: 25 Minimum uv: 3 Maximum uv: 250

Reward  
Desired reward %: 65 Minimum uv: 0 Maximum uv: 250

Inhibit  
Desired % over threshold: 20 Minimum uv: 6 Maximum uv: 250

Seconds between autothresholds (0 means at end of a period): 0 Automatic autogoal every rest period

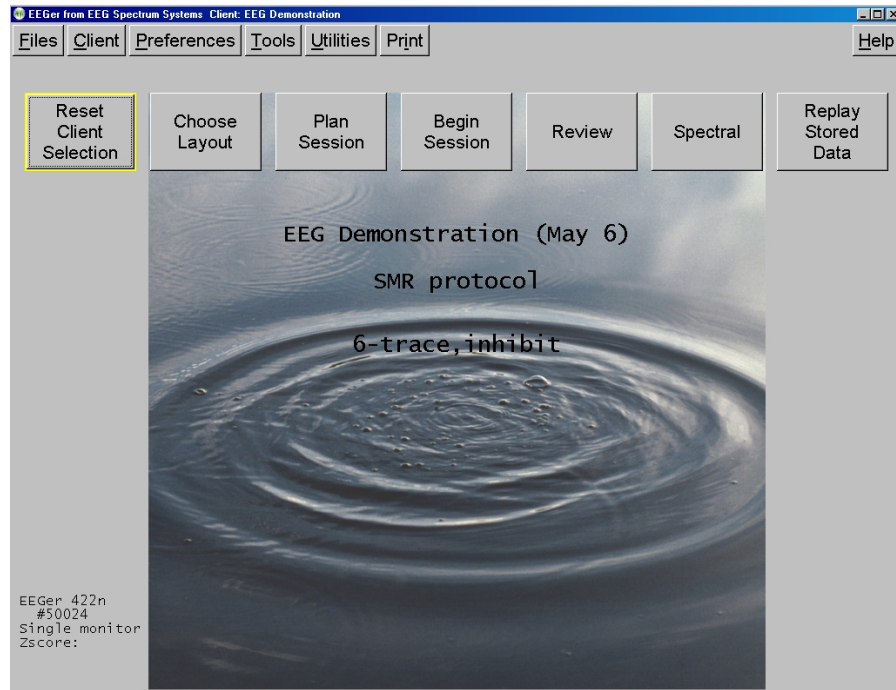
OK Cancel

Any stream with 0 % selected will have NO change made when F11 is pressed. The **Minimum uv** value is the minimum (measured average value) threshold that will ever be “automatically” set by F11. The **Maximum uv** value is the largest threshold value that will be set by F11. The **Autogoal only on F11** button is a toggle where the other value is **Automatic autogoal every rest period** or **Automatic autogoal every xx seconds** where xx is the number of seconds in the entry box. Clicking on **OK** saves the autogoal settings and returns to the session planning screen. When the F2 key is used during real-time processing to switch between up and down rewarding, the appropriate percentages would be reversed (i.e. 65% would become 35%).

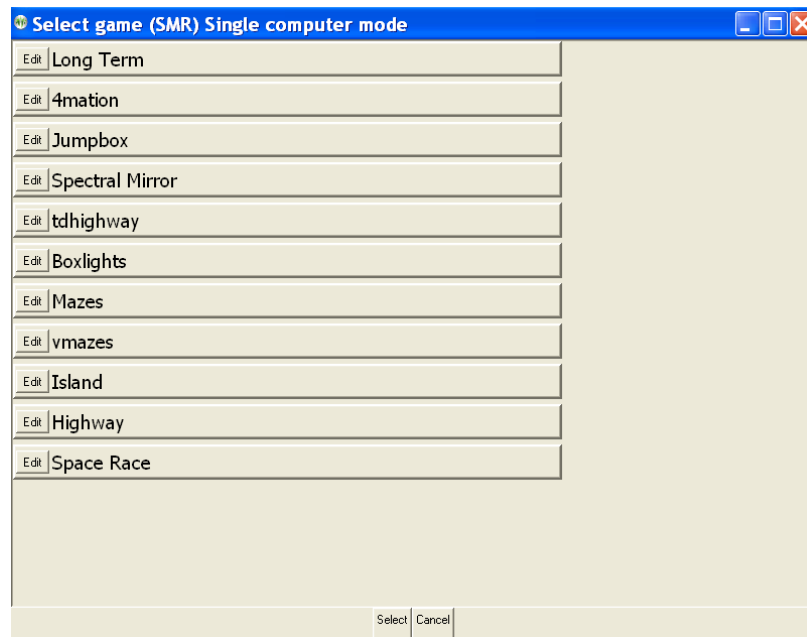
On the session planning screen, clicking on the **OK** button saves the session plan and returns to the top menu. You cannot click on **OK** if any field is highlighted with a pink background (marking it as in error).



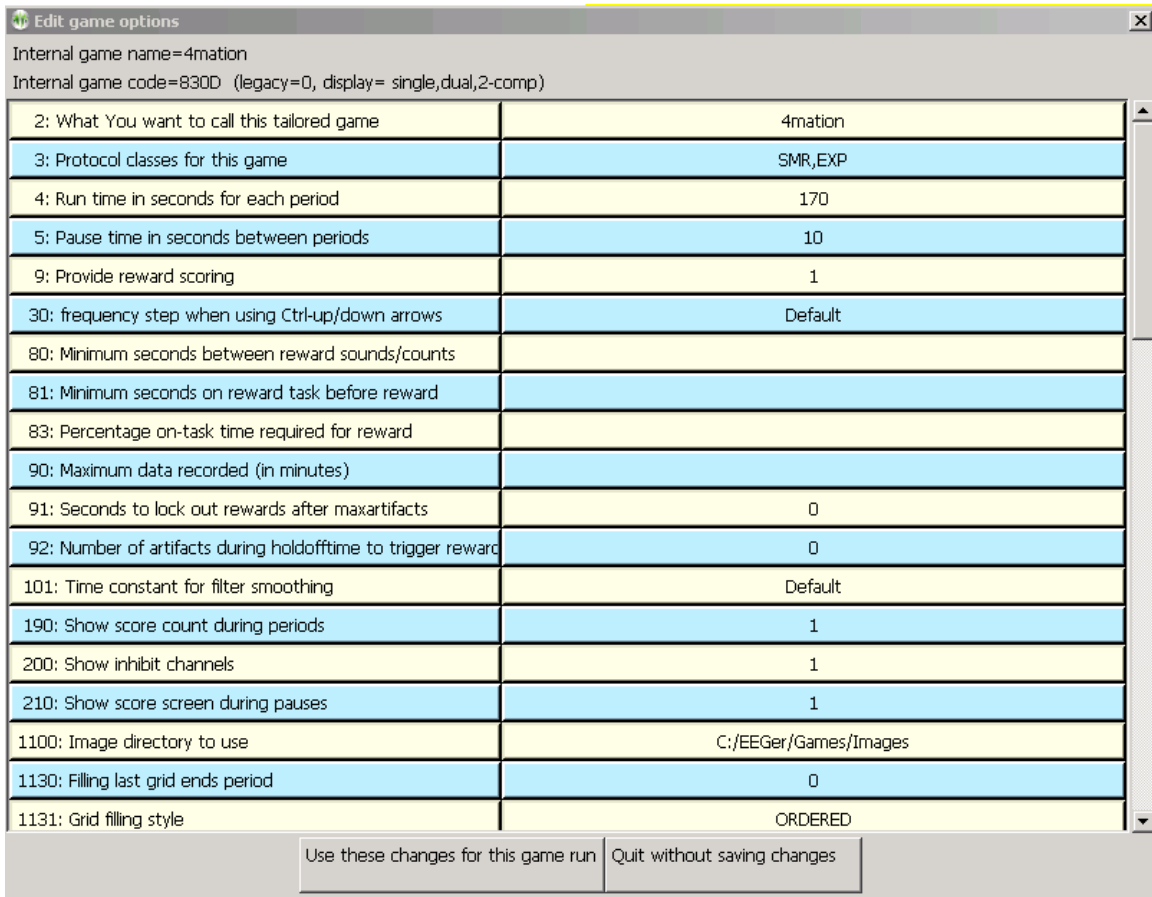
- **Begin session**



To begin a live session, click on the **Begin session** button. This brings up the game selection screen with a list of choices. Only licensed games are shown here (replay shows all installed games).



Clicking on the Edit button brings up a game tailoring screen. Changes made here affect ONLY this selection and are not saved as defaults.



Internal game name=4mation  
Internal game code=830D (legacy=0, display= single,dual,2-comp)

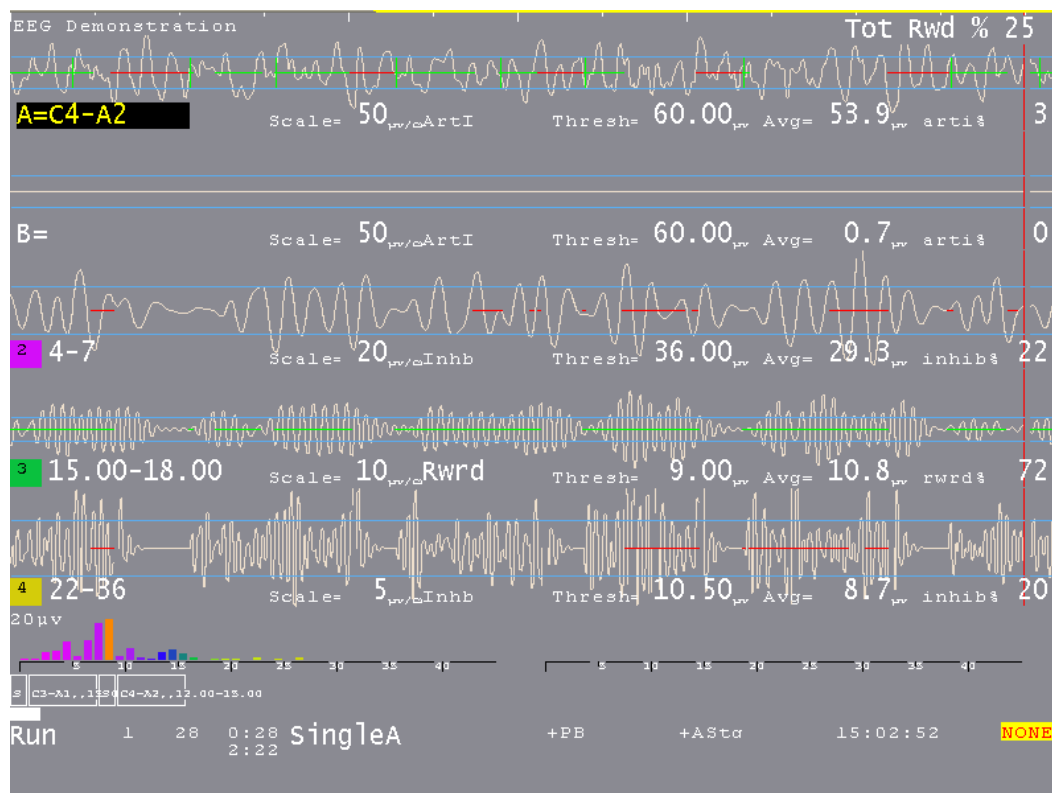
2: What You want to call this tailored game	4mation
3: Protocol classes for this game	SMR,EXP
4: Run time in seconds for each period	170
5: Pause time in seconds between periods	10
9: Provide reward scoring	1
30: frequency step when using Ctrl-up/down arrows	Default
80: Minimum seconds between reward sounds/counts	
81: Minimum seconds on reward task before reward	
83: Percentage on-task time required for reward	
90: Maximum data recorded (in minutes)	
91: Seconds to lock out rewards after maxartifacts	0
92: Number of artifacts during holdofftime to trigger reward	0
101: Time constant for filter smoothing	Default
190: Show score count during periods	1
200: Show inhibit channels	1
210: Show score screen during pauses	1
1100: Image directory to use	C:/EEGer/Games/Images
1130: Filling last grid ends period	0
1131: Grid filling style	ORDERED

Use these changes for this game run    Quit without saving changes

Selecting a game (highlight and click **Select** or double-click on game line) brings up the realtime display screens. There are NO mouse actions during the realtime processing part of the program.

## Brainwave screen

The brainwave screen looks like this:



There is a lot of information on this screen. Generally speaking, the upper part of the screen contains signal data and the lower part contains process/progress data.

There are several popup menus which can be used to control autogol thresholds, volume, tactile feedback settings, etc. The menus work alike in that the line to alter is controlled by PageUp/PageDown and the settings change by the "+" and "-" keys (just like threshold settings).

The **Esc** key closes any popup screens and continues processing. If no popups, it terminates realtime processing (without warning) and returns to the top menu.

This sample shows a typical single channel setup. The top two streams are the input channels

(labeled “**A**” and “**B**”). The “**A**” channel electrodes are at C3-A1.

The three streams below that are reward and inhibit streams (labeled at about the middle of each stream display). Possible legends are:

1. **Artl** Artifact Inhibit (lowpass data)
2. **Inhb** Inhibit
3. **Rwrđ** Reward (signal above threshold)
4. **Down** Reward (signal below threshold)
5. **Monitor**

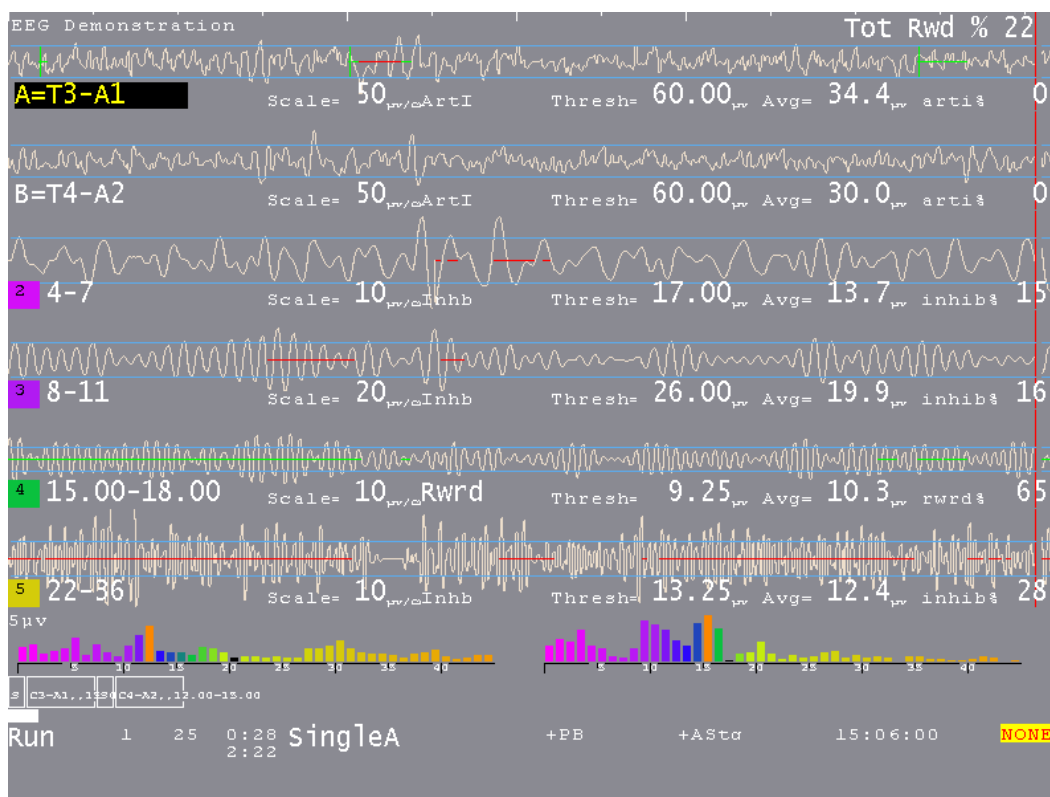
(Additionally, for advanced users:)

6. **Cntr** Reward (signal close to threshold)
7. **Elev** Reward (signal above threshold, clamp to threshold)
8. **DevU** Reward (deviation above)
9. **DevD** Reward (deviation down)
10. **Band** Band (within band limits of threshold setting)

The current frequency range of each stream is shown at the left near the colored blocks. The “color” of the blocks is based on the center frequency of the frequency range (using the customizable colors previously mentioned in the **Tools** menu description). The **Scale**, **Thresh**, and **Avg** values are in microvolts (peak-to-peak). The **inhib%** value is the percent of time the signal was over the threshold voltage (for inhibits). The **rwrđ%** is the percentage of time in reward state (smoothed over the previous 30 seconds). The **Avg** value is the average value of the signal smoothed over the previous 30 seconds. The blue horizontal lines represent the relative position of the threshold setting. The **Tot Rew %** value in the upper right corner is the (smoothed over 30 seconds) percent of time the client is in overall reward state (no inhibits/artifacts and in reward state).

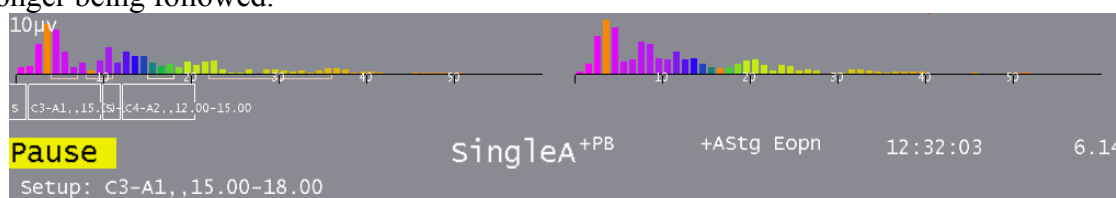
The (frequency) colored bars at the bottom are a measure of the energy contained in each 1 Hertz frequency range from 0 to 45 Hz. They are computed as FFT (Fast Fourier Transform) values every ½ second. If the FFT Highlight mode is on (toggled by Alt-F10), the highest/lowest FFT amplitudes between 1 and 20 Hz will be color-coded with colors 49/50 of the current color set. This is a method of seeing where dominant values lie every ½ second. The FFT scale maximum value is shown in microvolts on the left of the FFT area.

A typical two-channel screen might look like this:



Several other features are shown on this screen. The reward stream shows a GREEN line in the center meaning signal-in-reward-condition. The high frequency band below it has a RED line meaning signal-above-threshold. Red lines inhibit rewards while green lines permit rewards (if there are no inhibits). The red lines in the input streams are times when an artifact (signal over threshold) has been detected/processed. The horizontal green lines are times when all reward criteria have been met (no artifacts/inhibits and all rewards ok). The vertical green lines reaching from threshold line to threshold line indicate a reward/“score” has been issued.

The bottom area of the screen has a number of regions of data. Shown below are some boxes with text inside. This is a graphical representation of the session plan. The little boxes with “S” inside represent Setup stages. The run stages have the setup text from the previous setup and a width proportional to the specified run time. The entire bottom width is scaled to represent the maximum session time (from the preferences screen). The white progress bar is filled in to show the current position in the session plan. The boxes, text, and bar disappear if the session plan is no longer being followed.



Below the boxes is a line of status information. The leftmost field contains the current status of feedback (**Pause**, **Run**, **Rest**, **Stage**, **Wait**) with a different background color for each status. “**Pause**” is shown when an operator action (F5) is required to continue the session. “**Rest**” status is shown during the rest periods between periods and implies no operator action is required. “**Stage**” is shown when there is an operator action/decision needed (move electrodes, continue/change session process, etc.). “**Wait**” is shown while waiting for the game to respond to its initialization.

The current period, score, and feedback time (minutes:seconds) is shown to the right of the current status. Below the feedback time is shown the time remaining before a status change takes place (like Run to Rest or Rest to Run). Next is shown the current feedback mode (**SingleA**).

There are a number of flags and operator-changeable modes whose state is shown in the middle of this line. Possibilities are:

- +PB** playback mode (not live)
- +Gen** signal generator mode
- +Athr** autothreshold (auto F11) at beginning of rest period
- +Astg** auto stage processing enabled
- DC** DC compensation turned off
- Ainh** artifact inhibit turned off
- lpf** lowpass filter disabled
- Nuse** unused raw trace data is suppressed
- Eopn** Eyes open
- Ecls** Eyes closed

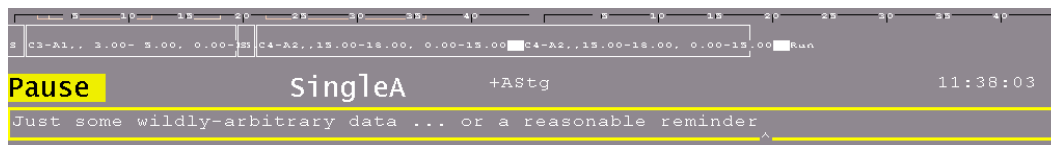
Further right the current time-of-day is shown..At the right edge the device voltage or status is shown. In all cases, a flashing RED message indicates a fatal error condition.

The bottom two lines contain program messages, in this case displaying the setup-specified site locations. Additionally, some generic messages may be shown about the feedback process.

Among them are:

- |                 |  |
|-----------------|--|
| NOT RUNNING     | - EEGer paused after first run   |
| REWARDS BLOCKED | - No more rewards are sent to game. This is usually caused by manually exiting a game during feedback.   |
| NOT RECORDING   | - Session has run more than 90 minutes. Feedback can continue but no more data recording will occur.   |
| INPUT FAILURE   | - Live input lost (amplifier failure or dongle removed)  |
| KEYBOARD Lost   | - EEGer is not the focus for keyboard inputs. If this occurs, move the mouse to the brainwave screen and left-click.                               |
| RAW% TOO HIGH   | -One of the in-use raw channels has too many artifacts. Please adjust artifact thresholds until percentage gets lower and then readjust as needed. |

Pressing Shift-F8 causes the two bottom lines to be used as a single-line entry area as shown below.

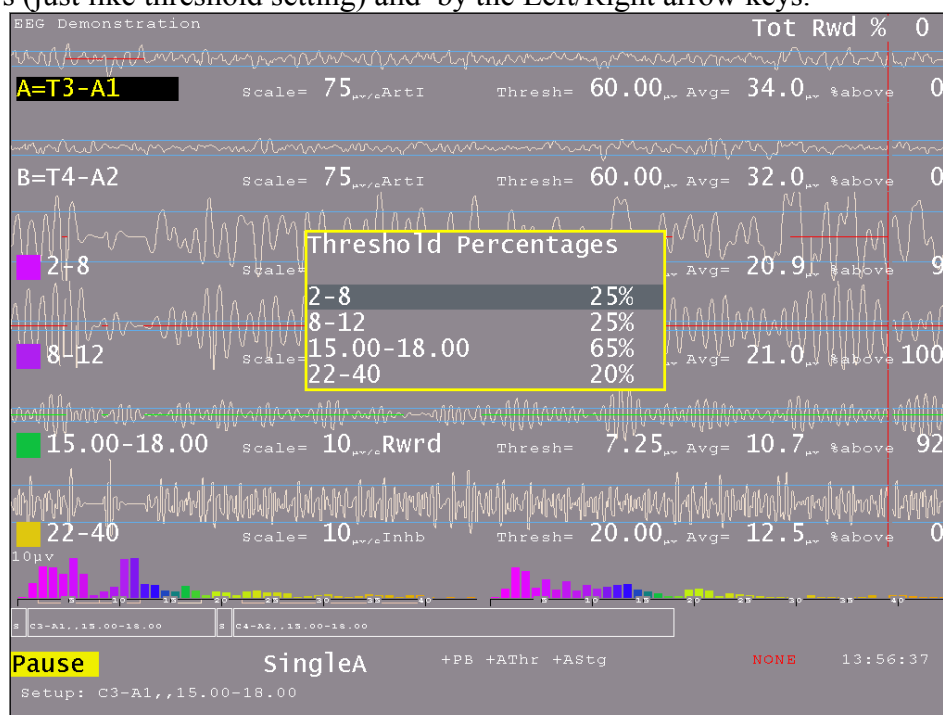


F8 raises/lowers the editor screen which can be used while feedback is ongoing.

There are a number of popup menus which can be used to control autogoal thresholds, volume, etc.,. The menus work alike in that the line to alter is controlled by PageUp/PageDown or the Up/Down arrow keys and the settings changed by the "+" and "-" keys (just like threshold settings) and by the Left/Right arrow keys.

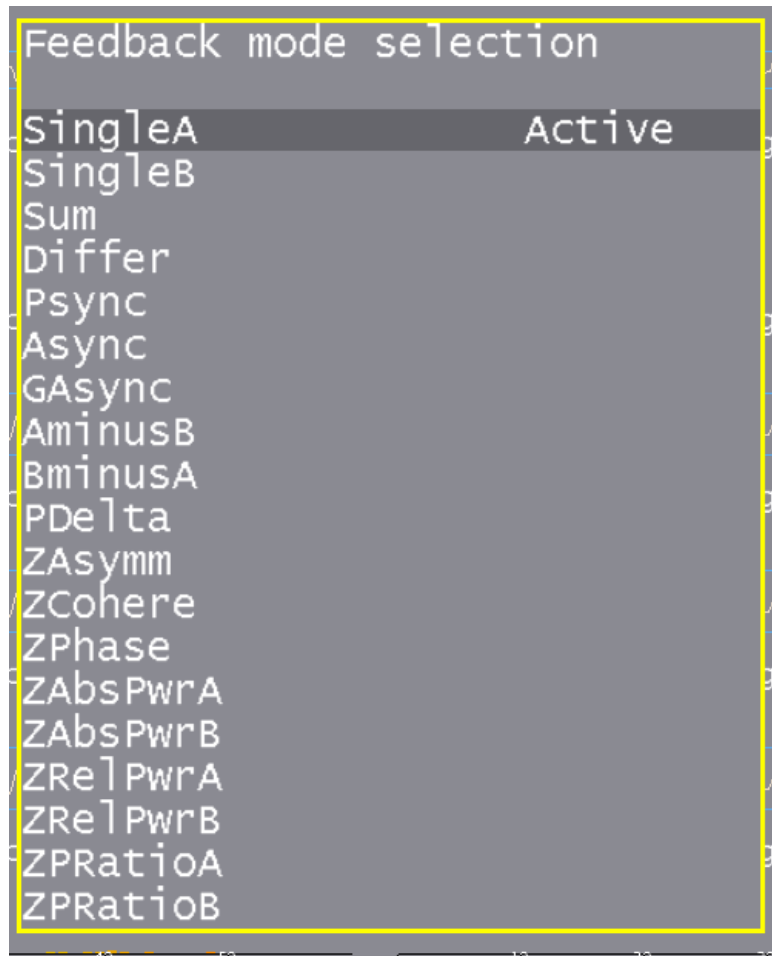
### Autogoal popup

The autogoal threshold popup is initiated/dismissed by the "%" or the "G" keys. The line to alter is controlled by PageUp/PageDown or arrow up/arrow down and the settings changed by the "+" and "-" keys (just like threshold setting) and by the Left/Right arrow keys.



## Feedback Mode Popup

The Feedback Mode popup is selected/dismissed by the Alt-F3 key. The line to alter is controlled by PageUp/PageDown or arrow up/arrow down and the selection changed by the "+" and "-" keys (just like threshold setting) and by the Left/Right arrow keys. Only valid modes for the current layout are shown.

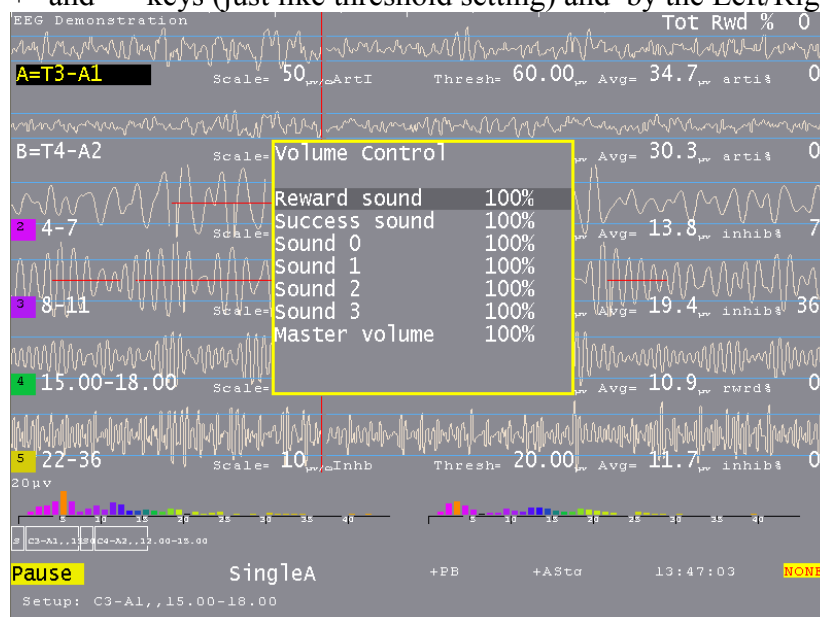




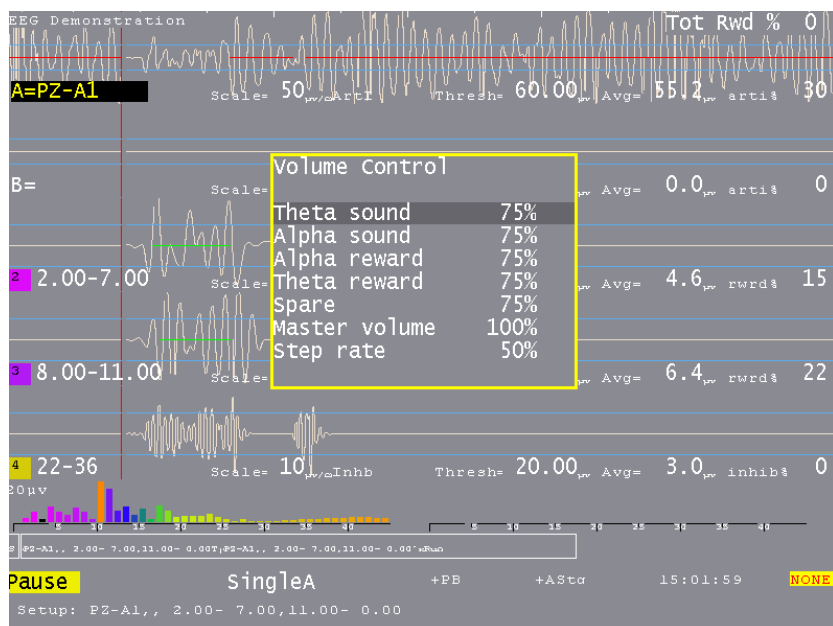
## Volume popup

The volume popup is selected/dismissed by the “V” key. Volume controls here only work for those games which “understand”, in particular the EGS games.

The line to alter is controlled by PageUp/PageDown or arrow up/arrow down and the settings changed by the “+” and “-” keys (just like threshold setting) and by the Left/Right arrow keys.

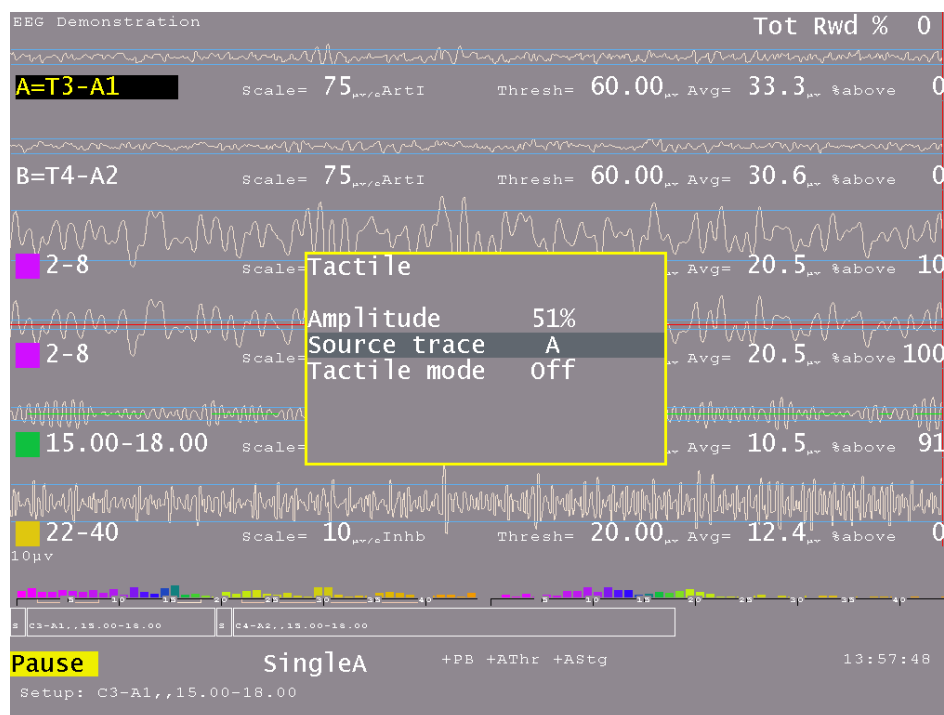


If an Alpha Theta session is being run, the volume popup looks like this:



## Tactile popup

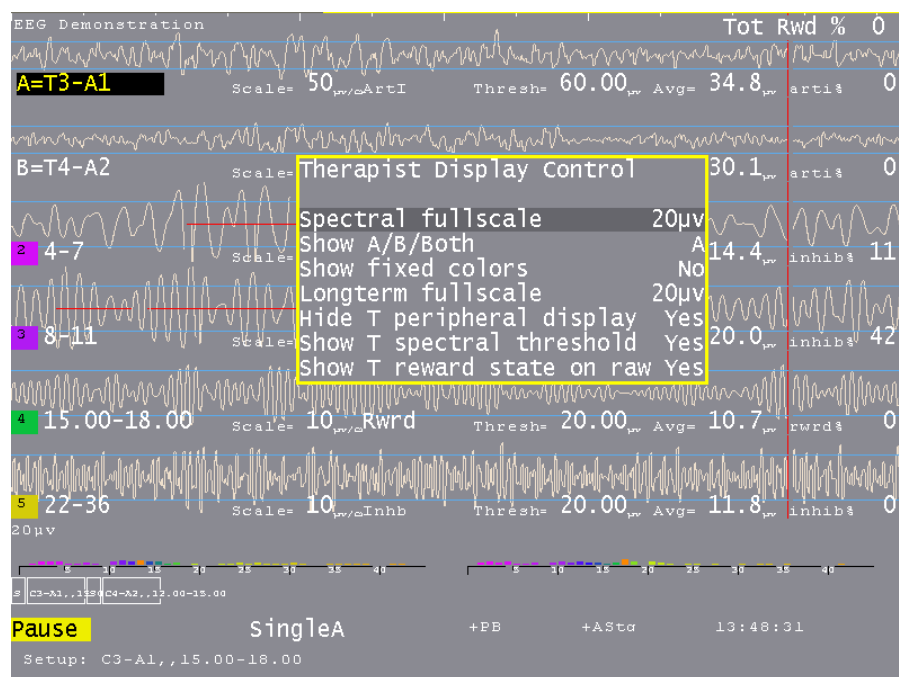
The tactile feedback popup is initiated/dismissed by the “T” key. The line to alter is controlled by PageUp/PageDown or arrow up/arrow down and the settings changed by the “+” and “-” keys (just like threshold setting) and by the Left/Right arrow keys.



Any trace can be selected as the source of tactile data. The tactile mode can be OFF, 10 Hz, 60 Hz, or 160 Hz. This is the frequency of the signal being modulated by the source trace amplitude. Note that many laptops cannot produce 10 Hz signals due to poor audio systems.

## Therapist display control popup

The “D” key initiates/dismisses the Therapist Display Control. This controls ONLY the Therapist display options. The line to alter is controlled by PageUp/PageDown or arrow up/arrow down and the settings changed by the “+” and “-” keys (just like threshold setting) and by the Left/Right arrow keys.

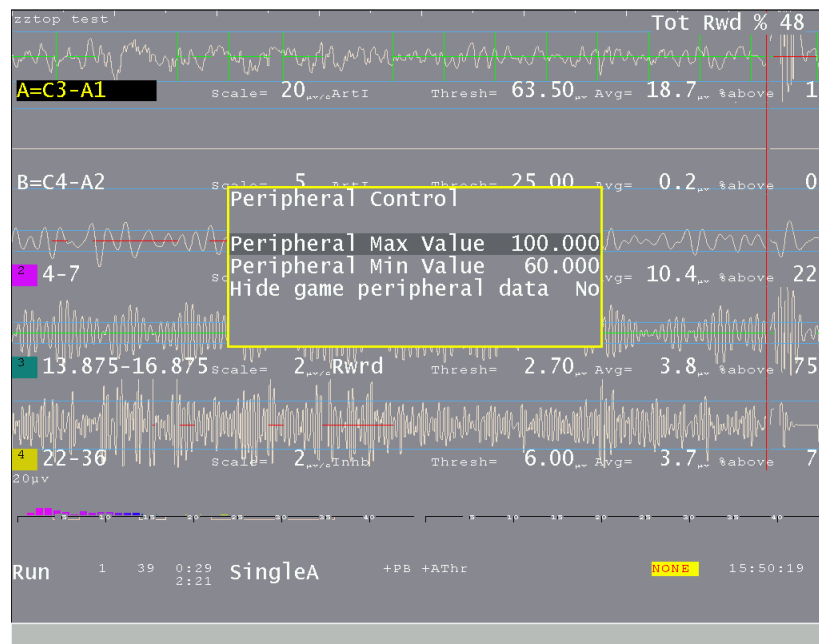


- The “**Spectral fullscale**” setting controls the full-scale setting of the Therapist Spectral Mirror display.
- The “**Show A/B/Both**” control determines if the Therapist sees just the A trace signal mirrored, just the B trace signal mirrored, or both (A on the left and B on the right).
- The “**Show fixed colors**” option determines if the fixed color set is used instead of the user-chosen color set (but just on the Therapist displays).
- The “**Longterm fullscale**” setting is another way to control the long-term display scale.
- The “**Hide T peripheral display**” removes the peripheral data from the long-term display (assuming there is any peripheral data).
- The “**Show T spectral threshold**” controls whether or not the threshold and average values are displayed over the spectral mirror display.
- The “**Show T reward state on raw**” option controls display of the green reward line display on the raw traces.

## Peripheral control popup

The “P” key initiates/dismisses the peripheral data control.

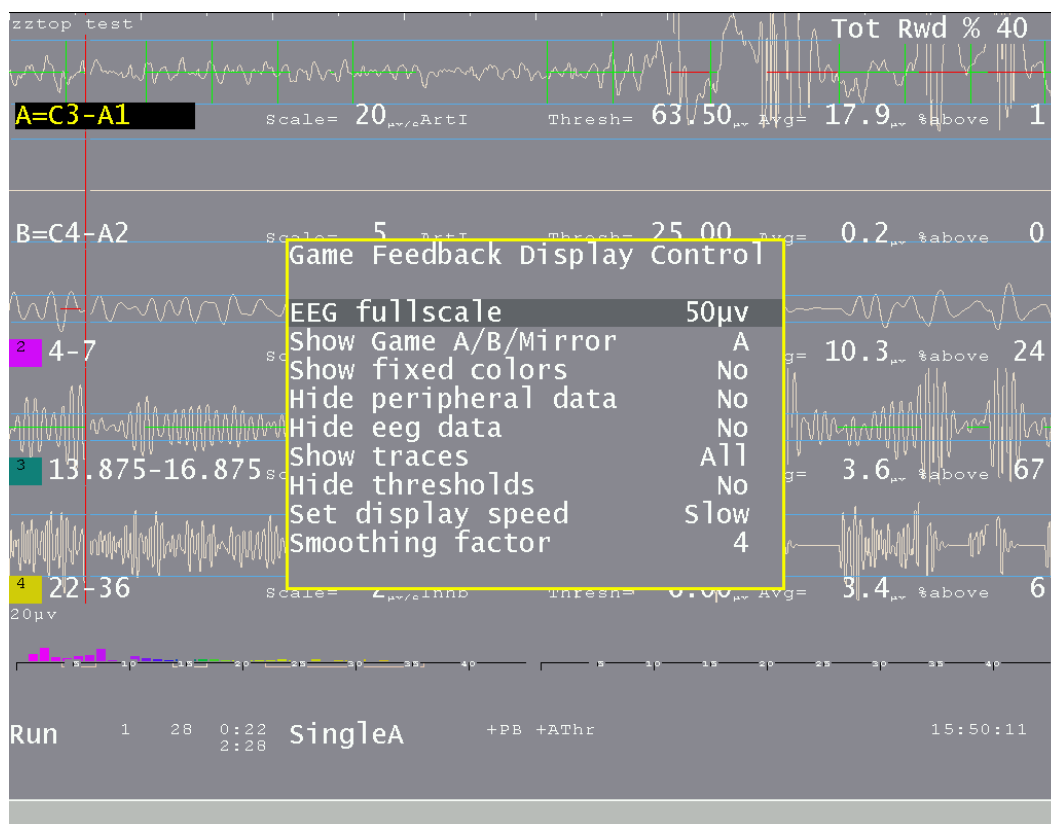
The line to alter is controlled by PageUp/PageDown or arrow up/arrow down and the settings changed by the “+” and “-” keys (just like threshold setting) and by the Left/Right arrow keys.



- The “**Peripheral Max Value**” sets the maximum value of the selected peripheral input type. A suitable starting value is chosen based on the type of peripheral specified.
- The “**Peripheral Min Value**” sets the minimum value for the peripheral data.
- The “**Hide game peripheral data**” option controls display of peripheral data on the game long-term display (just as the control on the Game Feedback Control menu does).

## Game Feedback Display Control popup

The “F” key initiates/dismisses the “Game Feedback Display Control” popup. Note that this controls only display aspects at the client display and not any feedback decisions/controls. The line to alter is controlled by PageUp/PageDown or arrow up/arrow down and the settings changed by the “+” and “-” keys (just like threshold setting) and by the Left/Right arrow keys.

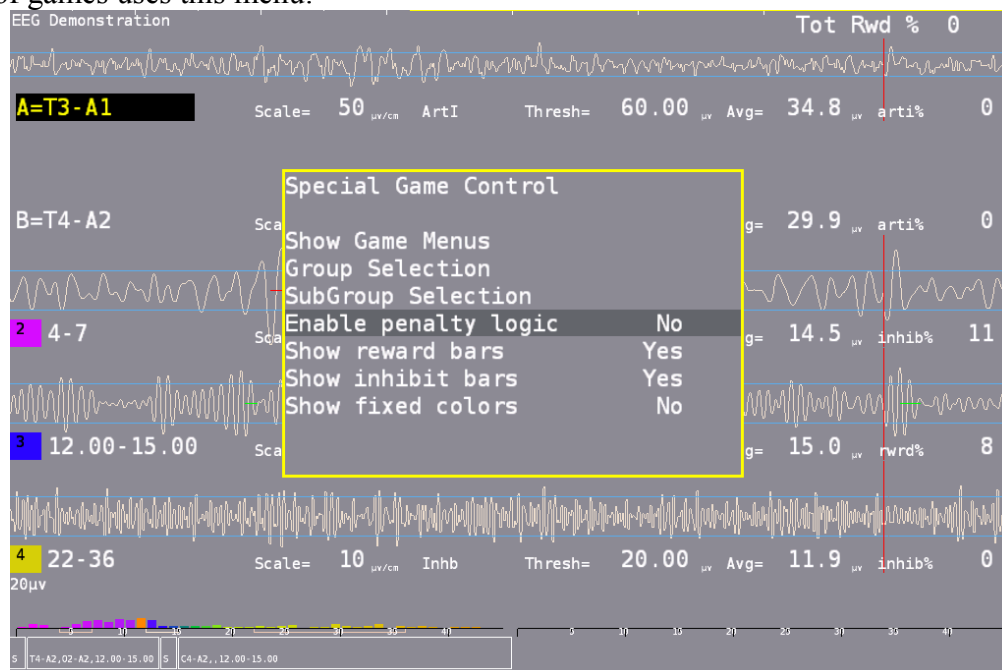


- “**EEG fullscale**” controls the scale used on both the game long-term display and the game spectral mirror display.
- The “**Show A/B/Both**” option controls whether the game spectral display shows A mirrored, B mirrored, or both A & B.
- The “**Show fixed colors**” causes the game long-term display to use fixed colors rather than the color set selected in the game tailoring logic.
- The “**Hide peripheral data**” option hides/shows the peripheral data (if there is any) on the game long-term display.
- The “**Hide EEG data**” option controls display of the EEG data on the game long-term display.
- The “**Show traces**” option allows selection of all traces, just the uppermost reward trace, or the uppermost reward and the inhibit just above the uppermost reward trace.
- The “**Hide thresholds**” option controls display of the EEG threshold(s) for the selected trace(s).
- The “**Set display speed**” allows selection of slow, medium, or fast displays of data. The slow display shows the entire session. The medium display shows ten minutes of data. The fast display shows one minute of data. The “per” display shows one period of data.
- The “**Smoothing factor**” controls how smooth the data will be on the display (just as is done in the Review process).

## Game Control popup

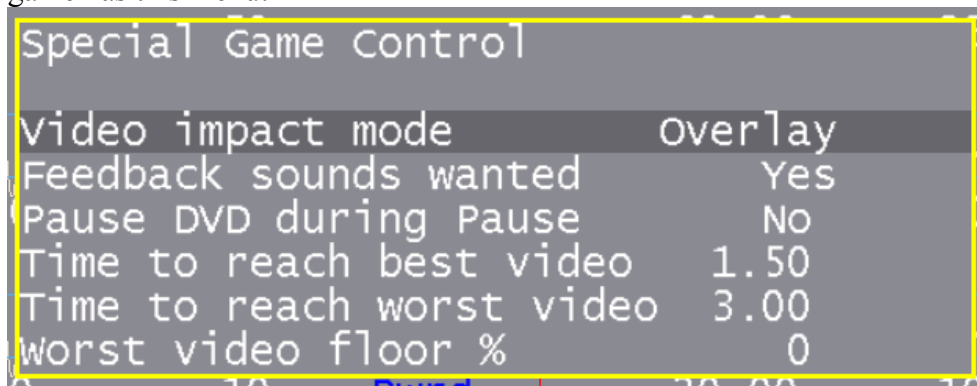
This menu has different values depending on the currently running game.

