

L^AT_EX Class for the *Association for Computing Machinery**

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Abstract

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

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1 Introduction

The Association for Computing Machinery¹ 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, Nils Anders Danielsson, Michael Ekstrand, Matthew Fluet, Paolo G. Giarrusso, Ben Greenman, Enrico Gregorio, Jamie Davis, Jason Hemann, Peter Kemp, Luis Leiva, Ben Liblit, Rholais Lii, LianTze Lim, Kai Mindermann, Frank Mittelbach, Serguei Mokhov, Ross Moore, John Owens, Joel Nider, Tobias Pape, Philip Quinn, Mathias Rav, Andreas Reichinger, Matteo Riondato, Craig Rodkin, Bernard Rous, Feras Saad, Kerry A. Seitz, Jr., David Shamma, Gabriel Scherer, Kartik Singhal, 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 customizatón 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://github.com/borisveytsman/acmart>. At this address you can file a bug report—or even contribute your own enhancement by making a pull request.

¹<http://www.acm.org/>

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 \TeX 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>
- *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 2.17).

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.

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 BibTeX style is based on `natbib`. In most cases you do not need to set it. See Section 2.11.

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

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, 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, TRETS, 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 `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.

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 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

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
urlbreakonhyphens	true	Whether to break urls on hyphens

`\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 ORCID, <http://www.orcid.org/>), `\affiliation` and `\email`. In the simplest case, you enter them in this order:

```
\affiliation
\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 Thørvöld Group.

`\position`
`\institution`
`\department`
`\streetaddress`
`\city`
`\state`
`\postcode`
`\country`

The `\affiliation` and `\additionalaffiliation` commands are further structured to interact with the metadata extraction tools. Inside these commands you should use the

`\position`, `\institution`, `\department`, `\city`, `\streetaddress`, `\state`, `\postcode` and `\country` macros to indicate the corresponding parts of the affiliation. Note that in some cases (for example, journals) these parts are not printed in the resulting copy, but they *are* necessary since they are used by the XML metadata extraction programs. Do *not* put commas or `\\` between the elements of `\affiliation`. They will be provided automatically.

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 insitution. 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 `obey punctuation`, which can be `false` (the default) or `true`. If this parameter is `true`, `\affiliation` obeys the author's command. Thus

```

\affiliation[obey punctuation=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
`\acmNumber` inserted by the editor and set the journal volume, issue, article number, year and month
`\acmArticle` correspondingly. The arguments of all these commands, including `\acmMonth`, is numer-
`\acmYear` ical. For example,
`\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 *after* the `\setcopyright` command. Also, the command `\acmPrice{}` suppresses the printing of the price.

`\acmISBN` Book-like volumes have ISBN numbers attached to them. The macro `\acmISBN{<ISBN>}`
 sets it. Normally it is set by the typesetter, for example,

```

\acmISBN{978-1-4503-3916-2}

```

Setting it to the empty string, as `\acmISBN{}`, suppresses printing the ISBN.

`\acmDOI` The macro `\acmDOI{<DOI>}` sets the DOI of the article, for example,

```

\acmDOI{10.1145/9999997.9999999}

```

It is normally set by the typesetter. Setting it to the empty string, as `\acmDOI{}`, suppresses the DOI.

`\acmBadgeR` Some conference articles get special distinctions, for example, the artifact evaluation
`\acmBadgeL` for PPOPP 2016 (see <http://ctuning.org/ae/ppopp2016.html>). These articles display special badges supplied by the conference organizers. This class provides commands to add these badges: `\acmBadgeR[url]{graphics}` and `\acmBadgeL[url]{graphics}`. 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: [*url*], if provided, sets the link to the badge authority in the screen version, while {*graphics*} 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 `ae-logo.pdf`, the command is

```
\acmBadgeR[http://ctuning.org/ae/ppopp2016.html]{ae-logo}
```

`\startPage` The macro `\startPage{page}` sets the first page of the article in a journal or book. It is used by the typesetter.

`\terms` The command `\keywords{keyword, keyword,...}` sets keywords for the article.
`\keywords` They must be separated by commas, for example,

```
\keywords{wireless sensor networks, media access control,  
multi-channel, radio interference, time synchronization}
```

`CCSXML` ACM publications are classified according to the ACM Computing Classification
`\ccsdesc` Scheme (CCS). CCS codes are used both in the typeset version of the publications *and* in the metadata in various databases. Therefore you need to provide both \TeX commands and XML metadata with the paper.

The tool at <http://dl.acm.org/ccs.cfm> can be used to generate CCS codes. After you select the topics, click on “Generate CCS codes” to get results like the following:

```
\begin{CCSXML}  
<ccs2012>  
  <concept>  
    <concept_id>10010520.10010553.10010562</concept_id>  
    <concept_desc>Computer systems organization~Embedded systems</concept_desc>  
    <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>  
</ccs2012>  
</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 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 \TeX . 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,

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.

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

```
\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}
```

`\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^AT_EX 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
sourcernote. This is a table sourcernote. This is a table
sourcernote.

\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 $0.5\sim V$ 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` All financial support *must* be listed using the commands `\grantsponsor` and
`\grantnum` `\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 `{\sponsorID}` 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_T_EX style file `ACM-Reference-Format.bst` for Bib_T_EX 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_T_EX 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 Bib_T_EX 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 <http://arxiv.org/hypertext/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). 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”.

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 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 type-setting of ACM papers.

2.15 A note for wizards: `acmart-preload-hook.tex`

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.

2.16 Currently supported publications

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

Abbreviation	Publication
CIE	ACM Computers in Entertainment
CSUR	ACM Computing Surveys
DGOV	Digital Government: Research and Practice
DTRAP	Digital Threats: Research and Practice
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
TALG	ACM Transactions on Algorithms

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

Abbreviation	Publication
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
TSLP	ACM Transactions on Speech and Language Processing

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

Abbreviation	Publication
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.

2.17 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 [2020/04/30 v1.71 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@natbib@override This macro is no longer used.

\if@ACM@natbib Whether we use natbib mode
106 \define@boolkey+{acmart.cls}[@ACM@]{natbib}[true]{%
107   \if@ACM@natbib

```

```

108 \PackageInfo{\@classname}{Explicitly selecting natbib mode}%
109 \else
110 \PackageInfo{\@classname}{Explicitly deselecting natbib mode}%
111 \fi}{\PackageError{\@classname}{The option natbib can be either true or
112 false}}
113 \ExecuteOptionsX{natbib=true}

\if@ACM@anonymous Whether we use anonymous mode
114 \define@boolkey+{acmart.cls}[@ACM@]{anonymous}[true]{%
115 \if@ACM@anonymous
116 \PackageInfo{\@classname}{Using anonymous mode}%
117 \else
118 \PackageInfo{\@classname}{Not using anonymous mode}%
119 \fi}{\PackageError{\@classname}{The option anonymous can be either true or
120 false}}
121 \ExecuteOptionsX{anonymous=false}

\if@ACM@timestamp Whether we use timestamp mode
122 \define@boolkey+{acmart.cls}[@ACM@]{timestamp}[true]{%
123 \if@ACM@timestamp
124 \PackageInfo{\@classname}{Using timestamp mode}%
125 \else
126 \PackageInfo{\@classname}{Not using timestamp mode}%
127 \fi}{\PackageError{\@classname}{The option timestamp can be either true or
128 false}}
129 \ExecuteOptionsX{timestamp=false}

\if@ACM@authordraft Whether we use author-draft mode
130 \define@boolkey+{acmart.cls}[@ACM@]{authordraft}[true]{%
131 \if@ACM@authordraft
132 \PackageInfo{\@classname}{Using authordraft mode}%
133 \@ACM@timestamptrue
134 \@ACM@reviewtrue
135 \else
136 \PackageInfo{\@classname}{Not using authordraft mode}%
137 \fi}{\PackageError{\@classname}{The option authordraft can be either true or
138 false}}
139 \ExecuteOptionsX{authordraft=false}

\ACM@fontsize The font size to pass to the base class
140 \def\ACM@fontsize{}
141 \DeclareOptionX{9pt}{\edef\ACM@fontsize{\CurrentOption}}
142 \DeclareOptionX{10pt}{\edef\ACM@fontsize{\CurrentOption}}
143 \DeclareOptionX{11pt}{\edef\ACM@fontsize{\CurrentOption}}
144 \DeclareOptionX{12pt}{\edef\ACM@fontsize{\CurrentOption}}

145 \DeclareOptionX{draft}{\PassOptionsToClass{\CurrentOption}{amsart}}
146 \DeclareOptionX{*}{\PassOptionsToClass{\CurrentOption}{amsart}}
147 \ProcessOptionsX
148 \ClassInfo{\@classname}{Using format \ACM@format, number \ACM@format@nr}

```

3.4 Setting switches

<code>\if@ACM@manuscript</code>	Whether we use manuscript mode 149 <code>\newif\if@ACM@manuscript</code>
<code>\if@ACM@journal</code>	There are two kinds of publications: journals and books 150 <code>\newif\if@ACM@journal</code>
<code>\if@ACM@journal@bibstrip</code>	Sometimes ACM wants a journal-like publication to have conference information in the bibstrip and vice versa, so we have an additional switch. 151 <code>\newif\if@ACM@journal@bibstrip</code>
<code>\if@ACM@sigchiamode</code>	The formatting of SIGCHI extended abstracts is quite unusual. We have a special switch for them. 152 <code>\newif\if@ACM@sigchiamode</code>

Setting up switches

```

153 \ifnum\ACM@format@nr=5\relax % siggraph
154 \ClassWarning{\@classname}{%
155   The format siggraph is now obsolete.\MessageBreak
156   I am switching to sigconf.}
157   \setkeys{acmart.cls}{format=sigconf}
158 \fi
159 \ifnum\ACM@format@nr=7\relax % sigchi
160 \ClassWarning{\@classname}{%
161   The format sigchi is now obsolete.\MessageBreak
162   I am switching to sigconf.}
163   \setkeys{acmart.cls}{format=sigconf}
164 \fi
165 \ifnum\ACM@format@nr=8\relax % sigchi
166 \ClassWarning{\@classname}{%
167   ACM SIGCHI has retired the SIGCHI-A template\MessageBreak
168   effective immediately. ACM is keeping this template\MessageBreak
169   option available to authors who are working on legacy\MessageBreak
170   documents only. ACM will not, under any circumstances,\MessageBreak
171   accept documents in this format for publication and\MessageBreak
172   will not offer technical support to the authors who use\MessageBreak
173   this template.\MessageBreak
174   ACM SIGCHI is directing Conference leaders and\MessageBreak
175   authors to publish their articles using the SIGCONF\MessageBreak
176   template call.}
177 \fi
178 \ifnum\ACM@format@nr=0\relax
179   \@ACM@manuscripttrue
180 \else
181   \@ACM@manuscriptfalse
182 \fi
183 \@ACM@sigchiamodefalse
184 \ifcase\ACM@format@nr

```

```

185 \relax % manuscript
186 \ACM@journaltrue
187 \or % acmsmall
188 \ACM@journaltrue
189 \or % acmlarge
190 \ACM@journaltrue
191 \or % acmtog
192 \ACM@journaltrue
193 \or % sigconf
194 \ACM@journalfalse
195 \or % siggraph
196 \ACM@journalfalse
197 \or % sigplan
198 \ACM@journalfalse
199 \or % sigchi
200 \ACM@journalfalse
201 \or % sigchi-a
202 \ACM@journalfalse
203 \ACM@sigchiamodetrue
204 \fi
205 \ifACM@journal
206 \ACM@journal@bibstriptrue
207 \else
208 \ACM@journal@bibstripfalse
209 \fi

```

3.5 Loading the base class and package

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

```

210 \ifx\ACM@fontsize\@empty
211 \ifcase\ACM@format@nr
212 \relax % manuscript
213 \def\ACM@fontsize{9pt}%
214 \or % acmsmall
215 \def\ACM@fontsize{10pt}%
216 \or % acmlarge
217 \def\ACM@fontsize{10pt}%
218 \or % acmtog
219 \def\ACM@fontsize{9pt}%
220 \or % sigconf
221 \def\ACM@fontsize{9pt}%
222 \or % siggraph
223 \def\ACM@fontsize{9pt}%
224 \or % sigplan
225 \def\ACM@fontsize{10pt}%
226 \or % sigchi
227 \def\ACM@fontsize{9pt}%
228 \or % sigchi-a
229 \def\ACM@fontsize{10pt}%

```

```

230 \fi
231 \fi
232 \ClassInfo{\@classname}{Using fontsize \ACM@fontsize}
233 \LoadClass[\ACM@fontsize, reqno]{amsart}
234 \RequirePackage{microtype}

    We need etoolbox for delayed code
235 \RequirePackage{etoolbox}

    Booktabs is now the default
236 \RequirePackage{booktabs}

    We need totpages to calculate the number of pages and refcount to use that num-
ber
237 \RequirePackage{refcount}
238 \RequirePackage{totpages}

    The \collect@body macro in amsmath is defined using \def. We load environ to
access the \long version of this command
239 \RequirePackage{environ}

    We use setspace for double spacing
240 \if@ACM@manuscript
241 \RequirePackage{setspace}
242 \onehalfspacing
243 \fi

    We need textcase for better upcasing
244 \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.

```

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

```

```

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

```

```

312     \xdef\NAT@sep{\@tempc}\fi
313   \fi
314 }%
315 \NAT@@setcites
316 }
317 \renewcommand\citestyle[1]{%
318   \ifcsname bibstyle@#1\endcsname%
319   \csname bibstyle@#1\endcsname\let\bibstyle\gobble%
320   \else%
321     \@latex@error{Undefined ‘#1’ citestyle}%
322   \fi
323 }%
324 \fi

```

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

```

325 \newcommand{\bibstyle@acmauthoryear}{%
326   \setcitestyle{%
327     authoryear,%
328     open={},close={}},citesep={;},%
329     aysep={},yysep={},,%
330     notesep={, }}%

```

`\bibstyle@acmnumeric` The default numeric format:

```

331 \newcommand{\bibstyle@acmnumeric}{%
332   \setcitestyle{%
333     numbers,sort&compress,%
334     open={},close={}},citesep={},,%
335     notesep={, }}%

```

The default is numeric:

```

336 \if@ACM@natbib
337 \citestyle{acmnumeric}
338 \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:

```

339 \def\@startsection#1#2#3#4#5#6{%
340   \if@noskipsec \leavevmode \fi
341   \par
342   \@tempskipa #4\relax
343   \@afterindenttrue
344   \ifdim \@tempskipa <\z@
345     \@tempskipa -\@tempskipa \@afterindentfalse
346   \fi
347   \if@nobreak
348     \everypar{}%
349   \else
350     \addpenalty\@secpenalty\addvspace\@tempskipa

```



```

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

```

```

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

```

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

```

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

```

`\l@section` Section spacing is more generous than for `amsart`

```

444 \def\l@section{\@tocline{1}{0pt}{1pc}{2pc}{}}

```

```

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

\l@subsubsection The spacing in amsart is too large
446 \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
447 \def\@makefnmark{\noindent\@makefnmark}

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

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

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

And now, hyperref
473 \let\@footnotemark@nolink\@footnotemark
474 \let\@footnotetext@nolink\@footnotetext
475 \RequirePackage[bookmarksnumbered,unicode]{hyperref}
476 \pdfstringdefDisableCommands{%
477   \def\addtocounter#1#2{}%
478   \def\unskip{}%

```

```

479 \def\textbullet{- }%
480 \def\textrightarrow{-> }%
481 \def\footnotemark{ }%
482 }
483 \urlstyle{rm}
484 \ifcase\ACM@format@nr
485 \relax % manuscript
486 \or % acmsmall
487 \or % acmlarge
488 \or % acmtog
489 \or % sigconf
490 \or % siggraph
491 \or % sigplan
492 \urlstyle{sf}
493 \or % sigchi
494 \or % sigchi-a
495 \urlstyle{sf}
496 \fi
497 \AtEndPreamble{%
498 \if@ACM@urlbreakonhyphens
499 \def\do@url@hyp{\do{-}}%
500 \fi
501 \if@ACM@screen
502 \hypersetup{colorlinks,
503 linkcolor=ACMPurple,
504 citecolor=ACMPurple,
505 urlcolor=ACMDarkBlue,
506 filecolor=ACMDarkBlue}
507 \else
508 \hypersetup{hidelinks}
509 \fi
510 \hypersetup{pdflang={en},
511 pdfdisplaydoctitle}}
    Bibliography mangling.
512 \if@ACM@natbib
513 \let\citeN\cite
514 \let\cite\citep
515 \let\citeANP\citeauthor
516 \let\citeNN\citeyearpar
517 \let\citeyearNP\citeyear
518 \let\citeNP\citealt
519 \DeclareRobustCommand\citeA
520 {\begingroup\NAT@swafalse
521 \let\NAT@ctype\@ne\NAT@partrue\NAT@fullfalse\NAT@open\NAT@citetp}%
522 \providecommand\newblock{}%
523 \else
524 \AtBeginDocument{%
525 \let\shortcite\cite%
526 \providecommand\citename[1]{#1}}

```

```

527 \fi
528 \newcommand\shortcite[2][]{%
529   \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:

```

530 \def\bibliographystyle#1{%
531   \ifx\@begindocumenthook\@undefined\else
532     \expandafter\AtBeginDocument
533   \fi
534   {\if@filesw
535     \immediate\write\@auxout{\string\bibstyle{#1}}%
536   \fi}}

```

Graphics and color.

