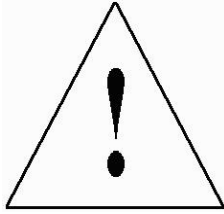


## **Self Diagnostic**

The Navigator Pro hardware module contains components responsible for the stimulus output to the transducer and an amplifier that increases the incoming signal from the electrodes. Within the AEP software there is a Self Diagnostic procedure that can be performed which assesses the integrity of these components and calibrates them.

To perform the Self Diagnostic Procedure:

1. Plug the Navigator Pro system in and turn it on so that all components are receiving power.



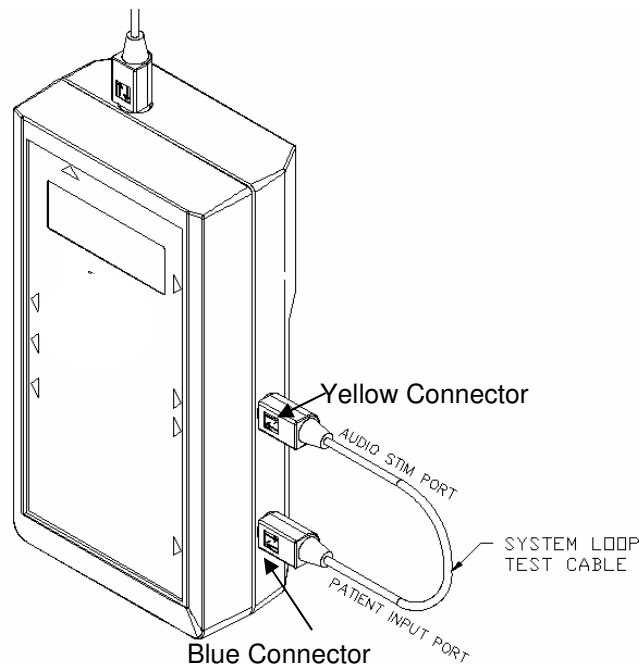
**CAUTION**

**Be careful not to twist the patient electrode cable and transducer connectors as you remove them. Metal pins inside the connectors can be bent or broken by twisting, using excessive force, or if they are not positioned correctly.**

