

# L<sup>A</sup>T<sub>E</sub>X Class for the *Association for Computing Machinery*\*

Boris Veytsman<sup>†</sup>

2021/09/24, v1.80

## Abstract

This package provides a class for typesetting publications of the Association for Computing Machinery.

## Contents

<b>1</b>	<b>Introduction</b>	<b>3</b>
<b>2</b>	<b>User's guide</b>	<b>3</b>
2.1	Installation	3
2.2	Invocation and options	6
2.3	Top matter	7
2.4	Algorithms	20
2.5	Figures and tables	20
2.6	Descriptions of images	22
2.7	Theorems	22
2.8	Online-only and offline-only material	22
2.9	Note about anonymous mode	23
2.10	Acknowledgments	23
2.11	Bibliography	24
2.12	Colors	27
2.13	Other notable packages and typographic remarks	28
2.14	Counting words	28
2.15	Disabled or forbidden commands	29
2.16	Notes for wizards	29
2.17	Currently supported publications	30
2.18	A note about <code>sigchi-a</code> format	32

---

\*©2016–2021, Association for Computing Machinery

<sup>†</sup>[borisv@lk.net](mailto:borisv@lk.net), [boris@varphi.com](mailto:boris@varphi.com)

<b>3</b>	<b>Implementation</b>	<b>33</b>
3.1	Identification	33
3.2	Preload hook	33
3.3	Options	33
3.4	Setting switches	37
3.5	Loading the base class and package	38
3.6	Citations	39
3.7	Paper size and paragraphing	47
3.8	Fonts	50
3.9	Image descriptions	51
3.10	Floats	52
3.11	Lists	54
3.12	Top-matter data	56
3.13	Concepts system	71
3.14	Copyright system	72
3.15	Maketitle hook	77
3.16	Typesetting top matter	78
3.17	Headers and Footers	94
3.18	Sectioning	100
3.19	TOC lists	103
3.20	Theorems	103
3.21	Balancing columns	106
3.22	Acknowledgments	107
3.23	Conditional typesetting	108
3.24	Additional bibliography commands	108
3.25	Index	109
3.26	End of Class	109

# 1 Introduction

The Association for Computing Machinery<sup>1</sup> is the world's largest educational and scientific computing society, which delivers resources that advance computing as a science and a profession. It was one of the early adopters of  $\TeX$  for its typesetting.

It provided several different classes for a number of journals and conference proceedings. Unfortunately during the years since these classes were written, the code was patched many times, and supporting different versions of the classes became difficult.

This package provides the uniform interface for all ACM publications. It is intended to replace all the different classes and packages and provide an up-to-date  $\LaTeX$  package.

This package uses only free  $\TeX$  packages and fonts included in  $\TeX$ Live, Mik $\TeX$  and other popular  $\TeX$  distributions. It is intended to be published in these distributions itself, which minimizes users' efforts in the installation and support of this package.

I am grateful to Michael D. Adams, Leif Andersen, Lawrence Christopher Angrave, Dirk Beyer, Andrew Black, Joachim Breitner, Benjamin Byholm, John Collins, Nils Anders Danielsson, Michael Ekstrand, Matthew Fluet, Paolo G. Giarrusso, Ben Greenman, Enrico Gregorio, Jamie Davis, Ulrike Fischer, Jason Hemann, Peter Kemp, Luis Leiva, Ben Liblit, Rholais Lii, LianTze Lim, Kuldeep S. Meel, Kai Mindermann, Frank Mittelbach, Serguei Mokhov, Ross Moore, John Owens, Joel Nider, Scott Pakin, Tobias Pape, Henning Pohl, Philip Quinn, Mathias Rav, Andreas Reichinger, Matteo Riondato, Craig Rodkin, Bernard Rous, Feras Saad, Kerry A. Seitz, Jr., David Shamma, Gabriel Scherer, Kartik Singhal, Christoph Sommer, Stephen Spencer, Shin Hwei Tan, Daniel Thomas, Shari Trewin, Zack Weinberg, John Wickerson and many others for their invaluable help.

The development version of the package is available at <https://github.com/borisveytsman/acmart>.

## 2 User's guide

This class uses many commands and customizatopn options, so it might appear intimidating for a casual user. Do not panic! Many of these commands and options can be safely left with their default values or the values recommended by your conference or journal editors. If you have problems or questions, do not hesitate to ask me directly or the community at <https://github.com/borisveytsman/acmart>, <https://tex.stackexchange.com> or the closest  $\TeX$  Users Group. The world-wide  $\TeX$  Users Group is at <https://tug.org/>; please consider joining us if you use  $\TeX$  regularly.

### 2.1 Installation

Most probably, you already have this package installed in your favorite  $\TeX$  distribution; if not, you may want to upgrade. You may need to upgrade it anyway since this package uses a number of relatively recent packages, especially the ones related to fonts.

The latest released version of this package can be found on CTAN: <https://www.ctan.org/pkg/acmart>. The development version can be found on GitHub: <https://>

---

<sup>1</sup><http://www.acm.org/>

[github.com/borisveytsman/acmart](https://github.com/borisveytsman/acmart). At this address you can file a bug report—or even contribute your own enhancement by making a pull request.

Please note that the version on Github is a development (or experimental) version: please download it for testing new features. The production version is the one on CTAN and ACM sites.

Most users should not attempt to install this package themselves but should rather rely on their  $\TeX$  distributions to provide it. If you decide to install the package yourself, follow the standard rules:

1. Run `latex acmart.ins`. This will produce the file `acmart.cls`
2. Put the files `acmart.cls` and `ACM-Reference-Format.bst` in places where  $\LaTeX$  can find them (see [1] or the documentation for your  $\TeX$  system).
3. Update the database of file names. Again, see [1] or the documentation for your  $\TeX$  system for the system-specific details.
4. The file `acmart.pdf` provides the documentation for the package. (This is probably the file you are reading now.)

As an alternative to items 2 and 3 you can just put the files in the working directory where your `.tex` file is.

This class uses a number of other packages. They are included in all major  $\TeX$  distributions ( $\TeX$ Live, Mac $\TeX$ , Mik $\TeX$ ) of 2015 and later, so you probably have them installed. Just in case here is the list of these packages:

- *amscs*, <http://www.ctan.org/pkg/amscs>
- *amsfonts*, <http://www.ctan.org/pkg/amsfonts>
- *amsmath*, <http://www.ctan.org/pkg/amsmath>
- *binhex*, <http://www.ctan.org/pkg/binhex>
- *balance*, <http://www.ctan.org/pkg/balance>
- *booktabs*, <http://www.ctan.org/pkg/booktabs>
- *caption*, <http://www.ctan.org/pkg/caption>
- *comment*, <http://www.ctan.org/pkg/comment>
- *cm-super*, <http://www.ctan.org/pkg/cm-super>
- *cmap*, <http://www.ctan.org/pkg/cmap>
- *draftwatermark*, <http://www.ctan.org/pkg/draftwatermark>
- *environ*, <http://www.ctan.org/pkg/environ>
- *etoolbox*, <http://www.ctan.org/pkg/etoolbox>

- *fancyhdr*, <http://www.ctan.org/pkg/fancyhdr>
- *float*, <http://www.ctan.org/pkg/float>
- *fontaxes*, <http://www.ctan.org/pkg/fontaxes>
- *geometry*, <http://www.ctan.org/pkg/geometry>
- *graphics*, <http://www.ctan.org/pkg/graphics>
- *hyperref*, <http://www.ctan.org/pkg/hyperref>
- *hyperxmp*, <http://www.ctan.org/pkg/hyperxmp>
- *iftex*, <http://www.ctan.org/pkg/iftex>
- *inconsolata*, <http://www.ctan.org/pkg/inconsolata>
- *libertine*, <http://www.ctan.org/pkg/libertine>
- *manyfoot*, <http://www.ctan.org/pkg/manyfoot>
- *microtype*, <http://www.ctan.org/pkg/microtype>
- *mmap*, <http://www.ctan.org/pkg/mmap>
- *ms*, <http://www.ctan.org/pkg/ms>
- *mweights*, <http://www.ctan.org/pkg/mweights>
- *natbib*, <http://www.ctan.org/pkg/natbib>
- *nccfoots*, <http://www.ctan.org/pkg/nccfoots>
- *newtx*, <http://www.ctan.org/pkg/newtx>
- *oberdiek*, <http://www.ctan.org/pkg/oberdiek>
- *pdftex-def*, <http://www.ctan.org/pkg/pdftex-def>
- *refcount*, <http://www.ctan.org/pkg/refcount>
- *setspace*, <http://www.ctan.org/pkg/setspace>
- *textcase*, <http://www.ctan.org/pkg/textcase>
- *totpages*, <http://www.ctan.org/pkg/totpages>
- *trimspaces*, <http://www.ctan.org/pkg/trimspaces>
- *upquote*, <http://www.ctan.org/pkg/upquote>
- *url*, <http://www.ctan.org/pkg/url>
- *xcolor*, <http://www.ctan.org/pkg/xcolor>
- *xkeyval*, <http://www.ctan.org/pkg/xkeyval>
- *xstring*, <http://www.ctan.org/pkg/xstring>

## 2.2 Invocation and options

To use this class, put in the preamble of your document

```
\documentclass[options]{acmart}
```

There are several options corresponding to the type of the document and its general appearance. They are described below. Generally speaking, the options have key=value forms, for example,

```
\documentclass[format=acmsmall, screen=true, review=false]{acmart}
```

The option `format` describes the format of the output. There are several possible values for this option, for example,

```
\documentclass[format=acmtog]{acmart}
```

Actually the words `format=` can be omitted, e.g.,

```
\documentclass[acmtog, review=false]{acmart}
```

The possible formats are listed in Table 1. Note that formats starting with `acm` are intended for journals and transactions, while formats starting with `sig` are intended for proceedings published as books.

Note that sometimes conference proceedings are published as a special issue (or issues) of an ACM journal. In this case, you should use the journal format for a conference paper. Please contact your conference committee if in doubt.

Starting in 2020, ACM retired formats `sigchi` and `sigchi-a`. SIGCHI conferences now use `sigconf` format for their publications. If a file uses `sigchi` format, a warning is issued, and the format is automatically switched to `sigconf`. Format `sigchi-a` can be used for non-ACM documents only (see Section 2.18).

There are several Boolean options that can take `true` or `false` values. They are listed in Table 2. The words `=true` can be omitted when setting a Boolean option, so instead of `screen=true` one can write just `screen`, for example,

```
\documentclass[acmsmall, screen, review]{acmart}
```

The option `review` is useful when combined with the `manuscript` format option. It provides a version suitable for reviewers and copy editors.

Two samples in the `samples` directory, `manuscript` and `acmsmall-submission`, show manuscripts formatted for submission to ACM.

The default for the option `screen` depends on the publication. At present it is `false` for all publications *but* PACM, since PACM is now electronic-only. Thus PACM titles (see Table 5) set this option to `true`. In the future this option may involve additional features suitable for on-screen versions of articles.

The option `natbib` is used when the corresponding Bib<sub>T</sub><sub>E</sub>X style is based on `natbib`. In most cases you do not need to set it. See Section 2.11.

Table 1: The possible values for the format option

Value	Meaning
<code>manuscript</code>	A manuscript. This is the default.
<code>acmsmall</code>	Small single-column format. Used for CIE, CSUR, DLT, FAC, JACM, JDIQ, JEA, JERIC, JETC, PACMCGIT, PACMHCI, PACMPL, TAAS, TACCESS, TACO, TALG, TALLIP (formerly TALIP), TCPS, TDS, TEAC, TECS, TELO, THRI, TIIS, TIOT, TISSEC, TIST, TKDD, TMIS, TOCE, TOCHI, TOCL, TOCS, TOCT, TODAES, TODS, TOIS, TOIT, TOMACS, TOMM (formerly TOMCCAP), TOMPECS, TOMS, TOPC, TOPLAS, TOPS, TOS, TOSEM, TOSN, TQC, TRET, TSAS, TSC, TSLP and TWEB, including special issues.
<code>acmlarge</code>	Large single-column format. Used for DTRAP, HEALTH, IMWUT, JOCCH, POMACS and TAP, including special issues.
<code>acmtog</code>	Large double-column format. Used for TOG, including annual conference Technical Papers.
<code>sigconf</code>	Proceedings format for most ACM conferences (with the exceptions listed below) and all ICPS volumes.
<code>sigplan</code>	Proceedings format for SIGPLAN conferences.

The option `anonymous` is used for anonymous review processes and causes all author information to be obscured.

The option `timestamp` is used to include a time stamp in the footer of each page. When preparing a document, this can help avoid confusing different revisions. The footer also includes the page range of the document. This helps detect missing pages in hard copies.

The option `authordraft` is intended for author’s drafts that are not intended for distribution. It typesets a copyright block to give the author an idea of its size and the overall size of the paper but overprints it with the phrase “Unpublished working draft. Not for distribution.”, which is also used as a watermark. This option sets `timestamp` and `review` to `true`, but these can be overridden by setting these options to `false` *after* setting `authordraft` to `true`.

The option `balance` determines whether the last page in the two column mode has balanced columns. By default it is `true`; however, it may lead to problems for some documents. Set it to `false` if you encounter compilation errors. Note that for one page documents `\balance` command might cause problems. An alternative is the (experimental) option `pbalance`, which uses the new package `pbalance` for this end.

The option `urlbreakonhyphens` determines whether URLs can be split between lines after hyphens. By default it is `true`. Set it to `false` to disallow these breaks.

## 2.3 Top matter

A number of commands set up *top matter* or (in computer science jargon) *metadata* for an article. They establish the publication name, article title, authors, DOI and other

Table 2: Boolean options

Option	Default	Meaning
review	false	A review version: lines are numbered and hyperlinks are colored
screen	see text	A screen version: hyperlinks are colored
natbib	true	Whether to use the natbib package (see Section 2.11)
anonymous	false	Whether to make author(s) anonymous
authorversion	false	Whether to generate a special version for the authors' personal use or posting (see Section 2.3)
nonacm	false	Use the class typesetting options for a non-ACM document, which will not include the conference/journal header and footers or permission statements
timestamp	false	Whether to put a time stamp in the footer of each page
authordraft	false	Whether author's-draft mode is enabled
acmthm	true	Whether to define theorem-like environments, see Section 2.7
balance	true	Whether to balance the last page in two column mode
pbalance	false	Whether to balance the last page in two column mode using pbalance package
urlbreakonhyphens	true	Whether to break urls on hyphens

data. Some of these commands, like `\title` and `\author`, should be put by the authors. Others, like `\acmVolume` and `\acmDOI`—by the editors. Below we describe these commands and mention who should issue them. These macros should be used *before* the `\maketitle` command. Note that in previous versions of ACM classes some of these commands should be used before `\maketitle`, and some after it. Now they all must be used before `\maketitle`.

This class internally loads the `amsart` class, so many top-matter commands are inherited from `amsart` [2].

`\acmJournal`     The macro `\acmJournal{<shortName>}` sets the name of the journal or transaction for journals and transactions. The argument is the short name of the publication *in uppercase*, for example,

```
\acmJournal{TOMS}
```

The currently recognized journals are listed in Table 5. Note that conference proceedings published in *book* form do not set this macro.

`\acmConference`     The macro `\acmConference[<short name>]{<name>}{<date>}{<venue>}` is used for conference proceedings published in the book form. The arguments are the following:

**short name:** the abbreviated name of the conference (optional).

**name:** the name of the conference.

**date:** the date(s) of the conference.

**venue:** the place of the conference.

Examples:

```
\acmConference[TD'15]{Technical Data Conference}{November
12--16}{Dallas, TX, USA}
\acmConference{SA'15 Art Papers}{November 02--06, 2015}{Kobe, Japan}
```

`\acmBooktitle`     By default we assume that conference proceedings are published in the book named *Proceedings of CONFERENCE*, where *CONFERENCE* is the name of the conference inferred from the command `\acmConference` above. However, sometimes the book title is different. The command `\acmBooktitle` can be used to set this title, for example,

```
\acmBooktitle{Companion to the first International Conference on the
Art, Science and Engineering of Programming (Programming '17)}
```

An ACM paper should have either `\acmJournal` or `\acmConference` command. If it has both (or more) commands, the last one takes precedence. Note that if you have the command `\acmConference` in a journal format like `acmsmall`, the class will use conference format for bibstrip and reference citation formatting. In the samples directory there is a file `sample-acmsmall-conf.tex` with the example of this usage.

`\editor`     In most cases, conference proceedings are edited. You can use the command

`\editor{<editor>}` to set the editor of the volume. This command can be repeated, for example,

```
\editor{Jennifer B. Sartor}
\editor{Theo D'Hondt}
\editor{Wolfgang De Meuter}
```

`\title` The command `\title`, as in the `amsart` class, has two arguments: one optional, and one mandatory:

```
\title[<ShortTitle>]{<FullTitle>}
```

The mandatory argument is the full title of the article. The optional argument, if present, defines the shorter version of the title for running heads. If the optional argument is absent, the full title is used instead.

It is expected that this command is inserted by the author of the manuscript.

`\subtitle` Besides title, ACM classes allow a subtitle, set with the `\subtitle{<subtitle>}` macro.

The commands for specifying authors are highly structured. The reason is they serve double duty: the authors' information is typeset in the manuscript *and* is used by the metadata extraction tools for indexing and cataloguing. Therefore it is very important to follow the guidelines exactly.

`\author` The basic commands are `\author`, `\orcid` (for the researchers registered with OR-

`\orcid` CID, <http://www.orcid.org/>), `\affiliation` and `\email`. In the simplest case, you

`\affiliation` enter them in this order:

```
\email
\author{...}
\orcid{...}
\affiliation{...}
\email{...}
```

Do *not* use the  $\LaTeX$  `\and` macro or commas, or `\\` between the authors! Each author deserves his or her own `\author` command. An attempt to list several authors or their e-mails in one command leads to a warning or an error. This is not a bug, but the expected behavior.

Note that some formats do not typeset e-mails or ORCID identifiers. Do not worry: the metadata tools will get them.

Sometimes an author has several affiliations. In this case, the `\affiliation` command should be repeated:

```
\author{...}
\orcid{...}
\affiliation{...}
\affiliation{...}
\email{...}
```

Similarly you can repeat the `\email` command.

You may have several authors with the same affiliation, different affiliations, or overlapping affiliations (author  $A_1$  is affiliated with institutions  $I_1$  and  $I_2$ , while author  $A_2$  is affiliated with  $I_2$  only, author  $A_3$  is affiliated with  $I_1$  and  $I_3$ , etc.). The recommended solution is to put the `\affiliation` commands after each author, possibly repeating them:

```
\author{...}
\orcid{...}
\affiliation{...}
\affiliation{...}
\email{...}
\author{...}
\orcid{...}
\affiliation{...}
\email{...}
\author{...}
\orcid{...}
\affiliation{...}
\affiliation{...}
\email{...}
```

In some cases, when several authors share the same affiliation, you can try to save space using the format

```
\author{...}
\email{...}
\author{...}
\email{...}
\affiliation{...}
```

However, this format is not generally recommended.

`\additionalaffiliation`

In some cases, too many affiliations can take too much space. The command `\additionalaffiliation{<affiliation>}` creates a footnote after an author’s name with the words “Also with {<affiliation>}”. You should use this command only as a last resort. An example of usage is:

```
\author{G. Tobin}
\author{Ben Trovato}
\additionalaffiliation{%
  \institution{The Th{\o}rv{"a}ld Group}
  \streetaddress{1 Th{\o}rv{"a}ld Circle}
  \city{Hekla}
  \country{Iceland}}
\affiliation{%
  \institution{Institute for Clarity in Documentation}
  \streetaddress{P.O. Box 1212}
  \city{Dublin}
  \state{Ohio}}
```

```
\postcode{43017-6221}}
```

Here Trovato and Tobin share their affiliation with the Institute for Clarity in Documentation, but only Ben Trovato is affiliated with The Thørväld Group.

<code>\position</code>	The <code>\affiliation</code> and <code>\additionalaffiliation</code> commands are further structured
<code>\institution</code>	to interact with the metadata extraction tools. Inside these commands you should use the
<code>\department</code>	<code>\position</code> , <code>\institution</code> , <code>\department</code> , <code>\city</code> , <code>\streetaddress</code> , <code>\state</code> , <code>\postcode</code>
<code>\streetaddress</code>	and <code>\country</code> macros to indicate the corresponding parts of the affiliation. Note that in
<code>\city</code>	some cases (for example, journals) these parts are not printed in the resulting copy, but
<code>\state</code>	they <i>are</i> necessary since they are used by the XML metadata extraction programs. Do
<code>\postcode</code>	<i>not</i> put commas or <code>\\</code> between the elements of <code>\affiliation</code> . They will be provided
<code>\country</code>	automatically.

The fields `\institution`, `\city` and `\country` are mandatory. If they are not provided, an error or a warning is issued. Currently the absence of `\country` produces an error; ACM may change this in the future.

An example of the author block:

```
\author{A. U. Thor}
\orcid{1234-4564-1234-4565}
\affiliation{%
  \institution{University of New South Wales}
  \department{School of Biomedical Engineering}
  \streetaddress{Samuels Building (F25), Kensington Campus}
  \city{Sidney}
  \state{NSW}
  \postcode{2052}
  \country{Australia}}
\email{author@nsw.au.edu}
\author{A. N. Other}
\affiliation{%
  \institution{University of New South Wales}
  \city{Sidney}
  \state{NSW}
  \country{Australia}}
\author{C. O. Respondent}
\orcid{1234-4565-4564-1234}
\affiliation{%
  \institution{University of Pennsylvania}
  \city{Philadelphia}
  \state{PA}
  \country{USA}}
\affiliation{%
  \institution{University of New South Wales}
  \city{Sidney}
  \state{NSW}
  \country{Australia}}
```

Note that the old ACM conference formats did not allow more than six authors and

required some effort from authors to achieve alignment. The new format is much better in this.

Sometimes an author works in several departments within the same institution. There could be two situations: the departments are independent, or one department is within another. In the first case, just repeat the command `\department` several times. To handle the second case the command has an optional numerical parameter. The departments with higher numbers are higher in the organizational chart. Compare

```
\affiliation{%
  \department[0]{Department of Lunar Studies} % 0 is the default
  \department[1]{John Doe Institute} % higher than 0
  \institution{University of San Serriffe}
  \country{San Serriffe}}
```

and

```
\affiliation{%
  \department{Department of Lunar Studies} % Not in the John Doe Institute!
  \department{John Doe Institute}
  \institution{University of San Serriffe}
  \country{San Serriffe}}
```

The command `\affiliation` formats its output according to American conventions. This might be wrong for some cases. Consider, for example, a German address. In Germany, the postcode is put before the city and is not separated by a comma. We can handle this order using

```
\affiliation{%
  \institution{Fluginstitut}
  \streetaddress{Sonnenallee 17}
  \postcode{123456}
  \city{Helm}
  \country{Germany}}
```

However, the comma after the postcode is unfortunate: the address will be typeset (in some formats) as

```
Fluginstitut
Sonnenallee 17
123456, Helm, Germany
```

To overcome this problem, the command `\affiliation` has an optional parameter `obeypunctuation`, which can be `false` (the default) or `true`. If this parameter is `true`, `\affiliation` obeys the author's command. Thus

```
\affiliation[obeypunctuation=true]{%
  \institution{Fluginstitut}\}
```

```

\streetaddress{Sonnenallee 17}\
\postcode{123456}
\city{Helm},
\country{Germany}}

```

will be typeset as

```

Fluginstitut
Sonnenallee 17
123456 Helm, Germany

```

Note that you should *not* use this option for journals.

It is expected that these commands are inserted by the author of the manuscript.

`\thanks` Like `amsart` (and unlike standard  $\LaTeX$ ), we allow `\thanks` only *outside* of the commands `\title` and `\author`. This command is obsolete and should *not* be used in most cases. Do not list your acknowledgments or grant sponsors here. Put this information in the `acks` environment (see Section 2.10).

`\authorsaddresses` In some formats, addresses are printed as a footnote on the first page. By default  $\LaTeX$  typesets them itself using the information you give it. However, you can override its choice using the command `\authorsaddresses{<contact addresses>}`, for example,

```

\authorsaddresses{%
  Authors' addresses: G. Zhou, Computer Science Department, College of
  William and Mary, 104 Jameson Rd, Williamsburg, PA 23185, US;
  V. B'eranger, Inria Paris-Rocquencourt, Rocquencourt, France;
  A. Patel, Rajiv Gandhi University, Rono-Hills, Doimukh, Arunachal
  Pradesh, India; H. Chan, Tsinghua University, 30 Shuangqing Rd,
  Haidian Qu, Beijing Shi, China; T. Yan, Eaton Innovation Center,
  Prague, Czech Republic; T. He, C. Huang, J. A. Stankovic University
  of Virginia, School of Engineering Charlottesville, VA 22903, USA;
  T. F. Abdelzaher, (Current address) NASA Ames Research Center,
  Moffett Field, California 94035.}

```

You can *suppress* printing authors' addresses by setting them to an empty string: `\authorsaddresses{}`. Please note that authors' addresses are mandatory for journal articles.

`\titlenote` While the command `\thanks` generates a note without a footnote mark, sometimes  
`\subtitlenote` the authors might need notes more tightly connected to the title, subtitle or author. The  
`\authornote` commands `\titlenote`, `\subtitlenote` and `\authornote` that follow the corresponding  
 commands (`\title`, `\subtitle` and `\author`) generate such notes. For example,

```

\title{This is a title}
\titlenote{This is a titlenote}
\author{A. U. Thor}
\authornote{This is an authornote}

```

Please never use a `\footnote` inside an `\author` or `\title` command since this confuses the metadata extraction software. (Actually these commands now produce errors.)

`\authornotemark` Sometimes one may need to have the same footnote connected to several authors. The command `\authornotemark[number]` adds just the footnote mark, for example,

```
\author{A. U. Thor}
\authornote{Both authors contributed equally to the paper}
...
\author{A. N. Other}
\authornotemark[1]
```

The correct numbering of these marks is the responsibility of the user.

`\acmVolume` The macros `\acmVolume`, `\acmNumber`, `\acmArticle`, `\acmYear` and `\acmMonth` are inserted by the editor and set the journal volume, issue, article number, year and month correspondingly. The arguments of all these commands, including `\acmMonth`, is numerical. For example,

```
\acmVolume
\acmNumber
\acmArticle
\acmYear
\acmMonth
\acmVolume{9}
\acmNumber{4}
\acmArticle{39}
\acmYear{2010}
\acmMonth{3}
```

Note that `\acmArticle` is used not only for journals but also for some conference proceedings.

`\acmArticleSeq` The articles in the same issue of a journal have a *sequence number*. It is used to vertically position the black blob on the first page of some formats. By default it is the same as the article number, but the command `\acmArticleSeq{n}` can be used to change it:

```
\acmArticle{39} % The sequence number will be 39 by default
\acmArticleSeq{5} % We redefine it to 5
```

Setting this number to zero suppresses the blob.

`\acmSubmissionID` If your paper got a Submission ID from the Conference Management System, put it here:

```
\acmSubmissionID{123-A56-BU3}
```

`\acmPrice` The macro `\acmPrice{price}` sets the price for the article, for example,

```
\acmPrice{25.00}
```

Note that you do not need to put the dollar sign here, just the amount. By default the price is \$15.00, unless the copyright is set to `usgov`, `rightsretained`, `iw3c2w3`, or `iw3c2w3g`, when it is suppressed. Note that to override the defaults you need to set the

	price <i>after</i> the <code>\setcopyright</code> command. Also, the command <code>\acmPrice{}</code> suppresses the printing of the price.
<code>\acmISBN</code>	<p>Book-like volumes have ISBN numbers attached to them. The macro <code>\acmISBN{&lt;ISBN&gt;}</code> sets it. Normally it is set by the typesetter, for example,</p> <pre>\acmISBN{978-1-4503-3916-2}</pre> <p>Setting it to the empty string, as <code>\acmISBN{}</code>, suppresses printing the ISBN.</p>
<code>\acmDOI</code>	<p>The macro <code>\acmDOI{&lt;DOI&gt;}</code> sets the DOI of the article, for example,</p> <pre>\acmDOI{10.1145/9999997.9999999}</pre> <p>It is normally set by the typesetter. Setting it to the empty string, as <code>\acmDOI{}</code>, suppresses the DOI.</p>
<code>\acmBadgeR</code> <code>\acmBadgeL</code>	<p>Some conference articles get special distinctions, for example, the artifact evaluation for PPOPP 2016 (see <a href="http://ctuning.org/ae/ppopp2016.html">http://ctuning.org/ae/ppopp2016.html</a>). These articles display special badges supplied by the conference organizers. This class provides commands to add these badges: <code>\acmBadgeR[&lt;url&gt;]{&lt;graphics&gt;}</code> and <code>\acmBadgeL[&lt;url&gt;]{&lt;graphics&gt;}</code>. The first command puts the badge to the right of the title, and the second one—to the left. The arguments have the following meaning: [<code>&lt;url&gt;</code>], if provided, sets the link to the badge authority in the screen version, while <code>{&lt;graphics&gt;}</code> sets the graphics file with the badge image. The file must be a cropped square, which is scaled to a standard size in the output. For example, if the badge image is <code>ae-logo.pdf</code>, the command is</p> <pre>\acmBadgeR[http://ctuning.org/ae/ppopp2016.html]{ae-logo}</pre>
<code>\startPage</code>	<p>The macro <code>\startPage{&lt;page&gt;}</code> sets the first page of the article in a journal or book. It is used by the typesetter.</p>
<code>\terms</code> <code>\keywords</code>	<p>The command <code>\keywords{&lt;keyword, keyword,...&gt;}</code> sets keywords for the article. They must be separated by commas, for example,</p> <pre>\keywords{wireless sensor networks, media access control, multi-channel, radio interference, time synchronization}</pre>
CCSXML <code>\ccsdesc</code>	<p>ACM publications are classified according to the ACM Computing Classification Scheme (CCS). CCS codes are used both in the typeset version of the publications <i>and</i> in the metadata in various databases. Therefore you need to provide both TeX commands and XML metadata with the paper.</p> <p>The tool at <a href="http://dl.acm.org/ccs.cfm">http://dl.acm.org/ccs.cfm</a> can be used to generate CCS codes. After you select the topics, click on “Generate CCS codes” to get results like the following:</p> <pre>\begin{CCSXML} &lt;ccs2012&gt; &lt;concept&gt; &lt;concept_id&gt;10010520.10010553.10010562&lt;/concept_id&gt; &lt;concept_desc&gt;Computer systems organization~Embedded systems&lt;/concept_desc&gt;</pre>

```

    <concept_significance>500</concept_significance>
  </concept>
  <concept>
    <concept_id>10010520.10010575.10010755</concept_id>
    <concept_desc>Computer systems organization~Redundancy</concept_desc>
    <concept_significance>300</concept_significance>
  </concept>
  <concept>
    <concept_id>10010520.10010553.10010554</concept_id>
    <concept_desc>Computer systems organization~Robotics</concept_desc>
    <concept_significance>100</concept_significance>
  </concept>
  <concept>
    <concept_id>10003033.10003083.10003095</concept_id>
    <concept_desc>Networks~Network reliability</concept_desc>
    <concept_significance>100</concept_significance>
  </concept>
</ccs2012>
\end{CCSXML}

\ccsdesc[500]{Computer systems organization~Embedded systems}
\ccsdesc[300]{Computer systems organization~Redundancy}
\ccsdesc{Computer systems organization~Robotics}
\ccsdesc[100]{Networks~Network reliability}

```

You just need to copy this code and paste it in your paper anywhere before `\maketitle`.

CCS Concepts and user-defined keywords are required for all articles over two pages in length, and are optional for one- and two-page articles (or abstracts).

`\setcopyright` There are several possibilities for the copyright of the papers published by the ACM: the authors may transfer the rights to the ACM, license them to the ACM, some or all authors might be employees of the US or Canadian governments, etc. Accordingly the command `\setcopyright{...}` is introduced. Its argument is the copyright status of the paper, for example, `\setcopyright{acmcopyright}`. The possible values for this command are listed in Table 3. This command must be placed in the preamble, before `\begin{document}`.

The ACM submission software should generate the right command for you to paste into your file.

`\copyrightyear` Each copyright statement must have the year of copyright. By default it is the same as `\acmYear`, but you can override this using the macro `\copyrightyear`, e.g.,

```

\acmYear{2016}
\copyrightyear{2015}

```

There is a special case for a personal copy that the authors may be allowed to generate for their use or a posting on a personal site (check the instructions for the specific journal or conference for the details). The document option `authorversion=true` produces

Table 3: Parameters for the `\setcopyright` command

Parameter	Meaning
<code>none</code>	The copyright and permission information is not typeset. (This is the option for some ACM conferences.)
<code>acmcopyright</code>	The authors transfer the copyright to the ACM (the “traditional” choice).
<code>acmlicensed</code>	The authors retain the copyright but license the publication rights to ACM.
<code>rightsretained</code>	The authors retain the copyright and publication rights to themselves or somebody else.
<code>usgov</code>	All the authors are employees of the US government.
<code>usgovmixed</code>	Some authors are employees of the US government.
<code>cagov</code>	All the authors are employees of the Canadian government.
<code>cagovmixed</code>	Some authors are employees of the Canadian government.
<code>licensedusgovmixed</code>	Some authors are employees of the US government, and the publication rights are licensed to ACM.
<code>licensedcagov</code>	All the authors are employees of the Canadian government, and the publication rights are licensed to ACM.
<code>licensedcagovmixed</code>	Some authors are employees of the Canadian government, and the publication rights are licensed to ACM.
<code>othergov</code>	Authors are employees of a government other than the US or Canada.
<code>licensedothergov</code>	Authors are employees of a government other than the US or Canada, and the publication rights are licensed to ACM.
<code>iw3c2w3</code>	Special statement for conferences organized by IW3C2.
<code>iw3c2w3g</code>	Special statement for conferences organized by IW3C2, when some authors are approved Google employees.

a special form of the copyright statement for this case. Note that you still need the `\setcopyright` command and (optionally) `\copyrightyear` command to tell TeX about the copyright owner and year. Also, you should be aware that due to the different sizes of the permission blocks for the printed version and authors' version, the page breaks might be different between them.

`abstract` The environment `abstract` must *precede* the `\maketitle` command. Again, this is different from the standard L<sup>A</sup>T<sub>E</sub>X. Putting `abstract` after `\maketitle` will trigger an error.

`teaserfigure` A special kind of figure is used for many two-column conference proceedings. This figure is placed just after the authors but before the main text. The environment `teaserfigure` is used for these figures. This environment must be used *before* `\maketitle`, for example,

```
\begin{teaserfigure}
  \includegraphics[width=\textwidth]{sampleteaser}
  \caption{This is a teaser}
  \label{fig:teaser}
\end{teaserfigure}
```

`\settopmatter` Some information in the top matter is printed for certain journals or proceedings and suppressed for others. You can override these defaults using the command `\settopmatter{<settings>}`. The settings and their meanings are listed in Table 4. For example,

```
\settopmatter{printacmref=false, printccs=true, printfolios=true}
```

The parameter `authorsperrow` requires some explanation. In conference proceedings authors' information is typeset in boxes, several boxes per row (see `sample-sigconf.pdf`, `sample-sigplan.pdf`, etc.). The number of boxes per row is determined automatically. If you want to override this, you can do it using this parameter, for example,

```
\settopmatter{authorsperrow=4}
```

However, in most cases you should *not* do this and should use the default settings. Setting `authorsperrow` to 0 will revert it to the default settings.

The parameter `printacmref` specifies whether to print the ACM bibliographic entry (default), or not. Note that this entry is required for all articles over one page in length, and is optional for one-page articles (abstracts).

`\received` The command `\received[<stage>]{<date>}` sets the history of the publication. The [`<stage>`] argument is optional; the default is Received for the first date and revised for the subsequent ones. For example,

```
\received{February 2007}
\received[revised]{March 2009}
\received[accepted]{June 2009}
```

Table 4: Settings for the `\settopmatter` command

Parameter	Values	Meaning
<code>printccs</code>	true/false	Whether to print CCS categories
<code>printacmref</code>	true/false	Whether to print the ACM bibliographic entry
<code>printfolios</code>	true/false	Whether to print page numbers (folios)
<code>authorsperrow</code>	numeric	Number of authors per row for the title page in conference proceedings formats

`\maketitle` The macro `\maketitle` must be the last command in the top-matter group. That is it must follow the commands defined in this section.

`\shortauthors` *After* the command `\maketitle`, the macro `\shortauthors` stores the names of the authors for the running head. You can redefine it if the list of author’s name is too long, e.g.,

```
\maketitle
\renewcommand{\shortauthors}{Zhou et al.}
```

## 2.4 Algorithms

There are now several good packages for typesetting algorithms [3, 4, 5], and the authors are free to choose their favorite one.

## 2.5 Figures and tables

The new ACM styles use the standard L<sup>A</sup>T<sub>E</sub>X interface for figures and tables. There are some important items to be aware of, however.

1. The captions for figures must be entered *after* the figure bodies and for tables *before* the table bodies.
2. The ACM uses the standard types for figures and tables and adds several new ones. In total there are the following types:

**figure, table:** a standard figure or table taking a full text width in one-column formats and one column width in two-column formats.

**figure\*, table\*** in two-column formats, a special figure or table taking a full text width.

**teaserfigure:** a special figure before `\maketitle`.

3. Accordingly, when scaling images, one should use the following sizes:
  - (a) For `teaserfigure`, `figure` in one-column mode or `figure*` in two-column mode, use `\textwidth`. In one-column mode, you can also use `\columnwidth`, which coincides with `\textwidth` in this case.

(b) For figure in two-column mode, use `\columnwidth`.

It is strongly recommended to use the package `booktabs` [6] and follow its main principles of typography with respect to tables:

1. Never, ever use vertical rules.
2. Never use double rules.

It is also a good idea not to overuse horizontal rules.

For table *footnotes* you have several options described in the TeX FAQ [1]. The simplest one is to use a `\minipage` environment:

```
\begin{table}
\caption{Simulation Configuration}
\label{tab:conf}
\begin{minipage}{\columnwidth}
\begin{center}
\begin{tabular}{ll}
\toprule
TERRAIN\footnote{This is a table footnote. This is a
table footnote. This is a table footnote.} &
(200\,m$\times$200\,m) Square\\
Node Number & 289\\
Node Placement & Uniform\\
Application & Many-to-Many/Gossip CBR Streams\\
Payload Size & 32 bytes\\
Routing Layer & GF\\
MAC Layer & CSMA/MMSN\\
Radio Layer & RADIO-ACCNOISE\\
Radio Bandwidth & 250Kbps\\
Radio Range & 20m--45m\\
\bottomrule
\end{tabular}
\end{center}
\bigskip
\footnotesize\emph{Source:} This is a table
sourcenote. This is a table sourcenote. This is a table
sourcenote.

\emph{Note:} This is a table footnote.
\end{minipage}
\end{table}
```

Tables and figures are by default centered. However, in some cases (for example, when you use several subimages per figure) you may need to override this. A good way to do so is to put the contents into a `\minipage` of the width `\columnwidth`.

## 2.6 Descriptions of images

`\Description` Some readers of ACM publications might be visually challenged. These readers might use a voice-over software to read aloud the papers. It is important to provide them a description of each image used in the paper.

The command `\Description[<short description>]{<long description>}` should be placed inside every `figure`, `teaserfigure` or `marginfigure` environment to provide a description of the image(s) used in the figure. Unlike `\caption`, which is used alongside the image, `\Description` is intended to be used instead of the image, for example,

```
\begin{figure}
  \centering
  \includegraphics{voltage}
  \Description{A bell-like histogram centered at  $0.5\text{V}$  with most
  measurements between  $0.2\text{V}$  and  $0.8\text{V}$ }
  \caption{Histogram of the measurements of voltage}
  \label{fig:voltage}
\end{figure}
```

At present the lack of descriptions generates a warning at compilation.

## 2.7 Theorems

The ACM classes define two theorem styles and several pre-defined theorem environments:

**acmplain:** this is the style used for theorem, conjecture, proposition, lemma and corollary, and

**acmdefinition:** this is the style used for example and definition.

These environments are defined by default. In the unusual circumstance that a user does not wish to have these environments defined, the option `acmthm=false` in the preamble will suppress them.

## 2.8 Online-only and offline-only material

`printonly` Some supplementary material in ACM publications is put online but not in the printed  
`screenonly` version. The text inside the environment `screenonly` will be typeset only when the option `screen` (see Section 2.2) is set to true. Conversely, the text inside the environment `printonly` is typeset only when this option is set to false. For example,

```
\section{Supplementary materials}

\begin{printonly}
  Supplementary materials are available in the online version of this paper.
\end{printonly}

\begin{screenonly}
```

```
(The actual supplementary materials.)
\end{screenonly}
```

We use the `comment` package for typesetting this code, so `\begin` and `\end` should start on a line of their own with no leading or trailing spaces.

## 2.9 Note about anonymous mode

`anonsuppress` When the option `anonymous` is selected,  $\TeX$  suppresses author information (including the number of authors) for a blind review. However, sometimes the information identifying the authors may be present in the body of the paper. For example,

```
\begin{anonsuppress}
  This is the continuation of the previous work by the author
  \cite{prev1, prev2}.
\end{anonsuppress}
```

As for the `printonly` and `screenonly` environments, `\begin{anonsuppress}` and `\end{anonsuppress}` should start on a line of their own with no leading or trailing spaces.

