

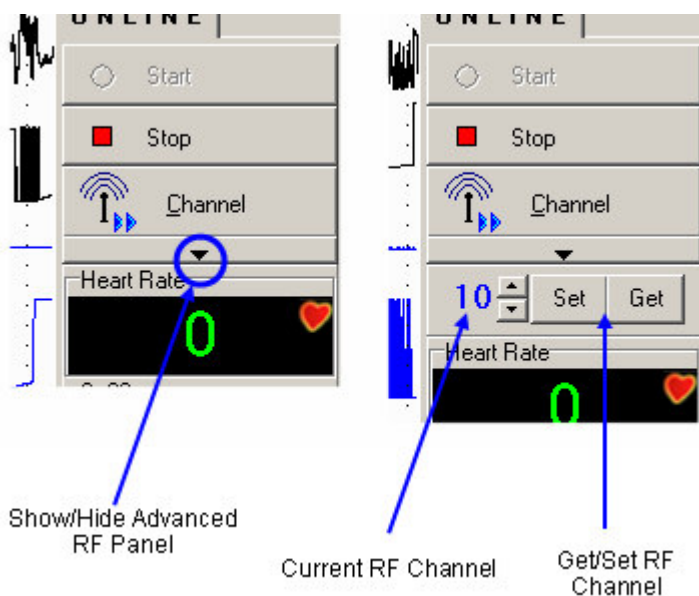
Radio Frequency Channel (Crystal Monitor 20-S only)

While collecting data with the Crystal Monitor 20-S the user may change the radio frequency (RF) channel that the device is using to transmit data.

For most applications the user can leave the software in the default mode where the device will automatically change channels when interference occurs. The user can manually change channels by selecting the switch RF channel button from the acquisition toolbar.



Advanced users may wish to manually select an RF channel. This feature will be most useful in environments where the frequency spectrum is known to be busy. On the patient summary panel the Advanced RF Panel can be displayed. The Get button will display the current RF channel. The Set button will reset the RF channel to the channel number currently displayed.



Chapter 7: Reviewing Data

Opening Saved Studies

Once a data file has been recorded, it can be reviewed. During the review, it can be scored or the display settings can be changed, just as during the recording.

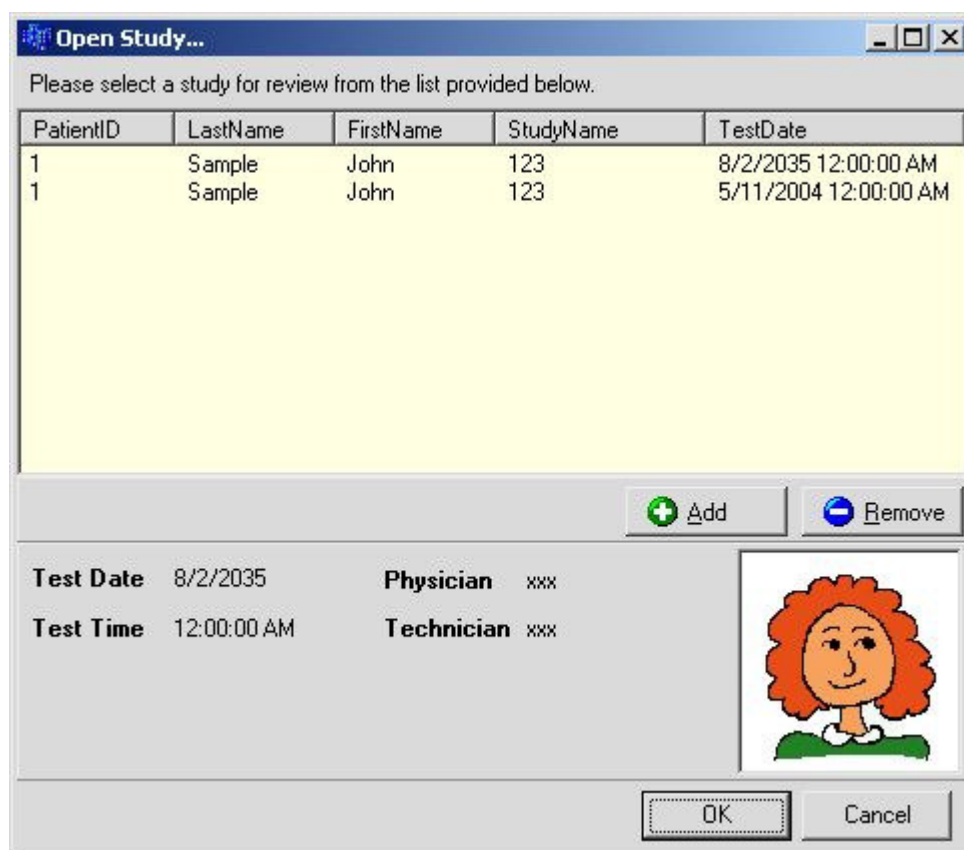
To review a previously recorded study:



Click the **Review Studies** button on the **Main Menu**



This displays the **Open Study...** dialog window, where you select the study you wish to review.



The top portion of the **Open Study...** window displays a list of all studies in the system. Studies can be arranged in order by **Patient ID**, **Last Name**, **First Name**, **Study Description** or **Test Date** by clicking on the appropriate column title. A brief summary of the highlighted study is found on the lower half of the screen, detailing the date and time of the study, the associated physician, attending technician, and a brief description of the study.

To open a study for review:

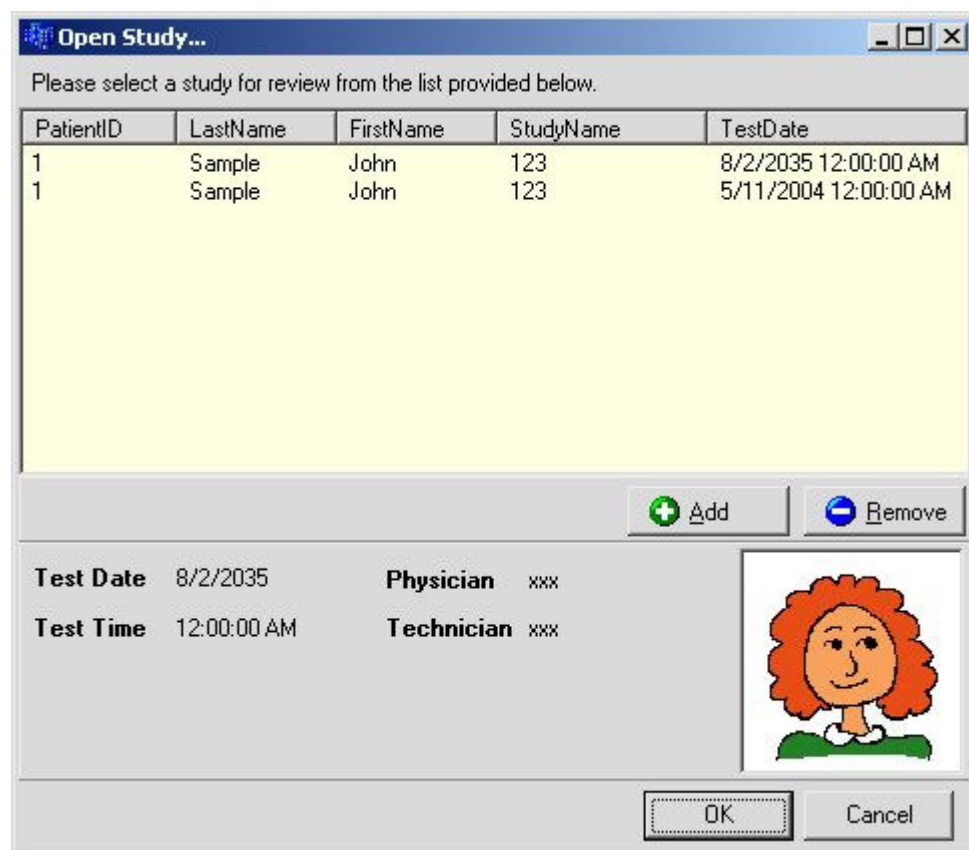
- ☐ Select the study you wish to review, then
- ☐ Click the **OK** button on the bottom of the window.

Click the **Cancel** button to dismiss the window without opening a study.

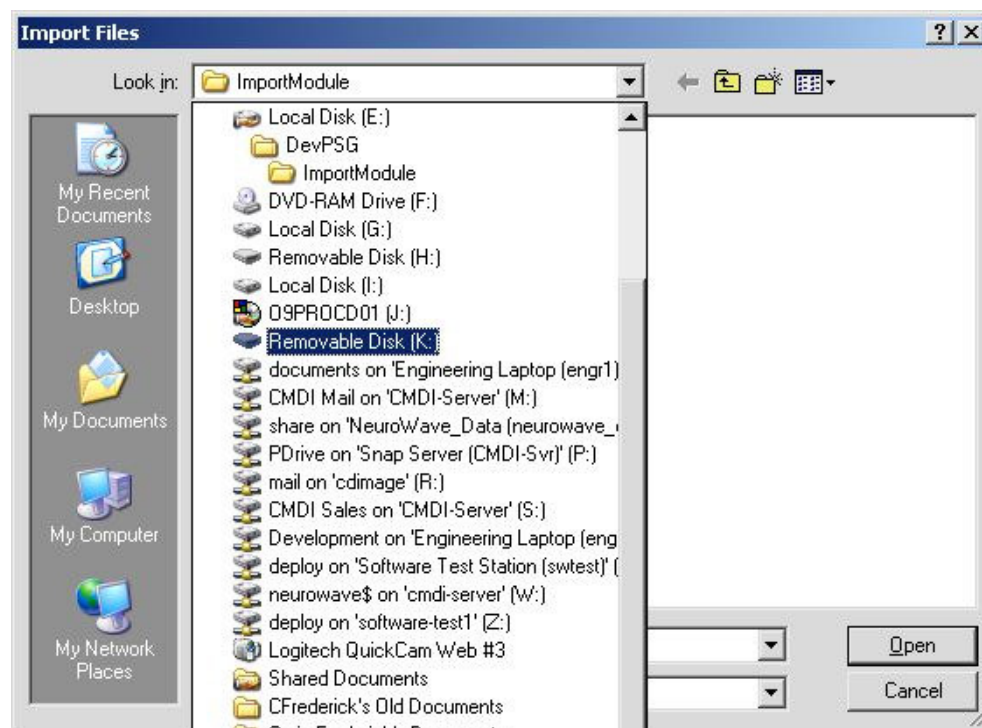
Adding a Patient Study from a Memory Card

After inserting an SD card in the card reader,

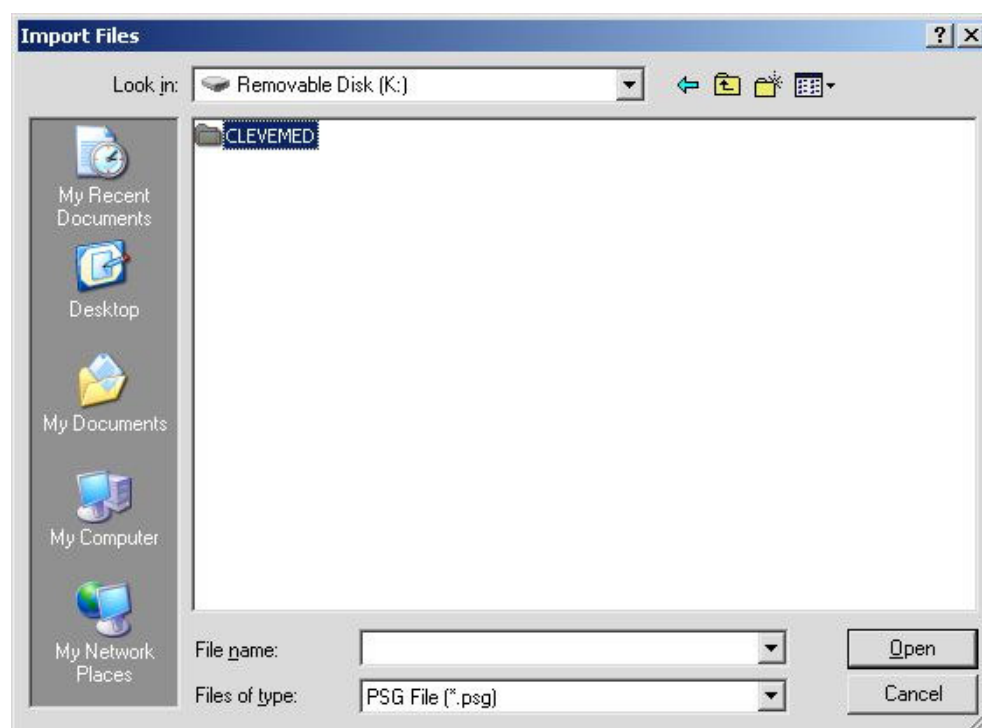
Click the Review Studies button on the Main Menu



