EEG System

TRAINING MANUAL

China Care Medical

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Installation Requirements

Environmental Requirements:

- The location should have good ventilation to remove gases in the air which will either affect the readings or cause danger to the users and patients;
- There should be temperature and humidity control device to ensure appropriate test subjects skin temperature, room temperature maintained at 20°C ~ 24°C, and humidity kept between 20% to 80%;
- The location should have controlled lighting, preferably incandescent;
- There should be a shading device in the location to help achieving better results for flash-induced EEG examinations and sleep analysis;
- The location should be soundproof to prevent external noise interference during AEP examinations;
- The location should have special hand-washing station installed for the convenience of use. All operating personnel and the patient should wash their hands before the examination to release static electricity;
- If possible, the location should be close to nerve medicine and pediatrics for convenience of access for patients;
- Make sure power switch is off when installing the device. The device should only be switched on during examinations;
- The device should be placed away from electrical instruments, high-frequency radiant point, CT, MRI, etc. to avoid interference during examination;
- The device should be kept away from moisture or water, extreme air pressure, excessive humidity and temperature, poor ventilation and acid gas or alkaline dust during the examination;
- The device should not be used in the presence of any flammable anesthetics to prevent voltaic arc, which may cause explosion;
- This device is not suitable for use in places with chemical storage or gas chambers such as a medical hyperbaric oxygen chamber, as it may trigger an explosion or fire.

Ground cable connection requirements of equipment:

- This equipment complies with IEC60601-1 requirements;
- The ground cable must be used with the supplied 3-pin power plug. Otherwise, it may cause electric shock to the patient and the operator;
- An effective connection with the potential equalization terminal should be secured for safe grounding.

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- When several medical devices are used together, all devices should be grounded at the same place to prevent any potential differences between the devices, which may cause electric shock to the patient and operating personnel.

Precautionary Steps

1. Before Operation

- Check to ensure that the equipment is cleaned and are in good operating conditions;
- Place the equipment in appropriate position;
- Make sure all the cable connections and lead connections are correct;
- When the device is used with other instruments, extra measures should be taken to avoid diagnostic errors or other problems, such as making sure they share the same grounding;
- Examinees should be notified that:
  - Food consumption before EEG examination may affect the examination results;
  - They should wash their head and hair the night before the examination
  - They should stop taking medicine that may influence the central nervous system 3 days before the examination;
  - They should remain calm, as the examination is painless and has no side effects;
  - Children who refuse to cooperate in the examination may need to be sedated with chloral hydrate or its equivalent.

2. During Operation

- Both the patient and the instruments should be given sustained, careful attention;
- To ensure patient's safety, switch off the power before removing the electrodes and/or sensors, even just to switch the electrode positions;
- Patient should avoid touching the devices directly for safety reasons.

3. After Operation

- Return all the devices back to initial position before switching them off;
- Gently remove the electrode cables;
- Clean the device and accessories for future use.

Other Notes:

- Do not use this device for other uses than medical examinations;
- If the device is connected with multiple instruments on the same patient simultaneously, superimposed leakage current of each instrument will cause security risk. Any such combination should be checked by relevant security personnel before being put into use;
- Removable multi-jack provided with the EEG system package is strictly for use with instruments within the original system only;

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- When the system power is powered by the removable multi-jack socket with isolation transformer, do not connect non-medical electrical equipment to the wall outlet directly;
- The equipment parts that are in physical contact with human body after equipment should be confirmed to be working in stable condition;
- For instrument power supply, voltage and frequency of power supply used for this instrument must correspond to the specifications in the manual;
- EEG amplifier and electrodes for EEG system are medical electrical devices designed for use in a clinical environment;
- Maximum allowable load for removable multi-jack socket is 2500VA;
- Do not connect device electrodes to other conductive parts of the device or to the ground;
- Device and its attachments should be examined regularly;
- New silver electrodes and silver support electrodes should be dipped in normal saline for 2 hours when used for the first time for better effectiveness; after the usage, please dip the electrodes in normal saline.
- This device does not have anti-defibrillation function, so it cannot be used together with the defibrillator or any high-frequency surgical equipment;
- When the device is used together with other equipment (such as a pacemaker or electrical stimulation), safety of the combination should be confirmed by clinical engineers, so it will not affect the equipment's diagnostic results or cause harm to the patient.

Important Notes

- **Warning: When used with a removable multi-jack socket, the socket should not be placed on the ground.**
- **Warning: Switch on and run the EEG amplifier by battery when conducting EEG examinations. Do not run the EEG amplifier by AC during examinations, because the AC power adapter for EEG amplifier is only for recharging purpose, and any misuse may cause electric shock hazard to the patients.**

Requirements for Accessories:

All accessories used together with the device should be approved by Neurostyle Pte. Ltd. or its authorized distributors. Unapproved device and accessories will affect the effectiveness of the instrument as well as safety to the users and patients.

Staff Requirements:

- Operators should be trained with EEG related skills and knowledge before they are allowed to operate the equipment;
- Operators should be familiar with electrical safety knowledge.

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Important Notes

- **When the system power is supplied from an isolation transformer through moveable jack socket outlets, non-medical electrical equipment of the system is not available directly connected to wall socket, non-system consisting of electrical is not available to connect with move multi-jack socket.**
- **Warning: it is Class IIa equipment. To avoid the risk of electric shock, the equipment must only be connected to a power supply with earth protection.**
- **Warning: The SIP/SOP should be connected to IEC certified device. If not, there will be risk of external voltage on this part.**
- **Warning: Appliance coupler is considered as disconnected device; please do not place the equipment in a difficult-to-operate position.**
- **Warning: Do not modify this equipment without authorization of the manufacturer.**
- **Warning: Computer, monitor and printer used with this equipment should meet national safety standards, and the power supply to the medical equipment should be insulated using an isolation transformer unit.**

Intended Use:

Neurostyle EEG System delivers high quality EEG signals through state-of-the-art hardware and software design, built-in impedance test module and anti-interference data transmission technology.

Indications of Use:

Neurostyle EEG Systemcan be used for routine EEG, event-related potential (ERP) data acquisition and analysis, as well as professional sleep monitoring using polysomnography (PSG). It also can be used by post-stroke patients for rehabilitation through Brain Exercise Therapy Towards Enhanced Recovery (nBETTER).

NOTE: Please refer to nBETTER Operation Manual or nBETTER Training Manual for details on rehabilitation application.

Contraindications:

Those with the following medical conditions should be advised against undergoing the optional ERP stimulation test module:

- Patients with cardiac pacemakers or cardiac catheterization;
- Patients with skin diseases;
- Patients with bleeding tendencies;
- Patients who are susceptible to recurrent and/or systemic infections.

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User Interface

- Mouse, keyboard
- Portable EEG Host
- Supported output devices
- Windows supported printer

Input Requirements

1. Input impedance ≥1000MΩ;
2. Noise level <0.4μV (rms);
3. CMRR ≥110dB;
4. Resistance polarization voltage ± 300mV;
5. Frequency characteristics: 0.5Hz ~ 100Hz. Error of +5% ~ -30%;
6. Amplifier with a light display to indicate amplifier work status;
7. Impedance Test: Includes scalp impedance test function, impedance threshold lights on top of EEG amplifier can be set to indicate impedance status (red or yellow means high impedance, green means impedance is acceptably low); threshold values can be set at 5KΩ, 10 KΩ, 15 KΩ, 20 KΩ;
8. Channel Configuration: 24, 36, 48, 60 channel EEG；
9. Sampling frequency: 128Hz, 256Hz, 512Hz;
10. Interface technology: USB 2.0 interface, transmission rate 480Mb (/12Mb)/s;
11. Fiber optic modules: Work rate: ≤84Mb/s;
12. Precision sampling resolution: 24bit;
13. Digital low-pass filter control: 15Hz, 30Hz, 40Hz, 60Hz, 120Hz etc;
14. Digital time constant control: 0.01s, 0.02s, 0.03s, 0.1s, 0.2s, 0.3s, 1s, 2s, 3s, etc.;
15. Digital zoom (from 1 to 10000 times);

Device Classification Information

According to IEC 60601-1:1988+A1:1991+A2:1995, NS-EEG-D-1 EEG System is classified as:

1. Type of shock protection	Class II-A device and USB-powered
2. Level of shock protection	BF-type
3. Inlet liquid protection grade	IPX0
4. Protection from defibrillator electric discharge effect	No
5. Safety grade under the condition of the mixture of flammable anesthetic gas with air, oxygen or nitrous oxide	Device is not AP nor APG type
6. Operation of work system	Continuous operation
7. System power supply voltage	AC 220V, 50HZ
8. Disinfection and sterilization methods recommended by manufacturer	Applicable

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Device Symbols

1.		BF type equipment
2.	~	(AC)
3.		Note (please refer to the files attached with device)
4.	|	Power On
5.	O	Power Off
6.		Equipment can't be thrown away arbitrarily
7.	SN	Serial No.
8.	CE	This Product meets the main requirements of the European Directive

Disposal:

- EEG amplifier should be disposed after its product shelf life (after removing the lithium battery beforehand).
- When a Lithium battery is damaged or fails, it should be processed together with other batteries according to local environmental regulations, and it should not be thrown away.
- Application Parts like electrode wire, electrodes and other accessories should be processed in accordance with the medical waste disposal, and it should not be thrown away.

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I. EEG Hardware System Overview

Standard NS-EEG-D-1 hardware include EEG Controller, EEG Amplifier, Fiber optical cable, USB-HDMI cable, 2 sets of AC power adaptors and power cables, electrode cables, and EEG cap.
Optional hardware includes AV Stimulator, Current Stimulator, headphones, flash stimulation lamp, saddle electrode, DB15 cables, and PSG electrodes cables.

A. EEG Controller

NS-EEG-D-1-MB EEG Controller serves as the central interchange of the EEG system. It connects to the EEG amplifier with the fiber optical cable, and connects to the PC via the USB-HDMI cable. It is also the platform to connect to the optional stimulator hardware required for ERP.

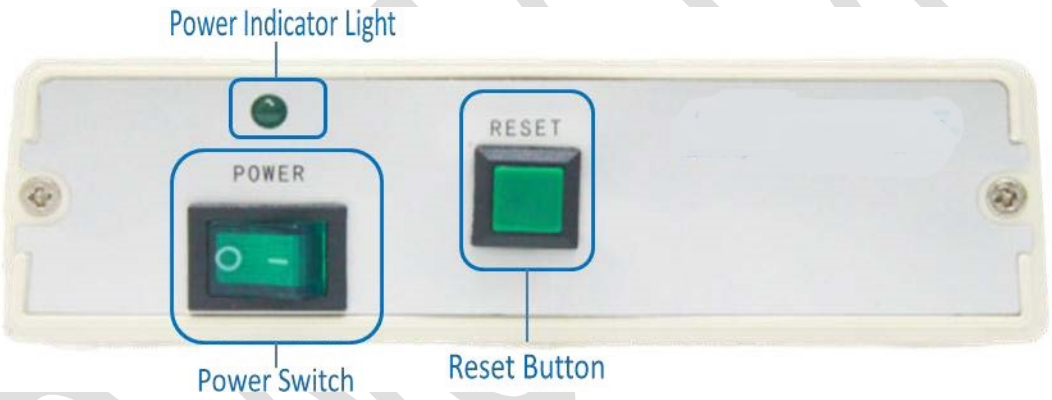

Fig 1-1A Front view of EEG controller

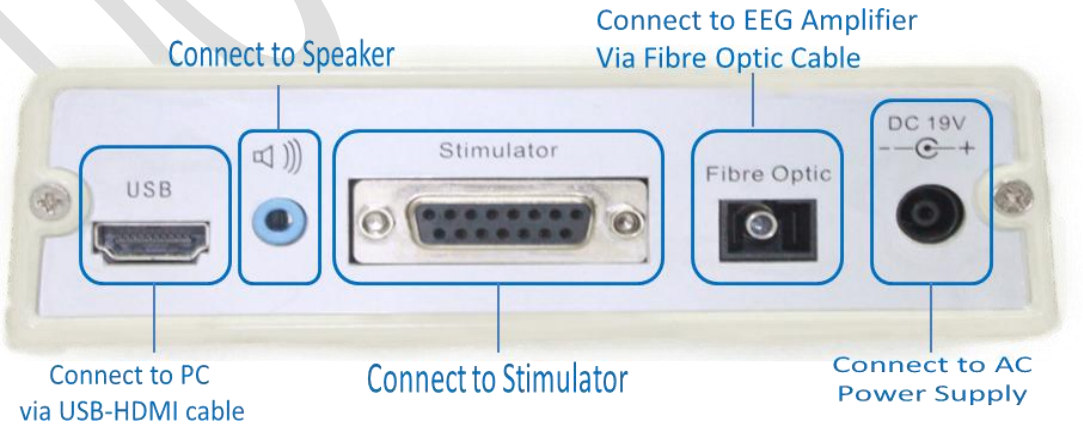

Fig 1-1B Back view of EEG controller

Fig 1-2A USB-HDMI cable

Fig 1-2B Fiber Optical cable

Fig 1-2C AC adaptor for EEG controller (Narrow-tipped cable)

Fig 1-2D AC adaptor for EEG amplifier (Large, 4-pinned tip cable)

B. EEG Amplifier

EG amplifier is the hardware to connect to EEG cap for EEG signal acquisition, and then transmitting the data to the EEG Controller via the fiber optical cable.

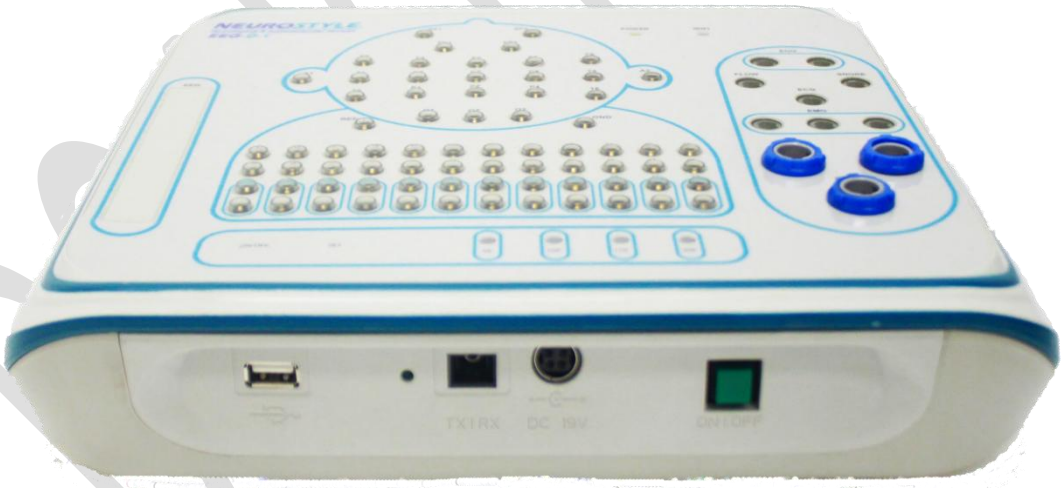

Fig 1-3 AMP EEG Amplifier

Fig 1-3 indicates the cable connections of fiber optical cable (blue head) and power cable (black), as well as the green power button at the frontal part of the device. Note that the green power button is for DC power supply only, and when AC power is supplied to the amplifier, the amplifier is always on.

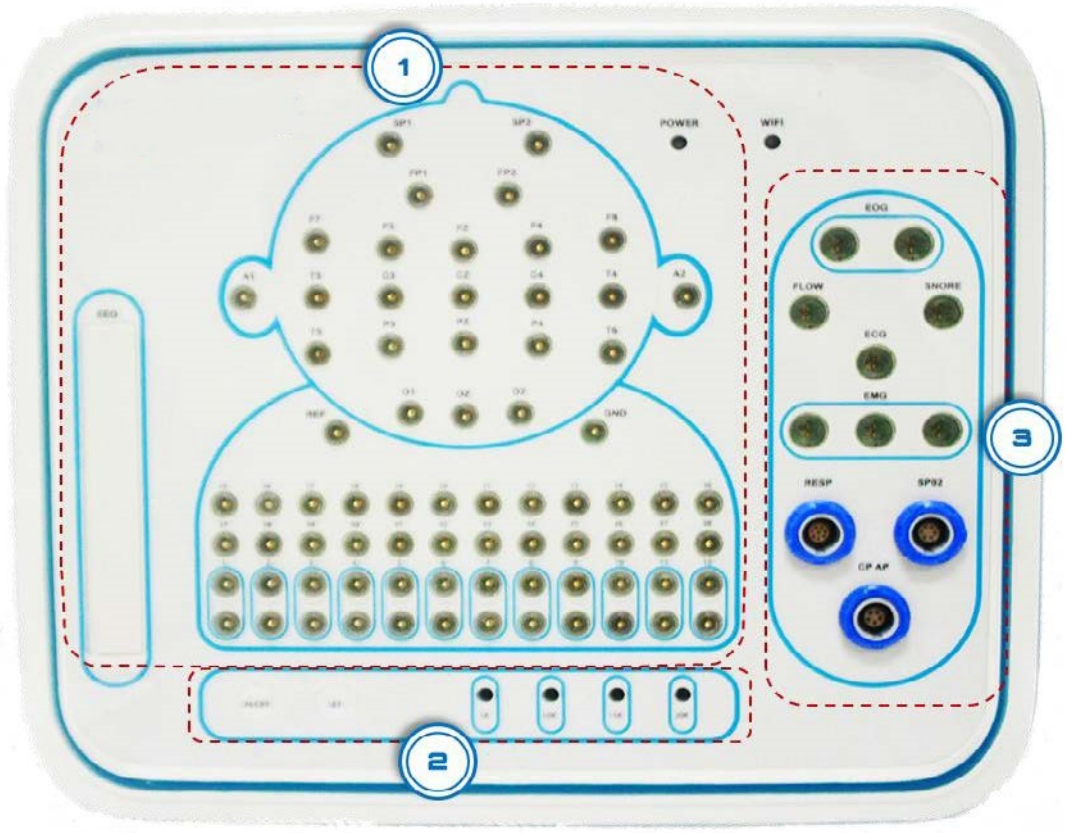

Fig 1-4 Function areas of EEG Amplifier

AMP EEG Amplifier has a few functional areas, as indicated in the Fig 1-4:

1. Area 1is for connecting the required EEG channels to the EEG cap through touch proof pins.
   1.1 The top right of Area 1 has an indicator LED to indicate operation status of the amplifier.
      a) When device is in operation, the LED is bright green.
      b) When the device battery is charging, the LED will flash in yellowish light.
   1.2 Input lead cable should be connected to the corresponding positions on the amplifier.
   1.3 For the first 24 channels, the lead positions are fixed; for channel 25 onwards, the positions can be determined based on the software lead configuration.
   1.4 The left part of Area 1 is an optional port for a Single-plug All-in-one electrode cable.

Fig 1-4A EEG Cap

Fig 1-4B EEG Cap (worn)

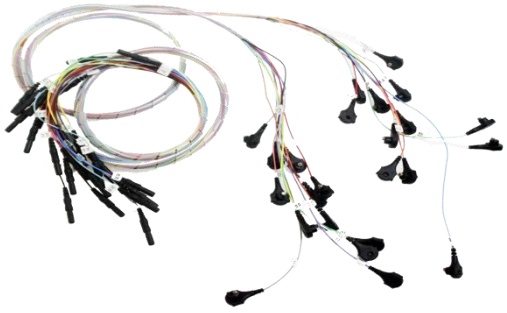

Fig 1-4C EEG Cap electrode cables
(24 cables bunched together)

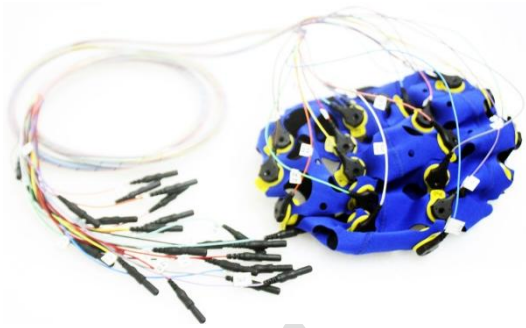

Fig 1-4D EEG Cap with electrode cables

Fig 1-4E EEG Cap with Electrodes
Front view (worn).