## 2.10 Acknowledgments

The traditional “Acknowledgments” section is conventionally used to thank persons and granting agencies for their help and support. However, there are several important considerations about this section.

First, in anonymous mode this section must be omitted: it gives too much information to reviewers. Second, data about grants is extracted and stored separately by the postprocessing software. ACM classes provide facilities for both these tasks.

`acks` The environment `acks` starts an unnumbered section “Acknowledgments” unless the anonymous mode is chosen. Put all thanks inside this environment.

As for the `printonly` and `screenonly` environments, `\begin{acks}` and `\end{acks}` should start on a line of their own with no leading or trailing spaces.

`\grantsponsor`  
`\grantnum` All financial support *must* be listed using the commands `\grantsponsor` and `\grantnum`. These commands tell the postprocessing software about the granting organization and grant. The format of these commands is the following:

```
\grantsponsor{\sponsorID}{\name}{\url}
\grantnum[\url]{\sponsorID}{\number}.
```

Here `{\sponsorID}` is the unique ID used to match grants to sponsors, `{\name}` is the name of the sponsor, `{\url}` is its URL, and `{\number}` is the grant number. The `{\sponsorID}` of the `\grantnum` command must correspond to the `{\sponsorID}` of a `\grantsponsor` command. Some awards have their own web pages, which you can include using the optional argument of the `\grantnum` command.

At present  $\langle sponsorID \rangle$  is chosen by the authors and can be an arbitrary key in the same way the label of a `\cite` is arbitrarily chosen. There might be a change to this policy if the ACM decides to create a global database of sponsoring organizations.

Example:

```
\begin{acks}
  The authors would like to thank Dr. Yuhua Li for providing the
  matlab code of the \textit{BEPS} method.

  The authors would also like to thank the anonymous referees for
  their valuable comments and helpful suggestions. This work is
  supported by the \grantsponsor{GS501100001809}{National Natural
  Science Foundation of
  China}{https://doi.org/10.13039/501100001809} under Grant
  No.: \grantnum{GS501100001809}{61273304}
  and \grantnum[http://www.nnsf.cn/youngscientists]{GS501100001809}{Young
  Scientists' Support Program}.
\end{acks}
```

## 2.11 Bibliography

The ACM uses the `natbib` package for formatting references and the Bib $\TeX$  style file `ACM-Reference-Format.bst` for Bib $\TeX$  processing. You can disable loading of `natbib` using the option `natbib=false` in `\documentclass`. However, it is not recommended, as well as the use of Bib $\TeX$  styles other than `ACM-Reference-Format.bst`, and may delay the processing of the manuscript.

`\citestyle` If you use `natbib`, you can select one of two predefined citation styles using the command `\citestyle`: the author-year format `acmauthoryear` or the numeric format `acmnumeric`. For example,

```
\citestyle{acmauthoryear}
```

Note that numeric citations are the default mode for most formats.

`\setcitestyle` You can further customize `natbib` using the `\setcitestyle` command, for example,

```
\setcitestyle{numbers,sort&compress}
```

One of the more common versions is

```
\setcitestyle{nosort}
```

It is useful if you do not like the way `natbib` sorts citation lists.

If you use `natbib`, then commands like `\citep` and `\citeauthor` are automatically supported. The command `\shortcite` is the same as `\cite` in numerical mode and cites the year in author-date mode.

Note that before version 1.48 the command `\citeyear` put the year in parentheses. In version 1.48 and later it produces just the year; the command `\citeyearpar` can be used to emulate its old behavior.

There are several customized BibTeX entry types and fields in the ACM style file `ACM-Reference-Format.bst` that you may want to be aware of.

The style supports the fields `doi` and `url`, for example,

```
doi = "10.1145/1188913.1188915",
url = "http://ccrma.stanford.edu/~jos/bayes/bayes.pdf",
```

The style supports the arXiv-recommended fields `eprint` and (optionally) `primaryclass`, for example,

```
eprint = "960935712",
primaryclass = "cs",
```

See the examples at <https://arxiv.org/help/hypertex/bibstyles>.

There are several special entry types. Types `online` and `game` are used for Web pages and games, for example,

```
@online{Thornburg01,
  author = "Harry Thornburg",
  year = "2001",
  title = "Introduction to Bayesian Statistics",
  url = "http://ccrma.stanford.edu/~jos/bayes/bayes.html",
  month = mar,
  lastaccessed = "March 2, 2005",
}
```

Entry types `artifactsoftware`, `artifactdataset` (with synonyms `software` and `dataset`) can be used to cite software artifacts and datasets, for example,

```
@ArtifactSoftware{R,
  title = {R: A Language and Environment for Statistical Computing},
  author = {{R Core Team}},
  organization = {R Foundation for Statistical Computing},
  address = {Vienna, Austria},
  year = {2019},
  url = {https://www.R-project.org/},
}
@ArtifactDataset{UMassCitations,
  author = {Sam Anzaroot and Andrew McCallum},
  title = {{UMass} Citation Field Extraction Dataset},
  year = 2013,
  url =
    {http://www.iesl.cs.umass.edu/data/data-umasscitationfield},
  lastaccessed = {May 27, 2019}
}
```

For these entry types you can use the `lastaccessed` field to add the access date for the URL.

There are two ways to enter video or audio sources in the bibliography corresponding to two different possibilities. For standalone sources available online, you can use an online entry and set its `howpublished` field. For example,

```
@online{Obama08,
  author =      "Barack Obama",
  year   =      "2008",
  title  =      "A more perfect union",
  howpublished = "Video",
  day    =      "5",
  url    =      "http://video.google.com/videoplay?docid=6528042696351994555",
  month  =      mar,
  lastaccessed = "March 21, 2008",
}
```

For sources available as attachments to conference proceedings and similar documents, you can use the usual `inproceedings` entry type and set its `howpublished` field:

```
@inproceedings{Novak03,
  author =      "Dave Novak",
  title  =      "Solder man",
  booktitle =   "ACM SIGGRAPH 2003 Video Review on Animation theater Program",
  year   =      "2003",
  publisher =   "ACM Press",
  address =     "New York, NY",
  pages  =      "4",
  month  =      "March 21, 2008",
  doi    =      "10.9999/woot07-S422",
  howpublished = "Video",
}
```

Sometimes you need to cite a complete issue of a journal. The periodical entry type is intended for this:

```
@periodical{JCohen96,
  key =        "Cohen",
  editor =     "Jacques Cohen",
  title =     "Special issue: Digital Libraries",
  journal =   "Communications of the {ACM}",
  volume =    "39",
  number =    "11",
  month =     nov,
  year =      "1996",
}
```

If you do not know the year of publication, the style will add “[n. d.]” (for “no date”) to the entry.

If you do not know the author (this is often the case for online entries), use the key field to add a key for sorting and citations, for example,

```
@online{TUGInstmem,
  key =      {TUG},
  year =     2017,
  title =    "Institutional members of the {\TeX} Users Group",
  url =      "http://wwtug.org/instmem.html",
  lastaccessed = "May 27, 2017",
}
```

A note about sorting. The current ACM bibliography styles always sort the entries according to authors names and publication year. There is a controversy about sorting names with “von” or “van” part: should Ludwig van Beethoven be sorted under “V” or under “B”? The American practice is to use “van” in sorting, i.e. to file van Beethoven under “V”. However, some authorities recommend to sort Dutch persons according to their last names (see e.g. [https://www.ifla.org/files/assets/cataloguing/pubs/names-of-persons\\_1996.pdf](https://www.ifla.org/files/assets/cataloguing/pubs/names-of-persons_1996.pdf)). While I do not want to take a part in this dispute, I would like to point to the old “noopsort” trick by Oren Patashnik. Add to the .bib file the line

```
@PREAMBLE{"\providecommand{\noopsort}[1]{}"}
```

and then encode the author as

```
author = {Ludwig {\noopsort{Beethoven}}van Beethoven},
```

This will make the author to be sorted as “Beethoven” rather than “van Beethoven”.

The current bst style defines a number of macros for common journal names. In particular, all journals listed in Table 5 are included, so you can use strings like `journal = taccess` for *ACM Transactions on Accessible Computing*.

## 2.12 Colors

While printed ACM publications are usually black and white, screen mode allows the use of colors. The ACM classes pre-define several colors according to [7]: `ACMBlue`, `ACMYellow`, `ACMOrange`, `ACMRed`, `ACMLightBlue`, `ACMGreen`, `ACMPurple` and `ACMDarkBlue`. You can use them in color assignments.

The ACM provides the following recommendation on color use.

The most accessible approach would be to ensure that your article is still readable when printed in greyscale. The most notable reasons for this are:

1. The most common type of inherited Color Vision Deficiency (CVD) is red-green (in which similar-brightness colors that differ only in their amounts of red or green are often confused), and it affects up to 8% of males and 0.5% of females of Northern European descent.

2. The most common type of acquired Color Vision Deficiency (CVD) is blue-yellow (including mild cases for many older adults).
3. Most printing is in black and white.
4. Situational impairments (e.g., bright sunlight shining on a mobile screen) tend to reduce the entire color gamut, reducing color discriminability.

**Note:** It is *not* safe to encode information using only variations in color (i.e., only differences in hue and/or saturation) as there is bound to be someone affected!

To ensure that you are using the most accessible colors, the ACM recommends that you choose sets of colors to help ensure suitable variations in when printed in greyscale by using either of the following tools:

1. ColourBrewer: <http://colorbrewer2.org/>
2. ACE: The Accessible Colour Evaluator: <http://daprlab.com/ace/> for designing WCAG 2.0 compliant palettes.

### 2.13 Other notable packages and typographic remarks

Several other packages are recommended for specialized tasks.

The package `subcaption` [8] is recommended for complex figures with several subplots or subfigures that require separate subcaptioning. The packages `nomencl` [9] and `glossaries` [10] can be used for the automatic creation of the lists of symbols and concepts used.

By default `acmart` prevents all widows and orphans (i.e., lonely lines at the beginning or end of the page) and hyphenation at the end of the page. This is done by the rather strict settings

```
\widowpenalty=10000
\clubpenalty=10000
\brokenpenalty=10000
```

However, this may lead to frustrating results when the authors must obey a page limit. Setting these penalties to smaller values may help if you absolutely need to.

Another problem might be the too strict line breaking rules. Again, a strategically placed `\sloppy` command or putting the problematic paragraph inside `sloppypar` environment might help—but beware, the results might be, well, sloppy.

Note that the uppercasing in section titles is done using the `textcase` package [11], so the command `\NoCaseChange` inside the title may help to prevent extraneous uppercasing.

### 2.14 Counting words

Some ACM conferences use word count limits for papers. The calculation of word number for a paper with math, tables and figures is not a trivial task. Currently the authoritative word count is done by translating the PDF to text and using `wc -w` on the output.

Authors can use the package `texcount` (used by Overleaf) to get an estimate of the word count. To facilitate this one adds to the beginning of the package metacomments

```
%TC:macro \cite [option:text,text]
%TC:macro \citep [option:text,text]
%TC:macro \citet [option:text,text]
%TC:envir table 0 1
%TC:envir table* 0 1
%TC:envir tabular [ignore] word
%TC:envir displaymath 0 word
%TC:envir math 0 word
%TC:envir comment 0 0
```

and uses `\begin{math}... \end{math}` instead of dollar signs for math. Note that the count is in any case approximate, and the final decision of editors is based on PDF count.

The script `texcount` provides a report of word count in the document.

## 2.15 Disabled or forbidden commands

The goal of `acmart` package is to provide a uniform look and feel for ACM publications. Accordingly, a number of commands is forbidden or disabled in `acmart`.

You may *not* put several authors or several e-mails into a `\author` or `\email` command. This may lead to errors or warning.

You cannot change `\baselinestretch` in your document: this produces an error.

You should not abuse the command `\vspace`: this command may disturb the typesetting of ACM papers.

You should not load `amssymb` package since the package `acmart` defines the corresponding symbols itself.

## 2.16 Notes for wizards

Sometimes you need to change the behavior of `acmart`. The usual way to do this is to redefine commands in the preamble. However, these definitions are executed *after* `acmart` is loaded and certain decisions are made. This presents a number of problems.

For example, one may want to use the `titletoc` package with `acmart`. This package should be loaded before `hyperref`. However, since `acmart` loads `hyperref` itself, the line `\usepackage{titletoc}` in the preamble will lead to grief (see <http://tex.stackexchange.com/questions/357265/using-titletoc-with-acm-acmart-style>).

Another example is passing options to a package. Suppose you want to use the `dvipsnames` option of the `xcolor` package. Normally you cannot do this because `acmart` loads this package itself without options.

The file `acmart-preload-hook.tex` can be used to solve these problems. If this file exists, it will be processed before any other package. You can use this file to load packages or pass options to them. For example, if you put in this file

```
\let\LoadClassOrig\LoadClass
\renewcommand\LoadClass[2][\LoadClassOrig[#1]{#2}%
```

```
\usepackage{titletoc}
```

then `titletoc` will be loaded before `hyperref`. If you put in this file

```
\PassOptionsToPackage{dvipsnames}{xcolor}
```

you will pass `dvipsnames` to `xcolor`.

**Important note.** This hook makes it too easy to create a manuscript that is not acceptable by the ACM. It is even easier to create a file that cannot be compiled. So please do not use it *unless you know what you are doing*. And if you use it, *do not ask for support*. If you decide to use this hook, you are on your own.

`\AtBeginMaketitle` Another hook is `\AtBeginMaketitle`. The commands in this hook are executed before `\maketitle`, for example,

```
\AtBeginMaketitle{\acmPrice{125.00}}
```

## 2.17 Currently supported publications

Table 5: ACM publications and arguments of the `\acmJournal` command

Abbreviation	Publication
CIE	ACM Computers in Entertainment
CSUR	ACM Computing Surveys
DLT	Distributed Ledger Technologies: Research and Practice
DGOV	Digital Government: Research and Practice
DTRAP	Digital Threats: Research and Practice
FAC	Formal Aspects of Computing
HEALTH	ACM Transactions on Computing for Healthcare
IMWUT	PACM on Interactive, Mobile, Wearable and Ubiquitous Technologies
JACM	Journal of the ACM
JDIQ	ACM Journal of Data and Information Quality
JEA	ACM Journal of Experimental Algorithmics
JERIC	ACM Journal of Educational Resources in Computing
JETC	ACM Journal on Emerging Technologies in Computing Systems
JOCCH	ACM Journal on Computing and Cultural Heritage
PACMCGIT	Proceedings of the ACM on Computer Graphics and Interactive Techniques
PACMHCI	PACM on Human-Computer Interaction
PACMPL	PACM on Programming Languages
POMACS	PACM on Measurement and Analysis of Computing Systems
TAAS	ACM Transactions on Autonomous and Adaptive Systems
TACCESS	ACM Transactions on Accessible Computing
TACO	ACM Transactions on Architecture and Code Optimization

Table 5: ACM publications and arguments of the \acmJournal command (continued)

Abbreviation	Publication
TALG	ACM Transactions on Algorithms
TALLIP	ACM Transactions on Asian and Low-Resource Language Information Processing
TAP	ACM Transactions on Applied Perception
TCPS	ACM Transactions on Cyber-Physical Systems
TDS	ACM/IMS Transactions on Data Science
TEAC	ACM Transactions on Economics and Computation
TECS	ACM Transactions on Embedded Computing Systems
TELO	ACM Transactions on Evolutionary Learning
THRI	ACM Transactions on Human-Robot Interaction
TIIS	ACM Transactions on Interactive Intelligent Systems
TIOT	ACM Transactions on Internet of Things
TISSEC	ACM Transactions on Information and System Security
TIST	ACM Transactions on Intelligent Systems and Technology
TKDD	ACM Transactions on Knowledge Discovery from Data
TMIS	ACM Transactions on Management Information Systems
TOCE	ACM Transactions on Computing Education
TOCHI	ACM Transactions on Computer-Human Interaction
TOCL	ACM Transactions on Computational Logic
TOCS	ACM Transactions on Computer Systems
TOCT	ACM Transactions on Computation Theory
TODAES	ACM Transactions on Design Automation of Electronic Systems
TODS	ACM Transactions on Database Systems
TOG	ACM Transactions on Graphics
TOIS	ACM Transactions on Information Systems
TOIT	ACM Transactions on Internet Technology
TOMACS	ACM Transactions on Modeling and Computer Simulation
TOMM	ACM Transactions on Multimedia Computing, Communications and Applications
TOMPECS	ACM Transactions on Modeling and Performance Evaluation of Computing Systems
TOMS	ACM Transactions on Mathematical Software
TOPC	ACM Transactions on Parallel Computing
TOPLAS	ACM Transactions on Programming Languages and Systems
TOPS	ACM Transactions on Privacy and Security
TOS	ACM Transactions on Storage
TOSEM	ACM Transactions on Software Engineering and Methodology
TOSN	ACM Transactions on Sensor Networks
TQC	ACM Transactions on Quantum Computing
TRETS	ACM Transactions on Reconfigurable Technology and Systems
TSAS	ACM Transactions on Spatial Algorithms and Systems
TSC	ACM Transactions on Social Computing

Table 5: ACM publications and arguments of the `\acmJournal` command (continued)

Abbreviation	Publication
TSLP	ACM Transactions on Speech and Language Processing
TWEB	ACM Transactions on the Web

Besides the publications listed in Table 5, there is a special “publication” type FACMP, a forthcoming ACM publication, reserved for new journals which are not assigned an ISSN yet.

## 2.18 A note about `sigchi-a` format

Starting in Spring 2020 ACM retired SIGCHI Extended Abstract format (`sigchi-a`). ACM will not, under any circumstances, accept documents in this format for publication and will not offer technical support to the authors who use this template.

You may use this format in the `nonacm` mode only, as in

```
\documentclass[sigchi-a, nonacm]{acmart}
```

sidebar  
marginfigure  
margintable

This format has large margin uses for special figures and tables. This package provides three environments for this with optional captions:

**sidebar:** textual information in the margin,

**marginfigure:** a figure in the margin,

**margintable:** a table in the margin.

The environments `figure` and `table` produce figures and tables with the width of the text column. The environments `figure*` and `table*` produce “wide” figures and tables, which take a large part of the margin.

The horizontal sizes of figures are:

1. `figure`: `\columnwidth`,
2. `marginfigure`: `\marginparwidth`,
3. `figure*`: `\fulltextwidth`.

## 3 Implementation

### 3.1 Identification

We start with a declaration of who we are. Most .dtx files put driver code in a separate .drv driver file. We roll this code into the main file and use the pseudo-guard <gobble> for it.

```
1 <class>\NeedsTeXFormat{LaTeX2e}
2 <*gobble>
3 \ProvidesFile{acmart.dtx}
4 </gobble>
5 <class>\ProvidesClass{acmart}
6 [2021/09/24 v1.80 Typesetting articles for the Association for Computing Machinery]
```

And the driver code:

```
7 <*gobble>
8 \documentclass{ltxdoc}
9 \usepackage{array,booktabs,amsmath,graphicx,fancyvrb,tabularx, longtable}
10 \usepackage[tt=false, type1=true]{libertine}
11 \usepackage[varqu]{zi4}
12 \usepackage[libertine]{newtxmath}
13 \usepackage[tableposition=top]{caption}
14 \usepackage{hypdoc}
15 \PageIndex
16 \CodelineIndex
17 \RecordChanges
18 \EnableCrossrefs
19 \begin{document}
20   \DocInput{acmart.dtx}
21 \end{document}
22 </gobble>
23 <*class>
24 \def\@classname{acmart}
```

### 3.2 Preload hook

We preload acmart-preload-hook:

```
25 \InputIfFileExists{acmart-preload-hook.tex}{%
26   \ClassWarning{\@classname}{%
27     I am loading acmart-preload-hook.tex. You are fully responsible
28     for any problems from now on.}}{}
```

### 3.3 Options

We need xkeyval since some of our options may have values:

```
29 \RequirePackage{xkeyval}
```

We use xstring to check whether user input is valid

```
30 \RequirePackage{xstring}
```

We need iftex to check the engine

```
31 \RequirePackage{iftex}
```

format The possible formats

```
32 \define@choicekey*+{acmart.cls}{format}[\ACM@format\ACM@format@nr]{%
33 manuscript, acmsmall, acmlarge, acmtog, sigconf, siggraph,
34 sigplan, sigchi, sigchi-a}[manuscript]{}{%
35 \ClassError{\@classname}{The option format must be manuscript,
36 acmsmall, acmlarge, acmtog, sigconf, siggraph,
37 sigplan, sigchi or sigchi-a}}
38 \def\@DeclareACMFormat#1{\DeclareOptionX{#1}{\setkeys{acmart.cls}{format=#1}}}
39 \@DeclareACMFormat{manuscript}
40 \@DeclareACMFormat{acmsmall}
41 \@DeclareACMFormat{acmlarge}
42 \@DeclareACMFormat{acmtog}
43 \@DeclareACMFormat{sigconf}
44 \@DeclareACMFormat{siggraph}
45 \@DeclareACMFormat{sigplan}
46 \@DeclareACMFormat{sigchi}
47 \@DeclareACMFormat{sigchi-a}
48 \ExecuteOptionsX{format}
```

\if@ACM@screen Whether we use screen mode

```
49 \define@boolkey+{acmart.cls}[@ACM@]{screen}[true]{%
50 \if@ACM@screen
51 \PackageInfo{\@classname}{Using screen mode}%
52 \else
53 \PackageInfo{\@classname}{Not using screen mode}%
54 \fi}{\PackageError{\@classname}{The option screen can be either true or
55 false}}
56 \ExecuteOptionsX{screen=false}
```

\if@ACM@urlbreakonhyphens

```
57 \define@boolkey+{acmart.cls}[@ACM@]{urlbreakonhyphens}[true]{%
58 \if@ACM@urlbreakonhyphens
59 \PackageInfo{\@classname}{Using breaking urls on hyphens}%
60 \else
61 \PackageInfo{\@classname}{Not breaking urls on hyphens}%
62 \fi}{\PackageError{\@classname}{The option urlbreakonhyphens can be either true or
63 false}}
64 \ExecuteOptionsX{urlbreakonhyphens=true}
```

\if@ACM@acmthm Whether we define theorem-like environments.

```
65 \define@boolkey+{acmart.cls}[@ACM@]{acmthm}[true]{%
66 \if@ACM@acmthm
67 \PackageInfo{\@classname}{Requiring acmthm}%
68 \else
69 \PackageInfo{\@classname}{Suppressing acmthm}%
70 \fi}{\PackageError{\@classname}{The option acmthm can be either true or
```

```

71     false}}
72 \ExecuteOptionsX{acmthm=true}

\if@ACM@review Whether we use review mode
73 \define@boolkey+{acmart.cls}[@ACM@]{review}[true]{%
74   \if@ACM@review
75     \PackageInfo{\@classname}{Using review mode}%
76     \AtBeginDocument{\@ACM@printfoliostrue}%
77   \else
78     \PackageInfo{\@classname}{Not using review mode}%
79   \fi}{\PackageError{\@classname}{The option review can be either true or
80     false}}
81 \ExecuteOptionsX{review=false}

\if@ACM@authorversion Whether we use author's-version mode
82 \define@boolkey+{acmart.cls}[@ACM@]{authorversion}[true]{%
83   \if@ACM@authorversion
84     \PackageInfo{\@classname}{Using authorversion mode}%
85   \else
86     \PackageInfo{\@classname}{Not using authorversion mode}%
87   \fi}{\PackageError{\@classname}{The option authorversion can be either true or
88     false}}
89 \ExecuteOptionsX{authorversion=false}

\if@ACM@nonacm Special option for non-ACM publications using the ACM typesetting options.
90 \define@boolkey+{acmart.cls}[@ACM@]{nonacm}[true]{%
91   \if@ACM@nonacm
92     \PackageInfo{\@classname}{Using nonacm mode}%
93     \AtBeginDocument{\@ACM@printacmreffalse}%
94     % in 'nonacm' mode we disable the "ACM Reference Format"
95     % printing by default, but this can be re-enabled by the
96     % user using \settopmatter{printacmref=true}
97   \else
98     \PackageInfo{\@classname}{Not using nonacm mode}%
99   \fi}{\PackageError{\@classname}{The option nonacm can be either true or
100     false}}
101 \ExecuteOptionsX{nonacm=false}

\if@ACM@balance Whether to balance the last page
102 \define@boolkey+{acmart.cls}[@ACM@]{balance}[true]{}{%
103   \PackageError{\@classname}{The option balance can be either true or
104     false}}
105 \ExecuteOptionsX{balance}

\if@ACM@pbalance Whether to balance the last page
106 \define@boolkey+{acmart.cls}[@ACM@]{pbalance}[true]{}{%
107   \PackageError{\@classname}{The option pbalance can be either true or
108     false}}
109 \ExecuteOptionsX{pbalance=false}

```

`\if@ACM@natbib@override` This macro is no longer used.

`\if@ACM@natbib` Whether we use natbib mode

```

110 \define@boolkey+{acmart.cls}[@ACM@]{natbib}[true]{%
111   \if@ACM@natbib
112     \PackageInfo{\@classname}{Explicitly selecting natbib mode}%
113   \else
114     \PackageInfo{\@classname}{Explicitly deselecting natbib mode}%
115   \fi}{\PackageError{\@classname}{The option natbib can be either true or
116     false}}
117 \ExecuteOptionsX{natbib=true}

```

`\if@ACM@anonymous` Whether we use anonymous mode

```

118 \define@boolkey+{acmart.cls}[@ACM@]{anonymous}[true]{%
119   \if@ACM@anonymous
120     \PackageInfo{\@classname}{Using anonymous mode}%
121   \else
122     \PackageInfo{\@classname}{Not using anonymous mode}%
123   \fi}{\PackageError{\@classname}{The option anonymous can be either true or
124     false}}
125 \ExecuteOptionsX{anonymous=false}

```

`\if@ACM@timestamp` Whether we use timestamp mode

```

126 \define@boolkey+{acmart.cls}[@ACM@]{timestamp}[true]{%
127   \if@ACM@timestamp
128     \PackageInfo{\@classname}{Using timestamp mode}%
129   \else
130     \PackageInfo{\@classname}{Not using timestamp mode}%
131   \fi}{\PackageError{\@classname}{The option timestamp can be either true or
132     false}}
133 \ExecuteOptionsX{timestamp=false}

```

`\if@ACM@authordraft` Whether we use author-draft mode

```

134 \define@boolkey+{acmart.cls}[@ACM@]{authordraft}[true]{%
135   \if@ACM@authordraft
136     \PackageInfo{\@classname}{Using authordraft mode}%
137     \@ACM@timestamptrue
138     \@ACM@reviewtrue
139   \else
140     \PackageInfo{\@classname}{Not using authordraft mode}%
141   \fi}{\PackageError{\@classname}{The option authordraft can be either true or
142     false}}
143 \ExecuteOptionsX{authordraft=false}

```

`\ACM@fontsize` The font size to pass to the base class

```

144 \def\ACM@fontsize{ }
145 \DeclareOptionX{9pt}{\edef\ACM@fontsize{\CurrentOption}}
146 \DeclareOptionX{10pt}{\edef\ACM@fontsize{\CurrentOption}}
147 \DeclareOptionX{11pt}{\edef\ACM@fontsize{\CurrentOption}}
148 \DeclareOptionX{12pt}{\edef\ACM@fontsize{\CurrentOption}}

```

```

149 \DeclareOptionX{draft}{\PassOptionsToClass{\CurrentOption}{amsart}}
150 \DeclareOptionX*{*}{\PassOptionsToClass{\CurrentOption}{amsart}}
151 \ProcessOptionsX
152 \ClassInfo{\@classname}{Using format \ACM@format, number \ACM@format@nr}

```

### 3.4 Setting switches

```

\if@ACM@manuscript Whether we use manuscript mode
153 \newif\if@ACM@manuscript

\if@ACM@journal There are two kinds of publications: journals and books
154 \newif\if@ACM@journal

\if@ACM@journal@bibstrip Sometimes ACM wants a journal-like publication to have conference information in the
bibstrip and vice versa, so we have an additional switch.
155 \newif\if@ACM@journal@bibstrip

\if@ACM@sigchiamode The formatting of SIGCHI extended abstracts is quite unusual. We have a special switch
for them.
156 \newif\if@ACM@sigchiamode

```

#### Setting up switches

```

157 \ifnum\ACM@format@nr=5\relax % siggraph
158 \ClassWarning{\@classname}{%
159 The format siggraph is now obsolete.\MessageBreak
160 I am switching to sigconf.}
161 \setkeys{acmart.cls}{format=sigconf}
162 \fi

163 \ifnum\ACM@format@nr=7\relax % sigchi
164 \ClassWarning{\@classname}{%
165 The format sigchi is now obsolete.\MessageBreak
166 I am switching to sigconf.}
167 \setkeys{acmart.cls}{format=sigconf}
168 \fi

169 \ifnum\ACM@format@nr=8\relax % sigchi
170 \ClassWarning{\@classname}{%
171 ACM SIGCHI has retired the SIGCHI-A template\MessageBreak
172 effective immediately. ACM is keeping this template\MessageBreak
173 option available to authors who are working on legacy\MessageBreak
174 documents only. ACM will not, under any circumstances,\MessageBreak
175 accept documents in this format for publication and\MessageBreak
176 will not offer technical support to the authors who use\MessageBreak
177 this template.\MessageBreak
178 ACM SIGCHI is directing Conference leaders and\MessageBreak
179 authors to publish their articles using the SIGCONF\MessageBreak
180 template call.}
181 \fi

182 \ifnum\ACM@format@nr=0\relax
183 \@ACM@manuscripttrue

```

```

184 \else
185   \@ACM@manuscriptfalse
186 \fi
187 \@ACM@sigchiamodeffalse
188 \ifcase\ACM@format@nr
189 \relax % manuscript
190   \@ACM@journaltrue
191 \or % acsmall
192   \@ACM@journaltrue
193 \or % acmlarge
194   \@ACM@journaltrue
195 \or % acmtog
196   \@ACM@journaltrue
197 \or % sigconf
198   \@ACM@journalfalse
199 \or % siggraph
200   \@ACM@journalfalse
201 \or % sigplan
202   \@ACM@journalfalse
203 \or % sigchi
204   \@ACM@journalfalse
205 \or % sigchi-a
206   \@ACM@journalfalse
207   \@ACM@sigchiamodetrue
208 \fi
209 \if@ACM@journal
210   \@ACM@journal@bibstriptrue
211 \else
212   \@ACM@journal@bibstripfalse
213 \fi

```

### 3.5 Loading the base class and package

At this point we either have \ACM@fontsize or use defaults

```

214 \ifx\ACM@fontsize\@empty
215   \ifcase\ACM@format@nr
216   \relax % manuscript
217     \def\ACM@fontsize{9pt}%
218   \or % acsmall
219     \def\ACM@fontsize{10pt}%
220   \or % acmlarge
221     \def\ACM@fontsize{10pt}%
222   \or % acmtog
223     \def\ACM@fontsize{9pt}%
224   \or % sigconf
225     \def\ACM@fontsize{9pt}%
226   \or % siggraph
227     \def\ACM@fontsize{9pt}%
228   \or % sigplan

```

```

229 \def\ACM@fontsize{10pt}%
230 \or % sigchi
231 \def\ACM@fontsize{9pt}%
232 \or % sigchi-a
233 \def\ACM@fontsize{10pt}%
234 \fi
235 \fi
236 \ClassInfo{\@classname}{Using fontsize \ACM@fontsize}
237 \LoadClass[\ACM@fontsize, reqno]{amsart}
238 \RequirePackage{microtype}
    We need etoolbox for delayed code
239 \RequirePackage{etoolbox}
    Booktabs is now the default
240 \RequirePackage{booktabs}
    We need totpages to calculate the number of pages and refcount to use that number
241 \RequirePackage{refcount}
242 \RequirePackage{totpages}
    The \collect@body macro in amsmath is defined using \def. We load environ to
    access the \long version of this command
243 \RequirePackage{environ}
    We use setspace for double spacing
244 \if@ACM@manuscript
245 \RequirePackage{setspace}
246 \onehalfspacing
247 \fi
    We need textcase for better upcasing
248 \RequirePackage{textcase}

```

### 3.6 Citations

We patch `\setcitestyle` to allow, for example, `\setcitestyle{sort}` and `\setcitestyle{nosort}`. We patch `\citestyle` to warn about undefined citation styles.

```

249 \if@ACM@natbib
250 \RequirePackage{natbib}
251 \renewcommand{\bibsection}{%
252 \section*{\refname}%
253 \phantomsection\addcontentsline{toc}{section}{\refname}%
254 }
255 \renewcommand{\bibfont}{\bibliofont}
256 \renewcommand\setcitestyle[1]{
257 \@for\@tempa:=#1\do
258 {\def\@tempb{round}\ifx\@tempa\@tempb
259 \renewcommand\NAT@open{()\renewcommand\NAT@close{}}\fi
260 \def\@tempb{square}\ifx\@tempa\@tempb

```

```

261 \renewcommand\NAT@open{[]\renewcommand\NAT@close{]}\fi
262 \def\@tempb{angle}\ifx\@tempa\@tempb
263 \renewcommand\NAT@open{<}\renewcommand\NAT@close{>}\fi
264 \def\@tempb{curly}\ifx\@tempa\@tempb
265 \renewcommand\NAT@open{\{\}\renewcommand\NAT@close{\}}\fi
266 \def\@tempb{semicolon}\ifx\@tempa\@tempb
267 \renewcommand\NAT@sep{;}\fi
268 \def\@tempb{colon}\ifx\@tempa\@tempb
269 \renewcommand\NAT@sep{:}\fi
270 \def\@tempb{comma}\ifx\@tempa\@tempb
271 \renewcommand\NAT@sep{,}\fi
272 \def\@tempb{authoryear}\ifx\@tempa\@tempb
273 \NAT@numbersfalse\fi
274 \def\@tempb{numbers}\ifx\@tempa\@tempb
275 \NAT@numberstrue\NAT@superfalse\fi
276 \def\@tempb{super}\ifx\@tempa\@tempb
277 \NAT@numberstrue\NAT@supertrue\fi
278 \def\@tempb{nobibstyle}\ifx\@tempa\@tempb
279 \let\bibstyle=\@gobble\fi
280 \def\@tempb{bibstyle}\ifx\@tempa\@tempb
281 \let\bibstyle=\@citestyle\fi
282 \def\@tempb{sort}\ifx\@tempa\@tempb
283 \def\NAT@sort{\@ne}\fi
284 \def\@tempb{nosort}\ifx\@tempa\@tempb
285 \def\NAT@sort{\z@}\fi
286 \def\@tempb{compress}\ifx\@tempa\@tempb
287 \def\NAT@cmprs{\@ne}\fi
288 \def\@tempb{nocompress}\ifx\@tempa\@tempb
289 \def\NAT@cmprs{\z@}\fi
290 \def\@tempb{sort&compress}\ifx\@tempa\@tempb
291 \def\NAT@sort{\@ne}\def\NAT@cmprs{\@ne}\fi
292 \def\@tempb{mcite}\ifx\@tempa\@tempb
293 \let\NAT@merge\@ne\fi
294 \def\@tempb{merge}\ifx\@tempa\@tempb
295 \@ifnum{\NAT@merge<\tw@}{\let\NAT@merge\tw@}\fi
296 \def\@tempb{elide}\ifx\@tempa\@tempb
297 \@ifnum{\NAT@merge<\thr@}{\let\NAT@merge\thr@}\fi
298 \def\@tempb{longnamesfirst}\ifx\@tempa\@tempb
299 \NAT@longnamestrue\fi
300 \def\@tempb{nonamebreak}\ifx\@tempa\@tempb
301 \def\NAT@nmfmt#1{\mbox{\NAT@up#1}}\fi
302 \expandafter\NAT@find@eq\@tempa=\relax\@nil
303 \if\@tempc\relax\else
304 \expandafter\NAT@rem@eq\@tempc
305 \def\@tempb{open}\ifx\@tempa\@tempb
306 \xdef\NAT@open{\@tempc}\fi
307 \def\@tempb{close}\ifx\@tempa\@tempb
308 \xdef\NAT@close{\@tempc}\fi
309 \def\@tempb{aysep}\ifx\@tempa\@tempb
310 \xdef\NAT@aysep{\@tempc}\fi

```

```

311 \def\@tempb{yysep}\ifx\@tempa\@tempb
312 \xdef\NAT@yrsep{\@tempc}\fi
313 \def\@tempb{notesep}\ifx\@tempa\@tempb
314 \xdef\NAT@cmt{\@tempc}\fi
315 \def\@tempb{citesep}\ifx\@tempa\@tempb
316 \xdef\NAT@sep{\@tempc}\fi
317 \fi
318 }%
319 \NAT@@setcites
320 }
321 \renewcommand\citestyle[1]{%
322 \ifcsname bibstyle@#1\endcsname%
323 \csname bibstyle@#1\endcsname\let\bibstyle\@gobble%
324 \else%
325 \@latex@error{Undefined ‘#1’ citestyle}%
326 \fi
327 }%
328 \fi

```

`\bibstyle@acmauthoryear` The default author-year format:

```

329 \newcommand{\bibstyle@acmauthoryear}{%
330 \setcitestyle{%
331 authoryear,%
332 open={[]},close={]},citesep={;},%
333 aysep={},yysep={},,%
334 notesep={, }}}

```

`\bibstyle@acmnumeric` The default numeric format:

```

335 \newcommand{\bibstyle@acmnumeric}{%
336 \setcitestyle{%
337 numbers,sort&compress,%
338 open={[]},close={]},citesep={,},%
339 notesep={, }}}

```

The default is numeric:

```

340 \if@ACM@natbib
341 \citestyle{acmnumeric}
342 \fi

```

`\@startsection` Before we call `hyperref`, we redefine `\startsection` commands to their  $\LaTeX$  defaults since the `amsart` ones are too AMS-specific. We need to do this early since we want `hyperref` to have a chance to redefine them again:

```

343 \def\@startsection#1#2#3#4#5#6{%
344 \if@noskipsec \leavevmode \fi
345 \par
346 \@tempskipa #4\relax
347 \@afterindenttrue
348 \ifdim \@tempskipa <\z@
349 \@tempskipa -\@tempskipa \@afterindentfalse

```

```

350 \fi
351 \if@nbreak
352   \everypar{%
353 \else
354   \addpenalty\@secpenalty\addvspace\@tempskipa
355 \fi
356 \@ifstar
357   {\@ssect{#3}{#4}{#5}{#6}}%
358   {\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}%
359 \def\@sect#1#2#3#4#5#6[#7]#8{%
360 \edef\@toclevel{\ifnum#2=\@m 0\else\@number#2\fi}%
361 \ifnum #2>\c@secnumdepth
362   \let\@svsec\@empty
363 \else
364   \refstepcounter{#1}%
365   \protected@edef\@svsec{\@secntformat{#1}\relax}%
366 \fi
367 \@tempskipa #5\relax
368 \ifdim \@tempskipa>\z@
369   \begingroup
370     #6{%
371       \@hangfrom{\hskip #3\relax\@svsec}%
372       \interlinepenalty \@M #8\@par}%
373 \endgroup
374 \csname #1mark\endcsname{#7}%
375 \ifnum #2>\c@secnumdepth \else
376   \@tochangmeasure{\csname the#1\endcsname}%
377 \fi
378 \addcontentsline{toc}{#1}{%
379   \ifnum #2>\c@secnumdepth \else
380     \protect\@numberline{\csname the#1\endcsname}%
381   \fi
382   #7}%
383 \else
384   \def\@svsechd{%
385     #6{\hskip #3\relax
386       \@svsec #8}%
387     \csname #1mark\endcsname{#7}%
388     \ifnum #2>\c@secnumdepth \else
389       \@tochangmeasure{\csname the#1\endcsname\space}%
390     \fi
391     \addcontentsline{toc}{#1}{%
392       \ifnum #2>\c@secnumdepth \else
393         \protect\@numberline{\csname the#1\endcsname}%
394       \fi
395       #7}}%
396 \fi
397 \@xsect{#5}}
398 \def\@xsect#1{%
399   \@tempskipa #1\relax

```

```

400 \ifdim \@tempskipa>\z@
401 \par \nobreak
402 \vskip \@tempskipa
403 \@afterheading
404 \else
405 \@nobreakfalse
406 \global\@noskipsectrue
407 \everypar{%
408 \if@noskipsec
409 \global\@noskipsecfalse
410 {\setbox\z@\lastbox}%
411 \clubpenalty\@M
412 \begingroup \@svsechd \endgroup
413 \unskip
414 \@tempskipa #1\relax
415 \hskip -\@tempskipa
416 \else
417 \clubpenalty \@clubpenalty
418 \everypar{%
419 \fi}%
420 \fi
421 \ignorespaces}
422 \def\@secntformat#1{\csname the#1\endcsname\quad}
423 \def\@ssect#1#2#3#4#5{%
424 \@tempskipa #3\relax
425 \ifdim \@tempskipa>\z@
426 \begingroup
427 #4{%
428 \@hangfrom{\hskip #1}%
429 \interlinepenalty \@M #5\@par}%
430 \endgroup
431 \else
432 \def\@svsechd{#4{\hskip #1\relax #5}}%
433 \fi
434 \@xsect{#3}}

