SYSTEM DATA

Pass-by Noise Measurement System — Type 3598

Pass-by Noise Measurement System Type 3598 is a powerful tool for automotive designers working to meet steadily tightening noise emission standards. The system is designed to support a wide range of exterior vehicle noise tests, including those specified in ISO 362 and SAE J1470, ISO 13325 (tyre noise) and ISO 5130 (exhaust noise).

3598, 7757

Brüel & Kjær

Applications and Features

APPLICATIONS

- ❍ Pass-by noise testing in accordance with a variety of standards, including ISO 362 and SAE standards, and regional or company standards
- ❍ Research and development testing

FEATURES

- ❍ Forms a complete system for pass-by measurements including other exterior noise measurements such as tyre and exhaust noise
- ❍ Complete data collection in one pass-by noise measurement system: equidistantly spaced noise spectra from both sides of the vehicle, orders, position, velocity, acceleration, RPM and throttle (gas pedal) position
- ❍ Microsoft® Windows® 2000-based software for controlling measurements and displaying results in numerous combinations and formats. Optimised for easy export of data to Microsoft® Excel and Word, and database programs

Standard Systems and Software

Type 3598 is available in four standard configurations:

- ❍ Entry-level system
- ❍ Standard system
- ❍ Advanced post-processing system
- ❍ Advanced data back-up system

The Standard Pass-by System

The central part of the pass-by system is the PULSE™ Multi-analyzer, which handles the data processing. The two microphones are connected directly to the PULSE™ Front-end. All other parameters are transferred through the Pass-by Connection Unit. The two photocells give an absolute reference for the position of the car measured by the radar. Based on the radar data, the car velocity is calculated. Optionally, a weather station can be connected to the Pass-by Connection Unit.

The Pass-by Vehicle Unit is in the car. It measures the engine RPM, throttle position and optional parameters like fan speed. The information is sent via wireless LAN to the Pass-by Connection Unit. Information about the speed is sent to the Notebook in the Pass-by Vehicle Unit enabling the driver to see the exact speed on the screen during the test run. The Notebook computer and the PULSE™ computer (ground-station) run under DCOM (Distributed Component Object Model), so any information seen on one PC can also be seen on the other. This enables one person (the driver) to do the complete pass-by test.

The Standard Pass-by System Type 3598 includes:

- ❍ PULSE™ System incl. 1 DSP board (Type 2825 front-end) or Portable PULSE™(Type 2827 front-end)
- ❍ Pass-by Software Type 7757 A
- ❍ Computer
- ❍ Pass-by Vehicle Unit
- ❍ Pass-by Connection Unit
- ❍ Aironet UC 4800 (wireless LAN)
- ❍ Photocell × 2
- ❍ Reflector × 2
- ❍ Radar Unit

Options for all configurations:

- Weather Station
- RPM Sensor
- Throttle Position Sensor
- Head-up Display, sunlight capable

All items (microphones, preamplifiers, tripods, cables, etc.) to consider when placing a Pass-by order will be covered in the Pass-by ordering form. Please contact your local Brüel & Kjær representative.

The pass-by noise measurement system includes user-friendly Microsoft® Windows® 2000-based software that is used to set up and control measurements, to store data and notes about test conditions, and to display results.

The software allows you to look at multiple test results at once, in order to make fast decisions. You can display several parameters simultaneously in terms of car position, or display autospectra, 3D spectrum slices, orders, 3D order and statistics. In addition, you can select graphical or tabular display formats.

Database in ODBC format
The Microsoft® ODBC specification allows unlimited storage and retrieval in a database such as Microsoft® Access.

Data Export
ASCII format, such as Universal File Format; also Binary Universal File Format. Query access through Microsoft® Office XP applications.

Reporting in Microsoft Office XP
Test reports are produced by running Microsoft® Word templates and Microsoft® Excel.

Entry-level System

Like the standard system, but excluding the Pass-by Vehicle Unit.

Even without the Vehicle Unit, the entry-level system is still capable of, for example, tyre-noise measurements.

The standard and entry-level systems only need a stationary PULSE™ system with 1 DSP board or a portable PULSE system with Analysis Engine (included with Type 7700). With these two versions Overall A-level, 1/3-octave spectra and FFT can be measured. Normal spectra and 3D diagrams can be shown.

