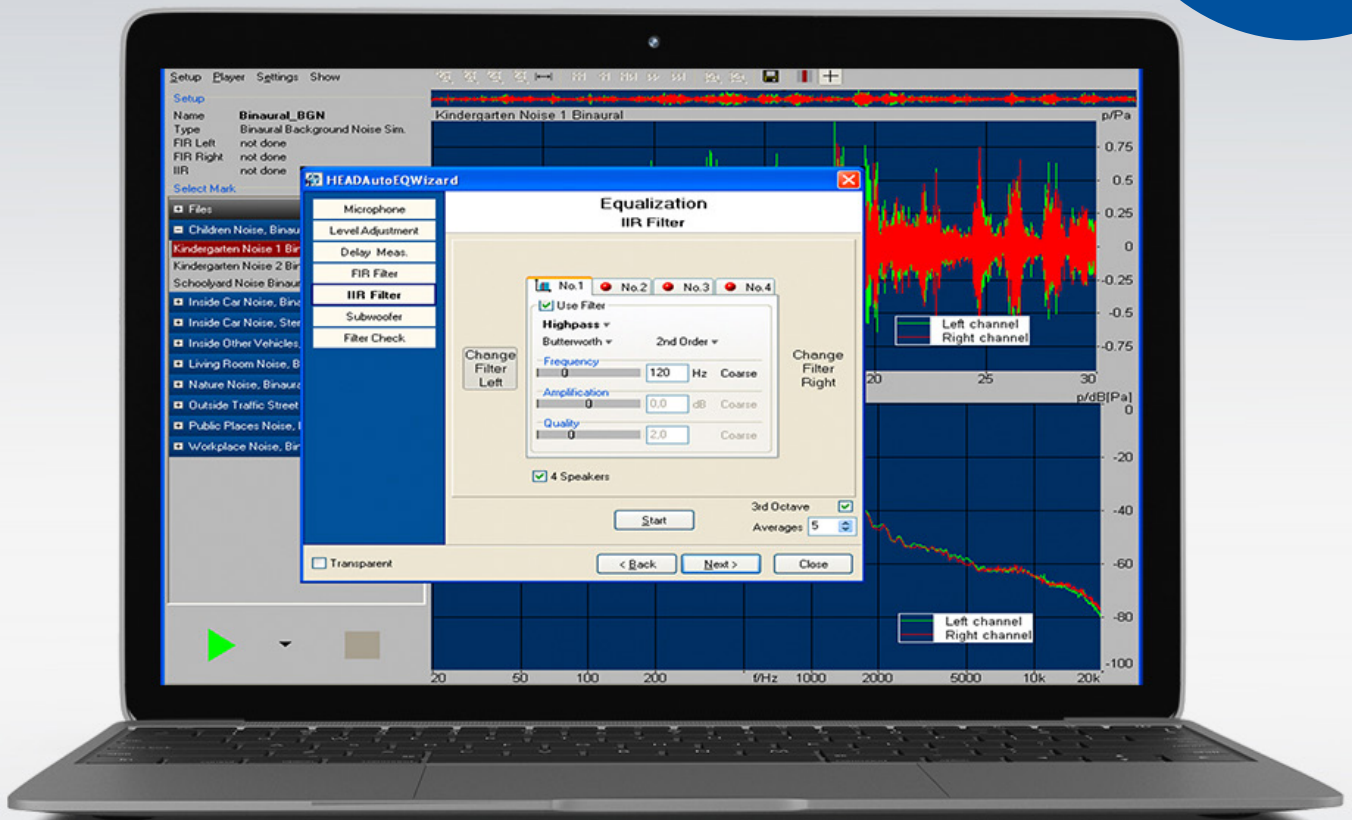




Code 6971

HAE-BGN

HEAD acoustics Automated Equalization for Background Noise Simulation in Labs

OVERVIEW

HAE-BGN

Code 6971

HEAD acoustics Automated Equalization for Background Noise Simulation in Labs

HAE-BGN is a background noise simulation system for laboratories and test rooms. The goal is to test telecommunication equipment in the presence of background noise under laboratory conditions and with full repeatability. With four loudspeakers and the HSW II.1 subwoofer, HAE-BGN reproduces previously recorded binaural signals with high accuracy. It features semi-automated equalization and is delivered with a background noise database as specified in ETSI ES 202 396-1 as well as binaural versions of the recordings described in TS 103 224. All recordings are adapted for use with the ACQUA analysis system and require no additional calibration.

HAE-BGN operates with the *labBGN* and *labCORE* hardware platforms as well as the HMS II.3 and HMS II.4 HEAD Measurement Systems, forming a binaural, ID-equalized recording and playback system.

