

# How to Use the L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> Class File (ieej-e.cls) for the Transactions of the Institute of Electrical Engineers of Japan

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IEE Japan provides a L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> class file, named `ieej-e.cls`, for the Transactions of the Institute of Electrical Engineers of Japan. This document describes how to use the class file, and also makes some remarks about typesetting a document by using L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>. The design is based on L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>.

**Keywords:** Class file, L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>

## 1. Introduction

This document describes how to handle the `ieej-e.cls` for the Transactions of the Institute of Electrical Engineers of Japan. Section 2 explains how to typeset according to the template. `template.tex` which is distributed with the `ieej-e.cls` can be used. Section 3 describes a special feature of `ieej-e.cls`, which is different to the `article.cls` provided by the standard L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> and which points may be aware of on writing a paper and so on. Section 4 is about typographic notes, which explains how to typeset, how to prevent typographic errors and how to handle long formulas. For information about printing on A4 paper and making pdf file, see Appendix (p.6).

## 2. Template and How to Typeset the Paper and Letter

**2.1 Type of the Paper** Here is the template of the paper.

```
\documentclass[english]{ieej-e}
\usepackage{graphicx}
\usepackage[varg]{txfonts}
\FIELD{A}
\YEAR{2011}
\NO{1}
\title[]{}
\authorlist{}
\authorentry{name}{membership}{label}
}
\affiliate[label]
{affiliate\ address}
\received{2011}{1}{23}
\revised{2011}{3}{15}
\begin{document}
\begin{abstract}
Summary
```

```
\end{abstract}
\begin{keyword}
Keywords
\end{keyword}
\maketitle
\section{Introduction}
...
\begin{thebibliography}{99}
\bibitem{}
\bibitem{}
...
\end{thebibliography}
\appendix
\section{}
...
\acknowledgment
...
\begin{biography}
\profile{membership}{name}{text}
\end{biography}
\end{document}
```

- The `txfonts` package should be loaded.  
`\usepackage[varg]{txfonts}`  
Note that if you require `amsmath` packages, it must be specified before `txfonts` package.
- The `\FIELD` command is used for the footer. Its argument indicates the categories of IEEJ transactions (see Table 1 of “Author’s Guidelines for the Transactions of the Institute of Electrical Engineers of Japan”). For example, in the case of “Fundamental and Materials” A is specified as the argument of `\FIELD`.
- The `\YEAR` command is used for the footer. The year of publication is assigned as `\YEAR{2011}`.
- The `\NO` command is also used for the footer. The number of the issue is assigned as `\NO{1}`.  
Those two commands are optional. If you do not know which issue your paper to be appear, they may be commented out or left blank.
- The title of a paper is assigned in `\title`. You may use `\` to start a new line in a long title.  
The argument of the `\title` command is used for

a) Correspondence to: TaroDenshi@iee.or.jp  
\* Technical Research Labs., Shin-nichi Electric Co., Ltd.  
7–2, Gobancho, Chiyoda-ku, Tokyo, Japan 102–0076  
\*\* Technical Labs., Kagoshima Electron Corp.  
2–100, Daikan-cho, Kagoshima, Japan 890–0099

more than just producing a title, it is also used to generate a running head.

A shorter title should be specified within 8 words as follows.

`\title[short title]{title}`

- The outputs of authors' names, memberships and marks of affiliates are automatically generated by using the `\authorlist` and `\authoreentry` commands.

The `\authoreentry` command must be described as an argument of the `\authorlist` command.

The `\authoreentry` command has three arguments.

`\authoreentry{name}{membership}{label}`

For example, they could be typesetted as follows:

```
\authorlist{%
\authoreentry{Taro_Denshi}{m}{TRL}
\authoreentry{Hanako_Denki}{n}{KEC}
}
```

- The first argument of `\authoreentry` is filled with the author's name.
- The second argument is specified by one letter out of seven letters (m, a, s, l, n, h, S, f), each one indicating the membership of authors as the following table shows.

---

m	Member
a	Associate
s	Student Member
l	Life Member
n	Non-member
h	Honorary Member
S	Senior Member
f	Fellow

---

the left column is letters to be specified. the right column is membership to be generated.