Advanced Post-processing System

Like the standard system but the stationary PULSE™ system has 2 DSP Boards to do the advanced post-processing and Throughput-to-Disk UL 0112. The portable PULSE™ system requires two extra Analysis Engine Licenses Type 7707. Uses Pass-by Software 7757 B which adds:

- Throughput-to-disk (time data)
- Advanced order analysis features
- SQL – advanced data base engine
- 1 viewer license free of charge
- A-weighted waterfalls and order analysis in FFT, 1/3-, 1/12- and 1/24-octaves
- Doppler-corrected ground microphone time histories

Advanced post order analysis enables easy definition of order cursors, real contour plots and graph display where it is possible to move between frequency and order domain.

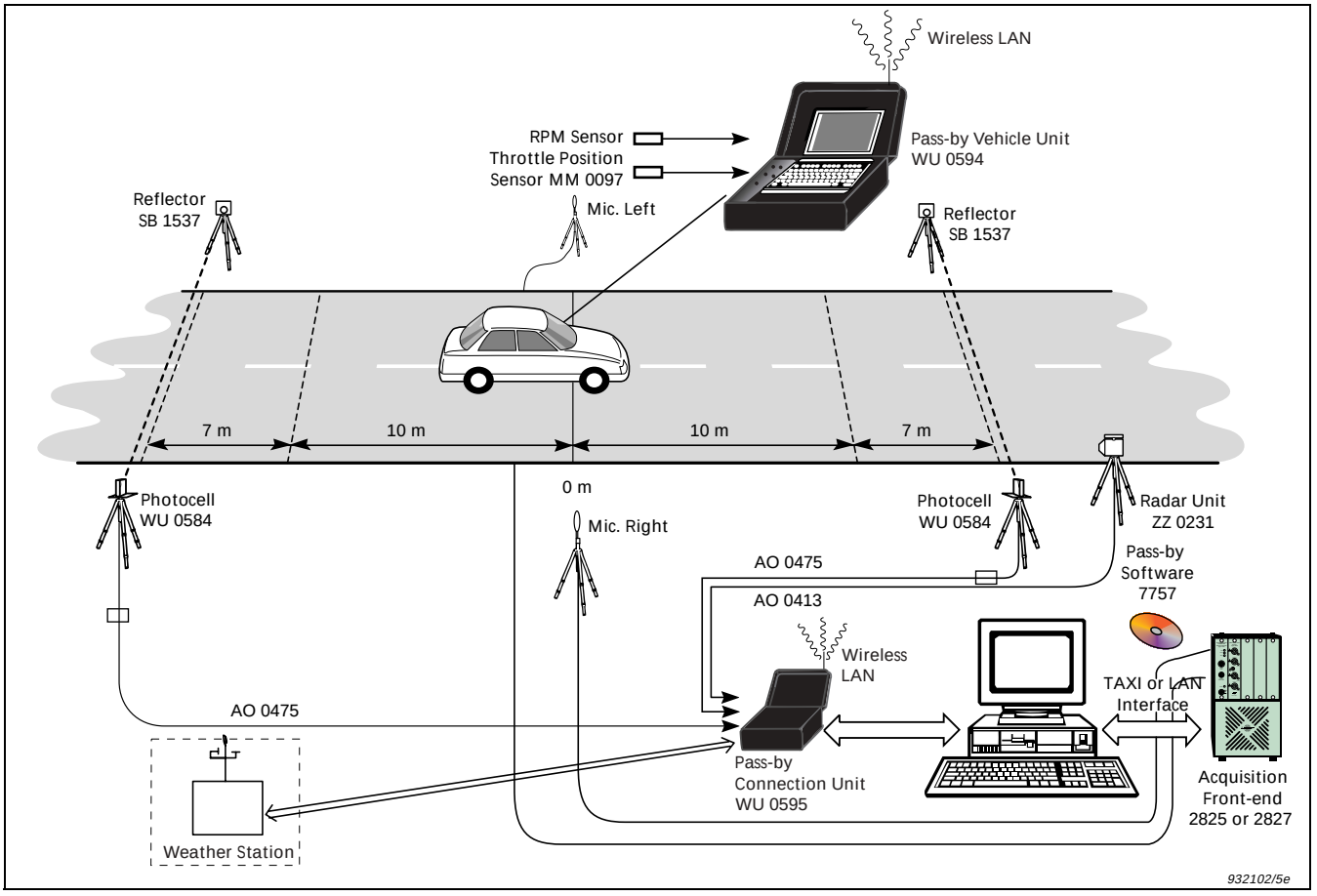
MS® SQL Server Database (structured query language) for easy and reliable data management, e.g., data can be linked to make comparisons.

