

# Hearlab Final Test Procedure

File Name : (hearlab final.doc)

Originator : ( Jana Brekke)

## Approvals:

**Engineering** \_\_\_\_\_

**Manufacturing** \_\_\_\_\_

## Change History:

Effective Date	Description of change

## Purpose:

To do a final test on the Hearlab unit

## Performed By:

Test Technician II

## Test Equipment Required:

1. QT Sound Calibrator
2. Special modified 7000 for insert cable testing
3. Spectrum Analyzer
4. Sound Level Meter (Rocket Ship) (optional)
5. Mastoid

## Special Precautions:

If shipping to a country where the power is 220v, make sure the computer power supply switch is indicating 220v before sending to first.

## Parts Needed for Procedure:

1. Computer and Monitor, Keyboard
2. Hearlab Stimulus Controller
3. Hearlab Electrode Processor
4. Speaker, Microphone, Inserts, Bone
5. Assorted cables
6. Microphone stand

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## Procedure:

- 1.0** Unbox computer and monitor. Make all connections and return packaging to boxes.  
Connect Hearlab Stimulus Controller to the computer and Electrode Processor to the Stimulus Controller.

## **2.0 Installing OS BartPE CD**

Put Hearlab Tech Tool V1.1 (Bart PE) CD into drive. When booting hit F12 to get into the boot menu.

Select → On board or USB CD-Rom Drive. <Enter>.

Following message takes about a minute to come up.

Message → Install Base Hearlab System Image <y>

Message → Out of virtual memory <OK>.

Software starts install. This takes a few minutes.

Hit any key to continue → hit “y” computer turns off.

Power on computer, take out disk.

Boot up computer.

In the *Type an Administrator Password* field  
just click in both password fields Administrator  
and Confirm, making zero passwords <Next>  
Computer boots up again.

Just click in password field for zero password <OK>

Message → do you want to restart your computer <Yes>.

Click for zero password <OK>

Computer is now booted.

## **3.0 Max out screen resolution**

Right click on desktop

Select → <Properties>

<Settings Tab>

Screen resolution → Move to max/per monitor slider to max.

<Apply>

Monitor setting dialog box . <yes>

<ok> to close “Display properties window”

## **4.0 Making Default devices**

Make sure HearLab Stimulus Controller is powered on.

Click on Start → Control Panel

Find “Sound and Audio Devices”. Drag and drop to desktop.

Or right click on selection. Select → Create short cut

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Click on *Sound and Audio* short cut.

Select → audio tab

Sound play back

arrow down to “Sound Max HD Audio”

(or any selection other than the SRU or EPU number. This makes the stimulus controller the non-default device.)

Click → <Apply>

Sound Recording

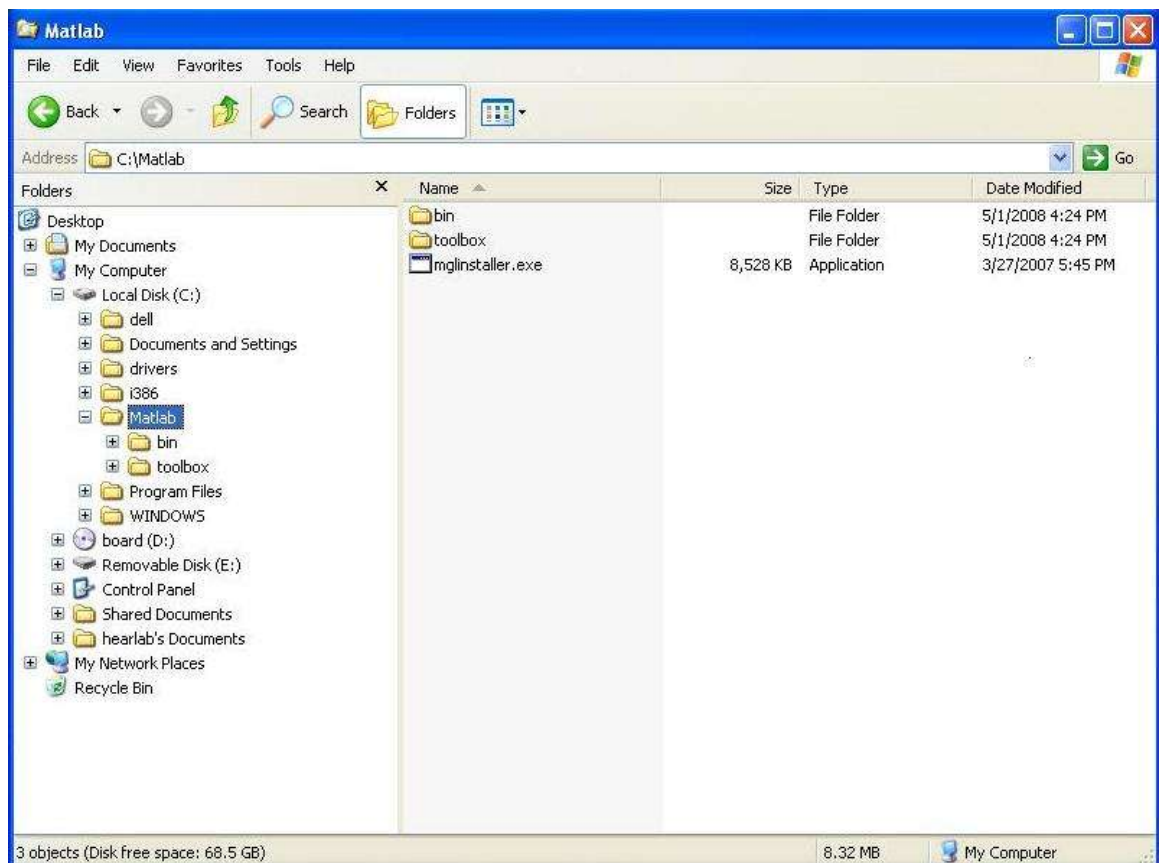
arrow down to “Sound Max HD Audio”

