User's Guide to $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX

Version 2.2
August 2001

This publication was typeset using $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX, the American Mathematical Society's TEX macro system.

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Contents

1. Overview

$\mathcal{A}\mathcal{M}\mathcal{S}$-TEX is a macro package for TEX, designed to simplify the input of mathematical material and format the output according to preset style specifications. Although the American Mathematical Society holds the copyright for $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX, its use is not restricted, but is encouraged for the preparation of manuscripts intended for publication both in the Society's books and journals, and also in other mathematical literature.

Version 2.0 of $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX was released in 1990, concurrent with the publication of the second edition of *The Joy of TEX*. It contained numerous minor improvements and bug fixes, as well as some major changes involving additional fonts. Version 2.1 was first released in 1991; interim updates are identified by changes in release date. The present version 2.2 was released in August 2001. This User's Guide describes all the new and changed features from these versions and how to use them, with further additions and revisions pertaining to the current release. Topics are grouped by type, and then presented in roughly the same order as they appear in *The Joy of TEX*.

This User's Guide assumes that you already have a copy of *The Joy of TEX*. It contains references to specific sections that won't help you much if you don't have a copy. It also assumes for the most part that you will be using the "preprint style", a set of macros that provides features specific to the formatting of a document, such as headings, page numbers, and the like. If you are planning to use the preprint style, you will also need to have a copy of AMSFonts Version 2.2. *The Joy of TEX*

Typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX

and AMSFonts 2.2 are available from the American Mathematical Society and other distributors.

Files Comprising the $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX Version 2.2 package

The following files are contained in the $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX Version 2.2 package distributed by the American Mathematical Society:

`amstex.tex`	the $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX Version 2.2 macros
`amstex.bug`	a chronicle of bug fixes to `amstex.tex` and `amsppt.sty`, as well as known open bugs
`amssym.tex`	macros defining the symbols in fonts `msam` and `msbm`
`amsppt.sty`	the preprint style for $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX Version 2.2
`amsppt.sti`	initialization options for the $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX 2.2 preprint style
`amsppt.doc`	technical documentation for `amsppt.sty`
`amsppt.faq`	some frequently asked questions and answers about $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX
`amsguide.tex`	the source file for this User's Guide
`amstinst.tex`	the source file for Installation Procedures; appendices to this User's Guide
`amsppt1.tex`	a backward compatibility file for use with documents already completed using $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX versions earlier than 2.0
`joyerr.tex`	errata to *The Joy of TEX* (first edition)
`joyerr2.tex`	errata to *The Joy of TEX* (second edition)
`amstex.ini`	used in creating format files

The file `amsppt.doc` is an ASCII file, and is not intended to be processed with TEX. This documentation file is arranged in the same order as the macro file that it describes, and explains the intent and mechanics of the macros in detail. A separate file (`amstex.doc`), documenting the file `amstex.tex`, is available on request.

In addition, other files are used during installation. For instructions on installing the $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX macros and preprint style, see Appendix B. This appendix describes the installation process for TEX systems based on the TEX Directory Structure (TDS), and also gives suggestions for installation on other systems.

General Description of Changes

$\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX 2.0+, the preprint style, and their technical documentation are the result of a joint effort begun by Michael Spivak and extended by the Composition Technical Support group of the American Mathematical Society.

In version 2.0 of $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX, the following changes were made:

(1) All known bugs were eliminated.
(2) Messages were added identifying the current versions of `amstex.tex` and `amsppt.sty`, to be displayed on your terminal screen and in the log file.
(3) Some error and help messages were changed for the sake of clarity or to provide more information.
(4) Refinements were made to conserve memory space.
(5) The CM versions of the Computer Modern fonts were substituted for the older AM versions.
(6) Support for additional fonts was added.
    (a) `amstex.tex` provides the mechanism for accessing the Euler and extra symbol fonts of the AMSFonts collection.

   (b) The preprint style assumes that fonts `msam`, `msbm`, and `eufm` are installed and available.
(7) Changes were made to the preprint style to make it conform more closely to the style of AMS publications, in particular, the *Journal of the American Mathematical Society*.
   (a) Running heads were made automatic; they can be suppressed if desired.
   (b) Additional elements are recognized in both the top matter and the body of a document, and the input syntax was regularized.
   (c) Footnotes were changed to have normal indentation.[1]
   (d) The style of the references was changed considerably.
(8) The ability to produce roman-numeral page numbers using the plain TEX convention (negative `\pageno`) was added.
(9) In the preprint style, mathematics-oriented hyphenation exceptions were added. (These follow American, not British, rules.)
(10) An option was added in the preprint style that allows documents to be formatted as chapters of a monograph rather than as separate papers.
(11) Finally, some optional formatting features requested by $\mathcal{A}_\mathcal{M}\mathcal{S}$-TEX users were added to the preprint style.

In version 2.1, the following changes were made:

(1) `\curraddr`, `\rom`, and `\linespacing` were added.
(2) Additional error conditions were identified and supplied with more informative messages.
(3) A sporadic line-breaking problem in the preprint style references section was remedied.
(4) Some bugs introduced into the preprint style during the version 2.0 changes were found and eliminated.
(5) Use of the Euler fonts other than medium Euler Fraktur was made more convenient.
(6) The ability to use multiple `\thanks` commands was added.
(7) The `\proclaim` font was changed from slanted to italic, and `\proclaimfont` provided so that users can change it if desired.
(8) `\nologo` was reinstated.
(9) The installation instructions were revised and augmented.
(10) The backward compatibility file `amsppt1.tex` was added.

These changes were made in the January 1997 release:

(1) Bugs reported since the release of version 2.1 were fixed.
(2) `\urladdr` was added; `\linespacing` was documented.
(3) Bibliographic elements were added for *Math. Reviews*, *CMP* and AMS preprint server references.
(4) Various changes were made to permit easier customization:
   (a) Command names were given to fonts and dimensions used in various environments.

[1]Like this.

   (b) Changeable end-of-document processing was split out and associated with a new command name.
   (c) The output routine was simplified.
   (d) Initialization options that a user might want to suppress to save space were moved into a separate file, `amsppt.sti`
5. Page dimensions were changed in the preprint style to match the current AMS publication specifications.
6. The mechanism for loading AMSFonts was changed to make it easier for a user to specify the use of a PostScript outline version.
7. The installation instructions were updated and augmented.

These changes were made in version 2.2:

1. Bugs reported since the release of version 2.1 were fixed.
2. The requirement to acknowledge use of AMS-TEX was removed, and the copyright statement and restriction notice is no longer printed out on the terminal every time AMS-TEX starts up.
3. The installation instructions were completely revised, and based on the TEX Directory Structure (TDS) used by most current TEX distributions.
4. a `\subjclassyear` command was provided to allow a particular version of the Mathematics Subject Classification to be cited.

This User's Guide

This User's Guide has been prepared using AMS-TEX Version 2.2 with the preprint style. Some changes have been made: font and dimension settings have been reset, the macros for headings have been redefined to produce a result more suited to documentation, and some *ad hoc* macros have been defined to simplify the presentation of particular information. However, in general, this document and the file from which it was produced illustrate the general appearance and input for a preprint with running heads. Printing the output of TEX for this Guide requires AMSFonts Version 2.0 or later (users of AMSFonts Version 2.0 are strongly encouraged to upgrade to Version 2.2).

2. Formatting Features

Formatting documents prepared with AMS-TEX is accomplished by a "style file". The features described here are part of the preprint style. The AMS-TEX preprint style, Version 2.2, will format an input file in a manner suitable for a paper in a journal, unless the style of a `\Monograph` is explicitly selected. Unless noted otherwise, the journal style is the style described below.

Top Matter

Some commands affect the appearance of a whole document. Such commands should go at the top of your input file, right after the `\documentstyle` line and before the `\topmatter` line. This area will be referred to as the "preamble". Commands that should be in the preamble include `\define`, `\TagsOnRight` and the like, `\NoPageNumbers`, `\NoRunningHeads`, `\Monograph`, `\pagewidth`, `\pageheight`, `\pageno`, and commands that load fonts. The preamble is relevant to any document, whether paper or monograph.

```
\input amstex
\documentstyle{...}
```

⟨*preamble commands, such as* `\define`, `\pageno`, `\Monograph`, `\NoRunningHeads`, `\loadbold`, *etc.*⟩

```
\topmatter
\title...\endtitle
\author...\endauthor
\affil...\endaffil
\address...\endaddress
\curraddr...\endcurraddr
\email...\endemail
\urladdr...\endurladdr
\thanks...\endthanks
\dedicatory...\enddedicatory
\date...\enddate
\translator...\endtranslator
\keywords...\endkeywords
\subjclass...\endsubjclass
\abstract...\endabstract
\endtopmatter
\document
```

FIGURE 1. The beginning of an $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX file

The beginning of an $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX file should look something like what is shown in Figure 1.

If any `\end...` tag is omitted (or misspelled), an error message will appear at `\endtopmatter` or at the next blank line: for example, if you misspell `\endtitle`, the message will be something like "`! Paragraph ended before \title was complete.`" If you omit `\endtopmatter`, there won't be any error message, but none of the topmatter material will print. Tags should be omitted for any top matter elements for which there is no data; if "empty" tags are included, empty footnotes may appear on the first page, or labels indicating addresses at the end of a paper.