```

`\@startsection` The `amsart` package redefines `\startsection`. Here we redefine it again to make the table of contents work.

```

435 \def\@starttoc#1#2{\begingroup\makeatletter
436 \setTrue{#1}%
437 \par\removelastskip\vskip\z@skip
438 \@startsection{section}\@M\z@{\linespacing\@plus\linespacing}%
439 { .5\linespacing}{\centering\contentsnamefont}{#2}%
440 \@input{\jobname.#1}%
441 \if@filesw
442 \exp\newwrite\csname tf#1\endcsname
443 \immediate\exp\openout\csname tf#1\endcsname \jobname.#1\relax
444 \fi
445 \global\@nobreakfalse \endgroup
446 \addvspace{32\p@\@plus14\p@}%

```

```

447 }

\l@section Section spacing is more generous than for amsart
448 \def\l@section{\@tocline{1}{0pt}{1pc}{2pc}{}}

\l@subsection The spacing in amsart is too large
449 \def\l@subsection{\@tocline{2}{0pt}{1pc}{3pc}{}}

\l@subsubsection The spacing in amsart is too large
450 \def\l@subsubsection{\@tocline{3}{0pt}{1pc}{5pc}{}}

We need to define footnote-related stuff before the call to hyperref (Ross Moore)

\@makefnmark We do not use indentation for footnotes
451 \def\@makefnmark{\noindent\@makefnmark}

\@footnotetext In sigchi-a mode our footnotes are in the margin!
452 \if@ACM@sigchiamode
453 \long\def\@footnotetext#1{\marginpar{%
454   \reset@font\small
455   \interlinepenalty\interfootnotelinepenalty
456   \protected@edef\@currentlabel{%
457     \csname p@footnote\endcsname\@thefnmark
458   }}%
459   \color@begingroup
460     \@makefnmark{%
461       \rule{z}{\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
462     \color@endgroup}}%
463 \fi

\@mpfootnotetext We want the footnotes in minipages centered:
464 \long\def\@mpfootnotetext#1{%
465   \global\setbox\@mpfootins\vbox{%
466     \unvbox\@mpfootins
467     \reset@font\footnotesize
468     \hsize\columnwidth
469     \@parboxrestore
470     \protected@edef\@currentlabel
471       {\csname p@mpfootnote\endcsname\@thefnmark}%
472     \color@begingroup\centering
473     \@makefnmark{%
474       \rule{z}{\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
475     \color@endgroup}}

\@makefnmark AMS classes use a buggy definition of \makefnmark. We revert to the standard one.
476 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}

Adding hyperxmp
477 \RequirePackage{hyperxmp}

```

And now, hyperref

```
478 \let\@footnotemark@nolink\@footnotemark
479 \let\@footnotetext@nolink\@footnotetext
480 \RequirePackage[bookmarksnumbered,unicode]{hyperref}
481 \pdfstringdefDisableCommands{%
482   \def\addtocounter#1#2{%
483     \def\unskip{%
484       \def\textbullet{- }%
485       \def\textrightarrow{ -> }%
486       \def\footnotemark{%
487     }
488 \urlstyle{rm}
489 \ifcase\ACM@format@nr
490 \relax % manuscript
491 \or % acmsmall
492 \or % acmlarge
493 \or % acmtog
494 \or % sigconf
495 \or % siggraph
496 \or % sigplan
497   \urlstyle{sf}
498 \or % sigchi
499 \or % sigchi-a
500   \urlstyle{sf}
501 \fi
502 \AtEndPreamble{%
503   \if@ACM@urlbreakonhyphens
504     \def\do@url@hyp{\do-}%
505   \fi
506   \if@ACM@screen
507     \hypersetup{colorlinks,
508       linkcolor=ACMPurple,
509       citecolor=ACMPurple,
510       urlcolor=ACMDarkBlue,
511       filecolor=ACMDarkBlue}
512   \else
513     \hypersetup{hidelinks}
514   \fi
515   \hypersetup{pdflang={en},
516     pdfdisplaydoctitle}}
517 \if@ACM@natbib
518   \let\citeN\cite
519   \let\cite\citep
520   \let\citeANP\citeauthor
521   \let\citeNN\citeyearpar
522   \let\citeyearNP\citeyear
523   \let\citeNP\citealt
524   \DeclareRobustCommand\citeA
```

```

525     {\begingroup\NAT@swafalse
526       \let\NAT@ctype\@ne\NAT@partrue\NAT@fullfalse\NAT@open\NAT@citetp}%
527   \providecommand\newblock{%
528 \else
529   \AtBeginDocument{%
530     \let\shortcite\cite%
531     \providecommand\citename[1]{#1}}
532 \fi
533 \newcommand\shortcite[2][{}]{%
534   \ifNAT@numbers\cite[#1]{#2}\else\citeyearpar[#1]{#2}\fi}

```

`\bibliographystyle` The `amsart` package redefines `\bibliographystyle` since it prefers the AMS bibliography style. We turn it back to the  $\LaTeX$  definition:

```

535 \def\bibliographystyle#1{%
536   \ifx\@begindocumenthook\@undefined\else
537     \expandafter\AtBeginDocument
538   \fi
539   {\if@filesw
540     \immediate\write\@auxout{\string\bibstyle{#1}}}%
541   \fi}}

```

Graphics and color.

```

542 \RequirePackage{graphicx}
543 \RequirePackage[prologue]{xcolor}

```

We define ACM colors according to [7]:

```

544 \definecolor[named]{ACMBlue}{cmyk}{1,0.1,0,0.1}
545 \definecolor[named]{ACMYellow}{cmyk}{0,0.16,1,0}
546 \definecolor[named]{ACMOrange}{cmyk}{0,0.42,1,0.01}
547 \definecolor[named]{ACMRed}{cmyk}{0,0.90,0.86,0}
548 \definecolor[named]{ACMLightBlue}{cmyk}{0.49,0.01,0,0}
549 \definecolor[named]{ACMGreen}{cmyk}{0.20,0,1,0.19}
550 \definecolor[named]{ACMPurple}{cmyk}{0.55,1,0,0.15}
551 \definecolor[named]{ACMDarkBlue}{cmyk}{1,0.58,0,0.21}

```

Author-draft mode or sigchi-a mode

```

552 \if@ACM@authordraft
553   \RequirePackage{draftwatermark}
554   \SetWatermarkFontSize{0.5in}
555   \SetWatermarkColor[gray]{.9}
556   \SetWatermarkText{\parbox{12em}{\centering
557     Unpublished working draft.\
558     Not for distribution.}}
559 \else
560   \if@ACM@sigchiamode
561     \if@ACM@nonacm\else
562       \RequirePackage{draftwatermark}
563       \SetWatermarkFontSize{0.5in}
564       \SetWatermarkColor[gray]{.9}
565       \SetWatermarkText{\parbox{12em}{\centering

```

```

566         Legacy document. \\
567         Not for publication in an ACM venue}}
568     \fi
569 \fi
570 \fi

```

### 3.7 Paper size and paragraphing

We use geometry for dimensions. Note that the present margins do not depend on the font size option—we might need to change this. See <https://github.com/borisveytsman/acmart/issues/5#issuecomment-272881329>.

```

571 \RequirePackage{geometry}
572 \ifcase\ACM@format@nr
573 \relax % manuscript
574     \geometry{letterpaper,head=13pt,
575     marginparwidth=6pc,heightrounded}%
576 \or % acmsmall
577     \geometry{twoside=true,
578     includeheadfoot, head=13pt, foot=2pc,
579     paperwidth=6.75in, paperheight=10in,
580     top=58pt, bottom=44pt, inner=46pt, outer=46pt,
581     marginparwidth=2pc,heightrounded
582     }%
583 \or % acmlarge
584     \geometry{twoside=true, head=13pt, foot=2pc,
585     paperwidth=8.5in, paperheight=11in,
586     includeheadfoot,
587     top=78pt, bottom=114pt, inner=81pt, outer=81pt,
588     marginparwidth=4pc,heightrounded
589     }%
590 \or % acmtog
591     \geometry{twoside=true, head=13pt, foot=2pc,
592     paperwidth=8.5in, paperheight=11in,
593     includeheadfoot, columnsep=24pt,
594     top=52pt, bottom=75pt, inner=52pt, outer=52pt,
595     marginparwidth=2pc,heightrounded
596     }%
597 \or % sigconf
598     \geometry{twoside=true, head=13pt,
599     paperwidth=8.5in, paperheight=11in,
600     includeheadfoot, columnsep=2pc,
601     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
602     marginparwidth=2pc,heightrounded
603     }%
604 \or % siggraph
605     \geometry{twoside=true, head=13pt,
606     paperwidth=8.5in, paperheight=11in,
607     includeheadfoot, columnsep=2pc,
608     top=57pt, bottom=73pt, inner=54pt, outer=54pt,

```

```

609     marginparwidth=2pc,heightrounded
610   }%
611 \or % sigplan
612   \geometry{twoside=true, head=13pt,
613     paperwidth=8.5in, paperheight=11in,
614     includeheadfoot=false, columnsep=2pc,
615     top=1in, bottom=1in, inner=0.75in, outer=0.75in,
616     marginparwidth=2pc,heightrounded
617   }%
618 \or % sigchi
619   \geometry{twoside=true, head=13pt,
620     paperwidth=8.5in, paperheight=11in,
621     includeheadfoot, columnsep=2pc,
622     top=66pt, bottom=73pt, inner=54pt, outer=54pt,
623     marginparwidth=2pc,heightrounded
624   }%
625 \or % sigchi-a
626   \geometry{twoside=false, head=13pt,
627     paperwidth=11in, paperheight=8.5in,
628     includeheadfoot, marginparsep=72pt,
629     marginparwidth=170pt, columnsep=20pt,
630     top=72pt, bottom=72pt, left=314pt, right=72pt
631   }%
632   \@mparswitchfalse
633   \reversemarginpar
634 \fi

```

`\parindent` Paragraphing

```

\parskip 635 \setlength\parindent{10\p@}
636 \setlength\parskip{\z@}
637 \ifcase\ACM@format@nr
638 \relax % manuscript
639 \or % acmsmall
640 \or % acmlarge
641 \or % acmtog
642 \setlength\parindent{9\p@}%
643 \or % sigconf
644 \or % siggraph
645 \or % sigplan
646 \or % sigchi
647 \or % sigchi-a
648 \fi

```

`\normalparindent` The `amsart` package defines the `\normalparindent` length and initializes it to 12pt (the value of `\parindent` in `amsart`). It is later used to set the `\listparindent` length in the quotation environment and the `\parindent` length in the `\@footnotetext` command. We set `\normalparindent` to the value of `\parindent` as selected by `acmart` for consistent paragraph indents.

```

649 \setlength\normalparindent{\parindent}

```

Footnotes require some consideration. We have several layers of footnotes: front-matter footnotes, “regular” footnotes and the special insert for the bibstrip. In the old ACM classes, the bibstrip was a `\@float`. The problem with floats is that they tend to, well, float—and we want the guarantee they stay.

We use `manyfoot` for layered footnotes instead.

`\copyrightpermissionfootnoterule` This is the footnote rule that separates the bibstrip from the rest of the paper. It is a full width rule.

```
650 \def\copyrightpermissionfootnoterule{\kern-3\p@
651   \hrule \@width \columnwidth \kern 2.6\p@}

652 \RequirePackage{manyfoot}
653 \SelectFootnoteRule[2]{copyrightpermission}
654 \DeclareNewFootnote{authorsaddresses}
655 \SelectFootnoteRule[2]{copyrightpermission}
656 \DeclareNewFootnote{copyrightpermission}
```

`\footnoterule` Tschichold’s rules:

```
657 \def\footnoterule{\kern-3\p@
658   \hrule \@width 4pc \kern 2.6\p@}
```

`\endminipage` We do not use footnote rules in minipages

```
659 \def\endminipage{%
660   \par
661   \unskip
662   \ifvoid\@mpfootins\else
663     \vskip\skip\@mpfootins
664     \normalcolor
665     \unvbox\@mpfootins
666   \fi
667   \@minipagefalse
668   \color@endgroup
669   \egroup
670   \expandafter\@iiparbox\@mpargs{\unvbox\@tempboxa}}
```

`\@textbottom` Add some stretch according to David Carlisle’s advice at <http://tex.stackexchange.com/a/62318/5522>

```
671 \def\@textbottom{\vskip \z@ \@plus 1pt}
672 \let\@texttop\relax
```

In two-column layouts, force both columns to be the same height by inserting extra internal vertical space to fill out the page.

```
673 \ifcase\ACM@format@nr
674 \relax % manuscript
675 \or % acmsmall
676 \or % acmlarge
677 \or % acmtog
678 \flushbottom
679 \or % sigconf
```

```

680 \flushbottom
681 \or % siggraph
682 \flushbottom
683 \or % sigplan
684 \flushbottom
685 \or % sigchi
686 \flushbottom
687 \or % sigchi-a
688 \fi

```

### 3.8 Fonts

Somehow PDFTeX and XeTeX require different incantations to make a PDF compliant with the current Acrobat bugs. Xpdf is much better.

The code below is by Ross Moore.

```

689 \ifPDFTeX
690 \input{glyphtounicode}
691 \pdfglyphtounicode{f_f}{FB00}
692 \pdfglyphtounicode{f_f_i}{FB03}
693 \pdfglyphtounicode{f_f_l}{FB04}
694 \pdfglyphtounicode{f_i}{FB01}
695 \pdfglyphtounicode{t_t}{0074 0074}
696 \pdfglyphtounicode{f_t}{0066 0074}
697 \pdfglyphtounicode{T_h}{0054 0068}
698 \pdfgentounicode=1
699 \RequirePackage{cmap}
700 \fi

```

`\if@ACM@newfonts` Whether we load the new fonts

```

701 \newif\if@ACM@newfonts
702 \@ACM@newfontstrue
703 \IfFileExists{libertine.sty}{\ClassWarning{\@classname}{You do not
704   have the libertine package installed. Please upgrade your
705   TeX}\@ACM@newfontsfalse}
706 \IfFileExists{zi4.sty}{\ClassWarning{\@classname}{You do not
707   have the inconsolata (zi4.sty) package installed. Please upgrade your
708   TeX}\@ACM@newfontsfalse}
709 \IfFileExists{newtxmath.sty}{\ClassWarning{\@classname}{You do not
710   have the newtxmath package installed. Please upgrade your
711   TeX}\@ACM@newfontsfalse}

```

We use Libertine throughout.

```

712 \if@ACM@newfonts
713 \RequirePackage[T1]{fontenc}
714 % Note that the order in which packages are loaded matters,
715 % and the correct order depends on the LaTeX engine used.
716 % See https://github.com/borisveytsman/acmart/issues/402
717 % and https://github.com/borisveytsman/acmart/issues/410
718 \ifxetex

```

```

719 \RequirePackage[libertine]{newtxmath}
720 \RequirePackage[tt=false]{libertine}
721 \setmonofont[StylisticSet=3]{inconsolata}
722 \else
723 \ifluatex
724 \RequirePackage[libertine]{newtxmath}
725 \RequirePackage[tt=false]{libertine}
726 \setmonofont[StylisticSet=3]{inconsolata}
727 \else
728 \RequirePackage[tt=false, type1=true]{libertine}
729 \RequirePackage[varqu]{zi4}
730 \RequirePackage[libertine]{newtxmath}
731 \fi
732 \fi
733 \fi

```

`\liningnums` Libertine defines `\liningnums`, which makes `fontspec` unhappy. While we do not use `fontspec`, some users do.

```

734 \let\liningnums\@undefined
735 \AtEndPreamble{%
736 \DeclareTextFontCommand{\liningnums}{\libertineLF}}

```

The SIGCHI extended abstracts are sans serif:

```

737 \if@ACM@sigchiamode
738 \renewcommand{\familydefault}{\sfdefault}
739 \fi

```

### 3.9 Image descriptions

`\if@Description@present` A local switch: whether there is a description in the given figure

```

740 \newif\if@Description@present
741 \@Description@presenttrue

```

`\if@undescribed@images` A global switch whether some images were *not* described

```

742 \newif\if@undescribed@images
743 \@undescribed@imagesfalse

```

`\Description` The `Description` macro right now just sets switches

```

744 \newcommand\Description[2][\global\@Description@presenttrue\ignorespaces}

```

The global warning

```

745 \AtEndDocument{\if@undescribed@images
746 \ClassWarningNoLine{\@classname}{Some images may lack descriptions}\fi}

```

Hooks for figures and tables. We also patch `algorithm` and `algorithm*` in case somebody uses them.

```

747 \AtBeginEnvironment{figure}{\@Description@presentfalse
748 \let\@vspace\@vspace@orig
749 \let\@vspacer\@vspacer@orig}

```

```

750 \AtBeginEnvironment{figure*}{\@Description@presentfalse
751 \let\@vspace\@vspace@orig
752 \let\@vspacer\@vspacer@orig}
753 \AtEndEnvironment{figure}{\if@Description@present\else
754 \global\@undescribed@imagestrue
755 \ClassWarning{\@classname}{A possible image without description}\fi}
756 \AtEndEnvironment{figure*}{\if@Description@present\else
757 \global\@undescribed@imagestrue
758 \ClassWarning{\@classname}{A possible image without description}\fi}
759 \AtBeginEnvironment{table}{\let\@vspace\@vspace@orig
760 \let\@vspacer\@vspacer@orig}
761 \AtBeginEnvironment{table*}{\let\@vspace\@vspace@orig
762 \let\@vspacer\@vspacer@orig}
763 \AtBeginEnvironment{algorithm}{\let\@vspace\@vspace@orig
764 \let\@vspacer\@vspacer@orig}
765 \AtBeginEnvironment{algorithm*}{\let\@vspace\@vspace@orig
766 \let\@vspacer\@vspacer@orig}
767 \AtBeginEnvironment{lstlisting}{\let\@vspace\@vspace@orig
768 \let\@vspacer\@vspacer@orig}
769 \AtBeginEnvironment{lstlisting*}{\let\@vspace\@vspace@orig
770 \let\@vspacer\@vspacer@orig}
771 \AtBeginEnvironment{minted}{\let\@vspace\@vspace@orig
772 \let\@vspacer\@vspacer@orig}
773 \AtBeginEnvironment{minted*}{\let\@vspace\@vspace@orig
774 \let\@vspacer\@vspacer@orig}
775 \AtBeginEnvironment{listing}{\let\@vspace\@vspace@orig
776 \let\@vspacer\@vspacer@orig}
777 \AtBeginEnvironment{listing*}{\let\@vspace\@vspace@orig
778 \let\@vspacer\@vspacer@orig}
779

```

### 3.10 Floats

We use the caption package

```

780 \RequirePackage{caption, float}
781 \captionsetup[table]{position=top}
782 \if@ACM@journal
783 \captionsetup{labelfont={sf, small},
784 textfont={sf, small}, margin=\z@}
785 \captionsetup[figure]{name={Fig.}}
786 \else
787 \captionsetup{labelfont={bf},
788 textfont={bf}, labelsep=colon, margin=\z@}
789 \ifcase\ACM@format@nr
790 \relax % manuscript
791 \or % acmsmall
792 \or % acmlarge
793 \or % acmtog
794 \or % sigconf

```

```

795 \or % siggraph
796   \captionsetup{textfont={it}}
797 \or % sigplan
798   \captionsetup{labelfont={bf},
799     textfont={normalfont}, labelsep=period, margin=\z@}
800 \or % sigchi
801   \captionsetup[figure]{labelfont={bf, small},
802     textfont={bf, small}}
803   \captionsetup[table]{labelfont={bf, small},
804     textfont={bf, small}}
805 \or % sigchi-a
806   \captionsetup[figure]{labelfont={bf, small},
807     textfont={bf, small}}
808   \captionsetup[table]{labelfont={bf, small},
809     textfont={bf, small}}
810 \fi
811 \fi

sidebar The sidebar environment:
812 \newfloat{sidebar}{sbar}
813 \floatname{sidebar}{Sidebar}
814 \renewenvironment{sidebar}{\Collect@Body\@sidebar}{}

\@sidebar The processing of the saved text
815 \long\def\@sidebar#1{\bgroup\let\@vspace\@vspace@orig
816   \let\@vspacer\@vspacer@orig\captionsetup{type=sidebar}%
817   \marginpar{\small#1}\egroup}

marginfigure The marginfigure environment:
818 \newenvironment{marginfigure}{\Collect@Body\@marginfigure}{}

\@marginfigure The processing of the saved text
819 \long\def\@marginfigure#1{\bgroup
820   \let\@vspace\@vspace@orig
821   \let\@vspacer\@vspacer@orig
822   \captionsetup{type=figure}%
823   \marginpar{\@Description@presentfalse\centering
824     \small#1\if@Description@present\else
825       \global\@undescrbed@imagestrue
826       \ClassWarning{\@classname}{A possible image without description}
827       \fi}%
828   \egroup}

margintable The margintable environment:
829 \newenvironment{margintable}{\Collect@Body\@margintable}{}

\@margintable The processing of the saved text
830 \long\def\@margintable#1{\bgroup\let\@vspace\@vspace@orig
831   \let\@vspacer\@vspacer@orig\captionsetup{type=table}%
832   \marginpar{\centering\small#1}\egroup}

```

SIGCHI extended abstracts provide an interesting possibility to push into the margin. Here we use `figure*` and `table*` for this.

```

\fulltextwidth We define the width of the boxes as
833 \newdimen\fulltextwidth
834 \fulltextwidth=\dimexpr(\textwidth+\marginparwidth+\marginparsep)

\@dblfloat We redefine the double-float command. First, we make the size bigger. Second, our
default position is going to be tp (to give marginalia a chance)
835 \if@ACM@sigchiamode
836 \def\@dblfloat{\bgroup\let\@vspace\@vspace@orig
837 \let\@vspacer\@vspacer@orig\columnwidth=\fulltextwidth
838 \let\@endfloatbox\@endwidefloatbox
839 \def\@fpsaddefault{\def\@fps{tp}}%
840 \@float}
841 \fi

\enddblfloat And the end. Just adding a \bgroup.
842 \if@ACM@sigchiamode
843 \def\enddblfloat{%
844 \endfloat\egroup}
845 \fi

\@endwidefloatbox This is the end of a wide box—we basically move everything to the left
846 \def\@endwidefloatbox{%
847 \par\vskip\z@skip
848 \@minipagefalse
849 \outer@nobreak
850 \egroup
851 \color@endbox
852 \global\setbox\@currbox=\vbox{\moveleft
853 \dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%
854 \wd\@currbox=\textwidth
855 }

```

### 3.11 Lists

```

856 \ifcase\ACM@format@nr
857 \relax % manuscript
858 \or % acmsmall
859 \or % acmlarge
860 \or % acmtog
861 \or % sigconf
862 \or % siggraph
863 \or % sigplan
864 \def\labelenumi{\theenumi.}
865 \def\labelenumii{\theenumii.}
866 \def\labelenumiii{\theenumiii.}
867 \def\labelenumiv{\theenumiv.}

```

```

868 \or % sigchi
869 \or % sigchi-a
870 \fi

```

The AMS uses generous margins for lists. Note that `amsart` defines `\leftmargin` values for list levels at the beginning of the document, so we must redefine them in the same manner. Also, note that `amsart` redefines the `enumerate` and `itemize` environments with a `\makeLabel` command that uses `\llap`, so the `\labelwidth` value is (effectively) irrelevant; nonetheless, we follow `amsart` and set `\labelwidth` to `\leftmargin` minus `\labelsep`.

```

871 \newdimen\@ACM@labelwidth
872 \AtBeginDocument{%
873   \setlength\labelsep{4pt}
874   \setlength{\@ACM@labelwidth}{6.5pt}
875
876   %% First-level list: when beginning after the first line of an
877   %% indented paragraph or ending before an indented paragraph, labels
878   %% should not hang to the left of the preceding/following text.
879   \setlength\leftmarginii{\z@}
880   \addtolength\leftmarginii{\parindent}
881   \addtolength\leftmarginii{2\labelsep}
882   \addtolength\leftmarginii{\@ACM@labelwidth}
883
884   %% Second-level and higher lists.
885   \setlength\leftmarginiii{\z@}
886   \addtolength\leftmarginiii{0.5\labelsep}
887   \addtolength\leftmarginiii{\@ACM@labelwidth}
888   \setlength\leftmarginiiii{\leftmarginiii}
889   \setlength\leftmarginiv{\leftmarginiii}
890   \setlength\leftmarginv{\leftmarginiv}
891   \setlength\leftmarginvi{\leftmarginiv}
892   \@listi}
893 \newskip\listisep
894 \listisep\smallskipamount
895 \def\@listI{\leftmargin\leftmarginii
896   \labelwidth\leftmarginii \advance\labelwidth-\labelsep
897   \listparindent\z@
898   \topsep\listisep}
899 \let\@listi\@listI
900 \def\@listii{\leftmargin\leftmarginiii
901   \labelwidth\leftmarginiii \advance\labelwidth-\labelsep
902   \topsep\z@skip}
903 \def\@listiii{\leftmargin\leftmarginiiii
904   \labelwidth\leftmarginiiii \advance\labelwidth-\labelsep}
905 \def\@listiv{\leftmargin\leftmarginiv
906   \labelwidth\leftmarginiv \advance\labelwidth-\labelsep}
907 \def\@listv{\leftmargin\leftmarginv
908   \labelwidth\leftmarginv \advance\labelwidth-\labelsep}
909 \def\@listvi{\leftmargin\leftmarginvi
910   \labelwidth\leftmarginvi \advance\labelwidth-\labelsep}

```

`\descriptionlabel` We do not use a colon by default like `amsart` does:  
`911 \renewcommand{\descriptionlabel}[1]{\upshape\bfseries #1}`

`\description` Make the description environment indentation consistent with that of the `itemize` and `enumerate` environments.

```
912 \renewenvironment{description}{\list{}{%
913   \labelwidth\@ACM@labelwidth
914   \let\makelabel\descriptionlabel}%
915 }{
916   \endlist
917 }
918 \let\enddescription=\endlist % for efficiency
```

### 3.12 Top-matter data

`\if@ACM@maketitle@typeset` The switch to check whether `\maketitle` is already typeset. It is initially false, and setting top matter when it is true is wrong.

```
919 \newif\if@ACM@maketitle@typeset
920 \@ACM@maketitle@typesetfalse
```

We use the `xkeyval` interface to define journal titles and the relevant information

```
921 \define@choicekey*+{ACM}{acmJournal}[\@journalCode\@journalCode@nr]{%
922   CIE,%
923   CSUR,%
924   DGOV,%
925   DLT,%
926   DTRAP,%
927   FAC,%
928   HEALTH,%
929   IMWUT,%
930   JACM,%
931   JDIQ,%
932   JEA,%
933   JERIC,%
934   JETC,%
935   JOCCH,%
936   PACMCGIT,%
937   PACMHCI,%
938   PACMPL,%
939   POMACS,%
940   TAAS,%
941   TACCESS,%
942   TACO,%
943   TALG,%
944   TALLIP,%
945   TAP,%
946   TCPS,%
947   TDS,%
948   TEAC,%
```

949 TECS,%  
 950 TELO,%  
 951 THRI,%  
 952 TIIS,%  
 953 TIOT,%  
 954 TISSEC,%  
 955 TIST,%  
 956 TKDD,%  
 957 TMIS,%  
 958 TOCE,%  
 959 TOCHI,%  
 960 TOCL,%  
 961 TOCS,%  
 962 TOCT,%  
 963 TODAES,%  
 964 TODS,%  
 965 TOG,%  
 966 TOIS,%  
 967 TOIT,%  
 968 TOMACS,%  
 969 TOMM,%  
 970 TOMPECS,%  
 971 TOMS,%  
 972 TOPC,%  
 973 TOPS,%  
 974 TOPLAS,%  
 975 TOS,%  
 976 TOSEM,%  
 977 TOSN,%  
 978 TQC,%  
 979 TRETs,%  
 980 TSAS,%  
 981 TSC,%  
 982 TSLP,%  
 983 TWEB,%  
 984 FACMP%  
 985 }{%  
 986 \ifcase\@journalCode@nr  
 987 \relax % CIE  
 988 \def\@journalName{ACM Computers in Entertainment}%  
 989 \def\@journalNameShort{ACM Comput. Entertain.}%  
 990 \def\@permissionCodeOne{1544-3574}%  
 991 \or % CSUR  
 992 \def\@journalName{ACM Computing Surveys}%  
 993 \def\@journalNameShort{ACM Comput. Surv.}%  
 994 \def\@permissionCodeOne{0360-0300}%  
 995 \or % DGOV  
 996 \def\@journalName{Digital Government: Research and Practice}%  
 997 \def\@journalNameShort{Digit. Gov. Res. Pract.}%  
 998 \def\@permissionCodeOne{2639-0175}%

```

999 \or % DLT
1000 \def\@journalName{Distributed Ledger Technologies: Research and Practice}%
1001 \def\@journalNameShort{Distrib. Ledger Technol.}%
1002 \def\@permissionCodeOne{2769-6472}%
1003 \or % DTRAP
1004 \def\@journalName{Digital Threats: Research and Practice}%
1005 \def\@journalNameShort{Digit. Threat. Res. Pract.}%
1006 \def\@permissionCodeOne{2576-5337}%
1007 \or % FAC
1008 \def\@journalName{Formal Aspects of Computing}%
1009 \def\@journalNameShort{Form. Asp. Comput.}%
1010 \def\@permissionCodeOne{0934-5043}%
1011 \or % HEALTH
1012 \def\@journalName{ACM Transactions on Computing for Healthcare}%
1013 \def\@journalNameShort{ACM Trans. Comput. Healthcare}%
1014 \def\@permissionCodeOne{2637-8051}%
1015 \or % IMWUT
1016 \def\@journalName{Proceedings of the ACM on Interactive, Mobile,
1017     Wearable and Ubiquitous Technologies}%
1018 \def\@journalNameShort{Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.}%
1019 \def\@permissionCodeOne{2474-9567}%
1020 \@ACM@screentruer
1021 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1022 \or % JACM
1023 \def\@journalName{Journal of the ACM}%
1024 \def\@journalNameShort{J. ACM}%
1025 \def\@permissionCodeOne{0004-5411}%
1026 \or % JDIQ
1027 \def\@journalName{ACM Journal of Data and Information Quality}%
1028 \def\@journalNameShort{ACM J. Data Inform. Quality}%
1029 \def\@permissionCodeOne{1936-1955}%
1030 \or % JEA
1031 \def\@journalName{ACM Journal of Experimental Algorithmics}%
1032 \def\@journalNameShort{ACM J. Exp. Algor.}%
1033 \def\@permissionCodeOne{1084-6654}%
1034 \or % JERIC
1035 \def\@journalName{ACM Journal of Educational Resources in Computing}%
1036 \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%
1037 \def\@permissionCodeOne{1073-0516}%
1038 \or % JETC
1039 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
1040 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
1041 \def\@permissionCodeOne{1550-4832}%
1042 \or % JOCCH
1043 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%
1044 \def\@journalNameShort{ACM J. Comput. Cult. Herit.}%
1045 \or % PACMCGIT
1046 \def\@journalName{Proceedings of the ACM on Computer Graphics and Interactive Techniques}%
1047 \def\@journalNameShort{Proc. ACM Comput. Graph. Interact. Tech.}%
1048 \def\@permissionCodeOne{2577-6193}%

```

```

1049 \@ACM@screentruer
1050 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1051 \or % PACMHCI
1052 \def\@journalName{Proceedings of the ACM on Human-Computer Interaction}%
1053 \def\@journalNameShort{Proc. ACM Hum.-Comput. Interact.}%
1054 \def\@permissionCodeOne{2573-0142}%
1055 \@ACM@screentruer
1056 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1057 \or % PACMPL
1058 \def\@journalName{Proceedings of the ACM on Programming Languages}%
1059 \def\@journalNameShort{Proc. ACM Program. Lang.}%
1060 \def\@permissionCodeOne{2475-1421}%
1061 \@ACM@screentruer
1062 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1063 \or % POMACS
1064 \def\@journalName{Proceedings of the ACM on Measurement and Analysis of Computing Systems}%
1065 \def\@journalNameShort{Proc. ACM Meas. Anal. Comput. Syst.}%
1066 \def\@permissionCodeOne{2476-1249}%
1067 \@ACM@screentruer
1068 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1069 \or % TAAS
1070 \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
1071 \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
1072 \def\@permissionCodeOne{1556-4665}%
1073 \or % TACCESS
1074 \def\@journalName{ACM Transactions on Accessible Computing}%
1075 \def\@journalNameShort{ACM Trans. Access. Comput.}%
1076 \def\@permissionCodeOne{1936-7228}%
1077 \or % TACO
1078 \def\@journalName{ACM Transactions on Architecture and Code Optimization}%
1079 \def\@journalNameShort{ACM Trans. Arch. Code Optim.}%
1080 \or % TALG
1081 \def\@journalName{ACM Transactions on Algorithms}%
1082 \def\@journalNameShort{ACM Trans. Algor.}%
1083 \def\@permissionCodeOne{1549-6325}%
1084 \or % TALLIP
1085 \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
1086 \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
1087 \def\@permissionCodeOne{2375-4699}%
1088 \or % TAP
1089 \def\@journalName{ACM Transactions on Applied Perception}%
1090 \def\@journalNameShort{ACM Trans. Appl. Percept.}%
1091 \def\@permissionCodeOne{1544-3558}%
1092 \or % TCPS
1093 \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
1094 \def\@journalNameShort{ACM Trans. Cyber-Phys. Syst.}%
1095 \def\@permissionCodeOne{2378-962X}%
1096 \or % TDS
1097 \def\@journalName{ACM/IMS Transactions on Data Science}%
1098 \def\@journalNameShort{ACM/IMS Trans. Data Sci.}%

```

1099 \def\@permissionCodeOne{2577-3224}%  
1100 \or % TEAC  
1101 \def\@journalName{ACM Transactions on Economics and Computation}%  
1102 \def\@journalNameShort{ACM Trans. Econ. Comput.}%  
1103 \def\@permissionCodeOne{2167-8375}%  
1104 \or % TECS  
1105 \def\@journalName{ACM Transactions on Embedded Computing Systems}%  
1106 \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%  
1107 \def\@permissionCodeOne{1539-9087}%  
1108 \or % TELO  
1109 \def\@journalName{ACM Transactions on Evolutionary Learning}%  
1110 \def\@journalNameShort{ACM Trans. Evol. Learn.}%  
1111 \def\@permissionCodeOne{2688-3007}%  
1112 \or % THRI  
1113 \def\@journalName{ACM Transactions on Human-Robot Interaction}%  
1114 \def\@journalNameShort{ACM Trans. Hum.-Robot Interact.}%  
1115 \def\@permissionCodeOne{2573-9522}%  
1116 \or % TIIS  
1117 \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%  
1118 \def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%  
1119 \def\@permissionCodeOne{2160-6455}%  
1120 \or % TIOT  
1121 \def\@journalName{ACM Transactions on Internet of Things}%  
1122 \def\@journalNameShort{ACM Trans. Internet Things}%  
1123 \def\@permissionCodeOne{2577-6207}%  
1124 \or % TISSEC  
1125 \def\@journalName{ACM Transactions on Information and System Security}%  
1126 \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%  
1127 \def\@permissionCodeOne{1094-9224}%  
1128 \or % TIST  
1129 \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%  
1130 \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%  
1131 \def\@permissionCodeOne{2157-6904}%  
1132 \or % TKDD  
1133 \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%  
1134 \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%  
1135 \def\@permissionCodeOne{1556-4681}%  
1136 \or % TMIS  
1137 \def\@journalName{ACM Transactions on Management Information Systems}%  
1138 \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%  
1139 \def\@permissionCodeOne{2158-656X}%  
1140 \or % TOCE  
1141 \def\@journalName{ACM Transactions on Computing Education}%  
1142 \def\@journalNameShort{ACM Trans. Comput. Educ.}%  
1143 \def\@permissionCodeOne{1946-6226}%  
1144 \or % TOCHI  
1145 \def\@journalName{ACM Transactions on Computer-Human Interaction}%  
1146 \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%  
1147 \def\@permissionCodeOne{1073-0516}%  
1148 \or % TOCL

```

1149 \def\@journalName{ACM Transactions on Computational Logic}%
1150 \def\@journalNameShort{ACM Trans. Comput. Logic}%
1151 \def\@permissionCodeOne{1529-3785}%
1152 \or % TOCS
1153 \def\@journalName{ACM Transactions on Computer Systems}%
1154 \def\@journalNameShort{ACM Trans. Comput. Syst.}%
1155 \def\@permissionCodeOne{0734-2071}%
1156 \or % TOCT
1157 \def\@journalName{ACM Transactions on Computation Theory}%
1158 \def\@journalNameShort{ACM Trans. Comput. Theory}%
1159 \def\@permissionCodeOne{1942-3454}%
1160 \or % TODAES
1161 \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%
1162 \def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
1163 \def\@permissionCodeOne{1084-4309}%
1164 \or % TODS
1165 \def\@journalName{ACM Transactions on Database Systems}%
1166 \def\@journalNameShort{ACM Trans. Datab. Syst.}%
1167 \def\@permissionCodeOne{0362-5915}%
1168 \or % TOG
1169 \def\@journalName{ACM Transactions on Graphics}%
1170 \def\@journalNameShort{ACM Trans. Graph.}%
1171 \def\@permissionCodeOne{0730-0301}
1172 \or % TOIS
1173 \def\@journalName{ACM Transactions on Information Systems}%
1174 \def\@permissionCodeOne{1046-8188}%
1175 \or % TOIT
1176 \def\@journalName{ACM Transactions on Internet Technology}%
1177 \def\@journalNameShort{ACM Trans. Internet Technol.}%
1178 \def\@permissionCodeOne{1533-5399}%
1179 \or % TOMACS
1180 \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
1181 \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
1182 \or % TOMM
1183 \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
1184 \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
1185 \def\@permissionCodeOne{1551-6857}%
1186 \def\@permissionCodeTwo{0100}%
1187 \or % TOMPECS
1188 \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
1189 \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
1190 \def\@permissionCodeOne{2376-3639}%
1191 \or % TOMS
1192 \def\@journalName{ACM Transactions on Mathematical Software}%
1193 \def\@journalNameShort{ACM Trans. Math. Softw.}%
1194 \def\@permissionCodeOne{0098-3500}%
1195 \or % TOPC
1196 \def\@journalName{ACM Transactions on Parallel Computing}%
1197 \def\@journalNameShort{ACM Trans. Parallel Comput.}%
1198 \def\@permissionCodeOne{1539-9087}%

```

```

1199 \or % TOPS
1200 \def\@journalName{ACM Transactions on Privacy and Security}%
1201 \def\@journalNameShort{ACM Trans. Priv. Sec.}%
1202 \def\@permissionCodeOne{2471-2566}%
1203 \or % TOPLAS
1204 \def\@journalName{ACM Transactions on Programming Languages and Systems}%
1205 \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
1206 \def\@permissionCodeOne{0164-0925}%
1207 \or % TOS
1208 \def\@journalName{ACM Transactions on Storage}%
1209 \def\@journalNameShort{ACM Trans. Storage}%
1210 \def\@permissionCodeOne{1553-3077}%
1211 \or % TOSEM
1212 \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
1213 \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
1214 \def\@permissionCodeOne{1049-331X}%
1215 \or % TOSN
1216 \def\@journalName{ACM Transactions on Sensor Networks}%
1217 \def\@journalNameShort{ACM Trans. Sensor Netw.}%
1218 \def\@permissionCodeOne{1550-4859}%
1219 \or % TQC
1220 \def\@journalName{ACM Transactions on Quantum Computing}%
1221 \def\@journalNameShort{ACM Trans. Quantum Comput.}%
1222 \def\@permissionCodeOne{2643-6817}%
1223 \or % TRET
1224 \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
1225 \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
1226 \def\@permissionCodeOne{1936-7406}%
1227 \or % TSAS
1228 \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%
1229 \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
1230 \def\@permissionCodeOne{2374-0353}%
1231 \or % TSC
1232 \def\@journalName{ACM Transactions on Social Computing}%
1233 \def\@journalNameShort{ACM Trans. Soc. Comput.}%
1234 \def\@permissionCodeOne{2469-7818}%
1235 \or % TSLP
1236 \def\@journalName{ACM Transactions on Speech and Language Processing}%
1237 \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
1238 \def\@permissionCodeOne{1550-4875}%
1239 \or % TWEB
1240 \def\@journalName{ACM Transactions on the Web}%
1241 \def\@journalNameShort{ACM Trans. Web}%
1242 \def\@permissionCodeOne{1559-1131}%
1243 \else % FACMP, a dummy journal
1244 \def\@journalName{Forthcoming ACM Publication}%
1245 \def\@journalNameShort{ACM Forthcoming}%
1246 \def\@permissionCodeOne{XXXX-XXXX}%
1247 \fi
1248 \ClassInfo{\@classname}{Using journal code \@journalCode}%