Click → <Apply>

Click → <OK> to exit. Window.

## 5.0 Matlab Installation

- a) Create a new folder under your default hard drive c:\Matlab

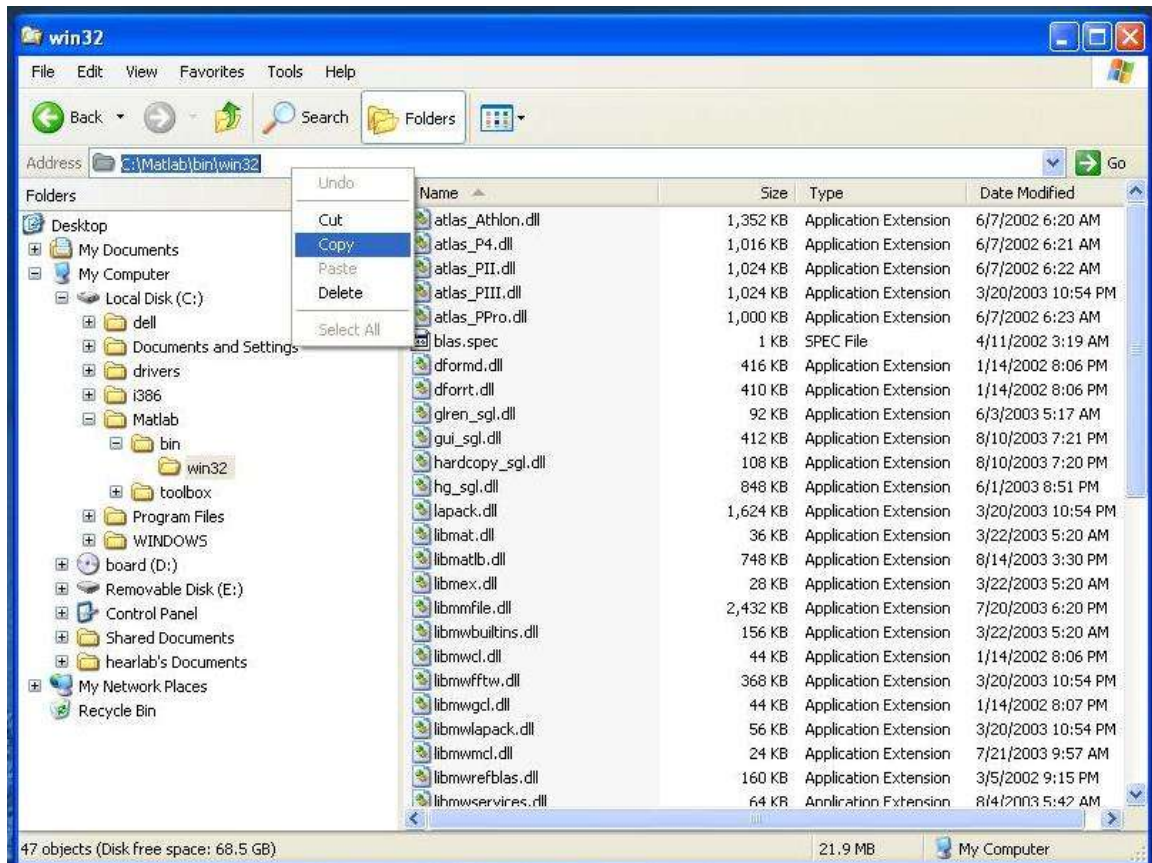


**Fig 1**

- b) Copy matlab installation file (mglnstaller.exe) to this newly created directory. Find under “Surfboard E:\Hearlab\Matlab”. (*memory stick that’s shape like a surfboard.*)
- c) Double click the file. A text window will appear and the installer will ask you if it can proceed with the installation. Into c:\Matlab: Press enter.

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- d) Press enter to close the window.
- e) Click on C:\Matlab\bin\win32  
Leave path up on screen in address bar.