```

537 \RequirePackage{graphicx}
538 \RequirePackage[prologue]{xcolor}

```

We define ACM colors according to [7]:

```

539 \definecolor[named]{ACMBlue}{cmyk}{1,0.1,0,0.1}
540 \definecolor[named]{ACMYellow}{cmyk}{0,0.16,1,0}
541 \definecolor[named]{ACMOrange}{cmyk}{0,0.42,1,0.01}
542 \definecolor[named]{ACMRed}{cmyk}{0,0.90,0.86,0}
543 \definecolor[named]{ACMLightBlue}{cmyk}{0.49,0.01,0,0}
544 \definecolor[named]{ACMGreen}{cmyk}{0.20,0,1,0.19}
545 \definecolor[named]{ACMPurple}{cmyk}{0.55,1,0,0.15}
546 \definecolor[named]{ACMDarkBlue}{cmyk}{1,0.58,0,0.21}

```

Author-draft mode or sigchi-a mode

```

547 \if@ACM@authordraft
548   \RequirePackage{draftwatermark}
549   \SetWatermarkFontSize{0.5in}
550   \SetWatermarkColor[gray]{.9}
551   \SetWatermarkText{\parbox{12em}{\centering
552     Unpublished working draft.\}
553     Not for distribution.}}
554 \else
555   \if@ACM@sigchiamode
556     \if@ACM@nonacm\else
557       \RequirePackage{draftwatermark}
558       \SetWatermarkFontSize{0.5in}
559       \SetWatermarkColor[gray]{.9}
560       \SetWatermarkText{\parbox{12em}{\centering
561         Legacy document. \}
562         Not for publication in an ACM venue}}
563     \fi
564   \fi
565 \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>.

```
566 \RequirePackage{geometry}
567 \ifcase\ACM@format@nr
568 \relax % manuscript
569   \geometry{letterpaper,head=13pt,
570     marginparwidth=6pc,heightrounded}%
571 \or % acmsmall
572   \geometry{twoside=true,
573     includeheadfoot, head=13pt, foot=2pc,
574     paperwidth=6.75in, paperheight=10in,
575     top=58pt, bottom=44pt, inner=46pt, outer=46pt,
576     marginparwidth=2pc,heightrounded
577   }%
578 \or % acmlarge
579   \geometry{twoside=true, head=13pt, foot=2pc,
580     paperwidth=8.5in, paperheight=11in,
581     includeheadfoot,
582     top=78pt, bottom=114pt, inner=81pt, outer=81pt,
583     marginparwidth=4pc,heightrounded
584   }%
585 \or % acmtog
586   \geometry{twoside=true, head=13pt, foot=2pc,
587     paperwidth=8.5in, paperheight=11in,
588     includeheadfoot, columnsep=24pt,
589     top=52pt, bottom=75pt, inner=52pt, outer=52pt,
590     marginparwidth=2pc,heightrounded
591   }%
592 \or % sigconf
593   \geometry{twoside=true, head=13pt,
594     paperwidth=8.5in, paperheight=11in,
595     includeheadfoot, columnsep=2pc,
596     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
597     marginparwidth=2pc,heightrounded
598   }%
599 \or % siggraph
600   \geometry{twoside=true, head=13pt,
601     paperwidth=8.5in, paperheight=11in,
602     includeheadfoot, columnsep=2pc,
603     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
604     marginparwidth=2pc,heightrounded
605   }%
606 \or % sigplan
607   \geometry{twoside=true, head=13pt,
608     paperwidth=8.5in, paperheight=11in,
609     includeheadfoot=false, columnsep=2pc,
610     top=1in, bottom=1in, inner=0.75in, outer=0.75in,
```

```

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

\parindent Paragraphing
\parskip
630 \setlength\parindent{10\p@}
631 \setlength\parskip{\z@}
632 \ifcase\ACM@format@nr
633 \relax % manuscript
634 \or % acmsmall
635 \or % acmlarge
636 \or % acmtog
637   \setlength\parindent{9\p@}%
638 \or % sigconf
639 \or % siggraph
640 \or % sigplan
641 \or % sigchi
642 \or % sigchi-a
643 \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 com-
mand. We set \normalparindent to the value of \parindent as selected by acmart for
consistent paragraph indents.
644 \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.

```
645 \def\copyrightpermissionfootnoterule{\kern-3\p@
646   \hrule \@width \columnwidth \kern 2.6\p@}

647 \RequirePackage{manyfoot}
648 \SelectFootnoteRule[2]{copyrightpermission}
649 \DeclareNewFootnote{authorsaddresses}
650 \SelectFootnoteRule[2]{copyrightpermission}
651 \DeclareNewFootnote{copyrightpermission}
```

`\footnoterule` Tschichold's rules:

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

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

```
654 \def\endminipage{%
655   \par
656   \unskip
657   \ifvoid\@mpfootins\else
658     \vskip\skip\@mpfootins
659     \normalcolor
660     \unvbox\@mpfootins
661   \fi
662   \@minipagefalse
663   \color@endgroup
664   \egroup
665   \expandafter\@iiiparbox\@mpargs{\unvbox\@tempboxa}}
```

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

```
666 \def\@textbottom{\vskip \z@ \@plus 1pt}
667 \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.

```
668 \ifcase\ACM@format@nr
669 \relax % manuscript
670 \or % acmsmall
671 \or % acmlarge
672 \or % acmtog
673   \flushbottom
674 \or % sigconf
675   \flushbottom
676 \or % siggraph
677   \flushbottom
678 \or % sigplan
679   \flushbottom
680 \or % sigchi
```



```

681 \flushbottom
682 \or % sigchi-a
683 \fi

```

3.8 Fonts

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

The code below is by Ross Moore.

```

684 \RequirePackage{iftex}
685 \ifPDFTeX
686 \input{glyphtounicode}
687 \pdfglyphtounicode{f_f}{FB00}
688 \pdfglyphtounicode{f_f_i}{FB03}
689 \pdfglyphtounicode{f_f_l}{FB04}
690 \pdfglyphtounicode{f_i}{FB01}
691 \pdfglyphtounicode{t_t}{0074 0074}
692 \pdfglyphtounicode{f_t}{0066 0074}
693 \pdfglyphtounicode{T_h}{0054 0068}
694 \pdfgentounicode=1
695 \fi
696 \RequirePackage{cmap}

```

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

```

697 \newif\if@ACM@newfonts
698 \@ACM@newfontstrue
699 \IfFileExists{libertine.sty}{\ClassWarning{\@classname}{You do not
700   have the libertine package installed. Please upgrade your
701   TeX}\@ACM@newfontsfalse}
702 \IfFileExists{zi4.sty}{\ClassWarning{\@classname}{You do not
703   have the zi4 package installed. Please upgrade your
704   TeX}\@ACM@newfontsfalse}
705 \IfFileExists{newtxmath.sty}{\ClassWarning{\@classname}{You do not
706   have the newtxmath package installed. Please upgrade your
707   TeX}\@ACM@newfontsfalse}

```

We use Libertine throughout.

```

708 \if@ACM@newfonts
709   \RequirePackage[T1]{fontenc}
710   \ifxetex
711     \RequirePackage[tt=false]{libertine}
712     \setmonofont[StylisticSet=3]{inconsolata}
713   \else
714     \ifluatex
715       \RequirePackage[tt=false]{libertine}
716       \setmonofont[StylisticSet=3]{inconsolata}
717     \else
718       \RequirePackage[tt=false, type1=true]{libertine}
719       \RequirePackage[varqu]{zi4}

```

```

720 \fi
721 \fi
722 \RequirePackage[libertine]{newtxmath}
723 \fi

```

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

```

724 \let\liningnums\undefined
725 \AtEndPreamble{%
726 \DeclareTextFontCommand{\liningnums}{\libertineLF}}

```

The SIGCHI extended abstracts are sans serif:

```

727 \if@ACM@sigchiamode
728 \renewcommand{\familydefault}{\sfdefault}
729 \fi

```

3.9 Image descriptions

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

```

730 \newif\if@Description@present
731 \@Description@presenttrue

```

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

```

732 \newif\if@undescrbed@images
733 \@undescrbed@imagesfalse

```

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

```

734 \newcommand\Description[2][\global\@Description@presenttrue\ignorespaces]

```

The global warning

```

735 \AtEndDocument{\if@undescrbed@images
736 \ClassWarningNoLine{\@classname}{Some images may lack descriptions}\fi}

```

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

```

737 \AtBeginEnvironment{figure}{\@Description@presentfalse
738 \let\@vspace\@vspace@orig
739 \let\@vspacer\@vspacer@orig}
740 \AtBeginEnvironment{figure*}{\@Description@presentfalse
741 \let\@vspace\@vspace@orig
742 \let\@vspacer\@vspacer@orig}
743 \AtEndEnvironment{figure}{\if@Description@present\else
744 \global\@undescrbed@imagestrue
745 \ClassWarning{\@classname}{A possible image without description}\fi}
746 \AtEndEnvironment{figure*}{\if@Description@present\else
747 \global\@undescrbed@imagestrue
748 \ClassWarning{\@classname}{A possible image without description}\fi}
749 \AtBeginEnvironment{table}{\let\@vspace\@vspace@orig
750 \let\@vspacer\@vspacer@orig}

```

```

751 \AtBeginEnvironment{table*}{\let\@vspace\@vspace@orig
752 \let\@vspacer\@vspacer@orig}
753 \AtBeginEnvironment{algorithm}{\let\@vspace\@vspace@orig
754 \let\@vspacer\@vspacer@orig}
755 \AtBeginEnvironment{algorithm*}{\let\@vspace\@vspace@orig
756 \let\@vspacer\@vspacer@orig}
757 \AtBeginEnvironment{lstlisting}{\let\@vspace\@vspace@orig
758 \let\@vspacer\@vspacer@orig}
759 \AtBeginEnvironment{lstlisting*}{\let\@vspace\@vspace@orig
760 \let\@vspacer\@vspacer@orig}
761

```

3.10 Floats

We use the caption package

```

762 \RequirePackage{caption, float}
763 \captionsetup[table]{position=top}
764 \if@ACM@journal
765 \captionsetup{labelfont={sf, small},
766 textfont={sf, small}, margin=\z@}
767 \captionsetup[figure]{name={Fig.}}
768 \else
769 \captionsetup{labelfont={bf},
770 textfont={bf}, labelsep=colon, margin=\z@}
771 \ifcase\ACM@format@nr
772 \relax % manuscript
773 \or % acmsmall
774 \or % acmlarge
775 \or % acmtog
776 \or % sigconf
777 \or % siggraph
778 \captionsetup{textfont={it}}
779 \or % sigplan
780 \captionsetup{labelfont={bf},
781 textfont={normalfont}, labelsep=period, margin=\z@}
782 \or % sigchi
783 \captionsetup[figure]{labelfont={bf, small},
784 textfont={bf, small}}
785 \captionsetup[table]{labelfont={bf, small},
786 textfont={bf, small}}
787 \or % sigchi-a
788 \captionsetup[figure]{labelfont={bf, small},
789 textfont={bf, small}}
790 \captionsetup[table]{labelfont={bf, small},
791 textfont={bf, small}}
792 \fi
793 \fi

```

sidebar The sidebar environment:

```

794 \newfloat{sidebar}{}{sbar}
795 \floatname{sidebar}{Sidebar}
796 \renewenvironment{sidebar}{}{\Collect@Body\@sidebar}{}

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

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

\@marginfigure The processing of the saved text
801 \long\def\@marginfigure#1{\bgroup
802 \let\@vspace\@vspace@orig
803 \let\@vspacer\@vspacer@orig
804 \captionsetup{type=figure}%
805 \marginpar{\@Description@presentfalse\centering
806 \small#1\if@Description@present\else
807 \global\@undescribed@imagestrue
808 \ClassWarning{\@classname}{A possible image without description}
809 \fi}%
810 \egroup}

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

\@margintable The processing of the saved text
812 \long\def\@margintable#1{\bgroup\let\@vspace\@vspace@orig
813 \let\@vspacer\@vspacer@orig\captionsetup{type=table}%
814 \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
815 \newdimen\fulltextwidth
816 \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)
817 \if@ACM@sigchiamode
818 \def\@dblfloat{\bgroup\let\@vspace\@vspace@orig
819 \let\@vspacer\@vspacer@orig\columnwidth=\fulltextwidth
820 \let\@endfloatbox\@endwidefloatbox
821 \def\@fpsaddddefault{\def\@fps{tp}}}%
822 \@float}
823 \fi

```

`\end@dblfloat` And the end. Just adding a `\bgroup`.

```
824 \if@ACM@sigchiamode
825 \def\end@dblfloat{%
826     \end@float\egroup}
827 \fi
```

`\@endwidefloatbox` This is the end of a wide box—we basically move everything to the left

```
828 \def\@endwidefloatbox{%
829     \par\vskip\z@skip
830     \@minipagefalse
831     \outer@nobreak
832     \egroup
833     \color@endbox
834     \global\setbox\@currbox=\vbox{\moveleft
835         \dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%
836     \wd\@currbox=\textwidth
837 }
```

3.11 Lists

```
838 \ifcase\ACM@format@nr
839 \relax % manuscript
840 \or % acmsmall
841 \or % acmlarge
842 \or % acmtog
843 \or % sigconf
844 \or % siggraph
845 \or % sigplan
846 \def\labelenumi{\theenumi.}
847 \def\labelenumii{\theenumii.}
848 \def\labelenumiii{\theenumiii.}
849 \def\labelenumiv{\theenumiv.}
850 \or % sigchi
851 \or % sigchi-a
852 \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`.

```
853 \newdimen\@ACM@labelwidth
854 \AtBeginDocument{%
855     \setlength\labelsep{4pt}
856     \setlength{\@ACM@labelwidth}{6.5pt}
857
858     %% First-level list: when beginning after the first line of an
859     %% indented paragraph or ending before an indented paragraph, labels
```

```

860 %% should not hang to the left of the preceding/following text.
861 \setlength\leftmargini{\z@}
862 \addtolength\leftmargini{\parindent}
863 \addtolength\leftmargini{2\labelsep}
864 \addtolength\leftmargini{\@ACM@labelwidth}
865
866 %% Second-level and higher lists.
867 \setlength\leftmarginii{\z@}
868 \addtolength\leftmarginii{0.5\labelsep}
869 \addtolength\leftmarginii{\@ACM@labelwidth}
870 \setlength\leftmarginiii{\leftmarginii}
871 \setlength\leftmarginiv{\leftmarginiii}
872 \setlength\leftmarginv{\leftmarginiv}
873 \setlength\leftmarginvi{\leftmarginv}
874 \@listi}
875 \newskip\listisep
876 \listisep\smallskipamount
877 \def\@listI{\leftmargin\leftmargini
878 \labelwidth\leftmargini \advance\labelwidth-\labelsep
879 \listparindent\z@
880 \topsep\listisep}
881 \let\@listi\@listI
882 \def\@listii{\leftmargin\leftmarginii
883 \labelwidth\leftmarginii \advance\labelwidth-\labelsep
884 \topsep\z@skip}
885 \def\@listiii{\leftmargin\leftmarginiii
886 \labelwidth\leftmarginiii \advance\labelwidth-\labelsep}
887 \def\@listiv{\leftmargin\leftmarginiv
888 \labelwidth\leftmarginiv \advance\labelwidth-\labelsep}
889 \def\@listv{\leftmargin\leftmarginv
890 \labelwidth\leftmarginv \advance\labelwidth-\labelsep}
891 \def\@listvi{\leftmargin\leftmarginvi
892 \labelwidth\leftmarginvi \advance\labelwidth-\labelsep}
\descriptionlabel We do not use a colon by default like amsart does:
893 \renewcommand{\descriptionlabel}[1]{\upshape\bfseries #1}

\description Make the description environment indentation consistent with that of the itemize
and enumerate environments.
894 \renewenvironment{description}{\list{}{%
895 \labelwidth\@ACM@labelwidth
896 \let\makelabel\descriptionlabel}%
897 }{
898 \endlist
899 }
900 \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.

```
901 \newif\if@ACM@maketitle@typeset
902 \@ACM@maketitle@typesetfalse
```

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

```
903 \define@choicekey*+{ACM}{acmJournal}[\@journalCode\@journalCode@nr]{%
904   CIE,%
905   CSUR,%
906   DGOV,%
907   DTRAP,%
908   HEALTH,%
909   IMWUT,%
910   JACM,%
911   JDIQ,%
912   JEA,%
913   JERIC,%
914   JETC,%
915   JOCCH,%
916   PACMCGIT,%
917   PACMHCI,%
918   PACMPL,%
919   POMACS,%
920   TAAS,%
921   TACCESS,%
922   TACO,%
923   TALG,%
924   TALLIP,%
925   TAP,%
926   TCPS,%
927   TDS,%
928   TEAC,%
929   TECS,%
930   TELO,%
931   THRI,%
932   TIIS,%
933   TIOT,%
934   TISSEC,%
935   TIST,%
936   TKDD,%
937   TMIS,%
938   TOCE,%
939   TOCHI,%
940   TOCL,%
941   TOCS,%
942   TOCT,%
943   TODAES,%
944   TODS,%
```

```

945 TOG,%
946 TOIS,%
947 TOIT,%
948 TOMACS,%
949 TOMM,%
950 TOMPECS,%
951 TOMS,%
952 TOPC,%
953 TOPS,%
954 TOPLAS,%
955 TOS,%
956 TOSEM,%
957 TOSN,%
958 TQC,%
959 TRETs,%
960 TSAS,%
961 TSC,%
962 TSLP,%
963 TWEB,%
964 FACMP%
965 }{%
966 \ifcase\@journalCode@nr
967 \relax % CIE
968 \def\@journalName{ACM Computers in Entertainment}%
969 \def\@journalNameShort{ACM Comput. Entertain.}%
970 \def\@permissionCodeOne{1544-3574}%
971 \or % CSUR
972 \def\@journalName{ACM Computing Surveys}%
973 \def\@journalNameShort{ACM Comput. Surv.}%
974 \def\@permissionCodeOne{0360-0300}%
975 \or % DGOV
976 \def\@journalName{Digital Government: Research and Practice}%
977 \def\@journalNameShort{Digit. Gov. Res. Pract.}%
978 \def\@permissionCodeOne{2639-0175}%
979 \or % DTRAP
980 \def\@journalName{Digital Threats: Research and Practice}%
981 \def\@journalNameShort{Digit. Threat. Res. Pract.}%
982 \def\@permissionCodeOne{2576-5337}%
983 \or % HEALTH
984 \def\@journalName{ACM Transactions on Computing for Healthcare}%
985 \def\@journalNameShort{ACM Trans. Comput. Healthcare}%
986 \def\@permissionCodeOne{2637-8051}%
987 \or % IMWUT
988 \def\@journalName{Proceedings of the ACM on Interactive, Mobile,
989 Wearable and Ubiquitous Technologies}%
990 \def\@journalNameShort{Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.}%
991 \def\@permissionCodeOne{2474-9567}%
992 \@ACM@screentru
993 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
994 \or % JACM

