私立文系初級 LaTeX ユーザーが訳してみた初級 LaTeX ユーザーのための

実用 TeX 入門の入門〔抄〕

❀ 別冊付録 ❀

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第 1 章　plain TEX

『改訂新版　TEX ブック　コンピュータによる組版システム』
ドナルド・クヌース〔鷲谷好輝訳〕（アスキー・1992 年）

3　TEX を扱うには（11–19 頁）

TEX は約 900 個のコントロール・シーケンスを，もともと組み込まれた命令として理解している。このコントロール・シーケンスについては，すべて本書の中で説明しているが，複雑な文書でなければ，ほとんどのコントロール・シーケンスはまったく必要ないであろう。そのため，900 個もの命令について思い悩む必要はない。さらに，実際に憶えなければならないコントロール・シーケンスは，いくつかの種類に分けることができるので，それほど無理なく理解できるだろう。数式に使われる特別な記号は記号名と同じ名前がつけられているものが多い。たとえば，`\pi` と入力すると π が出力される。また Π は `\Pi` と入力すればよい。$\aleph$ は `\aleph` と入力し，∞ は `\infty`，$\le$ は `\le`，$\neq$ は `\ne`，$\oplus$ は `\oplus`，$\otimes$ は `\otimes` と入力すれば出力することができる。Appendix F にこのような記号を一覧表にして載せてある。

コントロール・シーケンスの名前では，大文字と小文字はもともと独立しているので，たとえば，`\pi` と `\Pi` と `\PI` と `\pI` は，それぞれ違うコントロール・ワードとみなされる。

TEX が理解できるのは 900 個ほどのコントロール・シーケンスだけではない。というのは，読者がさらに自分で命令を定義することが簡単にできるからである。TEX の数学記号を好きな名前に置き換えて，なじみやすくしたいときには，TEX ではそれが自由にでき，実際に置き換えてかまわない。定義の方法については，第 20 章に説明してある。

TEX がもつこうしたコントロール・シーケンスのうち，約 300 個は “プリミティブ（primitive）” と呼ばれる命令である。プリミティブは，それ以上単純な機能に分解できない低レベルで原始的な命令である。プリミティブ以外のコントロール・シーケンスは，結局のところプリミティブをいくつか用いて定義された命令なのである。たとえば，`\input` はプリミティブであるが，`\'` や `\"`はプリミティブではない。この 2 つは `\accent` というプリミティブを用いて定義された命令である。

普通のユーザーが原稿の中に TEX のプリミティブを使用する機会はほとんどない。というのは，プリミティブは…そう…**プリミティブ**だからだ。低レベルの命令を使用して TEX を扱おうとすると，たくさんの命令を入力しなければならない。そうすると時間もかかるし，間違いも犯しやすくなってしまう。そのため多くの命令を入力するよりも，どの機能を使うかを指示する高レベルなコントロール・シーケンスを使用する方がよい。こういう高レベルなコントロール・シーケンスは，プリミティブを用いて一度定義しておくだけでよいのである。たとえば，`\TeX` は “TEX というロゴを組版せよ” という意味のコントロール・シーケンスであり，また `\'` は “アクセント記号を次の文字の上に置け” というコントロール・シーケンスである。確かにどちらのコントロール・シーケンスも，書体が変わればプリミティブの組合せも変える必要があるが，TEX のロゴを変える場合には，著者は，ロゴを定義している命令を 1 箇所変えるだけで済むようにしてある。そうすれば，必要なところがすべて自動的に変更されるからである。これに対して，ロゴマークが出てくるたびに，一連のプリミティブを用いて記述していたとすると，それを変更するには非常な労力を必要とするだろう。（16–17 頁）

〔中 略〕

以降の章では “plain TEX” の書式について主に取り上げる。plain TEX は，Appendix B に定義されている約 600 個の基本的なコントロール・シーケンスの集まりで，300 個近くのプリミティブとともに，TEX が原稿を処理するときに利用される。TEX が約 900 個ものコントロール・シーケンスを理解して処理行うと述べたのはこのためである。TEX システムで使用できる書体を用いて，どんな要求にも合う融通性のある書式で文書を作成するときに，plain TEX がどのように使われているか見ていくことにしよう。しかし，plain TEX は TEX のプリミティブを基にして設計された，無数にある書式の 1 つでしかないことを心に留めておいていただきたい。もっとほかの書式にしたい場合には，ユーザーが望むどんな書式でも取り扱えるように TEX を変更できるのである。だが，TEX を学ぶ最良の方法は，まず plain TEX から始めて，慣れるにしたがって少しずつ TEX の定義を変更していくことだろう。（18 頁）

Appendix B 基本的なコントロール・シーケンス（459–493 頁）

以降，この Appendix では，plain TEX の書式について詳しく説明しよう。plain TEX の書式は，通常の TEX をインプリメントしたときに，そのままま使用できるマクロの集まりである。このマクロは 3 つの基本的な目的をもっている。(1) TEX のもつプリミティブ命令で行えることは，非常に低レベルな操作でしかないので，このようなマクロを定義することによって，TEX を便利なシステムにしている。マクロが何も定義されていないバージンの TEX システムは，現実の世界について，非常に多くのことを知らなければならない生まれたての赤ん坊のようなものである。しかし，バージンの TEX は素早くそのようなことを憶えられるようになっている。(2) plain TEX のマクロには個人の趣味やアプリケーションに応じて，より複雑でより強力な書式に作り換えられる基本的な命令が備わっている。そのため，plain TEX を使用すると，変化に富んだ多くの文書を組めるようになっている。しかし，使い始めるとすぐに，もっと多くのことを行いたくなるであろう。(3) このマクロは，別の書式の作成方法も示す役割を果たしている。

