

# **AES project report**

## **for articles on professional audio and for equipment specifications — Notations for expressing levels**

*Published by*

**Audio Engineering Society, Inc.**

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### **Abstract**

This document describes the style for levels standardized in IEC 60027-3, *Letter symbols to be used in electrical technology — Part 3: Logarithmic quantities and units*, and the power and voltage level clauses of IEC 60268-2, *Sound system equipment — Part 2: Explanation of general terms and calculation methods*, and summarizes and reviews the presently used notations for expressing levels in condensed or abbreviated form, what expressions are used, and what quantities and reference quantities are implied.

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## Foreword

[This foreword is not a part of AES-R2-1998, *AES project report for articles on professional audio and for equipment specifications — Notations for expressing levels.*]

This document was prepared by the SC-05-A task group of the Audio Engineering Society Standards Committee (AESSC) SC-05 Subcommittee on Interconnections. The task group was established on 1995-10-09, with Chair John Woodgate and Vice Chair J. McKnight. It was assigned project AES-X39 with the goals:

(1) to familiarize AES members and others with the style for levels standardized in IEC 60027-3, *Letter symbols to be used in electrical technology — Part 3: Logarithmic quantities and units*, and the power and voltage level clauses of IEC 60268-2, *Sound system equipment — Part 2: Explanation of general terms and calculation methods*, for example:

Power level re 1 mW =  $n$  dB;

(2) to collect information;

(3) to provide guidance for recommendations in this area by the staff of the *Journal of the Audio Engineering Society*;

(4) to consider any further standardization in this area if necessary, and, if so, draft a standard.

The project was established by the AESSC at the AES 99th Convention in New York, NY, US in 1995-10. Open meetings were held at the AES 101st Convention in Los Angeles, CA, US, in 1996-11, and at the 103rd Convention in New York, in 1997-09, at which the task group reported to the SC-05 subcommittee. That report to the subcommittee was published in the *Journal of the AES*, vol. 46, no. 3, pp. 217–219 (1998-03), and appears on the AESSC Web site.

J. M. Woodgate, Chairman  
J. McKnight, Vice-Chairman  
1998-06-01

## Foreword to second edition

This report was reviewed and revised by the SC-03-01 Working Group on Analog Recording. Clause 3 originally proposed that "The task group has suggested that AESSC should consider recommending the adoption of 1 V as the reference quantity for new work in audio engineering, corresponding to the level 0 dB (V)." This proposal has been abandoned for reasons explained in the revised clause 3.

J. McKnight, Chairman  
2003-12

# AES project report

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### 1 Introduction and background

In 1995-10, the SC-05 Subcommittee on Interconnections set up the SC-05-A task group as a result of correspondence and discussions involving the *Journal of the Audio Engineering Society* concerning unfamiliar, ambiguous, and frankly incorrect usage associated with the symbol “dB.” Discussions by correspondence continued throughout 1996, and open meetings were held at the AES 101st Convention in 1996 and the AES 103rd Convention in 1997. Further discussions have continued by e-mail.

It had become apparent that there is an intense and (to some) surprising dichotomy on this subject. Common audio engineering practice has been to write levels with a condensed notation that implies both the quantities and the reference quantities for levels by using an abbreviation following the level, for example, “the level was 10 dBm,” where the meaning of the abbreviation “m” is only implied. On the other hand, according to existing policies and standards, the quantity and the reference quantity should be explicitly stated, for example, “the electrical power level re 1 mW was 10 dB.” Many are not sure that this is clearer, except perhaps to those first entering the audio field, but are sure that it results in a rather verbose style. In the following text, an attempt has been made to respect both views, but clearly that is in principle an impossible task: they are indeed mutually exclusive. Nevertheless, each has merit.

Unfortunately, this dichotomy has to some extent attracted attention away from the original task of the group, which was to address the more serious problems of ambiguity and incorrectness, and to remedy, where appropriate, unfamiliarity.

The subject is not new to the Society. This and other related matters have been standardized in IEC 60027-3, *Letter symbols to be used in electrical technology — Part 3: Logarithmic quantities and units*; ITU/R Rec. 574-3; and ANSI/IEEE 260.4-1996 (formerly ANSI/ASME Y10.11), *Standard letter symbols and abbreviations for quantities used in acoustics*. The principles and usage have been explained in J. G. McKnight, “Quantities, Units, Letter symbols, and Abbreviations,” *J. Audio Eng. Soc.*, vol. 24, pp. 40-44 (1976-01/02) which gives references to the then-current standards. However, in the succeeding twenty years, the audio engineering community has been generally unaware of these standards, and some of those individuals who have been aware of them have shown a definite resistance to adopting them. This has led to a lack of an accepted guiding principle, and this in turn has led to a growth of ambiguity and frankly incorrect usage.

### 2 Proposed guidelines

The cited McKnight paper sets out what was at that time the editorial policy of the *Journal*, not to say that this has formally changed since then. But the usage in manuscripts submitted to the *Journal*, and, in some cases, published therein, has certainly not uniformly adhered to that policy. Despite the AES Standards Committee requirement that International Standard symbols be used, the same criticism of usage might apply to AES published standards: they may not all conform completely to the policy, and that is also true for standards published by other bodies. Some of these latter contain usage that is very difficult indeed to support.

Under the circumstances, it seems appropriate to re-appraise the recommendations given to authors and to members in general on this subject, taking into account both established standards and that established usage which, while not beyond criticism, is unlikely to cause confusion or doubt. For that reason, the following guidelines are offered to authors seeking publication in the *Journal* and to members in general for use in their professional work.

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