HEAD acoustics

DATA SHEET

APPLICATION EXAMPLES INCLUDED

Code 6486

labBGN

ACQUA*lab* 16-Channel Background Noise Hardware Platform

OVERVIEW

*lab*BGN

Code 6486

ACQUA*lab* 16-channel background noise hardware platform

We developed numerous background noise simulation systems for testing telecommunication equipment under realistic conditions. *lab*BGN is the dedicated ACQUA*lab* generation hardware platform for these systems serving as an audio distribution interface.

*lab*BGN distributes up to 16 output channels to amplifiers for background noise playback. Various other inputs and outputs allow receiving, recording, and playing back audio signals. *lab*BGN also offers a HEAD*link* connector for direct connection to supported devices from us.

The pulse channel of *lab*BGN allows automated triggering of playback to ensure repeatability of test runs under the exact same conditions.

KEY FEATURES

Audio distribution hardware interface for all our background noise simulation systems

Supports up to 10 analog output channels and in total up to 16 output channels when combined with ADAT output channels

Various digital inputs for recording

HEAD*link* for direct connection to our other devices

Automatic playback triggering via pulse channel

APPLICATIONS

Fully repeatable testing of telecommunication and other devices in the presence of background noise

DETAILS

Background noise has a major influence on voice transmission quality of telecommunication devices and systems. For conclusive testing under laboratory conditions, we offer various background noise simulation systems for application in labs and vehicles:

- HAE-BGN
- HAE-car
- 3PASS *lab* (with and without 3PASS *reverb*)
- 3PASS *flex* (with and without 3PASS *reverb*)

For recording background noise scenarios, equalizing the test environment's loudspeaker setup, and for playback itself, a powerful and versatile hardware interface are required. To work with the systems listed above, we developed the *lab*BGN hardware platform.

It connects to the computer running the software part of the system via USB. *lab*BGN supports up to 10 loudspeakers through 8 + 2 analog outputs, or up to 16 loudspeakers through 8 analog + 8 ADAT outputs for connection to external amplifiers. The hardware interface also offers digital inputs in connection types such as ADAT and AES, and general-purpose inputs for custom applications. All inputs are accompanied by an equal number of digital outputs of the same respective connection type. Monitoring playback is possible through the front-side 6.35 mm headphone output.

OPTIONS

HARDWARE

RMB IV.3 (Code 9852.1)
- 19" rack mount for *lab*BGN, MFE VIII.1 (2 pcs.)

CBA II (Code 1640)
- Cable adapter BNC ↔ BNC for connection *lab*BGN ↔ MFE (for pulse trigger)

GENERAL REQUIREMENTS

Software

One of our following background noise simulation systems (plus necessary components)

3PASS *lab* (Code 6990)
- Advanced background noise simulation system with automated equalization – lab version

3Pass *flex* (Code 6995)
- Advanced background noise simulation system with automated equalization – flex version

HAE-car (Code 6970)
- Background noise simulation system with semi-automated equalization for car cabins

HAE-BGN (Code 6971)
- Background noise simulation system with semi-automated equalization for labs

SCOPE OF DELIVERY

*lab*BGN (Code 6486)
- ACQUA*lab* 16-channel background noise hardware platform

PS 24-60-L4 (Code 0617B)
- Power supply 24 V, 60 W, LEMO 4-pin

PCC I.9x (Code 997x)
- Power cable (to local specification)

Continued on next page

SCOPE OF DELIVERY

CDM V (Code 1637)
- Cable D-Sub 15-pin → 2 x XLR (AES/EBU in/out) + 2 x BNC (Pulse in/out)

Breakout Cable
- D-Sub 25-pin → 8 × XLR male, TASCAM compatible, 1.5 m

CUSB II.1.5 (Code 5478-1.5)
- USB 2.0 cable, type B ↔ type A, with ferrite, 1.5 m

CXX II.3 (Code 5177-3)
- Cable AES/EBU XLR male 3-pin ↔ XLR female 3-pin, 2.95 m

Carrying case

Manual (hardcopy)