`plain.tex` と呼ばれるファイルが，使用しているコンピュータ・システムにあるはずである。このファイルには，TEX システムに何が事前に読み込まれている（ロードされている）かが定義されている。この Appendix では `plain.tex` ファイルの内容について述べることにしよう。しかし，ファイルのある部分はあまりにも退屈であり，また実際のマクロは，メモリ空間や実行時間を考慮して “最適化” されているので，一字一句の説明は行わないことにする。また，このマクロの最適化されていないバージョンの方が理解しやすいので，実際には最適化されたマクロではなく，最適化されていないマクロを説明することにしよう。`plain.tex` には，マシン上ではもっとうまく動作する同等の構成が含まれていることを忘れないでほしい。

次のようにこの Appendix B を進めていくことにしよう。`plain.tex` を部分ごとに少し手を加えて示しながら，詳述に値する部分にはコメントをつけ，一通り見ていくことにする。これまでに使い方を説明していないマクロ ——たとえば，`\vglue` と `\beginsection` マクロは，第 1 章から第 27 章では説明していない—— については，ユーザーの立場から考えてみることにしよう。しかし，ほとんどは，マクロ作成者の立場から問題を見ていくことになるだろう。（464 頁）

…として，以下のような順番で，“`plain.tex`” の中味について，縷々説明が行われています：

1. コード表（*l.* 11–）
2. レジスタの割当て（*l.* 152–）
3. パラメータ（*l.* 273–）
4. フォント情報（*l.* 393–）
5. 文書用マクロ（*l.* 494–）
6. 数式用マクロ（*l.* 726–）
7. 出力ルーチン用マクロ（*l.* 1140）
8. ハイフネーションとその他（*l.* 1218–）

説明部分を転写するのは面倒なので，以下では “`plain.tex`” をただ listings に流し込んでいるだけです（英語でもよければ，“`texbook.tex`” の 18852 行以降をそのまま読むか，または〔ホントはやってはいけないのですが〕こっそりとタイプセットして “Appendix B” を読むという手も一応あります．なお，以下の警告にもご注意）。

Copyright Infringement

(`http://www-cs-faculty.stanford.edu/~knuth/abcde.html`)

The source file `texbook.tex` for *The TeXbook* has been available for many years, and it begins with the following lines:

```
% This manual is copyright (C) 1984 by the American Mathematical Society.
% All rights are reserved!
% The file is distributed only for people to see its examples of TeX input,
% not for use in the preparation of books like The TeXbook.
% Permission for any other use of this file must be obtained in writing
% from the copyright holder and also from the publisher (Addison-Wesley).
\loop\iftrue
\errmessage{This manual is copyrighted and should not be TeXed}\repeat
```

From time to time, however, people have flagrantly violated these instructions, and posted PDF files of *The TeXbook* on the Internet.

Which of the words in those perfectly clear instructions do the people who do such things fail to understand? Please, if you happen to see illicit copies of these books, send a note to `board@tug.org` so that our user community can apply peer pressure and/or legal action to those who are unfairly exploiting our open-TeX approach.