KEY FEATURES

Background noise simulation for laboratories and test rooms as specified in ETSI ES 202 396-1

Including recordings ready for use with ACQUA:

- › background noise database as specified in ES 202 396-1
- › binaural recordings according to TS 103 224

Supports creating background noise environments in accordance with ITU-T G.160

Semi-automated digital equalization with measurement microphone or binaural HEAD Measurement Systems, e.g., HMS II.3, HMS II.3 LN, HMS II.3 LN HEC, HMS II.3 ViBRIDGE, HMS II.4, HMS II.6, and HMS II.7

Minimal inherent noise and high dynamic range

Synchronization of playback with ACQUA measurements to ensure full repeatability

APPLICATIONS

Background noise simulation for laboratories and test rooms with semi-automated equalization, e.g. for speech quality evaluation of mobile devices

DETAILS

With an arrangement of four loudspeakers as well as a binaural head measurement system, such as HMS II.3, HAE-BGN is able to reproduce previously recorded background noise in suitable laboratories with high accuracy. The HSW II.1 subwoofer supports the loudspeakers at low frequencies, ensuring realistic playback and high dynamic range. At the same time, it leaves room for scaling of loudspeaker size and allows quick setup of HAE-BGN.

Semi-automated equalization allows fast and convenient calibration of the system, compensating the individual acoustic characteristics of the loudspeakers and the room. The equalization procedure works on several levels, correcting frequency response, level, and delay of the playback system. This ensures high playback accuracy at the reference position.

HAE-BGN is optimized for playback of binaural (two-channel) signals. For testing telecommunication devices in the presence of background noise as described in ETSI ES 202 396-1, HAE-BGN includes a background noise database with binaural and stereophonic recordings as well as binaural versions of the recordings specified in ETSI TS 103 224. To ensure full repeatability of each test, HAE-BGN can be configured for triggered playback.

GENERAL REQUIREMENTS

Hardware

Hardware Platform

labBGN (Code 6486)

- › ACQUA*lab* 16-Channel Background Noise Hardware Platform

Equalization Equipment

Hardware Platform

labCORE (Code 7700)

- › Modular multi-channel hardware platform
- coreBUS* (Code 7710)
- › *labCORE* I/O bus mainboard
- coreIN-Mic4* (Code 7730)
- › Microphone input board
- coreBEQ* (Code 7740), *labCORE*
- › Binaural equalization software extension

Head and Torso Simulator

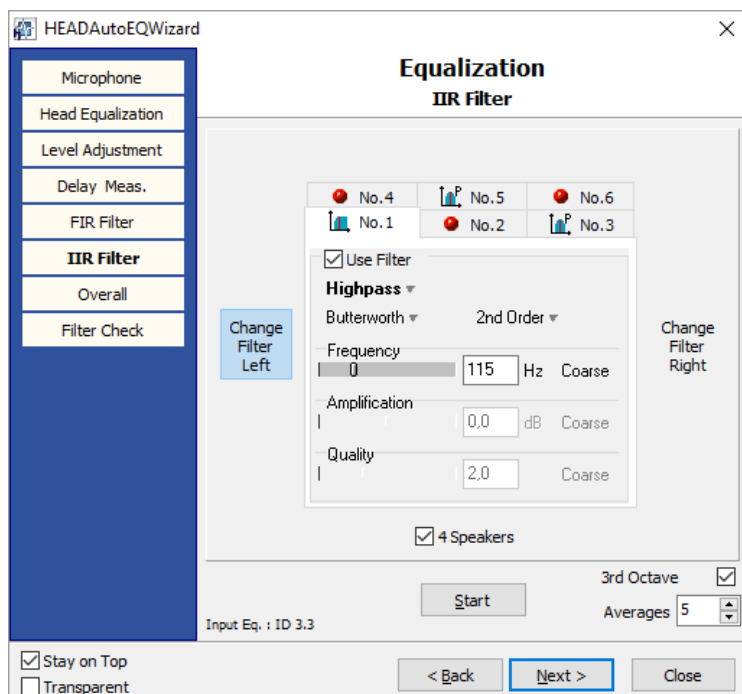
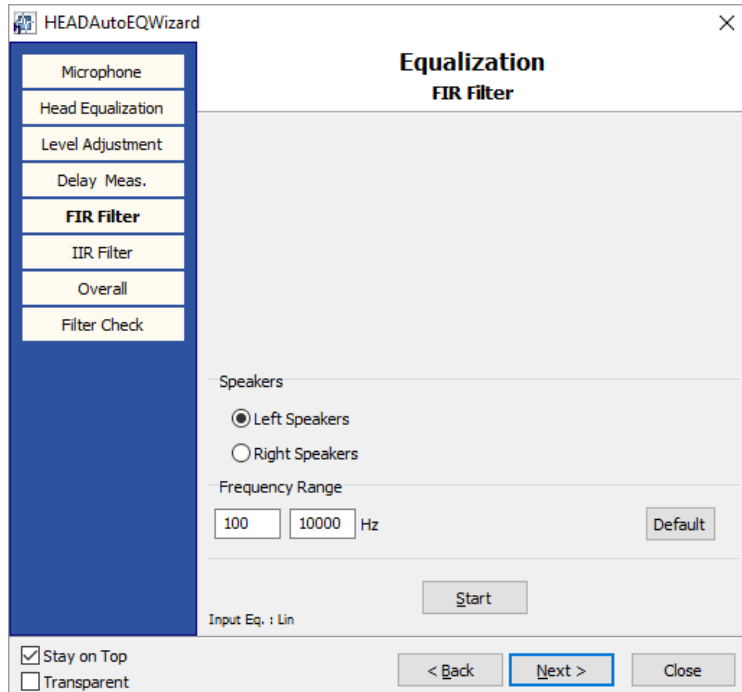
One of the following HEAD Measurement Systems

