

PRODUCT DATA

PULSE Vehicle Pass-by Test System

Vehicle Pass-by Software Type 7788-B/C, Pass-by In-vehicle Box Type 3643 and Pass-by Ground Station Type 3645

PULSE™ Vehicle Pass-by Test System is a system for measuring operational exterior vehicle noise built on powerful PULSE multi-analyzer solutions. The system consists of Vehicle Pass-by Software Type 7788-A together with PULSE hardware and a selection of dedicated pass-by accessories.

Single-person operation is supported together with a range of hardware configurations including GPS and an on-vehicle photocell, or radar and two sets of photocells. All configurations give extremely accurate results independent of weather conditions.

The complete measurement chain can be traceably calibrated.



Uses and Features

Uses

- Pass-by noise testing of accelerating road vehicles according to a variety of international standards, such as ISO 362:1998 and ISO 362 – 1:2007
- Measurement of operational exterior vehicle noise according to standards such as ISO 3325 and ISO 5130

Features

- System for pass-by measurements including exterior noise measurements such as tyre and exhaust noise
- Real-time acquisition of noise levels, vehicle position, velocity, RPM (optional), and weather station data (optional)
- Single-person operation
- Scalable solution
- User-definable calculations of final result to adapt to different standards and regulations
- Data-centric solution for organising all aspects of the measurement
- Export of results in common data formats
- Advanced graphical displays with live cursor functionality when embedded in Microsoft® Office applications
- Easy configuration of customised procedures including modifications to international standards
- Advanced reporting to Microsoft® Word and Excel®
- Storing of raw time data documented, including meta-data

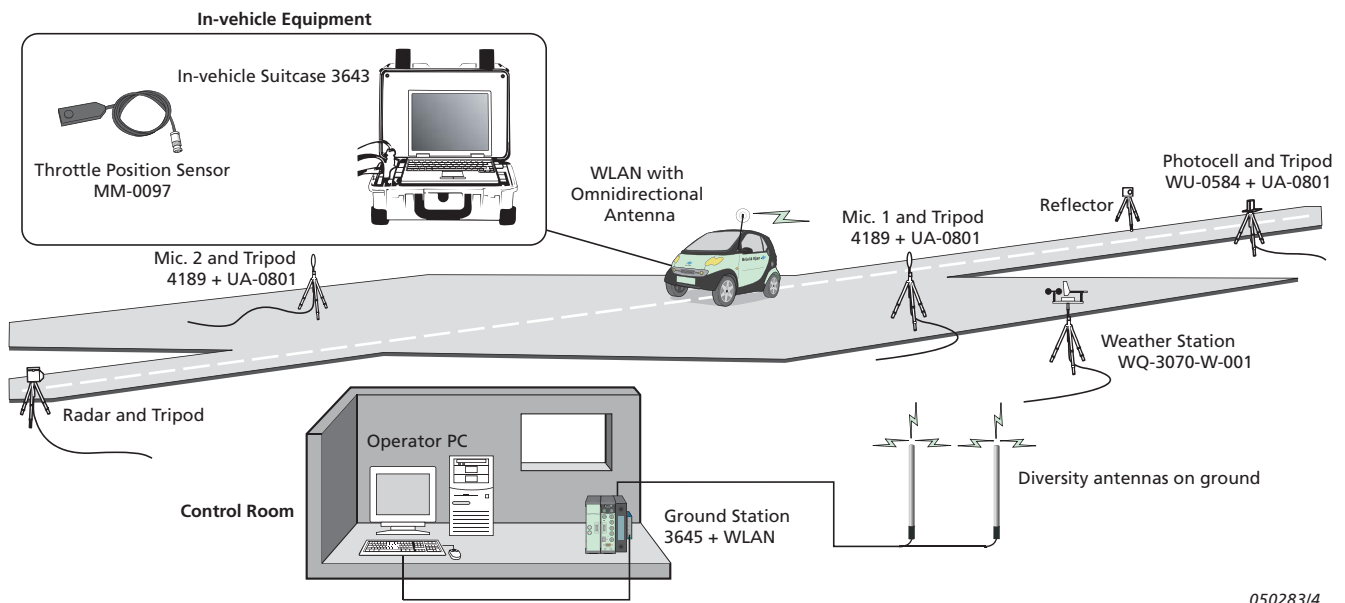
Introduction

The increased complexity of today's exterior vehicle noise test procedures along with the requirements for accuracy and full documentation of the measurement chain have added to the test burden for vehicle manufacturers and sub-suppliers. Our goal is to provide intelligent solutions that enhance productivity and provide non-experts and occasional users with a system that is easy to deploy and operate, while keeping the power and the flexibility demanded by expert users.