CONNECTIONS

Front

POWER BUTTON

Boots up / shuts down *lab*BGN

Indicates current system status via LED color

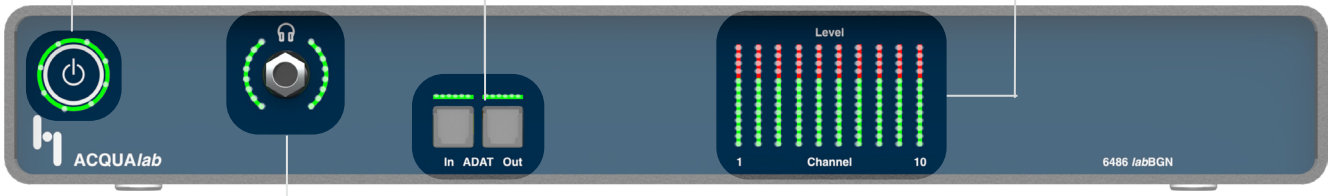
ADAT IN/OUT

Allow receiving/sending digital multichannel audio via TOSLINK interfaces

Can be used to support additional 8 loudspeakers through external amplifieres up to a total of 16 in combination with the analog output channels 1–8

CHANNEL LEVEL INDICATORS

Indicates signal levels for up to 10 input/output channels via colored LED bars



6.35 mm HEADPHONE JACK

Allows monitoring of played back background noise

Indicates output level via LED color

CONNECTIONS

Back

ANALOG OUTPUTS 1–10

Analog Out Channel 1 ... 8
- Main analog outputs for connection to amplifiers
- TASCAM compatible

Analog Out Channel 9 ... 10
- Supplementary XLR outputs for connection to amplifiers
- Can be used for adding one or two subwoofers or loudspeakers to the setup

USB MAIN CONNECTOR

Connects *lab*BGN to the computer running background noise simulation software

POWER CONNECTOR

Delivery of power by power supply via 4-pin LEMO connector

AES/PULSE INTERFACE

Offers automated triggering of background noise playback via pulse input

Supplementary digital AES input / output via XLR

HEAD*link* INTERFACE

Allows direct connection to other hardware from us:
- MSA I
- MSA II
- SQuadriga III

* Not currently supported.

TECHNICAL DATA

General Information

Operation	Remote control via background noise simulation software from us
System check	Automatic hardware check at boot up
GND connection	< 0.05 Ω (for all inputs/outputs)

Connections Front

Inputs/Outputs

ADAT In	1 × TOSLINK
Headphones	1 × 6.35 mm headphone jack
ADAT Out	1 × TOSLINK

Connections Back

Inputs/Outputs

Analog out channel 1 ... 8	1 × D-Sub 25-pin female
Analog out channel 9 ... 10	2 × XLR male
Digital audio	1 × D-Sub 15-pin female (DA-15)
AES/Pulse	1 × D-Sub 15-pin female (DE-15)
USB (In)	1 × USB Type-B
USB (Host)	2 × USB Type-A (for internal use only)
HEAD*link*	1 × LEMO 8-pin
Power	1 × LEMO 4-pin, (hermaphroditic)

Environmental Conditions

Operation temperature range	0 °C–50 °C (32 °F–122 °F)
Storage temperature range	-20 °C–70 °C (-4 °F–158 °F)
Air humidity	20%–80% (non-condensing environment)

Other

Power supply adapter	100 V_{AC}–240 V_{AC} → 24 V_{DC}, 60 W
Power consumption	Typ. 15 W
Dimensions (W × H × D)	327 mm × 44 mm × 175 mm
Weight	Approx. 1.4 kg

