Advanced GPS-based Pass-By Noise system
SAMURAI + StarPass
Measurement requirements of ISO 362:1998

- 2 Microphone channels
  - Sound level meter
  - 1/3-octave analyzer
- Speed at point \( P = 50 \text{ km/h} \)
- Positions A, B, P
- Weather data
- Engine speed
- Gas-pedal position

New version of ISO 362 is in preparation!
Innovative solution: RADAR + photoelectric barriers replaced by GPS

Soundbook + SAMURAI + StarPass

Innovative Pass-By measurement system according to the standards
(ISO 362, ISO 13325, 2001/43CE)

Vehicle speed, position and passage of gates A, B and P are measured automatically and precisely via the GPS receiver in the vehicle.

The complete system is very easy to use and does not require any technicians other than the driver, i.e. the measurement is controlled by the test driver, who sees the results of the measurement immediately.
Option: Pass-By Noise

Hardware in test vehicle:
GPS-Module, Flybook, Onboard-Unit
with measurement inputs:
• 3 x analog (0..12 VDC / 10 Bit)
• 1 x RPM (10 Hz..10kHz)

Outputs (optional):
• 1 x analog (0,1%, 2,5V DC)
• 2 x digital (TTL 50ms..20ms)

Interface:
• LAN
• WLAN

Hardware of base unit:
• Soundbook + 2 microphones
• Mobile WLAN access-point + antenna
The whole Soundbook Pass-By measurement is controlled by the driver using the user-friendly StarPass™ software and the on-board electronics via the 7” driver console (tablet-PC) on the windscreen:

Operational Overview:
- Remote control of Soundbook
- Setting of gates A and B
- Setting of Position P
- Driver’s navigation
- Display of instantaneous measurement values
- Confirm measurement run
- Display measurement results
The driver also has the possibility to save the pass-by setup (GPS coordinates) of the test vehicle as well as all measured values for later analysis. An enhancement with interior noise measurement and capture of additional vehicle parameters is available as an option.

The test driver can check important GPS parameters:

- Number of satellites in view
- Satellite identification PRN (Pseudo-Random Noise)
- Signal to Noise Ratio (SNR)
- Horizontal precision
- Quality of the position-finding
- Accuracy of the position

Good visibility of the satellites is a prerequisite for the functionality (no shadowing effects from buildings)
The driver is guided by the StarPass system such that the vehicle passes the measurement position \( P \) with fully open throttle at exactly the prescribed speed of \( 50 \pm 1 \text{ km/h} \).

The instantaneous measurement values are transferred from the Soundbook via WLAN and displayed by the on-board PC. Thus, immediately after the pass-by the driver can decide if the measurement is valid or whether the pass-by must be repeated. The measurement results are also available on the Soundbook.

The sound signal is also stored in the Soundbook as well as the histories of the sound levels and 1/3-octaves.
Why is a new standard being defined?
• ISO 362:1998 does not take sufficient account of the vehicle’s power characteristics
• Minimizes tyre and road noise
• Does not sufficiently reflect a realistic road performance

Significant improvements:
• Determination of power to mass ratio
• Differentiation in 1- or 2-gear measurements
• Tests with constant speed and with maximum acceleration necessary
• Statistical analysis of results
• Rounding and correction of test results

Implementation in SAMURAI PASS-BY:
• All requirements are either already supported or will be implemented during 2007
• We therefore guarantee for 24 Months a Pass-By Software Update free of charge!
**Brüel & Kjaer**
- high effort, high costs (RADAR)
- many cables necessary
- barriers must be positioned exactly
- multiple operators necessary

**LMS**
- high costs (2 wireless microphones)
- many cables and devices in vehicle
- reflectors must be positioned exactly
- only one operator necessary

**SINUS**
- moderate costs, low weight
- not many cables in vehicle
- highly flexible due to virtual barriers
- only one operator necessary
Options for SINUS Pass-By Measurement System:
• Delivery of Soundbook in a robust case with additional battery power
• Extension with wireless microphones
• Vehicle interior noise measurement
• Delivery of measurement system in container or car trailer

Statistical Pass-By Noise according to ISO 11819
• Measurement of pass-by noise for various classes of vehicle with statistical analysis of measurement results
• Acoustical investigation of road surfaces and tyres
Simulated Pass-By Noise Measurement in the Laboratory:

- Simulation of pass-by noise measurement according to ISO 362 via simultaneous measurement with 15 microphones on each side and signal-processing
- Hardware: 1x or 2x MSX16 and 15 or 30 microphones
- Software: customized
- Semi-anechoic chamber with roller dynamometer and exhaust system

Measurement setup for indoor pass-by noise testing system