If you have documents that were prepared for versions of $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX earlier than version 2.0, you may find the file `amsppt1.tex` useful. By including the line `\input amsppt1` immediately after the `\documentstyle` line, the topmatter commands and the sectioning commands that changed in form will work in the original way. Other than that, there should be few incompatibility problems with previous versions. Note: The use of `amsppt1.tex` is discouraged except for processing preexisting files.

For multi-line titles, affiliations, authors, or dedications (basically everywhere that lines are centered individually rather than being set in paragraphs), line breaks are obtained by using `\\`. In other parts of the topmatter, which are set in paragraph form, line breaks are obtained by `\linebreak`.

The title will be set in uppercase. To turn off the automatic uppercasing, use the `\nofrills` option: `\title\nofrills...\endtitle`.

Each author is tagged separately, followed by address(es) and other information associated with that author.

Normally, the address given with `\address` is the address of the author at the time the research was being done; if the author's address at the time of publication is different, the current address should be given with `\curraddr`. This should be entered immediately following the `\address` for the same author. If a `\curraddr` is not paired with an `\address`, the current address will not print.

Electronic mail addresses can be tagged `\email...\endemail`. Like `\curraddr`, every `\email` address must be paired with a regular `\address`, otherwise the e-mail address will not print. The `\email` address will be printed at the end of the paper, as "*E-mail address:* ⟨*net-address*⟩", following the address (and current address, if present) with which it is paired.

URLs, the addresses of "home pages" on the World Wide Web, can be included using `\urladdr...\endurladdr`. They behave in the same manner as `\email` addresses.

The `\thanks` command is provided for acknowledgments of grant support and other kinds of support for the author's research, or other general information not covered by one of the predefined tags such as `\keywords` or `\subjclass`. The information will be printed as an unnumbered footnote at the bottom of the first page. Like `\address`, `\thanks` can be used more than once, and is associated with a particular author.

In case a paper has not only an author but a translator, `\translator` is provided. This information will be printed at the end of the paper in eight-point roman, as "Translated by" followed by the translator's name in uppercase.

The `\dedicatory` command is used for such things as "Dedicated to Professor X on the occasion of his eightieth birthday." The dedication will appear in italics, before the abstract.

The information for `\keywords` and `\subjclass` appears as unnumbered footnotes at the foot of the first page, as in AMS journals. In a monograph chapter they will not print at all, since they should be handled separately, as part of the front matter for the monograph. By default, for backward compatibility, the 1991 Mathematics Subject Classification will be cited; to specify the 2000 Mathematics Subject Classification, enter

```
\subjclassyear{2000}
\subjclass ...\endsubjclass
```

The abstract heading "ABSTRACT." appears in caps and small caps, in the same size (eight point) as the abstract itself.

A simple table of contents setup is available. Tables of contents are typed in the topmatter along with everything else (except for monographs—see the section **Book Formatting** below), using `\toc...\endtoc`.

```
\toc
\specialhead...\endspecialhead
\head...\endhead
\subhead...\endsubhead
\subsubhead...\endsubsubhead
```

```
\endtoc
```

The syntax of the parts is identical to the syntax used for headings within the document (see the sections **Headings** and **Book Formatting** below), so that for those who wish to do so and have a capable text editor, the table of contents can be constructed by extracting the relevant lines from the main text.[2]

Page numbers aren't usually appropriate for the short table of contents that might appear in a journal article, but if desired, page numbers can be entered in a manner similar to that for a monograph; see the section **Book Formatting** below.

The hanging indentation within a table of contents for `\head` and `\subhead` is preset to accommodate numbers of the form "1." and "1.1." respectively; the amount of indentation can be adjusted by using `\widestnumber`:

```
\toc
\widestnumber\head{10}
\widestnumber\subhead{10.1}
...
```

This can be done more than once within different sections of the table of contents, if desired.

If the "section number" of a `\head` happens to be something like "Appendix" (as actually happens in this User's Guide), a pair of empty braces should be entered before it, as follows:

```
\head {} Appendix. Sample bibliography input ...\endhead
```

Insertion of `{}` followed by a space at the beginning of the heading text will cause the entire entry to be set flush left as a unit.

If you are preparing a monograph, the format and content of the top matter will be different. See the section below on **Book Formatting** for details.

Headings

There are four levels of headings (not counting `\title`):

```
\specialhead...\endspecialhead
\head...\endhead
\subhead...\endsubhead
\subsubhead...\endsubsubhead
```

The heading of this section was typed as

```
\head 2. Formatting Features
\endhead
```

And the subheading for this subsection was typed as

```
\subhead Headings\endsubhead
```

Ordinarily, subheadings in the preprint style are run into the text, but for this User's Guide, the style varies slightly.

---

[2]But note that the original line breaks in multi-line headings would not be appropriate for the table of contents, so you'd want to remove any `\\`es that might be present.

`\specialhead` is for long articles that need extra divisions at a level above the `\head` level. In the preprint style `\specialhead` uses boldface type and is set ragged right; `\head` is small caps, centered; `\subhead` is boldface, flush left, run in with the following text; and `\subsubhead` is italic, indented as for an ordinary paragraph, and run into the text.

Explicit line breaks are obtained by a `\\` in a `\head` or a `\specialhead`, but for `\subhead` and `\subsubhead`, which are part of their paragraph, just use `\linebreak` as you would in normal paragraphed text.

If you are preparing a monograph, the styles of headings will be different. See the section below on **Book Formatting** for details.

Theorems and Proofs

In addition to the usual proclamations and demonstrations, mathematicians may pose other kinds of propositions, which editors may prefer to see presented in different styles. The following have been provided in the preprint style.

```
\definition...\enddefinition
\example...\endexample
\remark...\endremark
```

The proof of any proclamation is indicated by `\demo...\enddemo`.

Note that all kinds of proclamations, demonstrations and propositions must be ended explicitly; a check for proper endings is included with all classes of proclamations and a missing `\end...` is reported.

In the preprint style `\definition` and `\example` have the spacing and heading font of `\proclaim`, but are in roman. `\remark` resembles `\demo` except that extra space added at the end of a proof by `\enddemo` is not added by `\endremark`.

In accordance with the style of the *Journal of the American Mathematical Society*, the labels on `\proclaim`s and similar constructions are now printed in boldface type (`\bf`) and the text in italic (`\it`). (The command `\proclaimfont` is provided so that a user can change the text of a proclamation to slanted type if desired: `\redefine\proclaimfont{\sl}`.)

It is conventional in mathematical publishing to use roman, upright numbers and punctuation even in the midst of italic text, to avoid visual conflicts with numbers and punctuation in adjacent math formulas. Since dedicated "mathematical text italic" fonts containing roman numbers and punctuation are not currently available, the `amsppt` preprint style provides a command `\rom` to be applied inside theorems and other stretches of italic text, to give the desired results. For example, to produce

Proposition 2.5. *Let $S_1, \dots, S_m$ be the components of a J-holomorphic cusp-curve S and suppose that each component S_i is* (*a multiple covering of*) *a regular curve and that Assumption* (1.4a) *is satisfied. …*

you would use `\rom` in the following places:

```
each component $S_i$ is \rom(a multiple covering of\rom) a
regular curve and that Assumption \rom{(1.4a)} is satisfied
```

As you can see, `\rom` is used like the math font command `\roman`: it applies to the next single character or the next group enclosed in braces.

Other Devices

For a list produced by `\roster`, the amount of indentation can be adjusted to accommodate wide item numbers. Just before beginning the `\roster`, type, for example, `\widestnumber\item{(viii)}`. This adjustment is temporary. The default will be reinstated by `\endroster`.

The command `\cite` produces a reference citation in roman type, within square brackets: [21].

A structure `\block...\endblock` is provided for quotations. It is intended for use in the middle of a paragraph to quote an extract from another source.

Book Formatting

If you are preparing a monograph, several features are available in the preprint style that will make your output look like chapters rather than individual papers.

First of all, you must signal your intentions by typing `\Monograph` in the preamble, right after the `\documentstyle` line.

A typical topmatter section for a monograph chapter would be typed like this:

```
\documentstyle{amsppt}
\Monograph
\topmatter
\title\chapter{4} Matrix Algebras\endtitle
\endtopmatter
```

which produces a chapter heading that looks like this:

CHAPTER IV

MATRIX ALGEBRAS

Notice that the number is converted automatically to roman numerals and the word "CHAPTER" is added. For a chapter title that needs a different sort of treatment, `\nofrills` can be used:

```
\topmatter
\title\chapter\nofrills{APPENDIX D} The Poisson Integral\endtitle
\endtopmatter
```

This produces

APPENDIX D

THE POISSON INTEGRAL

The replacement `\chapter` text will appear exactly as typed.

