

PRODUCT DATA

Sonoscout™ NVH Recorder BZ-5950

Sonoscout is an ultra-portable, multi-channel, wireless NVH recorder from Brüel & Kjær. It allows real-time recording validation with a simple touch of an iPad® screen. Sonoscout continuously displays test information, such as tachometer output, to maximise confidence during testing, and brings simple control and analysis to tasks such as comparing vehicle and data sets.

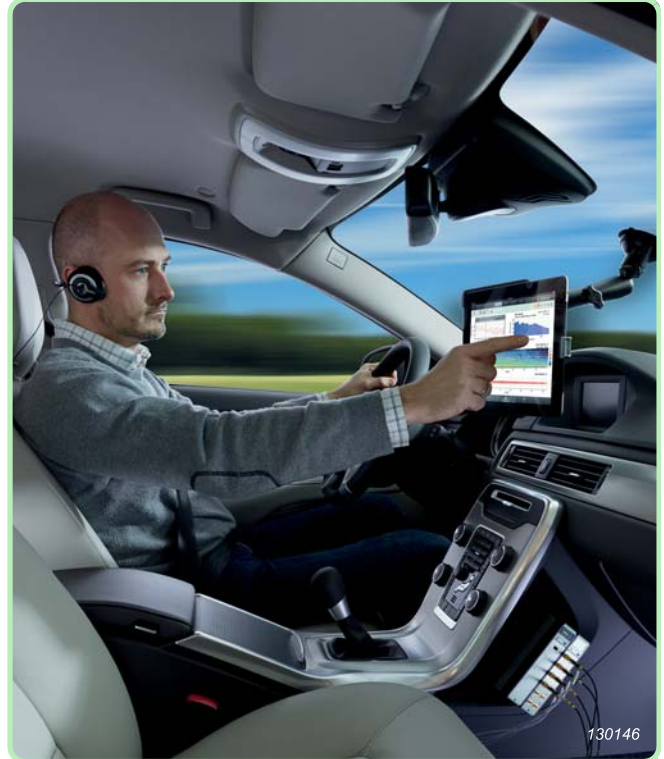
The Sonoscout system is a combination of an iPad app (BZ-5950-A) and a battery-powered acquisition front-end based on Brüel & Kjær's modular LAN-XI hardware. Placed anywhere, it connects to up to 12 measurement transducers that transmit data to the app to record data. A binaural microphone headset captures cabin sound in real-time and replays recordings immediately.

Try out the full recording and analyzer functionality without purchasing any additional hardware, using the 'virtual front-end' demonstration feature.

In addition, Sonoscout can be used for simple analysis functions like rotating machinery validation or benchmarking and is the perfect first step before exporting known data for further analysis in PULSE Reflex™, or other post-processing software.

The system runs on iPad 2 (iOS 6 or later) and uses one LAN-XI module (up to 12 channels) with data streaming directly to the mobile device.

It supports GPS and analog CAN signals and there is an optional Notar™ set-up mode for off-line recording and on-site data checking/analysis.



Uses and Features

Uses

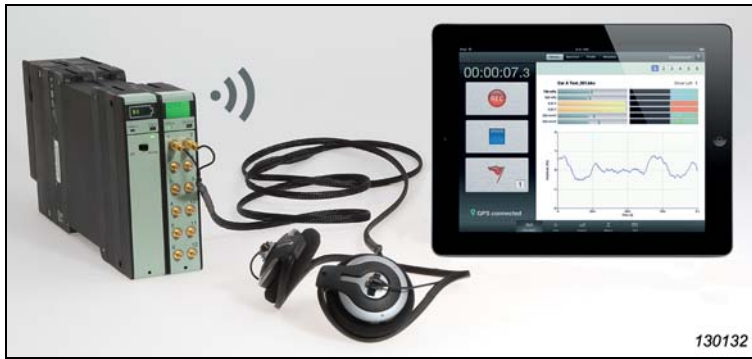
- Characterisation of NVH recordings
- Benchmarking
- Simple troubleshooting
- Creating PULSE NVH Simulator vehicle level models

Features

- Completely portable
- Free download from the App StoreSM
- Data recorder capable of recording up to 12 channels
- Wireless connection to front-end
- 'Virtual Front-end' demonstration feature
- SD card recording option using front-end
- Battery powered
- Pre-triggering and auto-stop
- Time history markers
- Two-channel playback for listening
- Narrow-band and 1/3-octave band analysis (synthesized)
- Spectrogram
- Order slicing
- GPS tracking
- Sound quality metrics
- Intuitive touch operation
- Save and export data in various file formats (BKC, WAV, PTI, HDF)
- Automated calibration procedure
- TEDS support
- Dyn-X compatible (excl. LAN-XI Module Type 3053-B-120)
- Analog CAN support (when used with CAN-to-Analogue Converter ZH-0700)

