

Vehicle Exhaust measurement system: *Noise Patrol*

Noise Patrol is an evolution of well-renowned and established system known as Noise Inspector. Noise Patrol is based on the technology of acoustic detection as was the distinguishing trait of the Noise Inspector. Passing of time caused certain changes that were necessary to implement to keep it the market leader in the area of Vehicle Exhaust noise measurements.

A wireless control for one-man operation was implemented to further carry the vision of ease-of-use and to meet current expectations for modern measurement equipment.

Well-designed workflow allows for low measurement error rate and quick setup of equipment making measurements simple and easy to perform.



USES

Measurement of exterior exhaust sound level from motorbikes, cars, trucks and mopeds under stationary conditions (engine sweep test)

FEATURES

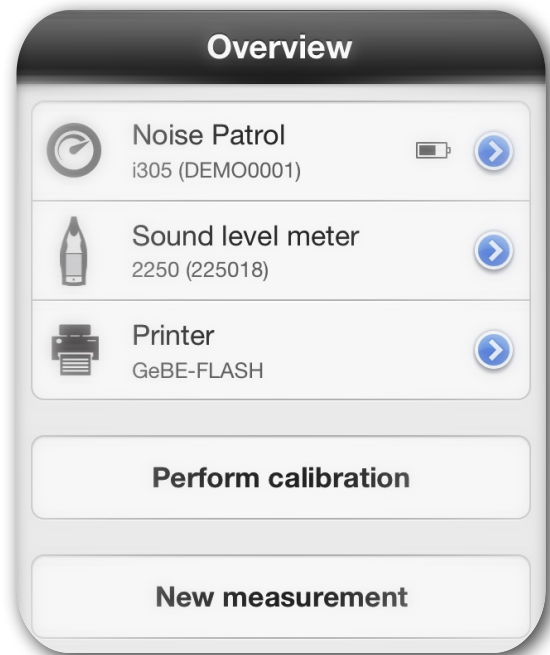
- IEC and ANSI Type 1 Sound Level Meter Type 2250L
- Non-contact measurements of engine RPM by computing the engine speed from the acoustic signal of the exhaust noise
- Automatic procedure according to 70/157/EEC and ISO 5130
- Full Standard compatibility
- Complete measurement and result traceability with print-out and stored data
- Possible to integrate into other measurement systems or existing platforms
- Allows totally non-invasive tests of vehicles. The engine bonnet or compartment cover does not need to be opened
- Acoustic detection of engine RPM for 2- and 4- stroke engines, gasoline and diesel, from 1 to 12 cylinders
- Suitable for use by a single operator. A dedicated computer manages the complete measurement sequence
- All in one suitcase
- Battery operated
- Intuitive setup menu for measurement configuration and engine type, via touch display
- Remote control of the SLM, for setup, and measurements
- Simultaneous measurement and display of sound level and engine RPM
- Intuitive measurement flow through smart device
- Automatic trigger of the measurement when the correct RPM is reached
- Integrated printer for measurement reports
- Optional external tachometer with case connector
- Print out of results for instantaneous report

PRELIMINARY

Introduction

The Directive on Motor Vehicles 70/157/EEC: "Permissible Sound level and the exhaust system of motor vehicles" and its amendments describe a measurement procedure to facilitate subsequent checks on vehicles in use. In addition, ISO - 5130 specifies a test procedure, environment and instrumentation for measuring the exterior exhaust sound levels from road vehicles under stationary conditions, providing a continuous measure of exhaust system sound level over a range of engine speeds (engine sweep test).

Noise Patrol is a Sound Level Meter (SLM) especially designed for automatically performing the complete measurement procedure mentioned above.



Calibration

The system assists the operator in calibrating the SLM. Once the calibration menu has been selected, you only have to insert the microphone into Type 4231 Sound Level Calibrator and activate calibration. The results can be printed for official reports.

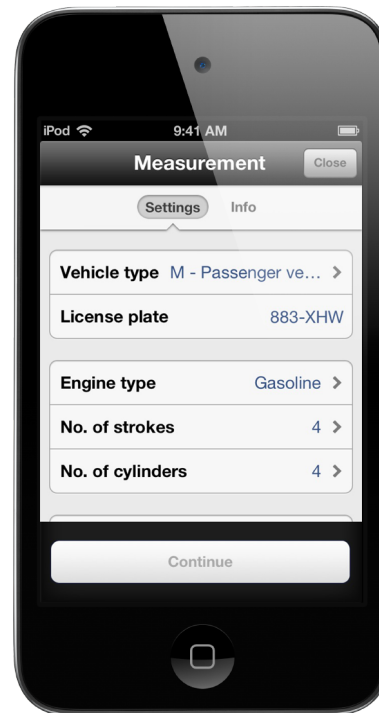
Calibration procedure is also a part of each measurement. Before a measurement can be started and after each measurement.

