

Proposed Recommended Practice for the Preparation and Use of Symbols

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Foreword

In the IEEE, as in engineering and the sciences in general, graphic and alphabetic symbols and designations are an important factor in effective communication. The rapid technological expansion in the electrical and electronics fields results in proposals for new symbols and designations being generated in many areas. In order to eliminate confusion, it is necessary to establish and use a coordinated set of symbols and designations, thus providing a common language that is formed according to carefully established principles.

As a result of discussions in the Symbols Committee and later in the Standards Committee, this Recommended Practice for the Preparation and Use of Symbols was developed. The purpose of the recommendations is to provide guidance to the Technical Committees and others within the IEEE who may be engaged either in developing Standards Publications or in preparing publications. It is believed that by following the guidelines laid down herein, it will be possible for such committees and individuals to develop Standards Publications which employ fully coordinated and universally understood symbology.

In addition, there is much information in this Recommended Practice that can be of considerable aid to persons and organizations who are users of symbols. The Standards Coordinating Committee for Letter and Graphic Symbols feels that the availability of this document to such users will provide answers to many questions and solutions to many problems frequently encountered in the application of symbology. Questions to which the answers cannot be found in this Recommended Practice may be directed to

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This Recommended Practice was prepared primarily by R. T. Haviland during the period 1962 through 1964 in frequent consultation with, and with invaluable aid from, the Standards Coordinating Committee for Letter and Graphic Symbols (formerly the Symbols Committee), whose membership included the following:

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Proposed Recommended Practice for the Preparation and Use of Symbols

I INTRODUCTION

The IEEE Standards Coordinating Committee for Letter and Graphic Symbols recognizes the need for guidelines to be used in developing and applying those symbols that are employed in the electrical and electronics fields. These include: abbreviations, functional designations, graphic symbols, letter combinations, mathematical symbols, reference designations, symbols for quantities, and symbols for units. Such guidelines are useful not only to members of the Standards Coordinating Committee, but are especially helpful to any other committee engaged in developing Standards Publications in the areas mentioned. Accordingly, these guidelines have been formulated and are given in detail herein.

There is considerable confusion as to what is meant by the terms “abbreviation”, “designation”, and “symbol”. The first step, then, is to define the terms involved. This has been done and, for additional guidance, examples have been included to show how such terms are used.

Applicable reference Standards Publications are listed at the end of each section. The basic Standards Publication number is given for each document; it is assumed that the user will obtain the latest issue and amendment in each case.

Committees, Subcommittees, and Task Forces of the IEEE and its Groups that find it necessary to engage in the development of symbols are required to advise the IEEE Standards Coordinating Committee for Letter and Graphic Symbols of the intended action before beginning work. Other bodies (outside of IEEE) are urged to do so. The Standards Coordinating Committee for Letter and Graphic Symbols is continuously reviewing and coordinating in the above-mentioned areas. This committee also is constantly engaged in developing new symbols to take care of advances in the state of the electrical and electronics arts. A considerable background in symbology has been built up by this committee over the years, and its aid and counsel are available to any individual or group.

II DEFINITIONS

Abbreviation—A shortened form of a word or expression. (For special-purpose abbreviations, *see also*: “Functional Designation”, “Letter Combination”, “Mathematical Symbol”, “Reference Designation”, “Symbol for a Quantity”, “Symbol for a Unit”.)

Functional Designation—Letters, numbers, words, or combinations thereof, used to indicate the function of an item or a circuit, or of the position or state of a control or adjustment. (*Compare with*: “Letter Combination”, “Reference Designation”, “Symbol for a Quantity”.)

Graphic Symbol—A geometric representation used to depict graphically the generic function of an item as it normally is used in a circuit.

Letter Combination—One or more letters which form a part of the graphic symbol for an item and denote its distinguishing characteristic. (*Compare with*: “Functional Designation”, “Reference Designation”, “Symbol for a Quantity”.)

Mathematical Symbol—A graphic sign, a letter or letters (which may have letters or numbers, or both, as subscripts or superscripts, or both), used to denote the performance of a specific mathematical operation, or the result of such operation, or to indicate a mathematical relationship. (*Compare with*: “Symbol for a Quantity”, “Symbol for a Unit”.)

Reference Designation—Numbers, or letters and numbers, used to identify and locate units, portions thereof, and basic parts of a specific set. (*Compare with*: “Functional Designation” and “Symbol for a Quantity”.)

Symbol for a Quantity (Quantity Symbol)—A letter (which may have letters or numbers, or both, as subscripts or superscripts, or both), used to represent a physical quantity or a relationship between quantities. (*Compare with*: “Abbreviation”, “Functional Designation”, “Mathematical Symbol”, “Reference Designation”, and “Symbol for a Unit”.)

Symbol for a Unit (Unit Symbol)—A letter, a character, or combinations thereof, that may be used in place of the name of the unit. With few exceptions, the letter is taken from the name of the unit. (*Compare with*: “Abbreviation”, “Mathematical Symbol”, “Symbol for a Quantity”.)

III ABBREVIATIONS

1 Definition: Abbreviation

A shortened form of a word or expression. (For special-purpose abbreviations, *see also*: “Functional Designations”, “Letter Combinations”, “Mathematical Symbols”, “Reference Designations”, “Symbols for Quantities”, and “Symbols for Units”.)

2 Application

Abbreviations are used on diagrams, drawings, parts lists, etc., as well as in text and tabular matter, and on nameplates, panels, etc.

