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Data Sheet

ACOPT 37 (Code 6869)

Option ABLE – Assessment of Binaural Listening Effort according to ETSI TS 103 558

Overview

ABLE is an optional extension for ACQUA for the **A**ssessment of **B**inaural **L**istening **E**ffort.

It extends ACQUA with the capability to assess the effort for perceiving speech signals from communication devices. For simulation of realistic scenarios, the speech signals are impaired by a background noise simulation system. The analysis and the assessment process follow the specifications according to ETSI TS 103 558.

Finally, ACQUA provides a straightforward MOS value to evaluate the performance of the communication device.

Description

The degree of perceived listening effort is a fundamental part of speech communication at the listener's position. In everyday situations, environmental noise typically impairs received speech signals. This issue concerns many present communication devices and technologies.

ABLE addresses the issue by providing reproducible and comparable results for the assessment of listening effort.

The prediction algorithm analyzes noisy speech signals and assesses corresponding listening effort that is necessary to follow a conversation. ACQUA provides the results as MOS (Mean Opinion Score) based on ITU-T P.800. The result values are in a range between 1.0 and 5.0. A higher value refers to lower required effort for listening to the speech signal and vice versa.

Category Description Listening Effort	Value
Complete relaxation possible; no effort required	5 (best)
Attention necessary; no appreciable effort required	4
Moderate effort required	3
Considerable effort required	2
No meaning understood with any feasible effort	1 (worst)

Categories and values for ABLE (based on ITU-T P.800)

Applications

- (Mobile) handsets[1]
- (ANC) headsets
- Hands-free devices
- In-car communication[1]

1 Incorporated in ETSI TS 103 558

General requirements

Hardware

- **HMS II.3 (Code 1230)**, HEAD measurement system
- **HIS L (Code 1231)**, HEAD impedance simulator, left ear
- ***lab*CORE (Code 7700)**, Modular multi-channel hardware platform incl.
  - ***core*BUS (Code 7710)**, *lab*CORE I/O mainboard
  - ***core*IN-Mic4 (Code 7730)**, Microphone input board

Further hardware depends on the device under test (DUT) and its applicable assessment configuration.

Software

- **ACQUA (Code 6810)**, Advanced communication analysis
- **Background noise simulation system**
  - **3PASS *lab* (Code 6990)**, Background noise simulation system

  or
  - **3PASS *flex* (Code 6995)**, Background noise simulation system

  Utilization of background noise simulation systems HAE-BGN or HAE-car is possible but not recommended.

ABLE

Key features

- Automatic and reproducible assessment of binaural listening effort
- Objective procedure for comprehensive and comparable testing based on Recommendation ITU-T P.800 MOS scoring

Configuration examples

The examples demonstrate typical applications of ABLE.

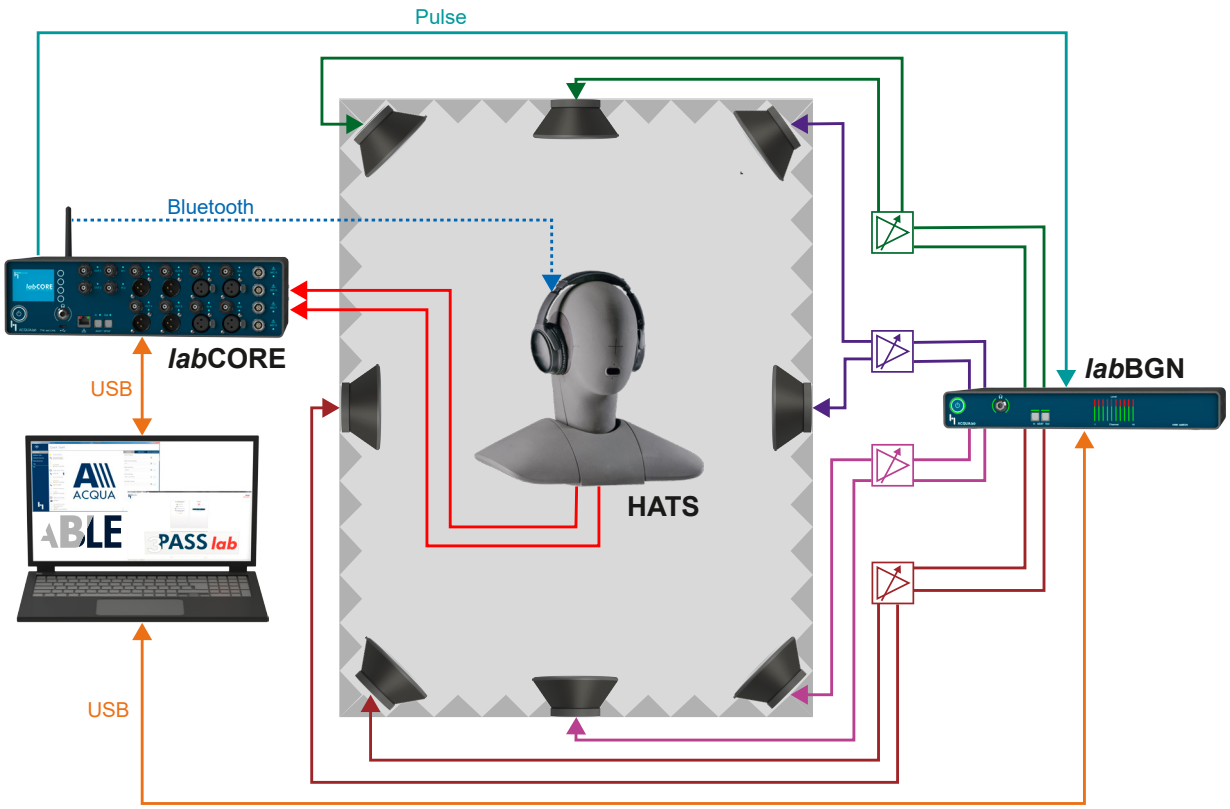
The first example shows the use of ABLE in a an anechoic room, assessing an ANC headset.