Click  to open a browsing window

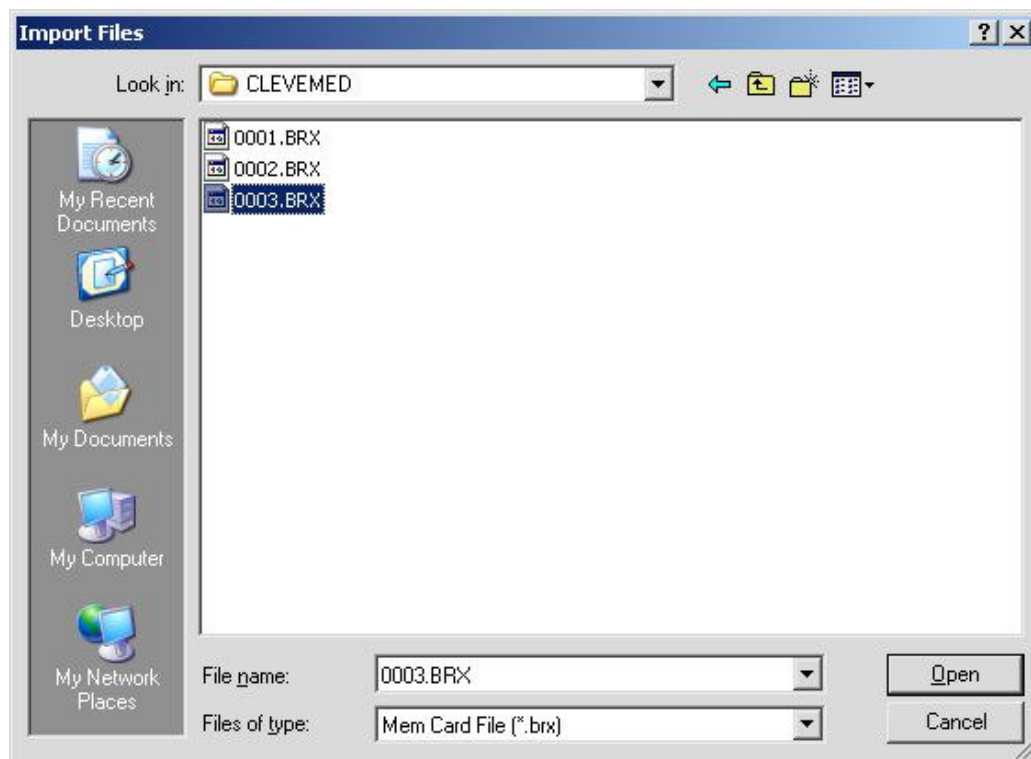


Select the removable disk that refers to your SD card. The drive name will vary depending on the computer used and the number drives available.



Select the "CLEVEMED" folder

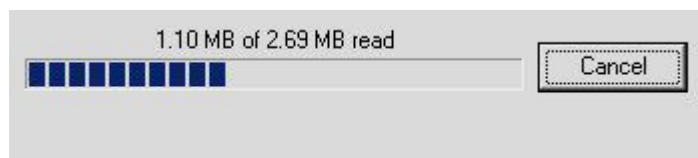
From "Files of type" Select "Mem Card File (*.brx)"



Select the file you wish to import and Click <Open>

The New Study Wizard will appear and you should follow the steps you normally would to start a new study (see Proceeding Through the New Study Wizard)

After you click <Finish>, a progress window will appear showing the import process



After the import progress window closes, a new entry will appear in the list of studies.

Open Study...

Please select a study for review from the list provided below.

PatientID	LastName	FirstName	StudyName	TestDate
1	Sample	John	123	8/2/2035 12:00:00 AM
1	Sample	John	123	5/11/2004 12:00:00 AM
1	Sample	John	123	5/11/2004 12:00:00 AM

 Add  Remove

Test Date 5/11/2004 **Physician** xxx
Test Time 12:00:00 AM **Technician** xxx

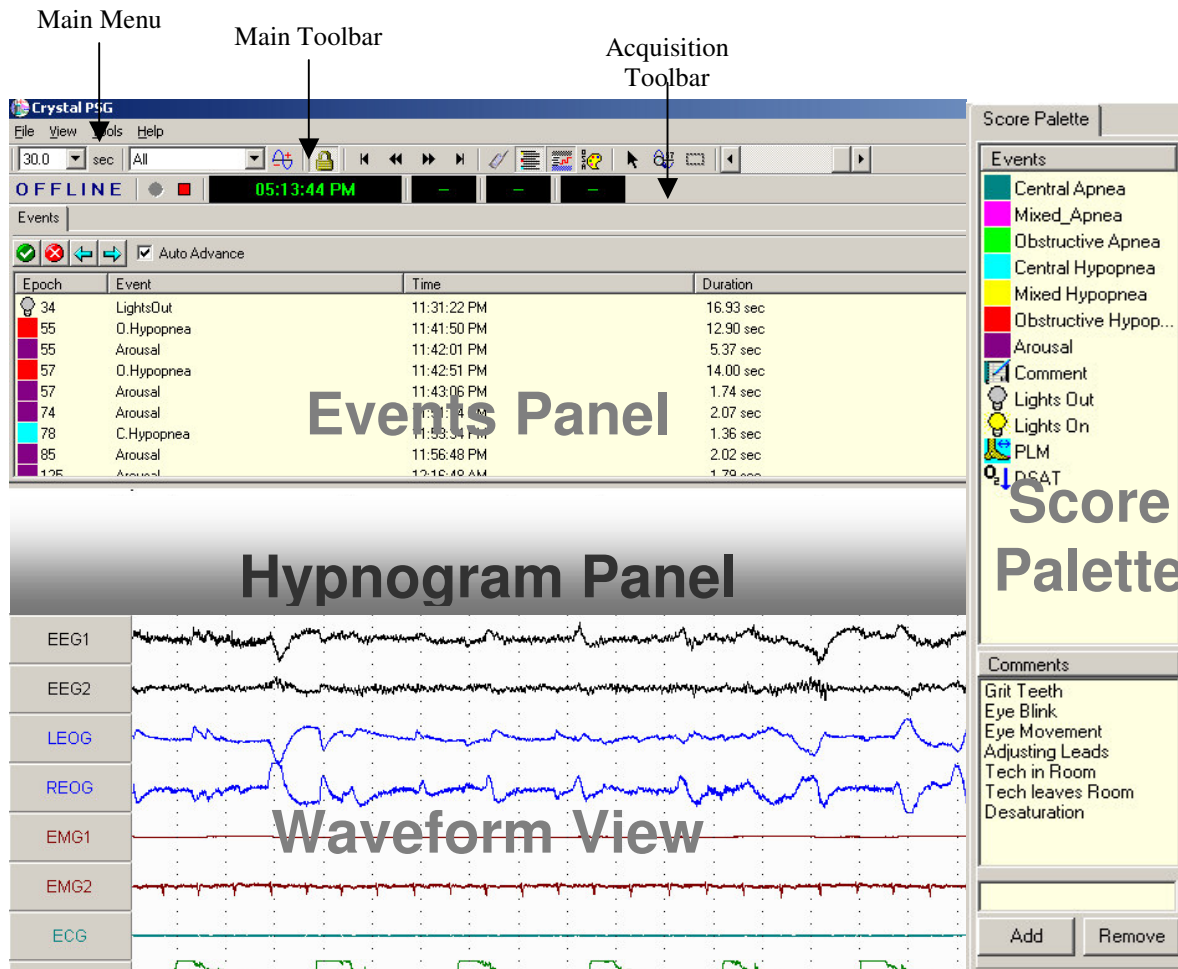


OK Cancel

To review the study select the newly added study and click <OK>.