3 General Rules

- a) Development of a new abbreviation shall be considered only if there is a genuine need for it, and only after a thorough search of widely recognized Standards Publications indicates that there is no existing abbreviation that will meet the requirements.
- b) When a search of the applicable Standards Publications does not reveal the desired abbreviation, contact the IEEE Standards Coordinating Committee for Letter and Graphic Symbols.
- c) *Abbreviation Patterns*—Examination of existing Standards Publications will reveal that most abbreviations fall into one of the following patterns:
 - 1) Initial letter of a one-word term:

- n negative
 - p positive
- 2) Initial letters of a multiword term:
 - ac alternating current
 - vhf very high frequency
- 3) Initial letters of the elements of a compound term:
 - ccw counterclockwise
 - uv ultraviolet
- 4) First portion of a term:
 - approx approximate
 - discr discriminator
- 5) First portions of the words of a multiword term:
 - modem modulator-demodulator
 - magamp magnetic amplifier
- 6) Omission of most vowels and (sometimes) consonants:
 - rcvr receiver
 - swbd switchboard
- d) *Distinctiveness*—Wherever possible, the abbreviation for a term should be distinctive, brief, mnemonic, quickly recognizable, and unambiguous. For example, “rep” could mean repeater, repeller, repair, or repetition, among other terms; but the use of rprr, rplr, rpr, and rptn, respectively, for their abbreviations, eliminates any confusion and, at the same time, makes for faster phonetic recognition by the reader. Note also “tel” for telephone or telegraph; and “elec” for electrical or electronic.
- e) *Recommended Usage*—
 - 1) Abbreviations should not be used if they could possibly be misinterpreted or result in a lack of comprehension by the reader. If there is doubt that the reader will understand the meaning of an abbreviation, it is recommended that, in text, the abbreviation be followed by the term spelled out in parentheses the first time it appears. In tabular matter and on drawings, a note, footnote, key, or legend should be included, as appropriate. **WHEN IN DOUBT, SPELL IT OUT!**
 - 2) In text, the use of abbreviations should be held to a minimum, except where a term is repeated frequently, or its abbreviation and meaning are widely understood.
 - 3) Technical data prepared for distribution within a single organization may make substantial use of abbreviations because the technical data comprehension of the user is known. In most documents, however, the use of abbreviations should be limited in the introductory section that is intended primarily for nontechnical management and supervisory personnel, even though abbreviations may be employed freely elsewhere.
- f) *Taste*—Good taste and judgment must be observed in the development of new abbreviations. Carefully avoid any abbreviation which spells an English word that could be construed as profane, indecent, or obscene.
- g) *Short Words*—In general, avoid abbreviating short words, except those established by longstanding practice.
- h) *Word Combinations*—Single abbreviations may be combined, when necessary, to form an abbreviation for a word combination, according to patterns established by the forms given. Abbreviations given for word combinations, however, shall not be separated for use singly: e.g., use AGC for automatic gain control, but do not separate and use A for automatic, G for gain, or C for control.
- i) *Capitalization*—
 - 1) Abbreviations used as functional designations, letter combinations, or reference designations are intended primarily for use on diagrams, nameplates and the like. As such, they normally are printed in capital letters.
 - 2) Abbreviations used as quantity symbols or unit symbols may consist of upper-case or lower-case letters, or a mixture of both. The appropriate rules should be followed closely as a change of case often denotes a change of meaning.
 - 3) General abbreviations, not included in the above classifications, usually may be written in either upper- or lower-case letters, according to the style preference of the user. The following ground rules, however, are recommended.
 - a) As a general rule, lower-case letters are recommended for abbreviations in text and tables, except:
 - where the use of capital letters has been established by longstanding practice (e.g., AQL, NRZ);

- for names of widely used major electronic systems (**e.g., IFF, GCA**);
 - where capitalization agrees with the parent words (**e.g., AWG**).
- b) Capital letters generally are used on drawings, nameplates, and in titles, table headings, and similar places, provided no confusion is likely. When drawings are to be microfilmed, special consideration should be given to the question of legibility, particularly where lower-case letters are used.
- 4) Where an abbreviation appears on a panel, nameplate, or illustration, the direct specific reference in text to that feature of the panel, nameplate, or illustration must appear in identical form with regard to spelling and capitalization.
- j) *Punctuation*—Punctuation marks shall not be part of abbreviations of technical terms, except that a period shall be placed at the end of any abbreviation that spells an English word if the omission of such period would result in ambiguity or confusion.
- k) *Spacing*—Spaces between letters are used only for clarity, especially in abbreviations for word combinations or phrases. Example: ref des for reference designation.
- l) *Tense and Number*—The same abbreviation should be used for all tenses (discharge—disch, discharged—disch), the singular or plural, and the noun or modifying forms of a term.

4 Examples

See 3c.

5 Reference Standards

a) *Industry.*

ASA Z32.13	American Standard Abbreviations for Use on Drawings.
ASA Z10.1	American Standard Abbreviations for Scientific and Engineering Terms.
IEEE No. 198	Abbreviations of Radio-Electronic Terms. (Same as 51 IRE 21.S1. Abbreviations for Units portion superseded by IEEE No. 260.)

b) *Military.*

MIL-STD-12	Abbreviations for Use on Drawings and in Technical Type Publications.
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IV FUNCTIONAL DESIGNATIONS

1 Definition: Functional Designation

Letters, numbers, words, or combinations thereof, used to indicate the function of an item or a circuit, or of the position or state of a control or adjustment. (*See also*: “Letter Combinations”, “Reference Designations”, and “Symbols for Quantities”.)