HEAD acoustics

DATA SHEET

Code 7041

SoundSeat II

Multimodal Playback for Vehicle Interior Noise and Vibrations (4DOF)

OVERVIEW

SoundSeat II

Code 7041

Multimodal Playback for Vehicle Interior Noise and Vibrations (4DOF)

Scientific studies have shown that the validity of a perceptual auditory assessment of vehicle interior noise is highly context-sensitive. Compared to headphones-only playback, the authenticity is significantly increased when the playback is experienced and interactively controlled in as realistic a simulation as possible.

Combining airborne and structure-borne sound reproduction with familiar vehicle components, such as the driver's seat, steering wheel, pedals, and gearshift, SoundSeat II provides a realistic driving experience. In combination with the interactive NVH simulator PreSense, SoundSeat II enables you to simulate the driving experience in a real vehicle. You accelerate, brake, and shift gears.

KEY FEATURES

Playback and Simulation

- Calibrated, 6-channel playback and simulation system
- Aurally-accurate playback of binaural signals via headphones or 3PASS
- Original playback of seat and steering wheel vibrations using shakers

Components

- Vibration excitation: Driver's seat (z-translation and x-translation) and steering wheel (z-rotation and x-rotation)
- Steering wheel motor for steering angle, force feedback, and steering wheel vibration (x-rotation)
- Compact, modular, and rollable design
- 19" rack for control unit, 4-channel shaker amplifier, two 2-channel playback equalizers for the shakers, and 2-channel playback equalizer for headphone playback
- Touchscreen on the side for operating the playback software PreSense (not included in the scope of delivery)
- Monitor mount (VESA standard), e.g., for displaying a visual road simulation

APPLICATIONS

Realistic experience and assessment of sounds and vibrations in the vehicle interior in an authentic context

- Playback system for the NVH simulator software PreSense
- Virtual engineering & prototyping
- Decision support during the development process
- Troubleshooting and target sound definition
- Benchmarking
- Increased immersion through tactile vibration feedback

DETAILS

Combining airborne and structure-borne sound reproduction in conjunction with real vehicle components, SoundSeat II provides a realistic driving experience.
With its calibrated, 6-channel playback and simulation system, SoundSeat II enables aurally-accurate playback of binaural signals via headphones or optional loudspeakers.
The test subject sits in a driver's seat with (non-axial) vibration excitation, navigating through the simulation using a leather steering wheel. In addition, SoundSeat II can be controlled via high-quality pedals for the accelerator and the brake as well as a gearshift for shifting gears.

The NVH simulator PreSense is played on a monitor in the field of view and can be operated via a touchscreen on the side.

SoundSeat II can be separated at the center and is mounted on castors, facilitating convenient transport of the system.
In order not to impair the sound experience of the simulation, only low-noise electronic components are used, which are installed in a separate 19" rack. The low-noise electronic components comprise a powerful computer as the central control unit, a 4-channel amplifier for the shakers, HXB-PreSense as the playback system including playback equalization for headphones, and two *lab*O2-V1 devices for vibration playback equalization.

SCOPE OF DELIVERY

› SoundSeat II (Code 7041)
Multimodal playback system for vehicle interior noise with 4DOF vibration excitation
  - » Vehicle seat with pedals, steering wheel, and gearshift
  - » High-performance computer with sound card for real-time playback of vehicle interior noise
  - » Shakers
  - » Amplifier for shakers
  - » Steering wheel motor with force feedback and vibration reproduction
  - » 19" rack
  - » Country-specific power adapter

Example configuration: SoundSeat II with 3Pass option

GENERAL REQUIREMENTS

Equalizer (Shaker)

› *lab*O2-V1 (Code 3731-V1)
  » Equalizer for 2-channel playback

Playback System with Equalizer

› HXB-PreSense (Code 7661)
  » Playback system with low latency for two equalized headphones and CAN interface

Touchscreen

› Touchscreen for interactive operation of the NVH simulation software PreSense

Monitor

› Monitor for visual road simulations (including speed and RPM display)

Software

› PreSense
  » NVH simulation software

One of the following headphones for aurally-accurate and equalized playback using HXB-PreSense
Open Headphones