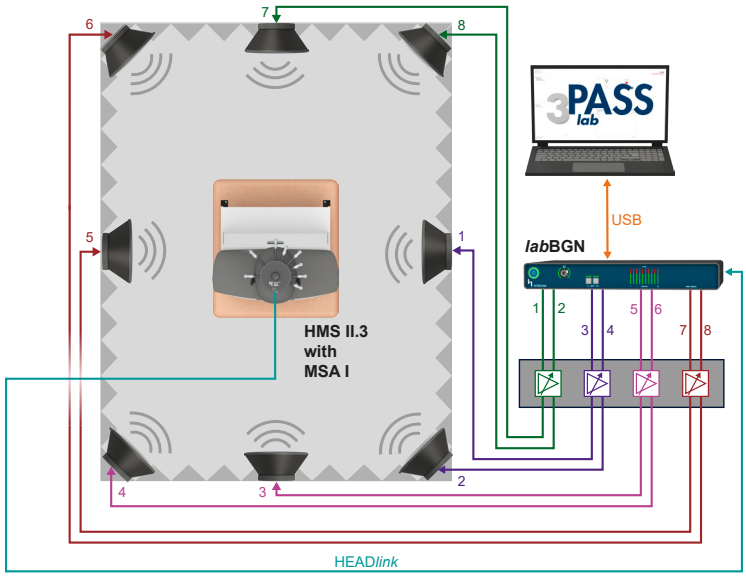
IN PRACTICE

APPLICATION EXAMPLES

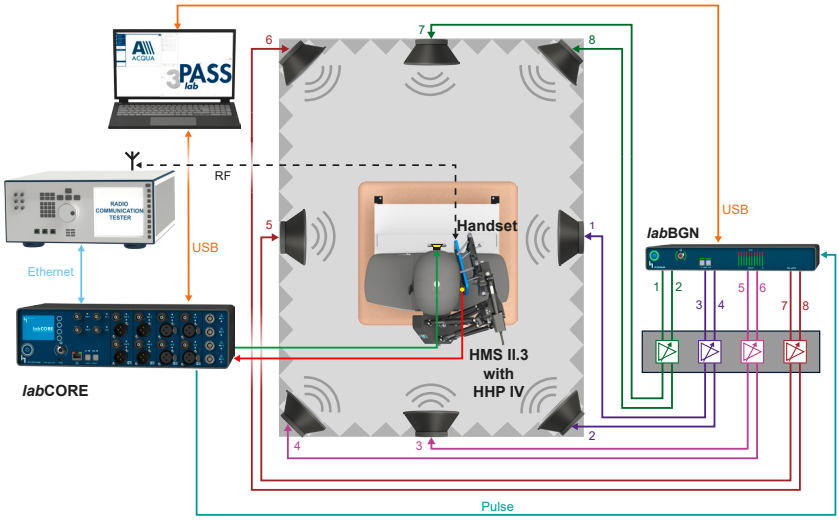
Configuration Example: Handset Setup

Step 1: Equalization

MSA I is mounted on HMS II.3 in the measurement cabin for recording. It connects to *lab*BGN via HEAD*link*. 3PASS *lab* runs on a computer that connects to *lab*BGN. *lab*BGN forwards signals via power amplifiers to eight loudspeakers in the measurement cabin. The equalization proceeds according to the procedure from ETSI TS 103 224.



The numbering of the loudspeakers in this figure is according to the numbering of the loudspeakers in Figure 5b of ETSI TS 103 224 V1.7.1 (2025-11).



The numbering of the loudspeakers in this figure is according to the numbering of the loudspeakers in Figure 5b of ETSI TS 103 224 V1.7.1 (2025-11).