No extra spaces may be added between a letter and a brace. `{m}` and `{m_}` are regarded as different. The latter will not generate "Member".

- The third argument is assigned by the label of the author's affiliate, corresponding to the label of the `\affiliate` command (see below). For example, an abbreviation for a university, institute or company can be given.

If an author does not have an affiliate, none must be specified.

- You might specify e-mail address as follows.

```
\authoreentry[TaroDenshi@iee.or.jp]
{Taro Denshi}{m}{TRL}
```

The following words are generated on the left side at the bottom of the first page.

"a) Correspondence to: TaroDenshi@iee.or.jp"

- The `\authoreentry` command lists the authors' names and affiliates one by one. If more than 10 authors are listed, the list occupies almost a half of the page. Therefore, if you specify as follows, `\def\authoralign{2}` then, it will list the names two per line. The argument of `\authoralign` must be 1 or 2.

- An author's affiliate is described in the `\affiliate` command as follows.

`\affiliate[label]{affiliate\address}`

The first argument "*label*" must be the same as the 3rd argument of the `\authoreentry` command. The second argument is assigned by both the author's affiliate and address, which are separated by `\\`.

No extra spaces may be added between a letter and a brace in the first *label* argument. The entry of `\affiliate` must be followed by the order of labels in `\authorlist` commands.

- If the labels of `\affiliate` are different from those of `\authoreentry`, there will be a warning message on your terminal.
- Both the `\received` and `\revised` commands are used for the date of receipt and revision of the paper. For example, the date of receipt is assigned as `\received{2011}{1}{23}` and the date of revision is assigned as `\revised{2011}{3}{15}`.

Both commands will generate the following strings below authors' names.

"(Manuscript received January 23, 2011, revised March 15, 2011)"

- The text of the abstract is described in the `abstract` environment. The text should be a maximum of 150 to 200 words.

The text of the keywords is described in the `keyword` environment. The text should be a maximum of 6 words.

- The `\maketitle` command must come after those commands before the main text begins.
- The `\appendix` command of the standard L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> is a declaration that changes the way sectional units are numbered. But `\appendix` of `ieej-e.cls` generates the heading "Appendix" and appendix sections are numbered "1", "2", etc., appendix equation numbers are numbered "(A1)", "(A2)", etc., appendix figure numbers are numbered "app. Fig. 1", "app. Fig. 2", etc.
- The `\acknowledgment` command is available if you might express your gratitude.
- Authors' profile on page 6 is generated with:

```
\begin{biography}
\profile{m}{Denshi Taro}{%
was born in Kumamoto, Japan,
on August 15, 1972.
... }
\profile{n}{Denki Hanako}{%
was born in Okayama, Japan,
on February 25, 1960.
... }
\end{biography}
```

- The first argument of the `\profile` command is specified by one letter out of seven letters (m, a, s, l, n, h, S) the same as the second argument of `\authoreentry`.

The second and third arguments are filled with an author's name and profile respectively.

- If EPS (see p.3) files of pictures of the authors' faces are provided, put the EPS files named `a1.eps`, `a2.eps`, etc., which are followed by the order of authors, on the current directory of your computer (`a1.pdf` when compiling with `\usepackage[pdftex]{graphicx}`). The `\profile` command automatically reads their files



```
\begin{figure}[tbp]
... floating materials ...
\capwidth=50mm
\caption{An example of caption
in English.}
\label{fig:1}
\end{figure}
```

Fig. 1. An example of caption in English.

Table 1. An example of table caption in English.

A	B	C
X	Y	Z

```
\begin{table}[b][tbp]
\caption{An example of table caption in English.}
\label{table:1}
\begin{center}
\begin{tabular}{c|c|c}
\hline
A & B & C \\
\hline
X & Y & Z \\
\hline
\end{tabular}
\end{center}
\end{table}
```

ues of the parameters in the verbatim environment which is customized for `ieej-e.cls`. The default settings are:

```
\verbatimleftmargin=0pt
\def\verbatimsize{\normalsize}
\verbatimbaselineskip=\baselineskip
```

The leftmargin of the verbatim environment is set 0pt. The font size is set `\normalsize`. The baselineskip is set the same of normal texts.

