MADSEN CAPELLLA^2 BY OTOMETRICS

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Disclosures

- I am an employee of Otometrics, a division of Natus

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Learning Objectives

- After this course learners will be able to identify basic hardware and software components of the Capella2.
- After this course learners will be able to explain how to perform diagnostic and screening otoacoustic emissions testing including DP, TE, and spontaneous OAEs using the Capella2.
- After this course learners will be able to explain how to to perform basic troubleshooting and test interpretation using the Capella2.

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Natus + Otometrics + Audiology Systems

- **Natus** – Leading manufacturer of medical devices, software, and service provider for Newborn Care, Neurology, Sleep, Hearing and Balance markets.
- **Otometrics** - Develops, manufactures and markets computer based audiological, otoneurologic & vestibular instrumentation in more than 70 countries globally.

  "The Manufacturer"

- **Audiology Systems** - US partnership of industry professionals, audiologists and local audiology & vestibular experts who work together to distribute products, educate and serve as a resource to our customers

  "The Sales Organization"
  - Account Executives
  - Education and Training
  - Calibration Services
  - Customer Service
  - Product Support

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Product Families – Hearing Assessment

Audiometry

Immittance

Diagnostic OAE

Auditory Evoked Potentials

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PRODUCT INTRODUCTION

Device Overview

Madsen Capella[2*] is a powerful PC-based Otoacoustic Emissions (OAE) system designed to deliver accurate and objective analysis of cochlear function for all ages. Intuitive and easy to use, Madsen Capella[2] provides dynamic features in a modern workflow.

Includes testing for:
- DPOAE (DP Gram & DP I/O)
- TEOAE
- SOAE (add on license)

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PRODUCT INTRODUCTION

Key Selling Points

- Choice of Chirp or In-Situ calibration
- Probe fit before AND after data collection
- PrecisePoints™ frequency selection
- Historical comparisons including probe fit data
- User controlled overlays
- USB plug and play
- Swap Ear Data feature
- User controlled settings and User Tests
- Otosuite Universe

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PRODUCT USE - HARDWARE

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PRODUCT USE

Hardware Overview

What's included:
- DPOAE, DP I/O, and TEOAE
- OAE probe
- OAE test cavity
- Probe holder kit
- Wall mount kit
- USB Cable
- Start up kit (probe tips)
- User manual
- Otosuite software

Optional:
- Additional ear tips
- Additional probes
- SOAE license

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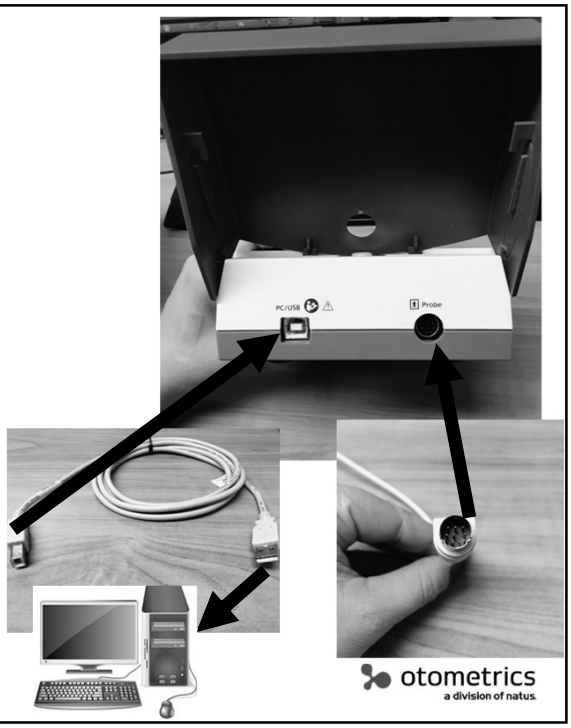
HARDWARE OVERVIEW

The box



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HARDWARE OVERVIEW

Starter kit

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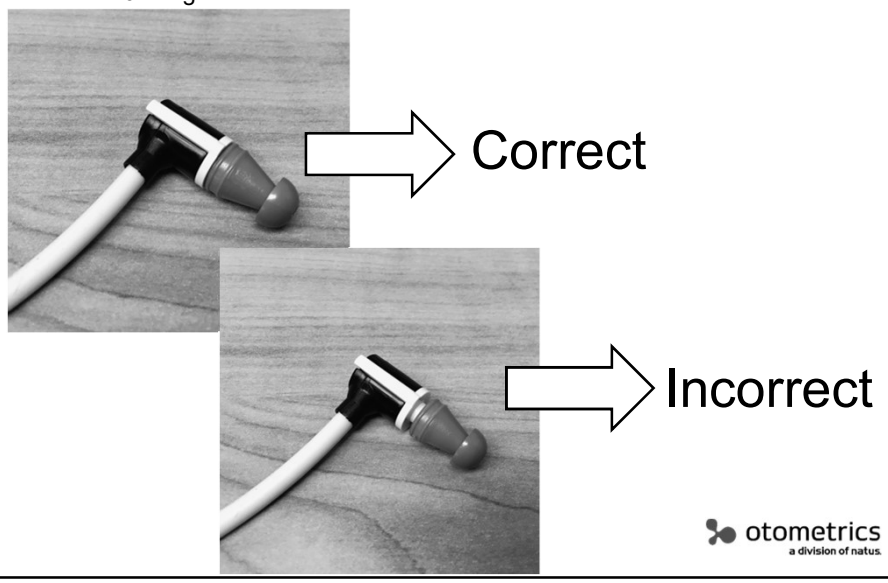
HARDWARE OVERVIEW

Probe tips

10mm green



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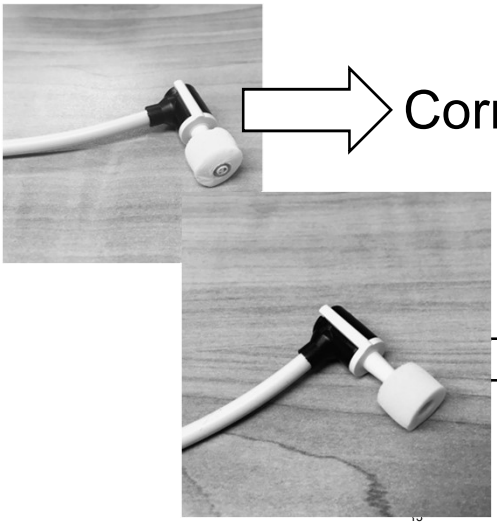
HARDWARE OVERVIEW

Probe tips

14mm foam yellow



Correct

Incorrect

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PRODUCT USE

MADSEN® Capella²

TECHNICAL SPECIFICATIONS

General	
Degree of Mobility	Portable Equipment
Expected Lifetime	5 Years from date of manufacture
Standards	
Safety:	Class I (IEC 60601-1); Type BF (IEC 60601-1); IPXO - Ordinary Equipment (IEC 60601-1)
Operating environment	
Temperature:	+15°C to +35°C (59°F to +95°F)
Relative humidity:	15% to 90% at 40°C non-condensing
Storage environment	
Temperature:	0°C to +50°C (32°F to +122°F)
Relative humidity:	< 95%, non-condensing
Electrical specifications	
Rated Input Current:	0.5 A
Rated Input Voltage:	Nominal: +5 V DC; Acceptable range: 4.30 V to 5.50 V
PC power supply	
The PC that Capella² is connected to should have a grounded power supply	
Technical specifications - ER-10D Probe	
Connector	8-Pin mini DIN
Cable Length	6 feet (1.83 meters)
Net Weight	3.6 oz. (100 grams) approx.
Maximum Output	109 dB SPL - 64 dB SPL (frequency dependent) measured in Zwislocki coupler
Technical specifications - OAE System	
The OAE amplifier, inside Capella², contains the low-pass filters, high-pass filters and gain settings used to acquire otoacoustic emission recordings from an ER-10D OAE probe, for OTOsuite.	
Accessories	
ER-10D OAE Probe, USB cable , Wall Mount Kit (optional). **Disposable accessories**: MADSEN Capella² Starter Kit, ER-10D OAE Probe Tips, Probe cleaning tool, Plastic eartips, Foam eartips.	
System requirements	
For system requirements, please refer to the OTOsuite data sheet.	