One set of games uses this menu:



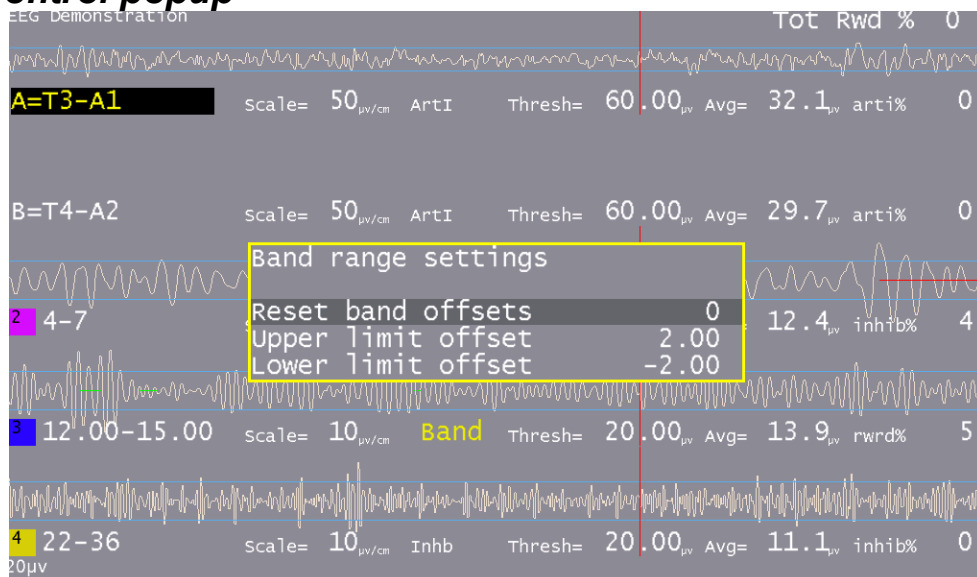
- **“Show Game Menus”** allows hiding/showing of the special game selection menu. A '+' raises the screen and a '-' hides it. The menu is only displayed if EEGer is in a PAUSE or STAGE state. The special menu shows the title of the main group, the current subgroup, and the instructions for the client for the current game/subgame.
- **“Group Selection”** cycles through all the allowed game main game groups.
- **“SubGroup Selection”** cycles through the subgroups of the current game game group.
- **“Enable penalty logic”** turns on/off the logic in the game that backs up displaying pieces if rewards do not occur within the timeout. This only works if the game definition has a time specified for the timeout.
- **“Show reward bars”** turns on/off the display of the reward amplitude bars at the bottom of the game display. The threshold setting is the bottom of the picture and the reward bars are on the right side.
- **“Show inhibit bars”** turns on/off the display of the inhibit amplitude bars at the bottom of the game display. The threshold setting is the bottom of the picture and the inhibit bars are on the left side.
- **“Show fixed colors”** turns on/off the display of fixed colors (instead of the frequency sensitive colors) in the reward/inhibit bars.

The DVD game has this menu:



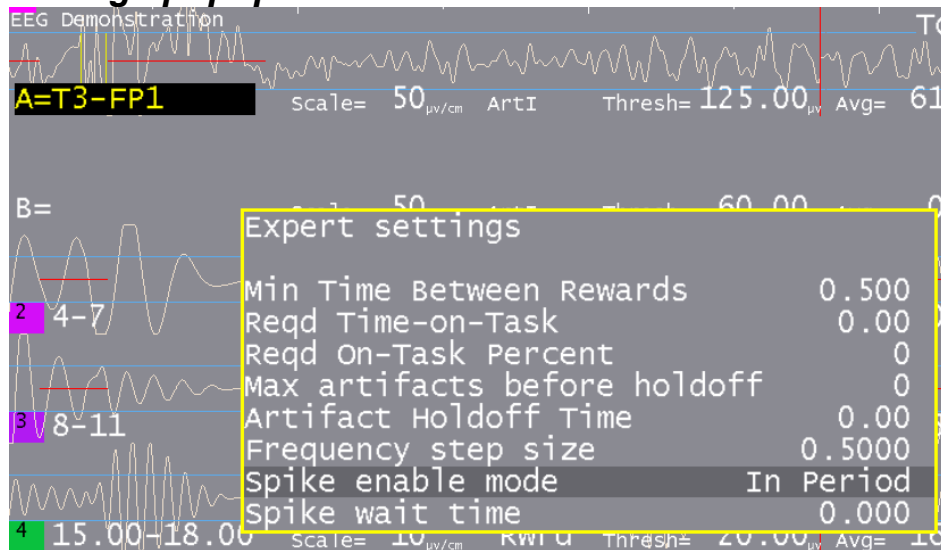
- **“Video impact mode”** allows selection of the video modification applied to the current video playback. Choices are Overlay, Blur, Black White.
- **“Feedback sounds wanted”** allows feedback sounds (reward, etc.) to be heard.
- **“Pause DVD during pause”** allows pausing/not pausing video playback during PAUSE or STAGE phases.
- **“Time to reach best video”** is the number of seconds of on-task time to reach minimal video modification.
- **“Time to reach worst video”** is the decay time in seconds to reach the most video modification.
- **“Worst video floor %”** is the minimum amount of video that will always be seen. Setting 100% means that NO video modification is performed. Setting 0 % means that the full range of modification/obscuration will be performed.

### ***Band Control popup***



- **“Reset band offsets”** sets the upper and lower offset limits to 10% of the current threshold setting.
- **“Upper limit offset”** adjusts the allowable range above the threshold for a rewardable condition.
- **“Lower limit offset”** adjusts the allowable range below the threshold for a rewardable condition.

### Expert Settings popup



- **“Min Time between Rewards”** allows changing the minimum time between rewards from the value set by the game definitions (down to a minimum of 0.25 seconds).
- **“Reqd Time-on-Task”** allows setting the minimum seconds needed to be in a rewardable state before a reward is allowed.
- **“Reqd On-Task Percent”** allows setting the minimum overall reward rate required before rewards are allowed.
- **“Max artifacts before holdoff”** allows setting the number of artifacts withing the holdoff time before rewards are inhibited for the holdoff time.
- **“Artifact holdoff time”** allows setting the artifact monitoring period and the length of holdoff if the count is exceeded.
- **“Frequency step size”** allows changing the step size used when changing the reward-band frequency when using the Ctrl-Up and -Down arrows.
- **“Spike enable mode”** allows changing the spike detector mode. Any mode except 'Disabled' causes (yellow) vertical bars to be shown on the raw traces. If mode is “In Period” or “Always”, an optional sound can e produced on the game computer. Modes are:  
 Disabled  
 In Period - display on therapist display, sound triggered on game if in feedback  
 Always - display on therapist display, sound triggered on game at any time  
 Just Show - display on therapist display



- “Spike wait time” allows selection of how long to wait after a spike to see if its really an artifact.

Note that these changes are NOT saved for future sessions.

## Help screens

The F1 key brings up a help display that shows the key usage during feedback. Normally, the colored display below appears.

<b>Feedback/reward/setup:</b>		<b>F1 - Help on/off</b>		4.2.2
F2/Shift-F2	Incr/Decr reward mode	<b>Adjustments:</b>		Fixed Colors by trace
F3/Shift-F3	Incr/popup feedback mode	Page Up ↑	select previous trace/menu to modify	A 8
F4	Cycle to next setup stage	Page Down ↓	select next trace/menu to modify	B 9
F5	Start/pause feedback	+ or =	increment selected value (shift for ½ steps)	2 10
Ctrl-F5	Start/pause feedback, turn off autostaging	-	decrement selected value (shift for ½ steps)	3 11
Shift-F4	Turn autostaging back on	Enter	unselect/terminate current selection	4 12
Ctrl-F4	Set freq to last session	F9	Scale adjust select/unselect (or autoscale)	5 13
<b>Controls:</b>		F11	autothreshold selected trace (or all filtered)	6
Esc	End current display/feedback	Ctrl ↑/↓	Incr/Decr CF or upper edge of selected trace (or CF of all reward traces if none selected)	7
Delete	Delete current alert message	Ctrl →/←	Incr/Decr lower freq edge of selected trace	
F6	Save 16-second snapshot	<b>Game Controls</b>		
Spacebar	Change therapist/game display	Ctrl-F3	Game color Green/Magenta	
F8	Editor Open/Close	<b>Display options:</b>		<b>Popup menus:</b>
Shift-F8	Insert marker (optional text)	F7	Cycle display of wave/integral	V Volume
Ctrl-F7	Impedance mode On/Off	F10/Shift-F10	Decr/Incr FFT or longterm scale	T Tactile
Alt-F7	Calibration mode On/Off	Ctrl-F10	FFT display Off/On	S Game menu ctl
Alt-F8	Artifact inhibit Off/On	Alt-F10	Dom freq markers Off/On	%,G Threshold
Alt-F9	DC compensation Off/On	F12/Shift F12	Incr/Decr therapist display	P Peripheral ctl
Alt-F3	Lowpass filter Off/On	Ctrl-F12	Display drawing speed Slow/Fast	D T display ctl
Ctrl-F11	Auto-autothreshold Off/On	Alt-F12	Unused trace display On/Off	F Feedback disp
Pause	Pause/resume replay	Shift-F7	Fixed colors On/Off	O Options
Alt-A/Alt-B	Change input channel site	<b>Debug options:</b>		E Expert time/%
Alt-F11	Reset history values	Alt-F1	Debug display on/off	B Band controls
Ctrl-F2	State hold off/on	Ctrl-F8	Toggle internal data logging	
Alt-E	Change Eyes Open/Closed	O	Change Feedback signal source	
<b>Status codes:</b>				
+PB = playback, +Gen = signal generator, Eopn=Eyes Open				
+Athr = autothreshold at rest or periodically (F11/Ctrl-F11)				
+Astg = autostaging enabled (F4/Shift F4), ECls=Eyes Closed				
-DC = DC compensation off (Alt-F9), -lpf = lowpass filter off (Alt-F3)				
-Ainh = artifact inhibit off (Alt-F8), -Nuse = Hide unused data (Alt-F12)				

If there is some problem with (lack of) graphics memory or if Shift-F1 is pressed, the following textual display may appear (containing the same information).

Key	NORMAL	SHIFT	CTRL	ALT
F1	Help	Help	Help	Debug display
F2	Cycle reward+	Cycle reward-	Toggle state hold	
F3	Cycle FB kind+	FB popup menu	Toggle game color	Toggle LP filter
F4	Cycle stage	Autostage+	Previous session freq	
F5	Begin/pause FB		B/P FB,end AutoStage	
F6	Save printout		Change FB src	
F7	show integral	Fixed clr on/off	Toggle impedance chk	Toggle Cal mode
F8	Editor	Marker	*togl saves	Toggle Arti Inhib
F9	Scale adjust	Scale adj. trace	*game actv kind thrsh	Toggle DC comp
F10	Decr slow scales	Incr slow scales	Toggle fft disp	Toggle fft hilite
F11	AutoThresh		Toggle autoAutoThresh	Clear ampl history
F12	Cycle display+	Cycle display-	Toggle draw spd	Blank unused traces
up	like PageUp		Incr CF/upper edge	
down	like PageDown		Decr CF/upper edge	
right/left			Incr/Decr lower edge	
Scroll Lock	or spacebar	(Toggle game/therapist display		
Pause	Pause/resume replay			
Esc	End feedback/dialog			
+/-	Incr/Decr Thresh/Scale			
Enter	End scale/trace selection			
PageUp	Cycle trace selection-			
PageDown	Cycle trace selection+			
Alt-A/Alt-B	Change sites for channel A/B			
Delete	Delete highest level message			
Alt-E	Change eye open/closed status			

V Volume, T Tactile, % or G autothreshold %, E Expert settings, B Band controls  
S game menu, P Peripheral, F Feedback displays, D Therapist display, O Options  
Status codes: +PB=playback, +Gen=signal generator, Eopn/Ecls=eyes open/closed  
+Athr = Autothreshold at Rest or Periodic, +Astg = Autostaging enabled  
-DC = DC compensation disabled -Ainh= Artifact inhibit disabled  
-lpf = low pass filter turned off -Nuse=Hide unused raw data

The debug screen contains (cryptic) information for use in troubleshooting and further development of EEGer. It is selected/terminated by the Alt-F1 key.

```

Debug Display

Dongle = 50025, Build: PB=410      SB=4   Tue Mar 22 09:46:50 2005*

ATmode=0 seconds=      71 hfr= 18350 fr= 18351      105.60016
behind 3176 nest=0 mn=0 fr 18280 avg=   4190.780493 dt=   4000.234667

doframes=38439 avg ttime= 1473.846 gcalls=0 avg gtime=   0.000
State 20  Stg#  1 Type Run      Seq Run      Per  1 Key 40070

Proc 18420  18.52 346.13 Read 18351      6.55 135.77
Dongle=50025 DV=1 RV=1 GV=1 lstatus=0 gstatus=0 gcode=8306 numg=14
Thr (F11)  24.00 ( 24.00)  24.00 ( 24.00)    9.00 (  9.00)
DC compensation levels:  -0.10  -0.12

# C3-A1..15.00-18.00 # C4-A2..18.00-18.00

Run 1 33 0:28 SingleA +PB +Athr +Astg NONE 11:40:53
2:22

```

## Control keys

Table of keys:

Key	Modifier	Action
F1		Toggles help screen off/on
	Alt	Toggles debug screen on/off
	Shift	Toggles text mode help screen on/off
F2		<p>Cycle reward style to next available reward style</p> <p><b>Rwrd</b> Reward (signal above threshold)</p> <p><b>Down</b> Reward (signal below threshold)</p> <p><b>Cntr</b> Reward (signal close to threshold)</p> <p><b>Elev</b> Reward (signal above threshold, clamp to threshold)</p> <p><b>DevU</b> Reward (deviation above)</p> <p><b>DevD</b> Reward (deviation down)</p> <p><b>Band</b> Reward (signal between limits)</p> <p>Note that switching between up and down rewards alters the target percentages.</p>
	Shift	Cycle reward style to previous available reward style
	Ctrl	Toggle state-hold-required logic which inhibits rewards unless a state is maintained for the specified rate/time.
F3		Cycle feedback mode to next available mode
	Shift	Raise popup menu of available feedback modes
	Ctrl	Toggle game 'color' between Green, Blue
	Alt	Toggle lowpass filter on/off
F4		Cycle to next stage; turns off autostage logic
	Shift	*Turn autostaging back ON
	Ctrl	Set frequency values to ending values from last run.
F5		Begin/pause feedback
	Ctrl	Begin/pause feedback; turn autostaging OFF
F6		Save 16 second data sample for later printout
	Ctrl	*Change feedback data source: raw,playback,signal generator
	Alt	Signal generator setup
F7		Show integral value instead of signal value on display

Key	Modifier	Action
		(3 settings: just waveshape, just integral, both)
	Shift	Toggle fixed colors on/off
	Ctrl	Toggle impedance mode (if hardware-supported and in Pause)
	Alt	Toggle calibration mode (if hardware supported)
F8		Start/terminate editor
	Shift	Insert marker. User has (60 second) option of entering a line of text.
	Ctrl	*toggle saving debug data
	Alt	Toggle artifact inhibit control on/off
F9		Scale adjust. If no streams are selected (highlighted), performs autoscale of all non-lowpass streams. If a stream is selected, toggles between threshold and scale adjustment (using +/-).
	Shift	Autoscales currently selected stream (including raw streams!)
	Ctrl	* toggle game data activity control
	Alt	Toggle DC compensation on/off
F10		Decrease scale used to display FFT data and long term data
	Shift	Increase scale used to display FFT data and long term data
	Ctrl	Toggle FFT display on/off
	Alt	Toggle FFT highlight mode
F11		Autothreshold. If a stream is selected, choose appropriate threshold value for only that stream. If the stream is a lowpass stream, choose threshold based on 1% over threshold as target. If no streams are selected, choose appropriate threshold value for all non-lowpass streams. If the user-specified threshold percentage is zero, no autothreshold action is ever taken on that stream.
	Ctrl	Toggle automatic autothreshold at beginning of each reset period (or specified time frame) on/off.
	Alt	Reset history data (used for display, autogoal, averages)
F12		Cycle display shown. Current displays are : brainwave, long-term, spectral mirror, zscore, realtime summary
	Shift	Cycle display shown in reverse order
	Ctrl	Toggle drawing speed of brainwave screen between fast and

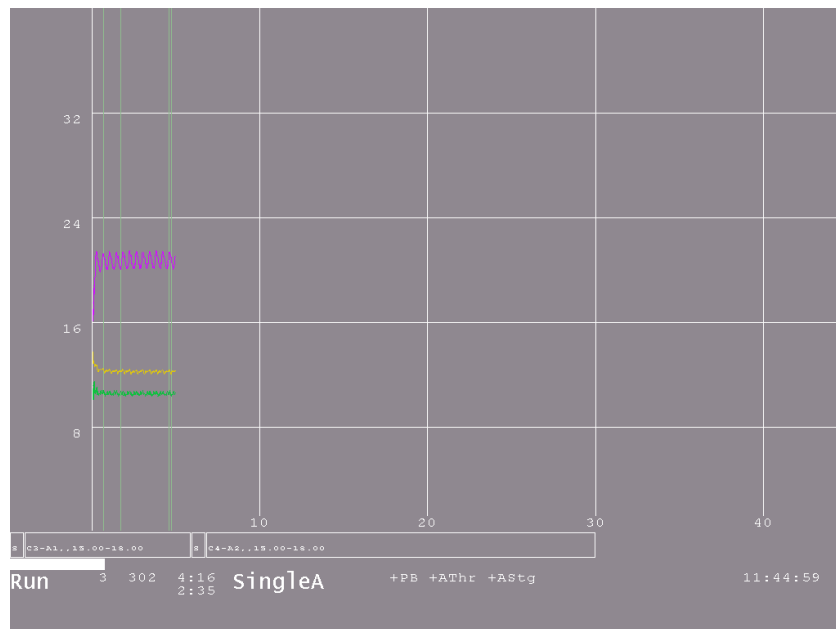
Key	Modifier	Action
		slow (normal).
	Alt	Toggle “hide unused traces” mode. Turns off DISPLAY of unused input/FFT traces to minimize screen confusion.
Up arrow		Just like Page Up
	Ctrl	Increase reward center frequency or inhibit upper edge of selected stream. If no trace is selected, adjust ALL reward streams at the same time.
Down arrow		Just like Page Down
	Ctrl	Decrease reward center frequency or inhibit upper edge of selected stream. If no trace is selected, adjust ALL reward streams at the same time.
Right arrow	Ctrl	Increase frequency of reward lower edge (decreasing width) or inhibit lower edge of selected trace.
Left arrow	Ctrl	Decrease frequency of reward lower edge (increasing width) or inhibit lower edge of selected trace.
Spacebar	(any)	Toggle between Therapist display and game display if NOT entering text for an F8 mark
Scroll Lock	(any)	Toggle between Therapist display and game display
Pause	(any)	PLAYBACK ONLY. Pause/resume playback
Esc	(any)	Exit popup screen if shown (goal/threshold, tactile, volume, help, debug). Otherwise, exit realtime processing and return to top menu
+ or =		Increase threshold/scale value on selected stream.
	Shift	Increase threshold/scale value on selected stream by ½ step
-		Decrease threshold/scale value on selected stream.
	Shift	Decrease threshold/scale value on selected stream by ½ step
Enter	(any)	End scale/threshold selection. If a scale value is currently highlighted, Enter just switches to threshold modification mode. If a threshold is highlighted, deselects trace.
Page Up	(any)	Cycle trace selection upwards
Page Down	(any)	Cycle trace selection downwards

Key	Modifier	Action
A	Alt	Start/terminate option to change the text for the site that the A channel is connected to. Automatically terminates (without change) after 60 seconds.
B		Popup/remove the Band Control popup (to adjust band reward mode range).
B	Alt	Start/terminate option to change the text for the site that the B channel is connected to. Automatically terminates (without change) after 60 seconds.
P		Popup/remove Peripheral Control menu
	Alt	*Capture a screen dump of the current screen
Delete	(any)	Delete highest priority message from display
% or G		Popup/remove target threshold setting menu
V		Popup/remove volume setting menu
T		Popup/remove tactile feedback controls
S		Popup/remove special game control menu (only for games that have game control menus)
D		Popup/remove Therapist Display Control menu
F		Popup/remove Game Feedback Display menu
E		Popup/remove Expert settings menu
	Alt	Change eyes open/closed status

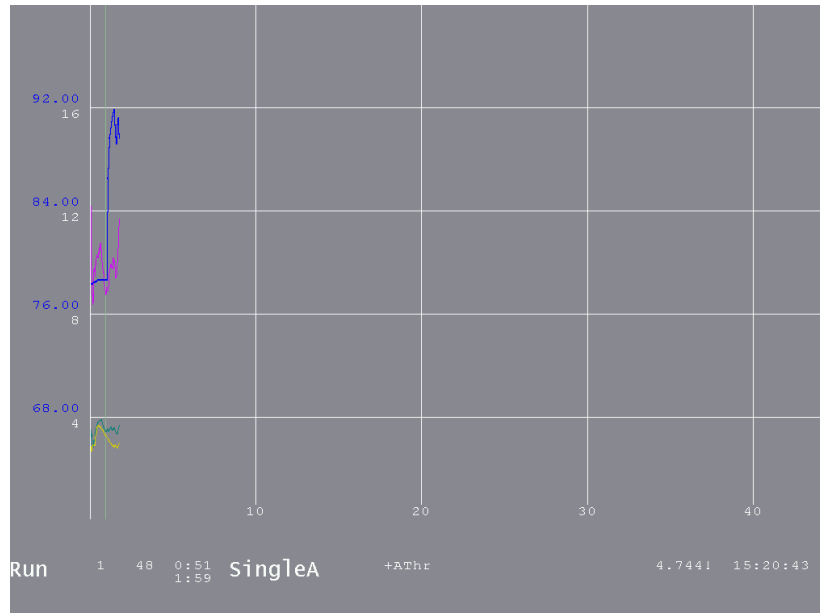
Items marked with an asterisk (\*) are provided as debug aids only.

### ***Long-term display***

The long-term display (selected with F12) shown below is a display of signal amplitudes drawn at a one-second interval during the session. The width of the display is taken from the (user-preference-specified) maximum session time. The vertical scale of the display is set using F10/Shift-F10 or the Therapist Display Control popup menu. The (faint) vertical green lines mark beginning/ending of periods.

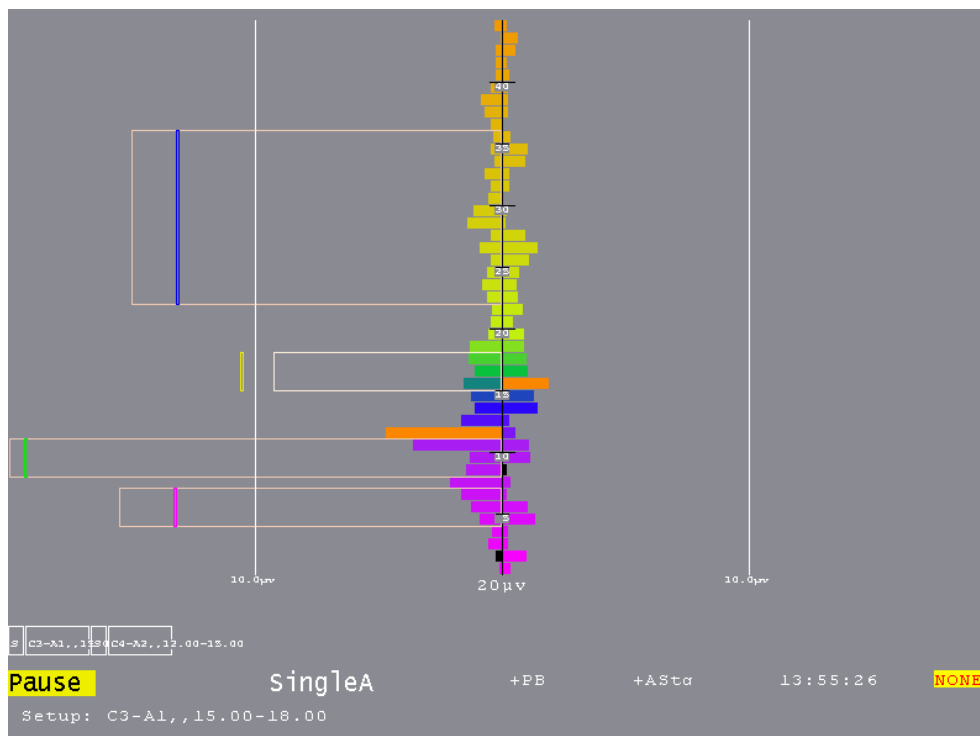


If peripheral data is displayed, it overlays the screen with its own scale.



### ***Spectral Mirror display***

The Spectral Mirror display shown below displays the same spectral data as the FFT bars but in a different format. The “D” Therapist Display Control popup allows control over the scale for this display. The A channel is on the left and B channel on the right when A&B is selected as the display mode. Otherwise, a single channel is mirrored on left and right.

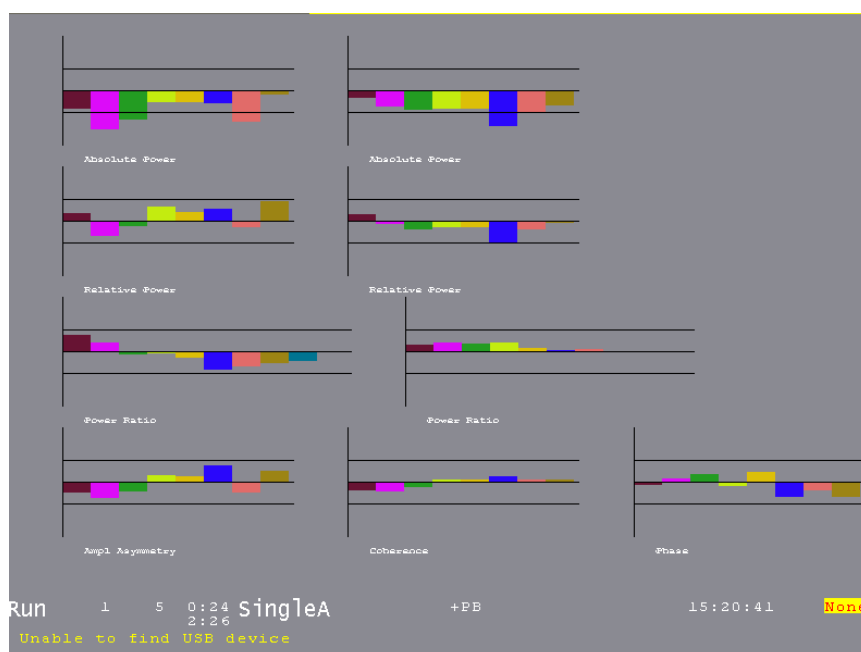




Notice that the filter bands are shown with a threshold value as the edge of the outline and the current average amplitude is shown as a vertical colored bar at the appropriate position. The orange bars are the dominant frequency markers.

## ZScore display

The ZScore display (available only if zscore is installed and working) shows the standard deviation values in real time for the various ANI outputs. Up values are positive deviations. The graph is limited to  $\pm 5$  standard deviations. The horizontal lines represent two standard deviations from the mean. The top three left graphs are the A channel values. The top three right graphs are the B channel values. The bottom three graphs are the two-channel values.



## Realtime Summary display

The realtime summary display shows significant values for the latest 16 periods.

Summary Display				
Period#	1	2		
Score	16	35		
Seconds	31	61		
Overall%	17	10		
A	Avg	32.6	28.9	
	%ovr	2	0	
	SD	6.7	4.4	
	Low	0.000	0.000	
	Hi	50.000	50.000	
B	Avg	30.3	28.9	
	%ovr	0	0	
	SD	7.3	4.8	
	Low	0.000	0.000	
	Hi	50.000	50.000	
2	Avg	12.2	11.7	
	%ovr	28	9	
	SD	3.3	2.7	
	Low	4.000	4.000	
	Hi	7.000	7.000	
3	Avg	18.1	17.5	
	%ovr	29	5	
	SD	2.1	3.5	
	Low	8.000	8.000	
	Hi	11.000	11.000	
Run	2	51	1:32	singleA
			1:49	+PB
				15:23:27
				None
				Unable to find USB device

During a period, the (latest) current values are shown/updated. The end-of-period values are the same as those shown on the review data screens.

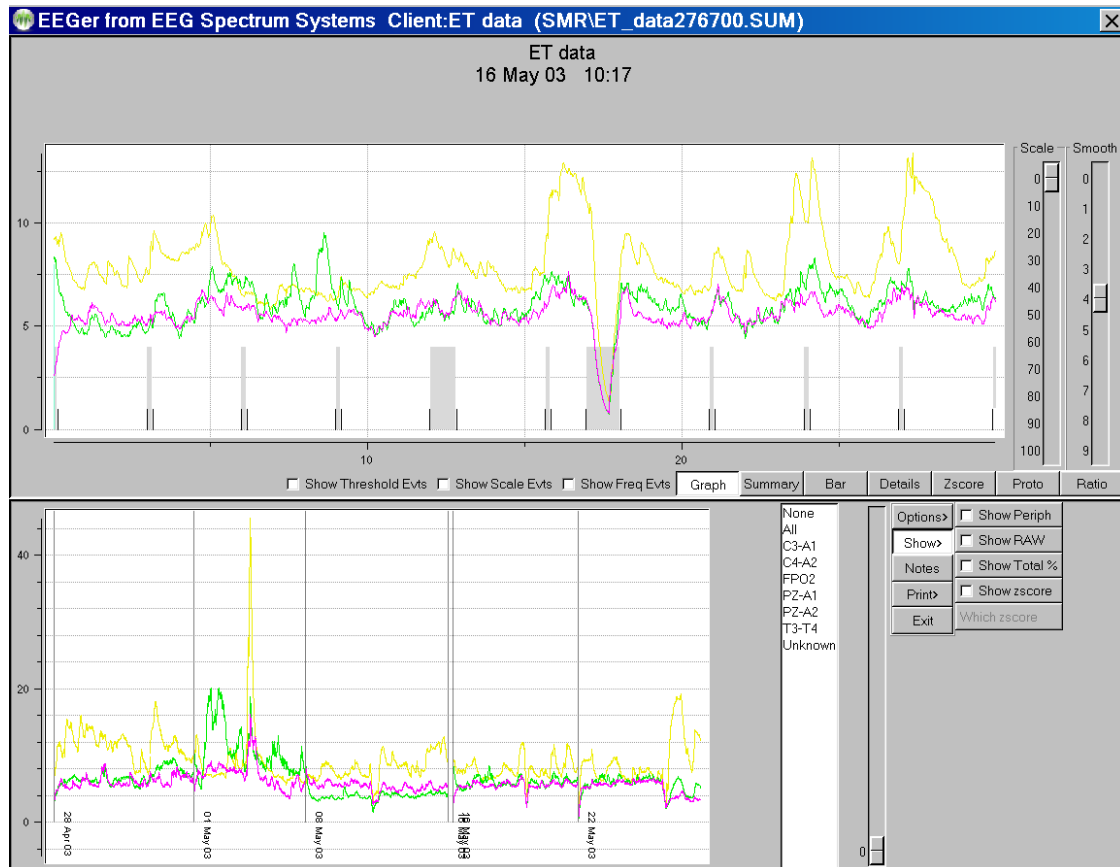
Of course, there will be more data than can be shown on one screen. PageUp/PageDown control display of additional trace data.

Summary Display			
Period#	1	2	
Score	16	35	
Seconds	31	61	
Overall%	17	10	
4	Avg	10.5	8.4
	%ovr	43	33
	SD	9.5	8.6
	Low	15.000	15.000
	Hi	18.000	18.000
5	Avg	11.8	9.4
	%ovr	13	23
	SD	7.2	6.3
	Low	22.000	22.000
	Hi	36.000	36.000
Run	2	51	1:32
			1:49
SingleA		+PB	15:23:41
Unable to find USB device			None

The **Esc** key closes any popup screens and continues processing. If no popups, it terminates realtime processing (**without warning**) and returns to the top menu.

## • **Review**

The **Review** button brings up the session review screens for post-session analysis. A typical screen is shown. The top portion has a number of different display formats (graph, summary, bar, and details). Shown is the **Graph** format with a single session's data shown in graphical format.



To the right of the graph are two sliders for controlling the scale and smoothing of the graphical data. Just below the graph are some checkboxes and buttons controlling the display at the top of this screen.

The graph shows each stream plotted as amplitude versus time (in minutes). The colors are the frequency-specific colors used throughout EEGer unless changed by a user option (discussed below). The short vertical black lines mark the beginning/ending of periods. Non-feedback times (paused or resting) are shown by the gray shading between period lines. Short red lines mark the time-location of significant events such as frequency changes, user F8 marks, etc. Threshold change events and scale change events can optionally be shown if the respective checkboxes are checked. These checkboxes also control whether threshold/scale changes appear in the details data.

The top scale slider allows selection of a voltage scale for the session graph (or 0 for autoscaling). The smoothing slider allows control of data smoothing for graphical display. The value 4 represents 16-second smoothing and the value 5 represents 32-second smoothing. The value 0 is no smoothing.

The bottom graph is a trend graph of sessions. The colors of the lines are the frequency-specific colors used throughout EEGer. To the right of the trend graph is a list of all the sites used in the displayed sessions. To the right of the list is a scale slider allowing selection of a voltage scale for the trend graph (or 0 for autoscaling). At the right edge are some buttons and checkboxes allowing various options.

The **options** available are shown here:

Options>	<input type="checkbox"/> Recompute avg
Show>	<input checked="" type="checkbox"/> Fixed colors
Notes	<input type="checkbox"/> Tabular
Print>	<input type="checkbox"/> Trend Graph
Exit	<input type="checkbox"/> Last 25
	<input type="checkbox"/> Show raw summary data
	<input type="checkbox"/> Show interperiod data
	Date order

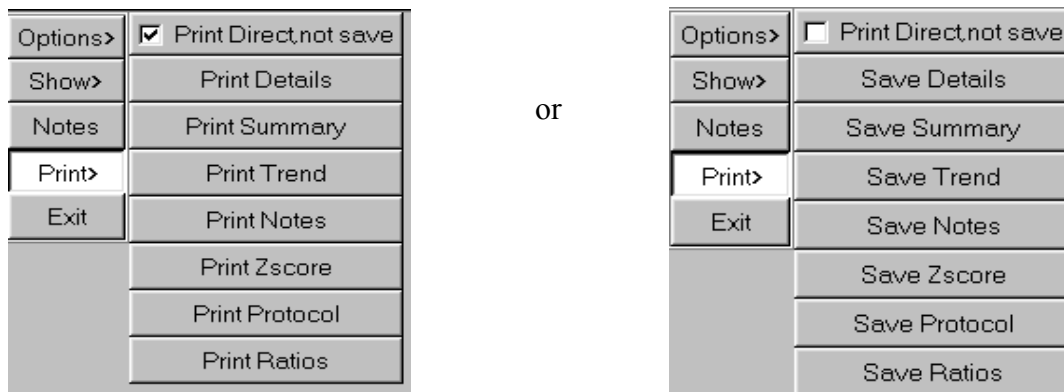
The **Show** choices available are:

Options>	<input type="checkbox"/> Show Periph
Show>	<input type="checkbox"/> Show RAW
Notes	<input checked="" type="checkbox"/> Show Total %
Print>	<input checked="" type="checkbox"/> Show zscore
Exit	Which zscore

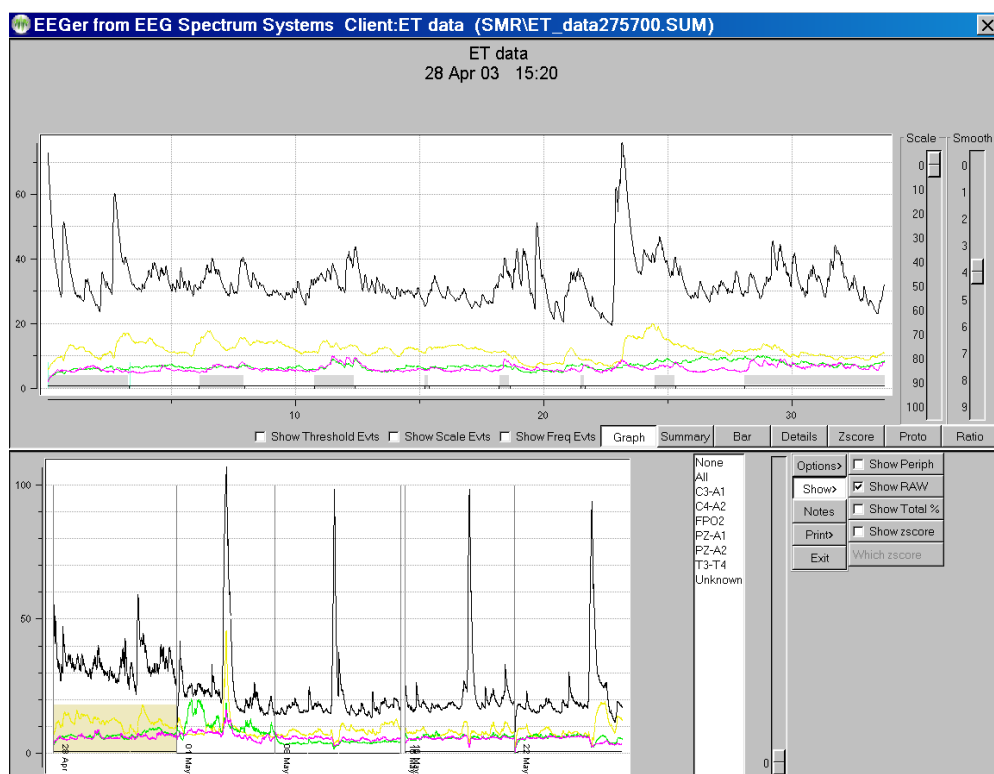
If there is zscore data embedded in the data file, the additional button choices for display after clicking on **Which zscore** are:

Options>	<input type="radio"/> Amp Asymm	<input type="radio"/> A Pwr A	<input type="radio"/> A Pwr B
Show>	<input checked="" type="radio"/> Coher	<input type="radio"/> R Pwr A	<input type="radio"/> R Pwr B
Notes	<input type="radio"/> Abs Ph	<input type="radio"/> P Rat A	<input type="radio"/> P Rat B
Print>	<input checked="" type="radio"/> 0(1-4)	<input type="radio"/> 3(12.5-25.5)	<input type="radio"/> 6(15-18)
Exit	<input type="radio"/> 1(4-8)	<input type="radio"/> 4(25.5-30.5)	<input type="radio"/> 7(18-25.5)
	<input type="radio"/> 2(8-12.5)	<input type="radio"/> 5(12-15.5)	<input type="radio"/> 8
	<input type="radio"/> 9	<input checked="" type="radio"/> Measure	<input type="radio"/> All

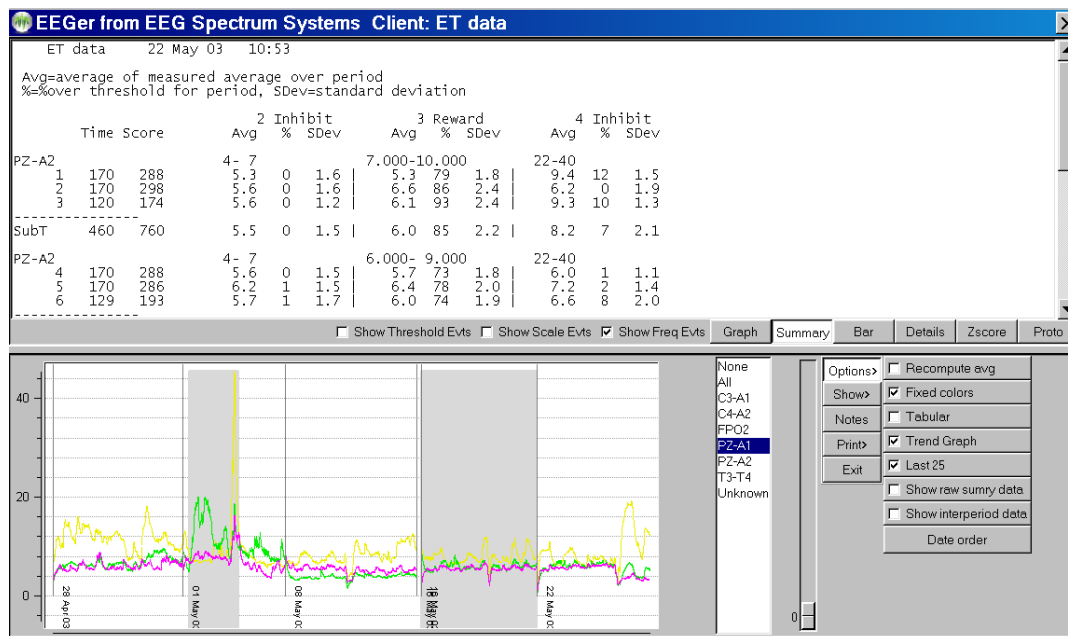
The **Notes** button brings up the embedded editor with notes for the current client. **F8** can also be used to start/end the editor function. The **Print** button options will be either



By default, the raw data streams are not shown. Clicking on the **Show Raw** checkbox toggles display of the raw data streams. On the top graph, raw data is shown with a black color. On the bottom graph, raw data is shown with a color representing the lowpass filter width.



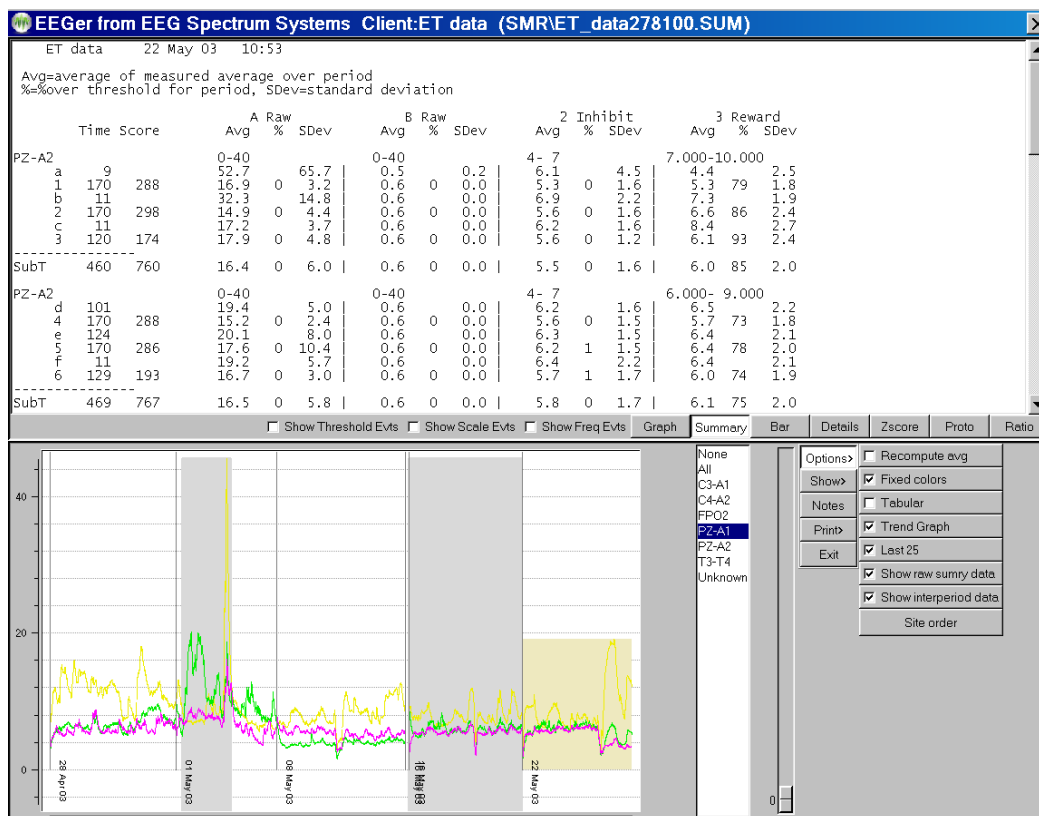
In some cases, it is hard to see/print the colors or to determine which stream is which if the frequencies (colors) are similar. The **Fixed colors** checkbox toggles between frequency-specific colors and a fixed set of colors that is independent of frequency.



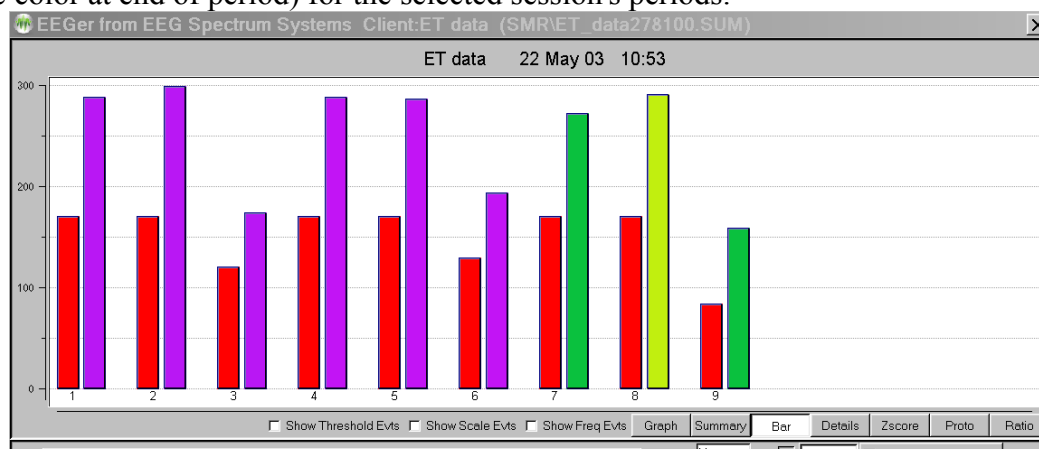
The above screen shows the summary data (text) for the currently-selected session. Clicking on one of the sites listed in the site list produces a gray shading (in the trend graph) for the periods where the selected site was used (shown in the next screen).

The average values shown above are the average values at the end of the period. Checking the “Recompute avg” checkbox produces the same display except that the average values are recomputed to be the average value across the entire period rather than just the ending values.

Above is the same screen with the raw data option checked (to show channels A and B) and with the interperiod data shown. The interperiod data is the average value and standard deviation of the time BETWEEN feedback periods.