Review/Acquisition User Interface

The same user interface is used for both acquisition and review in order to facilitate quick and simple study collection, review, and scoring. The layout is annotated in the figure below.

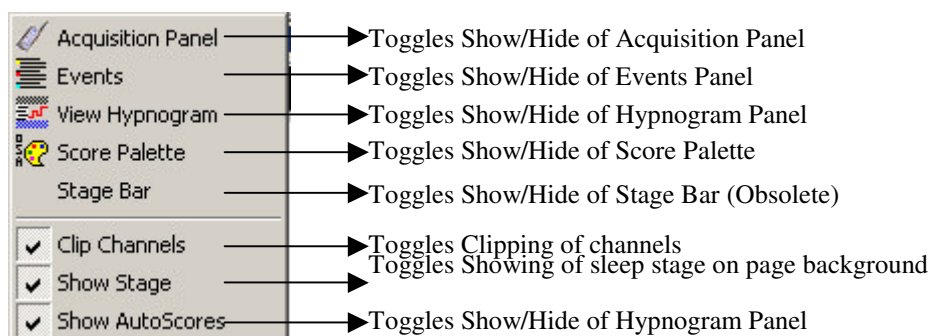


The **Main Menu** bar contains the **File**, **View**, **Tools**, and **Help** menus. These menus provide a convenient way of accessing information controlling various aspects of the acquisition module. The **File Menu** has the following commands:

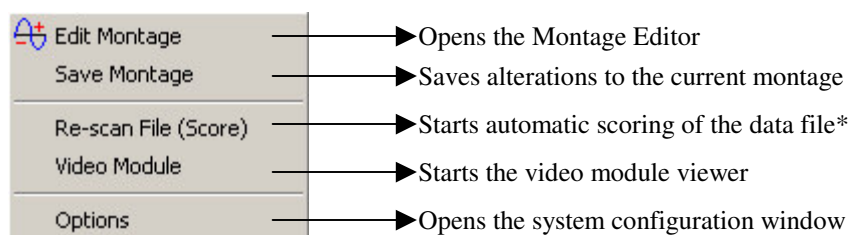
Open... Ctrl+O	Allows opening of files for review *
Save	Saves changes to the file (Scores, stages, etc.)
Export	Calls the Export wizard, which allows export of data to ASCII and EDF formats *
Exit	Closes the program

***Note: opening of files for review is not available during acquisition**

The **View Menu** has the following commands that allow you to configure the display of the application.



The **Tools Menu** has the following commands:

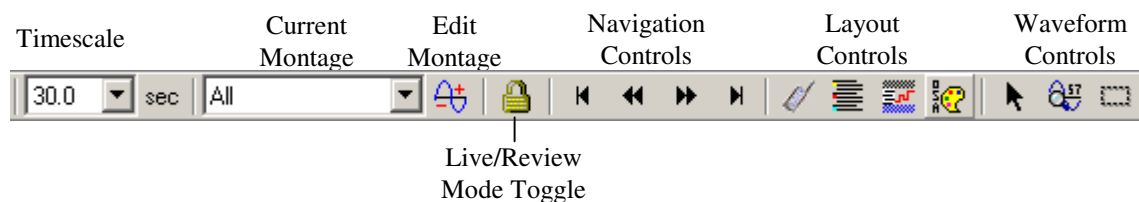


***Note: automatic scoring is a review function not available during acquisition**

The **Help Menu** provides access to an online manual and contains software version information.

Main Toolbar

The main toolbar in Crystal PSG provides quick and convenient access to the major functions of the system, some of which were outlined above.

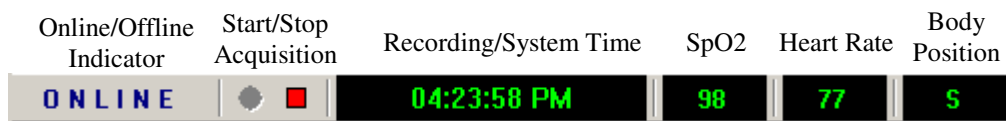


Main Controls	
Timescale:	Allows the user to change the page size of the display graph; the traces should expand with decreasing time and compress with increasing time.
Current Montage:	Allows the user to select a different layout setting. The layout dictates how and what array of waveforms to display.
 Edit Montage:	Allows the user to add, edit or remove waveform display configurations.
 Live/Review Mode Toggle:	Toggles live updating of the review display. When "Locked" the navigation buttons are disabled, and the screen will be updated once a second with the newly acquired data.
Navigation Controls	
 Begin Keyboard shortcut: <Home>	Moves the display to the beginning of the data file.
 Previous Page Keyboard shortcut <PgUp>	Moves to display back one page (page size dictated by the Timescale setting).
 Next Page Keyboard shortcut <PgDn>	Moves to display forward one page (page size dictated by the Timescale setting).
 End Keyboard shortcut <End>	Moves the display to the end of the data file.

Layout Controls	
 Acquisition Panel	Toggles Show/Hide of Acquisition Panel
 Events Panel	Toggles Show/Hide of Events Panel
 Hypnogram Panel	Toggles Show/Hide of Hypnogram Panel
 Score Palette	Toggles Show/Hide of Score Palette
Waveform Controls	
 Scoring:	Allows the user to highlight and label specific portions of the display.
 Measure:	Allows the user to magnify a small portion of the graph and obtain statistical data/measurement information from that portion.

Acquisition Toolbar

The acquisition toolbar provides control over system data acquisition as well as status information.