```

```

1249 }{%
1250 \ClassError{\@classname}{Incorrect journal #1}%
1251 }%

\acmJournal And the syntactic sugar around it
1252 \def\acmJournal#1{\setkeys{ACM}{acmJournal=#1}%
1253 \global\@ACM@journal@bibstriptrue}

    The defaults:
1254 \def\@journalCode@nr{0}
1255 \def\@journalName{}%
1256 \def\@journalNameShort{\@journalName}%
1257 \def\@permissionCodeOne{XXXX-XXXX}%
1258 \def\@permissionCodeTwo{}%

\acmConference This is the conference command
1259 \newcommand\acmConference[4][[]]{%
1260 \gdef\acmConference@shortname{#1}%
1261 \gdef\acmConference@name{#2}%
1262 \gdef\acmConference@date{#3}%
1263 \gdef\acmConference@venue{#4}%
1264 \ifx\acmConference@shortname\empty
1265 \gdef\acmConference@shortname{#2}%
1266 \fi
1267 \global\@ACM@journal@bibstripfalse
1268 }
1269 \if@ACM@journal\else
1270 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
1271 DC, USA}%
1272 \fi

\acmBooktitle The book title of the conference:
\@acmBooktitle 1273 \def\acmBooktitle#1{\gdef\@acmBooktitle{#1}}
1274 \acmBooktitle{}
1275 \ifx\acmConference@name\undefined\else
1276 \acmBooktitle{Proceedings of \acmConference@name
1277 \ifx\acmConference@name\acmConference@shortname\else
1278 \ (\acmConference@shortname)\fi}
1279 \fi

\@editorsAbbrev How to abbreviate editors
1280 \def\@editorsAbbrev{(Ed.)}

\@acmEditors The list of editors
1281 \def\@acmEditors{}

\editor Add a new editor to the list
1282 \def\editor#1{\ifx\@acmEditors\empty
1283 \gdef\@acmEditors{#1}%

```

```

1284 \else
1285 \gdef\@editorsAbbrev{(Eds.)}%
1286 \g@addto@macro\acmEditors{\and#1}%
1287 \fi}

\subtitle The subtitle macro
1288 \def\subtitle#1{\def\@subtitle{#1}}
1289 \subtitle{}

\num@authorgroups The total number of “groups”. Each group is several authors with the same affiliations(s)
1290 \newcount\num@authorgroups
1291 \num@authorgroups=0\relax

\num@authors The total number of authors
1292 \newcount\num@authors
1293 \num@authors=0\relax

\if@insideauthorgroup Whether we are continuing an author group
1294 \newif\if@insideauthorgroup
1295 \@insideauthorgroupfalse

\author Adding an author to the list of authors and addresses.
    Note that we want to typeset the link to the author’s orcid if known. The problem
    is, we know the orcid only after the author is entered. The trick is based on the idea
    that \csname . . . \endcsname is \relax unless defined. Therefore we typeset authors by
    the special macro \csname typeset@author\the\num@authors\endcsname, which is
    defined by \orcid command.
1296 \renewcommand\author[2][{}%
1297 \IfSubStr{\detokenize{#2}}{,}{\ClassWarning{\@classname}{Do not put several
1298 authors in the same \string\author\space macro!}}{}%
1299 \global\advance\num@authors by 1\relax
1300 \if@insideauthorgroup\else
1301 \global\advance\num@authorgroups by 1\relax
1302 \global\@insideauthorgrouptrue
1303 \fi
1304 \ifx\addresses\@empty
1305 \if@ACM@anonymous
1306 \gdef\addresses{\@author{Anonymous Author(s)}%
1307 \ifx\@acmSubmissionID\@empty\else\Submission Id:
1308 \@acmSubmissionID\fi}}%
1309 \gdef\authors{Anonymous Author(s)}%
1310 \else
1311 \expandafter\gdef\expandafter\addresses\expandafter{%
1312 \expandafter\@author\expandafter{%
1313 \csname typeset@author\the\num@authors\endcsname{#2}}}%
1314 \gdef\authors{#2}%
1315 \fi
1316 \else
1317 \if@ACM@anonymous\else

```

```

1318 \expandafter\g@addto@macro\expandafter\addresses\expandafter{%
1319 \expandafter\and\expandafter\author\expandafter{%
1320 \csname typeset@author\the\num@authors\endcsname{#2}}}%
1321 \g@addto@macro\authors{\and#2}%
1322 \fi
1323 \fi
1324 \if@ACM@anonymous
1325 \ifx\shortauthors\@empty
1326 \gdef\shortauthors{Anon.
1327 \ifx\@acmSubmissionID\@empty\else Submission Id:
1328 \@acmSubmissionID\fi}%
1329 \fi
1330 \else
1331 \def\@tempa{#1}%
1332 \ifx\@tempa\@empty
1333 \ifx\shortauthors\@empty
1334 \gdef\shortauthors{#2}%
1335 \else
1336 \g@addto@macro\shortauthors{\and#2}%
1337 \fi
1338 \else
1339 \ifx\shortauthors\@empty
1340 \gdef\shortauthors{#1}%
1341 \else
1342 \g@addto@macro\shortauthors{\and#1}%
1343 \fi
1344 \fi
1345 \fi}

```

`\affiliation` The macro `\affiliation` mimics `\address` from `amsart`. Note that it has an optional argument, which we use differently from `amsart`.

```

1346 \newcommand{\affiliation}[2][{}]{%
1347 \global\@insideauthorgroupfalse
1348 \if@ACM@anonymous\else
1349 \g@addto@macro\addresses{\affiliation{#1}{#2}}%
1350 \fi}

```

`@ACM@affiliation@obeypunctuation` Whether to use the author's punctuation (false by default, which adds American-style address punctuation)

```

1351 \define@boolkey+{@ACM@affiliation@}{@ACM@affiliation@}{obeypunctuation}%
1352 [true]{}{\ClassError{\@classname}{The option obeypunctuation can be either true or false}}

```

`\additionalaffiliation` Additional affiliations go to footnotes

```

1353 \def\additionalaffiliation#1{\authornote{\@additionalaffiliation{#1}}}

```

`@additionalaffiliation` Process `\additionalaffiliation` inside `\authornote`

```

1354 \def\@additionalaffiliation#1{\bgroup
1355 \def\position##1{\ignorespaces}%
1356 \def\institution##1{##1\ignorespaces}%

```

```

1357 \def\department{\@ifnextchar[{\@department}{\@department[]}]%
1358 \def\@department[#1]#2{\unskip, ##2\ignorespaces}%
1359 \let\streetaddress\position
1360 \let\city\position
1361 \let\state\position
1362 \let\postcode\position
1363 \let\country\position
1364 Also with #1\unskip.\group}

\email The macro \email mimics \email from amsart. Again, it has an optional argument that
we do not currently need but keep for possible future use.
1365 \renewcommand{\email}[2][{}]{%
1366 \IfSubStr{#2}{,}{\ClassWarning{\@classname}{Do not put several
1367 addresses in the same \string\email\space macro!}}{}}%
1368 \if@ACM@anonymous\else
1369 \g@addto@macro\addresses{\email{#1}{#2}}%
1370 \fi}

\orcid We redefine the command to typeset the current author
1371 \def\orcid#1{\unskip\ignorespaces%
1372 \IfBeginWith{#1}{http}{%
1373 \expandafter\gdef\csname
1374 typeset@author\the\num@authors\endcsname##1{%
1375 \href{#1}{##1}}}%
1376 \expandafter\gdef\csname
1377 typeset@author\the\num@authors\endcsname##1{%
1378 \href{https://orcid.org/#1}{##1}}}}

\authorsaddresses Setting up authors' addresses
1379 \def\authorsaddresses#1{\def\@authorsaddresses{#1}}
1380 \authorsaddresses{\mkauthorsaddresses}

\@titlenotes The title notes
1381 \def\@titlenotes{}

\titlenote Adding a note to the title
1382 \def\titlenote#1{%
1383 \g@addto@macro\@title{\footnotemark}%
1384 \if@ACM@anonymous
1385 \g@addto@macro\@titlenotes{%
1386 \stepcounter{footnote}\footnotetext{Title note}}%
1387 \else
1388 \g@addto@macro\@titlenotes{\stepcounter{footnote}\footnotetext{#1}}%
1389 \fi}

\@subtitlenotes The subtitle notes
1390 \def\@subtitlenotes{}

```

```

\subtitlenote Adding a note to the subtitle
1391 \def\subtitlenote#1{%
1392   \g@addto@macro\@subtitle{\footnotemark}%
1393   \if@ACM@anonymous
1394     \g@addto@macro\@subtitlenotes{%
1395       \stepcounter{footnote}\footnotetext{Subtitle note}}%
1396   \else
1397     \g@addto@macro\@subtitlenotes{%
1398       \stepcounter{footnote}\footnotetext{#1}}%
1399   \fi}

\@authornotes The author notes
1400 \def\@authornotes{}

\authornote Adding a note to the author
1401 \def\authornote#1{%
1402   \if@ACM@anonymous\else
1403     \g@addto@macro\addresses{\@authornotemark}%
1404     \g@addto@macro\authornotes{%
1405       \stepcounter{footnote}\footnotetext{#1}}%
1406   \fi}

\authornotemark Adding a footnote mark to the authors
1407 \newcommand\authornotemark[1][\relax]{%
1408   \ifx#1\relax\relax\relax
1409     \g@addto@macro\addresses{\@authornotemark}%
1410   \else
1411     \g@addto@macro\addresses{\@authornotemark{#1}}%
1412   \fi}

\acmVolume The current volume
1413 \def\acmVolume#1{\def\@acmVolume{#1}}
1414 \acmVolume{1}

\acmNumber The current number
1415 \def\acmNumber#1{\def\@acmNumber{#1}}
1416 \acmNumber{1}

\acmArticle The current article
1417 \def\acmArticle#1{\def\@acmArticle{#1}}
1418 \acmArticle{}

\acmArticleSeq The sequence number
1419 \def\acmArticleSeq#1{\def\@acmArticleSeq{#1}}
1420 \acmArticleSeq{\@acmArticle}

\acmYear The current year
1421 \def\acmYear#1{\def\@acmYear{#1}}
1422 \acmYear{\the\year}

```

`\acmMonth` The current month  
1423 `\def\acmMonth#1{\def\acmMonth{#1}}`  
1424 `\acmMonth{the\month}`

`\@acmPubDate` The publication date  
1425 `\def\@acmPubDate{\ifcase\acmMonth\or`  
1426 `January\or February\or March\or April\or May\or June\or`  
1427 `July\or August\or September\or October\or November\or`  
1428 `December\fi}\@acmYear}`

`\acmPrice` The price  
1429 `\def\acmPrice#1{\def\acmPrice{#1}}`  
1430 `\acmPrice{15.00}`

`\acmSubmissionID` The submission ID  
1431 `\def\acmSubmissionID#1{\def\@acmSubmissionID{#1}}`  
1432 `\acmSubmissionID{}`

`\acmISBN` The book ISBN  
1433 `\def\acmISBN#1{\def\acmISBN{#1}}`  
1434 `\acmISBN{978-x-xxxx-xxxx-x/YY/MM}`

`\acmDOI` The paper DOI  
1435 `\def\acmDOI#1{\def\acmDOI{#1}}`  
1436 `\acmDOI{10.1145/nnnnnnn.nnnnnnn}`

`\if@ACM@badge` Whether to print a badge. Note that either a left or right badge triggers it:  
1437 `\newif\if@ACM@badge`  
1438 `\@ACM@badgefalse`

`\@ACM@badge@width` The width of the badge  
1439 `\newlength\@ACM@badge@width`  
1440 `\setlength\@ACM@badge@width{5pc}`

`\@ACM@title@width` The width of the badge  
1441 `\newlength\@ACM@title@width`

`\@ACM@badge@skip` The space between the badge and the title  
1442 `\newlength\@ACM@badge@skip`  
1443 `\setlength\@ACM@badge@skip{1pc}`

`\acmBadgeR` Setting the right badge  
1444 `\newcommand\acmBadgeR[2][\@ACM@badgetrue`  
1445 `\def\acmBadgeR@url{#1}%`  
1446 `\def\acmBadgeR@image{#2}}`  
1447 `\def\acmBadgeR@url{}`  
1448 `\def\acmBadgeR@image{}`

```

\acmBadgeL Setting the left badge
1449 \newcommand\acmBadgeL[2][\@ACM@badgetrue
1450 \def\@acmBadgeL@url{#1}%
1451 \def\@acmBadgeL@image{#2}}
1452 \def\@acmBadgeL@url{}
1453 \def\@acmBadgeL@image{}

\startPage The start page of the paper
1454 \def\startPage#1{\def\@startPage{#1}}
1455 \startPage{}

\terms Terms are obsolete. We use CCS now.
1456 \def\terms#1{\ClassWarning{\@classname}{The command \string\terms} is
1457   obsolete. I am going to ignore it}}

\keywords Keywords are mostly obsolete. We use CCS now. Still it makes sense to keep them for
compatibility.
1458 \def\keywords#1{\def\@keywords{#1}}
1459 \let\@keywords\@empty

1460 \AtEndDocument{\if@ACM@nonacm\else\ifx\@keywords\@empty
1461 \ifnum\getrefnumber{TotPages}>2\relax
1462 \ClassWarningNoLine{\@classname}{ACM keywords are mandatory
1463   for papers over two pages}%
1464 \fi\fi\fi}

abstract The amsart package puts abstract in a box. Since we do not know whether we will
use two-column mode, we prefer to save the text
1465 \renewenvironment{abstract}{\Collect@Body\@saveabstract}{ }

\@saveabstract And saving the abstract
1466 \long\def\@saveabstract#1{\if@ACM@maketitle@typeset
1467 \ClassError{\@classname}{Abstract must be defined before maketitle
1468   command. Please move it!}\fi
1469 \long\gdef\@abstract{#1}}
1470 \@saveabstract{}

\@empty The long version of \@empty (to compare with \@abstract)
1471 \long\def\@empty{}

\if@ACM@printccs Whether to print CCS
1472 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printccs}[true]{%
1473 \if@ACM@printccs
1474 \ClassInfo{\@classname}{Printing CCS}%
1475 \else
1476 \ClassInfo{\@classname}{Suppressing CCS}%
1477 \fi}{\ClassError{\@classname}{The option printccs can be either true or false}}

```

```

\if@ACM@printacmref Whether to print the ACM bibstrip
1478 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printacmref}[true]{%
1479   \if@ACM@printacmref
1480     \ClassInfo{\@classname}{Printing bibformat}%
1481   \else
1482     \ClassInfo{\@classname}{Suppressing bibformat}%
1483 \fi}{\ClassError{\@classname}{The option printacmref can be either true or false}}

1484 \AtEndDocument{\if@ACM@nonacm\else\if@ACM@printacmref\else
1485   \ifnum\getrefnumber{TotPages}>1\relax
1486   \ClassWarningNoLine{\@classname}{%
1487     ACM reference format is mandatory \MessageBreak
1488     for papers over one page. \MessageBreak
1489     Please add printacmref=true to the \MessageBreak
1490     \string\settopmatter\space command.}%
1491   \fi\fi\fi}

\if@ACM@printfolios Whether to print folios
1492 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printfolios}[true]{%
1493   \if@ACM@printfolios
1494     \ClassInfo{\@classname}{Printing folios}%
1495   \else
1496     \ClassInfo{\@classname}{Suppressing folios}%
1497 \fi}{\ClassError{\@classname}{The option printfolios can be either true or false}}

\@ACM@authorssperrow The number of authors per row. 0 means use the default algorithm.
1498 \define@cmdkey{@ACM@topmatter@}[@ACM@]{authorssperrow}[0]{%
1499   \IfInteger{#1}{\ClassInfo{\@classname}{Setting authorssperrow to
1500     #1}}{\ClassWarning{\@classname}{The parameter authorssperrow must be
1501     numerical. Ignoring the input #1}}\gdef\@ACM@authorssperrow{0}}

\settopmatter The usual syntactic sugar
1502 \def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}

Now the settings
1503 \settopmatter{printccs=true, printacmref=true}
1504 \if@ACM@manuscript
1505   \settopmatter{printfolios=true}
1506 \else
1507   \if@ACM@journal
1508     \settopmatter{printfolios=true}
1509   \else
1510     \settopmatter{printfolios=false}
1511   \fi
1512 \fi
1513 \settopmatter{authorssperrow=0}

\@received The container for the paper history
1514 \def\@received{}

```

`\received` The `\received` command

```

1515 \newcommand\received[2][\def\tempa{#1}%
1516 \ifx\tempa\empty
1517 \ifx\@received\empty
1518 \gdef\@received{Received #2}%
1519 \else
1520 \g@addto@macro{\@received}{; revised #2}%
1521 \fi
1522 \else
1523 \ifx\@received\empty
1524 \gdef\@received{#1 #2}%
1525 \else
1526 \g@addto@macro{\@received}{; #1 #2}%
1527 \fi
1528 \fi}
1529 \AtEndDocument{%
1530 \ifx\@received\empty\else
1531 \par\bigskip\noindent\small\normalfont\@received\par
1532 \fi}

```

### 3.13 Concepts system

We exclude CCSXML stuff generated by the ACM system:

```

1533 \RequirePackage{comment}
1534 \excludecomment{CCSXML}

```

`\@concepts` This is the storage macro and counter for concepts

```

1535 \let\@concepts\empty
1536 \newcounter{@concepts}

```

`\ccsdesc` The first argument is the significance, the second is the concept(s)

```

1537 \newcommand\ccsdesc[2][100]{%
1538 \ccsdesc@parse#1~#2~~\ccsdesc@parse@end}

```

`\ccsdesc@parse` The parser of the expression Significance~General~Specific (we need `textcomp` for `\textrightarrow`). Note that Specific can be empty!

```

1539 \def\textrightarrow{\rightarrow}
1540 \def\ccsdesc@parse#1~#2~#3~{%
1541 \stepcounter{@concepts}%
1542 \expandafter\ifx\csname CCS@General@#2\endcsname\relax
1543 \expandafter\gdef\csname CCS@General@#2\endcsname{\textbullet\
1544 \textbf{#2}}%
1545 \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{; }%
1546 \expandafter\gdef\csname CCS@Specific@#2\endcsname{}%
1547 \g@addto@macro{\@concepts}{\csname CCS@General@#2\endcsname
1548 \csname CCS@Punctuation@#2\endcsname
1549 \csname CCS@Specific@#2\endcsname}%
1550 \fi
1551 \ifx#3\relax\relax\else

```

```

1552 \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{
1553   \textrightarrow\ }%
1554 \expandafter\g@addto@macro\expandafter{\csname CCS@Specific@#2\endcsname}{%
1555   \addtocounter{@concepts}{-1}%
1556   \ifnum#1>499\textbf{#3}\else
1557   \ifnum#1>299\textit{#3}\else
1558   #3\fi\fi\ifnum\value{@concepts}=0.\else; \fi}%
1559 \fi
1560 \ccsdesc@parse@finish}

1561 \AtEndDocument{\if@ACM@nonacm\else\ifx\@concepts\empty\relax
1562   \ifnum\getrefnumber{TotPages}>2\relax
1563   \ClassWarningNoLine{\@classname}{CCS concepts are mandatory
1564     for papers over two pages}%
1565   \fi\fi\fi}

```

```

\ccdesc@parse@finish Gobble everything to \ccsdesc@parse@end
1566 \def\ccsdesc@parse@finish#1\ccsdesc@parse@end{}

```

### 3.14 Copyright system

This is from acmcopyright.sty

```

\if@printcopyright Whether to print a copyright symbol
1567 \newif\if@printcopyright
1568 \@printcopyrighttrue

```

```

\if@printpermission Whether to print the permission block
1569 \newif\if@printpermission
1570 \@printpermissiontrue

```

```

\if@acmowned Whether the ACM owns the rights to the paper
1571 \newif\if@acmowned
1572 \@acmownedtrue

```

Keys:

```

1573 \define@choicekey*{ACM@}{acmcopyrightmode}[%
1574   \acm@copyrightinput\acm@copyrightmode]{none,%
1575   acmcopyright,acmlicensed,rightsretained,%
1576   usgov,usgovmixed,cagov,cagovmixed,licensedusgovmixed,%
1577   licensedcagov,licensedcagovmixed,othergov,licensedothergov,%
1578   iw3c2w3,iw3c2w3g}{%
1579   \@printpermissiontrue
1580   \@printcopyrighttrue
1581   \@acmownedtrue
1582   \ifnum\acm@copyrightmode=0\relax % none
1583   \@printpermissionfalse
1584   \@printcopyrightfalse
1585   \@acmownedfalse

```

```

1586 \fi
1587 \ifnum\acm@copyrightmode=2\relax % acmlicensed
1588 \@acmownedfalse
1589 \fi
1590 \ifnum\acm@copyrightmode=3\relax % rightsretained
1591 \@acmownedfalse
1592 \AtBeginDocument{\acmPrice{}}%
1593 \fi
1594 \ifnum\acm@copyrightmode=4\relax % usgov
1595 \@printpermissiontrue
1596 \@printcopyrightfalse
1597 \@acmownedfalse
1598 \AtBeginDocument{\acmPrice{}}%
1599 \fi
1600 \ifnum\acm@copyrightmode=6\relax % cagov
1601 \@acmownedfalse
1602 \fi
1603 \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
1604 \@acmownedfalse
1605 \fi
1606 \ifnum\acm@copyrightmode=9\relax % licensedcagov
1607 \@acmownedfalse
1608 \fi
1609 \ifnum\acm@copyrightmode=10\relax % licensedcagovmixed
1610 \@acmownedfalse
1611 \fi
1612 \ifnum\acm@copyrightmode=11\relax % othergov
1613 \@acmownedtrue
1614 \fi
1615 \ifnum\acm@copyrightmode=12\relax % licensedothergov
1616 \@acmownedfalse
1617 \fi
1618 \ifnum\acm@copyrightmode=13\relax % iw3c2w3
1619 \@acmownedfalse
1620 \AtBeginDocument{\acmPrice{}}%
1621 \fi
1622 \ifnum\acm@copyrightmode=14\relax % iw3c2w3g
1623 \@acmownedfalse
1624 \AtBeginDocument{\acmPrice{}}%
1625 \fi}

```

`\setcopyright` This is the syntactic sugar around setting keys.

```

1626 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}
1627 \setcopyright{acmcopyright}

```

`\@copyrightowner` Here is the owner of the copyright

```

1628 \def\@copyrightowner{%
1629 \ifcase\acm@copyrightmode\relax % none
1630 \or % acmcopyright
1631 Association for Computing Machinery.

```

1632 \or % acmlicensed  
1633 Copyright held by the owner/author(s). Publication rights licensed to  
1634 ACM\@.  
1635 \or % rightsretained  
1636 Copyright held by the owner/author(s).  
1637 \or % usgov  
1638 \or % usgovmixed  
1639 Association for Computing Machinery.  
1640 \or % cagov  
1641 Crown in Right of Canada.  
1642 \or %cagovmixed  
1643 Association for Computing Machinery.  
1644 \or %licensedusgovmixed  
1645 Copyright held by the owner/author(s). Publication rights licensed to  
1646 ACM\@.  
1647 \or % licensedcagov  
1648 Crown in Right of Canada. Publication rights licensed to  
1649 ACM\@.  
1650 \or %licensedcagovmixed  
1651 Copyright held by the owner/author(s). Publication rights licensed to  
1652 ACM\@.  
1653 \or % othergov  
1654 Association for Computing Machinery.  
1655 \or % licensedothergov  
1656 Copyright held by the owner/author(s). Publication rights licensed to  
1657 ACM\@.  
1658 \or % ic2w3www  
1659 IW3C2 (International World Wide Web Conference Committee), published  
1660 under Creative Commons CC-BY~4.0 License.  
1661 \or % ic2w3wwwgoogle  
1662 IW3C2 (International World Wide Web Conference Committee), published  
1663 under Creative Commons CC-BY-NC-ND~4.0 License.  
1664 \fi}

\@formatdoi Print a clickable DOI

1665 \def\@formatdoi#1{\url{https://doi.org/#1}}

\@copyrightpermission The canned permission block.

1666 \def\@copyrightpermission{%  
1667 \ifcase\acm@copyrightmode\relax % none  
1668 \or % acmcopyright  
1669 Permission to make digital or hard copies of all or part of this  
1670 work for personal or classroom use is granted without fee provided  
1671 that copies are not made or distributed for profit or commercial  
1672 advantage and that copies bear this notice and the full citation on  
1673 the first page. Copyrights for components of this work owned by  
1674 others than ACM must be honored. Abstracting with credit is  
1675 permitted. To copy otherwise, or republish, to post on servers or to  
1676 redistribute to lists, requires prior specific permission  
1677 and\hspace\*{.5pt}/or a fee. Request permissions from

1678 permissions@acm.org.  
1679 \or % acmlicensed  
1680 Permission to make digital or hard copies of all or part of this  
1681 work for personal or classroom use is granted without fee provided  
1682 that copies are not made or distributed for profit or commercial  
1683 advantage and that copies bear this notice and the full citation on  
1684 the first page. Copyrights for components of this work owned by  
1685 others than the author(s) must be honored. Abstracting with credit  
1686 is permitted. To copy otherwise, or republish, to post on servers  
1687 or to redistribute to lists, requires prior specific permission  
1688 and\hspace\*{.5pt}/or a fee. Request permissions from  
1689 permissions@acm.org.  
1690 \or % rightsretained  
1691 Permission to make digital or hard copies of part or all of this work  
1692 for personal or classroom use is granted without fee provided that  
1693 copies are not made or distributed for profit or commercial advantage  
1694 and that copies bear this notice and the full citation on the first  
1695 page. Copyrights for third-party components of this work must be  
1696 honored. For all other uses, contact the  
1697 owner\hspace\*{.5pt}/author(s).  
1698 \or % usgov  
1699 This paper is authored by an employee(s) of the United States  
1700 Government and is in the public domain. Non-exclusive copying or  
1701 redistribution is allowed, provided that the article citation is  
1702 given and the authors and agency are clearly identified as its  
1703 source.  
1704 \or % usgovmixed  
1705 ACM acknowledges that this contribution was authored or co-authored  
1706 by an employee, contractor, or affiliate of the United States  
1707 government. As such, the United States government retains a  
1708 nonexclusive, royalty-free right to publish or reproduce this  
1709 article, or to allow others to do so, for government purposes only.  
1710 \or % cagov  
1711 This article was authored by employees of the Government of Canada.  
1712 As such, the Canadian government retains all interest in the  
1713 copyright to this work and grants to ACM a nonexclusive,  
1714 royalty-free right to publish or reproduce this article, or to allow  
1715 others to do so, provided that clear attribution is given both to  
1716 the authors and the Canadian government agency employing them.  
1717 Permission to make digital or hard copies for personal or classroom  
1718 use is granted. Copies must bear this notice and the full citation  
1719 on the first page. Copyrights for components of this work owned by  
1720 others than the Canadian Government must be honored. To copy  
1721 otherwise, distribute, republish, or post, requires prior specific  
1722 permission and\hspace\*{.5pt}/or a fee. Request permissions from  
1723 permissions@acm.org.  
1724 \or % cagovmixed  
1725 ACM acknowledges that this contribution was co-authored by an  
1726 affiliate of the national government of Canada. As such, the Crown  
1727 in Right of Canada retains an equal interest in the copyright.

1728 Reprints must include clear attribution to ACM and the author's  
1729 government agency affiliation. Permission to make digital or hard  
1730 copies for personal or classroom use is granted. Copies must bear  
1731 this notice and the full citation on the first page. Copyrights for  
1732 components of this work owned by others than ACM must be honored.  
1733 To copy otherwise, distribute, republish, or post, requires prior  
1734 specific permission and\hspace\*{.5pt}/or a fee. Request permissions  
1735 from permissions@acm.org.

1736 \or % licensedusgovmixed

1737 Publication rights licensed to ACM\@. ACM acknowledges that this  
1738 contribution was authored or co-authored by an employee, contractor  
1739 or affiliate of the United States government. As such, the  
1740 Government retains a nonexclusive, royalty-free right to publish or  
1741 reproduce this article, or to allow others to do so, for Government  
1742 purposes only.

1743 \or % licensedcagov

1744 This article was authored by employees of the Government of Canada.  
1745 As such, the Canadian government retains all interest in the  
1746 copyright to this work and grants to ACM a nonexclusive,  
1747 royalty-free right to publish or reproduce this article, or to allow  
1748 others to do so, provided that clear attribution is given both to  
1749 the authors and the Canadian government agency employing them.  
1750 Permission to make digital or hard copies for personal or classroom  
1751 use is granted. Copies must bear this notice and the full citation  
1752 on the first page. Copyrights for components of this work owned by  
1753 others than the Canadian Government must be honored. To copy  
1754 otherwise, distribute, republish, or post, requires prior specific  
1755 permission and\hspace\*{.5pt}/or a fee. Request permissions from  
1756 permissions@acm.org.

1757 \or % licensedcagovmixed

1758 Publication rights licensed to ACM\@. ACM acknowledges that this  
1759 contribution was authored or co-authored by an employee, contractor  
1760 or affiliate of the national government of Canada. As such, the  
1761 Government retains a nonexclusive, royalty-free right to publish or  
1762 reproduce this article, or to allow others to do so, for Government  
1763 purposes only.

1764 \or % othergov

1765 ACM acknowledges that this contribution was authored or co-authored  
1766 by an employee, contractor or affiliate of a national government. As  
1767 such, the Government retains a nonexclusive, royalty-free right to  
1768 publish or reproduce this article, or to allow others to do so, for  
1769 Government purposes only.

1770 \or % licensedothergov

1771 Publication rights licensed to ACM\@. ACM acknowledges that this  
1772 contribution was authored or co-authored by an employee, contractor  
1773 or affiliate of a national government. As such, the Government  
1774 retains a nonexclusive, royalty-free right to publish or reproduce  
1775 this article, or to allow others to do so, for Government purposes  
1776 only.

1777 \or % iw3c2w3

```

1778 This paper is published under the Creative Commons Attribution~4.0
1779 International (CC-BY~4.0) license. Authors reserve their rights to
1780 disseminate the work on their personal and corporate Web sites with
1781 the appropriate attribution.
1782 \or % iw3c2w3g
1783 This paper is published under the Creative Commons
1784 Attribution-NonCommercial-NoDerivs~4.0 International
1785 (CC-BY-NC-ND~4.0) license. Authors reserve their rights to
1786 disseminate the work on their personal and corporate Web sites with
1787 the appropriate attribution.
1788 \fi}

```

`\copyrightyear` By default, the copyright year is the same as `\acmYear`, but one can override this:

```

1789 \def\copyrightyear#1{\def\copyrightyear{#1}}
1790 \copyrightyear{\acmYear}

```

`\@teaserfigures` The teaser figures container

```

1791 \def\@teaserfigures{}

```

`teaserfigure` The teaser figure

```

1792 \newenvironment{teaserfigure}{\Collect@Body\@saveteaser}{}

```

`\@saveteaser` Saving the teaser

```

1793 \long\def\@saveteaser#1{\g@addto@macro\@teaserfigures{\@teaser{#1}}}

```

`\thanks` We redefine `amsart \thanks` so the anonymous key works

```

1794 \renewcommand{\thanks}[1]{%
1795   \@ifnotempty{#1}{%
1796     \if@ACM@anonymous
1797       \g@addto@macro\thankses{\thanks{A note}}%
1798     \else
1799       \g@addto@macro\thankses{\thanks{#1}}%
1800     \fi}}

```

### 3.15 Maketitle hook

The current  $\LaTeX$  provides a nice `lthooks` mechanism. However, since it is relatively new, we will use oldfashioned approach—at least for now.

`\@beginmaketitlehook` The hook

```

1801 \ifx\@beginmaketitlehook\@undefined
1802   \let\@beginmaketitlehook\@empty
1803 \fi

```

`\AtBeginMaketitle` Adding to the hook

```

1804 \def\AtBeginMaketitle{\g@addto@macro\@beginmaketitlehook}

```

### 3.16 Typesetting top matter

`\mktitle@bx` Some of our formats use a two-column design. Some use a one-column design. In all cases we use a wide title. Thus we typeset the top matter in a special box to be used in the construction `\@twocolumn[⟨box⟩]`.

```
1805 \newbox\mktitle@bx
```

`\maketitle` The (in)famous `\maketitle`. Note that in `sigchi-a` mode, authors are *not* in the title box.

Another note: there is a subtle difference between author notes, title notes and thanks. The latter two refer to the paper itself and therefore belong to the copyright/permission block. By the way, this was the default behavior of the old ACM classes.

```
1806 \def\maketitle{\@beginmaketitlehook
1807   \@ACM@maketitle@typesettrue
1808   \if@ACM@anonymous
1809     % Anonymize omission of \author-s
1810     \ifnum\@authorgroups=0\author{}\fi
1811   \fi
1812   \begingroup
1813   \let\@vspace\@vspace@orig
1814   \let\@vspacer\@vspacer@orig
1815   \let\@footnotemark\@footnotemark@nolink
1816   \let\@footnotetext\@footnotetext@nolink
1817   \renewcommand\thefootnote{\@fnsymbol\c@footnote}%
1818   \hsize=\textwidth
1819   \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}%
1820   \@mktitle\if@ACM@sigchiamode\else\mkauthors\fi\mkteasers
1821   \@printtopmatter
1822   \if@ACM@sigchiamode\mkauthors\fi
1823   \setcounter{footnote}{0}%
1824   \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}%
1825   \@titlenotes
1826   \@subtitlenotes
1827   \@authornotes
1828   \let\@makefnmark\relax
1829   \let\@thefnmark\relax
1830   \let\@makefntext\noindent
1831   \ifx\@empty\thankses\else
1832     \footnotetextauthorsaddresses{%
1833       \def\par{\let\par\@par}\parindent\z@\@setthanks}%
1834   \fi
1835   \ifx\@empty\@authorsaddresses\else
1836     \if@ACM@anonymous\else
1837       \if@ACM@journal@bibstrip
1838         \footnotetextauthorsaddresses{%
1839           \def\par{\let\par\@par}\parindent\z@\@setauthorsaddresses}%
1840     \fi
1841   \fi
1842 \fi
```

```

1843 \if@ACM@nonacm\else\footnotetextcopyrightpermission{%
1844 \if@ACM@authordraft
1845     \raisebox{-2ex}[\z@][\z@]{\makebox[0pt][l]{\large\bfseries
1846         Unpublished working draft. Not for distribution.}}%
1847     \color[gray]{0.9}%
1848 \fi
1849 \parindent\z@\parskip0.1\baselineskip
1850 \if@ACM@authorversion\else
1851     \if@printpermission\@copyrightpermission\par\fi
1852 \fi
1853 \if@ACM@manuscript\else
1854     \if@ACM@journal@bibstrip\else % Print the conference information
1855     {\itshape \acmConference@shortname, \acmConference@date, \acmConference@venue}\par
1856     \fi
1857 \fi
1858 \if@printcopyright
1859     \copyright\ \@copyrightyear\ \@copyrightowner\
1860 \else
1861     \@copyrightyear.\
1862 \fi
1863 \if@ACM@manuscript
1864     Manuscript submitted to ACM\
1865 \else
1866     \if@ACM@authorversion
1867         This is the author's version of the work. It is posted here for
1868         your personal use. Not for redistribution. The definitive Version
1869         of Record was published in
1870         \if@ACM@journal@bibstrip
1871             \emph{\@journalName}%
1872         \else
1873             \emph{\@acmBooktitle}%
1874         \fi
1875         \ifx\@acmDOI\@empty
1876             .
1877         \else
1878             , \@formatdoi{\@acmDOI}.
1879         \fi\
1880 \else
1881     \if@ACM@nonacm\else
1882         \if@ACM@journal@bibstrip
1883             \@permissionCodeOne/\@acmYear/\@acmMonth-ART\@acmArticle
1884             \ifx\@acmPrice\@empty\else\ $\@acmPrice\fi\
1885             \@formatdoi{\@acmDOI}%
1886         \else % Conference
1887             \ifx\@acmISBN\@empty\else ACM~ISBN~\@acmISBN
1888             \ifx\@acmPrice\@empty.\else\dots\$\@acmPrice\fi\fi
1889             \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi
1890         \fi
1891     \fi
1892 \fi

```

```

1893     \fi}
1894     \fi
1895 \endgroup
1896 \setcounter{footnote}{0}%
1897 \@mkabstract
1898 \if@ACM@printccs
1899 \ifx\@concepts\@empty\else\bgroup
1900     {\@specialsection{CCS Concepts}%
1901     \noindent\@concepts\par}\egroup
1902     \fi
1903     \fi
1904 \ifx\@keywords\@empty\else\bgroup
1905     {\if@ACM@journal
1906     \@specialsection{Additional Key Words and Phrases}%
1907     \else
1908     \@specialsection{Keywords}%
1909     \fi
1910     \noindent\@keywords\par}\egroup
1911     \fi
1912 \let\metadata@authors=\authors
1913 \xandlist{, }{, }{\, }\metadata@authors
1914 \def\@ACM@checkaffil{}%
1915 \hypersetup{%
1916     pdfauthor={\metadata@authors},
1917     pdftitle={\@title},
1918     pdfsubject={\@concepts},
1919     pdfkeywords={\@keywords},
1920     pdfcreator={LaTeX with acmart
1921     \csname ver@acmart.cls\endcsname\space
1922     and hyperref
1923     \csname ver@hyperref.sty\endcsname}}%
1924 \andify\authors
1925 \andify\shortauthors
1926 \global\let\authors=\authors
1927 \global\let\shortauthors=\shortauthors
1928 \if@ACM@printacmref
1929     \@mkbibcitation
1930 \fi
1931 \global\@topnum\z@ % this prevents floats from falling
1932                 % at the top of page 1
1933 \global\@botnum\z@ % we do not want them to be on the bottom either
1934 \@printendtopmatter
1935 \@afterindentfalse
1936 \@afterheading
1937 }

```

`\@specialsection` This macro starts sections for proceedings and uses `\small` for journals

```

1938 \def\@specialsection#1{%
1939     \let\@vspace\@vspace@orig
1940     \let\@vspacer\@vspacer@orig

```

```

1941 \ifcase\ACM@format@nr
1942 \relax % manuscript
1943 \par\medskip\small\noindent#1: %
1944 \or % acmsmall
1945 \par\medskip\small\noindent#1: %
1946 \or % acmlarge
1947 \par\medskip\small\noindent#1: %
1948 \or % acmtog
1949 \par\medskip\small\noindent#1: %
1950 \or % sigconf
1951 \section*{#1}%
1952 \or % siggraph
1953 \section*{#1}%
1954 \or % sigplan
1955 \noindentparagraph*{#1:~}%
1956 \or % sigchi
1957 \section*{#1}%
1958 \or % sigchi-a
1959 \section*{#1}%
1960 \fi
1961 \let\@vspace\@vspace@acm
1962 \let\@vspacer\@vspacer@acm
1963 }

```

`\@printtopmatter` The printing of top matter starts a new page and uses the given title box. Note that for `sigchi-a` we print badges here rather than in `\mktitle` since we want them in the margins.