Advanced Data Back-up System

Like the standard system but requires 2 DSP boards or 2 additional Analysis Engines and 1 extra computer which acts as a server. Uses Pass-by Software 7757 C, which is customised for companies where large amounts of data have to be handled and where comprehensive connection to and integration with the corporate network is required.

System Configuration

Fig. 1 *Pass-by Noise Measurement System Type 3598. The standard system measures in accordance with ISO 362. Options like weather station and head-up display, etc., can be added upon request*



Because of the need to relate noise data from both sides of the car to engine RPM, and vehicle speed, acceleration and position relative to the microphones, the system measures these parameters simultaneously. In addition, the throttle position is measured throughout the test. Measurement is triggered at a distance defined in the software.

During measurements, RPM and throttle position data are digitised and sent to the ground-station computer (GSC) by wireless LAN. The RPM signal is conditioned before being sent, based on the tacho setup in Pass-by Vehicle Unit WU 0594.

For measurements on motorcycles and scooters, special kit WU 0604 is available for transmitting the RPM from the vehicle to the ground PC.

Throughout a measurement, the pass-by software on the GSC receives continuous data on the position of the car from the radar unit, from which it calculates speed and acceleration. PULSE also uses the position reading to trigger the measurement of spectra at equidistant points along the test track. The speed information is also sent to the Notebook in the car so that the driver can see the exact speed on the display or on a sunlight capable head-up display.

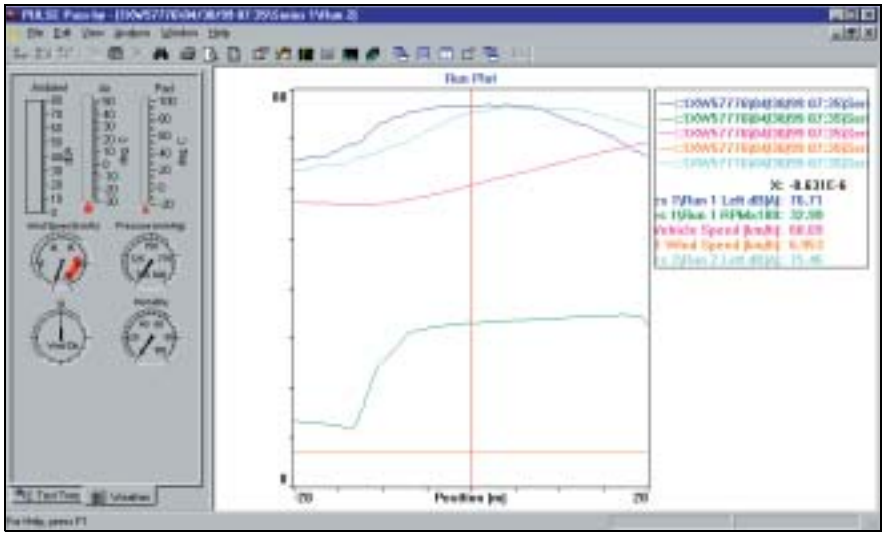


Fig. 2
Typical display where ambient conditions (temperature, sound pressure level) are shown with a graph of the pass-by measurement (A-weighted level with speed, RPM and wind speed)

Acoustic Excellence

The microphone channels are acquired and processed with the Brüel&Kjær PULSE™ Multi-analyzer System, which measures overall sound pressure levels and 1/nth octaves, both A- and C-weighted and FFT. Optionally, the system also stores Doppler-corrected time history data and FFT spectra.

All ISO, SAE, and Company Standards

Test types are included in a parameterised scheme, so that variations are specified by parameters like approach speed, RPM range and constraints on operating modes and environmental conditions. A test-editing wizard allows extension and customisation of the test palette.

Environmental Data

The environment can also be monitored so that constraints with respect to wind speed, air temperature, humidity and dew point can be checked and documented with every test.

Vehicle Parameters

RPM
Engine speed is measured by evaluating pulse trains from the ignition cable, engine computer or flywheel.