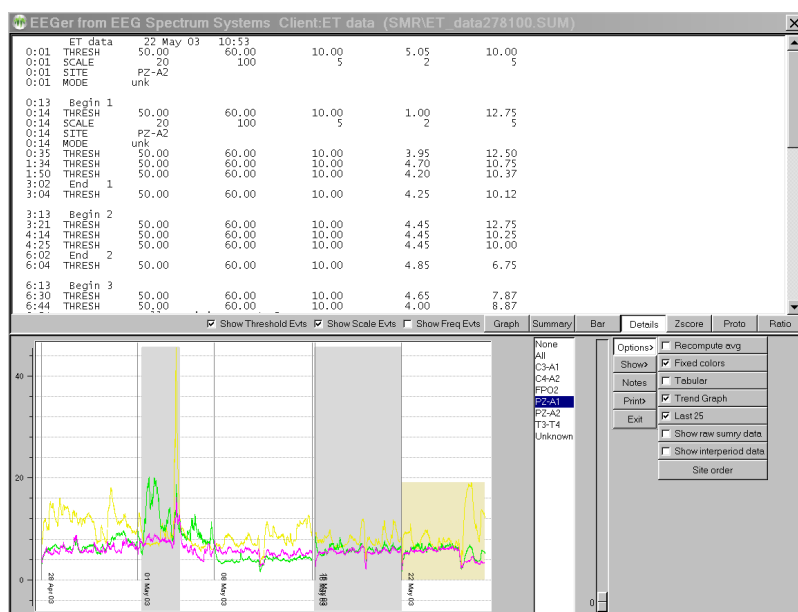
The **Bar** screen shows a barchart representation of the time (red bars) and scores (frequency specific color at end of period) for the selected session's periods.



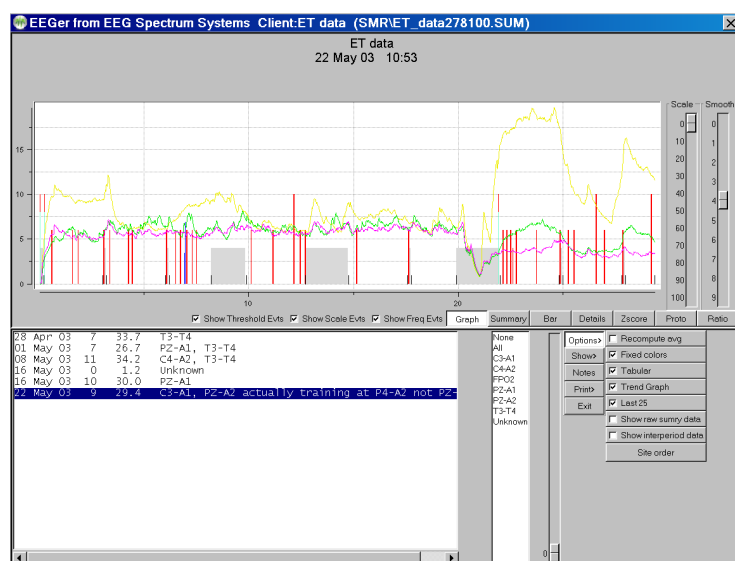
The following image shows the **Details** screen. This is a chronological list of significant events during the selected session.



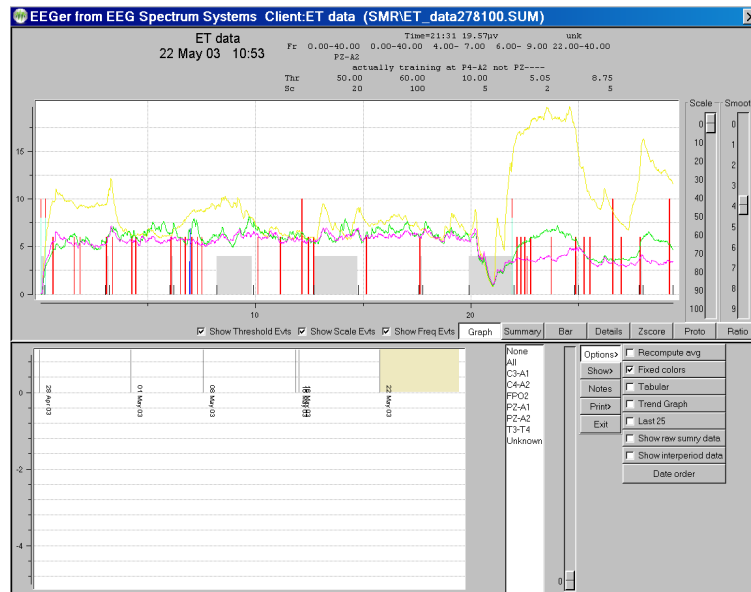
Note that the threshold and scale checkboxes were selected so that threshold and scale adjustments were reported. The time of the threshold/scale adjustment is the time at the beginning of the adjustment and the value at the end of the adjustment (10 seconds without change).



If there are many sessions, the **Tabular** checkbox allows display of all the sessions for the current client. Double-clicking on a line causes that session to be displayed in the top area.



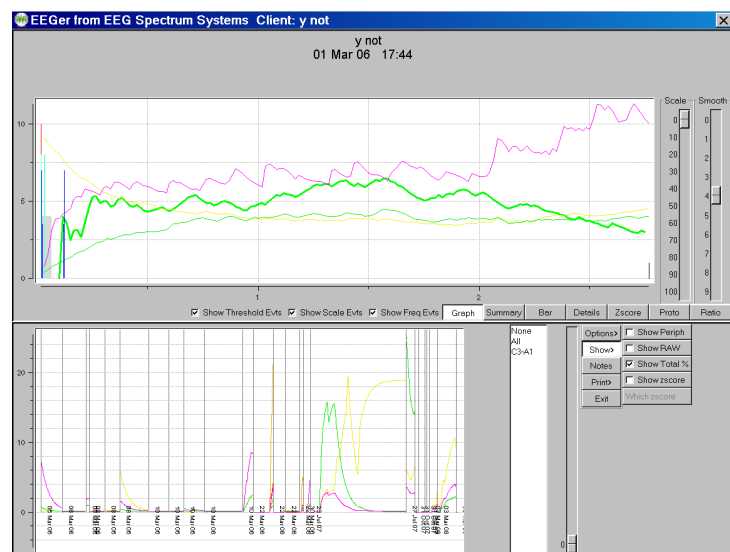
The **Trend** checkbutton controls whether or not the trend graph is shown on the bottom graph.



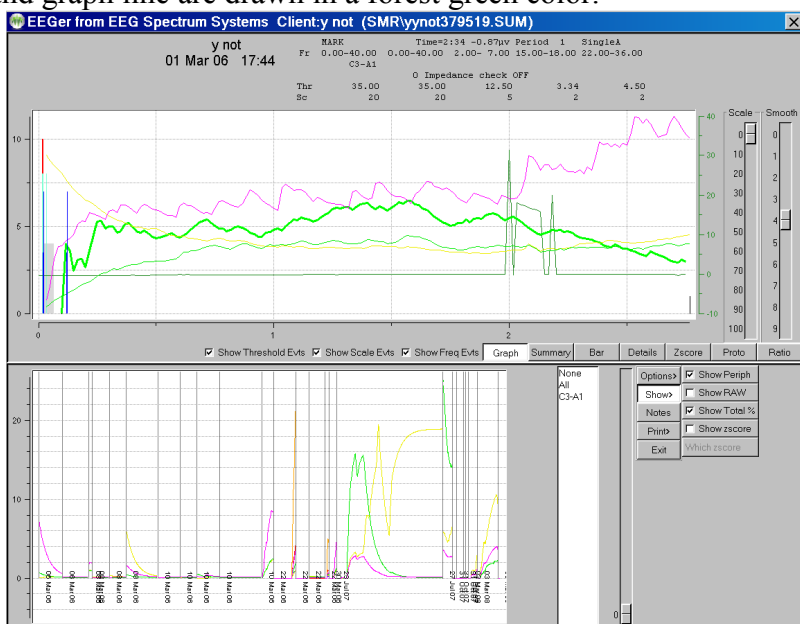
Whenever the mouse cursor is moved over the top graph area, the text display at the top represents the state at that (horizontal) time.



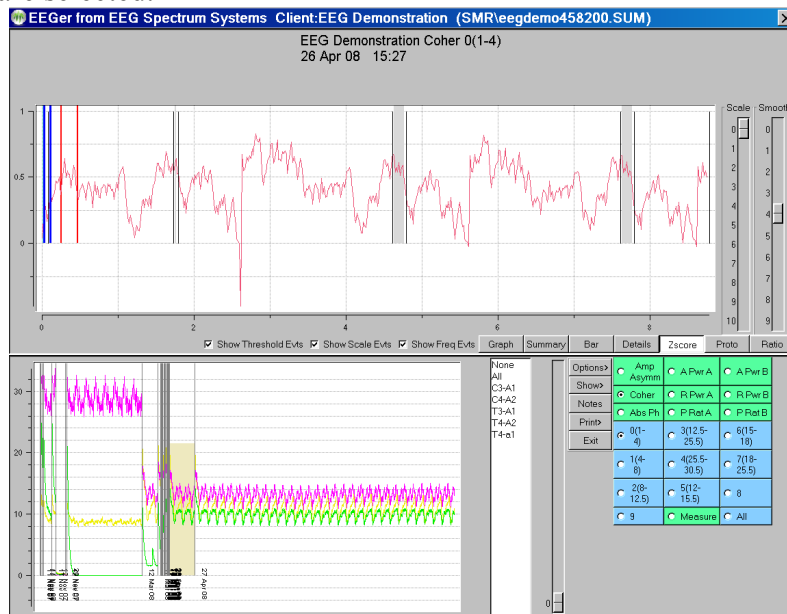
If the **TOTAL %** checkbox is selected, the total reward percentage will be shown on the graph as a bold green line.



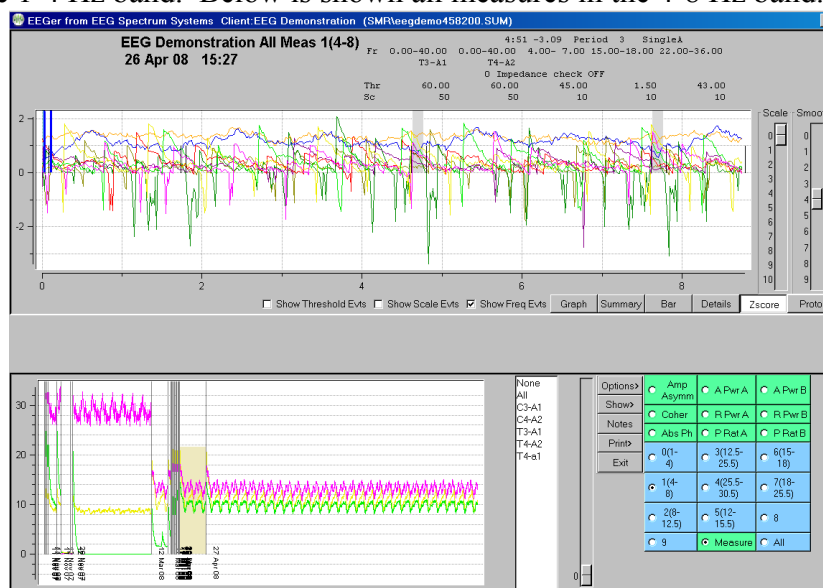
If peripheral data exists in the summary file, the **Show Periph** button controls the display of the data. The scale and graph line are drawn in a forest green color.



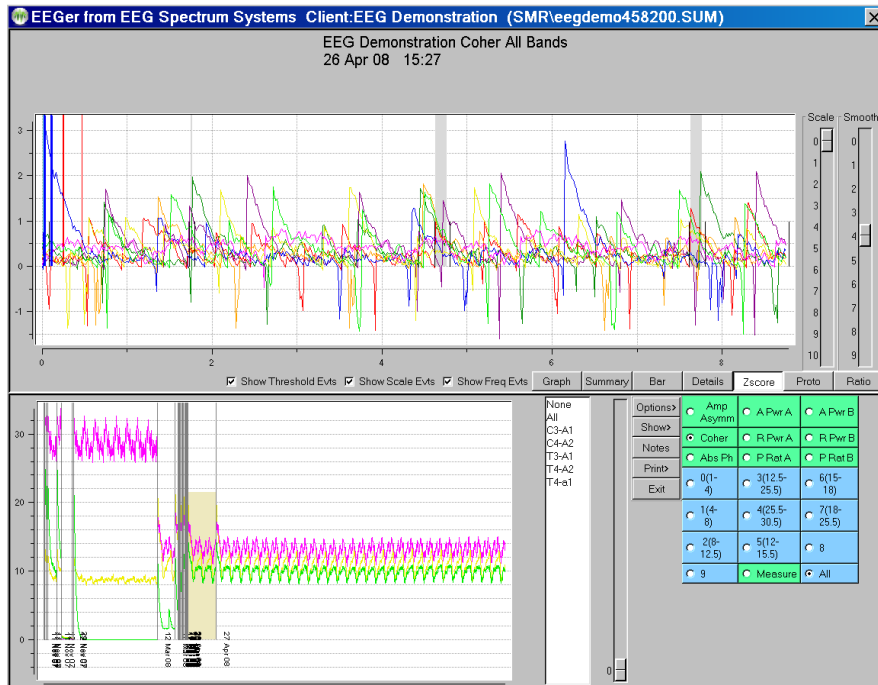
The **zscore** screen shows one or more measures as selected by the “which zscore” buttons. The green buttons determine which zscore measures are selected. The blue buttons determine which frequency bands are selected.



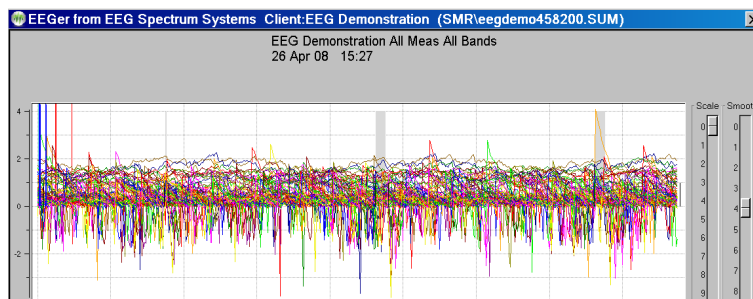
The displayed measure is always shown in the title of the graph. Above is shown zscore coherence in the 1-4 Hz band. Below is shown all measures in the 4-8 Hz band.



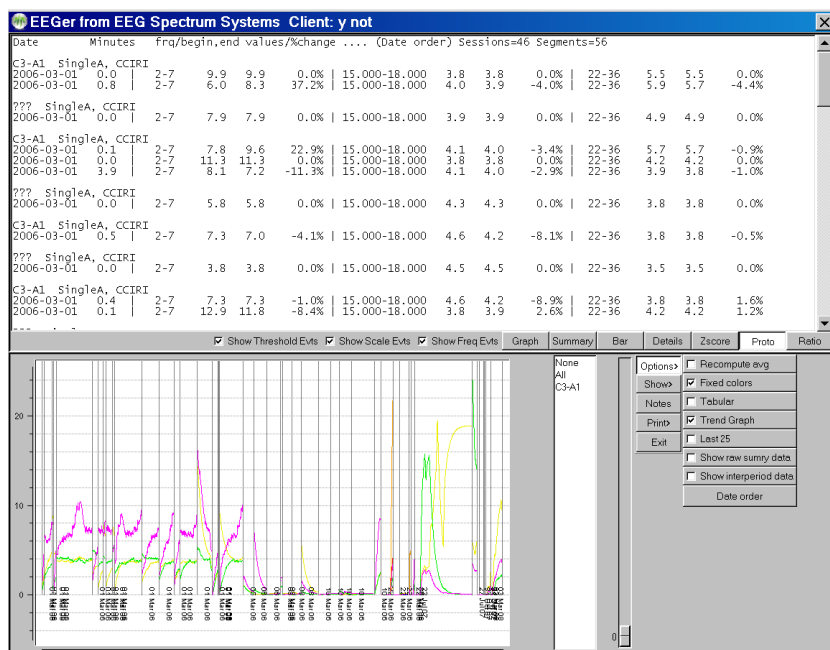
Below is a single zscore measure (coherence) for all bands.



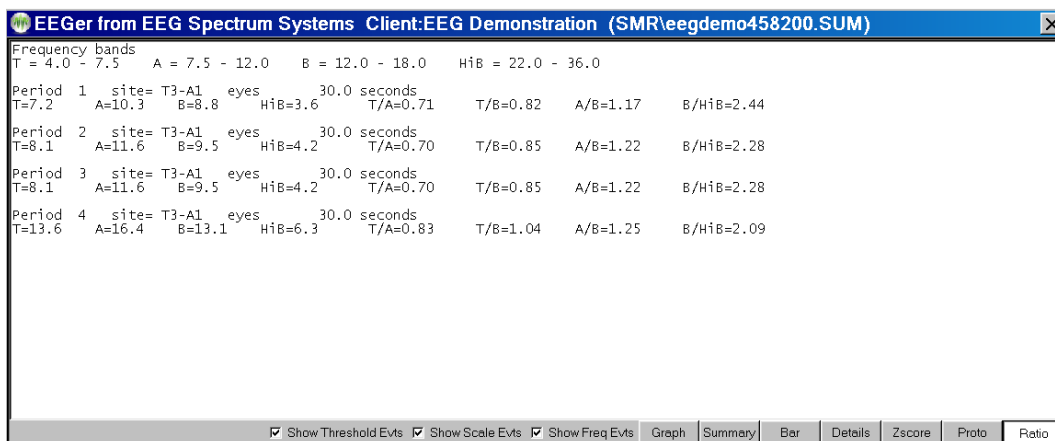
For completeness, you can also show all measures for all bands. It is pretty to look at but not of much use.



The **Proto** screen shows the (textual) values of the selected sessions (all or last 25) for the current client. This data is sorted by session date (Date order), frequency settings (Freq order), or reward frequency (Reward Freq order) as selected by the Option selection. Each group is comprised of like layouts, sites, feedback modes, and eyes open/closed status. Each line has the date of the session, the length (in minutes), and the frequency range/ending value/percent change for each band. The percent value will be 0 or 100 if the beginning value was zero (based on the ending value...).



The **Ratio** screen computes (ONLY if the raw file exists for the current summary file) the amplitudes and selected ratios of the amplitudes. The values are computed based on the last 30 seconds of data in each period.



The **Save Summary** Print button causes two files to be created with the graph display in one and the summary data in the second for later printing (using the **Print** menu option). If the button says **Print Summary**, the two printouts will be directed immediately to the default Windows printer as two pages. If the option for a single page is select in the Preferences configuration menu, both printouts will be combined into a single file/printout page. Selection of the button actions is made in the **Configuration->Preferences** tab

The **Save Details** Print button causes a file to be created with the currently-selected options (threshold, scale actions) for later printing. If the button says **Print Details**, the printout will be directed immediately to the default Windows printer.

The **Save Trend** Print button causes a file to be created with the trend graph display. If the button says **Print Trend**, the trend graph will be directed immediately to the default Windows printer.

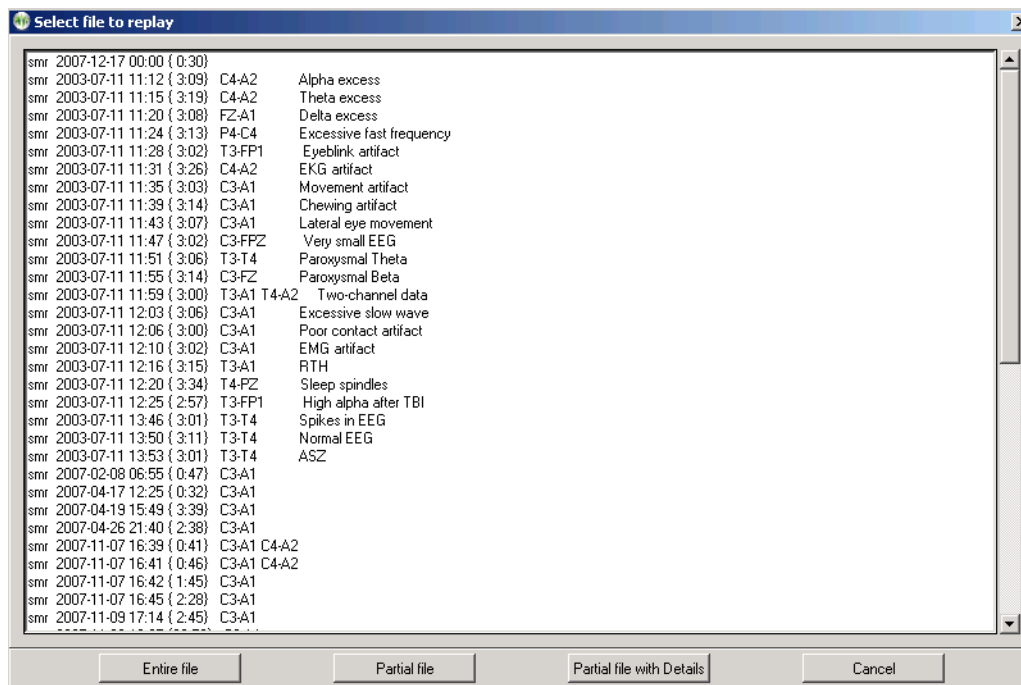
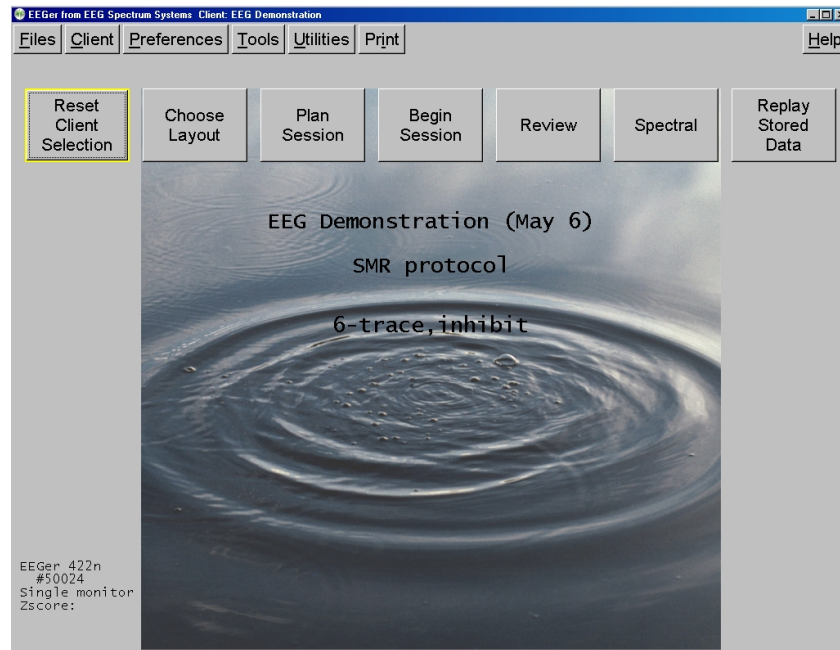
The **Save Protocol** print button causes a file to be created with the protocol summary data (as currently ordered). If the button says **Print Protocol**, the printout will be directed immediately to the default Windows printer. Please note that the line wrapping can make the output hard to interpret. It may be better to use the **Save Protocol** mode and view the print file stored in the Print folder in some external program.

The **Save Ratio** print button causes the re-filtered gand amplitudes and ratios to be saved. If the button says **Print Ratio**, the data is directly printed.

The **Exit** button returns to the top menu.

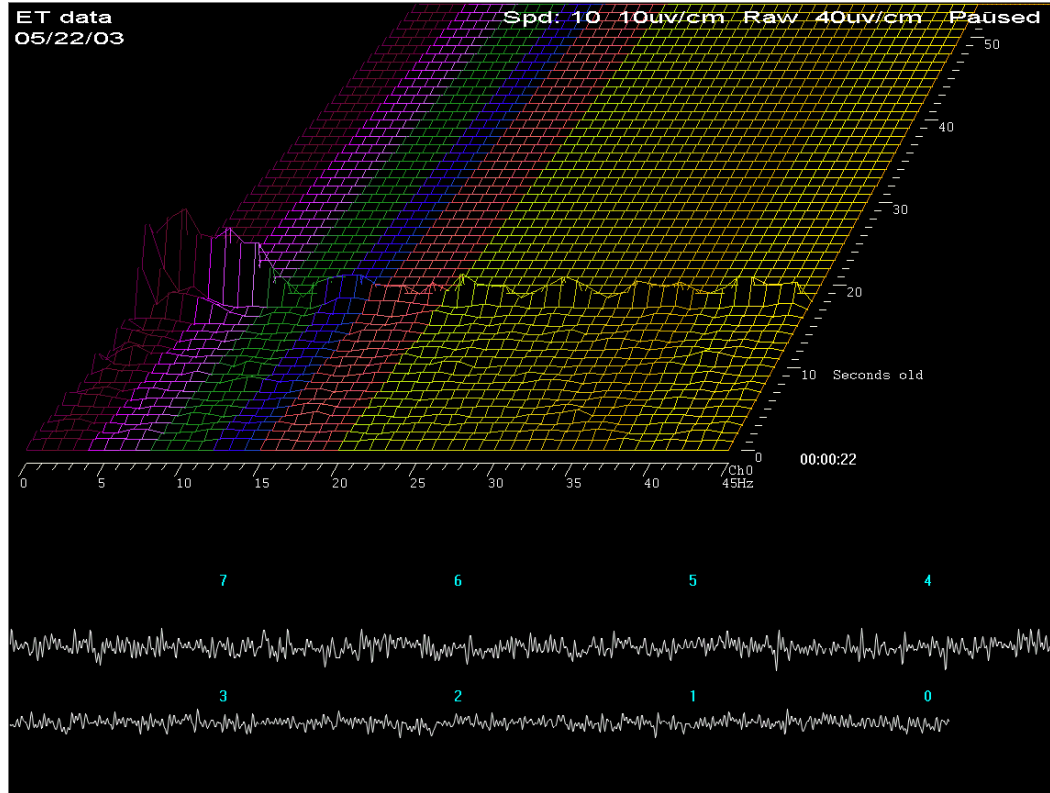
## • **Spectral**

Clicking on the **Spectral** button brings up a raw file selection screen.



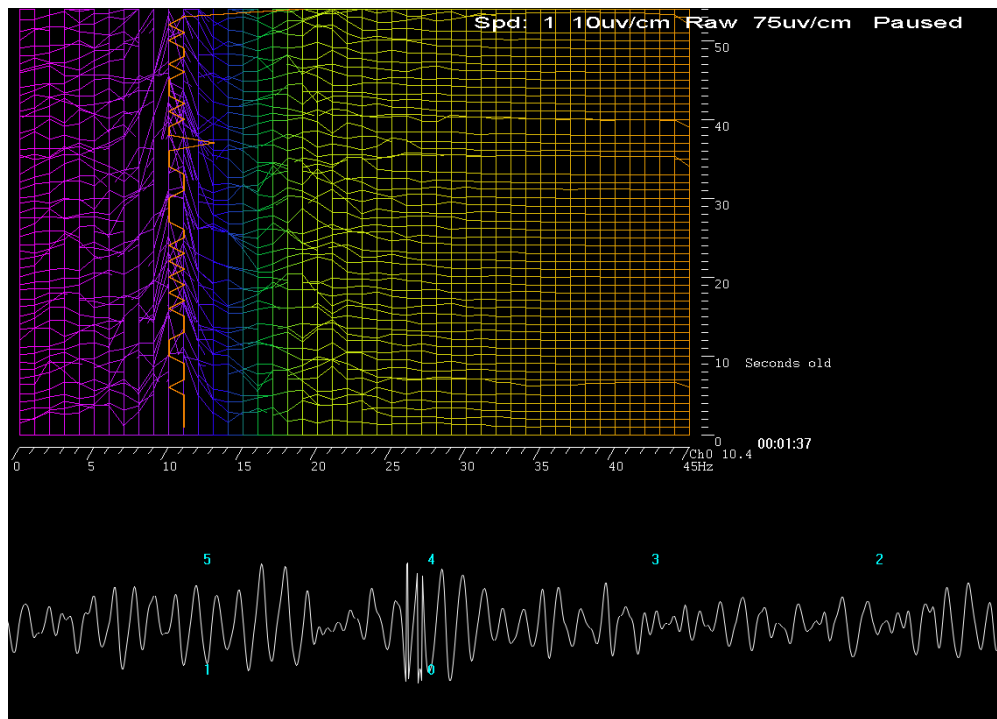


Once the file is selected, the graphical display of the data is begun. A typical screen looks like this:

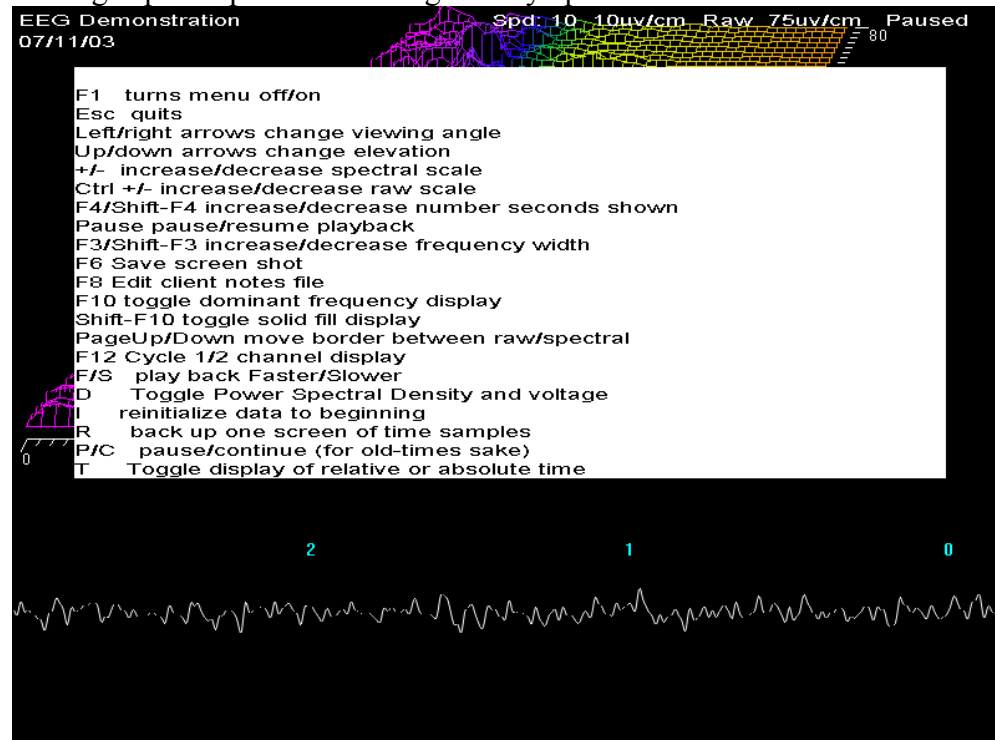


The top part of the screen shows spectral (FFT) data as a three-dimensional plot of frequency (horizontal), time (perspective), and amplitude (vertical). The coloration of the frequency bands uses the customizable color scheme used throughout EEGer. The bottom part of the screen shows the raw signal corresponding to the spectral data. The legends on the raw data show how many seconds “old” the raw data is. The “newest” raw data corresponds to the front-most spectral display row.

This is the screen with the time axis shown vertically (by moving the viewing angle left) and the dominant frequency marker turned on. Notice the 10-second average dominant frequency value shown to the immediate right of the channel assignment value.

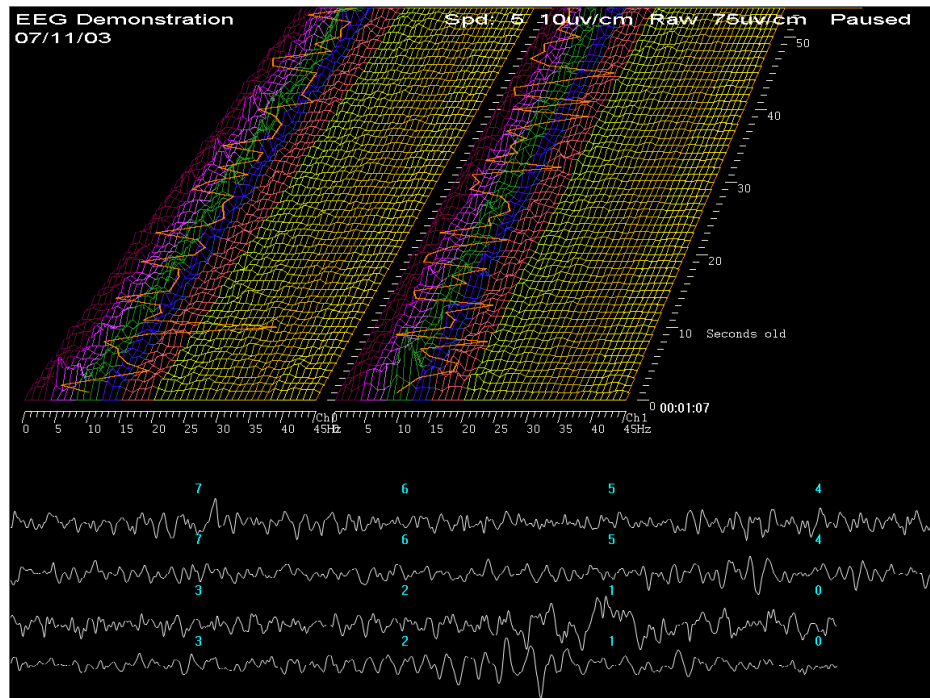


Pressing F1 brings up a help menu showing the key options available.



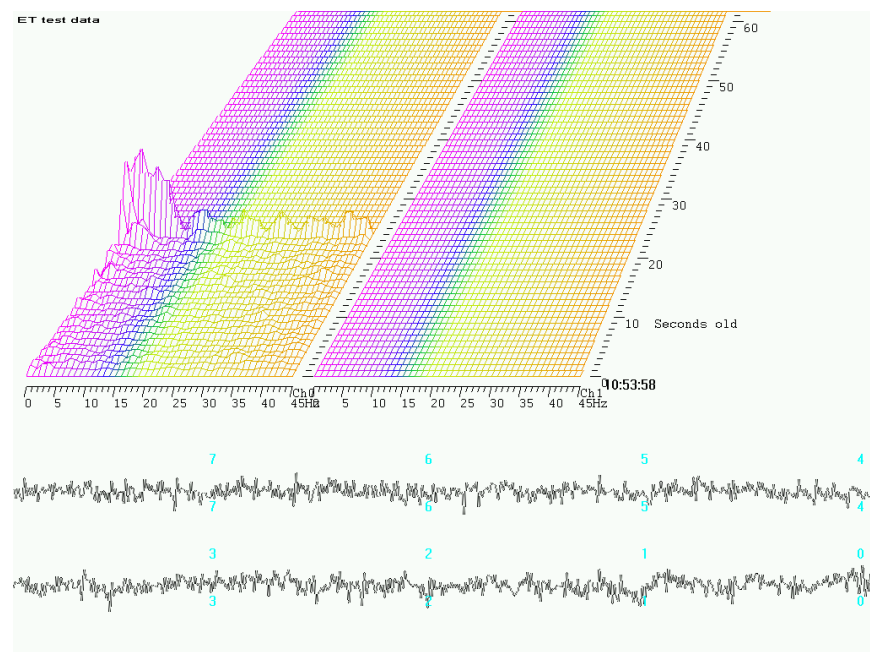
F1	toggles the help screen off/on.
Esc	terminates the spectral replay and returns to the top menu.
left/right arrows	change the viewing angle by moving the apparent vanishing point left/right.
up/down arrows	change the apparent elevation angle by moving the apparent vanishing point up/down.
+/-	change the relative spectral scale.
Ctrl +/-	change the relative raw data scale.
F4/Shift-F4	increases/decreases the “number of seconds” of data shown (apparent depth of display).
Pause	pauses/resumes playback of data.
F3/Shift-F3	increases/decreases the displayed number of frequency bins. The computation always uses a 1 Hz bandwidth but the clinician may only be interested in the lower 10 Hz.
F6	saves a screen for later printing. Black and white are reversed in the print file.
F8	Raise/lower the editor screen
F10	Toggles display of dominant frequency line (which uses color 49 of the current color set).
Shift-F10	Toggles display of solid fill for colors
Page-Up/ Page-Down	moves the border between the raw and spectral data.
F12	changes the display between two-channel/channel A only/channel B only modes.
F/S	make the playback be faster/slower than real time.
I	pauses playback and rewinds the data point back to the beginning.
R	pauses playback and backs up one “number of seconds” worth of data.
P	pauses playback.
C	continues playback from a pause.
D	Toggles between voltage amplitude on spectral display and Power Spectral Density display (voltage squared). PSD tends to show changes more dramatically.
T	Toggle time display between time-of-day and relative time in session.

This is what a two-channel screen display looks like (after pressing F12 several times).

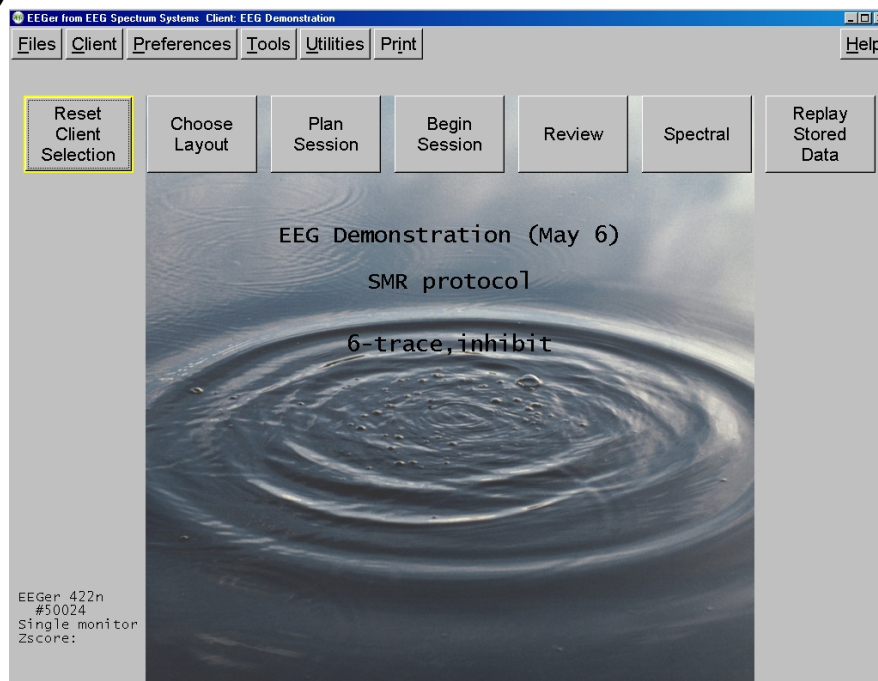


Note that the dominant frequency display marker is turned on (using F10).

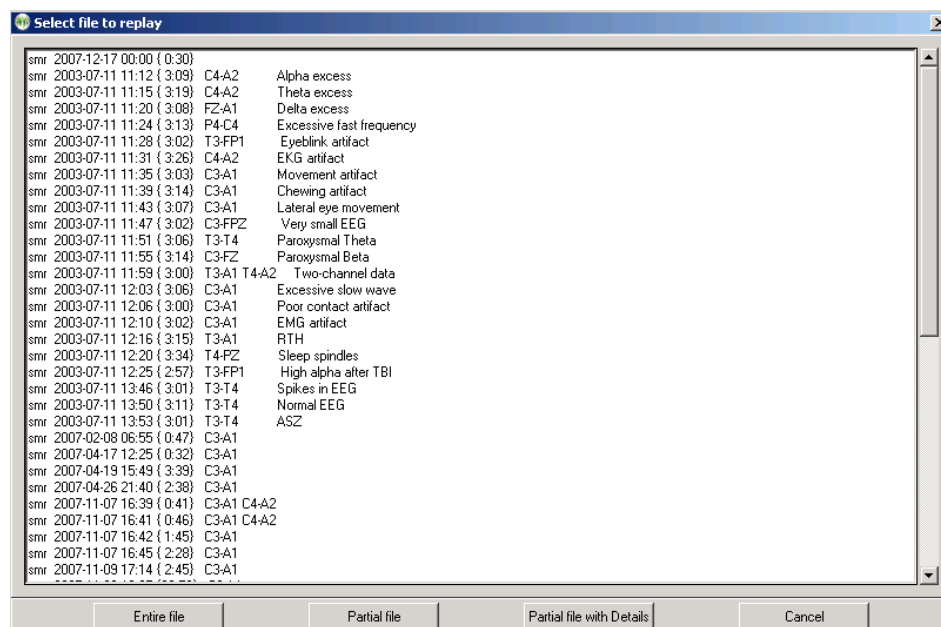
Pressing F6 causes a printout to be saved with black and white reversed (to save printer ink).



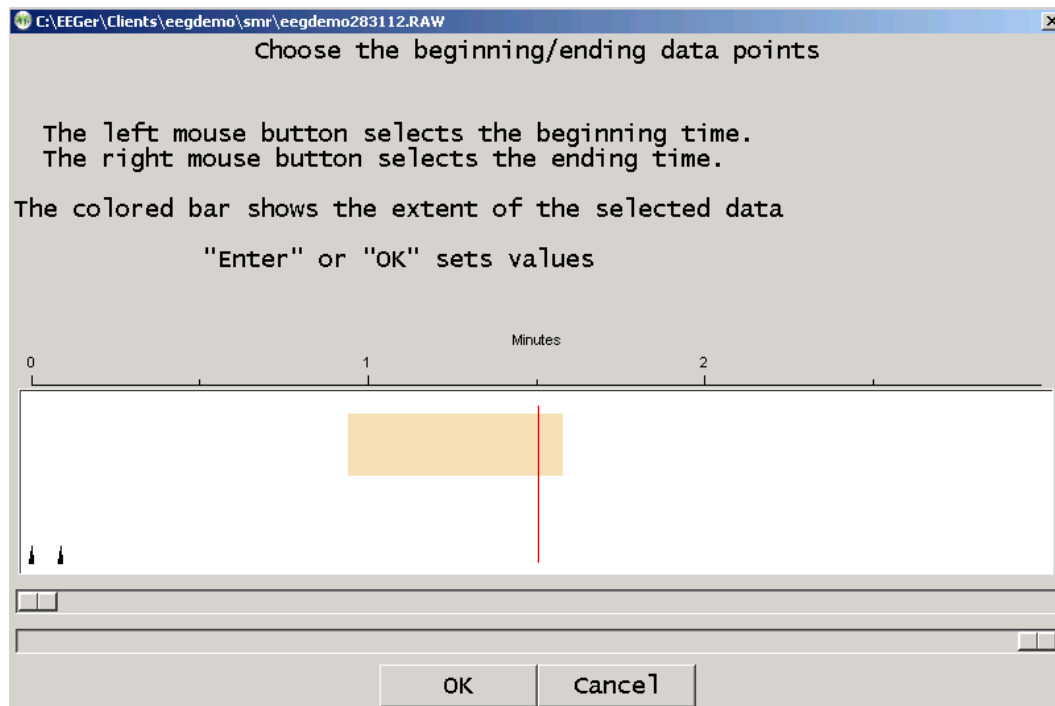
## • **Replay Stored Data**



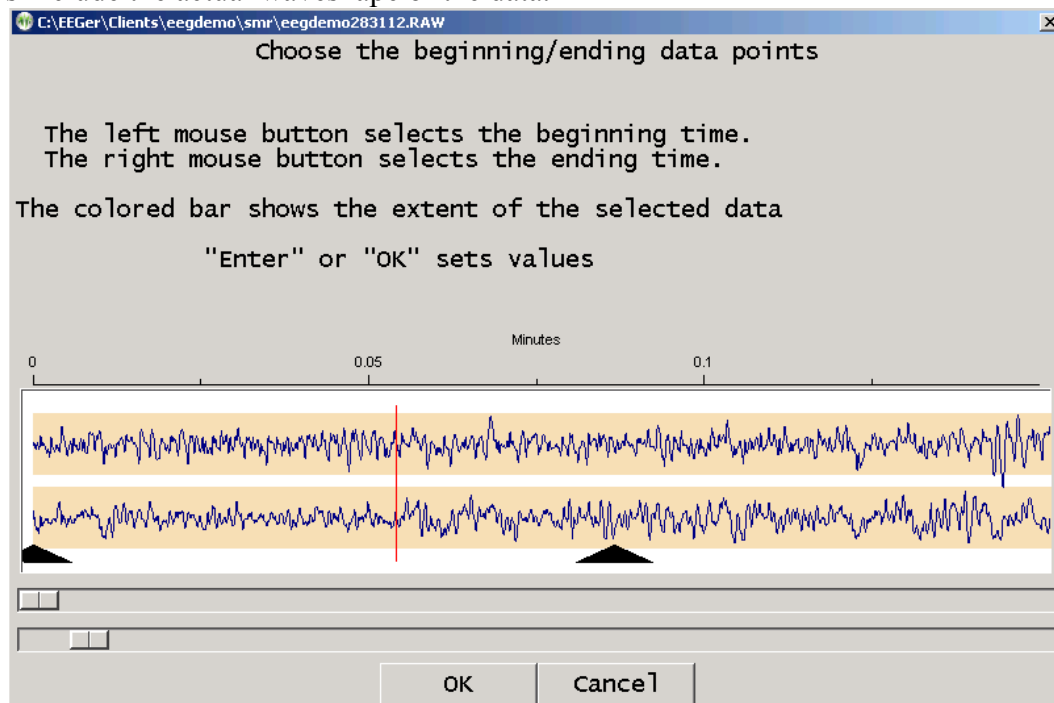
Clicking on the **Replay Stored Data** button brings up a list of raw data files to choose to replay.



Clicking on **Partial file** or **Partial file with Details** brings up a selection option which allows just a portion of the file to be used.

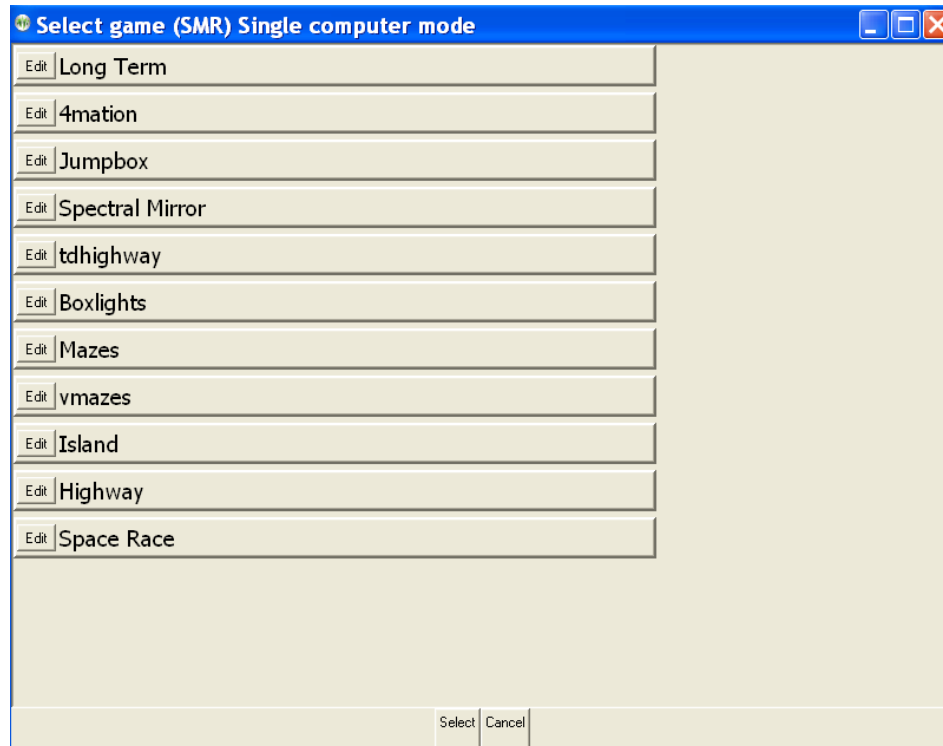


If you select the **Partial file with Details** option, be prepared to wait for some time since the details include the actual waveshape of the data.