**Fig2**

- f) Right click on “My Computer”,  
Select <Properties>  
Click the Advanced tab  
Press the <Environment Variables> button.
- h) Under the “System Variables” window,.  
Select <“Path”> and press the <Edit> button  
Click into the field titled “Variable Value”.  
Press the [End] key on your keyboard. Cursor goes to the end of line.  
Add a semi colon “;”.

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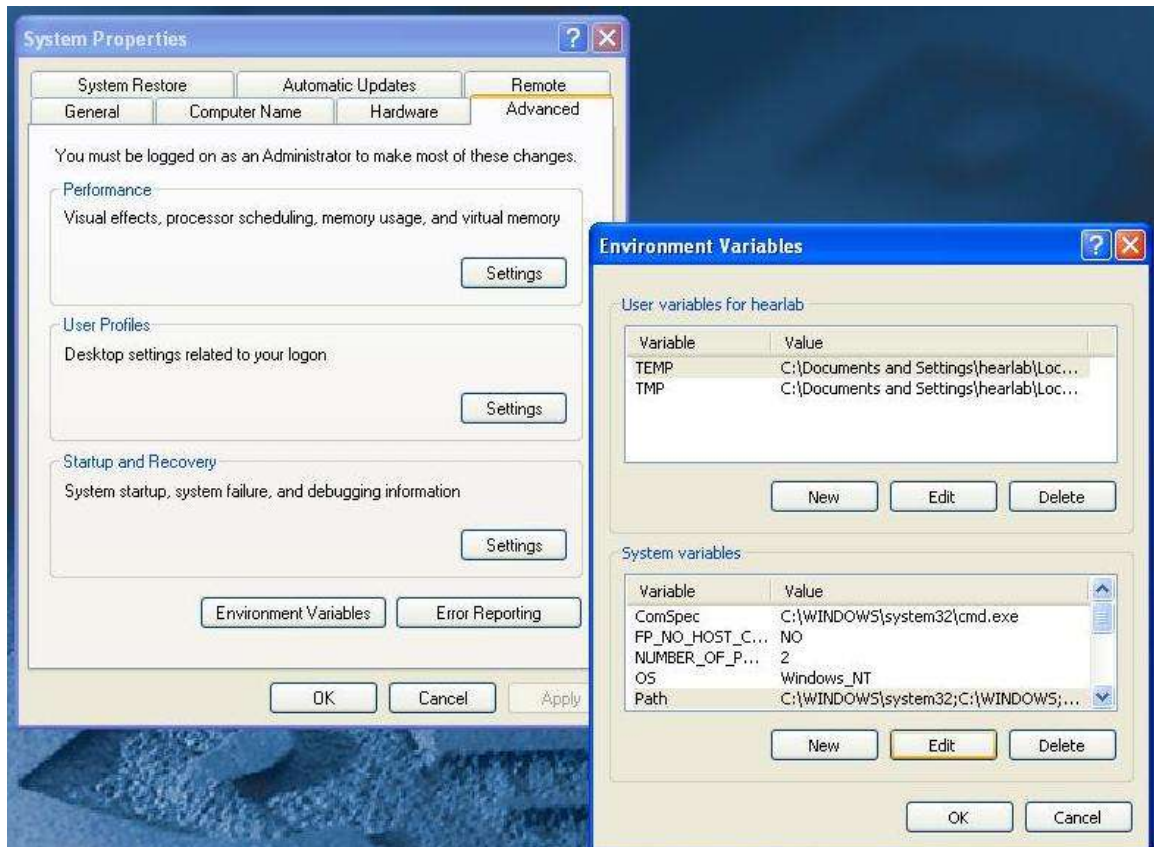


Fig 3

- i) Copy “C:\matlab\bin\win32” (without the quotes) from address bar and paste to the end of the path line.
- j) Press the <OK> button.
- k) Press the <OK> button again to exit “Environment Variable” window
- l) Press <ok> to exit “System Properties” window
- m) Reboot computer, press <OK> at password window.
- n) Your system is now ready to install the ACA software.

## 6.0 ACA Software Installation

Go to

Surfboard E:\Hearlab\ACA\1.0.(*most resent date*).1\windows installer package

Click on installer then <Next>

Folder window

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Use default path C:\Program Files\Frye Electronics\HearLab\

Click → “Everyone” button <Next>

Confirm installation window <Next>

## 7.0 Module Activation Code

Leave Module Activation Code window up and go to

Surfboard E:\Hearlab\ACA Code Generator

Click on “HLCodeGen.exe”

Move windows so you can see both at the same time.

Enter SRU number (numbers only no letters) from the “Device Information” window into the “HLCodeGen” window “Stimulus Controller serial number” field. Do the same for the EPU number.