Note that if there are too many authors, `\mktitle@bx` might overflow the page. Therefore we start with checking this and if this happens, we split the box and print it page by page.

```

1964 \def\@printtopmatter{%
1965 \ifx\@startPage\@empty
1966 \gdef\@startPage{1}%
1967 \else
1968 \setcounter{page}{\@startPage}%
1969 \fi
1970 \@tempdima=\ht\mktitle@bx
1971 \advance\@tempdima by \dp\mktitle@bx
1972 \ifdim\@tempdima>0.9\textheight
1973 \loop
1974 \setbox\@tempboxa=\vsplit \mktitle@bx to 0.9\textheight
1975 \thispagestyle{firstpagestyle}%
1976 \noindent\unvbox\@tempboxa
1977 \clearpage
1978 \@tempdima=\ht\mktitle@bx
1979 \advance\@tempdima by \dp\mktitle@bx
1980 \ifdim\@tempdima>0.9\textheight\repeat
1981 \fi
1982 \thispagestyle{firstpagestyle}%

```

```

1983 \noindent
1984 \ifcase\ACM@format@nr
1985 \relax % manuscript
1986 \box\mktitle@bx\par
1987 \or % acsmall
1988 \box\mktitle@bx\par
1989 \or % acmlarge
1990 \box\mktitle@bx\par
1991 \or % acmtog
1992 \twocolumn[\box\mktitle@bx]%
1993 \or % sigconf
1994 \twocolumn[\box\mktitle@bx]%
1995 \or % siggraph
1996 \twocolumn[\box\mktitle@bx]%
1997 \or % sigplan
1998 \twocolumn[\box\mktitle@bx]%
1999 \or % sigchi
2000 \twocolumn[\box\mktitle@bx]%
2001 \or % sigchi-a
2002 \par\box\mktitle@bx\par\bigskip
2003 \if@ACM@badge
2004 \marginpar{\noindent
2005 \ifx\@acmBadgeL@image\empty\else
2006 \href{\@acmBadgeL@url}{%
2007 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}%
2008 \hskip\@ACM@badge@skip
2009 \fi
2010 \ifx\@acmBadgeR@image\empty\else
2011 \href{\@acmBadgeR@url}{%
2012 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}%
2013 \fi}%
2014 \fi
2015 \fi
2016 }

```

\@mktitle The title of the article

```

2017 \def\@mktitle{%
2018 \ifcase\ACM@format@nr
2019 \relax % manuscript
2020 \@mktitle@i
2021 \or % acsmall
2022 \@mktitle@i
2023 \or % acmlarge
2024 \@mktitle@i
2025 \or % acmtog
2026 \@mktitle@i
2027 \or % sigconf
2028 \@mktitle@iii
2029 \or % siggraph
2030 \@mktitle@iii

```

```

2031 \or % sigplan
2032   \@mkttitle@iii
2033 \or % sigchi
2034   \@mkttitle@iii
2035 \or % sigchi-a
2036   \@mkttitle@iv
2037 \fi
2038 }

```

`\@titlefont` The font to typeset the title

```

2039 \def\@titlefont{%
2040   \ifcase\ACM@format@nr
2041   \relax % manuscript
2042     \LARGE\sffamily\bfseries
2043   \or % acmsmall
2044     \LARGE\sffamily\bfseries
2045   \or % acmlarge
2046     \LARGE\sffamily\bfseries
2047   \or % acmtog
2048     \Huge\sffamily
2049   \or % sigconf
2050     \Huge\sffamily\bfseries
2051   \or % siggraph
2052     \Huge\sffamily\bfseries
2053   \or % sigplan
2054     \Huge\bfseries
2055   \or % sigchi
2056     \Huge\sffamily\bfseries
2057   \or % sigchi-a
2058     \Huge\bfseries
2059   \fi}

```

`\@subtitlefont` The font to typeset the subtitle

```

2060 \def\@subtitlefont{\normalsize
2061   \ifcase\ACM@format@nr
2062   \relax % manuscript
2063     \mdseries
2064   \or % acmsmall
2065     \mdseries
2066   \or % acmlarge
2067     \mdseries
2068   \or % acmtog
2069     \LARGE
2070   \or % sigconf
2071     \LARGE\mdseries
2072   \or % siggraph
2073     \LARGE\mdseries
2074   \or % sigplan
2075     \LARGE\mdseries
2076   \or % sigchi

```

```

2077 \LARGE\mdseries
2078 \or % sigchi-a
2079 \mdseries
2080 \fi}

```

`\@mkttitle@i` The version of `\mkttitle` for most journals

```

2081 \def\@mkttitle@i{\hsize=\textwidth
2082 \@ACM@title@width=\hsize
2083 \ifx\@acmBadgeL@image\@empty\else
2084 \advance\@ACM@title@width by -\@ACM@badge@width
2085 \advance\@ACM@title@width by -\@ACM@badge@skip
2086 \fi
2087 \ifx\@acmBadgeR@image\@empty\else
2088 \advance\@ACM@title@width by -\@ACM@badge@width
2089 \advance\@ACM@title@width by -\@ACM@badge@skip
2090 \fi
2091 \setbox\mkttitle@bx=\vbox{\noindent\@titlefont
2092 \ifx\@acmBadgeL@image\@empty\else
2093 \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeL@url}{%
2094 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
2095 \hskip\@ACM@badge@skip
2096 \fi
2097 \parbox[t]{\@ACM@title@width}{\raggedright
2098 \@titlefont\noindent
2099 \@title
2100 \ifx\@subtitle\@empty\else
2101 \par\noindent{\@subtitlefont\@subtitle}
2102 \fi}%
2103 \ifx\@acmBadgeR@image\@empty\else
2104 \hskip\@ACM@badge@skip
2105 \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeR@url}{%
2106 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
2107 \fi
2108 \par\bigskip}}%

```

`\@mkttitle@ii` The version of `\mkttitle` for TOG. Since v1.06, this is subsumed by the `\mkttitle@i` macro

`\@mkttitle@iii` The version of `\@mkttitle` for SIG proceedings. Note that since the title is centered, we leave space for the left badge even if only the right badge is defined.

```

2109 \def\@mkttitle@iii{\hsize=\textwidth
2110 \setbox\mkttitle@bx=\vbox{\@titlefont\centering
2111 \@ACM@title@width=\hsize
2112 \if\@ACM@badge
2113 \advance\@ACM@title@width by -2\@ACM@badge@width
2114 \advance\@ACM@title@width by -2\@ACM@badge@skip
2115 \parbox[b]{\@ACM@badge@width}{\strut
2116 \ifx\@acmBadgeL@image\@empty\else
2117 \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeL@url}{%
2118 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%

```

```

2119         \fi}%
2120         \hskip\@ACM@badge@skip
2121     \fi
2122     \parbox[t]{\@ACM@title@width}{\centering\@titlefont
2123         \@title
2124         \ifx\@subtitle\@empty\else
2125             \par\noindent{\@subtitlefont\@subtitle}
2126         \fi
2127     }%
2128     \if@ACM@badge
2129         \hskip\@ACM@badge@skip
2130         \parbox[b]{\@ACM@badge@width}{\strut
2131             \ifx\@acmBadgeR@image\@empty\else
2132                 \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeR@url}{%
2133                     \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
2134             \fi}%
2135         \fi
2136     \par\bigskip}}%

```

`\@mktitle@iv` The version of `\@mktitle` for sigchi-a

```

2137 \def\@mktitle@iv{\hsize=\textwidth
2138     \setbox\mktitle@bx=\vbox{\raggedright\leftskip5pc\@titlefont
2139         \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
2140         \noindent\@title
2141         \ifx\@subtitle\@empty\else
2142             \par\noindent\@subtitlefont\@subtitle
2143         \fi
2144     \par\bigskip}}%

```

`\@ACM@addtoaddress` This macro adds an item to the address using the following rules:

1. If we start a paragraph, add the item
2. Otherwise, add a comma and the item
3. However, the comma is deleted if it is at the end of a line. We use the magic `\cleaders` trick for this.

```

2145 \newbox\@ACM@commabox
2146 \def\@ACM@addtoaddress#1{%
2147     \ifvmode\else
2148         \if@ACM@affiliation@obeypunctuation\else
2149             \setbox\@ACM@commabox=\hbox{, }%
2150             \unskip\cleaders\copy\@ACM@commabox\hskip\wd\@ACM@commabox
2151         \fi\fi
2152     #1}

```

`\institution` Theoretically we can define the macros for `\affiliation` inside the `\@mkauthors`-style  
`\position` commands. However, this would lead to a strange error if an author uses them outside  
`\department` `\affiliation`. Of course we can make them produce an error message, but...  
`\streetaddress`  
`\city`  
`\state`  
`\postcode`  
`\country`

```

2153 \def\streetaddress#1{\unskip\ignorespaces}
2154 \def\postcode#1{\unskip\ignorespaces}
2155 \if@ACM@journal
2156   \def\position#1{\unskip\ignorespaces}
2157   \def\institution#1{\global\@ACM@instpresenttrue
2158     \unskip~#1\ignorespaces}
2159   \def\city#1{\global\@ACM@citypresenttrue\unskip\ignorespaces}
2160   \def\state#1{\unskip\ignorespaces}
2161   \newcommand\department[2][0]{\unskip\ignorespaces}
2162   \def\country#1{\global\@ACM@countrypresenttrue
2163     \if@ACM@affiliation@obeypunctuation\else, \fi#1\ignorespaces}
2164 \else
2165   \def\position#1{\if@ACM@affiliation@obeypunctuation#1\else#1\par\fi}%
2166   \def\institution#1{\global\@ACM@instpresenttrue
2167     \if@ACM@affiliation@obeypunctuation#1\else#1\par\fi}%
2168   \newcommand\department[2][0]{\if@ACM@affiliation@obeypunctuation
2169     #2\else#2\par\fi}%
2170 % \def\streetaddress#1{\if@ACM@affiliation@obeypunctuation#1\else#1\par\fi}%
2171 \def\city#1{\global\@ACM@citypresenttrue\@ACM@addtoaddress{#1}}%
2172 \let\state\@ACM@addtoaddress
2173 % \def\postcode#1{\if@ACM@affiliation@obeypunctuation#1\else\unskip\space#1\fi}%
2174 \def\country#1{\global\@ACM@countrypresenttrue\@ACM@addtoaddress{#1}}%
2175 \fi

```

#### \@mkauthors Typesetting the authors

```

2176 \def\@mkauthors{\begingroup
2177   \hsize=\textwidth
2178   \ifcase\ACM@format@nr
2179   \relax % manuscript
2180     \@mkauthors@i
2181   \or % acmsmall
2182     \@mkauthors@i
2183   \or % acmlarge
2184     \@mkauthors@i
2185   \or % acmtog
2186     \@mkauthors@i
2187   \or % sigconf
2188     \@mkauthors@iii
2189   \or % siggraph
2190     \@mkauthors@iii
2191   \or % sigplan
2192     \@mkauthors@iii
2193   \or % sigchi
2194     \@mkauthors@iii
2195   \or % sigchi-a
2196     \@mkauthors@iv
2197   \fi
2198 \endgroup
2199 }

```

`\@authorfont` Somehow different conferences use different fonts for author names. Why?

```
2200 \def\@authorfont{\Large\sffamily}
```

`\@affiliationfont` Font for affiliations

```
2201 \def\@affiliationfont{\normalsize\normalfont}
```

Adjusting fonts for different formats

```
2202 \ifcase\ACM@format@nr
```

```
2203 \relax % manuscript
```

```
2204 \or % acmsmall
```

```
2205 \def\@authorfont{\large\sffamily}
```

```
2206 \def\@affiliationfont{\small\normalfont}
```

```
2207 \or % acmlarge
```

```
2208 \or % acmtog
```

```
2209 \def\@authorfont{\LARGE\sffamily}
```

```
2210 \def\@affiliationfont{\large}
```

```
2211 \or % sigconf
```

```
2212 \def\@authorfont{\LARGE}
```

```
2213 \def\@affiliationfont{\large}
```

```
2214 \or % siggraph
```

```
2215 \def\@authorfont{\normalsize\normalfont}
```

```
2216 \def\@affiliationfont{\normalsize\normalfont}
```

```
2217 \or % sigplan
```

```
2218 \def\@authorfont{\Large\normalfont}
```

```
2219 \def\@affiliationfont{\normalsize\normalfont}
```

```
2220 \or % sigchi
```

```
2221 \def\@authorfont{\bfseries}
```

```
2222 \def\@affiliationfont{\mdseries}
```

```
2223 \or % sigchi-a
```

```
2224 \def\@authorfont{\bfseries}
```

```
2225 \def\@affiliationfont{\mdseries}
```

```
2226 \fi
```

`\@typeset@author@line` At this point we have `\@currentauthors` and `\@currentaffiliations`. We typeset them in the journal style

```
2227 \def\@typeset@author@line{%
```

```
2228 \andify\@currentauthors\par\noindent
```

```
2229 \@currentauthors\def\@currentauthors{}}%
```

```
2230 \ifx\@currentaffiliations\@empty\else
```

```
2231 \andify\@currentaffiliations
```

```
2232 \unskip, {\@currentaffiliations}\par
```

```
2233 \fi
```

```
2234 \def\@currentaffiliations{}}
```

`\if@ACM@instpresent` Whether the given affiliation has institution

```
2235 \newif\if@ACM@instpresent
```

```
2236 \@ACM@instpresenttrue
```

```

\if@ACM@citypresent Whether the given affiliation has city
2237 \newif\if@ACM@citypresent
2238 \@ACM@citypresenttrue

\if@ACM@countrypresent Whether the given affiliation has country
2239 \newif\if@ACM@countrypresent
2240 \@ACM@countrypresenttrue

\@ACM@resetaffil Reset affiliation flags
2241 \def\@ACM@resetaffil{%
2242   \global\@ACM@instpresentfalse
2243   \global\@ACM@citypresentfalse
2244   \global\@ACM@countrypresentfalse
2245 }

\@ACM@checkaffil Check affiliation flags
2246 \def\@ACM@checkaffil{%
2247   \if@ACM@instpresent\else
2248     \ClassWarningNoLine{\@classname}{No institution present for an affiliation}%
2249     \fi
2250   \if@ACM@citypresent\else
2251     \ClassWarningNoLine{\@classname}{No city present for an affiliation}%
2252     \fi
2253   \if@ACM@countrypresent\else
2254     \ClassError{\@classname}{No country present for an affiliation}{ACM
2255     requires each author to indicate their country using country macro.}%
2256     \fi
2257 }

\@mkauthors@i This version is used in most journal formats. Note that \and between authors with the
same affiliation becomes _and_:
2258 \def\@mkauthors@i{%
2259   \def\@currentauthors{}%
2260   \def\@currentaffiliations{}%
2261   \global\let\and\@typeset@author@line
2262   \def\@author##1{%
2263     \ifx\@currentauthors\@empty
2264       \gdef\@currentauthors{\@authorfont\MakeTextUppercase{##1}}%
2265     \else
2266       \g@addto@macro{\@currentauthors}{\and\MakeTextUppercase{##1}}%
2267     \fi
2268     \gdef\and{}%
2269   \def\email##1##2{}%
2270   \def\affiliation##1##2{}%
2271   \def\@tempa{##2}\ifx\@tempa\@empty\else
2272     \ifx\@currentaffiliations\@empty
2273       \gdef\@currentaffiliations{%
2274         \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2275         \setkeys{@ACM@affiliation@}{##1}%

```

```

2276         \@ACM@resetaffil
2277         \@affiliationfont##2\@ACM@checkaffil}%
2278     \else
2279         \g@addto@macro{\@currentaffiliations}{\and
2280         \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2281         \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2282         ##2\@ACM@checkaffil}%
2283     \fi
2284 \fi
2285 \global\let\and\@typeset@author@line}%
2286 \global\setbox\mktitle@bx=\vbox{\noindent\unvbox\mktitle@bx\par\medskip
2287 \noindent\addresses\@typeset@author@line
2288 \par\medskip}%
2289 }

```

`\@mkauthors@ii` The `\@mkauthors@ii` command was the version used in `acmtog`. It is no longer necessary.

`\author@bx` The box to put an individual author in  
2290 `\newbox\author@bx`

`\author@bx@wd` The width of the author box  
2291 `\newdimen\author@bx@wd`

`\author@bx@sep` The separation between author boxes  
2292 `\newskip\author@bx@sep`  
2293 `\author@bx@sep=1pc\relax`

`\@typeset@author@bx` Typesetting the box with authors. Note that in `sigchi-a` the box is not centered.

```

2294 \def\@typeset@author@bx{\bgroup\hsize=\author@bx@wd
2295 \def\and{\par}\normalbaselines
2296 \global\setbox\author@bx=\vtop{\if@ACM@sigchiamode\else\centering\fi
2297 \@authorfont\@currentauthors\par\@affiliationfont
2298 \@currentaffiliation}\egroup
2299 \box\author@bx\hspace{\author@bx@sep}%
2300 \gdef\@currentauthors{}}%
2301 \gdef\@currentaffiliation{}}

```

`\@mkauthors@iii` The `sigconf` version. Here we use a centered design with each author in a separate box.

```

2302 \def\@mkauthors@iii{%

```

First, we need to determine the design of the author strip. The boxes are separated by `\author@bx@sep` plus two `\author@bx@sep` margins. This means that each box must be of width  $(\text{\textwidth} - \text{\author@bx@sep})/N - \text{\author@bx@sep}$ , where  $N$  is the number of boxes per row.

```

2303 \author@bx@wd=\textwidth\relax
2304 \advance\author@bx@wd by -\author@bx@sep\relax
2305 \ifnum\@ACM@authorsperrow>0\relax
2306 \divide\author@bx@wd by \@ACM@authorsperrow\relax

```

```

2307 \else
2308   \ifcase\num@authorgroups
2309   \relax % 0?
2310   \or % 1=one author per row
2311   \or % 2=two authors per row
2312     \divide\author@bx@wd by \num@authorgroups\relax
2313   \or % 3=three authors per row
2314     \divide\author@bx@wd by \num@authorgroups\relax
2315   \or % 4=two authors per row (!)
2316     \divide\author@bx@wd by 2\relax
2317   \else % three authors per row
2318     \divide\author@bx@wd by 3\relax
2319   \fi
2320 \fi
2321 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of \addresses:

```

2322 \gdef\@currentauthors{ }%
2323 \gdef\@currentaffiliation{ }%
2324 \def\@author##1{\ifx\@currentauthors\@empty
2325   \gdef\@currentauthors{\par##1}%
2326 \else
2327   \g@addto@macro\@currentauthors{\par##1}%
2328 \fi
2329 \gdef\and{ }%
2330 \def\email##1##2{\ifx\@currentaffiliation\@empty
2331   \gdef\@currentaffiliation{\bgroup
2332     \mathchardef\UrlBreakPenalty=10000\nolinkurl{##2}\egroup}%
2333 \else
2334   \g@addto@macro\@currentaffiliation{\par\bgroup
2335     \mathchardef\UrlBreakPenalty=10000\nolinkurl{##2}\egroup}%
2336 \fi}%
2337 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
2338   \gdef\@currentaffiliation{
2339     \setkeys{@ACM@affiliation@}{obexpunctuation=false}%
2340     \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2341     ##2\@ACM@checkaffil}%
2342 \else
2343   \g@addto@macro\@currentaffiliation{\par
2344     \setkeys{@ACM@affiliation@}{obexpunctuation=false}%
2345     \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2346     ##2\@ACM@checkaffil}%
2347 \fi
2348 \global\let\and\@typeset@author@bx
2349 }%

```

Actual typesetting is done by the \and macro:

```

2350 \hsize=\textwidth
2351 \global\setbox\mktitle@bx=\vbox{\noindent
2352   \unvbox\mktitle@bx\par\medskip\leavevmode
2353   \lineskip=1pc\relax\centering\hspace*{-1em}%

```

```

2354   \addresses\let\and\@typeset@author@bx\and\par\bigskip}}
\mkauthors@iv The sigchi-a version. We put authors in the main text with no more than 2 authors per
line, unless overridden.
2355 \def\mkauthors@iv{%
First, we need to determine the design of the author strip. The boxes are separated by
\author@bx@sep plus two \author@bx@sep margins. This means that each box must
be of width  $(\text{textwidth} - \text{author@bx@sep})/N - \text{author@bx@sep}$ , where  $N$  is the
number of boxes per row.
2356   \author@bx@wd=\columnwidth\relax
2357   \advance\author@bx@wd by -\author@bx@sep\relax
2358   \ifnum\@ACM@authorsperrow>0\relax
2359     \divide\author@bx@wd by \@ACM@authorsperrow\relax
2360   \else
2361     \ifcase\@num@authorgroups
2362       \relax % 0?
2363     \or % 1=one author per row
2364     \else % 2=two authors per row
2365       \divide\author@bx@wd by 2\relax
2366     \fi
2367   \fi
2368   \advance\author@bx@wd by -\author@bx@sep\relax
Now, parsing of \addresses:
2369   \gdef\@currentauthors{}%
2370   \gdef\@currentaffiliation{}%
2371   \def\@author##1{\ifx\@currentauthors\@empty
2372     \gdef\@currentauthors{\par##1}%
2373   \else
2374     \g@addto@macro\@currentauthors{\par##1}%
2375   \fi
2376   \gdef\and{}}%
2377   \def\@email##1##2{\ifx\@currentaffiliation\@empty
2378     \gdef\@currentaffiliation{\nolinkurl{##2}}%
2379   \else
2380     \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
2381   \fi}%
2382   \def\@affiliation##1##2{\ifx\@currentaffiliation\@empty
2383     \gdef\@currentaffiliation{%
2384       \setkeys{@ACM@affiliation@}{obexpunctuation=false}%
2385       \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2386       ##2\@ACM@checkaffil}%
2387   \else
2388     \g@addto@macro\@currentaffiliation{\par
2389       \setkeys{@ACM@affiliation@}{obexpunctuation=false}%
2390       \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2391       ##2\@ACM@checkaffil}%
2392   \fi
2393   \global\let\and\@typeset@author@bx}%

```

2394 %

Actual typesetting is done by the `\and` macro

```
2395 \bgroup\hsize=\columnwidth
2396 \par\raggedright\leftskip=\z@
2397 \lineskip=1pc\noindent
2398 \addresses\let\and\@typeset@author@bx\and\par\bigskip\egroup}
```

`\@mkauthorsaddresses` Typesetting authors' addresses in the footnote style

```
2399 \def\@mkauthorsaddresses{%
2400 \ifnum\num@authors>1\relax
2401 Authors' \else Author's \fi
2402 \ifnum\num@authorgroups>1\relax
2403 addresses: \else address: \fi
2404 \bgroup
2405 \def\streetaddress##1{\unskip, ##1}%
2406 \def\postcode##1{\unskip, ##1}%
2407 \def\position##1{\unskip\ignorespaces}%
2408 \gdef\@ACM@institution@separator{,}%
2409 \def\institution##1{\unskip\@ACM@institution@separator ##1\gdef\@ACM@institution@separator{ and }}%
2410 \def\city##1{\unskip, ##1}%
2411 \def\state##1{\unskip, ##1}%
2412 \renewcommand\department[2][0]{\unskip\@addpunct, ##2}%
2413 \def\country##1{\unskip, ##1}%
2414 \def\and{\unskip; \gdef\@ACM@institution@separator{, }}%
2415 \def\author##1{##1}%
2416 \def\email##1##2{\unskip, \nolinkurl{##2}}%
2417 \addresses
2418 \egroup}

2419 \AtEndDocument{\if@ACM@nonacm\else\if@ACM@journal
2420 \ifx\@authorsaddresses\@empty
2421 \ClassWarningNoLine{\@classname}{Authors'
2422 addresses are mandatory for ACM journals}%
2423 \fi\fi\fi}
```

`\@setaddresses` This is an `amsart` macro that we do not need.

```
2424 \def\@setaddresses{}
```

`\@authornotemark` Adding a footnote mark to authors. This version adds a “normal” footnote mark.

```
2425 \def\@authornotemark{\g@addto@macro\@currentauthors{\footnotemark\relax}}
```

`\@@authornotemark` Adding a footnote mark to authors with a given number

```
2426 \def\@@authornotemark#1{\g@addto@macro\@currentauthors{\footnotemark[#1]}}
```

`\@mkteasers` Typesetting the teasers

```
2427 \def\@mkteasers{%
2428 \ifx\@teaserfigures\@empty\else
2429 \def\@teaser##1{\par\bigskip\bgroup
2430 \captionsetup{type=figure}##1\egroup\par}
```

```

2431 \global\setbox\mktitle@bx=\vbox{\noindent\unvbox\mktitle@bx\par
2432 \noindent\@Description@presentfalse
2433 \@teaserfigures\par\if@Description@present\else
2434 \global\@undescribed@imagestrue
2435 \ClassWarning{\@classname}{A possible image without
2436 description}\fi
2437 \medskip}%
2438 \fi}

```

**\@mkabstract** Typesetting the abstract

```

2439 \def\@mkabstract{\bgroup
2440 \ifx\@abstract\@empty\else
2441 {\phantomsection\addcontentsline{toc}{section}{Abstract}%
2442 \if@ACM@journal
2443 \everypar{\setbox\z@\lastbox\everypar{}}\small
2444 \else
2445 \section*\@abstractname}%
2446 \fi
2447 \ignorespaces\@abstract\par}%
2448 \fi\egroup}

```

**\@mkbibcitation** Print the bibcitation format

```

2449 \def\@mkbibcitation{\bgroup
2450 \let\@vspace\@vspace@orig
2451 \let\@vspacer\@vspacer@orig
2452 \def\@pages@word{\ifnum\getrefnumber{TotPages}=1\relax page\else pages\fi}%
2453 \def\@footnotemark{}%
2454 \def\@unskip{} \ignorespaces}%
2455 \def\@footnote{\ClassError{\@classname}{Please do not use footnotes
2456 inside a \string\title{} or \string\author{} command! Use
2457 \string\titlenote{} or \string\authornote{} instead!}}%
2458 \def\@article@string{\ifx\@acmArticle\@empty{\ }else,
2459 Article~\@acmArticle \fi}%
2460 \par\medskip\small\noindent{\bfseries ACM Reference Format:}\par\nobreak
2461 \noindent\bgroup
2462 \def\@unskip{, \ignorespaces}\authors\egroup. \@acmYear. \@title
2463 \ifx\@subtitle\@empty. \else: \@subtitle. \fi
2464 \if@ACM@nonacm\else
2465 % The 'nonacm' option disables 'printacmref' by default,
2466 % and the present \@mkbibcitation definition is never used
2467 % in this case. The conditional remains useful if the user
2468 % explicitly sets \settopmatter{printacmref=true}.
2469 \if@ACM@journal@bibstrip
2470 \textit{\@journalNameShort}
2471 \@acmVolume, \@acmNumber \article@string (\@acmPubDate),
2472 \ref{TotPages}~\@pages@word.
2473 \else
2474 In \textit{\@acmBooktitle}%
2475 \ifx\@acmEditors\@empty\textit{.}\else
2476 \andify\@acmEditors\textit{, }\@acmEditors~\@editorsAbbrev.%

```

```

2477     \fi\
2478     ACM, New York, NY, USA%
2479     \@article@string\unskip, \ref{TotPages}~\@pages@word.
2480     \fi
2481     \fi
2482     \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi
2483 \par\egroup}

```

`\@printendtopmatter` End the top matter

```

2484 \def\@printendtopmatter{%
2485   \let\@vspace\@vspace@orig
2486   \let\@vspacer\@vspacer@orig
2487   \par\bigskip
2488   \let\@vspace\@vspace@acm
2489   \let\@vspacer\@vspacer@acm
2490 }

```

`\@setthanks` We redefine `\setthanks` using `\long`

```

2491 \def\@setthanks{\long\def\thanks##1{\par##1\@addpunct.}\thanks}

```

`\@setauthorsaddresses`

```

2492 \def\@setauthorsaddresses{\@authorsaddresses\unskip\@addpunct.}

```

### 3.17 Headers and Footers

We use `fancyhdr` for our headers and footers:

```

2493 \RequirePackage{fancyhdr}

```

`\ACM@restore@pagestyle` The following code by Ross Moore protects against changes by the `totpages` package:

```

2494 \let\ACM@ps@plain\ps@plain
2495 \let\ACM@ps@myheadings\ps@myheadings
2496 \let\ACM@ps@headings\ps@headings
2497 \def\ACM@restore@pagestyle{%
2498   \let\ps@plain\ACM@ps@plain
2499   \let\ps@myheadings\ACM@ps@myheadings
2500   \let\ps@headings\ACM@ps@headings}
2501 \AtBeginDocument{\ACM@restore@pagestyle}

```

`\ACM@linecount@bx` This is the box displayed in review mode

```

2502 \if@ACM@review
2503   \newsavebox{\ACM@linecount@bx}
2504   \newlength\ACM@linecount@bxht
2505   \newcount\ACM@linecount
2506   \ACM@linecount\@ne\relax
2507   \def\ACM@mk@linecount{%
2508     \savebox{\ACM@linecount@bx}[4em][t]{\parbox[t]{4em}{\normalfont
2509       \normalsize
2510       \setlength{\ACM@linecount@bxht}{0pt}%
2511       \loop{\color{red}\scriptsize\the\ACM@linecount}\}

```

```

2512     \global\advance\ACM@linecount by \@ne
2513     \addtolength{\ACM@linecount@bxht}{\baselineskip}%
2514     \ifdim\ACM@linecount@bxht<\textheight\repeat
2515     {\color{red}\scriptsize\the\ACM@linecount}\hfill
2516     \global\advance\ACM@linecount by \@ne}}
2517 \fi

```

\ACM@linecountL How to display the box on the left

```

2518 \def\ACM@linecountL{%
2519   \if@ACM@review
2520   \ACM@mk@linecount
2521   \begin{picture}(0,0)%
2522     \put(-26,-22){\usebox{\ACM@linecount@bx}}%
2523   \end{picture}%
2524   \fi}

```

\ACM@linecountR How to display the box on the right. In one column formats we do not step the numbers.

```

2525 \def\ACM@linecountR{%
2526   \if@ACM@review
2527     \ifcase\ACM@format@nr
2528     \relax % manuscript
2529     \relax
2530     \or % acmsmall
2531     \relax
2532     \or % acmlarge
2533     \relax
2534     \or % acmtog
2535     \ACM@mk@linecount
2536     \or % sigconf
2537     \ACM@mk@linecount
2538     \or % siggraph
2539     \ACM@mk@linecount
2540     \or % sigplan
2541     \ACM@mk@linecount
2542     \or % sigchi
2543     \ACM@mk@linecount
2544     \or % sigchi-a
2545     \ACM@mk@linecount
2546   \fi
2547   \begin{picture}(0,0)%
2548     \put(20,-22){\usebox{\ACM@linecount@bx}}%
2549   \end{picture}%
2550   \fi}

```

\ACM@timestamp The timestamp system

```

2551 \if@ACM@timestamp
2552 % Subtracting 30 from \time gives us the effect of rounding down despite
2553 % \numexpr rounding to nearest
2554 \newcounter{ACM@time@hours}

```

```

2555 \setcounter{ACM@time@hours}{\numexpr (\time - 30) / 60 \relax}
2556 \newcounter{ACM@time@minutes}
2557 \setcounter{ACM@time@minutes}{\numexpr \time - \theACM@time@hours * 60 \relax}
2558 \newcommand\ACM@timestamp%
2559   \footnotesize%
2560   \ifx\@acmSubmissionID\@empty\relax\else
2561   Submission ID: \@acmSubmissionID.{ }%
2562   \fi
2563   \the\year-\two@digits{\the\month}-\two@digits{\the\day}{ }%
2564   \two@digits{\theACM@time@hours}:\two@digits{\theACM@time@minutes}{. }%
2565   Page \thepage\ of \@startPage--\pageref*{TotPages}.%
2566 }
2567 \fi

```

\@shortauthors Even if the author redefined \@shortauthors, we do not print it in the headers when in anonymous mode:

```

2568 \def\@shortauthors{%
2569   \if@ACM@anonymous
2570     Anon.
2571     \ifx\@acmSubmissionID\@empty\else Submission Id: \@acmSubmissionID\fi
2572   \else\@shortauthors\fi}

```

\@headfootfont The font to typeset header and footer text.

```

2573 \def\@headfootfont{\sffamily\footnotesize}

```

standardpagestyle The page style for all pages but the first one The page style for all pages but the first one

```

2574 \AtBeginDocument{%
2575 \fancypagestyle{standardpagestyle}{%
2576   \fancyhf{}%
2577   \renewcommand{\headrulewidth}{\z@}%
2578   \renewcommand{\footrulewidth}{\z@}%
2579   \def\@acmArticlePage{%
2580     \ifx\@acmArticle\@empty%
2581       \if@ACM@printfolios\thepage\fi%
2582     \else%
2583       \@acmArticle\if@ACM@printfolios:\thepage\fi%
2584     \fi%
2585   }%
2586   \if@ACM@journal@bibstrip
2587     \ifcase\ACM@format@nr
2588     \relax % manuscript
2589     \fancyhead[LE]{\ACM@linecountL\if@ACM@printfolios\thepage\fi}%
2590     \fancyhead[RO]{\if@ACM@printfolios\thepage\fi}%
2591     \fancyhead[RE]{\@shortauthors}%
2592     \fancyhead[LO]{\ACM@linecountL\shorttitle}%
2593     \if@ACM@nonacm\else%
2594     \fancyfoot[RO,LE]{\footnotesize Manuscript submitted to ACM}%
2595     \fi%

```

```

2596 \or % acmsmall
2597   \fancyhead[LE]{\ACM@linecountL\@headfootfont\@acmArticlePage}%
2598   \fancyhead[RO]{\@headfootfont\@acmArticlePage}%
2599   \fancyhead[RE]{\@headfootfont\@shortauthors}%
2600   \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2601   \if@ACM@nonacm\else%
2602   \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2603     \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2604   \fi
2605 \or % acmlarge
2606   \fancyhead[LE]{\ACM@linecountL\@headfootfont
2607     \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
2608   \fancyhead[LO]{\ACM@linecountL}%
2609   \fancyhead[RO]{\@headfootfont
2610     \shorttitle\quad\textbullet\quad\@acmArticlePage}%
2611   \if@ACM@nonacm\else%
2612   \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2613     \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2614   \fi
2615 \or % acmtog
2616   \fancyhead[LE]{\ACM@linecountL\@headfootfont
2617     \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
2618   \fancyhead[LO]{\ACM@linecountL}%
2619   \fancyhead[RE]{\ACM@linecountR}%
2620   \fancyhead[RO]{\@headfootfont
2621     \shorttitle\quad\textbullet\quad\@acmArticlePage\ACM@linecountR}%
2622   \if@ACM@nonacm\else%
2623   \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2624     \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2625   \fi
2626 \else % Proceedings
2627   \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2628   \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2629   \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2630   \if@ACM@nonacm
2631     \fancyhead[LE]{\ACM@linecountL}%
2632     \fancyhead[RO]{\ACM@linecountR}%
2633   \else%
2634     \fancyhead[LE]{\ACM@linecountL\@headfootfont\footnotesize
2635       \acmConference@shortname,
2636       \acmConference@date, \acmConference@venue}%
2637     \fancyhead[RO]{\@headfootfont
2638       \acmConference@shortname,
2639       \acmConference@date, \acmConference@venue\ACM@linecountR}%
2640   \fi
2641   \fi
2642 \else % Proceedings
2643   \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2644   \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2645   \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%

```

```

2646 \if@ACM@nonacm
2647 \fancyhead[LE]{\ACM@linecountL}%
2648 \fancyhead[RO]{\ACM@linecountR}%
2649 \else%
2650 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2651 \acmConference@shortname,
2652 \acmConference@date, \acmConference@venue}%
2653 \fancyhead[RO]{\@headfootfont
2654 \acmConference@shortname,
2655 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2656 \fi
2657 \fi
2658 \if@ACM@sigchiamode
2659 \fancyheadoffset[LL]{\dimexpr(\marginparsep+\marginparwidth)}%
2660 \fi
2661 \if@ACM@timestamp
2662 \fancyfoot[LO,RE]{\ACM@timestamp}
2663 \fi
2664 }%
2665 \pagestyle{standardpagestyle}
2666 }

```

```

\@folio@wd Folio blob width, height, offsets and max number
\@folio@ht
\@folio@voffset
\@folio@max
2667 \newdimen\@folio@wd
2668 \@folio@wd=\z@
2669 \newdimen\@folio@ht
2670 \@folio@ht=\z@
2671 \newdimen\@folio@voffset
2672 \@folio@voffset=\z@
2673 \def\@folio@max{1}
2674 \ifcase\ACM@format@nr
2675 \relax % manuscript
2676 \or % acmsmall
2677 \@folio@wd=45.75pt\relax
2678 \@folio@ht=1.25in\relax
2679 \@folio@voffset=.2in\relax
2680 \def\@folio@max{8}
2681 \or % acmlarge
2682 \@folio@wd=43.25pt\relax
2683 \@folio@ht=79pt\relax
2684 \@folio@voffset=.55in\relax
2685 \def\@folio@max{10}
2686 \fi

```

```

\@folioblob The macro to typeset the folio blob.
2687 \def\@folioblob{\@tempcnta=0\@acmArticleSeq\relax
2688 \ifnum\@tempcnta=0\relax\else
First, we calculate \@acmArticleSeq modulo \@folio@max
2689 \loop

```

```

2690 \ifnum\@tempcnta>\@folio@max\relax
2691 \advance\@tempcnta by - \@folio@max
2692 \repeat
2693 \advance\@tempcnta by -1\relax
2694 \@tempdima=\@folio@ht\relax
2695 \multiply\@tempdima by \the\@tempcnta\relax
2696 \advance\@tempdima by -\@folio@voffset\relax
2697 \begin{picture}(0,0)
2698 \makebox[\z@]{\raisebox{-\@tempdima}{%
2699 \rlap{%
2700 \raisebox{-0.45\@folio@ht}[\z@][\z@]{%
2701 \rule{\@folio@wd}{\@folio@ht}}}%
2702 \parbox{\@folio@wd}{%
2703 \centering
2704 \textcolor{white}{\LARGE\sffamily\bfseries\@acmArticle}}}}
2705 \end{picture}\fi}
2706

```

firstpagestyle The page style for the first page only.

```

2707 \AtBeginDocument{%
2708 \fancypagestyle{firstpagestyle}{%
2709 \fancyhf{}%
2710 \renewcommand{\headrulewidth}{\z@}%
2711 \renewcommand{\footrulewidth}{\z@}%
2712 \if@ACM@journal@bibstrip
2713 \ifcase\ACM@format@nr
2714 \relax % manuscript
2715 \fancyhead[L]{\ACM@linecountL}%
2716 \fancyfoot[RO,LE]{\if@ACM@printfolios\small\thepage\fi}%
2717 \if@ACM@nonacm\else%
2718 \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
2719 \fi%
2720 \or % acmsmall
2721 \if@ACM@nonacm\else%
2722 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2723 \@acmNumber, Article \@acmArticle. Publication date:
2724 \@acmPubDate.}%
2725 \fi%
2726 \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2727 \fancyhead[LO]{\ACM@linecountL}%
2728 \fancyhead[RO]{\@folioblob}%
2729 \fancyheadoffset[RO,LE]{0.6\@folio@wd}%
2730 \or % acmlarge
2731 \if@ACM@nonacm\else%
2732 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2733 \@acmNumber, Article \@acmArticle. Publication date:
2734 \@acmPubDate.}%
2735 \fi%
2736 \fancyhead[RO]{\@folioblob}%

```

```

2737     \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2738     \fancyhead[LO]{\ACM@linecountL}%
2739     \fancyheadoffset[RO,LE]{1.4\@folio@wd}%
2740 \or % acmtog
2741     \if@ACM@nonacm\else%
2742     \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2743     \@acmNumber, Article \@acmArticle. Publication date:
2744     \@acmPubDate.}%
2745     \fi%
2746     \fancyhead[L]{\ACM@linecountL}%
2747     \fancyhead[R]{\ACM@linecountR}%
2748 \else % Conference proceedings
2749     \fancyhead[L]{\ACM@linecountL}%
2750     \fancyhead[R]{\ACM@linecountR}%
2751     \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2752 \fi
2753 \else
2754     \fancyhead[L]{\ACM@linecountL}%
2755     \fancyhead[R]{\ACM@linecountR}%
2756     \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2757 \fi
2758 \if@ACM@timestamp
2759     \ifnum\ACM@format@nr=0\relax % Manuscript
2760     \fancyfoot[LO,RE]{\ACM@timestamp\quad
2761     \if@ACM@nonacm\else
2762     \footnotesize Manuscript submitted to ACM
2763     \fi}
2764 \else
2765     \fancyfoot[LO,RE]{\ACM@timestamp}
2766 \fi
2767 \fi
2768 }}

```

### 3.18 Sectioning

`\ACM@NRadjust` Ross Moore's macro.

Initially `\ACM@sect@format@` just passes through its #1 argument unchanged. When a sectioning macro such as `\section` occurs, the `\ACM@NRadjust` redefines `\ACM@sect@format@` to expand into the styling commands; e.g., `\@secfont`. Then `\Sectionformat` is temporarily redefined to produce `\realSectionformat{\ACM@sect@format{#1}}{#2}`, which ultimately becomes `\Sectionformat{\@secfont{#1}}{#2}`. This is done to allow `\Sectionformat` to be variable, as may be needed in particular circumstances. Its current expansion is saved as `\realSectionformat` which is used with the modified 1st argument, then `\Sectionformat` is reverted to its former expansion.

To style the section-number, the line `#1{}` is used at the end of `\ACM@NRadjust`. This imposes style-changing commands for fonts and sizes, but any `\MakeUppercase` acts on just the `{}`. It's a bit hacky, by essentially assuming that only num-

bers occur here, not letters to be case-changed. (This should be acceptable in a class-file, as it ought to be possible to change the case elsewhere, if that was ever desired.) Also, it can result in \@adddotafter being called too soon, so a slight adjustment is made, via \ACM@adddotafter, which now tests whether its argument is empty. But the coding has to allow for other packages to have also patched \@adddotafter.

```

2769 \def\ACM@NRadjust#1{%
2770 \begingroup
2771 \expandafter\ifx\csname Sectionformat\endcsname\relax
2772 % do nothing when \Sectionformat is unknown
2773 \def\next{\endgroup #1}%
2774 \else
2775 \def\next{\endgroup
2776 \let\realSectionformat\Sectionformat
2777 \def\ACM@sect@format@{#1}%
2778 \let\Sectionformat\ACM@NR@adjustedSectionformat
2779 %% next lines added 2018-06-17 to ensure section number is styled
2780 \let\real@adddotafter\@adddotafter
2781 \let\@adddotafter\ACM@adddotafter
2782 #1}% imposes the styles, but nullifies \MakeUppercase
2783 \let\@adddotafter\real@adddotafter
2784 }%
2785 \fi \next
2786 }

```

\ACM@NR@adjustedSectionformat

```

2787 \def\ACM@NR@adjustedSectionformat#1#2{%
2788 \realSectionformat{\ACM@sect@format{#1}}{#2}%
2789 \let\Sectionformat\realSectionformat}
2790 \DeclareRobustCommand{\ACM@sect@format}{\ACM@sect@format@}
2791 \def\ACM@sect@format@null#1{#1}
2792 \let\ACM@sect@format@\ACM@sect@format@null
2793 \AtBeginDocument{%
2794 \expandafter\ifx\csname LTX@adddotafter\endcsname\relax
2795 \let\LTX@adddotafter\@adddotafter
2796 \fi
2797 }

```

\ACM@adddotafter

```

2798 \def\ACM@adddotafter#1{\ifx\relax#1\relax\else\LTX@adddotafter{#1}\fi}

```

Sectioning is different for different levels

```

2799 \renewcommand\section{\@startsection{section}{1}{\z@}%
2800 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2801 {.25\baselineskip}%
2802 {\ACM@NRadjust\@secfont}}
2803 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
2804 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%

```

```

2805 {.25\baselineskip}%
2806 {\ACM@NRadjust@subsecfont}}
2807 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
2808 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2809 {-3.5\p@}%
2810 {\ACM@NRadjust{\@subsubsecfont\@adddotafter}}}}
2811 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
2812 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2813 {-3.5\p@}%
2814 {\ACM@NRadjust{\@parfont\@adddotafter}}}}
2815 \newcommand\noindentparagraph{\@startsection{paragraph}{4}{\z@}%
2816 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2817 {-3.5\p@}%
2818 {\ACM@NRadjust{\@parfont}}}}
2819
2820 \renewcommand\part{\@startsection{part}{9}{\z@}%
2821 {-10\p@ \@plus -4\p@ \@minus -2\p@}%
2822 {4\p@}%
2823 {\ACM@NRadjust\@parfont}}

```

`\section@raggedright` Special version of `\raggedright` compatible with `\MakeUppercase`

```

2824 \def\section@raggedright{\@rightskip\@flushglue
2825 \rightskip\@rightskip
2826 \leftskip\z@skip
2827 \parindent\z@}

```

`\@secfont` Fonts for sections etc. are different for different formats.