```



```

995 \def\@journalName{Journal of the ACM}%
996 \def\@journalNameShort{J. ACM}%
997 \def\@permissionCodeOne{0004-5411}%
998 \or % JDIQ
999 \def\@journalName{ACM Journal of Data and Information Quality}%
1000 \def\@journalNameShort{ACM J. Data Inform. Quality}%
1001 \def\@permissionCodeOne{1936-1955}%
1002 \or % JEA
1003 \def\@journalName{ACM Journal of Experimental Algorithmics}%
1004 \def\@journalNameShort{ACM J. Exp. Algor.}%
1005 \def\@permissionCodeOne{1084-6654}%
1006 \or % JERIC
1007 \def\@journalName{ACM Journal of Educational Resources in Computing}%
1008 \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%
1009 \def\@permissionCodeOne{1073-0516}%
1010 \or % JETC
1011 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
1012 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
1013 \def\@permissionCodeOne{1550-4832}%
1014 \or % JOCCH
1015 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%
1016 \def\@journalNameShort{ACM J. Comput. Cult. Herit.}%
1017 \or % PACMCGIT
1018 \def\@journalName{Proceedings of the ACM on Computer Graphics and Interactive Techniques}%
1019 \def\@journalNameShort{Proc. ACM Comput. Graph. Interact. Tech.}%
1020 \def\@permissionCodeOne{2577-6193}%
1021 \@ACM@screentru
1022 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1023 \or % PACMHCI
1024 \def\@journalName{Proceedings of the ACM on Human-Computer Interaction}%
1025 \def\@journalNameShort{Proc. ACM Hum.-Comput. Interact.}%
1026 \def\@permissionCodeOne{2573-0142}%
1027 \@ACM@screentru
1028 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1029 \or % PACMPL
1030 \def\@journalName{Proceedings of the ACM on Programming Languages}%
1031 \def\@journalNameShort{Proc. ACM Program. Lang.}%
1032 \def\@permissionCodeOne{2475-1421}%
1033 \@ACM@screentru
1034 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1035 \or % POMACS
1036 \def\@journalName{Proceedings of the ACM on Measurement and Analysis of Computing Systems}%
1037 \def\@journalNameShort{Proc. ACM Meas. Anal. Comput. Syst.}%
1038 \def\@permissionCodeOne{2476-1249}%
1039 \@ACM@screentru
1040 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1041 \or % TAAS
1042 \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
1043 \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
1044 \def\@permissionCodeOne{1556-4665}%

```

```

1045 \or % TACCESS
1046   \def\@journalName{ACM Transactions on Accessible Computing}%
1047   \def\@journalNameShort{ACM Trans. Access. Comput.}%
1048   \def\@permissionCodeOne{1936-7228}%
1049 \or % TACO
1050   \def\@journalName{ACM Transactions on Architecture and Code Optimization}%
1051   \def\@journalNameShort{ACM Trans. Arch. Code Optim.}%
1052 \or % TALG
1053   \def\@journalName{ACM Transactions on Algorithms}%
1054   \def\@journalNameShort{ACM Trans. Algor.}%
1055   \def\@permissionCodeOne{1549-6325}%
1056 \or % TALLIP
1057   \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
1058   \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
1059   \def\@permissionCodeOne{2375-4699}%
1060 \or % TAP
1061   \def\@journalName{ACM Transactions on Applied Perception}%
1062 \or % TCPS
1063   \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
1064 \or % TDS
1065   \def\@journalName{ACM/IMS Transactions on Data Science}%
1066   \def\@journalNameShort{ACM/IMS Trans. Data Sci.}%
1067   \def\@permissionCodeOne{2577-3224}%
1068 \or % TEAC
1069   \def\@journalName{ACM Transactions on Economics and Computation}%
1070 \or % TECS
1071   \def\@journalName{ACM Transactions on Embedded Computing Systems}%
1072   \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%
1073   \def\@permissionCodeOne{1539-9087}%
1074 \or % TELO
1075   \def\@journalName{ACM Transactions on Evolutionary Learning}%
1076   \def\@journalNameShort{ACM Trans. Evol. Learn.}%
1077   \def\@permissionCodeOne{2688-3007}%
1078 \or % THRI
1079   \def\@journalName{ACM Transactions on Human-Robot Interaction}%
1080   \def\@journalNameShort{ACM Trans. Hum.-Robot Interact.}%
1081   \def\@permissionCodeOne{2573-9522}%
1082 \or % TIIS
1083   \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%
1084   \def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%
1085   \def\@permissionCodeOne{2160-6455}%
1086 \or % TIOT
1087   \def\@journalName{ACM Transactions on Internet of Things}%
1088   \def\@journalNameShort{ACM Trans. Internet Things}%
1089   \def\@permissionCodeOne{2577-6207}%
1090 \or % TISSEC
1091   \def\@journalName{ACM Transactions on Information and System Security}%
1092   \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%
1093   \def\@permissionCodeOne{1094-9224}%
1094 \or % TIST

```

```

1095 \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%
1096 \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%
1097 \def\@permissionCodeOne{2157-6904}%
1098 \or % TKDD
1099 \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%
1100 \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%
1101 \def\@permissionCodeOne{1556-4681}%
1102 \or % TMIS
1103 \def\@journalName{ACM Transactions on Management Information Systems}%
1104 \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%
1105 \def\@permissionCodeOne{2158-656X}%
1106 \or % TOCE
1107 \def\@journalName{ACM Transactions on Computing Education}%
1108 \def\@journalNameShort{ACM Trans. Comput. Educ.}%
1109 \def\@permissionCodeOne{1946-6226}%
1110 \or % TOCHI
1111 \def\@journalName{ACM Transactions on Computer-Human Interaction}%
1112 \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%
1113 \def\@permissionCodeOne{1073-0516}%
1114 \or % TOCL
1115 \def\@journalName{ACM Transactions on Computational Logic}%
1116 \def\@journalNameShort{ACM Trans. Comput. Logic}%
1117 \def\@permissionCodeOne{1529-3785}%
1118 \or % TOCS
1119 \def\@journalName{ACM Transactions on Computer Systems}%
1120 \def\@journalNameShort{ACM Trans. Comput. Syst.}%
1121 \def\@permissionCodeOne{0734-2071}%
1122 \or % TOCT
1123 \def\@journalName{ACM Transactions on Computation Theory}%
1124 \def\@journalNameShort{ACM Trans. Comput. Theory}%
1125 \def\@permissionCodeOne{1942-3454}%
1126 \or % TODAES
1127 \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%
1128 \def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
1129 \def\@permissionCodeOne{1084-4309}%
1130 \or % TODS
1131 \def\@journalName{ACM Transactions on Database Systems}%
1132 \def\@journalNameShort{ACM Trans. Datab. Syst.}%
1133 \def\@permissionCodeOne{0362-5915}%
1134 \or % TOG
1135 \def\@journalName{ACM Transactions on Graphics}%
1136 \def\@journalNameShort{ACM Trans. Graph.}%
1137 \def\@permissionCodeOne{0730-0301}%
1138 \or % TOIS
1139 \def\@journalName{ACM Transactions on Information Systems}%
1140 \def\@permissionCodeOne{1046-8188}%
1141 \or % TOIT
1142 \def\@journalName{ACM Transactions on Internet Technology}%
1143 \def\@journalNameShort{ACM Trans. Internet Technol.}%
1144 \def\@permissionCodeOne{1533-5399}%

```

```

1145 \or % TOMACS
1146 \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
1147 \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
1148 \or % TOMM
1149 \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
1150 \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
1151 \def\@permissionCodeOne{1551-6857}%
1152 \def\@permissionCodeTwo{0100}%
1153 \or % TOMPECS
1154 \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
1155 \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
1156 \def\@permissionCodeOne{2376-3639}%
1157 \or % TOMS
1158 \def\@journalName{ACM Transactions on Mathematical Software}%
1159 \def\@journalNameShort{ACM Trans. Math. Softw.}%
1160 \def\@permissionCodeOne{0098-3500}%
1161 \or % TOPC
1162 \def\@journalName{ACM Transactions on Parallel Computing}%
1163 \def\@journalNameShort{ACM Trans. Parallel Comput.}%
1164 \def\@permissionCodeOne{1539-9087}%
1165 \or % TOPS
1166 \def\@journalName{ACM Transactions on Privacy and Security}%
1167 \def\@journalNameShort{ACM Trans. Priv. Sec.}%
1168 \def\@permissionCodeOne{2471-2566}%
1169 \or % TOPLAS
1170 \def\@journalName{ACM Transactions on Programming Languages and Systems}%
1171 \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
1172 \def\@permissionCodeOne{0164-0925}%
1173 \or % TOS
1174 \def\@journalName{ACM Transactions on Storage}%
1175 \def\@journalNameShort{ACM Trans. Storage}%
1176 \def\@permissionCodeOne{1553-3077}%
1177 \or % TOSEM
1178 \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
1179 \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
1180 \def\@permissionCodeOne{1049-331X}%
1181 \or % TOSN
1182 \def\@journalName{ACM Transactions on Sensor Networks}%
1183 \def\@journalNameShort{ACM Trans. Sensor Netw.}%
1184 \def\@permissionCodeOne{1550-4859}%
1185 \or % TQC
1186 \def\@journalName{ACM Transactions on Quantum Computing}%
1187 \def\@journalNameShort{ACM Trans. Quantum Comput.}%
1188 \def\@permissionCodeOne{2643-6817}%
1189 \or % TRET
1190 \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
1191 \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
1192 \def\@permissionCodeOne{1936-7406}%
1193 \or % TSAS
1194 \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%

```

```

1195 \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
1196 \def\@permissionCodeOne{2374-0353}%
1197 \or % TSC
1198 \def\@journalName{ACM Transactions on Social Computing}%
1199 \def\@journalNameShort{ACM Trans. Soc. Comput.}%
1200 \def\@permissionCodeOne{2469-7818}%
1201 \or % TSLP
1202 \def\@journalName{ACM Transactions on Speech and Language Processing}%
1203 \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
1204 \def\@permissionCodeOne{1550-4875}%
1205 \or % TWEB
1206 \def\@journalName{ACM Transactions on the Web}%
1207 \def\@journalNameShort{ACM Trans. Web}%
1208 \def\@permissionCodeOne{1559-1131}%
1209 \else % FACMP, a dummy journal
1210 \def\@journalName{Forthcoming ACM Publication}%
1211 \def\@journalNameShort{ACM Forthcoming}%
1212 \def\@permissionCodeOne{XXXX-XXXX}%
1213 \fi
1214 \ClassInfo{\@classname}{Using journal code \@journalCode}%
1215 }{%
1216 \ClassError{\@classname}{Incorrect journal #1}%
1217 }%

\acmJournal And the syntactic sugar around it
1218 \def\acmJournal#1{\setkeys{ACM}{acmJournal=#1}%
1219 \global\@ACM@journal@bibstriptrue}

The defaults:
1220 \def\@journalCode@nr{0}
1221 \def\@journalName{}%
1222 \def\@journalNameShort{\@journalName}%
1223 \def\@permissionCodeOne{XXXX-XXXX}%
1224 \def\@permissionCodeTwo{}%

\acmConference This is the conference command
1225 \newcommand\acmConference[4][{}]{%
1226 \gdef\acmConference@shortname{#1}%
1227 \gdef\acmConference@name{#2}%
1228 \gdef\acmConference@date{#3}%
1229 \gdef\acmConference@venue{#4}%
1230 \ifx\acmConference@shortname\@empty
1231 \gdef\acmConference@shortname{#2}%
1232 \fi
1233 \global\@ACM@journal@bibstripfalse
1234 }
1235 \if@ACM@journal\else
1236 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
1237 DC, USA}%
1238 \fi

```

`\acmBooktitle` The book title of the conference:

`\@acmBooktitle` 1239 `\def\acmBooktitle#1{\gdef\acmBooktitle{#1}}`
1240 `\acmBooktitle{Proceedings of \acmConference@name`
1241 `\ifx\acmConference@name\acmConference@shortname\else`
1242 `\ (\acmConference@shortname)\fi}`

`\@editorsAbbrev` How to abbreviate editors

1243 `\def\@editorsAbbrev{(Ed.)}`

`\@acmEditors` The list of editors

1244 `\def\@acmEditors{}`

`\editor` Add a new editor to the list

1245 `\def\editor#1{\ifx\@acmEditors\empty`
1246 `\gdef\@acmEditors{#1}%`
1247 `\else`
1248 `\gdef\@editorsAbbrev{(Eds.)}%`
1249 `\g@addto@macro\@acmEditors{\and#1}%`
1250 `\fi}`

`\subtitle` The subtitle macro

1251 `\def\subtitle#1{\def\@subtitle{#1}}`
1252 `\subtitle{}`

`\num@authorgroups` The total number of “groups”. Each group is several authors with the same affiliations(s)

1253 `\newcount\num@authorgroups`
1254 `\num@authorgroups=0\relax`

`\num@author` The total number of authors

1255 `\newcount\num@author`
1256 `\num@author=0\relax`

`\if@insideauthorgroup` Whether we are continuing an author group

1257 `\newif\if@insideauthorgroup`
1258 `\@insideauthorgroupfalse`

`\author` Adding an author to the list of authors and addresses

1259 `\renewcommand\author[2][{}]{%`
1260 `\IfSubStr{#2}{,}{\ClassWarning{\@classname}{Do not put several`
1261 `authors in the same \string\author\space macro!}}{}%`
1262 `\global\advance\num@author by 1\relax`
1263 `\if@insideauthorgroup\else`
1264 `\global\advance\num@authorgroups by 1\relax`
1265 `\global\@insideauthorgrouptrue`
1266 `\fi`
1267 `\ifx\addresses\empty`
1268 `\if@ACM@anonymous`
1269 `\gdef\addresses{\@author{Anonymous Author(s)%`

```

1270         \ifx\@acmSubmissionID\empty\else\Submission Id:
1271         \@acmSubmissionID\fi}}%
1272     \gdef\authors{Anonymous Author(s)}%
1273 \else
1274     \gdef\addresses{\@author{#2}}%
1275     \gdef\authors{#2}%
1276 \fi
1277 \else
1278     \if@ACM@anonymous\else
1279         \g@addto@macro\addresses{\and\@author{#2}}%
1280         \g@addto@macro\authors{\and#2}%
1281     \fi
1282 \fi
1283 \if@ACM@anonymous
1284     \ifx\shortauthors\empty
1285         \gdef\shortauthors{Anon.
1286             \ifx\@acmSubmissionID\empty\else Submission Id:
1287             \@acmSubmissionID\fi}%
1288     \fi
1289 \else
1290     \def\@tempa{#1}%
1291     \ifx\@tempa\empty
1292         \ifx\shortauthors\empty
1293             \gdef\shortauthors{#2}%
1294         \else
1295             \g@addto@macro\shortauthors{\and#2}%
1296         \fi
1297     \else
1298         \ifx\shortauthors\empty
1299             \gdef\shortauthors{#1}%
1300         \else
1301             \g@addto@macro\shortauthors{\and#1}%
1302         \fi
1303     \fi
1304 \fi}

```

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

```

1305 \newcommand{\affiliation}[2][]{%
1306     \global\@insideauthorgroupfalse
1307     \if@ACM@anonymous\else
1308         \g@addto@macro\addresses{\affiliation{#1}{#2}}%
1309     \fi}

```

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

```

1310 \define@boolkey+{@ACM@affiliation@}[@ACM@affiliation@]{obeypunctuation}%
1311 [true]{\ClassError{\@classname}{The option obeypunctuation can be either true or false}}

```

`\additionalaffiliation` Additional affiliations go to footnotes

```

1312 \def\additionalaffiliation#1{\authornote{\@additionalaffiliation{#1}}}

```

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

```

1313 \def\@additionalaffiliation#1{\bgroup
1314   \def\position##1{\ignorespaces}%
1315   \def\institution##1{##1\ignorespaces}%
1316   \def\department{\@ifnextchar[{\@department}{\@department[]}}%
1317   \def\@department[##1]##2{\unskip, ##2\ignorespaces}%
1318   \let\streetaddress\position
1319   \let\city\position
1320   \let\state\position
1321   \let\postcode\position
1322   \let\country\position
1323   Also with #1\unskip.\egroup}

```

`\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.

```

1324 \renewcommand{\email}[2][{}]{%
1325   \IfSubStr{#2}{,}{\ClassWarning{\@classname}{Do not put several
1326     addresses in the same \string\email\space macro!}}{}%
1327   \if@ACM@anonymous\else
1328     \g@addto@macro\addresses{\email{#1}{#2}}%
1329   \fi}

```

`\orcid` Right now we do not typeset ORCIDs

```

1330 \def\orcid#1{\unskip\ignorespaces}

```

`\authorsaddresses` Setting up authors' addresses

```

1331 \def\authorsaddresses#1{\def\@authorsaddresses{#1}}
1332 \authorsaddresses{\@mkauthorsaddresses}

```

`\@titlenotes` The title notes

```

1333 \def\@titlenotes{}

```

`\titlenote` Adding a note to the title

```

1334 \def\titlenote#1{%
1335   \g@addto@macro\@title{\footnotemark}%
1336   \if@ACM@anonymous
1337     \g@addto@macro\@titlenotes{%
1338       \stepcounter{footnote}\footnotetext{Title note}}%
1339   \else
1340     \g@addto@macro\@titlenotes{\stepcounter{footnote}\footnotetext{#1}}%
1341   \fi}