The second example presents the application of ABLE in a car cabin, assessing an in-car communication system.

Delivery items

- ACOPT 37, Option ABLE, delivered as V2C file for ACQUA

ANC Headset assessment

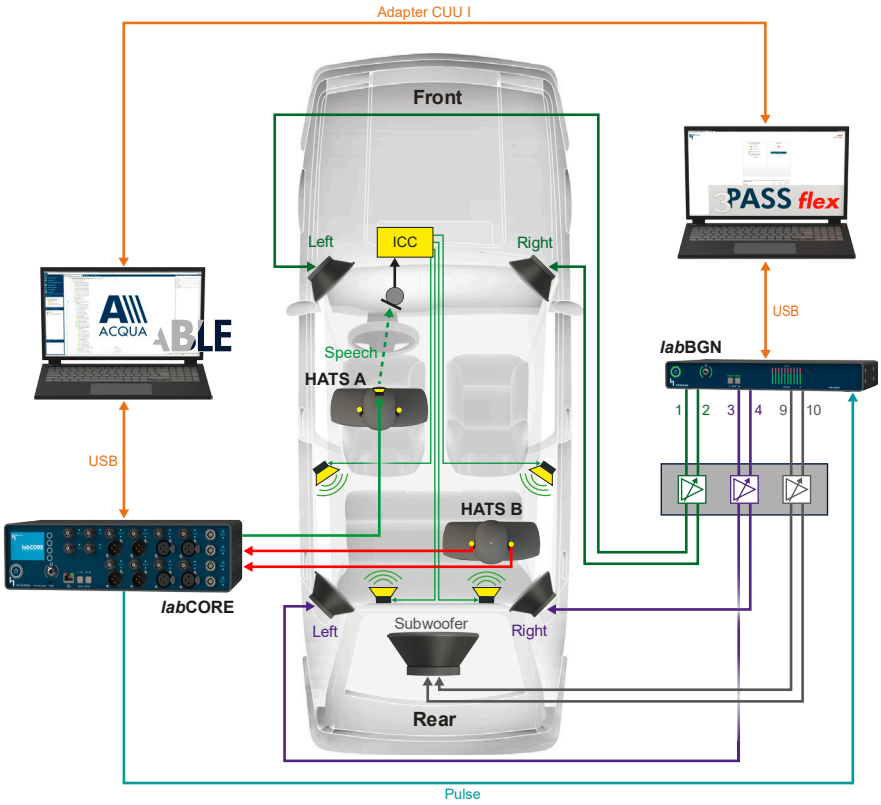


This example describes the assessment with ABLE of the active noise cancellation (ANC) performance from a headset including Bluetooth wireless technology. The assessment is carried out with ANC switched off and for comparison with ANC switched on.

*lab*CORE transmits a speech signal via Bluetooth to the ANC headset (DUT). Simultaneously, 3PASS *lab* plays back background noise. ACQUA receives the binaural recording (degraded speech signal) from the ear microphones of the HATS via *lab*CORE.

The objective prediction algorithm ABLE calculates a MOS score for the perceived listening effort based on the clean speech signal and the transmitted (processed) speech signal.

In-car communication (ICC) assessment



This example illustrates the assessment with ABLE of an in-car communication system. The assessment is executed with enabled as well as disabled ICC system for comparison.

*lab*CORE plays back a speech signal via HATS A inside a car cabin. 3PASS *flex* plays back driving noise at the same time. The ICC system receives the speech signal from HATS A and processes it. HATS B receives the reinforced speech signal from the ICC system, the direct speech signal from HATS A and the background noise. The recording is transferred via the connected *lab*CORE to ACQUA.

The objective prediction algorithm ABLE calculates a MOS score for the perceived listening effort based on the clean speech signal and the transmitted (processed) speech signal.