

IEEE Editorial Style Manual

This style manual provides editorial guidelines for IEEE Transactions, Journals, and Letters. For spelling reference, IEEE Publications uses *Webster's College Dictionary*, 4th Edition. For guidance on grammar and usage not included in this manual, please consult *The Chicago Manual of Style*, published by the University of Chicago Press.

IEEE Transactions Editing Philosophy

The IEEE's responsibility in editing papers for the Transactions is not to make any determination on or do any editing of the technical content of the papers we work with, but is instead to render the work as readable, grammatically correct, and as consistent with IEEE style as possible.

Since we are concerned with style mainly in the sense of IEEE house style, we do not try to change an author's style of writing. We do a mechanical edit to correct or question grammatical errors, obvious inconsistencies or omissions, spelling, and punctuation. Since we work with highly technical text, we also do extensive formatting of mathematical material.

Parts of a Paper

Paper Title

In the paper title, capitalize the first letter of the first and last word and all the nouns, pronouns, adjectives, verbs, adverbs, and subordinating conjunctions (*If, Because, That, Which*). Capitalize abbreviations that are otherwise lowercase (e.g., use DC, not dc or Dc) except for unit abbreviations and acronyms. Articles (*a, an, the*), coordinating conjunctions (*and, but, for, or, nor*), and most short prepositions are lowercase unless they are the first or last word. Prepositions of more than three letters (*Before, Through, With, Without, Versus, Among, Under, Between*) should be capitalized.

First Footnote

The first footnote is made up of three paragraphs. This footnote is not numbered. All other footnotes in the paper are numbered consecutively.

The first paragraph contains the *received* and (possibly) *revised* dates of the paper. When a paper has more than one revised date, list all the dates given.

The second paragraph is made up of the authors' affiliations. For two or more authors with different affiliations, use separate sentences and paragraphs for each, using all initials with a surname. Group the authors with the same affiliation together; list the affiliations according to the order of the authors in the byline.

The third or final paragraph lists the Digital Object Identifier (DOI) number, assigned by the IEEE.

All *financial support* for the work in the paper is listed next to the first paragraph and not in the Acknowledgment at the end of the paper.

Body of a Paper

Abstract

Every published paper must contain an Abstract. Abstracts appear in text in boldface type. By nature, Abstracts shall not contain numbered mathematical equations or numbered references.

Index Terms

All papers must contain Index Terms as provided by the authors. A list of keywords is available by sending a blank email to keywords@ieee.org. Index Terms appear in boldface type as in the Abstract, in alphabetical order, and as a final paragraph of the Abstract. Acronyms are defined in Index Terms if they are defined in the paper.

Nomenclature

Nomenclature lists (lists of symbols and definitions) generally follow the Abstract and Index terms and precede the Introduction.

Text Section Headings

Standard specifications have been established for Transactions text section headings. There are four levels of section headings with established specifications: primary; secondary; tertiary; and quaternary heads.

Enumeration of section heads is desirable, but not required. The author's preference may be followed. However, the choice must be consistent throughout the paper.

Primary headings are enumerated by Roman numerals and centered above the text.

Secondary headings are enumerated by capital letters followed by followed by periods, flush left, upper and lower case, and italic.

Tertiary headings are enumerated by Arabic numerals followed by parentheses. They are indented one em, and run into the text in their sections, italic, upper and lower case, and followed by a colon.

Quaternary headings are identical to tertiary headings, except that they are indented two ems, lower case letters are used as labels, and only the first letter of the heading is capitalized.

Reference and Acknowledgment headings are unlike all other section headings in text. They are never enumerated. They are simply primary headings without labels, regardless of whether the other headings in the papers are enumerated.

Appendix headings are a special case. The primary heading(s) in the Appendix or Appendixes (note spelling of plural) are set according to the usual style, except that there is flexibility in the enumeration of the heading. The author may use Roman numerals as heading numbers (Appendix I) or letters (Appendix A). The Appendix heading is not preceded by a Roman numeral. If there is only one Appendix in the paper, the Appendix heading is unnumbered and unnamed.

Text Equations

Equations within a paper are numbered consecutively from the beginning of the paper to the end. There are some Transactions in which the author's own numbering system, such as numbering by section, e.g., (1.1), (1.2.1), (A1), is permitted.

Acknowledgment

The placement of the Acknowledgment appears after the final text of the paper, just before the References section, and after any Appendix(es).

When citing names within the Acknowledgment, use first initials only, not full names. Do not use Mr., Mrs., Ms., or Miss (list first initial and last name only). Use the Dr. or Prof. title with each name separately; do not use plural Drs. or Profs. with lists of names.

All acknowledgment of financial support must be removed from the Acknowledgment section, and placed in the first paragraph of the first footnote.

Write the Acknowledgment section to be read in the third person.

References

The numbering of references is employed by citing one reference per number. Every reference in a Transactions reference list should be a separate number entry. Use of one reference number to designate a group of references is **not allowed**.

Text Citation of Figures and Tables

All citations of figure and tables in text must be in numerical order. Citations to figures in text always carry the abbreviation "Fig." followed by the figure number. The abbreviation is used even when it begins a sentence.

Biographies

IEEE Transactions' author biographies are generally divided into three paragraphs.

The *first paragraph* begins with the author's full name and IEEE membership history. If provided by the author, the first paragraph may contain a place and/or the date of birth. Next, the author's educational background is listed. Use lower case for the author's major field of study. Always use the word "degree" after a degree title. Include the years the degrees were received. Abbreviations for common international and domestic degrees are:

Dipl.Ing., Diplom-Physiker, Dr. ing., dr. Phil., Dr. Eng., B.S., S.B., B.A., A.B., B.Sc. (Hons.), B.S.E., B.E.E., M.Eng., M.S.(tech.), M.S.E.E., M.S.E., Civilingenir, Lic.es Sci., Lic.es Lett.

The *second paragraph* should list work and military experience, including summer and fellow jobs and consultant positions. Job titles are capitalized. The current job must have a location. Previous positions may be listed without a location. List author affiliations with non-IEEE journals. List the author's current and previous fields of interest. Do not repeat the author's name in the second paragraph; use "he" or "she".

The *third paragraph* begins with the author's title and last name (e.g., Dr. Smith, Prof. Jones, Mr. Hunter, Ms. Taylor). It lists the author's membership in professional societies other than IEEE and his or her status as a

Professional Engineer. Finally, list awards and work for IEEE committees and publications. Personal notes such as hobbies are excluded.

If no photograph is available or the Transactions does not require them, the biography is set across one column.

If no biography is available, a squib is used. For example:

James A. Author (S'xx—M'xx), photograph and biography not available at time of publication.

Other Text

Footnotes

Footnotes should be numbered in consecutive order throughout the text. The footnote numbers are superscripts in text and in the actual footnotes. In text, place the superscript footnote numbers after the punctuation such as periods, commas, and parentheses, but before colons, dashes, quotation marks, and semicolons in a compound sentence. The footnotes should be placed at the bottom of the text column in which they are cited.