plain.tex

```
% This is the plain TeX format that's described in The TeXbook.
% N.B.: A version number is defined at the very end of this file;
%       please change that number whenever the file is modified!
% And don't modify the file unless you change its name:
%       Everybody's "plain.tex" file should be the same, worldwide.

% Unlimited copying and redistribution of this file are permitted as long
% as this file is not modified. Modifications are permitted, but only if
% the resulting file is not named plain.tex.

\catcode`\{=1 % left brace is begin-group character
\catcode`\}=2 % right brace is end-group character
\catcode`\$=3 % dollar sign is math shift
\catcode`\&=4 % ampersand is alignment tab
\catcode`\#=6 % hash mark is macro parameter character
\catcode`\^=7 \catcode`\^^K=7 % circumflex and uparrow are for superscripts
\catcode`\_=8 \catcode`\^^A=8 % underline and downarrow are for subscripts
\catcode`\^^I=10 % ascii tab is a blank space
\chardef\active=13 \catcode`\~=\active % tilde is active
\catcode`\^^L=\active \outer\def^^L{\par} % ascii form-feed is "\outer\par"

\message{Preloading the plain format: codes,}

% We had to define the \catcodes right away, before the message line,
% since \message uses the { and } characters.
% When INITEX (the TeX initializer) starts up,
% it has defined the following \catcode values:
% \catcode`\^^@=9 % ascii null is ignored
% \catcode`\^^M=5 % ascii return is end-line
% \catcode`\\=0 % backslash is TeX escape character
% \catcode`\%=14 % percent sign is comment character
% \catcode`\ =10 % ascii space is blank space
% \catcode`\^^?=15 % ascii delete is invalid
% \catcode`\A=11 ... \catcode`\Z=11 % uppercase letters
% \catcode`\a=11 ... \catcode`\z=11 % lowercase letters
% all others are type 12 (other)

% Here is a list of the characters that have been specially catcoded:
\def\dospecials{\do\ \do\\\do\{\do\}\do\$\do\&%
  \do\#\do\^\do\^^K\do\_\do\^^A\do\%\do\~}
% (not counting ascii null, tab, linefeed, formfeed, return, delete)
% Each symbol in the list is preceded by \do, which can be defined
% if you want to do something to every item in the list.

% We make @ signs act like letters, temporarily, to avoid conflict
% between user names and internal control sequences of plain format.
\catcode`@=11

% INITEX sets up \mathcode x=x, for x=0..255, except that
% \mathcode x=x+"7100, for x = `A to `Z and `a to `z;
% \mathcode x=x+"7000, for x = `0 to `9.
% The following changes define internal codes as recommended
% in Appendix C of The TeXbook:
\mathcode`\^^@="2201 % \cdot
\mathcode`\^^A="3223 % \downarrow
\mathcode`\^^B="010B % \alpha
\mathcode`\^^C="010C % \beta
\mathcode`\^^D="225E % \land
```

```
\mathcode`\^^E="023A % \lnot
\mathcode`\^^F="3232 % \in
\mathcode`\^^G="0119 % \pi
\mathcode`\^^H="0115 % \lambda
\mathcode`\^^I="010D % \gamma
\mathcode`\^^J="010E % \delta
\mathcode`\^^K="3222 % \uparrow
\mathcode`\^^L="2206 % \pm
\mathcode`\^^M="2208 % \oplus
\mathcode`\^^N="0231 % \infty
\mathcode`\^^O="0140 % \partial
\mathcode`\^^P="321A % \subset
\mathcode`\^^Q="321B % \supset
\mathcode`\^^R="225C % \cap
\mathcode`\^^S="225B % \cup
\mathcode`\^^T="0238 % \forall
\mathcode`\^^U="0239 % \exists
\mathcode`\^^V="220A % \otimes
\mathcode`\^^W="3224 % \leftrightarrow
\mathcode`\^^X="3220 % \leftarrow
\mathcode`\^^Y="3221 % \rightarrow
\mathcode`\^^Z="8000 % \ne
\mathcode`\^^[="2205 % \diamond
\mathcode`\^^\="3214 % \le
\mathcode`\^^]="3215 % \ge
\mathcode`\^^^="3211 % \equiv
\mathcode`\^^_="225F % \lor
\mathcode`\ ="8000 % \space
\mathcode`\!="5021
\mathcode`\'="8000 % ^\prime
\mathcode`\(="4028
\mathcode`\)="5029
\mathcode`\*="2203 % \ast
\mathcode`\+="202B
\mathcode`\,="613B
\mathcode`\-="2200
\mathcode`\.="013A
\mathcode`\/="013D
\mathcode`\:="303A
\mathcode`\;="603B
\mathcode`\<="313C
\mathcode`\=="303D
\mathcode`\>="313E
\mathcode`\?="503F
\mathcode`\[="405B
\mathcode`\\="026E % \backslash
\mathcode`\]="505D
\mathcode`\_="8000 % \_
\mathcode`\{="4266
\mathcode`\|="026A
\mathcode`\}="5267
\mathcode`\^^?="1273 % \smallint

% INITEX sets \uccode`x=`X and \uccode `X=`X for all letters x,
% and \lccode`x=`x, \lccode`X=`x; all other values are zero.
% No changes to those tables are needed in plain TeX format.

% INITEX sets \sfcode x=1000 for all x, except that \sfcode`X=999
% for uppercase letters. The following changes are needed:
\sfcode`\)=0 \sfcode`\'=0 \sfcode`\]=0
% The \nonfrenchspacing macro will make further changes to \sfcode values.

% Finally, INITEX sets all \delcode values to -1, except \delcode`.=0
\delcode`\(="028300
\delcode`\)="029301
\delcode`\[="05B302
\delcode`\]="05D303
\delcode`\<="26830A
\delcode`\>="26930B
\delcode`\/="02F30E
\delcode`\|="26A30C
\delcode`\\="26E30F
% N.B. { and } should NOT get delcodes; otherwise parameter grouping fails!

