PULSE Array Acoustics, Refined Beamforming Calculations BZ-5639

Uses

- Noise source identification (NSI) requiring high spatial resolution
- Measurements on factory sites, cars, engines and gearboxes
- Mapping of contributions from car-exterior aerodynamic sources to an in-cabin reference signal using CLEAN-SC
- Measurements in wind tunnels; pressure contribution at array, reference contribution at the driver's ear

Features

- Option for PULSE Array Acoustics, Beamforming Type 8608 and Sperical Beamforming Type 8606
- Compatible with systems using sliced wheel, pentangular and other multi-armed arrays
- Patented method uses non-negative least squares (NNLS) and CLEAN based on Source Coherence (CLEAN-SC) deconvolution algorithms
- Improved resolution at low frequencies
- Reduced side lobe effect at high frequencies

Benefits

- Detailed acoustical noise maps enable qualified decisions

PULSE Array Acoustics, Refined Beamforming Calculations BZ-5639 is an option for PULSE Array Acoustics, Beamforming Type 8608 and Spherical Beamforming Type 8606 (see Product Data BP 2144). BZ-5639 adds CLEAN-SC algorithm capabilities to the Filter and Sum (FAS) algorithm of Type 8606.

This option was developed for use in wind-tunnel measurements but has many outdoor applications such as measurements on wind turbines and trains. For example, it is an important component in PULSE Array Acoustics, Flyover Moving Source Beamforming BZ-5940 (Product Data BP 2537).

Standard Versus Refined Beamforming

Standard beamforming measurements using the Delay and Sum (DAS) algorithm typically reconstruct measured sound sources with poor resolution at low frequencies. Better resolution can be achieved at high frequencies, but ghost sources appear due to side lobe effects.

BZ-5639 uses a coordinate transform in the source plane and deconvolution algorithms (NNLS or CLEAN-SC) to produce detailed acoustical noise maps of sound sources.

Both algorithms can improve the spatial resolution of noise maps by a factor of three to five depending on the geometry of the sound source, see Table 1.

CLEAN-SC is recommended for wind tunnel measurements that have many non-coherent sources, while NNLS is better for engine test cell applications that have many coherent sources.