List in Text

The ordering of labeling for all lists is 1), 2), 3) followed by a), b), c), and then i), ii), iii).

An example of a *run-in list* is as follows.

The carrier—phonon interaction matrices are given by: 1) polar optical phonons; 2) deformation potential optical phonons; and 3) piezoelectric acoustic phonons.

Other Types of Papers

Brief Papers are set up as full-length papers, except that the paper title is set in 16-point typeface. These papers do contain Abstracts, but do not contain biographies and photographs of the authors.

Short Papers, Correspondences, and Communications are set up like full-length papers, except that usually they are 9-point typeface. These papers do contain Abstracts, but do not contain biographies and photographs of the authors.

Comments and Replies are generally published together in that the “Author’s Reply” is in response to the Comments. The “Comments” is in response to a previously published paper. These short items may appear with or without an Abstract. Begin the first sentence with, “In the above paper [1], ...” The reference, the commented paper’s citation, is the first reference in the References section of the Comments.

Obituaries/In Memoriam may carry a photo of the person being memorialized. The name of the person appears above the photograph. The photograph is generally centered above the text. The years of birth and death are generally cited at the bottom of the photo within parentheses.

Editorial Style for Transactions

The following provides a summary of the most important style distinctions to be made in the final copy of a Transactions paper.

Acronyms

Define acronyms the first time they appear in the Abstract as well as the first time they appear in the body of the paper, written out as part of the sentence, followed by the acronym in parentheses. If the acronym is not repeated in the Abstract, do not include the acronym in parentheses. Coined plurals or plurals of acronyms do not take the apostrophe (e.g., FETs). Possessive forms of the acronym do take the apostrophe (e.g., CPU’s speed).

Indefinite articles are assigned to abbreviations to fit the sound of the first letter (e.g., an FCC regulation; a BRI).

Trademarks

The trademark symbol, TM, C, R, is not used. Capitalize the first letter in the trademark only.

Plurals

Plurals of units of measure usually do not take the “s”. For example, the plural form of 3 mil is 3 mil, but 3 bits/s instead of 3 bit/s. Plural forms of calendar years do not take the apostrophe (e.g., 1990s). To avoid confusion, plural forms of variables in math do take the apostrophe (e.g., x ’s).

The En, Em, or Two-Em Dash

The en dash represents the words “to,” “through,” or “and.” Use it between page numbers (e.g., pp. 5–10), reference numbers (e.g., [5]–[10]), figure citations, (e.g., Figs. 2–4), academic years (e.g., 1996–1999), proper nouns (Bose–Einstein theory), a range of values (e.g., 10–20 cm), or for opposites (e.g., in–out). Also use the en dash in chemical abbreviations such as Ni–Al–Si. When using the en dash to represent a range, if the word “from” is used, the word “to” must be used rather than an en dash (e.g., from 5 to 50 times). The em dash is used to highlight a parenthetical phrase in a sentence (e.g., “An FIB modifies a surface by sputtering with energetic ions—usually Ga for technical reasons—in a beam with half-width of the order of 10 nm.”).

Math

- 1) Variables are set in italic; vectors and matrices are usually boldface italic.
- 2) Remove commas around variables in text.
- 3) Always add a zero before decimals, but do not add after (e.g., 0.25).
- 4) Spell out units in text without quantities (e.g., where the noise is given in decibels).
- 5) Numbers and units used as compound adjectives should be hyphenated only if needed for clarity (e.g., 10-kV voltage; 5-in-thick glass).
- 6) Use thin spaces (instead of a comma) between numbers in tens or hundreds of thousands (e.g., 60 000, 100 000, but 4000).
- 7) Use zeroth, first, n th, $(k+1)$ th, not 0^{th} , 1^{st} , 2^{nd} , 99^{th} , n^{th} , $(k+1)^{\text{st}}$.
- 8) Use the word “equation” at the start of a sentence only, but in text just use the number [e.g., in (1)], unless describing an equation, e.g., see “Darlington equation (1).”
- 9) The slash is used in place of the word “per” when it leads to the clarity of the sentence (e.g., the ratio of 16 samples/s to 35 samples/s as compared to...).
- 10) Use “indices” instead of “indexes” when referring to subscripts.
- 11) Plural variables have an “s”.

Ellipses

Ellipses may be used to show continuation in an expression (e.g., x_2, \dots, x_{16}). The type of mathematical expression will determine whether the ellipses are on the baseline or centered.

Conditions

In displayed equations, there should be a comma or parentheses and a two-em space between the main expression and the condition following it. For example,

$$X=yn^{-2}, \quad \text{for all } n=3$$

$$X=yn^{-2}, \quad \forall n=3$$

$$X=yn^{-2}, \quad \text{if } n=3-y^{-4}$$

$$X=yn^{-2}, \quad y=3, \dots, m$$

NOTE: There is no comma before a “for all” (\forall) symbol.

Compound Units

Compound units should be separated by a multidot (e.g., 4 V·s). Parentheses may be used to clarify a unit: $\text{g}/(\text{cm}\cdot\text{s})$ or $\text{g}\cdot\text{cm}^{-1}\cdot\text{s}^{-1}$.

Use of Period and Commas

Equations that conclude a sentence should end with a period. The only time punctuation is used to lead into an equation when the lead-in text is a complete sentence. Example:

where we had the following:

$$x=Y+Z.$$

or, where, i.e.,

$$x=Y+Z.$$

Commas appearing at the ends of equations are deleted unless they are critical to the punctuation of the sentence containing the equation.

Displayed Equations

Certain types of material in displayed equations are automatically italic. Some simple general rules apply. All variables are italic. (e.g., x , y , n). Function names and abbreviations are Roman (sin, cos, sinc, sinh), as are units or unit abbreviations (e.g., deg, Hz,) complete words (e.g., in, out), and abbreviations of words (e.g., max, min), or acronyms (e.g., SNR). Single letter superscripts and subscripts may be italic even if they are abbreviations, unless this leads to inconsistency between italic and roman characters for similar types of subscripts.

Rules of Grammar

The principles of style given below aim to concentrate on the fundamentals of modern usage. Particular emphasis is given to the rules most commonly violated.

- 1) Form the possessive singular of nouns by adding 's.
- 2) In a series of three or more terms, use a comma after each term except the last.
- 3) Enclose parenthetical expressions between commas.
- 4) Use the semicolon, not the comma, to separate two complete sentences which form a compound sentence.
- 5) Use a colon after an independent clause to introduce a list.
- 6) Punctuation always goes inside the quotation mark, except for the colon and semicolon.
- 7) Do not use double parentheses in text expression, but keep them in math.
- 8) All acronyms and numerical plurals do not use apostrophes.
- 9) Compound nouns made from a one-syllable verb and a short adverb are one word when found that way in the dictionary.
- 10) A pair of words, modifying a third word separately, does not get a hyphen.
- 11) A hyphen is not used after the comparative or the superlative.
- 12) Do not use commas between adjectives.
- 13) Do not hyphenate predicate adjectives.
- 14) Compound verbs are generally hyphenated.