The top slider controls the origin of the left edge of the graph. The bottom slider controls the “time” width of the displayed data.

After selecting the replay file, a game must be chosen.



At this point, the feedback screens come up. During replay, new summary and data files are NOT stored, nor can Shift-F8 be used for annotation (since no new files are being saved). The F8 editor option **DOES** work so you can add notes or comments while observing the replay of a past session.

## **Client software**

### **EEGer Game Set**

The EEGer Game Set (EGS) comprises a set of Client-computer feedback and display programs which support the Therapist software. The same games can be used on single-computer systems.

The feedback programs are comprised of ten displays:

1. Boxlights
2. Highway
3. Island
4. Fixed-dot mazes
5. Variable-dot mazes
6. Jumpbox
7. Theta-down highway
8. 4mation
9. Spectral Mirror
10. Long-Term Display

The support programs are comprised of several displays:

1. Alpha-Theta display/sound generation
2. Main menu

A special directory exists on the computer (C:\EEGer\PRINT) which receives screen image files if requested by pressing the appropriate key (Alt-P) on the Client computer. The (color .BMP file) contents of this directory can be printed using any applicable Windows print program when biofeedback programs are not running.

In addition to any key combinations listed below, all the feedback programs respond to the following keys:

**Esc** exits the program

**ALT-P** saves a copy of the current screen to the PRINT directory. If the score screen is displayed (see below), it is saved with a white background for more efficient printing.

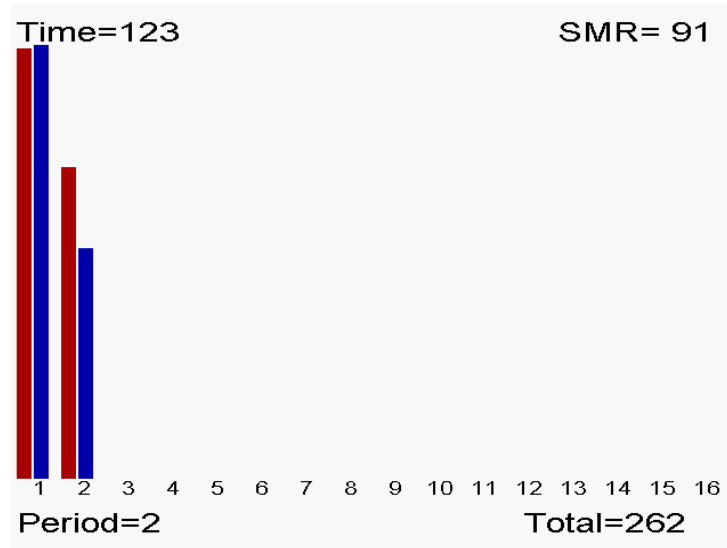
### **Score Screen**

#### **Score Screen**

Most of the Beta/SMR games are divided into **training** periods generally three minutes long. After 170 seconds (except for Mazes), biofeedback pauses and a bar chart is shown on the client station screen, showing the client's performance for each past period. The client is allowed 10 seconds to wiggle, scratch, rest, and assess his performance in the session so far. These times are tailorable for each game.



At the end of each period a scoring screen comes up in the form of a bar graph as pictured here. A red bar is displayed for elapsed time and a blue (SMR) or green (Beta) bar is displayed for the points scored.



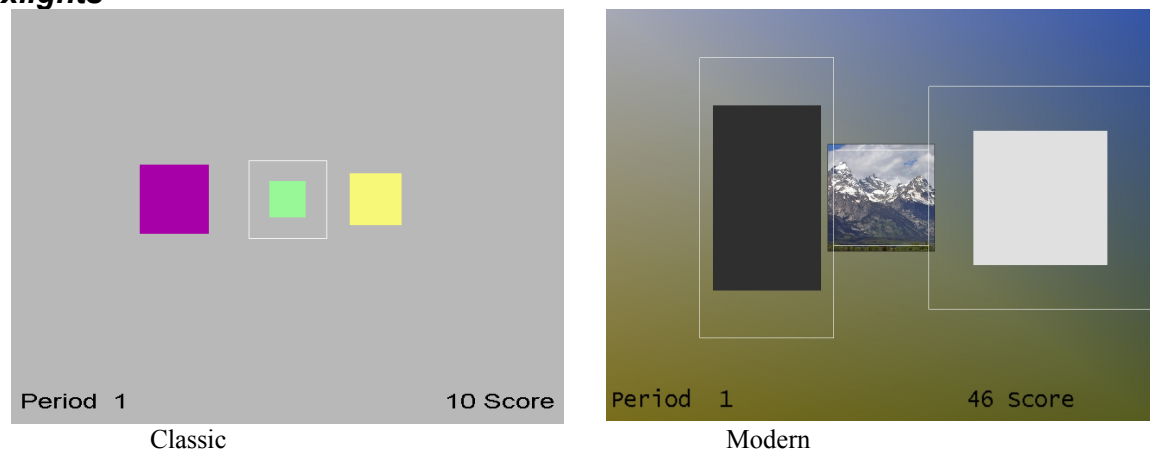
### ***Beta/SMR Protocol Displays***

In addition to any key combinations listed below, all the feedback programs respond to the following keys:

**Esc** exits the program

**ALT-P** saves a copy of the current screen to the PRINT directory. If the score screen is displayed (see below), it is saved with a white background for more efficient printing.

## Boxlights



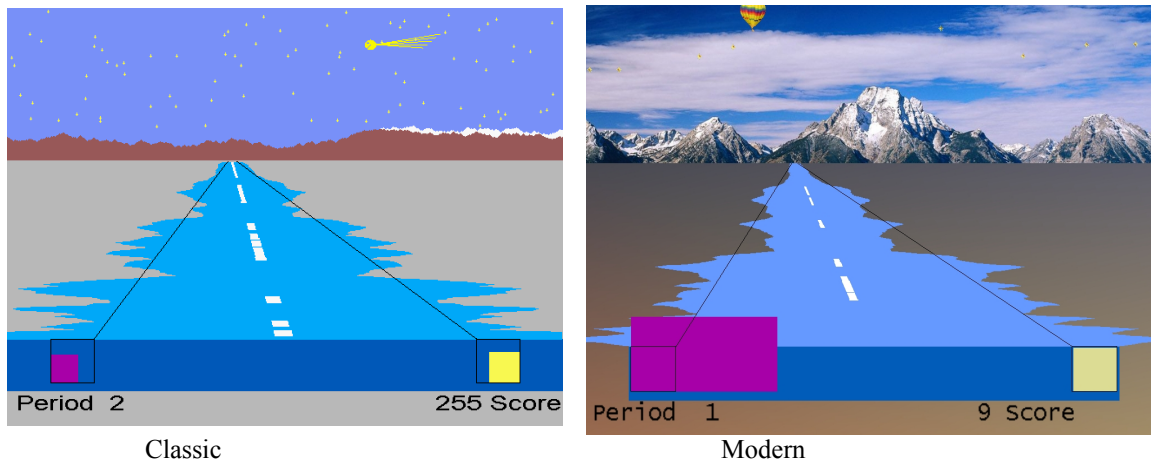
In the Boxlights game screen, pictured here, the left box represents the amplitude of EEG activity within the **low frequency inhibit band**; the right box represents the amplitude of the **high frequency inhibit band** activity. The middle box represents the medium frequency (reward band) amplitude. These boxes correspond directly to the bottom three traces on the therapist's station in 5-trace layouts. A white outline square appears for the reward box. This represents the goal for the band. If the client makes the middle colored box bigger than the white square and keeps it bigger for half a second, while keeping the two outer boxes from touching the white square, they are rewarded with a beep and a score. For 6-trace-with-inhibit layouts, the left box is a rectangle with the horizontal width proportional to the topmost inhibit trace amplitude and the vertical height proportional to the next inhibit trace amplitude. 6-trace-with-reward layouts have the center box width proportional to the upper reward trace amplitude and the height proportional to the next reward trace amplitude. For 8-trace layouts, the horizontal widths are functions of the top set of inhibits+reward and the vertical widths are a function of the lower set of inhibits+reward.

The colors of the boxes in classic mode are consistent in this and several other games. The low frequency box at the left is magenta; the high frequency box at the right is yellow, and the center box is blue for SMR training and green for beta training (as controlled by the therapist). In the modern mode, the box colors are fixed and the entire background is set based on the current image being displayed in the center box. The image changes at the end of each period.

The goals for the low and high frequency inhibit bands are represented by their distances from the white square. If one of those boxes grows big enough to overlap the white square, rewards are not given. Thus the objective for the client is to make the middle box big and the outer boxes small - that is, to increase amplitude in the selected intermediate frequency (Alpha, SMR, Beta) and reduce amplitude in the outlying frequencies.

The therapist can adjust the relative sizes of the boxes in the Boxlights game by adjusting the scales of the three traces on the therapist station screen. Classic/modern is selected in the game tailoring options.

## Highway

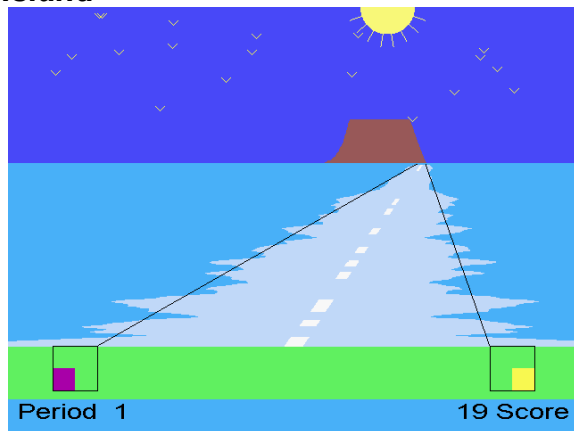


The Highway game simulates the view from the back window of a car driving down a highway, apparently traveling away from a snow-capped mountain range. The width of the blue or green bar at the bottom of the screen represents the amplitude of the **reward frequency band** at the moment, just as the center box in Boxlights. Boxes to the left and right represent the amplitudes of the low and high frequency inhibit bands. The near end of the highway varies in width with the central bar (the sides of the Highway are actually a profile of the EEG), but recedes in the distance showing the amplitude over the last seconds. To add interest, and also to give the client a sense of his scoring performance over previous time, a white stripe appears on the center of the highway each time he scores, accompanying the beep and the count. To extend that sense of performance, a star appears in the sky with each beep and stays there for the duration of the three-minute training period. A special visual reward occurs when the score reaches 500 or 1000 or 1500 points. Similar to Boxlights, the box sizes are a function of amplitudes driven by which layout is used. In this case, the left half of the highway corresponds to the uppermost reward trace and the right side to the lowermost reward trace.

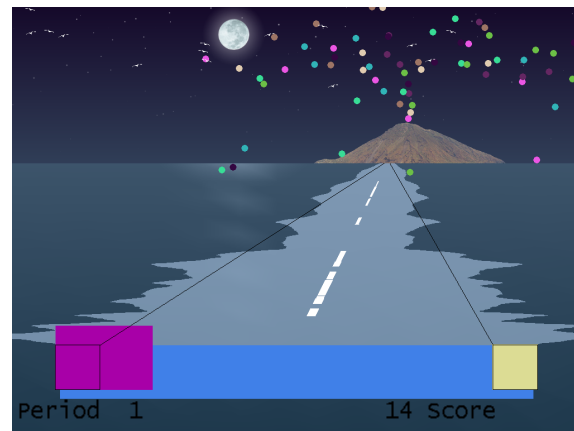
The therapist **K** key generates a comet (classic) or balloon (modern) reward display.

Classic/modern is selected in the tailoring options.

## Island



Classic



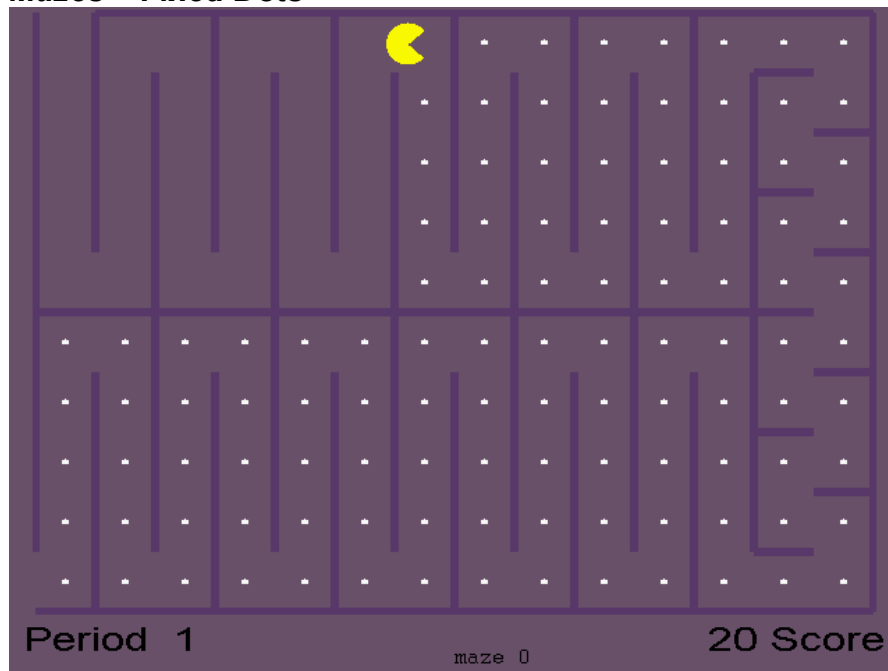
Modern

The Island game is a variation on the Highway game except that the mountain range is replaced by a volcanic island, the stars by birds, and it is the wake of a boat (again defined by the EEG) that disappears in the distance. All reward logic is exactly the same as Highway.

The therapist **K** key generates a volcano eruption reward display.

Classic/modern is selected in the tailoring options.

### **Mazes – Fixed Dots**



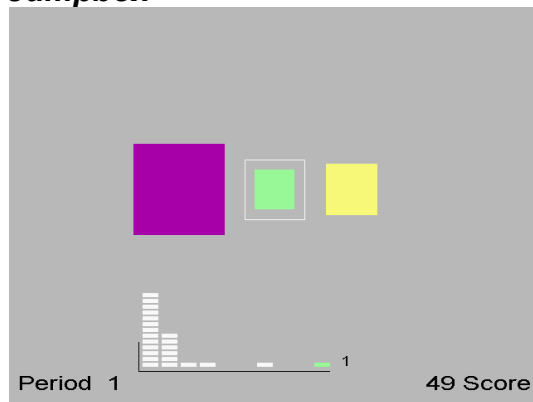
In the Mazes game, an icon moves through a maze eating dots. The speed and color of the icon provide biofeedback information to the client about his brain's accomplishment of goals. Amplitude in the reward frequency determines the color and speed of the icon; it becomes darker and slower when the Beta or other reward frequency is too low in amplitude; as the amplitude in the reward frequency band grows, the icon becomes brighter and faster. When the amplitude equals or exceeds the goal, the icon is at its brightest and fastest and scores are heard and seen. If amplitude in the low or high frequency inhibit band exceeds its goal, then the icon stops moving and turns black. When the icon reaches the end of the maze, there is a brief rest for the client and a bar graph of his/her progress is shown. Then a new maze starts. There are thirty different mazes; if more than thirty training periods are given, the early mazes are repeated. Scale selection has no effect visually on the Mazes game, but (of course) affects goal and threshold settings.

Mazes is self-timing. A training period ends not on a fixed schedule but when all the dots have been eaten or after 200 seconds, whichever comes first. Therefore the red time bars on the score bar chart will vary in height.

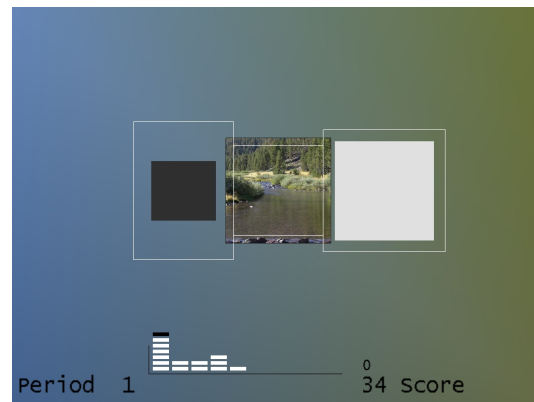
### **Mazes – Variable Dots**

This game is a variation of Mazes in which the size of the dots varies (getting larger) with the amplitude of the low frequency inhibit. In some cases, the larger dot sizes are rewarding (instead of inhibiting) and the fixed-dot version should be used.

## ***Jumpbox***



Classic



Modern

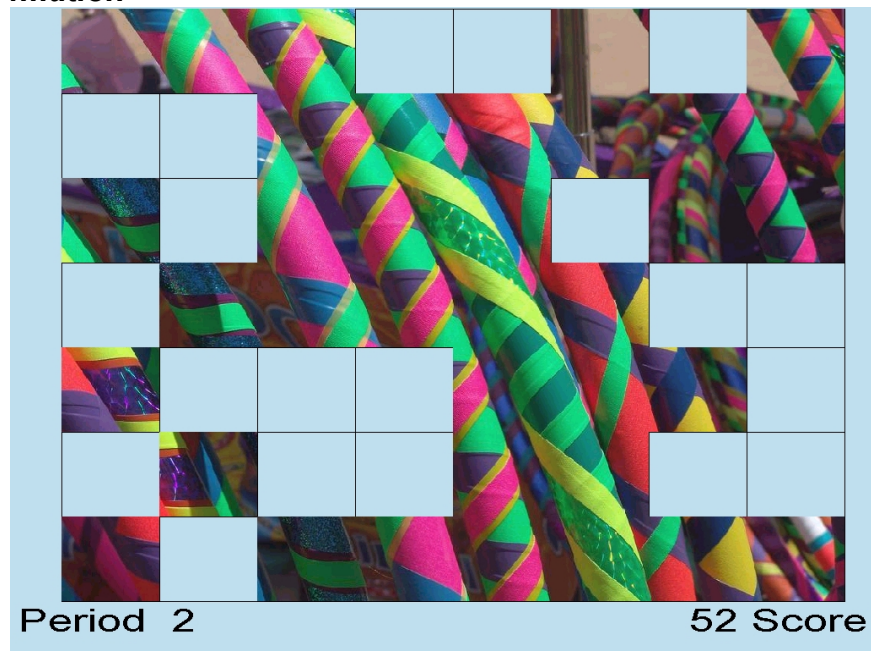
Jumpbox is a more sophisticated version of Boxlights. It has the same three colored boxes and the score and time reports. It also has a marker chip that moves horizontally along the bottom of the screen that jumps every time the client makes a score. If he makes three scores in a row, a chip will jump as far as the third column. If the client reaches ten scores in a row, the chip will reach the last column and turn green/blue. Each chip stops at the point the client fails to maintain all three criteria. Piles of markers further to the right indicate that the client is able to sustain the desired state for longer periods of time. This gives the client added information and an extra challenge. Similar to Boxlights, the box sizes are a function of amplitudes driven by which layout is used. In Modern mode, whenever a chip reaches the last pile the background picture/color changes just as it does at the end of each period.

## ***Theta-down Highway***

Theta-down Highway looks like Highways, but the green or blue bar is totally determined by the inhibit signals with no input from the reward band. The purple box and green/blue bar are tightly coupled. The reward bar is the inverse of the inhibit signals (mostly low frequency). Some special setups are required for this game. The reward threshold (beta or SMR) should be set at about 1 microvolt so that you are over threshold 100% of the time (so feedback is not dependent on it). Set the high frequency inhibit as usual. If the client tenses up, he should be over threshold. The low frequency (theta) inhibit is set so that the client is above threshold about 50%, so beeping will occur about half the time. Either a standard filter or the special filters (2-13 Hz inhibit) can be used. The percentages are set a little different typically, because rather than the wide bar meaning beta or SMR, the wide band is the inverse of theta. That is, if you watch the purple box (theta) it will be identical to the wide band painting highway, except inverse. When theta goes down, the purple box gets smaller, and the wide bar gets wider. The theory is that by positively reinforcing decreased amplitude in the theta band in both the purple and the wide bar – the client gets a possible reward for inhibiting theta.

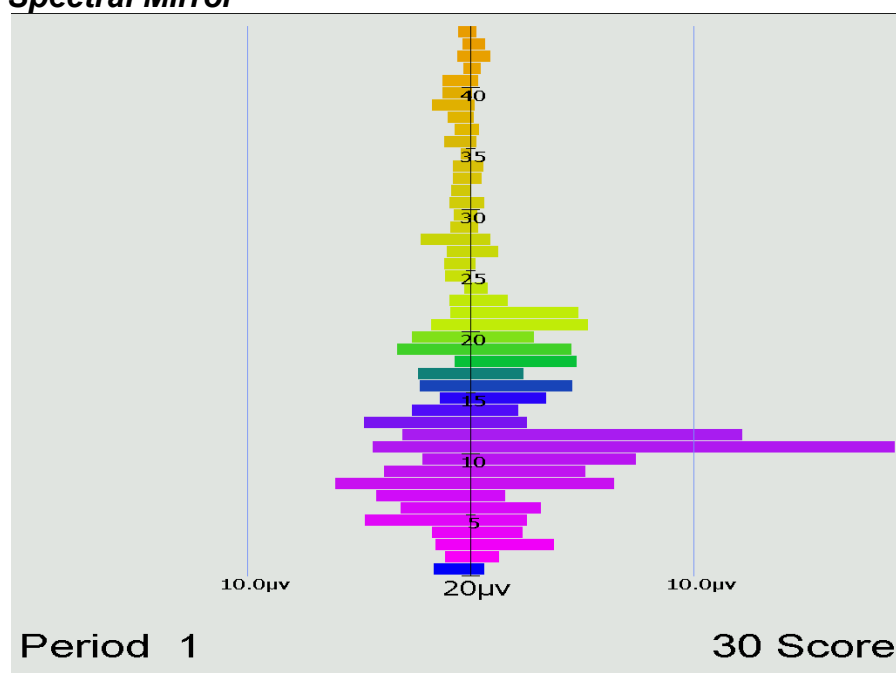
The therapist **K** key generates a reward display

### 4mation

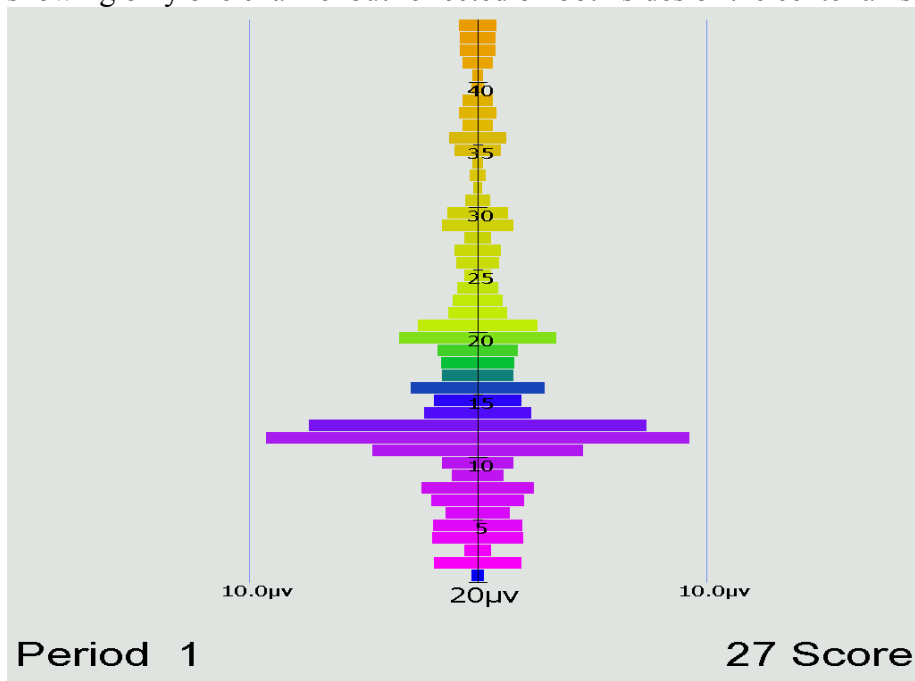


The 4mation game is an image display game where each reward displays another grid in the image. Options are tailorable for grid sizing (x and y dimensions), grid selection (random, ordered, weighted), sounds played, a success sound on filling all the grids, user selection of image directories, etc. A special key option on the game computer (Alt-D) can be used to cycle through the pictures during the time that the credits are shown on the screen (i.e. before pressing F5 for the first time). User pictures can be .BMP , .PNG or JPEG files. Note that many cameras provide files with .JPG extensions that are NOT JPEG files but EXIF files – an attempt is made to translate these also.

### ***Spectral Mirror***



The Spectral Mirror display shows amplitude of the EEG signals at various frequencies. Above is shown the display with two channels of information displayed. Below is a mirrored display showing only one channel but reflected on both sides of the center axis.



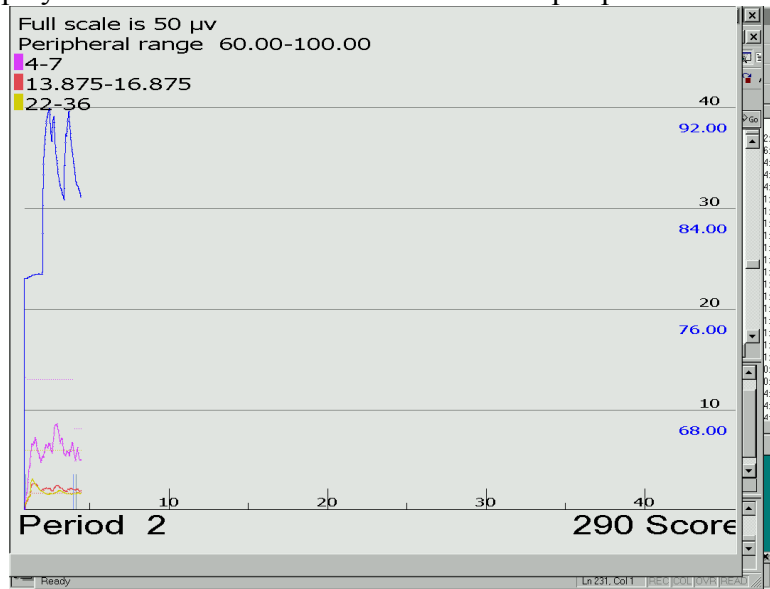
The therapist controls the horizontal scale for this display whose data is the real-time spectral



data used for the Therapist displays.

### ***Long-Term Display***

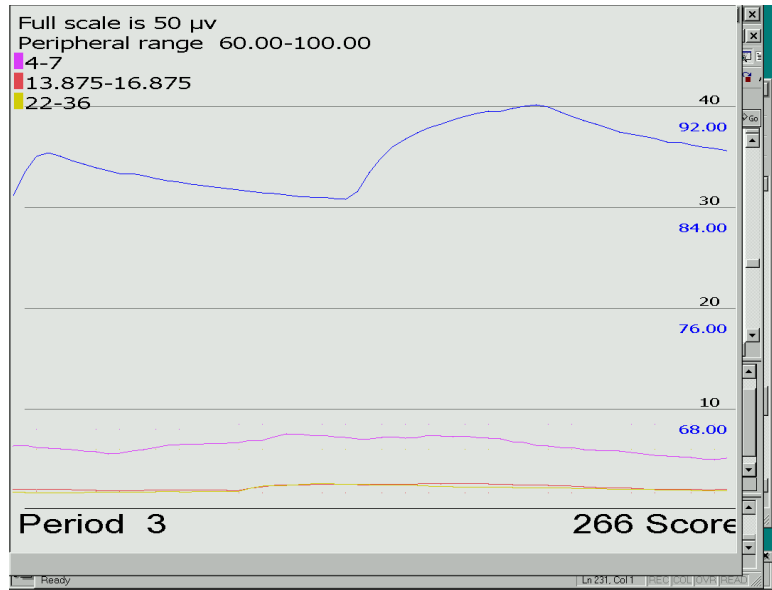
The long-term display shows either or both of EEG data and peripheral data.



The display above shows both kinds of data in the slow display mode where the entire session width represents the screen width (as shown on the time scale at the bottom). There are different scales for peripheral and EEG data. Notice that the frequency bands are shown with the related color code. Below is shown the display with no peripheral data displayed (in the medium speed, 10 minutes across).



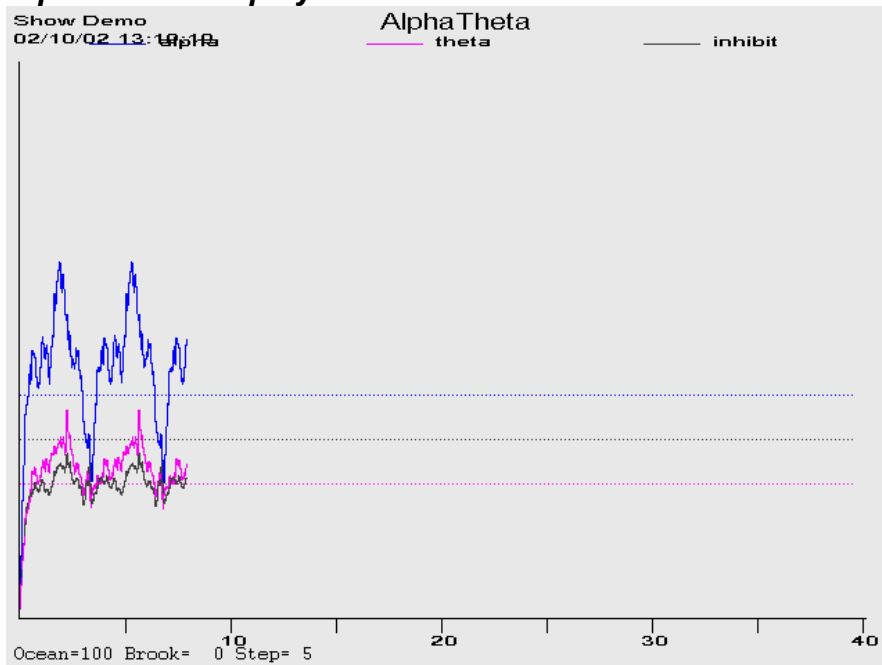
Here is the display shown using the fast speed display (one minute across):



The EEG threshold line displays are also controllable by the therapist.

## Support Programs

### Alpha-Theta Display



The feedback consists of two environmental tones signaling the general *range* of the client's state-of-relaxation, and tones that signal momentary bursts of EEG in one or the other reward band. The alpha environment (trace 3) is a running stream, and its tone is a high-pitched bell.

The theta environment (trace 2) is ocean waves, and the theta tone is a low-pitched bell. As relaxation deepens, the ongoing environmental sound will cross-fade from stream to ocean and low-pitched bell tones will replace the high-pitched tones. In cases where both frequency ranges are over threshold at the same time, the system is biased toward signaling the trace 3 state.

Since the client station screen is not needed for visual display, it is used to display extra therapist information in the form of a line graph depicting amplitude over time for the two reward traces and the inhibit trace.

### **Alpha-Theta Volume Controls**

The default volume levels for the background sounds and reward tones are set to a percentage value.

- Theta (ocean wave) volume
- Alpha (babbling brook) volume
- Alpha reward (Bell) volume
- Theta reward (Gong) volume

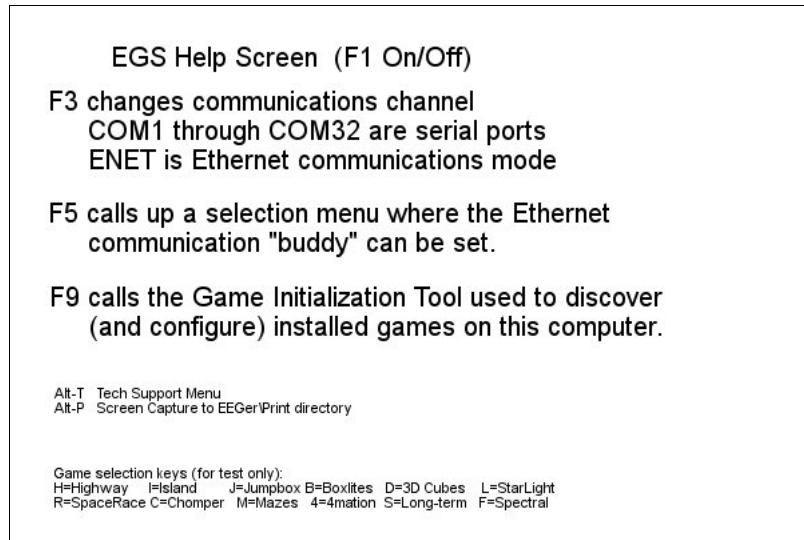
The next-to-last option adjusts the master volume. The last option adjusts the fade or rate-of-change speed used when switching between the wave and babble sounds.

At the bottom of the Alpha-Theta display are the "names" of the sounds along with the relative percentage of the two signals (alpha and theta). When a tone is generated, the appropriate "name" for the tone displays during the playing of the tone. The "Step" value is the current setting of the fade step value which controls how rapidly the environmental sounds transition.

The **ALT-P** key combination saves the current display screen to the PRINT directory.

### **Main menu**

The main menu program monitors communication with the Therapist computer and responds accordingly by dispatching whichever feedback/support program is commanded by the Therapist computer. **F1** brings up/drops a help menu display. **Alt-T** may be used to bring up a tech support menu used to simplify customer support.

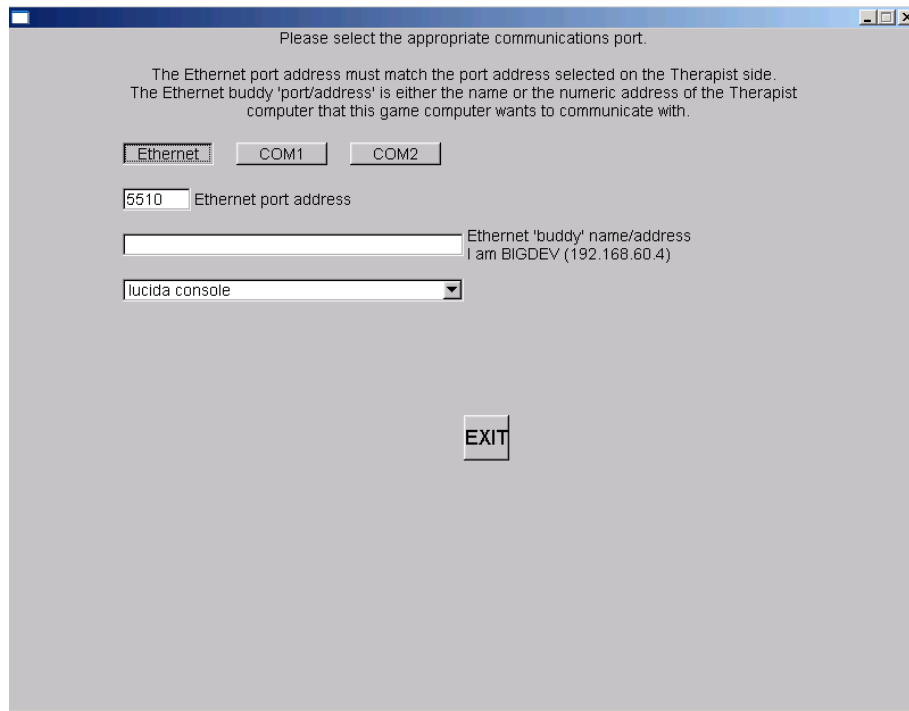


A spinning "propeller" is shown in the upper left corner as a confidence factor (reporting that the program really IS running). The display shows installed Beta/SMR games and is updated by saving the result of the game discovery tool.

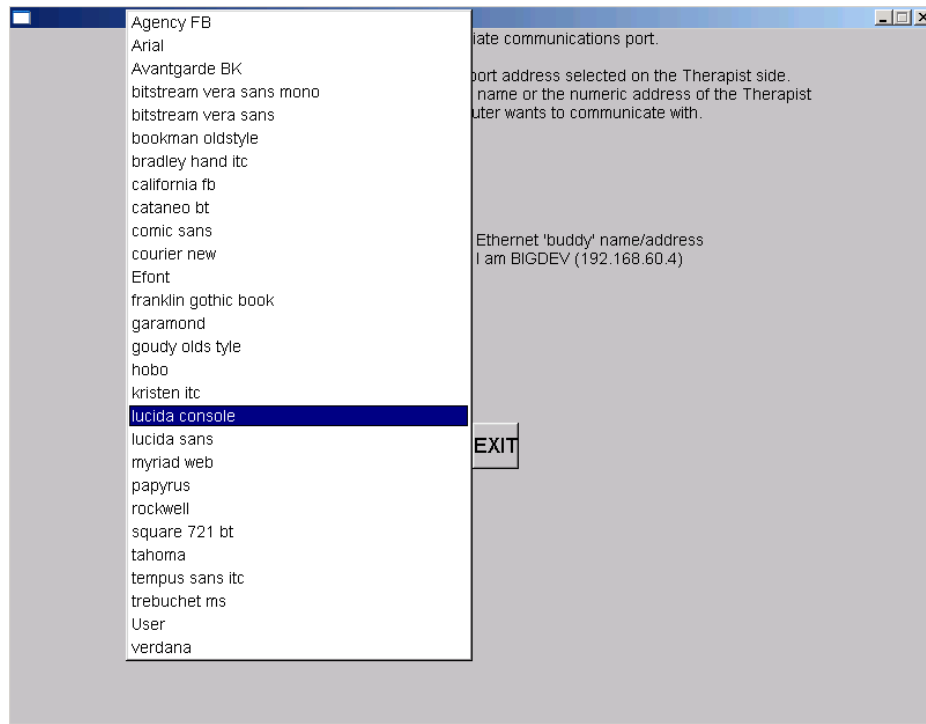
The **Esc** key is used to exit the menu program back to the Windows Desktop.

The **F3** key is used to change the communications channel used to "listen" to the Therapist computer. Pressing **F3** causes selection of the "next" available channel and the selected channel to be displayed in the upper left corner (in red). Each **F3** press causes the next channel to be selected cyclically. The Ethernet selection is one of the possible communications channels (but needs some extra setup – see the **F5** option).

Alternately, the **F5** key can be used to bring up a menu of channels and Ethernet options.



On this menu, the appropriate Ethernet port address (which **MUST** match the therapist preference setting) can be set. The EGS font selection (for 2-computer operations) is made on this screen. Selecting the font name popup window gives a selection similar to this:

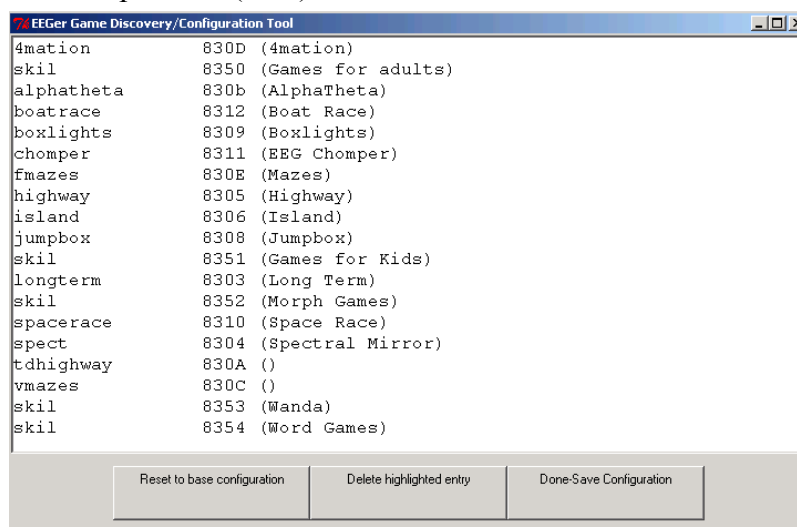


Please experiment with these font selections to find one suitable for you. Not all selections appeal to everyone.

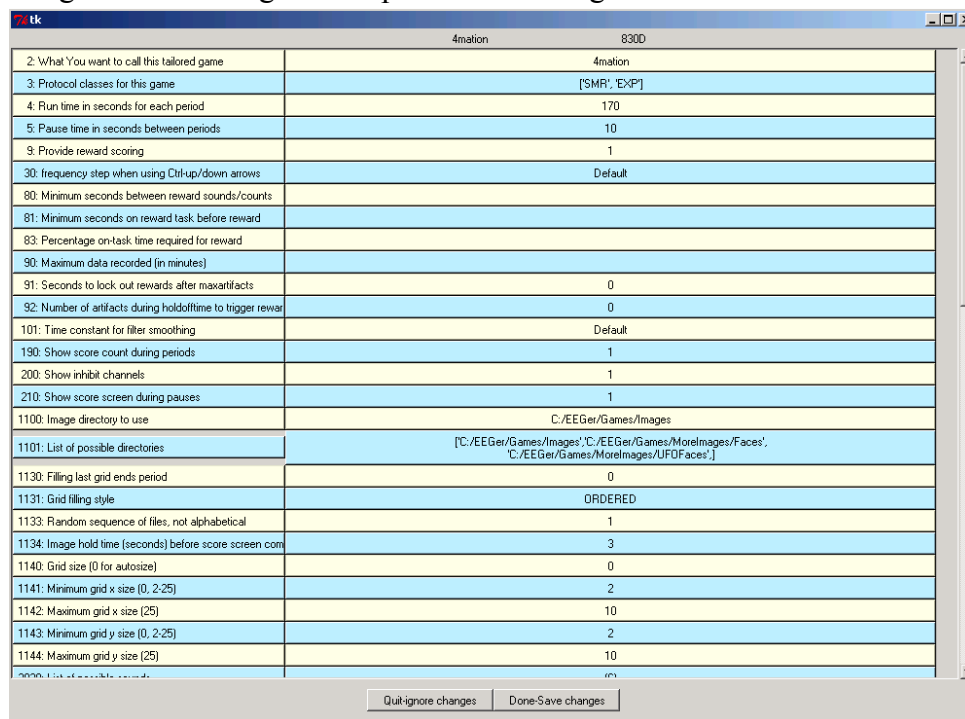
The **F9** key can be used to start the Game Initialization/discovery tool directly from the game menu.

## Game Initialization Tool

The game initialization tool is the tool which searches the user computer for the special files which identify a “game definition”. A list of all the games discovered is then presented to the user for establishment of “option possibilities”. By this, I mean the set of sound/picture/video files which the therapist will (later) be able to select from.



Double-clicking on a line will give the specifics of each game definition.



The user can add additional sounds, etc. to each definition using various browse/selection menus.

Selecting Done-Save Changes saves the specified selections for that game. Selecting Done-Save Configuration at the top menu saves ALL the game specifications for later transmittal to the therapist computer. The user can entirely delete games from ever being a choice on the therapist computer (until the next memory scan).. During therapist setup, the saved specifications are sent to the therapist machine for “tailoring”.



## ***Appendix 1: How the Feedback process works.***

The feedback loop begins with the client. Sensors 'pasted' to the client's head pick up microvolt-level EEG signals which are amplified and converted to digital voltages by the A/D subsystem at a nominal rate (either 160 or 256 Hz).

The samples are converted to equivalent peak-peak voltages. All filters in the software are Infinite Impulse Response (IIR) filters. The raw samples are lowpass-filtered by a 40 Hz filter to remove 60 Hz ambient noise. The clinician adjusts a threshold voltage value to inhibit the data in the presence of muscle (EMG) artifacts. The resulting lowpass signal is fed to a number of 'streams' of processing which are very similar, although some are labeled "Inhibit" and some labeled "Reward". A typical test run uses two inhibit streams and one reward stream.

In each stream, the lowpass signal is bandpass-filtered into various frequency bands (of the clinician's choice) using IIR digital filters. The filter output is fed to an exponentially-weighted moving average filter which produces a short-term average (peak- to-peak) voltage for further use. The time constant of the averaging filter is selectable but is usually 0.5 seconds. The moving average goes two places: directly to the client (game) computer (for visual stimulus) and to a comparator. The comparator produces a threshold-exceeded signal whenever the clinician-adjusted threshold voltage is less than the current moving average of the stream.

All the threshold-exceeded signals are processed by the reward decision logic which declares a 'client reward' when all streams defined as "Inhibit" are below threshold and all streams defined as "Reward" are above threshold. The client aural reward rate is further limited to no more than 2 Hz (so that each sound can be separately heard). The client reward command is sent to the client computer to create an aural stimulus.

The visual feedback is independent of the aural feedback (except that they are both based on relative amplitude/threshold values). The client computer plays a prerecorded sound file (usually a short ¼ second beep) whenever a reward is commanded, giving aural feedback to the client that all clinician-specified (amplitude) conditions were being met. The client computer also draws simple graphics images giving a continuous display of the ratio of amplitude to threshold for each stream of data. The client visual display depends on the particular "game" chosen but all act similarly. The simplest presentation is of three boxes as shown in figure 2. An outline is drawn for each box representing the "threshold" value. A color-filled square is drawn representing the current "amplitude" of the stream of data. Instructions to the client consist of telling them to make the 'inhibit' squares smaller than the outlines and the 'reward' square bigger than the outline. The 'reward' square is in the center and the inhibit squares on either side of the reward square.

The client's EEG response to the aural/visual signals is then sensed and fed back into the loop.

