

## Impulse Noise Evaluation System

System for measuring impulse noise based on PULSE™ Impulse Noise Evaluation Type 7963

*Accurate impulsive noise measurements for small firearms performed quickly and simply with a mobile battery-driven system.*



### Uses and Benefits

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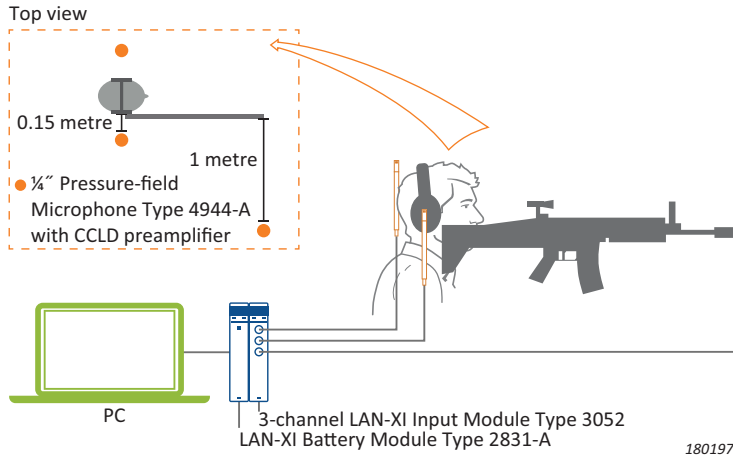
#### Uses

- Accurate measuring and reporting unsuppressed and suppressed firearms impulse noise in accordance with US MIL-STD-1474-D (1997) and US MIL-STD-1474-E (2015)
- Evaluation of firearms noise exposure based on accurate impulse noise measurements
- Measuring impulse noise peak values to compare and evaluate various prototypes
- Show and illustrate to customer the peak values of various rifles, pistols, suppressors and compensators
- Calculation of impulse noise limit category

#### Benefits

- Triggering function for sound pressure level reduces incidence of false recordings
- Enables quick comparison of impulse events
- Simple measurement procedure for multiple shots and for different combinations of small arms, silencers, ammunition, etc.
- User interface is easy to use, which means minimal training of personnel required

**Fig. 1**  
Typical system setup

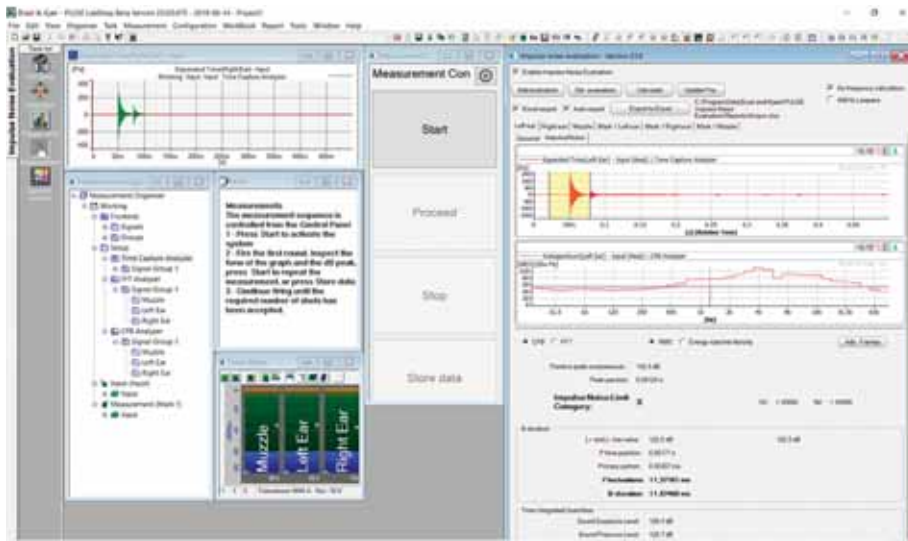


The complete portable system uses three ¼" microphones for simultaneous measurements at the left and right ear and the muzzle. After each shot, the noise parameters are calculated and displayed immediately. Full documentation of the shooting session is available in a Microsoft® Excel® report.

All the necessary hardware is contained in the Impulse Noise Hardware Kit UA-4133 and all the software in PULSE Impulse Noise Evaluation Type 7963, the heart of the Impulse Noise Evaluation system. It is here that the measurements are controlled and the calculations performed.

**The Software**

**Fig. 2**  
The template for Impulse Noise Evaluation includes measurements and calculations in real time



**Table 1**  
Complete list of available measurement results with Type 7963

MIL-1474-D 1997 A-duration, B-duration, Impulse noise limit category	ANSI S12.7 Sound exposure level, such as written Lx, where x is the frequency weighting	ANSI S12.7 FFT/CPB spectra	MIL-1474-E ARU (auditory risk unit) as measured with AHAH (auditory hazard assessment algorithm for humans)	MIL-1474-E Equal energy equivalent averaged over 100 ms intervals (LIAeq100ms). 'I' refers to an impulse, not a time weighting	Overall Peak Level Plot of Pa vs seconds. The peak level is measured in Lzpeak
Full support	Full support	Full support	Exports time history to AHAH	Full support	Full support

## The Hardware

The system's LAN-XI data acquisition hardware conforms to all relevant standards, with a sampling rate of 262,144 samples/second.

