

# IEEE Transactions on Reliability General Instructions for Authors

## Procedural Instructions

\* The instructions apply to all papers. Please READ AND FOLLOW them carefully. Use it as a check list as you prepare your paper, to assure you have followed these directions.

\* Look at a current issue for examples. When producing or editing your paper, consider all sections in this document.

1. EVERYTHING in the manuscript must conform to the IEEE writing style. The editors must be able to read every character, letter, word, sentence, and paragraph unambiguously.
2. Send one copy in PDF format. Also, you must work with and send either a single .tex file, or a single .doc file.
3. Send separate (in addition to that in the text) figure ORIGINALS (several may be on 1 page). For virtually all figures, the lettering and legends must be large enough so that the figure can be reduced to 3.5 inches (8.9 cm) wide; it is much better if YOU produce the figures to that width. Check your figures with the IEEE graphical checker on their website too. Instructions are in each issue, in *Information for Readers & Authors*. Realize that the same rules apply to tables too.
4. Supply Index Terms. The individual *key words* are specific to the topic. See a current issue for examples. "Reliability" and similar terms are not key words, as they apply to all papers equally.
5. Supply an informative *Summary & Conclusions* for the paper, at the front. It will be called the *Abstract*, but will contain a summary of your work, and your key conclusions. Do not use equations here. Do not refer to a Reference List.
6. Put the Title Page in the following format. See a current issue for examples. Do NOT use all capitals for anything.
  - Title
  - Authors (put IEEE membership after each name, and place institution & contact information for each author as a footnote)
  - Index Terms -
  - Abstract – (containing your Summary, and Conclusions)
7. Provide a *Nomenclature* or *Notation* list, and-or *Abbreviations & Acronyms* list, as (an) unnumbered section(s) just after the *Abstract*. If you have anything in your paper which belongs in these sections, you must have these sections. Notation which is repeatedly used belongs in this notation section. Only define notation in the body when it is used only at that location. You can point out specific uses at key points in the body, as that will be helpful to the reader.
8. Provide a numbered list(s) of Assumptions for the mathematical derivations.
9. Make all mathematical equations and symbols as math type, not standard text.
10. Do not use too many *significant figures* artificially. Be sure to reflect reality.
11. Use a references list at the end; never use end notes. Use numbered footnotes for side explanations.
12. Put your references into our IEEE format. The format for author names is "Initials Family-Name, Initials Family-Name, and Initials Family-Name." Do not capitalize the paper-title, except for proper nouns. Spell out all the important words in journal names; give journal volume, year, month, pages. Paper titles are in double quotes, and the comma goes inside the closing quotes. See a current issue for examples.

13. The biographies appear after the references, untitled, and should contain a brief technical biography, and the IEEE serial number if available. All biographies together must fit on one page (double spaced)! The more authors you have in the paper, the less average space exists for each biography. We do not print photos with the biographies.
14. Proofs should be placed in the Appendix of the paper, unless the proof is useful in explaining to the reader how to use or interpret the results. Create one Appendix for everything, listed chronologically.
15. See *Information for Readers & Authors* in a current issue, on line, or the enclosed copy if provided. Also see other relevant information at these locations, including our Publication Guidelines Editorial, and examples of both good and bad graphic productions.
16. There is no need to produce a two column formatted paper in journal format any more. IEEE handles that after you and the Managing Editor agree that the paper is ready, considering the Cs: clear, correct, concise, convincing, conforming, and critical to the state of the art.
17. If you have additional questions or need additional help, contact the Managing Editor at [jrupe@ieee.org](mailto:jrupe@ieee.org).