EDITING REFERENCES

A. Citing References

References in Text: References need not be cited in the text. When they are, they appear on the line, in square brackets, *inside the punctuation*. Grammatically, they may be treated as if they were footnote numbers, e.g.,

as shown by Brown [4], [5]; as mentioned earlier [2], [4]–[7], [9]; Smith [4] and Brown and Jones [5]; Wood et al. [7]

NOTE: Use *et al.* when three or more names are given.

or as nouns:

as demonstrated in [3]; according to [4] and [6]–[9].

References Within a Reference: Check the reference list for *ibid.* or *op. cit.* These refer to a previous reference and should be eliminated from the reference section. In text, repeat the earlier reference number and renumber the reference section accordingly. If the *ibid.* gives a new page number, or other information, use the following forms:

[3, Th. 1]; [3, Lemma 2]; [3, pp. 5-10]; [3, eq. (2)]; [3, Fig. 1]; [3, Appendix I]; [3, Sec. 4.5]; [3, Ch. 2, pp. 5-10]; [3, Algorithm 5].

NOTE: Editing of references may entail careful renumbering of references, as well as the citations in text.

B. Style

Reference numbers are set flush left and form a column of their own, hanging out beyond the body of the reference. The reference numbers are on the line, enclosed in square brackets. In all references, the given name of the author or editor is abbreviated to the initial only and precedes the last name. Use commas around Jr., Sr., and III in names. If there

are many names, use them all; use *et al.* only if names are not given. Note that when citing IEEE Transactions, if the month is not available, the number may be kept, although it is normally deleted. Keep the day of the month when referencing a patent. References may not include all information; please obtain and include relevant information. Do not combine references. There must be only one reference with each number. If there is a URL included with the print reference, it can be included at the end of the reference.

Periodicals

Prior to 1988, the volume number of IEEE Transactions/Journals carried the acronym of the journal. For example, an issue of the IEEE TRANSACTIONS ON AUTOMATIC CONTROL would read: *IEEE Trans. Automat. Contr.*, vol. AC-26, pp. 1–34, Jan. 1981. When referencing IEEE Transactions, the issue number should be deleted and month carried.

NOTE: The only exception to this rule is PROCEEDINGS OF THE IEEE, which never carried an acronym on the masthead.

Basic Format:

- [1] J. K. Author, "Name of paper," *Abbrev. Title of Periodical*, vol. x, no. x, pp. xxx-xxx, Abbrev. Month, year.

Examples:

- [1] R. E. Kalman, "New results in linear filtering and prediction theory," *J. Basic Eng.*, ser. D, vol. 83, pp. 95-108, Mar. 1961.
- [2] J. U. Buncombe, "Infrared navigation—Part I: Theory," *IEEE Trans. Aerosp. Electron. Syst.*, vol. AES-4, pp. 352–377, Sept. 1944.
- [3] _____, "Infrared navigation—Part II: An assessment of feasibility," *IEEE Trans. Aerosp. Electron. Syst.*, vol. AES-4, pp. 588–613, Nov. 1944.
- [4] H. Eriksson and P. E. Daniellsson, "Two problems on Boolean memories," *IEEE Trans. Electron. Devices*, vol. ED-11, pp. 32–33, Jan. 1959.
- [5] F. Aronowitz, "Theory of traveling-wave optical maser," *Phys. Rev.*, vol. 134, pp. A635–A646, Dec. 8, 1965.
- [6] Ye. V. Lavrova, "Geographic distribution of ionospheric disturbances in the F2 layer," *Tr. IZMIRAN*, vol. 19, no. 29, pp. 31–43, 1961 (Transl.: E. R. Hope, Directorate of Scientific Information Services, Defence Research Board of Canada, Rep. T384R, Apr. 1963).
- [7] E. P. Wigner, "On a modification of the Rayleigh–Schrodinger perturbation theory," (in German), *Math. Naturwiss. Anz. Ungar. Akad. Wiss.*, vol. 53, p. 475, 1935.
- [8] E. H. Miller, "A note on reflector arrays," *IEEE Trans. Antennas Propag...*, to be published. *** Always use this style when the paper has been accepted or scheduled for a future publication, i.e., do not use "to appear in." ***
- [9] C. K. Kim, "Effect of gamma rays on plasma," submitted for publication. *** Always use this style when the paper has not yet been accepted or scheduled for publication, i.e., do not use "to appear in." ***
- [10] W. Rafferty, "Ground antennas in NASA's deep space telecommunications," *Proc. IEEE* vol. 82, pp. 636-640, May 1994.
- [11] J. S. Turner, "New directions in communications," *IEEE J. Select. Areas Commun.*, vol. 13, pp. 11-23, Jan. 1995.
- [12] L. T. Wu *et al.*, "Real-time analytic sensitivity method for transient security assessment and prevent control," *Proc. Inst. Elect. Eng.*, vol. 135, pt. C, pp. 107-117, Mar. 1988.
Authors may refer to this journal as *Proc. IEE*, but the abbreviation must be as listed above. *Proc. IEE* is printed in the U.K. and must not be confused with the *Proc. IEEE*.
- [13] *Special Issue on Artificial Neural Network Applications, Proc. IEEE*, vol. 84, pp. 1353-1576, Oct. 1996.

Article Referred to in the Same Issue:

- [1] R. U. Aslip, "Surface and leaky wave antennas," *IEEE Trans. Circuits Syst. I*, vol. 30, pp. 545–546, Jan. 2000.

NOTE: Handle it exactly as you would any other reference.

Books

Basic Format:

- [1] J. K. Author, "Title of chapter in the book," in *Title of His Published Book*, xth ed. City of Publisher, Country if not USA: Abbrev. of Publisher, year, ch. x, sec. x, pp. xxx-xxx.

Examples:

- [1] B. Klaus and P. Horn, *Robot Vision*. Cambridge, MA: MIT Press, 1986.
- [2] L. Stein, "Random patterns," in *Computers and You*, J. S. Brake, Ed. New York: Wiley, 1994, pp. 55-70.
- [3] R. L. Myer, "Parametric oscillators and nonlinear materials," in *Nonlinear Optics*, vol. 4, P. G. Harper and B. S. Wherret, Eds. San Francisco, CA: Academic, 1977, pp. 47-160.
- [4] M. Abramowitz and I. A. Stegun, Eds., *Handbook of Mathematical Functions* (Applied Mathematics Series 55). Washington, DC: NBS, 1964, pp. 32-33.
- [5] E. F. Moore, "Gedanken-experiments on sequential machines," in *Automata Studies* (Ann. of Mathematical Studies, no. 1), C. E. Shannon and J. McCarthy, Eds. Princeton, NJ: Princeton Univ. Press, 1965, pp. 129-153.
- [6] Westinghouse Electric Corporation (Staff of Technology and Science, Aerospace Division), *Integrated Electronic Systems*. Englewood Cliffs, NJ: Prentice-Hall, 1970.
- [7] M. Gorkii, "Optimal design," *Dokl. Akad. Nauk SSSR*, vol. 12, pp. 111-122, 1961 (Translated in L. Pontryagin, Ed., *The Mathematical Theory of Optimal Processes*. New York: Interscience, 1962, ch. 2, sec. 3, pp. 127-135).
- [8] G. O. Young, "Synthetic structure of industrial plastics," in *Plastics*, vol. 3, *Polymers of Hexadromicon*, J. Peters, Ed., 2nd ed. New York: McGraw-Hill, 1964, pp. 15-64.