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PRODUCT USE - SOFTWARE

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PRODUCT USE

Using the Capella^2

Enter Otosuite software

- Shown via Noah

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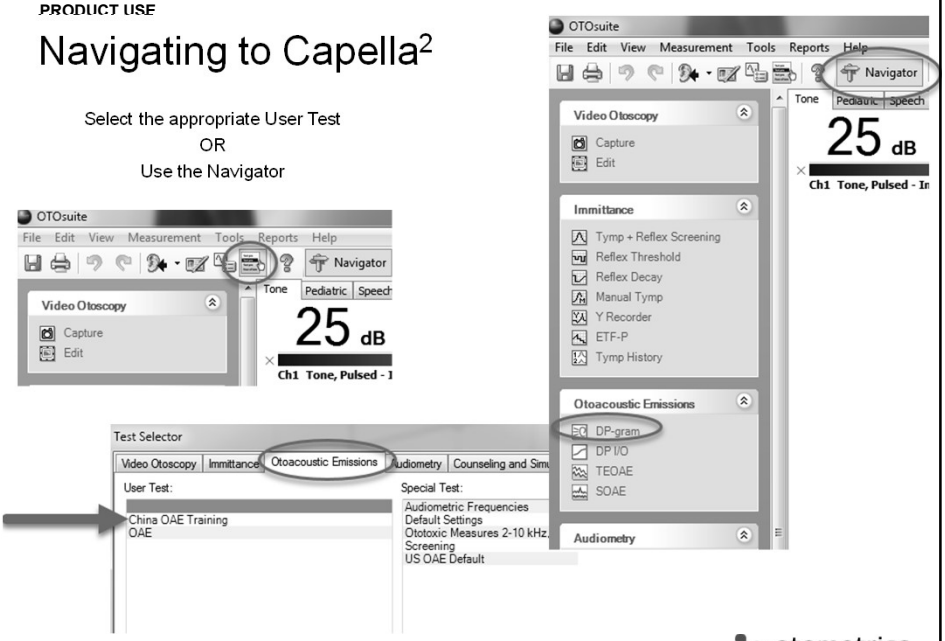
PRODUCT USE

Navigating to Capella^2

Select the appropriate User Test
OR
Use the Navigator



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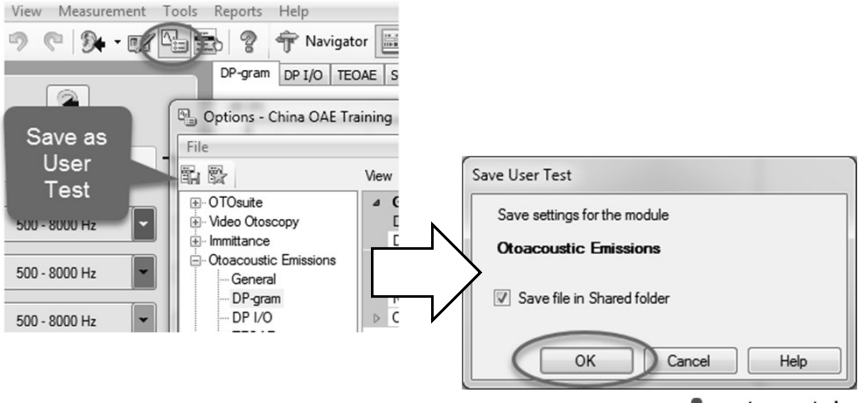
PRODUCT USE

Saving a User Test

Tools → Options
OR
Click the icon in the toolbar



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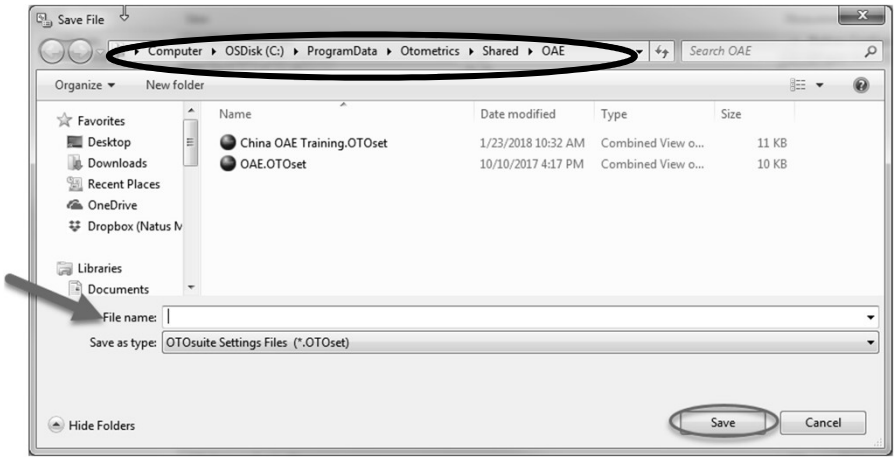
PRODUCT USE

Saving a User Test

Name the User Test, or select a User Test to overwrite

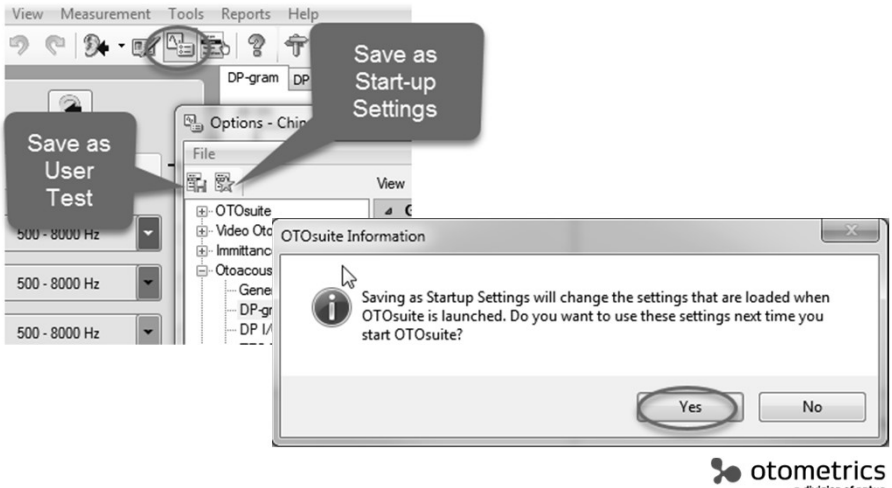
- Think of using User Tests as being similar to saving a Word document



PRODUCT USE

Saving Start-up Settings

Start-up Settings: the test module that Otosuite will launch to when opened



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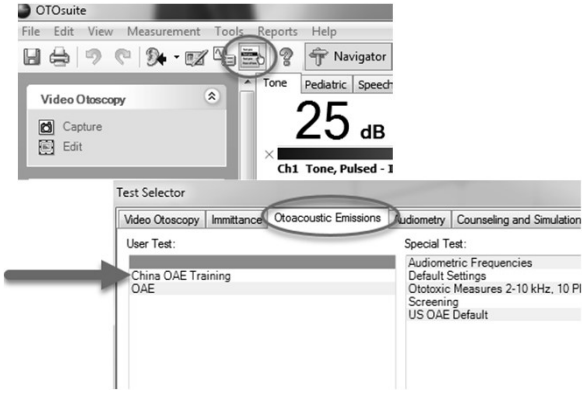
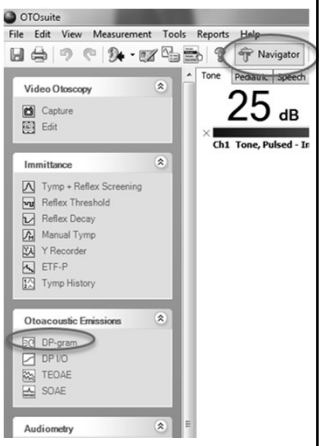
PRODUCT USE

Navigating to Capella^2

Select the appropriate User Test
OR
Use the Navigator





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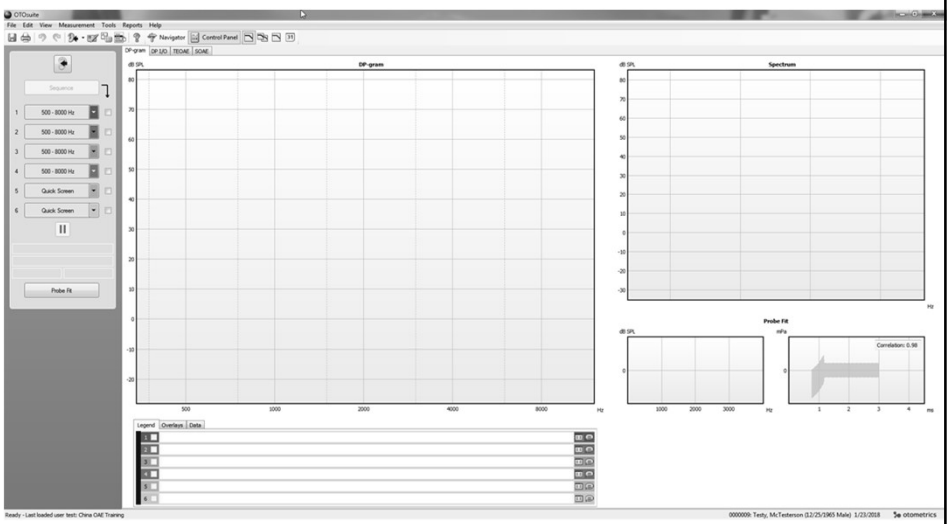
PRODUCT USE

DPOAE Testing - screen layout



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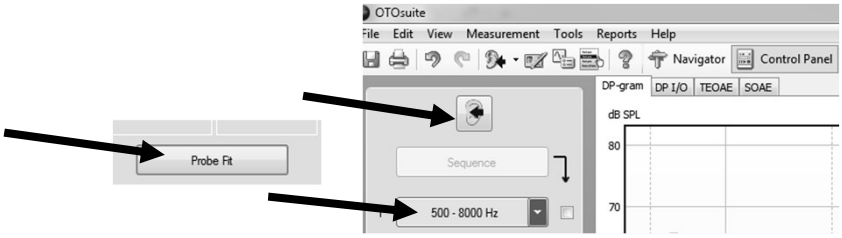
PRODUCT USE

DPOAE Testing - protocol

1) Preform otoscopy to ensure ear canal is clear/note any anatomical abnormalities
2) Select appropriate size tip
3) Insert probe into ear
4) Select ear to test
5) Preform Probe Fit
6) Run selected protocol by clicking the appropriate gray button to start the test
7) Test will automatically stop when completed