For example, those parameters can be changed as follows:

```
\verbatimleftmargin=6.5mm
\def\verbatimsize{\footnotesize}
\verbatimbaselineskip=3mm
```

**3.6 Bibliography and Citations** `ieej-e.cls` includes the `citesort.sty` with a little customized. The `citesort.sty` collapses a list of three or more consecutive numbers into a range, and sorts the numbers before collapsing them. For example, “(6) (7) (5) (2) (1) (3)” is transformed into “(1)–(3) (5)–(7)”.

The `\cite` command displays citations as superscript numbers. To get “ref.(1)”, the `\Cite` command can be used.

In the `thebibliography` environment, place references in the right order according to the IEEJ editing style; e.g., authors’ names, initials, title of article, journal abbreviation, volume number, pages, and publication year. Journals are italicized as `\itshape`, and titles of papers enclosed with “ ” in plain text.

### 3.7 Make All Text Pages the Same Height

`\flushbottom` is declared in `ieej-e.cls`. It makes all text pages the same height, adding extra vertical space when necessary to fill out the page.

**3.8 AMS Packages** The  $\mathcal{A}\mathcal{M}\mathcal{S}$ -L<sup>A</sup>T<sub>E</sub>X packages are provided to typeset complex equations or other mathematical constructions. If you would like to use them, the `amsmath` package should be loaded with the `fleqn` option.

```
\usepackage[fleqn]{amsmath}
```

When the `amsmath` package is loaded, many environments, for example the `equation`, `align`, `gather`, `multiline`

Table 2. `\FRAC` and `\RN`

<code>\RN{2}</code>	II
<code>\RN{117}</code>	CXVII
<code>\FRAC{\pi}{2}</code>	$\pi/2$
<code>\FRAC{1}{4}</code>	$1/4$

and `split` environments etc., will not automatically generate dots between a formula and a formula number. One primitive way to resolve this problem is to typeset as follows at the end of the formula.

```
\rlap{\hbox to 10mm{\ \EqnDots}}
```

This puts the leaders of width 10 mm into a box of width zero, extending to the right of the current position.

While the `amsmath` package presents many functions, only the `\boldsymbol` command which is to be used for individual bold math symbols and bold Greek letters is needed, only the `amsbsy` package should be loaded.

```
\usepackage{amsbsy}
```

When the `amssymb` package is loaded, many extra math symbols of the  $\mathcal{A}\mathcal{M}\mathcal{S}$ -L<sup>A</sup>T<sub>E</sub>X fonts will become available<sup>(10)</sup>.

```
\usepackage[psamsfonts]{amssymb}
```

## 3.9 Miscellaneous

### 3.9.1 Macros Defined by `ieej-e.cls`

- `\QED`: Produces “□” in the end of the proof and so on. You would get the same output by using `\hfill $\Box$`. But if the end of a paragraph goes to the right margin, the character □ is positioned at the start of a line. Using `\QED` will prevent such cases.
- `\halflineskip` and `\onelineskip`: Produce a vertical space,  $1/2\text{baselineskip}$ ,  $1\text{baselineskip}$  respectively.
- As shown in Table 2, the macros `\RN` and `\FRAC` are defined<sup>(1)</sup>.
- `\ddash`: Produce double “—”. double “---” sometimes produce thin space between two “—”. `\ddash` will prevent such a case.

## 4. Typographic Notes

### 4.1 How to Prevent Typographic Errors

- (1) You should pay attention to a space after a period. “T<sub>E</sub>X simply assumes that a period ends a sentence unless it follows an uppercase letter. This works most of the time, but not always—abbreviations like ‘etc.’ being the most common exception. You tell T<sub>E</sub>X that a period doesn’t end a sentence by using a `\_` command (a `\` character followed by a space or the end of a line) to make the space after the period.”  
“On the rare occasions that a sentence-ending period follows an uppercase letter, you will have to tell T<sub>E</sub>X that the period ends the sentence. You do this by preceding the period with a `\@` command.”<sup>(9)</sup>  
Beans (lima, etc.)\\_have vitamin B\@.
- (2) “Line breaking should be prevented at certain interword spaces. ... Trying ~ (a tilde character) produces an ordinary interword space at which T<sub>E</sub>X will never break a line.”<sup>(9)</sup>  
Mr. ~ Jones, Figure~\ref{fig:1}, (1)~gnats.
- (3) With respect to Figure, Section, Equation, when these words appear at the beginning of a sentence, they should be spelt out in full, e.g., “Figure 1 shows...” is

