Duet

Evoked Potentials and Otoacoustic Emissions in perfect harmony

INTELLIGENT HEARING SYSTEMS

many options, one **smart** system

the clinical solution you've been waiting for

We've listened to you and have integrated your feedback into a powerful platform for EP and OAE. We are excited to introduce the Duet: a sleek, portable, and versatile clinical evoked potential and otoacoustic emissions system.

stellar performance

Over 30 years of engineering design experience, combined with unsurpassed expertise in evoked responses, have culminated in the **next generation bio-amplifier** to bring you **superior data quality** for evoked potentials and otoacoustic emissions.

Repeatable, reliable data you can count on

- High definition responses
- Cleaner, more robust responses
- Increased signal-to-noise ratio (SNR)
- Lower residual noise

Reduced test times without compromising data quality

dressed up for performance

The newest member of the Universal Smart Box family, the Duet's sleek design is both ergonomic and portable.

- It is lightweight, at less than 4 lbs (2 kg)
- Fits perfectly under a 15 inch notebook PC
- Maximize your workspace by using it with its companion stand
- Built-in isolation and shielding: it can be used in any location, including the NICU and OR

Test in more places without sacrificing flexibility

ready for the clinic

The Duet is available in two base packages: Duet 2 Channel AEP, or Duet 2 Channel AEP & OAE. Choose from a variety of add-on modules for the ultimate in flexibility and versatility. Upgrade anytime with minimal or no down time.

Standard SmartEP modules:

- ECochG
- ABR (click, tone burst, iChirp)
- MLR
- LLR/CAEP

Optional SmartEP modules:

- P300/MMN
- eABR
- Chained-Stimuli ABR
- cVEMP, oVEMP *
- ASSR

Standard SmartOAE modules:

- DPOAE
- TEOAE
- SOAE

flexible enough for research needs

Advanced options for SmartEP:

- CLAD for high-rate stimulation
- Notched Noise Masking
- Advanced Auditory Research Module
- Complex ABR
- Frequency Following Response
- Acoustic Change Complex
- CHIRP Stimulus Generation Module
- USB Development Kit

Advanced options for SmartOAE:

- Contralateral, ipsilateral, and binaural TEOAE suppression
- Dual OAE probe system
- HF DPOAE for ototoxicity monitoring

designed for an improved clinical experience

SmartEP

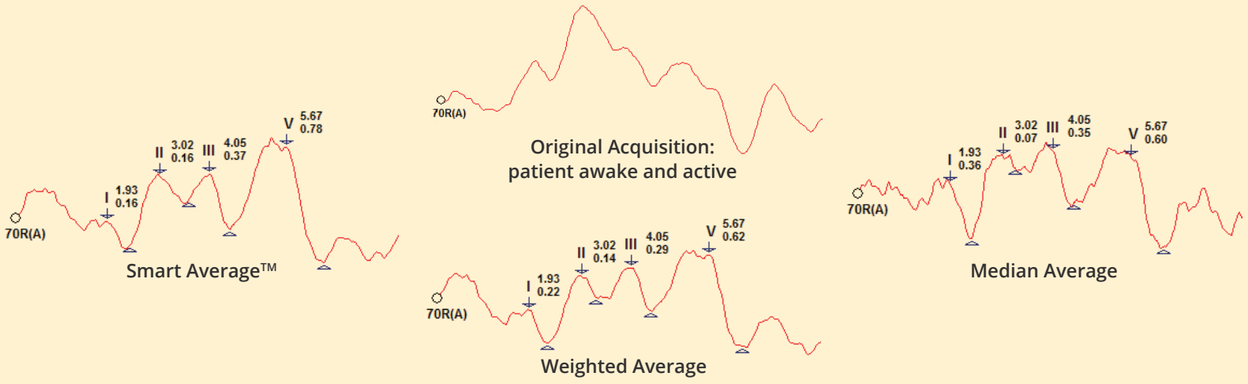
The ideal clinical tool for recording ECochG, ABR, and more.

new and improved user interface simplifies acquisition

- Easy main screen access to test settings
- Quickly load your own or preset protocols
- Automated impedance checking and on-screen display
- New EEG display option for easy viewing of the patient state during testing
- Great variety of options allow you to perform the tests the way you want them
- Automatically arrange recordings by intensity, acquisition order, or rate
- On-screen recording information

smarter averaging display options

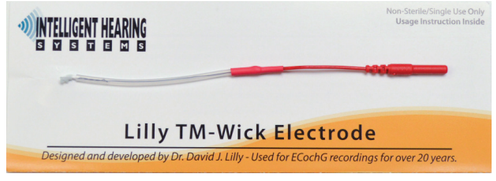
- Option to automatically acquire and store data in sweep blocks for more powerful processing
- Easily analyze acquired waveforms using additional averaging techniques for further noise reduction
- Averaging techniques includes traditional linear, median, and weighted



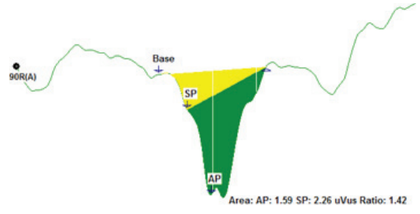
- Objective response measurements provide indicators of recording quality
- Automated averaging stopping rules using residual noise measures allow data to be acquired automatically with consistent quality and noise levels

the perfect duet for electrocochleography

Our next generation amplifiers combined with the non-invasive IHS Lilly TM-Wick Electrodes produce more robust and repeatable ECochGs.