## Policies and Principles

Conformance to our policies and principles helps to ensure that the paper is not only technically correct but is useful to specialized, and non-specialized readers alike. Write to the broadest of audiences

1. The spelling, syntax, and structure are important because they can help to make the paper
  - clear, concise, convincing, correct, critical, and conforming to IEEE policies;
  - easy to read and understand and interpret correctly; and
  - hard to read or understand or interpret incorrectly.
2. *There must be a one-to-one correspondence between a concept, and its name.* Where there is more than one name for a particular concept, you must choose one, and drop the other(s). You should explain the nomenclature in a Nomenclature list. For some concepts, such as the idea or program being proposed in the paper, it helps to choose an acronym or abbreviation for the concept-name, then to use that acronym or abbreviation everywhere.
3. *The ampersand (&)* is optionally used to close-couple words, and useful for referencing coauthors of a paper. The "and" can be ambiguous because it can both close-couple and separate words and phrases. When joining ideas, it is best to use "&," or strings of "and," but reserve the use of ", and" for lists of separate items. Be sure to always use a comma before you use separating "and," unless the comma causes confusion. See the bullets in A above for examples.
4. The hyphen (-) is often used to close-couple words, where several nouns and adjectives appear together in a string, to show which word goes with which, and thus reduce ambiguity; *the hyphen is used only when the ambiguity would otherwise be present.* Do not give into temptation to use a hyphen where a colon or semicolon belongs, or where words should be provided.
5. Mark the end of a list or unnumbered segment whose end might otherwise be unclear, such as a proof. I suggest a black box.
6. Dual-meaning statistical-jargon can be a very real stumbling block for both authors, and readers. Some words, in their statistical use, mean something quite different from their ordinary-language meaning (e.g., "independent," "significant," "expected"). If you intend the exact statistical meaning, then precede the word with s- (to imply "statistical"); otherwise, a) choose a synonym (e.g., "important" or "appreciable" in place of "significant"), or b) precede the word with an adjective that

implies the exact meaning of the word (*e.g.*, physically independent). You can write out “statistical” instead of “s-” if you prefer.

7. The purposes of equations are to facilitate computation, and to increase understanding. Long, complicated equations do neither. When an expression appears several times, especially if it is long, complicated, or both, it should be replaced by a simpler symbol. That symbol will usually have subscripts, arguments, or both (as in a function). That substitution will help everyone, from the author (in proofing) to the reader (easier to read correctly). It is very desirable (but not essential) that the replaced expression have a specific meaning or implication (something that would be a separate function or procedure in a computer program).
8. *All writing is influential.* Clearly state your contributions, and your purpose for writing. Your paper must influence readers that your work is important enough for them to spend their time reading it! Organize it well to do so!
9. *Please write your paper in first person, with an early subject, and close following verb in each sentence.* Sentences like this one here should not be written unless the subject is necessarily unidentifiable. Write clear sentences like this one.
10. *Create figures and tables with as little clutter as possible, and avoid unnecessary color.* For guidance on how to create top quality scientific graphics, see the work of Edward R. Tufte, and refer to the image examples attached to your packet. We accepted color graphics in the following formats: EPS, PS, TIFF, Word, Power Point, Excel, or PDF. The resolution of a RGB color TIFF file should be 400 dpi. The print version will be printed in grey-scale, unless you elect to pay the appreciable color printing charges. So do not rely on color in your graphics unless you intend to pay the print fees.

## Style Guide

### Text and equations

There are several practices that all published papers with the IEEE Transactions on Reliability must follow. Some of these practices are to support clarity of communication, and others are to avoid ambiguity. Here they are, in no particular order, but numbered for easy reference.

1. Appendix – The Appendix section is unnumbered, and unlettered, so is just listed as the Appendix; so having multiple appendices would be confusing. Therefore, you cannot have multiple appendices in your paper; only one appendix. But you can have multiple parts in the Appendix, which will be unnumbered. So if you have more than one proof, for example, simply use an unnumbered subsection title to note the beginning of the proof, such as “Proof of Theorem 2” but do not number that title, or any title within.
2. Active voice – It is by far clearest to write in first person active voice. You should write sentences like this, where the subject is quickly followed by the verb, and the subject is not left ambiguous unless necessary. Sentences like this one are not structured clearly, because the subject who structured the sentence is left ambiguous. Only obfuscate the subject when it must be done, which is very seldom.
3. Integer numbering – Follow integer numbering for all items like equations, references, figures, tables, theorems, algorithms, proofs, notes, or any item you want to number across the paper. Equations are numbered like (1), references and citations like [2], figures like Fig. 3, tables like Table IV (tables are numbered with roman numerals, but integers), theorems like Theorem 5, etc. Do not use letters like (A), do not use decimals like (1.a) or (1.2), and do not use section numbers or letters as part of any of

them like (3.1). Also do not change numbering within the Appendix like (A.1); simply continue from where the body left off like (45) for example.