```

```
% To make the plain macros more efficient in time and space,
% several constant values are declared here as control sequences.
% If they were changed, anything could happen; so they are private symbols.
\chardef\@ne=1
\chardef\tw@=2
\chardef\thr@@=3
\chardef\sixt@@n=16
\chardef\@cclv=255
\mathchardef\@cclvi=256
\mathchardef\@m=1000
\mathchardef\@M=10000
\mathchardef\@MM=20000

% Allocation of registers

% Here are macros for the automatic allocation of \count, \box, \dimen,
% \skip, \muskip, and \toks registers, as well as \read and \write
% stream numbers, \fam codes, \language codes, and \insert numbers.

\message{registers,}

% When a register is used only temporarily, it need not be allocated;
% grouping can be used, making the value previously in the register return
% after the close of the group. The main use of these macros is for
% registers that are defined by one macro and used by others, possibly at
% different nesting levels. All such registers should be defined through
% these macros; otherwise conflicts may occur, especially when two or more
% macro packages are being used at once.

% The following counters are reserved:
%   0 to 9 page numbering
%       10  count allocation
%       11  dimen allocation
%       12  skip allocation
%       13  muskip allocation
%       14  box allocation
%       15  toks allocation
%       16  read file allocation
%       17  write file allocation
%       18  math family allocation
%       19  language allocation
%       20  insert allocation
%       21  the most recently allocated number
%       22  constant -1
% New counters are allocated starting with 23, 24, etc. Other registers are
% allocated starting with 10. This leaves 0 through 9 for the user to play
% with safely, except that counts 0 to 9 are considered to be the page and
% subpage numbers (since they are displayed during output). In this scheme,
% \count 10 always contains the number of the highest-numbered counter that
% has been allocated, \count 14 the highest-numbered box, etc.
% Inserts are given numbers 254, 253, etc., since they require a \count,
% \dimen, \skip, and \box all with the same number; \count 20 contains the
% lowest-numbered insert that has been allocated. Of course, \box255 is
% reserved for \output; \count255, \dimen255, and \skip255 can be used freely.

% It is recommended that macro designers always use
% \global assignments with respect to registers numbered 1, 3, 5, 7, 9, and
% always non-\global assignments with respect to registers 0, 2, 4, 6, 8, 255.
% This will prevent ``save stack buildup'' that might otherwise occur.

\count10=22 % allocates \count registers 23, 24, ...
\count11=9 % allocates \dimen registers 10, 11, ...
\count12=9 % allocates \skip registers 10, 11, ...
\count13=9 % allocates \muskip registers 10, 11, ...
\count14=9 % allocates \box registers 10, 11, ...
\count15=9 % allocates \toks registers 10, 11, ...
\count16=-1 % allocates input streams 0, 1, ...
\count17=-1 % allocates output streams 0, 1, ...
\count18=3 % allocates math families 4, 5, ...
\count19=0 % allocates \language codes 1, 2, ...
\count20=255 % allocates insertions 254, 253, ...
\countdef\insc@unt=20 % the insertion counter
\countdef\allocationnumber=21 % the most recent allocation
\countdef\m@ne=22 \m@ne=-1 % a handy constant
```

```
\def\wlog{\immediate\write\m@ne} % write on log file (only)

% Here are abbreviations for the names of scratch registers
% that don't need to be allocated.

\countdef\count@=255
\dimendef\dimen@=0
\dimendef\dimen@i=1 % global only
\dimendef\dimen@ii=2
\skipdef\skip@=0
\toksdef\toks@=0

% Now, we define \newcount, \newbox, etc. so that you can say \newcount\foo
% and \foo will be defined (with \countdef) to be the next counter.
% To find out which counter \foo is, you can look at \allocationnumber.
% Since there's no \boxdef command, \chardef is used to define a \newbox,
% \newinsert, \newfam, and so on.

\outer\def\newcount{\alloc@0\count\countdef\insc@unt}
\outer\def\newdimen{\alloc@1\dimen\dimendef\insc@unt}
\outer\def\newskip{\alloc@2\skip\skipdef\insc@unt}
\outer\def\newmuskip{\alloc@3\muskip\muskipdef\@cclvi}
\outer\def\newbox{\alloc@4\box\chardef\insc@unt}
\let\newtoks=\relax % we do this to allow plain.tex to be read in twice
\outer\def\newhelp#1#2{\newtoks#1#1\expandafter{\csname#2\endcsname}}
\outer\def\newtoks{\alloc@5\toks\toksdef\@cclvi}
\outer\def\newread{\alloc@6\read\chardef\sixt@@n}
\outer\def\newwrite{\alloc@7\write\chardef\sixt@@n}
\outer\def\newfam{\alloc@8\fam\chardef\sixt@@n}
\outer\def\newlanguage{\alloc@9\language\chardef\@cclvi}
\def\alloc@#1#2#3#4#5{\global\advance\count1#1by\@ne
  \ch@ck#1#4#2% make sure there's still room
  \allocationnumber=\count1#1%
  \global#3#5=\allocationnumber
  \wlog{\string#5=\string#2\the\allocationnumber}}
\outer\def\newinsert#1{\global\advance\insc@unt by\m@ne
  \ch@ck0\insc@unt\count
  \ch@ck1\insc@unt\dimen
  \ch@ck2\insc@unt\skip
  \ch@ck4\insc@unt\box
  \allocationnumber=\insc@unt
  \global\chardef#1=\allocationnumber
  \wlog{\string#1=\string\insert\the\allocationnumber}}
\def\ch@ck#1#2#3{\ifnum\count1#1<#2%
  \else\errmessage{No room for a new #3}\fi}

% Here are some examples of allocation.
\newdimen\maxdimen \maxdimen=16383.99999pt % the largest legal <dimen>
\newskip\hideskip \hideskip=-1000pt plus 1fill % negative but can grow
\newskip\centering \centering=0pt plus 1000pt minus 1000pt
\newdimen\p@ \p@=1pt % this saves macro space and time
\newdimen\z@ \z@=0pt % can be used both for 0pt and 0
\newskip\z@skip \z@skip=0pt plus0pt minus0pt
\newbox\voidb@x % permanently void box register

% And here's a different sort of allocation:
% For example, \newif\iffoo creates \footrue, \foofalse to go with \iffoo.
\outer\def\newif#1{\count@\escapechar \escapechar\m@ne
  \expandafter\expandafter\expandafter
   \def\@if#1{true}{\let#1=\iftrue}%
  \expandafter\expandafter\expandafter
   \def\@if#1{false}{\let#1=\iffalse}%
  \@if#1{false}\escapechar\count@} % the condition starts out false
\def\@if#1#2{\csname\expandafter\if@\string#1#2\endcsname}
{\uccode`1=`i \uccode`2=`f \uppercase{\gdef\if@12{}}} % `if' is required

% Assign initial values to TeX's parameters

\message{parameters,}

% All of TeX's numeric parameters are listed here,
% but the code is commented out if no special value needs to be set.
% INITEX makes all parameters zero except where noted.

