

3M Occupational Health and Environmental Safety

3M™ E-A-Rfit™ Validation System



E-A-Rfit™ Validation System Version 4.4
Operations Manual

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1. Purpose

The E-A-Rfit™ Validation System is comprised of hardware and software that enables the operator to test and record the personal attenuation rating (PAR) of many earplug style hearing protection products produced by 3M.

Probed test plugs are required for testing and can be purchased through your 3M™ distributor.

Product Number	Stock ID Number	UPC Number	Description
393-2000-50	70071562741	10080529190731	E-A-Rsoft™ Yellow Neons Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
393-2001-50	70071562758	10080529190748	UltraFit™ Probed Test Plugs 50 EA/Case (5 bags of 10 pair each)
393-2002-50	70071562766	10080529190755	Push-Ins™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
393-2003-50	70071562774	10080529190762	Classic™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
393-2004-50	70071562782	10080529190779	E-A-Rsoft™ FX™ Probed Test Plug 50 PR/Case (5 bags of 10 pair each)
393-2005-50	70071562790	10080529190786	E-Z-fit™ Probed Test Plug 50 PR/Case (5 bags of 10 pair each)
393-2006-50	70071562808	10080529190793	TaperFit™ Probed Test Plug 50 PR/Case (5 bags of 10 pair each)
393-2007-50	70071562816	10080529190809	Classic™ Small Probed Test Plug 50 PR/Case (5 bags of 10 pair each)
393-2008-50	70071562725	10080529190816	Express™ Probed Test Plug 50 PR/Case (5 bags of 10 pair each)
393-2009-50	70071562733	10080529190823	Classic™ Plus Test Plug 50 PR/Case (5 bags of 10 pair each)
393-2010-50	70071577772	080529190871	3M™ 1100 Test Plug 50 PR/Case (5 bags of 10 pair each)

This Operations Manual will guide you through hardware set-up and through each screen of the software.

2. Hardware Set-Up

2.1. Assembling Speaker to Stand

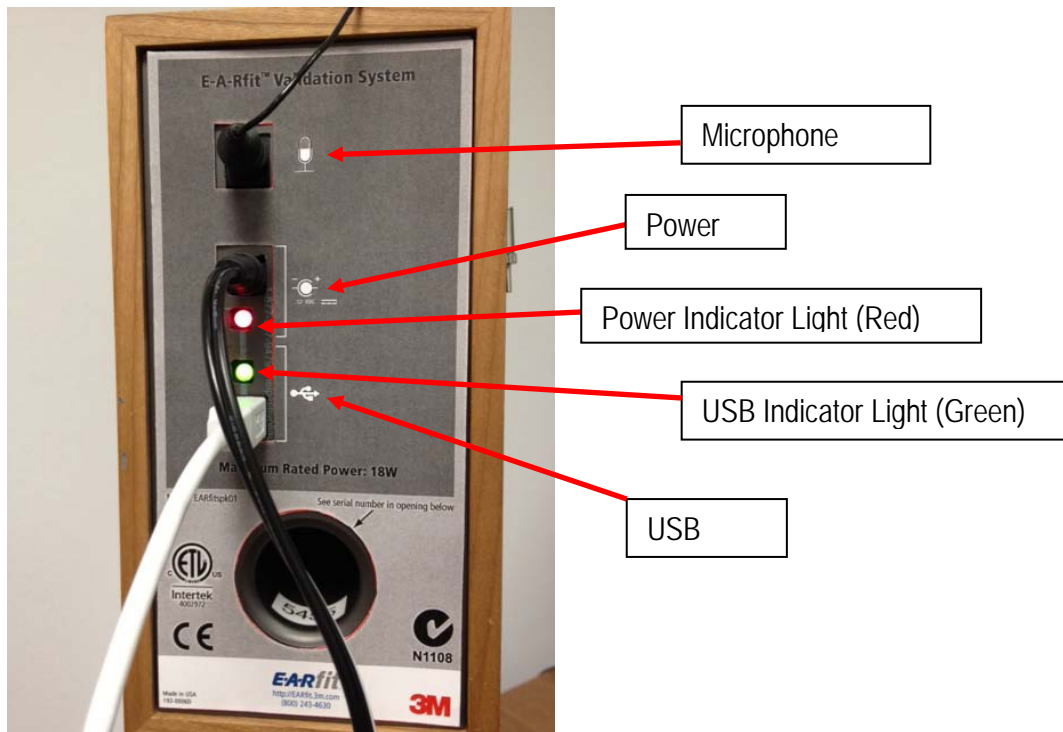
Attach speaker mounting plate to the stand by screwing it onto the threaded mounting post.

Position the speaker over the center of the mounting plate so that the magnet engages into the mounting plate recess. The speaker should sit nearly flush with the mounting plate. If it is noticeably elevated above the plate move it slightly until it snaps into the recessed area.

2.2. Connecting Cables

Connect the power to the speaker first, and then connect the microphone and USB cable before launching the software.

Connect cables as shown below:



3. Login Screen



Pressing the **F1** button on your computer will open up a copy of this Operations Manual once you have launched the software. Should you have any questions regarding the software, you are now one click away from the manual and the answer!

In order to access all of the features of this software, the speaker must be connected to your computer before you launch the application. You may run the E-A-Rfit software without the speaker connected but with limited functionality.

Technician Code

Once your account is created, your Technician Code will be listed in the Technician Code drop-down. The Technician Code is a combination of 4 letters (first 4 letters of your last name) and 4 randomly assigned digits.

There is one code that you can use immediately without having to create a user account.

DEMO0032: used for demonstration

All data from tests performed under this code will not be saved when you exit the E-A-Rfit software.

Login

Once you chose your Technician from the drop-down and the "Login" button will be enabled. Click the button and you will taken to the "Welcome" screen.

Version

Always ensure that you are using the most recent version of E-A-Rfit™ software. Each user will be advised by email when updates are available and will be able to download the latest version on the E-A-Rfit User Support website: <http://earfit.3m.com> . Please check the website regularly for updates & announcements.

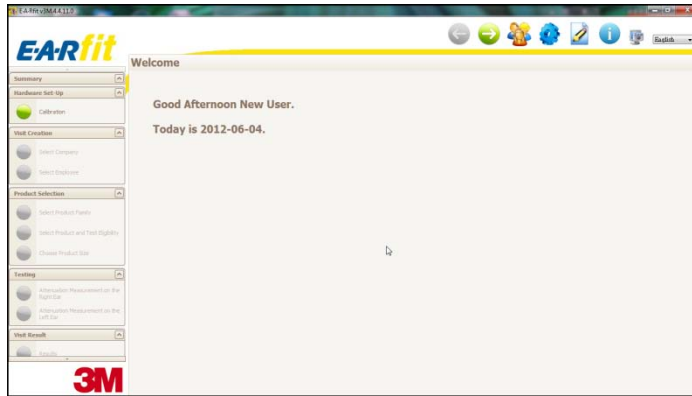
Create User Account

After you register on the E-A-Rfit User Support website, you will be issued a Technician Code to create your account within the software.

Before you log in to the E-A-Rfit software, you will need to create a user account. In order to proceed, you must have your hardware (speaker) connected to your computer. This step is only required once on your computer per user unless you wish to use the software on a different computer.

Please refer to the E-A-Rfit 4.4 Installation Guide (Full) for more information about this process.

4. Welcome Screen



4.1. Navigation

Navigation through the software can be done by:

1. Using the navigation arrow buttons at the top right-hand side of the screen; OR
2. Selecting the desired function directly by clicking on the appropriate button in the navigation window on the left side of the screen

4.2. Top Right-Hand Menu



Left Arrow: Leads you to the previous step in the software navigation

Right Arrow: Leads you to the next step in the software navigation

Employee Manager: Click here to add company or add/import/export employees. (See page 22 for details)

Setting: Click here to change your technician contact information and language. (See page 24 for details)

Report Manager: Click here to generate reports and export data. (See page 25 for details)

About: Click here to view software and database version information and technical support (See page 27 for details)

Screen Capture: Click here to take a screen capture. (See page 27 for details)

Language: Click on the drop-down menu to change the language. (See page 27 for details)

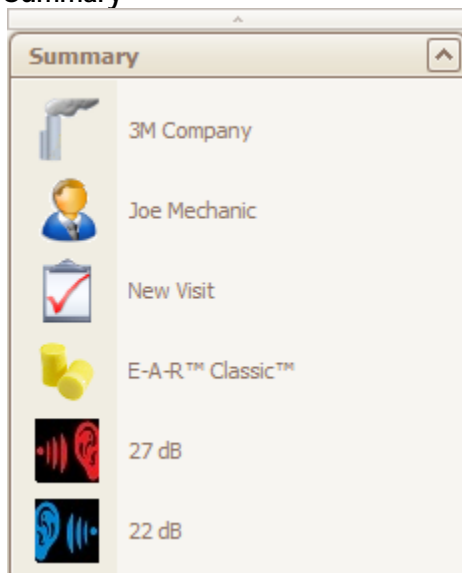
4.3. Left Side Menu



The Left menu will guide you through the software. As tasks are completed, a check mark appears within the green circle.