PULSE Vehicle Pass-by Test System builds on the experience gained from previous generations of the Pass-by solution. The result is a functionally innovative, user friendly, safe design. The system forms part of an exterior vehicle noise test suite that also includes Indoor Pass-by and Pass-by Beamforming, which is noise source identification on moving vehicles. See Product Data BP 2015 and BP 2249, respectively, for more information on these additional solutions.

The complete system includes pass-by related accessories such as photocells for giving absolute position reference, a speed sensor (radar, GPS or other device) for providing continuous speed and position information, along with a weather station for providing environmental parameters.

Fig. 1 Pass-by system overview



050283/4

Software

Selection of a test standard via the user interface fully configures the system to acquire the required data and calculate the result according to that particular standard. A built-in configuration validation ensures that all of the system settings conform to the requirements of the standard, by auto-correcting any wrong settings or accidental manual input. This guarantees correctly calculated results. The system's Constraints engine gives feedback on the driving and test conditions during the measurement to ensure compliance. An example of this could be the maximum wind speed occurring during the test. This feature also supports user-defined constraints on any measured parameter.

In addition to standard test procedures, you can create your own procedures, deciding what values are to be measured, gears to be used, runs to be made in each gear and how the intermediate value is calculated.

The Pass-by System software automatically configures a measurement template for any suitable PULSE front-end once you have defined the input channels.

Additional analyses and time history recordings can be performed in parallel with the pass-by measurements, with automatic labelling of the recordings as well as auto-saving of the test results to a selected database. Analysis can be done on in-vehicle channels as well as the ground channels, or even across ground and vehicle channels to investigate component contribution. All results are available for inspection as soon as the measurement ends.

The PULSE Pass-by software provides unprecedented system intelligence benefiting both expert and occasional users by greatly reducing the knowledge and effort needed to do exterior noise tests. In short, it is “Easy, Safe and Clever”.

Hardware

Ground Station

Our Pass-by hardware has been developed to fully support the software for a total system solution. The system can be used with a PULSE front-end and provides external vehicle noise measurements simultaneously on both sides of the test track. Vehicle speed and position are obtained using a combination of a speed sensor and photocells. A weather station for measuring environmental parameters in real-time can also be added to the system.

Fig. 4
Pass-by Ground
Station Type 3645 and
optional 1-channel
Telemetry System
WQ-2850



120439

Pass-by Ground Station Type 3645 is a fully integrated unit containing a PULSE data acquisition unit (PULSE Multi-analyzer Type 3560-B and PoE Unit ZN-0707-W-001) and Advanced Connection Box Type 7451 for powering and conditioning the photocells, radar and a five-parameter weather station. The acoustic channels, speed sensor and weather station can be traceably calibrated. The solution can be upgraded with the addition of 2-channel Telemetry System WQ-3208 for acquiring engine speed and throttle position during test.

Ground and In-vehicle Solution

Fig. 5
Pass-by In-vehicle Box
Type 3643 with
operator's lap-top



120440

This configuration builds on the Ground Station and adds an in-vehicle front-end. Any parameter, such as speed (engine and vehicle), sound and vibration data, can be measured in-vehicle and sampled synchronously with the ground channels. The system uses a wireless LAN-based telemetry system with a combined hardware and software synchronisation solution to guarantee sample synchronous alignment between ground and in-vehicle data. The solution supports Power over Ethernet (PoE) according to IEEE 802.3–2008 allowing free choice of WLAN hardware, including recommended Linksys®/Cisco® solutions.

In-vehicle Configuration

Fig. 6
On-vehicle photocell





In cases where there is only one person available to perform the test, the control PC, preferably a ruggedized touchscreen PC to simplify operation, is moved inside of the vehicle. The measurement control GUI was specially developed to support this mode of operation. Set-up time can be reduced by using a GPS as the speed sensor to replace a radar. As GPS cannot be used reliably as an absolute position reference without the use of DGPS with a GPS base station, a special on-vehicle photocell can be used together with special triggering (reflecting) plates that are placed on the road at the triggering points.

