

FONIX 6500-CX Hearing Aid Test System

ACOUSTIC DRIVE SIGNAL

Frequencies: 100 Hz through 8000 Hz in 100-Hz intervals. Accuracy within 1 percent. Frequencies used in sweep presentation are from 200 to 8000 Hz only.

COMPOSITE MODE AMPLITUDES:

Flat or White Noise Weighting: Each frequency component, 30 through 80 dB SPL; (total signal, 49 through 99 dB SPL RMS) in 5-dB steps.

Speech Weighting: Response has flat amplitude for low frequency components; a slope of -6 dB/octave starts at 900 Hz, which is 3 dB down. Amplitude from 40 through 90 dB SPL RMS, in 5-dB steps.

SINE MODE AMPLITUDES:

Amplitude Accuracy: 50 through 100 dB SPL in 5-dB steps. After leveling, all amplitudes accurate to within 1 dB from 300 to 5000 Hz; all others within 3 dB.

CREST FACTOR

Composite Mode Signal: Less than 12 dB (4 to 1 ratio of peak to RMS value).

TELECOIL DRIVE

10 and 31.6 mA/meter, or telewand in Coil modes.

DIGITAL READOUT OF SOUND PRESSURE LEVEL

Frequency Range: 100 through 8000 Hz.
Amplitude Range: From 0 through 149 dB (-90 through +150 dB gain).

Resolution: 0.1 dB.
Type: True RMS.
Accuracy: Within 1 dB plus or minus 1 digit from 300 to 5000 Hz; within 2 dB plus or minus 1 digit for all other frequencies.

Noise Immunity: 2.5 dB.
SPL Equivalent Input Noise: Less than 50 dB RMS
Noise Reduction: Averages the measured signal in synchronism with the signal generator by the factor chosen. Factors of 2, 4, 8, and 16 available. Random noise will be reduced by an amount equal to the inverse of the square root of the factor chosen.

SPECTRUM MODE AVERAGING Uses the Noise Reduction button to control the Spectral averaging in Spectrum Mode from 2 to 16.

BATTERY CURRENT MEASUREMENT

Range: 0 to 20 mA.
Accuracy: Within $\pm 3\%$ of full scale.
Resolution: 0.01 mA.
Voltages supplied: 1.5 (silver), 1.3 (zinc air). See Appendix B, ANSI S3.22-1987.

HARMONIC DISTORTION ANALYZER

Type: Selectable for 2nd, 3rd, Total (2nd plus 3rd), or none.
Resolution: 0.1 percent.
Reading: Percent (%) with respect to total signal. Pure tone readings made at 100-Hz intervals from 400 through 2500 Hz.

ATTACK/RELEASE TIME

Range: 2 to 5000 mSec.
Accuracy: $\pm 10\%$ or 2 mSec + Resolution, whichever is larger.
Resolution: 2000-8000 Hz: 1.25 mSec;
800-1600 Hz: 2.5 mSec;
400, 500 Hz: 5 mSec.
100 to 300 Hz and Composite: 10 mSec.

Available Test Modes: Star Option: Enhanced, Adaptive
ANSI 96, ANSI 87, IEC

Signal Durations: All modes: 2000 mSec
Adaptive: 2 Sec, 0.1 Sec (Attack)
ANSI 96: variable (500 to 5000 mSec)

PRIMARY POWER

Selectable for 100, 120 or 240 VAC (within 10 percent), 50/60 Hz. Power requirement is 50 watts.

ELECTRONICS MODULE

Color: Ivory module case with dark grey front panel. Black trim and buttons.
Size: 17.5"W x 6.5"H x 14.75"D (44.5 x 16.5 x 37.5 cm).
Weight: 20.5 lbs.(9.5 kg).

VGA VIDEO MONITOR

Display Format: 320 pixels wide x 210 lines high.
Display Refresh Rate: 60 Hz.
Display Color: Red, Green & Blue or Monochrome (Black & White)
Power: 115 VAC, 50 or 60 Hz. (230 VAC optional).
Color: Light gray
Size: 14" diagonal (35.5 cm)
Weight: 27 lbs. (13.2 kg).

