SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1161

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Operational Sound Level Measurement Procedure for Snowmobiles

1. Scope

This recommended practice establishes the instrumentation, test site, and test procedure for determining the exterior operational sound level for snowmobiles.

2. References

2.1 Applicable Publications

The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the lastest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATION

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

SAE J184—NOV98—Qualifying a Sound Data Acquisition System

2.1.2 ANSI PUBLICATION

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ANSI S1.4A 1983 (R-2000)—Specification for Sound Level Meters

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 ANSI PUBLICATIONS

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ANSI S1.1—1994 (R-1999)—Acoustical Terminology

3. Instrumentation

The following instrumentation shall be used, where applicable, for the measurements required:

3.1 A precision sound level meter which meets the Type 1 requirements of American National Standard Specification for Sound Level Meters (S1.4 A-1985 (R-2000)).

3.1.1 As an alternate to making direct measurements using a sound level meter, a microphone or sound level meter may be used with a magnetic tape recorder and/or graphic level recorder or indicating meter providing the system meets the requirements of SAE J184, Qualifying a Sound Data Acquisition System.

3.1.2 The microphone shall be used with a windscreen that will not affect the microphone response by more than ±1 dB for frequencies of 20–4000 Hz or ±1.5 dB for frequencies of 4000–10 000 Hz at zero wind speed conditions.

3.2 An acoustic calibrator (accuracy within ±0.5 dB).

3.3 A calibrated vehicle speed indicating system (accuracy within ±5% at test speed).

3.4 A thermometer (accuracy within ±1 °C [2 °F]).

3.5 A barometer (accuracy within ±1%).

3.6 A psychrometer or dew point apparatus.

3.7 An anemometer (accuracy within ±1%).

3.8 A windvane or other device for the measurement of wind direction.

4. Test Site

4.1 A suitable test site is a level open space free from the effects of large sound reflecting surfaces. Parked vehicles, signboards, and other obstacles must not be located within 30.4 m (100 ft) of either the vehicle path or the microphone (Figure 1).

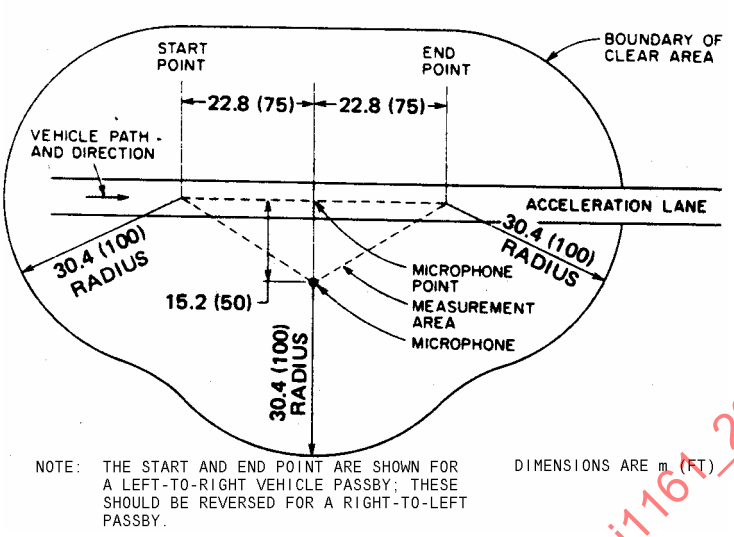

FIGURE 1—UNIDIRECTIONAL TEST SITE LAYOUT

4.2 The microphone shall be located 15.2 m (50 ft) from the centerline of the vehicle path and 120 cm (48 in) above the snow or turf. The normal to the vehicle path from the microphone shall establish the microphone point on the vehicle path.

4.3 The measurement area shall be the triangular area formed by the start point, the end point, and the microphone location.

4.4 The surface of the ground within the measurement area, including the vehicle path, shall be covered with a maximum of 7.5 cm (3 in) loose snow over a base consisting of at least 5 cm (2 in) of snow sufficiently compacted to support the snowmobile without penetration. As an alternative, a surface of turf, primarily grass up to a maximum of 7.5 cm (3 in) in height may be used, which, except for the vehicle operating path, shall be free of visible droplets of water.

4.5 The reference point of the vehicle, to indicate when the vehicle is at any of the points on the vehicle path, shall be the front of the vehicle skis.

4.6 While making sound level measurements, not more than one person, other than the observer reading the meter and the test driver, shall be within 15.2 m (50 ft) of the vehicle path or microphone and that person shall be directly behind the observer reading the meter on a line through the microphone and observer.

4.7 The ambient A-weighted sound level (including wind effects) coming from sources other than the vehicle being measured, shall be at least 10 dB lower than the noise level with the vehicle operating under test conditions.

5. Procedure

5.1 Vehicle Operation

5.2 A constant speed as specified below is the basis for determining the operational sound level of the snowmobile.

5.2.1 Before reaching the start point, accelerate the vehicle to the speed of 24 ± 3 km/h (15 ± 2 mile/h). Maintain this constant speed with throttle held as steady as possible through to the end point. The centerline of the vehicle must not deviate more than 1 m (3 ft) from either side of the centerline of the vehicle path.

6. Measurements

6.1 The sound level meter shall be set for slow response and the A-weighted network.

6.2 The applicable sound level reading shall be the highest indicated for the run, between the start point and the end point, ignoring unrelated peaks due to extraneous noise.

6.3 During the test period, the atmospheric temperature, pressure, humidity, wind speed, and wind direction shall be recorded at intervals not to exceed 1 h. Also record test surface conditions.

6.4 Test runs shall be repeated until three readings within a 2 dB range per vehicle side have been obtained. The sound level for each side of the vehicle shall be the average of all three readings, rounded to the nearest integer. The sound level reported shall be that for the side of the vehicle with the highest average.

7. General Comment

7.1 It is recommended that persons technically trained and experienced in the current technique of sound measurement select the equipment and conduct the tests.

7.2 The operation of recording and measuring equipment is likely to be affected by low temperatures. Where measurements are undertaken at temperatures near or below 0 °C (32 °F), special precautions must be taken to ensure the reliability of sound meter readings and/or recordings.

7.3 Instrument manufacturers' specifications for the proper use of all the test equipment shall be adhered to.

7.4 Measurements shall be made only when the wind speed is below 19 km/h (12 mile/h) and absolute barometric pressure is between 93 and 103 kPa (27.5 and 30.5 in of mercury).

7.5 The vehicle manufacturers' recommendation governing the proper operation of the vehicle shall be followed.

7.6 Proper acoustical calibration procedure shall include the influence of extension cables, etc. Field calibration shall be made immediately before and after each test sequence. Internal calibration means is acceptable for field use, provided external calibration is accomplished immediately before and after field use.

7.7 A 2 dB tolerance over the sound level limit shall be included to provide for variations in test sites, temperature gradients, wind velocity gradients, test equipment, and inherent differences in nominally identical vehicles.

8. Notes

8.1 Marginal Indicia

The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE SNOWMOBILE SUBCOMMITTEE