(4) There should be no space after opening or before closing parentheses, as in `(_word_)`.

- (8) The difference when hyphen and en dash are used in maths mode should also be noted. Some examples are given below.

$A^{b-c} \Rightarrow$  hyphen

$$A^{b-c} \Rightarrow \text{en dash}$$
 $A^{b-c} \Rightarrow \text{minus sign}$ 

- ```
\begin{eqnarray}
y &=& a + b + c + \dots + e\\
&& \mbox{} + f + \dots
\end{eqnarray}
```

- ## 4.2 How to Handle Long Formulas
- Here are some explanations how to handle long formulas, for example, overhanged equations, equations overriding the equation number, and so forth.

Here are some

$$y = a + b + c + d + e + f + g + h + i + j + k + l + m(2)$$

“The \! acts like a backspace, removing the same space amount of space that \, adds.”<sup>(9)</sup>

$$\end{equation}$$

$$y=a+b+c+d+e+f+g+h+i+j+k+l+m\cdots\cdots\cdots (3)$$

$$\begin{array}{c} \alpha \quad \alpha \quad \backslash \text{mben}\{ \\ \backslash \text{end}\{\text{eqnarray}\} \end{array}$$
$$y = a + b + c + d + e + f + g + h + i + j + k + l + m + n + o \dots\dots\dots (4)$$

To typeset above (see [1]), you will get the following output.

$$y = a + b + c + d + e + f + g + h + i + j + k + l + m \cdots (5)$$

The value of `\mathindent` must be restored (see [2]).

$$\iint_S \left( \frac{\partial V}{\partial x} - \frac{\partial U}{\partial y} \right) dx dy = \oint_C \left( U \frac{dx}{ds} + V \frac{dy}{ds} \right) ds \dots (6)$$
$$\end{eqnarray}$$
$$\iint_S \left( \frac{\partial V}{\partial x} - \frac{\partial U}{\partial y} \right) dx dy$$

---

<sup>†</sup> This explanation is appropriate to left-aligns displayed formulas, not to centering formulas.

$$= \oint_C \left( U \frac{dx}{ds} + V \frac{dy}{ds} \right) ds \dots \dots \dots (7)$$

**Example 5:** A matrix using the array environment.

$$A = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{pmatrix} \dots \dots \dots (8)$$

The width of a matrix can be shrunk by changing the value of `\arraycolsep` or using an @-expression (@{}).

```
\begin{equation}
\arraycolsep=3pt % <--- [1]
A = \left(
\begin{array}{@{\hspace{2pt}}% <-- [2]
cccc
@{\hspace{2pt}}% <-- [2]
}
a_{11} & a_{12} & \ldots & a_{1n} \\
a_{21} & a_{22} & \ldots & a_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
a_{m1} & a_{m2} & \ldots & a_{mn} \\
\end{array}
\right)
\end{equation}
```

The `\arraycolsep` dimension is half the width of a horizontal space between columns in the array environment. A matrix using the array environment can be shrunk by changing the value of `\arraycolsep` (see [1]). And also it can be shrunk by using @-expression (see [2]).

$$A = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{pmatrix} \dots \dots \dots (9)$$

Compare Eqs. (8) and (9).

**Example 6:** A matrix using a `\pmatrix`.

```
\begin{equation}
\def\quad{\hspace{.75em}\relax}% <-- [1]
% default setting is \hspace{1em}
A = \pmatrix{
a_{11} & a_{12} & \ldots & a_{1n} \cr
a_{21} & a_{22} & \ldots & a_{2n} \cr
\vdots & \vdots & \ddots & \vdots \cr
a_{m1} & a_{m2} & \ldots & a_{mn} \cr
}
\end{equation}
```

In the case of the equation using `\pmatrix`, the definition of `\quad` can be changed (see [1]).