HMS II.3

- › HMS II.3 (Code 1703)
 - » HEAD Measurement System, basic version with right ear simulator, 3.3 pinna, and artificial mouth
- › HIS I (Code 1701)
 - » HEAD Impedance Simulator, left

Continued on next page

The Equalization wizard (HEADAutoEQWizard) of HAE-BGN guides the user through the equalization procedure. The system uses a combination of FIR and IIR filters (see screenshots) to equalize the loudspeaker setup.



GENERAL REQUIREMENTS

HMS II.3 LN

- › HMS II.3 LN (Code 1703.1)
 - » HEAD Measurement System, low-noise version with right ear simulator, 3.3 pinna, and artificial mouth
- › HIS L LN (Code 1701.1)
 - » HEAD Impedance Simulator, left, low-noise version

HMS II.3 LN HEC

- › HMS II.3 LN HEC (Code 1703.2)
 - » HEAD Measurement System, low-noise version with human-like ear canal simulator right and artificial mouth
- › HIS L LN HEC (Code 1701.2)
 - » HEAD Impedance Simulator, left, low noise, human-like ear canal version

HMS II.3 ViBRIDGE

- › HMS II.3 ViBRIDGE (Code 1703.3)
 - » HEAD Measurement System, low-noise, with human-like ViBRIDGE (bone conduction simulation) ear simulators (left and right) and artificial mouth

HMS II.4

- › HMS II.4 (Code 1704)
 - » HEAD Measurement System, basic version with right ear simulator, 3.3 pinna
- › HIS L (Code 1701)
 - » HEAD Impedance Simulator, left

HMS II.6

- › HMS II.6 (Code 1706)
 - » HEAD Measurement System, with artificial mouth and free-field microphones (left and right)

HMS II.7

- › HMS II.7 (Code 1707)
 - » HEAD Measurement System, with artificial mouth and free-field ICP microphones (left and right)

Compatible third-party artificial head

Measurement Microphone

Only required for equalization type "Noise Generator":
Measurement microphone including a cable and acoustic calibrator

Continued on next page

OPTIONS

PSB III (Code 6001)

- › Pulse splitter box (for synchronization of non-stationary noise with ACQUA)

CXX II.3 (Code 5177-3)

- › Cable AES/EBU XLR male 3-pin <> XLR female 3-pin, 2.95 m

CUU I (Code 6085)

- › Adapter USB <> USB for Remote Control HAE (Connection between the ACQUA computer and the HAE computer)

GENERAL REQUIREMENTS

Playback Equipment

HEAD acoustics provides a selection of appropriate third-party loudspeakers and power amplifiers for HAE-BGN configurations.

CSO I.0 (Code 9822)

- › Loudspeaker cable set for HAE-car/HAE-BGN/3PASS (4 speaker connections)

HSW II.1 (Code 2952)

- › Subwoofer with amplifier

Power amplifier(s)

Four loudspeakers

Sound Board

One of the following Sound Boards

DSB III.1 (Code 2407.1)

- › Digital Sound Board (24 bit), PCIe version

DSB IV.1 (Code 2408.1)

- › Digital Sound Board, USB version

System Requirements

Computer

- › 40 GB free disk space
- › 4 free USB ports

Operating system (one of the listed)

- › Windows 11 x64
 - » Pro, Enterprise, Education; version 21H2 or later; languages: US, Western European
- › Windows 10 x64
 - » Pro, Enterprise, Education; version 1809 or later; languages: US, Western European