Enter unique software key → 7177

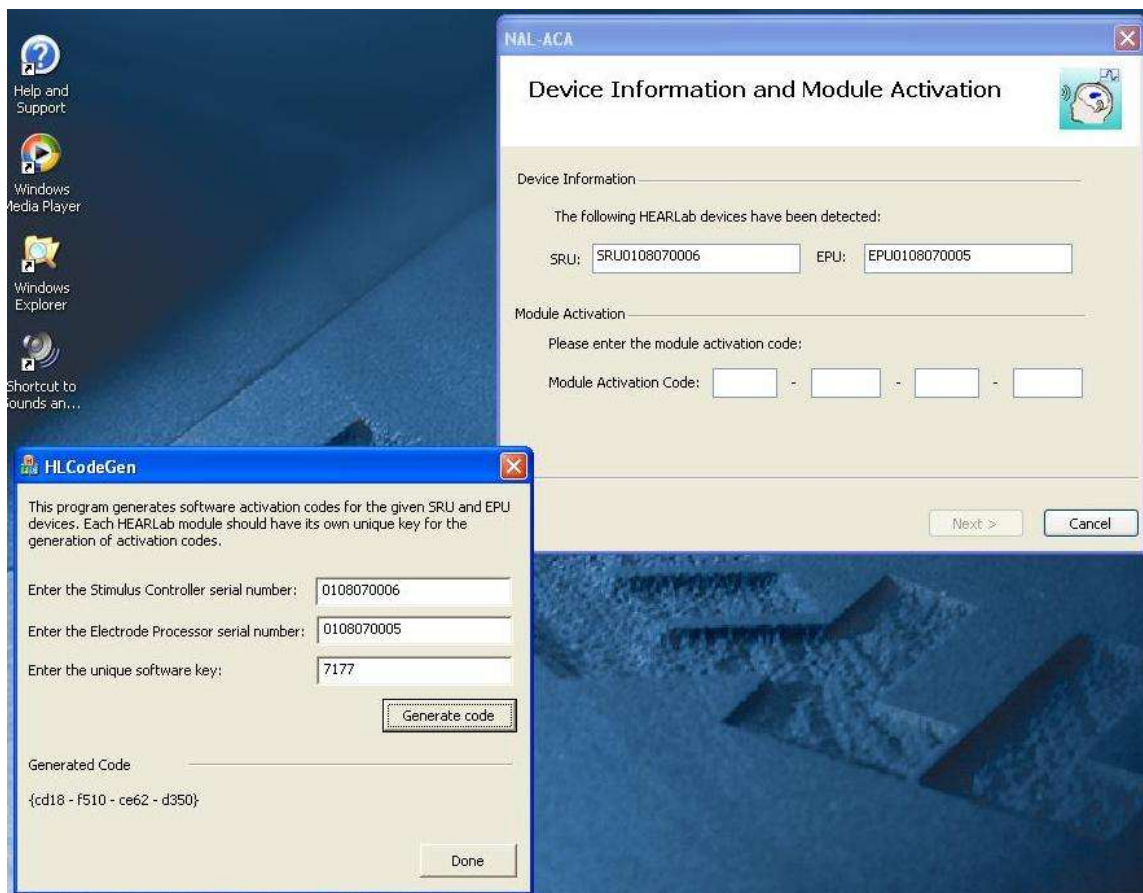


Fig 4

In “HLCodeGen” window

Click → Generate code

Note the code between the brackets {xxx-xxx-xxx-xxx} and enter this code into the Module Activation field in the Device Information window. <Next>

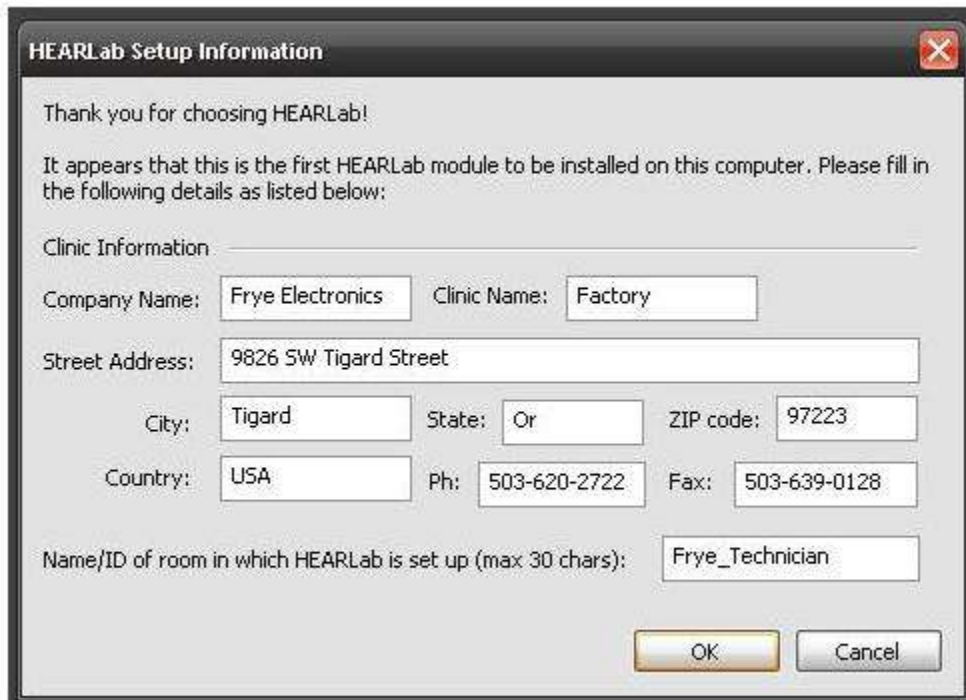


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Close “HLCodeGen” window <Done>  
Close “Hearlab ACA” window <Close>

## 8.0 HEARLab Setup Information

Click on “HearLab ACA”.  
Fill out fields as per Fig 5.