```

```
\pretolerance=100
\tolerance=200 % INITEX sets this to 10000
\hbadness=1000
\vbadness=1000
\linepenalty=10
\hyphenpenalty=50
\exhyphenpenalty=50
\binoppenalty=700
\relpenalty=500
\clubpenalty=150
\widowpenalty=150
\displaywidowpenalty=50
\brokenpenalty=100
\predisplaypenalty=10000
% \postdisplaypenalty=0
% \interlinepenalty=0
% \floatingpenalty=0, set during \insert
% \outputpenalty=0, set before TeX enters \output
\doublehyphendemerits=10000
\finalhyphendemerits=5000
\adjdemerits=10000
% \looseness=0, cleared by TeX after each paragraph
% \pausing=0
% \holdinginserts=0
% \tracingonline=0
% \tracingmacros=0
% \tracingstats=0
% \tracingparagraphs=0
% \tracingpages=0
% \tracingoutput=0
\tracinglostchars=1
% \tracingcommands=0
% \tracingrestores=0
% \language=0
\uchyph=1
% \lefthyphenmin=2 \righthyphenmin=3 set below
% \globaldefs=0
% \maxdeadcycles=25 % INITEX does this
% \hangafter=1 % INITEX does this, also TeX after each paragraph
% \fam=0
% \mag=1000 % INITEX does this
% \escapechar='\\ % INITEX does this
\defaulthyphenchar='\-
\defaultskewchar=-1
% \endlinechar='\^^M % INITEX does this
\newlinechar=-1
\delimiterfactor=901
% \time=now % TeX does this at beginning of job
% \day=now % TeX does this at beginning of job
% \month=now % TeX does this at beginning of job
% \year=now % TeX does this at beginning of job
\showboxbreadth=5
\showboxdepth=3
\errorcontextlines=5

\hfuzz=0.1pt
\vfuzz=0.1pt
\overfullrule=5pt
\hsize=6.5in
\vsize=8.9in
\maxdepth=4pt
\splitmaxdepth=\maxdimen
\boxmaxdepth=\maxdimen
% \lineskiplimit=0pt, changed by \normalbaselines
\delimitershortfall=5pt
\nulldelimiterspace=1.2pt
\scriptspace=0.5pt
% \mathsurround=0pt
% \predisplaysize=0pt, set before TeX enters $$
% \displaywidth=0pt, set before TeX enters $$
% \displayindent=0pt, set before TeX enters $$
\parindent=20pt
% \hangindent=0pt, zeroed by TeX after each paragraph
% \hoffset=0pt
```

```
% \voffset=0pt

% \baselineskip=0pt, changed by \normalbaselines
% \lineskip=0pt, changed by \normalbaselines
\parskip=0pt plus 1pt
\abovedisplayskip=12pt plus 3pt minus 9pt
\abovedisplayshortskip=0pt plus 3pt
\belowdisplayskip=12pt plus 3pt minus 9pt
\belowdisplayshortskip=7pt plus 3pt minus 4pt
% \leftskip=0pt
% \rightskip=0pt
\topskip=10pt
\splittopskip=10pt
% \tabskip=0pt
% \spaceskip=0pt
% \xspaceskip=0pt
\parfillskip=0pt plus 1fil

\thinmuskip=3mu
\medmuskip=4mu plus 2mu minus 4mu
\thickmuskip=5mu plus 5mu

% We also define special registers that function like parameters:
\newskip\smallskipamount \smallskipamount=3pt plus 1pt minus 1pt
\newskip\medskipamount \medskipamount=6pt plus 2pt minus 2pt
\newskip\bigskipamount \bigskipamount=12pt plus 4pt minus 4pt
\newskip\normalbaselineskip \normalbaselineskip=12pt
\newskip\normallineskip \normallineskip=1pt
\newdimen\normallineskiplimit \normallineskiplimit=0pt
\newdimen\jot \jot=3pt
\newcount\interdisplaylinepenalty \interdisplaylinepenalty=100
\newcount\interfootnotelinepenalty \interfootnotelinepenalty=100

% Definitions for preloaded fonts

\def\magstephalf{1095 }
\def\magstep#1{\ifcase#1 \@m\or 1200\or 1440\or 1728\or 2074\or 2488\fi\relax}

% Fonts assigned to \preloaded are not part of "plain TeX",
% but they are preloaded so that other format packages can use them.
% For example, if another set of macros says "\font\ninerm=cmr9",
% TeX will not have to reload the font metric information for cmr9.

\message{fonts,}

\font\tenrm=cmr10 % roman text
\font\preloaded=cmr9
\font\preloaded=cmr8
\font\sevenrm=cmr7
\font\preloaded=cmr6
\font\fiverm=cmr5

\font\teni=cmmi10 % math italic
\font\preloaded=cmmi9
\font\preloaded=cmmi8
\font\seveni=cmmi7
\font\preloaded=cmmi6
\font\fivei=cmmi5

\font\tensy=cmsy10 % math symbols
\font\preloaded=cmsy9
\font\preloaded=cmsy8
\font\sevensy=cmsy7
\font\preloaded=cmsy6
\font\fivesy=cmsy5

\font\tenex=cmex10 % math extension

\font\preloaded=cmss10 % sans serif
\font\preloaded=cmssq8

\font\preloaded=cmssi10 % sans serif italic
\font\preloaded=cmssqi8