4. [1],[3]-[5], for example – strings of citations or references to equations should be done so that each item gets its own () or [] or whatever it needs. Do not write [1, 3-5] so we don't get it confused with interval math or sets or other things. [1-4] or (2,3) could be line fragments, or coordinates, for example. Instead write [1], [3]-[5] for references, and (1), (3)-(5) for equations, and follow similar approaches for other things, for consistency.
5. X/Y – In line equations must be of the form X/Y, not using the horizontal line or the \frac form in TeX. In line means within the text. Complicated equations that are clearer by using the horizontal form should be set aside like this one.

$$F(t) = \frac{x}{y+z} e^{-ti\theta}$$

6. ~~In order to~~ – Many times, we use the dismissible phrase of “in order to” where we just mean “to.” For example, rather than write “we show the next example in order to demonstrate the...” we should just write “we show the next example to demonstrate the...” because it is clearer, and more succinct.
7. Equation (1) – Take for example a reference to the first numbered equation in your paper. When you begin a sentence with an equation reference, write starting with “Equation (1)...”, but if the reference is in the middle of a sentence, write just the equation reference as in “We show in (1) the formula for...” Do not use Eqn. at all in any place. Note also that you don't need to number all equations in the paper, not even all the equations set out of line. Just number the ones you need to refer to.
8. Don't repeat, and I mean don't repeat - There is no value in repeating material in a paper that the reader can reference. Don't repeat yourself in the paper, and don't repeat material from other works.
  - 8.1. Notation definitions for repeated notation should be defined in the Notation section, then not repeated in the body. Only define notation in the body that is used in that one place, or has a special meaning at that place. But for convenience, define each abbreviation or acronym at its first use in the body, then use the abbreviation.
  - 8.2. However, most importantly, do not repeat material from other papers already published, even your own. For one, that is plagiarism. But also, there is no reason to reprint something that can be found in a paper you can cite. For example, don't repeat a proof you can simply refer the reader to (though you may want to provide that proof to the reviewers during the review process, just not for the print version).
9. Plural variables – Variables like  $x_i$  are already plural. You don't need to write  $x_i$ s or  $x_i$ 's to note it is plural. The former just looks like you are multiplying by s, and the latter just looks like the variables are prime or transposed and multiplied by s. Just leave it alone as  $x_i$ .
10. And, – Sentence with “and” joining two or more phrases should not be written with the comma after the “and” such as “The system runs for the duration of the mission and, by design, it continues.” But rather, the longer pause is before the “and” so the sentence should be written as “The system runs for the duration of the mission, and by design it continues.”
11. Colon – Be sure to use the colon properly, as a continuation of a complete sentence. For example, the phrase before the colon must be a complete sentence, but that which follows is a continuation of the material set up by the complete sentence, often a list or an elaboration. Think of the colon as a replacement for the word “namely” and you'll likely be correct. Don't use it after a sentence fragment continued to an item like an equation to complete the sentence. No colon needed in that case. Don't

use it after completing a sentence with “the following” in it, as it isn’t necessary then (the namely part is a bit redundant then). Follow the “namely” rule.