1. **Summary**
 - a. Displays the Company and Employee being tested once the visit has been created.
2. **Hardware Set-Up**
 - a. Calibration: The microphone and speaker need a calibration check before testing can be done.
3. **Visit Creation**
 - a. Select Company and Employee: Enter demographic information for a company and their employees as well as applying exposure level tables and audiograms within the employee record.
4. **Product Selection**
 - a. Select Product Family: Select the family of products you wish to test.
 - b. Select Product and Test Eligibility: Select product to be tested and complete an eligibility questionnaire.
 - c. Choose Product Size: Product size can be chosen if applicable
5. **Testing**
 - a. Attenuation Measurement of the Right/Left Ear: Attenuation measurements are conducted and results are displayed.
6. **Visit Result**
 - a. Results: All results are displayed
 - b. Report: Standard report for reviewing, printing, saving, and validating

Summary



The "Summary" box provides important information accessible at all stages of the software.

5. Calibration



Speaker serial number, sensitivity and firmware version will be automatically detected by the software. The software will also detect when your speaker is due for its factory calibration. The “calibration due date” message will change from green to yellow to red depending on how close you are to the calibration due date.

You will need to enter the microphone serial number and sensitivity, or select the serial number from the drop-down menu. The software will retain serial numbers and sensitivities (unless updated) in its database for all microphones used with a dedicated hardware (speaker).

Four curves will appear on the calibration graph:

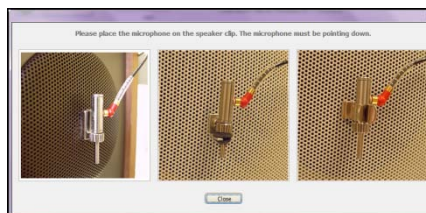
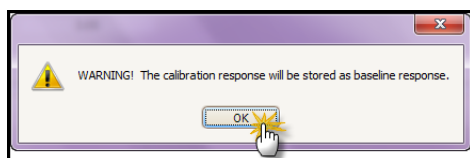
1. Maximum (Yellow): Established by adding 3 Standard Deviations (Std's) from the initial Baseline Response.
2. Baseline Response (Green dashes): The first response curve for the microphone
3. Today's Response (Red dots): This is the current and last response curve for the microphone
4. Minimum (Yellow): Established by subtracting 3 Std's from the initial Baseline Response

The “Baseline Response” curve will determine the Maximum and Minimum curves. In order to have a successful calibration, “Today's Response” needs to be inside the range established by the Maximum and Minimum curves (± 3 Std's). The calibration must be successful in order to test the hearing protectors.

Check to ensure all the equipment is well connected if the calibration check is not successful. The software will not allow you to proceed further. After three consecutive failed attempts, the software will automatically close.

You may check the calibration again anytime while in the E-A-Rfit software.

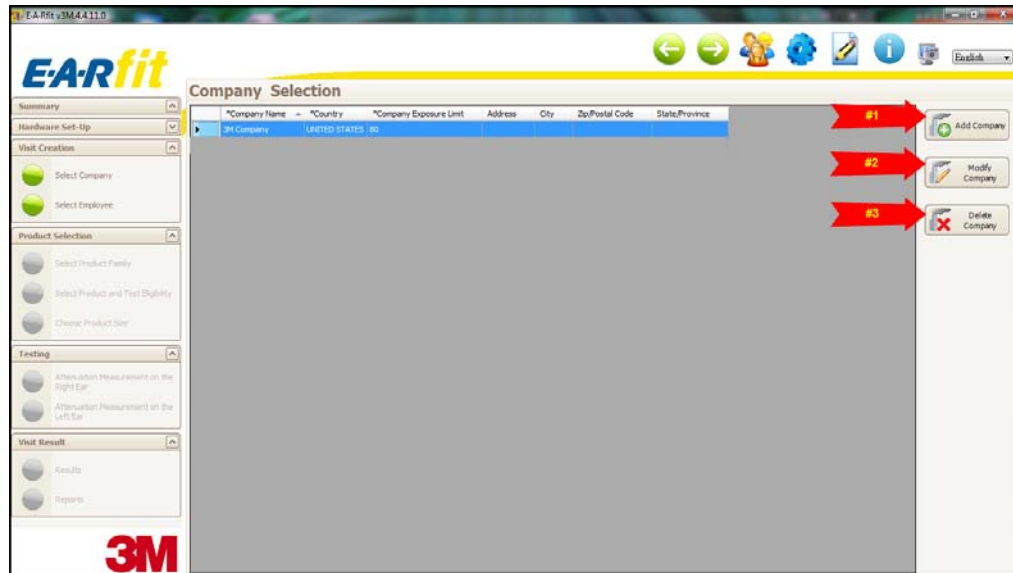
5.1. Baseline Measurements



Two pop-up warnings will arise prior to the first baseline response calibration check to stress the importance of this measurement. This message will not occur on subsequent calibration checks.

6. Visit Creation

6.1. Select Company



Here is a list of actions you can perform on this screen.

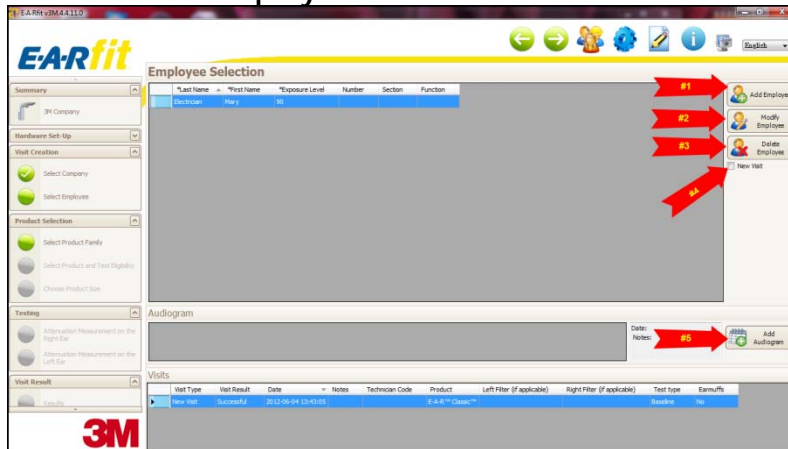
1. **Add Company** – Click to add a new company.
2. **Modify Company** – Click to modify an existing company.
3. **Delete Company** – Click to delete an existing company. You may only delete if there are no saved tests associated with the company.

6.2. Add or Modify Company

Click on “Add Company” to create a new company. Click on “Modify Company” to edit the company information. All required fields have an asterisk*. Click “Apply” when all required information has been inserted. Press “Close” if you wish to exit without adding a company.

Company Exposure Limit: By default the Company Exposure Limit is set to 80 dB. The default level may be modified if, for example, legislation in your region differs from this or if the company you are testing prefers to change it. You will not be able to set the limit above 90 dB.

6.3. Select Employee



Here is a list of actions you can perform on this screen.

1. **Add Employee** – Click to add a new employee.
2. **Modify Employee** - Click to modify an existing employee.
3. **Delete Employee** – Click to delete an existing employee. You may only delete if there are no saved tests associated with the employee.
4. **New Visit** – Tick this box, if you wish to label the test as a “New Visit”.
5. **Add Audiogram** – Click to add audiogram data to an employee record.

6.4. Add or Modify Employee

Click on “Add Employee” to create a new employee. Click “Modify Employee” to edit the employee information. All required fields have an asterisk*. Click “Apply” when all required information has been inserted. Press “Close” if you wish to exit without adding an employee.

Exposure Level: By default, the employee will not have exposure data entered. To enter the employee’s dBA Sound Level or A-weighted Exposure Level – 8hr, un-tick the box and type the exposure from 80 dbA to 120 dBA.