Description

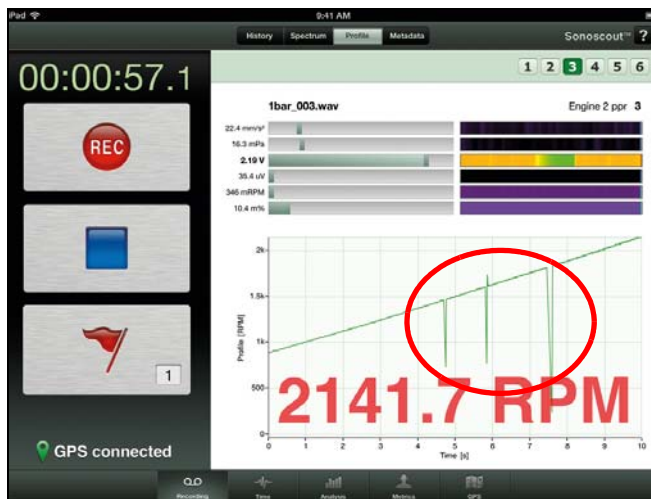
Fig. 1
Sonoscout NVH
Recorder system



Sonoscout NVH Recorder gives you full control of your measurements. Using a mobile device on the dashboard, you can see all the test information as it records for maximum confidence. Use the mobile device to take pictures and videos to document measurement conditions, then mount it on the dashboard, connect it wirelessly to the LAN-XI front-end*, and drive.

Be certain you have recorded the right data in the simplest way possible by listening with the wireless headphones and using multi-touch analysis such as pinching graphs to zoom in and out. FFT, synthesised 1/3-octave, order analysis and spectrogram analysis is included.

Fig. 2
Example Sonoscout
display showing tachometer
dropouts (circled)



Mobile analysis gives early confirmation when problems have been identified, for example, you can immediately identify tachometer dropouts (see Fig. 2). This allows you to optimise your test plan based on up-to-date results. You can then make easy confidence checks before sending data for further analysis in PULSE Reflex, or other post-processing software.

A typical system is shown in Fig. 1, where you can see the front-end combination connected wirelessly to the iPad.

The front-end combination consists of a LAN-XI Module Type 3050/53, a LAN-XI Battery Module Type 2831-A and a 1-module Wireless LAN Frame Type 3660-A-200.

Sonoscout App BZ-5950-A is free to download from the App Store and can be installed on an unlimited number of mobile devices. To start testing using a LAN-XI module, you need Sonoscout License BZ-5950-L, which is installed in the LAN-XI module. However, you can also run Sonoscout in Demo mode, which allows you to try the functionality of the Recording task without the need for a license (or a LAN-XI connected).

Binaural Recording Headphones – Equalisation for Loudness Function

Loudness calculation often requires the free-field pressure measured typically at the centre of the head, without the presence of the listener. The free-field pressure can be calculated from the recording of Binaural Recording Headphones Type 4965 by applying an equalization filter. The equalization filter is calculated from the diffuse-field response mounted on HATS Type 4100 in a diffuse sound field and the free-field response at zero degree frontal incidence in an anechoic room. This produces an accurate loudness estimation from the recordings of the Binaural Recording Headphones, and the filters are implemented as part of the Sonoscout solution.

The Sonoscout System

All Brüel & Kjær components incorporate high measurement quality and the Sonoscout system includes up to twelve input channels, TEDS and Dyn-X compatibility, a wireless front-end and battery powered operation.

The system comes in four variants:

- Type 3663-A-040: 4-channel Sonoscout LAN-XI Kit (incl. LAN-XI module, battery, frame and license)
- Type 3663-A-060: 6-channel Sonoscout LAN-XI Kit (incl. LAN-XI module, battery, frame and license)
- Type 3663-B-120: 12-channel Sonoscout LAN-XI Kit (incl. LAN-XI module, battery, frame and license)
- Type 3663-000: Sonoscout LAN-XI Kit (incl. battery, frame and license. No LAN-XI module – for users who already have a LAN-XI)

* Sonoscout supports Types 3050, 3052 and 3053 LAN-XI Front-ends. However, Types 3160 and 3056 have limited support in Sonoscout: only input channels are supported on Type 3160 and Type 3056 does not support high speed tachometer mode or auxiliary input channels.