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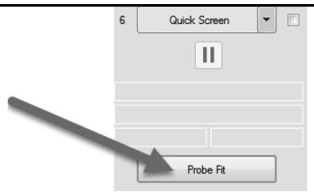
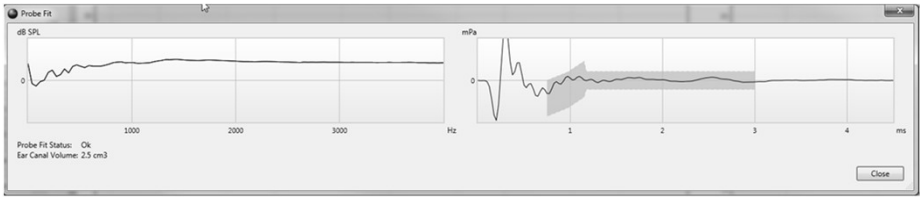
PRODUCT USE

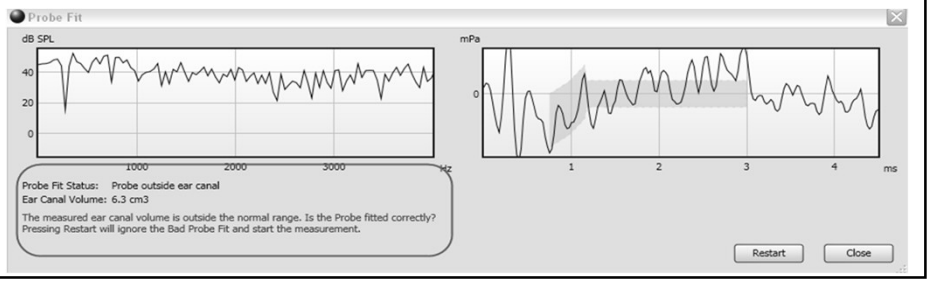
DPOAE Testing – Probe Fit



Good Probe Fit

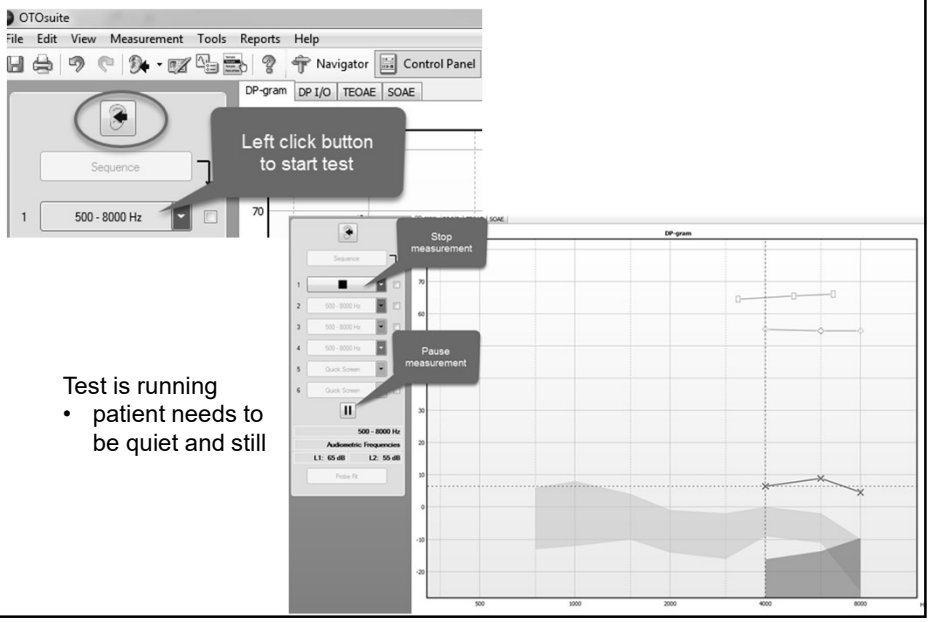


Poor Probe Fit



PRODUCT USE

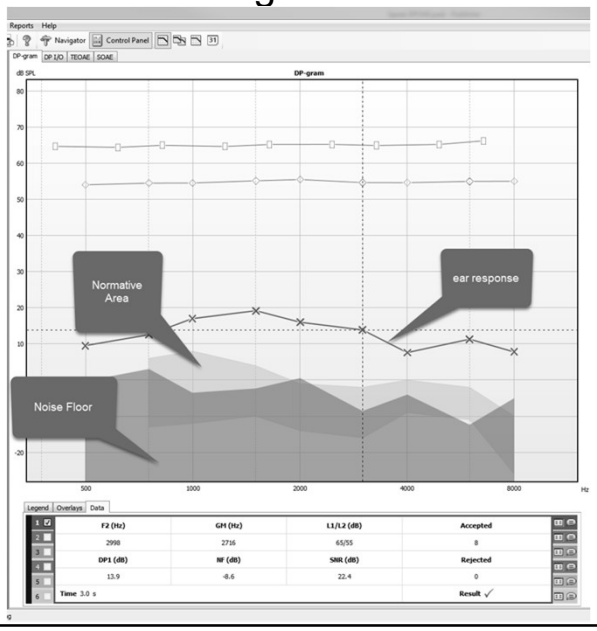
DPOAE Testing – preforming the test



Test is running
- patient needs to be quiet and still

PRODUCT USE

DPOAE Testing - results



But “normative area” isn’t what you might think…

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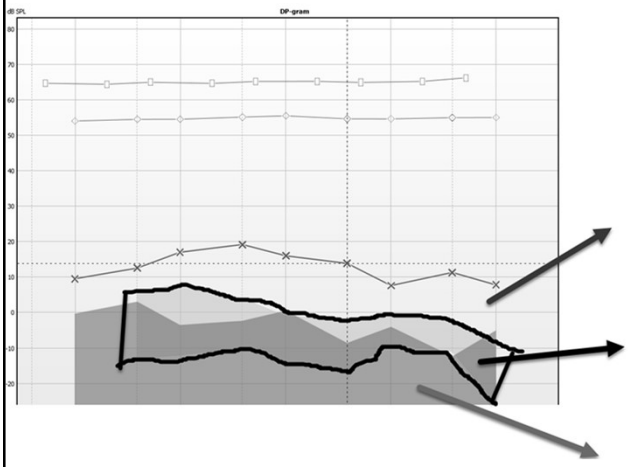
PRODUCT USE

DPOAE Testing – normative area

- OAEs are typically considered “present” if it is 3-6 dB above the noise floor
- *However, you also need to consider the age related normative data published in the literature (grey shaded region)*



Results in this area are consistent with normal OHC function and normal audiometric thresholds at a 95% confidence level

Results in the grey normative area are inconclusive

Results located within the noise floor (purple) are consistent with hearing loss at a 95% confidence level

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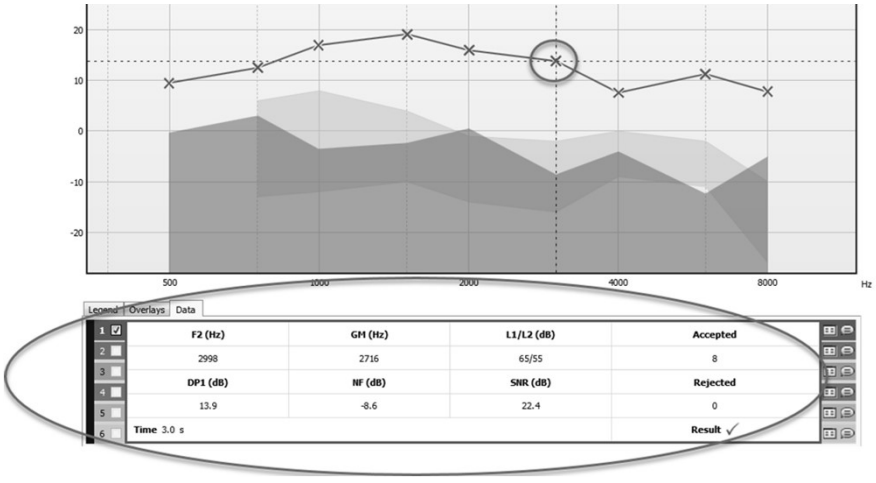
PRODUCT USE