Step 2: Measurement

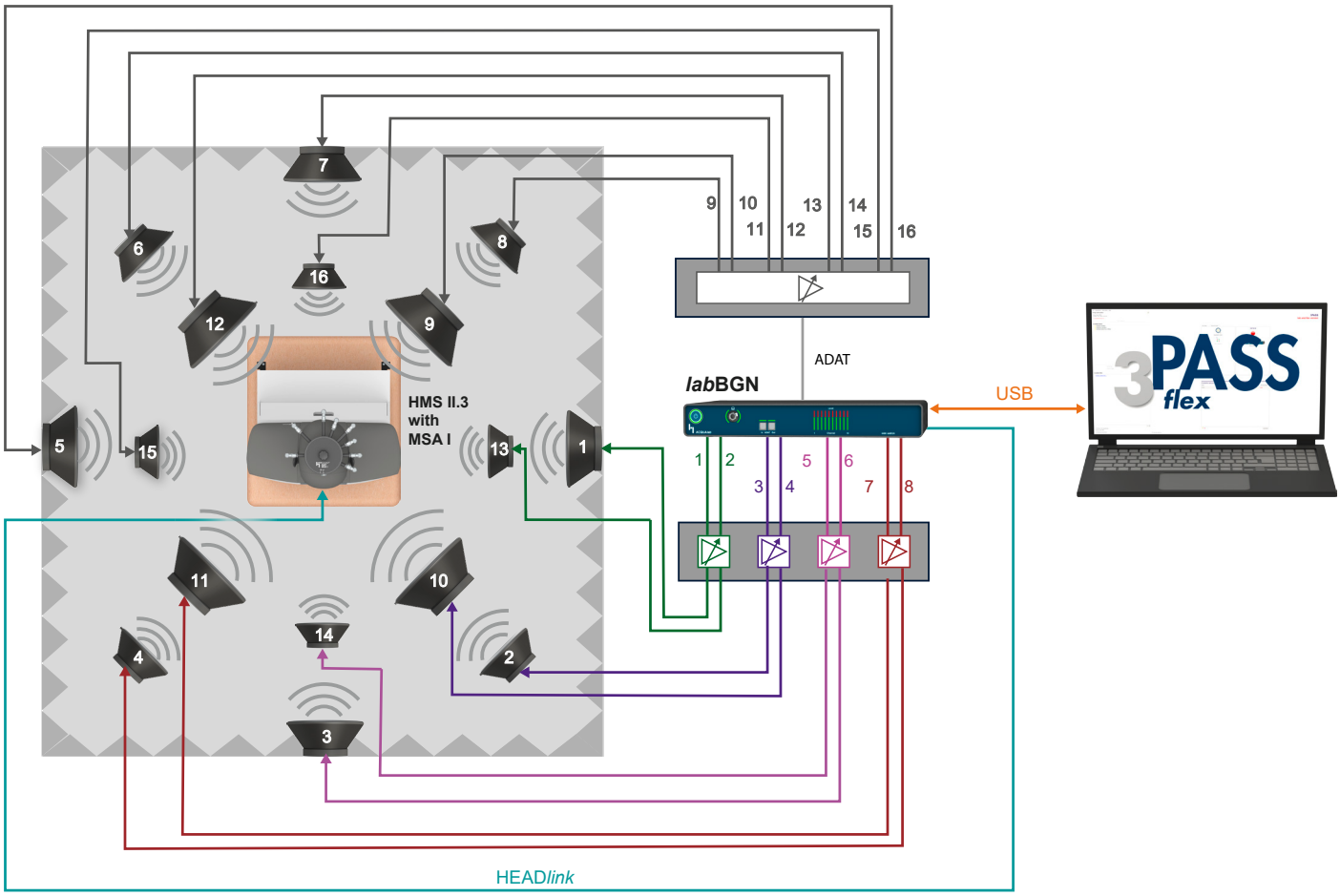
The handset is clamped into HHP IV and connects via packet-switched network to a radio tester. ACQUA transmits signals via *lab*CORE to HMS II.3 and the radio tester for playback and receives signals from HMS II.3 and the radio tester for recording. ACQUA generates the signals for playback and records signals for analysis. 3PASS *lab* plays back background noises via *lab*BGN, and ACQUA assesses speech signal processing of the handset under real-life conditions via *lab*CORE.

Configuration Example: Handset Setup (Spatial Audio Testing)

Step 1: Equalization

MSA I is mounted on HMS II.3 in the measurement cabin for recording. It it is connected to *lab*BGN via HEAD*link*. Equalization is performed in accordance with the procedure specified in ETSI TS 103 224. 3PASS *flex* runs on a computer that is connected to *lab*BGN. *lab*BGN forwards eight analog signals via power amplifiers to eight loudspeakers in the measurement cabin. It also forwards eight digital signals via the ADAT interface to eight additional loudspeakers. The 16 loudspeakers are arranged spherically around the HATS on four levels in accordance with ETSI S 103 224. The four levels are visualized by the varying sizes oft he loudspeakers.

