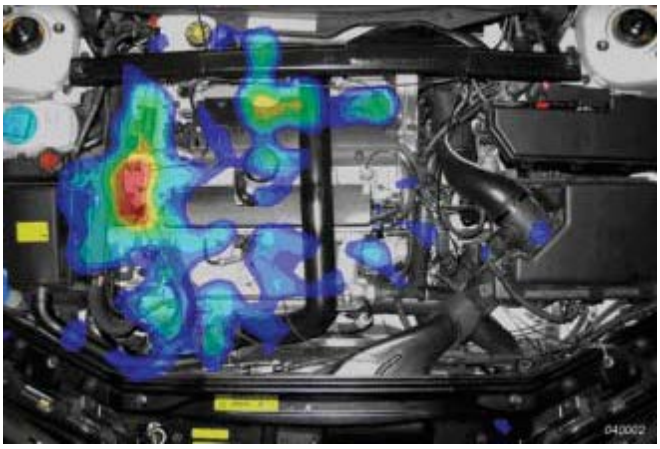
Acoustic Holography and Beamforming techniques for noise source identification

A complete PULSE-based system consists of the following main components:

- 20 kHz precision array microphone. Type 4958 is a ¼" prepolarized microphone suited for use in systems requiring a large number of microphones, for example, beamforming arrays, STSF measurements, and non-stationary STSF measurements. These microphones have excellent amplitude and phase-matching over wide ranges of temperature and humidity.
- Module frame. Unifies 5 LAN-XI modules in one portable frame. Module frames are the backbone of the LAN-XI platform, easily networking together to provide systems of 1000+ channels and more.
- Multi-purpose 6-channel input module. This module is designed to cover as many sound and vibration measurement applications as possible.
- High-density 12-channel input module. A 12-channel input module that delivers a compact and cost-efficient solution for high channel count applications.
- Battery module. A rechargeable Li-Ion battery that can power a single LAN-XI module or fit into a module frame. Featuring the same dimensions as all LAN-XI modules, this battery module can quickly attach to any standard analyzer module, or slot into a frame.
- Pistonphone. Type 4228 provides quick and accurate calibration of sound measuring equipment including sound level meters.
- A complete 18-channel combination array with a 35 cm diameter.
- Dell Latitude E6430. Equipped with a 14”display, the Latitude E6430 strikes the perfect balance of mobility, performance, and durability. Armored with a MIL-STD 810G tested Tri-Metal™ casing, anodized aluminum display back, magnesium alloy wrapped corners, steel hinges, and a powder-coated base, the Latitude E6430 can handle work’s tough demands. StrikeZone™ shock absorber, Fast Response Free-Fall Sensor, and rubber hard drive

isolation help protect data from drops and vibration, while the spill-resistant keyboard and LCD protective seal further help protect the system from bumps and spills.

- The basic Acoustic Test Consultant software has a separate robot option that makes the measurement process fully automatic, and a position detection option to determine the positions of microphones in a hand-held microphone array.
- Near-field acoustic holography maps noise sources using a complete sampling of the sound field. The method is very accurate and allows any property of the sound field like sound pressure, sound intensity or particle velocity to be calculated in any plane parallel to the measurement plane. This method has excellent resolution and maintains its source separation capabilities even at low frequencies.
- PULSE Refined Beamforming Calculations. When the object under test is composed of non-coherent sources, the PULSE Refined Beamforming Calculations can be used to improve the spatial resolution of the noise maps by a factor of three.
- FFT Analysis. Allows real-time, multi-channel FFT spectrum analysis, whether you want to perform mobility measurements, vibration diagnostics, or narrow-band analysis of acoustic signals.
- Time Data Recording. PULSE Data Recorder Type 7701 is recording at the same time as performing real-time analysis.



Averaged 6.3 kHz, 1/3-octave band for a car engine