DPOAE Testing - results



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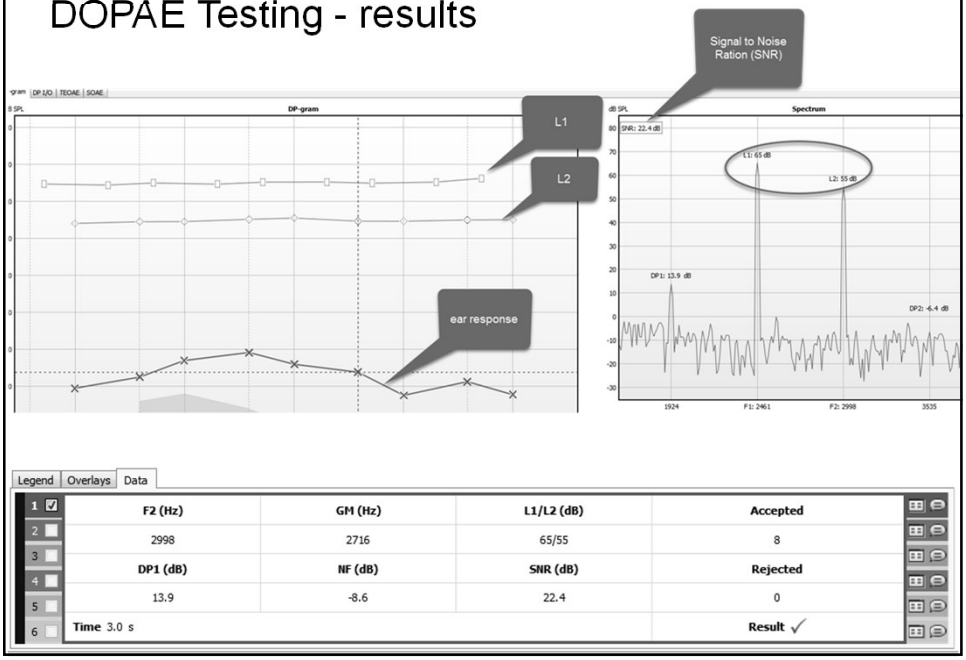
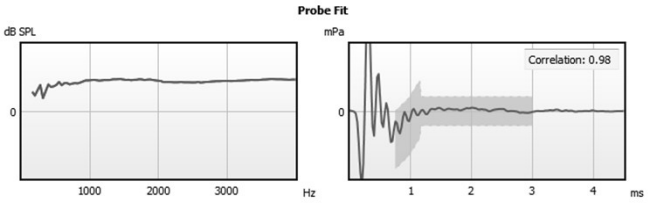
PRODUCT USE

DOPAE Testing - results



PRODUCT USE

DPOAE Testing – Probe Fit



Correlation

- The correlation between the initial probe fit measurement and the final probe fit measurement

Frequency

- Monitors frequency of the probe fit

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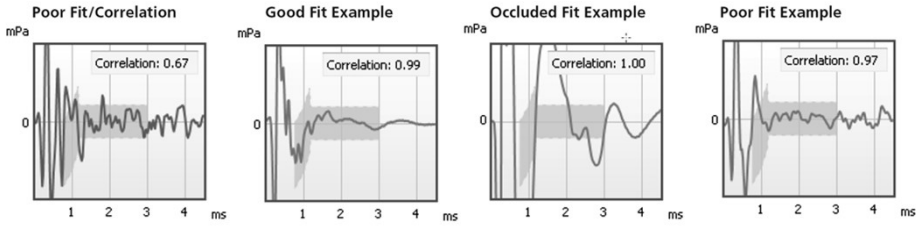
PRODUCT USE

DPOAE Testing - Probe Fit

Good probe fit correlation vs bad probe fit correlation

- High correlation does not mean a good fit
- The higher the correlation number, the more consistent the probe placement was during testing



Always ask:

1) Are these results due to poor probe fit?
2) Are the L1/L2 levels off because of poor probe fit?
3) Did the DP amplitudes really change or is it a result of inconsistent probe fittings?

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PRODUCT USE

Calibration Methods

Many systems utilize a broadband "chirp" prior to testing

- Very fast but makes assumption that broadband chirp covers most test frequencies
  - Reduced accuracy for the high frequencies
- Calibration occurs once prior to data collection and assumes no or little movement of probe

Other systems utilize an "in situ" method

- Utilizes single tone or sweep of tones and sets level prior to data collection
- Calibration occurs once prior to data collection and assumes no or little movement of probe
- Time consuming method

Optimized "InSitu" method

- Utilizes the 2 primary test frequencies to calibrate then collects data for that pair
- Accounts for probe movement as well as accurate calibration
- Hybrid method– faster and more accurate than original "in situ" method

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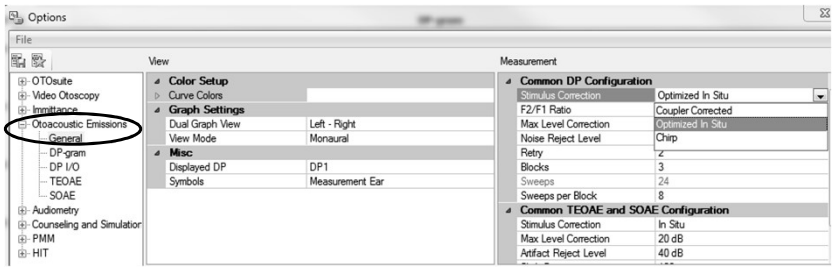
PRODUCT USE

Calibration Methods

Why Do We Care About Calibration?

- An otoacoustic emission is a very minimal response
- Measured in a sealed ear canal helps to reduce ambient noise but may not remain sealed
- Sealed volume will vary by person and by changes in probe placement
- Ear canal and TM impedance vary by individual
- Calibration ensures proper target signal levels by adjusting device voltage
- Improper or inadequate calibration will effect test results
  - Changes in amplitude



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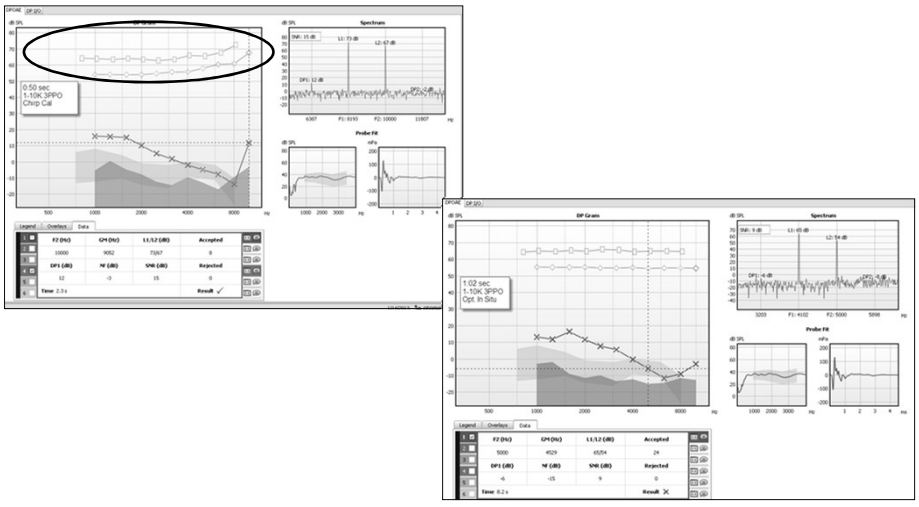
PRODUCT USE

Broadband Chirp vs. Optimized In Situ



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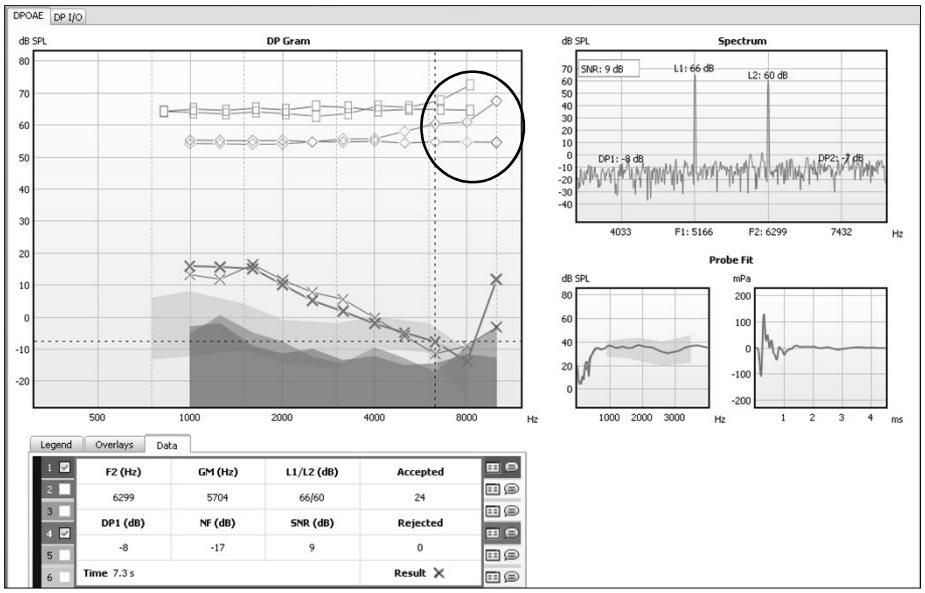
PRODUCT USE