Finally, for things like a preface or introduction which have no pretitle text at all, omit the `\chapter` command:

```
\topmatter
\title Preface\endtitle
\endtopmatter
```

In monographs, the table of contents is usually treated as a separate chapter. Start by typing the title "Contents" as for a preface or introduction, and then use the `\toc...\endtoc` structure as the body of the document (rather than putting it in the topmatter, as you would for a journal article).

```
\topmatter
\title Contents\endtitle
\endtopmatter

\document
\toc
\title Preface\page{vii}\endtitle
\title\chapter{1} Matrix Algebras\page{1}\endtitle
\head {} Continuous complex-valued functions\page{1}\endhead
...
\title Bibliography\page{307}\endtitle
\endtoc
\enddocument
```

The chapter titles listed in the table of contents are typed in the same way as in actual use. To get page numbers in the table of contents, use `\page` as shown, just before the ending of an element. This option is available for all levels of headings.

In a monograph using the preprint style, the chapter title is used for the left running head and the text of section headings (from `\head`) appears as the right running head. It's not uncommon for the text of a heading to be too long to fit in the running head width; in such a case use `\rightheadtext` to specify a shortened form of the heading for use in the running heads:

```
\head Fourier coefficients of continuous periodic functions
of bounded entropy norm\endhead
\rightheadtext{Fourier coefficients of periodic functions}
```

This should follow immediately after the `\head`, to ensure that both take effect on the same page. If the chapter title is too long to fit as a running head, a shortened form can be supplied in a similar way with `\leftheadtext` immediately after the `\title`. See also the section **Running Heads**.

The style for a chapter of a monograph differs in some particulars from the style for a paper. The text of a `\head` will be boldface instead of small caps; headings of theorems, propositions, definitions, remarks, etc. will be small caps instead of boldface, and indented rather than flush left.

Inserts with Captions

Figures, tables, and some other kinds of objects are often handled as inserts. These objects may be prepared separately from the main document and pasted in, in which case space must be left for them. These objects usually have captions; a caption may be positioned above (for a table) or below (for a figure).

An insert may be specified for the top or "middle" of a page, i.e., right where the input for the insert occurs in the text. These are typed as `\topinsert` and `\midinsert` respectively. Furthermore, a caption may be placed at the top or the bottom of the insert, using the tags `\topcaption` and `\botcaption` respectively.

The general structure used to specify an insert with a caption at the top is:

```
\topinsert  or  \midinsert
\captionwidth{⟨dimen⟩}  (optional)
\topcaption{⟨caption label⟩}
 ⟨optional caption text⟩
\endcaption
\vspace{⟨dimen⟩}  or  ⟨optional code for the insertion body⟩
\endinsert
```

Here the notation ⟨*dimen*⟩ means a valid TEX dimension as described in the **Dimensions** section of *The Joy of TEX*. If a bottom caption was desired, `\topcaption` would be replaced by `\botcaption`, and the `\vspace` command (or the optional code for the insertion body) would be moved before the `\botcaption` macro.

The `\vspace{`⟨*dimen*⟩`}` option would be used to leave blank space for an object to be pasted into place. The value of the ⟨*dimen*⟩ should be the exact height of the object to be pasted in, because extra space around the object and the caption are dependent on the document style, and will be provided automatically.

The `\captionwidth{`⟨*dimen*⟩`}` option may be used to override the default caption width specified by the document style.

The ⟨*caption label*⟩ is something like "Figure 1" or "Table 2a". Do not type any final punctuation; it will be provided. The caption label will be set in caps and small caps.

The ⟨*optional caption text*⟩ is any descriptive text that may be desired. The preprint style will set this in roman. Even if there is no text, the `\endcaption` tag must be present.

If you choose to include the TEX code for a figure, table, or other captioned object in the input, then omit the `\vspace` command and type the code where appropriate (before `\botcaption` or after the `\endcaption` of `\topcaption`).

Sometimes a table is small enough that it is not necessary to put it in an insert. If the caption is to appear above it, input can be typed as follows:

```
\topcaption{⟨caption label⟩}
 ⟨optional caption text⟩
\endcaption
 ⟨code for the table body⟩
```

The form of the input would be the following if the caption is to appear below:

```
 ⟨code for the table body⟩
\botcaption{⟨caption label⟩}
 ⟨optional caption text⟩
\endcaption
```

To avoid page-breaking problems, this form of "insertion" should be used only for very small objects.

Page Numbers

If you are using the preprint style, page numbers will appear in the running heads, at the outside margin, except for the first page, where the running head will be omitted and the page number will be centered at the bottom of the page.

If you wish to omit page numbers, type `\NoPageNumbers` in the preamble of the document (after the `\documentstyle` line). The running head text will remain; see also **Running Heads**.

You can get roman numeral page numbers, e.g. for a table of contents or preface, using the normal TEX convention of `\pageno` plus a negative number.

Page Size and Line Spacing

In the preprint style, the default page width is 30pc, and the default height is 50.5pc. You can change the size of the page by typing

`\pagewidth{`⟨*dimen*⟩`}`
`\pageheight{`⟨*dimen*⟩`}`

using suitable ⟨*dimen*⟩s, where by this notation we mean a valid TEX dimension as described in the **Dimensions** section of *The Joy of TEX*.

The spacing between lines in the preprint style is ordinarily 2pt greater than the nominal type size. This can be changed by providing a multiplication factor to the command `\linespacing`; for example, `\linespacing{1.5}` gives the effect of typewritten doublespacing.

QED

In the preprint style, `\qed` gives an open box '□', separated from what precedes it by a quad of space.

Running Heads

If you are using the preprint style, running heads similar to those in *Joy* will appear, with text in the center and page numbers to the outside. (On the first page, as usual, the running head is omitted, and the page number is placed at the bottom.)

If you do nothing to define the text of the running heads, the author's name will be used on the left-hand and the title on the right-hand pages. (This is the style for papers; for monographs, see below.) If you want some other values, say a shortened title, you can redefine the text to appear on left- and right-hand pages by typing

`\leftheadtext{`⟨*left running head text*⟩`}`
`\rightheadtext{`⟨*right running head text*⟩`}`

These instructions can appear anywhere after the `\documentstyle` command, but the most common place to use them is immediately after a `\title` or `\author` or `\head` to override the automatic running head text. If `\rightheadtext` or `\leftheadtext` is specified above the topmatter, `\title` and `\author` will not override them.

If you are doing a monograph rather than a journal article, and use the `\Monograph` switch, it affects the running heads as follows: The chapter title appears in the left-hand running heads, and the text of the current section heading (from `\head`) appears in the right-hand running heads. In chapters that don't contain any `\head`s—for example, a foreword—both the left- and right-hand running heads will contain the chapter title.

By default, running heads will be uppercase. This is a frill that can be turned off by `\nofrills`, e.g.,

```
\rightheadtext\nofrills{Text of Running Head}
```

If for some reason you don't want running heads at all, type `\NoRunningHeads` in the preamble of the document (after the `\documentstyle` line). When running heads are omitted, page numbers will appear centered at the bottom of the page. (And even those can be turned off using `\NoPageNumbers`.)

In a monograph, if you don't want the text from the section `\head`s to appear in the running heads you must redefine the internal command, `\headmark`, that is used by `\head` to set the right-hand running head. To do this, put the following line in your document file, after `\Monograph` and before `\topmatter`:

```
\redefine\headmark#1{}
```

(where the `#1` is an argument number as explained in *Joy*, in the description of `\define` and related commands).

Tables

There are no special macros to support the creation of tables in $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX. Plain TEX's `\settabs` command and `\halign` can also be used (see *The TEXbook* for documentation of their usage). More sophisticated table macro packages are available from other sources. See also the section **Inserts with Captions** above.

Bibliographies

The references section of a paper begins with `\Refs` and must have `\endRefs` at the end. Each entry in the references begins with `\ref` and ends with `\endref`. The individual elements between `\ref` and `\endref` can be specified in any order. However, following `\ref` is usually a number or other label identifying the particular reference. This label is produced using `\key`. The format of the labels is determined by the current *references style*, which is set by the `\refstyle` command. The preprint document style provides three reference styles denoted A, B, and C, corresponding to letter labels, no labels, and arabic numbers respectively. The form of the `\cite` and `\key` commands for each style, and the output they produce, is as follows:

`\refstyle{A}`		`\refstyle{B}`		`\refstyle{C}`	
`\cite{DK}`	[DK]	`\cite{Smith 1989}`	[Smith 1989]	`\cite{19}`	[19]
`\key DK`	[DK]	(no key)	(no label)	`\key 19`	19.

The `\refstyle` command is normally placed in the preamble of a document.

The references are set with hanging indentation. The amount of indentation is preset to accommodate the most common case, two-digit numbers. It can be increased (or decreased) by specifying the widest label used in the references. For example,

```
\widestnumber\key{GHMR} % refstyle A
\widestnumber\key{999} % refstyle C --- 3 digits
```

will increase the indentation to accommodate the key [GHMR], or a three-digit number, respectively. You could also specify `\widestnumber\key{9}` to reduce the indentation from two digits' worth to one, if your bibliography has fewer than ten entries. As the examples show, you do not include square brackets, periods, font commands, or other such formatting when using `\widestnumber`. The indentation will be adjusted for these things automatically.

For consecutive references by the same author(s), `\by` is used for the first reference, with the author name(s) given in full, and `\bysame` is used for subsequent ones—just the command `\bysame` without repetition of the name(s). The horizontal line produced by `\bysame` has a fixed length of three ems.

Two variations, `\ed` and `\eds`, are provided for entering editor names, as with `\page` and `\pages`, because the note "ed." or "eds." is part of the automatic formatting. If `\by` is absent, the editor name(s) will be used in place of the author name.