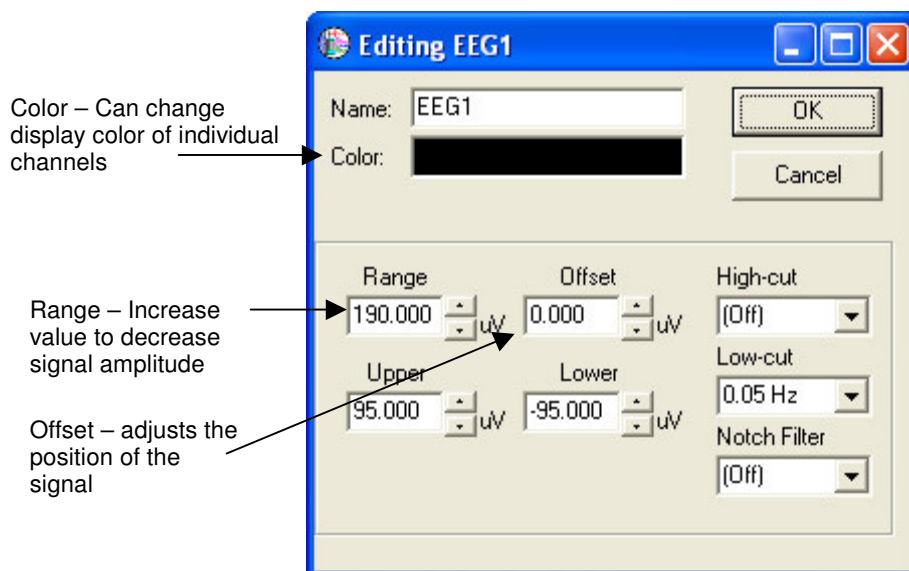
Offline/Online indicator	Shows the state of the Crystal Monitor transmitter (whether it is on or off or out of range).
Start/Stop Acquisition	Controls start and stop of acquisition
Recording/System Time	Clicking this label toggles between showing time of day or elapsed recording time.
SpO2 Heart Rate and Body Position	Real-time indicators of live acquisition data

Keyboard Shortcuts

Select Next Trace (Above): <Up Arrow>
 Select Next Trace (Below): <Down Arrow>
 Increase Trace Gain: <Shift> + <Up Arrow>
 Decrease Trace Gain: <Shift> + <Down Arrow>
 Move Trace Up (offset): <Ctrl> + <Up Arrow>
 Move Trace Down (offset): <Ctrl> + <Down Arrow>
 Beginning of Recording: <Home>
 End of Recording: <End>
 Page Forward: <Page Down>
 Page Back: <Page Up>
 Scroll through the study: <Right Arrow> or <Left Arrow>
 Speed of Scrolling: <Right Arrow> or <Left Arrow>
 Increase Event Length: <Shift> + Left Mouse
 Decrease Event Length: <Shift> + Right Mouse

Adjusting Individual Signals

To make changes to each signal double left click on the name of the channel you would like to adjust. A new window will open.



Staging Guide

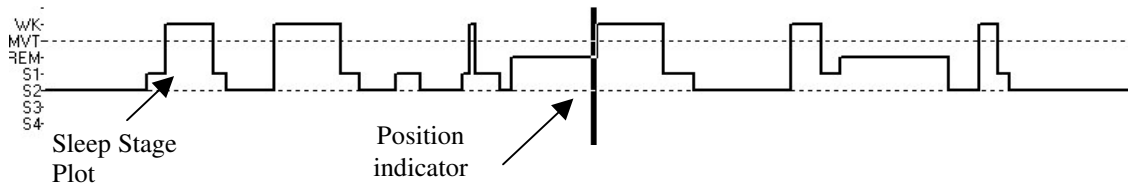
- 0: Wake
- 1: Stage 1
- 2: Stage 2
- 3: Stage 3
- 4: Stage 4
- 5: REM
- 6: Movement



At any time during review, the user may stage the current page by using the numeric keypad, or numeric keys according to the following definitions:

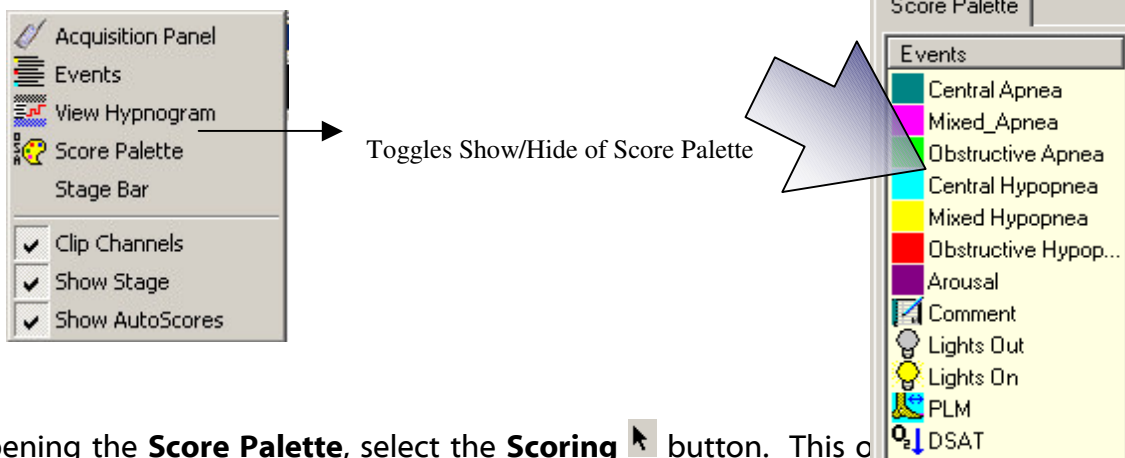
For convenience, the system is set to automatically page forward to the next epoch (30sec), each time a new stage is entered.

As part of the review window, a hypnogram view is provided that will show a 20 minute window of the sleep architecture. The value of the current epoch is shown according to the y-axis of this plot and a highlighting bar indicates the position of the current page within the plot.



Scoring Guide

To begin scoring, you must first open the **Score Palette** window. To do this, open the **View** option at the top of the screen and select **Score Palette**. You may need to expand your screen window to view the entire page.