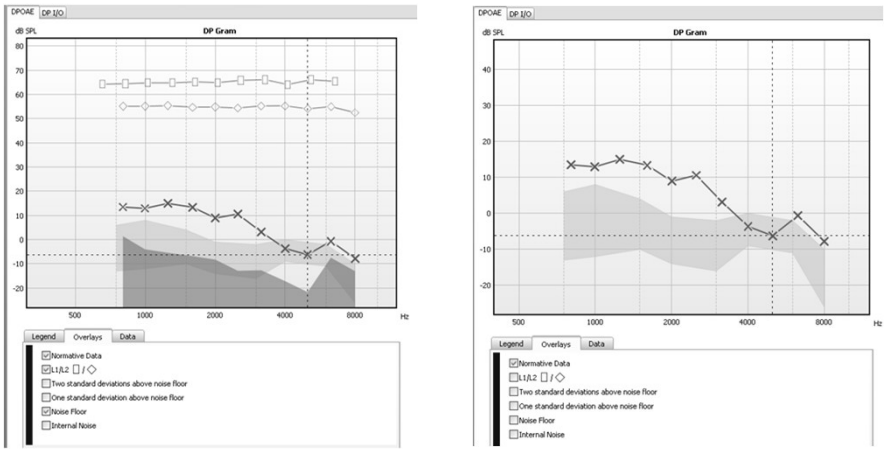
Broadband Chirp vs. Optimized In Situ



PRODUCT USE

Other Features - overlays

More or Less



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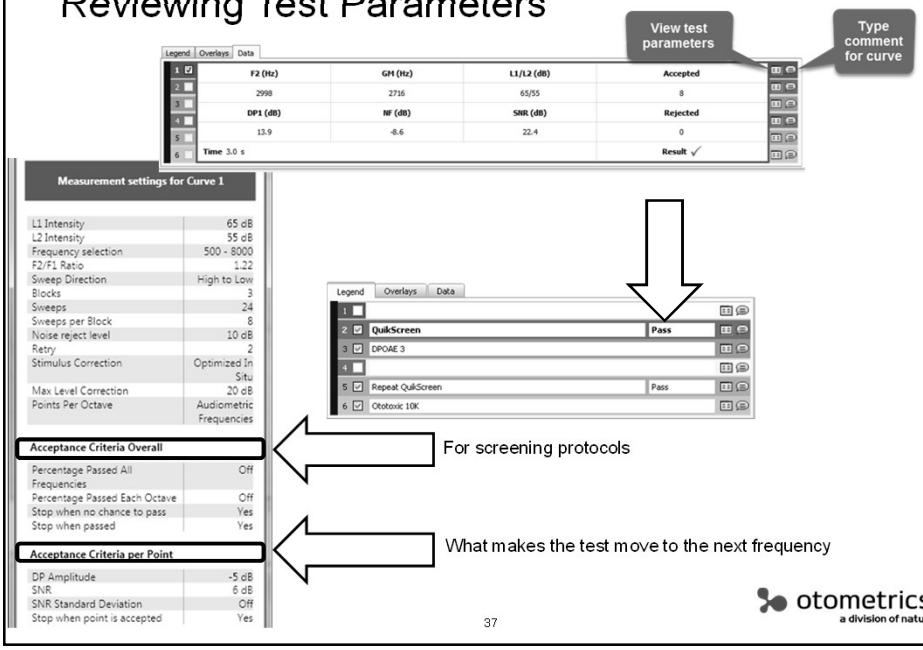
PRODUCT USE

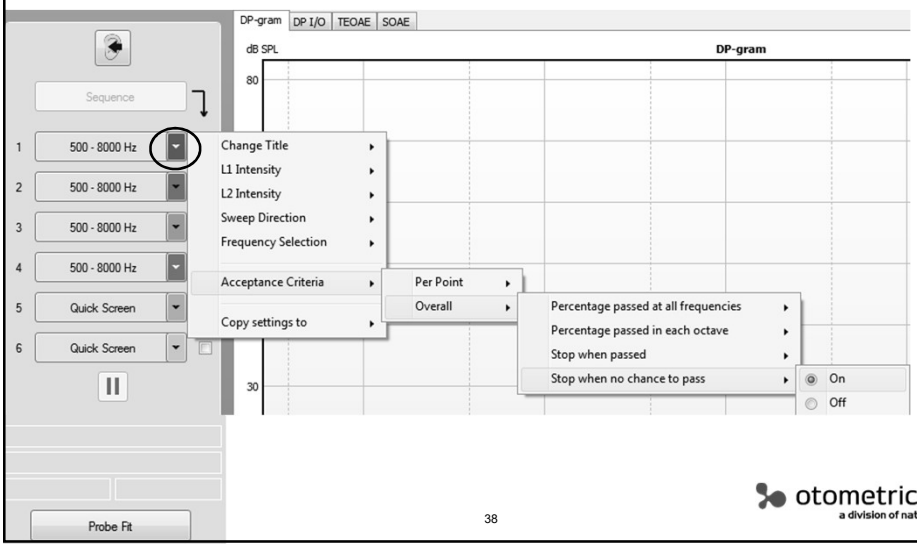
Reviewing Test Parameters



PRODUCT USE

Other Features - changing test options

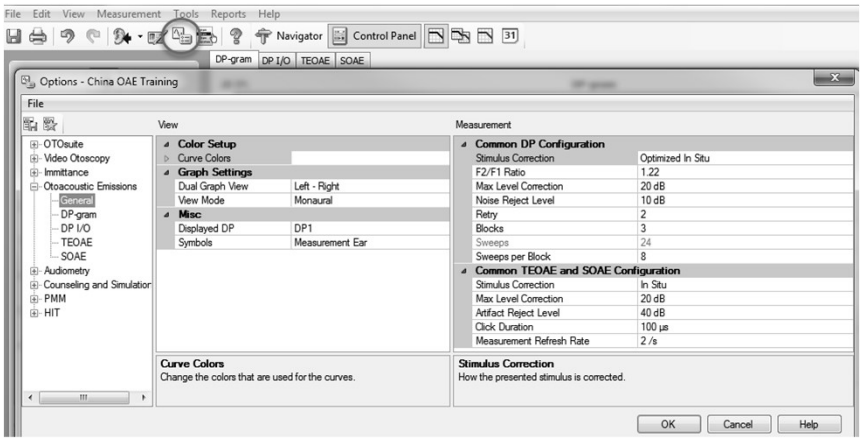
Click the test drop down arrow for that test OR go to Tools → Options



PRODUCT USE

Other Features – changing test options

Tools → Options OR click the Set Options icon in the toolbar



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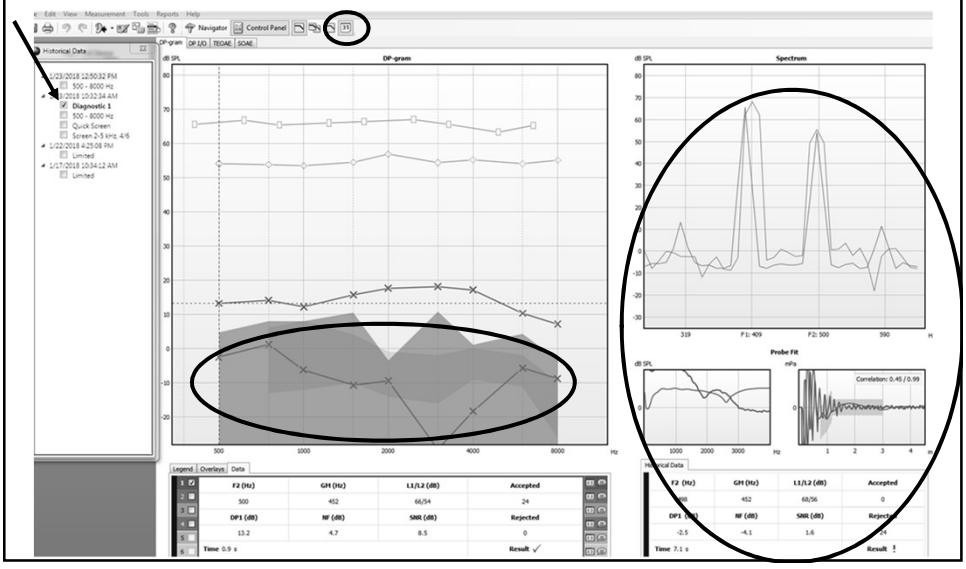
PRODUCT USE

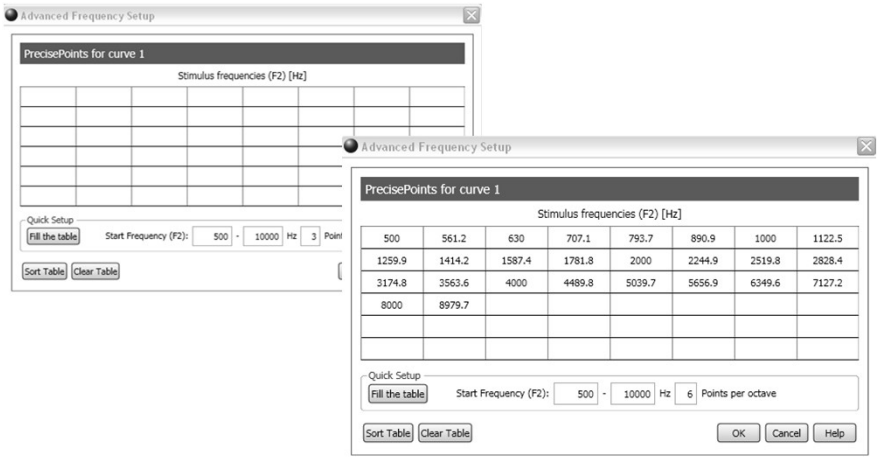
Other Features – Historical Data

See past data when integrated with a patient data-base system



PRODUCT USE

Other Features - PrecisePoints



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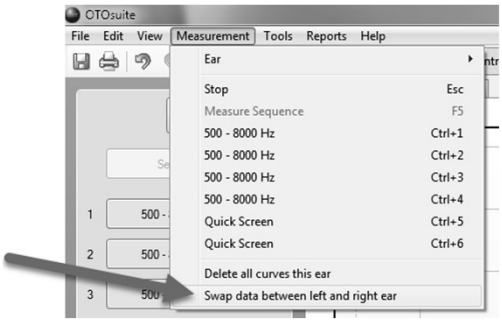
PRODUCT USE