Fig 1-4F EEG Cap with Electrodes
Side view (worn).

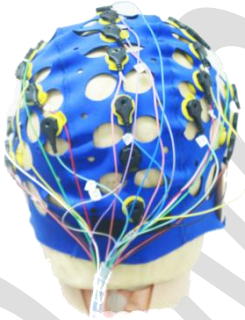

Fig 1-4G EEG Cap with Electrodes
Back view (worn)

Fig 1-4H Single-plug EEG Electrode cable
(All-in-one)

2. Area 2 is the impedance testing control area with 2 press buttons: “ON/OFF” and “Set”. 4 indicator lights on the right to indicate impedance threshold values of the EEG channels at 5k, 10k, 15k, and 20k Ohms respectively. **More details in Chapter III.**

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Fig 1-4GEEG Amplifier in Impedance Testing Mode

3. Area 3is for PSG related functions, as displayed in Fig 1-5. Fig 1-6 to Fig 1-11 are the connection cables for the respective PSG channels **(Operation details in Chapter IV, Section C).**

Fig 1-5 PSG Module

A. EOG, EMG

Fig 1-5A Connection cable of EOG, EMG

Nr 1: Record Side; Nr 2: Reference side.

B. Airflow

Fig 1-5B Airflow connection cable

C. SpO2

Fig 1-5C SpO2 connection cable

D. Snoring

Fig 1-5D Snoring connection cable

E. ECG

Fig 1-5E ECG connection cable

F. Respiration, Body position

Fig 1-5F RESP, Body position connection cable

C. Audio and Visual Stimulator

Audio and Visual Stimulator (AV Stimulator) is an optional hardware for audio and visual stimulation in the ERP module.

The rectangular LED indicator at the middle is the power indicator of the A/V stimulator. The channel ports from left to right are for connecting flash stimulation lamp, video display and headphones. The indicator above the respective ports will be lit when activated, particularly during the AEP, VEP and P300 examinations.

AV Stimulator is connected to the rest of the hardware system via a DB15 extension cable.

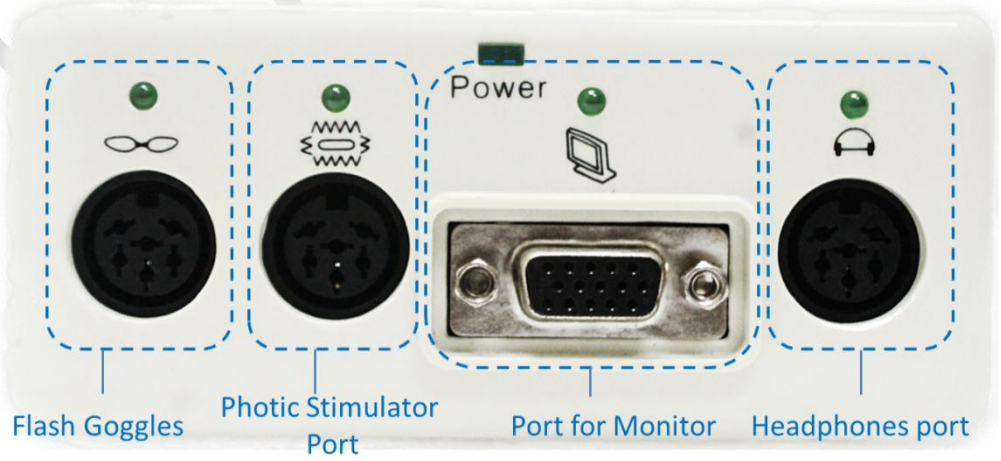

Fig 1-6A - AV Stimulation Controller (Front View)

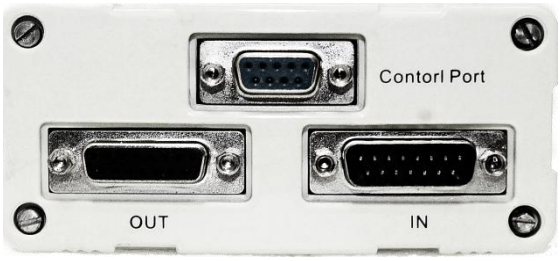

Fig 1-6B - AV Stimulation Controller (Back View)

Fig 1-6C - Audio Stimulation Headphones

NOTE: While connecting multiple AV stimulators is possible, it is not advisable as the configuration may confuse the program and crash the application system.

NOTE: For VEP, connect to a monitor instead for displaying various visual patterns.

D. Current Stimulator

Current Stimulator is an optional hardware for current stimulation in EEG/ERP examinations. The rectangular LED indicator at the middle is the power indicator of the current stimulator. The channel port is for connecting to saddle electrode for current stimulation in ERP examinations. Current Stimulator is connected to the rest of the hardware system via a DB15 extension cable.

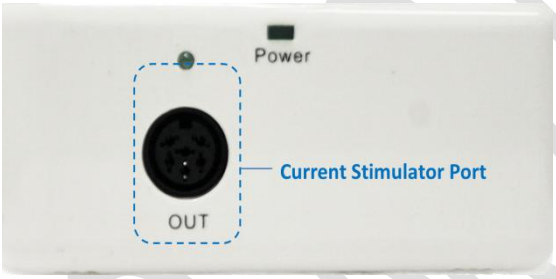

Fig 1-7A - Current Stimulation Controller (Front View)

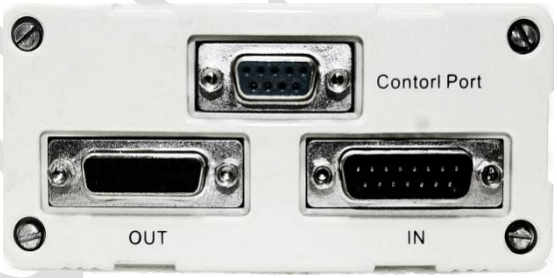

Fig 1-7B - Current Stimulation Controller (Back View)

Fig 1-7C Saddle electrode (Bar Type)

Fig 1-7D Saddle electrode (Felt Type)

NOTE: While connecting multiple current stimulators is possible, it is not advisable as the current stimulators cannot be differentiated by the program, and is hence unable to generate 2 current stimulation programs simultaneously.

E. Flash Stimulation Lamp

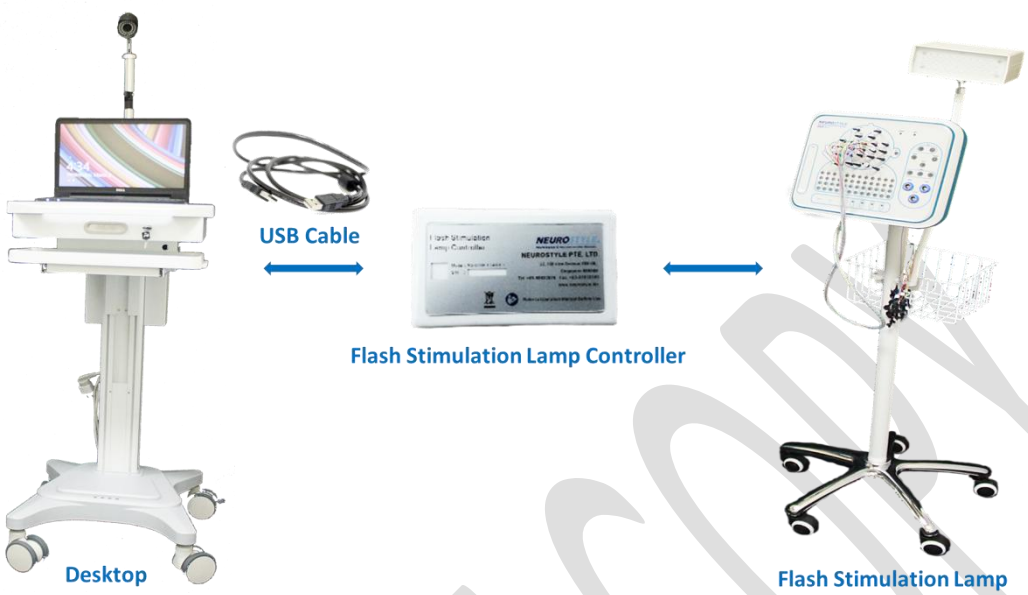

Fig 1-8 Flash Stimulation Lamp Module

Flash Stimulation Lamp module is an optional module for non-ERP users to conduct flash stimulation on EEG subjects.

1. **Hardware connection**
   a. The Flash Stimulation Lamp module comes with a **Flash Stimulation Lamp**, **Flash Stimulation Lamp Controller**, **USB cable (AA interface)**, and a **Signal Control Cable**.
   b. Connect the Flash Stimulation Lamp to the Flash Stimulation Lamp Controller with the Signal Control Cable, and then use the USB cable to connect the controller to the computer.
   c. If the computer is switched on, it should detect the new hardware right away and proceed to hardware driver installation.

Fig 1-9 Flash Stimulation Lamp module connected to a laptop computer

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2. **Steps for flash stimulation lamp controller driver installation are covered in Chapter II Section D (page 24).**
3. **Steps for flash stimulation lamp controller driver operation are covered in Chapter IV Part D (page 47).**

F. EEG Hardware Configuration

The EEG system connection is shown below:

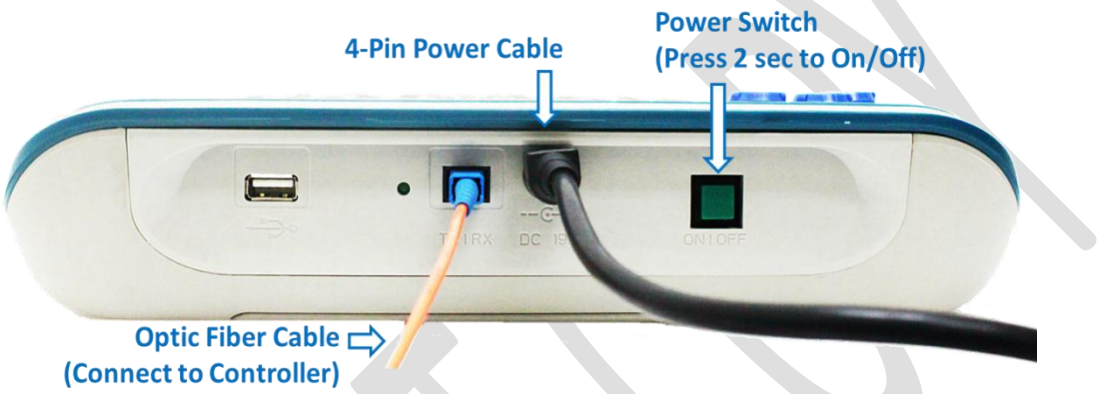

Fig 1-10 Connection for EEG Amplifier

1. Fiber optic serves to connect between EEG Controller and EEG Amplifier. The indicator light beside the connector will light up when the connection is made correctly.
2. USB-HDMI connector connects the EEG Controller to the PC in order to access EEG data from the EEG Amplifier.

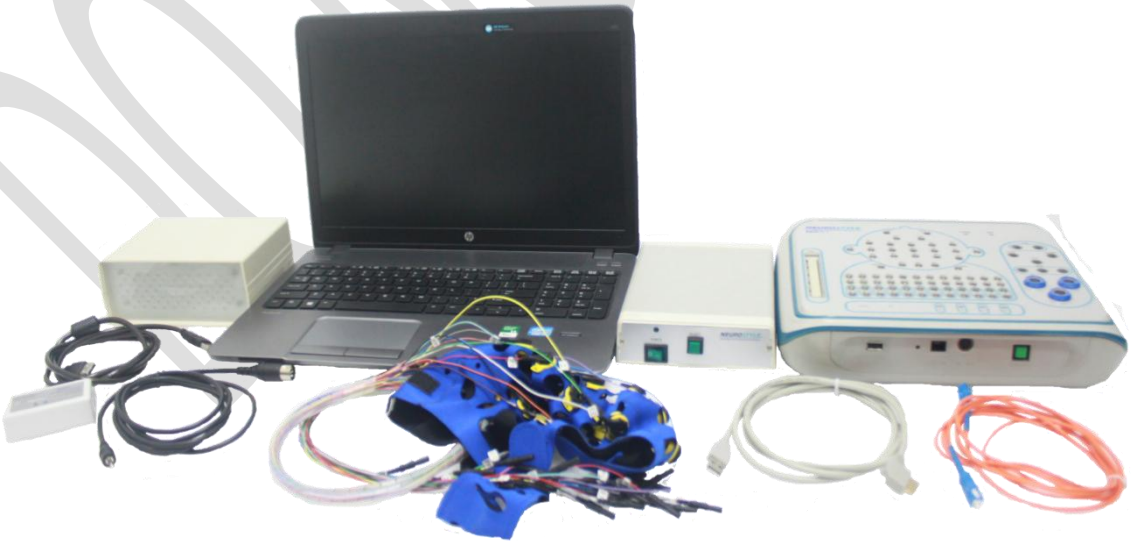

Fig 1-11 Standard EEG System parts (with Flash Stimulation Lamp)

Fig 1-12 Standard EEG System parts (with ERP Modules at left)

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II. Installation and Configuration

A. Software Installation Requirements

The following are the specifications to install and use the EEG system. For any equivalent substitutes, it is advisable to check with the supplier beforehand.

Windows 7

Operating System	32-bit	64-bit
Memory (RAM)	1GB or Higher	2GB or Higher
Processor (CPU)	1 GHz (x86) Processor or faster	1 GHz (x64) Processor or faster
Hard Disk	128GB or more	
Display Card	Microsoft DirectX 9 graphics device with WDDM 1.0 or higher driver	
Software	Microsoft Word (2003 or better)	
Printer	Color Inkjet printer Recommended	

Windows 8

Operating System	32-bit	64-bit
Memory (RAM)	1GB or Higher	2GB or Higher
CPU	1 GHz or faster with support for PAE, NX and SSE2	
Hard Disk	128GB or more	
Display Card	Microsoft DirectX 9 graphics device with WDDM driver or higher	
Software	Microsoft Word (2003 or better)	
Printer	Color Inkjet printer Recommended	

B. Software Installation Procedure

1. To begin, insert the installation CD that is available in the EEG System package into the computer. If the CD cannot be found, please request for technical support from the supplier.
2. Double-click "**NS-EEG Setup.exe**" program in the installation CD, and a pop-up installation interface will appear:

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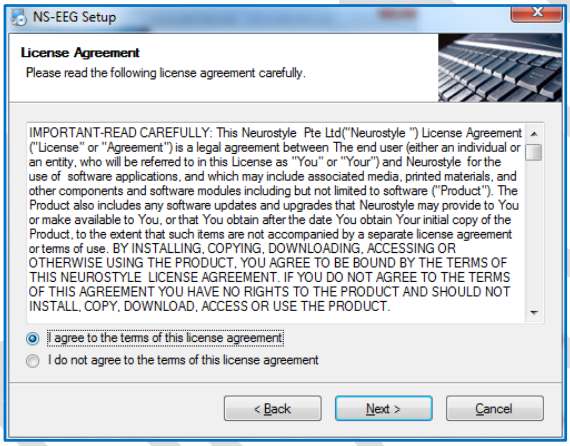
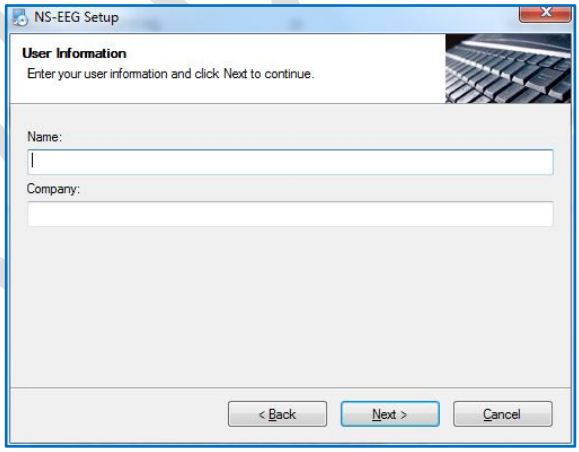
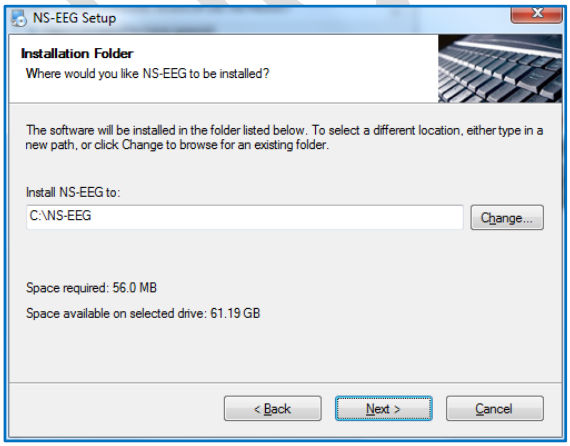
3. The installer will prompt you on License Agreement, User Information, Installation Folder, and Shortcut Folder. Choose to accept the License Agreement and proceed with default settings in C: drive whenever you are prompted and the installation will be completed within minutes.
4. "**NS-EEG**" folder will be created in the designated installation folder (default folder C:\) after installation is complete.