› HD OP II.1 (Code 2512.1)
  » Transmission range: 8 Hz – 41500 Hz
› HD OP III.1 (Code 2513.1)
  » Transmission range: 4 Hz – 51000 Hz

Closed Headphones

› HD CL II.1 (Code 2522.1)
  » Transmission range: 5 Hz – 40000 Hz
› HD CL III.1 (Code 2523.1)
  » Transmission range: 6 Hz – 48000 Hz

Alternatively, playback can be performed using several loudspeakers with crosstalk compensation in compliance with ETSI TS 103 224 (3PASS technology)

› If you have any questions, your HEAD acoustics contact person is available to assist you.

HD OP II.1

HD OP III.1

HD CL II.1

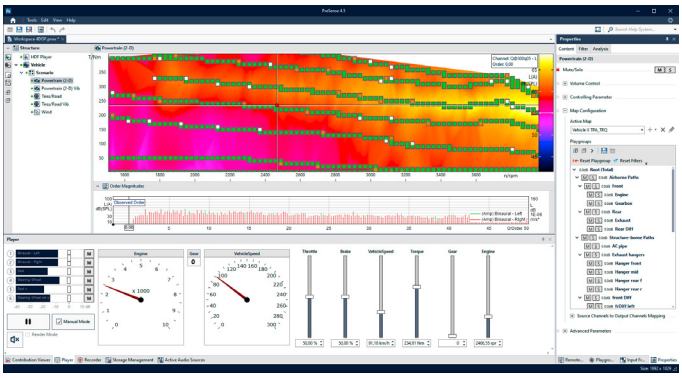
HD CL III.1

SOFTWARE

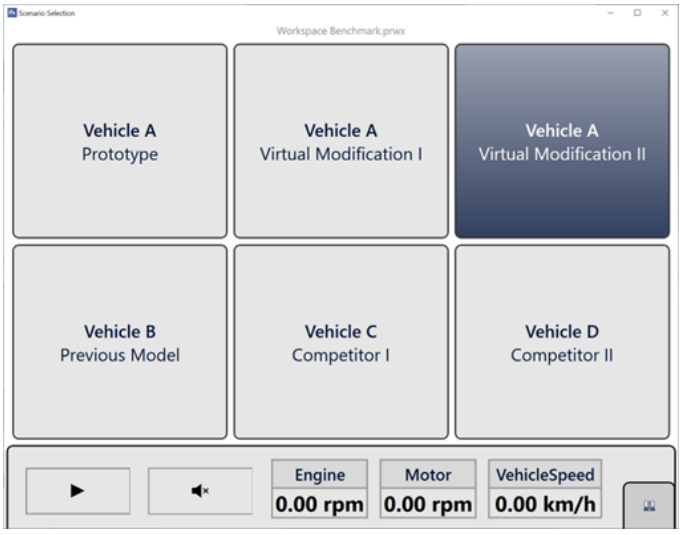
PreSense – NVH Simulation Software (Required)

In combination with the NVH simulator PreSense (Code 7600ff), SoundSeat II can be operated like a real vehicle. The test subject accelerates, shifts gears, and brakes, while the simulation dynamically adjusts the driving noise and vibrations to the current driving conditions in real time. Shakers ensure increased immersion and a more lifelike driving experience by means of tactile feedback from the steering wheel and seat vibrations while a large screen visually replicates real-world driving conditions.

During simulation, you can interactively switch between different vehicles and variants. Motors, components, and much more can be exchanged or acoustically modified. Changes are immediately audible, enabling reliable acoustic evaluation even without extensive specialist knowledge. The ability to actually experience sounds and vibrations enables fast, reliable decision-making and helps reduce costs.
For more information, please refer to the PreSense data sheet (Code 7600ff).



A touchscreen is attached to the control panel via a swivel arm, enabling convenient operation of PreSense, e.g., for switching between sound variants. During the driving simulation, PreSense renders a visual scene on a large screen positioned centrally behind the steering wheel and displays real-time driving parameters in the form of RPM and vehicle speed.



