



Data Acquisition and Analysis for Squeak and Rattle Testing

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. To determine the localized in-vehicle vibration to establish Squeak and Rattle (S&R) test criteria for evaluation of systems, subsystems and components.

1.2 Applicability. This procedure is applicable to obtain vibration data for any automotive component, system or subsystem, where S&R is a concern and the vibration condition can be simulated.

1.3 Remarks. The test data will be limited to excited vibration induced noises, responding to inputs > 5 Hertz (Hz). Squeaks or itches excited only by body twist motions will not be addressed by this test. Impact type vibrations caused by a door, hood or rear compartment lid slam cannot be addressed by this test.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW8518

2.3 Additional References.

PCB Piezotronics Incorporated, Depew, New York

3 Resources

3.1 Facilities.

- S&R roads consistent with those identified in GMW8518 shall be used to gather data.
- In the event that one of the roads is closed for an extended period of time, data may be measured on a 4-post road simulator. Fore-aft and lateral inputs measured on the simulator are not proportional to the road system. Therefore, only vertical data should be measured using the 4-post road simulator. Only vertical simulator inputs are required on pre-Integration Vehicle Engineering Release (IVER) (mule) vehicles and competitive vehicles.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Use the preferred data acquisition system identified by the Global Noise and Vibration (N&V) Infrastructure Team as capable of measuring the desired number or acceleration channels and the lengths of the roads being measured, see Appendix A, Table A1.

3.2.2 Integrated Circuit Piezoelectric (ICP) type accelerators, see Appendix A, Table A1.

3.2.3 Accelerometer mounting materials, see Appendix A, Table A1.

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3.2.4 Use the preferred data analysis system identified by the Global N&V Infrastructure Team as capable of producing Power Spectral Density (PSD) plots from the time data acquired, see Appendix A, Table A1.

3.2.5 Test vehicle may be any passenger car or light duty truck.

3.3 Test Vehicle/Test Piece. The test vehicle should be qualified to ensure that it represents design intent. Deviations should be either corrected or noted. Triaxial acceleration measurements should be obtained only for those systems and components that are production intent. Pre-IVER vehicles should include vertical only measurements on major systems from the 4-post road simulator. For competitive vehicles, vertical data only from the 4-post road simulator is required.

3.4 Test Time. The following is an estimate on the amount of time (work-hours) needed to perform this procedure.

Calendar time:	6 days
Test hours:	48 hours
Coordination hours:	2 hours

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. To complete this test, one (1) technician and/or one (1) engineer skilled in vibration data acquisition and analysis is required. Depending on operator skill level and equipment limitations, this test takes five (5) to seven (7) days of technician time and one (1) day of engineer time to complete. Test personnel responsibilities include:

- Accelerometer types and theory of operation
- Accelerometer mounting techniques
- Mechanical ability to remove and replace parts
- Digital Data Acquisition
- Digital Signal Processing, including Fourier Analysis
- Data transfer, storage and retrieval techniques
- Enveloped Power Spectral Density (PSD) plot breakpoint selection.

4 Procedure

4.1 Preparation.

4.1.1 Obtain vehicle description and test data log; enter appropriate information.

4.1.2 Vehicle Preparation.

4.1.2.1 Test drive the vehicle to ensure the requirements specified in 3.3 are met.

4.1.2.2 Half fill the vehicle fuel tank. Fill the coolant and washer fluid reservoirs.

4.1.2.3 Adjust cold tire pressures to manufacturer's specifications. Allow tires to cool if the vehicle has been operated recently. Record tire pressures.

4.1.2.4 Ensure the surfaces are clean for adhesion of accelerometers. Inspect vehicle for any missing fasteners or parts.

4.1.3 Component Preparation.

4.1.3.1 Record test equipment serial numbers and calibration information.

4.1.3.2 Attach cable ends to accelerometers and acquisition hardware. Set up system recording parameters for the proper sampling rate, filter frequency, etc. See Appendix A, Table A1.

4.1.3.3 Secure all instrumentation in accordance with the Regional Proving Ground Driving Regulations.

4.2 Conditions.

4.2.1 Environmental Conditions. The measurements should not be made if road surfaces are covered with ice, snow or standing water. Weather conditions should be recorded in data logbook, including temperature. If only one (1) road surface is unavailable, the vertical inputs for that road surface can be recorded on the 4-post road simulator.

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