For a proceedings volume, the place and date of the meeting can be recorded in the `\procinfo` field. Parentheses will be added.

There are two options for miscellaneous notes at the end of a reference, `\finalinfo` and `\miscnote`. `\miscnote` differs only by automatically adding parentheses; it would typically be used for a note such as "(preprint)" or "(submitted)" or "(to appear)". Because it's fairly common, the latter has its own command `\toappear` that is equivalent to `\miscnote to appear`.

`\lang` is used to indicate the original language for papers where bibliographic information has been translated or there is some other reason to believe that the original language cannot be correctly identified from information in the reference.

Sometimes several references are combined into one—for example, parts of a long paper that have been published separately. Another type of compound reference is a work cited both in the original and in translation. There are commands `\moreref` and `\transl` to handle such situations. After `\moreref` and `\transl`, any of the normal reference tags can be used again.

`\moreref` is used for citing, e.g., "part II" of an article; the `\moreref` command is followed by the desired additional tags and data. For example:

```
...\moreref\paper\rom{II}
\jour Comm. Pure Appl. Math. \vol 36
\yr 1983 \pages 571--594\endref
```

When using `\transl`, a note that describes the translation is normally entered between `\transl` and the next tag. The tags and data for the translated work then follow. For example:

```
...\transl English transl. \publ Birkh\"auser
\publaddr Basel \yr 1985 \endref
```

Automatic punctuation will be omitted if the pertinent field was included but left blank. Otherwise, the command `\nofrills` can be used to keep automatic punctuation from appearing. For example, `\bookinfo\nofrills...` suppresses the comma or other punctuation that would normally be added at the end of the `\bookinfo` information. `\nofrills` also suppresses other automatic formatting such as the word "eds." for `\eds`, the word "vol." for book volumes, or the parentheses around the year for journal articles. The ending period of a reference can be suppressed with `\finalinfo\nofrills`.

Some examples will illustrate the use of these tags. See Appendix A for samples of input and output. See also Appendix C of *The Joy of TEX* (first edition: Appendix B) for more information on references.

3. Mathematical Constructions

Wide Accents in Math Mode

In version 2.0+ of the AMSFonts, there are wider versions of the `\widehat` and `\widetilde` accents; they appear on lines (5) and (6):

(1)	`$\hat x, \tilde x$`	$\hat x, \tilde x$
(2)	`$\widehat x, \widetilde x$`	$\widehat x, \widetilde x$
(3)	`$\widehat{xy}, \widetilde{xy}$`	$\widehat{xy}, \widetilde{xy}$
(4)	`$\widehat{xyz}, \widetilde{xyz}$`	$\widehat{xyz}, \widetilde{xyz}$
(5)	`$\widehat{xyzu}, \widetilde{xyzu}$`	$\widehat{xyzu}, \widetilde{xyzu}$
(6)	`$\widehat{xyzuv}, \widetilde{xyzuv}$`	$\widehat{xyzuv}, \widetilde{xyzuv}$

These wider accents are in the `msbm` family. If `msbm` has been loaded, `\widehat` and `\widetilde` will automatically select these wider versions when required; otherwise, the characters on line (4) will be the largest available. If you are using the preprint style, `msbm` is loaded automatically; otherwise, see the section entitled **Fonts** for instructions on loading it.

4. Fonts

Additional fonts for $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX

A number of fonts were created for use with $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX 2.0+, both Computer Modern fonts in sizes not previously available and new fonts of alphabets and symbols intended to be used for mathematical notation. These fonts are in the collection AMSFonts Version 2.2. They must be installed on your computer before you can use $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX's preprint style or otherwise refer to them. Note that AMSFonts Version 2.2 cannot be used with versions of $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX earlier than Version 2.0, and $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX Version 2.2 cannot be used with versions of AMSFonts earlier than Version 2.0 (users of AMSFonts Version 2.0 are strongly encouraged to upgrade to Version 2.2).

Several of these fonts are loaded automatically by the preprint style and others can be loaded on demand. The fonts available and the commands used to load them are described below.

Fonts loaded with the preprint style. Several fonts are loaded automatically for general use.

- `cmcsc8` is an additional size of the Computer Modern small caps font.
- `cmex8` and `cmex7` are additional sizes of the Computer Modern math extension font. `cmex8` is used by the preprint style in abstracts and other eight-point environments; `cmex7` is used for all sub- and superscripts.

If `\PSAMSFonts` is specified (see Appendix C), scaled versions of the 10-point fonts are loaded instead (this is required for submission to AMS journals).

Math fonts loaded with the preprint style.

- `msam` and `msbm` contain extra symbols. The symbols and the names that will produce them are shown in the section **Symbol Names** below. If you are not using the preprint style, each can be loaded separately by `\loadmsam` or `\loadmsbm` as appropriate.
- `eufm` is the medium-weight Euler Fraktur (German) font. It can also be loaded by `\loadeufm` if the preprint style is not being used.

Math fonts loaded by `\loadbold`. See the sections below on **Bold Characters in Math Mode** and **Bold Greek Letters** for details on accessing particular characters in these fonts.

- `cmmib` is Computer Modern bold math italic. It also contains bold Greek.
- `cmbsy` contains Computer Modern bold math symbols.

Additional Euler fonts, for use in math, loaded by `\loadeu...`.

- `eufb` is bold Fraktur (`\loadeufb`).
- `eusm` is medium-weight script (`\loadeusm`).
- `eusb` is bold script (`\loadeusb`).
- `eurm` is medium-weight "cursive roman" (`\loadeurm`).
- `eurb` is bold "cursive roman" (`\loadeurb`).

Considerations and warnings. The commands to load these font files should be typed in the preamble area between the `\documentstyle{...}` line and the `\topmatter`. Each `\load...` command loads the pertinent fonts (including subscript sizes), assigns a "math family" for them, and defines a math font command. The names of the commands are the same as the font names: `\eufm`, `\eufb`, `\eusm`, `\eusb`, `\eurm`, and `\eurb`. These are used in the same way as `\roman` or `\bold`, e.g., `\eufb{M}` or `\eufb M`. $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX also defines a couple of synonyms, `\frak` and `\goth`, for `\eufm` (medium Euler Fraktur).

TEX can accommodate only sixteen font families in math mode; eight are already defined by plain TEX before $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX begins, and the preprint style loads three more (`msam`, `msbm`, and `eufm`), for a total of eleven. For this reason, you should load additional fonts with care, requesting only those you know for certain you will need.

All the fonts described here, and some others as well, are included in the collection AMSFonts Version 2.2, which is available from the AMS and other distributors. The math fonts mentioned here are all supplied in sizes from five through ten point, suitable for use in mathematical text.

If you intend to use the AMSFonts in PostScript Type 1 outline form, see Appendix C.

Bold Characters in Math Mode

Bold letters are obtained by `\bold` as described in *Joy.* In addition, bold symbols, italic, and lowercase Greek can be obtained once `\loadbold` appears in the file (this requires version 2.0+ of $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX and AMSFonts). Two control sequences are used for different kinds of bold symbols:

`\boldkey`	for symbols that actually appear on the keyboard
`\boldsymbol`	for symbols specified by a single control sequence

For example,

```
$\bold x \boldsymbol\in \boldsymbol\varGamma$
```

gives

$$\mathbf{x} \boldsymbol{\in} \boldsymbol{\varGamma}$$

[and `$\boldsymbol\lbrack a \boldsymbol\rbrack$` gives $\boldsymbol{[}a\boldsymbol{]}$, if you need to use `\lbrack` and `\rbrack` instead of the `[` and `]` keys].

More precisely, `\boldkey` can be used in math formulas in the following combinations:

- With any of the symbols

  $$+ \quad - \quad = \quad < \quad > \quad (\quad) \quad [\quad] \quad | \quad / \quad * \quad . \quad , \quad : \quad ; \quad ! \quad ?$$

  to give

  $$\boldsymbol{+} \quad \boldsymbol{-} \quad \boldsymbol{=} \quad \boldsymbol{<} \quad \boldsymbol{>} \quad \boldsymbol{(} \quad \boldsymbol{)} \quad \boldsymbol{[} \quad \boldsymbol{]} \quad \boldsymbol{|} \quad \boldsymbol{/} \quad \boldsymbol{*} \quad \boldsymbol{.} \quad \boldsymbol{,} \quad \boldsymbol{:} \quad \boldsymbol{;} \quad \boldsymbol{!} \quad \boldsymbol{?}$$

  But `\bold` cannot be used to get bold versions of these symbols. `$\bold+$` will give only the ordinary $+$, etc.

  The bold $\boldsymbol{+}$ and $\boldsymbol{-}$ will be binary operators, like the ordinary $+$ and $-$ symbols; the bold $\boldsymbol{=}$ will be a binary relation, like the ordinary $=$, etc.

- With letters:

`$\boldkey a$, ..., $\boldkey z$`	$\boldsymbol{a}, \dots, \boldsymbol{z}$
`$\boldkey A$, ..., $\boldkey Z$`	$\boldsymbol{A}, \dots, \boldsymbol{Z}$

  Notice that these are ***bold math italic*** letters, as opposed to the bold text letters $\mathbf{a}, \dots, \mathbf{z}$, $\mathbf{A}, \dots, \mathbf{Z}$ that you get by using `\bold` in math mode.