TEST CHAMBER

Type: FONIX FC 6050.
Test Area: Greater than 6" x 6" x 1.5" deep (15.5 x 7.5 x 4 cm).
Internal Acoustic Reflections: SPL at test point will change less than 3 dB above 1 kHz, when lid is raised (without feedback compensation).
Ambient Noise Isolation: 45 dB at 1 kHz (allows THD measurement to within 3% at 60 dB source level and a 60 dB ambient).
Color: Light gray with black trim. Black and white test area.
Size: 13.5"W x 18"H x 11.5"D (934.3 x 45.7 x 29.2cm).
Weight: 33 lbs. (15 kg).

SHIPPING

Total Shipping Weight with Quik-Probe Option: 130 lbs. (59.5 kg)
Total Shipping Weight without Quik-Probe Option: 112 lbs. (51 kg)

STANDARD ACCESSORIES


FONIX M1550E Low Noise Microphone: 14 mm diameter, high voltage, pressure type Electret. 149 dB maximum SPL.
Microphone Adapter: (044-1006-01) 14mm to 1" (25 mm).
HA-1 Coupler: (044-1003-03) Dimensions per requirements of ANSI S3.7-1995 for testing all-in-the-ear aids and earmolds.
HA-2 Coupler: (044-1001-04) Dimensions per requirements of ANSI S3.7-1995 for testing ear level, eyeglass and body aids.
Ear Level Adapter: (044-1007-00) Per requirements of ANSI S3.22-1996 for adapting ear level aids to the HA-2 coupler.
FC6050 Test Chamber Cable: (119-0204-07)
Battery Pills
#13: (059-2005-02) #675/76: (059-2004-02)
#312: (059-2006-02) #10A/230: (059-2010-01). All with 12" cables—24" cables available upon request.
(010-0003-01)
Operator's Manual: (010-0003-01)

OPTIONAL ACCESSORIES

6 CC Coupler: (044-1004-03) NBS 9A, for checking audiometer headphones.
Test Chamber Stand: (030-1003-00) Tubular steel stand which brings the testing area or the test chamber to convenient table height.
Quest QC-10 Sound Level Calibrator: (030-0004-00) For calibration of microphone amplifier. 1 kHz, 114 dB SPL.
Telewand: (043-1045-02) For checking response of aids in "telephone" mode.
Telecoil Induction Loop: (120-1001-00) For checking hearing aid response to a magnetic loop field.
Battery Pills: #AA: (059-1011-00); #41: (059-2009-02); #5: (059-2008-01). All with 12" cables—24" cables available upon request
Maintenance Manual: (010-0002-00) On request at time of purchase.

SAFETY

UL544 and IEC 601-1 approval available when used with hospital grade CRT monitor. Specify when ordering.

 medical device directive.
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GUARANTEE

The FONIX 6500-CX and its accessories are guaranteed to be free from manufacturing defects which would prevent the products from meeting these specifications for a period of one year from date of purchase.



FRYE ELECTRONICS, INC.

P.O. Box 23391 • Tigard, OR 97281-3391 • USA
(503) 620-2722 • (800) 547-8209
Fax: (503) 639-0128
www.frye.com • e-mail: sales@frye.com

The FONIX 6500-CX Hearing Aid Test System

The World Standard in Hearing Aid Evaluation and Fitting

Here is some of what is available on this instrument...