Reports

The general form for citing technical reports is to place the name and location of the company or institution after the author and title and to give the report number and date at the end of the reference.

Basic Format:

- [1] J. K. Author, "Title of report," Abbrev. Name of Co., City of Co., Abbrev. State, Rep. xxx, year.

Examples:

- [1] E. E. Reber, R. L. Michell, and C. J. Carter, "Oxygen absorption in the earth's atmosphere," Aerospace Corp., Los Angeles, CA, Tech. Rep. TR-0200 (4230-46)-3, Nov. 1988.
- [2] J. H. Davis and J. R. Cogdell, "Calibration program for the 16-foot antenna," Elect. Eng. Res. Lab., Univ. Texas, Austin, Tech. Memo. NGL-006-69-3, Nov. 15, 1987.
- [3] R. E. Haskell and C. T. Case, "Transient signal propagation in lossless isotropic plasmas," USAF Cambridge Res. Labs., Cambridge, MA, Rep. ARCRL-66-234 (II), 1994, vol. 2.
- [4] M. A. Brusberg and E. N. Clark, "Installation, operation, and data evaluation of an oblique-incidence ionosphere sounder system," in "Radio Propagation Characteristics of the Washington-Honolulu Path," Stanford Res. Inst., Stanford, CA, Contract NOBSR-87615, Final Rep., Feb. 1995, vol. 1.
- [5] P. Diamant, S. L. Richert, and W. L. Lupatkin, "V-line surface-wave radiation and scanning," Dept. Elect. Eng., Columbia Univ., New York, Sci. Rep. 85, Aug. 1991.

Handbooks

Basic Format:

- [1] *Name of Manual/Handbook*, x ed., Abbrev. Name of Co., City of Co., Abbrev. State, year, pp. xxx-xxx.

Examples:

- [1] *Transmission Systems for Communications*, 3rd ed., Western Electric Co., Winston-Salem, NC, 1985, pp. 44-60.
- [2] *Motorola Semiconductor Data Manual*, Motorola Semiconductor Products Inc., Phoenix, AZ, 1989.
- [3] *RCA Receiving Tube Manual*, Radio Corp. of America, Electronic Components and Devices, Harrison, NJ, Tech. Ser. RC-23, 1992.

Published Conference Proceedings

The general form for citing conference proceedings is to list the author and title of the paper, followed by the name (and location, if given) of the conference *in italics* using these standard abbreviations.

Annals
 Annual
 Colloquium
 Conference
 Congress
 Convention
 Digest
 Exposition
 International
 Meeting
 National
 Proceedings
 Record
 Symposium
 Technical Digest
 Technical Paper
 Workshop
 Ann.
 Annu.
 Colloq.
 Conf.
 Congr.
 Conv.
 Dig.
 Expo.
 Int.
 Meeting
 Nat.
 Proc.
 Rec.
 Symp.
 Tech. Dig.
 Tech. Paper
 Workshop

First
 Second
 Third
 Fourth/*n*th...
 1st
 2nd
 3rd
 4th/*n*th...

Write out all the remaining words, but omit most articles and prepositions like “of the” and “on.” That is, *Proceedings of the 1996 Robotics and Automation Conference* becomes *Proc. 1996 Robotics and Automation Conf.*

NOTE: All published conference or proceedings papers have page numbers.

Basic Format:

- [1] J. K. Author, "Title of paper," in *Unabbreviated Name of Conf.*, City of Conf., Abbrev. State (if given), year, pp. xxx-xxx.

Examples:

- [1] G. R. Faulhaber, "Design of service systems with priority reservation," in *Conf. Rec. 1995 IEEE Int. Conf. Communications*, pp. 3–8. *** *If the year is given in the conference title, it may be omitted from the end of the reference as shown here.* ***
- [2] S. P. Bingulac, "On the compatibility of adaptive controllers," in *Proc. 4th Annu. Allerton Conf. Circuit and System Theory*, New York, 1994, pp. 8–16.
- [3] W. D. Doyle, "Magnetization reversal in films with biaxial anisotropy," in *1987 Proc. INTERMAG Conf.*, pp. 2.2-1–2.2-6.
- [4] C. T. Meadow and D. W. Waugh, "Computer assisted interrogation," in *1991 Fall Joint Computer Conf., Proc. AFIPS Conf.*, vol. 29. Washington, DC: Spartan, 1991, pp. 381–394. *** *There is an <emspace> between "vol. 29." and "Washington."* ***
- [5] P. C. Parks, "Lyapunov redesign of model reference adaptive control systems," in *1993 Joint Automatic Control Conf., Preprints*, pp. 485–491.
- [6] C. Janow, "Guidance and control components for space applications," in *Proc. Nat. Electronics Conf.*, 1994, vol. 24, pp. 30-35.
- [7] T. S. Hsia, "System identification," in *IEDM Tech. Dig.*, 1993, vol. 2, no. 8, pp. 6–13.

Papers Presented at Conferences*Basic Format:*

- [1] J. K. Author, "Title of paper," presented at the Unabbrev. Name of Conf., City of Conf., Abbrev. State, year.

Examples:

- [1] M. Mayer, presented at the 4th Congr. Permanent Magnets, Grenoble, France, Mar. 1995.
- [2] J. G. Kreifeldt, "An analysis of surface-detected EMG as an amplitude-modulated noise," presented at the 1989 Int. Conf. Medicine and Biological Engineering, Chicago, IL.
- [3] G. W. Juette and L. E. Zeffanella, "Radio noise currents on short sections on bundle conductors," presented at the IEEE Summer Power Meeting, Dallas, TX, June 22-27, 1990, Paper 90 SM 690-0 PWRS.
- [4] J. Arrillaga and B. Giessner, "Limitation of short-circuit levels by means of HVDC links," presented at the IEEE Summer Power Meeting, Los Angeles, CA, July 12–17, 1990, Paper 70 CP 637.

Patents*Basic Format:*

- [1] J. K. Author, "Title of patent," U.S. Patent x xxx xxx, Abbrev. Month, day, year.

Example:

- [1] J. P. Wilkinson, "Nonlinear resonant circuit devices," U.S. Patent 3 624 125, July 16, 1990.

NOTE: Use "issued date" if several dates are given.