6.5. Add Audiogram

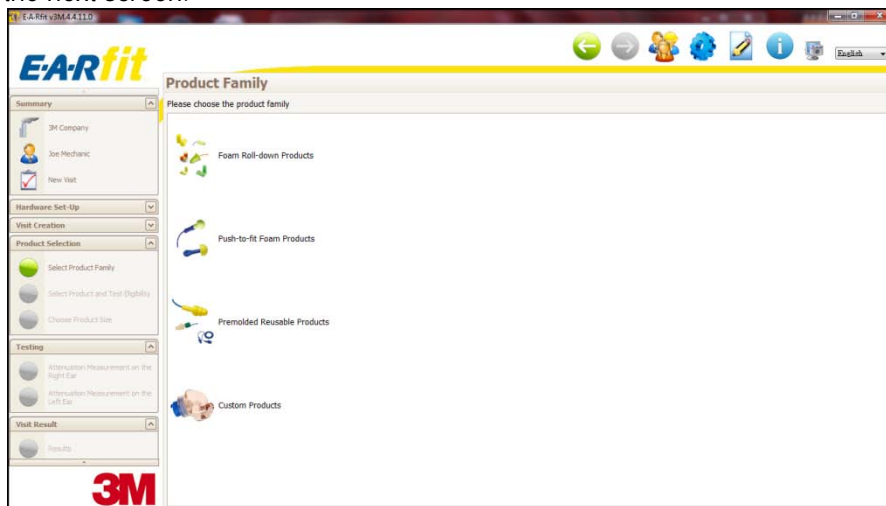


Click "Add Audiogram" and a window will appear. Enter the results per ear and per frequency. You may use the "tab" key to tab from frequency to frequency. Press "Apply" to save the audiogram results to the employee record. Press "New Audiogram" if you wish to add an additional audiogram to the employee record. Press "Close" if you wish to exit without adding the audiometric data.

7. Product Selection

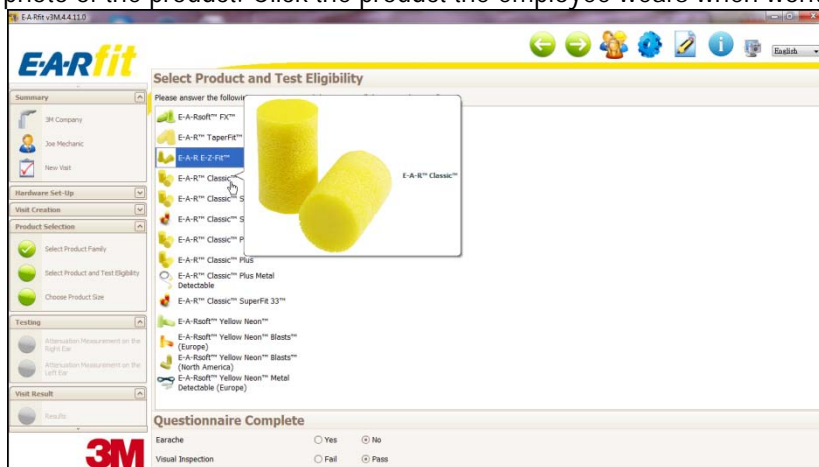
7.1. Select Product Family

You must first choose a product family; Foam Roll-down Products, Premolded Reusable Products, Push-to-fit Style Products, Banded Products (when available), and Custom Products. Double-click the image to move to the next screen.



7.2. Select Product and Test Eligibility

Within each Product Family, you will see a list of product. Place the cursor over the product to see an enlarged photo of the product. Click the product the employee wears when working.



Two questions in the questionnaire must be answered in order to proceed. Questionnaires vary depending on the product chosen.

Non-custom products such as roll-down, will display this questionnaire:

Questionnaire Complete	
Earache	<input type="radio"/> Yes <input checked="" type="radio"/> No
Visual Inspection	<input type="radio"/> Fail <input checked="" type="radio"/> Pass

If the employee has an earache at the time of testing, click "Yes". Chose "Fail" for the "Visual Inspection" if you performed an otoscope inspection (optional) and saw signs of infection or excessive wax that you believe will interfere with the test. If either "Yes" and/or "Fail" are ticked, the employee will not be eligible to be tested. Clicking the forward arrow button at the top of the screen will bring you directly to the "Report" screen.

The Custom Products questionnaire looks like this:

Questionnaire Complete	
Ear Condition	<input type="radio"/> Fail <input checked="" type="radio"/> Pass
Visual Inspection	<input type="radio"/> Fail <input checked="" type="radio"/> Pass

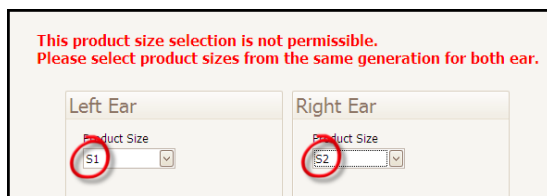
Click on the "Fail" button for "Ear Condition" and/or "Visual Inspection" if the employee has ever had a history of a Mastoidectomy, has had ear surgery within the last 12 months, has signs or symptoms of an ear infection, has excessive wax in the ear canal, has a perforation of their tympanic membrane, or any sensitivity in their ear.

7.3. Choose Product Size

If you choose E-A-R™ Custom, you will be brought to the “Choose Product Size” screen. The screen for choosing the size for the E-A-R™ Custom product looks like this:



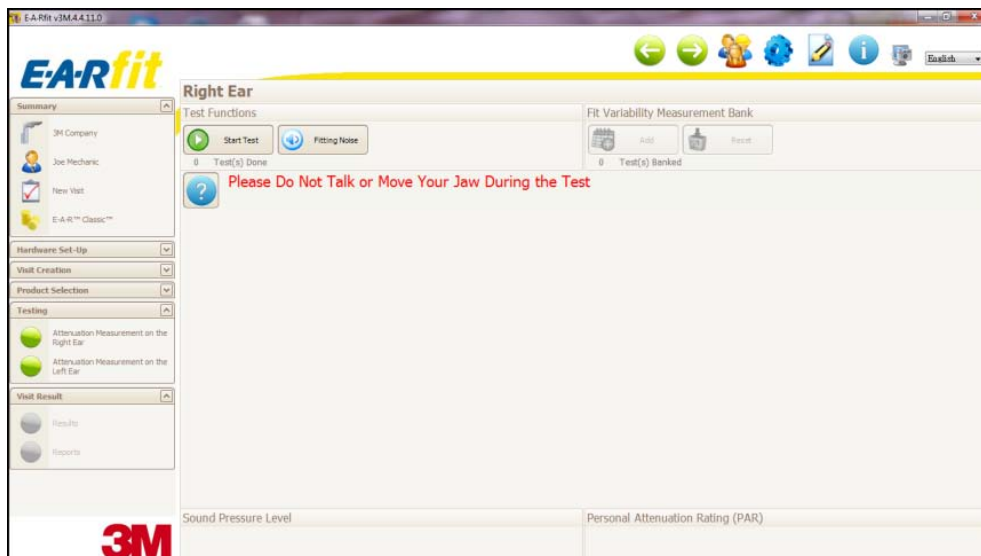
First, click on the drop-down tab to choose the left and right product size. Insert the Product Lot Number for the E-A-R™ Custom (label on product bag) into the fields. Insert the Filler Lot Number (label on silicone cartridge) in the field. Product and Filler lot codes are mandatory if this is a “New Visit” and optional for a “Follow-up Visit.”




The E-A-R™ Custom chosen for left and right ear can be different sizes but must be of the same generation (Generation 1 vs. Generation 2).

8. Testing

Once the product is selected, click the forward arrow button and you will automatically be brought to the Attenuation Measurement screen. The software automatically begins at the Right Ear for testing but you may choose to test the Left Ear first by clicking on “Attenuation Measurement on the Left Ear” in the left-hand navigation window.





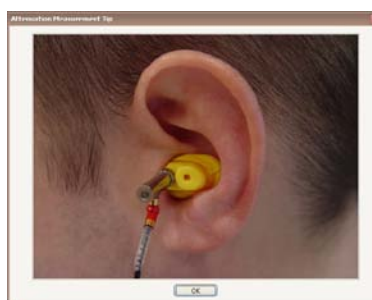
Click  to view the test plug you should be testing or the custom ear plug microphone setup. Click “OK” to close the window



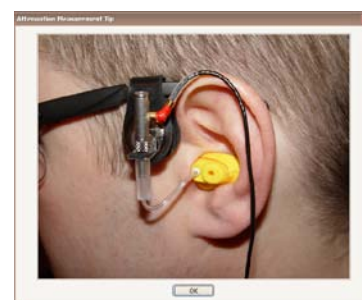
Sample non-custom test plug pop-up



3M™ sonus Otoplastik Premium Setup

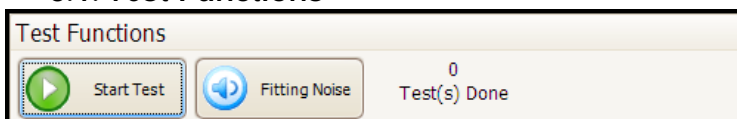


E-A-R™ Custom S1/M1 set-up



S2/M2 set-up

8.1. Test Functions



Start Test: The test begins as soon as you click the “Start Test” button.

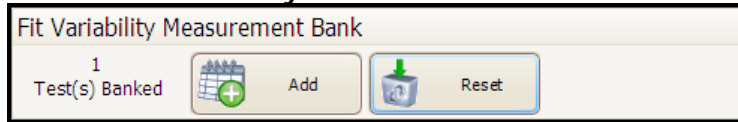
A short amount of noise will be heard, during which the system will evaluate the quality of the measurement response. The noise will pause then the testing noise will begin and will automatically stop once the measurement is completed. At times, the testing noise may appear longer and louder. The system will automatically boost the noise and increase the length of the noise, if needed.