SCOPE OF DELIVERY

HAE-BGN (Code 6971)

- › Software including noise database as specified in ETSI ES 202 396-1

USB dongle

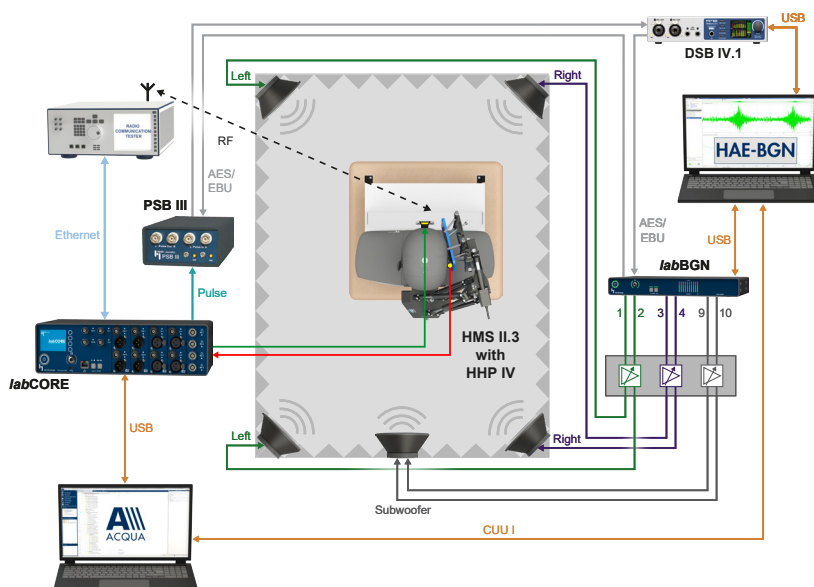
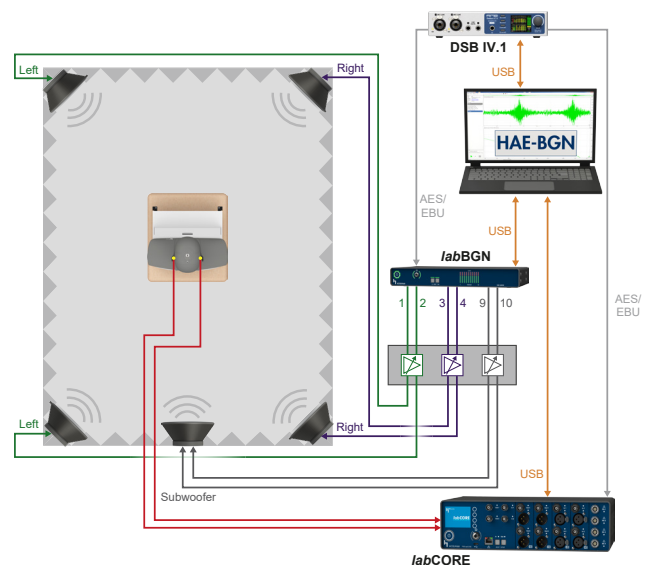
IN PRACTICE

APPLICATION EXAMPLE

Handset Setup

Step 1: Equalization

HMS II.3 is positioned in the laboratory and records signals during the equalization process. It is connected to *labCORE*. HAE-BGN runs on a computer that is connected to *labBGN* and DSB IV.1 via USB. DSB IV.1 synchronizes *labBGN* and *labCORE*. *labBGN* forwards signals through power amplifiers to four loudspeakers and one subwoofer in the laboratory. The equalization is performed in accordance with the procedure specified in ETSI ES 202 396-1.



Step 2: Measurement

The handset is clamped into HHP IV and connected to a radio tester via a packet-switched network. *labCORE* transmits signals to HMS II.3 and the radio tester for playback, and receives signals from HMS II.3 and the radio tester for recording. ACQUA generates the playback signals and records the received signals for analysis. HAE-BGN plays back background noise while ACQUA evaluates the handset's speech signal processing under real-life conditions.

HEAD acoustics® is a registered trademark.

Windows® is a registered trademark of Microsoft Corporation.

The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by HEAD acoustics GmbH is under license. Other trademarks and trade names are those of their respective owners.

IEPE denotes an industry standard for piezoelectric sensors with integrated impedance-converting electronics. Comparable technologies are marketed by individual manufacturers under proprietary names such as *ICP*, *CCLD*, *IsoTron*, or *DeltaTron*. In this document, the term *IEPE/ICP* is used as a generic designation representing the corresponding manufacturer-specific product and trademark names.



Contact Information

Ebertstraße 30a

52134 Herzogenrath, Germany

Phone: +49 2407 577-0

E-Mail: sales@head-acoustics.com

Website: www.head-acoustics.com