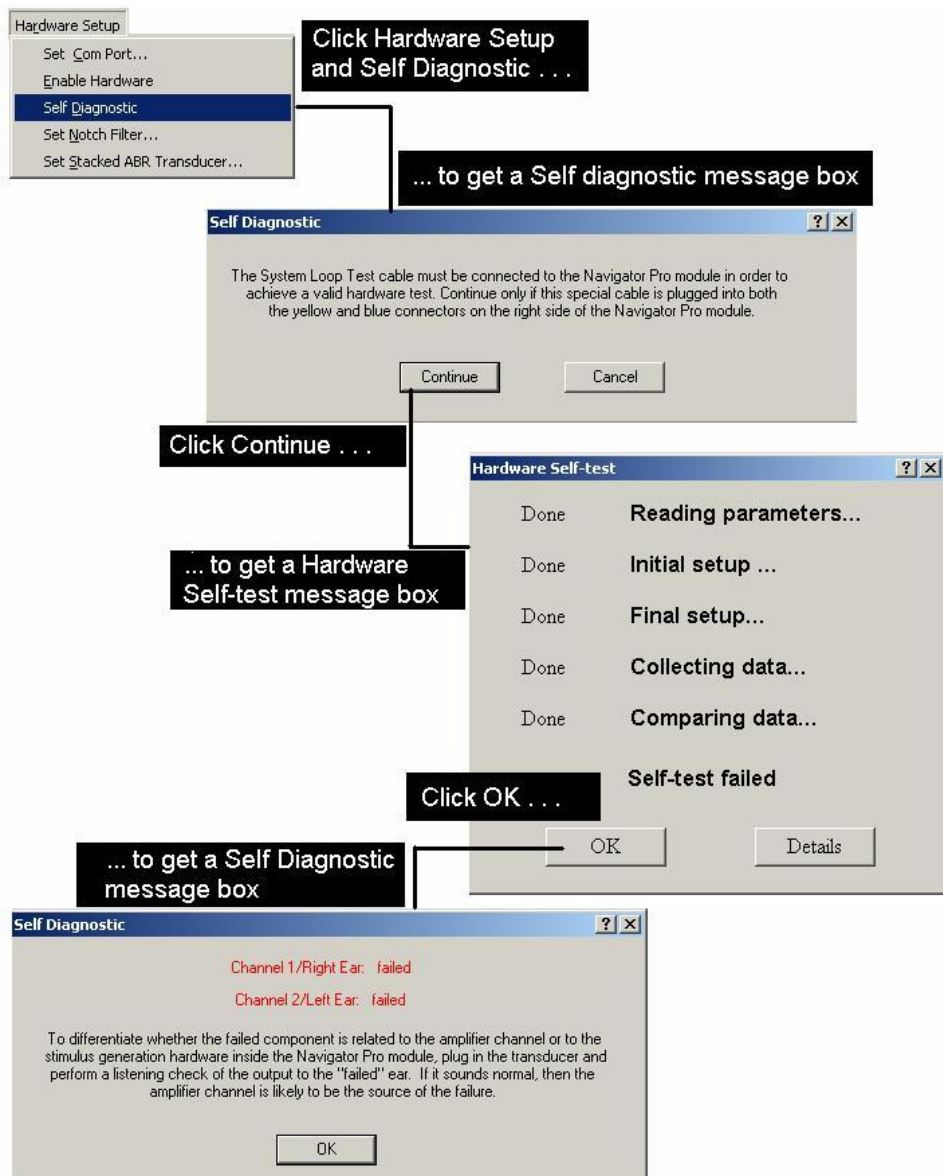
**ATTENTION**

**Faites attention de ne pas tordre le câble de l'électrode du patient et les connecteurs du transducteur en les enlevant. Les broches métalliques à l'intérieur des connecteurs peuvent être tordues ou cassées par la torsion, la force excessive ou si elles ne sont pas correctement placées.**

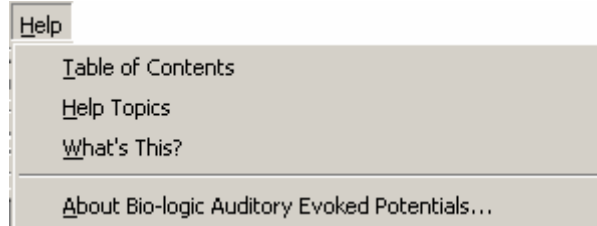
2. Pull the patient cable and transducer cable connectors straight out of the Navigator Pro unit.
3. Connect the system loop test cable (part number: 541-TSTCBL) to both the blue and yellow-ringed sockets on the right side of the Navigator Pro system by matching the connector color to the color ring around the socket. Make sure the flat side of the molded connector faces the label side of the box. Be sure to push the connector into the socket as far as it will go.



After you have setup the navigator Pro system:

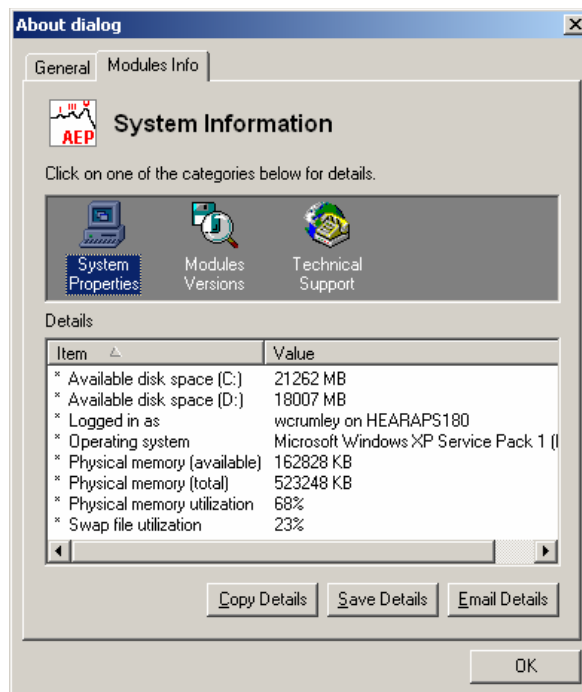


## Help Menu



Component	Description
Table of Contents	Currently Under Development
Help Topics	Currently Under Development
What's This?	Currently Under Development
About Bio-logic Auditory Evoked Potentials	Provides General Information, the Software Version and Bio-logic Systems Corp contact information and provides modules information, the computer system information and critical file information.

## About Bio-logic Auditory Evoked Potentials – Modules Info



This process only needs to be performed if directed to do so by Bio-logic Technical Support. Choose a System Information category (System Properties or Modules Versions). Click on Save Details and designate the location where you want this information saved and a name for the file. Burn this file to a CD or other medium that will allow you to send it in to Bio-logic Technical Support for evaluation.

Alternately, you can click on Email Details to send this information thru Outlook Email if your system has this capability. Click OK to close this dialog box. Copy Details function is under development.

**Bio-logic Systems Corp**

**Auditory Evoked Potential Troubleshooting Guide**

**Noisy recordings and Excessive artifacts**

**Patient variables**

Post-auricular muscle reflex occurs at a latency of 10-15 msec. It can be so large in amplitude that it prevents averaging or obscures the response.

- Use ear lobe placement of electrodes rather than mastoid.
- Check patient state.
- Place a pillow under the patient's neck for support. Encourage patient to relax, close their eyes, and avoid clenching their teeth.
- Ensure electrode impedance is low ( $\leq 5$  kOhms) and balanced (inter-electrode difference  $\leq 2$  kOhms).

**Equipment variables**

Pause averaging and check for stimulation artifact in EEG.

- Separate sources of electromagnetic energy (power cable, stimulus cable, transducers, computer, monitor) away from cables carrying patient response (patient cable, pre-amplifier, pre-amp cable).
- Braid the electrodes to improve common mode rejection.
- Make sure that all electrodes are of the same metal type.
- Re-chloride electrodes, if necessary.
- Separate NavPro box from isolation transformer.
- Ensure the patient cable (blue connector) and transducer cable (yellow connector) are fully inserted.
- Bone conduction: Stimulation artifact is common. Physically separate electrodes from oscillator and use alternating polarity. Place electrodes on the front of ear lobe.

**Environmental variables**

- With medical approval, temporarily disconnect patient from other equipment.
- Place the electrodes in a glass of water and position the glass in the location where the patient's head is usually positioned. View the EEG signal on your system. If electrical interference is evident: Try moving the glass of water to a different location. If you find a quieter spot, reposition the patient chair/bed to that location.
- Turn off electrical equipment in the test environment (cellular phones, pagers, computer monitors) and in adjacent rooms, if possible.

**Noisy recordings and Excessive artifacts**

**60 (50) Hz interference**

- Only rarely is 60 or 50 cycle noise the cause of noisy recordings or artifacts. Using a notch filter frequently produces ringing which increases artifacts. So, to check for true 60 (50) Hz interference, temporarily enable the notch filter. If the problem goes away, find and correct the source of the noise so that the notch filter may be disabled during actual data collection.
- Turn off fluorescent lights or lights with dimmer switches. Test the outlet to make sure it is grounded.
- In some cases, it will be necessary to install a dedicated electrical outlet or shield the test environment.