Fitting Noise:

The Fitting Noise can be used as a teaching tool to learn how to fit an earplug properly by performing a “loudness test” after a HPD is fit into the employee’s ears. To start the noise, click on the button; to stop the noise, click the button again.

Number Test(s) Done: This will tally the number of tests conducted for each ear.

8.2. Fit Variability Measurement Bank



Number Test(s) Banked: This will tally the number of tests saved or “banked” to be used in the calculations for each ear.

Add: After each measurement is conducted, you may click the “Add” button or “save” the results in the bank.

Reset: If for any reason you wish to clear the bank of all the measurements for this individual, click “Reset” and the bank will be returned to zero.

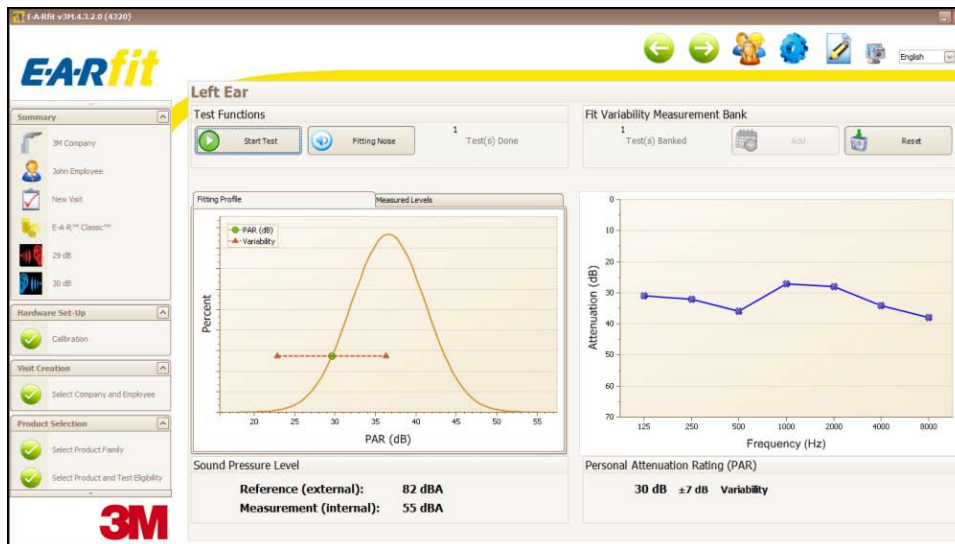
You must bank at least one measurement per ear in order to have access to the “Results” screen. The more tests added to the bank after removing, refitting, and retesting the probed plug, the more precise the results will be for they will account for the variability of the employee’s fit. You will need to bank at least four tests for each ear in order to calculate the “Individual Variability”. Please refer to the “Fitting Profile” section of the “Visit Results” for more detail.

If you have not banked any tests, you will see



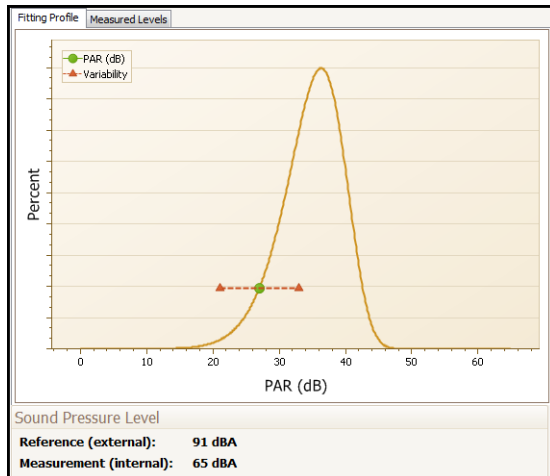
replacing the “Attenuation Measurement” green circle on the left navigation window

8.3. Attenuation Measurement



At the completion of the test for each ear, the results are displayed on this screen. You will have the option to bank or “Add” the test to the “Fit Variability Measurement Bank” before continuing. This bank is specific to this test subject.

8.3.1. Fitting Profile Graph

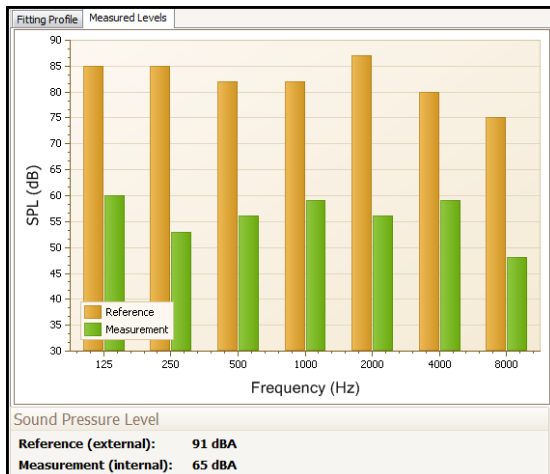


The **Fitting Profile** graph depicts the individual's personal attenuation rating (PAR) superimposed on a Weibull distribution curve.

The green dot represents the PAR value of the last test conducted.

The red line intersecting the PAR illustrates the range of variability associated with the measurement.

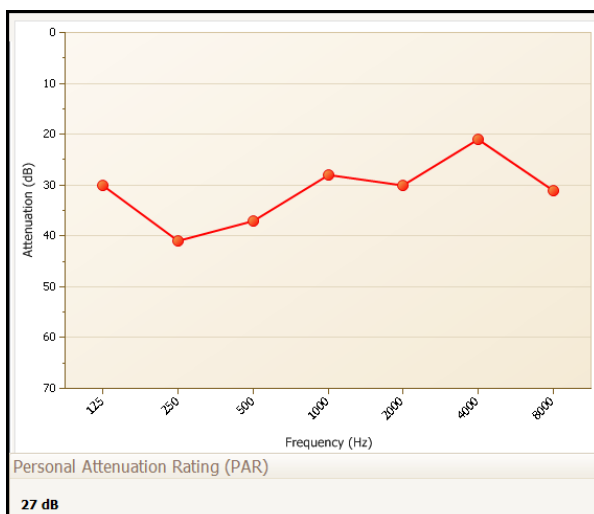
8.3.2. Measured Levels Graph



The **Measured Levels** graph displays the sound pressure levels measured by the reference microphone (yellow bars) and the measurement microphone (green bars) per octave band.

The overall results are displayed below the graph.

8.3.3. Personal Attenuation Graph



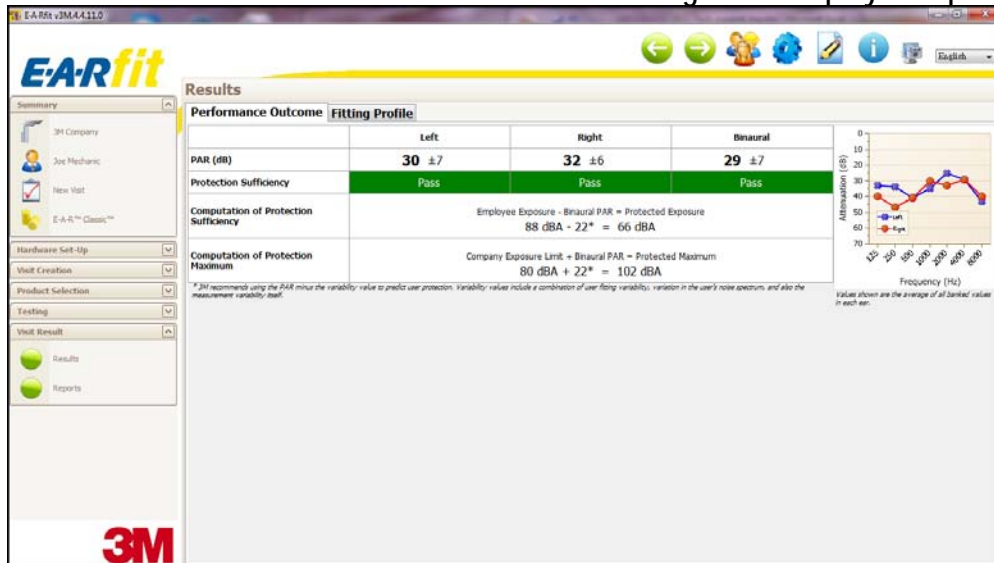
The **Personal Attenuation Graph** displays the attenuation values for the seven octave bands, color coded with red for the right ear and blue for the left ear. The PAR is computed from the octave-band data and displayed at the bottom of the graph. The PAR does give an indication of the A-weighted protection anticipated for this fit of the test earplug. However, for the best application of PARs the variability should be included in the estimation of the user exposure. The variability values and computation are reported on the Results Screens that are displayed once the fit-test attenuation measurements have been completed and banked

9. Visit Results

The “Results” screen compiles all the test data and displays the results on several result tabs.