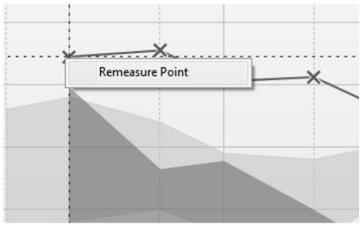
Other Features

Swapping ear data



Re-measure one point only:

- right click on the point you wish to test again



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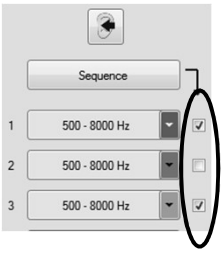
PRODUCT USE

Miscellaneous

- Touch screen ready control panel
- Easy viewing of data—see table, see spectrum, see graph
- Check box to right of test button for sequencing of test measurements
- USB powered
- Plug and Play
- F1 key on PC keyboard takes customer to related content in User Manual



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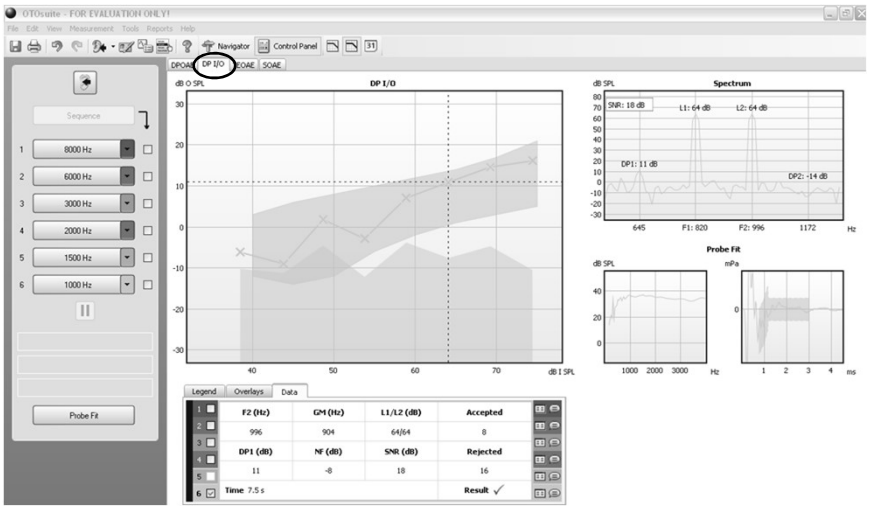
PRODUCT USE

DP/IO



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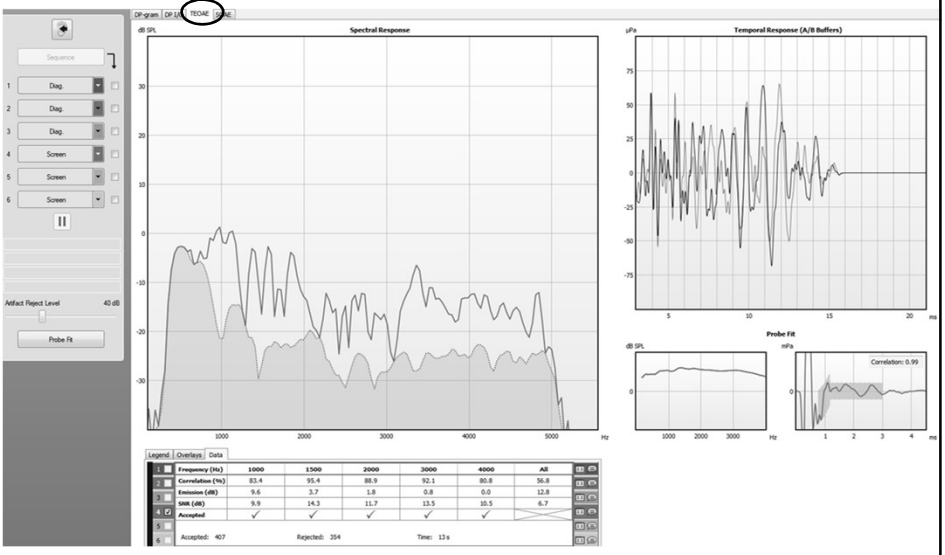
PRODUCT USE

TEOAE



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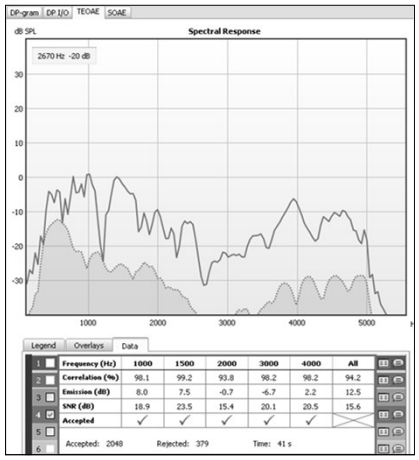
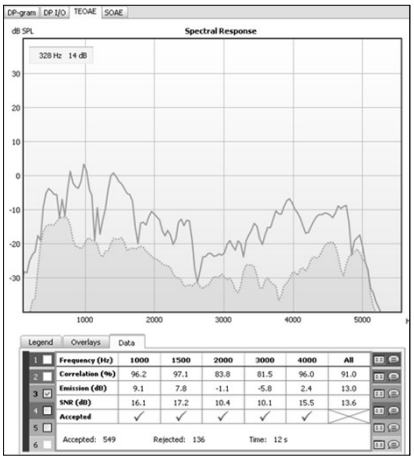
PRODUCT USE

TEOAE





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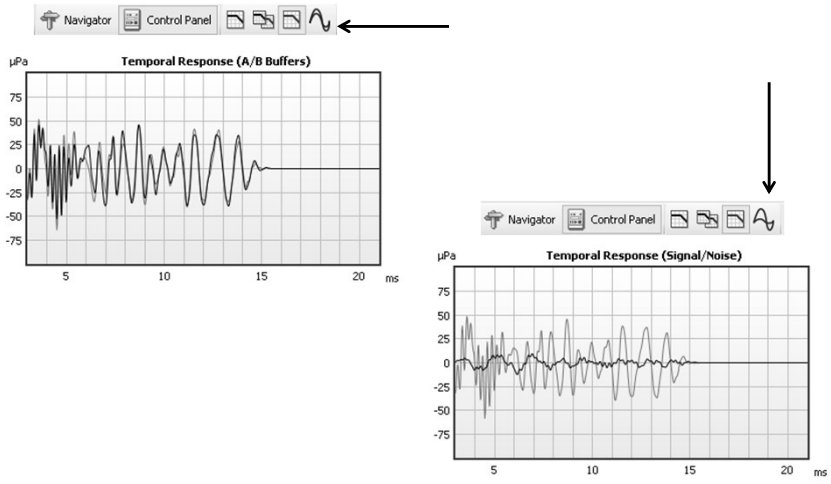
PRODUCT USE

TEOAE – temporal response



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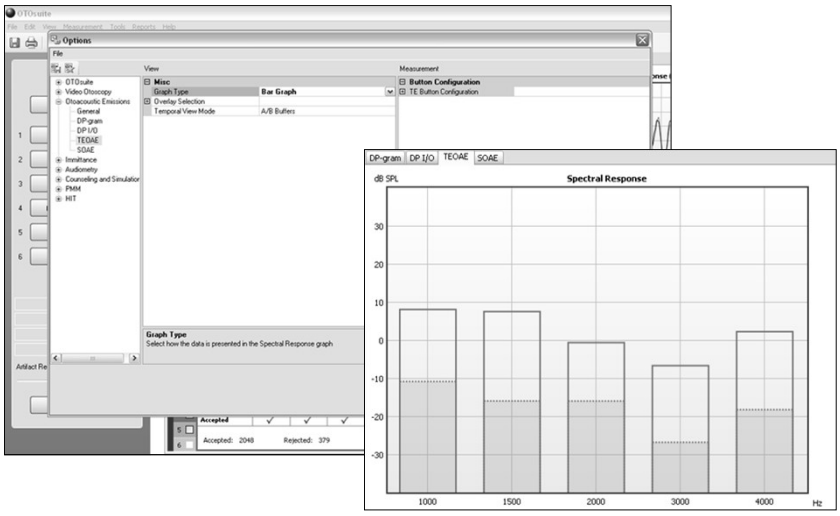
PRODUCT USE

TEOAE – display option



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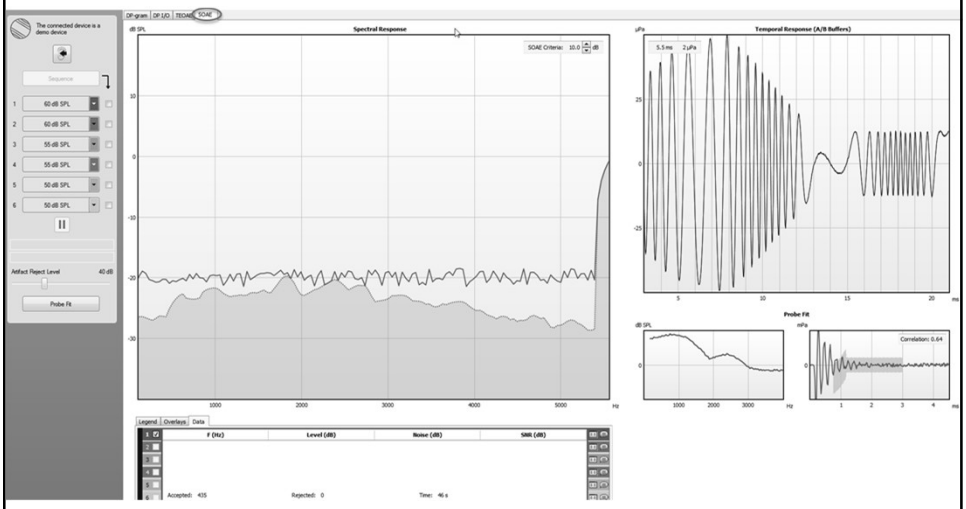
PRODUCT USE