Theses (M.S.) and Dissertations (Ph.D.)*Basic Format:*

- [1] J. K. Author, "Title of thesis," M.S. thesis, Abbrev. Dept., Abbrev. Univ., City of Univ., Abbrev. State, year.
- [2] J. K. Author, "Title of dissertation," Ph.D. dissertation, Abbrev. Dept., Abbrev. Univ., City of Univ., Abbrev. State, year.

Examples:

- [1] J. O. Williams, "Narrow-band analyzer," Ph.D. dissertation, Dept. Elect. Eng., Harvard Univ., Cambridge, MA, 1993.
- [2] N. Kawasaki, "Parametric study of thermal and chemical nonequilibrium nozzle flow," M.S. thesis, Dept. Electron. Eng., Osaka Univ., Osaka, Japan, 1993.
- [3] N. M. Amer, "The effects of homogeneous magnetic fields on developments of tribolium confusum," Ph.D. dissertation, Radiation Lab., Univ. California, Berkeley, Tech. Rep. 16854, 1995. *** *The state abbreviation is omitted if the name of the university includes the state name, i.e., "Univ. California, Berkeley."* ***
- [4] C. Beclé, These de doctorat d'état, Univ. Grenoble, Grenoble, France, 1968.

Unpublished

These are the two most common types of unpublished references.

Basic Format :

- [1] J. K. Author, private communication, Abbrev. Month, year.
- [2] J. K. Author, "Title of paper," unpublished.

Examples:

- [1] A. Harrison, private communication, May 1995.
- [2] B. Smith, "An approach to graphs of linear forms," unpublished.
- [3] A. Brah ms, "Represen tation error for real nu mbers in b inary co mputer arith metic," I EEE Computer Group Repository, Paper R-67-85.

Standards

Basic Format:

- [1] *Title of Standard*, Standard number, date.

Examples:

- [1] *IEEE Criteria for Class IE Electric Systems*, IEEE Standard 308, 1969.
- [2] *Letter Symbols for Quantities*, ANSI Standard Y10.5-1968.

C. On-Line Sources

The guidelines for citing electronic information as offered here are in modified illustration of the adaptation by the International Standards Organization (ISO) documentation system and the American Psychological Association style.

Books, Monographs

Basic Format:

- [1] J. K. Author. (year, month day). *Title* (edition) [Type of medium]. *volume(issue)*. Available: site/path/file

Example:

- [1] S. Khut aina. (1995, Aug. 15). *EMBASE handbook* (3rd ed.) [Online]. *3(21)*. Avail able: Knowledge Index File: EMBASE Handbook (EMHB)

FTP

Basic Format:

- [1] J. K. Author. (year). *Title* (edition) [Type of medium]. Available FTP: Directory: File:

Example:

- [1] R. J. Vi dmar. (1994). *On the use of atmospheric plasmas as electromagnetic reflectors* [Online]. Available FTP: atmnext.usc.edu Directory: pub/etext/1994 File: atmosplasma.txt

WWW

Basic Format:

- [1] J. K. Author. (year, month day). *Title* (edition) [Type of medium]. Available: http://www.(URL)

Example:

- [1] J. Jones. (1991, May 10). *Networks (2nd ed.)* [Online]. Available: http://www.atm.com

E-Mail

Basic Format:

- [1] J. K. Author. (year, month day). *Title* (edition) [Type of medium]. Available e-mail: Message:

Example:

- [1] S. H. Gold. (1995, Oct. 10). *Inter-Network Talk* [Online]. Available e-mail: COMSERVE@RPIECS Message: Get NETWORK TALK

Telnet

Basic Format:

- [1] J. K. Author. (year, month day). *Title* (edition) [Type of medium]. Available Telnet: Directory: File:

Example:

- [1] V. Meligna. (1993, June 11). *Periodic table of elements* [Online]. Available Telnet: Library.CMU.edu Directory: Libraries/Reference Works File: Periodic Table of Elements

Full Text Databases—Periodicals

Journal Articles

Basic Format:

- [1] J. K. Author. (year, month). Title. *Journal* [Type of medium]. *volume(issue)*, paging if given. Available: site/path/file

Examples:

- [1] J. Bourke. (1995, Mar.). A comparison of RF electrode models. *J. Phys.* [CD-ROM]. 32(4), RD2-RD3. Available: JPY File: Science Periodicals Ondisc Item: 95-76401
- [2] R. J. Vidmar. (1992, Aug.) On the use of atmospheric plasmas as electromagnetic reflectors. *IEEE Trans. Plasma Sci.* [Online]. 21(3), pp. 876–880. Available: <http://www.halcyon.com/pub/journals/21ps03-vidmar>

FTP

Basic Format:

- [1] J. K. Author. (year, month). Title. *Journal* [Type of medium]. *volume(issue)*, paging if given. Available FTP: Directory: File:

Example:

- [1] R. P. Drew. (1996, Jan.). All-digital oversampled front-end sensors. *Science Online* [Online]. 3(1). Available FTP: sci.mit.edu Directory: pub/journals/sci.online/issue12 File: 012bel5.txt

WWW

Basic Format:

- [1] J. K. Author. (year, month day). Title. *Journal* [Type of medium]. *volume(issue)*, paging if given. Available: [http://www.\(URL\)](http://www.(URL))

Example:

- [1] M. Semilof. (1996, July 15). Driving commerce to the Web—Corporate Intranets and the Internet: Lines blur. *Communications Week* [Online]. 6(19). Available: <http://www.techweb.com/se/directlink.cgi?CWK19960715S0005>

E-Mail

Basic Format:

- [1] J. K. Author. (year, month). Title. *Journal* [Type of medium]. *volume(issue)*, paging if given. Available e-mail: Message:

Example:

- [1] J. Frasene. (1992, July/Aug.). Least squares theory. *The Electronic Journal of Automation* [Online]. 6(8). Available e-mail: listserv@nasum.cc.edu Message: Get [frasene 992] eja-f@mail

Telnet

Basic Format:

- [1] J. K. Author. (year, month). Title. *Journal* [Type of medium]. *volume(issue)*, paging if given. Available Telnet: Directory: File:

Example:

- [1] P. Darien. (1992, Jan.). Buying science. *Quantum* [Online]. 4(3). Available Telnet: gopher.tp.umn.edu Directory: Libraries/Newspapers, Magazines, and Newsletters/Technical Journals/Quantum/ASCII Issues/Volume V Issue 3 January 1992 File: “Buying Science” by P. Darien

*Magazine Articles**Basic Format:*

- [1] J. K. Author. (year, month day). Title. *Magazine* [Type of medium]. paging if given. Available: site/path/file

Example:

- [1] S. Fujii and Y. Mikami. (1991, Apr. 20). Construction aspects of intelligent buildings. *IEEE Communications Mag.* [CD-ROM]. pp. 50-57. Available: UMI File: IPO (IEEE/IEE Publications Ondisc) Item: 3939837