```

`\@subtitlenotes` The subtitle notes

```

1342 \def\@subtitlenotes{}

```


`\subtitlenote` Adding a note to the subtitle

```

1343 \def\subtitlenote#1{%
1344   \g@addto@macro\@subtitle{\footnotemark}%
1345   \if@ACM@anonymous
1346     \g@addto@macro\@subtitlenotes{%
1347       \stepcounter{footnote}\footnotetext{Subtitle note}}%
1348   \else
1349     \g@addto@macro\@subtitlenotes{%
1350       \stepcounter{footnote}\footnotetext{#1}}%
1351   \fi}

```

`\@authornotes` The author notes

```

1352 \def\@authornotes{}

```

`\authornote` Adding a note to the author

```

1353 \def\authornote#1{%
1354   \if@ACM@anonymous\else
1355     \g@addto@macro\addresses{\@authornotemark}%
1356     \g@addto@macro\@authornotes{%
1357       \stepcounter{footnote}\footnotetext{#1}}%
1358   \fi}

```

`\authornotemark` Adding a footnote mark to the authors

```

1359 \newcommand\authornotemark[1][\relax]{%
1360   \ifx#1\relax\relax\relax
1361     \g@addto@macro\addresses{\@authornotemark}%
1362   \else
1363     \g@addto@macro\addresses{\@authornotemark{#1}}%
1364   \fi}

```

`\acmVolume` The current volume

```

1365 \def\acmVolume#1{\def\@acmVolume{#1}}
1366 \acmVolume{1}

```

`\acmNumber` The current number

```

1367 \def\acmNumber#1{\def\@acmNumber{#1}}
1368 \acmNumber{1}

```

`\acmArticle` The current article

```

1369 \def\acmArticle#1{\def\@acmArticle{#1}}
1370 \acmArticle{}

```

`\acmArticleSeq` The sequence number

```

1371 \def\acmArticleSeq#1{\def\@acmArticleSeq{#1}}
1372 \acmArticleSeq{\@acmArticle}

```

`\acmYear` The current year

```

1373 \def\acmYear#1{\def\@acmYear{#1}}
1374 \acmYear{\the\year}

```

`\acmMonth` The current month
1375 `\def\acmMonth#1{\def\@acmMonth{#1}}`
1376 `\acmMonth{\the\month}`

`\@acmPubDate` The publication date
1377 `\def\@acmPubDate{\ifcase\@acmMonth\or`
1378 `January\or February\or March\or April\or May\or June\or`
1379 `July\or August\or September\or October\or November\or`
1380 `December\fi~\@acmYear}`

`\acmPrice` The price
1381 `\def\acmPrice#1{\def\@acmPrice{#1}}`
1382 `\acmPrice{15.00}`

`\acmSubmissionID` The submission ID
1383 `\def\acmSubmissionID#1{\def\@acmSubmissionID{#1}}`
1384 `\acmSubmissionID{}`

`\acmISBN` The book ISBN
1385 `\def\acmISBN#1{\def\@acmISBN{#1}}`
1386 `\acmISBN{978-x-xxxx-xxxx-x/YY/MM}`

`\acmDOI` The paper DOI
1387 `\def\acmDOI#1{\def\@acmDOI{#1}}`
1388 `\acmDOI{10.1145/nnnnnnn.nnnnnnn}`

`\if@ACM@badge` Whether to print a badge. Note that either a left or right badge triggers it:
1389 `\newif\if@ACM@badge`
1390 `\@ACM@badgefalse`

`\@ACM@badge@width` The width of the badge
1391 `\newlength\@ACM@badge@width`
1392 `\setlength\@ACM@badge@width{5pc}`

`\@ACM@title@width` The width of the badge
1393 `\newlength\@ACM@title@width`

`\@ACM@badge@skip` The space between the badge and the title
1394 `\newlength\@ACM@badge@skip`
1395 `\setlength\@ACM@badge@skip{1pc}`

`\acmBadgeR` Setting the right badge
1396 `\newcommand\acmBadgeR[2][\@ACM@badgetrue`
1397 `\def\@acmBadgeR@url{#1}%`
1398 `\def\@acmBadgeR@image{#2}}`
1399 `\def\@acmBadgeR@url{}`
1400 `\def\@acmBadgeR@image{}`

`\acmBadgeL` Setting the left badge

```

1401 \newcommand\acmBadgeL[2][\@ACM@badgetrue
1402   \def\@acmBadgeL@url{#1}%
1403   \def\@acmBadgeL@image{#2}}
1404 \def\@acmBadgeL@url{}
1405 \def\@acmBadgeL@image{}

```

`\startPage` The start page of the paper

```

1406 \def\startPage#1{\def\@startPage{#1}}
1407 \startPage{}

```

`\terms` Terms are obsolete. We use CCS now.

```

1408 \def\terms#1{\ClassWarning{\@classname}{The command \string\terms{} is
1409   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.

```

1410 \def\keywords#1{\def\@keywords{#1}}
1411 \let\@keywords\@empty

1412 \AtEndDocument{\if@ACM@nonacm\else\ifx\@keywords\@empty
1413   \ifnum\getrefnumber{TotPages}>2\relax
1414     \ClassWarningNoLine{\@classname}{ACM keywords are mandatory
1415       for papers over two pages}%
1416   \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

```

1417 \renewenvironment{abstract}{\Collect@Body\@saveabstract}{}

```

`\@saveabstract` And saving the abstract

```

1418 \long\def\@saveabstract#1{\if@ACM@maketitle@typeset
1419   \ClassError{\@classname}{Abstract must be defined before maketitle
1420     command. Please move it!}\fi
1421   \long\gdef\@abstract{#1}}
1422 \@saveabstract{}

```

`\@empty` The long version of `\@empty` (to compare with `\@abstract`)

```

1423 \long\def\@empty{}

```

`\if@ACM@printccs` Whether to print CCS

```

1424 \define@boolkey+{@ACM@topmatter@}{@ACM@}{printccs}[true]{%
1425   \if@ACM@printccs
1426     \ClassInfo{\@classname}{Printing CCS}%
1427   \else
1428     \ClassInfo{\@classname}{Suppressing CCS}%
1429   \fi}{\ClassError{\@classname}{The option printccs can be either true or false}}

```

`\if@ACM@printacmref` Whether to print the ACM bibstrip

```

1430 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printacmref}[true]{%
1431   \if@ACM@printacmref
1432     \ClassInfo{\@classname}{Printing bibformat}%
1433   \else
1434     \ClassInfo{\@classname}{Suppressing bibformat}%
1435   \fi}{\ClassError{\@classname}{The option printacmref can be either true or false}}

1436 \AtEndDocument{\if@ACM@nonacm\else\if@ACM@printacmref\else
1437   \ifnum\getrefnumber{TotPages}>1\relax
1438     \ClassWarningNoLine{\@classname}{ACM reference format is mandatory
1439       for papers over one page}%
1440   \fi\fi\fi}

```

`\if@ACM@printfolios` Whether to print folios

```

1441 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printfolios}[true]{%
1442   \if@ACM@printfolios
1443     \ClassInfo{\@classname}{Printing folios}%
1444   \else
1445     \ClassInfo{\@classname}{Suppressing folios}%
1446   \fi}{\ClassError{\@classname}{The option printfolios can be either true or false}}

```

`\@ACM@authorsperrrow` The number of authors per row. 0 means use the default algorithm.

```

1447 \define@cmdkey{@ACM@topmatter@}[@ACM@]{authorsperrrow}[0]{%
1448   \IfInteger{#1}{\ClassInfo{\@classname}{Setting authorsperrrow to
1449     #1}}{\ClassWarning{\@classname}{The parameter authorsperrrow must be
1450     numerical. Ignoring the input #1}}\gdef\@ACM@authorsperrrow{0}}

```

`\settopmatter` The usual syntactic sugar

```

1451 \def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}

    Now the settings
1452 \settopmatter{printccs=true, printacmref=true}
1453 \if@ACM@manuscript
1454   \settopmatter{printfolios=true}
1455 \else
1456   \if@ACM@journal
1457     \settopmatter{printfolios=true}
1458   \else
1459     \settopmatter{printfolios=false}
1460   \fi
1461 \fi
1462 \settopmatter{authorsperrrow=0}

```

`\@received` The container for the paper history

```

1463 \def\@received{}

```

`\received` The `\received` command

```

1464 \newcommand\received[2][\def\@tempa{#1}%

```

```

1465 \ifx\@tempa\@empty
1466 \ifx\@received\@empty
1467 \gdef\@received{Received #2}%
1468 \else
1469 \g@addto@macro{\@received}{; revised #2}%
1470 \fi
1471 \else
1472 \ifx\@received\@empty
1473 \gdef\@received{#1 #2}%
1474 \else
1475 \g@addto@macro{\@received}{; #1 #2}%
1476 \fi
1477 \fi}
1478 \AtEndDocument{%
1479 \ifx\@received\@empty\else
1480 \par\bigskip\noindent\small\normalfont\@received\par
1481 \fi}

```

3.13 Concepts system

We exclude CCSXML stuff generated by the ACM system:

```

1482 \RequirePackage{comment}
1483 \excludecomment{CCSXML}

```

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

```

1484 \let\@concepts\@empty
1485 \newcounter{@concepts}

```

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

```

1486 \newcommand\ccsdesc[2][100]{%
1487 \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!

```

1488 \def\textrightarrow{\rightarrow}
1489 \def\ccsdesc@parse#1~#2~#3~{%
1490 \stepcounter{@concepts}%
1491 \expandafter\ifx\csname CCS@General@#2\endcsname\relax
1492 \expandafter\gdef\csname CCS@General@#2\endcsname{\textbullet\
1493 \textbf{#2}}}%
1494 \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{; }%
1495 \expandafter\gdef\csname CCS@Specific@#2\endcsname{}%
1496 \g@addto@macro{\@concepts}{\csname CCS@General@#2\endcsname
1497 \csname CCS@Punctuation@#2\endcsname
1498 \csname CCS@Specific@#2\endcsname}%
1499 \fi
1500 \ifx#3\relax\relax\else
1501 \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{
1502 \textrightarrow\ }%

```

```

1503 \expandafter\g@addto@macro\expandafter{\csname CCS@Specific@#2\endcsname}{%
1504 \addtocounter{@concepts}{-1}%
1505 \ifnum#1>499\textbf{#3}\else
1506 \ifnum#1>299\textit{#3}\else
1507 #3\fi\fi\ifnum\value{@concepts}=0.\else; \fi}%
1508 \fi
1509 \ccsdesc@parse@finish}

1510 \AtEndDocument{\if@ACM@nonacm\else\ifx\@concepts\@empty\relax
1511 \ifnum\getrefnumber{TotPages}>2\relax
1512 \ClassWarningNoLine{\@classname}{CCS concepts are mandatory
1513 for papers over two pages}%
1514 \fi\fi\fi}

```

```

\ccdesc@parse@finish Gobble everything to \ccsdesc@parse@end
1515 \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
1516 \newif\if@printcopyright
1517 \@printcopyrighttrue

\if@printpermission Whether to print the permission block
1518 \newif\if@printpermission
1519 \@printpermissiontrue

\if@acmowned Whether the ACM owns the rights to the paper
1520 \newif\if@acmowned
1521 \@acmownedtrue

Keys:
1522 \define@choicekey*{ACM@}{acmcopyrightmode}[%
1523 \acm@copyrightinput\acm@copyrightmode]{none,%
1524 acmcopyright,acmlicensed,rightsretained,%
1525 usgov,usgovmixed,cagov,cagovmixed,licensedusgovmixed,%
1526 licensedcagov,licensedcagovmixed,othergov,licensedothergov,%
1527 iw3c2w3,iw3c2w3g}{%
1528 \@printpermissiontrue
1529 \@printcopyrighttrue
1530 \@acmownedtrue
1531 \ifnum\acm@copyrightmode=0\relax % none
1532 \@printpermissionfalse
1533 \@printcopyrightfalse
1534 \@acmownedfalse
1535 \fi
1536 \ifnum\acm@copyrightmode=2\relax % acmlicensed

```

```

1537 \acmownedfalse
1538 \fi
1539 \ifnum\acm@copyrightmode=3\relax % rightsretained
1540 \acmownedfalse
1541 \AtBeginDocument{\acmPrice{}}%
1542 \fi
1543 \ifnum\acm@copyrightmode=4\relax % usgov
1544 \@printpermissiontrue
1545 \@printcopyrightfalse
1546 \acmownedfalse
1547 \AtBeginDocument{\acmPrice{}}%
1548 \fi
1549 \ifnum\acm@copyrightmode=6\relax % cagov
1550 \acmownedfalse
1551 \fi
1552 \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
1553 \acmownedfalse
1554 \fi
1555 \ifnum\acm@copyrightmode=9\relax % licensedcagov
1556 \acmownedfalse
1557 \fi
1558 \ifnum\acm@copyrightmode=10\relax % licensedcagovmixed
1559 \acmownedfalse
1560 \fi
1561 \ifnum\acm@copyrightmode=11\relax % othergov
1562 \acmownedtrue
1563 \fi
1564 \ifnum\acm@copyrightmode=12\relax % licensedothergov
1565 \acmownedfalse
1566 \fi
1567 \ifnum\acm@copyrightmode=13\relax % iw3c2w3
1568 \acmownedfalse
1569 \AtBeginDocument{\acmPrice{}}%
1570 \fi
1571 \ifnum\acm@copyrightmode=14\relax % iw3c2w3g
1572 \acmownedfalse
1573 \AtBeginDocument{\acmPrice{}}%
1574 \fi}

```

\setcopyright This is the syntactic sugar around setting keys.

```

1575 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}
1576 \setcopyright{acmcopyright}

```

\@copyrightowner Here is the owner of the copyright

```

1577 \def\@copyrightowner{%
1578   \ifcase\acm@copyrightmode\relax % none
1579   \or % acmcopyright
1580   Association for Computing Machinery.
1581   \or % acmlicensed
1582   Copyright held by the owner/author(s). Publication rights licensed to

```

```

1583 ACM\@.
1584 \or % rightsretained
1585 Copyright held by the owner/author(s).
1586 \or % usgov
1587 \or % usgovmixed
1588 Association for Computing Machinery.
1589 \or % cagov
1590 Crown in Right of Canada.
1591 \or %cagovmixed
1592 Association for Computing Machinery.
1593 \or %licensedusgovmixed
1594 Copyright held by the owner/author(s). Publication rights licensed to
1595 ACM\@.
1596 \or % licensedcagov
1597 Crown in Right of Canada. Publication rights licensed to
1598 ACM\@.
1599 \or %licensedcagovmixed
1600 Copyright held by the owner/author(s). Publication rights licensed to
1601 ACM\@.
1602 \or % othergov
1603 Association for Computing Machinery.
1604 \or % licensedothergov
1605 Copyright held by the owner/author(s). Publication rights licensed to
1606 ACM\@.
1607 \or % ic2w3www
1608 IW3C2 (International World Wide Web Conference Committee), published
1609 under Creative Commons CC-BY~4.0 License.
1610 \or % ic2w3wwwgoogle
1611 IW3C2 (International World Wide Web Conference Committee), published
1612 under Creative Commons CC-BY-NC-ND~4.0 License.
1613 \fi}

```

\@formatdoi Print a clickable DOI

```

1614 \def\@formatdoi#1{\url{https://doi.org/#1}}

```

\@copyrightpermission The canned permission block.