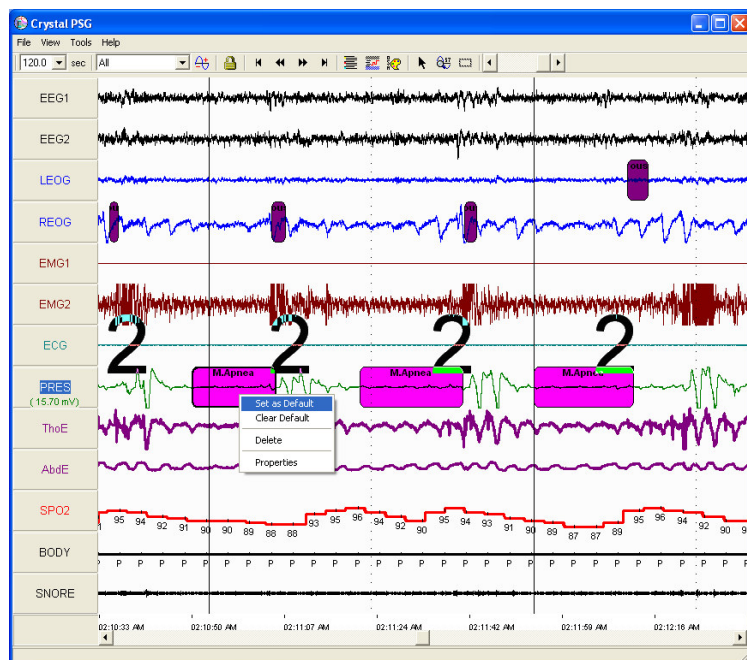
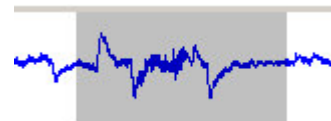


After opening the **Score Palette**, select the **Scoring** button. This allows you to mark and label any section of the chart. Once the **Scoring** button has been selected, you may choose any event on the right side of the screen.



Marking Events

The colored boxes show events commonly seen in patients being assessed for sleep disorders. If a particular color is selected, the color and label will appear on any section you choose. To mark (or score) a certain area, highlight the area with your left mouse cursor and drag it over the length of the event. For faster scoring of repeated events, just click the same channel again without dragging.



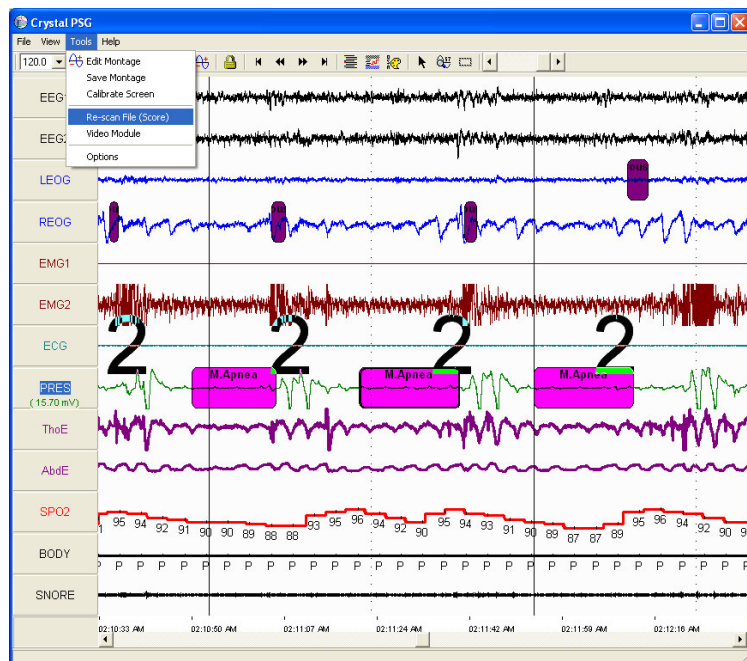
A default event can be set for each channel. Place an event on a channel. With the event selected right mouse click and select Set as Default from the menu.

The duration of events can be adjusted by holding the shift key and using the right and left mouse buttons. The left mouse button will lengthen the duration and the right mouse button will shorten the duration.

Auto-Scoring

Previously recorded studies can be autoscored by selecting Tools and Re-scan file (autoscore). Auto-scoring will score events such as arousals, apneas, hypopneas and desaturations. Auto staging is not available in Crystal PSG.

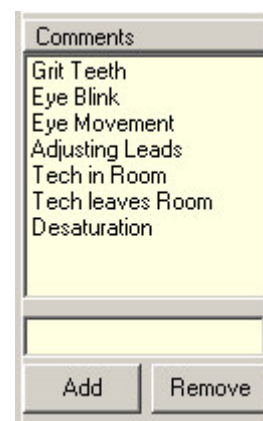
Auto-scoring a file will not delete any manually entered scores. On the events list auto-scores will be marked so manual and auto-scores can be easily differentiated.



Adding Comments and Bio-cals

To add a comment to a certain area, select the **Comment**  button. Then, in the bottom window, you can select a specific pre-labeled comment (such as Leg Movement or Eye Blink). If desired, you may enter your own comment in the space provided. If you click the **Add** button, it will be permanently added to the comments box for future use. If you do not click **Add**, then it will be used once. To remove a saved comment, highlight it in the list and click **Remove**.

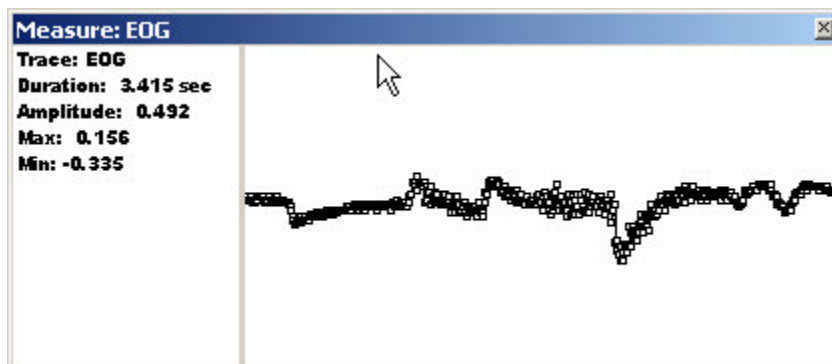
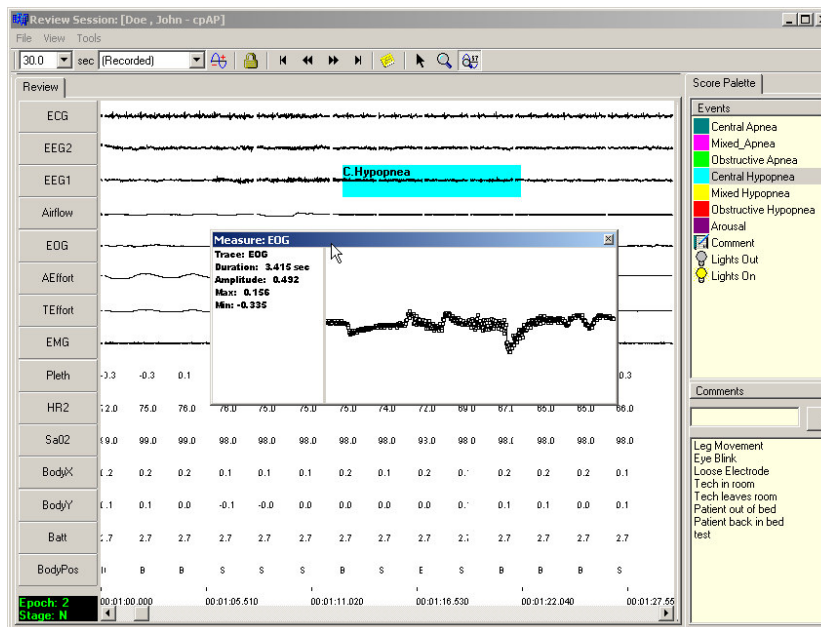
To put the comment in a certain area on the trace, choose a comment, then, highlight the area with the cursor.



use.