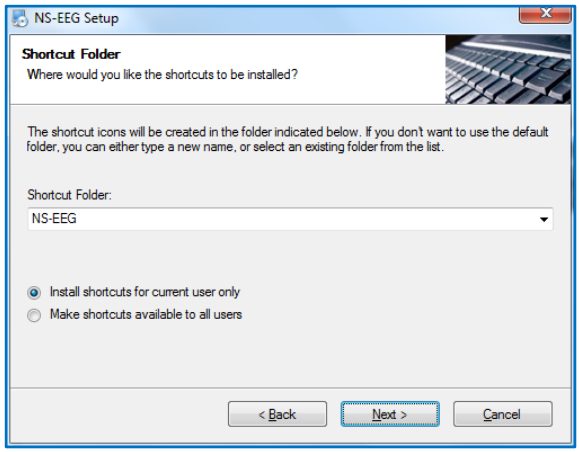
License Agreement



User Information



Installation Folder



Shortcut Folder

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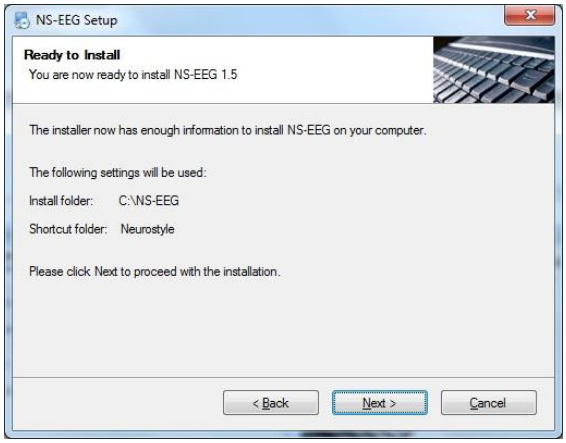
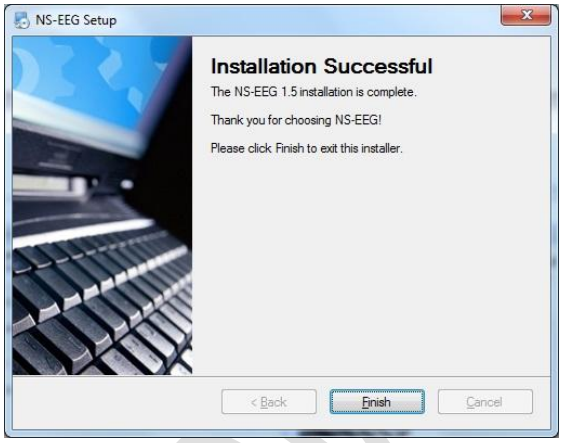


Ready to Install



Installation Successful

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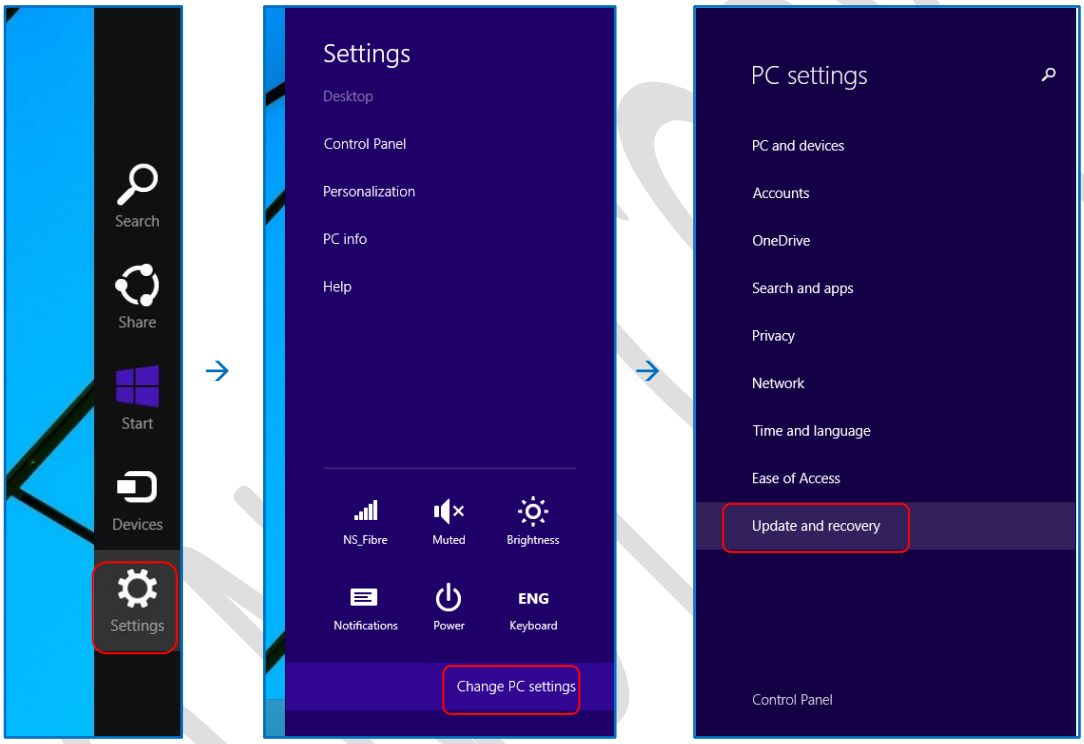
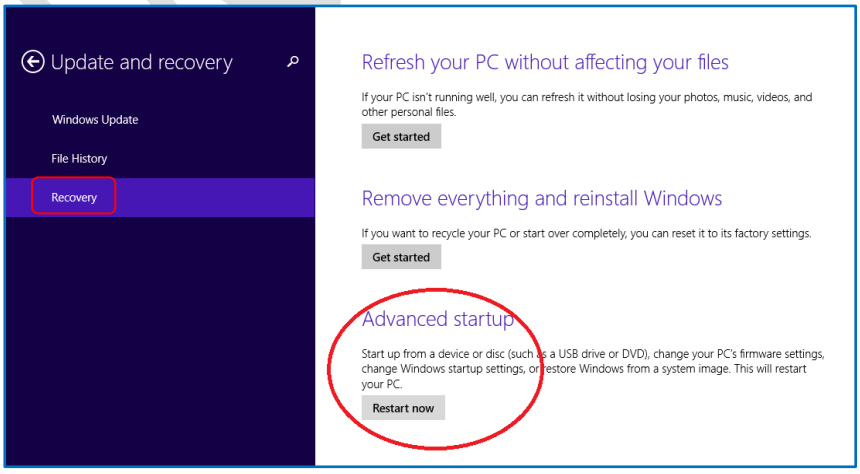
C. EEG Driver Installation

NOTE: For Windows 8 OS, do the following steps to install the driver **(For other older OS, skip to step 8 or page 23).**

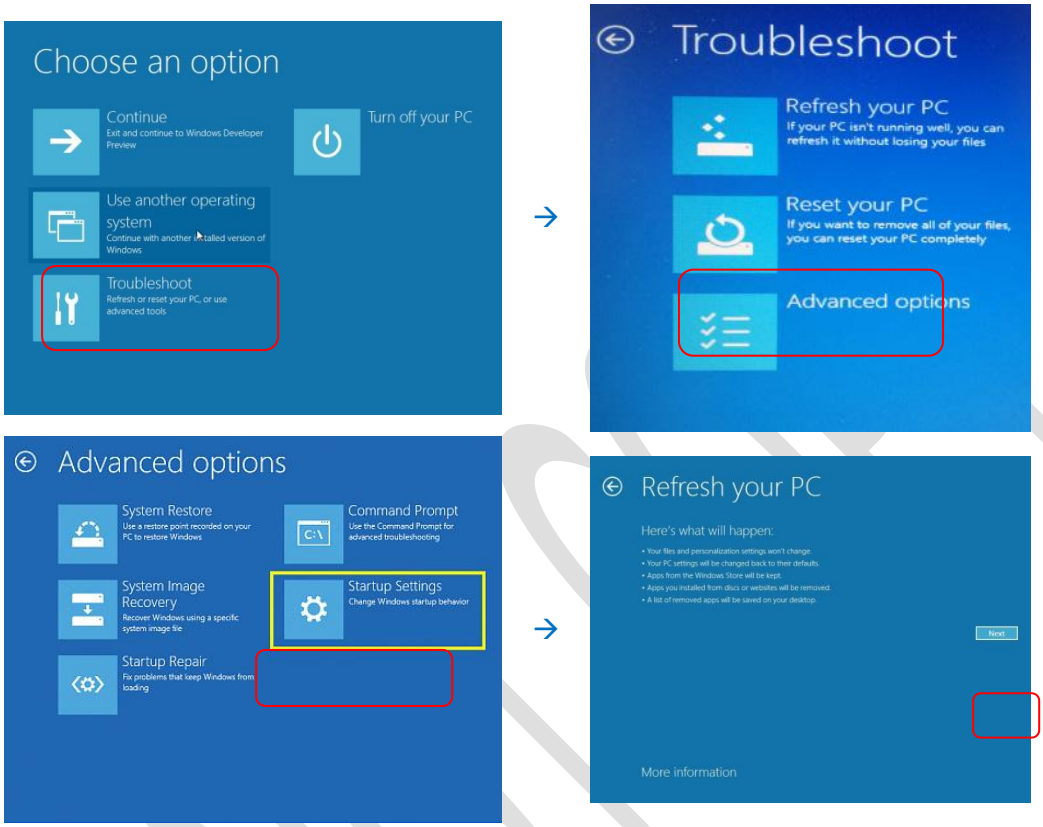
1. Move the mouse to the bottom right corner of the screen in order to bring up the five icons on the right side of the screen. Click on the lowest [Setup] icon, and when the computer settings menu opens up, click [Change PC Settings] at the bottom right corner to open the PC settings menu;



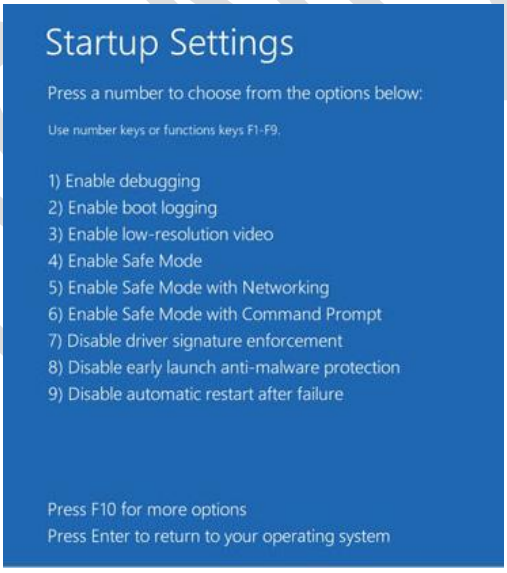
2. At the left menu of the PC Settings, select **[Update and Recovery]** to open Update and Recovery interface;
3. Select **[Recovery]** at the menu on the left side screen to bring up 3 sets of options. Click **[Restart now]** under the 'Advanced Startup' section to restart the computer;



4. In the startup options screen, click [Troubleshoot] to open the Troubleshooting interface, and then select **[Advanced Options].**
5. From the Advanced Options menu, select **[Startup Settings],** and then click [Restart] to open the startup settings interface;

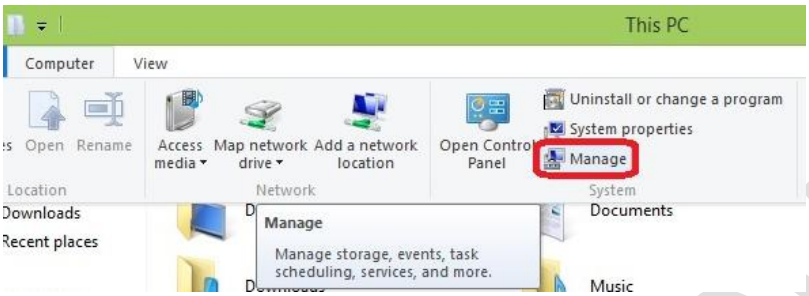


6. In the Startup Settings, input **"7"** with the keyboard. The computer will be restarted;



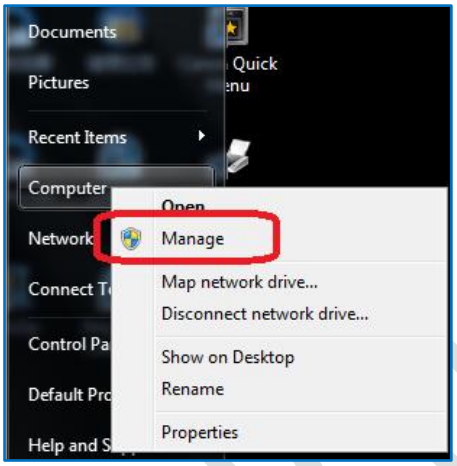
7. **The rest of the steps for installation on Windows 8 OS should be similar to older OS. If the steps earlier are not done, the driver installation will be stopped by the OS.**
8. **Open the Device Manager** (one way is to right-click **"Computer"/"This PC"** and select **"Manage"**, and then select **"Device Manager"** from the left menu).

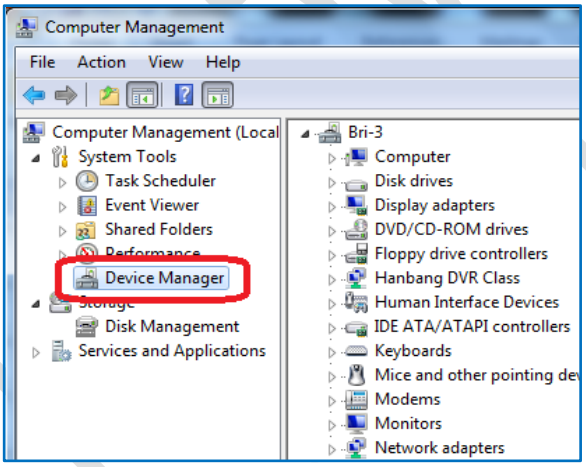
9. Connect the EEG hardware to the computer. **"Unknown Device"** should be detected by the computer. To resolve that, right-click the **"Unknown Device"** and choose **"Update Driver"** to open the driver installation wizard.



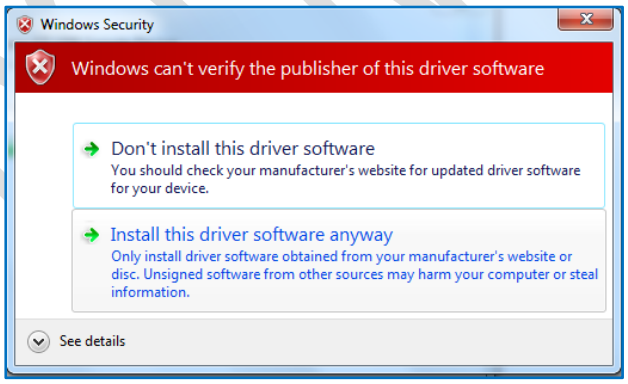
Windows 8

Windows 7

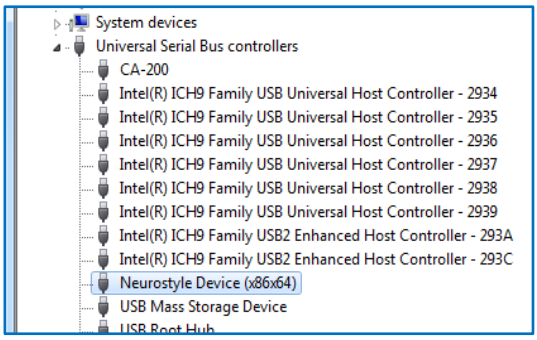




10. In the Driver Installation Wizard, select **"Browse my computer for driver software"**, and then click **"Browse"** under "search for driver software in this location" and set the path as "**target path: \NS-EEG\UsbDriver x86x64\".** Then click **"Next".**
11. The system will start to install driver automatically. If the dialog frame of "Hardware installation" pops up, click **"Continue anyway"**.



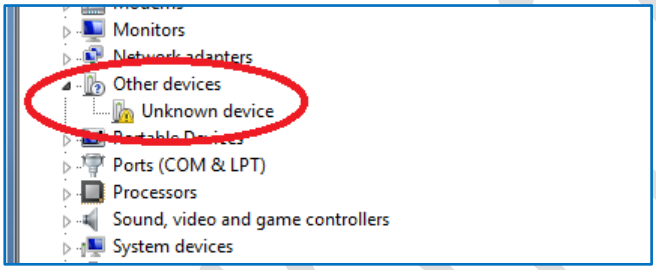
12. Click "Ok" to finish installation. The new hardware should be found under "**Universal Serial Bus Controllers**' as '**Neurostyle Device (x86x64)**'.



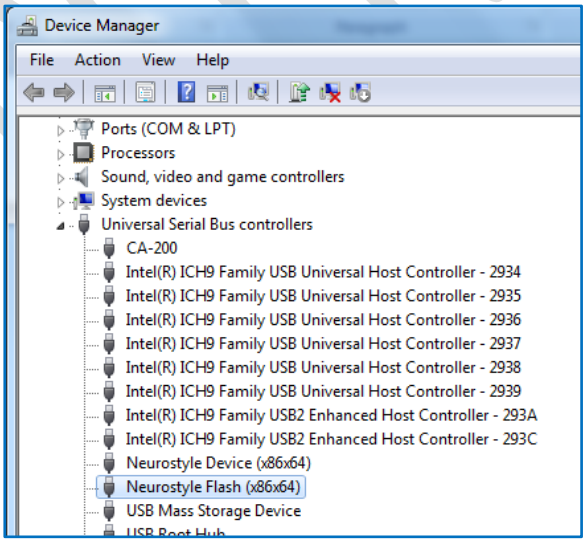
NOTE: If there is a yellow "!" mark on the icon, uninstall the driver along with the driver software, and then click "Scan for hardware changes" to reinstall the hardware driver (you can choose to skip checking from windows update to quicken the process). Repeat this until the yellow mark no longer appears.

D. Flash Stimulation Lamp Controller Driver Installation

1. Connect the flash stimulation lamp controller to computer by USB cable (AA interface). The computer will detect the new hardware and look for the corresponding driver automatically.
2. If the auto-installation fails, open the **Device Manager** to find a new '**Unknown Device**'. Right-click on it and click "**Update Driver**" to open the driver installation wizard.



3. In the Driver Installation Wizard, select **"Browse my computer for driver software"**, and then click **"Browse"** under **"search for driver software in this location"** and set the path as "**target path: \NS-EEG\UsbDriver x86x64\".** Then click **"Next".**
4. The system will start to install driver automatically. If the dialog frame of **"Hardware installation"** pops up, click **"Continue anyway".**
5. Click **"Ok"** to finish installation. The new hardware should be found under "**Universal Serial Bus Controllers**' as '**Neurostyle Flash (x86x64)**'.



6. If there is a yellow mark on the icon, **uninstall** the driver along with the driver software, and

then click **“Scan for hardware changes”** to re-connect the hardware and reinstall the hardware driver (you can choose to skip checking from windows update to quicken the process). Repeat this until the yellow mark no longer appears.

E. EEG Serial No. Registration

After completing NS-EEG software installation, a desktop shortcut for NS-EEG software will be created, as shown on the right. Double-click the “**NS-EEG**” icon to launch the NS-EEG software.

NOTE: The first time the EEG software opens, a system message about sampling rate may appear. To handle that, click “Setup”→"Display and Sampling", and then change the "Sampling Frequency" and click “OK”. After this, the system message will not appear again.

Registering the EEG amplifier serial number into the software is important to make sure that EEG amplifier is the only one recognized by the software, so the software will not confuse its input with other EEG amplifiers or machines in the vicinity.

1 Double click icon **"NS-EEG.exe"** on the desktop to open the main interface of the software, as shown in Fig 2-1.

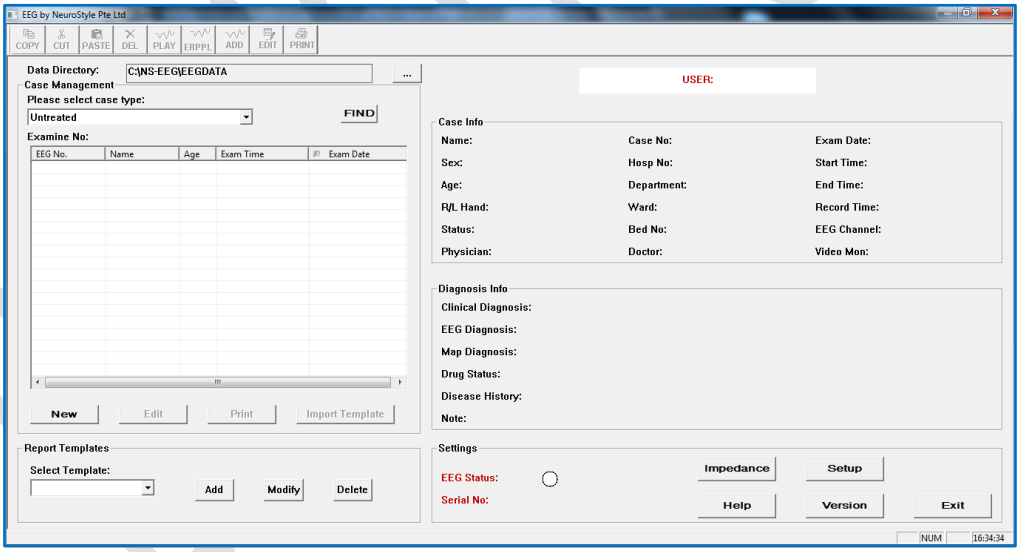


Fig 2-1 Main Interface

2 Click "**Setup**" button at lower right to open the system setup interface (See Fig. 2-2), and then click "**Leads Edit**" button under **[Leads and Template Settings]** tab (third tab) to open the leads edit interface (Fig 2-3).

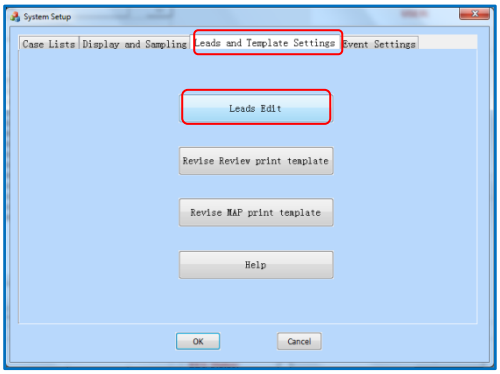


Fig 2-2 System Setup

NOTE: If the message "Unsupported operation is attempted" appears, close the NS-EEG application and open Windows Explorer to where you installed the NS-EEG software (…\NS-EEG\BIN) and find "SetupOcxC.bat", right-click it and choose "Run as Administrator". A message "DllRegisterServer in C:\temp06\msflxgrd.ocx succeeded" should pop up. Open the application and try again, and the problem should be resolved.