Fig. 3
Inside the kit



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Fig. 3 shows the contents of Type 3663-A-060 kit. It includes:

- 6-ch. LAN-XI Input Module Type 3050-A-060
- LAN-XI Battery Module Type 2831-A
- Wireless LAN Frame Type 3660-A-200
- Sonoscout License BZ-5950-L
- Mains Charger ZG-0469
- Car Utility Socket Cable AO-0546

The Sonoscout case contains pre-configured compartments for a host of optional accessories (see ordering information).

Sonoscout Kit Types 3663-A-040, 3663-A-060 and 3663-A-120 are pre-configured and ready to plug and play when you receive them.

With Type 3663-A-000 you will receive your Sonoscout license on a USB stick in a hard case.

Functionality

The Sonoscout app incorporates basic NVH measurement tasks, including recording, time editing, analysis, sound quality metrics and GPS tracking. The user interface is divided into separate task interfaces as listed below

Record Task

Use this task to perform the following:

- Select and set up the front-end (for example, defining storage settings so you can stream directly to the mobile device, or save to SD card)
- Define tacho and analog CAN channels
- Auto-calibration
- Recording (with pre-triggering and auto-stop options)
- GPS recording
- Peak and level meters
- Real time waveforms, spectra and profiles whilst recording
- Multiple native file formats
- Use markers to identify specific events or sections
- Demo Mode for trying out the entire measurement process when a front-end is not available

Fig. 4
Record Task – typical views



Time Task

Use this task to perform the following:

- Display any recorded time file
- Transfer LAN-XI Notar files from SD card
- Transfer saved files on mobile device to PC
- Listen to any channel or pair of channels
- Use touch and multi-touch gestures to change the display
- Display tachometer signals as profiles
- Display analog CAN signals as profiles
- Edit time file: trim to a range

Fig. 5
Time Task – typical views



Analysis Task

Use this task to perform the following:

- Analysis using these methods:
 - Narrowband
 - 1/3-octave (synthesised)
 - Spectrogram
 - Order Cut
- Average over selected range or instantaneous spectra
- View spectra while listening – real-time 2D spectrum is displayed synchronised to the play cursor
- Use touch and multi-touch gestures to change the display
- Export results
- Import and display target curves

Fig. 6
Analysis Task – typical views

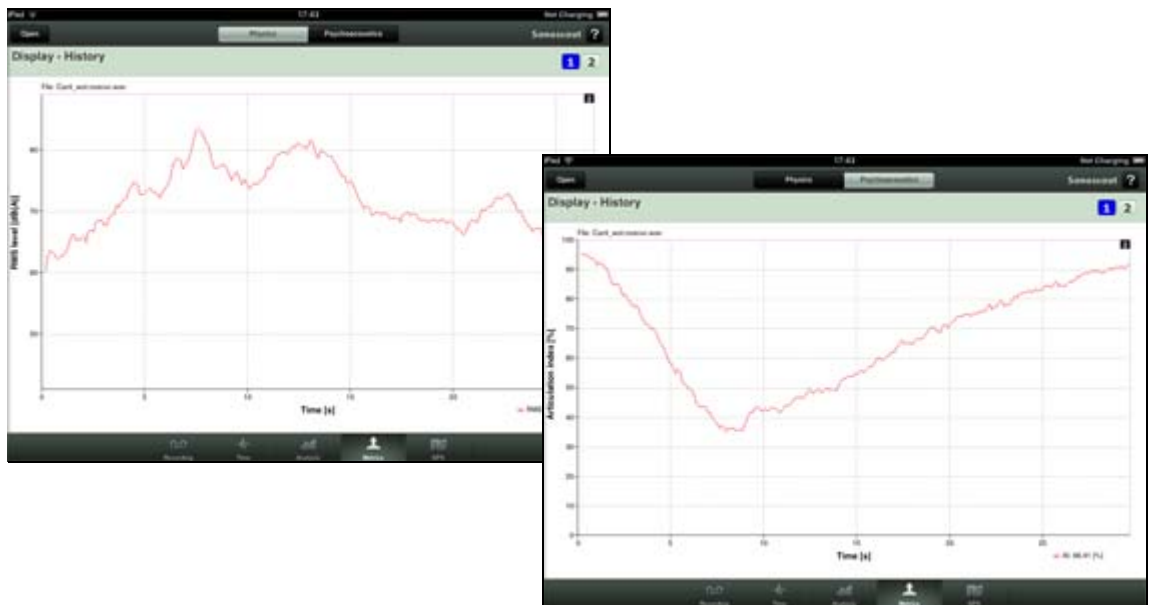


Metrics Task

Use this task to perform the following sound quality measurements:

- Physics (sound):
 - RMS level in dB: Linear or Weighted (A,B,C,D)
 - Level in a band in dB: Linear or Weighted (A,B,C,D)
- Physics (non-sound):
 - RMS level in units
 - Level in a band in units
- Psychoacoustics:
 - Loudness
 - Sharpness
 - Articulation Index
 - Roughness
 - Tonality
- Average values, or as a function of time, speed or rpm
- Export results
- Import and display target curves

Fig. 7
Metrics Task – typical views

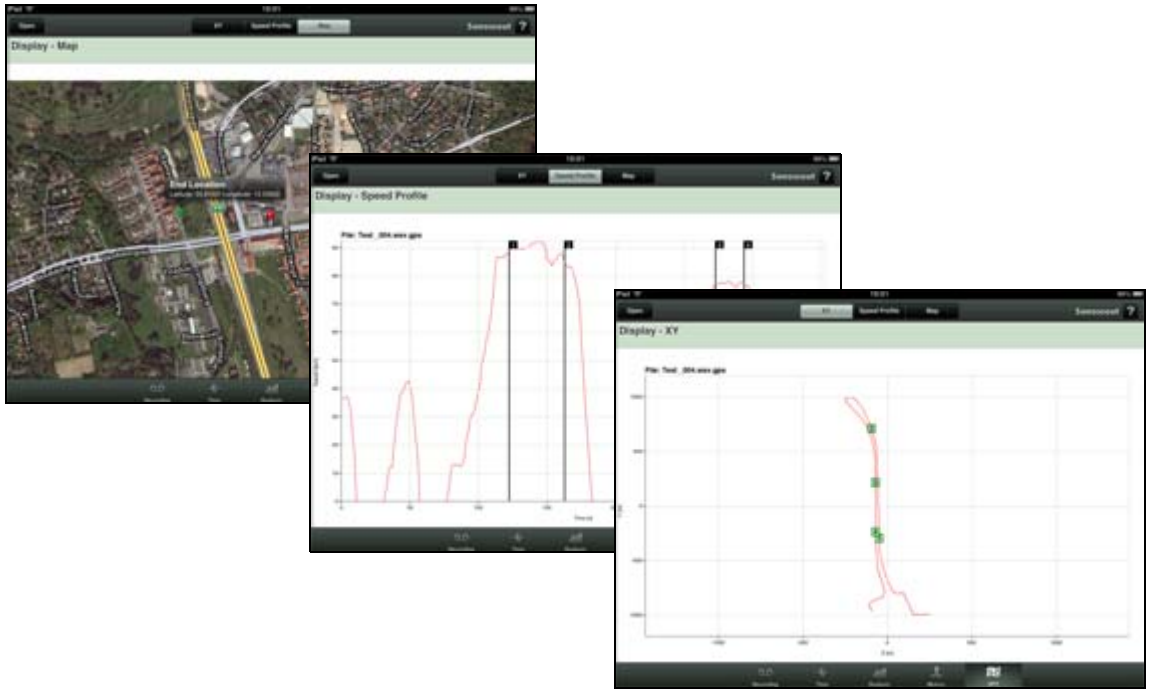


GPS Task

This task has the following options:

- Display the X-Y coordinates of the currently opened file
- Display the speed profile
- Display a hybrid map with the start and end positions marked (if you have Internet connection)
- Export file as a Keyhole Markup File (KML) file, which is automatically stored in the same folder as the original file, with same base-name

Fig. 8
GPS Task – typical
views



Note: If you have Google Earth™ installed, double-tap on the KML file and it will show you the measured route (including markers) superimposed on the satellite view.