The PC, GPS and photocell are connected to the in-vehicle solution, which provides power and signal interfaces. Only the microphones and optional weather station need to be connected to the ground station, reducing set-up time to a minimum while maintaining an ISO compliant solution.

The standard in-vehicle hardware option, Pass-by In-vehicle Box Type 3643 can be fitted with any PULSE front-end to provide more channels within the channel bandwidth limits of the wireless connection.

Pass-by In-vehicle Box Type 3643 provides a robust and easily transportable case with an integrated PULSE front-end, a wireless LAN unit and an optional tachometer sensor. The in-vehicle PC can be used for the Driver's Aid or to run the whole system. The system has been optimised to operate in this mode, with the driver requiring only a minimum of interaction with the system during the test.

Compliance with Standards – Pass-by In-vehicle Box Type 3643 and Ground Station Type 3645

 	CE-mark indicates compliance with: EMC Directive and Low Voltage Directive. C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand.
Safety	EN/IEC 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use. UL 61010–1: Standard for Safety – Electrical measuring and test equipment.
EMC Emission	EN/IEC 61000–6–3: Generic emission standard for residential, commercial and light industrial environments*. EN/IEC 61000–6–4: Generic emission standard for industrial environments. CISPR 22: Radio disturbance characteristics of information technology equipment. Class A Limits. FCC Rules, Part 15: Complies with the limits for a Class A digital device.
EMC Immunity	EN/IEC 61000–6–1: Generic standards – Immunity for residential, commercial and light industrial environments. EN/IEC 61000–6–2: Generic standards – Immunity for industrial environments. EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements. Note: The above is only guaranteed using accessories listed in this Product Data sheet.
Temperature	IEC 60068–2–1 & IEC 60068–2–2: Environmental Testing. Cold and Dry Heat. Operating Temperature: –10 to +50°C (+14 to +122°F) Storage Temperature: –25 to +70°C (–13 to +158°F)
Humidity	IEC 60068–2–78: Damp Heat: 80% RH (non-condensing at 40°C (104°F))
Mechanical	Non-operating: IEC 60068–2–26: Vibration: 0.3 mm, 20 m/s ² , 10–500 Hz IEC 60068–2–27: Shock: 500 m/s ² IEC 60068–2–29: Bump: 1000 bumps at 250 m/s ²
Enclosure	IEC 60529: Protection provided by enclosures: Type 3643: Closed IP 64, Open IP 40; Type 3645: IP 40D

* Excluding Type 3643

(For environmental specifications and compliance with standards for PCs, see the specifications given by their respective manufacturers.)

Specifications – Pass-by In-vehicle Box Type 3643

The standard Pass-by In-vehicle Box Type 3643 consists of:

- 5-channel PULSE Multi-analyzer Type 3560-B
- A WLAN unit
- A ruggedized case

POWER REQUIREMENTS

Fulfills the requirements of ISO 7637–1 and 7637–2 with batteries

Voltage: 10 – 32 V DC

Power Consumption:

Nominal: 20 W

Max.: 32 W (while charging battery)

Ext. Power Connector: XLR

BATTERIES

Optional Accessories: 2 × DR35 NiMH or NI 1030, 10.8 V (nominal)

Working Time (Continuous): 3.5 hours

Charging Time: 5 hours/battery

ACOUSTIC NOISE EMISSION (at 1 m)

Silent operation to 25°C (77°F) when not charging batteries. When charging batteries, fan operation may start at a lower ambient temperature

DC OUTPUT

+12 V Nominal, dependent on supply voltage

Connector: Cigarette Lighter

DIMENSIONS (CLOSEDCASE)

Height: 188 mm (7.4")

Width: 460 mm (18.1")

Depth: 350 mm (13.8")

Weight: 10.5 kg (23.1 lb.) with batteries

Specifications – Pass-by Ground Station Type 3645

The standard Pass-by Ground Station Type 3645 consists of:

- Power over Ethernet Unit ZN-0707-W-001, 5 slot
- Advanced Connection Box Type 7451
- 5-channel PULSE Multi-analyzer Type 3560-B