- With numerals:

`$\boldkey 0$, ..., $\boldkey 9$`	$\mathbf{0}, \dots, \mathbf{9}$

  However, these combinations simply give the same numerals that you get with `$\bold0$`, ... , `$\bold9$`.

The `\boldsymbol` construction can be used in any of the following combinations:

- With uppercase and lowercase Greek letters

`$\boldsymbol\Gamma$, ..., $\boldsymbol\Omega$`	$\boldsymbol{\Gamma}, \dots, \boldsymbol{\Omega}$
`$\boldsymbol\varGamma$, ..., $\boldsymbol\varOmega$`	$\boldsymbol{\varGamma}, \dots, \boldsymbol{\varOmega}$
`$\boldsymbol\alpha$, ..., $\boldsymbol\omega$`	$\boldsymbol{\alpha}, \dots, \boldsymbol{\omega}$

  In versions of $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX earlier than 2.0, bold unslanted uppercase Greek letters $\boldsymbol{\Gamma}, \dots, \boldsymbol{\Omega}$ were specified by `\boldGamma`, ... , `\boldOmega`; these control sequences have now disappeared.

- For convenience, `\boldsymbol` may also be followed by a letter (but not by a numeral or other character), giving the same result as `\boldkey`.

- You can also apply `\boldsymbol` to all the other standard symbols that are specified by single control sequences. For example, to get bold primes:

`$\boldsymbol\prime$`	$\boldsymbol{\prime}$
`$\boldsymbol A^{\boldsymbol\prime}$`	$\boldsymbol{A}^{\boldsymbol{\prime}}$

(But `\boldsymbol'`, using the shorthand notation for `\prime`, won't work.)

- You can apply `\boldsymbol` to "delimiters", such as

`$\boldsymbol\{ ... \boldsymbol\}$`	$\boldsymbol{\{}\dots\boldsymbol{\}}$
`$\boldsymbol\langle ... \boldsymbol\rangle$`	$\boldsymbol{\langle}\dots\boldsymbol{\rangle}$
`$\|, \boldkey\|, \\|, \boldsymbol\\|$`	$\vert, \boldsymbol{\vert}, \Vert, \boldsymbol{\Vert}$
`$\vert, \boldsymbol\vert, \Vert, \boldsymbol\Vert$`	$\vert, \boldsymbol{\vert}, \Vert, \boldsymbol{\Vert}$

However, you can't use `\boldsymbol` after `\left` and `\right`. In particular, typing `\left\boldsymbol| ... \right\boldsymbol|` will produce only error messages.

- Certain symbols on the bold fonts can't be accessed at all via `\boldkey` or `\boldsymbol`: These include bold versions $\boldsymbol{\mathcal{A}}, \dots, \boldsymbol{\mathcal{Z}}$ of the "calligraphic letters" $\mathcal{A}, \dots, \mathcal{Z}$ that you type as `\Cal A`, ... , `\Cal Z`, and bold versions **0**, ... , **9** of the oldstyle numbers 0, ... , 9 that you get with `\oldnos`. If you really need to have these symbols, you will have to enlist the aid of a TEXnician, or use `\pmb`.

Fraktur Font

The German Fraktur font, which is designed for use only in math mode, can be made available by typing `\loadeufm` in the preamble area of your paper. If you are using the preprint style, medium-weight Fraktur is loaded automatically. To produce a Fraktur letter, type

`$\frak g$`	$\mathfrak{g}$
`$\frak A$, \dots, $\frak Z$`	$\mathfrak{A}, \dots, \mathfrak{Z}$

Blackboard Bold

$\mathcal{AMS}$-TEX has a "blackboard bold" font, `\Bbb`. Like `\Cal`, it will work only in math mode, and only when applied to uppercase letters. This alphabet is part of the `msbm` font, and can be made available by typing `\loadmsbm` at the top of your file. (It is loaded automatically with the preprint style.)

`$\Bbb A, \Bbb C, \Bbb R$, etc.`	$\mathbb{A}, \mathbb{C}, \mathbb{R}$, etc.

Poor Man's Bold

$\mathcal{AMS}$-TEX now has boldface versions of most math symbols. However, if you need only one or two bold symbols and have run out of TEX capacity for new fonts or font families, you can always get a poor man's bold version of bold with `\pmb`, as described in *Joy*.

Bold Greek Letters

Bold Greek letters, both lowercase and uppercase, can be obtained by using the `\boldsymbol` construction, as described in **Bold Characters in Math Mode**. The upright uppercase bold Greek letters are part of the ordinary bold font and therefore extra font loading commands do not need to be used in order to get them. However, the lowercase and slanted uppercase bold Greek letters are not loaded automatically, so you must specify `\loadbold` before using them.

5. Symbol Names

The symbols in the `msam` and `msbm` fonts have been assigned "standard" control sequence names as shown below. All the symbol names are loaded automatically by the preprint style; if you are not using the preprint style, the command `\UseAMSsymbols` will have the same effect. This will add about 200 new control sequences to TEX's internal table. If you are short on space, or need only a few of the symbols, you can use a different approach to access just the ones you need. See the section **The `\newsymbol` command** below.

Special Symbols and Blackboard Bold Letters

Certain symbols from the `msam` family can be specified by control sequences that will be defined as soon as the command `\loadmsam` has appeared in the file.

First there are four symbols that are normally used outside of math mode:

✓	`\checkmark`	®	`\circledR`
✠	`\maltese`	¥	`\yen`

These symbols, like ¶, §, †, and ‡, can also be used in math mode, and will change sizes correctly in subscripts and superscripts.

Next are four symbols that are "delimiters" (although there are no larger versions obtainable with `\left` and `\right`), so they must be used in math mode:

$\ulcorner$	`\ulcorner`	$\urcorner$	`\urcorner`
$\llcorner$	`\llcorner`	$\lrcorner$	`\lrcorner`

Finally, two dashed arrows are constructed from symbols in this family. Note that one of them has two names; it can be accessed by either one:

$\dashrightarrow$	`\dashrightarrow`, `\dasharrow`	$\dashleftarrow$	`\dashleftarrow`

The Blackboard Bold letters $\mathbb{A}, \dots, \mathbb{Z}$ appear in the `msbm` family. Once `\loadmsbm` has appeared in the file, they can be typed (in math mode) as `\Bbb A`, ... , `\Bbb Z`.

The `msbm` family also contains wider versions of the `\widehat` and `\widetilde` as shown above in **Mathematical Constructions**.

The `\newsymbol` Command

All other symbols of the `msam` and `msbm` fonts must be named by control sequences so that they can be used (in math mode only) when the fonts are loaded. This can be done all at once by typing the instruction `\UseAMSsymbols`, which will load in the file `amssym.tex`. This instruction is included in the preprint style, so the names are assigned automatically, which requires over 200 control sequences.

If you are very short on space for control sequence names, and need only a few of these symbols, you can omit `\UseAMSsymbols`. Instead, assign only the names you will need by using a new $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX control sequence `\newsymbol` to create a control sequence that will properly produce this symbol. The control sequence can be either the "standard" name, as listed below, or one of your own choosing.

The list of symbols below shows for each symbol the symbol itself, a four-character "ID", and the "standard" name of the symbol. (The first character of the ID identifies the font family in which a symbol resides. Symbols from the `msam` family have `1` as the first character; symbols from the `msbm` family have `2` as the first character.) For example, the symbol $\nleqslant$ appears as

$\nleqslant$ `230A \nleqslant`

To produce a control sequence with this name, the instruction

```
\newsymbol\nleqslant 230A
```

appears in the file `amssym.tex`. This same instruction can be typed by a user who is not using the preprint style and has chosen not to load all the symbol names by `\UseAMSsymbols`. Thereafter, the control sequence `\nleqslant` will produce the symbol $\nleqslant$ (in math mode), and will act properly as a "binary relation".

A few symbols in these fonts replace symbols defined in `plain.tex` by combinations of symbols available in the Computer Modern fonts. These are `\angle` ($\angle$) and `\hbar` ($\hbar$) from the group "Miscellaneous symbols", and `\rightleftharpoons` ($\rightleftharpoons$) from the group "Arrows" below (and *Joy*, Appendix F). The new symbols will change sizes correctly in subscripts and superscripts, provided that you are using appropriate redefinitions. In order to use `\newsymbol` to replace an existing definition, the name must first be "undefined". Here are the lines you must put in your file if you are not using the preprint style or `\UseAMSsymbols` (which perform the redefinition automatically):

```
\undefine\angle
\newsymbol\angle 105C
\undefine\hbar
\newsymbol\hbar 207E
\undefine\rightleftharpoons
\newsymbol\rightleftharpoons 130A
```

These symbols are flagged in the tables below with a "(U)" as a reminder that they must be undefined.

Note in the tables that some symbols are shown with two names. In such cases, either one can be used to access the symbol.