```

```
\font\tenbf=cmbx10 % boldface extended
\font\preloaded=cmbx9
\font\preloaded=cmbx8
\font\sevenbf=cmbx7
\font\preloaded=cmbx6
\font\fivebf=cmbx5

\font\tentt=cmtt10 % typewriter
\font\preloaded=cmtt9
\font\preloaded=cmtt8

\font\preloaded=cmsltt10 % slanted typewriter

\font\tensl=cmsl10 % slanted roman
\font\preloaded=cmsl9
\font\preloaded=cmsl8

\font\tenit=cmti10 % text italic
\font\preloaded=cmti9
\font\preloaded=cmti8
\font\preloaded=cmti7

\message{more fonts,}
\font\preloaded=cmu10 % unslanted text italic

\font\preloaded=cmmib10 % bold math italic
\font\preloaded=cmbsy10 % bold math symbols

\font\preloaded=cmcsc10 % caps and small caps

\font\preloaded=cmssbx10 % sans serif bold extended

\font\preloaded=cmdunh10 % Dunhill style

\font\preloaded=cmr7 scaled \magstep4 % for titles
\font\preloaded=cmtt10 scaled \magstep2
\font\preloaded=cmssbx10 scaled \magstep2

\font\preloaded=manfnt % METAFONT logo and dragon curve and special symbols

% Additional \preloaded fonts can be specified here.
% (And those that were \preloaded above can be eliminated.)

\let\preloaded=\undefined % preloaded fonts must be declared anew later.

\skewchar\teni='177 \skewchar\seveni='177 \skewchar\fivei='177
\skewchar\tensy='60 \skewchar\sevensy='60 \skewchar\fivesy='60

\textfont0=\tenrm \scriptfont0=\sevenrm \scriptscriptfont0=\fiverm
\def\rm{\fam\z@\tenrm}
\textfont1=\teni \scriptfont1=\seveni \scriptscriptfont1=\fivei
\def\mit{\fam\@ne} \def\oldstyle{\fam\@ne\teni}
\textfont2=\tensy \scriptfont2=\sevensy \scriptscriptfont2=\fivesy
\def\cal{\fam\tw@}
\textfont3=\tenex \scriptfont3=\tenex \scriptscriptfont3=\tenex
\newfam\itfam \def\it{\fam\itfam\tenit} % \it is family 4
\textfont\itfam=\tenit
\newfam\slfam \def\sl{\fam\slfam\tensl} % \sl is family 5
\textfont\slfam=\tensl
\newfam\bffam \def\bf{\fam\bffam\tenbf} % \bf is family 6
\textfont\bffam=\tenbf \scriptfont\bffam=\sevenbf
\scriptscriptfont\bffam=\fivebf
\newfam\ttfam \def\tt{\fam\ttfam\tentt} % \tt is family 7
\textfont\ttfam=\tentt

% Macros for setting ordinary text
\message{macros,}

\def\frenchspacing{\sfcode`\.\@m \sfcode`\?\@m \sfcode`\!\@m
  \sfcode`\:\@m \sfcode`\;\@m \sfcode`\,\@m}
\def\nonfrenchspacing{\sfcode`\.3000\sfcode`\?3000\sfcode`\!3000%
  \sfcode`\:2000\sfcode`\;1500\sfcode`\,1250 }

\def\normalbaselines{\lineskip\normallineskip
```

```
  \baselineskip\normalbaselineskip \lineskiplimit\normallineskiplimit}

\def\^^M{\ } % control <return> = control <space>
\def\^^I{\ } % same for <tab>

\def\lq{`} \def\rq{'}
\def\lbrack{[} \def\rbrack{]}

\let\endgraf=\par \let\endline=\cr

\def\space{ }
\def\empty{}
\def\null{\hbox{}}

\let\bgroup={ \let\egroup=}

% In \obeylines, we say `\let^^M=\par' instead of `\def^^M{\par}'
% since this allows, for example, `\let\par=\cr \obeylines \halign{...'
{\catcode`\^^M=\active % these lines must end with %
  \gdef\obeylines{\catcode`\^^M\active \let^^M\par}%
  \global\let^^M\par} % this is in case ^^M appears in a \write
\def\obeyspaces{\catcode`\ \active}
{\obeyspaces\global\let =\space}

\def\loop#1\repeat{\def\body{#1}\iterate}
\def\iterate{\body \let\next\iterate \else\let\next\relax\fi \next}
\let\repeat=\fi % this makes \loop...\if...\repeat skippable

\def\thinspace{\kern .16667em }
\def\negthinspace{\kern-.16667em }
\def\enspace{\kern.5em }

\def\enskip{\hskip.5em\relax}
\def\quad{\hskip1em\relax}
\def\qquad{\hskip2em\relax}

\def\smallskip{\vskip\smallskipamount}