Automatic Test Sequences

- ANSI '96
- IEC 118-7 (1994)
- ANSI '87
- JIS 2000
- ANSI '92
- Profiler

Digital Speech in Noise Tests

Phase and Group Delay Measurement

Spectrum Analysis

- Comes as standard feature
- Use a human voice or any sound source

Quik Probe for Real Ear Measurement

- Unique hand-held module
- Insertion Gain and SPL

Complete Battery Current and Battery Life Measurements

Sophisticated Attack and Release Measurements

Our website has details about all of these great features

www.frye.com



FONIX® 6500-CX

The FONIX 6500-CX is the world's most complete hearing aid analyzer. Frye Electronics keeps it that way by continually updating the programming as new hearing aids and revised standards are introduced. Whether the testing is done in a sound chamber or in the real ear, the FONIX 6500-CX has the answers you need to evaluate and fit hearing aids.

Testing to Standards

Quality control in the manufacturing of hearing aids is based on testing to published standards. Currently the FONIX 6500-CX provides test sequences for the ANSI, IEC and JIS standards. Because these measurements are fast and accurate, the FONIX 6500-CX is used by virtually all the world's hearing aid manufacturers. In addition, there are provisions in the programming that can be used, when needed, to prevent incorrect results (testing artifacts) when testing sophisticated circuits.

Composite/Real Time Signal

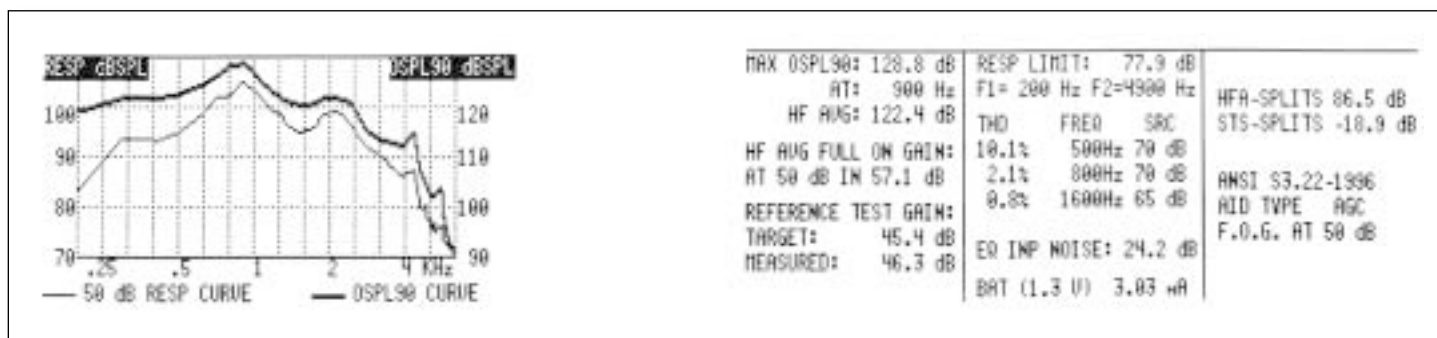
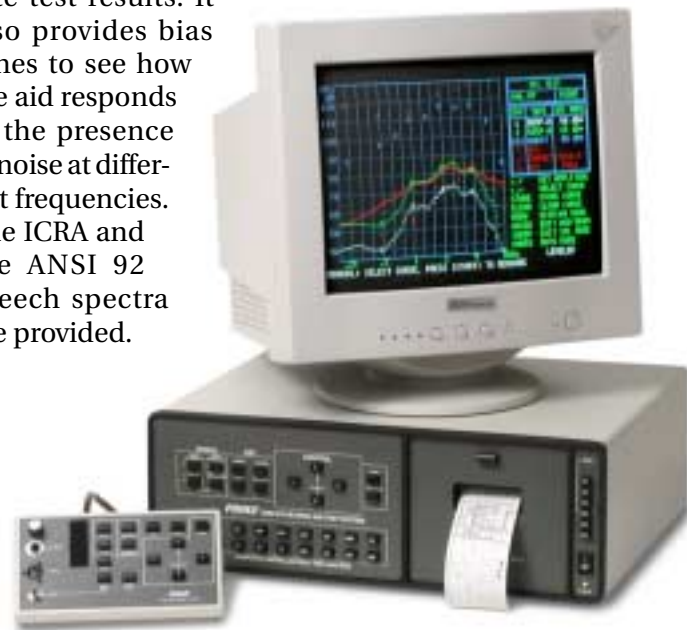
Testing to pure-tone standards is only a small part of the capability of the FONIX 6500-CX. The real time composite signal provides measurements several times a second. Along with great speed, measurements with this complex signal provide immediate information about the presence or absence of intermodulation distortion, while avoiding the "artificial blooming of the lows" caused by the use of pure tones in the measurement of Automatic Gain Control hearing aids.