12. Quotes are for quotes – If you write something with quotation marks around it in a technical paper, you will almost surely need to follow it up with the citation. If it isn’t really a quote from somewhere, then don’t use quote marks (unless you are doing something like I have done in this document for examples). Using quotes to set aside jargon or slang is a red flag to use the proper term instead of an approximate term or descriptive one. For example, don’t write “new” when you don’t mean new. If you mean new, then say new without the quotes. If you mean something almost new like as good as new, then say that. But don’t use quotes to indicate you really don’t mean precisely what you write. Instead, write precisely!
13. ~~Since~~ because – Although it is common to do so, do not use since as a synonym for because. Why? Because it is clearer to say because when you mean because, so we can leave the word since for cases involving time. For example, “Since the beginning of the system lifetime, it has functioned without failure because we have maintained it on the schedule presented in this paper.” Is a proper use of both those words. The because in that sentence should not be replaced by since. For example, if we wrote “Since we started the system...” you would not normally know whether the author means because they started the system or since the time they started the system. But in this journal, we will be clear so the reader will know without reading the sentence more than once.
14. This what? – If you use the word “this” in the sentence, be sure to follow it up with what “this” refers to. For example, don’t write “We take this and find the results...” but instead write “We take this equation and find the results...” so the reader knows what “this” refers to. Be clear about what you are referring to.
15. In other words – Chances are, if you are stating the phrase “in other words” in your paper that you proceed that phrase with a poorly written sentence. While it may be use to sum up a point, most of the time it is just used by authors to restate a point that they know was not clear. When you see this phrase in your writing, read what you wrote before it, and see if you can combine the two sentences or phrases around the “in other words” and improve your writing clarity.
16. Dash away – It seems common for some writers to use a lot of dashes – in the middle of sentences for example – to set aside a somewhat disconnected phrase – they can also try to use them to join sentences artificially – to seem less formal perhaps. As you see in the previous sentence, there are many ways people try to use them. But I have yet to find a sentence that needs it, or even benefits from it. Sometimes the writer just needed commas instead of the two dashes, like the first two dashes in the sentence above. Often the writer should have used a semicolon or colon instead, like the third dash above. And at other times, the dash is just lazy writing because it is replacing a phrase that would otherwise connect the phrases more clearly, like in the last dash above (where we could replace “- to” by “to make the writing”). Rather than falling into the temptation of using the dash in a sentence, think about the intent of the message you are trying to get across, and be sure to use the proper words or punctuation instead. Note I am not talking about the use of a dash to join words. That is fine and clear.
17. / again – Earlier we discussed the / for in line fractions. That means when you see / in the text, it has to mean a fraction. Otherwise we might be confused if it could mean other things. Therefore, don’t use / to replace the proper way to join items. For example, don’t write “this/that” to replace “this-that” or “this or that” or “this and that” or “this or that or both.” It seems some people want to write

“this and/or that” to mean “this or that or both” but it doesn’t save much writing, and might be confused by some readers. Just write out what you mean. We can handle the extra ink expense.

18. Comma – Use a comma before the word and, unless you are joining items. You can use & to join items if you like, but as that is rarely seen, we don’t require that antique approach. Instead, you can use and without the comma. Therefore, it is clearer to use the comma before the and when setting items aside, such as phrases, or item lists. It is common approach to not include the comma before the and in a list, but we ask you to use it for clarity. If you need examples or an explanation for what this is about, you can search for the term serial comma or Oxford comma to learn more. We aren’t a newspaper; clarity is more important than saving that small bit of ink or print space.
19. Keep it short – Write short sentences. Break up all long sentences. And starting a sentence with “And” is okay as long as it isn’t awkward to do so. Most importantly though, be sure to keep the overall paper short while making the contribution clear enough that a reader can confirm, validate, and verify the work.

Not all of these are common practice, but they are acceptable generally, and do improve clarity, so we ask that all authors comply with these guidelines, as well as others described in our other help material. See if you can find examples in this writing that are both acceptable and unacceptable. Many of both are in here, some on purpose.

## Graphics

Make all your graphics clean, and free of clutter.

1. It is common to use Excel for graphics, but the defaults in Excel are quite poor, being full of clutter.
2. Don’t put a box around the legend of a graph, as that often distracts from the actual data.
3. Don’t put extra axes, say at the top and right of the plot area, unless there are actual limits to the data being plotted (such as a CDF would be at most 1.0, so having a line at  $y=1.0$  would be okay in that case).
4. If you have multiple graphs next to each other for comparison, use the same point for where the axes cross. Ideally the axes would be at 0, but that is not always possible, so make it clear when it is different.
5. We print in grey scale, but on line the colors of the graphics show. Therefore, don’t rely on colors, but you may use them as long as they print clearly in grey scale. But unnecessary colors are distracting, so don’t use them. If you don’t need to fill in the bars of a bar chart to differentiate the bars, then don’t. And if you must, try not to change the way the data look in the graph with the colors.

Refer to the work of Edward Tufte for guidance and examples. There is much more I could say about this subject, but the items above cover most problems I see, and Tufte does such a great job already that I refer you to his works.