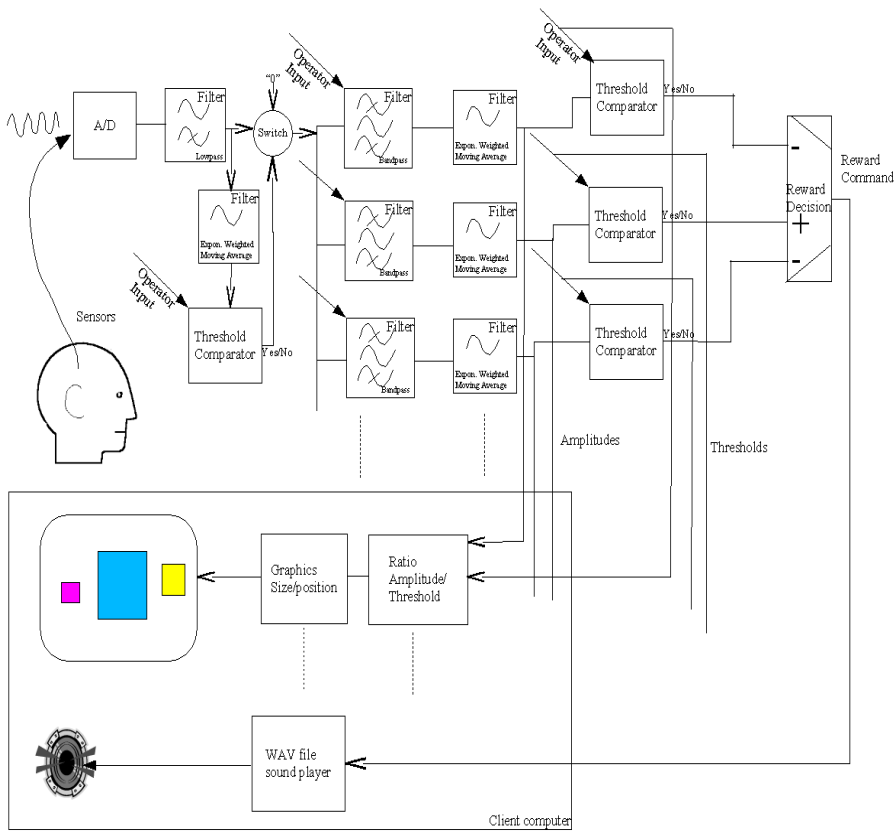


Figure 1

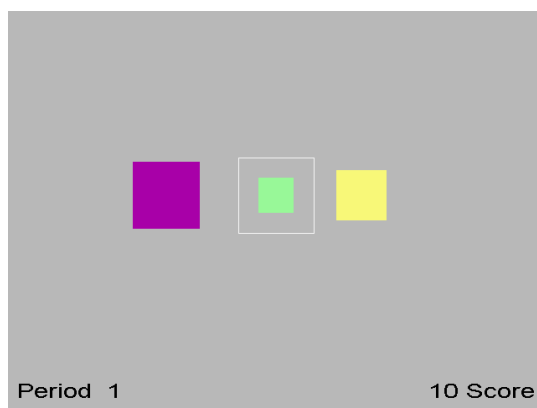


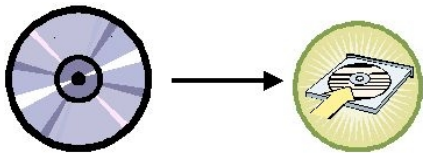
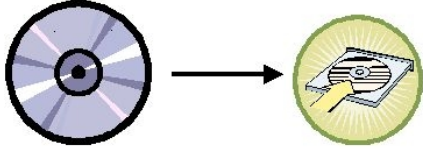
Figure 2


## Appendix 2: Installation

### You must have:

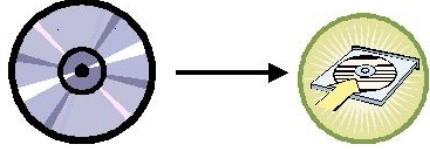
- EEGer CD
- USB dongle (software key) DO NOT PLUG IN UNTIL DRIVER IS INSTALLED!!!

### EEGer Therapist Software Installation

Insert EEGer CD into Therapist Computer CD drive.		<p>On the <u>Therapist</u> computer:</p> <ol style="list-style-type: none"> <li>1. At the windows desktop, insert the CD.</li> <li>2. When you see the menu come up, double click on “Install EEGer Therapist software package” (you may have to open the menu by double clicking on the CD drive under “My Computer”).</li> <li>3. When the EEGer installers come up, acknowledge prompts until it completes.</li> </ol> <p>After clicking on EEGer icon , you should be using EEGer!</p>
		<p>On the <u>Therapist</u> computer, select Preferences-&gt;Configuration .</p> <p>On the <u>Devices</u> tab, select the correct channels for the ProComp and serial communication cable to the Client/Game computer. Click on Save and then Exit (the preferences settings).</p>
Insert EEGer license CD in the CD drive		<p>Place the <u>floppy disk</u> with the EEGer keyfiles on it into the <u>A:</u> drive. If the keyfile is already on the hard drive, at least know where it is stored (and the exact filename!). Select Tools-&gt;Read EEGer Keyblock files. If the file is not found, click on Cancel in the message window and then browse to the file location. Select the file!</p>

<p>NOW plug in the dongle.</p>		<p>Exit from EEGer (under Client menu or by using the x-box in the upper right corner). Plug in the USB dongle to a USB port. Acknowledge any Windows messages about finding the dongle.</p>
		<p>Restart EEGer (by double clicking on the icon). Select Preferences-&gt;Configuration and the Keyfile settings tab. You should see the correct dongle number and license type (Clinical or Remote). Click Exit to return back to the top menu. You are ready to run EEGer at this time.</p>

## EEGer Game Set Installation (for 2-computer systems)

<p>Insert EEGer CD into Client/Game Computer CD drive.</p>		<p>On the <u>Client</u>/Game computer:</p> <ol style="list-style-type: none"> <li>1. Press: <b>Esc</b> (to exit game menu if running)</li> <li>2. At the windows desktop, insert the CD.</li> <li>3. When you see the menu come up, double click on “Install EEGer Game Set Client software” (you may have to open the menu by double clicking on the CD drive under “my computer”).</li> <li>4. When the EEGer Game Set installer comes up, acknowledge prompts until it completes.</li> </ol> <p>After clicking on EGS icon (or after restart), you should be using the EEGer Game Set 3.x</p>
<p>Insure that the two computers are communicating</p>		<p>On the <u>Therapist</u> computer, select Tools-&gt;Reset Game computer.  This should cause a screen flash on the <u>client</u>/game computer.  If not, verify that the <u>Therapist</u> serial channel for game communications has been appropriately selected.</p> <p>If that was correct, try pressing F3 on the <u>client</u>/game computer and repeating the above selection until the correct serial channel is selected on the game computer (observed as screen flash).</p>

## Appendix 3: Vocabulary

The terms listed are defined here to minimize confusion over the loose use of previous terminology. Terms are not alphabetically ordered.

<b>client</b>	- who is being treated
<b>clinician</b>	- the treating person
<b>electrode</b>	- the flat or cupped piece of metal used to sense electrical energy; also has a wire on it to attach to an amplifier or preamplifier
<b>signal</b>	- a voltage (measurement) varying with time; always made with respect to something (differentially); ProComp preamplifier leads are called Signal+ (yellow) and Signal- (blue); Picciottino amplifier leads are called Signal (yellow) and Reference (blue); also <i>Exploring electrode</i> and <i>Referential electrode</i> in classical EEG work
<b>reference</b>	- Depends (see <b>signal</b> above)
<b>base</b>	- A term defining the electrode used as a zero-voltage level for signal and reference measurements. This lead is also called "ground" due to a history of use with instruments connected to power lines.
<b>ground</b>	- Depends but note that the Picciottino "Ground" (black) lead is not really GROUND. The "ground" is an isolated current-limited input used to provide a "zero voltage" point with respect to the signal being measured against its reference.
<b>impedance</b>	- opposition to the flow of a cyclic (alternating current) current through the interface between an electrode and the scalp. If measuring, must be at least 500 ohms and less than 10,000 ohms between any two electrodes.
<b>Hz</b>	- Hertz, the measurement unit of cyclic activity
<b>amplifier</b>	- a device to increase the amplitude of a signal
<b>preamplifier</b>	- a device used to increase the amplitude of a small signal
<b>A/D</b>	- Analog (voltage) to digital converter
<b>Channel</b>	- each physical input measurement is one. It may take several 'connections' to a client for each physical input (such as 3 electrodes). A channel is comprised of the electrode(s), preamplifiers, and amplifiers that make up a measurement path.
<b>Stream</b>	- each processed entity is one; may be made up from one or more channels
<b>trace</b>	- a graphical display (strip chart display) of a stream
<b>band</b>	- range of frequencies; sometimes with a name (e.g. theta) but preferably just the explicit range of frequencies (e.g. 2-7 Hz).
<b>Layout</b>	- arrangement of traces with implied connections of data to game display
<b>class</b>	- a general grouping of treatment modalities (such as eyes-closed, eyes-open, etc.)
<b>session</b>	- portion of client process where the clinician/client interacts with the computer
<b>stage</b>	- one piece of the session process, usually a particular action/operation.

<b>peak</b>	- Highest (voltage) amplitude of a signal
<b>P-P</b>	- (peak-to-peak) difference between the most positive and negative values of a cycle of a (sine) wave; all EEG amplitudes are reported in peak-peak voltage
<b>phase</b>	- angular relationship of a particular signal from one or more channels
<b>smoothing</b>	- a method of limiting the effect of short term excursions of data samples. The technical term is Exponentially-Weighted-Moving-Average filtering. All our smoothing is : $\text{SMOOTHED} = \text{CURRENT\_SAMPLE} * (k) + \text{SMOOTHED} * (1 - k)$ where $k$ is something like $k = 1 / (\text{time\_constant} * \text{samples\_per\_second})$
<b>average</b>	- peak-to-peak equivalent of rectified signal value, smoothed
<b>integral</b>	- peak-to-peak equivalent of signal value, smoothed
<b>goal/threshold</b>	- peak-to-peak voltage amplitude which is compared to <u>integral</u> value when deciding if the smoothed p-p signal is above/equal a point
<b>% over threshold</b>	- smoothed ratio of samples over threshold to total samples
<b>artifact</b>	- when an input channel threshold is exceeded; used to prevent large muscle (EMG) signals from affecting the smaller (EEG) signal processing; usually from extracerebral sources or ambient electrical signals.
<b>fft</b>	- Fast Fourier Transform. A mathematical method of taking a time-varying set of data points (i.e. signal voltages for a period of time) and transforming the data into a frequency-varying set of data. Note that over a set of time measurements (e.g. 256 points), the frequency result corresponds to the time at the <u>center</u> of the time measurements. At a 256 Hz sample rate, a 256 point fft result always refers to 1/2 second before the last sample.
<b>spectral</b>	- A frequency versus (power) amplitude display of data. The frequency data is generated from a moving fft computation.
<b>DC level</b>	- The average value of the zero-crossing points of a periodic wave. If not zero, this means that there is a steady-state offset of the signal from its "ground" reference point. Computed by summing each sample. Used to move the incoming signal to a point where positive and negative excursions occur around a "zero voltage" point.
<b>filter</b>	- a mathematical method of attenuating/excluding cyclic activity (waves) of specific frequency ranges.
<b>FIR</b>	- Finite Impulse Response filters. Characterized by flat phase response throughout filter range. A typical FIR filter (12-15 Hz) requires about 200 "taps" or computations.
<b>IIR</b>	- Infinite Impulse Response filters. Characterized by relatively flat amplitude response throughout the filter range. A typical IIR filter (12-15 Hz) requires about 3 "taps" or computations. This is the filter type used. Phase errors are not

an issue since the same (apparent) phase shift occurs for all samples at the same frequency.

**lowpass filter** - passes low frequencies but attenuate high frequencies.

**bandpass filter** - attenuates frequencies below/above the bandpass limits

**center frequency**- frequency at midpoint between lower and upper limits of a filter

**edge frequency** - beginning of transition region where attenuation starts decreasing amplitudes; sometimes called "cutoff" frequency.

**ripple** - variation in amplitude of frequencies passed through a filter

**rolloff** - rate at which attenuation occurs at frequencies outside a filter's pass band. The higher the rolloff value (measured in decibels), the narrower/sharper the attenuation is outside the pass band and the more computation required.

Examples:

Shown is a typical filter diagram with frequency as the horizontal scale and relative amplitude as the vertical scale (adjusted to unity).

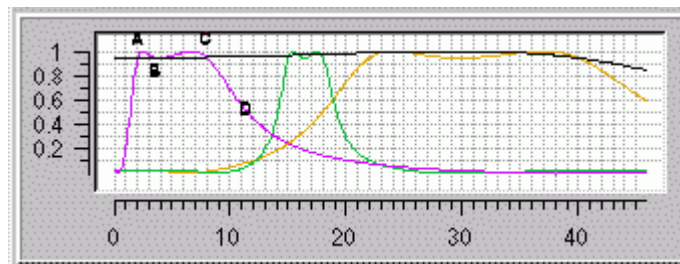
Ripple is the amplitude variation between points A,B, and C of a pass band.

Rolloff is how fast the attenuation takes place (as frequency changes) measured to the 30 db

(50% ) point (D) from point C. There is also rolloff on the low edge of the pass band.

Edge frequency is point A or C.

Center frequency is 4.5 Hz (midway between A at 2 Hz and C at 7 Hz).



### Frequency band names commonly used

<b>delta</b>	.1 to 4 Hz
<b>theta</b>	4-7.5 Hz
<b>alpha</b>	7.5 – 13 Hz
<b>beta</b>	13-30 Hz
<b>gamma</b>	30-50 Hz

**smr** (low beta) 12-15 Hz

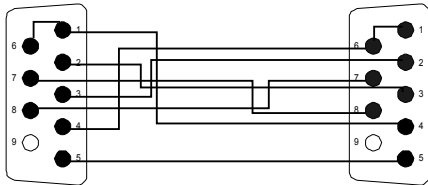
**beta**(mid beta) 15-18 Hz

**hi beta** > 18 Hz

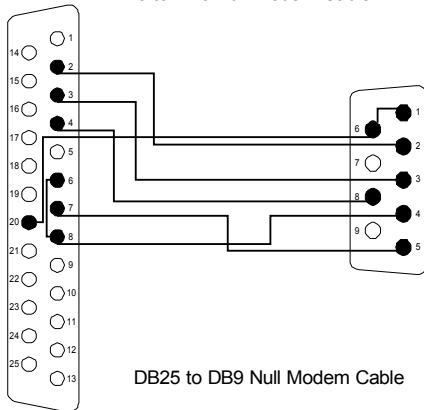


## Appendix 4: Cable Diagrams

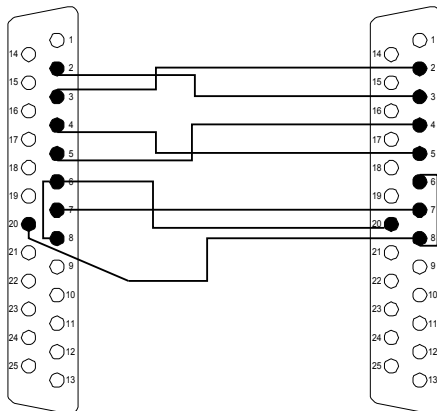
### Cable Diagrams



DB9 to DB9 Null Modem Cable



DB25 to DB9 Null Modem Cable



DB25 to DB25 Null Modem Cable

### DB25 Pin Assignments

Pin	Mnemonic	Name
1	FG	Frame Ground
2	TX	Transmit Data (out)
3	RX	Receive Data (in)
4	RTS	Request to Send (out)
5	CTS	Clear to Send (in)
6	DSR	Data Set Ready (in)
7	SG	Signal Ground
8	CD	Carrier Detect (in)
20	DTR	Data Terminal Ready (out)
22	RI	Ring Indicator (in)

### DB-9 Pin Assignments

Pin	Mnemonic	Name
1	CD	Carrier Detect (in)
2	RX	Receive Data (in)
3	TX	Transmit Data (out)
4	DTR	Data Terminal Ready (out)
5	SG	Signal Ground
6	DSR	Data Set Ready (in)
7	RTS	Request To Send (out)
8	CTS	Clear To Send (in)

### Port Base Addresses

Port	IRQ	Address
COM1	4	03F8
COM2	3	02F8
COM3	4	03E8
COM4	3	02E8
LPT1	7	0378
LPT2	?	0278

### Interrupt Assignments

IRQ	Function
0*	Timer output
1*	Keyboard
2	Cascade (from IRQ9)
3	Serial COM2/COM4
4	Serial COM1/COM3
5	Sound card
6*	Floppy disk
7	LPT1
8*	Real Time Clock
9	
10	
11	
12	
13*	Coprocessor
14*	Hard disk controller
15*	second HD controller

\* means reserved for system

## **Appendix 5: InstaCal™**

### **A/D setup using InstaCal™**

Standard settings on A/D cards for NeuroComp software were as follows:

Voltage Range	+ - 5 volts
Channel mode	Single-ended
Channels used	0 and 1
DAC mode	Bipolar
Clock speed	1 Mhz
Base address	340 (hex)
DMA	1
IRQ	Programmable, usually 7 or 5

To install InstaCal:

1. Insert EEGer CD. If menu does not automatically come up, select “My Computer” and click on the CD device.
2. Select “Additional Installations”.
3. Select “Install InstaCal” option.
4. Follow directions for installation. Default settings are correct.
5. Start InstaCal (from the Measurement Computing group).
6. Delete (remove) the default board.
7. Select INSTALL and ADD BOARD.
8. Scroll down the ISA tab and select CIO-DAS1601/12 or CIO-DAS1602/12. (Some of you may actually have CIO-DAS16 boards!!).
9. Make sure the board is highlighted.
10. Select INSTALL and CONFIGURE.
11. Make sure to set in the values from the table above and click OK.
12. Click on TEST and ANALOG.
13. Select Signal Source EXTERNAL.
14. Unplug any electrodes on the amplifier and turn it on.
15. With the channel switch on CH 1 position, press and release the TEST button several times while observing the InstaCal test display. You should see a SMALL sin wave when the button is pressed and a flat line otherwise.

Congratulations on a successful A/D setup!

## Appendix 6: Metrabyte

### Metrabyte Analog/Digital Card Settings

The switch settings on the *METRABYTE* A/D card are as follows:

1. Set both switches on S1 to BIP (Bipolar) (up).
2. Set both DAC0 (S2) and DAC1 (S3) to 5 (center).
3. Set switch S4 to BIP (Bipolar) (left).
4. Set the channel select switch S5 to 16 (down).
5. Set S6 to 340h by setting DIP switches (from left to right): 3, 5, 6 & 7 set to “On” (up) and switches 1, 2, 4 & 8 set to “Off” (down).
6. Set DMA switch S7 to 1 (left).
7. Make sure the power to the computer is off then insert the A/D card in any ISA slot in the computer and fasten tightly with a screw.
8. Connect the 37-pin brainwave cable to A/D card and connect the DIN connector on the other end of the cable to the brainwave amplifier marked OUTPUT.

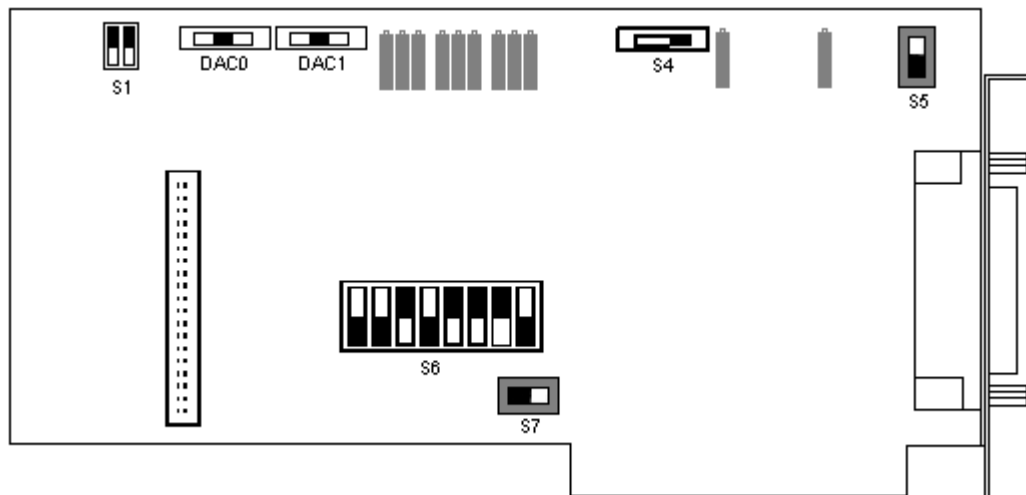


FIGURE 1.1 (METRABYTE DAS-1601)

***Warning: Attempting to plug in the 37-pin connector on the amplifier cable while computer power is ON almost ALWAYS destroys the A/D card circuitry.***

***DON'T DO IT!!***

## Appendix 7: DAS1600

### Computerboards DAS1600/12 Analog To Digital (A/D) Card:

The switch settings on the COMPUTER BOARDS A/D card are as follows:

1. Set jumpers on S1 to “5” as follows: (Off, On, Off, Off, Off, On, Off).
2. Set DAC0 to BIP (Bipolar) by jumping the top two pins.
3. Set DAC1 to BIP (Bipolar) by jumping the top two pins.
4. Set switch S4 to BIP (Bipolar) (left).
5. Set the channel select switch S5 to 16 Channel (left).
6. Set DIP switches on S6 to 340h by setting switches (from left to right): 3, 5 & 6 to “On” (up) and switches 1, 2, 4 & 7 to “Off” (down).
7. Set DMA switch S7 to “1” (left).
8. Make sure the J9 jumper has the bottom two pins jumped.
9. Make sure the J5 jumper is set to “1” (bottom two pins jumped).
10. Make sure the power to the computer is off then insert the A/D card in any ISA slot in the computer and fasten tightly with a screw.
11. Connect the 37-pin brainwave cable to A/D card and connect the DIN connector on the other end of the cable to the brainwave amplifier marked OUTPUT.

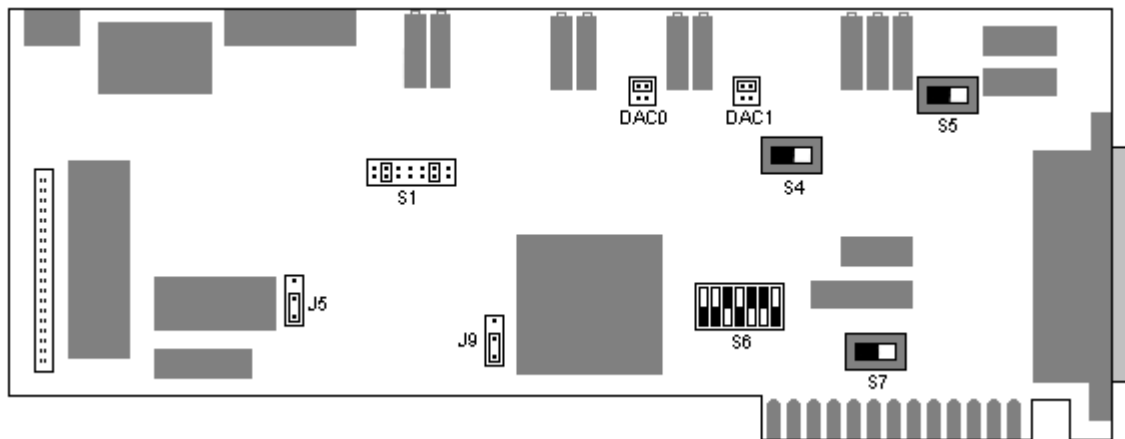


FIGURE 1.2 (COMPUTER BOARDS DAS1600/12)

**Warning:** Attempting to plug in the 37-pin connector on the amplifier cable while computer power is ON almost **ALWAYS** destroys the A/D card circuitry.

**DON'T DO IT!!**

## ***Appendix 8: J&J devices***

Make sure the appropriate batteries are installed in the device.

The C2 and C2mini are only supported using the supplied USB adapter.  
Connect the USB adapter to the DB-9 connector on the C2mini.

Exit EEGer if it is running.

Plug the USB cable into an open USB connector on the computer.  
Acknowledge Windows “New Device” sequence (the Human Interface Device drivers are already installed so no new drivers are required). This usually only needs doing the first time the device is plugged in.

Start EEGer.

Select ***Preferences->Configuration***

Select the ***Devices*** tab.

Select the correct device type under ***Source of EEG/peripheral data***.

Click on ***Store***.

Note: You must select the correct device type. The C2 and C2mini have incompatible internal scale codes. If the incorrect type is selected, the amplitudes of the signals shown will NOT be correct.



## Problems Connecting J&J Amplifier

*This document applies to amplifiers manufactured by J&J Technologies, including:*

- Brainlynx
- C2Mini
- C2
- C2+
- C2+Mini
- GP                -no longer supported
- GP+            -no longer supported
- Spectrum2
- Spectrum4

**MESSAGE RECEIVED: "C2 not echoing settings" or "Check batteries or polarity"**

### **POSSIBLE CAUSES:**

1. Batteries are too low to recognize - try changing again even if you think they're new.
2. The batteries are not inserted in the correct direction.
3. The amplifier was not unplugged from the computer when the batteries were changed.
4. Windows is "confused" about the device: Try connecting to a different USB port if one is available.
5. Windows is "confused" about the device: Unplug the amplifier and turn off the computer. Restart. After Windows is finished booting, re-connect the amplifier.
6. You're running an older version of EEGER (pre-September 2007) that does not have the latest support program for the amplifier. EEGER downloads are available from:  
[www.eegspectrumsystems.com/support/supportFAQ.html](http://www.eegspectrumsystems.com/support/supportFAQ.html)
7. The amplifier is "stuck" in a non-EEG mode: Exit EEGER. Disconnect the amplifier from the USB port. Remove the batteries, letting the amplifier sit for 15 minutes or so with no batteries inserted. Replace the batteries, plug into computer and restart EEGER.
- 8.

If these steps don't work, it may be necessary to send the amplifier to J&J Technologies for repair. Please let us know. An ESI Affiliate membership entitles you to access to a loaner amplifier (subject to availability).

J&J Engineering, Inc.  
22797 Holgar Ct. NE  
Poulsbo, WA 98370  
PHONE: 360-779-3853  
Toll Free U.S.: 888-550-8300  
FAX: 360-697-4435  
[techsupport@jjengineering.com](mailto:techsupport@jjengineering.com)

<http://www.jjengineering.com/>

## ***Appendix 9: Space Race Description***

SpaceRace  
by Wayforward™

### **GAME DESCRIPTION**

As the name suggests, SpaceRace is a game where three rockets race through space. The positions of the rockets are driven by the inhibit and reward band amplitudes, with engine plumes showing amplitude and speed increasing with amplitude.

Inhibit conditions cut off the audio and thrust of the center ('reward') spaceship making it fall back in the race. The thermal bars at the top of the screen correspond to the amplitude of the inhibit and reward bands. The bar at the bottom of the screen indicates how long optimal focus is being sustained (maintaining above threshold reward signal with no inhibits).

Sustained focus causes hyperspace to be entered with appropriate graphics and sounds. Various planets and jewels also appear as reward.

Game Option: Choose the pilot

- Access the pilot selection screen by pressing the left mouse button on the client computer while the game is at the "loading" screen.
- Highlight pilots by pressing the right mouse button. (Each right-click selects a new pilot)
- Select pilot by pressing the left mouse button.  
(This feature just adds a little entertainment, but has no actual effect on the game).

## **Appendix 10: Space Race Installation**

### **WayForward Technologies SpaceRace™**

You should have received the following items:

SpaceRace Installation CD

**EEGer** Keyblock File Disk (license update, if games purchased separately)

In order for SpaceRace to run, you will be installing game software on the Game computer and a license file on the Therapist computer.

#### **System Requirements for SpaceRace**

EEGer version 4.0 or greater; Version 4.2 or greater for single-computer or dual-monitor setup

Pentium 133 or greater, 32 MB RAM

ATI video or comparable

Windows 98SE or greater

DirectX Version 9.0\*

**IMPORTANT:** Before installing a newer version of DirectX, be certain your video driver is compatible with that version of DirectX or you may experience problems with displays.

#### **SpaceRace Installation**

##### **A. Game Computer - Software Installation**

1. If the EGS game menu is displayed, press **Esc** to exit to Windows.
2. Insert the installation CD into the game computer's CD/DVD drive.
3. In just a moment, the CD should start automatically and ask if you would like to install SpaceRace. (If the CD does not start automatically, double-click on the "My Computer" icon, double-click the CD/DVD drive icon.)
4. Follow the on screen installation steps, choosing the default options.
5. Once the software has installed, be sure to restart the computer.
6. If using EEGer/EGS Version 4.1.x or greater Two-Computer setup, finalize the game installation: Launch EGS and press **F9**. When the list of installed games appears, click **DONE-Save Configuration**.

##### **B. Therapist Computer - License Keyblock File Installation:**

1. Insert the EEGer Keyblock File Disk into the appropriate disk drive.
2. Double-click the EEGer icon to start the program.
3. Select **Files - Read EEGer Keyblock Files**.
4. When prompted, use the Open dialog to locate the keyblock file on the CD. Click the filename to highlight the file and click OK.
5. Finalize the Games:
  - a. EEGer/EGS Version 4.1.x or greater, Two-Computer Setup: In EEGer, select **Tools - Retrieve Installed Games List**, then click **SAVE All Games** (or Tools-Tailor Installed Games, SAVE All Games)
  - b. EEGer/EGS Version 4.2 or greater, Single-Computer or Dual-Monitor Setup: In EEGer, select **Tools - Game Initialization Tool**, click **DONE-Save Configuration**. When the list of games appears again, click **SAVE All Games** (or Tools-Tailor Installed Games, SAVE All Games)



# Appendix 11: EEG Chomper Description

Chomper  
by Wayforward™

## GAME DESCRIPTION

Chomper uses both 2D and 3D graphics. The icons and thermo bars at the top and the ghosts are 2D graphics while the remainder of the game is 3D graphics.

The thermo bars act just like Space Race in showing the amplitude of the band with respect to the threshold setting. The inhibit icons or "ghosts" are supposed to look 'fiendish' and gleeful when they are over threshold and sad when below threshold. The reward icon gets happy when above threshold.

When ghosts are turned on and an inhibit occurs, the appropriate ghost gets closer to the chomper and "fights" with it. When the inhibit goes away, the ghost will move away from the chomper. The goal is to keep the reward icon happy and moving through the maze away from the inhibit ghosts.

Music only plays when reward is above threshold and no inhibits are occurring.

### EEG Chomper Setup program

(Start-Programs-Wayforward-EEG Chomper-EEG Chomper Setup)

First screen:

Set audio amplitudes on first screen.

Set resolution to 640x480x16

Level of Detail should be all the way to the right.

Second screen:

RED outline means enabled. Clicking on maze icons will toggle the level choices.

On/off choices for music, special effects, animated icons.

Keyboard options (while running): Cameras	
'1' key (number) '2' key '3' key	default - distance fixed view of maze close up moving view centered on chomper distance moving view centered on chomper
Music Note: Make sure the relative volume is set and that music is enabled in the EEG Chomper setup program	'M' key toggle
Special effects (SFX) Note: Make sure the relative volume is set and that sfx is enabled in the EEG Chomper setup program	'N' toggle
Thermo bars	'T' toggle
Icons	'I' toggle
Ghosts	'G' toggle

There is also a text file available that lists Chomper hotkeys. From the main game screen press ESC to go to Windows desktop. Go to START | PROGRAMS | WAYFORWARD | EEG CHOMPER and select the "Read Me" file.

## Appendix 12: EEG Chomper Installation

### WayForward Technologies CHOMPER™

You should have received the following items:

Chomper Installation CD

**EEGer** Keyblock File Disk (license update, if games purchased separately)

In order for Chomper to run, you will be installing game software on the Game computer and a license file on the Therapist computer.

#### System Requirements for Chomper

**EEGer** software version 4.1.5E or greater; Chomper currently requires EEGer Two-Computer Setup.

Pentium 133 or greater, 32 MB RAM

ATI video or comparable

Windows 98SE or greater

DirectX Version 9.0

**IMPORTANT:** Before installing a newer version of DirectX, be certain your video driver is compatible with that version of DirectX or you may experience problems with displays.

#### Chomper Installation

##### A. Game Computer - Software Installation

1. If the **EGS** game menu is displayed, press **Esc** to exit to Windows.
2. Insert the installation CD into the game computer's CD/DVD drive.
3. In just a moment, the CD should start automatically and ask if you would like to install Chomper. (If the CD does not start automatically, double-click on the "My Computer" icon, and double-click on the CD/DVD drive icon.)
4. Click "Install Chomper" and follow the on screen installation steps, choosing the default options.
5. When the install has finished, complete Chomper Setup.
  - a. Select: **START | PROGRAM FILES | WAYFORWARD | EEG CHOMPER SETUP**
  - b. Set the **RESOLUTION** to **640x480x16-bit**.
  - c. Move the **LEVEL OF DETAIL** slider all the way to the right.
  - d. Set **TEXTURE FILTERING** to **BETTER**.
  - e. Click the **DONE** button, in the upper right-hand corner of the screen TWICE. Then press **Esc** twice.
6. Once the software has installed, be sure to restart the computer.
7. If using **EEGer/EGS** Version 4.1.x or greater, finalize the game installation: Launch **EGS** and press **F9**. When the list of installed games appears, click **DONE-Save Configuration**.

##### B. Therapist Computer - License Keyblock File Installation:

1. Insert the **EEGer** Keyblock File Disk into the appropriate disk drive.
2. Double-click the **EEGer** icon to start the program.
3. Select **Files - Read EEGer Keyblock Files**.
4. When prompted, use the Open dialog to locate the keyblock file on the CD. Click the filename to highlight the file and click OK.
5. Finalize the Games:
  - a. **EEGer/BGS** Version 4.0.x: Select **Tools - Update Installed Games List** in **EEGer**.
  - b. **EEGer/EGS** Version 4.1.x or greater: In **EEGer**, select **Tools - Retrieve Installed Games List**, then **Tools-Tailor Installed Games** and click **SAVE All Games**.

**Congratulations! You have successfully installed Chomper.**

#### Troubleshooting: If Chomper Does Not Run

- Be sure to restart both computers.
- If Chomper does not show up as a choice on the Therapist menu, then you do not have the appropriate EEGer keyblock file installed.
- Check to make sure that the key number written on the floppy/CD Keyfile disk matches your system's software key. You can find your software key number in the lower left corner of the main EEGer display or in Preferences, Configuration, on the Keyfile Settings tab.
- Make sure you don't press any keys (e.g, F9 or F11) on the Therapist computer until Chomper displays "Ready" or the game might not start when F5 is pressed.
- If segments of the Chomper display are missing when the game is played, go back to Step A5 and recheck the setup options.

Note: A keyfile disk may contain more than one key number, however, a single purchase of Chomper is only licensed to run on one system. You must purchase additional copies for additional systems.

For assistance, contact EEG Spectrum Systems Technical Support:  
(800) 400-0334 (4000eeg) or [support@eegspectrum.com](mailto:support@eegspectrum.com)

## ***Appendix 13: EEGer Computer Performance Settings***

**EEG Spectrum Systems Technical Support recommends the following steps to optimize the performance of EEGer Neurofeedback Software.**

### **PERFORM THESE STEPS ON COMPUTERS WITH PERFORMANCE PROBLEMS:**

- **Windows XP Video Settings:**

- Click Start. Right-click on My Computer in the menu and select Properties from the menu. System Properties should be displayed.
- Click the Advanced tab, then the first Settings button for Performance Settings.
- On the Video Settings tab. Select “Adjust for best PERFORMANCE” and click OK.
- This will cause other changes, such as the Control Panel will be Classic view. You can change it back when not running EEGer if you wish.

- **Video Resolution:**

- Click Start and select Control Panel.
- Double-click the Display Control Panel.
- Click the Settings tab.
- Screen area/resolution minimum requirement is 800x600 with 16-bit color. The best setting depends on the computer equipment, but we generally stay at or below 1024x768 pixels, 32-bit color. Note: If your system is already set to 800x600, 16-bit color, you may need to upgrade your desktop video card or laptop system.
- If you make a change, click OK. Be sure to respond to any prompts to confirm the change or the system will automatically revert to the previous setting (It does that in case you couldn't see with the new setting.)

### **PERFORM THESE STEPS ON ALL NEUROFEEDBACK COMPUTERS**

#### **Power Management Settings:**

Click Start and select Control Panel.

Double-click the Power Control Panel. (For Toshiba, use the Toshiba Power Management Control Panel.)

Set all options to Never turn off or to a high enough setting that it will not occur during a session. Note: This is particularly important for a Game computer since the keyboard and mouse are rarely used. (For Toshiba, you'll need to select the Power Save Mode option, such as Full

Power, and edit the details for that Power Save Mode).

Click OK to save changes.

### **Screen Saver:**

Click Start and select Control Panel.

Click the Screensaver tab.

Set the name to “None” or set the Wait time high enough to avoid the screensaver during a session. Note: This is particularly important for a Game computer since the keyboard and mouse are rarely used.

Click OK if you’ve made a change.

### **Windows Device Setting for USB Ports:**

Click Start and select Control Panel.

Double-click the System Control Panel.

Click the Hardware tab, then the button labeled Device Manager.

In the alphabetical list, locate “Universal Serial Bus Controllers” and double-click that text. (You may need to use the scroll bar at the right to get down to that entry).

For EVERY “USB Root Hub entry”, follow these steps:

- Double-click USB Root Hub

- Click the Power Management tab at the right.

- Click the checkbox so it is Unchecked.

- Click OK.

Close all windows.

### **Virus Protection and Firewalls:**

Follow the manufacturer's instructions to disable virus protection and configure your firewall to avoid interference during a Neurofeedback session. If you access the Internet with the system, disable virus protection only when actively running a session.

### **Wireless Internet Devices**

We recommend that you disable Wireless access to your computer when running a Neurofeedback session. Some computers have a switch to do so. For others, go to the Windows Device Manager under Network Adapters. Right-click the Wireless adapter and select Disable.

## **System Memory**

If the system has the minimum requirement of system memory to run the operating system, you may wish to add additional memory. If the system uses Integrated Video or an AGP video card, the video may share the system memory. Increasing the system memory may be necessary for optimal performance.

# Appendix 14: EEGer Remote Use Systems

## EEGer™ Remote Use Systems Client Instructions

Remote Use Systems are similar to clinical systems in their use of the same hardware and software to perform the neurofeedback functions. They are designed for remotely supervised use in a client's home.

You (or the caregiver) must first be trained by your therapist in the operation of the Remote Use system. The client training screens and software are identical to the therapist's Clinical machine. On a Clinical system, the therapist establishes a treatment period and number of sessions for each remote user by creating a Remote Use Client Disk (your personalized USB Flash drive). Each client is limited to a number of sessions to be run in a given time period using the kind of training (Alpha-Theta or BetaSMR) established on the Clinical system. Updates for the Remote Use Session Plan are obtained from the supervising clinician.

The functions of the Remote Use system are almost identical to those in the Clinical system. The only differences in operation are the restrictions on changing the session plan and the application of date or session count control to the use of EEG biofeedback. Some menu options will NOT appear on a Remote Use system, while it includes some that do not appear on a clinical system.

### How to Run a Session

- Insert the Remote Use Client Disk (personalized USB Flash drive) you received from the supervisor in a USB port. The EEGer Dongle (bright green USB key) must also be attached.
- Prep and attach the sensors (electrodes) as instructed by your supervising clinician.
- On the Remote Use Therapist machine, double-click the EEGer icon. (*Two-computer systems: start EGS on the game computer first.*)
- Click **Select Client** then click the large "button" for the drive letter of the Remote Use Flash drive. Select the Client ID/Protocol to use for the session.
- Note the Dongle and Remote Sessions remaining and if there is a warning about an expiration date on the main display.
- Click **Begin Session**.
- Select a game and click **OK**. (The last game used is pre-selected.)
- Confirm the game selection and turn on the amplifier, if necessary.
- At this point you can still back out without counting a session by pressing **Esc**.
- Adjust the scale on the raw trace, if necessary.
  - Press **PgDn** to highlight the raw trace (*e.g., Channel A is the first line on the EEG screen*).
  - Press **F9** to move to the Scale value field.
  - Press **+** or **-** to adjust the scale. (Increasing the scale value decreases the size of the wave.)
  - Press **Enter** twice to complete.
- Observe brainwaves. Blink or clench teeth to see how the "artifact" is displayed in the raw EEG trace. Adjust the thresholds on the raw trace, if necessary, to keep the artifact out of the training, but not too closely that they remove real EEG.
  - a. Press **PgDn** to highlight the raw trace.
  - b. Press **+** or **-** to adjust the threshold boundaries.
  - c. Press **Enter** once to complete.

- Set the scales and thresholds for the lower traces. With no lines highlighted, press **F9** to auto-adjust the scales. Then, press **F11** if adjustment for goals is needed. Follow the steps above to set scale or goal threshold for any individual trace.
- Press **F5** to start feedback. (Single-monitor: Press the **Space Bar** to switch to the Game display.)
- Enjoy the Game.
- Press **Esc** when finished.
- Exit EEGer.

EEGer Remote Use Client Instructions, p. 2 of 2

## EEGer Remote Use Updates

### a. How do I know when I need an update?

### b. How do I get an update?

- Insert both the EEGer Dongle (*bright green key*) and Remote Use Client Disk (*personalized USB Flash drive*) into the appropriate USB ports of your EEGer Therapist system. Open the EEGer program.
- Click **Select Client**. Click the large button that appears to load the EEGer client information from the Remote Use Client Disk.
- Select the client name (and protocol) from the client list.
- Note the information displayed on the main screen (Figure 1). Yellow messages are “warnings” that one of the controls is about to expire. Red messages mean you are not able to run a live session until you update.
- If you see that either Dongles Sessions or Remote Use Sessions/Days are about to expire, contact your supervising clinician to request the appropriate update(s).

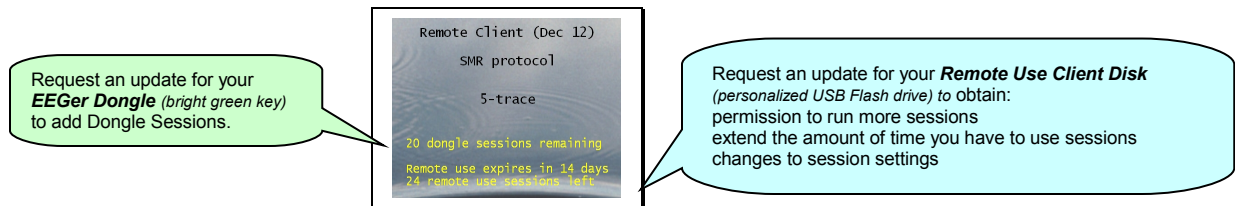


Figure 1. Remote Use Expiration Details

### • Updating EEGer Dongle Authorizations

Authorizations are added to the EEGer Dongle by installing a special keyfile obtained from EEG Spectrum (*supervisor's permission is required for purchase*). You may receive the keyfile on CD or as an email attachment.

### • Updating the Remote Use Client Disk

You can either have the Remote Use Client Disk updated in the clinician's office or you may receive an update file via email.

### Email Attachments for Updates:

For either type of update, save the attached update file to your Windows Desktop or to a disk (DO NOT OPEN the attachment). If your email computer is not your Remote Use system, copy the file to a disk to move it to the EEGer Remote Use computer (e.g., use your Remote Use USB Flash drive or burn to CD). Update files must be installed using the appropriate selection from the Files menu in EEGer and cannot be installed by double-clicking the file.

### Installing Dongle Authorizations or Remote Use Update Files:

- Attach your EEGer Dongle and Remote Use Client Disk (USB Flash drive) to the EEGer Therapist computer.
- Double-click the EEGer icon.



- If you are installing a Remote Use Update from your supervisor, click **Select Client** and choose the correct USB Flash drive by clicking the large “button” displayed. Choose the Protocol Class (AT/SMR/EXP) and ID to be updated.
- Go to the **Files** menu. To install the Dongle Session update from EEG Spectrum, select **Read EEGer keyblock file**. To install a Session/Protocol update from your clinician, select **Read EEGer remote user update**. If prompted again, click the large “button” to select the correct drive for the Remote Use Flash Drive update.
- Use the Windows Open dialog (Figure 2) to locate the update file on the Desktop or other disk (e.g., Click Desktop or “Look In” to choose your removable drive that contains your dongle update from the list of drives on your computer).
- Click the name of the update file so it is highlighted and click **Open** to install the update.

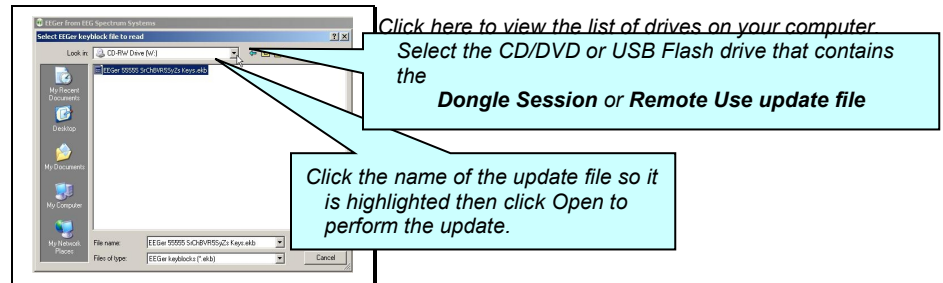


Figure 2. Windows (XP) File Open Dialog

## EEGer™ Remote Use Systems Therapist Instructions

Before the client can use the system, **it is the therapist's responsibility** to train the client (or caregiver) in the operation of the Remote Use system. You must also provide a client disk (utilizing a USB Flash drive) that contains the training plan and expiration data. This Remote Use Client Disk must be initialized on a Clinical Therapist machine using EEGer version 4.1.0 or greater.

### Remote Use System Requirements

#### Provided by EEG Spectrum

- EEGer version 4.1 or later
- EEGer license dongle with programmed Dongle Sessions
- EEGer Remote Use license keyfile

#### Provided by You – the Supervising Clinician

- Remote Use Client Disk containing the training session plan(s), number of Remote Use Sessions permitted, & expiration date.
- Training in the operation of the EEGer system; including sensor placement, confirmation of the amplifier connection, how to read the EEG and adjust training parameters.

### Requirements to Run a Remote Use Session

- EEGer version 4.1 or later.
- EEGer Dongle Authorizations available on the EEGer license dongle
- Remote Use Sessions available on the Remote Use Client Disk as specified in the Remote Use Session Plan
- Date must be prior to the Expiration Date for Remote Use Sessions as specified in the Remote Use Session Plan

Session counts and expiration dates for individual clients using the Remote Use system are controlled by YOU, through the purchase of Dongle Authorizations and creation (initialization) of the client's Remote Use disk (utilizing a USB Flash drive). The Remote Use Client Disk (USB Flash drive) conveys expiration, session count, and session plan information to the Remote Use computer. The EEGer license dongle contains the number of sessions available to be accessed by the Remote Session Plan.