3 Click **"Config"** button at the top right corner, and a dialog asking for password will appear. Input the password "***ns201508***", Single-click **"OK"** button to enter the Engineering Configuration interface as shown in Fig 2-4.

4 At the Engineering configuration interface, click on **"Serial No."** button to open a window of EEG serial numbers, shown in Fig 2-5.

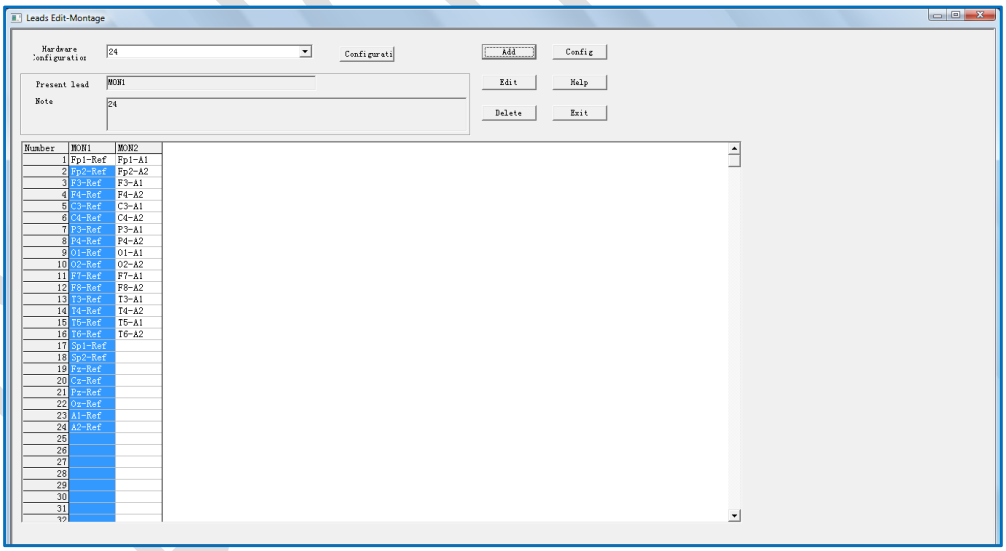


Fig 2-3 Leads Edit

DO NOT COPY

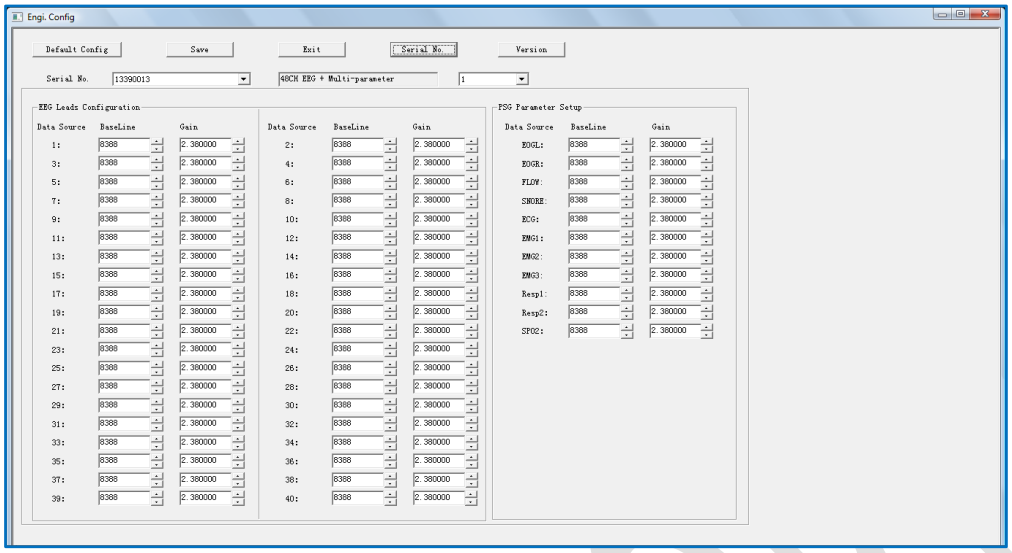


Fig 2-4 Engineering Configuration

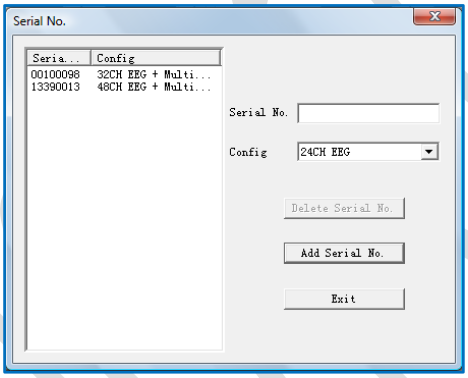


Fig 2-5 Serial Number addition

5 Input the EEG serial number based on the EEG Amplifier label (e.g. if serial no. label writes **"ED1-12345678"**, input **"12345678"** here) and select a channel configuration according to the hardware purchased. If PSG is included in the hardware, make sure the channel configuration selected includes **"Multi-parameter"** option as well. Click **"Add Serial No."** to complete the serial number registration.

6 If the serial number inputted is incorrect, the amplifier will not be recognized by the software system. To correct it, click on the incorrect serial number and click on "**Delete Serial No.**" to remove the incorrect entry.

7 After registering the EEG serial number, exit the EEG list window and Engineering Configuration interface to return to the Leads Edit interface.

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F. Leads Configuration

1 EEG leads can be configured from the Leads Edit/Montage Interface (See Fig. 2-3) accessible from the system setup. The configurations may differ slightly based on the EEG type selected and the inclusion of multi-parameters.

2 Click on "**Hardware Configuration**" button to enter interface of data source addition as shown in Fig 2-6.

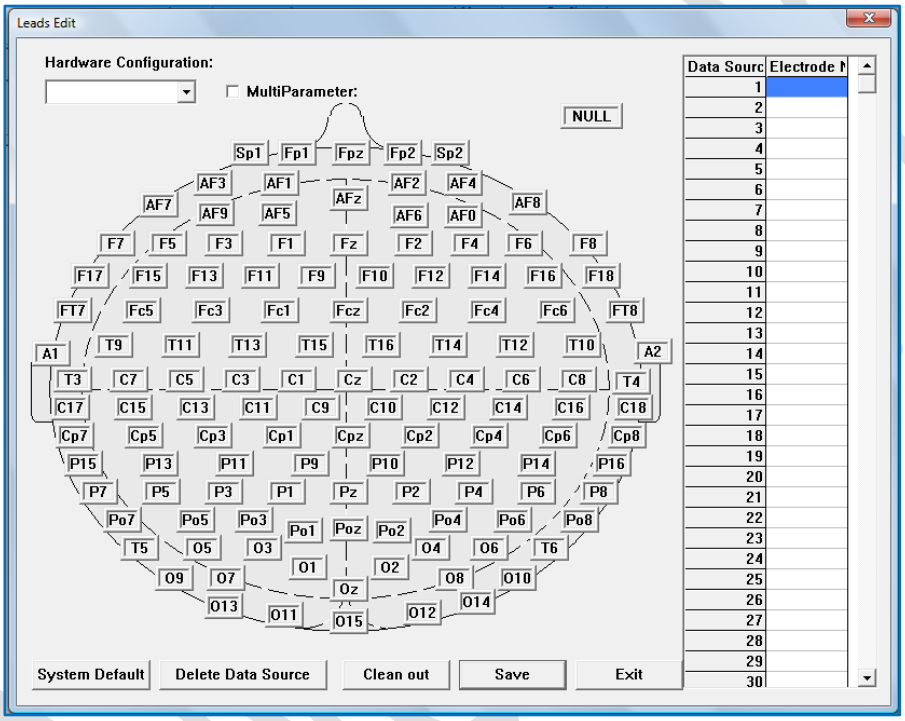


Fig 2-6 Hardware Configuration

3 Insert the name of hardware configuration plan in the textbox at the top left corner, and choose whether to add multiple parameters (i.e. PSG parameters) in the plan by checking the box beside the textbox.

4 Click on the electrode names in the leads diagram to add the leads into the list at the right. This will be the basis of EEG leads configuration.

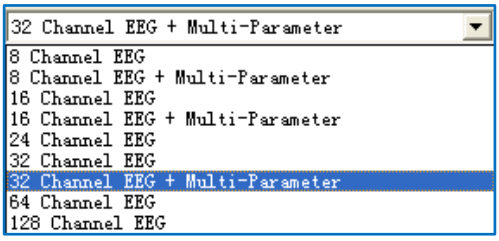
5 Click "**Save**" after setup of electrodes is finished, and the hardware configuration plan will be saved; or click "**Exit**" to discard the plan and close the window.

WARNING: Do not change any existing hardware configuration plans without guidance, or the software may not work properly.

NOTE: We recommend configuring based on International 10-20 System for the first 20 EEG channels in any hardware configuration.

6 Back at the Leads Edit/Montage Interface, click on the drop-down list box of "**Hardware Configuration**" at the top left to select the EEG configuration to be used. The columns below

will display the existing EEG channel configurations. The newly added hardware configuration plan should be available as well.



Hardware Configuration Drop-down List

7 Select a plan to be used for leads addition in Fig 2-7. Click "**Add**" to open the Leads Addition interface to determine how to connect the EEG channels. **NOTE: Leads Addition or Edit needs the EEG hardware to be switched on and connected to work properly.**

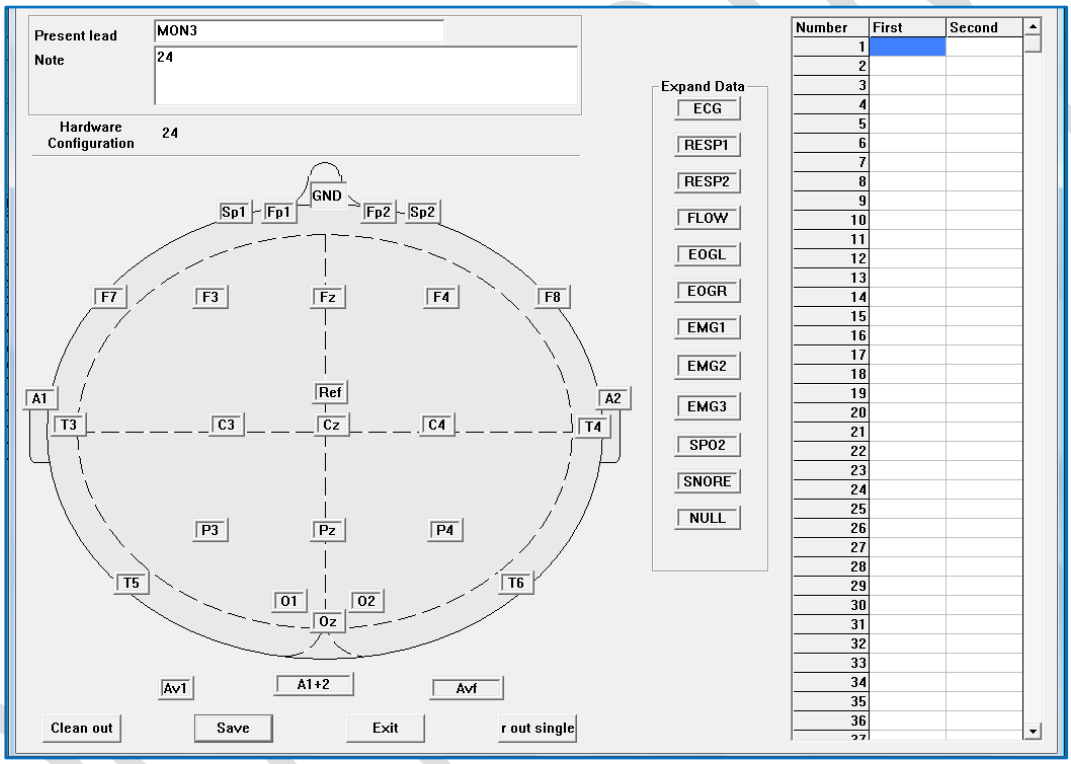


Fig 2-7 Leads Addition

8 In the Leads Addition interface, click an electrode name at the schematic diagram at the left, and the electrode name will be entered into the first or second column of the list on the right in an alternate fashion. The first column consists of active electrodes, and the second column consists of reference electrodes.

9 To change an existing electrode entry, click and select the particular entry, and then select a different electrode to replace it.

10 When the electrode configuration is completed, click "**Save**" and exit the interface.

11 The new set of leads will be added into the Fig 2-3 interface under the selected hardware configuration plan. Click on this lead mode to select it, and the lead mode can then be modified in a similar fashion by clicking "**Edit**" button.

III. Impedance Testing

Impedance testing is essential to ensure EEG signal output is reliable and noise-free prior to data acquisition of any kind.

1. **Important notes before using this function:**

a) **Make sure the EEG amplifier is connected to the PC, all EEG channels on the EEG cap are connected to the amplifier, and the subject has worn the EEG cap properly.**

b) **Impedance testing and EEG data acquisition cannot be done at the same time**.

2. Click on **[Impedance]** at the Setting section of the Main Interface to open the Impedance Testing window, and then click **"Start"** to begin impedance testing. Without any adjustments, the impedance values displayed for each channel should be more than 500kOhms.
3. If the channel values failed to display, press **"On/Off"** button on top of the EEG amplifier once or twice to activate the impedance testing. If the values still did not display correctly, reopen the impedance testing window.

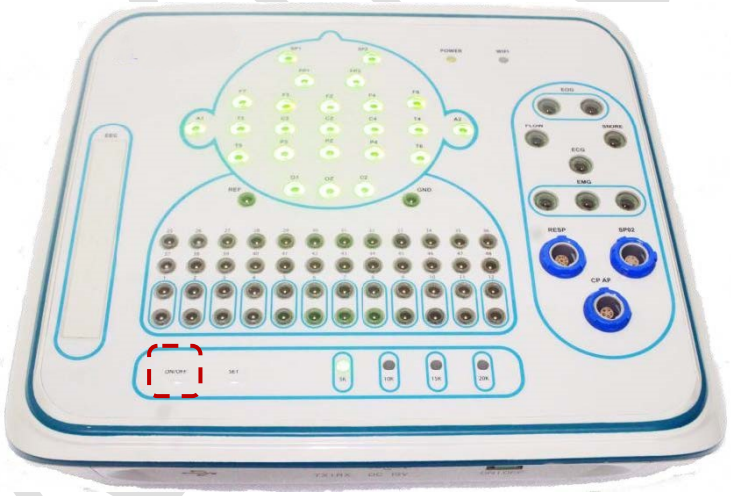


Fig 3-1 EEG amplifier during Impedance testing mode. Press the "On/Off" button in the red box above if impedance values are not displayed correctly.

4. Once the impedance values are displayed, proceed to reduce the impedance level while measuring the impedance level with this window.

a) Use a syringe with non-bevelled needle and EEG gel to reduce the impedance. Make sure the needle tip is clean and rust-free.

b) Fill the syringe tube with EEG gel (you can draw it from the front, or pour it in from the back). If you fill the syringe tube from the back, it is recommended to fill at 80% full, so the gel does not leak from the needle tip.

c) Inject the EEG gel into each channel of the EEG cap through the small hole at the connector. You can remove the EEG cable head before injecting the gel, although it will be messier when you reconnect the cable.

NOTE: Always begin injecting the gel from the channel that is related to most channels, e.g. If you are using Referential EEG lead configuration (all channels use REF as reference), You should begin injecting with the REF and GRD channels, because it will affect readings of all channels.

NOTE: For A1 and A2 channels (located at the ears), use button electrode cables and pads for impedance control instead.

d) Observe the impedance level decrease with the injecting of EEG gel. Make sure the impedance change corresponds to the correct channel, or you need to switch the cable connections of the EEG cap.

5. When impedance of all channels reaches safe level (approximately below 50 or when impedance light on amplifier becomes green, depending on user), the EEG hardware setup is complete and is ready for data acquisition.

NOTE: After completing impedance testing, check the bottom row of the EEG amplifier and make sure no light is on. Otherwise press the "On/Off" button to switch it off.

NOTE: Impedance test module (software method) can support up to 60 preset channels. To customize different EEG channel configurations, please contact Neurostyle or its authorized suppliers.

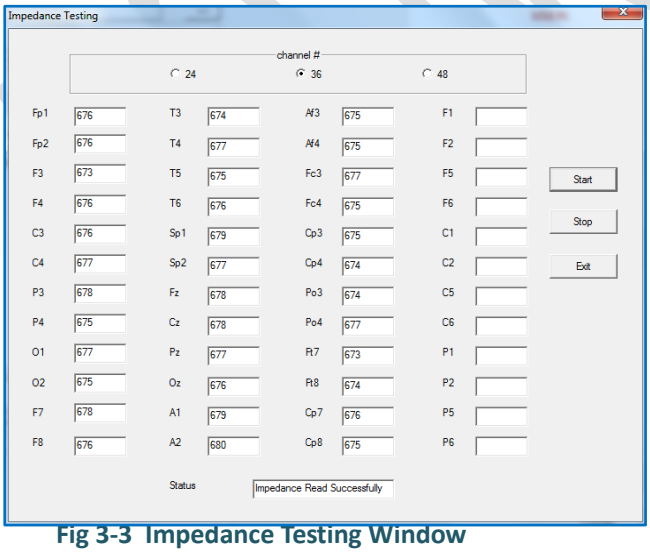


Fig 3-3 Impedance Testing Window

Fig 3-2 Applying EEG gel on the electrodes of EEG cap worn by a subject

IV. Routine EEG

A. Data Acquisition

EEG Data acquisition interface is where EEG data is measured and recorded.

Before data acquisition can begin, make sure the EEG cap is worn onto the subject's head firmly, and the EEG amplifier should be connected to the software with its serial number shown in the main interface. If PSG multi-parameters and/or ERP is used, the corresponding hardware connections and electrodes should be in place before beginning the acquisition.

To open EEG Data Acquisition:

i. Click ***"New"*** button under the case library to open the Add Case Form, as shown below.

ii. Select an EEG hardware configuration, input EEG No. and choose an examination mode at the lower right of the window.

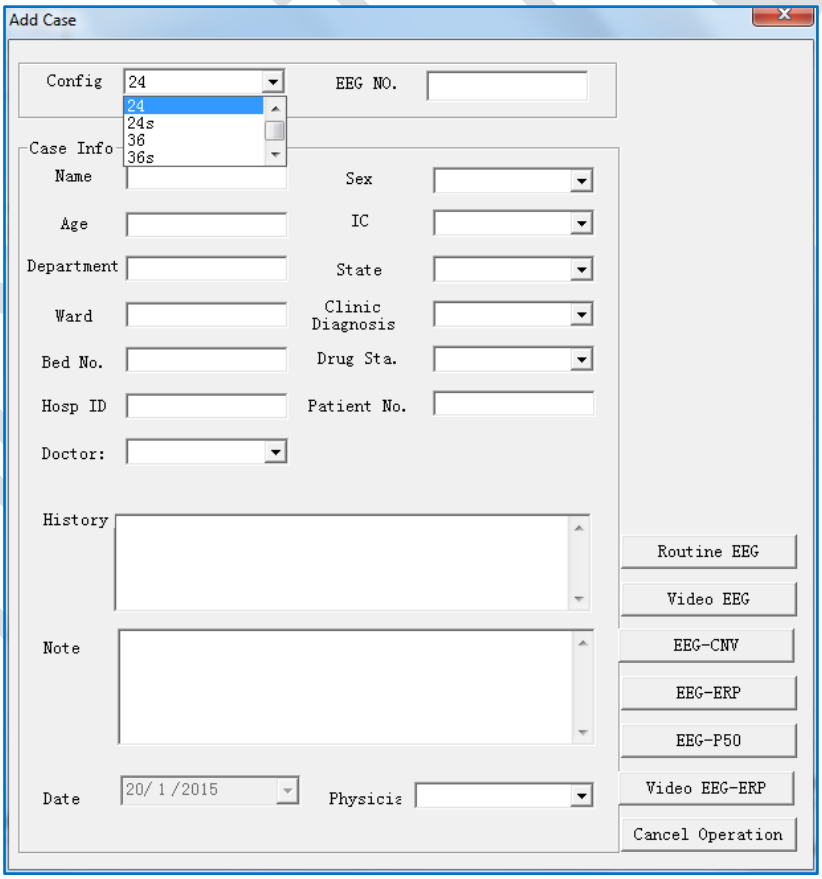


Fig 4-1 Add Case Form

1. Select "**Routine EEG**" in the Add Case Form to open standard EEG data acquisition interface.
2. The top row of the interface shows the patient info, recording status and recording

parameters. There are 2 sets of toolbars, Main Control Bar at the bottom and Functional Menu Bar on the left.