POWER REQUIREMENTS

Type 3560-B fulfills the requirements of ISO 7637 – 1 and 7637 – 2 with batteries

Voltage: 230 V AC @ 50 Hz and 110 V AC @ 60 Hz

Power Consumption:

- Nominal: 20 W
- Maximum: 37 W

• With Radar and two Photocells Attached: 25 W

Ext. Power Connector: LEMO coax., FFA.00.113, ground on shield

ACOUSTIC NOISE EMISSION (at 1 m)

Silent operation to 35°C (95°F) when not charging batteries. When charging batteries, fan operation may start at a lower ambient temperature

DIMENSIONS

Type 3560-B:

- Height: 182 mm (7.2")
- Width: 64 mm (2.5")
- Depth: 270 mm (10.6")
- Weight: 2.5 kg (5.5 lb.)

Type 7451:

- Height: 182 mm (7.2")
- Width: 64 mm (2.5")
- Depth: 270 mm (10.6")
- Weight: 2 kg (4.4 lb.)

ZN-0707-W-001:

- Height: 182 mm (7.2")
- Width: 64 mm (2.5")
- Depth: 270 mm (10.6")
- Weight: 2 kg (4.4 lb.)

Specifications – PULSE Vehicle Pass-by Software Type 7788-B/C

Vehicle Pass-by Software Type 7788-B/C works with PULSE Multi-analyzer System Type 3560. Note, licenses for this system are node-locked

SYSTEM REQUIREMENTS

- Pentium® III 1.4 GHz or better with 1024 MB RAM
- Windows® XP or Windows® 7
- Microsoft® Office 2003 or later

Measurement

Vehicle speed and position measured relative to a reference (photocell), noise measured via two microphones (left and right) and additional parameters

PULSE VEHICLE PASS-BY SOFTWARE TYPE 7788-B-N

Ground Channels :

- Vehicle speed using Radar
- Noise: Overall, FFT, and CPB slices as functions of distance, speed or time, CPB and FFT contours as functions of speed and time
- Auxiliary Parameters: Air temperature, Relative humidity, Wind speed, Wind direction and user-defined parameters, instantaneous, averaged and max. values available as tags on Waterfall data (up to 12 channels)
- Supported Standards:
 - ISO 362–1998
 - ISO 362–1–2007
 - ISO 362–2–2009/ECE R41

- ISO 13325/ECE R117
- ISO 5130
- Trias20
- SAE–J1470
- SAE–J366

PULSE VEHICLE PASS-BY SOFTWARETYPE 7788-C-N

Ground and In-vehicle Channels : Same as Type 7788-B with the addition of:

- Vehicle engine speed, vehicle throttle position, user-definable (dependent on hardware and software license) order analysis with doppler correction
- Auxiliary Parameters: In-car, user-definable, 12 channels
- CAN data

Calibration

Calibration of dynamic channels using the PULSE Calibration Master. Calibration histories available from the Global Calibration Database

User Interface

- Standard Windows®-based GUI
- Four-button operation (Activate, Run, Accept and Cancel)
- Automatic display of summarised measurement results including validation criteria with non-compliance notification
- User-configurable test documentation, input window

Available Displays

- Level vs. Position
- Spectra vs. Position
- Doppler corrected spectra vs. Position
- Slice vs. Position
- 2D Graphics – Real-time
- 3D Graphics – Waterfalls
- Auxiliary data (2D and readout)

Reports

- On the fly reporting direct from measurement GUI
- Reporting in user-defined formats through a PULSE Data Manager Type 7767 database
- Displays of all measured data available in Microsoft® Word and Excel®

Wireless LAN (Ethernet Connection)

Performance dependent on hardware

Throughput (typical): 600 kHz channel × bandwidth

Range: > 1 km dependent on test conditions and antenna used, with direct line of sight

Data Management

- Data labels and fields user-configurable
- Automatic storage of all measurement data and validation criteria along with user-selectable items such as pictures or data recordings
- Browsing of stored data using tree structure, keywords, or SQL statements
- Drag and drop of retrieved data into displays for viewing or comparison
- Easy editing or deletion of stored data
- Exportable as xml or ASCII
- Direct export to Microsoft® Excel®