**HEARLab Setup Information**

Thank you for choosing HEARLab!

It appears that this is the first HEARLab module to be installed on this computer. Please fill in the following details as listed below:

**Clinic Information**

Company Name: Frye Electronics    Clinic Name: Factory

Street Address: 9826 SW Tigard Street

City: Tigard    State: Or    ZIP code: 97223

Country: USA    Ph: 503-620-2722    Fax: 503-639-0128

Name/ID of room in which HEARLab is set up (max 30 chars): Frye\_Technician

OK    Cancel

Fig 5

Click <OK>

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Fill out fields as per Fig 6. Don't forget to select Auto log-in



Fig 6

Password is → Frye  
Click <OK>  
Close ACA window.

## 9.0 Turning Off All Screen Savers

Right click on the desktop. Select “properties”  
Display Properties Window  
Screen Saver Tab → Screen Saver select → “none”  
<Apply>  
Monitor Power Click → “power”  
Power Option Properties Window  
Power Schemes Tab  
Turn off monitor → “never”  
Turn off hard disks → “never”  
System standby → “never”  
<Apply>  
Advanced Tab  
Options → uncheck boxes  
<Apply>



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Hibernate Tab

Hibernate → uncheck boxes

<Apply>

<OK> to close “Power option window”

<OK> to close “display properties”

## 10.0 Setting background

Plug in Surfboard memory stick.

Right click on “My Computer”

Select → Explore → E: Surfboard → Hearlab

Right click on “Hearlab desktop background.jpg” (use laptop if applicable)

Select → Open with Windows Picture and Fax Viewer

Right click in window.

Select → set as desktop background

Close window.

Right click on desktop select properties.

Display Properties Window

Select → Desktop tab

Select → “none” <Apply>

Select → “Hearlab desktop background” <Apply>

<OK> to exit window

## 11.0 Turning off Automatic Login

- a) Click “Start”, and then “Run”.
- b) In the “Open” box, type “control userpasswords2”,  
without quotes  
Click → Ok
- c) Clear the “Users must enter a user name and password to use  
this computer” check box,  
Click → <Apply>
- d) In the “Automatically Log On” window click in both “Password”  
and “Confirm Password” boxes leaving them blank.
- e) Click → <OK> to close the “Automatically Log on” window,  
Click → <OK> to close the “User Accounts” window.
- f) Shut down computer and reboot to test for no password

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## 12.0 USB Port Configuration

The remaining 7 USB port needs to be set to recognize Stimulus Controller.

- a) Move the SC cable to the next USB port. Wait for the computer to recognize the new hardware.
- b) Click → “Sounds and Audio Device” from desktop shortcut  
Select → “Audio” tab  
Sound Playback  
Default device  
Select → SoundMAX HD Audio  
(or any selection other than the SRU or EPU number. This makes the SC and EP the non-default device.)  
Click → <Apply>  
Sound Recording  
Default device  
Select → SoundMAX HD Audio  
Click → <Apply>  
Click → <OK> to exit window
- c) Repeat for remaining USB ports including the ports the mouse and keyboard are plugged into.
- c) To test, plug cable into each USB port and check screen to make sure no message of new hardware installed comes up.

## 13.0 Creating a New Client

- a) Click on “HearLab ACA” icon  
This brings up the “Client Details and Assessment Record”
- b) Click “Client” on the tool bar  
On pull down Select → “Add New”
- c) This brings up “Add New Client” window.  
Client ID → 12345  
Surname → Flintstones  
First Name → Pebbles  
Date of birth → 2008-03-04  
Gender → Female  
Click → <OK>

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Close ACA window.

## 14.0 Microphone Calibration

- a) Connect reference microphone to one end of the S-video cable and the other end to the “control microphone” plug on the back of the stimulus controller.
- b) Click on Hearlab ACA  
Press the Ctrl+Shift+Alt+K keys to get into the calibration screen.
- c) Click on the microphone picture.  
“Calibration Access Code” window enter in all caps  
QWERTY <ok>
- d) Microphone ID: Select → other  
“Enter the ID of Mic” → 1 <ok>  
Step 1: window comes back click → <Next>  
Step 2: Select → Calibrator → <Next>  
Step 3: Follow equipment setup instructions → <Next>  
Step 4: The microphone will record and measure the signal coming from the calibrator . If the signal was successfully recorded, a dialog box will appear and prompt you to enter in the calibrators output.  
Enter the calibrator output → 114 or 110 depending on which calibrator used  
Click → <Ok> → <Next>  
  
Step 5: Click → Review results to see the calibration record  
Click → <close> → <Finish>

## 15.0 Speaker Calibration

- a) Speaker and Mic Set Up  
Connect banana plug to back of the speaker and connect cable from speaker to “speaker left” socket on the back of the stimulus controller. Secure microphone into mic stand with Fun Tak. Place the microphone centered 1 yard 3 inches (1 meter) away from the speaker.