The loudspeakers are distributed across the four levels as follows: loudspeakers 9–12 on the top level; 1, 3, 5, and 7 slightly above the ear level; 2, 4, 6, and 8 slightly below the ear level; and 13–16 on the bottom level.



The white numbering of the loudspeakers on the loudspeakers themselves in this figure is according to the numbering of the loudspeakers in Figure 5b of ETSI TS 103 224 V1.7.1 (2025-11).

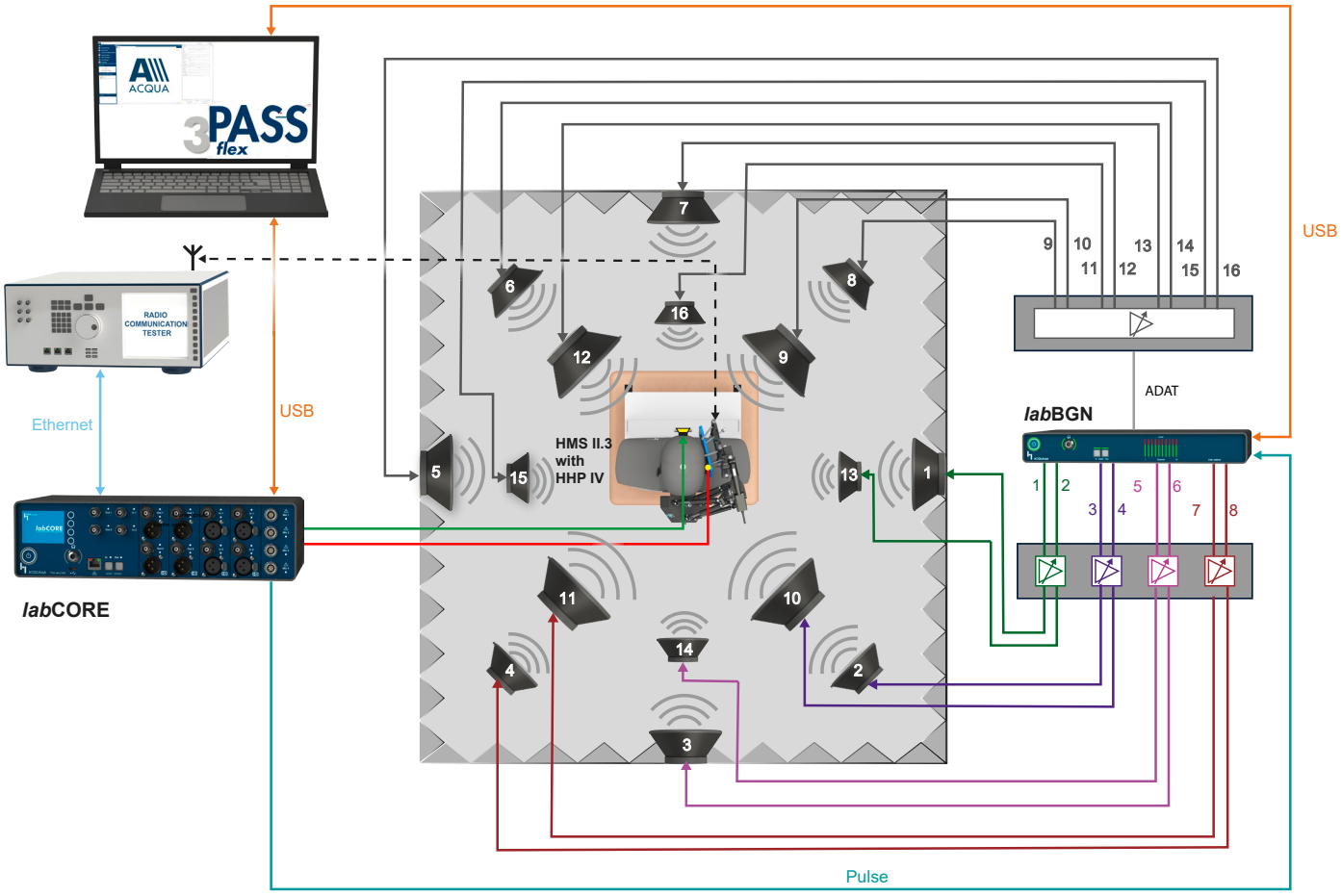
Configuration Example: Handset Setup (Spatial Audio Testing)