9.1. Performance Outcome

9.1.1. Performance Outcome – Non-Custom Plugs With Employee Exposure Level Input



PAR – The overall PAR ± variability values for Left, Right, & Binaural are displayed. Although PAR less variability can compute to a negative number, this is in part a statistical artifact, and thus the minimum reportable PAR is 0 dB.

PAR Graph – The PAR values per octave bands for each ear are graphically displayed. The **red** graph represents the overall attenuation measurements for the right ear and the **blue** graph represents the overall attenuation for the left ear. Values shown are the average of all banded values in each ear.

Protection Sufficiency – A color indicator displays if an exposure level is added to the employee's record. A **green** display (Pass) indicates that the PAR value minus the variability is above the Target Minimum Attenuation for this employee. A **red** display (Fail) indicates that the PAR value and its associated variability either intersects or is below the Target Minimum Attenuation for this employee.

Computation of Protection Sufficiency – The Protected Exposure is calculated by subtracting the PAR minus the variability from the employee's exposure level. 3M recommends using the PAR minus the variability value to predict user protection. Variability values include the combination of user fitting variability, variation in the user's noise spectrum, and also the measure variability itself.

Computation of Protection Maximum – The Protection Maximum is calculated by adding the Company Exposure level to the binaural PAR minus the variability.

NOTE: Protection Sufficiency determinations are based upon the data entered by the Technician (i.e., TWA) and the test results for this employee during these testing sessions.

9.1.2. Performance Outcome – No Noise Data



PAR – The overall PAR \pm variability values for Left, Right, & Binaural are displayed. Although PAR less variability can compute to a negative number, this is in part a statistical artifact, and thus the minimum reportable PAR is 0 dB.

PAR Graph – The PAR values per octave bands for each ear are graphically displayed. The **red** graph represents the overall attenuation measurements for the right ear and the **blue** graph represents the overall attenuation for the left ear. Values shown are the average of all banked values in each ear.

Protection Sufficiency – “No Noise Data” displays if the employee does not have exposure level values in their record.

Computation of Protection Sufficiency – The Protected Exposure cannot be calculated with an employee exposure value in their record.

Computation of Protection Maximum – The Protection Maximum is calculated by adding the Company Exposure level to the binaural PAR minus the variability.

9.1.3. Performance Outcome – 3M™ sonus Otoplastik Premium & E-A-R™ Custom plugs



When testing the 3M™ sonus Otoplastik Premium or E-A-R™ Custom and if an exposure value is entered in the employee record, the software will guide you in filter selection. If no exposure value is entered in the employee record, the filter will default to a full block protection.

Recommended Filter: If an exposure level is added to the employee record, the E-A-Rfit™ software will recommend the filter that offers the lowest amount of attenuation needed to meet the Target Minimum Attenuation.

Selected Filter: The “Selected Filter” drop-down menu enables you to override the software filter recommendation. You have the option to override the selected filters by clicking on the drop-down for each ear. The Protection Sufficiency and PAR will be adjusted.

PAR – The overall PAR \pm variability values for Left, Right, & Binaural are displayed. Although PAR less variability can compute to a negative number, this is in part a statistical artifact, and thus the minimum reportable PAR is 0 dB.

PAR Graph – The PAR values per octave bands for each ear are graphically displayed. The **red** graph represents the overall attenuation measurements for the right ear and the **blue** graph represents the overall attenuation for the left ear. Values shown are the average of all banked values in each ear.

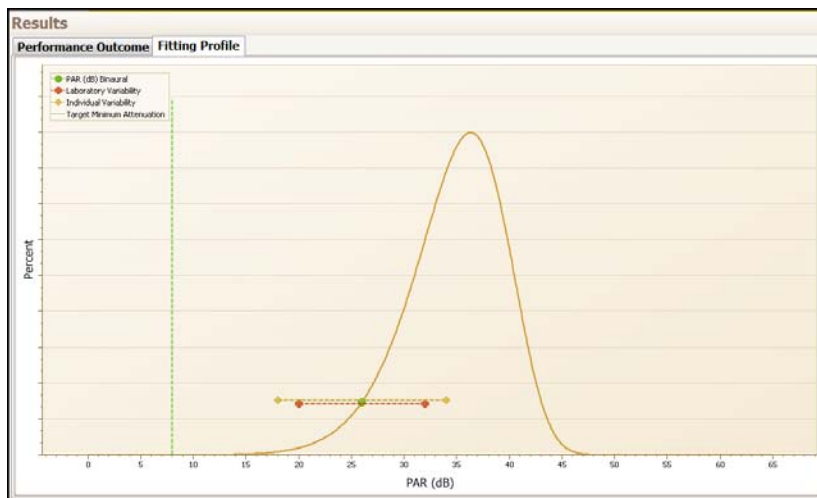
Protection Sufficiency – A color indicator displays if an exposure level is added to the employee’s record. A **green** display (Pass) indicates that the PAR value minus the variability is above the Target Minimum Attenuation for this employee. A **red** display (Fail) indicates that the PAR value and its associated variability either intersects or is below the Target Minimum Attenuation for this employee.

Computation of Protection Sufficiency – The Protected Exposure is calculated by subtracting the PAR minus the variability from the employee’s exposure level. 3M recommends using the PAR minus the variability value to predict user protection. Variability values include the combination of user fitting variability, variation in the user’s noise spectrum, and also the measure variability itself.

Computation of Protection Maximum – The Protection Maximum is calculated by adding the Company Exposure level to the binaural PAR minus the variability.

Seal – The Seal test is used to determine if the Custom Products have an acoustic seal. An acoustic seal is present if there is at least a 9 dB difference between the reference sound pressure level (SPL) measured by the external microphone and the measurement SPL measured by the internal microphone at 250 Hz. A **green** indicator light means there is an acoustic seal and a **red** indicator light is displayed when there is not an acoustic seal. If a red light appears, return to the “Attenuation Measurement” screen and have the employee refit the plug and retest. If the acoustic seal test continues to fail, remake the custom-molded product.

9.2. Fitting Profile



The Fitting Profile graph is similar to the Fitting Profile graph at the Attenuation Measurement screen, except the PAR is binaural.

PAR Binaural (green dot) value represents the binaural measurement

Individual Variability (yellow horizontal line) appears if more than 4 tests are banked on each ear.

Laboratory Variability (red horizontal line) represents the range of variability associated with the measurement as determined by 3Ms EARCAL Laboratory.

Target Minimum Attenuation (TMA, (green vertical line) represents the minimum attenuation required given the Company Exposure Limit (CEL) for this company and the dBA Sound Level or Time-Weighted Average (TWA) exposure value of this employee. ($CEL - TWA = TMA$). Remember that the default CEL is set at 80 dB. The CEL and SPL/TWA are company specific values based upon information that has been added to the record. Selection of earplugs can assist the company and user to provide the appropriate level of protection.

10. Report



The standard report (one page) will appear at this screen. Use the scroll bar on the right side of the screen to view the entire report.

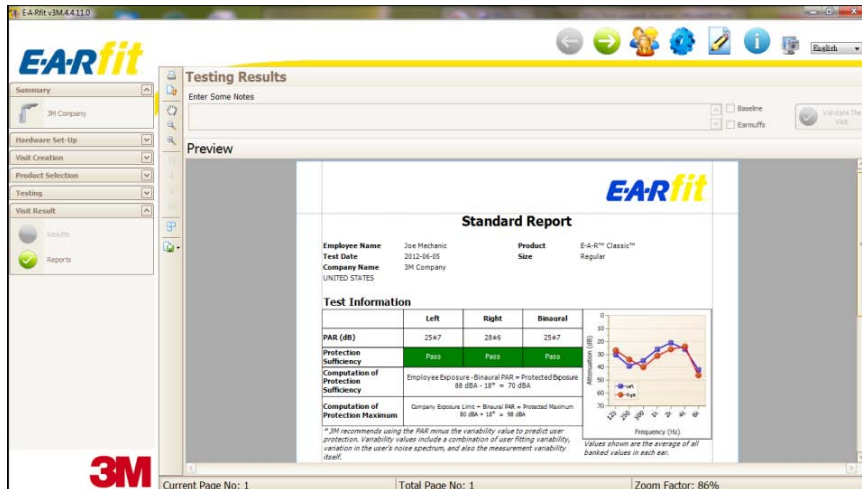
Enter any pertinent notes in the notes field. Notes entered here will be included on the reports when printed. Tick the "Baseline" box if you wish to tag this visit as the employee's baseline test. Tick the "Earmuffs" box if the employee prefers to wear earmuffs or if you are recommending earmuffs for this employee. Click the "Validate This Visit" button to save the visit. The watermark stating "Unvalidated Report" will be removed once the visit is validated.