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- b) Open Free Field Calibration wizard by clicking on the picture of the speaker.

Step 1: Speaker Position

Select → “loud speaker position” <Center>

Click → <Next>

*Note: last calibration position is selected by default. Click view results to see*

*Last cal*

Step 2: Loud Speaker Selection

“loud speaker ID” → other

“Enter ID” → 1

“Manufacturer” → Frye Electronics

“Select Type” → standard

Click → <ok>

Previous window displays

“Enter Distance” → 1 (meters)

Click → <Next>

Step 3: Calibration Method

Select → Automatic (using a calibrated mic)

“Specify microphone to use” → 1 (*the id just entered*)

Click → <Next>

Step 4: Equipment Setup

Microphone is plugged into “Control Mic” socket of the SC and centered 1 yard 3 inches away from speaker.

Speaker is plugged into “Free Field Speaker” socket of the SC.

Step 5: Start Calibration Click → <Next>

Step 6: If calibration says complete Click→ <Next>

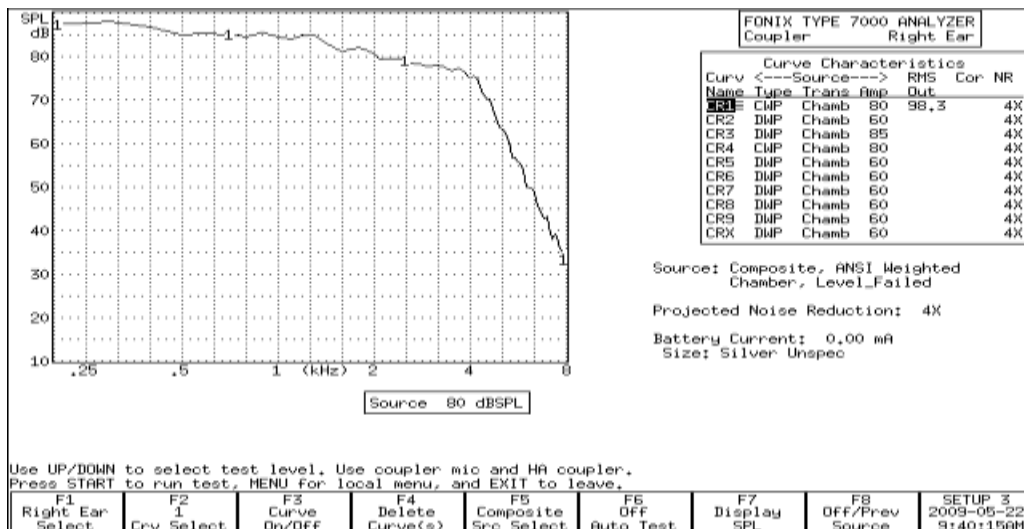
Step 7: Click → <Finish> to save results and exit  
(Cancel will discard results and exit)

*Note: Check “View results”. At the bottom of the window comments should say “All frequencies have been fully compensated”. If not redo calibration till it does.*

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## 16.0 Insert Earphone Cable Check

- a) Separate cable on both ends down to the stops.
- b) Plug the blue Insert tube into one end of a 2cc coupler and a coupler mic into the other end of coupler.  
Plug the jack end of the Insert into the connector on top of the 7000. (*special modified 7000*).
- c) Set up the 7000  
Make sure the 7000 is unleveled.  
In coupler menu :  
Display → SPL  
Static tone → single  
In coupler screen:  
Set source → 80 dBspl  
Set src select → composite  
Press start button to see response curve.
- d) While looking at the response curve, run your fingers along the entire Insert cable, starting at the jack end, bending the cable looking for changes in the response curve. (*figure a*)  
If there is change the cable is bad.
- e) When finished plug in red insert cable and repeat steps



Response curve  
Figure a

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## 17.0 Insert Earphone Calibration Using Spectrum Analyzer

The insert earphone calibration process involves obtaining the frequency response of the insert and adjusting the output levels to compensate for the response.

Equipment: 2cc acoustic coupler (DB0138)

Artificial ear

Spectrum Analyzer

Sound Calibrator (CA-12)

Plug the earphone inserts into the back of the hearlab unit

**Red** goes into the right jack and **Blue** goes into the left jack.

A) Click on hearlab and go to the calibration screen by pressing down the Ctrl+Shift+Alt+K keys.

Click on the Insert Earphone button.