*FTP**Basic Format:*

- [1] J. K. Author. (year, month day). Title. *Magazine* [Type of medium]. paging if given. Available FTP: Directory: File:

Example:

- [1] R. Young. (1994, Dec. 2). Summary of meta fonts available. *TexMag* [Online]. Available FTP: sum.soe.clarkson.edu Directory: pub/tex/texmag File: texmag.4.06

*WWW**Basic Format:*

- [1] J. K. Author. (year, month day). Title. *Magazine* [Type of medium]. paging if given. Available: http://www.(URL)

Examples:

- [1] A. Stuart, Ed. (1996, Dec. 3). Business in the wake of the Web. *WebMaster Mag.* [Online]. Available: http://www.cio.com/cgi-bin/gate2?~
 [2] L. Brigman (1997, Feb.). The never-ending story. *WebMaster Mag.* [Online]. Available: http://www.cio/WebMaster/020197_field_content.html

*E-Mail**Basic Format:*

- [1] J. K. Author. (year, month day). Title. *Magazine* [Type of medium]. paging if given. Available e-mail: Message:

Example:

- [1] A. Harriman. (1993, June 28). Compendium of genealogical software. *Humanist* [Online]. 2(41). Available e-mail: HUMANIST@NYVM Message: Get GENEALOGY REPORT

*Telnet**Basic Format:*

- [1] J. K. Author. (year, month day). Title. *Magazine* [Type of medium]. Available Telnet: Directory: File:

Example:

- [1] S. Bene. (1990, July 21). Queues at information desks. *Com* [Online]. Available Telnet: gopher.uet.edu Directory: Libraries/Newspapers, Magazines, Newsletters/EE/EECom File: V.2I.3Jul90

*Full Text Databases—Other Sources**Papers Presented at Conferences**Basic Format:*

- [1] J. K. Author. Title. presented at Conference title. [Type of Medium]. Available: site/path/file

Example:

- [1] Process Software Corp., MA. Intranets: Internet technologies deployed behind the firewall for corporate productivity. presented at INET'96 Annu. Meeting [Online]. Available: http://www.process.com/Intranets/wp2.htm

Reports and Handbooks

Basic Format:

- [1] J. K. Author. (year, month). Title. Company. City, State or Country. [Type of Medium]. Available: site/path/file

Examples:

- [1] S. L. Talleen. (1996, Aug.). The IntraNet Architecture: Managing information in the new paradigm. Amdahl Corp, CA. [Online]. Available: <http://www.amdahl.com/doc/products/bsg/intra/infra/html>
- [2] Netscape Communications Corp. (1997, Dec.). The new way to share workgroup information. [Online]. Available: <http://home.netscape.com/comprod/a>

U.S. Government Documents

Basic Format:

- [1] Legislative body. Number of Congress, Session. (year, month day). *Number of bill or resolution, Title*. [Type of medium]. Available: site/path/file

Example:

- [1] U.S. House. 102nd Congress, 1st Session. (1991, Jan. 11). *H. Con. Res. 1, Sense of the Congress on Approval of Military Action*. [Online]. Available: LEXIS Library: GENFED File: BILLS

Patents

Basic Format:

- [1] Name of the invention, by inventor's name. (year, month day). *Patent Number* [Type of medium]. Available: site/path/file

Example:

- [1] Musical toothbrush with adjustable neck and mirror, by L.M.R. Brooks. (1992, May 19). *Patent D 326 189* [Online]. Available: NEXIS Library: LEXPAT File: DESIGN

Common Abbreviations of Words Used in References

Acoustics	Acoust.
Administration	Admin.
Administrative	Administ.
American	Amer.
Analysis	Anal.
Annals	An n.
Annual	A nnu.
Apparatus	App.
Applications	Applicat.
Applied	Ap pl.
Association	Assoc.
Automatic	Automat.
Broadcasting	Broadcast.
Business	Bus.
Communications	Commun.
Computer(s)	Comput.
Congress	Congr.
Convention	Conv.
Correspondence	Corresp.
Cybernetics	Cybern.
Department	Dept.
Development	Develop.
Digest	Dig.
Economic(s)	Econ.
Education	Educ.
Electrical	Elect.
Electronic	Electron.
Engineering	Eng.

Ergonomics	Ergonom.
Evolutionary	Evol.
Foundation	Found.
Geoscience	Geosci.
Graphics	Graph.
Industrial	Ind.
Industry In	d.
Information	Inform.
Institute In	st.
Intelligence	Intell.
International	Int.
Journal J.	
Letter(s) Lett.	
Machine Mach.	
Magazine	Mag.
Management	Manage.
Managing	Manag.
Mathematic(s)	Math.
Mathematical	Math.
Mechanical	Mech.
National Nat.	
Newsletter	Newslett.
Nuclear Nucl.	
Occupation	Occupat.
Philosophical	Philosph.
Proceedings	Proc.
Processing	Process.
Production	Prod.
Productivity	Productiv.
Quarterly	Quart.
Record Rec.	
Reliability	Rel.
Report Rep	.
Royal Ro	y.
Science Sci.	
Selected Select.	
Society Soc.	
Sociological	Sociol.
Statistics	Stat.
Studies St	ud.
Supplement	Suppl.
Symposium	Symp.
Systems Syst.	
Technical	Tech.
Telecommunication	Telecomm un.
Transactions	Trans.
Vehicular	Veh.
Working Wo	rk.
Workshop	Workshop

List of IEEE Transactions, Journals, and Letters

IEEE Transactions on Acoustics, Speech, and
Signal Processing Pro
IEEE Transactions on Advanced Packaging IEEE

IEEE Trans. Acoust., Speech, Signal
cess. (1975–1990)
Adv. Packag.