Multiple Option Package

Most users purchase the Multiple Option package so they have instant access to input/output curves, gain, averaging, and telecoil measurements. The CIC option provides nonstandard, but realistic and validated measurements, of these very small in-the-canal hearing aids.

The Star Option Testing Digital Aids

With the recent introduction of digital hearing aids, other testing problems arose and have been overcome by additions to the programming of the FONIX 6500-CX. Noise reduction circuits of these aids can interpret conventional test signals as noise and alter the response of the hearing aid. The Digital Speech in Noise program in the Star Option provides randomly interrupted real time signals that the aid interprets as speech, leading to accurate test results. It also provides bias tones to see how the aid responds in the presence of noise at different frequencies. The ICRA and the ANSI 92 speech spectra are provided.



Printout of an ANSI S3.22 1996 test

Enhanced DSP

Enhanced DSP is an exciting new test for digital aids that is unique to the 6500-CX. It measures both the group delay—the digital aid's processing time—and the phase of the hearing aid. The group delay of the digital aid is especially important for monaural or open vent fittings because sound can travel faster to the unaided ear than the aid can process it for the aided ear, creating an echo effect. The phase measurement is important for binaural fittings to ensure that the hearing aids are working together as a team. (See the supplemental Enhanced DSP brochure for more details.)

Spectrum Analysis

Live Speech and Environmental Sounds

The spectrum analysis mode, a standard feature on all FONIX 6500-CX units, allows you the versatility of testing the aid with your choice of external signals, whether it be environment CDs or live voice. You can also test for the occlusion effect or apply any number of signals used in research or clinical practice.

Customizing the Menu

In order to make it convenient for the user to take advantage of the versatility of the FONIX 6500-CX, we have added the ability to customize the menu choices. There

are five custom setups available, in addition to the default menu. This is handy because different types of hearing aids may require different settings, and different users may have their own testing preferences. Having six different customized menus can be a great time saver.

New 6050 Sound Chamber

We have recently upgraded the sound chamber for the FONIX 6500-CX. This new sound chamber has improved seals and will provide greater isolation than our previous chamber. In addition, we have arranged the physical layout and construction of the hearing aid test area to allow greater flexibility in the positioning of hearing aids and couplers.



Quik-Probe Option

Speed and Accuracy in the Fitting Process

The FONIX 6500-CX would not be the most complete hearing aid analyzer without a great real ear measurement capability. The Quik Probe Option is just that. The composite, real time signal and its variations, the ICRA and ANSI digital speech signals, are basic to the ability to do tests quickly and accurately. The hand-held module adds to the convenience. Experienced users tell us how quickly they can use the module to get the needed results. And, you can use the spectrum analysis mode to show how the real speech of an accompanying person reaches the aided ear. The spectrum analysis can be a great counseling tool.

Confirming your fitting with real ear measurements is the mark of the dedicated professional. The hearing aid client and third party payers will also appreciate this validation of the fitting. And don't forget to keep a record of how each hearing aid went out the door!

Flexibility Provided

Not everyone uses real-measurements the same way, so we have made Quik-Probe as flexible as possible. You can choose automatic or manual modes, composite or pure tone signals. You can make measurements in gain or SPL.

Visit www.frye.com

Learn more about the Quik-Probe and other options and features on the 6500-CX. Our website contains a wealth of information on all of our FONIX instruments, as well as useful resources for the hearing health professional. We have application articles, downloadable workbooks and manuals, an audio-logical event calendar, and much more.