Step 2: Measurement

The handset is clamped into HHP IV and connects via packet-switched network to a radio tester. ACQUA transmits signals via *lab*CORE 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 signals for playback and records signals for analysis. 3PASS *flex* plays back background noises via *lab*BGN, and ACQUA assesses speech signal processing of the handset under real-life conditions.

The 16 loudspeakers are arranged spherically around the HATS on four levels in accordance with ETSI S 103 224. The four levels are visualized by the varying sizes oft he loudspeakers.

The loudspeakers are distributed across the four levels as follows: loudspeakers 9–12 on the top level; 1, 3, 5, and 7 slightly above the ear level; 2, 4, 6, and 8 slightly below the ear level; and 13–16 on the bottom level.

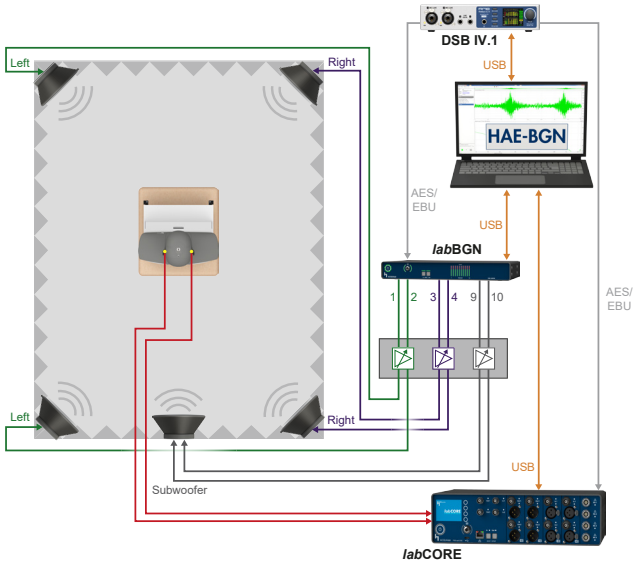


The white numbering of the loudspeakers on the loudspeakers themselves in this figure is according to the numbering of the loudspeakers in Figure 5b of ETSI TS 103 224 V1.7.1 (2025-11).

Configuration Example: Handset Setup (HAE-BGN)