Notes

Test type: Baseline; Visit duration: 00:01:46;
Write Pertinent Notes Here....

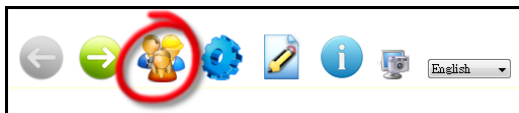
Notes will display on the report along the baseline or earmuff notation and the duration of fit-test. The time counter for the fit-test begins when the employee is selected and ends when the fit-test is validated.

Note: Once validated, the report can be generated within the Report Manager. See the Report Manager for more details.



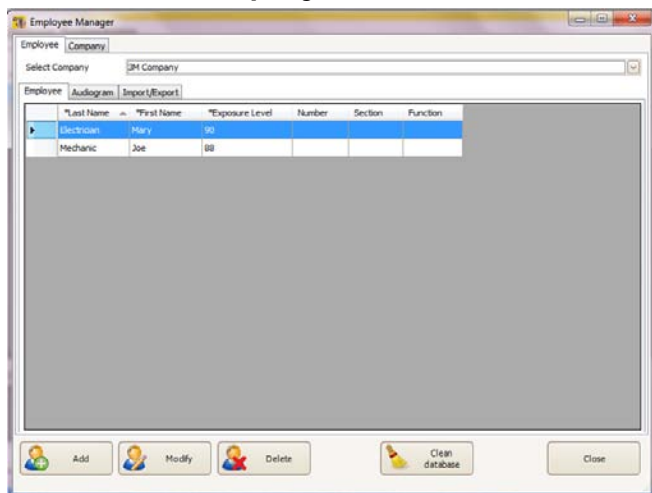
A complete session is finalized for this employee. The side menu enables you to send the “Standard” report directly to a printer, save the report in PDF format, and much more. Clicking on the right arrow button will bring you back to the “Select Company & Employee” screen so that you can choose another employee to test.

11. Employee Manager



Click on this button to open up the “Employee Manager” window. You do not have to be connected to the speaker in order to access this icon. This is an alternative to managing company and employee information and for importing/exporting demographic information.

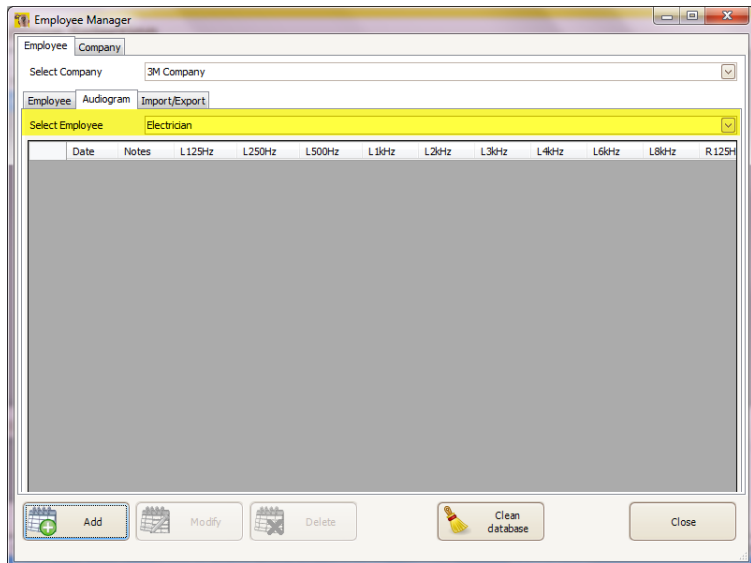
11.1. Employee Tab



“Select Company” will flash cuing you to select a company from the drop-down menu. Once you have selected your company, you have access to these buttons and the actions similar to ones described in Section 6.3.

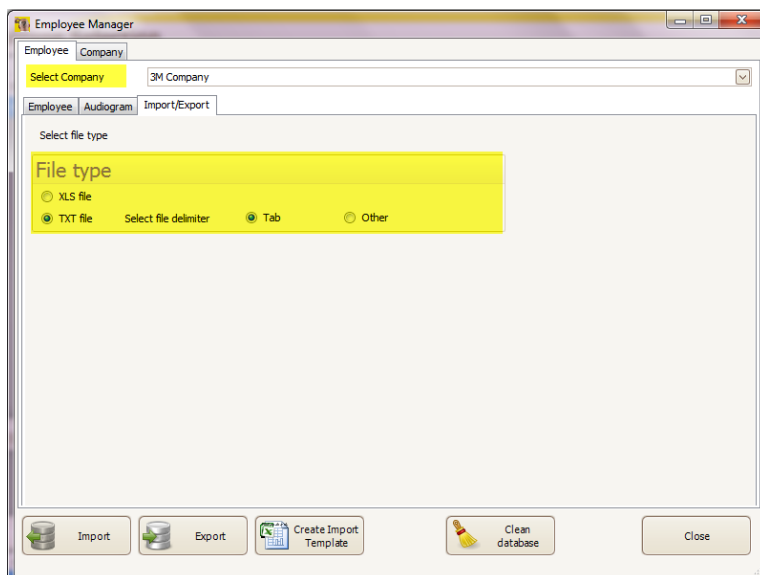
1. **Add** – Click to add a new employee.
2. **Modify** – Click to modify an existing employee.
3. **Delete** – Click to delete an existing employee. You may only delete if there are no saved tests associated with the employee.
4. **Clean Database** – Removes any employee or company without validated or saved tests.
5. **Close** – Click to close the window

11.1.1. Audiogram Tab



Select Employee" will flash cuing you to select an employee from the drop-down menu. Click "Add" to add audiogram data as described in Section 6.5

11.1.2. Import/Export Tab



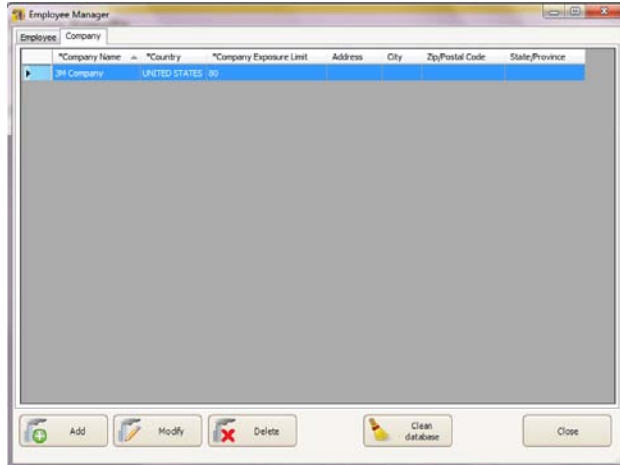
Select the company from the drop-down menu.

Select the "File Type"

- Excel Spreadsheet
- Text File
 - Tab Delimiter
 - Other Delimiters (User defined: comma, pipe, etc.)

1. **Import** – Click to import employee information defined by file type
2. **Export** – Click to export employee information defined by file type
3. **Create Import Template** – Click to create an empty import template defined by file type
4. **Clean Database** – Removes any employee or company without validated or saved tests.
5. **Close** – Click to close the window.

11.2. Company Tab



1. **Add** – Click to add a new company.
2. **Modify** – Click to modify an existing company.
3. **Delete** – Click to delete an existing company. You may only delete if there are no employees with saved tests associated with company.
4. **Clean Database** – Removes any employee or company without validated or saved tests.
5. **Close** – Click to close the window

12. Settings

12.1. Personal Information



Click on this button to open the Options window.

Settings

Personal Information

First Name: Last Name:

Company: Language:

Email:

Address:

City: State/Province:

Zip/Postal Code: Country:

Phone: Cellphone:

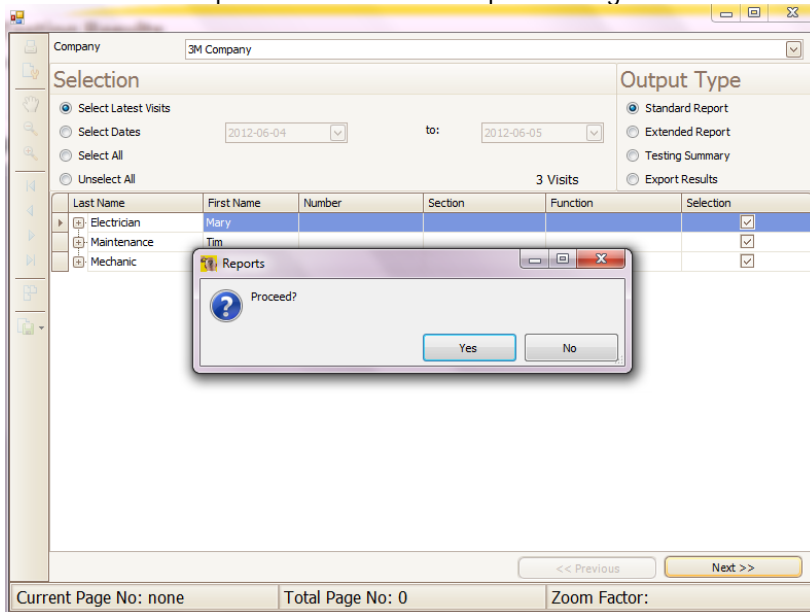
Fax:

The Settings window displays the demographic information of the technician who is logged in. You may modify this information at anytime. Click "Apply" to add the changes. Click "Close" to close the window.