3. Click **[Leads Graph]** at the left menu (second yellow button) and view the Leads. Make sure the correct EEG leads are used; or return to the main interface and restart a new case.

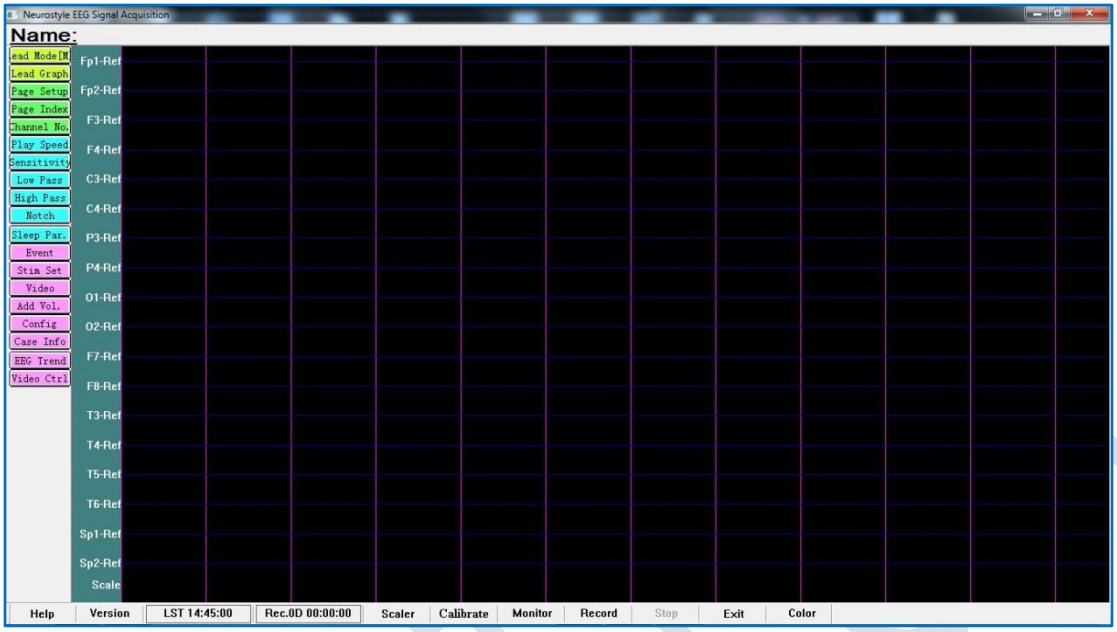


Fig 4-2 EEG Acquisition Interface

4. Check the EEG software parameters (blue buttons) and verify the system parameters are set as the following: **Speed = 3.0cm/s, Sensitivity = 100uV/cm, Low-Pass = 30Hz, High-Pass = 0.3s, Notch = 50Hz (according to local AC frequency)**. You can adjust the parameters as you record the EEG data to view better.
   NOTE: If PSG or Multi-parameter is selected for the case, you can click [Sleep Parameter] to view and adjust the PSG parameters.
5. Click **[Monitor]** to start reading EEG data on screen. The software will go through 30 seconds of ***[Scaler]*** before the real data is read (you can click ***[Scaler]*** at bottom menu to switch it off). EEG data read under this mode will not be recorded, so this is useful to check EEG connection on the cap and deal with artifacts that can affect signal quality. You can also adjust the parameters while monitoring the EEG data.
   NOTE: Make sure impedance testing mode is off and press [On/Off] button on top of the amplifier to switch off any lights besides Power and Wi-Fi indicators. If impedance testing mode stays on, the EEG will not output correctly.
6. Once the data output is satisfactory, click **[Record]** to begin storing the EEG data. Make sure the subject stay still during recording so their movements do not affect the data output. Once sufficient data is recorded, click **[Stop]** to end data recording.
   a) If additional data is required, click **[Record]** again to continue acquiring EEG data.
   b) You can toggle between **[Record]** and **[Stop]** by pressing the ***Spacebar*** on the keyboard.
7. You can mark events during data acquisition with the following steps:
   a) Open the Events List by clicking on [Event] on the left menu bar.
   b) During data acquisition, simply observe the subject's activity (e.g. eyes opened, eyes closed, eyes blinking, swallowing, etc.) and click on the event as observed.

c) Exact timing of the events recorded can be fine-tuned when reviewing the EEG data.

d) The selection of events in the events list can be configured in the System Setup, under “Events Settings”.

B. EEG Review and Analysis

At the Main Interface, select the case to be reviewed in the case list, and then click "Play" on the top left toolbar. This will open the Review Interface, as shown in Fig 4-3.

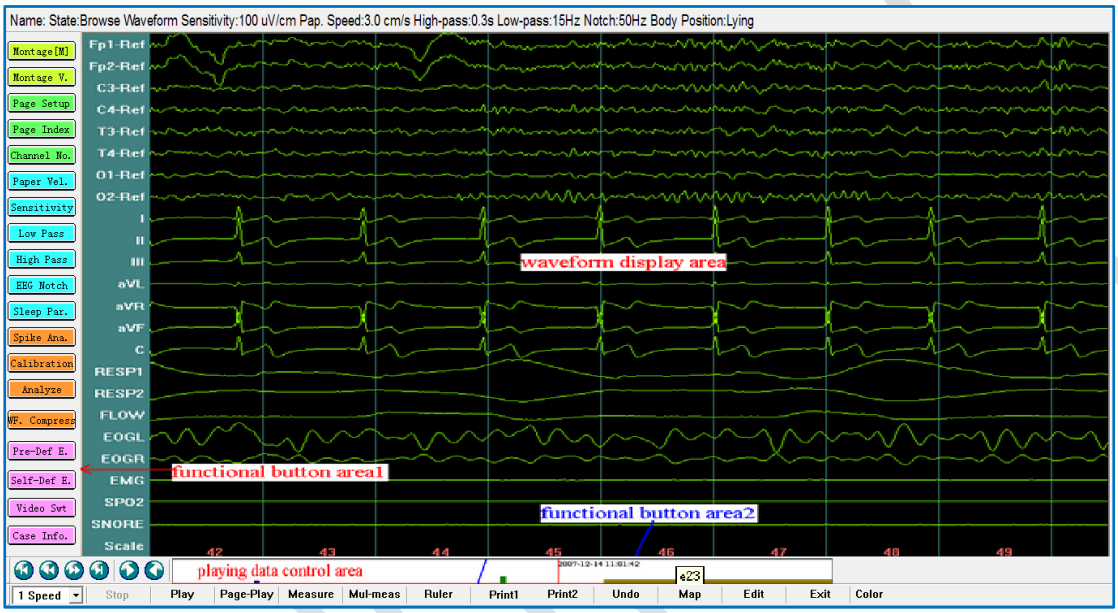


Fig 4-3 Review Interface

Things that can be done in Review and Analysis Interface:

1. **[EEG Data Playback]**: Play the EEG data recorded from any part of the timeline through the Playing Data Control Area. This can be useful in identifying event timings more accurately.

   a) **Shortcut Buttons**

First page | Previous page | Next page | Last page | Next second | Previous second

   b) **Waveform Navigation Bar**

Fig 4-4 Waveform Navigation Bar

- The Waveform Navigation Bar is located at the bottom of review interface. It is used for navigating the waveform at appointed time.
- To browse the waveform, place mouse cursor onto the navigation bar, and a time value will be displayed on the cursor. Click and the displayed time will be the time at the left of waveform display area, with all the corresponding waveforms displayed.

- Colored marks on the waveform navigation bar indicate instant events and long events marked in the EEG data. Events can be defined at Events List in the System Setup.

c) Waveform Playback

- Select a play speed from the pull down menu at lower left, and then click **"Play"** to run the playback.
- Play speed is determined by the paper speed set. If the paper speed is set to 3cm/s, the waveform will move 3cm in one second on "1 Speed". If "10 Speed" is selected instead, the waveform will move 30cm in one second.

2. Waveform measurement and multi-parameter waveform measurement:

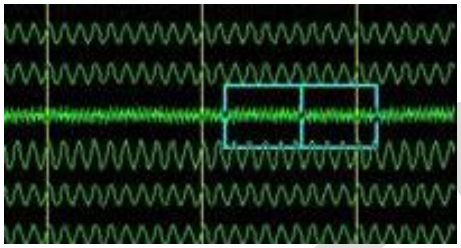


Fig 4-5 Measurement

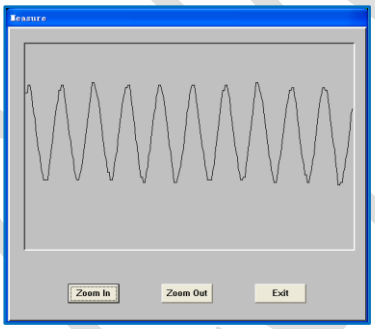


Fig 4-6 Highlighted Waveform

a) Click **[Measure]** at functional menu bar and the cursor will switch into a measuring frame, which you can use to target a part of the waveform to highlight.

b) Click on 2 points of the highlighted waveform and the time, frequency and amplitude of the waveform will be measured. Zoom out or zoom in the waveform if necessary.

c) Click on Multi-parameter measurement **[Mul-Meas]** at functional menu bar to open a new dialog box, and then select the corresponding parameter to measure (See Fig 4-7). Only values of the selected parameter will be measured in this option, e.g. ECG Measure will not work on EEG waveforms.

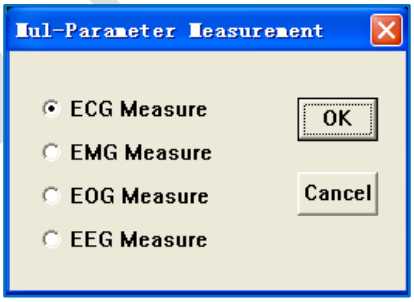


Fig 4-7 Selection of Multi-Parameter Measurement

i. A pair of red, horizontal lines and a pair of green, vertical lines will appear in the waveform display area, which you can click and drag to **"box in"** a part of the waveform, and the corresponding measurement values will show up. The green, vertical lines measure the frequency value, and the red, horizontal lines measure the amplitude value.

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ii. Click **“Undo”** or **"Exit"** to stop the measurement and delete the measurement lines and values shown in this interface.

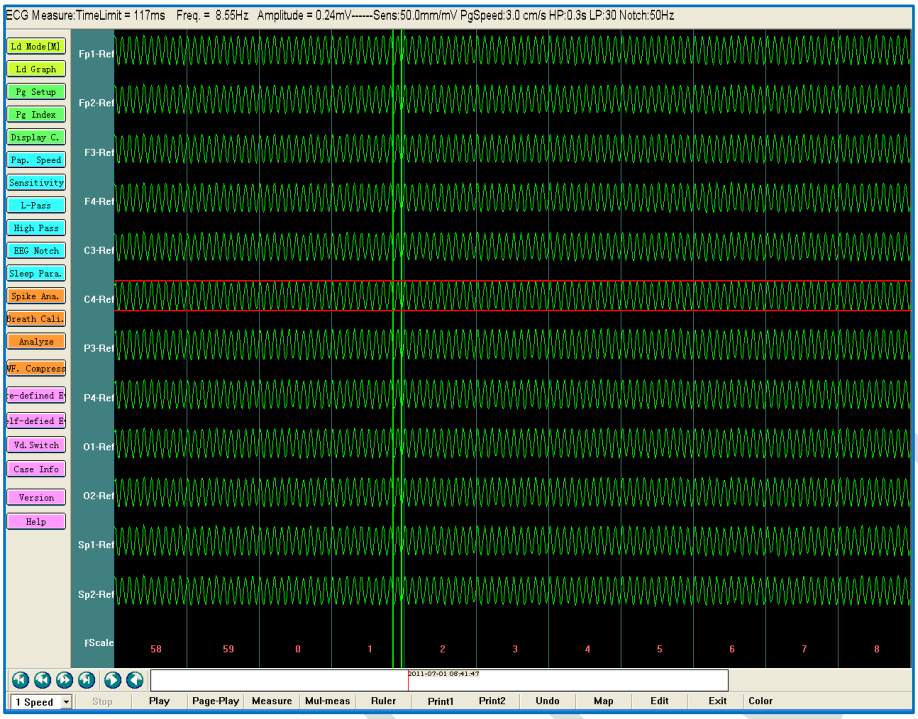


Fig 4-8 Multi-Parameter Measurement

3. **[Event marking]**: There are two ways this can be done.

a) [Predefined Event]

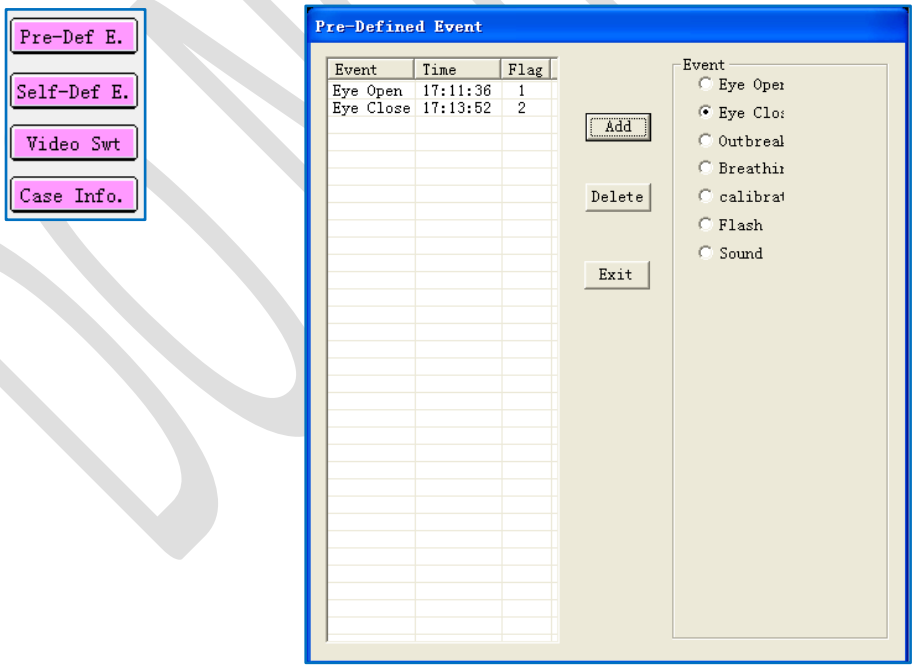


Fig 4-9 Pre-Defined Event

i. Mark events as defined in [Event Settings] at the System Setup. To mark an event, select a predefined event in the list at right, click [Add] and then click on the part of the data waveform. The event and its timing will be recorded into the events list, and will be shown on the waveform navigation bar.

ii. To delete a marked event, select the event in the left list and click [Delete].

b) [Self-Defined Event]

i. To mark a self-defined event, add a new event by entering event name and selecting the event colour, and then click on the data waveform. The event and its timing will be recorded into the events list, but not on the navigation bar.

ii. Self-defined event needs to be named individually, but can be edited and deleted.

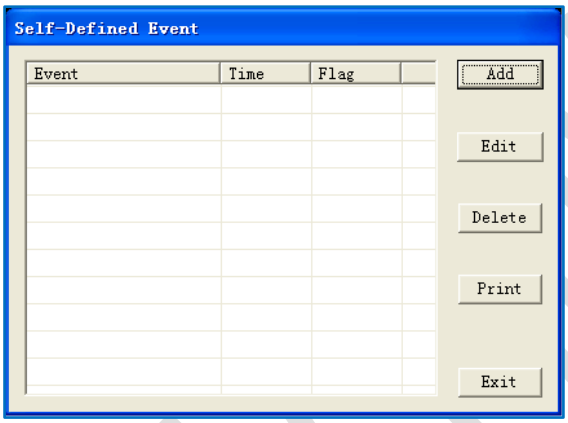


Fig 4-10 Self-Defined Event

4. **[Spike Analysis]**: Set waveform parameters to identify spikes in the acquired EEG data. The spikes can also be added or deleted manually.

NOTE: As this is a mechanical autonomic analysismethod, waveform output resulted by interference can also be recognized as spike waves. Therefore the analysis result should only be used for reference, and the clinician should use his own judgment to determine the patient's condition.

5. Report generation can be done in two ways:

a) **[Print1]**: Click this on the functional menu bar to bring up the Report print window, fill in the comment and select a print mode. The report will be generated in Word format.

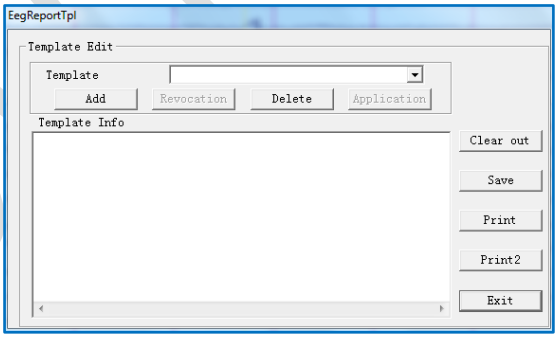


Fig 4-11 Interface of Print 1

i. [Print]: Generate the EEG analysis report with the EEG waveform currently displayed (up to 5 seconds).

ii. [Print 2]: Print only the EEG waveform currently displayed (up to 8 seconds).

b) **[Print 2]**: Click from the functional menu bar and select portions of the data waveform. Only the selected waveform portions will be printed out.

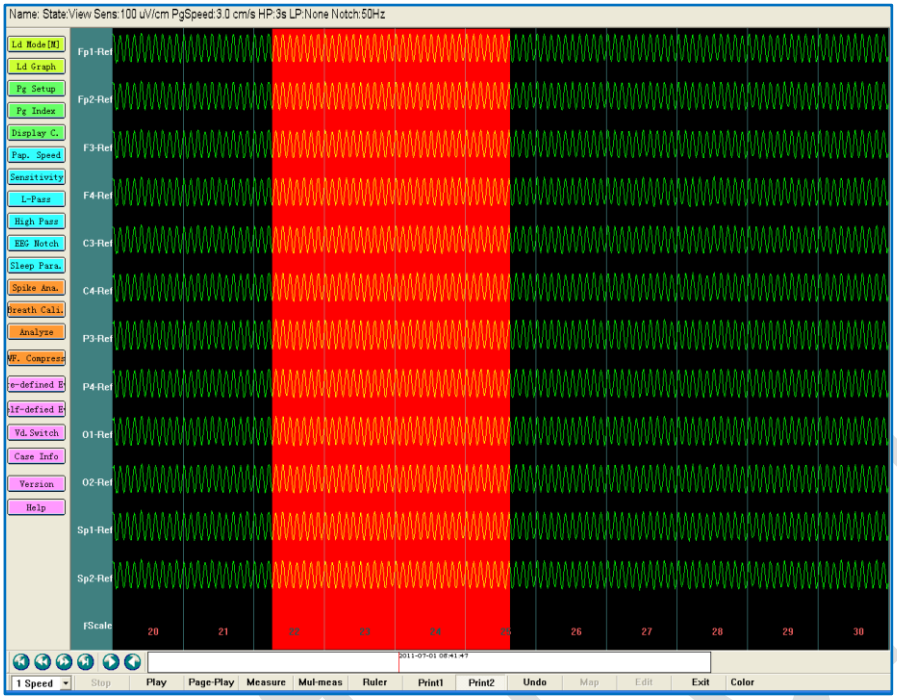


Fig 4-12 Waveform in red section is highlighted for printing

6. **[Edit]:** Use this to extract parts of the data waveform to be saved in a separate data file. This is useful for removing "rubbish data" and focusing on selected parts of the data waveform. Video data for parts greater than 5 seconds will be extracted as well.

a) Select parts of EEG waveform similar to that of **"Print 2".** Click **"Edit"** again after completing the selection.

b) Click **"Exit"** after editing the waveforms, and a dialog box will pop up to confirm the data extraction. Click **"Yes"** to save the waveforms into a new file, or click **"No"** to cancel the data extraction procedure.

c) Case Library in the Main Interface will have a new case file called **"XXXnew"**, depending on case file name and number of extractions done. Refreshing the case list may be required to see the new case file.