Fig. 1 *Typical beamforming measurement setup*

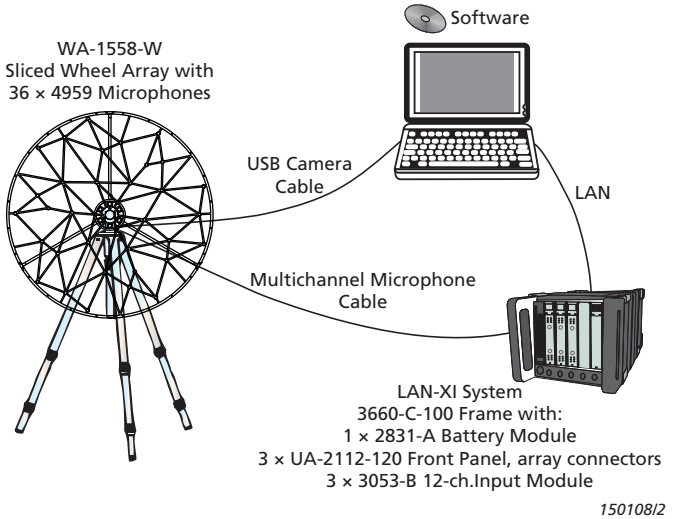

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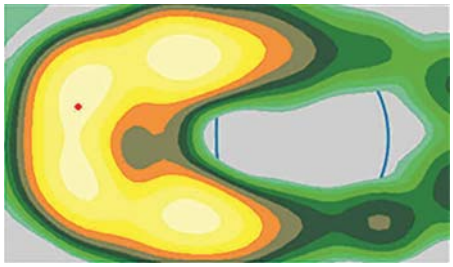
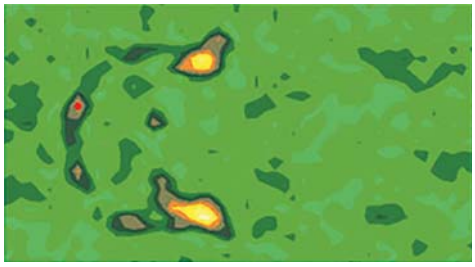
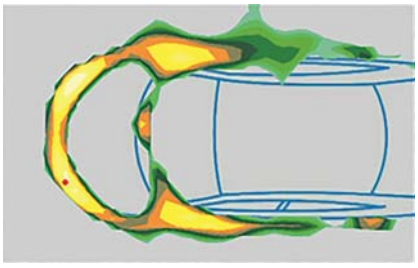
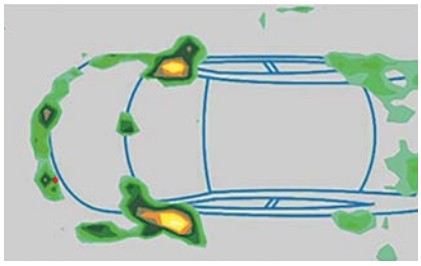
Table 1 *Comparison of DAS and NNLS algorithms, showing increased resolution at low frequencies and and reduced noise at high frequencies*

	1000 Hz	8000 Hz
DAS		
NNLS		

Specifications – PULSE Array Acoustics, Refined Beamforming Calculations BZ-5639

SOFTWARE PREREQUISITES
- Type 8608-N: PULSE Array Acoustics, Beamforming
- Type 7770-N: PULSE FFT Analysis
- Type 7761-N: PULSE Acoustic Test Consultant
- Type 3099-A-N: PULSE Front-end Driver

OPERATING SYSTEM REQUIREMENTS
As for PULSE, see System Data BU 0229

MICROSOFT OFFICE
As for PULSE, see System Data BU 0229

MICROSOFT SQL SERVER
As for PULSE, see System Data BU 0229

COMPUTER CONFIGURATION
As for PULSE, see System Data BU 0229

DATA ACQUISITION FRONT-END CONFIGURATION
As for LAN-XI, see Product Data BP 2215

Ordering Information

BZ-5639-N PULSE Array Acoustics, Refined Beamforming

Typical 36-channel system*

PULSE SOFTWARE†
- Type 8608-N: PULSE Array Acoustics, Beamforming
- BZ-5639-N: PULSE Array Acoustics, Refined Beamforming
- Type 7770-N: PULSE FFT Analysis
- Type 7761-N: PULSE Acoustic Test Consultant
- Type 3099-A-N: PULSE Front-end Driver

PULSE DATA ACQUISITION HARDWARE
- Type 3660-C-100: LAN-XI Mainframe with GPS, 5 modules
- 3 × UA-2112-120: LAN-XI Front Panel with array connectors, 2 × LEMO (7-pin), 12-ch.
- 3 × 3053-B-120: LAN-XI 12-channel Input Module, 25.6 kHz (CCLD, V)
- 1 × Type 2831-A Battery Module

SLICED WHEEL ARRAY BEAMFORMER
- WA-1558-W-xxx: 36-channel sliced wheel array with camera and specified diameter
- WL-1297-W-008: Bundle of 6 LEMO-to-LEMO cables, 5 m collected in braided sleeve with individual numbering
- WA-0728: 6-channel Pistonphone Adaptor
- Type 4228: Pistonphone

SOFTWARE MAINTENANCE AND SUPPORT
Available for all software packages. See the PULSE Software Maintenance and Support Agreement Product Data (BP 1800) for further details.
- M1-5639-N: Maintenance and support for BZ-5639-N, one year
- M1-8608-N: Maintenance and support for Type 8608-N, one year
- M1-7770-N: Maintenance and support for Type 7770-N, one year
- M1-7761-N: Maintenance and support for Type 7761-N, one year
- M1-3099-A-N: Maintenance and support for Type 3099-A-N, one year

* Ordered via Project Sales Office, visit bksv.com/contact for local contact information

† The following documents contain information on the typical system's software components:
Product Data: PULSE Array-based Noise Source Identification Solutions (BP 2144), including Beamforming Type 8608 and Acoustic Holography Type 8607
System Data: Software for PULSE (BU 0229), including Type 7770
Product Data: Acoustic Test Consultant with Noise Source Identification Type 7761 (BP 1908)
Product Data: PULSE Front-end Driver Type 3099-A (BP 2398)

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