### Therapist Clinical Procedures

The recommended procedure for a client who has acquired a Remote Use system is for the client to continue to be seen in the office periodically. The client should (must) bring the disk for each office visit. You may want to review the data before updating the training session plan. We strongly recommend that you create a new disk on every visit, alternating two or more storage devices. If the client should fail to bring the disk, make a new one and instruct the client bring both disks on the next visit.

When training clients who are unable to visit the office, you can create update files to keep their remote system active. However, you must still initialize the Remote Use Client Disk (USB Flash drive) using your CLINICAL system before they can begin training. Clients can either export and email session data or exchange their Remote Use Client Disk by mail for you to be able to review the session details and progress.

#### STEPS FOR SETTING UP REMOTE USE TRAINING

1. **Order** the EEGer system from ESI with a specified initial number of Dongle Authorizations. If the system is shipped to the client, they may set up the system prior to coming to the office for training. Systems set up by ESS are "plug and play" while clients who purchase a "kit" will have to do all of the installation and setup.

2. **Create** the ClientID and custom Plan Session for the desired training of each client who will use the remote system using your CLINICAL system.
3. **Create/Initialize** a Remote Use Client Disk for each client who will use the Remote system. Be prepared to enter the number of sessions allowed and expiration date for the session plan (Default is 45 sessions in 45 days. You can change the number of sessions or expiration based on your treatment plan.)
4. **Train** the client in the use of EEGer and provide them with the Remote Use Client Disk(s) for home use.
5. **Review** data on the Remote Use Client Disk.
6. **Update** the Remote Use Client Disk to permit additional sessions, change the session plan, or extend the expiration date for the Remote Use Plan by re-initializing the USB Flash drive or creating an update file that can be installed by the user.
7. **Update** the EEGer dongle by request additional Dongle Sessions from EEG Spectrum as necessary.

## Initialize the Remote Use Client Disk

**IMPORTANT:** This step must be performed *before* the EEGer Remote Use System can be used for the first time. The drive is first erased and then the necessary EEGer files are copied to the drive.

The same procedure can be used to provide updated plans for the client when the Flash drive is available. After initial setup, creation of update files to email is an alternative method to renew plans when the Flash drive is not present.

### A. SET UP THE CLIENT AND SESSION PLAN

9. On the **CLINICAL** Therapist system, go to the **Client** menu and select **Create Client**.
  - Follow prompts to enter a Client ID, full name, and birth date. Click **OK** after each.
10. Select **Create Client Class** from the **Client** menu.
  - a. Choose the client ID by double-clicking, or click the ID to highlight it and click **OK**.
    - Select the class for training: **BetaSMR**, **Alpha-Theta**, or **Experimental**.
    - Repeat if you want to add another class for this client.
11. Click **Select Client** and choose the Client ID/Class entry for the Client ID to set up session details.
12. Click **Choose Layout** then click the button to select the number of EEG traces for the training display.

13. Click **Plan Session** to set up protocol details.
  14. Repeat steps 3-5 if you want to add another Class type to the client's training plan.
- B. CREATE/RESET THE REMOTE USE CLIENT DISK
1. Insert the USB Flash drive into a USB port.
  2. From the **Client** menu, select **Remote Use Actions-Initialize EEGer remote use storage device**. (NOTE: Versions prior to EEGer 4.2.1R use the Client menu selection "Create Remote Use Storage Disk")
    - a. Select the client name from the list of clients.
    - b. Click the BIG button labeled "Use drive \_: for remote user storage" to choose the device drive where you want to write the client's session plan(s) to disk. (If there is no button, please exit and check My Computer (Computer for Vista systems) to be sure the drive is recognized by the computer.)

NOTE: If there is EEGer data on the disk, you are prompted to copy the session history to your Clinical system before the disk is reset.
  3. Create the Remote Use Plan
    - a. Select the client Class.
    - b. Select the desired Layout.
    - c. Set up the session count and expiration. You must know the client's EEGer dongle number for proper setup.
      - Default settings are 45 sessions and 45 days. Adjust the Remote Session count and expiration date as you see fit based on your treatment plan. Make a note of the allowances in preparation for future updates to the Remote Use Plan.
  4. The system returns to the initial dialog to allow creation of other Class Session Plans on the drive (You can include one of each type.) Repeat step 9 for another class type.
  5. Click **FINISH** to complete the setup. (Note: If you select the Class again, the Remote Session Plan details default back to 45 sessions in 45 days.)

Additional clients (presumably from the same family) can also be assigned to the same Remote Use System. Follow the same process as listed above to create a separate Remote Use Client Disk for each user. Remember, the clients will **share** the Dongle Authorizations available.

Visit [www.eegspectrumsystems.com/support/supportfaq.html](http://www.eegspectrumsystems.com/support/supportfaq.html) for additional instructions and a Microsoft PowerPoint demonstration/pdf.

## Updating the Remote Use Client Disk - Renew or Change the Session Plan and Count

### c. How do we know when I need an update?

### d. How do I provide the update?

1. Ask the client to insert both the EEGer Dongle (*bright green key*) and Remote Use Client Disk (*personalized USB Flash drive*) into the appropriate USB ports of the REMOTE EEGer Therapist system. Open the EEGer program.
2. Click **Select Client**. Click the large button that appears to load the EEGer client information from the Remote Use Client Disk.
3. Select the client name (and protocol) from the client list.
4. Note the information displayed on the main screen (Figure 1). Yellow messages are “warnings” that one of the controls is about to expire. Red messages mean you are not able to run a live session until you update.
5. If either Dongles Sessions or Remote Use Sessions/Days are about to expire, process the appropriate update. Repeat steps for additional Remote Use Client Disks used on the same system.

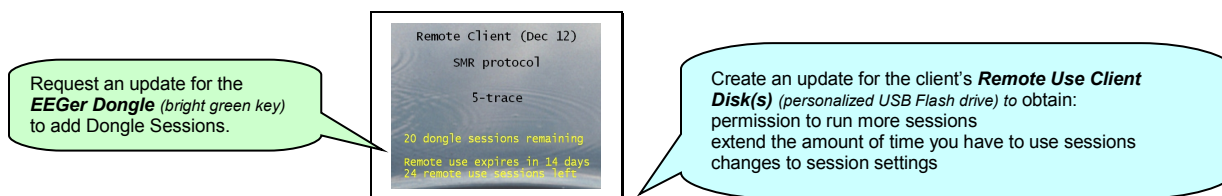


Figure 1. Remote Use Expiration Details

## To renew the client's session data

### METHOD 1: Create an update file

- On your CLINICAL system, select **CLIENT-REMOTE USE OPTIONS>Create EEGer remote use update file**.
- Complete the same steps used when initializing a disk.\*
- When you click Finish, a file is saved on your computer's Desktop.
- Attach the file to an email to send to the client or copy to a disk. The file is then loaded onto the Remote Use Client Disk on the client's computer by selecting **Read EEGer remote user update** from the **File** menu on the Remote Use system.

- \* Updates ADD Remote Use Sessions to the remote plan but reset the expiration date as opposed to initializing the device which resets both the Remote Use session count and expiration.

You must create a separate update for each Class (Beta, Alpha-Theta, or Experimental) used for training.

The filenames do not contain client information. If you update more than one client for the same dongle, we suggest renaming the files as created so it is easier for the client to know which Remote Use Client Disk corresponds to the file. Be sure to keep the file extension. (e.g., 55555\_AU091808.ekr or 55555\_BU091808.ekr)

To retrieve history from the client for review, instruct the client how to use Files – Consultation Import/Export options in EEGer.

## **METHOD 2: Re-Initialize the USB Flash drive on your Clinical Therapist system.**

- Using your CLINICAL EEGer system, select **CLIENT—REMOTE USE OPTIONS—Initialize EEGer remote use update storage device**.
- If there is session history on the Remote Use Client Disk (Flash drive), you are prompted to copy any historical data to your clinical system before the disk can be reinitialized. This allows you to review the client's session history on your system.
- Complete the same steps used when initializing a disk.
- When you click Finish, the new settings are copied to the USB Flash drive to be provided to your client.
  - When the device is re-initialized, the data is erased from the USB Flash drive, but is still available to the client since it is also stored on their system. This process RESETS the Remote Use Session count and expiration date.

Visit [www.eegspectrumsystems.com/support/supportfaq.html](http://www.eegspectrumsystems.com/support/supportfaq.html) for additional instructions and a Microsoft PowerPoint demonstration/pdf.

## **Retrieving and Reviewing Stored Data**

When you choose **Create Remote Use Disk—Initialize EEGer remote use storage device** from the **Client** menu, you are prompted to select the drive letter for the USB Flash drive. The next step is to copy the historical data from the drive to your Clinical system. (You may terminate the disk initialization if you wish to review the data before updating the patient's session plan or proceed with the session controls update at this point.) You can then do any appropriate interviews, testing, and run a training session in the office. There are three options for reviewing patient data:

Click **Select Client** and choose the correct class and patient ID. Click the desired option to review session history.

- **Review:** Displays the trend graph as well as individual session data.
- **Replay Stored Data:** Choose a session to replay (select Entire File or select Partial File to specify the beginning and end of the data to review). This runs the normal EEG program but without selection of game and electrode sites and filters.
- **Spectral:** Choose a session to replay (select Entire File or select Partial File to specify the beginning and end of the data to review). Press **Pause** or **C** to bring playback on the spectral display. (Press F1 for Help to see other options.)

The main control settings (overall expiration and authorization count) for the EEGer Remote Use license key can only be reset by EEG Spectrum Systems technical staff. Contact Customer Service ((**800**) **400-0334** ) or email **[sales@eegspectrum.com](mailto:sales@eegspectrum.com)** to arrange to update the EEGer license dongle or license keyfile.

## CD to Supervisor/Client

## **Appendix 15: Identifying COM Ports**

### **SERIAL PORTS**

Usually desktop computers have 1 or 2 Serial 9-pin ports. Laptops and newer desktops might not have any 9-pin Serial ports. If there is one 9-pin port, it is generally identified as COM1. If two, the upper- or left-most port is usually COM1 and the other COM2. If a 9-pin Serial port is not available, you can use a USB-Serial adapter to connect the amplifier or cable to the computer. USB port numbers are generally a higher number than COM2 and usually a different number is assigned each time a device is attached.

Note: You cannot substitute a USB-USB cable for the Serial null modem cable. If you're using a ProComp and only one 9-pin port is available, it is preferable to use that port for the amplifier.

### **IDENTIFYING COMMUNICATIONS PORTS**

COM port settings can be determined by viewing the Windows Device Manager. For systems using USB ports, especially with XP, unplugging or moving devices can cause the COM port number to change.

#### ***To confirm the COM port being used in the Device Manager.***

##### **WINXP:**

- Click Start.
- Right-click My Computer and select Properties.
- Click the Hardware tab.
- Click the Device Manager button.
- Click the + next to "Ports (COM & LPT)" to expand the list. (List is alphabetical).
- Write down the numbers of the COM ports available. (USB-Serial adapters appear as under a brand name. For example, "Prolific USB-to-Serial Comm Port")

Note: If you have more than one device, you can unplug one to see which is removed from the list. Then plug it back in to make sure the list is refreshed with both devices.

### **COMMUNICATION PORT LIMITATIONS:**

For EEGer, the connections must be COM32 or lower.

#### ***To FORCE the port setting for the USB-Serial adapter (ADVANCED USERS!):***

1. Find the adapter in the Device Manager.
2. Right-click on the device and select Properties.
3. Click the Port Settings tab.
4. Click the Advanced button.
5. Change the COM port setting to the desired number. CAUTION: Change to a number you are certain is not in use by another device.
6. Click OK and respond to prompts to complete.
7. Set the correct port in EEGer software:
  - a. Therapist: Return to EEGer, Preferences | Configuration to change the appropriate COM port to the forced number.
  - b. Game: On the game list menu, press F3 until the correct port is displayed in the upper-left corner of the menu display.



## Appendix 16: Signal Problems with ProComp Systems

This sheet is designed to help resolve signal problems where the system is functioning and you are getting a signal (indicated by the battery voltage value displayed in the lower-right corner of the screen) but the signal you are getting does not look right.

Examples of a bad signal include getting large rhythmic patterns in the raw EEG, or the high frequency looks much too high, or the raw EEG doesn't seem to stay centered within the blue lines, or "this person's EEG just doesn't look like it used to". If one of these cases resembles your situation, then this sheet should help.

**NOTE:** If you are having a problem with the lower traces going flat and the raw EEG looks okay, it is not a signal problem. Explanation: Whenever the raw EEG stretches outside of the blue inhibit lines, because of artifact such as movement, the lower traces automatically shut off.

The purpose of this sheet is to rule out possible causes of such signal problems one at a time. In order to do this, follow the steps below, making only one change at a time, and observing the result. Continue following the steps until your problem is resolved.

- **Impedance:**

**PREP INSTRUCTIONS** - Prep the skin by vigorously scrubbing each site, including the ears, with alcohol or Nu-Prep. Rub a small amount of electrode paste on each site, then put a dollop of paste on each electrode, and then place the electrode on the prepped site.

For this testing procedure you can be your own control. Try placing the electrode right below the hairline on your own forehead, near FP1, with reference and ground on each ear. This is not with the intention to train at this location, but to be sure that you are getting a good clean connection with no interference from hair. This method will tend to give a good contact a higher percentage of the time, and should be used in combination with the following tests in order to rule out contact as the problem factor.

Use an Impedance Meter, if available. For UFI Checktrodes sold by NeuroCybernetics, the digital number displayed should be under 20, ideally under 10. The LED light should be yellow or green, which indicates impedance is under 20 K $\Omega$ .

- **Interference:**

While you are testing, make sure to minimize body contact with the wiring between the electrodes and the computer. Do not have the client hold any portion of the wiring such as the preamp or ProComp. And, if possible, try to have the electrodes lie over the back of the chair, or over clothing, minimizing contact with skin other than the electrode contacts themselves which are in contact with the scalp. If you are hooking up another person, after connecting that person, step back from the system so that only the client is in physical contact with the system (another body touching the system or wiring that does not have a grounding electrode can act as an antenna and feed interference into the system).

Other sources of interference include:

- Turn off any fluorescent or halogen lights in the vicinity of your system. Repeat step 1.
- Check for any electric motors or other radiating devices in close proximity such as cell phones or microwave ovens, and make sure they are turned off.
- Find out if your office is close to a radio or television station transmitter.

- **Electrodes:**

Swap the electrodes with a brand new set of electrodes or a set from a system that you know works. Make sure to swap the full set; don't just change out one electrode or two. (Hint: It is helpful to label the electrodes so you can tell them apart if one set does not work properly.)

Another way to test the electrodes is to touch all three ends together; the trace should go flat. If the trace does not go completely flat when all three electrodes are touching, then you have wiring problem, and could be a problem with the electrodes, the DIN cable, or the pre-amplifier (FlexPro).

Note: Electrodes are easily damaged. Therefore, don't assume that just because an electrode is rather new that it is guaranteed to be good. An electrode could even have a manufacturers defect or could be damaged in shipping. Therefore, if you have the option, it is nice to trade electrodes from a system that you know works, and/or try your brand new set on more than one system.

- **Paste:**  
Change paste, use different paste, or just a new tub or tube of paste. Then completely repeat step 1. Paste can be damaged by getting it too hot or too cold.
- **Batteries:**  
Change the batteries in your ProComp with a brand new fresh set right out of the package. For the purposes of testing, set your rechargeable batteries aside and use a new set of regular alkaline batteries from the store.

- **DIN adapter cable:**



Swap the DIN cable. The din cable is the splitter that the electrodes plug into. It is the next piece after the electrodes as we move from the client toward the computer. If you do not have an extra DIN cable, call NeuroCybernetics to order one. Check the signal by following the procedure in step 1.

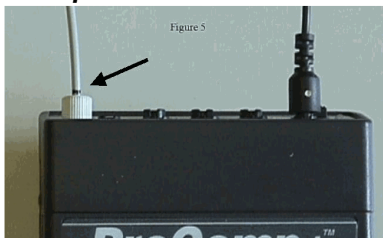
- **FlexPro:**  
(ProComp2 models use a FlexPro pre-amplifier in Channel B, but a pre-amplifier is built into Channel A).



Swap the pre-amplifier (FlexPro) cable that plugs directly into the ProComp, between the ProComp and the DIN adapter cable. It has a small, five-sided black connector on one end. Check the signal by following the procedure in step 1.

A common result from a bad preamp is a square EEG on the screen. If the EEG on the screen looks square, or just looks like vertical lines all the way to the top of the screen, then try switching out the pre-amplifier. Also try holding the FlexPro in your hand and see if that affects the problem. If your FlexPro is the problem, then it can be sent in for repair.

- **Fiber Optic Cable:**



This is the light gray, stiff wire running between the ProComp and the ProSB (square, gray fiber optic converter).

Make sure the fiber optic cable is fully inserted at both ends (insert about 1/2 inch; the cable often "catches" at 1/4 inch). Or replace the fiber optic cable completely. Check the signal by following the procedure in step 1. A fiber optic problem will often appear as short breaks of flat line in the RAW EEG (only the raw EEG is relevant here).

- **ProComp Test:**

NeuroComp/DOS: On the main menu of the therapist computer, under the "Utilities" menu choose

“Test system features”, then choose “ProComp Test”.

EEGer: Prior to 4.1.3: Download the ProComp Test from the EEGer website – <http://www.eeger.com>.

Double-click the downloaded file to launch the program.

4.1.3 and later: Select IOtest from the EEGer programs menu.

This should display a screen with two yellow bars. The top yellow bar should display a signal coming from channel A of the ProComp. Below the yellow bars you will see a set of numbers. The numbers on the left should be moving rapidly, the numbers on the right should be still. The numbers on the right may not be zeros but they should not be moving at all. If things look different from this, then you may have a problem with your fiber cable, your ProSB, or the ProComp itself. You can adjust the fiber cable while the screen is up and see if any change occurs.

Also, check the ProComp protocol setting switches by looking inside the battery compartment of the ProComp+ or ProComp2 or near the battery compartment on the outside of the ProComp Infiniti. There you will see 4 white switches. These should be set |ON|OFF|OFF|OFF| for Spectrum mode or |OFF|ON|OFF|OFF| for Biograph mode (EEGer option only).

## Appendix 17: Feedback and Reward Modes

EEGer has both “feedback modes” and “reward modes”. “Feedback modes” describe (control) the signal routing and processing of inputs, displays, and (game) outputs. Various modes are available depending on the specific layout (screen configuration).

Internal processing blocks:

Lowpass	- lowpass filter (IIR)
Bandpass	- bandpass filter (IIR) with one or sum of two inputs
Differ	- bandpass filter (IIR) with difference of two inputs
Synch	- Synchrony computation between two bandpass (IIR) values
Comod	- Comodulation computation between two bandpass (IIR) values
Glocom	- Comodulation computation between two lowpass (IIR) values
AminusB	- Difference between two bandpass integral outputs
Ratio	- various ratios
DiffSum	- ratio of (A-B) to (A+B)
Unity	- 1- (ratio of absolute value of (A-B) to (A+B))

SMR reward	- determines when a “reward” is to be issued
AT reward	- determines when “reward” tones are to be issued

Available feedback modes:

<b>SingleA</b>	- Input data comes from channel A; reward is SMR reward
<b>SingleB</b>	- Input data comes from channel B; reward is SMR reward
<b>Sum</b>	- Input data is sum of A and B; reward is SMR reward
<b>Differ</b>	- Input is A lowpass value minus B lowpass value; reward is SMR reward
<b>Psynch</b>	- Input is A & B lowpass/bandpass values; reward is SMR reward
<b>Asynch</b>	- Input is A & B lowpass/bandpass values; reward is SMR reward
<b>GAsynch</b>	- Input is A & B lowpass values; reward is SMR reward
<b>AminusB</b>	- Input is A & B lowpass/bandpass values; reward is SMR reward
<b>BminusA</b>	- Input is A & B lowpass/bandpass values; reward is SMR reward
<b>PDelta</b>	- Input is A & B lowpass/bandpass values; reward is time-sample deviation of phase difference between A & B
<b>RatioA</b>	- Input is A; reward is ratio of reward trace to inhibit trace just above reward trace
<b>RatioB</b>	- Input is B; reward is ratio of reward trace to inhibit trace just above reward trace
<b>RatioAB</b>	- Input is A & B; reward is ratio of A amplitude to B amplitude.
<b>RatioBA</b>	- Input is A & B; reward is ratio of B amplitude to A amplitude.
<b>D/S-Ratio</b>	- Input is A & B; reward is ratio of (A-B) amplitudes to (A+B) amplitudes
<b>Unity</b>	- Input is A & B; reward is 1- ratio of absolute value (A-B) amplitudes to (A+B) amplitudes
<b>Dual</b>	- Input is A & B lowpass values (A feeds 3 traces, B feeds 3 traces); reward is SMR

- MonitorA** - Input is A lowpass value; No rewards or game outputs
- MonitorAB** - Input is A & B lowpass values; 6 traces from A, and 6 from B;  
No rewards or game outputs
- MonitorB** - Input is B lowpass value; No rewards or game outputs

If the zscore option is available, the following reward modes are possible:

**ZAsymm**  
**ZCohere**  
**ZPhase**  
**ZAbsPwrA**  
**ZAbsPwrB**  
**ZRelPwrA**  
**ZRelPwrB**  
**ZPRatioA**  
**ZPRatioB**

See the zscore appendix for a discussion of these modes













Available reward modes (assuming there ARE some reward outputs):

- Rwrld** - Reward condition is integral value at or above target threshold.
- Down** - Reward condition is integral value at or below target threshold.
- Cntr** - Reward condition is when difference between current value and average value is less than target threshold.
- Elev** - Same as Rwrld but game output value is limited to threshold value.
- DevU** - Deviation is absolute difference between average and instantaneous integral. Reward is when this smoothed value is at or above target threshold.
- DevD** - Deviation is absolute difference between average and instantaneous integral. Reward is when this smoothed value is at or below target threshold.
- Band** - Reward condition is signal value within offsets from threshold setting. Limits are set using the Band Control popup.

## Appendix 18: Fixed color codes

This chart shows the fixed colors associated by stream/trace number:

Fixed-color mapping by stream number

	Stream 0
	Stream 1
	Stream 2
	Stream 3
	Stream 4
	Stream 5
	Stream 6
	Stream 7
	Stream 8
	Stream 9
	Stream 10
	Stream 11
	Stream 12
	Stream 13

## Appendix 19: Sound controls

This appendix describes the kinds of sound controls EEGer allows with the EEGer Game Set games. Third party games in general do NOT support these modes, which are set during the Game Initialization or tailoring phases.

There are three categories of sounds: discrete rewards, strand-related sounds, and special.

Discrete reward sounds are generated whenever the therapist computer issues a “reward” command. These sounds are intended to be short (shorter than the reward interval!) and indicate a successful “state” to the client. The games have two reward sound possibilities: “Reward” and “Success”. The “Success” sound is only used for those games that have some success criteria associated (completing a maze, filling a picture, reaching the end of the jumpbox display). Discrete reward sounds have controls for which channels the sound is played through. Normally BOTH is the selection. It is possible to select either LEFT or RIGHT also. The ALTERNATE selection alternates between LEFT and RIGHT for the number of seconds specified as the limit, then defaults to BOTH. Again, the reward sound is only generated when triggered by the therapist computer. Certain games respond to spike-triggered sounds as specified in the tailoring files.

Strand-related sounds are associated with particular processing bands and generally relate to amplitudes, ratios, etc., of the data in those bands. There are six separate sound possibilities defined although you can only use as many sounds as are driven by the therapist computer (which in turn is controlled by the current layout). All six sound options work identically (using the individual options, of course). It is possible to select BOTH, LEFT, or RIGHT channel for the sound output. The mode of operation for the sound is one of the following:

CONTINUOUS	The sound plays during feedback
ENABLED	The sound plays during feedback but ONLY if all inhibits are below threshold and all rewards are at or above threshold.
NOTENABLED	The sound plays during feedback but if any inhibits is above threshold or any rewards is below threshold.
PROPORTIONAL	The sound plays during feedback and the volume is proportional to the ratio of amplitude and threshold. The higher the signal is over threshold, the louder it is.
ENABLEDPROP	A combination of ENABLED and PROPORTIONAL
OVER	The sound plays during feedback only if the amplitude is over the threshold
UNDER	The sound plays during feedback only if the amplitude is under the threshold.

The clinician must select which game strand drives each sound. Each layout and feedback mode has a discrete mapping of stream/trace to strand. The tables are as follows:

Layout: 5

<i>Trace</i>	<i>Strand</i>
2	0
3	1 or 2
4	3

Layout: 6,inhibit

<i>Trace</i>	<i>Strand</i>
2	0
3	4
4	1 or 2
5	3

Layout: 6,reward

<i>Trace</i>	<i>Strand</i>
2	0
3	1 or 2
4	5 or 6
5	3

Layout: 8

<i>Trace</i>	<i>Strand</i>
2	0
3	1 or 2
4	3
5	4
6	5 or 6
7	7



Special sounds are those unrelated to specific strands. The only category of these are those sounds controlled by the overall reward %. A separate tailored value is the RWVALUES variable which contains 6 (comma-delineated) percentage values. Modes used with these settings are :

RWOVERn	The sound plays only when the overall reward % is greater than or equal the n <sup>th</sup> percentage specified in the RWVALUES setting.
RWUNDERn	The sound plays only when the overall reward % is less than the n <sup>th</sup> percentage specified in the RWVALUES setting.

## Appendix 20: Zscore

Support for Applied Neuroscience, Inc. (ANI) Z Score training is available in EEGer version 4.2. These instructions provide directions to set up and activate the Z Scores feature in EEGer.

For Z Scores to function in EEGer, the following items must be valid:

- ANI biofeedback software must be installed **by the EEGer installer in the EEGer-specified location.**
- A valid EEGer license for Z Scores must be installed.
- A valid ANI passkey must be installed.
- A valid birth date must be entered for the client prior to training (since the ANI software needs client age).
- Valid site(s) and frequency ranges must be entered in the client's session plan prior to training.

### ● Install EEGer 4.2 software

EEGer version 4.2 and subsequent program updates are available on CD from EEG Spectrum Systems or can be downloaded from the EEGer website: [www.eeger.com](http://www.eeger.com). Follow instructions provided with the CD or on the website to install.

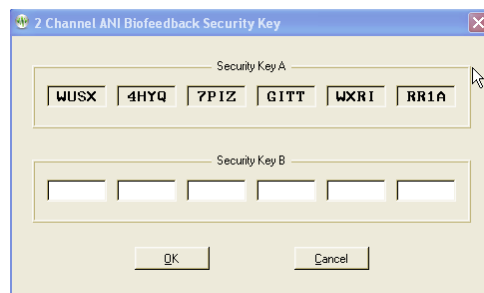
Be sure to check the option to **INSTALL THE ANI ZSCORE FILES** on the **Select Additional Tasks** display during the installation process.

### ● Install the EEGer Keyblock File:

1. Insert the **EEGer Keyblock File CD** in your CD/DVD drive.
2. If the contents of the CD are displayed automatically, close the window. You must load the key using EEGer.
3. Start the EEGer program. From the **Files** menu, select **Read EEGer Keyblock Files.**
4. Select the CD/DVD drive for the **Look In** field.
5. The updated keyfile is displayed on the Open dialog. Click the filename to select/highlight and click **Open.**

### ● Obtain the Z Score Security Key from ANI

- Start the EEGer program, if necessary.
- From the **Files** menu, select **Create ANI Biofeedback Key.** Accept the License agreement and the key screen appears:



- **Contact ANI.**

- Email **Security Code A** as it displays on your EEGer screen to [geeg@appliedneuroscience.com](mailto:geeg@appliedneuroscience.com) and cc: [rwthatcher@yahoo.com](mailto:rwthatcher@yahoo.com) (If you do not have access to email, please call ESS for assistance at **818-789-3456, ext. 807 or 832**)
- Repeat steps 1 and 2 to enter the code they provide for **Security Key B**. Click **OK** to activate the new feature.

Applied Neuroscience, Inc. / 228 176th Terrace Drive / St. Petersburg, FL 33708  
 PHONE: (727)244-0240 / FAX: (727) 319-1027 / EMAIL: [geeg@appliedneuroscience.com](mailto:geeg@appliedneuroscience.com)

NOTE: The ANI Z Score Security Key is computer specific. If you install EEGer on another computer or have to recover after hard drive failure, you must contact ANI to obtain a new Security Key.

## EEGer REWARD MODES FOR Z SCORES

In **Plan Session**, for the Z Score Setup stage, click the **Feedback** button to choose the desired mode. The mode can also be changed on the EEG training display by pressing **Shift+F3** to select a different reward mode.

- ZAsymm** - reward is standard deviation of absolute asymmetry for designated frequency band (2 channels)
- ZCohere** - reward is standard deviation of coherence for designated frequency band (2 channels)
- ZPhase** - reward is standard deviation of absolute phase for designated frequency band (2 channels)
- ZAbsPwrA** - reward is standard deviation of absolute power from A site for designated frequency band
- ZAbsPwrB** - reward is standard deviation of absolute power from B site for designated frequency band
- ZRelPwrA** - reward is standard deviation of relative power from A site for designated frequency band
- ZRelPwrB** - reward is standard deviation of relative power from B site for designated frequency band
- ZPRatioA** - reward is standard deviation of power ratios from A site for designated frequency band
- ZPRatioB** - reward is standard deviation of power ratios from B site for designated frequency band

NOTE: For Z Score training, enter a second training site (Input ChB) even if using a single-channel feedback mode. If only one site is entered, a "site error" may appear on the EEG training or replay screen. EEGer checks for a valid two-channel setup in case of a change to a two-channel mode while on the EEG training display.

EEGer automatically adjusts frequency bands when entering/exiting a Z Score feedback mode to match the closest standardized Z Score band.

<b>Frequency bands</b>	Enter this Reward Frequency Range in EEGer Plan Session (Hz)
Delta	1.0 - 4.0
Theta	4.0 - 8.0
Alpha	8.0 - 12.0
Beta	12.0 - 25.0
High Beta	25.0 - 30.0
Beta 1	12.0 -15.0
Beta 2	15.0 - 18.0
Beta 3	18.0 - 25.0

<b>Power Ratios</b>	Enter this Reward Frequency Range in EEGer Plan Session (Hz)
Delta / Theta	1.0 - 4.0
Delta / Alpha	4.0 - 8.0
Delta / Beta	8.0 - 12.0
Delta / High Beta	12.0 - 25.0
Theta / Alpha	25.0 - 30.0
Theta / Beta	12.0 -15.0
Theta / High Beta	15.0 - 18.0
Alpha / Beta	18.0 - 25.0
Alpha / High Beta	35.0 - 37.0
Beta / High Beta	37.0 - 39.0

### Valid sites (all referenced to A1 or A2):

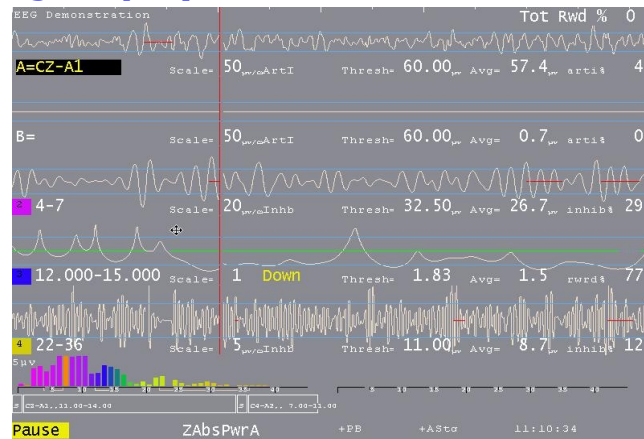
FP1	F7	C4	O1	T5
FP2	F8	Cz	O2	T6
F3	Fz	P3	T3	Pz
F4	C3	P4	T4	

### Review Options:

EEGer **Review** includes additional options for viewing data from sessions recorded using a Z Score reward mode.

Files can be exported in EDF+ format for analysis in ANI's NeuroGuide or other software that can import EDF+ format.

## Z Score Training Display



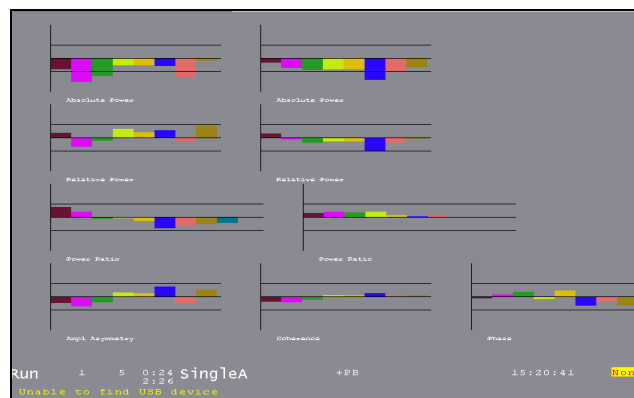
**Layout:** The **Reward Only** layout may be used for Z Score training if you do not want to use inhibit bands.

**Site and Frequency Settings:** When a Z Score feedback mode is selected for training, EEGer checks the selected site(s) and frequency against the available Z Score options. A message is displayed for invalid site(s). There must be two channels of EEG data for some of the options. For frequency, the Reward band is adjusted to the closest valid Z Score range.

**Feedback Mode:** To change the feedback mode, press **Shift+F3**. Use the arrow keys to move to the desired mode and press **+** to activate. EEGer must confirm the sites and frequency again if a Z Score mode is selected.

**Reward Mode:** Z Score training is performed with the down-training reward mode (Down). To change the reward mode, press **F2** to cycle through the options.

## Z Score Feedback Display



Press **F12** on the EEG training screen to cycle to the Z Score display (available only if Z Score is installed and working). This display shows the standard deviation values in real time for the various ANI outputs. Up values are positive deviations. The graph is limited to  $\pm 5$  standard deviations. The horizontal lines represent two standard deviations from the mean. Channel A values are on the left, Channel B values on the right and the three bottom graphs display values for modes that combine Channel A & Channel B readings.

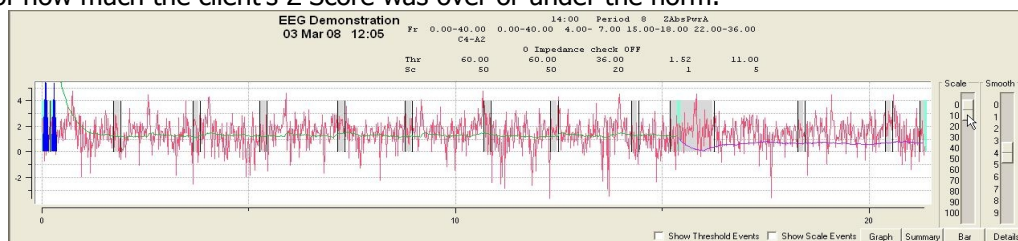
## Z Score Review Display

- Click **Show>** and check the box labeled **Show zscore**. If there is Z Score data embedded in the data file, the additional button choices available after clicking on **Which Z Score** are displayed below. Choose the Z Score Feedback Mode and Frequency Range you wish to view.

Options>	<input type="checkbox"/> Show Periph
Show>	<input type="checkbox"/> Show RAW
Notes	<input type="checkbox"/> Show Total %
Print>	<input checked="" type="checkbox"/> Show zscore
Exit	Which zscore

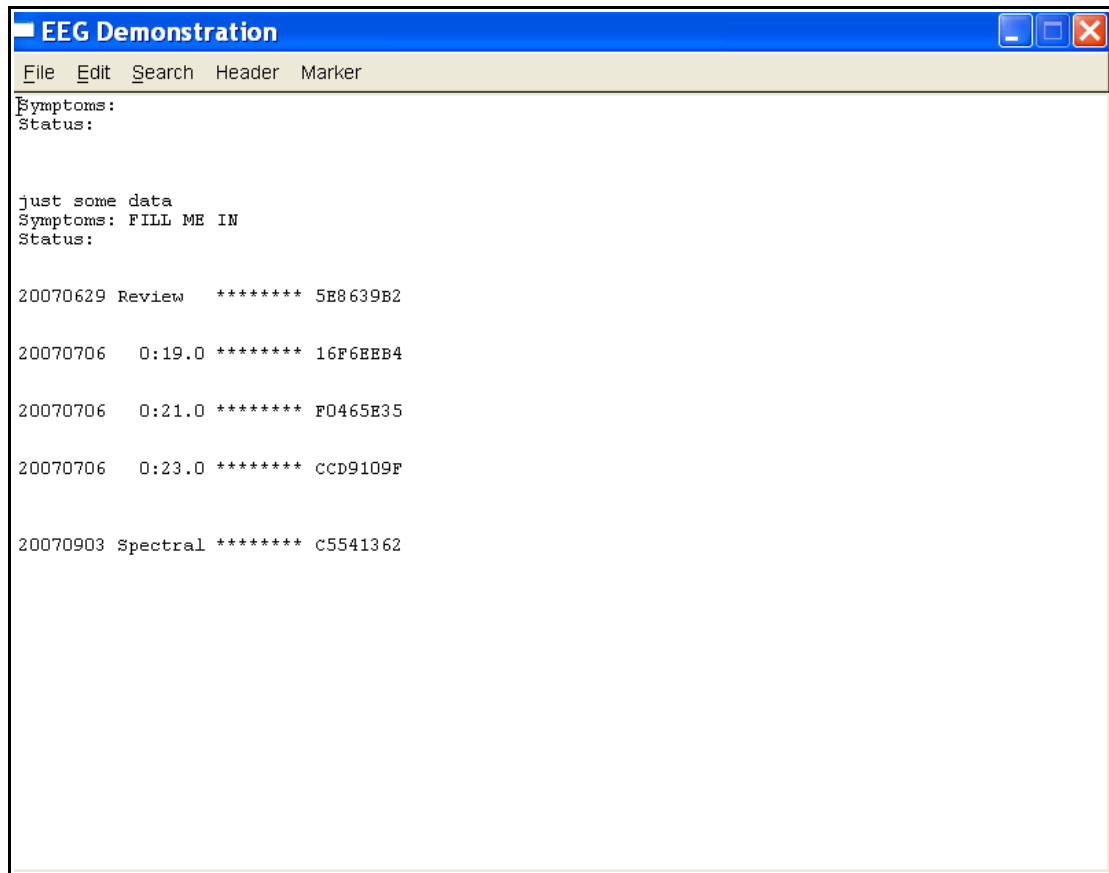
Options>	<input type="radio"/> Amp Asymm	<input type="radio"/> A Part A	<input type="radio"/> A Part B
Show>	<input checked="" type="radio"/> Color	<input type="radio"/> R Part A	<input type="radio"/> R Part B
Notes	<input type="radio"/> Abs Pl	<input type="radio"/> P Part A	<input type="radio"/> P Part B
Print>	<input checked="" type="radio"/> 0(1-4)	<input type="radio"/> 3(12.5-25.5)	<input type="radio"/> 6(15-18)
Exit	<input type="radio"/> 1(4-8)	<input type="radio"/> 4(25.5-30.5)	<input type="radio"/> 7(15-25.5)
	<input type="radio"/> 2(8-12.5)	<input type="radio"/> 5(12-15.5)	<input type="radio"/> 8
	<input type="radio"/> 9		

- Once you've selected the Z Score options, a red line appears at the bottom of the graph display. To view the Z Score deviation, adjust the **Scale** setting for the graph to "zoom in" on the Z Score line. For example, slide the Scale button to about 5 on the scale of 1 to 100. This gives an idea of how much the client's Z Score was over or under the norm.



## Appendix 21: Editor

EEGer contains a primitive text editor to allow notes and observations to be recorded during a feedback session (live or replay), client data review, and spectral data review. A typical screen looks like this:



The client “name” is shown on the top line (subject to HIPAA settings). The “Header” button pastes in the boilerplate file (specified by editing it from the “Preferences” menu) at the current cursor location. The “Marker” button pastes in a line of text with the date/time information. Also on the marker line is the relative session time (for live/replay sessions) or “Review” or “Spectral” to show when the marker was inserted. The remaining information (those letters/numbers on the marker line) are encoded information as to when the marker was “actually” created so that annotations can be forensically determined. However, the marker and header data is just text and can be deleted like any other text.

The editor is commonly started using F8 from wherever possible. It can be closed (and data saved) using F8, File->Exit, or clicking on the “x” in the upper right corner. The data is ALWAYS saved when the editor is closed. It is not possible to abort saving the data.

## Appendix 22: (Manual) Alternate Images for 4mation



### Technical Support Installing Alternate Images for 4mation

This is the “manual” procedure for adding images to 4mation. There is also an added utility (Image Installer) now available which is simpler. Please see that appendix for instructions.

You can customize your game setup to use different **Bitmap** (.bmp) , **JPEG** (.jpg) , or **PNG** (.png) format images with the **4mation** Neurofeedback Game. These instructions describe how to use copy & paste commands to make the images available and how to tailor the game options to take advantage of the new images.

*NOTE: The Game computer is the one you use to run games. It can either be your single-computer system or the Game/Client computer of a 2-computer system.*

#### There are methods for adding images to 4mation:

METHOD	DESCRIPTION	STEPS TO FOLLOW
1	Add images to those installed by the EEGer/EGS installation to display along with the original pictures.	<ul style="list-style-type: none"><li>● COPY IMAGES</li><li>● PASTE IMAGES (Method 1)</li></ul>
2	Create separate image folders on a local hard drive or mapped network drive to display different sets of pictures.	<ul style="list-style-type: none"><li>A. COPY IMAGES</li><li>B. PASTE IMAGES (Method 2)</li><li>C. CUSTOMIZE</li><li>D. CHOOSE CUSTOM IMAGES</li></ul>
3	Use a removable USB Flash drive that contains images. (NOTE: You cannot use a CD for optional images since the pictures cannot be accessed quickly enough when the game is running.)	<ul style="list-style-type: none"><li>● CUSTOMIZE</li><li>● CHOOSE CUSTOM IMAGES</li></ul>

#### Game Customization Options

When you have images in separate folders on your hard drive or on a removable USB Flash drive, there are additional options for using the alternate images. Directions for each option are detailed in Step D.

**Option 1:** Change images for the current session only

**Option 2:** Change images for all sessions of 4mation

**Option 3:** Create separate game definitions to choose images when you run a 4mation session



## **A. COPY IMAGES FILES TO PLACE IN AN IMAGE FOLDER**

For both Method 1 and Method 2, to add image files or use a different set of images from the hard drive, you must first select the files to copy to the hard drive.

1. Insert an image CD or USB Flash drive into the Game computer.
2. Double-click the My Computer icon on the Game computer's Windows Desktop (or select Start-My Computer).
3. Double-click the CD or USB Flash drive letter to display the contents of the drive.
4. Disk contents are usually displayed by Icon. From the View menu, select Details to list the files by Name. You can click on any "Header" above the columns to sort by Name, Type, etc.
5. Left-click on the first file you want to copy to highlight the name.
6. Hold down the Shift key and left-click on the last file you want to copy. This will cause all files in between to be selected. (Note: Ctrl + left-click will select/deselect individual files, in case there are certain files you don't want to copy).
7. Go to the Edit menu and select Copy (or press Ctrl+C).
8. Click the Back button in the toolbar to return to the list of drives on the computer.
9. Follow the instructions for the appropriate Method in Step B to make the make the files available for *4mation*.

## **B. PASTE IMAGE FILES INTO AN IMAGE FOLDER**

### **Method 1: Add Images to the Original 4mation Pictures**

1. Double-click the C: drive, which is often named "Local Disk".
2. Double-click the EEGer folder (c:\eeger).
3. Double-click the Games folder inside the EEGer folder (c:\eeger\games).
4. Double-click the Images folder within (c:\eeger\games\images).
5. Go to the Edit menu and select Paste (or press Ctrl+V). This will copy the Bitmap (.bmp) or JPEG (.jpg) files you've selected to add to the original *4mation* images.
6. Repeat Step A and Step B until you have all of the desired images in the new location.

### **Method 2: Copy Images to a New Folder for Customized 4mation Displays**

- e. Double-click the C: drive, which is usually displayed as "Local Disk (C:)".
- f. To create a new folder on the C: drive, go to the File menu and select New, then choose Folder.
- g. When the New Folder is created, simply type the name you would like to use for the folder. For example, create a folder named "EEGerImages".
- h. At this point, you can either proceed with the steps to place the images in this folder, or create a sub-folder to separate images for multiple choices.

For example:

- i. Double-click the EEGerImages folder you just created.
- ii. Go to the File menu and select New, then choose Folder again.
- iii. Type in the name of the sub-folder. For example, "Animals" or "Cartoons".
- d. Once you've created the folder where you want the files, double-click that folder to display the empty contents. (For example, double-click either c:\EEGerImages or c:\EEGerImages\Animals).
- e. Go to the Edit menu and select Paste (or press Ctrl+V). This will create a copy of the Bitmap (.bmp) or JPEG (.jpg) files you've selected to use when customizing the *4mation* images.
- f. Repeat Step A and Step B until you have all of the desired images in the new location.
- g. Next, you must perform Step C to customize the image sources for the *4mation* game.

### C. CUSTOMIZE 4mation TO ADD OPTIONAL IMAGE SOURCES

To configure *4mation*, the image folder must exist prior to customizing game options. Either create the folder (refer to Step B) or insert a USB Flash drive, so that the correct image location is available for customization. (You can use any USB Flash drive to configure the software; it is not necessary to have valid image files available at the time you perform these steps.)

- On the computer that will display the games, open the **Game Initialization Tool**. [Select *Start-All Programs*. Choose the *EEGer* folder, then *Game Initialization Tool*.]
- Double-click **4mation**.
- Locate the entry for “**List of possible directories**”. Click either the left or right column to select the “button” to edit the directory choices.
- Click the button labeled “**Add**”.
- Select the correct drive letter under **Drives:** (For example, c: or e:)
- Enter or select the correct pathname to display for **Directory name:** (For example, C:\EEGer\Images\Animals or E:\)
- Click **OK** to save the directory to the list of available choices.
- Repeat steps 5-7 until you’ve selected each possible image location.
- Click **Done** when finished adding directories.
- Click **Done-Save changes** to finalize the available choices for *4mation*.
- Click **Done-Save Configuration** to complete the changes for game setup.
- Finalize the changes for the Therapist software.
  - i. Single Computer: Select **Tools-Tailor Installed Games** and click **SAVE All Games**.
  - ii. Two-Computers: Select **Tools-Retrieve Installed Games** then select **Tools-Tailor Installed Games** and click **SAVE All Games**.