\def\medskip{\vskip\medskipamount}
\def\bigskip{\vskip\bigskipamount}

\def\nointerlineskip{\prevdepth-1000\p@}
\def\offinterlineskip{\baselineskip-1000\p@
  \lineskip\z@ \lineskiplimit\maxdimen}

\def\topglue{\nointerlineskip\vglue-\topskip\vglue} % for top of page
\def\vglue{\afterassignment\vgl@\skip@=}
\def\vgl@{\par \dimen@\prevdepth \hrule height\z@
  \nobreak\vskip\skip@ \prevdepth\dimen@}
\def\hglue{\afterassignment\hgl@\skip@=}
\def\hgl@{\leavevmode \count@\spacefactor \vrule width\z@
  \nobreak\hskip\skip@ \spacefactor\count@}

\def~{\penalty\@M \ } % tie
\def\slash{/\penalty\exhyphenpenalty} % a `/' that acts like a `-'

\def\break{\penalty-\@M}
\def\nobreak{\penalty \@M}
\def\allowbreak{\penalty \z@}

\def\filbreak{\par\vfil\penalty-200\vfilneg}
\def\goodbreak{\par\penalty-500 }
\def\eject{\par\break}
\def\supereject{\par\penalty-\@MM}

\def\removelastskip{\ifdim\lastskip=\z@\else\vskip-\lastskip\fi}
\def\smallbreak{\par\ifdim\lastskip<\smallskipamount
  \removelastskip\penalty-50\smallskip\fi}
\def\medbreak{\par\ifdim\lastskip<\medskipamount
  \removelastskip\penalty-100\medskip\fi}
\def\bigbreak{\par\ifdim\lastskip<\bigskipamount
  \removelastskip\penalty-200\bigskip\fi}

\def\line{\hbox to\hsize}
\def\leftline#1{\line{#1\hss}}
```

```
\def\rightline#1{\line{\hss#1}}
\def\centerline#1{\line{\hss#1\hss}}

\def\rlap#1{\hbox to\z@{#1\hss}}
\def\llap#1{\hbox to\z@{\hss#1}}

\def\m@th{\mathsurround\z@}
\def\underbar#1{$\setbox\z@\hbox{#1}\dp\z@\z@
  \m@th \underline{\box\z@}$}

\newbox\strutbox
\setbox\strutbox=\hbox{\vrule height8.5pt depth3.5pt width\z@}
\def\strut{\relax\ifmmode\copy\strutbox\else\unhcopy\strutbox\fi}

\def\hidewidth{\hskip\hideskip} % for alignment entries that can stick out
\def\ialign{\everycr{}\tabskip\z@skip\halign} % initialized \halign
\newcount\mscount
\def\multispan#1{\omit \mscount#1\relax
  \loop\ifnum\mscount>\@ne \sp@n\repeat}
\def\sp@n{\span\omit\advance\mscount\m@ne}

\newif\ifus@ \newif\if@cr
\newbox\tabs \newbox\tabsyet \newbox\tabsdone

\def\cleartabs{\global\setbox\tabsyet\null \setbox\tabs\null}
\def\settabs{\setbox\tabs\null \futurelet\next\sett@b}
\let\+=\relax % in case this file is being read in twice
\def\sett@b{\ifx\next\+\def\nxt{\afterassignment\s@tt@b\let\nxt}%
  \else\let\nxt\s@tcols\fi \let\next\relax \nxt}
\def\s@tt@b{\let\nxt\relax \us@false\m@ketabbox}
\def\tabalign{\us@true\m@ketabbox} % non-\outer version of \+
\outer\def\+{\tabalign}
\def\s@tcols#1\columns{\count@#1\dimen@\hsize
  \loop\ifnum\count@>\z@ \@nother \repeat}
\def\@nother{\dimen@ii\dimen@ \divide\dimen@ii\count@
  \setbox\tabs\hbox{\hbox to\dimen@ii{}\unhbox\tabs}%
  \advance\dimen@-\dimen@ii \advance\count@\m@ne}

\def\m@ketabbox{\begingroup
  \global\setbox\tabsyet\copy\tabs
  \global\setbox\tabsdone\null
  \def\cr{\@crtrue\crcr\egroup\egroup
    \ifus@\unvbox\z@\lastbox\fi\endgroup
    \setbox\tabs\hbox{\unhbox\tabsyet\unhbox\tabsdone}}%
  \setbox\z@\vbox\bgroup\@crfalse
    \ialign\bgroup&\t@bbox##\t@bb@x\crcr}

\def\t@bbox{\setbox\z@\hbox\bgroup}
\def\t@bb@x{\if@cr\egroup % now \box\z@ holds the column
  \else\hss\egroup \global\setbox\tabsyet\hbox{\unhbox\tabsyet
      \global\setbox\@ne\lastbox}% now \box\@ne holds its size
    \ifvoid\@ne\global\setbox\@ne\hbox to\wd\z@{}%
    \else\setbox\z@\hbox to\wd\@ne{\unhbox\z@}\fi
    \global\setbox\tabsdone\hbox{\box\@ne\unhbox\tabsdone}\fi
  \box\z@}

\def\hang{\hangindent\parindent}