```

1615 \def\@copyrightpermission{%
1616   \ifcase\acm@copyrightmode\relax % none
1617   \or % acmcopyright
1618     Permission to make digital or hard copies of all or part of this
1619     work for personal or classroom use is granted without fee provided
1620     that copies are not made or distributed for profit or commercial
1621     advantage and that copies bear this notice and the full citation on
1622     the first page. Copyrights for components of this work owned by
1623     others than ACM must be honored. Abstracting with credit is
1624     permitted. To copy otherwise, or republish, to post on servers or to
1625     redistribute to lists, requires prior specific permission
1626     and\hspace*{.5pt}/or a fee. Request permissions from
1627     permissions@acm.org.
1628   \or % acmlicensed

```


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 1630 work for personal or classroom use is granted without fee provided
 1631 that copies are not made or distributed for profit or commercial
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 1637 and\hspace*{.5pt}/or a fee. Request permissions from
 1638 permissions@acm.org.
 1639 \or % rightsretained
 1640 Permission to make digital or hard copies of part or all of this work
 1641 for personal or classroom use is granted without fee provided that
 1642 copies are not made or distributed for profit or commercial advantage
 1643 and that copies bear this notice and the full citation on the first
 1644 page. Copyrights for third-party components of this work must be
 1645 honored. For all other uses, contact the
 1646 owner\hspace*{.5pt}/author(s).
 1647 \or % usgov
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 1725 only.
 1726 \or % iw3c2w3
 1727 This paper is published under the Creative Commons Attribution~4.0
 1728 International (CC-BY~4.0) license. Authors reserve their rights to

```

1729   disseminate the work on their personal and corporate Web sites with
1730   the appropriate attribution.
1731 \or % iw3c2w3g
1732   This paper is published under the Creative Commons
1733   Attribution-NonCommercial-NoDerivs~4.0 International
1734   (CC-BY-NC-ND~4.0) license. Authors reserve their rights to
1735   disseminate the work on their personal and corporate Web sites with
1736   the appropriate attribution.
1737 \fi}

\copyrightyear By default, the copyright year is the same as \acmYear, but one can override this:
1738 \def\copyrightyear#1{\def\@copyrightyear{#1}}
1739 \copyrightyear{\@acmYear}

\@teaserfigures The teaser figures container
1740 \def\@teaserfigures{}

teaserfigure The teaser figure
1741 \newenvironment{teaserfigure}{\Collect@Body\@saveteaser}{}

\@saveteaser Saving the teaser
1742 \long\def\@saveteaser#1{\g@addto@macro\@teaserfigures{\@teaser{#1}}}}

\thanks We redefine amsart \thanks so the anonymous key works
1743 \renewcommand{\thanks}[1]{%
1744   \@ifnotempty{#1}{%
1745     \if@ACM@anonymous
1746       \g@addto@macro\thankses{\thanks{A note}}}%
1747   \else
1748     \g@addto@macro\thankses{\thanks{#1}}}%
1749   \fi}}

```

3.15 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>].
1750 \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 copy-
right/permission block. By the way, this was the default behavior of the old ACM classes.
1751 \def\maketitle{%
1752   \@ACM@maketitle@typesettrue
1753   \if@ACM@anonymous
1754     % Anonymize omission of \author-s

```

```

1755 \ifnum\num@authorgroups=0\author{}\fi
1756 \fi
1757 \begingroup
1758 \let\@vspace\@vspace@orig
1759 \let\@vspacer\@vspacer@orig
1760 \let\@footnotemark\@footnotemark@nolink
1761 \let\@footnotetext\@footnotetext@nolink
1762 \renewcommand\thefootnote{\@fnsymbol\c@footnote}%
1763 \hsize=\textwidth
1764 \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}%
1765 \mktitle\if@ACM@sigchiamode\else\mkauthors\fi\mkteasers
1766 \printtopmatter
1767 \if@ACM@sigchiamode\mkauthors\fi
1768 \setcounter{footnote}{0}%
1769 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}%
1770 \@titlenotes
1771 \@subtitlenotes
1772 \@authornotes
1773 \let\@makefnmark\relax
1774 \let\@thefnmark\relax
1775 \let\@makefntext\@noindent
1776 \ifx\@empty\thankses\else
1777 \footnotetextauthorsaddresses{%
1778 \def\par{\let\par\@par}\parindent\z@\@setthanks}%
1779 \fi
1780 \ifx\@empty\@authorsaddresses\else
1781 \if@ACM@anonymous\else
1782 \if@ACM@journal@bibstrip
1783 \footnotetextauthorsaddresses{%
1784 \def\par{\let\par\@par}\parindent\z@\@setauthorsaddresses}%
1785 \fi
1786 \fi
1787 \fi
1788 \if@ACM@nonacm\else\footnotetextcopyrightpermission{%
1789 \if@ACM@authordraft
1790 \raisebox{-2ex}{\z@\z@{\makebox[0pt][l]{\large\bfseries
1791 Unpublished working draft. Not for distribution.}}}%
1792 \color[gray]{0.9}%
1793 \fi
1794 \parindent\z@\parskip0.1\baselineskip
1795 \if@ACM@authorversion\else
1796 \if@printpermission\@copyrightpermission\par\fi
1797 \fi
1798 \if@ACM@manuscript\else
1799 \if@ACM@journal@bibstrip\else % Print the conference information
1800 {\itshape \acmConference@shortname, \acmConference@date, \acmConference@venue}\par
1801 \fi
1802 \fi
1803 \if@printcopyright
1804 \copyright\ \@copyrightyear\ \@copyrightowner\

```

```

1805 \else
1806   \@copyrightyear.\
1807 \fi
1808 \if@ACM@manuscript
1809   Manuscript submitted to ACM\
1810 \else
1811   \if@ACM@authorversion
1812     This is the author's version of the work. It is posted here for
1813     your personal use. Not for redistribution. The definitive Version
1814     of Record was published in
1815     \if@ACM@journal@bibstrip
1816       \emph{\@journalName}%
1817     \else
1818       \emph{\@acmBooktitle}%
1819     \fi
1820     \ifx\@acmDOI\@empty
1821       .
1822     \else
1823       , \@formatdoi{\@acmDOI}.
1824     \fi\
1825   \else
1826     \if@ACM@nonacm\else
1827       \if@ACM@journal@bibstrip
1828         \@permissionCodeOne/\@acmYear/\@acmMonth-ART\@acmArticle
1829         \ifx\@acmPrice\@empty\else\ $\@acmPrice\fi\
1830         \@formatdoi{\@acmDOI}%
1831       \else % Conference
1832         \ifx\@acmISBN\@empty\else ACM~ISBN~\@acmISBN
1833         \ifx\@acmPrice\@empty.\else\dots\$\@acmPrice\fi\\\fi
1834         \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi%
1835       \fi
1836     \fi
1837   \fi
1838 \fi}
1839 \fi
1840 \endgroup
1841 \setcounter{footnote}{0}%
1842 \@mkabstract
1843 \if@ACM@printccs
1844 \ifx\@concepts\@empty\else\bgroup
1845   {\@specialsection{CCS Concepts}%
1846   \noindent\@concepts\par}\egroup
1847 \fi
1848 \fi
1849 \ifx\@keywords\@empty\else\bgroup
1850   {\if@ACM@journal
1851     \@specialsection{Additional Key Words and Phrases}%
1852   \else
1853     \@specialsection{Keywords}%
1854   \fi

```

```

1855         \noindent\@keywords}\par\egroup
1856     \fi
1857     \andify\authors
1858     \andify\shortauthors
1859     \global\let\authors=\authors
1860     \global\let\shortauthors=\shortauthors
1861     \if@ACM@printacmref
1862         \mkbibcitation
1863     \fi
1864     \hypersetup{%
1865         pdfauthor={\authors},
1866         pdftitle={\@title},
1867         pdfsubject={\@concepts},
1868         pdfkeywords={\@keywords},
1869         pdfcreator={LaTeX with acmart
1870             \csname ver@acmart.cls\endcsname\space
1871             and hyperref
1872             \csname ver@hyperref.sty\endcsname}}%
1873     \global\@topnum\z@ % this prevents floats from falling
1874                     % at the top of page 1
1875     \global\@botnum\z@ % we do not want them to be on the bottom either
1876     \@printendtopmatter
1877     \@afterindentfalse
1878     \@afterheading
1879 }

```

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

```

1880 \def\@specialsection#1{%
1881     \ifcase\ACM@format@nr
1882     \relax % manuscript
1883     \par\medskip\small\noindent#1: %
1884     \or % acmsmall
1885     \par\medskip\small\noindent#1: %
1886     \or % acmlarge
1887     \par\medskip\small\noindent#1: %
1888     \or % acmtog
1889     \par\medskip\small\noindent#1: %
1890     \or % sigconf
1891     \section*{#1}%
1892     \or % siggraph
1893     \section*{#1}%
1894     \or % sigplan
1895     \noindentparagraph*{#1:~}%
1896     \or % sigchi
1897     \section*{#1}%
1898     \or % sigchi-a
1899     \section*{#1}%
1900     \fi
1901 }

```

`\@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.

```

1902 \def\@printtopmatter{%
1903   \ifx\@startPage\@empty
1904     \gdef\@startPage{1}%
1905   \else
1906     \setcounter{page}{\@startPage}%
1907   \fi
1908   \thispagestyle{firstpagestyle}%
1909   \noindent
1910   \ifcase\ACM@format@nr
1911   \relax % manuscript
1912     \box\mktitle@bx\par
1913   \or % acmsmall
1914     \box\mktitle@bx\par
1915   \or % acmlarge
1916     \box\mktitle@bx\par
1917   \or % acmtog
1918     \twocolumn[\box\mktitle@bx]%
1919   \or % sigconf
1920     \twocolumn[\box\mktitle@bx]%
1921   \or % siggraph
1922     \twocolumn[\box\mktitle@bx]%
1923   \or % sigplan
1924     \twocolumn[\box\mktitle@bx]%
1925   \or % sigchi
1926     \twocolumn[\box\mktitle@bx]%
1927   \or % sigchi-a
1928     \par\box\mktitle@bx\par\bigskip
1929     \if@ACM@badge
1930       \marginpar{\noindent
1931         \ifx\@acmBadgeL@image\@empty\else
1932           \href{\@acmBadgeL@url}{%
1933             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}%
1934           \hskip\@ACM@badge@skip
1935         \fi
1936         \ifx\@acmBadgeR@image\@empty\else
1937           \href{\@acmBadgeR@url}{%
1938             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}%
1939           \fi}%
1940       \fi
1941   \fi
1942 }
```

`\@mktitle` The title of the article

```

1943 \def\@mktitle{%
1944   \ifcase\ACM@format@nr
1945   \relax % manuscript
```

```

1946     \@mktitle@i
1947 \or % acmsmall
1948     \@mktitle@i
1949 \or % acmlarge
1950     \@mktitle@i
1951 \or % acmtog
1952     \@mktitle@i
1953 \or % sigconf
1954     \@mktitle@iii
1955 \or % siggraph
1956     \@mktitle@iii
1957 \or % sigplan
1958     \@mktitle@iii
1959 \or % sigchi
1960     \@mktitle@iii
1961 \or % sigchi-a
1962     \@mktitle@iv
1963 \fi
1964 }

```

`\@titlefont` The font to typeset the title

```

1965 \def\@titlefont{%
1966   \ifcase\ACM@format@nr
1967   \relax % manuscript
1968   \LARGE\sffamily\bfseries
1969 \or % acmsmall
1970   \LARGE\sffamily\bfseries
1971 \or % acmlarge
1972   \LARGE\sffamily\bfseries
1973 \or % acmtog
1974   \Huge\sffamily
1975 \or % sigconf
1976   \Huge\sffamily\bfseries
1977 \or % siggraph
1978   \Huge\sffamily\bfseries
1979 \or % sigplan
1980   \Huge\bfseries
1981 \or % sigchi
1982   \Huge\sffamily\bfseries
1983 \or % sigchi-a
1984   \Huge\bfseries
1985 \fi}

```

`\@subtitlefont` The font to typeset the subtitle

```

1986 \def\@subtitlefont{\normalsize
1987   \ifcase\ACM@format@nr
1988   \relax % manuscript
1989   \mdseries
1990 \or % acmsmall
1991   \mdseries

```



```

1992 \or % acmlarge
1993 \mdseries
1994 \or % acmtog
1995 \LARGE
1996 \or % sigconf
1997 \LARGE\mdseries
1998 \or % siggraph
1999 \LARGE\mdseries
2000 \or % sigplan
2001 \LARGE\mdseries
2002 \or % sigchi
2003 \LARGE\mdseries
2004 \or % sigchi-a
2005 \mdseries
2006 \fi}

```

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

```

2007 \def\mktitle@i{\hsize=\textwidth
2008 \ACM@title@width=\hsize
2009 \ifx\@acmBadgeL@image\@empty\else
2010 \advance\ACM@title@width by -\ACM@badge@width
2011 \advance\ACM@title@width by -\ACM@badge@skip
2012 \fi
2013 \ifx\@acmBadgeR@image\@empty\else
2014 \advance\ACM@title@width by -\ACM@badge@width
2015 \advance\ACM@title@width by -\ACM@badge@skip
2016 \fi
2017 \setbox\mktitle@bx=\vbox{\noindent\@titlefont
2018 \ifx\@acmBadgeL@image\@empty\else
2019 \raisebox{-.5\baselineskip}{\z@\z@{\href{\@acmBadgeL@url}{%
2020 \includegraphics[width=\ACM@badge@width]{\@acmBadgeL@image}}}%
2021 \hskip\ACM@badge@skip
2022 \fi
2023 \parbox[t]{\ACM@title@width}{\raggedright
2024 \@titlefont\noindent
2025 \@title
2026 \ifx\@subtitle\@empty\else
2027 \par\noindent{\@subtitlefont\@subtitle}
2028 \fi}%
2029 \ifx\@acmBadgeR@image\@empty\else
2030 \hskip\ACM@badge@skip
2031 \raisebox{-.5\baselineskip}{\z@\z@{\href{\@acmBadgeR@url}{%
2032 \includegraphics[width=\ACM@badge@width]{\@acmBadgeR@image}}}%
2033 \fi
2034 \par\bigskip}}%

```

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

`\@mktitle@iii` The version of `\@mktitle` 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.

```

2035 \def\@mktitle@iii{\hsize=\textwidth
2036   \setbox\mktitle@bx=\vbox{\@titlefont\centering
2037     \@ACM@title@width=\hsize
2038     \if@ACM@badge
2039       \advance\@ACM@title@width by -2\@ACM@badge@width
2040       \advance\@ACM@title@width by -2\@ACM@badge@skip
2041       \parbox[b]{\@ACM@badge@width}{\strut
2042         \ifx\@acmBadgeL@image\@empty\else
2043           \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeL@url}{%
2044             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
2045         \fi}%
2046       \hskip\@ACM@badge@skip
2047     \fi
2048     \parbox[t]{\@ACM@title@width}{\centering\@titlefont
2049       \@title
2050       \ifx\@subtitle\@empty\else
2051         \par\noindent{\@subtitlefont\@subtitle}
2052       \fi
2053     }%
2054     \if@ACM@badge
2055       \hskip\@ACM@badge@skip
2056       \parbox[b]{\@ACM@badge@width}{\strut
2057         \ifx\@acmBadgeR@image\@empty\else
2058           \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeR@url}{%
2059             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
2060         \fi}%
2061       \fi
2062     \par\bigskip}}%

```

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

```

2063 \def\@mktitle@iv{\hsize=\textwidth
2064   \setbox\mktitle@bx=\vbox{\raggedright\leftskip5pc\@titlefont
2065     \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
2066     \noindent\@title
2067     \ifx\@subtitle\@empty\else
2068       \par\noindent\@subtitlefont\@subtitle
2069     \fi
2070     \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.

```

2071 \newbox\@ACM@commabox
2072 \def\@ACM@addtoaddress#1{%
2073   \ifvmode\else
2074     \if@ACM@affiliation@obexpunctuation\else
2075       \setbox\@ACM@commabox=\hbox{, }%
2076       \unskip\cleaders\copy\@ACM@commabox\hskip\wd\@ACM@commabox
2077     \fi\fi
2078   #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 2079 \def\streetaddress#1{\unskip\ignorespaces}
\city 2080 \def\postcode#1{\unskip\ignorespaces}
\state 2081 \if@ACM@journal
\postcode 2082 \def\position#1{\unskip\ignorespaces}
\country 2083 \def\institution#1{\unskip~#1\ignorespaces}
2084 \def\city#1{\unskip\ignorespaces}
2085 \def\state#1{\unskip\ignorespaces}
2086 \newcommand\department[2][0]{\unskip\ignorespaces}
2087 \def\country#1{\if@ACM@affiliation@obexpunctuation\else, \fi#1\ignorespaces}
2088 \else
2089 \def\position#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
2090 \def\institution#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
2091 \newcommand\department[2][0]{\if@ACM@affiliation@obexpunctuation
2092   #2\else#2\par\fi}%
2093 % \def\streetaddress#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
2094 \let\city\@ACM@addtoaddress
2095 \let\state\@ACM@addtoaddress
2096 % \def\postcode#1{\if@ACM@affiliation@obexpunctuation#1\else\unskip\space#1\fi}%
2097 \let\country\@ACM@addtoaddress
2098 \fi

\@mkauthors Typesetting the authors
2099 \def\@mkauthors{\begingroup
2100   \hsize=\textwidth
2101   \ifcase\ACM@format@nr
2102     \relax % manuscript
2103     \@mkauthors@i
2104   \or % acmsmall
2105     \@mkauthors@i
2106   \or % acmlarge
2107     \@mkauthors@i
2108   \or % acmtog
2109     \@mkauthors@i
2110   \or % sigconf
2111     \@mkauthors@iii
2112   \or % siggraph
2113     \@mkauthors@iii

```

```

2114 \or % sigplan
2115     \@mkauthors@iii
2116 \or % sigchi
2117     \@mkauthors@iii
2118 \or % sigchi-a
2119     \@mkauthors@iv
2120 \fi
2121 \endgroup
2122 }

\@authorfont Somehow different conferences use different fonts for author names. Why?
2123 \def\@authorfont{\Large\sffamily}

\@affiliationfont Font for affiliations
2124 \def\@affiliationfont{\normalsize\normalfont}

Adjusting fonts for different formats
2125 \ifcase\ACM@format@nr
2126 \relax % manuscript
2127 \or % acmsmall
2128     \def\@authorfont{\large\sffamily}
2129     \def\@affiliationfont{\small\normalfont}
2130 \or % acmlarge
2131 \or % acmtog
2132     \def\@authorfont{\LARGE\sffamily}
2133     \def\@affiliationfont{\large}
2134 \or % sigconf
2135     \def\@authorfont{\LARGE}
2136     \def\@affiliationfont{\large}
2137 \or % siggraph
2138     \def\@authorfont{\normalsize\normalfont}
2139     \def\@affiliationfont{\normalsize\normalfont}
2140 \or % sigplan
2141     \def\@authorfont{\Large\normalfont}
2142     \def\@affiliationfont{\normalsize\normalfont}
2143 \or % sigchi
2144     \def\@authorfont{\bfseries}
2145     \def\@affiliationfont{\mdseries}
2146 \or % sigchi-a
2147     \def\@authorfont{\bfseries}
2148     \def\@affiliationfont{\mdseries}
2149 \fi

\@typeset@author@line At this point we have \@currentauthors and \@currentaffiliations. We typeset
them in the journal style
2150 \def\@typeset@author@line{%
2151     \andify\@currentauthors\par\noindent
2152     \@currentauthors\def\@currentauthors{}%
2153     \ifx\@currentaffiliations\@empty\else

```

```

2154 \andify\@currentaffiliations
2155 \unskip, {\@currentaffiliations}\par
2156 \fi
2157 \def\@currentaffiliations{}}

\mkauthors@i This version is used in most journal formats. Note that \and between authors with the
same affiliation becomes _and_:
2158 \def\mkauthors@i{%
2159 \def\@currentauthors{}%
2160 \def\@currentaffiliations{}%
2161 \global\let\and\@typeset@author@line
2162 \def\@author##1{%
2163 \ifx\@currentauthors\empty
2164 \gdef\@currentauthors{\@authorfont\MakeTextUppercase{##1}}%
2165 \else
2166 \g@addto@macro{\@currentauthors}{\and\MakeTextUppercase{##1}}%
2167 \fi
2168 \gdef\and{}}%
2169 \def\email##1##2{%
2170 \def\affiliation##1##2{%
2171 \def\@tempa{##2}\ifx\@tempa\empty\else
2172 \ifx\@currentaffiliations\empty
2173 \gdef\@currentaffiliations{%
2174 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2175 \setkeys{@ACM@affiliation@}{##1}%
2176 \@affiliationfont##2}%
2177 \else
2178 \g@addto@macro{\@currentaffiliations}{\and
2179 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2180 \setkeys{@ACM@affiliation@}{##1}##2}%
2181 \fi
2182 \fi
2183 \global\let\and\@typeset@author@line}%
2184 \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip
2185 \noindent\addresses\@typeset@author@line
2186 \par\medskip}%
2187 }

\mkauthors@ii The \mkauthors@ii command was the version used in acmtog. It is no longer neces-
sary.