PLAYBACK VIA LOUDSPEAKERS WITH 3PASS

Calibrated and equalized playback of binaural signals from the NVH simulator PreSense using several loudspeakers and crosstalk suppression (ETSI TS 103 224)

As an option, SoundSeat II can be operated with loudspeakers instead of headphones. This may be the case, for example, if

- immersion is to be increased,
- playback of very low frequencies is to be optimized,
- or headphones are to be dispensed with for cultural or hygienic reasons.

PreSense provides calibrated and equalized playback of binaural signals with several loudspeakers and crosstalk compensation in compliance with ETSI TS 103 224 that transfers the binaural impression of the headphone playback to loudspeakers in the best possible way. Equalization is performed using the 3PASS software that provides an automated process.

The associated hardware is only required for the equalization process; playback is executed entirely by the PreSense software.

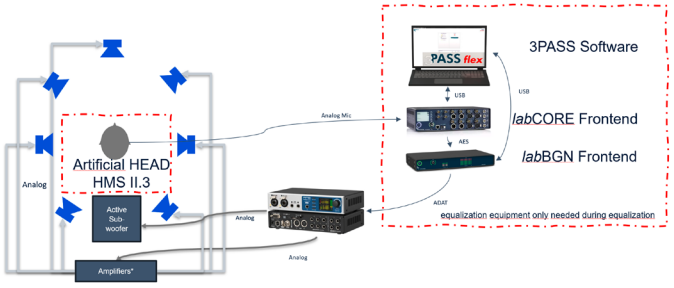
This enables even existing systems to be retrofitted or converted very easily. Depending on the application, a professional sound card and four or seven loudspeakers plus a subwoofer are sufficient.

Before commissioning, the loudspeakers must be calibrated at their positions in the room and the individual equalization filters determined. Re-equalization is only required if the loudspeakers are positioned differently or if relevant changes are made to the room acoustics.

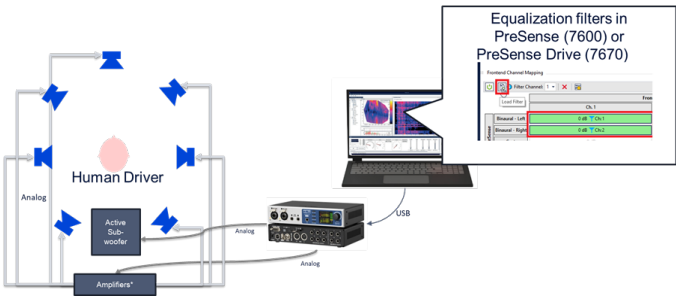
We offer all the equipment required for one-time calibration: HMS II.3 artificial head (or comparable) with *lab*CORE recording frontend, *lab*BGN playback frontend for test signals, and the 3PASS software that guides you quickly and easily through the equalization process.

There are two possible procedures for the equalization process:

- Independent equalization using existing and self-owned equipment.
- We offer loudspeaker equalization as a part of an Engineering Services project upon consultation.