**Table 2**  
Sampling rates specified by standards

	MIL-1474-D	MIL-1474-E
<b>Specified Sampling Rate</b>	Min. 160,000 samples/s	Min. 192,000 samples/s

## Specifications – Impulse Noise Evaluation System

For complete hardware specifications, including compliance information, see product data [BP 2215](#)

### Configuration

#### PC SYSTEM REQUIREMENTS

- Microsoft® Windows® 10 Pro or Enterprise (x64) with either Current Branch (CB) or Current Branch for Business (CBB) servicing model
- Microsoft® Office 2016 (x32 or x64) or Office 2019 (x32 or x64)
- Microsoft® SQL Server® 2017 or SQL Server® 2019

#### RECOMMENDED MINIMUM PC

- Intel® Core™ i7, 3 GHz processor or better
- 32 GB RAM
- 480 GB Solid State Drive (SSD) with 20 GB free space, or better
- 1 Gbit Ethernet network\*
- Microsoft® Windows® 10 Pro or Enterprise (x64) with CB
- Microsoft® Office 2016 (x32)
- Microsoft® SQL Server® 2017
- Screen resolution of 1920 × 1080 pixels (full HD)

#### FRONT END

One or more LAN-XI data acquisition modules (stand-alone or in frame). A standard system contains Impulse Noise Hardware Kit UA-4133, which includes 1 × LAN-XI 3-ch. Input Module Type 3052.

**Sampling Rate:** 262 k samples/s

#### SOFTWARE REQUIREMENTS

All required software is included in the system software package

### Microphone Type 4944-A

The main specifications are listed here. For full microphone specifications, see product data [BP 1892](#)

#### NOMINAL DIAMETER

¼-inch

#### SENSITIVITY (250 HZ)

-61 ±3 dB re 1 V/Pa, 0.9 mV/Pa

#### FREQUENCY RESPONSE (individually calibrated)

**Pressure-field Response:** 16 Hz to 70 kHz: ±2 dB

**Lower Limiting Frequency:** (-3 dB): 7 to 9 Hz

#### THERMAL NOISE

48 dB(A), 58 dB (Lin., 20 to 100 kHz)

\* A dedicated data acquisition network (LAN or WAN) is recommended. A network that only handles data from the front end improves the stability of the data

#### UPPER LIMIT OF DYNAMIC RANGE

>169 dB SPL (3% distortion) (>5.637 Pa)

#### MAXIMUM SOUND PRESSURE LEVEL

182 dB (peak) (25.178 Pa)

### Calibration

Calibration is performed using the software's Calibration Master that automatically initiates calibration while you move the calibrator from one microphone to the next. The full calibration history for a transducer can be retained in the Transducer Database that allows monitoring of calibration data variations over a period of time. Global calibration allows you to build up a calibration database that is shared across all projects

### Calculations

#### PARAMETERS

**Peak Position:** The time stamp of the peak and its dB value

**Impulse Noise Limit Category:** Calculated for peak sound pressure level and B-duration

#### SIGNAL RISE TIME

**90% Peak:** The time stamp of the 90% peak value and its dB value

**10% Peak:** The time stamp of the 10% peak value and its dB value

**Signal Rise Time:** The signal rise time in ms

#### BANDWIDTH

**10% Peak Left and 10% Peak Right:** The 3 dB down points and their dB values

**A-duration:** The calculated A-duration in ms

#### B-DURATION

**L+ and L- Line Value:** 20 dB down points

**P Time Position:** The end time of the primary portion

**Primary Portion (ms):** The time when the overpressure lies outside the L+ and L- band

**B-duration + Fluctuation:** The B-duration (primary portion + fluctuations) and the fluctuations in ms

#### TIME-INTEGRATED QUANTITIES

**Sound Exposure Level:** The sound exposure level (SEL) integrated over the selected time interval

**Sound Pressure Level:** Time-averaged sound pressure level (SPL) over the selected time interval

### Reporting of Measurements

After each test shot, measurements can be saved in the project and/or exported to Microsoft® Excel®. The standard Excel template supplied with the system can be modified to suit the user's needs

## Ordering Information

The Impulse Noise Evaluation System comprises the following hardware, software and services

### System Hardware

#### UA-4133 Impulse Noise Hardware Kit

The kit, weighing 5.5 kg (12.1 lb), contains the following:

- Type 3052-A-030: LAN-XI 3-ch. Input Module, 102.4 kHz (supporting Mic, CCLD, V)
- Type 2831-A: LAN-XI Battery Module, including Mains Charger ZG-0469 and Adapter ZH-0686
- 3 × Type 4944-A: ¼" Pressure-field Microphone with CCLD preamplifier, 4 Hz to 70 kHz, 1.0 mV/Pa
- 3 × AO-0587-D-030: Microphone Cable, single screen coax, SMB (F) to BNC (M), 3 m (10 ft), max.+105 °C (221 °F)
- 3 × UA-1588: Preamplifier Holder, to be used with a ¼" preamplifier on a tripod
- KE-4363: Measurement Bag for LAN-XI module
- UA-0692: Universal Headrest Microphone Holder, supports both ½" and ¼" microphones

### System Software

#### Type 7963-X\* PULSE Impulse Noise Evaluation

\* Where 'X' equals N for node-locked or F for floating licence

### Required Services

An annual software maintenance and support agreement is required with the software:

**M1-7963-X\*** Annual Software Maintenance and Support Agreement for PULSE Impulse Noise Evaluation

### Other Supported Accessories

Type 4231      Sound Calibrator (using ¼" Adapter DP-0775)  
UA-0801      Lightweight Tripod

### About Software Maintenance and Support

Software maintenance and support are available for all PULSE LabShop and BK Connect software. To find out more, contact your local Brüel & Kjær [service office](#)

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