13. Report Manager



Click on this button to access the "Report Manager" window to generate reports. You do not have to be connected to the speaker to access the report manager.



Select the company name from the Company drop-down menu. The Standard Report for the latest visits for all employees is selected by default. Click "Next". A window will appear to ask if you wish to proceed. Click "Yes" to display the report. Click "No" to exit window. There are a variety of report options.


Selection

1. **Select Latest Visits** – Selects the last visit for all employees
2. **Select Dates** – Chose a range of dates
3. **Select All** – Selects all visits for all employees
4. **Unselect All** – Unselects the employees

Output Type

5. **Standard Report** – Displays standard report in PDF format
6. **Extended Report** – Displays extended report in PDF format
7. **Testing Summary** – Displays a testing report in PDF format
8. **Export Results** – Exports employee fit-testing data to an Excel spreadsheet.

13.1. Standard Report (1 page) Sample

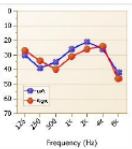


Standard Report

Employee Name	Joe Mechanic	Product	E-AR™ Classic™
Test Date	2012-06-05	Size	Regular
Company Name	3M Company		
UNITED STATES			

Test Information

	Left	Right	Binaural
PAR (dB)	25±7	28±6	25±7
Protection Sufficiency	Pass	Pass	Pass
Computation of Protection Sufficiency	Employee Exposure + Binaural PAR = Protected Exposure 88 dBA + 18" = 70 dBA		
Computation of Protection Maximum	Company Exposure Limit + Binaural PAR = Protected Maximum 80 dBA + 18" = 98 dBA		



Values shown are the average of all banded values in each ear.

* 3M recommends using the PAR minus the variability value to predict user protection. Variability values include a combination of user fitting variability, variation in the user's noise spectrum, and also the measurement variability itself.

System Information


Technician Name	New User	Speaker Serial Number	5481
Technician Code	USER0195	Last Calibration	2011-07-19
Software Version	3M-4.4.11.0	Microphone Serial Number	4377

The speaker and microphones in each E-ARfit Validation System should be calibrated at least every 24 months by the 3M Repair and Calibration Center.


Notes

Test type: Baseline; Visit duration: 00:01:46;
 Write Pertinent Notes Here.....

Employee Signature _____

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13.2. Extended Report (2 pages) Sample

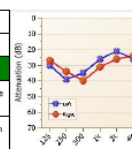


Extended Report

Employee Name	Joe Mechanic	Product	E-AR™ Classic™
Test Date	2012-06-05	Size	Regular
Company Name	3M Company		
UNITED STATES			

Test Information

	Left	Right	Binaural
PAR (dB)	25±7	28±6	25±7
Protection Sufficiency	Pass	Pass	Pass
Computation of Protection Sufficiency	Employee Exposure + Binaural PAR = Protected Exposure 88 dBA + 18" = 70 dBA		
Computation of Protection Maximum	Company Exposure Limit + Binaural PAR = Protected Maximum 80 dBA + 18" = 98 dBA		



Values shown are the average of all banded values in each ear.

* 3M recommends using the PAR minus the variability value to predict user protection. Variability values include a combination of user fitting variability, variation in the user's noise spectrum, and also the measurement variability itself.

System Information


Technician Name	New User	Speaker Serial Number	5481
Technician Code	USER0195	Last Calibration	2011-07-19
Software Version	3M-4.4.11.0	Microphone Serial Number	4377


The speaker and microphones in each E-ARfit Validation System should be calibrated at least every 24 months by the 3M Repair and Calibration Center.

Notes

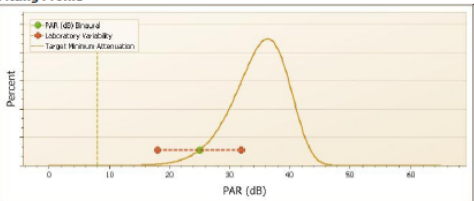
Test type: Baseline; Visit duration: 00:01:46;
 Write Pertinent Notes Here.....


Employee Signature _____

1 / 2




Fitting Profile



2 / 2


13.3. Testing Summary Report Sample

E-A-Rfit

Testing Summary

Company Name: 3M Company - Testing
UNITED STATES

Successfully Tested

Name	Number	Date	Visit duration	Product	Size Left	Size Right	PAR (dB) Binaural	Technician Code	Software Version
Terry Maintenance		2012-06-08	00:02:48	E-A-R™ custom	S2	S2	2145	USER0195	3M-A-4.12.0

Unsuccessfully Tested

Name	Number	Date	Visit duration	Product	Size Left	Size Right	PAR (dB) Binaural	Technician Code	Software Version
Use Assembly		2012-06-08	00:12:37	E-A-R Tracer™	Regular	Regular	847	USER0195	3M-A-4.12.0

Ineligible

Name	Number	Date	Visit duration	Product	Size Left	Size Right	PAR (dB) Binaural	Technician Code	Software Version
Joe Mechanic		2012-06-08	00:00:21	E-A-R™ Classic™ Small	Small	Small	-	USER0195	3M-A-4.12.0

1 / 1

3M

14. About



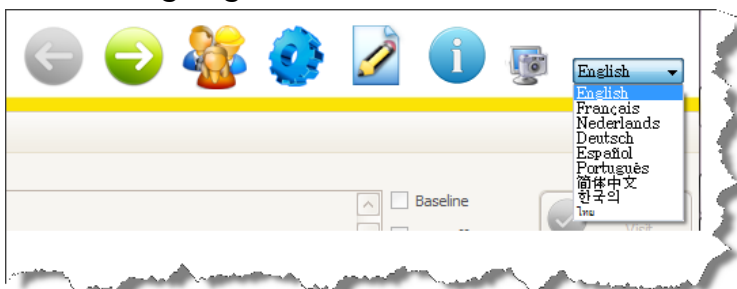
Click on this button to view software and database version details.

15. Screen Capture



Click on this button to automatically save a capture image of the current screen on your desktop. This feature is useful primarily for troubleshooting.

16. Language



Use the drop-down menu to select the software language. The default language is "English". You may change the select a different language at any time while you are within the E-A-Rfit software. If you wish to always launch in your preferred language, set the language in the Personal Information described in Section 12.1

17. Database Backup and Recovery

Is your 3M™ E-A-Rfit™ Validation System testing data backed up securely in the event you have a computer hard drive failure? If not, it is a good practice to backup your database into a secure place such as an external hard drive or company server. The important file folder to backup is entitled "3M" and it can be found in two different locations depending on the computer operating system.

Windows XP

Copy this file into a safe and secure location:

C:\Documents and Settings\All Users\Application Data\3M

Windows 7

Copy this file into a safe and secure location:

C:\Program Data\3M

Database Recovery and/or Transfer

Database file folders that have been backed up can easily be recovered or transferred to a different computer if necessary.

IMPORTANT: First, be sure that you have installed the latest E-A-Rfit™ software on your computer. You can download the latest version from the E-A-Rfit™ User Support website: EARfit.3m.com

1. Copy and replace the backup file (3M) into the proper location
 - a. Windows XP
 - i. C:\Documents and Settings\All Users\Application Data\
 - b. Windows 7
 - i. C:\Program Data\
2. Reinstall the E-A-Rfit™ software to restore the database
3. Launch the E-A-Rfit™ software. At the login screen, you should see your technician code on the technician code drop-down.
4. Highlight your technician code and the "Login" button will illuminate.
5. Click "Login" to enter the software.
6. Check the Employee Manager and/or Report Manager to see that your data has been transferred to the new computer.