Enter the access code: QWERTY <ok>

B) Step one: Select other from the drop down menu if this is a new earphone.

The “Add new insert earphone” dialog box comes up.

Enter the ID number that is printed on the earphone.

Select the manufacture from the pull down.

Select the type printed on the earphone either 10 ohm or 50 ohm..

Click <ok>.

Then click <next>.

C) Step 2: Select which insert to be calibrated from the pull down left (*blue*) or right (*red*). Click <next>.

D) Step 3: Coupler selection.

Select the Acoustic coupler

Enter the coupler ID (DB0138).

*(the id should be on the box the coupler comes in).*

E) Getting Reference on Spectrum Analyzer.

1e) If the coupler is on the artificial ear, remove it and place it in its storage box and put the grill over the mic. for protection Put the sound calibration CA-12 (GPIB only) over the grill on the artificial ear. Turn it on.

2e) To get the correct setup in the analyzer

run the program Bin/test1096.exe

Then arrow over to 110 dB reference and hit enter.



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Turn on calibrator <Enter>

Message “unable to make contact...” hit <Enter>

Message “Spectrum analyzer is now calibrated to 110”  
hit <Enter>

When its done the menu screen comes back

Now the analyzer has zero reference.

On the analyzer press the **marker button**.

Then on the side buttons set **marker value** (F4)  
to REL (relative) and **peak trk** (F7) to ON.

This measures the peak value of the frequency at the  
Yr value in dB's.

- F)           Open blank bone and insert phone cal tables  
              T: public\calibration\Hearlab\blank bone insert phone  
              Rename file to *Hearlab serial number* of the unit .  
              Enter in Left and Right insert serial numbers.
- G)    Step 4: Correct connections  
          Remove the grill from the artificial ear and install  
          the 2cc coupler.  
          Insert the tube from the earphone insert to be tested  
          into the coupler.
- H)    Step 5: Insert earphone calibration  
          Each frequency will need to be calibrated so  
          to start select the first frequency, 125 Hz.,  
          from the drop down list.  
          click the right arrow button to present the signal
- On the analyzer press the **Freq** button.  
          Then on the side buttons press **center** (F2)  
          and type in the frequency number on the key pad of  
          analyzer ie. “125” then hit the “hz, khz, mhz” on the side  
          buttons.  
          This centers the frequency that is being measured.
- In the upper right corner on top of the graph  
          on the analyzer is the Yr “reading in db's”  
          This is the number that needs to be adjusted  
          to match the number in the  
          ”Referenced to 110 dB SPL” column of the  
          “ER3A insert Earphone Calibration”  
          data sheet for the frequency being presented.  
          Enter the Yr number in the “before”  
          adjustment column. Then

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click the up arrow or the down arrow on the Hearlab screen to adjust the Yr number to match the target. Enter in the after column.

*Note:* Adjustments are in 0.5 db steps. Also the gain adjustment can be typed in the **Overall gain adjustment** text box, and hit <Enter> to apply the gain.

Repeat procedure until all frequencies have been adjusted accordingly. When completed click <Next> then <Finish> to save data.

ER3A Insert Earphone Calibration									
Right ER3A Serial Number:									
Left ER3A Serial Number:									
Freq Hz	RETSPL Value  dB	Mic Corr  Fact	Att Set  dBHL	Std + Att Set  dB SPL	Referenced to 110 dB SPL. As read directly on HP35665	Before		After	
						Left	Right	Left	Right
125	45.0	0.0	70	96.0	-14.0				
250	25.5	0.0	70	84.0	-26.0				
500	11.5	0.0	70	75.5	-34.5				
750	7.5	0.0	70	77.5	-32.5				
1000	7.0	0.0	70	77.0	-33.0				
1500	6.5	0.0	70	76.5	-33.5				
2000	9.0	0.0	70	79.0	-31.0				
3000	10.0	0.0	70	80.0	-30.0				
4000	9.5	0.0	70	79.5	-30.5				
6000	15.5	0.0	70	85.5	-24.5				
8000	13.0	0.0	70	83.0	-27.0				

*Note: cal sheet is located T: Public/calibration/hearlab/ blank insert phone cal table.xls*

## I) Retrying calibration

In cases where the sensitivity of the insert earphone output exceeds specifications by +\ -6dB or if the frequency response exceeds +\ -10dB you will be notified and asked whether or not you

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would like to retry the calibration.

You may wish to view the preliminary result before making a decision

Should you choose to retry the calibration, all previous adjustments would be discarded and thus you will be able to start the calibration afresh.

- J) Click on Insert Earphone button. Repeat insert earphone calibration steps B-1 through D-3 and G-5 with the right earphone insert plugged into the 2cc coupler and enter results into data sheet.