• Lowercase Greek letters

$\digamma$	207A	`\digamma`	$\varkappa$	207B	`\varkappa`

• Hebrew letters

$\beth$	2069	`\beth`	$\gimel$	206A	`\gimel`
$\daleth$	206B	`\daleth`			

• Miscellaneous symbols

$\hbar$	207E	`\hbar` (U)	$\backprime$	1038	`\backprime`
$\hslash$	207D	`\hslash`	$\varnothing$	203F	`\varnothing`
$\vartriangle$	134D	`\vartriangle`	$\blacktriangle$	104E	`\blacktriangle`
$\triangledown$	104F	`\triangledown`	$\blacktriangledown$	1048	`\blacktriangledown`
$\square$	1003	`\square`	$\blacksquare$	1004	`\blacksquare`
$\lozenge$	1006	`\lozenge`	$\blacklozenge$	1007	`\blacklozenge`
$\circledS$	1073	`\circledS`	$\bigstar$	1046	`\bigstar`

$\angle$	105C	\angle (U)	$\sphericalangle$	105E	\sphericalangle
$\measuredangle$	105D	\measuredangle			
$\nexists$	2040	\nexists	$\complement$	107B	\complement
$\mho$	2066	\mho	$\eth$	2067	\eth
$\Finv$	2060	\Finv	$\diagup$	201E	\diagup
$\Game$	2061	\Game	$\diagdown$	201F	\diagdown
$\Bbbk$	207C	\Bbbk			

• **Binary operators**

$\dotplus$	1275	\dotplus	$\ltimes$	226E	\ltimes
$\smallsetminus$	2272	\smallsetminus	$\rtimes$	226F	\rtimes
$\Cap$	1265	\Cap, \doublecap	$\leftthreetimes$	1268	\leftthreetimes
$\Cup$	1264	\Cup, \doublecup	$\rightthreetimes$	1269	\rightthreetimes
$\barwedge$	125A	\barwedge	$\curlywedge$	1266	\curlywedge
$\veebar$	1259	\veebar	$\curlyvee$	1267	\curlyvee
$\doublebarwedge$	125B	\doublebarwedge			
$\boxminus$	120C	\boxminus	$\circleddash$	127F	\circleddash
$\boxtimes$	1202	\boxtimes	$\circledast$	127E	\circledast
$\boxdot$	1200	\boxdot	$\circledcirc$	127D	\circledcirc
$\boxplus$	1201	\boxplus	$\centerdot$	1205	\centerdot
$\divideontimes$	223E	\divideontimes	$\intercal$	127C	\intercal

• **Binary relations**

$\leqq$	1335	\leqq	$\geqq$	133D	\geqq
$\leqslant$	1336	\leqslant	$\geqslant$	133E	\geqslant
$\eqslantless$	1330	\eqslantless	$\eqslantgtr$	1331	\eqslantgtr
$\lesssim$	132E	\lesssim	$\gtrsim$	1326	\gtrsim
$\lessapprox$	132F	\lessapprox	$\gtrapprox$	1327	\gtrapprox
$\approxeq$	2375	\approxeq			
$\lessdot$	236C	\lessdot	$\gtrdot$	236D	\gtrdot
$\lll$	136E	\lll, \llless	$\ggg$	136F	\ggg, \gggtr
$\lessgtr$	1337	\lessgtr	$\gtrless$	133F	\gtrless
$\lesseqgtr$	1351	\lesseqgtr	$\gtreqless$	1352	\gtreqless
$\lesseqqgtr$	1353	\lesseqqgtr	$\gtreqqless$	1354	\gtreqqless
$\doteqdot$	132B	\doteqdot, \Doteq	$\eqcirc$	1350	\eqcirc
$\risingdotseq$	133A	\risingdotseq	$\circeq$	1324	\circeq
$\fallingdotseq$	133B	\fallingdotseq	$\triangleq$	132C	\triangleq
$\backsim$	1376	\backsim	$\thicksim$	2373	\thicksim
$\backsimeq$	1377	\backsimeq	$\thickapprox$	2374	\thickapprox
$\subseteqq$	136A	\subseteqq	$\supseteqq$	136B	\supseteqq
$\Subset$	1362	\Subset	$\Supset$	1363	\Supset
$\sqsubset$	1340	\sqsubset	$\sqsupset$	1341	\sqsupset
$\preccurlyeq$	1334	\preccurlyeq	$\succcurlyeq$	133C	\succcurlyeq
$\curlyeqprec$	1332	\curlyeqprec	$\curlyeqsucc$	1333	\curlyeqsucc
$\precsim$	132D	\precsim	$\succsim$	1325	\succsim
$\precapprox$	2377	\precapprox	$\succapprox$	2376	\succapprox
$\vartriangleleft$	1343	\vartriangleleft	$\vartriangleright$	1342	\vartriangleright

$\trianglelefteq$	1345	`\trianglelefteq`	$\trianglerighteq$	1344	`\trianglerighteq`
$\vDash$	130F	`\vDash`	$\Vdash$	130D	`\Vdash`
$\Vvdash$	130E	`\Vvdash`			
$\smallsmile$	1360	`\smallsmile`	$\shortmid$	2370	`\shortmid`
$\smallfrown$	1361	`\smallfrown`	$\shortparallel$	2371	`\shortparallel`
$\bumpeq$	136C	`\bumpeq`	$\between$	1347	`\between`
$\Bumpeq$	136D	`\Bumpeq`	$\pitchfork$	1374	`\pitchfork`
$\varpropto$	135F	`\varpropto`	$\backepsilon$	237F	`\backepsilon`
$\blacktriangleleft$	134A	`\blacktriangleleft`	$\blacktriangleright$	1349	`\blacktriangleright`
$\therefore$	1329	`\therefore`	$\because$	132A	`\because`

• **Negated relations**

$\nless$	2304	`\nless`	$\ngtr$	2305	`\ngtr`
$\nleq$	2302	`\nleq`	$\ngeq$	2303	`\ngeq`
$\nleqslant$	230A	`\nleqslant`	$\ngeqslant$	230B	`\ngeqslant`
$\nleqq$	2314	`\nleqq`	$\ngeqq$	2315	`\ngeqq`
$\lneq$	230C	`\lneq`	$\gneq$	230D	`\gneq`
$\lneqq$	2308	`\lneqq`	$\gneqq$	2309	`\gneqq`
$\lvertneqq$	2300	`\lvertneqq`	$\gvertneqq$	2301	`\gvertneqq`
$\lnsim$	2312	`\lnsim`	$\gnsim$	2313	`\gnsim`
$\lnapprox$	231A	`\lnapprox`	$\gnapprox$	231B	`\gnapprox`
$\nprec$	2306	`\nprec`	$\nsucc$	2307	`\nsucc`
$\npreceq$	230E	`\npreceq`	$\nsucceq$	230F	`\nsucceq`
$\precneqq$	2316	`\precneqq`	$\succneqq$	2317	`\succneqq`
$\precnsim$	2310	`\precnsim`	$\succnsim$	2311	`\succnsim`
$\precnapprox$	2318	`\precnapprox`	$\succnapprox$	2319	`\succnapprox`
$\nsim$	231C	`\nsim`	$\ncong$	231D	`\ncong`
$\nshortmid$	232E	`\nshortmid`	$\nshortparallel$	232F	`\nshortparallel`
$\nmid$	232D	`\nmid`	$\nparallel$	232C	`\nparallel`
$\nvdash$	2330	`\nvdash`	$\nvDash$	2332	`\nvDash`
$\nVdash$	2331	`\nVdash`	$\nVDash$	2333	`\nVDash`
$\ntriangleleft$	2336	`\ntriangleleft`	$\ntriangleright$	2337	`\ntriangleright`
$\ntrianglelefteq$	2335	`\ntrianglelefteq`	$\ntrianglerighteq$	2334	`\ntrianglerighteq`
$\nsubseteq$	232A	`\nsubseteq`	$\nsupseteq$	232B	`\nsupseteq`
$\nsubseteqq$	2322	`\nsubseteqq`	$\nsupseteqq$	2323	`\nsupseteqq`
$\subsetneq$	2328	`\subsetneq`	$\supsetneq$	2329	`\supsetneq`
$\varsubsetneq$	2320	`\varsubsetneq`	$\varsupsetneq$	2321	`\varsupsetneq`
$\subsetneqq$	2324	`\subsetneqq`	$\supsetneqq$	2325	`\supsetneqq`
$\varsubsetneqq$	2326	`\varsubsetneqq`	$\varsupsetneqq$	2327	`\varsupsetneqq`

• **Arrows**

$\leftleftarrows$	1312	`\leftleftarrows`	$\rightrightarrows$	1313	`\rightrightarrows`
$\leftrightarrows$	131C	`\leftrightarrows`	$\rightleftarrows$	131D	`\rightleftarrows`
$\Lleftarrow$	1357	`\Lleftarrow`	$\Rrightarrow$	1356	`\Rrightarrow`
$\twoheadleftarrow$	1311	`\twoheadleftarrow`	$\twoheadrightarrow$	1310	`\twoheadrightarrow`
$\leftarrowtail$	131B	`\leftarrowtail`	$\rightarrowtail$	131A	`\rightarrowtail`
$\looparrowleft$	1322	`\looparrowleft`	$\looparrowright$	1323	`\looparrowright`