- IEEE Transactions on Aerospace and Electronic Systems
 IEEE
 IEEE
 IEEE
 IEEE
 IEEE
- IEEE Transactions on Antennas and Propagation
 IEEE Antennas and Wireless Propagation Letters
 IEEE Transactions on Applied Superconductivity
 IEEE Transactions on Audio Electroacoustics
- IEEE Transactions on Automatic Control
 IEEE Trans, Autom. Control
- IEEE Transactions on Autonomous Mental Development
 IEEE Transactions on Biomedical Engineering
 IEEE Transactions on Biomedical Circuits and Systems
 IEEE Transactions on Broadcasting IEEE
 IEEE Transactions on Broadcasting Technology
- IEEE Transactions on Circuits and Systems—I:
 Regular Papers
 IEEE Transactions on Circuits and Systems—II:
 Express Briefs
 IEEE Transactions on Circuits and Systems—I:
 Fundamental Theory and Applications
 IEEE Transactions on Circuits and Systems—II:
 Analog and Digital Signal Processing
 IEEE Transactions on Circuits and Systems IEEE
 IEEE Transactions on Circuit Theory IEEE
 IEEE Transactions on Circuits and Systems IEEE
 for Video Technology Vi
 IEEE Transactions on Communications
 IEEE Communications Letters
 IEEE Transactions on Communications Technology
- IEEE Transactions on Components and Packaging
 Technology
 IEEE Transactions on Components, Packaging, and
 Manufacturing Technology, Part A
 IEEE Transactions on Components, Packaging, and
 Manufacturing Technology, Part B
 IEEE Transactions on Components, Packaging, and
 Manufacturing Technology, Part C
 IEEE Transactions on Components, Hybrids, and
 Technology M
 IEEE Transactions on Computer-Aided Design of
 Integrated Circuits and Systems Circuits
 IEEE Transactions on Computers IEEE
 IEEE Transactions on Consumer Electronics IEEE
 IEEE Transactions on Control Systems Technology
- IEEE Transactions on Device and Materials
 Reliability
- IEEE Transactions on Dielectrics and Electrical
 Insulation
 IEEE Transactions on Education IEEE
 IEEE Transactions on Electromagnetic Compatibility
 IEEE Transactions on Electron Devices IEEE
 IEEE Electron Device Letters
- IEEE Trans. Aerosp. Electron. Syst.
 Trans. Aeronaut. Navig. Electron.
 Trans. Aerosp. Navig. Electron.
 Trans. Aerosp.
 Trans. Airbone Electron.
 Trans. Mil. Electron.
- IEEE Trans. Antennas Propag.
 IEEE Antennas Wireless Propag. Lett.
 IEEE Trans. Appl. Supercond.
 IEEE Trans. Audio Electroacoust.
(until 1974)
- IEEE Trans. Autonomous Mental Dev.
 IEEE Trans. Biomed. Eng.
 IEEE Trans. Biomed. Circuits Syst.
 Trans. Broadcast.
 IEEE Trans. Broadcast. Technol.
- IEEE Trans. Circuits Syst. I, Reg. Papers
 IEEE Trans. Circuits Syst. II, Exp. Briefs
- IEEE Trans. Circuits Syst. I, Fundam.
 Theory Appl. *(until 2003)*
 IEEE Trans. Circuits Syst. II, Analog
 Digit. Signal Process. *(until 2003)*
 Trans. Circuits Syst. *(1974–1992)*
 Trans. Circuit Theory *(until 1973)*
 Trans. Circuits Syst.
 deo Technol.
- IEEE Trans. Commun.
 IEEE Commun. Lett.
 IEEE Trans. Commun. Technol.
(until 1971)
 IEEE Trans. Compon. Packag. Technol.
- IEEE Trans. Compon. Packag. Manuf.
 Technol. A *(1994–1998)*
 IEEE Trans. Compon. Packag. Manuf.
 Technol. B *(1994–1998)*
 IEEE Trans. Compon. Packag. Manuf.
 Technol. C *(1996–1998)*
 IEEE Trans. Compon. Hybrids, Manufacturing
 anuf. Technol. *(1978–1993)*
 IEEE Trans. Comput.-Aided Des. Integr.
 Syst.
 Trans. Comput.
 Trans, Consum. Electron.
 IEEE Trans. Control Syst. Technol.
- IEEE Trans. Dev. Mat. Rel.
- IEEE Trans. Dielectr. Electr. Insul.
 Trans. Edu.
 IEEE Trans. Electromagn. Compat.
 Trans. Electron Devices
 IEEE Electron Device Lett.

IEEE Embedded Systems Letters	IEEE Embedded Sys. Lett.
IEEE Transactions on Electronics Packaging Manufacturing	Trans. Electron. Packag. Manuf.
IEEE Transactions on Energy Conversion	Trans. Energy Convers.
IEEE Transactions on Engineering Management	IEEE Trans. Eng. Manag.
IEEE Transactions on Evolutionary Computation	IEEE Trans. Evol. Comput.
IEEE Transactions on Fuzzy Systems	Trans. Fuzzy Syst.
IEEE Transactions on Geoscience and Remote Sensing	IEEE Trans. Geosci. Remote Sens.
IEEE Transactions on Geoscience Electronics	IEEE Trans. Geosci. Electron. (1962–1979)
IEEE Transactions on Image Processing	Trans. Image Process.
IEEE Transactions on Industrial Electronics	Trans. Ind. Electron.
IEEE Transactions on Industrial Informatics	Trans. Ind. Informat.
IEEE Transactions on Industry Applications	Trans. Ind. Appl.
IEEE Transactions on Information Forensics and Security	IEEE Trans. Inf. Forens. Security
IEEE Transactions on Information Technology in Biomedicine	IEEE Trans. Inf. Technol. Biomed.
IEEE Transactions on Information Theory	IEEE Trans. Inf. Theory
IEEE Transactions on Instrumentation and Measurement	IEEE Trans. Instrum. Meas.
IEEE Transactions on Instrumentation	Trans. Instrum.
IEEE Transactions on Intelligent Transportation Systems	IEEE Trans. Intell. Transp. Syst.
IEEE Transactions on Knowledge and Data Engineering	IEEE Trans. Knowl. Data Eng.
IEEE Transactions on Magnetics	Trans. Magn.
IEEE Transactions on Manufacturing Technology	IEEE Trans. Manuf. Technol. (1972–1977)
IEEE/ASME Transactions on Mechatronics	Trans. Mechatron.
IEEE Transactions on Medical Imaging	Trans. Med. Imag.
IEEE Transactions on Microwave and Guided Wave Letters	IEEE Trans. Microw. Guid. Wave Lett. (1987–1999)
IEEE Transactions on Microwave and Wireless Components Letters	IEEE Trans. Microw. Wireless ompon. Lett. (until 2004)
IEEE Transactions on Microwave Theory and Techniques	IEEE Trans. Microw. Theory Tech.
IEEE Transactions on Multimedia	Trans. Multimedia
IEEE Transactions on Nanotechnology	Trans. Nanotechnol.
IEEE/ACM Transactions on Networking	Trans. Netw.
IEEE Transactions on Neural Networks	Trans. Neural Netw.
IEEE Transactions on Neural Systems and Rehabilitation Engineering	IEEE Trans. Neural Syst. Rehabil. Eng.
IEEE Transactions on Nuclear Science	Trans. Nucl. Sci.
IEEE Journal of Oceanic Engineering	J. Ocean. Eng.
IEEE Transactions on Parallel and Distributed Systems	Trans. Parallel Distrib. Syst.
IEEE Transactions on Parts, Hybrids, and Manufacturing Technology	IEEE Trans. Parts, Hybrids, Packag. ol. (June 1971–1977)
IEEE Transactions on Parts and Material Packaging	IEEE Trans. Parts, Mater. Packag.
IEEE Transactions on Pattern Analysis and Machine Intelligence	IEEE Trans. Pattern Anal. Mach. Intell.
IEEE Photonics Technology Letters	Photonics Technol. Lett.
IEEE Transactions on Plasma Science	IEEE Trans. Plasma Sci.
IEEE Transactions on Power Apparatus and Systems	IEEE Trans. Power App. Syst. (until 1985)
IEEE Transactions on Power Delivery	IEEE Trans. Power Del.
IEEE Transactions on Power Electronics	Trans. Power Electron.
IEEE Power Electronics Letters	Power Electron. Lett. (until 2005)
IEEE Transactions on Power Systems	Trans. Power Syst.
IEEE Transactions on Professional Communication	IEEE Trans. Prof. Commun.
IEEE Journal of Quantum Electronics	J. Quantum Electron.
IEEE Transactions on Rehabilitation Engineering	IEEE Trans. Rehabil. Eng. (until 2000)
IEEE Transactions on Reliability	Trans. Reliab.
IEEE Transactions on Robotics and Automation	IEEE Trans. Robot. Autom.
IEEE Journal on Selected Areas in Communications	IEEE J. Sel. Areas Commun.
IEEE Journal on Selected Topics in Quantum Electronics	IEEE J. Sel. Topics. Quantum Electron.
IEEE Transactions on Selected Topics in Signal Processing	IEEE J. Sel. Topics Signal Process.