Procedure for complete measurement

Settings

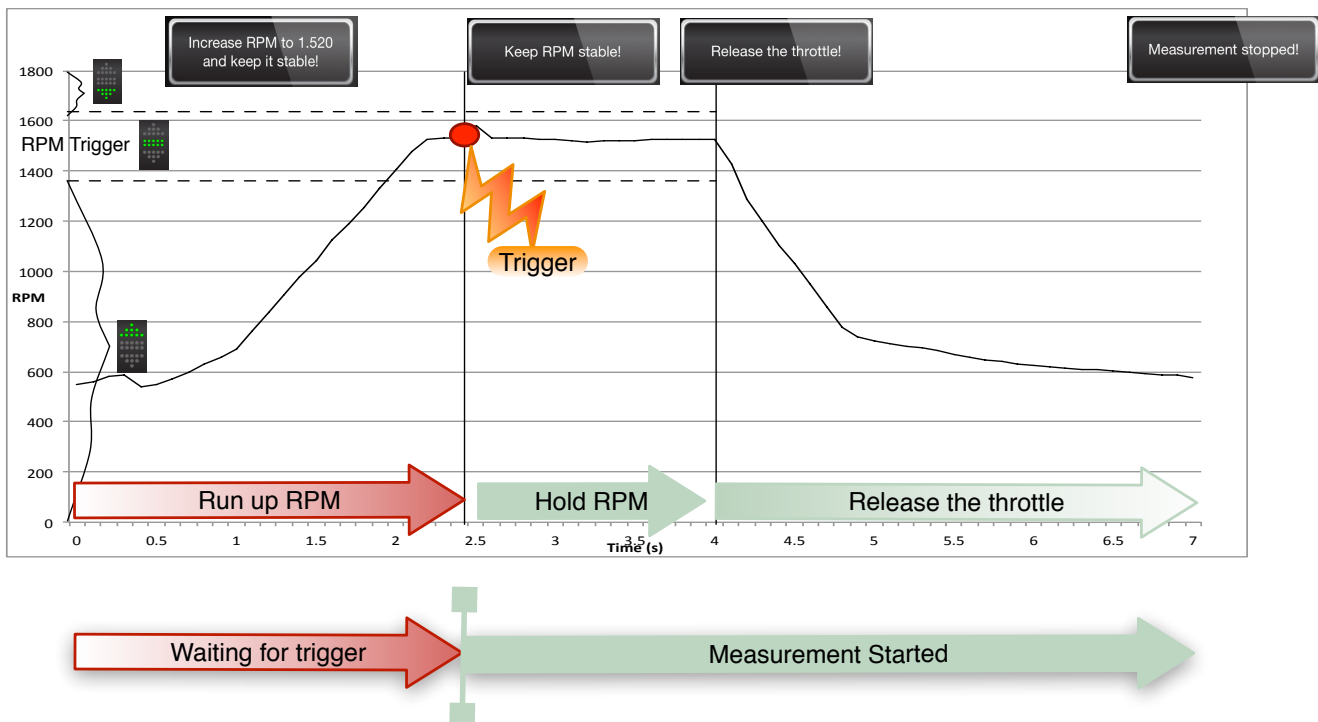
Before starting a measurement, you have to enter the different parameters via the Settings menu:

- Vehicle type
- License plate
- Engine Type
- Number of strokes (2 or 4 stroke)
- Number of cylinders
- Noise Limit
- RPM detection: set at three-quarters or half of the engine's rated maximum net power, as stated by the manufacturer.
- Operator
- RPM Tolerance [%]



Measurement Flow

Automatic calibration is followed by a set of menus guiding user through the measurement seamlessly and effortlessly with all the instruction on the screen with complete control over measurement process.