Improved SP/AP amplitude and area curve ratio analysis and automatic calculation.



smart features

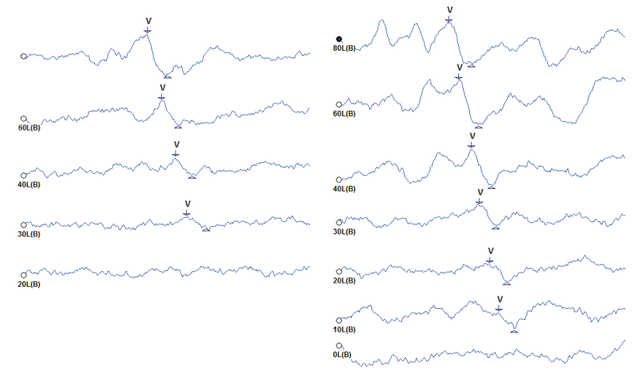
- Change most test parameters with a single click
- Set your own display scale
- Easily mark waveforms using over thirty pre-defined peak labels, or create your own custom labels
- View latency and amplitude of peaks directly on the waveform
- Latency-Intensity graphs indicating normative data ranges are automatically generated from marked waveforms
- Quickly add, subtract, invert, time shift, or cross-correlate recordings
- Split-sweep view to visualize single recording repeatability
- Multi-page display and reports
- Easy PDF report generation
- Auto-save reports on program exit
- Choose from a variety of stimuli, or generate or import your own custom stimuli

iChirp™ stimuli included

The intelligent Chirp for SmartEP and SmartEP-ASSR is included in the base package.

- Broadband and narrowband (500, 1000, 2000, 4000 Hz)
- Improved threshold detection
- Robust amplitude responses
- Optimized wave V identification
- Optional, innovative custom chirp design utility

Beneficial for recording ABR in awake and active patients.

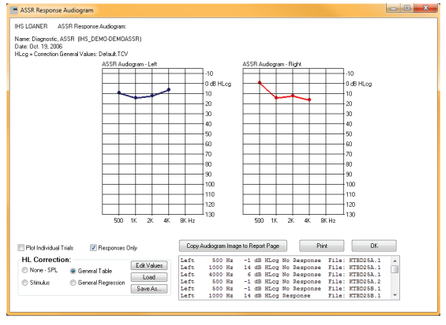


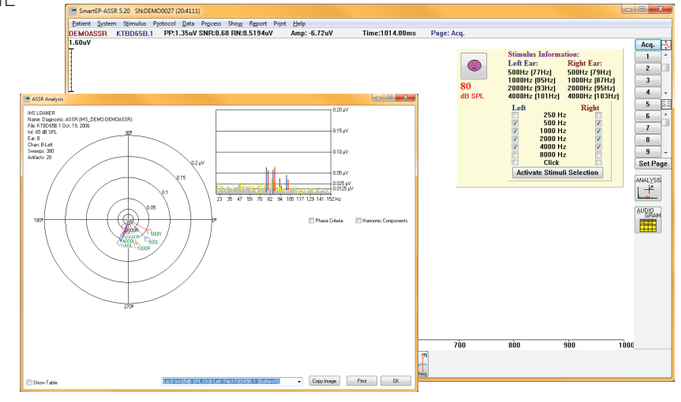
2000 Hz tone burst ABR (left) vs 2000 Hz iChirp ABR (right)

SmartEP-ASSR

Full-featured screening and diagnostic Auditory Steady State Response System.