Specifications – Other Pass-by Hardware

SPEED SENSOR

Any device capable of providing TTL pulses between 1 – 12 V frequency modulated according to speed

PHOTOCELLS/TRIGGERING DEVICES

Any device going high (8.4 – 12 V) when triggered

THROTTLE SENSOR

Pressure sensitive on/off sensor

WEATHER STATION WQ-3070-W-001

Wind Speed, Wind Direction, Temperature, Humidity and Atmospheric Pressure

Ordering Information

PULSE Vehicle Pass-by Test Systems

STANDARD GROUND CHANNEL SOLUTION (BASED ON PULSE VEHICLE PASS-BY SOFTWARE TYPE 7788-B)

includes:

- Type 3645: Pass-by Ground Station (with PULSE Multi-analyzer Type 3560-B, Pass-by Advanced Connection Box Type 7451 and PULSE PoE Unit ZN-0707-W-001)
- Type 7788-B-N: PULSE Vehicle Pass-by Software, Ground Channels (node-locked license)
- Type 7700-N: PULSE FFT & CPB Analysis, (node-locked license)
- Type 3099-A-N1: PULSE Single Module Front-end Driver (node-locked)
- M1-7788-B-N: Software Maintenance and Support Agreement for Type 7788-B-N
- M1-7700-N: Software Maintenance and Support Agreement for Type 7700-N
- M1-3099-A-N1: Software Maintenance and Support Agreement for Type 3099-A-N1

STANDARD GROUND AND IN-VEHICLE CHANNEL SOLUTION (BASED ON PULSE VEHICLE PASS-BY SOFTWARE TYPE 7788-C)

includes:

- Type 3645: Pass-by Ground Station
- Type 3643: Pass-by In-vehicle Box (with PULSE Multi-analyzer Type 3560-B and a WLAN unit)
- Type 7788-C-N: PULSE Vehicle Pass-by Software, Ground and In-vehicle Channels (node-locked license)
- Type 7700-N: PULSE FFT & CPB Analysis (node-locked license)
- Type 3099-A-N: PULSE Multiple Module Front-end Driver (node-locked)
- M1-7788-C-N: Software Maintenance and Support Agreement for Type 7788-C-N
- M1-7700-N: Software Maintenance and Support Agreement for Type 7700-N
- M1-3099-A-N: Software Maintenance and Support Agreement for Type 3099-A-N

Recommended Accessories for Test System

FOR GROUND CHANNEL OPERATION ONLY

2 × Type 4189-A-021	Prepolarized Microphone
AO-0087-D-012	Screened Connection Cable, BNC to BNC connector, 1.2 m (4 ft)
2 × UA-0237	Windscreen
2 × UA-0588	Microphone Holder
WQ-2856	Speed Sensor (Tescon 3210)
WQ-2857	Tripod for Sensor (Tescon 3210-2)
WQ-2859-M-100	Speed Sensor Cable (Tescon 3248-100), 100 m (328 ft)
WQ-3292	Signal Adaptor, for mobile use of WQ-2856
WL-3529	Adaptor Cable, for use between WQ-2856 and Advanced Connection Box Type 7451, Lemo 7-pin (F) to DIN 5-pin (M), 0.5 m (1.6 ft)
WU-0584-W-002*	Photocell with 2 m (6.6 ft) Cable
WB-3548	On-vehicle Photocell with BNT
SB-1537*	Light Reflector
4 × UA-0801†	Lightweight Tripod, for Types 4189-A-021, SB-1537 and WU-0584
WQ-3070-W-001	Weather Station
WL-1340	Cable for Weather Station, 40 m (131 ft)
WQ-1185	Cable Drum
UA-1522	Tripod for Weather Station
Type 7201-F-xx‡	Dell® Latitude® High-End Notebook with Microsoft® Office Professional (without manuals)

FOR GROUND AND IN-VEHICLE OPERATION

All the recommended accessories listed for Ground Channel operation plus the following components:

2 × AO-1450-D-xxx**	Ethernet Cable, Cat.6 S-FTP, RJ45 (M) to RJ45 (M)
1 × WA-1588	Fitting, for mounting antenna on tripod