7. **Brain Electrical Activity Mapping (BEAM) Analysis**

a) Click **[Map]** in the functional buttons area.

b) Select parts of EEG waveform. All selected parts will be highlighted in red.

c) Click **[Map]** button again, and BEAM Analysis will be conducted at selected parts of the waveform. BEAM Analysis window will then be opened to display the analysis results.

d) You can do the following in the BEAM Analysis Interface (Fig 4-13):

i. **[Left View] [Right View] [Top View]:** Switch between 3 directions to view the EEG Mapping output: left side, right side, and from the top.

ii. **[Scale]:** Click to switch between relative scale and absolute scale. Choice of scale will affect the printing results of the Mapping report.

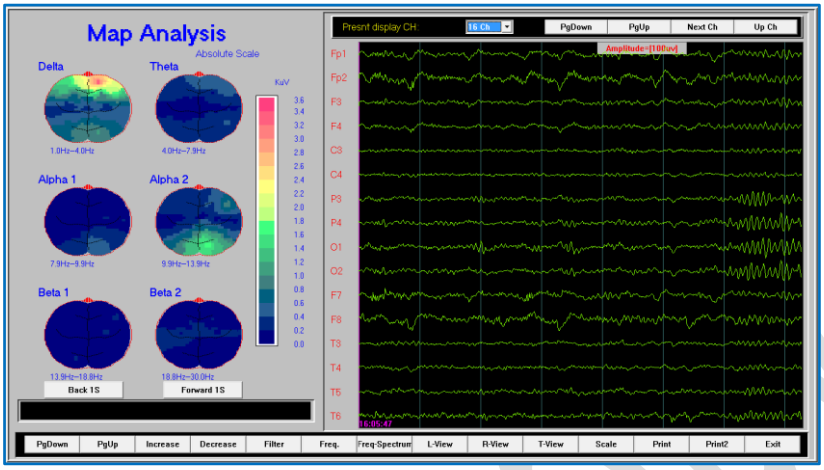
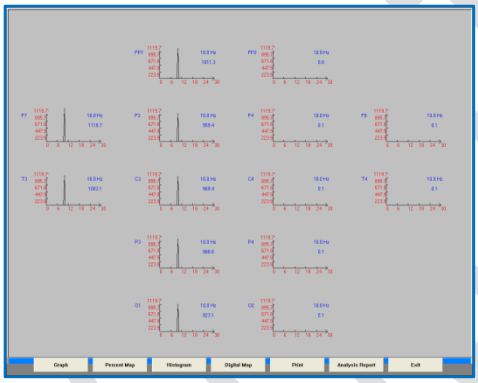


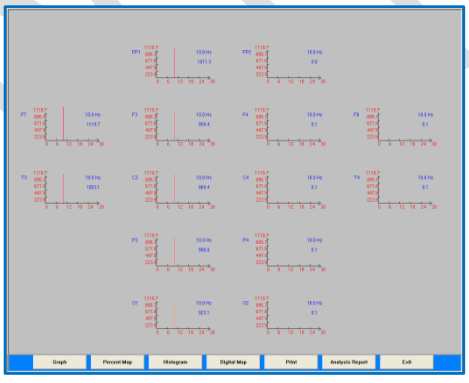
Fig 4-13 BEAM Analysis Interface

iii. **[Frequency Spectrum]:** Click to view the EEG data spectrum presented as **"Graph", "Percentage Map", "Histogram", and "Digital Map".** These spectrum interfaces can be printed out for future reference.



[Graph]

[Percentage Map]



[Histogram]

[Digital Map]

iv. **[Print] [Print2]:** Just like in the Review Interface, you can click on these to print the brain mapping analysis results with or without the analysis report.

8. **[Analyze]:** This command in the Review Interface opens a pull-down menu with a number of analyses available, as shown in Fig 4-14:

Fig 4-14 Analysis Menu

a) [EEG Tendency Analysis]

Click "Analyze" in the review mode, and then select "EEG Tendency Analysis". An electrode selection window will appear to choose the electrodes to be analyzed.

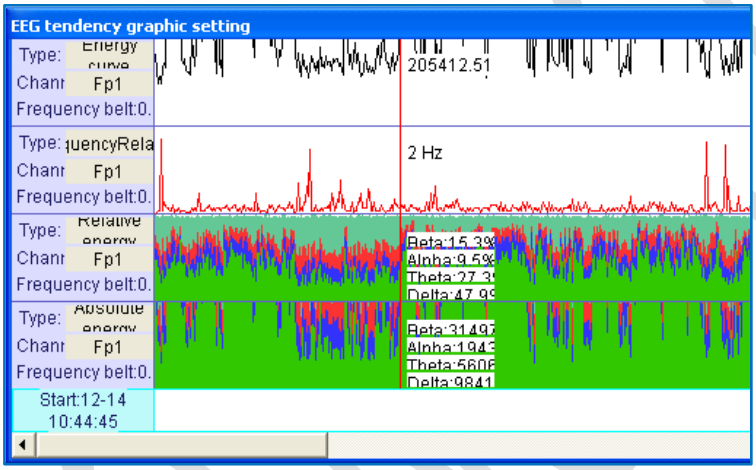


Fig 4-15A EEG Trend Diagram

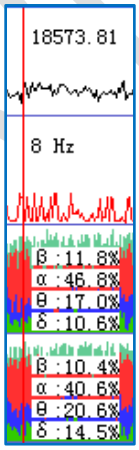


Fig 4-15B Energy Values

i. Click on the trend diagram, and it will show the current energy level, peak energy frequency, and (relative and absolute) energy values (See Fig 4-15C).

ii. The buttons at the lower right side  are adding/reducing one channel trend, toggle 2D/3D trend display, time interval setting, Frequency Gain Parameter Setup, EEG Trends Setup, and minimize EEG trend analysis display.

iii. Every trend channel is decided by the type of energy trends and EEG channel selected. Each channel can display a different trend, and you can decide which channel it is displaying for.

iv. You can also apply different filters and scaling to every trend channel. Click on **"Filter"** at the right side of the trend channel, and the frequency point and energy filter dialog box will pop-up, as shown in Fig 4-17.

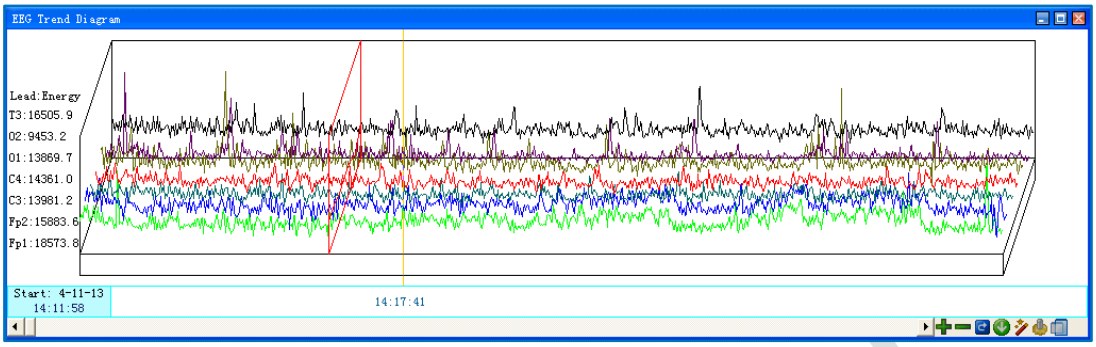


Fig 4-15C 3D EEG Trend Display

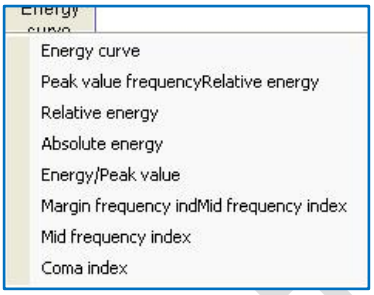


Fig 4-16 List of EEG values for display in EEG Trend Analysis

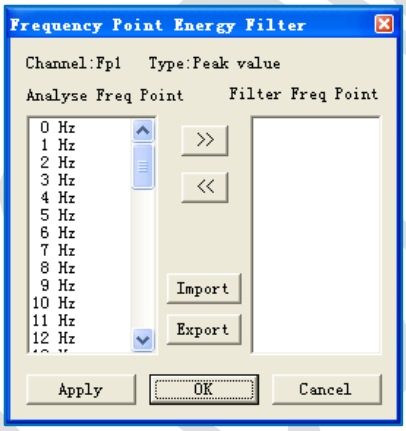


Fig 4-17 Frequency Point Energy Filter

v. In the Frequency Point Energy Filter settings, you can select the analysis frequency point to filter, then use button **">>",** click **"Ok"** or **"Apply".** The selected frequency points will not be used in the analytical operation.

vi. Click **"Frequency Gain Parameter Setup"** to bring up a dialog box to set the gain for each frequency point. As shown in Fig 4-18.

vii. Click **"EEG Trend Setup"**, and the system will pop-up the frequency gain parameter dialog box, which the frequency range and scope of each wave to be used in the analysis can be shown

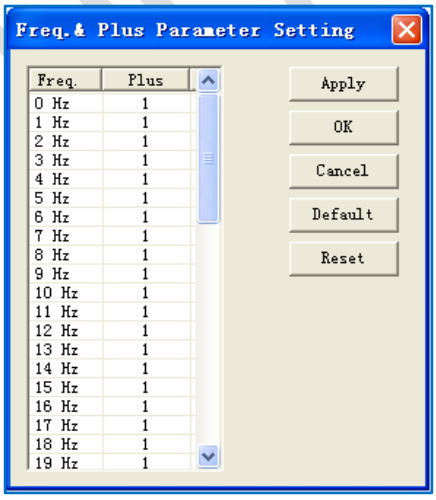


Fig 4-18 Frequency Gain Parameter Setup

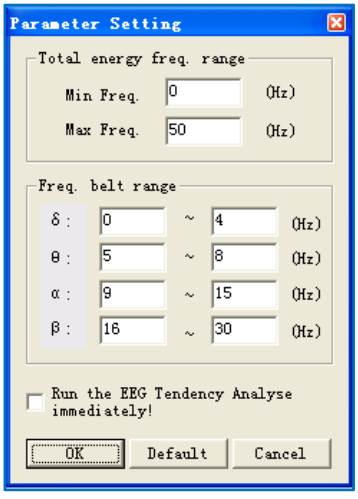
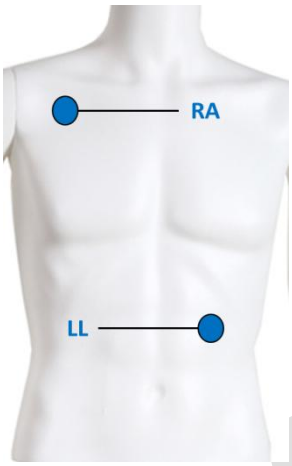


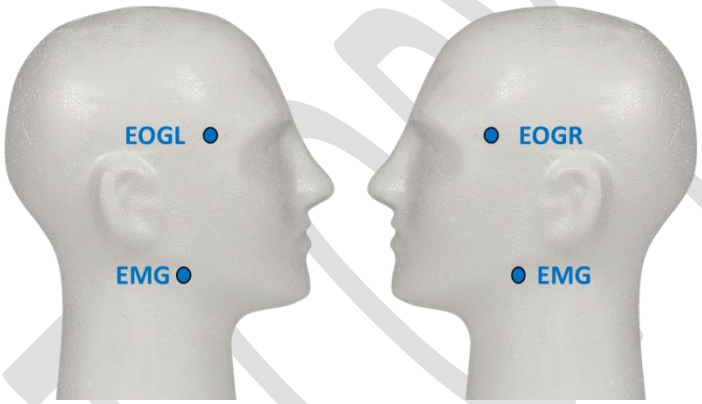
Fig 4-19 EEG Trend Analysis Parameter Setup

C. Polysomnography (PSG) or Sleep Study Parameters

1. PSG hardware module provides additional parameters during data acquisition, namely the **Multi-Parameters**.
2. PSG Multi-Parameters needs to be set during EEG hardware configuration to be usable.
3. PSG Multi-Parameters can be recorded with both EEG and EEG-ERP data acquisition modules. To include PSG, choose a hardware configuration with **Multi-Parameter** option when adding a new case.
4. PSG electrode placements are shown below:

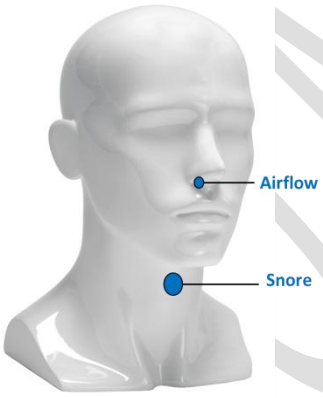


ECG electrodes

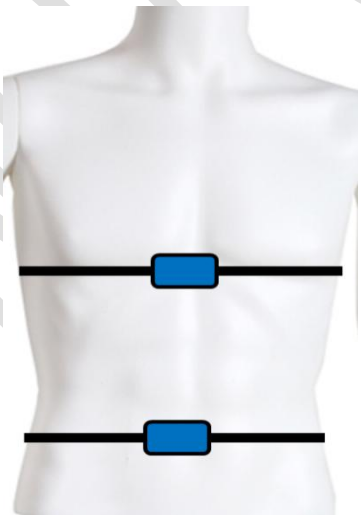


Left side Right side

EOG and EMG electrodes



Airflow and Snore electrodes



RESP electrodes (Black)

SpO_2 electrode

NOTE: Use reliable medical tapes or electrode pads to put on the PSG electrodes.

NOTE: Make sure that the Airflow electrode is placed and secured inside the subject's nose.

NOTE: When putting on SpO2 electrode, check the inner part of the probe and make sure the part emitting red light is in direct contact with the finger.

5. Sleep parameters can be set by selecting [Sleep Parameters] from the Functional Menu Toolbar in the EEG Acquisition interface.

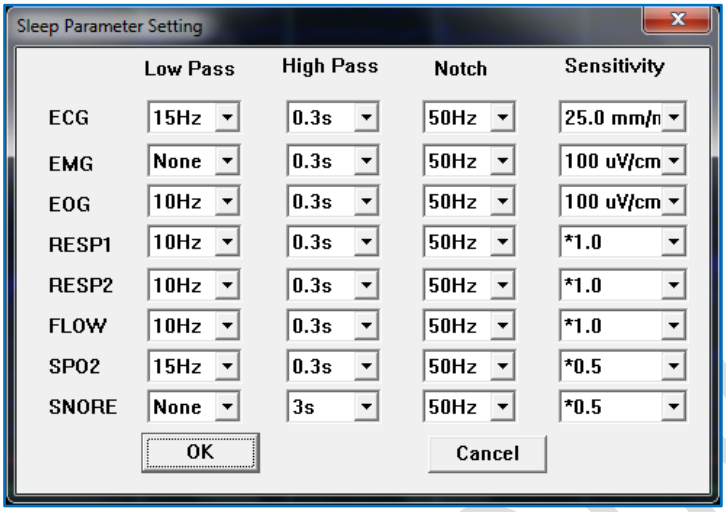


Fig 4-20 Sleep Parameters Setting

6. Additional RESP data can be obtained through **Breath Calibration**.
   a) From the Main Control Bar, select **[Calibrate]**. This will activate breath calibration for the RESP parameter in the PSG module.
   b) When activated, a message **"Under Calibrating"** will appear on top row of interface with a counter up to 60 seconds. Under Calibrating4s/60s
   c) When 60 seconds is reached, a message "Success to calibrate RESP" appears in place of the counter.
   Success to calibrate RESP
   d) Successful calibration results can be used to judge breath suspension during **Review and Analysis**. If the waveform is not shown, then the connections for the devices of respiratory tract or contact of RESP electrodes should be checked.
   e) Successful breath calibration data is also used in **RESP/Sleep Report** generation during **Review and Analysis.**
7. Usage of PSG multi-parameters enables access to additional data analysis during **Review and Analysis**.
   a) The steps to produce a **Sleep Analysis Report** is as follows: Auto-Sleep Analysis → Manual-Sleep Analysis (optional) → SpO2 Analysis → Sleep Analysis Report
   b) The steps to produce a **RESP/Sleep Analysis Report** is as follows: Breath Calibration (during data acquisition) → Auto-Sleep Analysis → Manual-Sleep Analysis (optional) → RESP Analysis → SpO2 Analysis → RESP/Sleep Analysis Report
   c) To generate a Sleep Analysis Report, first run [SpO2 Analysis], followed by [Auto-Sleep Analysis]; to generate RESP/Sleep Analysis Report, run [RESP Analysis] as well.

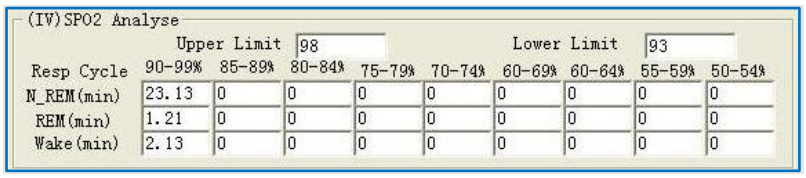


Fig 4-21 SpO_2 Analysis

d) Auto-Sleep Analysis requires at least 2 EEG channels, 2 EOG channels and 1 EMG channel selected during channel selection to run.

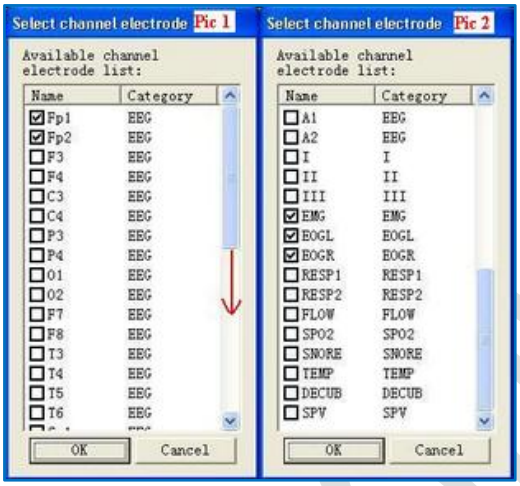


Fig 4-22 Channel Electrode Selection for Automatic Sleep Analysis

e) After selecting the channels, click **"Auto Analysis".** Remember to check the **"Remove FALSE Event"** option.

f) After the analysis is completed, click **"Cover and save"** to save the analysis information, and then **"Exit"** to close the analysis window.

g) If there is a need for a more thorough analysis, open **[Manual-Sleep Analysis].** You can manually browse through the sleep trends, adjust the sleep phases, and edit the breathing state events.

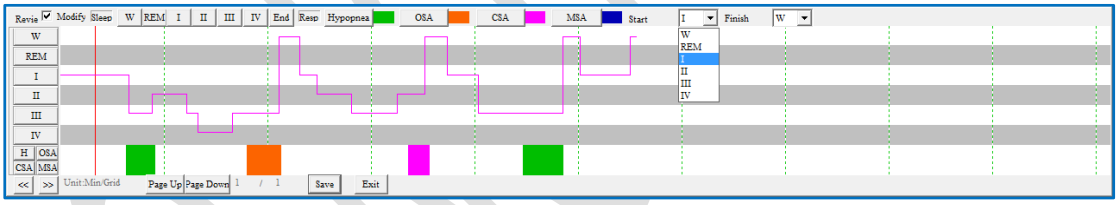


Fig 4-23 Manual-Sleep Analysis

h) **[Event View]** displays the events list of sleep analysis, which can be deleted or cleared if there are redundant events found. RESP analysis results can be seen in this list as well.

