PRODUCT INFORMATION

PULSE Beamforming System with 18-channel Sector Wheel Array
Based on Beamforming Type 8608

Beamforming is one of a suite of systems developed for noise source identification.

Based on one simple measurement, the system provides an acoustical map of noise sources by using an array of microphones to detect the direction of arrival of sound from the sources to the array.

Uses, Features and Benefits

Uses
• Basic system for beamforming measurements which can be expanded with holography
• Noise source identification
• Troubleshooting investigations
• Squeak and rattle testing
• Industrial plant noise measurement

Features
• Quick snapshot measurement
• Built-in high-resolution camera
• Wide frequency range of use
• Frequency range can be extended to 20 kHz by using high frequency microphones

Benefits
• Rapid evaluation of noise problems saves time
• Independent operation for up to 7 hours using internal battery
• Robust array suitable for on-site use
• Provides fully operative 18-channel FFT analyzer for other sound and vibration applications
The measurement is performed using a planar, sector wheel array of 18 microphones (see Fig. 2).

The microphone positions have been numerically optimized to maximize the dynamic depth of the map, that is, to minimize the levels of the ghost images produced by side lobes.

In use, the array is usually pointed at the source under test at a distance of 0.7 times the array’s diameter, $D$, in order to obtain optimal spatial resolution.

The relationship between distance to the source, $L$, the spatial resolution, $R$, and the wavelength of interest, $\lambda$, is given by:

$$ R_{\text{Axial}} \geq \frac{0.7 L}{D \lambda} $$
Performance

The frequency range provided by the 18-channel system depends on the algorithms installed.

In the basic entry level system, which includes delay and sum (DAS) beamforming, the useful frequency range is typically from 1 kHz to 10 kHz.

With the Refined Beamforming option, the range is typically 500 Hz to 10 kHz and with the Wideband Holography option, it is typically 100 Hz to 10 kHz.

Note that with the Wideband Holography option and the classical Acoustic Holography option, there are restrictions on the positioning of the array relative to the source in order to produce optimal results.

Fig. 3
Results from measurements on a pump at 1 kHz third-octave band: Left: basic DAS; Centre: Refined Beamforming; Right: Wideband Holography. The colour scale in the contour plots is in steps of 1 dB

Specifications – PULSE Beamforming System with 18-channel Sector Wheel Array

Configuration

OPERATING SYSTEM REQUIREMENTS
Microsoft® Windows® 10 Pro or Enterprise (x64), Windows® 8.1 Pro or Enterprise (x64), Windows® 7 Pro, Enterprise or Ultimate (SP1) (x64)

OTHER SOFTWARE REQUIREMENTS
Microsoft® Office 2007 SP2 (x32), Office 2010 SP2 (x32), Office 2013 (x32), or Office 2016 SP2 (x32) and (x64)
Microsoft® SQL Server® 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2012 R2, SQL Server 2014 or SQL Server 2014 Express (SP1) (included in PULSE installation)

COMPUTER CONFIGURATION/DATA ACQUISITION FRONT-ENDS
As for PULSE software, see System Data BU 0229
Ordering Information

Typical System

**PULSE HARDWARE**
- Type 3660-C-100: 5-module LAN-XI Front-end Frame with GPS
- Type 3050-A-060: 6-ch. Input Module LAN-XI 51.2 kHz (Mic, CCLD, V)
- Type 3053-B-120: 12-ch. LAN-XI Module (CCLD, V)
- UA-2112-060: LAN-XI Front Panel, detachable, 6-ch. Mic Arrays, 1 × 7-pin (F) connector
- UA-2112-120: LAN-XI Front Panel, detachable, 12-ch. Mic Arrays, 2 × 7-pin (F) connectors
- 2 × UA-2203: Blank Module for LAN-XI Front-end Frame

**BATTERY**
- Type 2831-A: Battery Module for LAN-XI, including Mains Charger ZG-0469 and Adaptor ZH-0686

**PULSE SOFTWARE**
- Type 8608-N: PULSE Array Acoustics Beamforming, node-locked licence
- Type 7770-N: PULSE FFT Analysis, node-locked licence
- Type 7761-N: PULSE Acoustic Test Consultant, node-locked licence
- Type 3099-A-N1: PULSE LAN-XI Single Module Front-end Driver, node-locked licence

**SOFTWARE MAINTENANCE AND SUPPORT**
- M1-8608-N: Annual Software Maintenance and Support Agreement for PULSE Array Acoustics Beamforming, node-locked licence
- M1-7770-N: Annual Software Maintenance and Support Agreement for PULSE FFT Analysis, node-locked licence
- M1-7761-N: Annual Software Maintenance and Support Agreement for PULSE Acoustic Test Consultant, node-locked licence

**INCLUDED ARRAY**
- WA-1558-W-021: 18-ch. Sector Wheel Array (for Beamforming and SONAH), size: 0.35 m (1.15 ft)
- 18 × Type 4957: 10 kHz Array Microphone
- WL-1297-W-004: Bundle of 3 × WL-1297-D-050 cables, 5 m (16.40 ft)
- WQ-2691: Tripod

Optional Accessories

**SOFTWARE**
- BZ-5635-X*: PULSE Array Acoustics Quasi-stationary Calculations
- BZ-5636-X*: PULSE Array Acoustics Transient Calculations
- BZ-5639-X*: PULSE Array Acoustics Refined Beamforming Calculations
- BZ-5644-X*: PULSE Array Acoustics Wideband Holography
- Type 8607: PULSE Array Acoustics Acoustic Holography

**TRANSDUCERS**
- Type 4958: 20 kHz Miniature TEDS Microphone, 11.2 mV/Pa, 10 Hz to 20 kHz, pre-polarized

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* X = Licence model either N for node-locked or F for floating

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