**High or open impedance****Equipment variables**

- Make sure the patient cable/pre-amp cable and transducer are securely coupled to the Navigator Pro.
- Exchange the electrodes between two inputs to see if the problem follows the electrode.
- Try a different set of electrodes.
- Perform internal diagnostics loop test procedures.
- Perform internal diagnostics/internal calibration of Navigator Pro.

**Software/Protocol variables**

- Shorten the analysis window to 9 msec or less.
- Change the click rate slightly.
- Use a post-stimulation time (+1) or add blocked points.
- Decrease gain on all channels in one or two increments (e.g. Reduce 150,000 to 100,000; reduce 100,000 to 75,000).
- Use alternating polarity.
- Reduce high filter (low pass) to 1500 Hz.
- Disable the artifact rejection as a last resort. Check if any useful, readable data can be collected. Interpret with caution as noise is being averaged into the recording.

**Bio-logic Systems Corp**

**Stacked ABR/CHAMP Troubleshooting Guide**

**Noisy recordings and Excessive artifacts**

Patient variables		Equipment variables	
<p>Carefully apply electrodes and position transducer(s). Place patient in a reclining position and then enter data into the program. Allow the patient to relax before beginning test. This will effectively reduce noise levels at the beginning of the test.</p> <ul style="list-style-type: none"> <li>◆ Check patient state. Encourage patient to relax.</li> <li>◆ Sleep is best. If patient cannot sleep, have them lie in a comfortable position, close their eyes, and avoid clenching their teeth.</li> <li>◆ Place support under the patient's neck.</li> <li>◆ Be sure that all possible sources of PAM are eliminated.</li> </ul>		<p>Check for artifact in EEG.</p> <p>Separate sources of electromagnetic energy (power cable, stimulus cable, transducers, computer, monitor) from cables carrying patient response (patient cable, electrode leads).</p> <p>Check for airborne electrical noise. Turn off other equipment in the room (especially computer monitors).</p> <p>Do NOT clip transducers onto patient's clothing.</p>	
		<p>Check electrode impedance.</p> <p>The goal is to have all electrode impedance at or below 5 k Ohms and balanced (less than or equal to 3.0 k Ohms) impedance between electrodes.</p> <p>Tape or braid the electrodes to improve common mode rejection.</p> <p>Make sure that all electrodes are of the same metal type.</p> <p>Re-chloride electrodes, if necessary.</p>	
Environmental variables			
<p>Temporarily disconnect patient from other equipment.</p> <p>Find a more electrically quiet place to test.</p> <p>If patient is on a chair or bed that is plugged into an electrical outlet, unplug it.</p> <p>Turn off other computer monitors or other sources of electromagnetic interference.</p>		<p>Place the electrodes in a glass of water and position the glass in the location where the patient's head is usually positioned.</p> <ul style="list-style-type: none"> <li>◆ View the EEG signal and noise level.</li> <li>◆ If electrical interference is evident, try moving the glass of water to a different location.</li> <li>◆ If you find a quieter spot, reposition the patient's chair/bed to that location.</li> </ul>	
60 (50) Hz interference			
<p>Turn off fluorescent lights or lights with dimmer switches.</p> <p>Test the outlet to make sure it is grounded.</p> <p>In some cases it will be necessary to install a dedicated electrical outlet or shield the test environment.</p>			

**Post-Auricular Muscle Artifact (PAM)**

What is PAM?

- ◆ A large peak in the response that occurs anywhere from 10-14 ms.
- ◆ Sound-evoked muscle compound action potential.
- ◆ Can change from run to run.

What are the sources of PAM?

- ◆ Muscle activity (movement of body parts, muscle tension, jaw movements, swallowing, coughing).

How does PAM affect Stacked ABR?

- ◆ PAM can change from run to run so the subtraction from the derived bands will not eliminate the effect of PAM.
- ◆ The peak latency can be anywhere from 10-14 ms so PAM can interfere with wave V in the lower high-pass conditions and derived waves.
- ◆ If the Click Alone or any of the high pass responses has PAM, the Stacked ABR will be unreliable and uninterpretable.