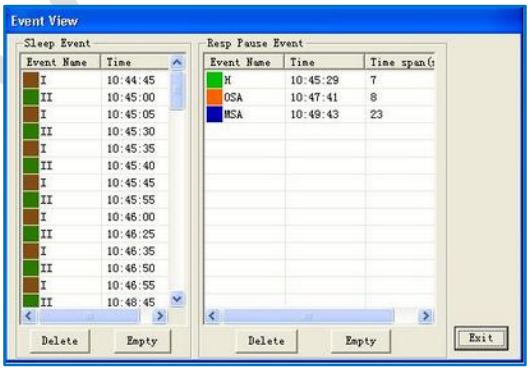


Fig 4-24 Event View

i) **[Sleep Analysis Report]** can be generated after completing the Auto-Sleep Analysis. The report will extract case information automatically, listing status and time of sleep stages,

provide stages of sleep trends and data on blood oxygen data. The test results can be edited and saved manually before printing.

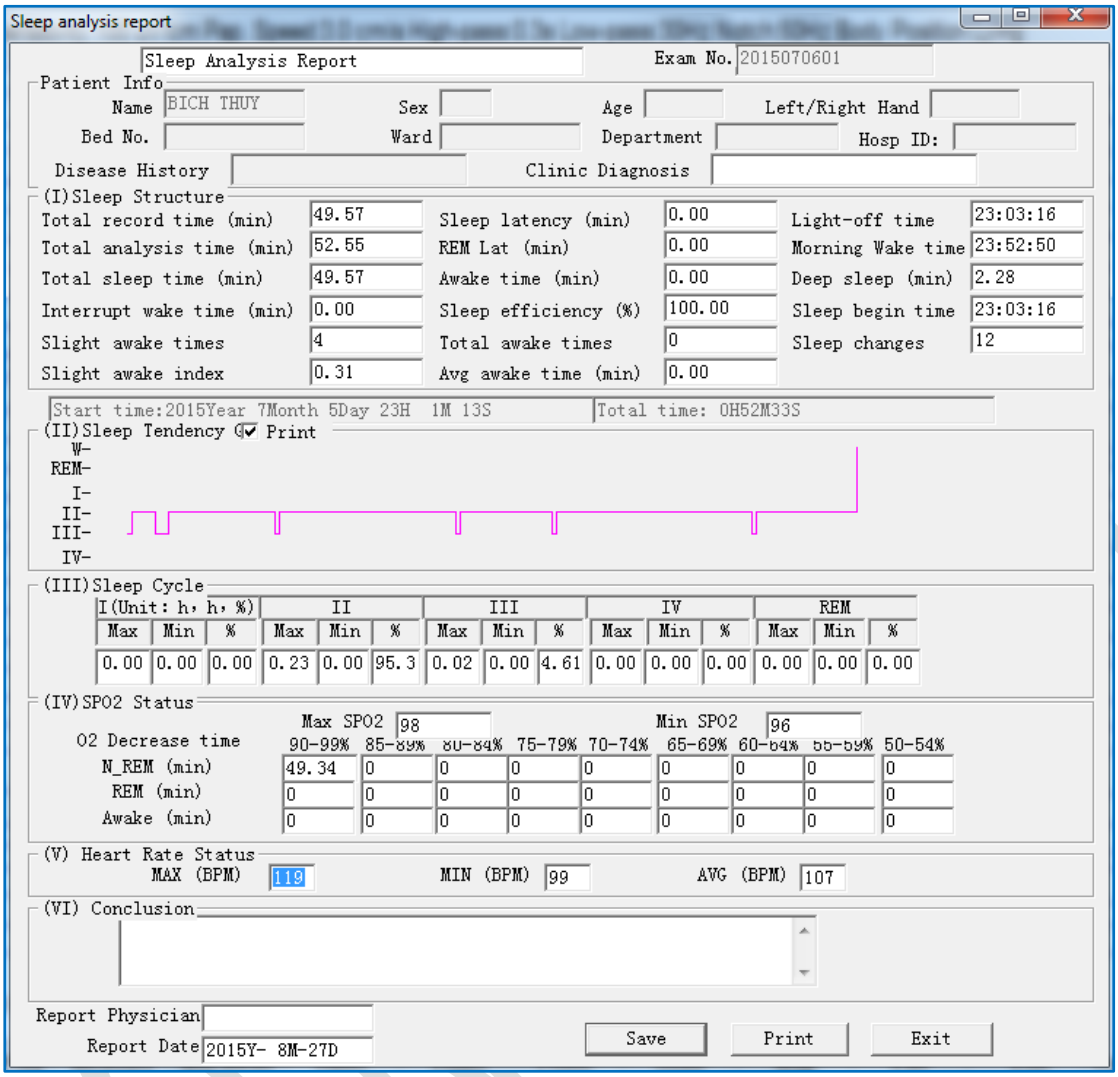


Fig 4-25 Sleep Analysis Report

j) **[RESP/Sleep Analysis Report]** will become selectable after completing the RESP Analysis, Auto-Sleep Analysis and SpO_2 Analysis. The report will be empty when it is opened, and the data will be filled in after clicking the **"Analyze"** key at the right side of report. The data entries can be edited and saved manually before printing.

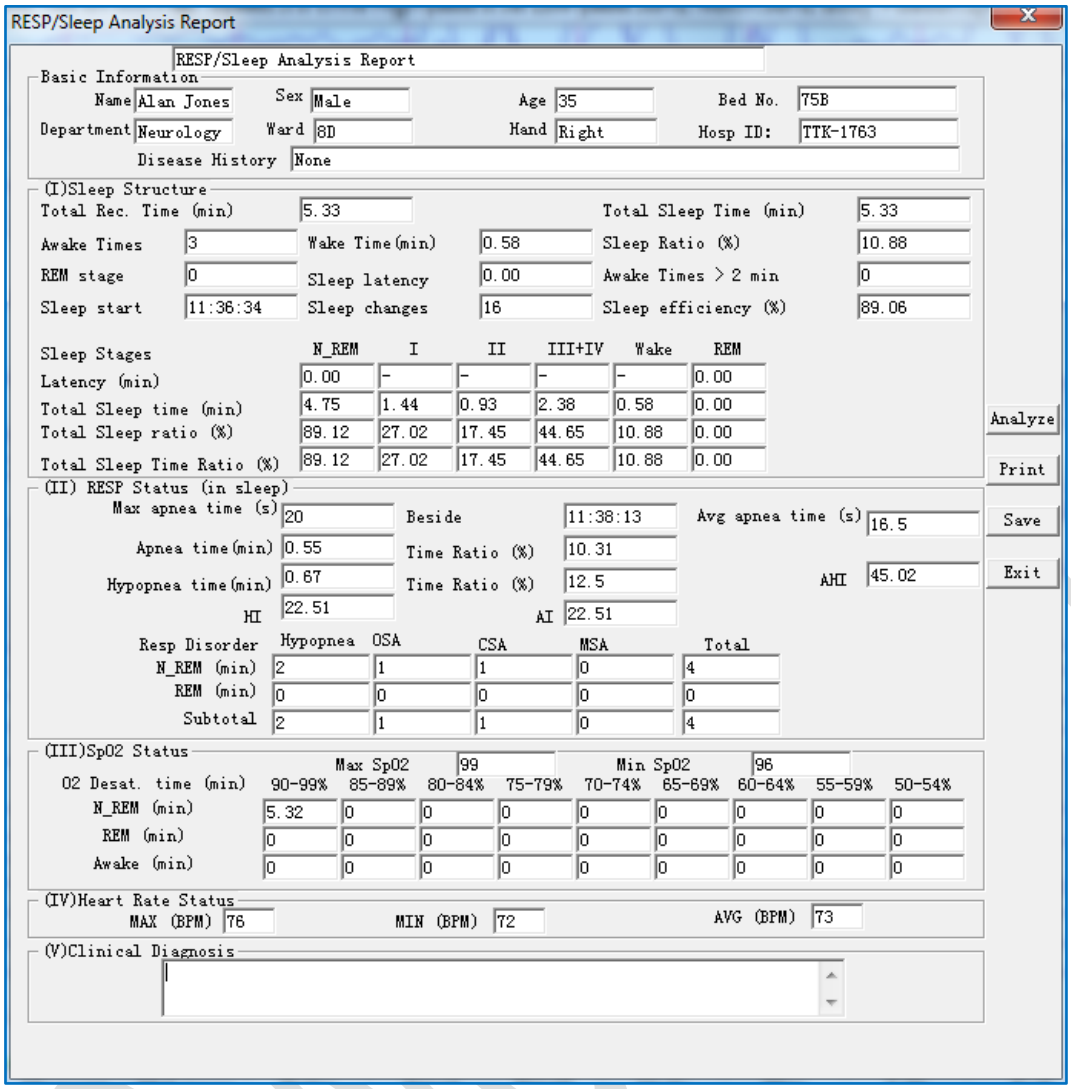
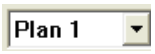


Fig 4-26 RESP/Sleep Analysis Report

D. Flash Stimulation Lamp

1. Flash Stimulation Lamp can be used for Routine EEG along with other accessories.
2. Make sure Flash Stimulation Lamp is connected and installed to PC.
3. Click **[Stimulation Setup]** (second pink button) to set a flash stimulation plan:
   a) Click on 

to choose the stimulation plan to use or edit;
   b) **Save plan:** Click this button to save the currently set stimulation plan. You can save up to 10 stimulation plans;
   c) **Cycle Index:** Click to choose how many cycles will the stimulation last. You can set up to 10 cycles max.
   d) **Phase:** Displays detailed information of each stimulation phase.
   e) **Stim Freq:** Set the stimulation frequency of each phase from 1Hz to 30Hz.
   f) **Stim Time:** Set the stimulation time of each phase from 5s to 60s.
   g) **Time interval:** Set the time interval between each stimulation phase.
   h) **OK:** Save the stimulation plan changes and close Stimulation Settings window.
   i) **Default:** Reset stimulation parameters to system default values.
   j) **Cancel:** Close Stimulation Settings without saving the changes.
4. Click **[Event]** to view the list of event, and check the ***"Auto Add"*** option in the sub-window. When recording, open **[Event]** and click on ***"Flash"*** in the events list, and the flash stimulation lamp will begin flashing according to the flash stimulation plan. **NOTE: If "Flash" is not found in the Events List, please open System Setup at Main Interface and add it under "Event Settings" (See Chapter III), and then start a new data acquisition examination.**

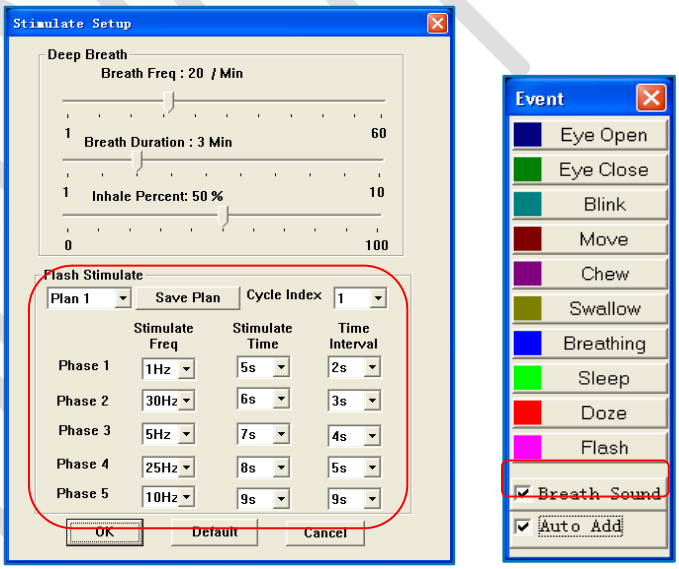
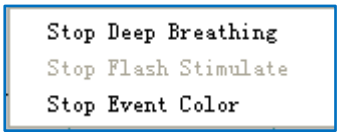


Fig 4-27 Flash Stimulation Setup

5. If there is a need to stop the flash stimulation plan midway, right-click on the waveform display during flash stimulation and select ***"Stop Flash Stimulation"***.



E. Video

1. Video in EEG can be used in Video EEG and Video EEG-ERP modules.
2. Only camera provided by Neurostylecan be used in EEG data acquisition.
3. Video display in EEG software can be hidden or viewed simultaneously during recording and reviewing.
4. When a portion of EEG data is edited into a new file, the corresponding video data will also be extracted as long as the data portions are longer than 5 seconds.

DO NOT COPY

V. EEG-ERP

A. Data Acquisition

EEG Data acquisition interface is where EEG data is measured and recorded.

Before data acquisition can begin, make sure the EEG cap is worn onto the subject's head firmly, and the EEG amplifier should be connected to the software with its serial number shown in the main interface. If PSG multi-parameters and/or ERP is used, the corresponding hardware connections and electrodes should be in place before beginning the acquisition.

To open EEG Data Acquisition:

i. Click ***"New"*** button under the case library to open the Add Case Form, as shown below.

ii. Select an EEG hardware configuration, input EEG No. and choose an examination mode at the lower right of the window.

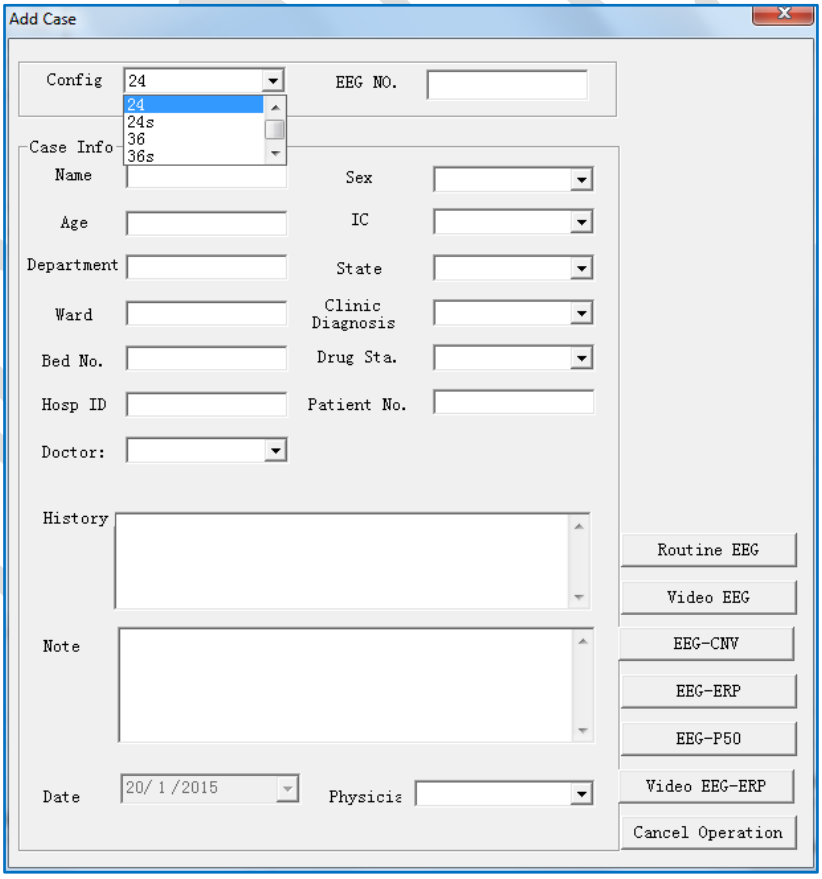


Fig 5-1 Add Case Form

1. Select "**EEG-ERP**" in the Add Case Form to open the EEG-ERP data acquisition interface.

2. The main control bar is at the bottom row of the interface, the functional menu bar is at the top row with the parameter settings, and display and stimulation mode control on the left.

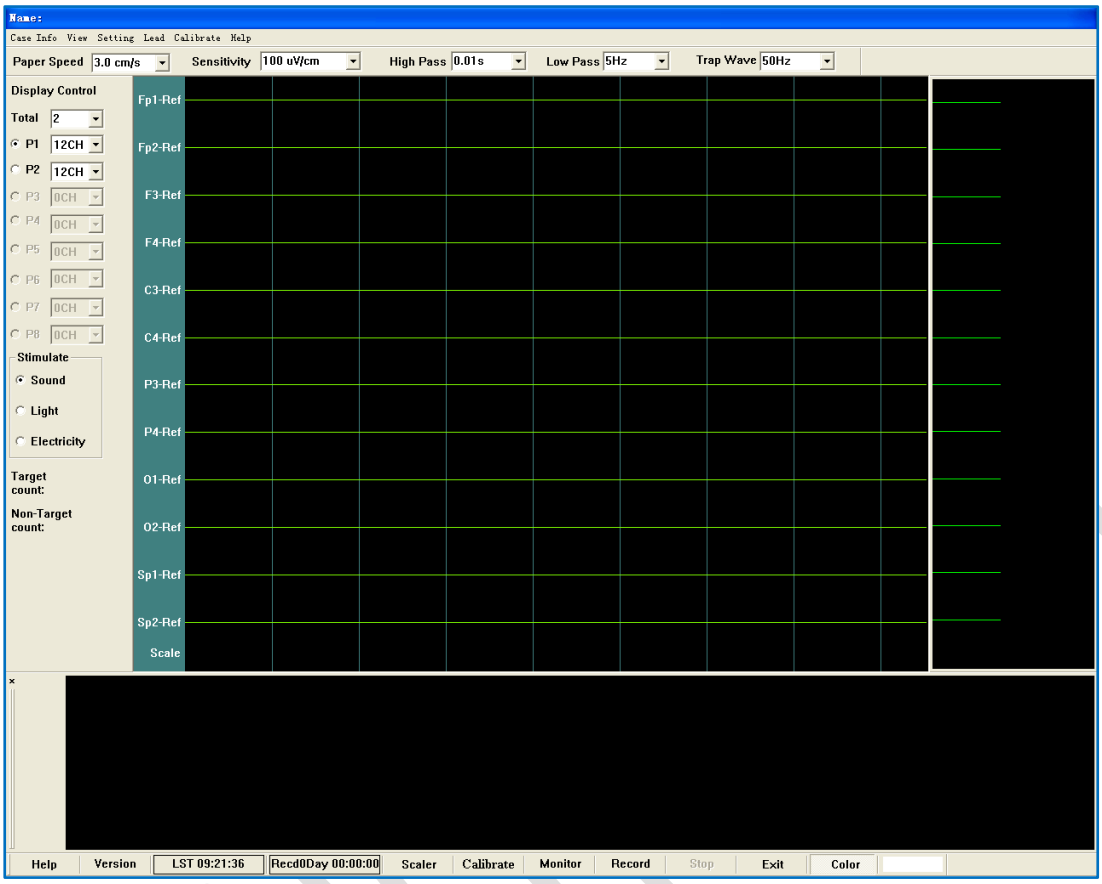


Fig 5-2 EEG-ERP Acquisition Interface

3. Check the EEG software parameters and verify the system parameters are set as the following: **Speed = 3.0cm/s, Sensitivity = 100uV/cm, Low-Pass = 30Hz, High-Pass = 0.3s, Notch = 50Hz (according to local AC frequency)**. You can adjust the parameters when recording the EEG data to view the waveforms better.
NOTE: While sleep parameters can be viewed in this mode, the parameter values cannot be adjusted.

4. Before proceeding to data acquisition, there are a few things to prepare on evoked potential:
   a) Open **[Event Settings]** under **[Settings]** to set target and non-target events during acquisition. Select from a list of events on the left and move to the respective boxes for target and non-target events.