Specifications – Sonoscout NVH Recorder BZ-5950

For hardware, the specifications, compliance with standards and service options can be found in the following Product Data:

- 4/6-ch. Input Module LAN-XI 51.2 kHz Type 3050 (BP 2330)
- 12-ch. Input Module LAN-XI 25.6 kHz Type 3053 (BP 2323)
- Generator, Input/Output Module LAN-XI 51.2 kHz Type 3160 (BP 2331) – only input channels supported
- 4-ch. Input/HS-Tacho + 8-ch. Aux. Module LAN-XI 51.2 kHz Type 3056 (BP 2422) – only input channels supported
- Battery Module for LAN-XI Type 2831-A (BP 2327)
- 1-module Wireless LAN Frame Type 3660-A-200 (BP 2474)
- LAN-XI Notar BZ-7848-A (BP 2328)
- Binaural Recording Headset (BP 2475)
- Sound Calibrator Type 4231 (BP 1311)
- Calibration Exciter Type 4294 (BP 2101)
- Sound Quality Head and Torso Simulator Type 4100/-D (BP 1436)

For hardware/software specifications of mobile devices and iOS 6, please refer to the relevant product support site on <http://www.apple.com/>

Requirements

Apple iPad running iOS 6 or later. Please see the compatibility table below:

| Device | Highest IOS Vers. | Processor | Usable | Limitations |
|---------------|-------------------|---------------------|--------|-------------|
| iPad | iOS 5.0.1 | 1.0 GHz single-core | ✘ | None |
| iPad 2* | iOS 6.0.1 | 1.0 GHz dual-core | ✓ | None |
| iPad 3rd Gen* | iOS 6.0.1 | 1.0 GHz dual-core | ✓ | None |
| iPad 4th Gen* | iOS 6.0.1 | 1.4 GHz dual-core | ✓ | None |
| iPad Mini* | iOS 6.0.2 | 1.0 GHz dual-core | ✓ | None |

* Recommended

Hardware Dimensions

FRONT-END COMBINATION

Length: 248 mm (9.76")
Width: 53 mm (2.09")
Height: 131 mm (5.16")
Weight: 2.03 kg (4.48 lb)

SONOSCOUT CASE (WITH SYSTEM COMPONENTS STORED INSIDE)

Length: 50 cm (19.69")
Width: 42.5 cm (16.73")
Height: 17 cm (6.69")
Weight: 5.81 kg (12.81 lb)

Recording

FREQUENCY RANGE

Maximum channel count and frequency range is dependent on the mobile device and LAN-XI module. For any dual-core mobile device the maximum frequency range is 102.4 kHz per channel (LAN-XI module dependent)

CALIBRATION

Automatic: Auto detection and calibration of all TEDS transducers on all Brüel & Kjær sound and vibration calibrators

Manual: For user-defined calibrators and non-TEDS transducers

MODES

Streaming to mobile device: Maximum length determined by space available

Notar: As defined in LAN-XI Notar BZ-7848-A (BP 2328)

REAL-TIME DISPLAYS

Channel monitor (time or FFT), channel peak level meter, channel peak level history, elapsed recording time, tachometer (time or profile), analog CAN profile, large digital readout of an RPM, speed or CAN signal

TRIGGERING

Start: Manual (with or without pre-triggering)

Stop: Manual or auto-stop after predefined time interval

EVENT MARKER

Markers can be defined during the recording. Each marker has a unique number

META-DATA

Editable user-definable information fields stored in the header of .BKC files and available for use in PULSE Reflex

NATIVE FILE FORMATS

.BKC, .WAV (24bit), .HDF, .PTI

Time data

DISPLAYS

Display time history or profile (rpm, speed, CAN) of 1,2,3,4 or all channels. Zoom using multi-touch or using editable settings. Range selection for replay or trimming

PLAYBACK

Select any 1 or 2 channels for listening. All sounds resampled to 44.1 kHz. Auto-crossfading during switching and at end of files to avoid clicks

FILES

Copy LAN-XI Notar files from the SD card to the mobile device

Export files to .BKC, .WAV, .HDF, .BUNV formats

Download files from the mobile device to a PC using a Web browser

Analysis

CALCULATIONS

FFT Lines: 400, 800, 1600, 3200, 6400, 12800, 25600

Frequency Range (Hz): 1600, 3200, 6400, 12800, 25600, 51200, 102400 (depending on LAN-XI module)

Band Types: Narrow-band, 1/3-octave (FFT)

Frequency Span (Hz): 200, 400, 800 (decimation using resampling and filtering)

Overlap %: 0, 25, 50, 66.67, 75

Averaging: Linear with Hanning window

Acoustic Weightings: Linear, A, B, C, D

DISPLAYS

Graph Types: Autospectrum (RMS), PSD, 1/3-octave (FFT Synthesis), Spectrogram, Order Cut

Axes:

X-axis Scale:

- linear
- logarithmic
- CPB

Y-axis Scale:

- linear
- logarithmic
- dB

Z-axis Scale:

- linear
- logarithmic

Layout: 1, 2, 3 or 4 display windows. Any graph type can be displayed in each window. Different files can be displayed in different windows. Linked cursors

Cursors:

2D:

- Time
- Level

3D:

- Time
- Level
- RPM
- Speed
- Order Number

Can be synchronised in different windows

Sound Quality Metrics

CALCULATIONS

Simple: Overall Level (Sound) in dB Linear, A, B, C, D. Level in a frequency band (Sound) in dB Linear, A, B, C, D. Overall Level (Vibration) in dB re 1, or in units

Sound Quality: Loudness (ISO 532B), Sharpness, Articulation Index from CPB calculation

Ordering Information

BZ-5950-A Sonoscout App (free download)

BZ-5950-L Sonoscout License

SONOSCOUT KITS

4-channel Sonoscout System

Type 3663-A-040 4-ch. Sonoscout LAN-XI Kit

Including the following software and hardware:

- Type 3050-A-040: 4-ch. Input Module LAN-XI 51.2 kHz (Mic, CCLD, V)
- Type 2831-A: Battery Module for LAN-XI (incl. Mains Charger ZG-0469 and DC Power Cable, Car Utility Socket Cable AO-0546)
- Type 3660-A-200: 1-module Wireless LAN Frame (for single LAN-XI module and Type 2831-A)
- BZ-5950-L: Sonoscout License
- KE-4333: Sonoscout Case

6-channel Sonoscout System

Type 3663-A-060 6-ch. Sonoscout LAN-XI Kit

Including the following software and hardware:

- Type 3050-A-060: 6-ch. Input Module LAN-XI 51.2 kHz (Mic, CCLD, V)
- Type 2831-A: Battery Module for LAN-XI (incl. Mains Charger ZG-0469 and DC Power Cable, Car Utility Socket Cable AO-0546)
- Type 3660-A-200: 1-module Wireless LAN Frame (for single LAN-XI module and Type 2831-A)
- BZ-5950-L: Sonoscout License
- KE-4333: Sonoscout Case

12-channel Sonoscout System

Type 3663-B-120 12-ch. Sonoscout LAN-XI Kit

Including the following software and hardware:

- Type 3053-B-120: 12-ch. Input Module LAN-XI 25.6 kHz (CCLD, V)
- Type 2831-A: Battery Module for LAN-XI (incl. Mains Charger ZG-0469 and DC Power Cable, Car Utility Socket Cable AO-0546)
- Type 3660-A-200: 1-module Wireless LAN Frame (for single LAN-XI module and Type 2831-A)
- BZ-5950-L: Sonoscout License
- KE-4333: Sonoscout Case

TRADEMARKS

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DISPLAYS

Table of average values or plot as function of time, rpm or speed

GPS

RECORDING

GPS coordinates from mobile device's built-in to GPS unit. Update rate determined by the mobile device

DISPLAYS

X-Y plot of coordinates, Speed profile and satellite map showing starting point for the recording

Speed profile can be appended to the time history file as an additional channel

Basic Sonoscout System (excluding LAN-XI module)

Type 3663-000 Sonoscout LAN-XI Kit

Including the following software and hardware:

- Type 2831-A: Battery Module for LAN-XI
- Type 3660-A-200: 1-module Wireless LAN Frame (for single LAN-XI module and Type 2831-A)
- BZ-5950-L: Sonoscout License
- KE-4333: Sonoscout Case

OPTIONAL ACCESSORIES

UL-1029

iPad

BZ-7848-A

LAN-XI Notar

Type 4231

Sound Calibrator

Type 4294

Calibration Exciter

KE-4333

Sonoscout Case

Type 4100-D

Sound Quality HATS

Type 3660-A-200

1-module Wireless LAN Frame

Type 4965

Binaural Recording Headset

ZH-0700

4-ch. CAN to Analogue Converter

Included in ZH-0700:

- AO-0760-D-005: Cable, 4-ch. analogue output, 25-pin sub-D (M) to 4-way SMB (M), 0.5 m (1.7 ft), +70°C (158°F)
- 4 × JP-0076: Adaptor, SMB (M) to BNC (M), 50 Ω Transducers (as required) – refer to relevant documentation

Service

Service products are covered by LAN-XI service items

RECOMMENDED THIRD-PARTY ACCESSORIES

RAM-B-166-C-202 Suction Mount for attaching iPad to car windscreen

RAM-HOL-AP8U Cradle for iPad (part of above mounting bracket)

– Available from RAM® Mounts (www.rammount.com)