The procedure first measures the background noise. The sequence is started by operating the throttle so that the engine speed gradually increases from idle to the engine speed corresponding to the trigger RPM value, with help from the RPM Indicator. Then the speed should be held constant for 1 to 2 s. Finally, the throttle should be released rapidly and the engine speed allowed to return to idle. The SLM will measure from the time the RPM trigger occurs, until the engine has returned to idling position. This sequence is generally repeated 3 times, but can be modified, if required.



Automated - simple - easy to use
Noise Patrol

Specifications

The following specifications applies to Noise Patrol used with a Type 2250L Sound Level Meter, fitted with the supplied microphone, preamplifier and extension cable.

Note: Specifications that apply only to the SLM are shown in italics in the following specification.

STANDARDS:

Conforms with the following:

- IEC/EN 61672 - 1:2002 Class 1
- IEC 60651 Type 1, 1979 & Amendment 1 1993 & Amendment 2 2000
- EN 60651 Type 1
- EN60804 Type 1
- ANSI S1.4 - 1983 Type S1
- ANSI S1.43 - 1997 Type 1
- Measurements of exhaust sound levels emitted by stationary road vehicles according to ISO 5130 and 70/157/EEC: Standards:
 - ISO - 5130:1982 (under revision)
 - SAE J1492: 1998-05, Measurement of Light Vehicle Stationary Exhaust System Sound Level Engine Sweep Method
 - SAEJ1297: 1998-07, Measurement of Exhaust Sound Levels of Stationary Motorcycles

NATIONAL LEGISLATION:

Germany: DIN ISO 5130 Methode für die Messung des Standgeräusches von Strassenfahrzeugen; 70/157EWG, 2/97/EGW, 96/20/EG, ECE-R 63, 78/1015/EGW, 97/24/EG, 1999/101/EC France: Arrêté du 18 juillet 1985 relatif au contrôle au point fixe du niveau sonore des véhicules; 70/157/EEC

SUPPLIED MICROPHONE

Type 4950 Pre-polarized Free-field 1/2" Condenser Microphone Nominal Sensitivity: -26dB re 1V/Pa or 50mV/Pa Frequency Range: 6.3Hz to 20kHz ± 2dB Capacitance: 12.5 pF (@250 Hz)

MICROPHONE PREAMPLIFIER

ZC 0032

EXTENSION CABLE

5m in length

MEASUREMENT RANGES

Dynamic Range: From typical noise floor to max. level for a 1 kHz pure tone signal, A-weighted: 16.4 to 140 dB

RPM ACOUSTIC MEASUREMENTS RANGE

- 2 or 4 stroke
- Number of cylinders: 1, 2, 3, 4, 5, 6, 8, 10, 12
- 200< RPM measurement capabilities< 13000 for 1, 2, 3, 4 cylinders
- 200< RPM measurement capabilities< 7000 for 5, 6, 8, 10, 12 cylinders
- Accuracy: better than 2 %

OPTIONAL RPM SOLUTIONS

Integrated tachometer AVL DISPEED 492

SPECIFICATION

- Passenger vehicles or trucks:
 - Petrol engine 400-8000 RPM, Resolution: 10 RPM

Diesel engine 400-8000 RPM, Resolution: 10 RPM

• Motorbikes:

2-stroke engine 900-8000 RPM, Resolution: 10 RPM

4-stroke engine 600-8000 RPM, Resolution: 10 RPM

Any Tachometer with interface. Connects to the outside connector of the suitcase via adapter SLM REMOTE CONTROL

The smart device manages the Sound Level Meter Type 2250 setup, measurements and measured values according to the above standards, automatically, via the Wireless interface

SMART DEVICE

Apple iOS (ver. 5+) device running application Noise Patrol. The device as such is a part of the Noise Patrol system. The indication on the Smart device is explained in the user manual.

TACHOMETER CONNECTION

'Plug and play'

CALIBRATION

Automatic, using Sound Level Meter calibrator Type 4231, via the Noise Patrol app.

PRINTER

Measurement data are automatically printed, (in the chosen language), or manually selected via the main menu. The data consists of the following:

- Engine RPM trigger
- Number of cylinders
- Type of engine
- Date/time
- Measurement values
- Criteria level
- Lmax OR Laverage
- Pass/Fail criteria
- SLM serial number

TACHOMETER INTERFACE AND CABLING

Tachometer cable (length 4 m) connected to the system on the front plate

SETTLING TIME

From power-on: <20s

BATTERY

Dry lead battery 6V/7.2Ah

Lifetime (at room temperature): typically >12h Power supply for SLM and external tachometer

LANGUAGE

Each instrument is loaded with English, German, French, Italian and Spanish text. You can select one of these languages at any time, via the advanced setup


EXTERNAL DC BATTERY CHARGER Voltage: Regulated 7 to 15V

Power: Approximately 150mA at 7V Standard plug connected on the front plate

PHYSICAL CHARACTERISTICS

Size (L×W×H): 426.7 x 337.8 x 111.7mm (16.8 x 13.3 x 4.4") Weight: Type 3638 A ñ 6 kg (13 lb 2 oz.) (including SLM, calibrator, tachometer and all the accessories).