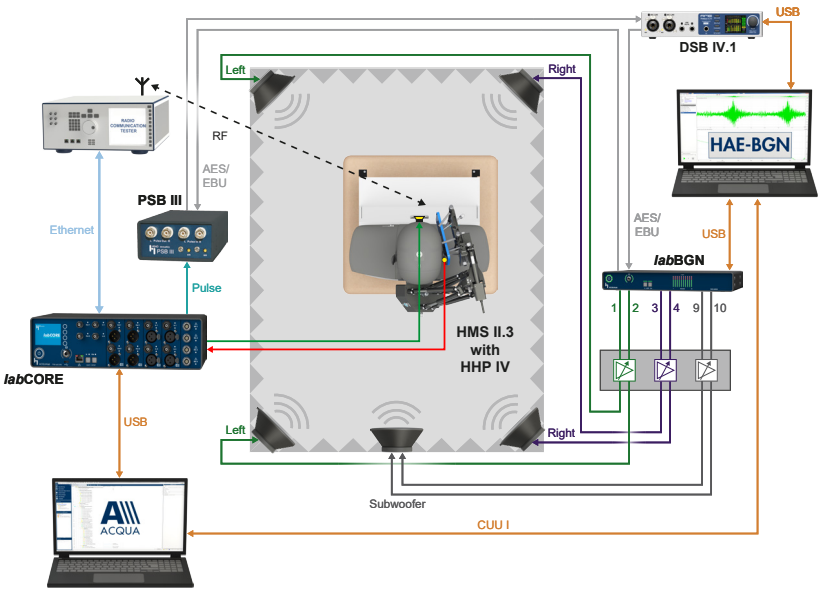
Step 1: Equalization

For the equalization process, HMS II.3 is positioned in the measurement cabin and connected to *lab*CORE. HAE-BGN runs on a computer that is connected via USB to *lab*CORE, *lab*BGN, and digital sound card DSB IV.1. DSB IV.1 receives signals from both *lab*CORE and *lab*BGN. The playback signals generated by *lab*BGN are routed through power amplifiers to four loudspeakers and one subwoofer installed in the measurement cabin. The equalization proceeds according to the procedure from ETSI ES 202 396-1.



Step 2: Measurement

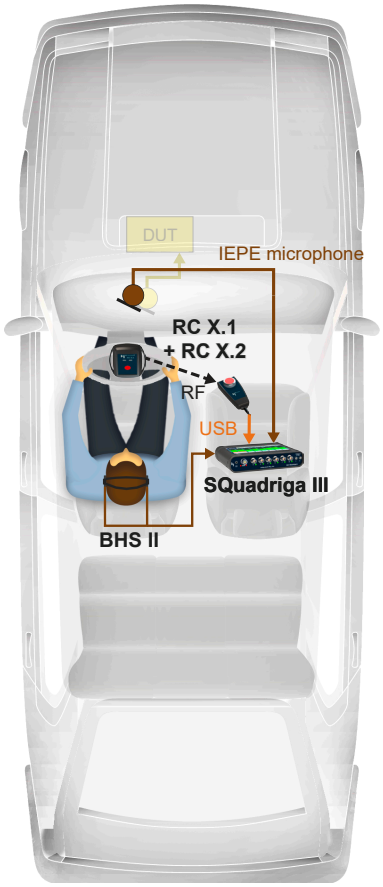
The handset is clamped into HHP IV and connects via packet-switched network to a radio tester. ACQUA transmitts signals via *lab*CORE to HMS II.3 and the radio tester for playback and receives signals from HMS II.3 and the radio tester for recording. ACQUA generates the signals for playback and records signals for analysis. HAE-BGN plays back background noises via *lab*BGN, and ACQUA assesses speech signal processing of the handset under real-life conditions.