```

\@subsecfont 2828 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
\@subsubsecfont 2829 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
\@parfont 2830 \def\@subsubsecfont{\sffamily\itshape}
2831 \def\@parfont{\itshape}
2832 \setcounter{secnumdepth}{3}
2833 \ifcase\ACM@format@nr
2834 \relax % manuscript
2835 \or % acmsmall
2836 \or % acmlarge
2837 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2838 \def\@subsecfont{\sffamily\large\section@raggedright}
2839 \or % acmtog
2840 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2841 \def\@subsecfont{\sffamily\large\section@raggedright}
2842 \or % sigconf
2843 \def\@secfont{\bfseries\Large\section@raggedright\MakeTextUppercase}
2844 \def\@subsecfont{\bfseries\Large\section@raggedright}
2845 \or % siggraph
2846 \def\@secfont{\sffamily\bfseries\Large\section@raggedright\MakeTextUppercase}
2847 \def\@subsecfont{\sffamily\bfseries\Large\section@raggedright}
2848 \or % sigplan
2849 \def\@secfont{\bfseries\Large\section@raggedright}
2850 \def\@subsecfont{\bfseries\section@raggedright}

```

```

2851 \def\@subsubsecfont{\bfseries\section@raggedright}
2852 \def\@parfont{\bfseries\itshape}
2853 \def\@subparfont{\itshape}
2854 \or % sigchi
2855 \setcounter{secnumdepth}{1}
2856 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2857 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2858 \or % sigchi-a
2859 \setcounter{secnumdepth}{0}
2860 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2861 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2862 \fi

```

`\@adddotafter` Add punctuation after a sectioning command

```
2863 \def\@adddotafter#1{#1\@addpunct{.}}
```

`\@addspaceafter` Add space after a sectioning command

```
2864 \def\@addspaceafter#1{#1\@addpunct{\enspace}}
```

### 3.19 TOC lists

`\@dotsep` Related to the `\tableofcontents` are all the horizontal fillers. Base  $\TeX$  defines `\@dottedtocline`, which we should not disable. Yet, this command expects `\@dotsep` to be defined but leaves this to the class implementation. Since `amsart` does not provide this, we copy the standard variant from `article` here.

```
2865 \providecommand*\@dotsep{4.5}
```

### 3.20 Theorems

`\@acmplainbodyfont` The font to typeset the body of the `acmplain` theorem style.

```
2866 \def\@acmplainbodyfont{\itshape}
```

`\@acmplainindent` The amount to indent the `acmplain` theorem style.

```
2867 \def\@acmplainindent{\parindent}
```

`\@acmplainheadfont` The font to typeset the head of the `acmplain` theorem style.

```
2868 \def\@acmplainheadfont{\scshape}
```

`\@acmplainnotefont` The font to typeset the note of the `acmplain` theorem style.

```
2869 \def\@acmplainnotefont{\@empty}
```

Customization of the `acmplain` theorem style:

```
2870 \ifcase\ACM@format@nr
```

```
2871 \relax % manuscript
```

```
2872 \or % acmsmall
```

```
2873 \or % acmlarge
```

```
2874 \or % acmtog
```

```
2875 \or % sigconf
```

```

2876 \or % siggraph
2877 \or % sigplan
2878 \def\acmplainbodyfont{\itshape}
2879 \def\acmplainindent{\z@}
2880 \def\acmplainheadfont{\bfseries}
2881 \def\acmplainnotefont{\normalfont}
2882 \or % sigchi
2883 \or % sigchi-a
2884 \fi

```

**acmplain** The acmplain theorem style

```

2885 \newtheoremstyle{acmplain}%
2886 { .5\baselineskip \@plus .2\baselineskip
2887 \@minus .2\baselineskip}% space above
2888 { .5\baselineskip \@plus .2\baselineskip
2889 \@minus .2\baselineskip}% space below
2890 {\@acmplainbodyfont}% body font
2891 {\@acmplainindent}% indent amount
2892 {\@acmplainheadfont}% head font
2893 { .}% punctuation after head
2894 { .5em}% spacing after head
2895 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmplainnotefont(#3)}}}% head spec

```

**\@acmdefinitionbodyfont** The font to typeset the body of the acmdefinition theorem style.

```
2896 \def\@acmdefinitionbodyfont{\normalfont}
```

**\@acmdefinitionindent** The amount to indent the acmdefinition theorem style.

```
2897 \def\@acmdefinitionindent{\parindent}
```

**\@acmdefinitionheadfont** The font to typeset the head of the acmdefinition theorem style.

```
2898 \def\@acmdefinitionheadfont{\itshape}
```

**\@acmdefinitionnotefont** The font to typeset the note of the acmdefinition theorem style.

```
2899 \def\@acmdefinitionnotefont{\@empty}
```

Customization of the acmdefinition theorem style:

```

2900 \ifcase\ACM@format@nr
2901 \relax % manuscript
2902 \or % acmsmall
2903 \or % acmlarge
2904 \or % acmtog
2905 \or % sigconf
2906 \or % siggraph
2907 \or % sigplan
2908 \def\@acmdefinitionbodyfont{\normalfont}
2909 \def\@acmdefinitionindent{\z@}
2910 \def\@acmdefinitionheadfont{\bfseries}
2911 \def\@acmdefinitionnotefont{\normalfont}
2912 \or % sigchi

```

```
2913 \or % sigchi-a
2914 \fi
```

acmdefinition The acmdefinition theorem style

```
2915 \newtheoremstyle{acmdefinition}%
2916   {.5\baselineskip\@plus.2\baselineskip
2917     \@minus.2\baselineskip}% space above
2918   {.5\baselineskip\@plus.2\baselineskip
2919     \@minus.2\baselineskip}% space below
2920   {\@acmdefinitionbodyfont}% body font
2921   {\@acmdefinitionindent}% indent amount
2922   {\@acmdefinitionheadfont}% head font
2923   {.}% punctuation after head
2924   {.5em}% spacing after head
2925   {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmdefinitionnotefont{#3}}}}% head spec
```

Make acmplain the default theorem style.

```
2926 \theoremstyle{acmplain}
```

Delay defining the theorem environments until after other packages have been loaded. In particular, the `cleveref` package must be loaded before the theorem environments are defined in order to show the correct environment name (see <https://github.com/borisveytsman/acmart/issues/138>). The `acmthm` option is used to suppress the definition of any theorem environments. Also, to avoid obscure errors arising from these environment definitions conflicting with environments defined by the user or by user-loaded packages, we only define environments that have not yet been defined.

```
2927 \AtEndPreamble{%
2928   \if@ACM@acmthm
2929     \theoremstyle{acmplain}
2930     \@ifundefined{theorem}{%
2931       \newtheorem{theorem}{Theorem}[section]
2932     }{}
2933     \@ifundefined{conjecture}{%
2934       \newtheorem{conjecture}[theorem]{Conjecture}
2935     }{}
2936     \@ifundefined{proposition}{%
2937       \newtheorem{proposition}[theorem]{Proposition}
2938     }{}
2939     \@ifundefined{lemma}{%
2940       \newtheorem{lemma}[theorem]{Lemma}
2941     }{}
2942     \@ifundefined{corollary}{%
2943       \newtheorem{corollary}[theorem]{Corollary}
2944     }{}
2945     \theoremstyle{acmdefinition}
2946     \@ifundefined{example}{%
2947       \newtheorem{example}[theorem]{Example}
2948     }{}

```

```

2949 \@ifundefined{definition}{%
2950 \newtheorem{definition}[theorem]{Definition}
2951 }{}
2952 \fi
2953 \theoremstyle{acmplain}
2954 }

```

`\@proofnamefont` The font to typeset the proof name.  
2955 `\def\@proofnamefont{\scshape}`

`\@proofindent` Whether or not to indent proofs.  
2956 `\def\@proofindent{\indent}`

Customization of the proof environment.

```

2957 \ifcase\ACM@format@nr
2958 \relax % manuscript
2959 \or % acmsmall
2960 \or % acmlarge
2961 \or % acmtog
2962 \or % sigconf
2963 \or % siggraph
2964 \or % sigplan
2965 \def\@proofnamefont{\itshape}
2966 \def\@proofindent{\noindent}
2967 \or % sigchi
2968 \or % sigchi-a
2969 \fi

```

`proof` We want some customization of the proof environment.

```

2970 \renewenvironment{proof}[1][\proofname]{\par
2971 \pushQED{\qed}%
2972 \normalfont \topsep6\p@\@plus6\p@\relax
2973 \trivlist
2974 \item[\@proofindent\hskip\labelsep
2975 {\@proofnamefont #1\@addpunct{.}}]\ignorespaces
2976 }{%
2977 \popQED\endtrivlist\@endpefalse
2978 }

```

### 3.21 Balancing columns

We need balancing only if the user did not disable it, and we use a two column format. Note that `pbalance` uses a different mechanism.

```

2979 \AtEndPreamble{%
2980 \if@ACM@pbalance
2981 \global\@ACM@balancefalse
2982 \ifcase\ACM@format@nr
2983 \relax % manuscript
2984 \or % acmsmall

```

```

2985     \or % acmlarge
2986     \or % acmtog
2987         \RequirePackage{pbalance}%
2988     \or % sigconf
2989         \RequirePackage{pbalance}%
2990     \or % siggraph
2991         \RequirePackage{pbalance}%
2992     \or % sigplan
2993         \RequirePackage{pbalance}%
2994     \or % sigchi
2995         \RequirePackage{pbalance}%
2996     \or % sigchi-a
2997 \fi
2998 \fi
2999 \if@ACM@balance
3000     \ifcase\ACM@format@nr
3001     \relax % manuscript
3002         \global\@ACM@balancefalse
3003     \or % acmsmall
3004         \global\@ACM@balancefalse
3005     \or % acmlarge
3006         \global\@ACM@balancefalse
3007     \or % acmtog
3008         \RequirePackage{balance}%
3009     \or % sigconf
3010         \RequirePackage{balance}%
3011     \or % siggraph
3012         \RequirePackage{balance}%
3013     \or % sigplan
3014         \RequirePackage{balance}%
3015     \or % sigchi
3016         \RequirePackage{balance}%
3017     \or % sigchi-a
3018         \global\@ACM@balancefalse
3019 \fi
3020 \fi
3021 }
3022 \AtEndDocument{%
3023     \if@ACM@balance
3024     \if@twocolumn
3025     \balance
3026     \fi\fi}

```

### 3.22 Acknowledgments

\acksname

```
3027 \newcommand\acksname{Acknowledgments}
```

\acks This is a comment-like structure

```

3028 \specialcomment{acks}{%
3029   \begingroup
3030   \section*{\acksname}
3031   \phantomsection\addcontentsline{toc}{section}{\acksname}
3032 }{%
3033   \endgroup
3034 }

```

`\grantsponsor` We just typeset the name of the sponsor

```

3035 \def\grantsponsor#1#2#3{#2}

```

`\grantnum`

```

3036 \newcommand\grantnum[3][]{#3%
3037   \def\@tempa{#1}\ifx\@tempa\@empty\else\space(\url{#1})\fi}

```

### 3.23 Conditional typesetting

We use the comment package for conditional typesetting:

```

3038 \AtEndPreamble{%
3039   \if@ACM@screen
3040     \includecomment{screenonly}
3041     \excludecomment{printonly}
3042   \else
3043     \excludecomment{screenonly}
3044     \includecomment{printonly}
3045   \fi
3046   \if@ACM@anonymous
3047     \excludecomment{anonsuppress}
3048     \excludecomment{acks}
3049   \else
3050     \includecomment{anonsuppress}
3051   \fi}

```

### 3.24 Additional bibliography commands

`\showeprint` The command `\showeprint` has two arguments: the (optional) prefix and the eprint number. Right now the only prefix we understand is the (lowercase) word ‘arxiv’.

```

3052 \newcommand\showeprint[2][arxiv]{%
3053   \def\@tempa{#1}%
3054   \ifx\@tempa\@empty\def\@tempa{arxiv}\fi
3055   \def\@tempb{arxiv}%
3056   \ifx\@tempa\@tempb\relax
3057     arXiv:\href{https://arxiv.org/abs/#2}{#2}%
3058   \else
3059     \def\@tempb{arXiv}%
3060     \ifx\@tempa\@tempb\relax
3061       arXiv:\href{https://arxiv.org/abs/#2}{#2}%
3062     \else

```

```

3063     arXiv:#2%
3064     \fi
3065     \fi}

```

### 3.25 Index

`\theindex` Standard amsart uses plain page style in index pages. This clashes with line numbering for review option, so we redefine it.

```

3066 \def\theindex{\@restonecoltrue\if@twocolumn\@restonecolfalse\fi
3067   \columnseprule\z@ \columnsep 35\p@
3068   \@indextitlestyle
3069   \let\item\@idxitem
3070   \parindent\z@ \parskip\z@\@plus.3\p@\relax
3071   \raggedright
3072   \hyphenpenalty\@M
3073   \footnotesize}

```

### 3.26 End of Class

`\vspace` We do not disable `\vspace`, but add warning to it

```

3074 \let\@vspace@orig=\@vspace
3075 \let\@vspacer@orig=\@vspacer
3076 \apptocmd{\@vspace}{\ClassWarning{\@classname}{\string\vspace\space should
3077   only be used to provide space above/below surrounding
3078   objects}}{}{}
3079 \apptocmd{\@vspacer}{\ClassWarning{\@classname}{\string\vspace\space should
3080   only be used to provide space above/below surrounding
3081   objects}}{}{}
3082 \let\@vspace@acm=\@vspace
3083 \let\@vspacer@acm=\@vspacer

```

`\ACM@origbaselinestretch` We produce an error if the user tries to change `\baselinestretch`

```

3084 \let\ACM@origbaselinestretch\baselinestretch
3085 \AtEndDocument{\ifx\baselinestretch\ACM@origbaselinestretch\else
3086   \ClassError{\@classname}{An attempt to redefine
3087     \string\baselinestretch\space detected. Please do not do this for
3088     ACM submissions!}\fi}

