SURFACE VEHICLE RECOMMENDED PRACTICE

J1477™	OCT2024

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Superseding J1477 JAN1986

Measurement of Interior Sound Levels of Light Vehicles

RATIONALE

SAE J1477 is being stabilized because the Light Vehicle Exterior Sound Level Standards Committee has determined that the using community is moving towards newer technology and would like to alert users that this new technology exists which may want to be considered for new design. Developments in vehicle technology and the need to have test procedures applicable to human noise dose exposure has led to the revision of ISO 5128:1980, on which SAE J1477 was based.

Users of SAE J1477 needing provisions for different vehicle technologies or wish to understand the human dose response related to long term fatigue, task attentiveness, or hearing damage, are directed to ISO 5128:2023.

STABILIZED NOTICE

This document has been declared “STABILIZED” by SAE Light Vehicle Exterior Sound Level Standards Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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***Foreword*—**This Document has not changed other than to put it into the new SAE Technical Standards Board Format. References were added as Section 2. All other section numbers changed accordingly.

1. ***Scope*—**This SAE Recommended Practice establishes the test procedure, environment, instrumentation, and data analyses for comparing interior sound level of passenger cars, multipurpose vehicles, and light trucks having gross vehicle weight rating (GVWR) of 4540 kg (10 000 lb) or less.

The test procedure is characterized by having fixed initial conditions (specified initial vehicle speed and gear selection at the starting point on the test site) to obtain vehicle interior sound measurement during road load operation over various road surfaces at specified constant speeds.

The measurement data so derived is useful for vehicle engineering development and analysis.

1.1 **Operation—**Perform a standard series of tests at 60, 70, 80, 90, and 100 km/h (38, 44, 50, 56, 63 mph) on smooth (within normal construction practice) level asphalt or equivalent road surface.

Perform special tests at desired speeds on designated road surfaces, and/or with special noise producing systems operating, as desired.

2. ***References***

2.1 **Applicable Publications—**The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated, the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J184—Qualifying a Sound Data Acquisition System

2.1.2 ANSI AND ISO PUBLICATIONS—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ANSI S1.4—American National Standard Specification for Sound Level meters
ISO 5128—Acoustics, measurement of noise inside motor vehicles

2.2 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

2.2.1 SAE PUBLICATION—Available from SAE, 400 Commonweatlh Drive, Warrendale, PA 15096-0001.

SAE J986—Sound Level for Passenger Cars and Light Trucks

2.2.2 OTHER PUBLICATIONS—Available from McGraw-Hill Book Company, New York.

Beranek, Leo L., Noise and Vibration Control, p. 554, 1971.

3. Instrumentation—The following instrumentation shall be used:

3.1 Two sound level meters which meet the type 1 or S1A requirements of the American National Standard Specifications for Sound Level Meters, S1.4.

3.2 Two condenser type omni-directional microphones.

3.3 A two-channel audio tape recorder (if analyses described in 8.2 are to be obtained) conforming to the requirements of SAE Recommended Practice J184a, Qualifying a Sound Data Acquisition System.

3.4 A sound level calibrator accurate to ±0.5 dB.

3.5 An anemometer accurate to ±10% at 18 km/h (11 mph).

3.6 Instrumentation to measure the vehicle speed accurate to ±2% for a desired test condition.

4. Test Site

4.1 The test site shall be a flat open space free of large reflecting surfaces which affect the sound level. No passing vehicles may be in the vicinity of the test vehicle while measurements are being made.

4.2 The test site shall include a vehicle path of sufficient length for safe acceleration, deceleration, and stopping of the vehicle.

4.3 The test road surfaces shall be hard, as smooth and level as possible, and of uniform surface texture[1]. The test road surfaces shall be in good repair and free of local extraneous material such as sand, gravel, snow, water, leaves, etc.

5. Vehicle Preparation—The test vehicle shall be properly prepared for the test.

5.1 During the test, all operating conditions of the engine shall correspond to the specifications provided by the manufacturer, for example, fuel, lubricating oil, temperature, and ignition timing.

5.2 The tires shall be of a type specified by the vehicle manufacturer as being appropriate to the conditions under which the vehicle is normally used. The cold tire pressure shall be as recommended by the vehicle manufacturer.

5.3 Exhaust system, suspension, and steering including front end alignment and wheel(s) balance shall be checked and corrected as required to conform to the manufacturer's specifications.

1. It should be noted that road surface texture differences may produce variability in test results.

5.4 All the windows and ventilating systems shall be tightly closed. Accessories such as windshield wipers and selectable ventilating fans shall not be operated for the standard test. Special tests, such as with an air-conditioning unit operating at higher blower speed, may be specified. Any system which operates automatically and affects the sound level reading must be identified in the test report, preferably with data for the different operating modes.

5.5 Operate the test vehicle for 8 km (5 mile) at 90 km/h (55 mph) to warm up the engine and tires immediately before the test.

6. ***Microphone Positions—***The noise inside a vehicle may vary considerably with location. Therefore, measuring points should be selected in sufficient number and in such a manner that the distribution of the noise in the vehicle is adequately represented with respect to driver and passenger locations.

One measuring point shall be at the driver's position.

The microphone shall be no closer than 0.15 m (6 in) from walls or upholstery.

The microphone shall be oriented so that the direction of the manufacturer's recommended free field orientation is the same as the direction in which a person occupying the seat would be looking, or if such direction is not defined, in the driving direction. If a different orientation is used, it shall be reported.

The microphone used during the tests shall be mounted in such a way that it is not affected by vibrations of the vehicle. The mounting shall prevent excessive (more than about 20 mm) amplitudes relative to the vehicle.

6.1 Microphone position with respect to a seat (see Figure 1).

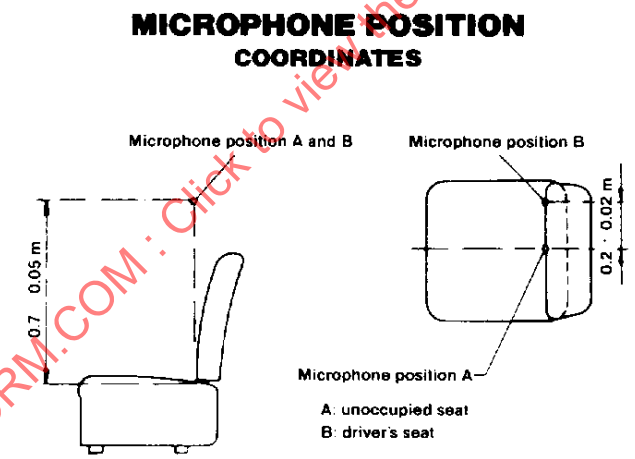

FIGURE 1—MICROPHONE POSITION WITH RESPECT TO A SEAT.

The vertical coordinate of the microphone shall be 0.7 m ± 0.05 m (28 in ± 2 in) above the intersection of the unoccupied seat surface and the surface of the back of the seat (see Figure 1). The horizontal coordinate shall be the middle plane (or plane of symmetry) of the unoccupied seat. At the driver's seat, with the driver present, the horizontal coordinate shall be 0.2 m ± 0.02 m (8 in ± 1 in) to the right from the middle plane of the seat.

Adjustable seats shall be set in the mid position of the horizontal and vertical range of adjustment. If the back rest of the seat is adjustable, it shall be set as near to the vertical position as possible.

Adjustable head rests shall be set at the mid position.