SOAE



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TRAINING THE CUSTOMER

OAE Clinical Considerations in the Adult Population

Benefits

- Objective testing that may be helpful in questionable cases (unable to cooperate, refuse to cooperate, differential diagnosis)
- Fast and repeatable results
  - Could be used as a hearing screening tool in elderly
- Monitor ototoxic agent effects
- Monitor noise-induced hearing loss
- Role in counseling tinnitus patients
- Monitor sudden hearing loss
- Research prognosis

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TRAINING THE CUSTOMER

OAE Clinical Considerations in the Adult Population

Limitations

- OAEs may not be present in individuals with hearing losses > 30 dB HL at given frequency
- OAEs may be absent with middle ear disease
- OAEs are not hearing thresholds
- Noise floor limitations

TRAINING THE CUSTOMER

OAE Clinical Considerations in the Pediatric Population

Benefits

- Good for difficult to test populations
- Assisting in differential diagnoses
  - Auditory Processing Disorders (APD)
  - Auditory Neuropathy Spectrum Disorder (ANSD)

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OAE Clinical Considerations in the Pediatric Population

Limitations in addition to what is seen for adults…

- Patient needs to be corporative

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TRAINING THE CUSTOMER

Pros vs Cons of OAE testing

PROS	CONS
Highly sensitive to cochlear changes	Affected by middle ear status
Does not require a response from the patient	Susceptible to noise
Ear specific	Only provides information about outer hair cell function
Does not require a sound room	Not present when hearing levels are worse that 40 dB HL
Highly frequency specific	Not a measure of neural function
Fast & efficient	Not a true measure of hearing
Provides valuable information to the cross check principle	

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TROUBLESHOOTING

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TROUBLESHOOTING

Common OAE Complaints

- High noise floor
- Audiogram and OAE results do not match
- Every patient is failing
- Unit intermittently disconnects when testing
- Can't find how to print a report
- High ear canal volumes
- Probe fails probe check in cavity

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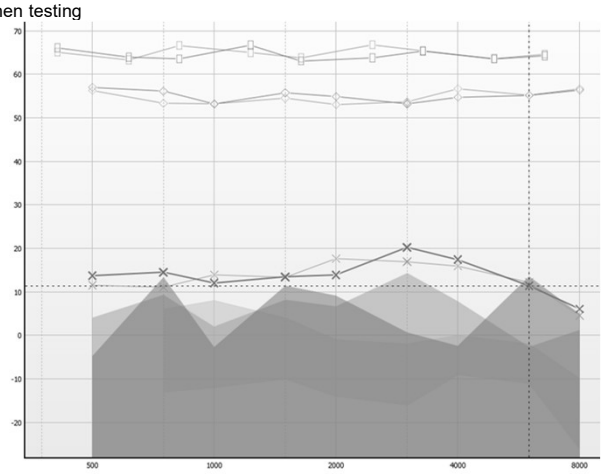
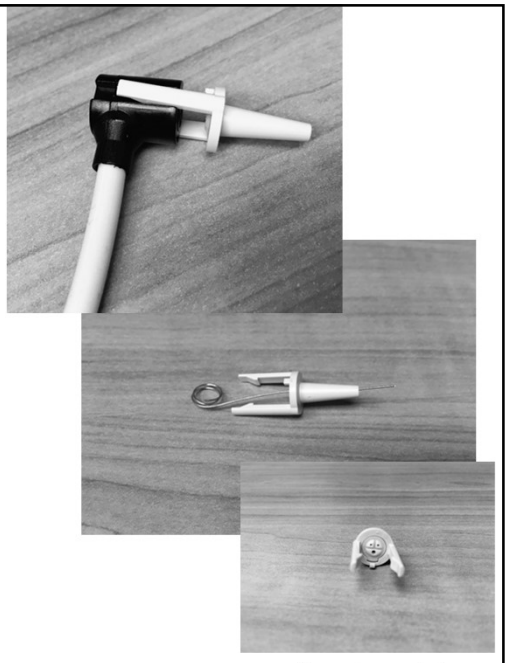


HARDWARE OVERVIEW

Cleaning/changing the probe tip



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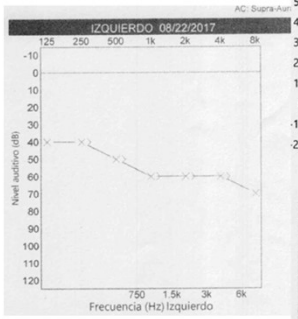

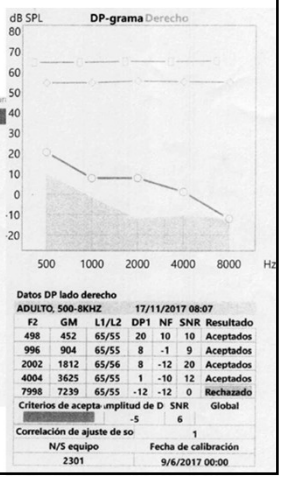

Datos DP lado derecho

ADULTO, 500-8KHZ 17/11/2017 08:07

F2	GM	L1/L2	DP1	NF	SNR	Resultado
498	452	65/55	20	10	10	Aceptados
996	904	65/55	8	-1	9	Aceptados
2002	1812	65/56	8	-12	20	Aceptados
4004	3625	65/55	1	-10	12	Aceptados
7998	7239	65/55	-12	-12	0	Rechazado

Criterios de acepta	amplitud de D	SNR	Global
	-5	6	

Correlación de ajuste de so	1
N/S equipo	Fecha de calibración
2301	9/6/2017 00:00

TROUBLESHOOTING

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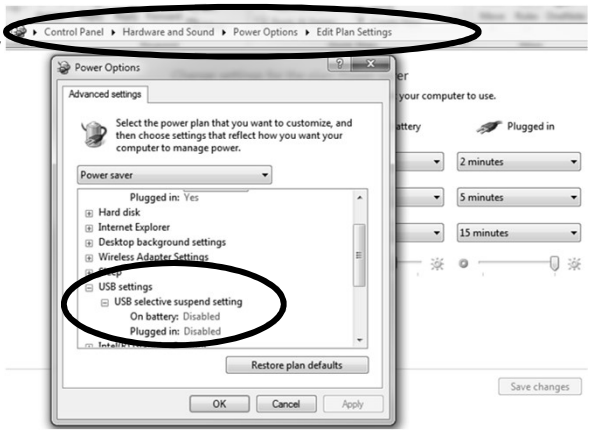

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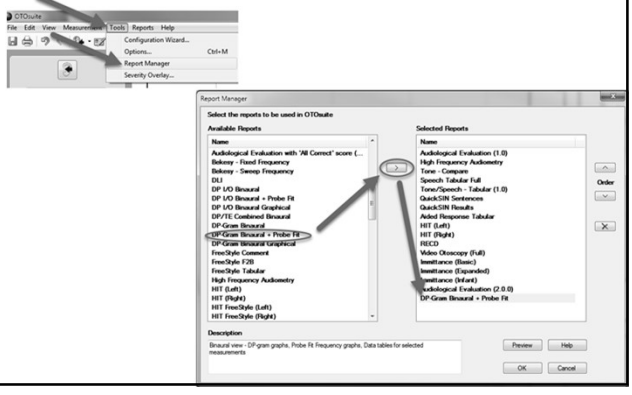
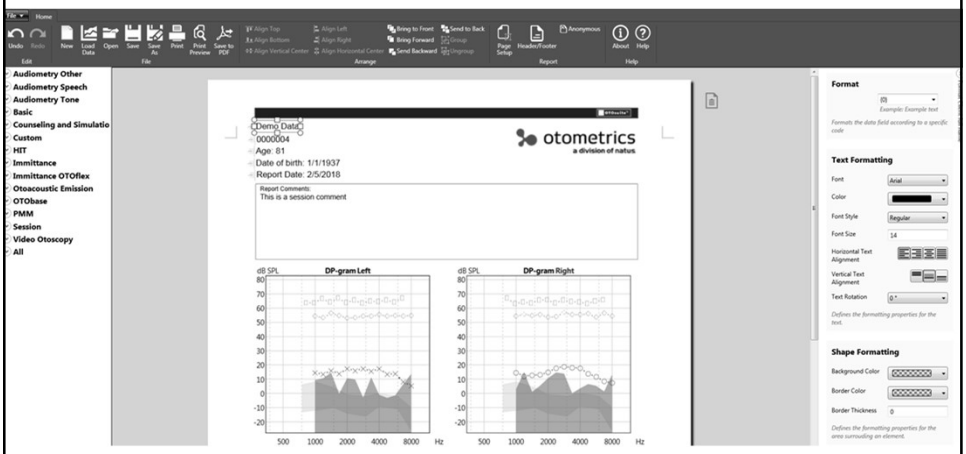