- Provides quick, accurate threshold detection using automated statistical analysis
- Test both ears at the same time, four frequencies per ear
- iChirp (broadband & frequency specific) for robust amplitudes and harmonic component analysis for improved threshold detection and reduced test times
- Automated audiogram generation in SPL and HL
- Cost effective add-on to SmartEP

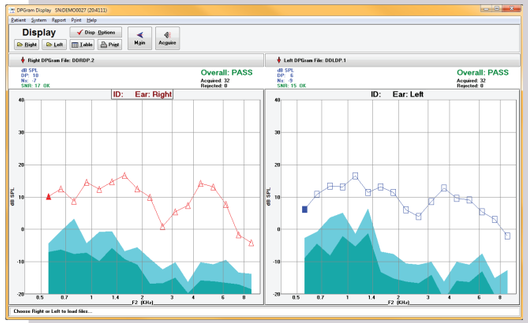


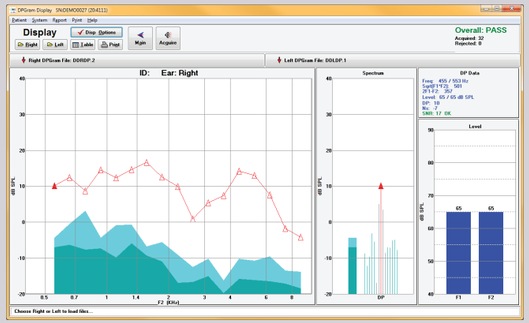


SmartDPOAE

Screening and diagnostic distortion product otoacoustic emissions.

- Fast and easy setup with up to 41 frequencies per ear in a single test
- Automatic probe-fit check and in-ear calibration for increased accuracy
- Easy-to-interpret colorful DPGrams and detailed information for each frequency tested
- Clear Pass or Refer indications based on user-selected passing criteria
- User-customizable display of normative ranges on the DPGram facilitates response analysis
- High frequency option for ototoxicity monitoring
- Built-in scripting feature allows you to define sequences of frequencies and intensities for automated data collection
- Optional graphical display of noise standard deviation for improved interpretation

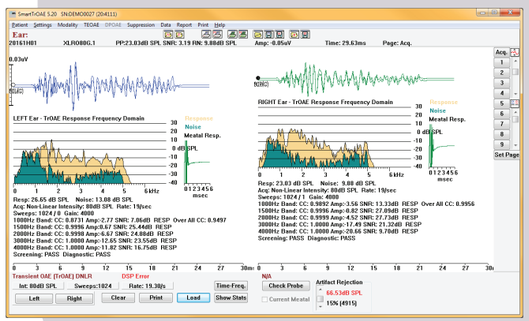




SmartTrOAE

Screening and diagnostic transient evoked and spontaneous otoacoustic emissions.

- Fast and easy test setup and data analysis
- Automatic probe-fit check and in-ear calibration
- Clear Pass or Refer indications based on user-selected passing criteria
- Displays of the OAE time signal, frequency analysis and the ear canal response
- Use clicks, tones, or user-defined stimulus files
- Time-Frequency plots can be used to illustrate how the frequency composition of transient OAE responses, Noise, and SNR change over time



Available in the Duet is a dual-probe option that allows for the acquisition of contralateral, ipsilateral, and binaural TEOAE suppression recordings.

This option includes a Suppression Analysis module for temporal and spectral comparison of control and suppression data.

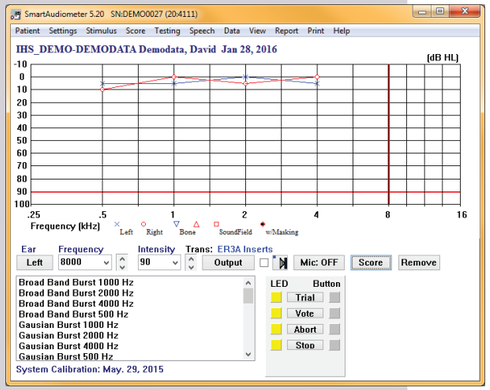
complement your Duet

Expand your capabilities by adding either of the following audiometry options to your Duet.

Smart Audiometer

PC-based screening audiometer.

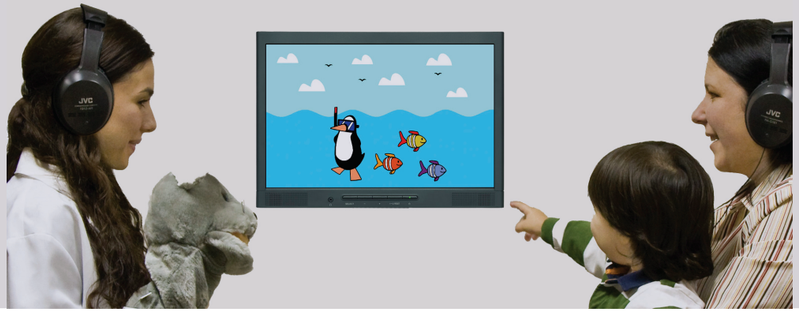
- Automatic generation of pure tones from 250 Hz to 16 kHz, depending on stimulator used
- Includes a wide array of stimulus files at 500, 1000, 2000, and 4000 Hz: warble tone, narrowband burst, small band burst, broadband burst, Gaussian burst, pure tones
- Ability to use custom stimuli
- Includes standard clinical '5-up/5-down' Adult Self-Test automated routine using the response box accessory
- Print detailed reports with sequence information, frequency tables, and threshold information
- Built in audiogram markers for different stimulator types
- Optional speech discrimination module



Intelligent VRA

Automated visual reinforcement audiometry.