Example configuration: equalization scenario



Example configuration: playback scenario

Components Required for the Equalization Scenario

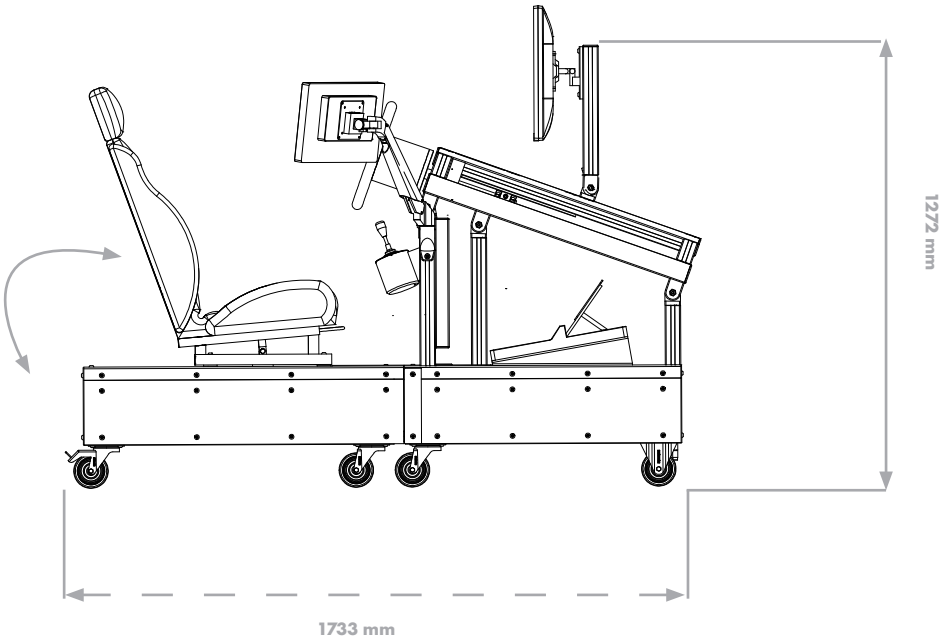
Code	Product	Description	Number
Software			
6995	3PASS *flex*	HEAD acoustics 3-dimensional Playback of Acoustic Sound Scenarios - Flex Version	1
Hardware			
7700	*lab*CORE	ACQUA*lab* Modular Multi-channel Hardware Platform for Speech and Audio Quality Testing	1
7710	coreBUS	*lab*CORE I/O Bus Mainboard	1
7730	coreIN-Mic4	*lab*CORE Input Module, Microphone (4 Channels)	1
7740	coreBEQ	*lab*CORE Binaural Equalization, incl. Filter Set for one Artificial Head	1
1703.2	HMS II.3 LN HEC	HEAD Measurement System, Low-Noise Version with Human Ear Canal Simulator Right and Artificial Mouth (incl. HTB VI HEAD Torso Box)	1
1231.3	HIS L-LN	HEAD Impedance Simulator, Left, Low-Noise Version, for HMS II.3, HMS II.4, and HMS II.5	1
6486	*lab*BGN	ACQUA*lab* (8+2)-channel Background Noise Hardware Platform for background noise reproduction	1
Cables and Accessories			
1223-10	CLL V.10	Cable LEMO I 7-pin male <> LEMO I 7-pin female, 1 pair, 10 m (red/black)	1
9825-1	CLW II.1	Fiber optic cable (ADAT) with TOSLINK connectors, 1 m	1

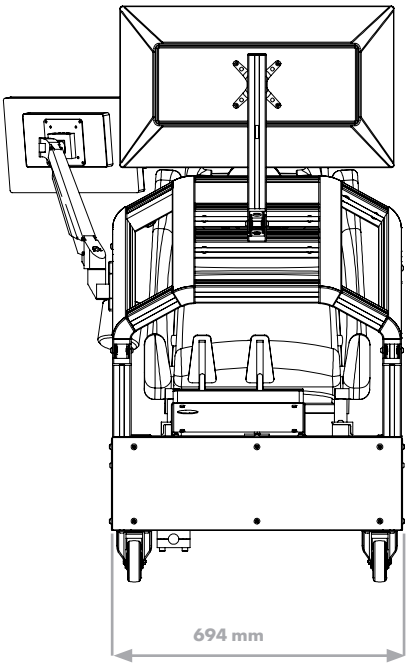
Components Required for the Playback Scenario

Code	Product	Description	Number
Sound card			
2408.1	RME Fireface UCX II	Sound card with 8 analog output channels	1
Loudspeaker			
H0233	Nubert NuLine24	Passive loudspeaker (1 pair)	4
H0234	Klipsch SPL-150	Active subwoofer	1
Amplifier			
–	QSC GX3	2-channel amplifier	4
Cables and Accessories			
H0377	aixFOAM HEIMKINOset	Home cinema set consisting of wall/ceiling and bass absorbers, room size up to 20 m², anthracite (optional)	1
H0378	Brennenstuhl 1165460	Power extension cable black H05VV-F 3G 1.5 mm², 10 m	
H0386	Cordial EY 0,3 VGG elements	Y adapter, 6.3 mm jack TRS male to 6.3 mm jack TS female 0.3 m	
H0387	BKL 072150-P	Banana plug, 4 mm, black	
–		Loudspeaker cable	7

DIMENSIONS

without accessories





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