If `amsmath` packages is loaded, the `\pmatrix` environment (`\begin{pmatrix}` and `\end{pmatrix}`) must be selected instead of `\pmatrix`. In that case the explanation on Example 5 is useful.

## References

- (1) D.E. Knuth, The T<sub>E</sub>Xbook, Addison-Wesley (1994)

- (2) R. Seroul & S. Levy: A Beginner's Book of T<sub>E</sub>X, Springer-Verlag (1989)  
(3) D. Salomon: The Advanced T<sub>E</sub>Xbook, Springer-Verlag (1995)  
(4) V. Eijkhout: T<sub>E</sub>X by Topic, Addison-Wesley (1991)  
(5) P.W. Abrahams: T<sub>E</sub>X for the Impatient, Addison-Wesley (1992)  
(6) S. von Bechtolsheim: T<sub>E</sub>X in Practice, Springer-Verlag (1993)  
(7) G. Grätzer: Math into T<sub>E</sub>X—A Simple Introduction to  $\mathcal{A}\mathcal{M}\mathcal{S}$ -L<sup>A</sup>T<sub>E</sub>X, Birkhäuser (1993)  
(8) N. Walsh: Making T<sub>E</sub>X Work, O'Reilly & Associates (1994)  
(9) L. Lamport, L<sup>A</sup>T<sub>E</sub>X: A Document Preparation System, Second Edition, Addison-Wesley (1994)  
(10) M. Goossens, F. Mittelbach & A. Samarin: The L<sup>A</sup>T<sub>E</sub>X Companion, Addison-Wesley (1994)  
(11) M. Goossens, S. Rahts, and F. Mittelbach: The L<sup>A</sup>T<sub>E</sub>X Graphics Companion, Addison-Wesley (1997)

## Appendix

### 1. Printing on A4 paper and making pdf file

- If you print a manuscript on A4 paper by using dvips printer driver, the following parameter might be set.  
`dvips -Pprinter -t a4 -O 0in,0in file.dvi`  
printer is a name of printer. “-t a4 -O 0in,0in” option might be omitted.
- You can directly make a pdf file by using pdflatex, or convert a dvi file to a pdf file by using dvips and Acrobat Distiller or dvi2pdf.
- If you convert a dvi file to a pdf file, you must first convert a dvi file to a ps file (printer is your printer name):  
`dvips -Pprinter -t a4 -O 0in,0in`  
`-o file.ps file.dvi`  
“-t a4 -O 0in,0in” option might be omitted. Then, convert a ps file to pdf file by using Acrobat Distiller.  
Otherwise, you may convert a dvi file to a pdf file by using dvi2pdf.  
`dvi2pdf -p a4 -x 1in -y 1in`  
`-o file.pdf file.dvi`  
“-p a4 -x 1in -y 1in” option might be omitted.

### 2. Omitted Commands

Some commands which is not required by `ieej-e.cls` are omitted. These commands are `\tableofcontents`, `\titlepage`, `\part`, `\theindex`, `headings`, `myheadings` and the related commands.

**Denshi Taro** (Member) was born in Kumamoto, Japan, on August 15, 1972. He received a Ph.D. degree in physics from Denshi Institute of Technology in 1995, and is presently an assistant engineer at Shin-nichi Electric Co., Ltd. He has worked on laser spectroscopy, and the development of LIDAR systems. Japan Applied Physics Society, American Physical Society member.

**Denki Hanako** (Non-member) was born in Okayama, Japan, on February 25, 1960. She received a Ph.D. degree in electrical engineering from Electric University in 1984, and is presently a Chief engineer at Kagoshima Electron Corp. She has worked on analysis of electromagnetic flow coupler pumps, the development of Cherenkhov radiation monitors for nuclear inspection, and the development of laser beam intensity transformation techniques. Japan Applied Physics Society, Laser Society of Japan, Optical Society of

America member.