IEEE Transactions on Semiconductor Manufacturing	IEEE Trans. Semicond. Manuf.
IEEE Sensors Journal IEEE	Sensors J
IEEE Transactions on Sustainable Energy	IEEE Trans. Sustainable Energy
IEEE Systems Journal IEEE	Syst. J.
IEEE Trans. Signal Processing	IEEE Trans. Signal Process.
IEEE Signal Processing Letters IEEE	Signal Process. Lett.
IEEE Transactions on Software Engineering IEEE	Trans. Softw. Eng.
IEEE Journal of Solid-State Circuits IEEE	J. Solid-State Circuits
IEEE Transactions on Speech and Audio Processing	IEEE Trans. Speech Audio Process.
IEEE Transactions on Systems, Man and Cybernetics	IEEE Trans. Syst. Man Cybern.
	<i>(1971–1995)</i>
IEEE Transactions on Systems, Man and Cybernetics, IEEE	Trans. Syst. Man Cybern. A.,
Part A (Systems and Humans) Sy	st. Humans
IEEE Transactions on Systems, Man and Cybernetics,	IEEE Trans. Syst. Man Cybern. B,
Part B (Cybernetics) Cy	bern.
IEEE Transactions on Systems, Man and Cybernetics,	IEEE Trans. Syst. Man Cybern. C,
Part C (Applications and Reviews) Ap	pl. Rev.
IEEE Transactions on Human Factors Electronics	IEEE Human–Factors Electron.
	<i>(until 1968)</i>
IEEE Transactions on Man—Machine Systems	IEEE Man–Mach. Syst. <i>(until 1970)</i>
IEEE Journal on Technology in Computer Aided Design	IEEE J. Comput. Aid. Des.
IEEE Transactions on Ultrasonics, Ferroelectrics and	IEEE Trans. Ultrason. Ferroelectr. Freq.
Frequency Control C	ontrol
IEEE Transactions on Sonics Ultrasonics IEEE	Trans. Sonics Ultrason. <i>(until 1985)</i>
IEEE Transactions on Ultrasonics Engineering	IEEE Trans. Ultrason. Eng.
IEEE Transactions on Vehicular Technology IEEE	Trans. Veh. Technol.
IEEE Transactions on Very Large Scale Integration	IEEE Trans. Very Large Scale Integr.
(VLSI) Systems	(VLSI) Syst.
IEEE Transactions on Visualization and Computer Graphics	IEEE Trans. Vis. Comput. Graphics
IEEE Transactions on Wireless Communications	IEEE Trans. Wireless Commun.
IEEE Translation Journal on Magnetism in Japan	IEEE Transl. J. Magn. Jpn.
Journal of Lightwave Technology	J. Lightw. Technol.
Journal of Microelectromechanical Systems J.	Microelectromech. Syst.
Proceedings of the IEEE Proc.	IEEE
Proceedings of the IRE Proc.	IRE <i>(until 1962)</i>

IEEE Magazines and Abbreviations

IEEE Aerospace and Electronics Systems Magazine	IEEE Aerosp. Electron. Syst. Mag.
IEEE Annals of the History of Computing IEEE	Annals Hist. Comput.
IEEE Antennas and Propagation Magazine IEEE	Antennas Propagat. Mag.
IEEE Circuits and Systems Magazine	IEEE Circuits Syst. Mag. <i>(1979–1984)</i>
IEEE Circuits and Devices Magazine	IEEE Circuits Devices Mag.
	<i>(1985–present)</i>
IEEE Communications Society Magazine	IEEE Commun. Soc. Mag.
	<i>(until 1978)</i>
IEEE Communications Magazine	IEEE Commun. Mag. <i>(1979–present)</i>
IEEE Computation in Science and Engineering	IEEE Comput. Sci. Eng. Mag.
Magazine	
IEEE Computational Intelligence Magazine IEEE	Comput. Intell. Mag.
IEEE Computer IEEE	Computer
IEEE Computer Applications in Power IEEE	Comput. Appl. Power
IEEE Computer Graphics and Applications IEEE	Comput. Graph. Appl.
IEEE Concurrency IEEE	Concurrency
IEEE Control Systems Magazine IEEE	Control. Syst. Mag.
IEEE Design and Test of Computers IEEE	Des. Test Comput.
IEEE Electrical Insulation Magazine IEEE	Electr. Insul. Mag.
IEEE Engineering in Medicine and Biology	IEEE Eng. Med. Biol. Mag.
Magazine	
IEEE Engineering Management Review IEEE	Eng. Manag. Rev.

IEEE Expert	IEEE	Expert (<i>until 1997</i>)
IEEE Industry Applications Magazine	IEEE	Ind. Appl. Mag.
IEEE Instrumentation and Measurement Magazine		IEEE Instrum. Meas. Mag.
IEEE Intelligent Systems (formerly IEEE Expert)		IEEE Intell. Syst.
IEEE Internet Computing	IEEE	Internet Comput.
IEEE IT Professional	IEEE	IT Prof.
IEEE Micro	IEEE	Micro
IEEE Microwave Magazine	IEEE	Microwave
IEEE Multimedia	IEEE	Multimedia
IEEE Network	IEEE	Network
IEEE Nanotechnology Magazine	IEEE	Nanotechnol. Mag.
IEEE Personal Communications	IEEE	Pers. Commun.
IEEE Potentials	IEEE	Potentials
IEEE Power Engineering Review		IEEE Power Eng. Rev.
IEEE Robotics and Automation Magazine		IEEE Robot. Automat. Mag.
IEEE Signal Processing Magazine	IEEE	Signal Processing Mag. (<i>1991–present</i>)
IEEE ASSP Mag.	IEEE	ASSP Mag. (<i>1984–1990</i>)
IEEE Software	IEEE	Softw.
IEEE Spectrum	IEEE	Spectr.
IEEE Technology and Society Magazine		IEEE Technol. Soc. Mag.
IEEE Vehicular Technology Magazine		IEEE Veh. Technol. Mag.
Today's Engineer	To	day's Eng.