\author@bx The box to put an individual author in
2188 \newbox\author@bx

\author@bx@wd The width of the author box
2189 \newdimen\author@bx@wd

\author@bx@sep The separation between author boxes
2190 \newskip\author@bx@sep
2191 \author@bx@sep=1pc\relax

```

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

```

2192 \def\@typeset@author@bx{\bgroup\hsize=\author@bx@wd
2193 \def\and{\par}\normalbaselines
2194 \global\setbox\author@bx=\vtop{\if@ACM@sigchiamode\else\centering\fi
2195 \@authorfont\@currentauthors\par\@affiliationfont
2196 \@currentaffiliation}\egroup
2197 \box\author@bx\hspace{\author@bx@sep}%
2198 \gdef\@currentauthors{}}%
2199 \gdef\@currentaffiliation{}}

```

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

```

2200 \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.

```

2201 \author@bx@wd=\textwidth\relax
2202 \advance\author@bx@wd by -\author@bx@sep\relax
2203 \ifnum\@ACM@authorssperrow>0\relax
2204 \divide\author@bx@wd by \@ACM@authorssperrow\relax
2205 \else
2206 \ifcase\@num@authorgroups
2207 \relax % 0?
2208 \or % 1=one author per row
2209 \or % 2=two authors per row
2210 \divide\author@bx@wd by \@num@authorgroups\relax
2211 \or % 3=three authors per row
2212 \divide\author@bx@wd by \@num@authorgroups\relax
2213 \or % 4=two authors per row (!)
2214 \divide\author@bx@wd by 2\relax
2215 \else % three authors per row
2216 \divide\author@bx@wd by 3\relax
2217 \fi
2218 \fi
2219 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of `\addresses`:

```

2220 \gdef\@currentauthors{}}%
2221 \gdef\@currentaffiliation{}}%
2222 \def\@author##1{\ifx\@currentauthors\@empty
2223 \gdef\@currentauthors{\par##1}%
2224 \else
2225 \g@addto@macro\@currentauthors{\par##1}%
2226 \fi
2227 \gdef\and{}}%
2228 \def\email##1##2{\ifx\@currentaffiliation\@empty
2229 \gdef\@currentaffiliation{\bgroup
2230 \mathchardef\UrlBreakPenalty=10000\nolinkurl{##2}\egroup}%
2231 \else

```

```

2232 \g@addto@macro\@currentaffiliation{\par\bgroup
2233 \mathchardef\UrlBreakPenalty=10000\nolinkurl{##2}\egroup}%
2234 \fi}%
2235 \def\affiliation##1##2{\ifx\@currentaffiliation\empty
2236 \gdef\@currentaffiliation{%
2237 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2238 \setkeys{@ACM@affiliation@}{##1}##2}%
2239 \else
2240 \g@addto@macro\@currentaffiliation{\par
2241 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2242 \setkeys{@ACM@affiliation@}{##1}##2}%
2243 \fi
2244 \global\let\and\@typeset@author@bx
2245 }%

```

Actual typesetting is done by the `\and` macro:

```

2246 \hsize=\textwidth
2247 \global\setbox\mktitle@bx=\vbox{\noindent
2248 \box\mktitle@bx\par\medskip\leavevmode
2249 \lineskip=1pc\relax\centering\hspace*{-1em}%
2250 \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.

```

2251 \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.

```

2252 \author@bx@wd=\columnwidth\relax
2253 \advance\author@bx@wd by -\author@bx@sep\relax
2254 \ifnum\@ACM@authorssperrow>0\relax
2255 \divide\author@bx@wd by \@ACM@authorssperrow\relax
2256 \else
2257 \ifcase\@num@authorgroups
2258 \relax % 0?
2259 \or % 1=one author per row
2260 \else % 2=two authors per row
2261 \divide\author@bx@wd by 2\relax
2262 \fi
2263 \fi
2264 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of `\addresses`:

```

2265 \gdef\@currentauthors{}%
2266 \gdef\@currentaffiliation{}%
2267 \def\@author##1{\ifx\@currentauthors\empty
2268 \gdef\@currentauthors{\par##1}%
2269 \else

```

```

2270 \g@addto@macro\@currentauthors{\par##1}%
2271 \fi
2272 \gdef\and{}}%
2273 \def\email##1##2{\ifx\@currentaffiliation\@empty
2274 \gdef\@currentaffiliation{\nolinkurl{##2}}%
2275 \else
2276 \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
2277 \fi}%
2278 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
2279 \gdef\@currentaffiliation{%
2280 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2281 \setkeys{@ACM@affiliation@}{##1}##2}%
2282 \else
2283 \g@addto@macro\@currentaffiliation{\par
2284 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2285 \setkeys{@ACM@affiliation@}{##1}##2}%
2286 \fi
2287 \global\let\and\@typeset@author@bx}%
2288 %

```

Actual typesetting is done by the \and macro

```

2289 \bgroup\hsize=\columnwidth
2290 \par\raggedright\leftskip=\z@
2291 \lineskip=1pc\noindent
2292 \addresses\let\and\@typeset@author@bx\and\par\bigskip\egroup}

```

\@mkauthorsaddresses Typesetting authors' addresses in the footnote style

```

2293 \def\@mkauthorsaddresses{%
2294 \ifnum\num@authors>1\relax
2295 Authors' \else Author's \fi
2296 \ifnum\num@authorgroups>1\relax
2297 addresses: \else address: \fi
2298 \bgroup
2299 \def\streetaddress##1{\unskip, ##1}%
2300 \def\postcode##1{\unskip, ##1}%
2301 \def\position##1{\unskip\ignorespaces}%
2302 \def\institution##1{\unskip, ##1}%
2303 \def\city##1{\unskip, ##1}%
2304 \def\state##1{\unskip, ##1}%
2305 \renewcommand\department[2][0]{\unskip\@addpunct, ##2}%
2306 \def\country##1{\unskip, ##1}%
2307 \def\and{\unskip; }%
2308 \def\@author##1{##1}%
2309 \def\email##1##2{\unskip, \nolinkurl{##2}}%
2310 \addresses
2311 \egroup}

2312 \AtEndDocument{\if@ACM@nonacm\else\if@ACM@journal
2313 \ifx\@authorsaddresses\@empty
2314 \ClassWarningNoLine{\@classname}{Authors'

```



```

2315     addresses are mandatory for ACM journals}%
2316     \fi\fi\fi}

\@setaddresses This is an amsart macro that we do not need.
2317 \def\@setaddresses{}

\@authornotemark Adding a footnote mark to authors. This version adds a “normal” footnote mark.
2318 \def\@authornotemark{\g@addto@macro\@currentauthors{\footnotemark\relax}}

\@@authornotemark Adding a footnote mark to authors with a given number
2319 \def\@@authornotemark#1{\g@addto@macro\@currentauthors{\footnotemark[#1]}}

\@mkteasers Typesetting the teasers
2320 \def\@mkteasers{%
2321     \ifx\@teaserfigures\@empty\else
2322         \def\@teaser##1{\par\bigskip\bgroup
2323             \captionsetup{type=figure}##1\egroup\par}
2324         \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par
2325             \noindent\@Description@presentfalse
2326             \@teaserfigures\par\if@Description@present\else
2327                 \global\@undescribed@imagestrue
2328                 \ClassWarning{\@classname}{A possible image without
2329                     description}\fi
2330             \medskip}%
2331     \fi}

\@mkabstract Typesetting the abstract
2332 \def\@mkabstract{\bgroup
2333     \ifx\@abstract\@empty\else
2334         {\phantomsection\addcontentsline{toc}{section}{Abstract}%
2335         \if@ACM@journal
2336             \everypar{\setbox\z@=\lastbox\everypar{}}\small
2337         \else
2338             \section*\@abstractname}%
2339         \fi
2340         \ignorespaces\@abstract\par}%
2341     \fi\egroup}

\@mkbibcitation Print the bibcitation format
2342 \def\@mkbibcitation{\bgroup
2343     \let\@vspace\@vspace@orig
2344     \let\@vspacer\@vspacer@orig
2345     \def\@pages@word{\ifnum\getrefnumber{TotPages}=1\relax page\else pages\fi}%
2346     \def\footnotemark{}%
2347     \def\@unskip{\ignorespaces}%
2348     \def\footnote{\ClassError{\@classname}{Please do not use footnotes
2349         inside a \string\title{} or \string\author{} command! Use
2350         \string\titlenote{} or \string\authornote{} instead!}}%
2351     \def\@article@string{\ifx\@acmArticle\@empty{\ }else,

```

```

2352 Article~\@acmArticle\ \fi}%
2353 \par\medskip\small\noindent{\bfseries ACM Reference Format:}\par\nobreak
2354 \noindent\bgroup
2355 \def\{\unskip{, \ignorespaces}\authors\egroup. \@acmYear. \@title
2356 \ifx\@subtitle\@empty. \else: \@subtitle. \fi
2357 \if@ACM@nonacm\else
2358 % The 'nonacm' option disables 'printacmref' by default,
2359 % and the present \mkbibcitation definition is never used
2360 % in this case. The conditional remains useful if the user
2361 % explicitly sets \settopmatter{printacmref=true}.
2362 \if@ACM@journal@bibstrip
2363 \textit{\@journalNameShort}
2364 \@acmVolume, \@acmNumber \@article@string (\@acmPubDate),
2365 \ref{TotPages}~\@pages@word.
2366 \else
2367 In \textit{\@acmBooktitle}%
2368 \ifx\@acmEditors\@empty\textit{.}\else
2369 \andify\@acmEditors\textit{, }\@acmEditors~\@editorsAbbrev.%
2370 \fi\
2371 ACM, New York, NY, USA%
2372 \@article@string\unskip, \ref{TotPages}~\@pages@word.
2373 \fi
2374 \fi
2375 \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi
2376 \par\egroup}

```

\@printendtopmatter End the top matter

```

2377 \def\@printendtopmatter{%
2378 \let\@vspace\@vspace@orig
2379 \let\@vspacer\@vspacer@orig
2380 \par\bigskip
2381 \let\@vspace\@vspace@acm
2382 \let\@vspacer\@vspacer@acm
2383 }

```

\@setthanks We redefine \setthanks using \long

```

2384 \def\@setthanks{\long\def\thanks##1{\par##1\@addpunct.}\thankses}

```

\@setauthorsaddresses

```

2385 \def\@setauthorsaddresses{\@authorsaddresses\unskip\@addpunct.}

```

3.16 Headers and Footers

We use fancyhdr for our headers and footers:

```

2386 \RequirePackage{fancyhdr}

```

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

```

2387 \let\ACM@ps@plain\ps@plain
2388 \let\ACM@ps@myheadings\ps@myheadings

```

```

2389 \let\ACM@ps@headings\ps@headings
2390 \def\ACM@restore@pagestyle{%
2391   \let\ps@plain\ACM@ps@plain
2392   \let\ps@myheadings\ACM@ps@myheadings
2393   \let\ps@headings\ACM@ps@headings}
2394 \AtBeginDocument{\ACM@restore@pagestyle}

```

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

```

2395 \if@ACM@review
2396   \newsavebox{\ACM@linecount@bx}
2397   \newlength\ACM@linecount@bxht
2398   \newcount\ACM@linecount
2399   \ACM@linecount\@ne\relax
2400   \def\ACM@mk@linecount{%
2401     \savebox{\ACM@linecount@bx}[4em][t]{\parbox[t]{4em}{\normalfont
2402       \normalsize
2403       \setlength{\ACM@linecount@bxht}{0pt}%
2404       \loop{\color{red}\scriptsize\the\ACM@linecount}\
2405       \global\advance\ACM@linecount by \@ne
2406       \addtolength{\ACM@linecount@bxht}{\baselineskip}%
2407       \ifdim\ACM@linecount@bxht<\textheight\repeat
2408       {\color{red}\scriptsize\the\ACM@linecount}\hfill
2409       \global\advance\ACM@linecount by \@ne}}
2410   \fi

```

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

```

2411 \def\ACM@linecountL{%
2412   \if@ACM@review
2413     \ACM@mk@linecount
2414     \begin{picture}(0,0)%
2415       \put(-26,-22){\usebox{\ACM@linecount@bx}}%
2416     \end{picture}%
2417   \fi}

```

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

```

2418 \def\ACM@linecountR{%
2419   \if@ACM@review
2420     \ifcase\ACM@format@nr
2421       \relax % manuscript
2422       \relax
2423       \or % acmsmall
2424       \relax
2425       \or % acmlarge
2426       \relax
2427       \or % acmtog
2428       \ACM@mk@linecount
2429       \or % sigconf
2430       \ACM@mk@linecount
2431       \or % siggraph

```

```

2432         \ACM@mk@linecount
2433     \or % sigplan
2434         \ACM@mk@linecount
2435     \or % sigchi
2436         \ACM@mk@linecount
2437     \or % sigchi-a
2438         \ACM@mk@linecount
2439 \fi
2440 \begin{picture}(0,0)%
2441     \put(20,-22){\usebox{\ACM@linecount@bx}}%
2442 \end{picture}%
2443 \fi}

\ACM@timestamp The timestamp system
2444 \if@ACM@timestamp
2445     % Subtracting 30 from \time gives us the effect of rounding down despite
2446     % \numexpr rounding to nearest
2447     \newcounter{ACM@time@hours}
2448     \setcounter{ACM@time@hours}{\numexpr (\time - 30) / 60 \relax}
2449     \newcounter{ACM@time@minutes}
2450     \setcounter{ACM@time@minutes}{\numexpr \time - \theACM@time@hours * 60 \relax}
2451     \newcommand\ACM@timestamp{%
2452         \footnotesize%
2453         \ifx\@acmSubmissionID\@empty\relax\else
2454             Submission ID: \@acmSubmissionID.{ }%
2455         \fi
2456         \the\year-\two@digits{\the\month}-\two@digits{\the\day}{ }%
2457         \two@digits{\theACM@time@hours}:\two@digits{\theACM@time@minutes}{. }%
2458         Page \thepage\ of \@startPage--\pageref*{TotPages}.%
2459     }
2460 \fi

\@shortauthors Even if the author redefined \shortauthors, we do not print it in the headers when in
anonymous mode:
2461 \def\@shortauthors{%
2462     \if@ACM@anonymous
2463         Anon.
2464         \ifx\@acmSubmissionID\@empty\else Submission Id: \@acmSubmissionID\fi
2465     \else\shortauthors\fi}

\@headfootfont The font to typeset header and footer text.
2466 \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
2467 \AtBeginDocument{%
2468     \fancypagestyle{standardpagestyle}{%
2469         \fancyhf{}%
2470         \renewcommand{\headrulewidth}{\z@}%
2471         \renewcommand{\footrulewidth}{\z@}%

```

```

2472 \def\@acmArticlePage{%
2473   \ifx\@acmArticle\empty%
2474     \if@ACM@printfolios\thepage\fi%
2475   \else%
2476     \@acmArticle\if@ACM@printfolios:\thepage\fi%
2477   \fi%
2478 }%
2479 \if@ACM@journal@bibstrip
2480   \ifcase\ACM@format@nr
2481   \relax % manuscript
2482     \fancyhead[LE]{\ACM@linecountL\if@ACM@printfolios\thepage\fi}%
2483     \fancyhead[RO]{\if@ACM@printfolios\thepage\fi}%
2484     \fancyhead[RE]{\@shortauthors}%
2485     \fancyhead[LO]{\ACM@linecountL\shorttitle}%
2486   \if@ACM@nonacm\else%
2487     \fancyfoot[RO,LE]{\footnotesize Manuscript submitted to ACM}
2488   \fi%
2489 \or % acmsmall
2490   \fancyhead[LE]{\ACM@linecountL\@headfootfont\@acmArticlePage}%
2491   \fancyhead[RO]{\@headfootfont\@acmArticlePage}%
2492   \fancyhead[RE]{\@headfootfont\@shortauthors}%
2493   \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2494   \if@ACM@nonacm\else%
2495     \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2496       \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2497   \fi
2498 \or % acmlarge
2499   \fancyhead[LE]{\ACM@linecountL\@headfootfont
2500     \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
2501   \fancyhead[LO]{\ACM@linecountL}%
2502   \fancyhead[RO]{\@headfootfont
2503     \shorttitle\quad\textbullet\quad\@acmArticlePage}%
2504   \if@ACM@nonacm\else%
2505     \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2506       \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2507   \fi
2508 \or % acmtog
2509   \fancyhead[LE]{\ACM@linecountL\@headfootfont
2510     \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
2511   \fancyhead[LO]{\ACM@linecountL}%
2512   \fancyhead[RE]{\ACM@linecountR}%
2513   \fancyhead[RO]{\@headfootfont
2514     \shorttitle\quad\textbullet\quad\@acmArticlePage\ACM@linecountR}%
2515   \if@ACM@nonacm\else%
2516     \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2517       \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2518   \fi
2519 \else % Proceedings
2520   \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2521   \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%

