

**ACOUSTICS—MEASUREMENT OF NOISE EMITTED BY
EARTHMOVING MACHINERY AT THE OPERATOR'S POSITION—
SIMULATED WORK CYCLE TEST CONDITIONS**

This document is equivalent to ISO document 6396.2, except for minor reorganization of Sections 1 through 4.

Foreword—This SAE Standard is a special test code for specific types of earthmoving machinery. It is an extension of ISO 6081 which contains the general requirements for many types of machinery and equipment.

A simulated rather than an actual work cycle test condition is chosen. Simulated work cycles provide acceptable noise emission data which are repeatable and representative. Actual work cycle tests are complex and repeatability can be a problem.

Specific procedures are described in this document to enable the sound pressure level at the operator's position, with the machine in a simulated work cycle test condition, to be determined in a manner which is repeatable. Attachments (bucket, dozer, etc.) for the manufacturer's production version are to be fitted since this is the configuration most likely to exist when the machine is in actual use.

This document enables compliance with noise limits to be determined. It can also be used for evaluation purposes in noise reduction investigations.

An additional special test code is given in SAE J2104/ISO 6395. This other special test code is intended to be used to determine the noise emitted by earthmoving machinery in terms of the A-weighted sound power level while the machine is in a simulated work cycle test condition.

Corresponding measurements of exterior noise and noise at the operator's position under stationary test conditions are described in SAE J2102/ISO 6393 and SAE J2103/ISO 6394, respectively.

- 1. Scope**—This SAE Standard describes a method for determining the noise emitted by earthmoving machinery at the operator's position in terms of the equivalent continuous A-weighted sound pressure level while the machine is carrying out a simulated work cycle.

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

SAE J2101/ISO 6393—Acoustics—Measurement of airborne noise emitted by earthmoving machinery—
Method for determining compliance with limits for exterior noise—Stationary Test condition

SAE J2102/ISO 6394—Acoustics—Measurement of airborne noise emitted by earthmoving machinery—
Operator's position—Stationary test condition

SAE J2104/ISO 6395—Acoustics—Measurement of exterior noise emitted by earthmoving machinery—
Dynamic test conditions¹

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

ISO 1585—Road vehicles—Engine test code—Net power

ISO 3411—Earth moving machinery—Human physical dimensions of operators and minimum operator
space envelope

ISO 6081—Acoustics—Noise emitted by machinery and equipment—Guidelines for the preparation of test
codes of engineering grade requiring noise measurements at the operator's or bystander's position

2.1.3 IEC PUBLICATIONS—Available from International Electrotechnical Commission, 3, rue de Verambe, P.O. Box
131, 1211 Geneva 20, Switzerland.

IEC Publication 651—Sound Level Meters

IEC Publication 804—Integrating-Averaging Sound Level Meters

3. Definitions—For the purposes of this document, the definitions given in ISO 6081 and the following definitions apply.

3.1 Equivalent Continuous A-Weighted Sound Pressure Level, $L_{pAeq,T}$ —The A-weighted sound pressure level averaged on an energy basis over the whole measurement period.

4. Field of Application—This document is applicable to the following specific crawler and wheeled types of earthmoving machinery:

- a. Excavators (hydraulic or rope-operated), (see Figure 1);
- b. Tractors with dozer equipment (see Figure 2);
- c. Loaders (see Figure 3);
- d. Backhoe loaders (also known as excavator-loaders) (see Figure 4).

5. Instrumentation—The instrumentation shall be capable of carrying out measurements as described in 8.1. Integrating-averaging sound level meters shall meet the requirements of IEC Publication 804 for a type 1 instrument. Alternative instrumentation, including the microphone and cable, shall meet the requirements of IEC Publication 651 for a type 1 instrument.

A microphone with a diameter not greater than 13 mm shall be used for measurements so as to reduce possible directivity errors. The microphone and its associated cable shall be chosen so that the combined sensitivity does not change significantly over the temperature range encountered during the measurements.

1. At present at the stage of draft.

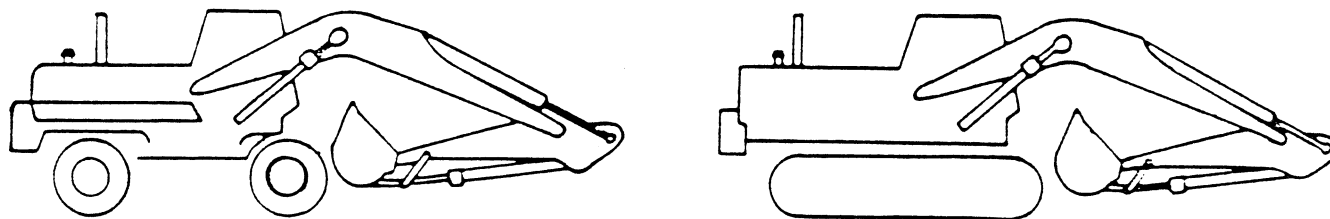


FIGURE 1—EXCAVATOR

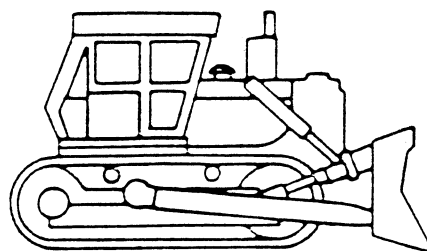
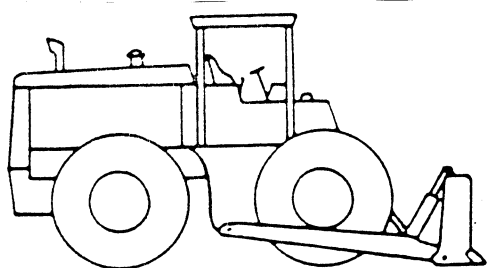


FIGURE 2—TRACTOR WITH DOZER EQUIPMENT

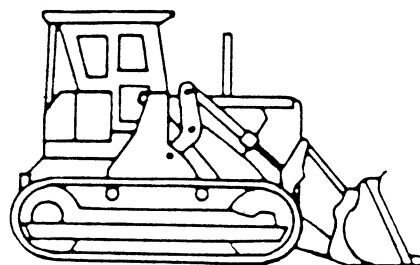
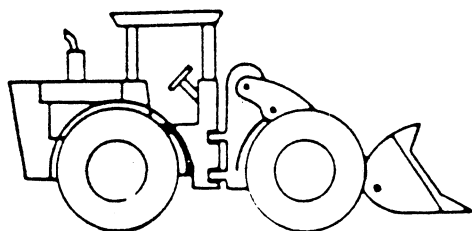


FIGURE 3—LOADER

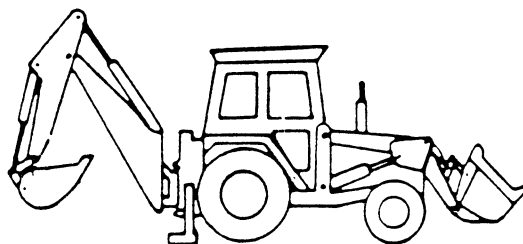


FIGURE 4—BACKHOE LOADER