3089 \normalsize\normalfont\frenchspacing
3090 </class>

```

## References

- [1] UK T<sub>E</sub>X Users Group. UK list of T<sub>E</sub>X frequently asked questions. <https://texfaq.org>, 2019.
- [2] Michael Downes and Barbara Beeton. *The amsart, amsproc, and amsbook document classes*. American Mathematical Society, August 2004. <http://www.ctan.org/pkg/amslatex>.
- [3] Christophe Fiorio. *algorithm2e.sty—package for algorithms*, October 2015. <http://www.ctan.org/pkg/algorithm2e>.
- [4] Rogério Brito. *The algorithms bundle*, August 2009. <http://www.ctan.org/pkg/algorithms>.
- [5] Carsten Heinz, Brooks Moses, and Jobst Hoffmann. *The Listings Package*, June 2015. <http://www.ctan.org/pkg/listings>.
- [6] Simon Fear. *Publication quality tables in L<sup>A</sup>T<sub>E</sub>X*, April 2005. <http://www.ctan.org/pkg/booktabs>.
- [7] Association for Computing Machinery. *ACM Visual Identity Standards*, 2007. <http://identitystandards.acm.org>.
- [8] Axel Sommerfeldt. *The subcaption package*, April 2013. <http://www.ctan.org/pkg/subcaption>.
- [9] Boris Veytsman, Bern Schandl, Lee Netherton, and C. V. Radhakrishnan. *A package to create a nomenclature*, September 2005. <http://www.ctan.org/pkg/nomencl>.
- [10] Nicola L. C. Talbot. *User Manual for glossaries.sty v4.44*, December 2019. <http://www.ctan.org/pkg/glossaries>.
- [11] David Carlisle. *The textcase package*, October 2004. <http://www.ctan.org/pkg/textcase>.

## Change History

1.48	General: Added prologue option to xcolor . . . . .	46	\if@ACM@printacmref: Added warning for longer papers . . . . .	70
	Bib code cleanup (Zack Weinberg)	33	\keywords: Added warning for missing keywords . . . . .	69
	Documentation update (siggraph)	33	General: ACM reference format is now mandatory for papers over one page; CCS concepts and keywords are now mandatory for papers over two pages . . . . .	33
1.49	General: New journal: DTRAP . . . . .	33	Authors' addresses are mandatory for journal articles . . . . .	33
1.53	General: New journals: PACMCGIT, TIOT, TDSCI . . . . .	33		
	Rearranged docs . . . . .	33		
1.54	General: Moved footnote stuff before hyperref call (Ross Moore) . . . . .	33	1.69	\vspace: Added the changed command to avoid grouping . . . . .
1.56	General: Documented \Description	33	1.70	General: Name change for TDS . . . . .
1.57	General: Booktabs package is now the default . . . . .	33	1.71	General: Bibliography change: volume for @inproceedings is now in brackets together with series . . . . .
1.58	General: Changes in samples (Enrico Gregorio) . . . . .	33		LuaTeX now uses the OTF versions of fonts . . . . .
	New journal: HEALTH. TDS is renamed to TDSCI . . . . .	33		Retired sigchi and sigchi-a . . . . .
1.60	\if@ACM@urlbreakonhyphens: introduced macro . . . . .	34	1.75	General: Documentation update . . . . .
	General: New option: urlbreakonhyphens . . . . .	33	1.78	General: Documentation update: Word count . . . . .
1.62	General: New journal: TELO . . . . .	33	1.79	General: Updated indormation for TAP, TCPS, TEAC . . . . .
1.63	General: New journal: FACMP . . . . .	33	1.80	General: Added DLT and FAC . . . . .
	New journal: TQUANT . . . . .	33		
1.63a	General: Move: TQUANT to TQC . . . . .	33	v1.00	General: First released version . . . . .
1.64	General: Putting abstract after \maketitle now causes an error . . . . .	33	v1.01	General: Changed hyperref colors in screen mode (closes <a href="https://github.com/borisveytsman/acmart/issues/1">https://github.com/borisveytsman/acmart/issues/1</a> ) . . . . .
1.65	General: New journal: DGOV . . . . .	33		Defined ACM colors . . . . .
1.66	\mkauthorsaddresses: Added warning for missing addresses . . . . .	92		Explicitly put draft option (closes <a href="https://github.com/borisveytsman/acmart/issues/4">https://github.com/borisveytsman/acmart/issues/4</a> ) . . . . .
	\ccsdesc@parse: Added warning for missing concepts . . . . .	72		

	Set headheight to 1pc for all formats (closes <a href="https://github.com/borisveytsman/acmart/issues/5">https://github.com/borisveytsman/acmart/issues/5</a> )	33		<code>\@mktitle@ii</code> : Now this macro is obsolete	84
v1.02	General: Added TOPS and TSC (closes <a href="https://github.com/borisveytsman/acmart/issues/12">https://github.com/borisveytsman/acmart/issues/12</a> )	33		<code>\@mktitle@iii</code> : Added processing badges	84
	Documentation changes (closes <a href="https://github.com/borisveytsman/acmart/issues/13">https://github.com/borisveytsman/acmart/issues/13</a> )	33		Made more generic	84
v1.03	<code>\@formatdoi</code> : Added macro	74		<code>\@mktitle@iv</code> : Made more generic	85
	<code>\if@ACM@authorversion</code> : Added macro	35		<code>\@printtopmatter</code> : Added processing badges	81
	<code>\maketitle</code> : Added special case of authorversion	78		<code>\@subtitlefont</code> : Added macro	83
	General: Added anonsuppress environment	33		<code>\@titlefont</code> : Added macro	83
	Added authorversion option (closes <a href="https://github.com/borisveytsman/acmart/issues/9">https://github.com/borisveytsman/acmart/issues/9</a> )	33		<code>\acmBadgeL</code> : Added macro	69
v1.04	<code>\acmArticleSeq</code> : Name change by Matthew Fluet	67		<code>\acmBadgeR</code> : Added macro	68
	<code>\acmDOI</code> : Name change by Matthew Fluet	68		<code>\if@ACM@badge</code> : Added macro	68
	<code>\acmISBN</code> : Name change by Matthew Fluet	68			
	General: Updated bibliography for siggraph	33	v1.07	<code>\maketitle</code> : Corrected a bug with abstract footnotes	78
v1.05	General: Added processing doi numbers for acmsiggraph and doi numbers for sigproc.bib	33		Corrected a bug with permission and footnotes order	78
	Patched <code>\setcitestyle</code> command; closes <a href="https://github.com/borisveytsman/acmart/issues/19">https://github.com/borisveytsman/acmart/issues/19</a>	33	v1.08	General: SIGPLAN reformatting by Matthew Fluet	33
v1.06	<code>\@ACM@badge@skip</code> : Added macro	68		Typos corrected (Tobias Pape)	33
	<code>\@ACM@badge@width</code> : Added macro	68	v1.09	General: Revert SIGPLAN caption rules	33
	<code>\@ACM@title@width</code> : Added macro	68	v1.10	<code>\maketitle</code> : Corrected a bug with doi in manuscript and author version, <a href="https://github.com/borisveytsman/acmart/issues/36">https://github.com/borisveytsman/acmart/issues/36</a>	78
	<code>\@mktitle@i</code> : Added processing badges	84		General: Changes of 'licensedothergov' wording	72
	Made generic	84		<code>standardpagestyle</code> : Reversed folios location	96
			v1.11	General: Customization of ACM theorem styles and proof environment by Matthew Fluet	33
			v1.12	<code>\@marginfigure</code> : Now centering by default	53
				<code>\@marginable</code> : Now centering by default	53
				<code>\@parfont</code> : Moved to <code>\section@raggedright</code>	102
				<code>\copyrightpermissionfootnoterule</code> : Added macro	49
				<code>\descriptionlabel</code> : Redefined	56
				<code>\footnoterule</code> : Made shorter	49

\if@ACM@natbib@override: Added macro . . . . .	36	\city: Added macro . . . . .	85
\if@ACM@newfonts: Added macro . .	50	\country: Added macro . . . . .	85
\maketitle: Moved thanks to copyrightpermission box . . . . .	78	\department: Added macro . . . . .	85
\section@raggedright: Introduced macro . . . . .	102	\grantnum: Added macro . . . . .	108
General: Added graceful behavior when libertine fonts are absent . .	50	\grantsponsor: Added macro . . . . .	108
Documentation updates . . . . .	33	\if@insideauthorgroup: Introduced macro . . . . .	64
v1.13		\institution: Added macro . . . . .	85
\@mpfootnotetext: Made minipage footnotes centered . . . . .	44	\num@authorgroups: Renamed . . . .	64
\bibliographystyle: Redefined macro . . . . .	46	\orcid: Introduced macro . . . . .	66
\bibstyle@acmauthoryear: Added macro . . . . .	41	\position: Added macro . . . . .	85
\bibstyle@acmnumeric: Added macro . . . . .	41	\postcode: Added macro . . . . .	85
\if@ACM@printfolios: Added macro	70	\state: Added macro . . . . .	85
General: Font adjustments for acmsmall . . . . .	87	\streetaddress: Added macro . . . .	85
Increased font size for ACM Large	38	standardpagestyle: Better handling of anonymous mode . . . . .	96
Print bibliographic information by default for the proceedings . . . . .	70	v1.16	
standardpagestyle: Added headers for sigs . . . . .	96	\@headfont: Added macro . . . . .	96
Expanded headers for sigchi-a . . .	96	General: Formatting header/footer (Matthew Fluet) . . . . .	33
Suppressed folios if sig . . . . .	96	standardpagestyle: Customize header/footer text font . . . . .	96
v1.14		v1.17	
\bibstyle@acmauthoryear: Moved def of \bibstyle@acmauthoryear before use . . . . .	41	\@makefnmark: Redefined . . . . .	44
\bibstyle@acmnumeric: Moved def of \bibstyle@numeric before use . .	41	\@mkauthors: TOG now uses the same authors block as other journals . .	86
General: \citestyle updates (Matthew Fluet) . . . . .	33	\@mkauthors@ii: Deleted . . . . .	89
Patched \citestyle . . . . .	39	\@mkbibcitation: Added \nobreak	93
v1.15		Changed format for sigs . . . . .	93
\@ACM@addtoaddress: Added macro	85	\acmArticle: The default is now numerical . . . . .	67
\@mkauthors@iii: New authors system . . . . .	89	\acmMonth: The default must be numerical. Closes #50. . . . .	68
\@shortauthors: Introduced macro . .	96	\acmNumber: The default is now numerical . . . . .	67
\@typeset@author@bx: Moved to separate macro . . . . .	89	\acmVolume: The default is now numerical . . . . .	67
\acks: Added macro . . . . .	107	\acmYear: The default is now numerical . . . . .	67
\affiliation: Added code for author groups . . . . .	65	\description: Decreased indent . . .	56
\author: Added code for author groups . . . . .	64	\grantnum: Added url . . . . .	108
		\grantsponsor: Renamed . . . . .	108
		\if@ACM@printacmref: Renamed from \if@ACM@printbib . . . . .	70
		General: Slightly decreased margins for sigs . . . . .	47
		standardpagestyle: Added paper title to sigs . . . . .	96

v1.18		semicolon separators no longer in bold/italic (John Wickerson) . . . .	71
	\@mkauthors@i: Now we andify affiliations . . . . .		88
	\@typeset@author@line: Added macro . . . . .		87
	General: Natbib is now the default for all formats . . . . .		33
v1.19			
	\@mkabstract: Include 'Abstract' in PDF bookmarks (Matthew Fluet) .		93
	\acks: Include 'Acknowledgements' in PDF bookmarks (Matthew Fluet)		107
	General: Include 'Abstract', 'Acknowledgements', and 'References' in PDF bookmarks (Matthew Fluet) . . . . .		33
	Include 'References' in PDF bookmarks (Matthew Fluet) . . . .		39
v1.20			
	\@mkabstract: Deleted spurious space		93
	General: Bug fixes for bst . . . . .		33
v1.21			
	\showeprint: Added macro . . . . .		108
v1.22			
	General: More bibliography changes for Aptara . . . . .		33
v1.23			
	General: Add PACMPL journal option		33
v1.24			
	General: Add IMWUT journal option		56
v1.25			
	General: Updated PACMPL . . . . .		56
v1.26			
	General: Corrected \shortcite bug .		33
	Documentation typos fixed (thanks to Stephen Spencer) . . . . .		33
v1.27			
	\if@ACM@printccs: Typo corrected .		69
v1.28			
	\ccsdesc@parse: Change from \to to \textrightarrow (Matteo Riondato) . . . . .		71
	General: Corrected option natbib behavior . . . . .		41
	Got rid of warnings in pdf keywords		45
v1.29			
	\@mkabstract: Removed spurious indentation (John Wickerson) . . .		93
	\ccsdesc@parse: Add spacing after bullet and around rightrightarrow;		
		General: Increased head to 13pt . . . .	47
		standardpagestyle: Corrected printfolios (Matthew Fluet) . . . . .	96
	v1.30		
	\department: Added optional parameter . . . . .		85
	General: Added \frenchspacing . . .		109
	Bibtex style now recognizes https:// in doi . . . . .		33
	Switched to T1: looks like libertine has problems with \l in OT1 . . .		50
	Updated IMWUT and PACMPL . .		56
	v1.31		
	\@additionalaffiliation: Added macro . . . . .		65
	\@mkbibcitation: Disabled linebreak		93
	\@startsection: Added \tochangmeasure . . . . .		41
	Redefined macro . . . . .		43
	\@textbottom: Redefined . . . . .		49
	\acmMonth: The default now is the current month (Matteo Riondato)		68
	\acmYear: The default now is the current year (Matteo Riondato) . .		67
	\additionalaffiliation: Added macro . . . . .		65
	\l@section: Redefined macro . .		44
	\l@subsection: Redefined macro		44
	General: Documentation changes . . .		33
	v1.32		
	\@formatdoi: New doi format . . . . .		74
	General: Added POMACS journal option . . . . .		33
	Format siggraph is now obsolete .		33
	v1.33		
	\@ACM@addtoaddress: Added obexpunctuation code . . . . .		85
	\@mkauthors@i: Added obexpunctuation code . . . . .		88
	\@mkauthors@iii: Added obexpunctuation code . . . . .		89
	\@mkauthors@iv: Added obexpunctuation code . . . . .		91
	\@subtitelfont: Added \normalsize . . . . .		83
	\ACM@linecountL: Renamed macro .		95
	\ACM@linecountR: Added macro . . .		95

\ACM@timestamp: Added current page number . . . . .	95	v1.34	\@mkbibcitation: Deleted DOI from doi numbers . . . . .	93
Added macro (Michael D. Adams) . . . . .	95		\ACM@linecount@bx: Rulers now are continuous . . . . .	94
Added submission id . . . . .	95		\ACM@linecountL: Rulers now are continuous . . . . .	95
\acmSubmissionID: Added macro . . . . .	68		\ACM@linecountR: Rulers now are continuous . . . . .	95
\city: Added obeypunctuation code . . . . .	85		\maketitle: Added date to the bibstrip in conf proceedings . . . . .	78
\country: Added obeypunctuation code . . . . .	85		Deleted 'DOI' from doi numbers . . . . .	78
\department: Added obeypunctuation code . . . . .	85		Rearranged bibstrip . . . . .	78
\if@ACM@affiliation@obeypunctuation: Added macro . . . . .	65		The \terms command is now obsolete . . . . .	78
\if@ACM@authordraft: Added macro . . . . .	36		\terms: The \terms command now just produces a warning . . . . .	69
\if@ACM@natbib@override: Deleted macro . . . . .	36			
\if@ACM@timestamp: Added macro (Michael D. Adams) . . . . .	36			
\institution: Added obeypunctuation code . . . . .	85	v1.35	\bibstyle@acmauthoryear: Square brackets for author-year style . . . . .	41
\maketitle: Fixed the bug with figures on top and bottom of the title page, thanks to David Epstein . . . . .	78		General: BibTeX bug fixed: et al. . . . .	33
\position: Added obeypunctuation code . . . . .	85		If the copyright is set to usgov or rigtsretained, the price is suppressed . . . . .	72
\postcode: Added obeypunctuation code . . . . .	85	v1.36		
\state: Added obeypunctuation code . . . . .	85		\@ACM@authorsperrow: Added macro . . . . .	70
\streetaddress: Added obeypunctuation code . . . . .	85		\@mkauthors@iii: Added authorsperrow override . . . . .	89
General: Added acmart-preload-hook . . . . .	33		\@mkauthors@iv: Added authorsperrow override . . . . .	91
Added cmap and glyphtounicode . . . . .	50		\if@ACM@authordraft: Corrected typo, thanks to bargteil . . . . .	36
BibTeX comma before articleno bug corrected . . . . .	33		General: Added PACMHCI journal options . . . . .	56
BibTeX crossref bug corrected . . . . .	33		Added the possibility to adjust number of author boxes per row in conference formats . . . . .	33
BibTeX numpages bug corrected . . . . .	33			
Documentation updates . . . . .	33	v1.37	\description: Reduce list indentation (Matthew Fluet) . . . . .	56
Moved \ci tename definition for non-natbib bibliography, so a package may redefine it . . . . .	45		\descriptionlabel: Reduce list indentation (Matthew Fluet) . . . . .	56
Switched to Type 1 fonts for libertine even if OTF-capable engine is used (Kai Mindermann) . . . . .	50		\normalparindent: Set \normalparindent (Matthew Fluet) . . . . .	48
firstpagestyle: Added right linecount for two-column formats . . . . .	99		General: Reduce list indentation (Matthew Fluet) . . . . .	55
Added timestamp (Michael D. Adams) . . . . .	99		Set \normalparindent; Reduce list indentation (Matthew Fluet) . . . . .	33
standardpagestyle: Added right linecount for two-column formats . . . . .	96			
Added timestamp (Michael D. Adams) . . . . .	96			

v1.38	General: Increase default font size for SIGPLAN . . . . .	33, 38	\@acmEditors: Added macro . . . . .	63
v1.39	\@authornotemark: Added macro . . . . .	92	\@editorsAbbrev: Added macro . . . . .	63
	\authornotemark: Added macro . . . . .	67	\@folioblob: Suppress the blob if acmArticleSeq is empty . . . . .	98
v1.40	\@copyrightowner: Added new copyright version: licensedcagov . . . . .	73	\@mkbibcitation: If the paper has just one page, use 'page' instead of 'pages' . . . . .	93
	\@copyrightpermission: Added new copyright version: licensedcagov . . . . .	74	\ACM@restore@pagestyle: Added macro . . . . .	94
	\@mkauthors@i: Switched to MakeTextUppercase . . . . .	88	\acmArticle: The default is now empty . . . . .	67
	\@parfont: Switched to MakeTextUppercase . . . . .	102	\acmArticleSeq: Now acmArticle might be empty . . . . .	67
	\ACM@linecount@bx: Work around a bug in xcolor: looks like cmyk colors in boxes do not work . . . . .	94	\acmBooktitle: Added macro . . . . .	63
	\ccdesc@parse@finish: Added macro . . . . .	72	\editor: Added macro . . . . .	63
	\city: We now do not print this even in SIG . . . . .	85	\if@ACM@acmthm: Added macro . . . . .	34
	\country: Fixed bugs with extra spaces . . . . .	85	\maketitle: Empty DOI or ISBN are not printed (by Michael Ekstrand) . . . . .	78
	\l@subsection: Redefined macro . . . . .	44	General: Added package reccount . . . . .	33
	\postcode: We now do not print this even in SIG . . . . .	85	Deleted package cleveref . . . . .	33
	\state: We now do not print this even in SIG . . . . .	85	Put theorem defs in a separate style . . . . .	33
	\streetaddress: We now do not print this even in SIG . . . . .	85	v1.45	
	General: Added 'textcase' package . . . . .	39	\@folioblob: Switched \bfseries\sffamily to \sffamily\bfseries . . . . .	98
	Added heightrounded to geometry . . . . .	47	\@parfont: Switched \bfseries\sffamily to \sffamily\bfseries . . . . .	102
	Added new copyright version: licensedcagov . . . . .	33	\@titlefont: Switched \bfseries\sffamily to \sffamily\bfseries . . . . .	83
	Added package cleveref . . . . .	33	v1.46	
	Added Ross Moore code for glyphtounicode . . . . .	50	\@mkauthorsaddresses: Introduced macro . . . . .	92
	Bibliography changes . . . . .	33	\@mkbibcitation: Added subtitle . . . . .	93
v1.41	General: Added new badges . . . . .	33	\@printendtopmatter: Made it \par\bigskip uniformly . . . . .	94
v1.42	General: Deleted ACM badges . . . . .	33	\@printtopmatter: Deleted rule . . . . .	81
v1.43	\@startsection: Added \makeatletter . . . . .	43	\@setauthorsaddresses: Introduced macro . . . . .	94
	\country: Added comma before country for journals . . . . .	85	\ACM@linecount@bx: Rearranged the code to get rid of spurious underfull messages (Benjamin Byholm) . . . . .	94
v1.44	\acmBooktitle: Added macro . . . . .	63	\author: Started counting authors . . . . .	64
			\authorsaddresses: Introduced macro . . . . .	66
			\country: Corrected spacing for institution . . . . .	85

\if@ACM@acmthm: Modified description . . . . .	34	Suppress price if the copyright is set to iw3c2w3 or iw3c2w3g . . . . .	72
\liningnums: Workaround for compatibility with fontspec . . . . .	51	XeTeX now uses OTF fonts (Joachim Breitner) . . . . .	50
\maketitle: Added authors' addresses Thankses go before authors' addresses . . . . .	78	firstpagestyle: We now use journal abbreviation for footers . . . . .	99
\num@author: Introduced macro . . . . .	64	standardpagestyle: We now use journal abbreviation for footers . . . . .	96
General: Added etoolbox . . . . .	33	v1.52	
Bst file bug fixes: label width is calculated correctly . . . . .	33	\@copyrightowner: Rewording of licenses . . . . .	73
Delayed hypersetup since journal options may change screen mode . . . . .	45	\@copyrightpermission: Another rewording of copyright statements for iw3c2w3[g] . . . . .	74
PACM now set screen to true . . . . .	56	v1.53	
Restore theorem defs to class file . . . . .	33	General: Added PACMCGIT, TIOT, TDSCI . . . . .	56
v1.47		v1.54	
General: New journal: THRI . . . . .	33	\@mkbibcitation: Bug corrected (Ross Moore) . . . . .	93
v1.48		\@shortauthors: Added submission id in anonymous mode . . . . .	96
\@headfootfont: Deleted unnecessary switch (Michael D. Adams) . . . . .	96	\ACM@NR@adjustedSectionformat: Added macro . . . . .	101
\@mkabstract: Removed spurious indentation if abstract is followed by an empty line . . . . .	93	\ACM@NRadjust: Added macro . . . . .	100
\ACM@timestamp: Fromatting change (Michael D. Adams) . . . . .	95	\ACM@adddotafter: Added macro . . . . .	101
\if@ACM@review: Review mode now switches on folios . . . . .	35	\author: Added submission id in anonymous mode . . . . .	64
\maketitle: Added acmart and version info to pdfcreator tag . . . . .	78	\if@ACM@nonacm: Added macro . . . . .	35
Added language and doctitle attributes to PDF (Andreas Reichinger) . . . . .	78	General: Added Ross's patch for sectioning . . . . .	101
Suppressed empty DOI (Serguei Mokhov) . . . . .	78	Deleted indent for subsection . . . . .	101
General: \citeyear no longer behaves like \citeyearpar . . . . .	45	XeTeX now uses T1 encoding . . . . .	50
Code prettying (Michael D. Adams) . . . . .	33	v1.55	
Initial support for Biblatex (Daniel Thomas) . . . . .	33	\@mkbibcitation: Bug corrected . . . . .	93
Misc entries in the bibliography no longer produce a separate date . . . . .	33	\maketitle: Fixes topnum . . . . .	78
Typos fixed (Jamie Davis) . . . . .	33	General: Now we use purple color for links . . . . .	45
v1.50		Table captions for SIGCHI now use the same font size as figure captions (Luis Leiva) . . . . .	52
\@copyrightpermission: New copyright statements for iw3c2w3[g] . . . . .	74	Typo corrected (Zack Weinberg) . . . . .	39
v1.51		v1.56	
General: Corrected the bug with price suppression . . . . .	72	\@marginfigure: Added checking for description . . . . .	53
		\@mkteasers: Added check for description . . . . .	92
		\Description: Added macro . . . . .	51
		\acksname: Added macro (Philip Quinn) . . . . .	107

\ccdesc@parse: End the concepts list with a period (Philip Quinn) .	71	firstpagestyle: Added logic for conference papers using journal format . . . . .	99
\if@Description@present: Added macro . . . . .	51	Moved page styles to \AtBeginDocument . . . . .	99
\if@undescribed@images: Added macro . . . . .	51	standardpagestyle: Added logic for conference papers using journal format . . . . .	96
General: Looks like XeTeX requires explicit monotype font declaration	50	Moved page styles to \AtBeginDocument . . . . .	96
Make two-column layouts flush (Philip Quinn) . . . . .	47	v1.60	
v1.57		\@headfootfont: Moved to footnotesize . . . . .	96
\ACM@origbaselinestretch: Added check whether the user changed \baselinestretch . . . . .	109	v1.61	
\author: Added warning if \author has comma . . . . .	64	\@typeset@author@bx: Added \normalbaselines . . . . .	89
\email: Added warning if \author has comma . . . . .	66	v1.64	
\if@ACM@balance: Added macro . . . . .	35	\ACM@linecount@bx: Bug fix: made the spacing on the left and the right size equal . . . . .	94
\vspace: Added warning . . . . .	109	\if@ACM@maketitle@typeset: Introduced macro . . . . .	56
v1.58		\maketitle: Added a switch setting to show that \maketitle is typeset .	78
\@dblfloat: Deleted spurious \vspace warning . . . . .	54	v1.65	
\@marginfigure: Deleted spurious \vspace warning . . . . .	53	\@mkauthorsaddresses: Deleted cs@addpunct . . . . .	92
\@margintable: Deleted spurious \vspace warning . . . . .	53	v1.66	
\@mkbibcitation: Deleted spurious \vspace warning . . . . .	93	\@specialsection: Suppress warnings about \vspace . . . . .	80
\@printendtopmatter: Deleted spurious \vspace warning . . . . .	94	General: Patching algorithm and algorithm* to prevent spurious space warnings . . . . .	51
\@sidebar: Deleted spurious \vspace warning . . . . .	53	v1.67	
\maketitle: Original \vspace inside \maketitle . . . . .	78	\@parfont: Deleted redefinitions of sections . . . . .	102
\vspace: Preserved old versions as \vspace@orig and \vspace@orig . . . . .	109	\@specialsection: Paragraph inside group does not print its argument. Added a bugfix . . . . .	80
General: Added HEALTH. TDSCI is renamed to TDS . . . . .	56	General: Patching lstlisting and lstlisting* to prevent spurious space warnings . . . . .	51
Suppressed \addtocounter in pdf subject . . . . .	45	v1.68	
v1.59		\@specialsection: Deleted grouping altogether . . . . .	80
\acmConference: Setting \ACM@journal@bibstrip . . . . .	63	General: New command for unindent paras . . . . .	101
\acmJournal: Setting \ACM@journal@bibstrip . . . . .	63	v1.69	
\if@ACM@journal@bibstrip: Introduced macro . . . . .	37	\@printendtopmatter: Deleted grouping . . . . .	94

\@specialsection: Changed dot to colon for sigplan . . . . .	80	General: Patching minted and minted* to prevent spurious space warnings . . . . .	51
\ACM@linecountR: Do not increase numbers in one column format . . .	95	v1.74	
\ccsdesc@parse: Use math right arrow in text . . . . .	71	General: Changed the order of font loading . . . . .	50
General: No dots for unindented paragraphs . . . . .	101	v1.75	
v1.71		\@ACM@checkaffil: Changed warning to error for country . . . . .	88
\l@subsubsection: Bug fixed (thanks to Andrew Black) . . . . .	44	\@beginmaketitlehook: Introduced macro . . . . .	77
v1.72		\@AtBeginMaketitle: Introduced macro . . . . .	77
\author: Added \detokenize (Kuldeep S. Meel) . . . . .	64	\maketitle: Added \@beginmaketitlehook . . . . .	78
\maketitle: Do not andify authors for pdf metadata (Scott Pakin) . . .	78	v1.76	
General: Added hyperxmp . . . . .	44	\author: Added code for orcid links . .	64
v1.73		\if@ACM@pbalance: Added macro . . .	35
\@ACM@checkaffil: Added macro . . .	88	\maketitle: Put \par inside group for keywords . . . . .	78
\@ACM@resetaffil: Added macro . . .	88	\orcid: Added code for orcid links . .	66
\@mkauthors@i: Check the presence of required elements for affiliations . . . . .	88	General: Moved before hyperref, see <a href="https://github.com/borisveytsman/acmart/issues/425">https://github.com/borisveytsman/acmart/issues/425</a> . . . . .	44
\@mkauthors@iii: Check the presence of required elements for affiliations . . . . .	89	standardpagestyle: Fixed bug with no line numbers for nonacm . . . . .	96
\@mkauthors@iv: Check the presence of required elements for affiliations . . . . .	91	v1.77	
\city: Check the presence in affil . .	85	\@mkauthorsaddresses: New separator of institutions . . . . .	92
\country: Check the presence in affil	85	v1.78	
\if@ACM@citypresent: Added macro	88	\@mkauthors@i: Unboxing \mktitle@bx . . . . .	88
\if@ACM@countrypresent: Added macro . . . . .	88	\@mkauthors@iii: Unboxing \mktitle@bx . . . . .	89
\if@ACM@instpresent: Added macro	87	\@mkteasers: Unboxing \mktitle@bx	92
\institution: Check the presence in affil . . . . .	85	\@printtopmatter: Added processing the overflowing title box . . . . .	81
\maketitle: Do not check again the presense of address fields . . . . .	78	\@specialsection: Again suppressed \vspace warning . . . . .	80

## Index

Numbers written in *italic* refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in *roman* refer to the code lines where the entry is used.

<b>Symbols</b>		
\\$	1884, 1888	\@ACM@instpresentfalse 42, 43, 44, 45, 46, 47
\-	504	..... 2242 \@Description@presentfalse .. 747, 750, 823, 2432
\@	1634, 1646, 1649, 1652, 1657, 1737, 1758, 1771	... 2157, 2166, 2236 \@Description@presenttrue .. 741, 744
\@authornotemark	..	..... 212, 1267 \@M . 372, 411, 429, 438, 3072
.....	1411, 2426	\@ACM@journal@bibstripfalse .. 210, 1253 \@abstract 1469, 2440, 2447
\@par	..... 372, 429	..... 210, 1253 \@acmArticle ... 1417,
\@ACM@addtoaddress	..	\@ACM@journalfalse . 1420, 1883, 2458, 198, 200, 202, 204, 206 2459, 2580, 2583,
.....	2145, 2171, 2172, 2174	\@ACM@journaltrue .. 2603, 2613, 2624, ... 190, 192, 194, 196 2704, 2723, 2733, 2743
\@ACM@authorsperrow	..... 1498, 2305, 2306, 2358, 2359	\@ACM@labelwidth ... \@acmArticlePage ... 871, 874, 882, 887, 913 2579, 2597, 2598,
\@ACM@badge@skip	...	\@ACM@maketitle@typesetfalse 2607, 2610, 2617, 2621 ..... 920 \@acmArticleSeq 1419, 2687
.....	1442, 2008, 2085, 2089, 2095, 2104, 2114, 2120, 2129	\@ACM@maketitle@typesettrue\@acmBadgeL@image .. ..... 1807 ..... 1451, 1453,
\@ACM@badge@width	..	\@ACM@manuscriptfalse 185 2005, 2007, 2083, ..... 1439, 2007, \@ACM@manuscripttrue 183 2092, 2094, 2116, 2118
.....	2012, 2084, 2088, 2094, 2106, 2113, 2115, 2118, 2130, 2133	\@ACM@newfontsfalse \@acmBadgeL@url . 1450, ..... 705, 708, 711 1452, 2006, 2093, 2117
\@ACM@badgefalse	... 1438	\@ACM@newfontstrue . 702 \@acmBadgeR@image .. ..... 1446, 1448, 2010, 2012, 2087, 2103, 2106, 2131, 2133
\@ACM@badgetrue	1444, 1449	\@ACM@printacmreffalse ..... 93 \@acmBadgeR@url . 1445, 1447, 2011, 2105, 2132
\@ACM@balancefalse	..	\@ACM@printfoliostrue 76 \@acmBooktitle .... ..... 2981, ..... 1273, 1873, 2474
.....	3002, 3004, 3006, 3018	\@ACM@resetaffil ... \@acmDOI .. 1435, 1875, 1878, 1885, 1889, 2482
\@ACM@checkaffil	1914, 2246, 2277, 2282, 2341, 2346, 2386, 2391	2241, 2276, 2281, \@acmEditors 1281, 1282, 1283, 1286, 2475, 2476
.....	2340, 2345, 2385, 2390	\@ACM@reviewtrue ... 138 \@acmISBN ..... 1433, 1887
\@ACM@citypresentfalse	..... 2243	\@ACM@screenstrue 1020, \@acmMonth 1423, 1425, 1883 1049, 1055, 1061, 1067 \@acmNumber ..... 1415, 2471, 2603, 2613, 2624, 2723, 2733, 2743
\@ACM@citypresenttrue	... 2159, 2171, 2238	\@ACM@sigchiamodefalse ..... 187 \@acmPrice 1429, 1884, 1888
\@ACM@commabox	.....	\@ACM@sigchiamodetrue 207 \@acmPubDate ... 1425, 2471, 2603, 2613, 2624, 2724, 2734, 2744
.....	2145, 2149, 2150	\@ACM@timestamptrue 137
\@ACM@countrypresentfalse	..... 2244	\@ACM@title@width .. ..... 1441, 2082, 2084, 2085, 2088, 2089, 2097, 2111, 2113, 2114, 2122
\@ACM@countrypresenttrue	... 2162, 2174, 2240	\@DeclareACMFormat . ... 38, 39, 40, 41,
\@ACM@institution@separator	... 2408, 2409, 2414	

<code>\@acmSubmissionID</code> ..	<code>\@author</code> .....	<code>\@copyrightyear</code> ....
..... 1307,	1306, 1312, 1319,	... 1789, 1859, 1861
1308, 1327, 1328,	2262, 2324, 2371, 2415	<code>\@currbox</code> ... 852, 853, 854
1431, 2560, 2561, 2571	<code>\@authorfont</code> .....	<code>\@currentaffiliation</code>
<code>\@acmVolume</code> .... 1413,	2200, 2205, 2209,	2298, 2301, 2323,
2471, 2602, 2612,	2212, 2215, 2218,	2330, 2331, 2334,
2623, 2722, 2732, 2742	2221, 2224, 2264, 2297	2337, 2338, 2343,
<code>\@acmYear</code> .....	<code>\@authornotemark</code> ...	2370, 2377, 2378,
1428, 1790, 1883, 2462	... 1403, 1409, 2425	2380, 2382, 2383, 2388
<code>\@acmdefinitionbodyfont</code>	<code>\@authornotes</code> .....	<code>\@currentaffiliations</code>
... 2896, 2908, 2920	... 1400, 1404, 1827	..... 2230,
<code>\@acmdefinitionheadfont</code>	<code>\@authorsaddresses</code> .	2231, 2232, 2234,
... 2898, 2910, 2922	1379, 1835, 2420, 2492	2260, 2272, 2273, 2279
<code>\@acmdefinitionindent</code>	<code>\@auxout</code> .....	<code>\@currentauthors</code> ...
... 2897, 2909, 2921	540	..... 2228, 2229,
<code>\@acmdefinitionnotefont</code>	<code>\@begindocumenthook</code> 536	2259, 2263, 2264,
... 2899, 2911, 2925	<code>\@beginmaketitlehook</code>	2266, 2297, 2300,
<code>\@acmownedfalse</code> . 1585,	... 1801, 1804, 1806	2322, 2324, 2325,
1588, 1591, 1597,	<code>\@botnum</code> .....	2327, 2369, 2371,
1601, 1604, 1607,	1933	2372, 2374, 2425, 2426
1610, 1616, 1619, 1623	<code>\@citestyle</code> .....	<code>\@currentlabel</code> . 456, 470
<code>\@acmownedtrue</code> ....	281	<code>\@dblarg</code> .....
... 1572, 1581, 1613	<code>\@classname</code> .....	358
<code>\@acmplainbodyfont</code> .	24,	<code>\@dblfloat</code> .....
... 2866, 2878, 2890	26, 35, 51, 53, 54,	835
<code>\@acmplainheadfont</code> .	59, 61, 62, 67, 69,	<code>\@department</code> .. 1357, 1358
... 2868, 2880, 2892	70, 75, 78, 79, 84,	<code>\@dotsep</code> .....
<code>\@acmplainindent</code> ...	86, 87, 92, 98, 99,	2865
... 2867, 2879, 2891	103, 107, 112, 114,	<code>\@editorsAbbrev</code> ....
<code>\@acmplainnotefont</code> .	115, 120, 122, 123,	... 1280, 1285, 2476
... 2869, 2881, 2895	128, 130, 131, 136,	<code>\@empty</code> .... 214, 362,
<code>\@adddotafter</code> .....	140, 141, 152, 158,	1264, 1282, 1304,
2780, 2781, 2783,	164, 170, 236, 703,	1307, 1325, 1327,
2795, 2810, 2814, 2863	706, 709, 746, 755,	1332, 1333, 1339,
<code>\@additionalaffiliation</code>	758, 826, 1021,	1459, 1460, 1516,
..... 1353, 1354	1050, 1056, 1062,	1517, 1523, 1530,
<code>\@addpunct</code> . 2412, 2491,	1068, 1248, 1250,	1535, 1561, 1802,
2492, 2863, 2864, 2975	1297, 1352, 1366,	1831, 1835, 1875,
<code>\@addspaceafter</code> .... 2864	1456, 1462, 1467,	1884, 1887, 1888,
<code>\@affiliationfont</code> ..	1474, 1476, 1477,	1889, 1899, 1904,
2201, 2206, 2210,	1480, 1482, 1483,	1965, 2005, 2010,
2213, 2216, 2219,	1486, 1494, 1496,	2083, 2087, 2092,
2222, 2225, 2277, 2297	1497, 1499, 1500,	2100, 2103, 2116,
<code>\@afterheading</code> . 403, 1936	1563, 2248, 2251,	2124, 2131, 2141,
<code>\@afterindentfalse</code> .	2254, 2421, 2435,	2230, 2263, 2271,
..... 349, 1935	2455, 3076, 3079, 3086	2272, 2324, 2330,
<code>\@afterindenttrue</code> .. 347	<code>\@clubpenalty</code> .....	2337, 2371, 2377,
<code>\@article@string</code> ...	417	2382, 2420, 2428,
... 2458, 2471, 2479	<code>\@concepts</code> . 1535, 1547,	2458, 2463, 2475,
	1561, 1899, 1901, 1918	2482, 2560, 2571,
	<code>\@copyrightowner</code> ...	2869, 2899, 3037, 3054
	..... 1628, 1859	<code>\@endfloatbox</code> .....
	<code>\@copyrightpermission</code>	838
	..... 1666, 1851	<code>\@endpefalse</code> .....
		2977

<code>\@endwfloatbox</code>	838, <a href="#">846</a>	<code>\@journalCode</code>	.....	2623, 2722, 2732, 2742
<code>\@finalstrut</code>	... 461, 474		. 921, 1021, 1050,	<code>\@keywords</code>
<code>\@float</code>	..... 840		1056, 1062, 1068, 1248	1458, 1459,
<code>\@flushglue</code>	..... 2824	<code>\@journalCode@nr</code>	...	1460, 1904, 1910, 1919
<code>\@fnsymbol</code>	..... 1817	.....	921, 986, 1254	<code>\@latex@error</code>
<code>\@folio@ht</code>	.....	<code>\@journalName</code>	988, 992,	..... 325
	2667, 2694, 2700, 2701		996, 1000, 1004,	<code>\@empty</code>
<code>\@folio@max</code>	2667, 2690, 2691		1008, 1012, 1016,	..... 1471, 2440
<code>\@folio@voffset</code>	2667, 2696		1023, 1027, 1031,	<code>\@listI</code>
<code>\@folio@wd</code>	..... 2667,		1035, 1039, 1043,	..... 895, 899
	2701, 2702, 2729, 2739		1046, 1052, 1058,	<code>\@listi</code>
<code>\@folioblob</code>	... 2687,		1064, 1070, 1074,	..... 892, 899
	2726, 2728, 2736, 2737		1078, 1081, 1085,	<code>\@listii</code>
<code>\@footnotemark</code>	. 478, 1815		1089, 1093, 1097,	..... 900
<code>\@footnotemark@nolink</code>	.....		1101, 1105, 1109,	<code>\@listiii</code>
	478, 1815		1113, 1117, 1121,	..... 903
<code>\@footnotetext</code>	.....		1125, 1129, 1133,	<code>\@listiv</code>
	452, 479, 1816		1137, 1141, 1145,	..... 905
<code>\@footnotetext@nolink</code>	.....		1149, 1153, 1157,	<code>\@listv</code>
	479, 1816		1161, 1165, 1169,	..... 907
<code>\@for</code>	..... 257		1173, 1176, 1180,	<code>\@listvi</code>
<code>\@formatdoi</code>	... 1665,		1183, 1188, 1192,	..... 909
	1878, 1885, 1889, 2482		1196, 1200, 1204,	<code>\@m</code>
<code>\@fps</code>	..... 839		1208, 1212, 1216,	..... 360
<code>\@fpsadddefault</code>	... 839		1220, 1224, 1228,	<code>\@makefnmark</code>
<code>\@gobble</code>	..... 279, 323		1232, 1236, 1240,	... 451,
<code>\@hangfrom</code>	..... 371, 428		1244, 1255, 1256, 1871	476, 1819, 1824, 1828
<code>\@headfootfont</code>	. 2573,	<code>\@journalNameShort</code>	.	<code>\@makefntext</code>
	2597, 2598, 2599,	... 989, 993, 997,	...	... 451, 460, 473, 1830
	2600, 2606, 2609,	1001, 1005, 1009,		<code>\@marginfigure</code>
	2616, 2620, 2628,	1013, 1018, 1024,		... 818, 819
	2629, 2634, 2637,	1028, 1032, 1036,		<code>\@marginable</code>
	2644, 2645, 2650, 2653	1040, 1044, 1047,		... 829, 830
<code>\@idxitem</code>	..... 3069	1053, 1059, 1065,		<code>\@minipagefalse</code>
<code>\@ifnextchar</code>	..... 1357	1071, 1075, 1079,		... 667, 848
<code>\@ifnotempty</code>	..... 1795	1082, 1086, 1090,		<code>\@minus</code>
<code>\@ifnum</code>	..... 295, 297	1094, 1098, 1102,		2800, 2804, 2808,
<code>\@ifstar</code>	..... 356	1106, 1110, 1114,		2812, 2816, 2821,
<code>\@ifundefined</code>	.....	1118, 1122, 1126,		2887, 2889, 2917, 2919
	2930, 2933, 2936,	1130, 1134, 1138,		<code>\@mkabstract</code>
	2939, 2942, 2946, 2949	1142, 1146, 1150,		... 1897, 2439
<code>\@iiiparbox</code>	..... 670	1154, 1158, 1162,		<code>\@mkauthors</code>
<code>\@indextitlestyle</code>	.. 3068	1166, 1170, 1177,		1820, 1822, 2176
<code>\@input</code>	..... 440	1181, 1184, 1189,		<code>\@mkauthors@i</code>
<code>\@insideauthorgroupfalse</code>	.....	1193, 1197, 1201,		... 2180,
	1295, 1347	1205, 1209, 1213,		2182, 2184, 2186, 2258
<code>\@insideauthorgrouptrue</code>	.....	1217, 1221, 1225,		<code>\@mkauthors@ii</code>
	1302	1229, 1233, 1237,		... 2290
		1241, 1245, 1256,		<code>\@mkauthors@iii</code>
		2470, 2602, 2612,		... 2188,
				2190, 2192, 2194, 2302
				<code>\@mkauthors@iv</code>
				2196, 2355
				<code>\@mkauthorsaddresses</code>
				..... 1380, 2399
				<code>\@mkbibcitation</code>
				1929, 2449
				<code>\@mkteasers</code>
				... 1820, 2427
				<code>\@mktitle</code>
				..... 1820, 2017
				<code>\@mktitle@i</code>
				... 2020,
				2022, 2024, 2026, 2081
				<code>\@mktitle@ii</code>
				..... 2109
				<code>\@mktitle@iii</code>
				... 2028,
				2030, 2032, 2034, 2109
				<code>\@mktitle@iv</code>
				... 2036, 2137
				<code>\@mpargs</code>
				..... 670
				<code>\@mparswitchfalse</code>
				... 632
				<code>\@mpfootins</code>
				.....
				465, 466, 662, 663, 665
				<code>\@mpfootnotetext</code>
				... 464
				<code>\@ne</code>
				... 283, 287, 291, 293,
				526, 2506, 2512, 2516
				<code>\@nil</code>
				..... 302

\@nobreakfalse .	405, 445	\@proofindent . . . . .	268, 270, 272, 274,
\@noskipsecfalse . . . .	409	. . . . .	276, 278, 280, 282,
\@noskipsectrue . . . . .	406	\@proofnamefont . . . . .	284, 286, 288, 290,
\@pages@word . . . . .		. . . . .	292, 294, 296, 298,
. . . . .	2452, 2472, 2479	\@received .	1514, 1517,
\@par . . . . .	1833, 1839	. . . . .	1518, 1520, 1523,
\@parboxrestore . . . . .	469	. . . . .	1524, 1526, 1530, 1531
\@parfont . . . . .		\@restonecolfalse . .	3066
. . . . .	2814, 2818, 2823, 2828	\@restonecoltrue . . .	3066
\@permissionCodeOne		\@rightskip . . . . .	2824, 2825
. . . . .	990,	\@saveabstract 1465, 1466	
. . . . .	994, 998, 1002,	\@saveteaser . . . . .	1792, 1793
. . . . .	1006, 1010, 1014,	\@secCNTformat . . . . .	365, 422
. . . . .	1019, 1025, 1029,	\@secfont . . . . .	2802, 2828
. . . . .	1033, 1037, 1041,	\@secpenalty . . . . .	354
. . . . .	1048, 1054, 1060,	\@sect . . . . .	358, 359
. . . . .	1066, 1072, 1076,	\@setaddresses . . . . .	2424
. . . . .	1083, 1087, 1091,	\@setauthorsaddresses	
. . . . .	1095, 1099, 1103,	. . . . .	1839, 2492
. . . . .	1107, 1111, 1115,	\@setthanks . . . . .	1833, 2491
. . . . .	1119, 1123, 1127,	\@shortauthors . . . . .	
. . . . .	1131, 1135, 1139,	. . . . .	2568, 2591, 2599,
. . . . .	1143, 1147, 1151,	. . . . .	2607, 2617, 2629, 2645
. . . . .	1155, 1159, 1163,	\@sidebar . . . . .	814, 815
. . . . .	1167, 1171, 1174,	\@specialsection . . . . .	
. . . . .	1178, 1185, 1190,	. . . . .	1900, 1906, 1908, 1938
. . . . .	1194, 1198, 1202,	\@sssect . . . . .	357, 423
. . . . .	1206, 1210, 1214,	\@startPage . . . . .	1454,
. . . . .	1218, 1222, 1226,	. . . . .	1965, 1966, 1968, 2565
. . . . .	1230, 1234, 1238,	\@startsection . . . . .	343,
. . . . .	1242, 1246, 1257, 1883	. . . . .	435, 2799, 2803,
\@permissionCodeTwo		. . . . .	2807, 2811, 2815, 2820
. . . . .	1186, 1258	\@starttoc . . . . .	435
\@plus . . . . .	438, 446,	\@subparfont . . . . .	2853
. . . . .	671, 2800, 2804,	\@subsecfont . . . . .	2806, 2828
. . . . .	2808, 2812, 2816,	\@subsubsecfont 2810, 2828	
. . . . .	2821, 2886, 2888,	\@subtitle . . . . .	1288, 1392,
. . . . .	2916, 2918, 2972, 3070	. . . . .	2100, 2101, 2124,
\@printcopyrightfalse		. . . . .	2125, 2141, 2142, 2463
. . . . .	1584, 1596	\@subtitlefont . . . . .	
\@printcopyrighttrue		. . . . .	2060, 2101, 2125, 2142
. . . . .	1568, 1580	\@subtitlenotes . . . . .	
\@printendtopmatter		. . . . .	1390, 1394, 1397, 1826
. . . . .	1934, 2484	\@svsec . . . . .	362, 365, 371, 386
\@printpermissionfalse		\@svsechd . . . . .	384, 412, 432
. . . . .	1583	\@teaser . . . . .	1793, 2429
\@printpermissiontrue		\@teaserfigures . . . . .	
. . . . .	1570, 1579, 1595	. . . . .	1791, 1793, 2428, 2433
\@printtopmatter . . . . .		\@tempa . . . . .	257, 258,
. . . . .	1821, 1964	. . . . .	260, 262, 264, 266,
		\@tempb . . . . .	258, 260, 262, 264,
		. . . . .	266, 268, 270, 272,
		\@tempboxa . . . . .	670, 1974, 1976
		\@tempc . . . . .	303, 304, 306,
		. . . . .	308, 310, 312, 314, 316
		\@tempcnta . . . . .	2687, 2688,
		. . . . .	2690, 2691, 2693, 2695
		\@tempdima . . . . .	
		. . . . .	1970, 1971, 1972,
		. . . . .	1978, 1979, 1980,
		. . . . .	2694, 2695, 2696, 2698
		\@tempskipa . . . . .	
		. . . . .	346, 348, 349, 354,
		. . . . .	367, 368, 399, 400,
		. . . . .	402, 414, 415, 424, 425
		\@textbottom . . . . .	671
		\@textsuperscript . . . . .	
		. . . . .	476, 1819, 1824
		\@texttop . . . . .	672
		\@thefnmark . . . . .	457, 471,
		. . . . .	476, 1819, 1824, 1829
		\@title . . . . .	1383, 1917,
		. . . . .	2099, 2123, 2140, 2462
		\@titlefont 2039, 2091,	
		. . . . .	2098, 2110, 2122, 2138
		\@titlenotes . . . . .	
		. . . . .	1381, 1385, 1388, 1825
		\@tochangmeasure 376, 389	
		\@toclevel . . . . .	360
		\@tocline . . . . .	448, 449, 450
		\@topnum . . . . .	1931
		\@typeset@author@bx	