### D. CHOOSE CUSTOM IMAGES

#### Option 1: Change images for the current session only

- Select the client and click **Begin Session**.
- On the game selection screen, click the **Edit** button next to **4mation**.
- Scroll down to find “**Image directory to use**” in the left-hand. Click either the left or right column to select the “button” to edit the directory choice.
- Select the image source you want to use by clicking the radio button next to the pathname. (The default is c:\EEGer\Games\Images).
- Click **OK** to save.
- Click **Use these changes for this game run** to confirm your choice.
- Select **4mation** to start the session.

#### Option 2: Change images for all sessions

1. Select **Tools-Tailor Installed Games**.
2. On the Edit Game Definitions screen, click the **Edit** button next to **4mation**.
3. Scroll down to find “**Image directory to use**” in the left-hand. Click either the left or right column to select the “button” to edit the directory choice.
4. Select the image source you want to use by clicking the radio button next to the pathname. (The default is c:\EEGer\Games\Images).
5. Click **OK** to save.
6. Click **Replace Selection with changes** to confirm your choice.
7. Click **SAVE all games**.
8. Choose **4mation** when you run a session.

#### Option 3: Create a separate game definition with different images

1. Select **Tools-Tailor Installed Games**.
2. On the Edit Game Definitions screen, click the **Edit** button next to **4mation**.

3. The first line is “**What You want to call this tailored game**”. Click either the left or right column to select the “button” to edit the name.
4. Enter a name that will help you identify the choice (e.g., “4mation Animals” or “4mation on USB”) then click **OK** to save.
5. Scroll down to find “**Image directory to use**” in the left-hand. Click either the left or right column to select the “button” to edit the directory choice.
6. Select the image source you want to use by clicking the radio button next to the pathname. (The default is c:\EEGer\Games\Images).
7. Click **OK** to save.
8. Click **Create a new selection** to create a copy of the default game setup.
9. Click **SAVE all games**.
10. Choose the **4mation** name you just created when you run a session.

Other Items to Note:

1. If there are no Bitmap (.bmp) or JPEG (.jpg) files in the chosen directory, the *4mation* game will not run.
2. Take care when setting up to use different directories and customization if you use different game computers. If you run both single and two-computer setup, you may need to create image folders on both systems and it's easier if you use the same folder name to take advantage of custom settings.
3. When customizing the image source, look over the other game options you can use. For example, you can fill in the grid with Ordered or Random squares when displaying images.

## Appendix 23: Boat Race

### WayForward Technologies



You should have received the following items:

- **Boat Race™** Installation CD
- **EEGer™** Keyblock File Disk (license update, if games purchased separately)

In order for Boat Race to run, you will be installing game software on the Game computer and a license file on the Therapist computer. Boat Race requires 2-computer or Dual Monitor configuration.

### **System Requirements for Boat Race**

1. **EEGer** software version 4.2.0 or greater
  2. Windows XP/Vista
  3. 128mb or greater video memory; min. 800x600px, 16-bit color
  4. DirectX Version 9.0c or later with d3dx9 components\*
- **IMPORTANT:** Before installing a newer version of DirectX, be certain your video driver is compatible with that version of DirectX or you may experience problems with displays. DirectX 9 and d3dx9 installations are accessible by Exploring the installation CD contents.

### **Boat Race Installation**

#### **Game Computer – Software Installation**

- If the **EGS** game menu is displayed, press **Esc** to exit to Windows.
- Insert the installation CD into the Game computer's CD/DVD drive.
- In just a moment, the CD should start automatically and ask if you would like to install Boat Race. (If the CD does not start automatically, double-click on the "My Computer" icon, and double-click on the CD/DVD drive icon.)
- Click "Install Boat Race" and follow the on screen installation steps, choosing the default options.
- Once the software has installed, be sure to restart the computer.
- If using **EEGer/EGS** Version 4.2.x or greater, finalize the game installation:
  - 2-Computer Configuration: Launch **EGS** and press **F9**.
  - When the list of installed games appears, click **DONE-Save Configuration**.

#### **Therapist Computer - License Keyblock File Installation**

- Insert the **EEGer** Keyblock File Disk into the appropriate disk drive.
- Double-click the **EEGer** icon to start the program.
- Select **Files – Read EEGer Keyblock Files**.
- When prompted, use the Open dialog to locate the keyblock file on the CD. Click the filename to

- highlight the file and click OK.
- Finalize the Games:
  - Dual Monitor Configuration:**
    - select **Tools-Game Initialization Tool**.
    - Click **Done Save Configuration** then **Save All Games**.
  - 2-Computer Configuration:**
    - In **EEGer**, select **Tools – Retrieve Installed Games List**,
    - then **Tools-Tailor Installed Games** and click **SAVE All Games**.

### Boat Race Game Description

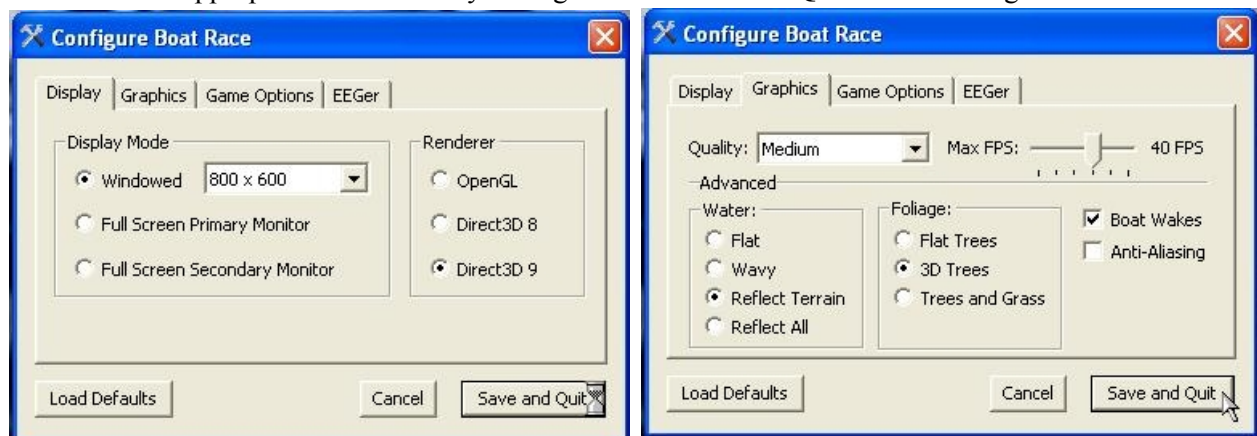
As the name suggests, Boat Race is a game where three boats race. The positions of the boats are driven by the inhibit and reward band amplitudes, with perspective and wake showing amplitude and speed increasing with amplitude.

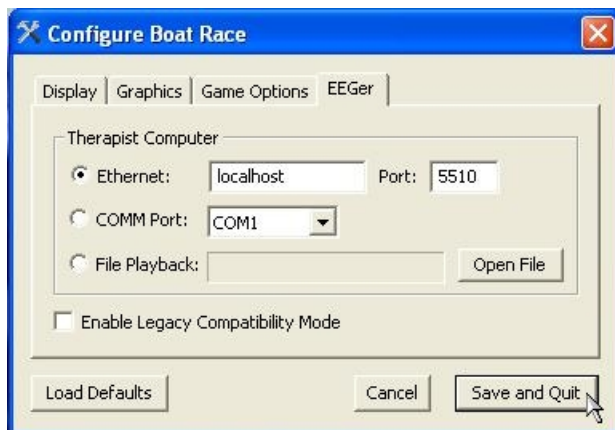
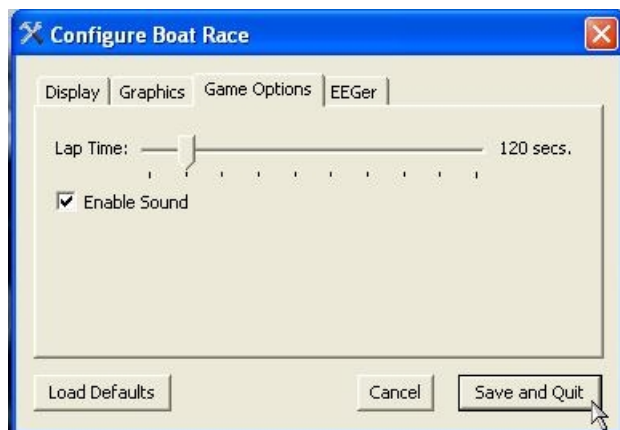
- Inhibit conditions cut off the audio and thrust of the center ('reward') boat making it fall back in the race.
- The colored bars at the bottom of the screen correspond to the amplitude of the inhibit and reward bands.
- The fuel tank at the upper-right of the screen indicates how long optimal focus is being sustained (maintaining above threshold reward signal with no inhibits).
- Inhibits can create a fog and dim the sky.
- With sustained focus the reward boat jumps a ramp for added interest.

### Game Configuration Options:

Click **Start** and select **Programs** or **All Programs**.

- From the **WayForward** Program Group, select **Boat Race - Configure Boat Race**.
- Select the appropriate tab to modify settings. Click **Save and Quit** to save changes.





## Appendix 24: Game Tailoring Options

All tailoring options have a unique number (prefix). Each unique number refers to a specific function which is common to all games which have that option. Not every option is present or available for every game.

**2: What You want to call this tailored game**

This is the text that appears on the Therapist selection screen and NOT what appears on the client Game Menu.

**3: Protocol classes for this game**

Selects which protocol classes this game is available for. Usually SMR and EXP since there is only one Alpha-Theta game.

**4: Run time in seconds for each period**

The length of each run period. Note that mazes and 4mation (among others) have the option to terminate a period when the 'game' completes. Default is 170 seconds.

**5: Pause time in seconds between periods**

This is the rest time between run periods. Default is 10 seconds.

**9: Provide reward scoring**

This option allows reward scoring (beeps) to occur.

**30: Frequency step when using Ctrl-up/down arrows**

Selects the frequency step size when changing reward frequencies. Note that this only works if you have selected a filter set in the Setup settings that supports the step size.

**80: Minimum seconds between reward sounds/counts**

Sets the minimum time between possible reward counts/beeps.

**81: Minimum seconds on reward task before reward**

Sets the minimum time that a rewardable state must be maintained before a reward/beep is commanded. Setting this too long will make rewarding very difficult since the measure is CONTINUOUS rewardable state. This action can be turned on/off during a session using the Ctrl-F2 option.

**83: Percentage on-task time required for reward**

Sets the minimum overall reward percentage to be maintained before a reward/beep is commanded. This action can be turned on/off during a session using the Ctrl-F2 option.

**90: Maximum data recorded (in minutes)**

Specifies how much storage is reserved for a session. Only this much data will be recorded. The maximum time is 90 minutes for a session. This time starts when the realtime session begins and ends when the realtime session exits.

**91: Seconds to lock out rewards after maxartifacts**

This specifies how long to monitor for artifacts and how long to inhibit rewards when the artifact count is exceeded. Intended to keep clients from artificially increasing the number of points scored by deliberately causing artifacts.

**92: Number of artifacts during holdofftime to trigger reward lockout**

Sets how many artifacts during the above specified time triggers the artifact reward inhibit.

- 101: Time constant for filter smoothing**  
Selects filter smoothing time constant. Usually 0.5 seconds. Larger values slow down reward/inhibit responses.
- 190: Show score count during periods**  
Display/not display the score count DURING a period.
- 200: Show inhibit channels**  
Display/not display inhibit data (if game supports this). In any case, no inhibit data will be sent anyway to the game if this is set to 0.
- 210: Show score screen during pauses**  
Show/not show score screen during pauses.
- 1080: Colorset to use for game frequency-specific colors**  
Specify which user-configured color set to use. Only spectral mirror and long-term displays use this at the current time.
- 1090: Mode used for spike detection**  
One of the spike detector modes. Available modes are:
- Disabled
  - In Period - display on therapist display, sound triggered on game if in feedback
  - Always - display on therapist display, sound triggered on game at any time
  - Just Show - display on therapist display
- 1091: Seconds to wait after spike to see if its really artifact**  
How long to wait after spike to see if its really an artifact.
- 1100: Image directory to use**  
Specify which image directory to get pictures from.
- 1101: List of possible directories**  
(Game Initialization Tool) Selection of possible directories to use at tailoring time.
- 1130: Filling last grid ends period**  
Option to end a period when the grid/picture completes.
- 1131: Grid filling style**  
Select grid fill mode – Ordered (left to right, top to bottom), Random, Weighted (random first grid selection then fill adjoining grids).
- 1133: Random sequence of files, not alphabetical**  
Specify random ordering of files.
- 1134: Image hold time (seconds) before score screen comes up**  
Specify how long a completed image is displayed before (possible) score screen appears.
- 1140: Grid size (0 for autosize)**  
A non-zero value forces a MxM rectangular grid for every image. Zero value picks random width/height sizes between specified limits below.
- 1141: Minimum grid x size (0, 2-25)**
- 1142: Maximum grid x size (25)**
- 1143: Minimum grid y size (0, 2-25)**



- 1144: Maximum grid y size (25)**
- 1145: Show first element of reveal at beginning**  
(dkgames) Shows first piece of a grid before the first reward.
- 1146: Show game rule conditions**  
(dkgames) Displays rule conditions during menu display.
- 1150: Seconds needed to remain on task**  
(Jumpbox) Maximum seconds allowed between rewards to keep chip moving.
- 1164: Swap alpha and theta sounds**  
(Alpha-Theta) Swaps water/ocean sounds.
- 1165: Transition rate for alpha/theta state change**  
(Alpha-Theta) Selects transition rate for state change. This can also be changed during A-T sessions using the volume control popup.
- 1170: 1 for classic game appearance, 0 otherwise**  
(Boxlights, Jumpbox, Highway, Island)
- 1171: 1 for warm, 2 for cold, 0 for color dependency**  
(Boxlights, Jumpbox, Highway, Island)
- 1172: 1 for frog image instead of boring black bars**  
(Jumpbox)
- 1200: Timer for expected reward rate**  
(dkgames) Seconds allowed between rewards before previous image pieces are UNdisplayed. This action can be toggled on/off during a session using the S popup menu.
- 1301: Not show happy face at completion of maze**  
(Mazes)
- 1402: Draw longterm display lines double-high**  
(longterm)
- 1403: Time width of long-term window**  
(longterm)
- 1404: Label lines with trace numbers**  
(longterm)
- 1700: Which artwork to use as overlay (0-3)**  
(DVDGame) Which overlay image to use for overlay mode.
- 1701: What kind of video control to use**  
(DVDGame) Options are OVERLAY, BLUR, BLACK, WHITE
- 1702: Time (seconds) to go from worst to best video**  
(DVDGame) How long to transition from complete obscurity to completely clear video when in a rewardable state.
- 1703: Time (seconds) to go from best to worst video**  
(DVDGame) How long to transition from completely clear to completely obscured when NOT in

a rewardable state.

- 1704: Minimum worst video percentage**  
(DVDGame) Worst obscuration percentage (video will never be obscured more than this percentage).
- 1706: Percentage of border size**  
(DVDGame) (not currently used)
- 1707: Pause video during pause**  
(DVDGame) Pause DVD playback when ever in PAUSE or STAGE state.
- 1708: Enable feedback sounds in addition to DVD soundtrack**  
(DVDGame) Provide normal EEger sound feedback in addition to DVD sound. This includes reward sounds as well as all the other sound modes.
- 2020: List of possible sounds**  
(Game Initialization Tool) List of possible sound files to select during tailoring.
- 2021: Pathname of reward sound**  
Full path of selected reward sound.
- 2023: Which L/R speaker the reward sound comes from**  
Sounds can come from the Left/Right/Both/Alternating speakers.
- 2024: Pathname of success sound**  
Full path of success sound for games which have a “success” condition.
- 2025: Which L/R speaker the success sound comes from**  
Sounds can come from the Left/Right/Both speakers.
- 2026: Maximum seconds for alternating reward sounds**  
If Alternating sounds was selected, specifies how many seconds from beginning of period that the alternation continues. After that time, sounds come from Both speakers.
- 2029: Sound channel for spike sound**  
Sound channel number for spike sound.
- 2030: Pathname of sound 0**  
Full pathname of a sound file
- 2031: Sound 0 play mode**  
Sound play modes are described in the Sound Controls appendix of the documentation.
- 2032: Which L/R speaker sound 0 comes from**  
Sounds can come from the Left/Right/Both speakers.
- 2033: Which strand feeds sound 0**  
Specifies which data path controls the sound action. This is described in the Sound Controls appendix of the documentation.
- 2034: Pathname of sound 1**
- 2035: Sound 1 play mode**
- 2036: Which L/R speaker sound 1 comes from**
- 2037: Which strand feeds sound 1**

2038: Pathname of sound 2  
 2039: Sound 2 play mode  
 2040: Which L/R speaker sound 2 comes from  
 2041: Which strand feeds sound 2  
 2042: Pathname of sound 3  
 2043: Sound 3 play mode  
 2044: Which L/R speaker sound 3 comes from  
 2045: Which strand feeds sound 3  
 2046: Pathname of sound 4  
 2047: Sound 4 play mode  
 2048: Which L/R speaker sound 4 comes from  
 2049: Which strand feeds sound 4  
 2050: Pathname of sound 5  
 2051: Sound 5 play mode  
 2052: Which L/R speaker sound 5 comes from  
 2053: Which strand feeds sound 5  
 2060: 6 comma-separated overall percentage enable points  
 2160: Sound file for alpha reward  
       Pathname of Alpha-Theta alpha reward (high-pitched bell)  
 2161: Sound file for theta reward  
       Pathname of A-T theta reward (low-pitched gong)  
 2162: Sound file for alpha state  
       Pathname of A-T alpha state (running stream)  
 2163: Sound file for theta state  
       Pathname of A-T theta state (ocean waves)  
 3000: Maximum number of strands to use  
       Reserved  
 3001: Maximum number of inhibit channels to use  
       Reserved  
 3002: Maximum number of reward channels to use  
       Reserved  
 3003: Maximum number of sounds to use  
       Reserved  
 4888: (GTOOL ONLY) Game name title order  
       Controls display order on the Client game menu

# Appendix 25: Coherence

*These instructions provide directions to activate and configure Coherence training modes.*

**For Coherence training, the following items must be valid:**

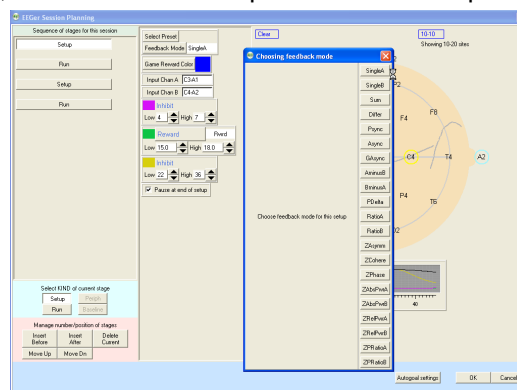
- A valid EEGer license for Coherence training must be installed.
- All modes use both Channel A and B: 2 signal, 2 reference and either 1 shared ground or 2 ground electrodes (dependent upon amplifier model). *ProComp/Infiniti amplifiers: An additional part, the FlexPro pre-amplifier, is necessary to utilize Channel B.*

## A. Install the EEGer Keyblock File:

- Insert the **EEGer Keyblock File CD** in your CD/DVD drive.
- If the contents of the CD are displayed automatically, close the window. You must load the key using EEGer.
- Start the EEGer program. From the **Files** menu, select **Read EEGer Keyblock Files**.
- Select the CD/DVD drive for the **Look In** field.
- The updated keyfile is displayed on the Open dialog. Click the filename to select/highlight and click **Open**.

## B. Select the Coherence training mode in Plan Session

- **Select Client** for Coherence training.
- Click **Choose Layout** to choose the number of traces for the EEG display, except 8-trace Layout (Dual mode training layout).
- Click **Plan Session**.
- In the **Setup** stage, enter the sites for Input **Chan A** and Input **Chan B**.



- Click **Feedback Mode** at the top of the middle column to display a menu of options. Click the appropriate button to select the Coherence mode:
  - **Psync** Comparison between filtered A and B envelopes (formerly Synchrony)
  - **Asyn** Comparison between filtered A and B envelope slopes (formerly Comodulation)
  - **GAsyn** Comparison between lowpass A and B envelope slopes (formerly Global Comodulation)
  - **AminusB** Difference between filtered A and B envelopes
  - **BminusA** Difference between filtered B and A envelopes
  - **PDelta** Comparison of phase difference between A and B signals
  - **D/S-Ratio** Ratio of (A-B) to (A+B)
  - **Unity** Compute  $1 - |(A-B)/(A+B)|$  similar to **D/S ratio** except absolute value

- Enter other relevant details for Setup and Run stages and click **OK** when finished.

### **C. Begin Session**

- Apply sensors to the appropriate sites and connect to ChA and ChB of the amplifier.
- Set scales and thresholds and press **F5** to run the session.
- To change the Coherence training mode during training, press **Shift+F3** for a menu of choices.

*It is suggested that you make changes to the session plan prior to the arrival of your client.*

### **SET UP A COHERENCE TRAINING SESSION**

- Once EEGer is launched, select your client and go to the **Plan Session** screen.
  - Click **Feedback Mode**. You should get a long vertical list of choices.
  - Choose **Psync**. Make sure that Psync is what now displays in the box directly next to the Feedback Mode box.
  - Coherence training requires input from 2 channels so make sure that you set up both Channel A and Channel B on your amplifier. While on the Plan Session screen enter the site in the Input Chan A box (for example C4-A2) and the site in the Input Chan B box (for example C3-A1). These sites should be derived from a qEEG report.
  - Using the bandwidth information provided in the qEEG report; enter the numeric values for the frequencies that need coherence training in the REWARD band (for example "increase coherence in the 8-11 Hz range").
  - Click the button labeled **Reward** to select the appropriate mode for the type of coherence training to be performed. If you wish to INCREASE coherence, choose **Rwrdr**. If you wish to DECREASE coherence, select **Down** and the box next to the REWARD box changes to Down.
- NOTE: Coherence training is performed using the REWARD frequency band(s). Any Inhibit bands in the selected layout can be set to values based on your training or according to information in the QEEG report. The inhibit frequencies may overlap the reward/coherence frequencies to any degree.
- Set the RUN time for the length of time you wish to do coherence training.

### **RUN A COHERENCE TRAINING SESSION**

1. Go to **Begin Session** and select a game.
2. At the bottom of the Therapist screen you should see the word **Psync**. This confirms that you set up the training mode correctly and are properly licensed to run coherence training.
  - Press the **Page Down** key until you highlight the Reward band.
  - Once the Reward band is highlighted press **F9**; the Scale number in the Reward band should now be highlighted.
  - Use the – or + keys to change the scale to **2**. Press **Enter** twice to de-select.

#### **NOTES:**

- While running a coherence session, the signal in the Reward band does not look like a typical EEG signal, it is a smoother line that goes UP when the two signals (Channel A and Channel B) are MORE coherent and DOWN when they are LESS coherent. The number next to the AVG under the Reward band now represents the numerical value of coherence, not amplitude. Perfect coherence shows as 10. (While increased coherence

may be the goal, perfect coherence is not necessarily ideal for achieving optimal performance.)

- Typically you can set the % Above numbers in the Reward band (now functioning as the coherence band) at 70%-80% to provide adequate information about the level of coherence. Set the inhibit band % Above numbers based on previous sessions or in a way that gives enough information about the frequency you are choosing. (This is a clinical judgment issue.)

Instructions prepared and reviewed by Joy Lunt, R.N., BCIA-EEG Fellow; Harold Burke, Ph.D., BCIA; Gary Schummer, Ph.D.

## Appendix 26: Using Checktrode®



MODEL 1089e  
(black)



MODEL 1089MKIII  
(gray)

1. Prep the placement sites and attach the YELLOW (signal), BLUE/GREEN (reference), and BLACK (ground) electrodes. (To prep sites: Scrub the skin with a cotton swab and NuPrep. Apply the 10/20 paste directly to the electrodes.)

- Tip: To gain experience with the Checktrode, you can place the electrodes on your forehead and ears to avoid the interference of hair.

2. To begin testing, plug the end of the YELLOW (signal) electrode into one of the red or black holes at the bottom or side of the Checktrode. Plug the end of the BLACK (ground) electrode into the remaining hole.

3. If you have the Model 1089MKIII with the Digital/LCD screen display, make sure your blue dial is set to **contact KΩ** (second line from the left).

4. Press the red button on the Checktrode to test impedance.

- Model 1089MKIII (Gray):

The digital number displayed should be under 20, ideally under 10. You may go as high as 30 as long as the signal is clearly visible in the software.

If there's a "1" all the way to the left of the LCD display, this means either:  
only one electrode is connected to the Checktrode OR  
you need to improve the contact.

If this is the case, prep the placement site again and make sure you don't have hair under the electrode. After trying several times, it is advisable to clean up and start again; too much paste over too large an area can make it hard to get an optimal reading.

- Model 1089e (Black):

The LED light should be yellow or green, which indicates impedance is under 20K=.

If the reading is >40K=, this means either:

only one electrode is connected to the Checktrode OR  
you need to improve the contact. If this is the case, prep the placement site again and make sure you don't have hair under the electrode. After trying several times, it is advisable to clean up and start again; too much paste over too large an area can make it hard to get an optimal reading.

**5. Remove the YELLOW electrode from the Checktrode and replace it with the BLUE/GREEN (reference) electrode. Repeat Step 4 with the BLUE and BLACK electrodes connected to the Checktrode.**



## Appendix 27: dkgames for EEGer™

**dkgames™** are available in six different training groups:

**Emotional  
Development**

**Right Brain Exercise**

**Perception Exercise**

**Serenity**

**Games for Adults**

**Games for Kids**

**The complete six-game suite consists of thirty-three different sets of images for client feedback.**

---

**You should have received the following items with your purchase:**

- **dkgames** Installation **DVD**
- **EEGer™** Keyblock File Disk (license update, if games purchased separately)

In order for **dkgames** to run, you will be installing game software on the Game computer and a license file on the Therapist computer. The games require 2-computer or Dual Monitor configuration.

### Requirements for **dkgames**

**A.**EEGer software version 4.2.1M (or later)

**B.**Windows XP/Vista

**C.**1.54 GB of free hard drive space

**D.**A DVD drive for the installation DVD (*contact ESS for instructions to create CD's from the DVD*)

---

## INSTALLATION INSTRUCTIONS

- **IMPORTANT:** You must install EEGer Version 4.2.1M (or later) **before** installing **dkgames**.
- Insert the **dkgames** installation DVD into the appropriate drive. (*If the computer cannot read the contents of the disk, please make sure you are using a DVD drive and not a CD-only drive.*)
- When the installation dialog appears, click **Next**.
- To install, accept the default path (C:\DKGAMES) or choose a different destination. Click **Next**.
- Select the categories you've purchased for installation. You may also choose "Additional Sound Installation" to include a group of audio clips. [Default location is  
C:\DKgames\Sounds]
- Click **Next** to begin the installation.

- Click **Finish** when the installation is complete.
- FINALIZE GAME INSTALLATION
  - **Two Computer Configuration:**
    1. Launch EGS on the Game computer.
    2. Press **F9** to display the Game Initialization Tool. *(Please be patient...this may take a few minutes)*
    3. Click **DONE – Save Configuration**.
    4. On the Therapist computer, launch EEGer.
    5. From the **Tools** menu, select **Retrieve Installed Game List**. Click **OK** on the Success message.
    6. Click **Save all games**.
  - **Single/Dual Monitor Configuration:**
    1. Launch EEGer.
    2. From the **Tools** menu, select **Game Initialization Tool**. *(Please be patient...this may take a few minutes)*
    3. Click **DONE – Save Configuration**.
    4. On the next list, click **Save all games**.

### **dkgames: Selection in EEGer**

- Select your client and click **Begin Session**. Choose the **dkgames** category title from the list of available games.
- From the EEG realtime display:
  - i. Press the **S** key on the Therapist computer keyboard to display the special games dialog.
  - j. To make a change, scroll to **Group** or **Subgroup**.
  - k. *Single monitor configuration only:* Press the **Space Bar** to view the game choices.
  - l. Press the plus or minus key (+/-) to display the next available game group/subgroup option. (The **Group** is displayed in blue text and **Subgroup** is displayed in green text.)
  - m. *Single monitor configuration only:* Press the **Space Bar** to return to the EEG display.
  - n. Press **Enter** to close the special games dialog.

### **Descriptions of Groups and Subgroups**

- **Emotional Development:** Focuses on emotion and nonverbal communication. Images are faces, nonthreatening animals, peaceful scenes, and signs of intergenerational synchrony in both humans and animals.

- Young Faces: Emotionally expressive children, scenes of safety with young animals and their parents, or young animals approaching the camera. Images are revealed one section or panel at a time, until the entire image is shown (mosaic mode). [350 photos]
- Where's Wanda in the Animal Kingdom: Images with Wanda the butterfly who we try to spot as she hides amid a variety of animals. She's very shy and often camouflages herself! [300 images]
- Where's Wanda around Children: Images of Wanda the butterfly hovering near expressive eyes, mouths, or at the end of a child's gaze. [300 images]
- Where's Wanda in Nature: Wanda the butterfly hiding amid peaceful and serene scenes of nature. [450 images]
- Name that Emotion: Ekman-like faces designed for children. The 6 major emotions (fear, anxiety, anger, surprise, happiness, sadness) are expressed by teenagers, young kids, and the occasional adult. [150 sets]

■ **Right Brain Exercise:** Emphasizes layers of visual perception and the arbitrary semantic divisions of the world around us. Humor and metaphor-based exercises are also included, to develop those strengths of the right cerebral hemisphere.

- Whatzit: Skewed (non-canonical) views of everyday objects. The two hemispheres must work together to identify common household items from atypical perspectives and extreme close-ups. [275 photos]
- Focus: Places or objects that are shown out of focus, then incrementally brought into focus. [75 photographs]
- Zoom out: Photos begin as extreme close-ups; the camera pulls back to reveal the entire subject. [225 photos]
- Om: Beautiful and luscious words (e.g., ethereal, callisto) or non-words (e.g., satellania, quoxidian, amanzi) are presented against backdrop images that extend or disambiguate their meaning. This set juxtaposes strengths of the left hemisphere (verbal) against strengths of the right hemisphere (holistic). [350 images]
- Jokes: 40 jokes set against images consistent with the humor.
- Oracle: Images that allow us to ask the Great Oracle any question we want and to bask in her extraordinary wisdom (i.e., a version of magic eight-ball) [165 images]

■ **Perception Exercise:** Centers on conscious and non-conscious visual perception. The role of color (cortical) along with resolution and form stability (subcortical and cortical) are explored by this collection, along with conscious exploration and the effect of atypicality and novelty on meaning.

- The Color of Art: Works of modern art in which color is added incrementally to a masterpiece. Paintings begin as dark and light versions of themselves and slowly transform into their final form. [150 images]
- The Color of the World: Photographs of nature and people in which color is added incrementally. [150 photos]
- Places in Focus: 75 sets of images of unusual scenes and events shown out of focus, then brought into focus.
- Art in Focus: Well-known works of arts which are brought into focus. [25 images]
- Unstable Art: Painted portraits that transform (morph) into other works of art or to real people. [150 images]
- Visual Exploration: Scenes (artwork, animals, or places) are explored in a series of selected close-ups followed by the entire scene. [125 images]
- Where's Wanda in Art: Works of art in which Wanda the butterfly hides, sometimes merging into the canvas itself. Be warned - she can be very shy around the masters and hard to spot! [450 images]

- **Serenity:** Focuses on the extremely vast, the infinitesimal, and the verbal freedom in between.

- Universe: Photographs of the larger world, from galaxies to sky to ocean. [275 photos]
- Unusual Beauty: Photographs of nature in its most striking attire. [450 photos]
- Sayings: 120 humorous sayings to ponder.
- Ancient Wisdom: 300 phrases from Tao, Gnostic, and Judeo-Christian traditions.

- **Games for Adults:** Designed to enable Neurofeedback training during mathematical processing, response inhibition, as well as visual and verbal perception.

- Mathematics: 100 addition and subtraction problems with answers (e.g.,  $2 - 3 + 3 = 2$ ).
- Stroop: Versions of the Stroop test in which the color of a font is to be said aloud while inhibiting the meaning of the word. This is a frontal lobe test (response inhibition). For instance, the word "green" may appear in a blue font and we should say aloud "blue" and inhibit what we read (the word "green"). [100 images]
- Masterpieces: Modern art paintings, revealed randomly (mosaic mode). [450 images]
- Unusual places: Photographs of nature and places. [450 photos]
- Word race: 100 sets of words in which we must decide or guess which of two words is longer as they are revealed letter by letter. This tests verbal perception, tapping on our entire lexicon to compare and discard likely word candidates as the words are slowly revealed.
- Where's Wanda in Masterpieces: Works of art in which Wanda the butterfly hides, sometimes merging into the paint itself. Be warned - she can be very shy around the masters and hard to spot! [900 images]

- **Games for Kids:** Designed for children. Reward centers on animals, bugs, and household items.

- Animals in Focus: Photos of animals shown out of focus, then incrementally brought into focus. [75 photos]
- Animals Everywhere! : Photos of animals in the wild (a few in captivity) presented in mosaic mode. [250 photos]
- Bug race: Races between butterflies, ladybugs, ants, and the occasional hungry spider. [100 variations]
- Road race: Races between double-decker buses, cars, and trucks. [100 variations]
- Where's Wanda in the World: Images of Wanda the butterfly hiding in unusual places. [450 images]

## Appendix 28: DVD Game

The DVD Game uses a computer capable of playing/displaying a DVD (or other video presentation) and modifying the video presentation in response to the client's rewardable state.

The game currently uses the VLC media player. VLC is freely downloadable (a copy is on the DVD Game distribution CD). The VLC media player is a highly portable **multimedia player** capable of playing many forms of content. If VLC cannot play a DVD on the monitor to be used for DVD display by itself, neither can DVD Game.

The first issue (before everything else) is to confirm that the computer to be used for DVD display can successfully display DVD content using VLC. Currently, DVDGame **only** works with version 1.0.5 or 1.0.6 of VLC. There is a newer version of VLC in the works but it is not yet stable enough to use. Note: VLC was chosen as the media player since it was the only media player to work correctly on all the machine varieties attempted.

### Test:

1. If VLC 1.0.5 is NOT installed, install it (from a download or from the DVDGame CD).
2. Start VLC and move it to the monitor to be used for the game display.
3. Put a DVD in the DVD drive on the computer.
4. Verify that the DVD plays.
5. Leave the VLC display on the monitor to be used.

### Installation:

1. Install DVDGame from the CD on the computer that the games run on.
2. Install the DVDGame keyfile on the therapist computer.
3. Start EEGer and run the Game Initialization Tool. Make sure the DVDGame is shown.
4. Click on Done-Save configuration.
- 5a. 2-computer systems:  
Tools->Retrieve Installed Games  
Click on Save all games.
- 5b. Dual-monitor systems:  
Click on Save all games

At this point, DVDGame is a selectable game just like any other EEGer game.

## Game usage:

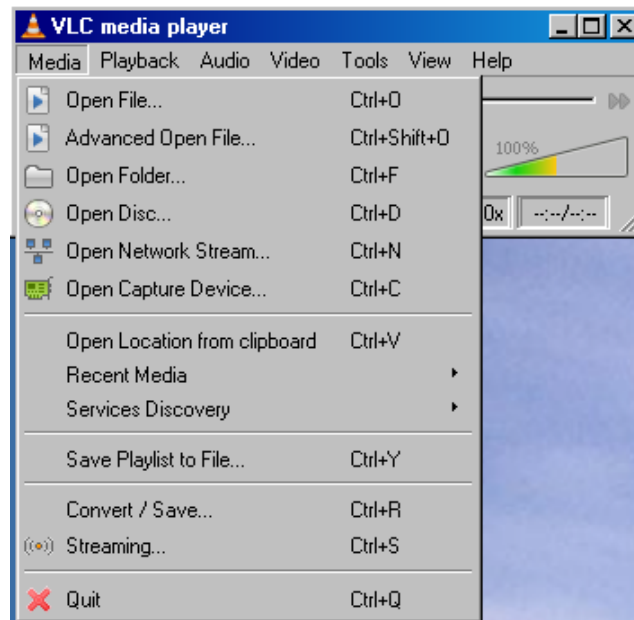
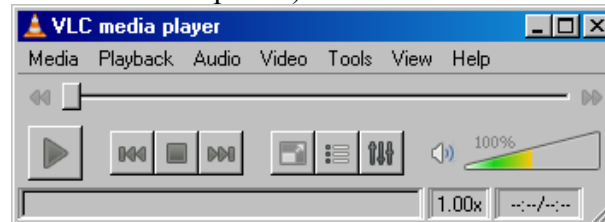
Run EEGer and select DVDGame as the game. EEGer will automatically start VLC and wait for the operator to continue.

If there is no DVD already installed, you get a popup message telling you to select one from the VLC menus.



If there is a DVD already installed, it will be automatically selected.

If no DVD was mounted, you may have to select the video (device or file) from the VLC menus. (Don't forget the "Recent media" menu options).

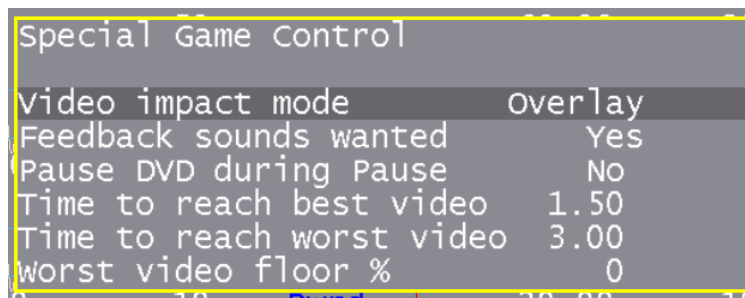


## IT IS THE OPERATOR'S RESPONSIBILITY TO NAVIGATE THROUGH THE MENUS AND ACTUALLY START THE GAME RUNNING AT THIS POINT!!!

DVDGame is not smart enough to figure out where to click the mouse on the item which actually plays the video. Many DVDs have coming attractions, FBI warnings, and other gallimaufry at the beginning. VLC will let you fast forward or chapter-skip on ahead. You must actually **start** the video **playing** since EEGer monitors the “time” and will pause if the video is not running. VLC will play many other kinds of video files. Any video playable by VLC can be used for DVDGame. Remember to click back on the EEGer brainwave screen when you want to control EEGer.

DVDGame works by obscuring the video from the DVD whenever the client is not in a rewardable state. The clinician gets to set the rates that the video obscuration gets better or worse (and a floor for the obscuration). The obscuration clears up during REST and PAUSE states of EEGer.

Things that can be controlled (initially set by the tailoring) using the “S” popup menu during a session:



- A. The kind of obscuration - 4 choices
  1. Overlay – this is a black-noise overlay over the picture
  2. Blur – this is a motion blur of the picture
  3. Black – this makes the picture fade to black
  4. White – this make the picture fade to white
- B. Whether EEGer sounds are desired (reward, etc.) in addition to the DVD audio.
- C. Pause DVD during Pause – this makes DVDGame pause the video when F5 or a STAGE state pauses EEGer. You probably don't need this.
- D. Time to reach best video – this is the time in seconds to change from totally obscure to totally clear video. This time constant is used to clear the obscuration when the client is on task.
- E. Time to reach worst video – this is the time in seconds to change from totally clear to totally obscured video.

F. Worst video floor – this is the lowest percent obscuration that will occur. This would be used as a way to provide some incentive to clearing the video when the client is mostly off state.

The V volume control popup can decrease the playback volume but cannot go above what the speakers are set for. The V control (master volume) works even before you start the session. Set the speakers high enough so you can turn DOWN the volume from the V or just manage the speaker volumes with the physical speaker control if you have one.

Caveats:

1. Some computers are just too slow to work. DVD Game cannot fix that.
2. Some computers (mostly laptops) have DVD drives that are too slow to play very well. Options are to update the drive or install some 3<sup>rd</sup> party software and copy DVD images to the hard drive (this also means they will be available right away.....).

About DVD videos.

It can take some time to prepare a DVD for playback during a session. Be sure to practice and plan ahead for this. Another option is to copy a DVD to the hard drive on the game computer. This can make it quicker to get started. Be advised that the MPAA (and DMCA) make it hard to do this since they believe that they “own” the video and not you. That aside, there are a number of programs that allow making a hard-drive copy of a DVD, which is perfectly legal (but I am not a lawyer) if you own the DVD.



# Appendix 29: Protocol Transfer Utility

## Purpose of the utility

This utility program exists to allow transfer of EEGer Session Plans and Presets between clients and between clinicians.

Session plans are comprised of a series of setup stages (setting frequencies, electrode sites, modes, etc.) and run stages (time to run at the previous setup).

Presets are comprised of single setup stages that can be entered into a session plan from a selection menu. They have all the same settings/values that a setup stage in a session plan can have and are intended to speed up creating custom session plans for a client. Presets are organized by protocol class and by layout.

Session plans can be packaged (by the utility) into tiny compressed files. These files can then be (re)loaded as either default session plans or session plans for specific clients. They can also be transmitted via email or downloaded (from some TBD site) and installed on any clinician's system (and then installed wherever). The limitation is that the plans are "Layout-specific" meaning that you cannot load a 5-trace layout plan into a 6-trace layout (but I handle that internally).

Presets can be gathered up and packaged (by the utility) into tiny compressed files. The presets can then be added to existing presets, either for the same protocol class or for a related class (AT presets NOT allowed in SMR, for example). They can also be transmitted via email or downloaded (from some TBD site) and installed on any clinician's system (and then installed wherever).

## Installation

The utility is available from [www.eeger.com](http://www.eeger.com) (Click on the Downloadable Files and Updates page, then click on Handy add-on utilities for EEGer). It may already be preinstalled with EEGer.

The utility is installed just like other installation programs – start it and acknowledge the prompts. The only option during installation is whether or not a desktop icon is created for the utility.

## Starting the utility

Click on Start->All Programs->EEGer->Protocol Transfer Utility or Double click on the desktop icon. Recent EEGer versions also have a start option under the **Utilities** menu.

## **Usage**

There are six option buttons on the main screen:

***Install Session Plan for a Client***

***Install Session Plan as a Default Session Plan***

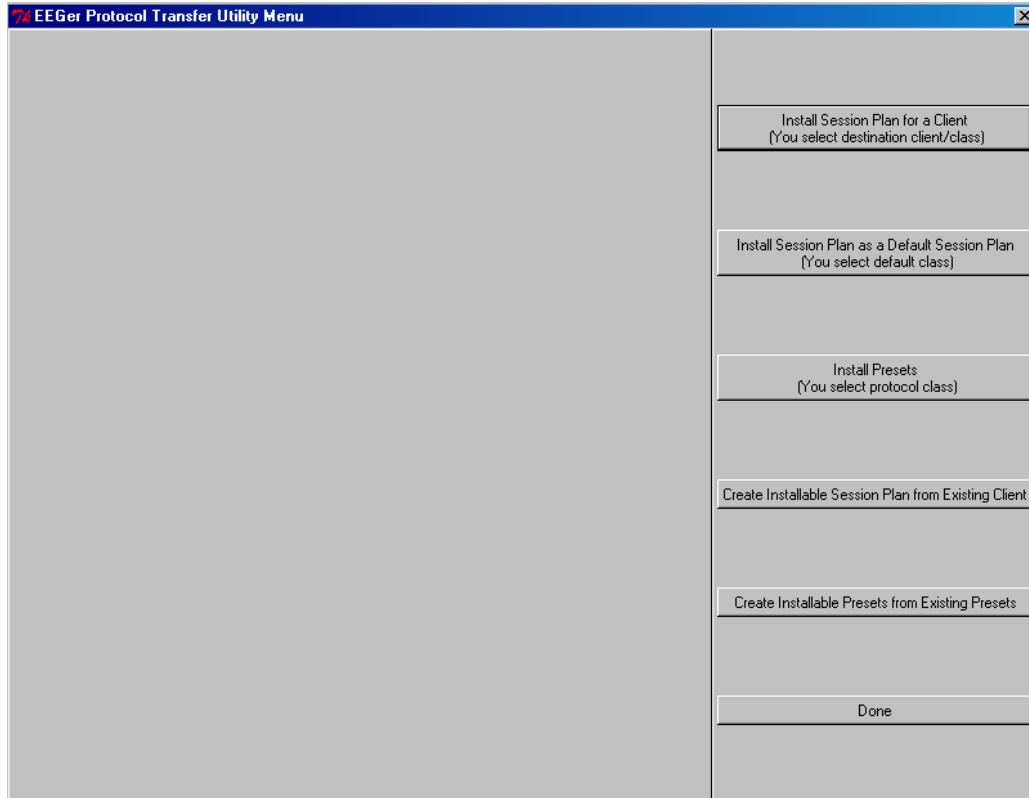
***Install Presets***

***Create Installable Session Plan from Existing Client***

***Create Installable Presets from Existing Presets***

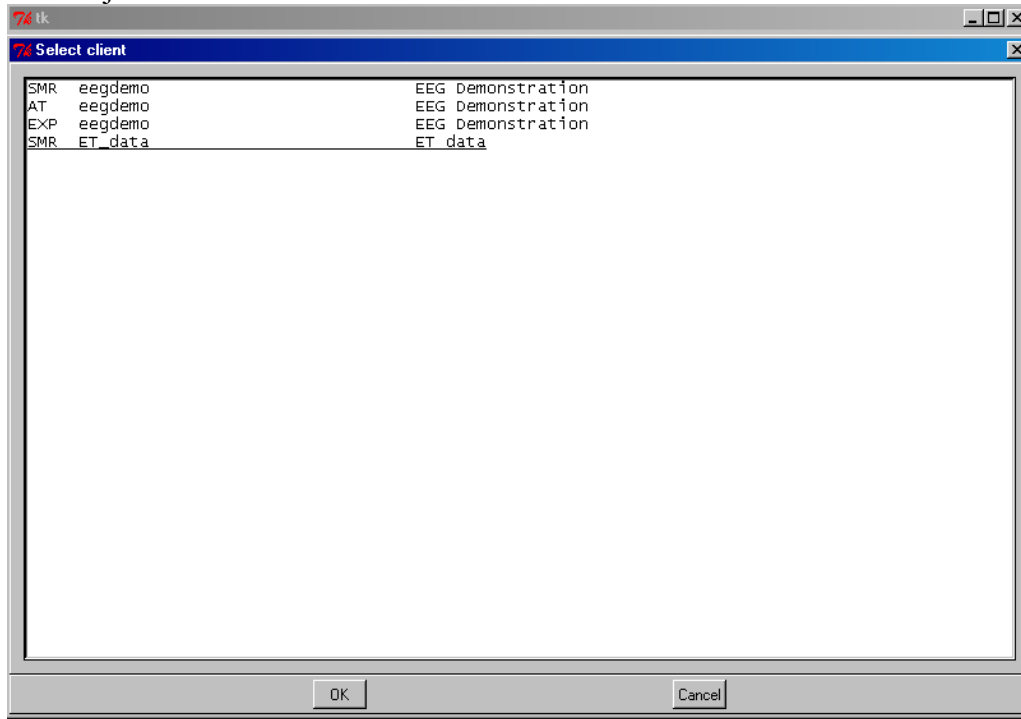
I would like to believe they are self-explanatory but the detailed procedures are described following.