What can be done about PAM?

- ◆ Make sure patient is relaxed.
- ◆ Make sure patient's head and neck are supported to make the patient feel more comfortable.
- ◆ Remind patient to keep eyes closed, relax head and neck muscles, unclench jaw, and keep head centered.
- ◆ Make sure mastoid electrodes are not placed on muscle.

**High or open impedance**

**Equipment variables**

Make sure the patient cable is securely coupled to the NavPro box.

Prepare the electrode site again.

Exchange the electrodes between two inputs to see if the problem follows the electrode.

Try a different set of electrodes.

Check impedance with blue end of loop test cable attached.

Perform Self Diagnostic Procedure.

## Environmental Noise Reduction Checklist

**The Navigator Pro has been designed to reject noise thru artifact rejection.** This checklist can assist you in identifying noise that may effect acquisition of AEP data.

1. Navigator Pro box should not be close to the isolation transformer.
2. Separate the patient cable from the transducer cable and from any power supplies and cables.
3. If possible, avoid clipping the transducer stimulus boxes to the patient. Clip to a pillowcase instead. Do not let the tubing of the transducers touch the electrodes.
4. Do not place the ground electrode close to the heart (front or back of the patient). Noise can be generated by a large EKG.
5. Turn off any unnecessary external computer monitors.
6. Turn off fluorescent light(s) or dimmer switches when operating the equipment. Do not have dimmer set in the middle position.
7. Turn off/Unplug any equipment in the same room as the system i.e. monitor, computer, typewriter, coffee pot etc. Of course, temporarily disabling medical monitoring equipment used on the patient must be performed by a qualified nurse or physician.
8. Only plug the Navigator Pro into the supplied isolation transformer. Do not use outlet strips or extension cords. Connect the isolation transformer directly to wall outlet.
9. If patient is lying on a chair that plugs in – unplug the chair. If patient is lying on a metal bed, do not have electrodes touching the metal of the bed.
10. Use a dedicated circuit (line) for the system (i.e. AEP system is only system in outlet.) Verify with an electrician or Bio-medical dept. If not using dedicated line – other office equipment (i.e. copier) can introduce noise.
11. Assure that your wall outlet is grounded and wired correctly. Verify with an electrician or Bio-medical dept.
12. Do you have a radio station transmission tower nearby? This will create noise.
13. Are there any large devices in adjacent rooms or adjacent floor (eg X-ray equip. MRI, refrigerators, air conditioner – window unit, elevator motors, etc.)
14. Do not use cellular phones when operating the equipment.
15. If 60 or 50 Hz noise is present (in most window sizes there will be only 1 or 2 cycles present), turn on the notch filter and see if the noise disappears. See Protocol – Amplifier Tab section.
16. Click on View EEG button on the collection screen. Place the electrodes into a cup of water and walk the cup of water and electrodes around the room to identify the noise source. Watch the EEG window, as you get closer to the noise source the EEG will become noisier.
17. If only artifact is being collected, turn off the artifact rejection so that data collection can occur. Collect the noise, so that you can fax it to Bio-logic to determine the frequency of the noise to assist you with troubleshooting.
18. Move the system to a different room away from the existing location. Move system to a different part of the building if noise cannot be resolved.

## **Calibration of Bio-logic Equipment**

Bio-logic Systems Corp does not require, however, does recommend calibration of its equipment. Most equipment used to test hearing is calibrated on an annual or semi-annual basis. The calibration of equipment sold by Bio-logic Systems Corp must be performed by the factory or by an authorized Bio-logic representative. Likewise, the repair of Bio-logic equipment must be performed by the factory or by an authorized Bio-logic representative.

Please contact Bio-logic Hearing Technical Support at 1-800-272-8075 or 1-847-949-5200 for the name of your local Bio-logic representative.