```

```

2522 \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2523 \if@ACM@nonacm\else%
2524 \fancyhead[LE]{\ACM@linecountL\@headfootfont\footnotesize
2525 \acmConference@shortname,
2526 \acmConference@date, \acmConference@venue}%
2527 \fancyhead[RO]{\@headfootfont
2528 \acmConference@shortname,
2529 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2530 \fi
2531 \fi
2532 \else % Proceedings
2533 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2534 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2535 \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2536 \if@ACM@nonacm\else%
2537 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2538 \acmConference@shortname,
2539 \acmConference@date, \acmConference@venue}%
2540 \fancyhead[RO]{\@headfootfont
2541 \acmConference@shortname,
2542 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2543 \fi
2544 \fi
2545 \if@ACM@sigchiamode
2546 \fancyheadoffset[L]{\dimexpr(\marginparsep+\marginparwidth)}%
2547 \fi
2548 \if@ACM@timestamp
2549 \fancyfoot[LO,RE]{\ACM@timestamp}
2550 \fi
2551 }%
2552 \pagestyle{standardpagestyle}
2553 }

```

```

\@folio@wd Folio blob width, height, offsets and max number
\@folio@ht
\@folio@voffset
\@folio@max
2554 \newdimen\@folio@wd
2555 \@folio@wd=\z@
2556 \newdimen\@folio@ht
2557 \@folio@ht=\z@
2558 \newdimen\@folio@voffset
2559 \@folio@voffset=\z@
2560 \def\@folio@max{1}
2561 \ifcase\ACM@format@nr
2562 \relax % manuscript
2563 \or % acmsmall
2564 \@folio@wd=45.75pt\relax
2565 \@folio@ht=1.25in\relax
2566 \@folio@voffset=.2in\relax
2567 \def\@folio@max{8}
2568 \or % acmlarge
2569 \@folio@wd=43.25pt\relax

```

```

2570 \@folio@ht=79pt\relax
2571 \@folio@voffset=.55in\relax
2572 \def\@folio@max{10}
2573 \fi

```

\@folioblob The macro to typeset the folio blob.

```

2574 \def\@folioblob{\@tempcnta=0\@acmArticleSeq\relax
2575 \ifnum\@tempcnta=0\relax\else
First, we calculate \@acmArticleSeq modulo \@folio@max
2576 \loop
2577 \ifnum\@tempcnta>\@folio@max\relax
2578 \advance\@tempcnta by - \@folio@max
2579 \repeat
2580 \advance\@tempcnta by -1\relax
2581 \@tempdima=\@folio@ht\relax
2582 \multiply\@tempdima by \the\@tempcnta\relax
2583 \advance\@tempdima by -\@folio@voffset\relax
2584 \begin{picture}(0,0)
2585 \makebox[\z@]{\raisebox{-\@tempdima}{%
2586 \rlap{%
2587 \raisebox{-0.45\@folio@ht}{\z@}\z@}{%
2588 \rule{\@folio@wd}{\@folio@ht}}}%
2589 \parbox{\@folio@wd}{%
2590 \centering
2591 \textcolor{white}{\LARGE\sffamily\bfseries\@acmArticle}}}%
2592 \end{picture}\fi}
2593

```

firstpagestyle The page style for the first page only.

```

2594 \AtBeginDocument{%
2595 \fancypagestyle{firstpagestyle}{%
2596 \fancyhf{}%
2597 \renewcommand{\headrulewidth}{\z@}%
2598 \renewcommand{\footrulewidth}{\z@}%
2599 \if@ACM@journal@bibstrip
2600 \ifcase\ACM@format@nr
2601 \relax % manuscript
2602 \fancyhead[L]{\ACM@linecountL}%
2603 \fancyfoot[R0,LE]{\if@ACM@printfolios\small\thepage\fi}%
2604 \if@ACM@nonacm\else%
2605 \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
2606 \fi%
2607 \or % acmsmall
2608 \if@ACM@nonacm\else%
2609 \fancyfoot[R0,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2610 \@acmNumber, Article \@acmArticle. Publication date:
2611 \@acmPubDate.}%
2612 \fi%
2613 \fancyhead[LE]{\ACM@linecountL\@folioblob}%

```

```

2614 \fancyhead[LO]{\ACM@linecountL}%
2615 \fancyhead[RO]{\@folioblob}%
2616 \fancyheadoffset[RO,LE]{0.6\@folio@wd}%
2617 \or % acmlarge
2618 \if@ACM@nonacm\else%
2619 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2620 \@acmNumber, Article \@acmArticle. Publication date:
2621 \@acmPubDate.}%
2622 \fi%
2623 \fancyhead[RO]{\@folioblob}%
2624 \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2625 \fancyhead[LO]{\ACM@linecountL}%
2626 \fancyheadoffset[RO,LE]{1.4\@folio@wd}%
2627 \or % acmtog
2628 \if@ACM@nonacm\else%
2629 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2630 \@acmNumber, Article \@acmArticle. Publication date:
2631 \@acmPubDate.}%
2632 \fi%
2633 \fancyhead[L]{\ACM@linecountL}%
2634 \fancyhead[R]{\ACM@linecountR}%
2635 \else % Conference proceedings
2636 \fancyhead[L]{\ACM@linecountL}%
2637 \fancyhead[R]{\ACM@linecountR}%
2638 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2639 \fi
2640 \else
2641 \fancyhead[L]{\ACM@linecountL}%
2642 \fancyhead[R]{\ACM@linecountR}%
2643 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2644 \fi
2645 \if@ACM@timestamp
2646 \ifnum\ACM@format@nr=0\relax % Manuscript
2647 \fancyfoot[LO,RE]{\ACM@timestamp\quad
2648 \if@ACM@nonacm\else
2649 \footnotesize Manuscript submitted to ACM
2650 \fi}
2651 \else
2652 \fancyfoot[LO,RE]{\ACM@timestamp}
2653 \fi
2654 \fi
2655 }}

```

3.17 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 numbers 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.

```

2656 \def\ACM@NRadjust#1{%
2657   \begingroup
2658   \expandafter\ifx\csname Sectionformat\endcsname\relax
2659   % do nothing when \Sectionformat is unknown
2660   \def\next{\endgroup #1}%
2661   \else
2662   \def\next{\endgroup
2663     \let\realSectionformat\Sectionformat
2664     \def\ACM@sect@format@{#1}%
2665     \let\Sectionformat\ACM@NR@adjustedSectionformat
2666     %% next lines added 2018-06-17 to ensure section number is styled
2667     \let\real@adddotafter\@adddotafter
2668     \let\@adddotafter\ACM@adddotafter
2669     #1{ }% imposes the styles, but nullifies \MakeUppercase
2670     \let\@adddotafter\real@adddotafter
2671   }%
2672   \fi \next
2673 }
```

\ACM@NR@adjustedSectionformat

```

2674 \def\ACM@NR@adjustedSectionformat#1#2{%
2675   \realSectionformat{\ACM@sect@format{#1}}{#2}%
2676   \let\Sectionformat\realSectionformat}
2677 \DeclareRobustCommand{\ACM@sect@format}{\ACM@sect@format@}
2678 \def\ACM@sect@format@null#1{#1}
2679 \let\ACM@sect@format\ACM@sect@format@null
2680 \AtBeginDocument{%
2681   \expandafter\ifx\csname LTX@adddotafter\endcsname\relax
2682   \let\LTX@adddotafter\@adddotafter
2683   \fi
2684 }
```

\ACM@adddotafter

```
2685 \def\ACM@adddotafter#1{\ifx\relax#1\relax\else\LTX@adddotafter{#1}\fi}
```

Sectioning is different for different levels

```
2686 \renewcommand\section{\@startsection{section}{1}{\z@}%
2687   {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2688   {.25\baselineskip}%
2689   {\ACM@NRadjust\@secfont}}
2690 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
2691   {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2692   {.25\baselineskip}%
2693   {\ACM@NRadjust\@subsecfont}}
2694 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
2695   {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2696   {-3.5\p@}%
2697   {\ACM@NRadjust{\@subsubsecfont\@adddotafter}}}}
2698 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
2699   {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2700   {-3.5\p@}%
2701   {\ACM@NRadjust{\@parfont\@adddotafter}}}}
2702 \newcommand\noindentparagraph{\@startsection{paragraph}{4}{\z@}%
2703   {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2704   {-3.5\p@}%
2705   {\ACM@NRadjust{\@parfont}}}}
2706
2707 \renewcommand\part{\@startsection{part}{9}{\z@}%
2708   {-10\p@ \@plus -4\p@ \@minus -2\p@}%
2709   {4\p@}%
2710   {\ACM@NRadjust\@parfont}}
```

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

```
2711 \def\section@raggedright{\@rightskip\@flushglue
2712   \rightskip\@rightskip
2713   \leftskip\z@skip
2714   \parindent\z@}
```

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

```
\@subsecfont 2715 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
\@subsubsecfont 2716 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
\@parfont 2717 \def\@subsubsecfont{\sffamily\itshape}
2718 \def\@parfont{\itshape}
2719 \setcounter{secnumdepth}{3}
2720 \ifcase\ACM@format@nr
2721 \relax % manuscript
2722 \or % acmsmall
2723 \or % acmlarge
2724 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2725 \def\@subsecfont{\sffamily\large\section@raggedright}
2726 \or % acmtog
2727 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
```

```

2728 \def\@subsecfont{\sffamily\large\section@raggedright}
2729 \or % sigconf
2730 \def\@secfont{\bfseries\Large\section@raggedright\MakeTextUppercase}
2731 \def\@subsecfont{\bfseries\Large\section@raggedright}
2732 \or % siggraph
2733 \def\@secfont{\sffamily\bfseries\Large\section@raggedright\MakeTextUppercase}
2734 \def\@subsecfont{\sffamily\bfseries\Large\section@raggedright}
2735 \or % sigplan
2736 \def\@secfont{\bfseries\Large\section@raggedright}
2737 \def\@subsecfont{\bfseries\section@raggedright}
2738 \def\@subsubsecfont{\bfseries\section@raggedright}
2739 \def\@parfont{\bfseries\itshape}
2740 \def\@subparfont{\itshape}
2741 \or % sigchi
2742 \setcounter{secnumdepth}{1}
2743 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2744 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2745 \or % sigchi-a
2746 \setcounter{secnumdepth}{0}
2747 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2748 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2749 \fi

```

\@adddotafter Add punctuation after a sectioning command

```
2750 \def\@adddotafter#1{#1\@addpunct{.}}
```

\@addspaceafter Add space after a sectioning command

```
2751 \def\@addspaceafter#1{#1\@addpunct{\enspace}}
```

3.18 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.

```
2752 \providecommand*\@dotsep{4.5}
```

3.19 Theorems

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

```
2753 \def\@acmplainbodyfont{\itshape}
```

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

```
2754 \def\@acmplainindent{\parindent}
```

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

```
2755 \def\@acmplainheadfont{\scshape}
```

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

```
2756 \def\@acmplainnotefont{\@empty}
```

Customization of the acmplain theorem style:

```
2757 \ifcase\ACM@format@nr
2758 \relax % manuscript
2759 \or % acmsmall
2760 \or % acmlarge
2761 \or % acmtog
2762 \or % sigconf
2763 \or % siggraph
2764 \or % sigplan
2765 \def\@acmplainbodyfont{\itshape}
2766 \def\@acmplainindent{\z@}
2767 \def\@acmplainheadfont{\bfseries}
2768 \def\@acmplainnotefont{\normalfont}
2769 \or % sigchi
2770 \or % sigchi-a
2771 \fi
```

`acmplain` The acmplain theorem style

```
2772 \newtheoremstyle{acmplain}%
2773 { .5\baselineskip \@plus.2\baselineskip
2774   \@minus.2\baselineskip}% space above
2775 { .5\baselineskip \@plus.2\baselineskip
2776   \@minus.2\baselineskip}% space below
2777 {\@acmplainbodyfont}% body font
2778 {\@acmplainindent}% indent amount
2779 {\@acmplainheadfont}% head font
2780 { .}% punctuation after head
2781 { .5em}% spacing after head
2782 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmplainnotefont{#3}}}}% head spec
```

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

```
2783 \def\@acmdefinitionbodyfont{\normalfont}
```

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

```
2784 \def\@acmdefinitionindent{\parindent}
```

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

```
2785 \def\@acmdefinitionheadfont{\itshape}
```

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

```
2786 \def\@acmdefinitionnotefont{\@empty}
```

Customization of the acmdefinition theorem style:

```
2787 \ifcase\ACM@format@nr
2788 \relax % manuscript
```

```

2789 \or % acmsmall
2790 \or % acmlarge
2791 \or % acmtog
2792 \or % sigconf
2793 \or % siggraph
2794 \or % sigplan
2795 \def\@acmdefinitionbodyfont{\normalfont}
2796 \def\@acmdefinitionindent{\z@}
2797 \def\@acmdefinitionheadfont{\bfseries}
2798 \def\@acmdefinitionnotefont{\normalfont}
2799 \or % sigchi
2800 \or % sigchi-a
2801 \fi

```

acmdefinition The acmdefinition theorem style

```

2802 \newtheoremstyle{acmdefinition}%
2803   {.5\baselineskip\@plus.2\baselineskip
2804     \@minus.2\baselineskip}% space above
2805   {.5\baselineskip\@plus.2\baselineskip
2806     \@minus.2\baselineskip}% space below
2807   {\@acmdefinitionbodyfont}% body font
2808   {\@acmdefinitionindent}% indent amount
2809   {\@acmdefinitionheadfont}% head font
2810   {.}% punctuation after head
2811   {.5em}% spacing after head
2812   {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmdefinitionnotefont{#3}}}}% head spec

```

Make acmplain the default theorem style.

```

2813 \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.

```

2814 \AtEndPreamble{%
2815   \if@ACM@acmthm
2816     \theoremstyle{acmplain}
2817     \@ifundefined{theorem}{%
2818       \newtheorem{theorem}{Theorem}[section]
2819     }{}
2820     \@ifundefined{conjecture}{%
2821       \newtheorem{conjecture}[theorem]{Conjecture}
2822     }{}
2823     \@ifundefined{proposition}{%
2824       \newtheorem{proposition}[theorem]{Proposition}

```

```

2825 }{}
2826 \@ifundefined{lemma}{%
2827 \newtheorem{lemma}[theorem]{Lemma}
2828 }{}
2829 \@ifundefined{corollary}{%
2830 \newtheorem{corollary}[theorem]{Corollary}
2831 }{}
2832 \theoremstyle{acmdefinition}
2833 \@ifundefined{example}{%
2834 \newtheorem{example}[theorem]{Example}
2835 }{}
2836 \@ifundefined{definition}{%
2837 \newtheorem{definition}[theorem]{Definition}
2838 }{}
2839 \fi
2840 \theoremstyle{acmplain}
2841 }

\@proofnamefont The font to typeset the proof name.
2842 \def\@proofnamefont{\scshape}

\@proofindent Whether or not to indent proofs.
2843 \def\@proofindent{\indent}

Customization of the proof environment.
2844 \ifcase\ACM@format@nr
2845 \relax % manuscript
2846 \or % acmsmall
2847 \or % acmlarge
2848 \or % acmtog
2849 \or % sigconf
2850 \or % siggraph
2851 \or % sigplan
2852 \def\@proofnamefont{\itshape}
2853 \def\@proofindent{\noindent}
2854 \or % sigchi
2855 \or % sigchi-a
2856 \fi

proof We want some customization of the proof environment.
2857 \renewenvironment{proof}[1][\proofname]{\par
2858 \pushQED{\qed}%
2859 \normalfont \topsep6\p@\@plus6\p@\relax
2860 \trivlist
2861 \item[\@proofindent\hspace\labelsep
2862 {\@proofnamefont #1\@addpunct{.}}]\ignorespaces
2863 }{%
2864 \popQED\endtrivlist\@endpfalse
2865 }

```

3.20 Balancing columns

We need balancing only if the user did not disable it, and we use a two column format

```
2866 \AtEndPreamble{%
2867   \if@ACM@balance
2868     \ifcase\ACM@format@nr
2869       \relax % manuscript
2870       \global\@ACM@balancefalse
2871       \or % acmsmall
2872       \global\@ACM@balancefalse
2873       \or % acmlarge
2874       \global\@ACM@balancefalse
2875       \or % acmtog
2876       \RequirePackage{balance}%
2877       \or % sigconf
2878       \RequirePackage{balance}%
2879       \or % siggraph
2880       \RequirePackage{balance}%
2881       \or % sigplan
2882       \RequirePackage{balance}%
2883       \or % sigchi
2884       \RequirePackage{balance}%
2885       \or % sigchi-a
2886       \global\@ACM@balancefalse
2887     \fi
2888   \fi
2889 }
2890 \AtEndDocument{%
2891   \if@ACM@balance
2892     \if@twocolumn
2893       \balance
2894     \fi\fi}
```

3.21 Acknowledgments

\acksname

```
2895 \newcommand\acksname{Acknowledgments}
```

\acks This is a comment-like structure

```
2896 \specialcomment{acks}{%
2897   \begingroup
2898     \section*{\acksname}
2899     \phantomsection\addcontentsline{toc}{section}{\acksname}
2900 }{%
2901   \endgroup
2902 }
```

\grantsponsor We just typeset the name of the sponsor

```
2903 \def\grantsponsor#1#2#3{#2}
```

`\grantnum`

```
2904 \newcommand\grantnum[3][\]{#3%
2905   \def\@tempa{#1}\ifx\@tempa\empty\else\space(\url{#1})\fi}
```

3.22 Conditional typesetting

We use the `comment` package for conditional typesetting:

```
2906 \AtEndPreamble{%
2907   \if@ACM@screen
2908     \includecomment{screenonly}
2909     \excludecomment{printonly}
2910   \else
2911     \excludecomment{screenonly}
2912     \includecomment{printonly}
2913   \fi
2914   \if@ACM@anonymous
2915     \excludecomment{anonsuppress}
2916     \excludecomment{acks}
2917   \else
2918     \includecomment{anonsuppress}
2919   \fi}
```

3.23 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’.