		. . . . .	2294,
		. . . . .	2348, 2354, 2393, 2398

<code>\@typeset@author@line</code>	1859, 1861, 1884,	<code>\ACM@linecountR</code> . . . .
<code>\@undefined</code> . . . . .	2458, 2459, 2477, 2565	. . . . <u>2525</u> , 2619,
. 536, 734, 1275, 1801		2621, 2629, 2632,
<code>\@undescribed@imagesfalse</code>		2639, 2645, 2648,
. . . . . 743		2655, 2747, 2750, 2755
<code>\@undescribed@imagestrue</code>		<code>\ACM@mk@linecount</code> . .
. . 754, 757, 825, 2434		. . . . . 2507,
<code>\@vspace</code> 748, 751, 759,		2520, 2535, 2537,
761, 763, 765, 767,		2539, 2541, 2543, 2545
769, 771, 773, 775,		<code>\ACM@NR@adjustedSectionformat</code>
777, 815, 820, 830,		. . . . . 2778, <u>2787</u>
836, 1813, 1939,		<code>\ACM@NRadjust</code> . . . . .
1961, 2450, 2485,		2769, 2802, 2806,
2488, 3074, 3076, 3082		2810, 2814, 2818, 2823
<code>\@vspace@acm</code> . . . . .		<code>\ACM@origbaselinestretch</code>
. . . 1961, 2488, 3082		. . . . . <u>3084</u>
<code>\@vspace@orig</code> 748, 751,		<code>\ACM@ps@headings</code> . . .
759, 761, 763, 765,		. . . . . 2496, 2500
767, 769, 771, 773,		<code>\ACM@ps@myheadings</code> .
775, 777, 815, 820,		. . . . . 2495, 2499
830, 836, 1813,		<code>\ACM@ps@plain</code> . 2494, 2498
1939, 2450, 2485, 3074		<code>\ACM@restore@pagestyle</code>
<code>\@vspacer</code> 749, 752, 760,		. . . . . <u>2494</u>
762, 764, 766, 768,		<code>\ACM@sect@format</code> . . .
770, 772, 774, 776,		. . . . . 2788, 2790
778, 816, 821, 831,		<code>\ACM@sect@format@</code> . .
837, 1814, 1940,		. . . 2777, 2790, 2792
1962, 2451, 2486,		<code>\ACM@sect@format@null</code>
2489, 3075, 3079, 3083		. . . . . 2791, 2792
<code>\@vspacer@acm</code> . . . . .		<code>\ACM@timestamp</code> . . . .
. . . 1962, 2489, 3083		<u>2551</u> , 2662, 2760, 2765
<code>\@vspacer@orig</code> . 749,		<code>\acmArticle</code> . . . . 15, <u>1417</u>
752, 760, 762, 764,		<code>\acmArticleSeq</code> . 15, <u>1419</u>
766, 768, 770,		<code>\acmBadgeL</code> . . . . . 16, <u>1449</u>
772, 774, 776,		<code>\acmBadgeR</code> . . . . . 16, <u>1444</u>
778, 816, 821,		<code>\acmBooktitle</code> . . . 9, <u>1273</u>
831, 837, 1814,		<code>\acmConference</code> . . 9, <u>1259</u>
1940, 2451, 2486, 3075		<code>\acmConference@date</code>
<code>\@width</code> . . . . . 651, 658		. . . . 1262, 1855,
<code>\@xp</code> . . . . . 442, 443		2636, 2639, 2652, 2655
<code>\@xsect</code> . . . . 397, 398, 434		<code>\acmConference@name</code>
<code>\@</code> 557, 566, 1307, 1859,		. . . . 1261, 1275, 1276, 1277
1864, 1879, 1884,		<code>\acmConference@shortname</code>
1888, 2454, 2462, 2511		. . . . 1260, 1264, 1265,
<code>\{</code> . . . . . 265		1277, 1278, 1855,
<code>\}</code> . . . . . 265		2635, 2638, 2651, 2654
<code>\_</code> . . . 1278, 1543, 1553,		<code>\acmConference@venue</code>
		. . . . 1263, 1855,
		2636, 2639, 2652, 2655
		<code>\acmdefinition</code> . . . . <u>2915</u>

<code>\acmDOI</code> . . . . .	16, <a href="#">1435</a>	1598, 1620, 1624,	<code>\bfseries</code> . .	911, 1845,
<code>\acmISBN</code> . . . . .	16, <a href="#">1433</a>	2501, 2574, 2707, 2793		2042, 2044, 2046,
<code>\acmJournal</code> . . . . .	9, <a href="#">1252</a>		<code>\AtBeginEnvironment</code>	2050, 2052, 2054,
<code>\acmMonth</code> . . . . .	15, <a href="#">1423</a>		. . .	747, 750, 759,
<code>\acmNumber</code> . . . . .	15, <a href="#">1415</a>	761, 763, 765, 767,		2056, 2058, 2221,
<code>\acmplain</code> . . . . .	<a href="#">2885</a>	769, 771, 773, 775, 777		2224, 2460, 2704,
<code>\acmPrice</code> . . .	15, <a href="#">1429</a> ,		<code>\AtBeginMaketitle</code>	30, <a href="#">1804</a>
	1592, 1598, 1620, 1624		<code>\AtEndDocument</code>	. 745,
<code>\acmSubmissionID</code>	15, <a href="#">1431</a>	1460, 1484, 1529,		2849, 2850, 2851,
<code>\acmVolume</code> . . . . .	15, <a href="#">1413</a>	1561, 2419, 3022, 3085		2852, 2856, 2857,
<code>\acmYear</code> . . . . .	15, <a href="#">1421</a>		<code>\AtEndEnvironment</code>	753, 756
<code>\addcontentsline</code>	253,		<code>\AtEndPreamble</code>	. 502,
	378, 391, 2441, 3031			735, 2927, 2979, 3038
<code>\additionalaffiliation</code>		<code>\author</code> . . . . .	10,	<code>\bgroup</code> .
. . . . .	11, <a href="#">1353</a>		1296, 1809, 1810, 2456	815, 819, 830,
<code>\addpenalty</code> . . . . .	354	<code>\author@bx</code>	2290, 2296, 2299	836, 1354, 1899,
<code>\addresses</code> . . . . .		<code>\author@bx@sep</code>	. . . . .	1904, 2294, 2331,
	1304, 1306, 1311,		2292, 2299,	2334, 2395, 2404,
	1318, 1349, 1369,		2304, 2321, 2357, 2368	2429, 2439, 2449, 2461
	1403, 1409, 1411,	<code>\author@bx@wd</code>	. . . . .	<code>\bibfont</code> . . . . .
	2287, 2354, 2398, 2417		2291, 2294,	255
<code>\addtocounter</code> . .	482, 1555		2303, 2304, 2306,	<code>\bibiofont</code> . . . . .
<code>\addtolength</code> . . .	880,		2312, 2314, 2316,	255
	881, 882, 886, 887, 2513		2318, 2321, 2356,	<code>\bibliographystyle</code> .
<code>\addvspace</code> . . . . .	354, 446		2357, 2359, 2365, 2368	<a href="#">535</a>
<code>\advance</code> . . .	896, 901,	<code>\authornote</code> . . . . .		<code>\bibsection</code> . . . . .
	904, 906, 908, 910,		. 14, 1353, <a href="#">1401</a> , 2457	251
	1299, 1301, 1971,	<code>\authornotemark</code> .	15, <a href="#">1407</a>	<code>\bibstyle</code> 279, 281, 323, 540
	1979, 2084, 2085,	<code>\authors</code> . . . . .		<code>\bibstyle@acmauthoryear</code>
	2088, 2089, 2113,		1309, 1314, 1321,	. . . . .
	2114, 2304, 2321,		1912, 1924, 1926, 2462	<a href="#">329</a>
	2357, 2368, 2512,	<code>\authorsaddresses</code>	14, <a href="#">1379</a>	<code>\bibstyle@acmnumeric</code>
	2516, 2691, 2693, 2696			<a href="#">335</a>
<code>\affiliation</code> . . . . .	10,	<b>B</b>		<code>\bigskip</code> . .
	<a href="#">1346</a> , 2270, 2337, 2382	<code>\balance</code> . . . . .	3025	1531, 2002,
<code>\and</code> . . . . .	1286, 1319,	<code>\baselineskip</code> . . . . .		2108, 2136, 2144,
	1321, 1336, 1342,		. . . . .	2354, 2398, 2429, 2487
	2261, 2266, 2268,		. . . . .	<code>\box</code> 853, 1986, 1988, 1990,
	2279, 2285, 2295,		1849, 2093,	1992, 1994, 1996,
	2329, 2348, 2354,		2105, 2117, 2132,	1998, 2000, 2002, 2299
	2376, 2393, 2398, 2414		2513, 2800, 2801,	
<code>\andify</code> . . . . .	1924,		2804, 2805, 2808,	
	1925, 2228, 2231, 2476		2812, 2816, 2886,	
<code>anonsuppress</code> (environ-			2887, 2888, 2889,	
ment) . . . . .	23		2916, 2917, 2918, 2919	
<code>\apptocmd</code> . . . . .	3076, 3079	<code>\baselinestretch</code> . . . . .		
<code>\AtBeginDocument</code> . . . . .	76, 93, 529,		. . .	3084, 3085, 3087
	537, 872, 1592,	<code>\begin</code> .	19, 2521, 2547, 2697	
		<code>\beginngroup</code> . . . . .	369,	
			412, 426, 435, 525,	
			1812, 2176, 2770, 3029	
				472, 556, 565,
				823, 832, 2110,
				2122, 2296, 2353, 2703

<code>\cite</code> ...	518, 519, 530, 534	<code>\copyrightpermissionfootnoterule</code>	992, 993, 994, 996, 997, 998, 1000, 1001, 1002, 1004, 1005, 1006, 1008, 1009, 1010, 1012, 1013, 1014, 1016, 1018, 1019, 1023, 1024, 1025, 1027, 1028, 1029, 1031, 1032, 1033, 1035, 1036, 1037, 1039, 1040, 1041, 1043, 1044, 1046, 1047, 1048, 1052, 1053, 1054, 1058, 1059, 1060, 1064, 1065, 1066, 1070, 1071, 1072, 1074, 1075, 1076, 1078, 1079, 1081, 1082, 1083, 1085, 1086, 1087, 1089, 1090, 1091, 1093, 1094, 1095, 1097, 1098, 1099, 1101, 1102, 1103, 1105, 1106, 1107, 1109, 1110, 1111, 1113, 1114, 1115, 1117, 1118, 1119, 1121, 1122, 1123, 1125, 1126, 1127, 1129, 1130, 1131, 1133, 1134, 1135, 1137, 1138, 1139, 1141, 1142, 1143, 1145, 1146, 1147, 1149, 1150, 1151, 1153, 1154, 1155, 1157, 1158, 1159, 1161, 1162, 1163, 1165, 1166, 1167, 1169, 1170, 1171, 1173, 1174, 1176, 1177, 1178, 1180, 1181, 1183, 1184, 1185, 1186, 1188, 1189, 1190, 1192, 1193, 1194, 1196, 1197, 1198, 1200, 1201, 1202, 1204,
<code>\citeA</code> .....	524	.....	650
<code>\citealt</code> .....	523	<code>\copyrightyear</code> .	17, 1789
<code>\citeANP</code> .....	520	<code>\country</code> 12, 1363, 2153, 2413	
<code>\citeauthor</code> .....	520	<code>\csname</code> ....	323, 374, 376, 380, 387, 389, 393, 422, 442, 443, 457, 471, 1313, 1320, 1373, 1376, 1542, 1543, 1545, 1546, 1547, 1548, 1549, 1552, 1554, 1921, 1923, 2771, 2794
<code>\citeN</code> .....	518	<code>\CurrentOption</code> .	145, 146, 147, 148, 149, 150
<code>\citename</code> .....	531		
<code>\citeNN</code> .....	521		
<code>\citeNP</code> .....	523		
<code>\citep</code> .....	519		
<code>\citestyle</code> ...	24, 321, 341		
<code>\citeyear</code> .....	522		
<code>\citeyearNP</code> .....	522		
<code>\citeyearpar</code> ...	521, 534		
<code>\city</code> ..	12, 1360, 2153, 2410		
<code>\ClassError</code> .....			
..	35, 1250, 1352, 1467, 1477, 1483, 1497, 2254, 2455, 3086		
<code>\ClassInfo</code> .....			
..	152, 236, 1248, 1474, 1476, 1480, 1482, 1494, 1496, 1499		
<code>\ClassWarning</code>	26, 158, 164, 170, 703, 706, 709, 755, 758, 826, 1297, 1366, 1456, 1500, 2435, 3076, 3079		
<code>\ClassWarningNoLine</code>			
.	746, 1462, 1486, 1563, 2248, 2251, 2421		
<code>\cleaders</code> .....	2150		
<code>\clearpage</code> .....	1977		
<code>\clubpenalty</code> ...	411, 417		
<code>\CodelineIndex</code> .....	16		
<code>\Collect@Body</code> ..	814, 818, 829, 1465, 1792		
<code>\color</code> ...	1847, 2511, 2515		
<code>\color@begingroup</code>	459, 472		
<code>\color@endbox</code> .....	851		
<code>\color@endgroup</code> .....			
.....	462, 475, 668		
<code>\columnsep</code> .....	3067		
<code>\columnseprule</code> ....	3067		
<code>\columnwidth</code> ...	468, 651, 837, 2356, 2395		
<code>\contentsnamefont</code> ..	439		
<code>\copy</code> .....	2150		
<code>\copyright</code> .....	1859		
		<b>D</b>	
		<code>\day</code> .....	2563
		<code>\DeclareNewFootnote</code>	
		.....	654, 656
		<code>\DeclareOptionX</code> ....	
		.....	38, 145, 146, 147, 148, 149, 150
		<code>\DeclareRobustCommand</code>	
		.....	524, 2790
		<code>\DeclareTextFontCommand</code>	
		.....	736
		<code>\def</code> ...	24, 38, 144, 217, 219, 221, 223, 225, 227, 229, 231, 233, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 294, 296, 298, 300, 301, 305, 307, 309, 311, 313, 315, 343, 359, 384, 398, 422, 423, 432, 435, 448, 449, 450, 451, 453, 464, 476, 482, 483, 484, 485, 486, 504, 535, 650, 657, 659, 671, 815, 819, 830, 836, 839, 843, 846, 864, 865, 866, 867, 895, 900, 903, 905, 907, 909, 988, 989, 990,

1205, 1206, 1208,	2269, 2270, 2271,	<code>\description</code> . . . . . <a href="#">912</a>
1209, 1210, 1212,	2294, 2295, 2302,	<code>\descriptionlabel</code> <a href="#">911</a> , <a href="#">914</a>
1213, 1214, 1216,	2324, 2330, 2337,	<code>\detokenize</code> . . . . . <a href="#">1297</a>
1217, 1218, 1220,	2355, 2371, 2377,	<code>\dimexpr</code> . . . . . <a href="#">834</a> , <a href="#">853</a> , <a href="#">2659</a>
1221, 1222, 1224,	2382, 2399, 2405,	<code>\divide</code> <a href="#">2306</a> , <a href="#">2312</a> , <a href="#">2314</a> ,
1225, 1226, 1228,	2406, 2407, 2409,	<a href="#">2316</a> , <a href="#">2318</a> , <a href="#">2359</a> , <a href="#">2365</a>
1229, 1230, 1232,	2410, 2411, 2413,	<code>\do</code> . . . . . <a href="#">257</a> , <a href="#">504</a>
1233, 1234, 1236,	2414, 2415, 2416,	<code>\do@url@hyp</code> . . . . . <a href="#">504</a>
1237, 1238, 1240,	2424, 2425, 2426,	<code>\DocInput</code> . . . . . <a href="#">20</a>
1241, 1242, 1244,	2427, 2429, 2439,	<code>\documentclass</code> . . . . . <a href="#">8</a>
1245, 1246, 1252,	2449, 2452, 2453,	<code>\dots</code> . . . . . <a href="#">1888</a>
1254, 1255, 1256,	2454, 2455, 2458,	<code>\dp</code> . . . . . <a href="#">1971</a> , <a href="#">1979</a>
1257, 1258, 1273,	2462, 2484, 2491,	
1280, 1281, 1282,	2492, 2497, 2507,	
1288, 1331, 1353,	2518, 2525, 2568,	<b>E</b>
1354, 1355, 1356,	2573, 2579, 2673,	<code>\edef</code> <a href="#">145</a> , <a href="#">146</a> , <a href="#">147</a> , <a href="#">148</a> , <a href="#">360</a>
1357, 1358, 1371,	2680, 2685, 2687,	<code>\editor</code> . . . . . <a href="#">9</a> , <a href="#">1282</a>
1379, 1381, 1382,	2769, 2773, 2775,	<code>\egroup</code> . . . . . <a href="#">669</a> ,
1390, 1391, 1400,	2777, 2787, 2791,	<a href="#">817</a> , <a href="#">828</a> , <a href="#">832</a> , <a href="#">844</a> ,
1401, 1413, 1415,	2798, 2824, 2828,	<a href="#">850</a> , <a href="#">1364</a> , <a href="#">1901</a> ,
1417, 1419, 1421,	2829, 2830, 2831,	<a href="#">1910</a> , <a href="#">2298</a> , <a href="#">2332</a> ,
1423, 1425, 1429,	2837, 2838, 2840,	<a href="#">2335</a> , <a href="#">2398</a> , <a href="#">2418</a> ,
1431, 1433, 1435,	2841, 2843, 2844,	<a href="#">2430</a> , <a href="#">2448</a> , <a href="#">2462</a> , <a href="#">2483</a>
1445, 1446, 1447,	2846, 2847, 2849,	<code>\else</code> <a href="#">52</a> , <a href="#">60</a> , <a href="#">68</a> , <a href="#">77</a> , <a href="#">85</a> , <a href="#">97</a> ,
1448, 1450, 1451,	2850, 2851, 2852,	<a href="#">113</a> , <a href="#">121</a> , <a href="#">129</a> , <a href="#">139</a> ,
1452, 1453, 1454,	2853, 2856, 2857,	<a href="#">184</a> , <a href="#">211</a> , <a href="#">303</a> , <a href="#">324</a> ,
1456, 1458, 1466,	2860, 2861, 2863,	<a href="#">353</a> , <a href="#">360</a> , <a href="#">363</a> , <a href="#">375</a> ,
1471, 1502, 1514,	2864, 2866, 2867,	<a href="#">379</a> , <a href="#">383</a> , <a href="#">388</a> , <a href="#">392</a> ,
1515, 1539, 1540,	2868, 2869, 2878,	<a href="#">404</a> , <a href="#">416</a> , <a href="#">431</a> , <a href="#">512</a> ,
1566, 1626, 1628,	2879, 2880, 2881,	<a href="#">528</a> , <a href="#">534</a> , <a href="#">536</a> , <a href="#">559</a> ,
1665, 1666, 1789,	2896, 2897, 2898,	<a href="#">561</a> , <a href="#">662</a> , <a href="#">722</a> , <a href="#">727</a> ,
1791, 1793, 1804,	2899, 2908, 2909,	<a href="#">753</a> , <a href="#">756</a> , <a href="#">786</a> , <a href="#">824</a> ,
1806, 1819, 1824,	2910, 2911, 2955,	<a href="#">1243</a> , <a href="#">1269</a> , <a href="#">1275</a> ,
1833, 1839, 1914,	2956, 2965, 2966,	<a href="#">1277</a> , <a href="#">1284</a> , <a href="#">1300</a> ,
1938, 1964, 2017,	3035, 3037, 3053,	<a href="#">1307</a> , <a href="#">1310</a> , <a href="#">1316</a> ,
2039, 2060, 2081,	3054, 3055, 3059, 3066	<a href="#">1317</a> , <a href="#">1327</a> , <a href="#">1330</a> ,
2109, 2137, 2146,		<a href="#">1335</a> , <a href="#">1338</a> , <a href="#">1341</a> ,
2153, 2154, 2156,	<code>\define@boolkey</code> . . . . .	<a href="#">1348</a> , <a href="#">1368</a> , <a href="#">1387</a> ,
2157, 2159, 2160,	. . . <a href="#">49</a> , <a href="#">57</a> , <a href="#">65</a> , <a href="#">73</a> ,	<a href="#">1396</a> , <a href="#">1402</a> , <a href="#">1410</a> ,
2162, 2165, 2166,	<a href="#">82</a> , <a href="#">90</a> , <a href="#">102</a> , <a href="#">106</a> ,	<a href="#">1460</a> , <a href="#">1475</a> , <a href="#">1481</a> ,
2170, 2171, 2173,	<a href="#">110</a> , <a href="#">118</a> , <a href="#">126</a> , <a href="#">134</a> ,	<a href="#">1484</a> , <a href="#">1495</a> , <a href="#">1506</a> ,
2174, 2176, 2200,	<a href="#">1351</a> , <a href="#">1472</a> , <a href="#">1478</a> , <a href="#">1492</a>	<a href="#">1509</a> , <a href="#">1519</a> , <a href="#">1522</a> ,
2201, 2205, 2206,	<code>\define@choicekey</code> . . . . .	<a href="#">1525</a> , <a href="#">1530</a> , <a href="#">1551</a> ,
2209, 2210, 2212,	. . . . . <a href="#">32</a> , <a href="#">921</a> , <a href="#">1573</a>	<a href="#">1556</a> , <a href="#">1557</a> , <a href="#">1558</a> ,
2213, 2215, 2216,	<code>\define@cmdkey</code> . . . . . <a href="#">1498</a>	<a href="#">1561</a> , <a href="#">1798</a> , <a href="#">1820</a> ,
2218, 2219, 2221,	<code>\definecolor</code> . . . . .	<a href="#">1831</a> , <a href="#">1835</a> , <a href="#">1836</a> ,
2222, 2224, 2225,	. . . <a href="#">544</a> , <a href="#">545</a> , <a href="#">546</a> ,	<a href="#">1843</a> , <a href="#">1850</a> , <a href="#">1853</a> ,
2227, 2229, 2234,	<a href="#">547</a> , <a href="#">548</a> , <a href="#">549</a> , <a href="#">550</a> , <a href="#">551</a>	<a href="#">1854</a> , <a href="#">1860</a> , <a href="#">1865</a> ,
2241, 2246, 2258,	<code>\department</code> . . . . .	<a href="#">1872</a> , <a href="#">1877</a> , <a href="#">1880</a> ,
2259, 2260, 2262,	. . . <a href="#">12</a> , <a href="#">1357</a> , <a href="#">2153</a> , <a href="#">2412</a>	<a href="#">1881</a> , <a href="#">1884</a> , <a href="#">1886</a> ,
	<code>\Description</code> . . . . . <a href="#">22</a> , <a href="#">744</a>	<a href="#">1887</a> , <a href="#">1888</a> , <a href="#">1889</a> ,

1899, 1904, 1907, 1967, 2005, 2010, 2083, 2087, 2092, 2100, 2103, 2116, 2124, 2131, 2141, 2147, 2148, 2163, 2164, 2165, 2167, 2169, 2170, 2173, 2230, 2247, 2250, 2253, 2265, 2271, 2278, 2296, 2307, 2317, 2326, 2333, 2342, 2360, 2364, 2373, 2379, 2387, 2401, 2403, 2419, 2428, 2433, 2440, 2444, 2452, 2458, 2463, 2464, 2473, 2475, 2482, 2560, 2571, 2572, 2582, 2593, 2601, 2611, 2622, 2626, 2633, 2642, 2649, 2688, 2717, 2721, 2731, 2741, 2748, 2753, 2761, 2764, 2774, 2798, 3037, 3042, 3049, 3058, 3062, 3085	<code>\endminipage</code> . . . . . 659 <code>\endtrivlist</code> . . . . . 2977 <code>\enspace</code> . . . . . 2864 environments: <code>abstract</code> . . . . . 19 <code>acks</code> . . . . . 23 <code>anonsuppress</code> . . . . . 23 <code>CCSXML</code> . . . . . 16 <code>marginfigure</code> . . . . . 32 <code>marginable</code> . . . . . 32 <code>printonly</code> . . . . . 22 <code>screenonly</code> . . . . . 22 <code>sidebar</code> . . . . . 32 <code>teaserfigure</code> . . . . . 19 <code>\everypar</code> 352, 407, 418, 2443 <code>\excludecomment</code> . 1534, 3041, 3043, 3047, 3048 <code>\ExecuteOptionsX</code> . . . . . . 48, 56, 64, 72, 81, 89, 101, 105, 109, 117, 125, 133, 143 <code>\expandafter</code> 302, 304, 537, 670, 1311, 1312, 1318, 1319, 1373, 1376, 1542, 1543, 1545, 1546, 1552, 1554, 2771, 2794	<code>\fancyheadoffset</code> . . . . . . 2659, 2729, 2739 <code>\fancyhf</code> . . . . . 2576, 2709 <code>\fancypagestyle</code> 2575, 2708 <code>\fi</code> 54, 62, 70, 79, 87, 99, 115, 123, 131, 141, 162, 168, 181, 186, 208, 213, 234, 235, 247, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 306, 308, 310, 312, 314, 316, 317, 326, 328, 342, 344, 350, 355, 360, 366, 377, 381, 390, 394, 396, 419, 420, 433, 444, 463, 501, 505, 514, 532, 534, 538, 541, 568, 569, 570, 634, 648, 666, 688, 700, 731, 732, 733, 739, 746, 755, 758, 810, 811, 827, 841, 845, 870, 1247, 1266, 1272, 1278, 1279, 1287, 1303, 1308, 1315, 1322, 1323, 1328, 1329, 1337, 1343, 1344, 1345, 1350, 1370, 1389, 1399, 1406, 1412, 1428, 1464, 1468, 1477, 1483, 1491, 1497, 1511, 1512, 1521, 1527, 1528, 1532, 1550, 1558, 1559, 1565, 1586, 1589, 1593, 1599, 1602, 1605, 1608, 1611, 1614, 1617, 1621, 1625, 1664, 1788, 1800, 1803, 1810, 1811, 1820, 1822, 1834, 1840, 1841, 1842, 1848, 1851, 1852, 1856, 1857,
<code>\email</code> . . . . . 10, 1365, 2269, 2330, 2377, 2416 <code>\emph</code> . . . . . 1871, 1873 <code>\empty</code> . . . . . 2580 <code>\EnableCrossrefs</code> . . . . . 18 <code>\end</code> . . . 21, 2523, 2549, 2705 <code>\end@dblfloat</code> . . . . . 842 <code>\end@float</code> . . . . . 844 <code>\endcsname</code> 322, 323, 374, 376, 380, 387, 389, 393, 422, 442, 443, 457, 471, 1313, 1320, 1374, 1377, 1542, 1543, 1545, 1546, 1547, 1548, 1549, 1552, 1554, 1921, 1923, 2771, 2794 <code>\enddescription</code> . . . . . 918 <code>\endgroup</code> . . . 373, 412, 430, 445, 1895, 2198, 2773, 2775, 3033 <code>\endlist</code> . . . . . 916, 918	<b>F</b> <code>\familydefault</code> . . . . . 738 <code>\fancyfoot</code> . . . . . 2594, 2602, 2612, 2623, 2627, 2643, 2662, 2716, 2718, 2722, 2732, 2742, 2751, 2756, 2760, 2765 <code>\fancyhead</code> . . . . . 2589, 2590, 2591, 2592, 2597, 2598, 2599, 2600, 2606, 2608, 2609, 2616, 2618, 2619, 2620, 2628, 2629, 2631, 2632, 2634, 2637, 2644, 2645, 2647, 2648, 2650, 2653, 2715, 2726, 2727, 2728, 2736, 2737, 2738, 2746, 2747, 2749, 2750, 2754, 2755	

1862, 1874, 1879,	<code>\footnote</code> . . . . . 2455	2372, 2376, 2378,
1884, 1888, 1889,	<code>\footnotemark</code> 486, 1383,	2383, 2408, 2409, 2414
1890, 1891, 1892,	1392, 2425, 2426, 2453	<code>\geometry</code> . . . . .
1893, 1894, 1902,	<code>\footnoterule</code> . . . . . 657	574, 577, 584, 591,
1903, 1909, 1911,	<code>\footnotesep</code> . . . 461, 474	598, 605, 612, 619, 626
1930, 1960, 1969,	<code>\footnotesize</code> 467, 2559,	<code>\getrefnumber</code> . . . . .
1981, 2009, 2013,	2573, 2594, 2602,	1461, 1485, 1562, 2452
2014, 2015, 2037,	2612, 2623, 2627,	<code>\global</code> . 406, 409, 445,
2059, 2080, 2086,	2634, 2643, 2718,	465, 744, 754, 757,
2090, 2096, 2102,	2722, 2732, 2742,	825, 852, 1253,
2107, 2119, 2121,	2751, 2756, 2762, 3073	1267, 1299, 1301,
2126, 2134, 2135,	<code>\footnotetext</code> . . 1386,	1302, 1347, 1926,
2143, 2151, 2163,	1388, 1395, 1398, 1405	1927, 1931, 1933,
2165, 2167, 2169,	<code>\footnotetextauthorsaddresses</code>	2157, 2159, 2162,
2170, 2173, 2175,	. . . . . 1832, 1838	2166, 2171, 2174,
2197, 2226, 2233,	<code>\footnotetextcopyrightpermission</code>	2242, 2243, 2244,
2249, 2252, 2256,	. . . . . 1843	2261, 2285, 2286,
2267, 2283, 2284,	<code>\footrulewidth</code> 2578, 2711	2296, 2348, 2351,
2296, 2319, 2320,	<code>\format</code> . . . . . 32	2393, 2431, 2434,
2328, 2336, 2347,	<code>\frenchspacing</code> . . . . 3089	2512, 2516, 2981,
2366, 2367, 2375,	<code>\fulltextwidth</code> . . . .	3002, 3004, 3006, 3018
2381, 2392, 2401,	. . . . . 833, 837, 853	<code>\grantnum</code> . . . . . 23, 3036
2403, 2423, 2436,		<code>\grantsponsor</code> . . 23, 3035
2438, 2446, 2448,		
2452, 2459, 2463,		
2477, 2480, 2481,		
2482, 2517, 2524,		
2546, 2550, 2562,		
2567, 2571, 2572,		
2581, 2583, 2584,		
2589, 2590, 2595,		
2604, 2614, 2625,		
2627, 2640, 2641,		
2643, 2656, 2657,		
2660, 2663, 2686,		
2705, 2716, 2719,		
2725, 2735, 2745,		
2751, 2752, 2756,		
2757, 2763, 2766,		
2767, 2785, 2796,		
2798, 2862, 2884,		
2914, 2952, 2969,		
2997, 2998, 3019,		
3020, 3026, 3037,		
3045, 3051, 3054,		
3064, 3065, 3066, 3088		
<code>\firstpagestyle</code> . . . . 2707		
<code>\floatname</code> . . . . . 813		
<code>\flushbottom</code> . . . . .		
678, 680, 682, 684, 686		
	<b>G</b>	
	<code>\g@addto@macro</code> . 1286,	
	1318, 1321, 1336,	
	1342, 1349, 1369,	
	1383, 1385, 1388,	
	1392, 1394, 1397,	
	1403, 1404, 1409,	
	1411, 1520, 1526,	
	1547, 1554, 1793,	
	1797, 1799, 1804,	
	2266, 2279, 2327,	
	2334, 2343, 2374,	
	2380, 2388, 2425, 2426	
	<code>\gdef</code> . 1260, 1261, 1262,	
	1263, 1265, 1273,	
	1283, 1285, 1306,	
	1309, 1311, 1314,	
	1326, 1334, 1340,	
	1373, 1376, 1469,	
	1501, 1518, 1524,	
	1543, 1545, 1546,	
	1552, 1966, 2264,	
	2268, 2273, 2300,	
	2301, 2322, 2323,	
	2325, 2329, 2331,	
	2338, 2369, 2370,	
		<b>H</b>
		<code>\hbox</code> . 476, 1819, 1824, 2149
		<code>\headrulewidth</code> 2577, 2710
		<code>\hfill</code> . . . . . 2139, 2515
		<code>\href</code> . 1375, 1378, 2006,
		2011, 2093, 2105,
		2117, 2132, 3057, 3061
		<code>\hrule</code> . . . . . 651, 658, 2139
		<code>\hsize</code> . . . . . 468,
		1818, 2081, 2082,
		2109, 2111, 2137,
		2177, 2294, 2350, 2395
		<code>\hskip</code> . . . . . 371,
		385, 415, 428, 432,
		2008, 2095, 2104,
		2120, 2129, 2150, 2974
		<code>\hspace</code> . . . . . 1677,
		1688, 1697, 1722,
		1734, 1755, 2299, 2353
		<code>\ht</code> . . . . . 1970, 1978
		<code>\Huge</code> . . . . . 2048, 2050,
		2052, 2054, 2056, 2058
		<code>\hypersetup</code> . . . . .
		. . 507, 513, 515, 1915
		<code>\hyphenpenalty</code> . . . . 3072

I	
<code>\if</code> .....	303
<code>\if@ACM@acmthm</code> .	<u>65</u> , 2928
<code>\if@ACM@affiliation@obeypunctuation</code> .....	<u>1351</u> , 2148, 2163, 2165, 2167, 2168, 2170, 2173
<code>\if@ACM@anonymous</code> <u>118</u> , 1305, 1317, 1324, 1348, 1368, 1384, 1393, 1402, 1796, 1808, 1836, 2569, 3046	
<code>\if@ACM@authordraft</code> .....	<u>134</u> , 552, 1844
<code>\if@ACM@authorversion</code> .....	<u>82</u> , 1850, 1866
<code>\if@ACM@badge</code> .....	<u>1437</u> , 2003, 2112, 2128
<code>\if@ACM@balance</code> .....	<u>102</u> , 2999, 3023
<code>\if@ACM@citypresent</code> .....	<u>2237</u> , 2250
<code>\if@ACM@countrypresent</code> .....	<u>2239</u> , 2253
<code>\if@ACM@instpresent</code> .....	<u>2235</u> , 2247
<code>\if@ACM@journal</code> .....	<u>154</u> , 209, 782, 1269, 1507, 1905, 2155, 2419, 2442
<code>\if@ACM@journal@bibstrip</code> .....	<u>155</u> , 1837, 1854, 1870, 1882, 2469, 2586, 2712
<code>\if@ACM@maketitle@typeset</code> .....	<u>919</u> , 1466
<code>\if@ACM@manuscript</code> . .....	<u>153</u> , 244, 1504, 1853, 1863
<code>\if@ACM@natbib</code> .....	<u>110</u> , 249, 340, 517
<code>\if@ACM@natbib@override</code> .....	<u>110</u>
<code>\if@ACM@newfonts</code> <u>701</u> , 712	
<code>\if@ACM@nonacm</code> ..	<u>90</u> , 561, 1460, 1484, 1561, 1843, 1881, 2419, 2464, 2593, 2601, 2611, 2622,
	2630, 2646, 2717, 2721, 2731, 2741, 2761
<code>\if@ACM@pbalance</code> <u>106</u> , 2980	
<code>\if@ACM@printacmref</code> .....	<u>1478</u> , 1928
<code>\if@ACM@printccs</code> ... .....	<u>1472</u> , 1898
<code>\if@ACM@printfolios</code> .....	<u>1492</u> , 2581, 2583, 2589, 2590, 2627, 2643, 2716, 2751, 2756
<code>\if@ACM@review</code> .....	<u>73</u> , 2502, 2519, 2526
<code>\if@ACM@screen</code> <u>49</u> , 506, 3039	
<code>\if@ACM@sigchiamode</code> .....	<u>156</u> , 452, 560, 737, 835, 842, 1820, 1822, 2296, 2658
<code>\if@ACM@timestamp</code> ..	<u>126</u> , 2551, 2661, 2758
<code>\if@ACM@urlbreakonhyphens</code> .....	<u>57</u> , 503
<code>\if@acmowned</code> .....	<u>1571</u>
<code>\if@Description@present</code> .....	<u>740</u> , 753, 756, 824, 2433
<code>\if@filesw</code> .....	441, 539
<code>\if@insideauthorgroup</code> .....	<u>1294</u> , 1300
<code>\if@nobreak</code> .....	351
<code>\if@noskipsec</code> ..	344, 408
<code>\if@printcopyright</code> . .....	<u>1567</u> , 1858
<code>\if@printpermission</code> .....	<u>1569</u> , 1851
<code>\if@twocolumn</code> .	3024, 3066
<code>\if@undescribed@images</code> .....	<u>742</u> , 745
<code>\IfBeginWith</code> .....	1372
<code>\ifcase</code> .....	188, 215, 489, 572, 637, 673, 789, 856, 986, 1425, 1629, 1667, 1941, 1984, 2018, 2040, 2061, 2178, 2202, 2308, 2361, 2527, 2587, 2674, 2713, 2833, 2870, 2900, 2957, 2982, 3000
<code>\ifcsname</code> .....	322
<code>\ifdim</code> ..	348, 368, 400, 425, 1972, 1980, 2514
<code>\IfFileExists</code>	703, 706, 709
<code>\IfInteger</code> .....	1499
<code>\ifluatex</code> .....	723
<code>\ifNAT@numbers</code> ....	534
<code>\ifnum</code> .....	157, 163, 169, 182, 360, 361, 375, 379, 388, 392, 1461, 1485, 1556, 1557, 1558, 1562, 1582, 1587, 1590, 1594, 1600, 1603, 1606, 1609, 1612, 1615, 1618, 1622, 1810, 2305, 2358, 2400, 2402, 2452, 2688, 2690, 2759
<code>\ifPDFTeX</code> .....	689
<code>\IfSubStr</code> .....	1297, 1366
<code>\ifvmode</code> .....	2147
<code>\ifvoid</code> .....	662
<code>\ifx</code> .....	214, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 305, 307, 309, 311, 313, 315, 536, 1264, 1275, 1277, 1282, 1304, 1307, 1325, 1327, 1332, 1333, 1339, 1408, 1460, 1516, 1517, 1523, 1530, 1542, 1551, 1561, 1801, 1831, 1835, 1875, 1884, 1887, 1888, 1889, 1899, 1904, 1965, 2005, 2010, 2083, 2087, 2092, 2100, 2103, 2116, 2124, 2131, 2141, 2230, 2263, 2271, 2272, 2324, 2330, 2337, 2371, 2377, 2382, 2420, 2428, 2440, 2458, 2463, 2475, 2482, 2560,

2571, 2580, 2771, 2794, 2798, 3037, 3054, 3056, 3060, 3085	\labelwidth . 896, 901, 904, 906, 908, 910, 913	1962, 2172, 2261, 2285, 2348, 2354, 2393, 2398, 2450, 2451, 2485, 2486, 2488, 2489, 2494, 2495, 2496, 2498, 2499, 2500, 2776, 2778, 2780, 2781, 2783, 2789, 2792, 2795, 3069, 3074, 3075, 3082, 3083, 3084
\ifxetex . . . . . 718	\LARGE . . . . . 2042, 2044, 2046, 2069, 2071, 2073, 2075, 2077, 2209, 2212, 2704	\libertineLF . . . . . 736
\ignorespaces 421, 461, 474, 744, 1355, 1356, 1358, 1371, 2153, 2154, 2156, 2158, 2159, 2160, 2161, 2163, 2407, 2447, 2454, 2462, 2975	\Large 2200, 2218, 2843, 2844, 2846, 2847, 2849	\lineskip . . . . . 2353, 2397
\immediate . . . . . 443, 540	\large . . . . . 1845, 2205, 2210, 2213, 2837, 2838, 2840, 2841	\linespacing . . . . . 438, 439
\includecomment . . . . . . . . . . 3040, 3044, 3050	\lastbox . . . . . 410, 2443	\liningnums . . . . . 734
\includegraphics . . . . . . . . . . 2007, 2012, 2094, 2106, 2118, 2133	\leaders . . . . . 2139	\list . . . . . 912
\indent . . . . . 2956	\leavevmode 344, 2139, 2352	\listisep . . . . . 893, 894, 898
\input . . . . . 690	\leftmargin . . . . . 895, 900, 903, 905, 907, 909	\listparindent . . . . . 897
\InputIfFileExists . . . . . 25	\leftmargini . . . . . 879, 880, 881, 882, 895, 896	\LoadClass . . . . . 237
\institution . . . . . . . . . . 12, 1356, 2153, 2409	\leftmarginii . . . . . 885, 886, 887, 888, 900, 901	\long . . . . . 453, 464, 815, 819, 830, 1466, 1469, 1471, 1793, 2491
\interfootnotelinepenalty . . . . . 455	\leftmarginiii . . . . . . . . . . 888, 889, 903, 904	\loop . . . . . 1973, 2511, 2689
\interlinepenalty . . . . . . . . . . 372, 429, 455	\leftmarginiv . . . . . . . . . . 889, 890, 905, 906	\LTX@adddotafter . . . . . . . . . . 2795, 2798
\item . . . . . 2974, 3069	\leftmarginv . . . . . . . . . . 890, 891, 907, 908	
\itshape . . . . . 1855, 2830, 2831, 2852, 2853, 2866, 2878, 2898, 2965	\leftmarginvi 891, 909, 910	<b>M</b>
	\leftskip . 2138, 2396, 2826	\makeatletter . . . . . 435
<b>J</b>	\let . . . . . 279, 281, 293, 295, 297, 323, 362, 478, 479, 518, 519, 520, 521, 522, 523, 526, 530, 672, 734, 748, 749, 751, 752, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 815, 816, 820, 821, 830, 831, 836, 837, 838, 899, 914, 918, 1359, 1360, 1361, 1362, 1363, 1459, 1535, 1802, 1813, 1814, 1815, 1816, 1828, 1829, 1830, 1833, 1839, 1912, 1926, 1927, 1939, 1940, 1961,	\makebox . . . . . 1845, 2698
\jobname . . . . . 440, 443		\makelabel . . . . . 914
<b>K</b>		\MakeTextUppercase . . . . . . . . . . 2264, 2266, 2828, 2837, 2840, 2843, 2846, 2856, 2860
\kern 650, 651, 657, 658, 2139		\maketitle . . . . . 20, 1806
\keywords . . . . . 16, 1458		\MakeUppercase . . . . . 2782
<b>L</b>		\marginfigure . . . . . 818
\l@section . . . . . 448		marginfigure (environ- ment) . . . . . 32
\l@subsection . . . . . 448, 449		\marginpar . . . . . 453, 817, 823, 832, 2004
\l@subsubsection . . . . . 450		\marginparsep . . . . . 834, 2659
\labelenumi . . . . . 864		\marginparwidth . 834, 2659
\labelenumii . . . . . 865		\margintable . . . . . 829
\labelenumiii . . . . . 866		margintable (environ- ment) . . . . . 32
\labelenumiv . . . . . 867		\mathchardef . . . . . 2332, 2335
\labelep . . . . . 873, 881, 886, 896, 901, 904, 906, 908, 910, 2974		\mbox . . . . . 301
		\mdseries . . . . . . . . . . 2063, 2065, 2067,



1108, 1112, 1116,	2872, 2873, 2874,	2372, 2374, 2380,
1120, 1124, 1128,	2875, 2876, 2877,	2388, 2396, 2398,
1132, 1136, 1140,	2882, 2883, 2902,	2429, 2430, 2431,
1144, 1148, 1152,	2903, 2904, 2905,	2433, 2447, 2460,
1156, 1160, 1164,	2906, 2907, 2912,	2483, 2487, 2491, 2970
1168, 1172, 1175,	2913, 2959, 2960,	\paragraph . . . . . 2811
1179, 1182, 1187,	2961, 2962, 2963,	\parbox . . . . . 556,
1191, 1195, 1199,	2964, 2967, 2968,	565, 2097, 2115,
1203, 1207, 1211,	2984, 2985, 2986,	2122, 2130, 2508, 2702
1215, 1219, 1223,	2988, 2990, 2992,	\parindent . . . . . 635,
1227, 1231, 1235,	2994, 2996, 3003,	649, 880, 1833,
1239, 1425, 1426,	3005, 3007, 3009,	1839, 1849, 2811,
1427, 1630, 1632,	3011, 3013, 3015, 3017	2827, 2867, 2897, 3070
1635, 1637, 1638,	\orcid . . . . . 10, 1371	\parskip . . 635, 1849, 3070
1640, 1642, 1644,	\outer@nobreak . . . . 849	\part . . . . . 2820
1647, 1650, 1653,		\PassOptionsToClass
1655, 1658, 1661,	<b>P</b>	. . . . . 149, 150
1668, 1679, 1690,	\p@ . . . . . 446, 635, 642,	\pdfgentounicode . . . 698
1698, 1704, 1710,	650, 651, 657, 658,	\pdfglyphtounicode .
1724, 1736, 1743,	2800, 2804, 2808,	. . . . . 691, 692,
1757, 1764, 1770,	2809, 2812, 2813,	693, 694, 695, 696, 697
1777, 1782, 1944,	2816, 2817, 2821,	\pdfstringdefDisableCommands
1946, 1948, 1950,	2822, 2972, 3067, 3070	. . . . . 481
1952, 1954, 1956,	\PackageError . 54, 62,	\phantomsection . . . .
1958, 1987, 1989,	70, 79, 87, 99, 103,	. . . . 253, 2441, 3031
1991, 1993, 1995,	107, 115, 123, 131, 141	\popQED . . . . . 2977
1997, 1999, 2001,	\PackageInfo . . . . 51,	\position . . . 12, 1355,
2021, 2023, 2025,	53, 59, 61, 67, 69,	1359, 1360, 1361,
2027, 2029, 2031,	75, 78, 84, 86,	1362, 1363, 2153, 2407
2033, 2035, 2043,	92, 98, 112, 114,	\postcode . . . . .
2045, 2047, 2049,	120, 122, 128, 130,	. 12, 1362, 2153, 2406
2051, 2053, 2055,	136, 140, 1021,	printonly (environment) 22
2057, 2064, 2066,	1050, 1056, 1062, 1068	\ProcessOptionsX . . . 151
2068, 2070, 2072,	\PageIndex . . . . . 15	\proof . . . . . 2970
2074, 2076, 2078,	\pageref . . . . . 2565	\proofname . . . . . 2970
2181, 2183, 2185,	\pagestyle . . . . . 2665	\protect . . . . . 380, 393
2187, 2189, 2191,	\par . 345, 401, 437, 660,	\protected@edef . . . .
2193, 2195, 2204,	847, 1531, 1833,	. . . . . 365, 456, 470
2207, 2208, 2211,	1839, 1851, 1855,	\providecommand . . . .
2214, 2217, 2220,	1901, 1910, 1943,	. . . . . 527, 531, 2865
2223, 2310, 2311,	1945, 1947, 1949,	\ProvidesClass . . . . . 5
2313, 2315, 2363,	1986, 1988, 1990,	\ProvidesFile . . . . . 3
2530, 2532, 2534,	2002, 2101, 2108,	\ps@headings . . 2496, 2500
2536, 2538, 2540,	2125, 2136, 2139,	\ps@myheadings 2495, 2499
2542, 2544, 2596,	2142, 2144, 2165,	\ps@plain . . . . . 2494, 2498
2605, 2615, 2676,	2167, 2169, 2170,	\pushQED . . . . . 2971
2681, 2720, 2730,	2228, 2232, 2286,	\put . . . . . 2522, 2548
2740, 2835, 2836,	2288, 2295, 2297,	
2839, 2842, 2845,	2325, 2327, 2334,	<b>Q</b>
2848, 2854, 2858,	2343, 2352, 2354,	\qed . . . . . 2971

<code>\quad</code> . . . . .	422, 2607, 2610, 2617, 2621, 2760	2687, 2688, 2690, 2693, 2694, 2695, 2696, 2714, 2759, 2771, 2794, 2798, 2834, 2871, 2901, 2958, 2972, 2983, 3001, 3056, 3060, 3070	2829, 2837, 2838, 2840, 2841, 2843, 2844, 2846, 2847, 2849, 2850, 2851, 2856, 2857, 2860, 2861	
<b>R</b>				
<code>\raggedright</code> . . . . .	2097, 2138, 2396, 3071			
<code>\raisebox</code> . . . . .	1845, 2093, 2105, 2117, 2132, 2698, 2700			
<code>\real@adddotafter</code> . . . . .	2780, 2783			
<code>\realSectionformat</code> . . . . .	2776, 2788, 2789			
<code>\received</code> . . . . .	19, 1515			
<code>\RecordChanges</code> . . . . .	17			
<code>\ref</code> . . . . .	2472, 2479			
<code>\refname</code> . . . . .	252, 253			
<code>\refstepcounter</code> . . . . .	364			
<code>\relax</code> . . . . .	157, 163, 169, 182, 189, 216, 302, 303, 346, 365, 367, 371, 385, 399, 414, 424, 432, 443, 490, 573, 638, 672, 674, 790, 857, 987, 1291, 1293, 1299, 1301, 1407, 1408, 1461, 1485, 1542, 1551, 1561, 1562, 1582, 1587, 1590, 1594, 1600, 1603, 1606, 1609, 1612, 1615, 1618, 1622, 1629, 1667, 1828, 1829, 1942, 1985, 2019, 2041, 2062, 2179, 2203, 2293, 2303, 2304, 2305, 2306, 2309, 2312, 2314, 2316, 2318, 2321, 2353, 2356, 2357, 2358, 2359, 2362, 2365, 2368, 2400, 2402, 2425, 2452, 2506, 2528, 2529, 2531, 2533, 2555, 2557, 2560, 2588, 2675, 2677, 2678, 2679, 2682, 2683, 2684,	255, 256, 259, 261, 263, 265, 267, 269, 271, 321, 738, 911, 1296, 1365, 1794, 1817, 2412, 2577, 2578, 2710, 2711, 2799, 2803, 2807, 2811, 2820	<code>\removelastskip</code> . . . . . 437 <code>\renewcommand</code> . . . . . 251, <code>\renewenvironment</code> . . . . . 814, 912, 1465, 2970 <code>\repeat</code> . . . . . 1980, 2514, 2692 <code>\RequirePackage</code> . . . . . 29, 30, 31, 238, 239, 240, 241, 242, 243, 245, 248, 250, 477, 480, 542, 543, 553, 562, 571, 652, 699, 713, 719, 720, 724, 725, 728, 729, 730, 780, 1533, 2493, 2987, 2989, 2991, 2993, 2995, 3008, 3010, 3012, 3014, 3016 <code>\reset@font</code> . . . . . 454, 467 <code>\reversemarginpar</code> . . . . . 633 <code>\rightarrow</code> . . . . . 1539 <code>\rightskip</code> . . . . . 2825 <code>\rlap</code> . . . . . 2699 <code>\rule</code> . . . . . 461, 474, 2701	<code>\Sectionformat</code> . . . . . 2772, 2776, 2778, 2789 <code>\SelectFootnoteRule</code> . . . . . 653, 655 <code>\setbox</code> . . . . . 410, 465, 852, 1974, 2091, 2110, 2138, 2149, 2286, 2296, 2351, 2431, 2443 <code>\setcitestyle</code> . . . . . 24, 256, 330, 336 <code>\setcopyright</code> . . . . . 17, 1626 <code>\setcounter</code> . . . . . 1823, 1896, 1968, 2555, 2557, 2832, 2855, 2859 <code>\setkeys</code> . . . . . 38, 161, 167, 1252, 1502, 1626, 2274, 2275, 2280, 2281, 2339, 2340, 2344, 2345, 2384, 2385, 2389, 2390 <code>\setlength</code> 635, 636, 642, 649, 873, 874, 879, 885, 888, 889, 890, 891, 1440, 1443, 2510 <code>\setmonofont</code> . . . . . 721, 726 <code>\settopmatter</code> . . . . . 19, 96, 1490, 1502, 1503, 1505, 1508, 1510, 1513, 2468 <code>\setTrue</code> . . . . . 436 <code>\SetWatermarkColor</code> . . . . . 555, 564 <code>\SetWatermarkFontSize</code> . . . . . 554, 563 <code>\SetWatermarkText</code> 556, 565 <code>\sfdefault</code> . . . . . 738 <code>\sffamily</code> . . . . . 2042, 2044, 2046, 2048, 2050, 2052, 2056, 2200, 2205, 2209, 2573, 2704, 2828, 2829, 2830, 2837, 2838, 2840, 2841, 2846, 2847, 2856, 2857, 2860, 2861
<b>S</b>				
<code>\savebox</code> . . . . .	2508			
<code>screenonly</code> (environment) . . . . .	22			
<code>\scriptsize</code> . . . . .	2511, 2515			
<code>\scshape</code> . . . . .	2868, 2955			
<code>\section</code> . . . . .	252, 1951, 1953, 1957, 1959, 2445, 2799, 3030			
<code>\section@raggedright</code> . . . . .	2824, 2828,			

<code>\shortauthors</code> 20, 1325, 1326, 1333, 1334, 1336, 1339, 1340, 1342, 1925, 1927, 2572	<code>\textrightarrow</code> . . . . . 485, 1539, 1553	2413, 2414, 2416, 2454, 2462, 2479, 2492
<code>\shortcite</code> . . . . . 530, 533	<code>\textwidth</code> 834, 853, 854, 1818, 2081, 2109, 2137, 2177, 2303, 2350	<code>\unvbox</code> . 466, 665, 670, 1976, 2286, 2352, 2431
<code>\shorttitle</code> 2592, 2600, 2610, 2621, 2628, 2644	<code>\thanks</code> . . . . . 14, 1794, 2491	<code>\upshape</code> . . . . . 911
<code>\showeprint</code> . . . . . 3052	<code>\thankses</code> . . . . . 1797, 1799, 1831, 2491	<code>\url</code> . . . . . 1665, 3037
<code>\sidebar</code> . . . . . 812	<code>\the</code> . . 1313, 1320, 1374, 1377, 1422, 1424, 2511, 2515, 2563, 2695	<code>\UrlBreakPenalty</code> . . . . . 2332, 2335
<code>sidebar (environment)</code> . 32	<code>\theACM@time@hours</code> . . . . . 2557, 2564	<code>\urlstyle</code> . . . 488, 497, 500
<code>\skip</code> . . . . . 663	<code>\theACM@time@minutes</code> 2564	<code>\usebox</code> . . . . . 2522, 2548
<code>\small</code> . . 454, 817, 824, 832, 1531, 1943, 1945, 1947, 1949, 2206, 2443, 2460, 2716	<code>\theenumi</code> . . . . . 864	<code>\usepackage</code> . . . . . 9, 10, 11, 12, 13, 14
<code>\smallskipamount</code> . . . 894	<code>\theenumii</code> . . . . . 865	<b>V</b>
<code>\space</code> . 389, 1298, 1367, 1490, 1921, 2173, 3037, 3076, 3079, 3087	<code>\theenumiii</code> . . . . . 866	<code>\value</code> . . . . . 1558
<code>\specialcomment</code> . . . . 3028	<code>\theenumiv</code> . . . . . 867	<code>\vbox</code> . . . . . 465, 852, 2091, 2110, 2138, 2286, 2351, 2431
<code>\standardpagestyle</code> . 2574	<code>\tfootnote</code> . . . . . 1817	<code>\vskip</code> 402, 437, 663, 671, 847
<code>\startPage</code> . . . . . 16, 1454	<code>\theindex</code> . . . . . 3066	<code>\vspace</code> . . . . . 3074
<code>\state</code> . 12, 1361, 2153, 2411	<code>\theoremstyle</code> . . . . . 2926, 2929, 2945, 2953	<code>\vsplit</code> . . . . . 1974
<code>\stepcounter</code> 1386, 1388, 1395, 1398, 1405, 1541	<code>\thepage</code> . . . . . 2565, 2581, 2583, 2589, 2590, 2627, 2643, 2716, 2751, 2756	<code>\vtop</code> . . . . . 2296
<code>\streetaddress</code> . . . . . 12, 1359, 2153, 2405	<code>\thispagestyle</code> 1975, 1982	<b>W</b>
<code>\string</code> 540, 1298, 1367, 1456, 1490, 2456, 2457, 3076, 3079, 3087	<code>\thmname</code> . . . . . 2895, 2925	<code>\wd</code> . . . . . 854, 2150
<code>\strut</code> . . . . . 2115, 2130	<code>\thmnote</code> . . . . . 2895, 2925	<code>\write</code> . . . . . 540
<code>\strutbox</code> . . . . . 461, 474	<code>\thmnumber</code> . . . . 2895, 2925	<b>X</b>
<code>\subsection</code> . . . . . 2803	<code>\thr@</code> . . . . . 297	<code>\xdef</code> . . . . . 306, 308, 310, 312, 314, 316
<code>\subsubsection</code> . . . . 2807	<code>\time</code> . . . . . 2552, 2555, 2557	<b>Y</b>
<code>\subtitle</code> . . . . . 10, 1288	<code>\title</code> . . . . . 10, 2456	<code>\year</code> . . . . . 1422, 2563
<code>\subtitlenote</code> . . 14, 1391	<code>\titlenote</code> . . 14, 1382, 2457	<b>Z</b>
<b>T</b>	<code>\topsep</code> . . . 898, 902, 2972	<code>\z@</code> . . . . . 285, 289, 348, 368, 400, 410, 425, 438, 461, 474, 636, 671, 784, 788, 799, 879, 885, 897, 1833, 1839, 1845, 1849, 1931, 1933, 2093, 2105, 2117, 2132, 2396, 2443, 2577, 2578, 2668, 2670, 2672, 2698, 2700, 2710, 2711, 2799, 2803, 2807, 2815, 2820, 2827, 2879, 2909, 3067, 3070
<code>\teaserfigure</code> . . . . . 1792	<code>\trivlist</code> . . . . . 2973	<code>\z@skip</code> 437, 847, 902, 2826
<code>teaserfigure (environment)</code> . . . . . 19	<code>\tw@</code> . . . . . 295	
<code>\terms</code> . . . . . 16, 1456	<code>\two@digits</code> . . . 2563, 2564	
<code>\textbf</code> . . . . . 1544, 1556	<code>\twocolumn</code> . . . . 1992, 1994, 1996, 1998, 2000	
<code>\textbullet</code> 484, 1543, 2607, 2610, 2617, 2621	<b>U</b>	
<code>\textcolor</code> . . . . . 2704	<code>\unskip</code> . . . . . 413, 483, 661, 1358, 1364, 1371, 2150, 2153, 2154, 2156, 2158, 2159, 2160, 2161, 2173, 2232, 2405, 2406, 2407, 2409, 2410, 2411, 2412,	
<code>\textheight</code> . . . . . 1972, 1974, 1980, 2514		
<code>\textit</code> . . . . . 1557, 2470, 2474, 2475, 2476		