Configuration Example: Background Noise Simulation in a Car

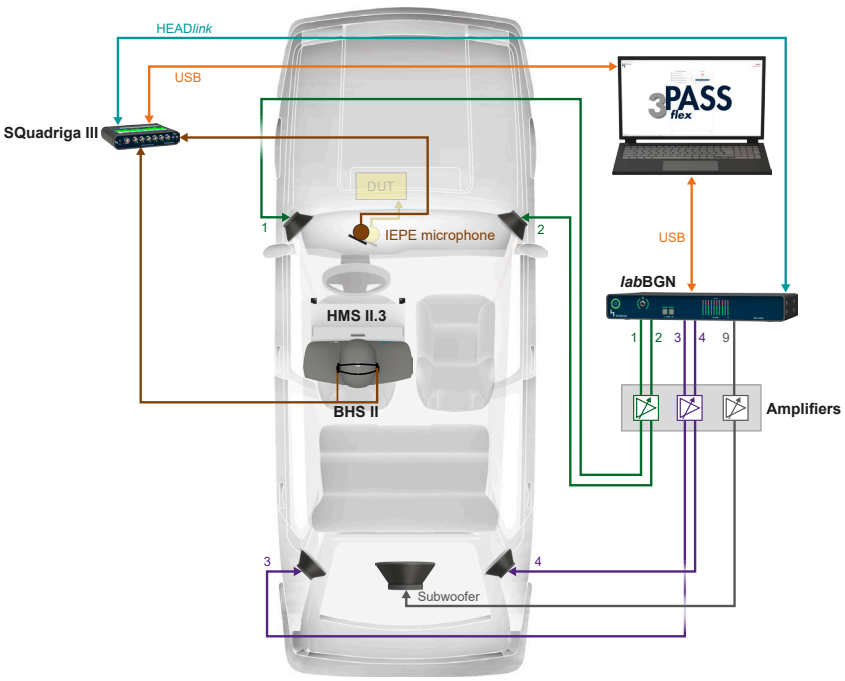
Step 1: Recording

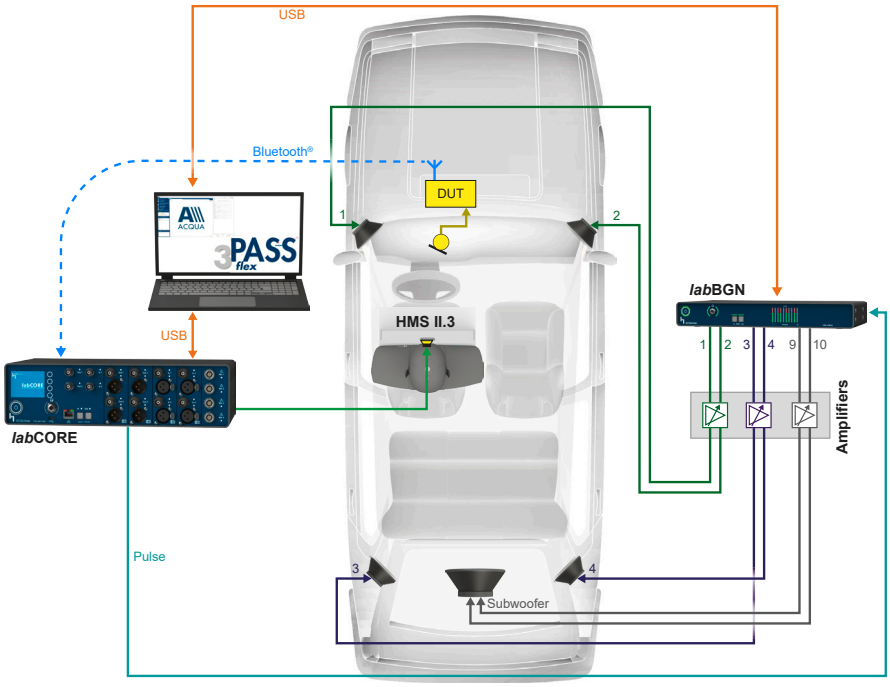
The IEPE/ICP microphone connects to SQuadriga III. The driver wears BHS II which also connects to SQuadriga III. RC X.1 connects to SQuadriga III via USB while it is paired with RC X.2. RC X.2 is attached to the steering wheel. When the car reaches the target speed in the desired driving conditions, the driver initiates the recording via RC X.2.



Step 2: Equalization

SQuadriga III connects to the IEPE/ICP microphone and BHS II for distributing the signals via *lab*BGN to 3PASS *flex*. HMS II.3 replaces the human driver. There is a loudspeaker setup with two loudspeakers on the instrument panel and two loudspeakers on the backrest. A subwoofer is positioned in the trunk. The equalization requires level adjustments of the loudspeakers as well as playback and recording of sine sweeps from each loudspeaker. This data is used for the calculation of the equalization.





Step 3: Measurement

3PASS *flex* plays back background noise via *lab*BGN and the loudspeakers. Simultaneously, ACQUA sends a speech signal via *lab*CORE to the mouth loudspeaker of HMS II.3 for playback. The microphone of the device under test picks up both the speech signal and the background noise. This degraded signal is transmitted via Bluetooth® to *lab*CORE and further to ACQUA for analysis.

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.

HEAD acoustics

Contact Information

Ebertstraße 30a
52134 Herzogenrath, Germany
Phone: +49 2407 577-0
E-Mail: sales@head-acoustics.com
Website: www.head-acoustics.com