```
2920 \newcommand\showeprint[2][arxiv]{%
2921   \def\@tempa{#1}%
2922   \ifx\@tempa\empty\def\@tempa{arxiv}\fi
2923   \def\@tempb{arxiv}%
2924   \ifx\@tempa\@tempb
2925     arXiv:\href{https://arxiv.org/abs/#2}{#2}\else arXiv:#2%
2926   \fi}
```

3.24 End of Class

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

```
2927 \let\@vspace@orig=\@vspace
2928 \let\@vspacer@orig=\@vspacer
2929 \apptocmd{\@vspace}{\ClassWarning{\@classname}{\string\vspace\space should
2930   only be used to provide space above/below surrounding
2931   objects}}{}{}
2932 \apptocmd{\@vspacer}{\ClassWarning{\@classname}{\string\vspace\space should
2933   only be used to provide space above/below surrounding
2934   objects}}{}{}
2935 \let\@vspace@acm=\@vspace
2936 \let\@vspacer@acm=\@vspacer
```



```

\ACM@origbaselinestretch We produce an error if the user tries to change \baselinestretch
2937 \let\ACM@origbaselinestretch\baselinestretch
2938 \AtEndDocument{\ifx\baselinestretch\ACM@origbaselinestretch\else
2939   \ClassError{\@classname}{An attempt to redefine
2940     \string\baselinestretch\space detected. Please do not do this for
2941     ACM submissions!}\fi}

2942 \normalsize\normalfont\frenchspacing
2943 \end{class}

```

References

- [1] UK T_EX Users Group. UK list of T_EX 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] Cristophe 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^AT_EX*, 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	45	\if@ACM@printacmref: Added warning for longer papers	68
	Bib code cleanup (Zack Weinberg)	32	\keywords: Added warning for missing keywords	67
	Documentation update (siggraph) .	32	General: ACM reference format is now mandatory for papers over one page; CCS concepts and keywords are now mandatory for papers over two pages	32
1.49	General: New journal: DTRAP	32	Authors' addresses are mandatory for journal articles	32
1.53	General: New journals: PACMCGIT, TIOT, TDSCI	32		
	Rearranged docs	32	1.69	\vspace: Added the changed command to avoid grouping
1.54	General: Moved footnote stuff before hyperref call (Ross Moore)	32	1.70	General: Name change for TDS
1.56	General: Documented \Description	32	1.71	General: Bibliography change: volume for @inproceedings is now in brackets together with series
1.57	General: Booktabs package is now the default	32		LuaTeX now uses the OTF versions of fonts
1.58	General: Changes in samples (Enrico Gregorio)	32		Retired sigchi and sigchi-a
	New journal: HEALTH. TDS is renamed to TDSCI	32	v1.00	General: First released version
1.60	\if@ACM@urlbreakonhyphens: introduced macro	33	v1.01	General: Changed hyperref colors in screen mode (closes https://github.com/borisveytsman/acmart/issues/1)
	General: New option: urlbreakonhyphens	32		Defined ACM colors
1.62	General: New journal: TELO	32		Explicitly put draft option (closes https://github.com/borisveytsman/acmart/issues/4)
1.63	General: New journal: FACMP	32		Set headheight to 1pc for all formats (closes https://github.com/borisveytsman/acmart/issues/5)
	New journal: TQUANT	32	v1.02	General: Added TOPS and TSC (closes https://github.com/borisveytsman/acmart/issues/12)
1.63a	General: Move: TQUANT to TQC	32		Documentation changes (closes https://github.com/borisveytsman/acmart/issues/12)
1.64	General: Putting abstract after \maketitle now causes an error .	32		
1.65	General: New journal: DGOV	32		
1.66	\@mkauthorsaddresses: Added warning for missing addresses	88		
	\ccsdesc@parse: Added warning for missing concepts	70		

	//github.com/borisveytsman/ acmart/issues/13)	32		<code>\if@ACM@badge</code> : Added macro	66
v1.03	<code>\@formatdoi</code> : Added macro	72	v1.07	<code>\maketitle</code> : Corrected a bug with abstract footnotes	75
	<code>\if@ACM@authorversion</code> : Added macro	34		Corrected a bug with permission and footnotes order	75
	<code>\maketitle</code> : Added special case of authorversion	75	v1.08	General: SIGPLAN reformatting by Matthew Fluet	32
	General: Added <code>anonsuppress</code> environment	32		Typos corrected (Tobias Pape) . . .	32
	Added authorversion option (closes https: //github.com/borisveytsman/ acmart/issues/9)	32	v1.09	General: Revert SIGPLAN caption rules	32
v1.04	<code>\acmArticleSeq</code> : Name change by Matthew Fluet	65	v1.10	<code>\maketitle</code> : Corrected a bug with doi in manuscript and author version, https: //github.com/borisveytsman/ acmart/issues/36	75
	<code>\acmDOI</code> : Name change by Matthew Fluet	66		General: Changes of 'licensedothergov' wording	70
	<code>\acmISBN</code> : Name change by Matthew Fluet	66		<code>standardpagestyle</code> : Reversed folios location	92
	General: Updated bibliography for siggraph	32	v1.11	General: Customization of ACM theorem styles and proof environment by Matthew Fluet . .	32
v1.05	General: Added processing doi numbers for <code>acmsiggraph</code> and doi numbers for <code>sigproc.bib</code>	32	v1.12	<code>\@marginfigure</code> : Now centering by default	52
	Patched <code>\setcitestyle</code> command; closes https: //github.com/borisveytsman/ acmart/issues/19	32		<code>\@margintable</code> : Now centering by default	52
v1.06	<code>\@ACM@badge@skip</code> : Added macro . .	66		<code>\@parfont</code> : Moved to <code>\section@raggedright</code>	98
	<code>\@ACM@badge@width</code> : Added macro .	66		<code>\copyrightpermissionfootnoterule</code> : Added macro	48
	<code>\@ACM@title@width</code> : Added macro .	66		<code>\descriptionlabel</code> : Redefined . . .	54
	<code>\@mktitle@i</code> : Added processing badges	81		<code>\footnoterule</code> : Made shorter	48
	Made generic	81		<code>\if@ACM@natbib@override</code> : Added macro	34
	<code>\@mktitle@ii</code> : Now this macro is obsolete	81		<code>\if@ACM@newfonts</code> : Added macro . .	49
	<code>\@mktitle@iii</code> : Added processing badges	81		<code>\maketitle</code> : Moved thankses to <code>copyrightpermission</code> box	75
	Made more generic	81		<code>\section@raggedright</code> : Introduced macro	98
	<code>\@mktitle@iv</code> : Made more generic .	82		General: Added graceful behavior when libertine fonts are absent . .	49
	<code>\@printtopmatter</code> : Added processing badges	78		Documentation updates	32
	<code>\@subtitlefont</code> : Added macro . . .	80			
	<code>\@titlefont</code> : Added macro	80			
	<code>\acmBadgeL</code> : Added macro	67			
	<code>\acmBadgeR</code> : Added macro	66			

v1.13		\position: Added macro	83
\@mpfootnotetext: Made minipage		\postcode: Added macro	83
footnotes centered	43	\state: Added macro	83
\bibliographystyle: Redefined		\streetaddress: Added macro	83
macro	45	standardpagestyle: Better handling	
\bibstyle@acmauthoryear: Added		of anonymous mode	92
macro	40	v1.16	
\bibstyle@acmnumeric: Added		\@headfootfont: Added macro	92
macro	40	General: Formatting header/footer	
\if@ACM@printfolios: Added macro	68	(Matthew Fluet)	32
General: Font adjustments for		standardpagestyle: Customize	
acmsmall	84	header/footer text font	92
Increased font size for ACM Large	37	v1.17	
Print bibliographic information by		\@makefnmark: Redefined	43
default for the proceedings	68	\@mkauthors: TOG now uses the same	
standardpagestyle: Added headers		authors block as other journals . .	83
for sigs	92	\@mkauthors@ii: Deleted	85
Expanded headers for sigchi-a . . .	92	\@mkbibcitation: Added \nobreak	89
Suppressed folios if sig	92	Changed format for sigs	89
v1.14		\acmArticle: The default is now	
\bibstyle@acmauthoryear: Moved		numerical	65
def of \bibstyle@acmauthoryear		\acmMonth: The default must be	
before use	40	numerical. Closes #50.	66
\bibstyle@acmnumeric: Moved def of		\acmNumber: The default is now	
\bibstyle@numeric before use . .	40	numerical	65
General: \citestyle updates		\acmVolume: The default is now	
(Matthew Fluet)	32	numerical	65
Patched \citestyle	38	\acmYear: The default is now	
v1.15		numerical	65
\@ACM@addtoaddress: Added macro	82	\description: Decreased indent . . .	54
\@mkauthors@iii: New authors		\grantnum: Added url	104
system	86	\grantsponsor: Renamed	103
\@shortauthors: Introduced macro .	92	\if@ACM@printacmref: Renamed	
\@typeset@author@bx: Moved to		from \if@ACM@printbib	68
separate macro	86	General: Slightly decreased margins	
\acks: Added macro	103	for sigs	46
\affiliation: Added code for author		standardpagestyle: Added paper	
groups	63	title to sigs	92
\author: Added code for author		v1.18	
groups	62	\@mkauthors@i: Now we andify	
\city: Added macro	83	affiliations	85
\country: Added macro	83	\@typeset@author@line: Added	
\department: Added macro	83	macro	84
\grantnum: Added macro	104	General: Natbib is now the default for	
\grantsponsor: Added macro	103	all formats	32
\if@insideauthorgroup: Introduced		v1.19	
macro	62	\@mkabstract: Include 'Abstract' in	
\institution: Added macro	83	PDF bookmarks (Matthew Fluet) .	89
\num@authorgroups: Renamed	62	\acks: Include 'Acknowledgements' in	
\orcid: Introduced macro	64	PDF bookmarks (Matthew Fluet)	103

General: Include 'Abstract', 'Acknowledgements', and 'References' in PDF bookmarks (Matthew Fluet)	32	v1.31	Switched to T1: looks like libertine has problems with \l in OT1 . . .	49
Include 'References' in PDF bookmarks (Matthew Fluet)	38		Updated IMWUT and PACMPL . .	55
v1.20			\@additionalaffiliation: Added macro	64
\@mkabstract: Deleted spurious space	89		\@mkbibcitation: Disabled linebreak	89
General: Bug fixes for bst	32		\@startsection: Added	
v1.21			\tochangmeasure	40
\showeprint: Added macro	104		Redefined macro	42
v1.22			\@textbottom: Redefined	48
General: More bibliography changes for Aptara	32		\acmMonth: The default now is the current month (Matteo Riondato)	66
v1.23			\acmYear: The default now is the current year (Matteo Riondato) . .	65
General: Add PACMPL journal option	32		\additionalaffiliation: Added macro	63
v1.24			\l@section: Redefined macro . .	43
General: Add IMWUT journal option	55		\l@subsubsection: Redefined macro	43
v1.25			General: Documentation changes . . .	32
General: Updated PACMPL	55	v1.32		
v1.26			\@formatdoi: New doi format	72
General: Corrected \shortcite bug .	32		General: Added POMACS journal option	32
Documentation typos fixed (thanks to Stephen Spencer)	32		Format siggraph is now obsolete .	32
v1.27		v1.33		
\if@ACM@printccs: Typo corrected .	67		\@ACM@addtoaddress: Added obeypunctuation code	82
v1.28			\@mkauthors@i: Added obeypunctuation code	85
\ccsdesc@parse: Change from \to to \textrightarrow (Matteo Riondato)	69		\@mkauthors@iii: Added obeypunctuation code	86
General: Corrected option natbib behavior	40		\@mkauthors@iv: Added obeypunctuation code	87
Got rid of warnings in pdf keywords	43		\@subtitlefont: Added \normalsize	80
v1.29			\ACM@linecountL: Renamed macro .	91
\@mkabstract: Removed spurious indentation (John Wickerson) . . .	89		\ACM@linecountR: Added macro . . .	91
\ccsdesc@parse: Add spacing after bullet and around rightrightarrow; semicolon separators no longer in bold/italic (John Wickerson)	69		\ACM@timestamp: Added current page number	92
General: Increased head to 13pt	46		Added macro (Michael D. Adams) .	92
standardpagestyle: Corrected printfolios (Matthew Fluet)	92		Added submission id	92
v1.30			\acmSubmissionID: Added macro . .	66
\department: Added optional parameter	83		\city: Added obeypunctuation code	83
General: Added \frenchspacing . . .	105		\country: Added obeypunctuation code	83
Bibtex style now recognizes https:// in doi	32		\department: Added obeypunctuation code	83
			\if@ACM@affiliation@obeypunctuation: Added macro	63

\if@ACM@authordraft: Added macro	35	Rearranged bibstrip	75
\if@ACM@natbib@override: Deleted macro	34	The \terms command is now obsolete	75
\if@ACM@timestamp: Added macro (Michael D. Adams)	35	\terms: The \terms command now just produces a warning	67
\institution: Added obeypunctuation code	83	v1.35	
\maketitle: Fixed the bug with figures on top and bottom of the title page, thanks to David Epstein	75	\bibstyle@acmauthoryear: Square brackets for author-year style	40
\position: Added obeypunctuation code	83	General: BibTeX bug fixed: et al.	32
\postcode: Added obeypunctuation code	83	If the copyright is set to usgov or rightsretained, the price is suppressed	70
\state: Added obeypunctuation code	83	v1.36	
\streetaddress: Added obeypunctuation code	83	\@ACM@authorsperrrow: Added macro	68
General: Added acmart-preload-hook	32	\@mkauthors@iii: Added authorsperrrow override	86
Added cmap and glyphtounicode	49	\@mkauthors@iv: Added authorsperrrow override	87
BibTeX comma before articleno bug corrected	32	\if@ACM@authordraft: Corrected typo, thanks to bargteil	35
BibTeX crossref bug corrected	32	General: Added PACMHCI journal options	55
BibTeX numpages bug corrected	32	Added the possibility to adjust number of author boxes per row in conference formats	32
Documentation updates	32	v1.37	
Moved \ci tename definition for non-natbib bibliography, so a package may redefine it	44	\description: Reduce list indentation (Matthew Fluet)	54
Switched to Type 1 fonts for libertine even if OTF-capable engine is used (Kai Mindermann)	49	\descriptionlabel: Reduce list indentation (Matthew Fluet)	54
firstpagestyle: Added right linecount for two-column formats	95	\normalparindent: Set \normalparindent (Matthew Fluet)	47
Added timestamp (Michael D. Adams)	95	General: Reduce list indentation (Matthew Fluet)	53
standardpagestyle: Added right linecount for two-column formats	92	Set \normalparindent; Reduce list indentation (Matthew Fluet)	32
Added timestamp (Michael D. Adams)	92	v1.38	
v1.34		General: Increase default font size for SIGPLAN	32, 37
\@mkbibcitation: Deleted DOI from doi numbers	89	v1.39	
\ACM@linecount@bx: Rulers now are continuous	91	\@@authornotemark: Added macro	89
\ACM@linecount@L: Rulers now are continuous	91	\authornotemark: Added macro	65
\ACM@linecount@R: Rulers now are continuous	91	v1.40	
\maketitle: Added date to the bibstrip in conf proceedings	75	\@copyrightowner: Added new copyright version: licensedcagov	71
Deleted 'DOI' from doi numbers	75	\@copyrightpermission: Added new copyright version: licensedcagov	72
		\@mkauthors@i: Switched to MakeTextUppercase	85

\@parfont: Switched to MakeTextUppercase	98	\acmBooktitle: Added macro	62
\ACM@linecount@bx: Work around a bug in xcolor: looks like cmyk colors in boxes do not work	91	\editor: Added macro	62
\ccdesc@parse@finish: Added macro	70	\if@ACM@acmthm: Added macro	33
\city: We now do not print this even in SIG	83	\maketitle: Empty DOI or ISBN are not printed (by Michael Ekstrand)	75
\country: Fixed bugs with extra spaces	83	General: Added package refcount . . .	32
\l@section: Redefined macro	42	Deleted package cleveref	32
\postcode: We now do not print this even in SIG	83	Put theorem defs in a separate style	32
\state: We now do not print this even in SIG	83	v1.45	
\streetaddress: We now do not print this even in SIG	83	\@folioblob: Switched \bfseries\sffamily to \sffamily\bfseries	95
General: Added 'textcase' package . .	38	\@parfont: Switched \bfseries\sffamily to \sffamily\bfseries	98
Added heightrounded to geometry	46	\@titlefont: Switched \bfseries\sffamily to \sffamily\bfseries	80
Added new copyright version: licensedcagov	32	v1.46	
Added package cleveref	32	\@mkauthorsaddresses: Introduced macro	88
Added Ross Moore code for glyphtounicode	49	\@mkbibcitation: Added subtitle . . .	89
Bibliography changes	32	\@printendtopmatter: Made it \par\bigskip uniformly	90
v1.41		\@printtopmatter: Deleted rule . . .	78
General: Added new badges	32	\@setauthorsaddresses: Introduced macro	90
v1.42		\ACM@linecount@bx: Rearranged the code to get rid of spurious underfull messages (Benjamin Byholm)	91
v1.43		\author: Started counting authors . .	62
\@startsection: Added \makeatletter	42	\authorsaddresses: Introduced macro	64
\country: Added comma before country for journals	83	\country: Corrected spacing for institution	83
v1.44		\if@ACM@acmthm: Modified description	33
\@acmBooktitle: Added macro	62	\liningnums: Workaround for compatibility with fontspec	50
\@acmEditors: Added macro	62	\maketitle: Added authors' addresses Thankses go before authors' addresses	75
\@editorsAbbrev: Added macro	62	\num@authors: Introduced macro . . .	62
\@folioblob: Suppress the blob if acmArticleSeq is empty	95	General: Added etoolbox	32
\@mkbibcitation: If the paper has just one page, use 'page' instead of 'pages'	89	Bst file bug fixes: label width is calculated correctly	32
\ACM@restore@pagestyle: Added macro	90	Delayed hypersetup since journal options may change screen mode	43
\acmArticle: The default is now empty	65	PACM now set screen to true	55
\acmArticleSeq: Now acmArticle might be empty	65		

Restore theorem defs to class file . . .	32	v1.53	General: Added PACMCGIT, TIOT, TDSCI	55
v1.47				
General: New journal: THRI	32			
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