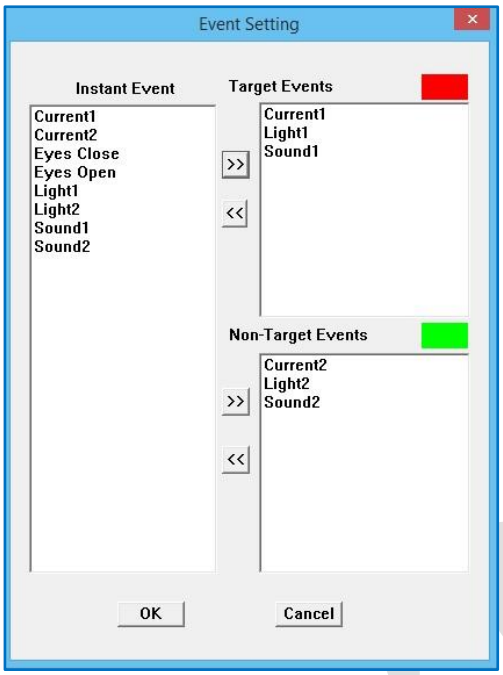


Fig 5-3 Event Setting

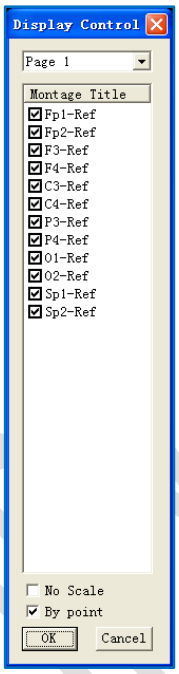


Fig 5-4 Display Setup

b) Open **[Stimulator Settings]** under **[Settings]** to configure parameter values based on the type of stimulation to be used for acquisition.

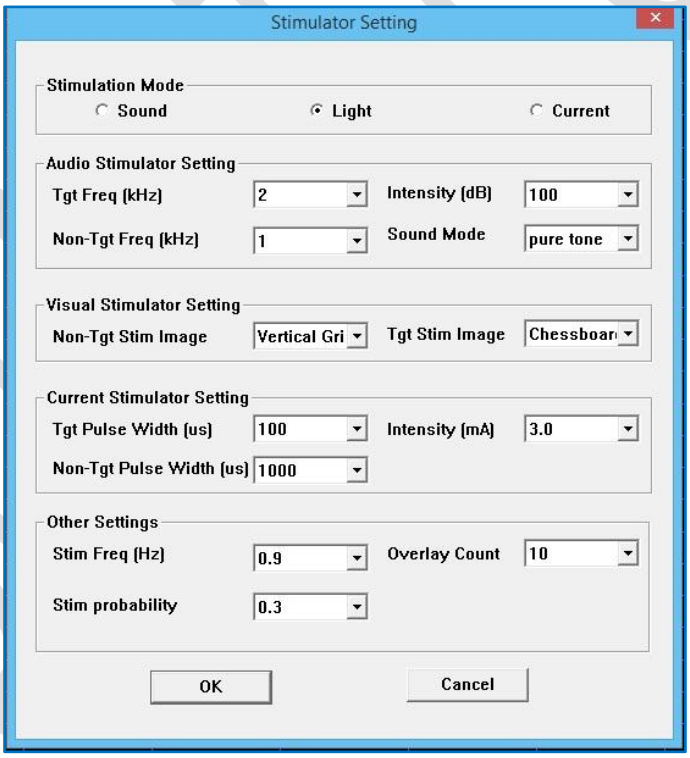


Fig 5-5 Stimulator Setting

i. Event superposition number is number for target superposition event. Stimulation probability is the probability for the target stimulation event in occurring.

ii. Stimulation Type should be decided before setting stimulator parameters, because stimulator type cannot be changed during data acquisition.

c) Open **[ERP Setting]** under **[Settings]** to set evoked potential event parameters and stimulation modes, as well as vice-screen resolution (See Fig 5-6).

i. Set the event name, stimulation order, duration, event interval and color setup, then click **"OK"** to add this event into the list of event related stimulation.

ii. To remove an event, select an event to be cancelled and click **"Remove event";**

iii. Vice-screen resolution can be set here, or set it through the PC.

NOTE: Setup method for vice-screen display from desktop is as follows:

- Have 2 independent display cards at the back of the host.
- Right-click mouse on desktop and select **"Properties"** (or **"Screen resolution"**) in pop-up menu.
- Click **"Setup"** to open display setup function.
- Click **"Recognition"** tab in display setup interface to recognize code of display.
- Click display marked with serial number on interface, then select serial number of display which is to be set as vice-screen display.
- Click **"Extend Windows desktop to this monitor"** on bottom left of the interface and select this item with "√". (**Note:** if **"Use this system as main monitor"** is chosen, it will make the intended vice-screen display into the main display instead. This option is not advisable.)
- Adjust display resolution and then click **"OK"** to save.

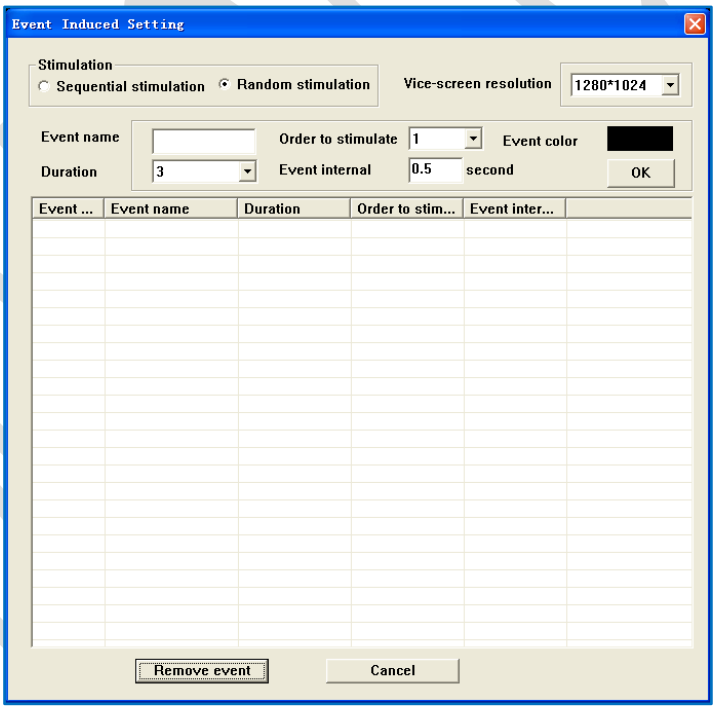


Fig. 5-6 ERP Setting

5. Once all the above preparation are set, proceed to record data with **[Monitor]** and**[Record]** just like standard EEG data acquisition.

a) On the left bar ERP interface, choose the display options and stimulation method. This should be set prior to data acquisition because it cannot be changed during acquisition.

b) The superposition counter is also on the left bar for observing the superposition count.

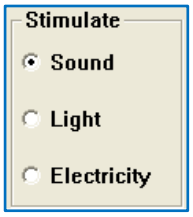


Fig 5-7 Stimulation Selection

Fig 5-8 Superposition Count

6. Click **[Monitor]** to start reading EEG data on screen. EEG data will not be recorded in this mode, so use this to check EEG connection on the cap and deal with artifacts that can affect signal quality. You can also adjust the parameters while monitoring the EEG data. **NOTE:Make sure impedance testing mode is off and press [On/Off] button on top of the amplifier to switch off any lights besides Power and Wi-Fi indicators. If impedance testing mode stays on, the EEG will not output correctly.**
7. Once the data output is satisfactory, click **[Record]** to begin storing the EEG data. Make sure the subject stay still during recording so their movements do not affect the data output. Once sufficient data is recorded, click **[Stop]** to end data recording.
   a) If additional data is required, click **[Record]** again to continue acquiring EEG data.
   b) You can toggle between **[Record]** and **[Stop]** by pressing the ***Spacebar*** on the keyboard.
   c) While the original waveform data acquisition are displayed, the right side of the waveform display area are superposed waveform data, with the background color, grid color, waveform color in this area adjustable in **"System setup - display and sampling"**.
   d) Evoked Stimulation: This function starts the evoked stimulation, and the sub-screen will display the evoked stimulation events, and at the same time mark on the EEG waveforms. The events of evoked stimulation can be modified in the ERP Setting.
   e) You can mark events during data acquisition with the following steps:
      i. Open the Events List by clicking on **[Event]** on the left menu bar.
      ii. During data acquisition, simply observe the subject's activity (e.g. eyes opened, eyes closed, eyes blinking, swallowing, etc.) and click on the event as observed.
      iii. Exact timing of the events recorded can be fine-tuned when reviewing the data.
      iv. The selection of events in the events list can be configured in the System Setup, under **"Events Settings".**

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B. EEG-ERP Review and Analysis

From the main interface, select a case recorded as EEG-ERP and click **"ERPPL"** button on the toolbar in the main interface to begin (See Fig 5-9).

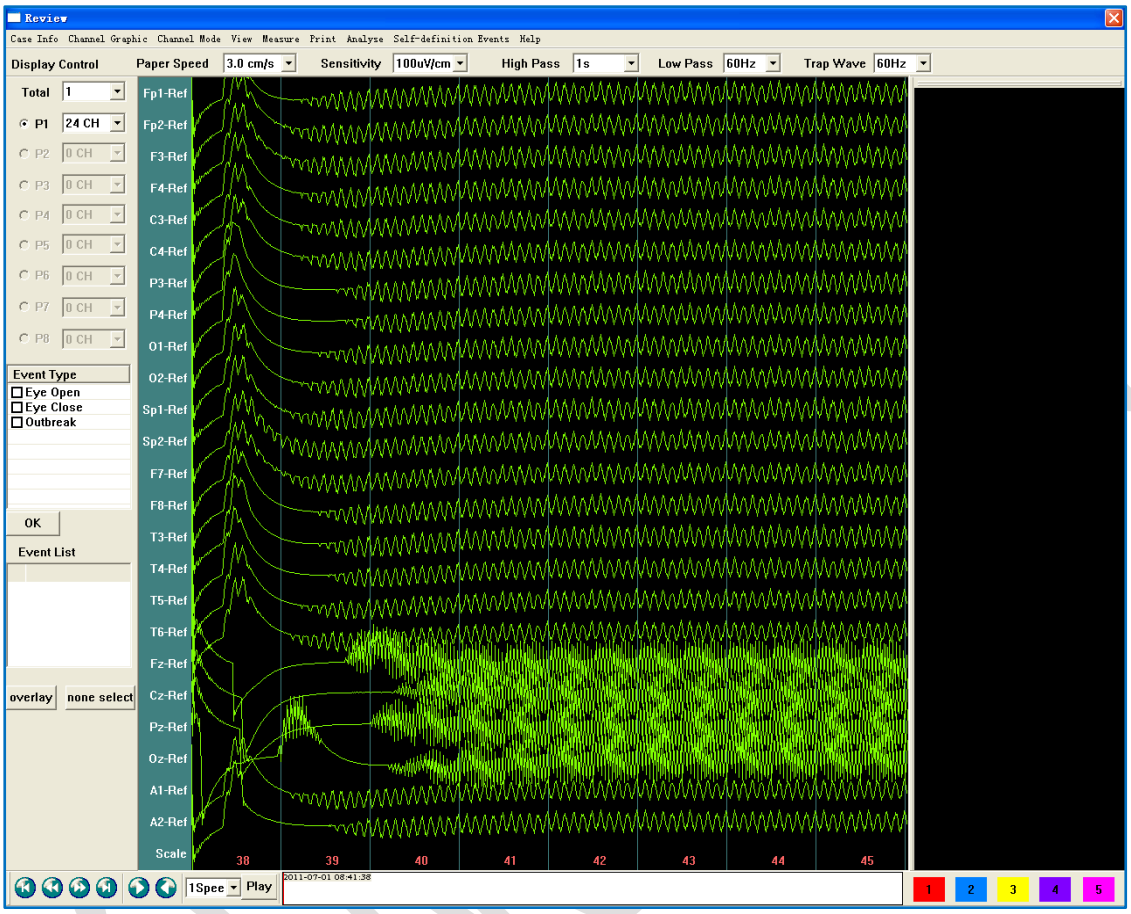

Fig 5-9 Interface for EEG-ERP Review

Many of the functions in EEG-ERP Review are also usable in normal Review interface or in the EEG-ERP Acquisition phase:

1. Waveform Playback control and Waveform navigation bar
2. Channel display control
3. EEG channel parameters (sensitivity, play speed, low-pass, high-pass, notch)
4. Video display switch
5. Standard waveform measurement and multi-parameter waveform measurement
6. **[Measure]:**In addition to the standard EEG waveforms, you can perform measurements on the superimposed waveforms.

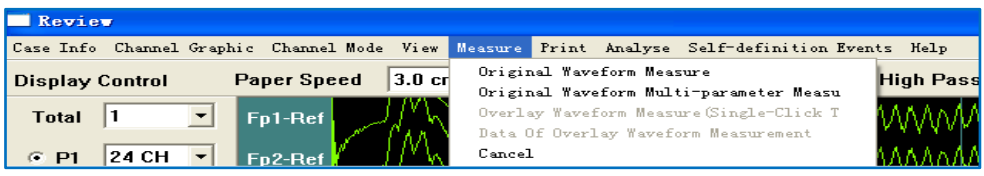

Fig 5-10 Measurement Function

a) Select the function and then select the waveform to be tested in the superposed waveform area. Then click on the waveform and the window like Fig 5-11 will appear.

b) In this interface, click on the waveform peak, and the latency and amplitude of the waveform can be measured.

c) Click **"Save"** to save the measured data. Up to 5 measurements can be saved.

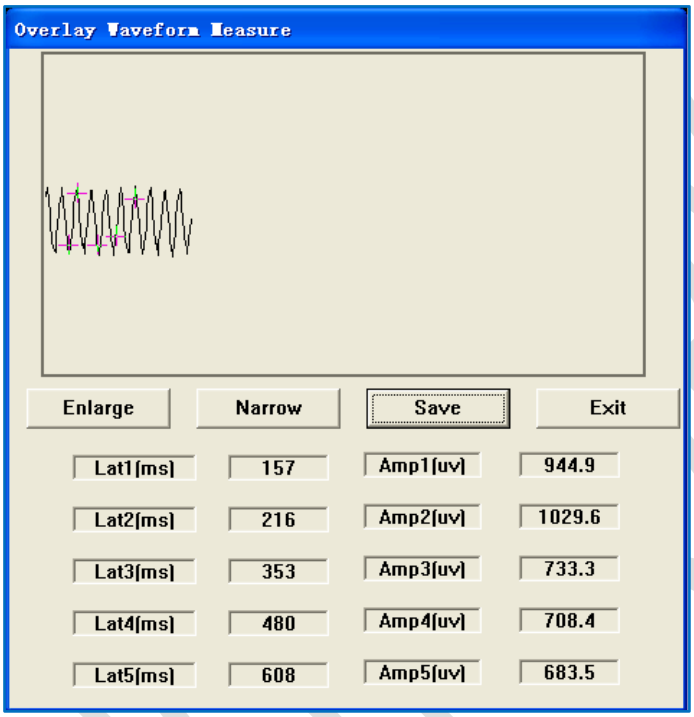

Fig 5-11 Superimposed Waveform Measurement

d) Check the saved measurement data of Superposed Waveform on **[Data of Superposed Waveform Measurement]** (See Fig 5-12).

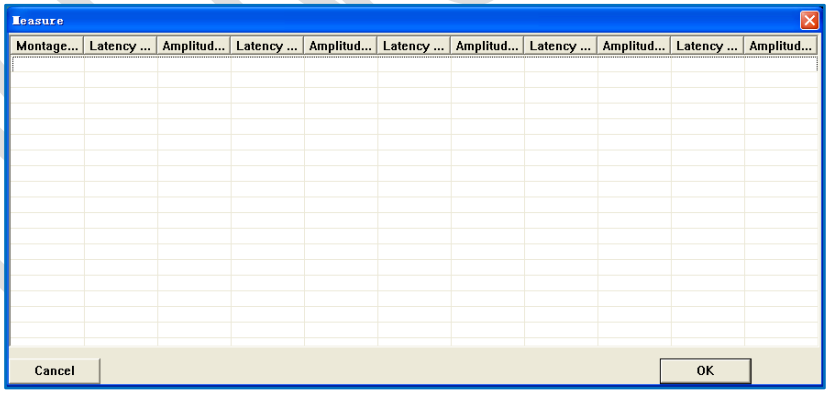

Fig 5-12 Superimposed Waveform Measurement Data

7. **[Print]:**Print current screen or all superposed waveform measurement data.

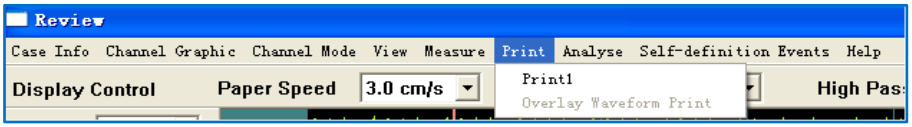

Fig 5-13 Print

8. **[Analysis]:** Many analysis and extraction of standard EEG Review can also be done here.

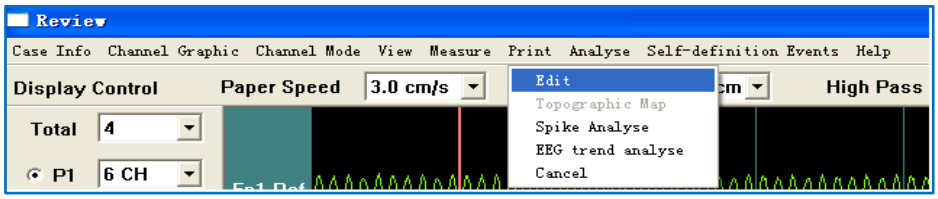

Fig 5-14 Analysis

9. **[Events List]:**In EEG-ERP Review, superposition of events can be added into the events list.

a) **Superposition Events List:**View all the superposition events and select the time point of the superposition event (See Fig. 5-16).

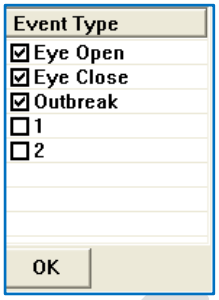

Fig 5-15 Events List

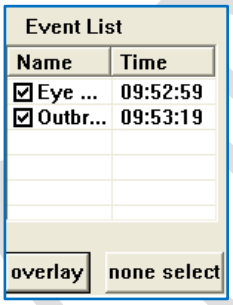

Fig 5-16 Superposition Events List

b) **Superposed Waveform Area:**View the superposed waveform in this area. If superposition is disabled, there will be no waveform in this section.

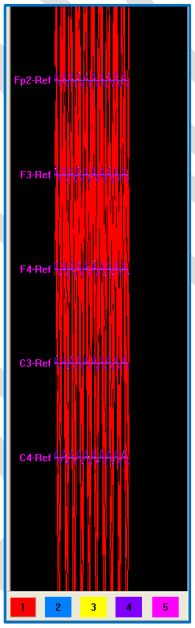

Fig 5-17 Superposed Waveform Area

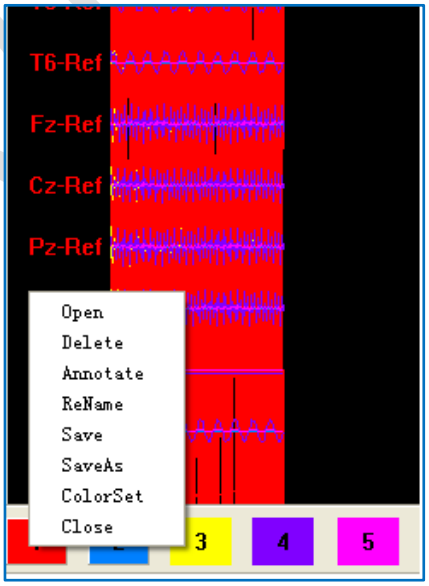

Fig 5-18 Function Keys of the Superposed Waveform

c) Up to 5 superposed waveforms can be viewed in this area, and the color of the superposed waveform can set manually. Click the color block on the superposed waveform, and the function keys of the superposed waveform will pop-up.

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Among the function keys available are:

- Open: Add superposed waveform.
- Delete: Delete selected waveform.
- Annotate: Input comments for a selected waveform, which can then be referred to afterwards.
- Rename: Rename your saved superposed waveforms.
- Save: Save the current superposed waveform as ".cdf" data file.
- SaveAs: Save the current superposed waveform viewed.
- ColorSet: Set the current color of superposed waveform.
- Close: Close the current superposed waveform.

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To establish as a leading company in Neurological Diagnostic & Rehabilitation devices.

Our Mission:

To build excellence through technological advancement and high service quality.

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