Compliance with Standards

	<p>CE-mark indicates compliance with: EMC Directive and Low Voltage Directive.</p> <p>C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand</p>
<p>Safety</p>	<p>EN61010ñ1 and IEC61010ñ1: Safety requirements for electrical equipment for measurement, control and laboratory use.</p> <p>UL3111ñ1: Standard for Safety ñ Electrical measuring and test equipment</p>
<p>EMC Emission</p>	<p>EN/IEC61000ñ6ñ3: Generic emission standard for residential, commercial and light industrial environments. EN/IEC61000ñ6ñ4: Generic emission standard for industrial environments.</p> <p>CISPR22: Radio disturbance characteristics of information technology equipment. Class B Limits.</p> <p>FCC Rules, Part 15: Complies with the limits for a Class B digital device.</p>
<p>EMC Immunity</p>	<p>IEC60068ñ2ñ1 & IEC60068ñ2ñ2: Environmental Testing. Cold and Dry Heat. Operating Temperature: ñ10 to +50°C (14 to 122°F)</p> <p>Storage Temperature: ñ25 to +70°C (ñ13 to +158°F)</p> <p>Effect of Temperature: <0.5dB (ñ10 to +50°C)</p> <p>Note: The above is only guaranteed using accessories listed in this Product Data sheet.</p>
<p>Temperature</p>	<p>IEC60068ñ2ñ1 & IEC60068ñ2ñ2: Environmental Testing. Cold and Dry Heat. Operating Temperature: ñ10 to +50°C (14 to 122°F)</p> <p>Storage Temperature: ñ25 to +70°C (ñ13 to +158°F)</p> <p>Effect of Temperature: <0.5dB (ñ10 to +50°C)</p>
<p>Humidity</p>	<p>IEC60068ñ2ñ78: Damp Heat: <0.5dB for 30% <RH <90% (non-condensing at 40°C, 1kHz)</p>

Ordering information

Type i305-A	Noise Patrol Unit with acoustic detection Software	NP-0060	Graphic Thermal Printer – GeBE Flash
Type i305-B	Noise Patrol Unit with acoustic detection Software and integrated AVL DiSpeed 492 RPM unit	NP-1101	Protection Suitcase Explorer with Power supply, LiFePo rechargeable battery, all internal cabling and interconnections, Connection Panel, soft insert pre-fabricated for all components
Type i305-C	Noise Patrol Unit with acoustic detection Software and external RPM detector	NP-0697-D-50	AO-0697-D-50, microphone extension cable, 5m
Type i305-D	Noise Patrol Unit with acoustic detection Software and NP-0327, OBD II interface	NP-2085	Tripod Cullman, adjustable height from 20cm to 85cm
Included with the Type i305 Noise Patrol Unit		NP-0588	UA-0588 ½” Microphone holder
		NP- 0200	Measurement tape
NP-0314	Mini PC with pre-installed Windows 7, SQL database and Noise Patrol Control Software	NP-1205	LiFePo Charger
NP-0315	Smart Remote Control, iPod with pre-installed Noise Patrol Application	NP-1678	Printer Paper, 58mm (1 extra roll)
NP-0316	Noise Patrol Utility Software for PC.		
Components that can be ordered separately			
2250-L-D-100	Brüel&Kjær Type 2250-Lite Sound Level Meter	NP-0327	OBD II interface
4231	Brüel&Kjær Sound Calibrator	NP-0492	RPM analyzer, AVL DiSpeed 492

Services

i305-CAF	Accredited Calibration of Noise Patrol including Accredited calibration of 2250-L, Acoustic calibrator 4231 and Acoustic Detection Module	4231-CAF	4231 Accredited calibration
2250-CAF	2250-L Accredited calibration	NP-0492-CAF	AVL DiSpeed RPM meter accredited calibration