TROUBLESHOOTING

Otosuite REPORTS

You can now also make customized reports in Otosuite REPORTS



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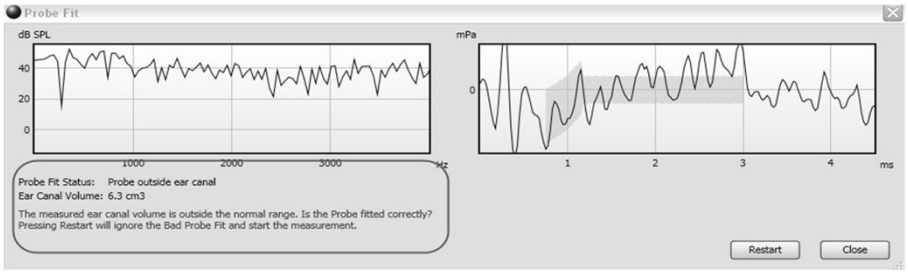

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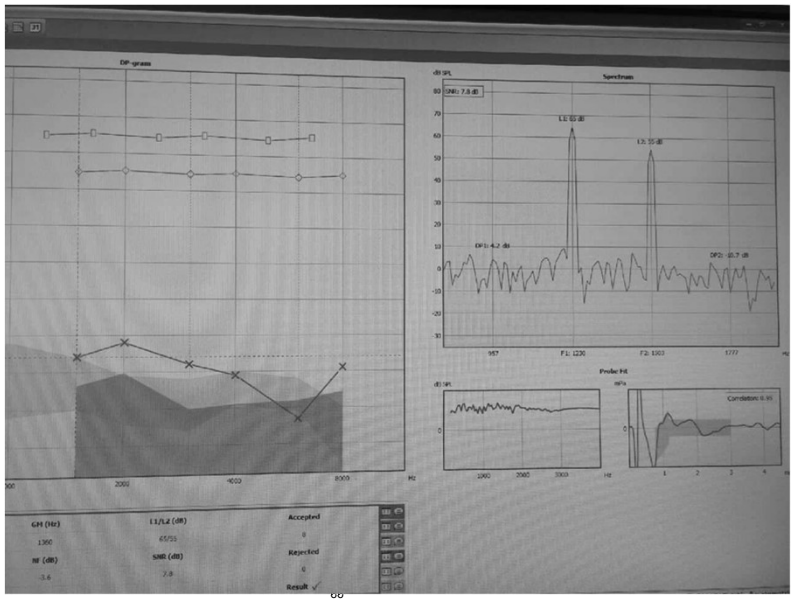
TROUBLESHOOTING

Example #1



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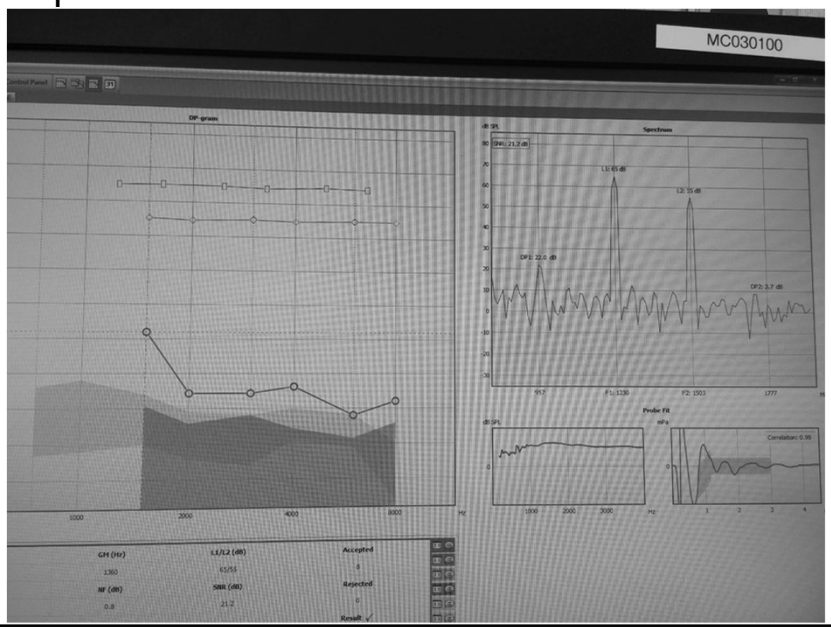
TROUBLESHOOTING

Example #2



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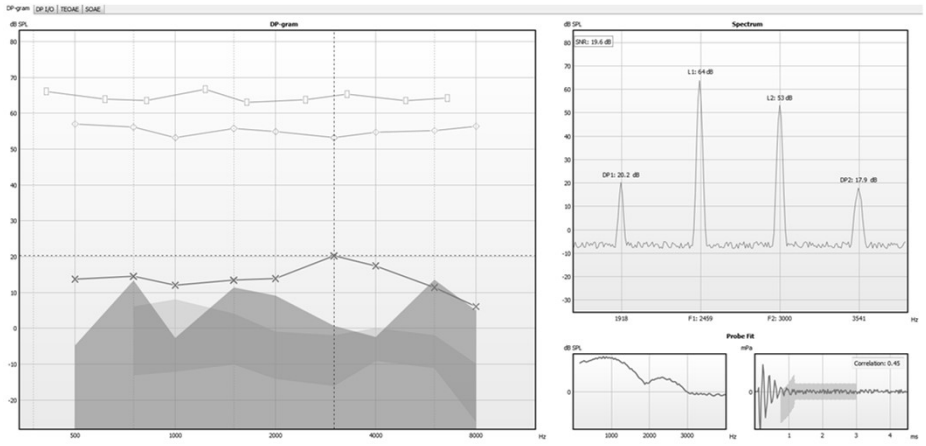
Example #3



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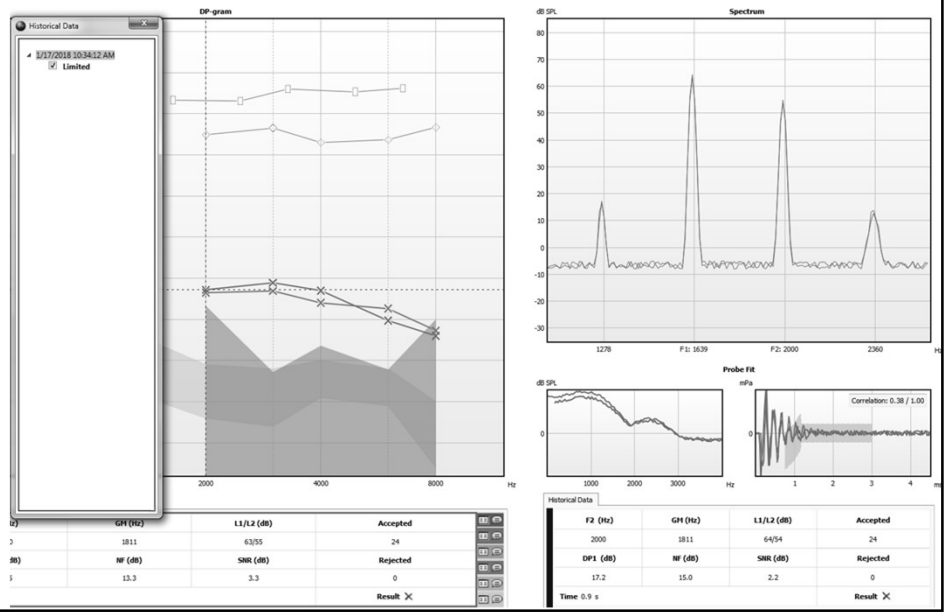
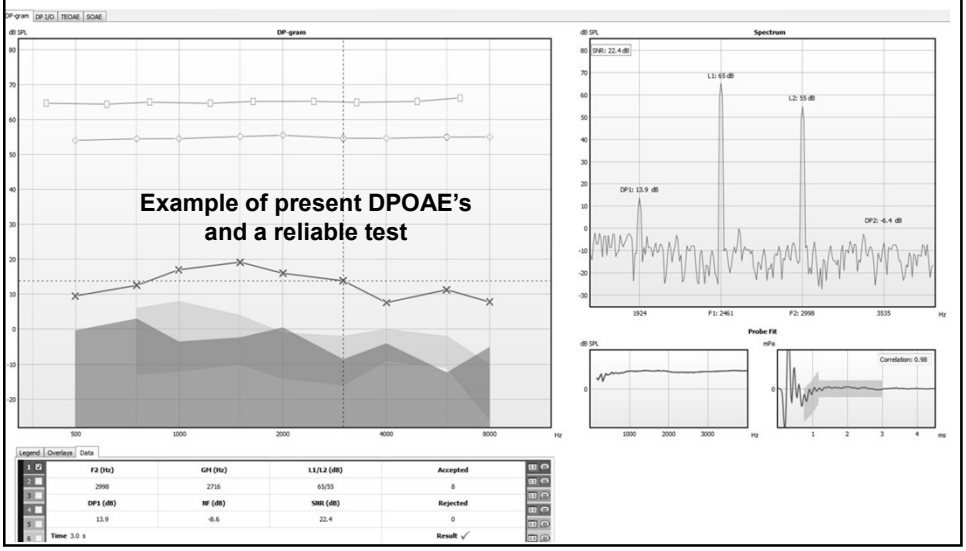
TROUBLESHOOTING

Example #4



TROUBLESHOOTING

Example #5



Thank you!

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