* Need two to support bidirectional mode measurements

† Need six to support measurements in bidirectional mode

‡ xx specifies country: GB, DE, FR, ES, IT, SE

1 × WA-1634	Mounting Kit for W-LAN Antenna (for tripod/magnet/suction cup)
1 × WA-1649	Mounting Boom for two W-LAN Antennas (for tripod/magnet/suction cup)
3 × WL-3387-D-030	Antenna Cable, 3 m (9.8 ft)
1 × WQ-2659	Tripod, 4.5 m (15 ft)
2 × WQ-2862	Cisco A-band Access Point, 1242ag
3 × WQ-2863	Antenna, 5.3 GHz, 10 dBi Omnidirectional wireless LAN, integral N (F) connector
2 × ZH-0683	PULSE Wireless Sync Unit

Software Only

Type 7788-B-N	PULSE Vehicle Pass-by Software, Ground Channels, (node-locked license)
Type 7788-C-N	PULSE Vehicle Pass-by Software, Ground and In-Vehicle Channels (node-locked license)

Both Type 7788-B-N and Type 7788-C-N licenses include:

- PULSE Data Manager Type 7767-A, single-user license
- A demo database with a predefined structure specifically designed for the pass-by application
- PULSE Data Recorder Type 7701

REQUIRED SOFTWARE

PULSE Vehicle Pass-by Software is application software that runs on the PULSE platform. It requires you have the following license:

Type 7700-Ny*	PULSE FFT & CPB Analysis (node-locked license)
---------------	--

The following components are needed when one or more of the following requirements has to be fulfilled:

- Database located on a separate PC (server)
- Data storage capability larger than 10 GB
- Configurable database structure
- Configurable reporting

Type 7767-B-N	PULSE Data Manager, 5-user (node-locked license)
BZ-5445	Microsoft® SQL Server® 2008 R2 Standard Edition, 5 users
BK-0058	System Installation, per day
BZ-5444†	PULSE Data Manager Browsing License

** Cables are available in different lengths, specified by D-xxx, where D is decimetres and xxx is the length

* where y is the number of channels

† Must be added for each additional office station browsing the database

Optional Accessories

FOR GROUND CHANNEL OPERATION ONLY

WQ-3208	2-ch Telemetry, 3.2 kHz
WL-1391-D-200	Cable Drum with double-screened BNC cable, 20 m (66 ft)
WL-1194	Cable Roller for Photocell, 60 m (197 ft)

FOR GROUND AND IN-VEHICLE OPERATION

WQ-2350	Cigarette Lighter Tacho Sensor
MM-0097	Throttle Position Sensor
WQ-2410	Power Splitter (1 to 2) for Cigarette Lighter Socket
WB-3471‡	Power Distributor for Cigarette Lighter Socket (1 to 4 splitter)
2 × QB-0048	Front-end Battery

Service and Support

MAINTENANCE AND SUPPORT AGREEMENTS

M1-7788-B-N	Software Maintenance and Support Agreement for Type 7788-B-N
M1-7788-C-N	Software Maintenance and Support Agreement for Type 7788-C-N
M1-7700-Ny*	Software Maintenance and Support Agreement for Type 7700-Ny
M1-3099-A-N1	Software Maintenance and Support Agreement for Type 3099-A-N1
M1-3099-A-N	Software Maintenance and Support Agreement for Type 3099-A-N
M1-7767-B-N	Software Maintenance and Support Agreement for Type 7767-B-N

CALIBRATION

BK-0115	Accredited Calibration as SLM (IEC 60651) for PULSE Front-end, 1 channel
BK-0115-001	Accredited Calibration as SLM (IEC 60651) for PULSE Front-end, Additional channels

INSTALLATION AND TRAINING

BK-0058	System Installation, per day
BK-0060	On-site Training, per day

‡ WB-3471 replaces WQ-2410 when more than two cigarette lighter sockets are required

Trademarks

Linksys and Cisco are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries · Microsoft, Windows, SQL Server and Excel are registered trademarks of Microsoft Corporation in the United States and/or other countries · Dell and Latitude are registered trademarks of Dell Computer Corporation · Pentium is a registered trademark of Intel Corporation or its subsidiaries in the United States and/or other countries

Brüel & Kjær reserves the right to change specifications and accessories without notice. © Brüel & Kjær. All rights reserved.