Miscellaneous
Ranges of parameters, such as throttle position, engine torque, horn voltage, etc., can be measured and used as test constraints or performance data.

Network Architecture

A high-speed wireless Ethernet network, running with the NetBEUI protocol links the vehicle computer and the GSC. The computer clocks are synchronised, and time stamping the data allows accurate merging of simultaneously sampled data at stations moving relative to each other. The NetBEUI protocol also allows any number of communication,

command and control streams to coexist on the network. For example, Microsoft® NetMeeting® can be used for voice communication between the vehicle computer and the GSC. Also, the car speed measured on the ground by radar is transferred to the car to be monitored.

Licensing Information

Certain countries demand that the purchaser obtain a license to use the radar. Brüel & Kjær cannot guarantee how long this process will take, or that the license will granted, but will assist in the process of obtaining a license by supplying the required technical information.

It is possible to buy Pass-by Noise Measurement System Type 3598 and substitute the radar unit with a component that is licensed locally.

Compliance with Standards – Type 3598

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

Type 2825 with Signal Analyzer Interface Module Type 7521 and 4-channel Input Module Type 3022:
See System Data BU 0216

Type 2827 with Lan Interface Module Type 7533 and Input/ Output Module Type 3032 A, 3032 B or 3109:
See System Data BU 0228

Specifications – Pass-by Noise Measurement System Type 3598

Standard Software Type 7757 A

Data Acquisition and Calculation
Set up to accept auxiliary data from as many as 11 different sources in ground station and 8 in vehicle
Ground Station: Vehicle Speed, Distance, Wind Speed, Wind Direction, Temperature, Pressure, Humidity, User-defined
In Vehicle: RPM, Throttle, User-defined
Channel Calibration: When the channel selected, the underlying PULSE™ system will become visible for calibration

Test and Analysis
- The Tool bar, with its icons, provides rapid access to frequently used items
- The Status bar displays Help, Wind Speed, and Ambient Noise Level
- The "Test Tree" provides a graphical way to select vehicle, test request, tests, and runs on which operation will be performed
- The vehicle Tool bar serves the vehicle information
- Weather Displays
- Test execution and Summary Results Dialog

Plots and Reports
- Level vs. Position
- Level Band vs. Position
- Spectra
- Overall
- 2D Graphics
- 3D Graphics – Waterfalls
- Managing Reports: Head information, Run Summary, Position, 1/3-, 1/12-, 1/24-octave spectra, FFT and other available parameters like speed, RPM and Throttle, etc.[1]
- Export all the results to Microsoft® Excel and Word

NT WORKSTATION
- Pentium® II, 64 MB RAM, 120 Mflops, DSP Board (1 or 2)
- TAXI Interface module
- Microsoft® Windows™ 2000

Advanced Post-processing System

Like the standard system but with Pass-by Software Type 7757 B, 2 × DSP Board ZD 0812 (2825) or 2 × Analysis Engine Type 7707 (2827) and Data Recorder Type 7701 with Throughput-to-Disk:
- Throughput-to-disk (time data)
- Advanced order analysis (VSI Rotate)
- A-weighted waterfalls and order tracking in FFT, 1/3-, 1/12- and 1/24-octaves
- Doppler corrected ground microphone time histories
- SQL (structured query language) for easy and secured data management
- 1 × Pass-by Viewer License included

Advanced Data Back-up System

Like the standard system but with 2 × DSP Board ZD 0812 (2825) or 2 × Analysis Engine Type 7707 (2827), Pass-by Software Type 7757 C and a separate SQL Server Database computer. Please contact your local Brüel & Kjær representative for details

Hardware

PULSE™
- Acquisition Front-end Type 2825 (2 ch.) or Type 2827
- Noise and Vibration Analysis Type 7700 G, 2 ch. license

Pass-by Vehicle Unit
This unit contains, connects and supplies the power to all the items needed inside the car to do the pass-by measurements
As standard it includes:
- Wireless LAN (Access Point)
- Notebook to show information to the driver and to set-up and measure other parameters as, e.g., RPM
- Data Acquisition Box for other parameters
- Tacho Conditioning: Trigger level and slope, hysteresis, hold-off and divider

Pass-by Connection Unit
This unit connects and supply the power to the radar and photocells as well as the optionally weather station

Wireless LAN
(Universal Client and Access Point)