Measuring Tool

To obtain more detailed information about the waveforms, choose the **Measuring  Tool**. Then highlight the desired section of the graph. A new window will appear in the middle of the screen with an enlarged view of the highlighted section and statistical data on the left side of the new screen.

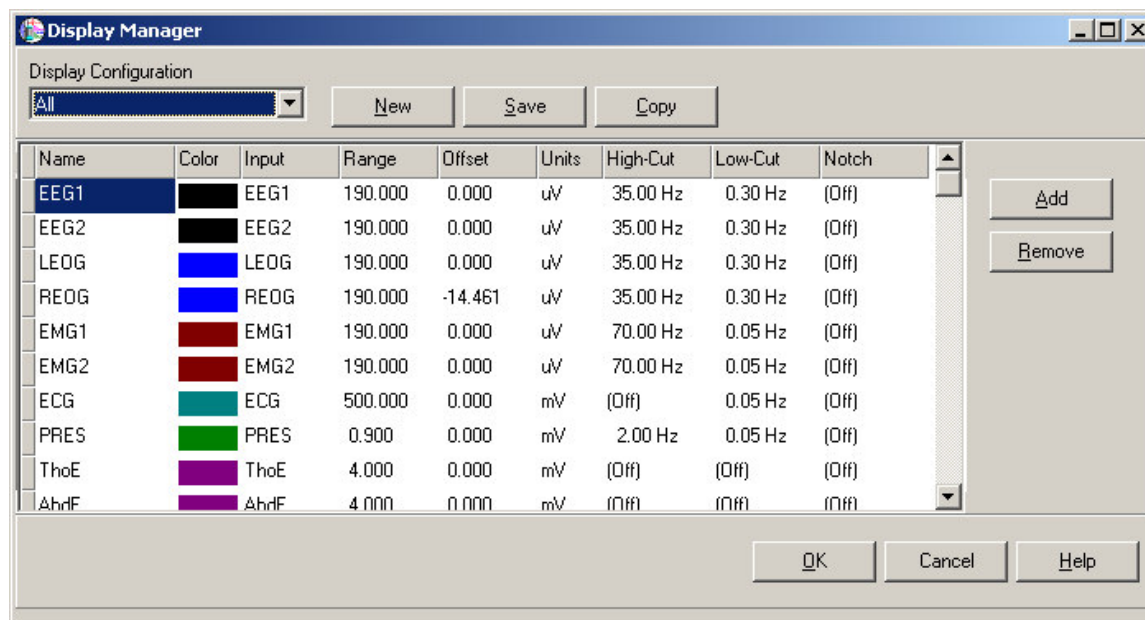


The statistical data shows the following:

- **Trace:** which specific channel the highlighted section is taken from
- **Duration:** the duration of the highlighted section
- **Amplitude:** the maximum peak-to-peak amplitude of the highlighted section
- **Max:** the maximum value in the highlighted section
- **Min:** the minimum value in the highlighted section

The Montage Editor

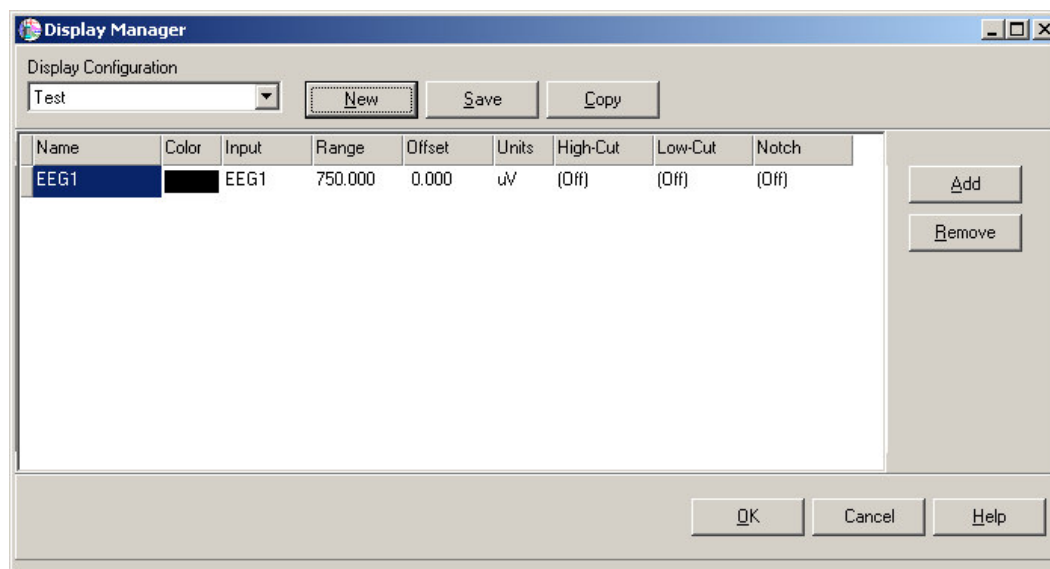
Click the **Montage Editor** button. A new window should appear.



This screen enables you to add/remove channels, change the color of certain channels on the acquisition screen, change the limits of the input, and add low/high pass filters.

- The **Name** box allows you to name the channel. You may edit/change this name as you see fit.
- The **Color** box changes the color of that channel's trace when it appears in the waveform view.
- The **Input** box represents the actual channel from the transmitting device that you would like to record under this name. These channels are marked appropriately on the device.
- The **Range** and **Offset** boxes allow you to set the upper and lower limits on the trace. The range is equivalent to sensitivity settings on other machines. To enlarge the graph, set smaller limits. To compress the graph, set larger limits.
- The **Units** box allows you to set the value of one unit.
- The **Low Pass**, **High Pass**, and **Notch** boxes allow you to filter the input.

If you would like to make a personalized display configuration, you can click **New**. You will be asked to enter a **Display Configuration** name. After you enter a name, click **OK**. A blank display configuration window will appear.