The main menu looks like this:

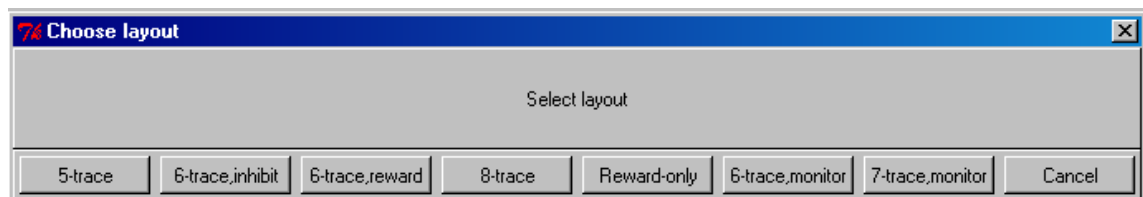


The first process to discuss is creating an installable session plan to use.

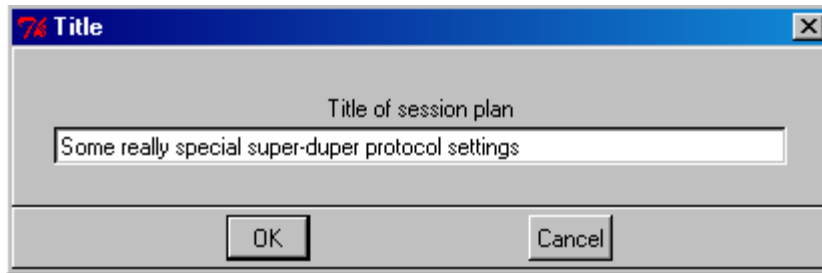
Clicking on “**Create Installable Session Plan from Existing Client**” brings up a client selection screen just like in EEGer:



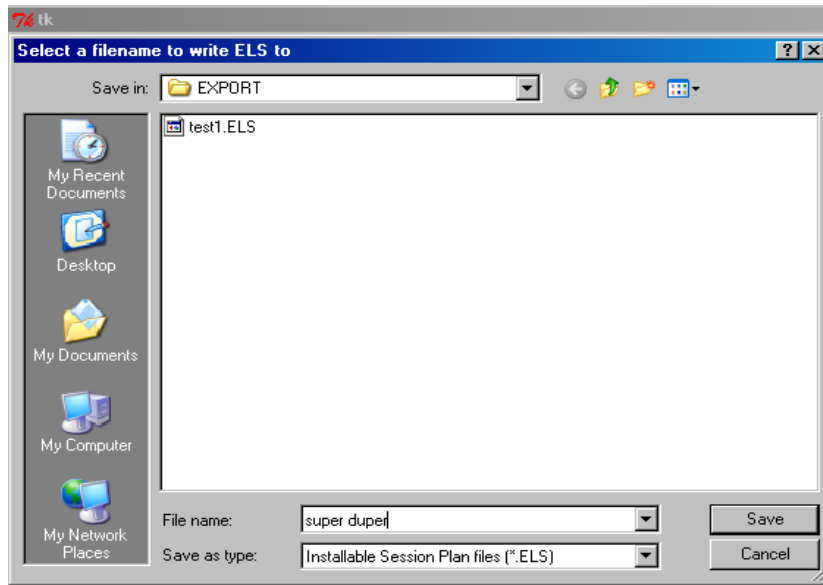
At this point select the client/protocol class you want to draw a session plan from. The next screen



lets you select which layout the session plan is drawn from. The plan itself is unmodified – only a copy is made. Then, you enter a descriptive line (such as why this is a great session plan):

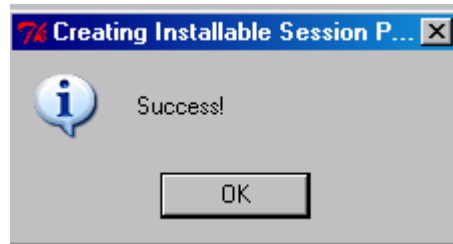


Now you select a file name for the file (which should help in selecting such a file later):



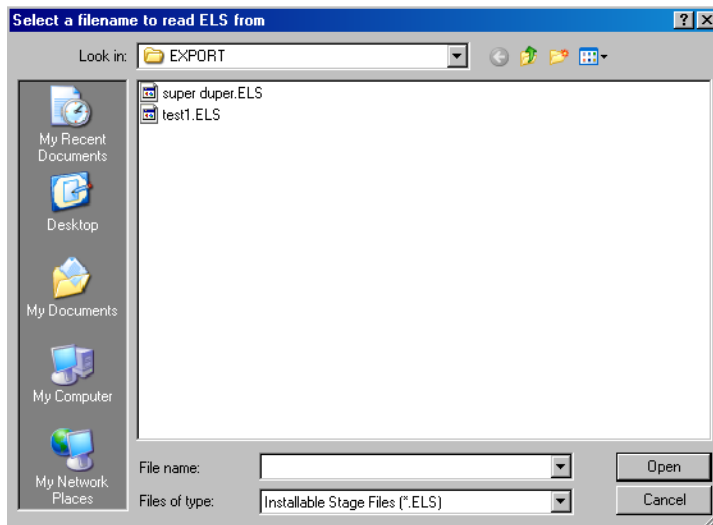
The default location for these files is C:\EEGer\Export but you can save them anywhere you like.

Next -

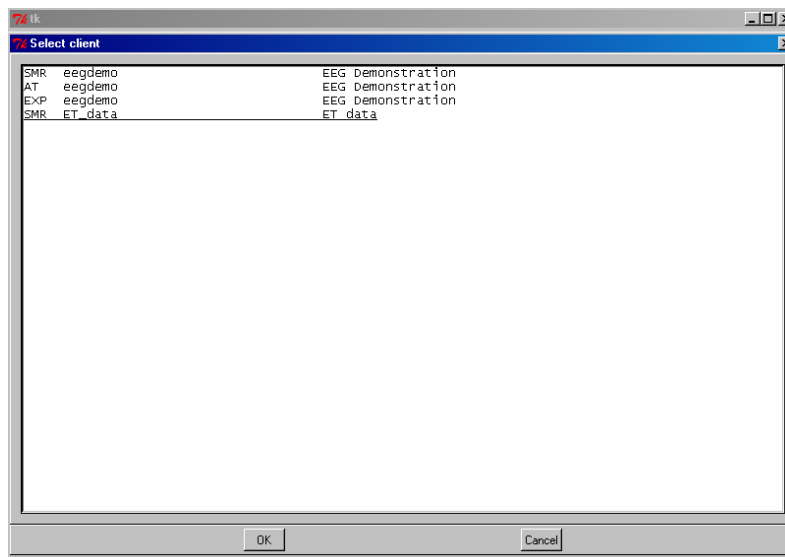


Now that we have an installable session plan, let's install it.

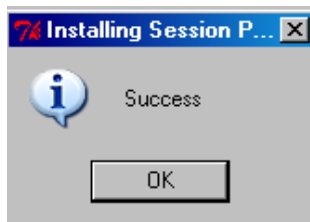
Clicking on “***Install Session Plan for a Client***” brings up a file selection menu:



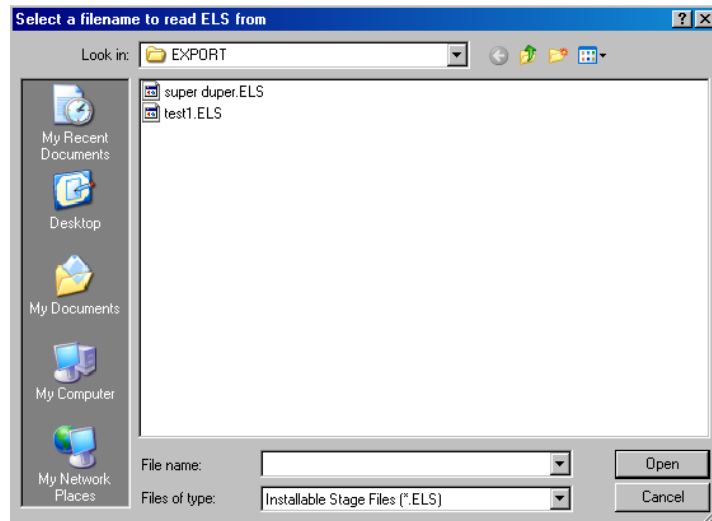
Selecting (double click or select and click on Open) a file lets the utility validate that it IS a valid session plan and then brings up a client selection menu for you to select the **recipient** client for the session plan.:



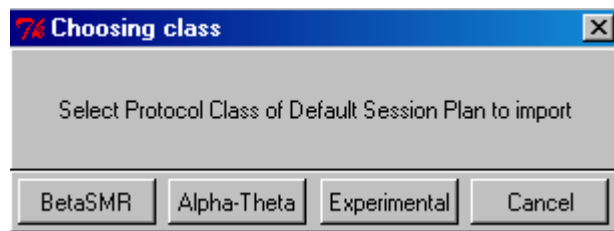
After selecting the client -



If you want to install a session plan as the “default” plan, click on “***Install Session Plan as a Default Session Plan***”. This brings up the plan selection screen:



After selecting a plan, the default destination selection screen comes up:

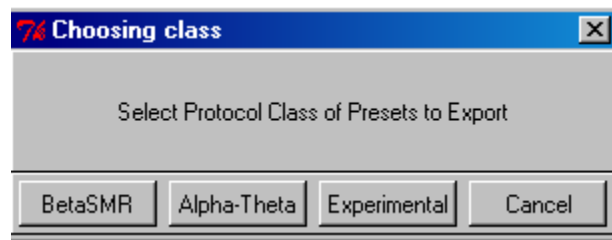


After picking the desired compatible protocol class -

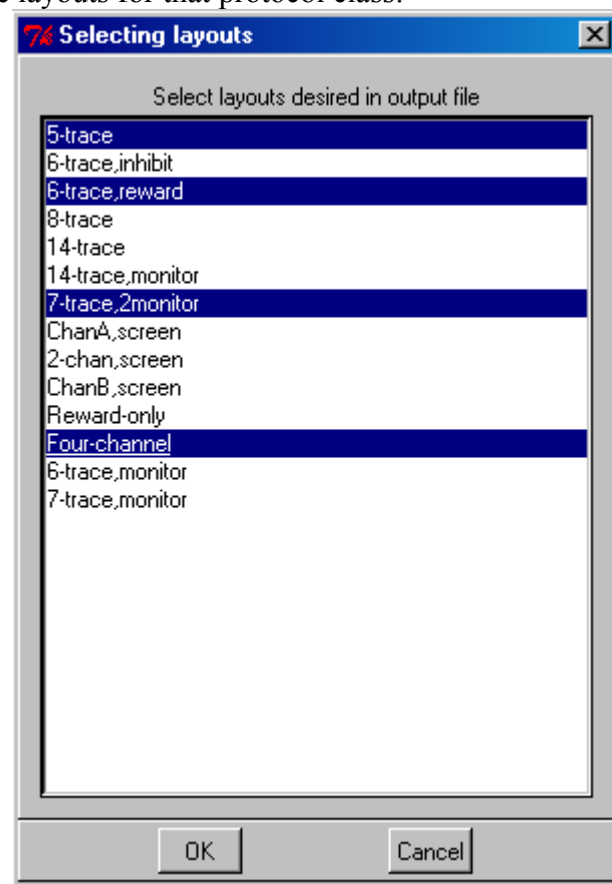


To create an installable presets file, click on “**Create Installable Presets from Existing Presets**” from the main menu.

Then choose the protocol class to export from.

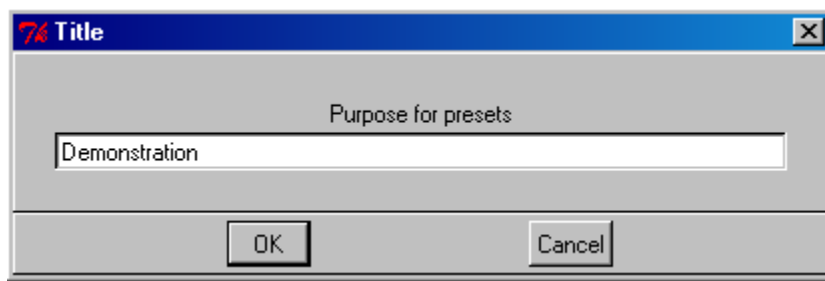


You then get a list of the layouts for that protocol class:



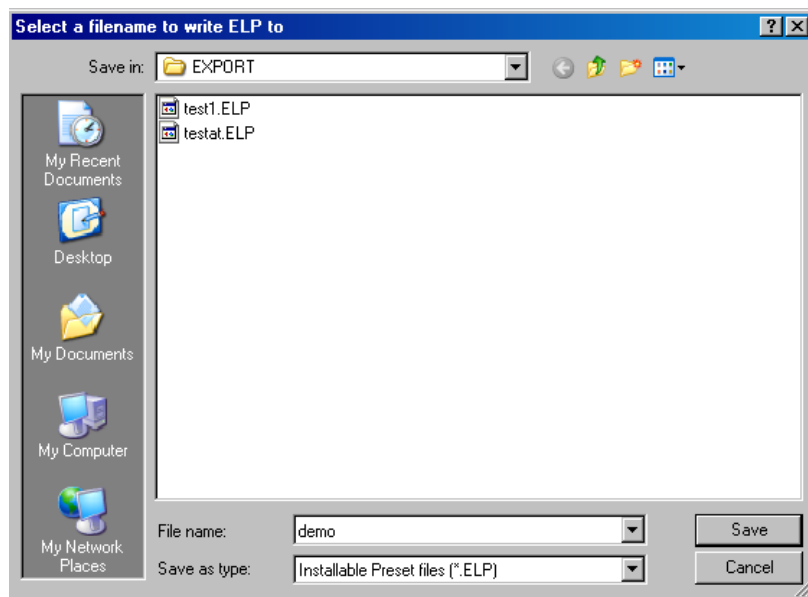
You can select one or more of the layouts to export presets from (Ctrl-click for more than one).

When done selecting layouts, click OK and the following screen comes up:



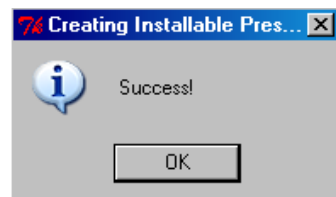
Enter something useful as a reminder.

Clicking on OK brings us to the export file naming screen:



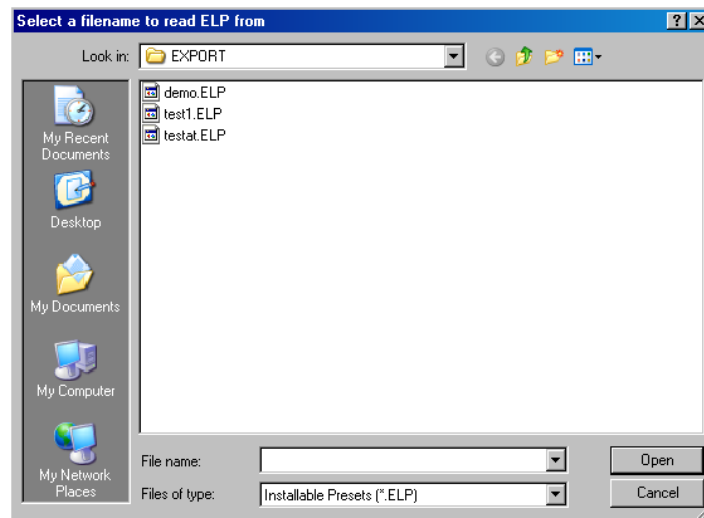
It is usually better to pick a (short) descriptive file name so you can recognize it later.

Then, of course:

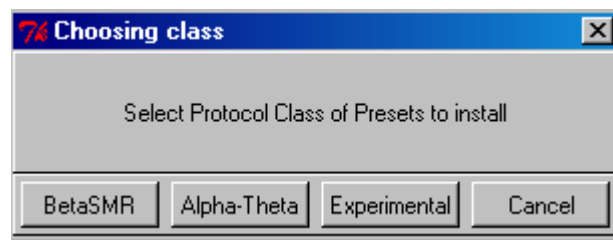




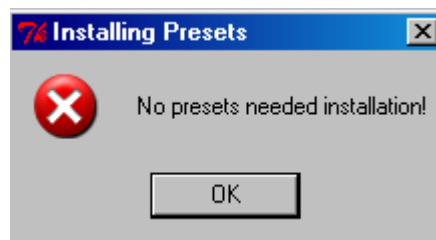
To actually install presets, click on “***Install Presets***” from the main menu.



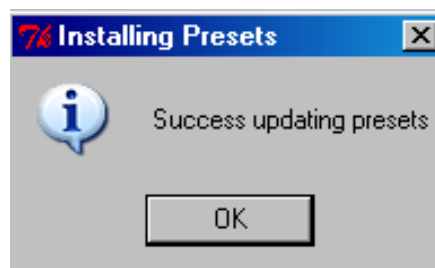
After selecting a presets file, the following choices are available:



Normally, you will then get :



You may also get :



This means you had all the presets in the file already existent in your presets for that protocol class.

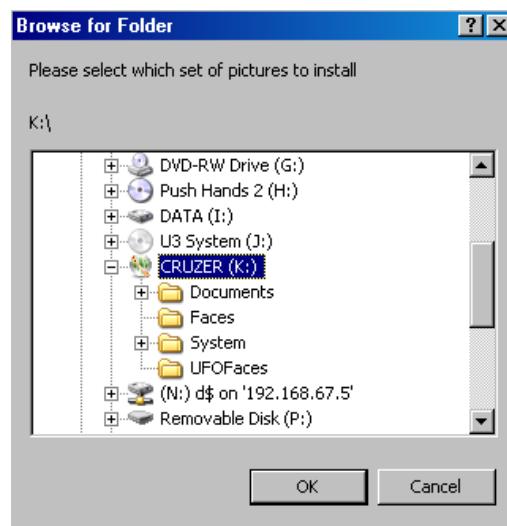
## Appendix 30: Image Installer Utility

### Instructions for the Image Install Utility for 4mation

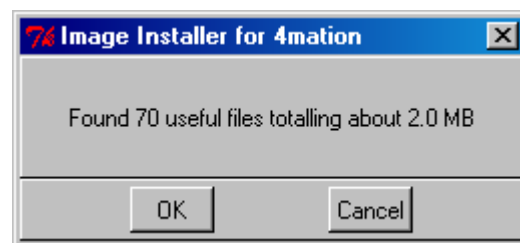
This utility program copies images (for 4mation to use) from **YOUR** folder of pictures to someplace that 4mation can find/use them. It also adds the new folder (location) into the choices of picture folders for 4mation (so they can be selected at tailoring time). It is not completely automatic (you have to specify from/to locations and still run the EEGer Game Initialization Tool and such) but you only need to click the Done/Save buttons. Also, remember that the pictures need to be installed on the computer that has the game screen attached (on a 2-computer system, that would be the game computer).

The utility is available from [www.eeger.com](http://www.eeger.com) (Click on the Downloadable Files and Updates page, then click on Handy add-on utilities for EEGer). It may also be pre-installed in EEGer.

Once installed, the utility itself can be started from the Start menu (EEGer->Image Installer). Recent EEGer versions also have a start option in the **Utilities** menu. Once the install utility is started, you get a screen like this which lets you pick where the pictures are that you want to install for 4mation.

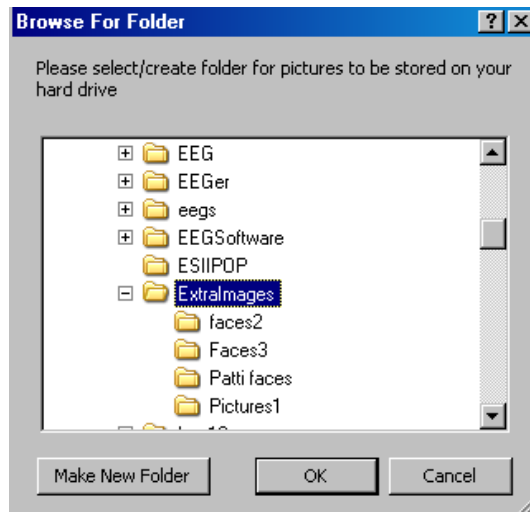


Select a folder and click on OK. The utility will examine the folder contents and report how many valid pictures are available.

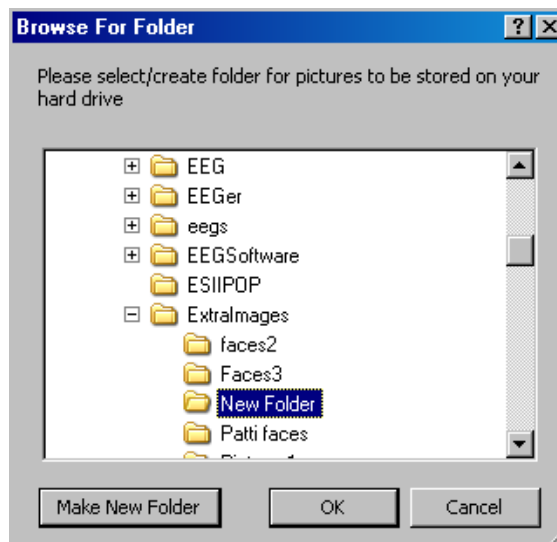


Please note that the utility will NOT copy pictures larger than 1600x1200 pixels since that requires too much time/video memory for 4mation.

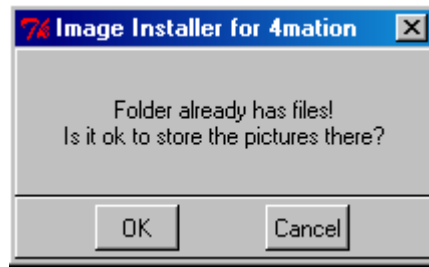
Now you are prompted to select a destination (on your computer) for the pictures to be copied.



The default location is a folder called “C:\Extralimages”. You should select or “Make New Folder” a recognizable folder name for the destination. “New Folder” is only a “good” name once.

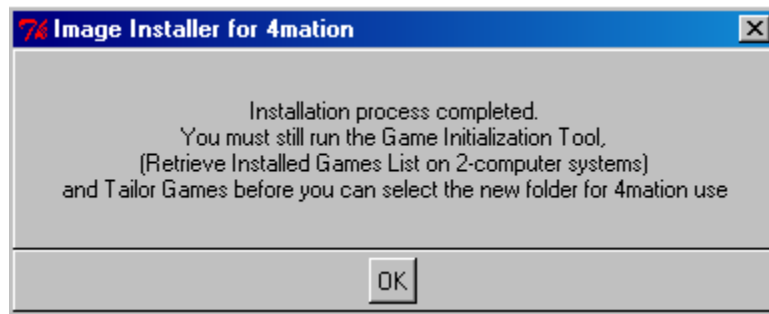


The utility will check to see if the folder is empty:



Then the files will be copied from the source you specified to the destination you specified. The utility will update the game definition file for 4mation to include the new folder.

Then, you get a reminder that EEGer will NOT know about these new folders until the Game Initialization Tool is run.

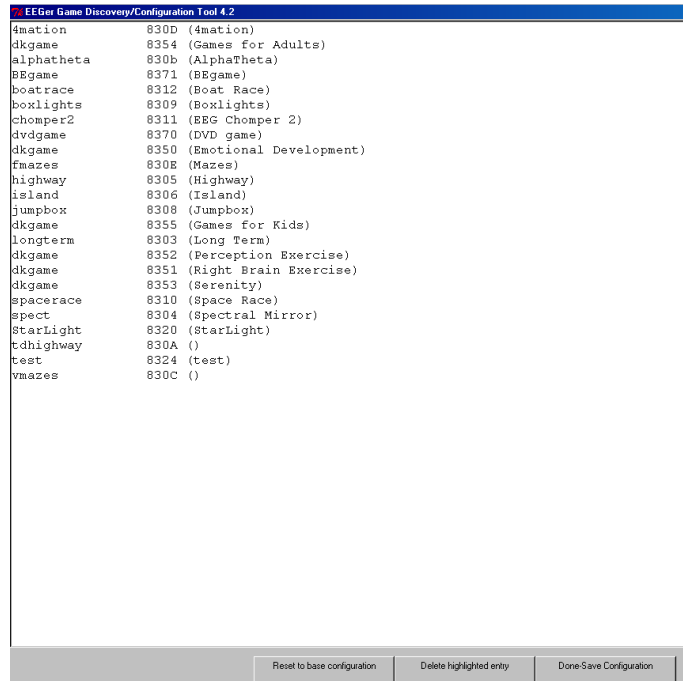


You can repeat the installation process for multiple folders before running the Game Initialization Tool.

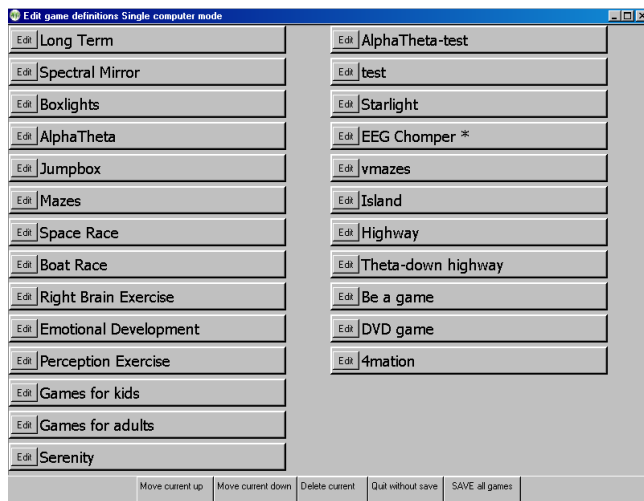
## This is the process for running the Game Initialization Tool:

- On the computer that will display the games, open the **Game Initialization Tool**. [Select **Start-All Programs**. Choose the **EEGer** folder, then **Game Initialization Tool**.]

Note: the utility has already added the correct picture folder paths for you.



- Click **Done-Save Configuration** to complete the changes for game setup.
- Finalize the changes for the Therapist software.



- Single Computer:  
Select **Tools-Tailor Installed Games** and click **SAVE All Games**.

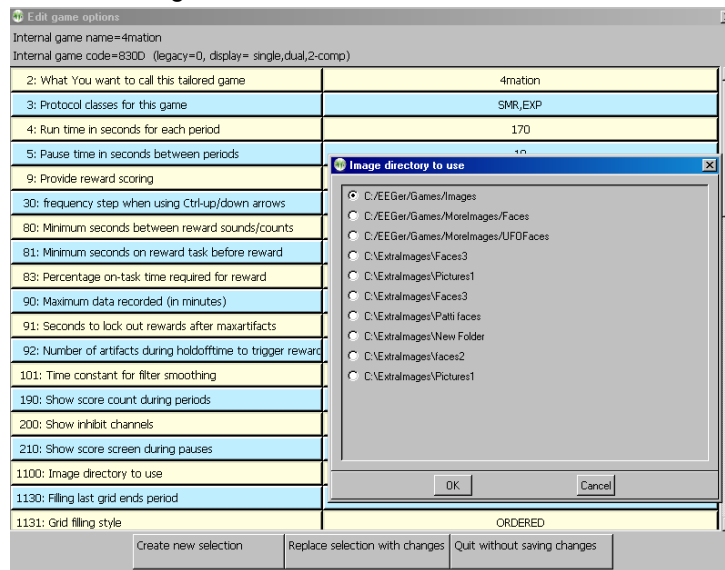
ii. Two-Computers:

Select **Tools-Retrieve Installed Games** then select **Tools-Tailor Installed Games** and click **SAVE All Games**.

## CHOOSING CUSTOM IMAGES

### Option 1: Change images for the current session only

- Select the client and click **Begin Session**.
- On the game selection screen, click the **Edit** button next to **4mation**.
- Scroll down to find “**Image directory to use**” in the left-hand (numbered 1100). Click either the left or right column to select the “button” to edit the directory choice.



- Select the image source you want to use by clicking the radio button next to the pathname. (The default is c:\EEGer\Games\Images).
- Click **OK** to save.
- Click **Use these changes for this game run** to confirm your choice.
- Select **4mation** to start the session.

### Option 2: Change images for all sessions

1. Select **Tools-Tailor Installed Games**.
2. On the Edit Game Definitions screen, click the **Edit** button next to **4mation**.
3. Scroll down to find “**Image directory to use**” in the left-hand (item 1100). Click either the left or right column to select the “button” to edit the directory choice. (See image above.)
4. Select the image source you want to use by clicking the radio button next to the pathname. (The default is c:\EEGer\Games\Images).
5. Click **OK** to save.
6. Click **Replace Selection with changes** to confirm your choice.
7. Click **SAVE all games**.
8. Choose **4mation** when you run a session.

### **Option 3: Create a separate game definition with different images**

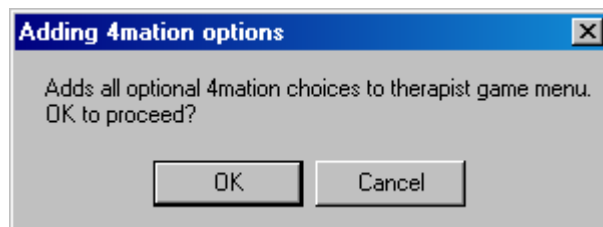
1. Select **Tools-Tailor Installed Games**.
2. On the Edit Game Definitions screen, click the **Edit** button next to **4mation**.
3. The first line is "**What You want to call this tailored game**". Click either the left or right column to select the "button" to edit the name.
4. Enter a name that will help you identify the choice (e.g., "4mation Animals" or "4mation on USB") then click **OK** to save.
5. Scroll down to find "**Image directory to use**" in the left-hand (item 1100). Click either the left or right column to select the "button" to edit the directory choice. (See image above.)
6. Select the image source you want to use by clicking the radio button next to the pathname. (The default is c:\EEGer\Games\Images).
7. Click **OK** to save.
8. Click **Create a new selection** to create a copy of the default game setup.
9. Click **SAVE all games**.
10. Choose the **4mation** name you just created when you run a session.

## Appendix 31: Add 4mation selections

This utility makes Therapist game selection screen entries for all 4mation image options (found after running the Game Initialization Tool) that do not already exist.

The utility is available from [www.eeger.com](http://www.eeger.com) (Click on the Downloadable Files and Updates page, then click on Handy add-on utilities for EEGer). It may also be pre-installed in EEGer. Once installed, the utility itself can be started from the Start menu (EEGer->Add 4mation selections). Recent EEGer versions also have a start option in the Utilities menu.

Starting the utility gives the option of NOT running it:



Otherwise, there are no operator interactions. Undesired entries can be deleted using the **Tools-Tailor Installed Games** options. Menu entries are added for both single computer and two computer menus if they exist.



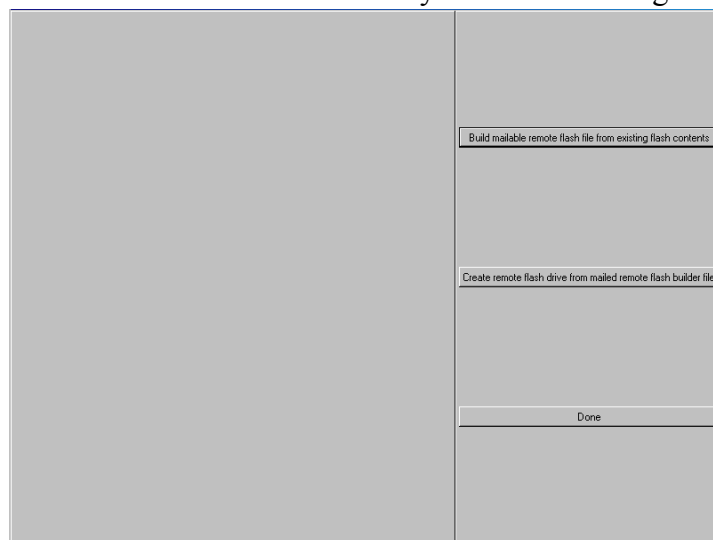
## Appendix 32: Remote Flash Utility

The Remote Flash Utility is a tool to allow remote re-creation of a Remote User flash drive. It is intended for rare occasions where a remote client flash drive has become corrupt and cannot be used. The normal case is for clients to return flash drives to clinicians so they can review and properly evaluate the treatment protocol. However, the client is sometimes too far away to make the extra trip for a new flash drive.

Basically, the tool works as follows:

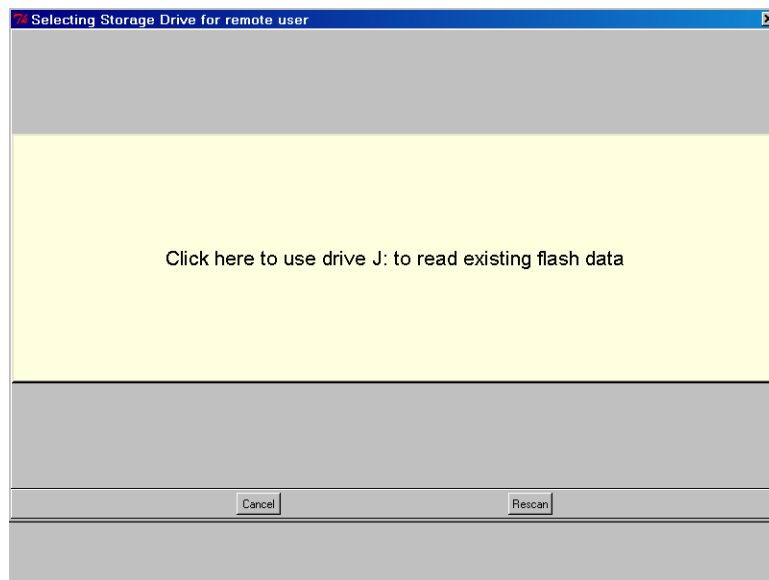
The Therapist creates a remote user flash drive just as always done (onto a flash drive in the Therapist's office).

The Therapist starts the Remote Flash Utility and the following screen comes up:

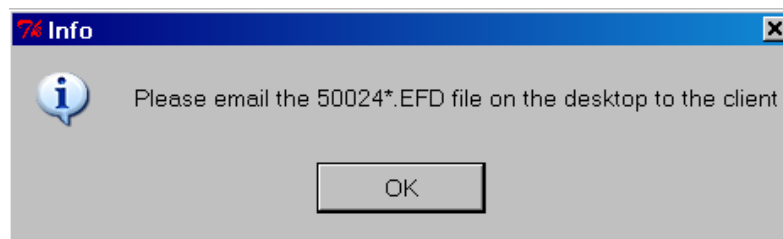


The Therapist selects the top option ("Build mailable remote flash file from existing flash contents").

The Therapist is prompted to select the flash drive just created:



The utility builds a email-suitable file and places it on the desktop:

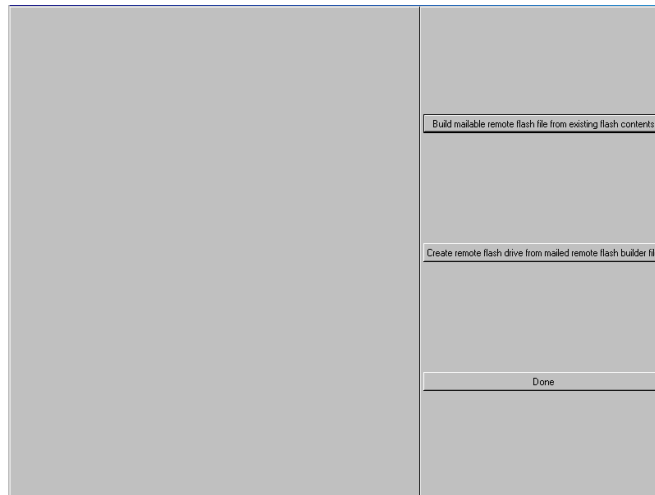


The filename of the file is the dongle number (of the destination dongle), some letters, and the extension .EFD (meaning something like EEGer Flash Drive).

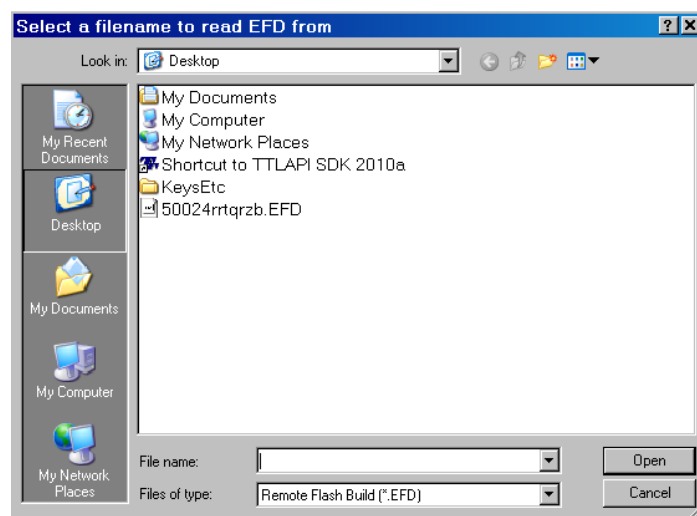
The Therapist emails the .EFD file to the eagerly waiting client.

When the client receives the email, it must be copied to the client's therapist computer. That file must remain readable while installing the contents onto a flash drive. It is possible to copy the EFD file onto the DESTINATION flash drive.

The client starts the Remote Flash Utility and sees the main screen:

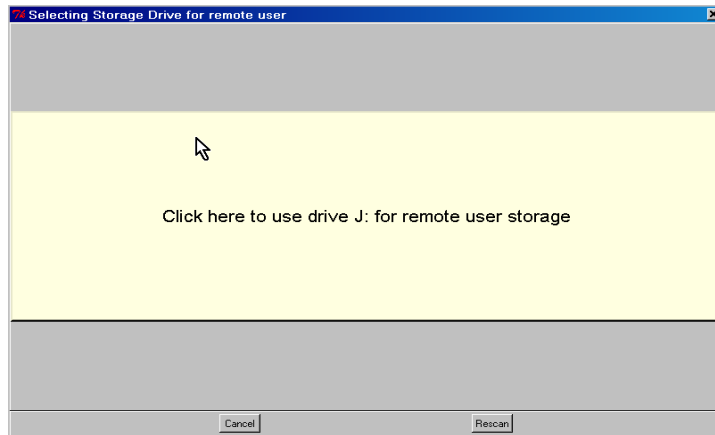


The client selects the middle button (“Create remote flash drive from mailed flash builder file”).

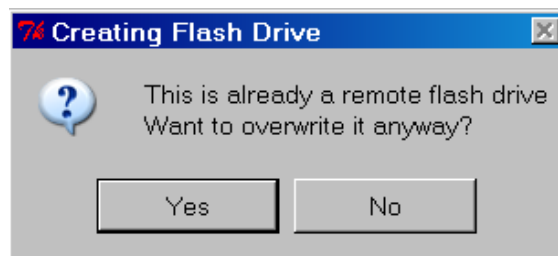


The client is then prompted to select the mailed (.EFD) file:

After verifying that the file is a valid remote flash file, the client is prompted to select the destination flash drive:



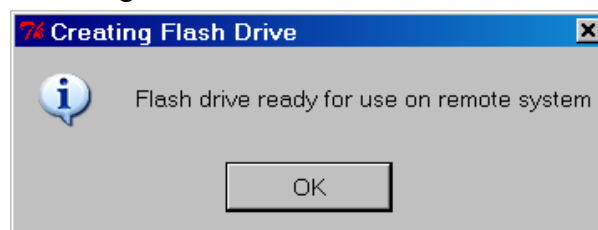
Some checks are made on the flash drive. If it was previously a remote flash drive, the following prompt is given:



If "Yes" is selected, a check will be made for enough room (at least 30 MB). If not, the process will make the client select another flash drive:



When the flash is done writing:

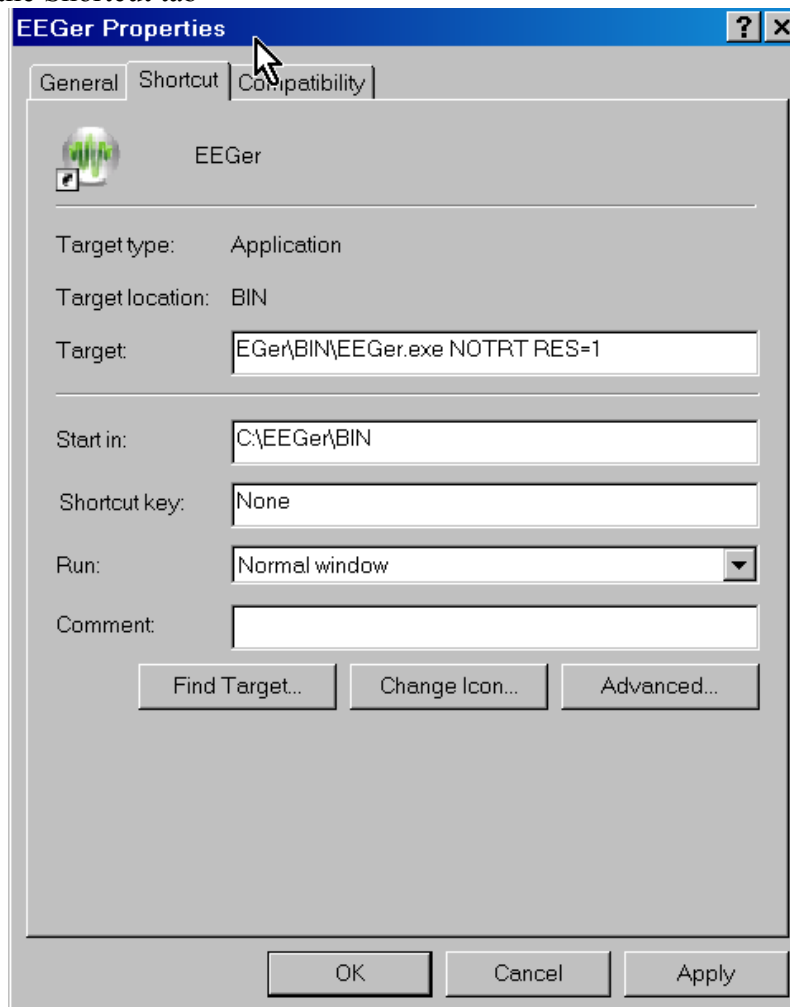


## Appendix 33: Special Startup Options

There are some special startup options that can be used only at the time that EEGer is started. They were originally intended as debugging options but have shown some utility for other uses. The user-available options are listed below.

To use these options, they must be manually added to the startup shortcuts on the desktop. To do this:

1. RIGHT-click on the EEGer startup option on the desktop
2. LEFT-click on the properties item on the popup menu
3. Click on the Shortcut tab



4. Add the desired options to the END of the target line, making sure to leave space(s) between each item.
5. Click on OK

Now whenever EEGer is started using that shortcut, the applicable options will be used. It is possible to have several shortcuts with different options (as long as you name them so you can remember what they are).

**WARNING: REINSTALLING EEGER DOES NOT ERASE ANY OPTIONS MANUALLY SET IN THE SHORTCUT!!!**

Available options:

**RES=1**

**RES=2**

These options force the EEGer (or EGS) screen size to be either 800x600 (RES=1) or 1024x768 (RES=2) no matter what size the screen graphics resolution is set for. Normally (or any other RES values), EEGer (and EGS) size themselves to the current screen resolution(s).

**NOTRT**

This option forces EEGer to NOT set realtime priorities. Some machines may function adequately with this option set but some may not. Your mileage may vary.

**FORCEREMOTE**

This option forces EEGer into being a remote user no matter what the license/dongle may be set for. It is intended for testing remote operations but may be used by a clinician for training clients to use the remote menus.

**NOREMINDER**

This option turn off the yellow reminder messages that appear at the bottom of the status window (LOST KEYBOARD, NOT RUNNING, etc.). Use normally by people smarter than EEGer and annoyed by the 1-second flashing messages.

**NOOVERRUN**

EEGer no longer aborts on graphics overruns and does not put up those annoying messages. This option turns the messages back on but EEGer still does not abort on graphics overruns (it just runs slower).

**NOFREEZE**

This option tells EEGer to NOT lock the position of the EEGer windows but allows them to be dragged around. Note that you cannot drag the realtime graphics screens since there is no border.

**NOFOREGROUND**

This option tells EEGer not to try forcing itself as the foreground window (so it can get keystrokes).

# Hardware Requirements for EEGer™

EEGer computer stations can be configured using 1 or 2 computers. In Single Computer mode, the Space Bar is used to switch between the Therapist and Client displays. Not all games are available in Single Computer mode.

These requirements are for the most restrictive feedback game.

<b><u>COMPONENT</u></b>	<b><u>THERAPIST or</u></b> <b>CLIENT/GAME</b>
PROCESSOR	<b>Two-computer</b> station: 1.8 GHz <b>Dual Monitor</b> station: 2 GHz <b>Recommended:</b> 2 GHz or greater; Pentium processor
OPERATING SYSTEM	Windows Vista Professional Windows 7 Professional, 32-bit (recommended) Windows XP SP3 (soon obsolete)
SYSTEM MEMORY	<b>Dual Monitor</b> Station: 2 GB <b>Two-computer</b> Station: 2 GB
STORAGE	Minimum 250 GB
VIDEO ATI Radeon or better NVIDIA GeForce GS series 8400 or better Intel Express 900 or better	Minimum resolution setting: 1024x768 with 16-bit color <b>Dual Monitor</b> Station: video card must support "Extended Desktop" with two available video ports (VGA or DVI with VGA adapter) <b>Two-computer</b> Station: <b>Min 512 MB</b> video memory <b>Dual Monitor</b> Station: <b>Min 512 MB</b> video memory
COMMUNICATION PORTS	3 Ports Required for Two-computer, 2 ports required for other <b>Amplifier:</b> -- esiPro, J&J: USB port -- ProComp: Serial or USB-Serial adapted port <b>Game Connection:</b> Serial, USB-Serial adapted, or Ethernet <b>License Dongle:</b> USB port