- Increased reliability & accuracy by a single examiner
- Choose from our variety of 4 and 10 second colorful, animated wide-screen video clips, or use your own video clips
- Use one of our three automated test routines, administer a speech discrimination paradigm (IVRISD), or run a VRA test manually
- Probe Trials maintain patient attention while testing near threshold
- Control Trials allow you to determine the reliability of a test
- Trial-by-trial reports include detailed information for each test sequence
- Final report includes audiogram and threshold for each frequency tested



CAST™

Classification of Audiograms by Sequential Testing selects the best-fitting audiogram from 9 patterns, for fast and efficient screening.

OHTA™

Optimized Hearing Test Algorithm is designed to test four frequencies, non-sequentially in an intensity staircase fashion.

5-up/5-down

Automated 'step-up, step-down' intensity staircase procedure for testing thresholds at up to four selected frequencies.

Specifications

SmartEP

- Adjustable Gain: 5K - 200K
- Adjustable High Pass and Low Pass filters (-6 dB/Oct)
- Stimulus: Clicks, Tones, iChirps, Complex, and user-defined files
- Stimulus duration in µsec or cycles
- Stimulus Envelopes: Rectangular, Blackman, Cosine, Hamming, Hann, Bartlett, Trapezoidal (Rise/fall time), Extended Cosine (Rise/fall time), Triangular, Gaussian
- Stimulus presented continuously or only while acquiring
- Ipsilateral and Contralateral noise masking. Specified level or tracking the stimulus level

SmartEP-ASSR

- Gain: 100K
- High Pass Filter: 30 Hz
- Low Pass Filter: 300 Hz
- Stimulus: Clicks, Tones, iChirps, and user-defined files
- Frequencies: 250, 500, 1000, 2000, 4000, and 8000 Hz
- Simultaneous testing of both ears
- Test up to four frequencies per ear

SmartDPOAE

- Up to 41 frequencies per DPGram
- DP I/O Function

SmartTrOAE

- Response window: 300 - 6000 Hz
- Stimulus: Clicks and Tones
- Contralateral, Ipsilateral, and Binaural suppression
- Dual probe option

EP Amplifier

- Two channels
- A/D Converter: 16-bit
- Sampling rate: 200 to 40000 Hz
- High Pass: 0.1 - 300 Hz
- Low Pass: 30 - 5000 Hz
- Adjustable artifact rejection level and time region
- Line Frequency Notch Filter (-12 dB/Oct)
- Common Mode Rejection:
  - ≥ 110 dB @ 1 kHz
  - ≥ 110 dB @ 60/50 Hz, notch filter off
- Noise Level: ≤ 0.27 uV RMS
- Input Impedance: > 10 MOhms

Transducers

- ER-3C Insert Earphones:
  - Intensity: 0 - 130 dB SPL
  - Frequency Range: 125 - 10000 Hz
- TDH Headphones:
  - Intensity: 0- 120 dB SPL
  - Frequency Range: 125 - 12000 Hz
- Bone Conductor:
  - Intensity: 0 - 98 dB SPL
  - Frequency Range: 250 - 8000 Hz
- ER-10D OAE Probe:
  - Intensity: 0 - 100 dB SPL
  - Frequency Range: 125 - 16000 Hz
- Sound field amplifier and speakers
- Auxiliary output channel for ipsilateral masking and stimulus mixing

Power Requirements

115 - 230 VAC, 50/60 Hz,
560 - 350 mA, 30 W

Operating Environment

- Portable Equipment
- Indoor use
- Operating temperature: 15 °C - 35 °C
- Relative humidity: 15% to 90% at 40 °C non-condensing
- Altitude: 0 - 3000 m

Storage

- Temperature: 0 °C - 50 °C
- Atmospheric Pressure: none specified

Standards Compliance

- Safety: IEC 60601-1 Class II, Type BF
- EMC: IEC 60601-1-2
- EP: IEC 60601-2-40
- Medical Device Directive: 93/42/EEC

Computer Requirements

- Windows 7, 8, or 10 operating system
- Minimum 4 GB RAM
- Minimum 5 GB hard drive space
- Minimum XGA display (1024x768 screen resolution)
- Grounded, 3-prong power supply
- Compliant with IEC 60950
- Mouse or other pointing device
- One available USB Port
- Removable media, network drive, or secure Internet storage site for data backup (recommended)
- Printer (optional)

*May not be available in all markets

DUET-BRCH-REV-20160831-ENG

Phone: +1 (305) 668-6102 • Toll Free: 1 (800) 447-9783 (USA & Canada)
Fax: +1 (305) 668-6103 • E-mail: sales@ihsys.com • Web: www.ihsys.com

CE 0470