Radar Unit
Transmission Frequency: 24.125 GHz
Frequency Stability: ± 50 MHz
Transmitted Power: ≥ 1 mW, < 5 mW

Throttle Sensor
Pressure sensitive on/off sensor

Acoustical Measurements
1/1-, 1/3-, 1/12- and 1/24-octave analysis fulfilling IEC 1260
Analysis Range: 0.1 Hz to 20 kHz (dual channel)
FFT analysis DC to 20 kHz (dual channel)
Fulfills IEC 651 Type 1 and IEC 804 Type 1

1. 1/12-, 1/24-octave spectra and FFT are not available with PULSE Types 7700 G and ZD 0828. The minimum requirements are Noise and Vibration Analysis Type 7700 A with two DSP boards ZD 0812

Ordering Information

Type 3598 Pass-by Noise Measurement System

The basis, standard system includes the following components:

STATIONARY PULSE

Type 2825	Acquisition Front-end
Type 3022	4-channel Input Module[1]
Type 7521	Signal Analyzer Interface Module
ZD 0815	TAXI Interface Module
ZD 0828	120 Mflops DSP Board
3 × FA 1009	Blank Panel

PORTABLE PULSE

Type 2827	Acquisition Front-end
Type 3109	4/2-channel Input/Output Module
UL 0167	LAN Switch

COMMON COMPONENTS

MM 0097	Throttle Position Sensor
WU 0594	Pass-by Vehicle Unit
WU 0595	Pass-by Connection Unit
2 × WU 0584	Photocell
2 × AO 0475	Cable for photocells (40 m)
2 × SB 1537	Reflector
ZZ 0231	Radar Unit
AO 0413	Radar Cable (40 m)
Type 7757 A	Application Software
Type 7700G	Noise and Vibration Analysis, 2-ch. license

Accessories Required

PCs[1]

UL 0191–xx	Brüel & Kjær specified Industrial PC, 650 MHz Pentium® III, 128 MB RAM, Microsoft® Windows® 2000, Keyboard, Mouse xx = GB, FR, DE, ES, IT, SE, US
UL 0109	HP 17" colour screen
UL 0176	Dell® Latitude Standard Notebook PC, 500 MHz Pentium® III

PC Software

BZ 5372–xx*	Microsoft® Windows® 2000 without manuals
BZ 5373–xx*	Microsoft® Windows® 2000 with manuals
UL 0208–xx*	Microsoft® Office XP Small Business Edition
UL 0209–xx*	Microsoft® Office XP Standard edition with manuals
UL 0207–xx*	Microsoft® Office XP Professional Edition

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

1.For other input module, preamplifier and microphone combinations, or other PCs and options, please consult your local Brüel & Kjær representative

Transducers[1]

With Type 3022:

2 × Type 4189	Prepolarized Free-field ½" Microphone
2 × Type 2671	Microphone Preamplifier
2 × WL 0082	BNC Cable, 40 m (specify length)

With Type 3109:

2 × Type 4190	Free-field ½" Microphone
2 × Type 2669 L	Microphone Preamplifier
2 × EL 4004–x	Extension Cable (specify length)

Optional Accessories

WQ 1256	Weather Station
WL 1340	Weather Station Cable
MM 0096	RPM Sensor (induction)
WQ 1269	RPM Sensor (vibration)
WQ 1258	Head-up Display, sunlight capable
	Cable for WQ 1258
WU 0604	Motorcycle Kit (RPM)

Advanced Post-processing

Type 7757 B	SW for Time Capture, Advanced Order Analysis
Requires:	
Type 7700 A	Noise and Vibration Analysis, 4-ch. license
Type 7701	Data Recorder
2825:	
UL 0112	Throughput-to-Disk
2 × ZD 0812	300 Mflops DSP Board
2827:	
2 × Type 7707	Analysis Engine

Advanced Data Back-up

Type 7757 C	SW for Database
Requires:	
Type 7700 A	Noise and Vibration Analysis, 4-ch. license
Type 7701	Data Recorder
Server PC	
2825:	
UL 0112	Throughput-to-Disk
2 × ZD 0812	300 Mflops DSP Board
2827:	
2 × Type 7707	Analysis Engine

Services

7700 G–MS1	Software Maintenance and Upgrade Agreement
3560–SI1	Installation and Configuration (at Brüel & Kjær)

Brüel & Kjær reserves the right to change specifications and accessories without notice

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