18. Troubleshooting Guide

Error #	Error Message	Problem Description	Possible Solutions
18.1. General Issues			
	"Your hardware is not detected".	Your hardware is not being recognized or you are not properly connected	<p>*Are all connections secured? If not, click Cancel to exit the E-A-Rfit™ software, secure connections, and re-open the software. If you wish to continue and have limited access, click OK.</p> <p>*Did you install the hardware drivers for all the computer's USB ports? Refer to the E-A-Rfit™ Full Installation Guide and follow the instructions for installing the USB drivers.</p>
	"An instance of this application is already running".	You have clicked the E-A-Rfit short cut more than once.	*Click OK to close the pop-up window. Wait for the software to open up.
5026	"Error 5026: USB Connection Interrupted. Please check all connections and restart E-A-Rfit".	There has been an interruption in the communication between the speaker and the software.	*Unplug the USB, unplug the power to the speaker. Re-plug the speaker power cord, re-plug the USB to connect the speaker. Then launch the E-A-Rfit software.
18.2. Calibration Issues			
	"A critical error has occurred. Please make sure your microphone is properly installed. Your hardware will be checked again".	The calibration is unsuccessful and you will not be able to proceed with testing	<p>*Check to be sure that the microphone is placed in the proper orientation on the speaker microphone clip with the tip directed downwards.</p> <p>*Check to be sure that the microphone tip is tightly attached to the microphone.</p> <p>*Check to be sure the microphone tip clean. Use the microphone cleaning tool provided in the testing kit to clear any debris from the tip.</p> <p>*Be sure the hardware (speaker) is free standing and away from reflective surfaces such as walls and cabinets.</p> <p>*Check if all the connections are secure.</p> <p>*The calibration graph will automatically display when a calibration check is performed. The calibration check will be compared to the Baseline calibration. If today's response is touching the Factory Maximum, the problem is with the reference microphone. You can use the palm bellows and gently blow air on it and/or use a dry paper towel to gently clean it. If today's response is touching the Factory Minimum line, the problem is with the measurement microphone. Clean the microphone tip.</p> <p>*If still unsuccessful, take a camera shot of the calibration screen for future reference which can be used by a 3M technician to fix the problem. Try another microphone.</p>

Error #	Error Message	Problem Description	Possible Solutions
18.3. Testing Issues			
#1	"The external microphone is not detecting the expected sound level. Check distance and elevation of speaker".	The external microphone is not detecting the correct sound.	*Be sure the speaker clip is level with the employee's eyes, check the distance away from the speaker, and retest.
#2	Something is interfering with the measurement. Look for cord friction, employee swallowing, talking moving jaw, electromagnetic fields, or power supply interference. Fix and retest.	Something is interfering with the measurement.	*Be sure the employee is not swallowing, talking, or moving their jaw during the test. *Check to be sure there is no cord friction. Drape the cord over the employee's shoulder to keep cord from touching the table. *Clean the microphone tip *Power supply may be shared with an intermittent high consumption device. Find a separate circuit. *If an electromagnetic field is near, move the system to a less exposed area. *After confirming the interference, retest.
#3	"Acoustic Seal Failure Re-educate, retest, and/or refit". <i>(applies only to the E-A-R™ Custom product)</i>	The E-A-R™ Custom does not meet the acoustic seal criteria.	* Instruct the employee on the proper fit of the plug. Be sure the employee has seated the E-A-R™ Custom into their ear and click "RETRY". If error continues for a total of 2 tests, you will need to make a new plug. If remaking the plug does not fix the error, the employee cannot be fit. Click "Cancel" and bank the erroneous measurement. This visit is considered "unsuccessful". *Fit the plug yourself & test but don't bank the measurement to see if there is a fitting issue. *If testing the S2/M2 product, use new testing probe. *Ensure that the microphone tip is tight on the microphone.
#4	"This test indicates there may be problems with your equipment. Please check the equipment, check distance, and elevation of the speaker and retest".	There may be a mechanical issue with the equipment.	*Make sure the microphone tip and the testing tube is clear. Use the microphone cleaning tube, the probe insertion tool, and/or the palm bellows to clear the microphone tip and testing tube. *Verify the microphone tip is inserted completely into the test probe sleeve. *Confirm that the reference microphone should be facing up, without any obstruction.

Error #	Error Message	Problem Description	Possible Solutions
#5	"Move the subject slightly closer to the speaker Retest with new test plug if needed".	The data gathered by the measurement system does not meet normal specifications.	<ul style="list-style-type: none"> * Move the subject closer to the speaker. *Clear any lubricant from the testing probe with the palm bellows if testing the E-A-R™ custom. *Check the calibration of the speaker and microphone. If calibration is not successful, switch microphones and check calibration. Successful calibration of the original microphone is likely after it has had a chance to "rest". Occasionally, after many successive tests, the microphone becomes warm and saturated with condensation resulting in erroneous results. *If all else fails, shut down the software, unplug the USB, unplug the speaker power, re-plug the speaker power, then the USB, and relaunch the E-A-Rfit™ software.
#7	"The internal microphone is picking up too much noise. Check placement and quality of fit. Move the subject slightly away from the speaker and retest".	The sound pressure levels are unusually high under the hearing protector.	*Move the subject slightly away from the speaker and retest until you are able to produce a measurement.
#8	"The external microphone is picking up too much noise. Move the subject slightly away from the speaker and retest".	The sound pressure levels are unusually high on the outside of the hearing protector.	*Move the subject slightly away or towards the speaker and retest until you are able to produce a measurement
#9	"The internal microphone is not picking up enough noise. Clean the microphone tip and/or probe tube. Move the subject slightly away from the speaker and retest".	The sound pressure levels are unusually low underneath the hearing protector.	<ul style="list-style-type: none"> *Check to be sure that the microphone tip is without debris and cleaned. *Be sure the testing probe tube is not kinked. *Retest
#10	"The external microphone is blocked. Gently clean the external microphone. Verify its placement and retest".	The sound pressure levels measured by the external microphone are unusually low.	<ul style="list-style-type: none"> *Gently blow air on the external microphone with the palm bellows and/or use a dry paper towel to gently clean it. *Check placement of the microphone on the magnetic clip to be sure the external microphone is vertical and unobstructed. *Retest
#11	"The cable and/or the microphone may be broken/disconnected. Verify and retest".	Something is interfering with the cable or microphone.	*Check to see that the cable is not detached from the microphone and/or the full length of cable is not broken then, retest.

18. Safety and Compliance



The E-A-Rfit System is in compliance with the Electromagnetic Compatibility Directive (2004/108/EC) and the below listed standards:

Emissions	Compliance	Compliance Level
FCC 47CFR Part 15, Subpart B	Radiated and Conducted Emissions	Class A
EN55022:2006 A1:2007 CISPR 22:2005 A1:2005	Radiated and Conducted Emissions	Class A
AS/NZS CISPR 22:2009	Radiated and Conducted Emissions	Class A

Immunity	Test Level	Compliance Level
EN55024-2:1998 A1:2001 A2:2003 CISPR 24-2:1997 A1:2001 A2:2002		
Electrostatic Discharge (EN/IEC 61000-4-2)	+/-6 kV contact +/-8 kV air	Level 2
Radiated Immunity (EN/IEC 61000-4-3)	3V/m	Complies
Electrical Fast Transient (EN/IEC 61000-4-4)	+/- 1 kV Common Mode	Complies
Surge (EN/IEC 61000-4-5)	+/-500V/1kV line-line and line-earth +/-2kV line-earth	Complies
Conducted Immunity (EN/IEC 61000-4-6)	3Vrms 150 kHz to 80 MHz	Complies
Voltage Dips & Interrupts (EN/IEC 61000-4-11)	Per spec	Complies

18.1. Power Supply Specifications

Power supply	Operating Condition	Units
Voltage Range	100-240	Volts AC
Frequency	50/60	Hertz
Current	0.5	Amps

18.2. Environmental Operating Conditions

Environmental Condition	Operating Condition	Units
Altitude	3000 (max)	meters
Operating Temperature	5-40	°C
Relative Humidity	80% for temperatures up to 31C decreasing linearly to 50% at 40C.	
Voltage Range	12	Volts DC
Current	1.5	Amps

Transient overvoltages: Impulse withstand (overvoltage) category II.
Rated pollution degree 2.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

3M Occupational Health and Environmental Safety Division
3M Center
St. Paul, MN 55144-1000
E-A-Rfit™ User Support website: EARfit.3m.com

WARNING

- To avoid the risk of electric shock, which if not avoided could result in serious injury or death:
 - Do not immerse the E-A-Rfit™ Validation System in any liquid.
 - Use indoors only.
 - Disconnect power cord before cleaning.
 - Clean the exterior surface of the speaker with a clean anti-static cloth. Do not attempt to clean the interior components. To clean the microphone tip, remove the microphone tip and insert the microphone cleaning tool to remove any debris inside the tip.
 - There are no user serviceable parts.
 - The E-A-Rfit™ Validation System must be returned to the manufacturer for repair.

CAUTION

- To avoid possible environmental contamination, dispose of the E-A-Rfit™ Validation System according to applicable governmental regulations.
- Since the noise levels are quite loud during the test, you may wish to wear hearing protection yourself while the test signal is on.

Test results, PAR values and hearing protector sufficiency determinations are based upon data entered by the technician and the employee's test results from a given E-A-Rfit testing session.