$\leftrightharpoons$	130B	`\leftrightharpoons`	$\rightleftharpoons$	130A	`\rightleftharpoons` (U)
$\curvearrowleft$	2378	`\curvearrowleft`	$\curvearrowright$	2379	`\curvearrowright`
$\circlearrowleft$	1309	`\circlearrowleft`	$\circlearrowright$	1308	`\circlearrowright`
$\Lsh$	131E	`\Lsh`	$\Rsh$	131F	`\Rsh`
$\upuparrows$	1314	`\upuparrows`	$\downdownarrows$	1315	`\downdownarrows`
$\upharpoonleft$	1318	`\upharpoonleft`	$\upharpoonright$	1316	`\upharpoonright`, `\restriction`
$\downharpoonleft$	1319	`\downharpoonleft`	$\downharpoonright$	1317	`\downharpoonright`
$\multimap$	1328	`\multimap`			
$\leftrightsquigarrow$	1321	`\leftrightsquigarrow`	$\rightsquigarrow$	1320	`\rightsquigarrow`

• Negated arrows

$\nleftarrow$	2338	`\nleftarrow`	$\nrightarrow$	2339	`\nrightarrow`
$\nLeftarrow$	233A	`\nLeftarrow`	$\nRightarrow$	233B	`\nRightarrow`
$\nleftrightarrow$	233D	`\nleftrightarrow`	$\nLeftrightarrow$	233C	`\nLeftrightarrow`

6. Other Things You Ought to Know

Errata to *The Joy of TEX* prior to $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX 2.0

The file `joyerr.tex` contains the full list of errata for the first edition of *The Joy of TEX*, for versions of $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX earlier than version 2.0; `joyerr2.tex` contains the errata for the second edition. A user who desires a typeset copy of this file may run it through TEX and print out the `.dvi` file. This will require Version 2.0+ of $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX and `amsppt.sty`, and also AMSFonts Version 2.0+ (users of AMSFonts Version 2.0 are strongly encouraged to upgrade to Version 2.2).

Acknowledging the Use of $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX

The following are suggested as appropriate statements of acknowledgment that $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX has been used to format a document for publication. It is not required that such an acknowledgment be made.

A single paper may include the following at the bottom of the first page:

> Typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX

(This notation is provided automatically by the $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX preprint style. It can be suppressed by the command `\nologo` in the preamble.)

If an entire journal or book is prepared with $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX, the following statement can be placed on its copyright page:

> This [journal/book] was typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX, the TEX macro system of the American Mathematical Society.

If only selected papers in a journal or book are set with $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX, these papers may be identified as shown above, and the following may be placed on the copyright page:

> $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX is the TEX macro system of the American Mathematical Society.

7. Getting Help

If you should find any bugs in the macros or documentation, send a Problem Report to:

Technical Support
American Mathematical Society
P. O. Box 6248
Providence, RI 02940
Phone: 800-321-4AMS (4267) or 401-455-4080
E-mail: tech-support@ams.org

A Problem Report should contain the following information:

(1) version and date of `amstex.tex` and of `amsppt.sty` with which the problem occurred;
(2) a detailed description of the problem;
(3) a brief input file which includes the input code for one or more examples that illustrate the problem;
(4) a log file of the TEX session for the input file showing the problem.

References

Knuth, Donald E. *The TEXbook.* Reading: Addison Wesley, 1986.
Spivak, Michael D. *The Joy of TEX*, 2nd (revised) edition, American Mathematical Society, Providence, 1990.
Instructions for Preparation of Papers and Monographs: $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX, version 2.2, American Mathematical Society, Providence, 2001.

Appendix A. Sample Bibliography Input and Output

```
\Refs
\ref\key 4 % assuming \refstyle{C}
\by V. I. Arnol$'$d, A. N. Varchenko,
 and S. M. Guse\u\i n-Zade
\book Singularities of differentiable maps.~\rom I
\publ ``Nauka'' \publaddr Moscow \yr 1982
\lang Russian
\endref

\ref\key 5\bysame
\book Singularities of differentiable maps.~\rom{II}
\publ ``Nauka'' \publaddr Moscow \yr 1984
\lang Russian
\endref

\ref\key 6
\by O. A. Ladyzhenskaya
\book Mathematical problems in the dynamics
 of a viscous incompressible fluid
\bookinfo 2nd rev. aug. ed.
\publ ``Nauka'' \publaddr Moscow \yr 1970
\lang Russian
\transl English transl. of 1st ed.
\book The mathematical theory of viscous
 incompressible flow
\publ Gordon and Breach \publaddr New York
\yr 1963; rev. 1969
\endref
```

```
\ref\key 7
\by P. D. Lax and C. D. Levermore
\paper The small dispersion limit for the
 KdV equation.~\rom I
\jour Comm. Pure Appl. Math. \vol 36 \yr 1983
\pages 253--290 \finalinfo (overview)
\moreref\paper \rom{II}
\jour Comm. Pure Appl. Math.
\vol 36 \yr 1983 \pages 571--594
\moreref\paper \rom{III}
\jour Comm. Pure Appl. Math.
\vol 36 \yr 1983 \pages 809--829 \endref

\ref\key 10 \by S. Osher
\paper Shock capturing algorithms for equations of
 mixed type
\inbook Numerical Methods for Partial Differential
 Equations \eds S. I. Hariharan and T. H. Moulton
\publ Longman \publaddr New York \yr 1986
\pages 305--322
\endref

\ref\key 17 \by G. S. Petrov
\paper Elliptic integrals and their nonoscillatory
 behavior
\jour Funktsional. Anal. i Prilozhen.
\vol 20 \yr 1986 \pages 46--49
\transl\nofrills English transl. in
\jour Functional Anal. Appl. \vol 20\yr 1986
\endref
```

```
% switch to a different references style
\refstyle{A}
\widestnumber\key{GHMR}

\ref\key C1
\by B. Coomes
\book Polynomial flows, symmetry groups, and
 conditions sufficient for injectivity of maps
\bookinfo Ph.D. thesis, Univ. Nebraska--Lincoln
\yr 1988
\endref

\ref\key C2
\bysame % B. Coomes
\paper The Lorenz system does not have a
 polynomial flow
\jour J. Differential Equations
\toappear
\endref

\ref\key GHMR
\by J. Guckenheimer, P. Holmes, M. Martineau,
 and L. P. Robinson
\book Nonlinear oscillations, dynamical systems,
 and bifurcations of vector fields
\bookinfo % fields can be left blank
\publ Springer-Verlag \publaddr New York
\yr 1983
\endRefs
```

References

4. V. I. Arnol′d, A. N. Varchenko, and S. M. Guseĭn-Zade, *Singularities of differentiable maps.* I, "Nauka", Moscow, 1982. (Russian)
5. ———, *Singularities of differentiable maps.* II, "Nauka", Moscow, 1984. (Russian)
6. O. A. Ladyzhenskaya, *Mathematical problems in the dynamics of a viscous incompressible fluid*, 2nd rev. aug. ed., "Nauka", Moscow, 1970 (Russian); English transl. of 1st ed., *The mathematical theory of viscous incompressible flow*, Gordon and Breach, New York, 1963; rev. 1969.

7. P. D. Lax and C. D. Levermore, *The small dispersion limit for the KdV equation.* I, Comm. Pure Appl. Math. **36** (1983), 253–290, (overview); II, Comm. Pure Appl. Math. **36** (1983), 571–594; III, Comm. Pure Appl. Math. **36** (1983), 809–829.
10. S. Osher, *Shock capturing algorithms for equations of mixed type*, Numerical Methods for Partial Differential Equations (S. I. Hariharan and T. H. Moulton, eds.), Longman, New York, 1986, pp. 305–322.
17. G. S. Petrov, *Elliptic integrals and their nonoscillatory behavior*, Funktsional. Anal. i Prilozhen. **20** (1986), 46–49; English transl. in Functional Anal. Appl. **20** (1986).

[C1] B. Coomes, *Polynomial flows, symmetry groups, and conditions sufficient for injectivity of maps*, Ph.D. thesis, Univ. Nebraska–Lincoln, 1988.

[C2] ———, *The Lorenz system does not have a polynomial flow*, J. Differential Equations (to appear).

[GHMR] J. Guckenheimer, P. Holmes, M. Martineau, and L. P. Robinson, *Nonlinear oscillations, dynamical systems, and bifurcations of vector fields*, Springer-Verlag, New York, 1983.

Appendix B
Installation Procedures

B.1. Introduction

The $\mathcal{A}\mathcal{M}\mathcal{S}$-TeX software can be used with any implementation of TeX. Many TeX distributions include $\mathcal{A}\mathcal{M}\mathcal{S}$-TeX, ready to run; check the documentation that came with the TeX distribution you are using. When a new version of $\mathcal{A}\mathcal{M}\mathcal{S}$-TeX is released, all distributors are notified, so if your TeX system is up to date, it is likely that you don't need to do anything at all.

Most up-to-date TeX installations are organized according to the TeX Directory Structure (TDS). This is a tree structure whose root is identified as something like `/usr/local/share/texmf` or `c:\sw\texmf`. In the following instructions, we will use the name `TEXMF` to identify the root directory of a TDS or similar structure.

When installing a new release of $\mathcal{A}\mathcal{M}\mathcal{S}$-TeX, you may want to first back up your old version, if you have existing documents that use it. Although new releases are intended to be backward compatible, a backup provides insurance in case something goes wrong.