## 18.0 Insert Earphone Calibration Using Sound Level Meter (Rocket ship)

- a) Equipment: 2cc acoustic coupler (DB0138)  
Precision Sound Level Meter (rocket ship)
- b) Remove the grill off the Sound Meter and place the 2cc coupler on top. Plug the earphone inserts into the back of the hearlab unit. Red goes into the right jack. Blue goes into the left jack.
- c) Follow steps 18 A thru D.
- d) Open blank bone and insert phone cal tables.  
T: \ public\calibration\Hearlab\blank bone insert phone  
Rename file to the serial number of the unit is place of blank. Enter in left and right serial number.
- e) Plug one of the inserts into the coupler.
- f) Each frequency will need to be calibrated. Select the first frequency, 125Hz., from the drop down list. Click the right arrow button to present the signal.
- g) Take the measurement off the meter and subtract 110dB.  
Enter this number into the before calibration column on the cal table. Calibrate the frequency that is selected. Enter gain adjustment until the sound meter display matches the target output number on the Hearlab display. Take the reading from the meter, subtract 110dB and

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enter into the after column. Continue until all frequencies are calibrated. Click <Next> then <Finish> to save data.

- h) Remove the 2cc coupler from the sound level meter and replace with the grill.

## 19.0 Bone Calibration

- A) Set up analyzer by running bin/test1096.exe with no calibrator on the artificial ear.  
Hit enter until menu comes back up.  
Note: *if you set up the analyzer for inserts no need to do this step.*
- B) On analyzer under Measurement push *inst mode*  
Select →channel 2 (F9)  
Under Display push *meas data*..  
Select →power spec chan2 (F2)  
Push Marker button..  
Select → Peak Trk → On (F7)  
Select → Mrk Value → ABS (F4)
- C) In Hearlab calibration click on Bone Conduction.
  - Step 1: Select other from pull down  
Enter bone serial number, manufacturer and type. (All number located on back of bone.) Then <Ok> and <Next>
  - Step 2: Check set up  
Connect cable to bone and plugged into bone jack on the back of Hearlab unit.  
Place bone serial number side up in center of mastoid under arm with a 30 degree angle so as many rubber bands as possible will contact bone and cable does not touch the back shaft of mastoid <Next>.
  - Step 3: Enter serial number on the side of the mastoid into ID field.  
Enter mastoid sensitivity. The number is found at the bottom left of the “Bone Conduction Calibration Chart”.  
Enter mastoid relative sensitivity number with a leading zero for each frequency. Numbers are found in the first column of the chart under mastoid dB re 1000Hz  
<Next>

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Enter serial number of bone into the “Bone Conduction Calibration Chart.”

## Step 4: Bone Conduction Calibration

Each frequency will need to be calibrated so to start select the first frequency, 250 Hz ., from the drop down list. Click the right arrow button to present the signal

On the analyzer press the **Freq** button Then on the side buttons press **center** (F2) and type in the frequency number on the key pad of analyzer ie. “125” then hit the “hz, khz, mhz” on the side buttons. This centers the frequency that is being measured.

In the upper right corner on top of the graph on the analyzer is the Yr “reading in dBvrms”

This is the number that needs to be adjusted to match the number in the “Output Level” column of the “Bone Conduction Calibration Chart” for the frequency being presented.

Enter the Yr number in the “before adjustment” column. Then click the up/down arrow or type the adjustment into the *Overall gain adjustment* text box on the Hearlab screen to adjust the Yr number to match the target. Enter in the “after” column.

Repeat for all frequencies. When complete click <Next> Then <Finish> to save data.

## 20.0 Backup Calibration Data

A) Make a new folder on the PC in *My Documents* called *Calibration backup data*. In that file make a folder with the *unit serial number*.

B) Open Hearlab ACA.

Select → Tools/Database administration/Backup Data Base

Browse for the folder you just made

*My documents\Calibration backup data\unit serial number*

Click → <OK>.

Database backup successful → <OK>

C) Verify that the data is in the correct folder

*unit serial number\ACA\_Data\_Backup\_XXXXX*

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- D) Make a folder for the unit on  
E: Surfboard\Hearlab\Calibration backup data\unit serial #  
and repeat steps B and C.
- E) Make a folder in the T:\Public\Calibration\Hearlab\ (*Serial number of the unit*).  
Move the Hearlab Calibration Data Certificate into this file.  
Move the Calibration backup data from the Surfboard memory stick into this folder.

## 21.0 Impedance Check

Make sure electrodes are connected to EP and impedance test fixture.

In ACA window click on

Tools → Utilities → Impedance check

Impedance window will come up. A green bar will appear on a scale. It should remain stable when you wiggle the cables around. Disconnect and connect snaps on board and make sure the green bar will reappear on scale.

## 22.0 Computer Power Supply Change 110/220

Check the Sales Order line item for the power cord needed. Check the back of computer and make sure power supply is switched to the correct voltage setting. 110 or 220.

*If wrong setting computer power supply could burn up!*

## 23.0 BASS Record

In the SC EE and EP EE serial number field put the SRU number and the EPU number. To find these numbers click on the *Sound and Audio Devices* short cut. Click on the audio tab and go to the *Sound Recording* pull down and there you will find the numbers. Enter the numbers in bass without the SRU or EPU prefixes.