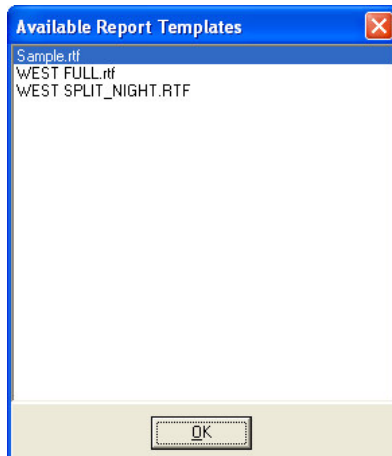
To add a new recording channel, click **Add**. A new channel will appear. You can manipulate the settings according to preference. Notice the blue highlighting around the right end of the channel toolbar. This indicates the channel you are currently modifying. To remove a specific channel click on that channel, highlight it, and click the **Remove** button. After you have completed your personalized display configuration, click the **Save** button.

To modify an existing configuration without overwriting the original, you may use the **Copy** button. Choose an existing configuration, then click the **Copy** button. You will be asked to enter a **Display Configuration** name. Enter a unique name and click **OK**. You will be able to modify existing parameters, delete or add channels, and rename existing channels. Once you have finished, click the **Save** button. All of the new modifications will be saved under the new name.

To exit this screen, press **OK**.

Chapter 8: Report Generation

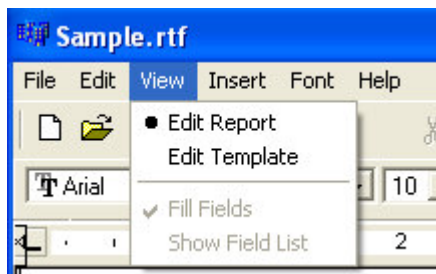
To generate a report, from the Main Menu select  Reporting. Select & open a study according to the same process used for scoring.



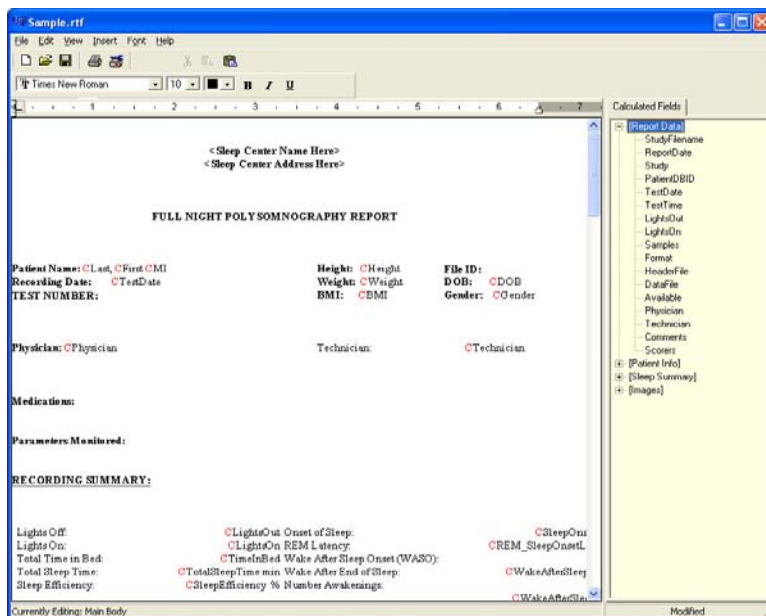
Select a template from the list in order to generate a report according to a standard format. The report may take up to a few minutes to generate depending on the length of the study and the number of events marked.

Crystal PSG is preconfigured with a few report templates that your lab can customize. CleveMed is also able to assist you in creating your own personalized report templates.

Editing and Creating a Report Template



After generating a report, select the view menu to toggle between "Edit Report" and "Edit Template". In edit report mode, the generated report for a particular patient may be edited. This is used for entering physician notes or scores for tests that are not part of the PSG test. In edit template mode, new templates can be created and edited.



In edit template mode, a list of calculated and drop in merge fields is shown on the right side of the screen. Text can be written including merge fields when the report is viewed in report mode the merge fields will be completed with the data for the selected patient. Please contact CleveMed for further assistance with creating custom report templates.

Chapter 9: Data Storage

The default software settings store

patient data files in C:\CleveMed\CrystalPSG. Each recorded study creates two files a header file (*.psg) and a data file (*.psd). The header and data files are both named by the date and

time that the file was collected. For example, the files 2005-05-18-23-45-25.psg and 2005-05-18-23-45-25.psd were created for a study recorded on May 18 2005 starting at 11:45:25 PM. **It is important to not open and edit these files as they may become corrupt or the patient data may be displayed incorrectly leading to a misdiagnosis.**

Note: There is no patient demographic information available in either file. The patient name, ID and other personal information is not included to comply with HIPAA (Health Insurance Portability and Accountability Act) in the event of sharing data with other labs or CleveMed.

Before archiving data, it is suggested that a log including the patient ID number, name, study date, and study time is created. A spreadsheet program, such as Microsoft Excel, could be used to make the log. To make data retrieval easier, create a folder named for each patient and copy the appropriate .psg and .psd files into the folder. Then the folder can be archived.

Chapter 10: Troubleshooting

If your **Crystal Monitor** is not performing properly, use this troubleshooting chart for quick solutions to common problems. If the problem persists, call Cleveland Medical Devices Customer Support at 1-877-CLEVEMED.

Symptom:	Possible Cause:	Solution:
1. No data is being displayed	a. Receiver unplugged from PC	a. Re-connect to USB port.
	b. Patient Unit power switch off	b. Turn power back on (Patient Unit)
	c. Patient Unit batteries are exhausted	c. Replace batteries
2. Signal image breaking up periodically	Dropped packets (poor wireless signal)	a. Position Computer Unit and Patient Unit closer together. Recommended distance is 100 feet (20-S) or 50 feet (20-B) direct (line of sight)
		b. Move large metal objects away from the area.
		c. Contact CleveMed for instructions on performing a frequency spectrum survey to determine good recording channels for your environment.
3. Signal image cut off	Amplitude of data exceeding visible range	Adjust scale control
4. Signals difficult to visualize	Channel color selected does not contrast well with screen background chosen	Change channel color
5. Signals are noisy	a. Electrode impedance is too high or miss matched	a. Check the impedance on the patient electrodes and replace electrodes with high impedance
	b. Display settings are not correct	b. Adjust the filter settings on the channels that are noisy
	c. System failure	c. Please contact customer support for further assistance.
6. Computer freezes up or display appears choppy	a. PC needs a faster processor	a. Run Crystal Monitor PSG on a Pentium III™ 500 MHz or higher system.
	b. Timescale is too large to display the requested number of data points	b. Change the timescale to a smaller value.
7. No receiver found	a. No power to the receiver	a. Check that the USB cable is not damaged, is properly connected to the Computer Unit

		and to the computer
	b. Drivers are not installed	b. See Chapter 3 Setting up the System.