B.2. Location of $\mathcal{A}\mathcal{M}\mathcal{S}$-TeX Files in a TDS Tree

Files in the $\mathcal{A}\mathcal{M}\mathcal{S}$-TeX distribution fall into four categories: files for use with TeX, source files, documentation, and formats. The following list shows all the files in the current distribution, along with their recommended locations in a TDS tree.

```
TEXMF/
  tex/amstex/base/
    amstex.tex
    amstex.ini
    amsppt.sty
    amsppt.sti
    amsppt1.tex
  tex/plain/amsfonts/
    amssym.def
    amssym.tex
  source/amstex/
    README
    amsppt.doc
    amstex.bug
  doc/ams/amstex/
    amsguide.tex
    amsguide.ps
    amsppt.faq
    amstinst.tex
    amstinst.ps
    joyerr.tex
    joyerr2.tex
  ⟨TeX-implementation⟩/formats/
    amstex.fmt
```

The $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX distribution can be retrieved in bundled form from the AMS web site, e.g., as a `.zip` or `.tar` file. In this form, the files are already arranged according to the TDS structure. (The format file is not included in the distribution. It is platform-specific, and must be created as part of the installation; see below.) To install the collection from a TDS-formatted bundle, place the bundled file into a convenient directory and unpack it using the `TEXMF` directory as the "Extract to" target. Some examples:

WinZip:	Click on "Extract" and then in the "Extract to" box, enter `\sw\texmf` (or whatever TEXMF is on your system)
gzip:	`gzip -dc amstex.tgz | (cd TEXMF; tar xvf -)`
unzip:	`unzip amstex2.zip -d TEXMF`

The bundled file may be deleted after unpacking.

If the files are obtained from CTAN (where they are mirrored from the AMS server), they are not in TDS order. Use the above list to place the files into the proper location.

Note: If you currently have any of the following files from very old releases of $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX, delete them before installing the new release. They are either irrelevant or superseded in the new version of $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX, and it is best to remove them to avoid confusion. If you back up your existing $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX files before installing the new version, these files should be included.

`amsfil.chg`	`amsplain.tex`	`amsppt.mor`	`amstex.chg`
`cyracc.def`	`cyrmemo.def`	`cyrmemo.tex`	`amsplain.fmt`

The TFM files for some of AMSFonts 2.2 (`msam*`, `msbm*`, and `eufm*`) are needed to run $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX with the AMSPPT document style, even if you don't plan to actually print anything using the AMSFonts. (These fonts *are* needed to process and print the User's Guide of which this appendix is a part.) TFM files are available from the AMS web site, `www.ams.org/tex/amsfonts.html`, or by anonymous FTP from `ftp.ams.org`. They should be placed in the directory `TEXMF/fonts/tfm/ams/`.

B.3. What if Your TEX System Isn't in a TDS Tree?

If your TEX system is arranged in some other way, you must consult the user documentation for guidance. The hints that follow are just that—hints. If your TEX system documentation recommends something different, you should follow that procedure.

We recommend placing $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX files into distinct subdirectories or folders, to simplify installation of future versions.

First, determine where TEX will look for files to be input. If `amstex.tex` and `amssym.def` are already present, place the files listed in section B.2 under `tex/amstex/base/` and `tex/plain/amsfonts/` into those same areas. If neither of these files is already present, look for the file `plain.tex`. Create appropriate subdirectories under the area where you find this file for the new $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX files.

If there isn't any obvious place to put source or documentation files (the ones listed in section B.2 under `source/amstex/` and `doc/ams/amstex/`), you can put them in with the input files. Consult the documentation for your TEX distribution.

Once all the files are installed, you are ready to create a format file.

B.4. Creating a Format File

Every implementation of TEX uses format files to preload the macros, fonts, and hyphenation patterns that define basic user environments such as $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX. Although it is not strictly necessary to use a format file for $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX, preloading will save startup time, especially on slower systems. Note: Each format file takes up 150K–300K of disk space (depending on your TEX implementation).

If your TEX system already includes the format file `amstex.fmt`, you may not have to create a new one; recent changes to `amstex.tex` are cosmetic, and will not affect any math formatting features. If the AMSPPT preprint style has been included in the format, then a new format file is in order. (We recommend using the name `amsppt.fmt` for a format file with AMSPPT preloaded so that there is no question which is present; see below.)

Creating a format file (also known as "initialization") requires a special version of TEX, a particular switch, or item in a menu. Read the documentation for your TEX distribution to learn how to create a format file.

Before creating your format file, you will want to consider whether you habitually use the AMSPPT document style. If you use other document styles rarely or never, then you would benefit from the use of a format file with `amsppt.sty` preloaded. If you are likely to use other document styles periodically, then you probably do not want to preload `amsppt.sty`. To make a simple $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX format file, proceed with the next paragraph. To make a format file with `amsppt.sty` preloaded, edit the file `amstex.ini` and remove the percent sign (comment character) at the beginning of the line `%\documentstyle{amsppt}`, just before the `\dump` command. Save this file with the name `amsppt.ini`.

If you intend to use Type 1 outline versions of AMSFonts, read Appendix C before proceeding. Users of *Textures* will have to comment out one more `\input` statement; read the instructions.

Update the file name database (if one is used) so that TEX will be able to find `amstex.ini` (or `amsppt.ini`) and the other files. This may be done by a command such as `texhash` or via a menu option. Consult the documentation for your TEX distribution for instructions on how to perform this update.

Now run the "initialization" version of TEX on `amstex.ini` (or `amsppt.ini`). This will create an $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX format file named `amstex.fmt` (or `amsppt.fmt`). Some implementations of TEX will automatically place the format file in the proper directory; otherwise you should move this file manually into the TEX formats directory. Once again update the file name database to make the format file visible to TEX.

B.5. Using $\mathcal{A}_{\mathcal{M}}\mathcal{S}$-TEX 2.0+

With some TEX implementations, a format file can be specified by preceding its name with an ampersand:

`tex &amstex filename` ⟨*return*⟩

Other implementations treat the name of the format file as a command:

`amstex filename` ⟨*return*⟩

Still other implementations allow the installation of this name as a menu option. For details of how to use format files with your implementation of TEX, see your documentation.

B.5. Getting a printed copy of the User's Guide

The $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX User's Guide can be obtained as a PDF file from the AMS web site. It is also included in the distribution as a PostScript file, ready to print (`amsguide.ps`). Or, you can use your newly created $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX or AMSPPT format file to typeset the file `amsguide.tex`; even if you print out this guide from another source, we recommend using the file `amsguide.tex` as a test to make sure that your newly installed $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX is working properly.

Appendix C
Before Installing $\mathcal{A}\kern-.1667em\lower.5ex\hbox{$\mathcal{M}$}\kern-.125em\mathcal{S}$-TEX: Facts About Fonts

C.1. Using AMSFonts in PostScript Type 1 Form

The AMSFonts Version 2.2 have been converted to PostScript Type 1 outlines in two forms:

The AMS web site (`www.ams.org/tex/type1-fonts.html`) holds the canonical distribution. This is a collection containing all the typefaces, but only in 5, 7, and 10 point sizes; other sizes must be created by scaling. The AMS-TEX preprint style provides a way for authors to indicate that fonts should be loaded under this alternative scaling convention. If you are using this version of AMSFonts, insert the line `\PSAMSFonts` in the preamble of your file, before the `\topmatter` line; see section C.3, below, for instructions on making this your local default.

Basil Malyshev has created a collection, called BaKoMa, containing the Computer Modern fonts as well as all sizes of the AMSFonts used in mathematics, but excluding the `wncy*` cyrillic fonts. The BaKoMa fonts can be used with no special action; however, for papers or monographs to be published by the AMS, `\PSAMSFonts` should be specified.

C.2. Using AMS Symbol Fonts

The preprint style automatically loads the Fraktur font (`eufm`) and both fonts of extra symbols (`msam` and `msbm`), as well as all the symbol names, as described in the sections **Fonts** and **Symbol Names**. If these will not be used, and you want a version of `amsppt.sty` that requires less memory than the default version, you can suppress the loading of these resources. If `amsppt.sty` is to be included in your format file, you must make this change before creating the format file. See the next section for instructions.

C.3 Setting Local Default Options

An "initialization file", `amsppt.sti`, contains settings for some options that a user may wish to change locally. This file is read in automatically by `amsppt.sty`.

Two lines in `amsppt.sti` affect the inclusion of AMS symbol fonts:

```
\loadeufm \loadmsam \loadmsbm
\message{symbol names}\UseAMSsymbols\message{,}
```

To use `amsppt.sty` without AMSFonts, comment out both lines (place a `%` at the beginning of each line); to disable just the symbol names, comment out the second line. In either case, remove the `%` sign from the beginning of the line

```
%\define\square{\vrule width.6em height.5em depth.1em\relax}
```

This is required for using `\qed` to indicate end of proof. Extra math symbols can be loaded on demand with `\newsymbol` or by including `\UseAMSsymbols` in the preamble of a particular document.

In order to make the Type 1 versions of the AMSFonts as distributed from the AMS web site your local default, activate the line

```
%\PSAMSFonts
```

by removing the `%` sign from the beginning of the line.