\def\textindent#1{\indent\llap{#1\enspace}\ignorespaces}
\def\item{\par\hang\textindent}
\def\itemitem{\par\indent \hangindent2\parindent \textindent}
\def\narrower{\advance\leftskip\parindent
  \advance\rightskip\parindent}

\outer\def\beginsection#1\par{\vskip\z@ plus.3\vsize\penalty-250
  \vskip\z@ plus-.3\vsize\bigskip\vskip\parskip
  \message{#1}\leftline{\bf#1}\nobreak\smallskip\noindent}
\outer\def\proclaim #1. #2\par{\medbreak
  \noindent{\bf#1.\enspace}{\sl#2\par}%
  \ifdim\lastskip<\medskipamount \removelastskip\penalty55\medskip\fi}

\def\raggedright{\rightskip\z@ plus2em \spaceskip.3333em \xspaceskip.5em\relax}
\def\ttraggedright{\tt\rightskip\z@ plus2em\relax} % for use with \tt only

\chardef\%='\%
```

```
\chardef\&=‘\&
\chardef\#=‘\#
\chardef\$=‘\$
\chardef\ss="19
\chardef\ae="1A
\chardef\oe="1B
\chardef\o="1C
\chardef\AE="1D
\chardef\OE="1E
\chardef\O="1F
\chardef\i="10 \chardef\j="11 % dotless letters
\def\aa{\accent23a}
\def\l{\char32l}
\def\L{\leavevmode\setbox0\hbox{L}\hbox to\wd0{\hss\char32L}}

\def\leavevmode{\unhbox\voidb@x} % begins a paragraph, if necessary
\def\_{\leavevmode \kern.06em \vbox{\hrule width.3em}}
\def\AA{\leavevmode\setbox0\hbox{!}\dimen@\ht0\advance\dimen@-1ex%
  \rlap{\raise.67\dimen@\hbox{\char’27}}A}

\def\mathhexbox#1#2#3{\leavevmode
  \hbox{$\m@th \mathchar"#1#2#3$}}
\def\dag{\mathhexbox279}
\def\ddag{\mathhexbox27A}
\def\S{\mathhexbox278}
\def\P{\mathhexbox27B}
\def\Orb{\mathhexbox20D}

\def\oalign#1{\leavevmode\vtop{\baselineskip\z@skip \lineskip.25ex%
  \ialign{##\crcr#1\crcr}}} \def\o@lign{\lineskiplimit\z@ \oalign}
\def\ooalign{\lineskiplimit-\maxdimen \oalign} % chars over each other
{\catcode‘p=12 \catcode‘t=12 \gdef\\#1pt{#1}} \let\getf@ctor=\\
\def\sh@ft#1{\dimen@#1\kern\expandafter\getf@ctor\the\fontdimen1\font
  \dimen@} % kern by #1 times the current slant
\def\d#1{{\o@lign{\relax#1\crcr\hidewidth\sh@ft{-1ex}.\hidewidth}}}
\def\b#1{{\o@lign{\relax#1\crcr\hidewidth\sh@ft{-3ex}%
    \vbox to.2ex{\hbox{\char22}\vss}\hidewidth}}}
\def\c#1{{\setbox\z@\hbox{#1}\ifdim\ht\z@=1ex\accent24 #1%
  \else\ooalign{\unhbox\z@\crcr\hidewidth\char24\hidewidth}\fi}}
\def\copyright{{\ooalign{\hfil\raise.07ex\hbox{c}\hfil\crcr\Orb}}}

\def\dots{\relax\ifmmode\ldots\else$\m@th\ldots\,$\fi}
\def\TeX{T\kern-.1667em\lower.5ex\hbox{E}\kern-.125emX}

\def\‘#1{{\accent18 #1}}
\def\’#1{{\accent19 #1}}
\def\v#1{{\accent20 #1}} \let\^^_=\v
\def\u#1{{\accent21 #1}} \let\^^S=\u
\def\=#1{{\accent22 #1}}
\def\^#1{{\accent94 #1}} \let\^^D=\^
\def\.#1{{\accent95 #1}}
\def\H#1{{\accent"7D #1}}
\def\~#1{{\accent"7E #1}}
\def\"#1{{\accent"7F #1}}
\def\t#1{{\edef\next{\the\font}\the\textfont1\accent"7F\next#1}}

\def\hrulefill{\leaders\hrule\hfill}
\def\dotfill{\cleaders\hbox{$\m@th \mkern1.5mu.\mkern1.5mu$}\hfill}
\def\rightarrowfill{$\m@th\smash-\mkern-7mu%
  \cleaders\hbox{$\mkern-2mu\smash-\mkern-2mu$}\hfill
  \mkern-7mu\mathord\rightarrow$}
\def\leftarrowfill{$\m@th\mathord\leftarrow\mkern-7mu%
  \cleaders\hbox{$\mkern-2mu\smash-\mkern-2mu$}\hfill
  \mkern-7mu\smash-$}
\mathchardef\braceld="37A \mathchardef\bracerd="37B
\mathchardef\braceru="37C \mathchardef\braceru="37D
\def\downbracefill{$\m@th \setbox\z@\hbox{$\braceld$}%
  \braceld\leaders\vrule height\ht\z@ depth\z@\hfill\braceru
  \braceru\leaders\vrule height\ht\z@ depth\z@\hfill\bracerd$}
\def\upbracefill{$\m@th \setbox\z@\hbox{$\braceld$}%
  \braceru\leaders\vrule height\ht\z@ depth\z@\hfill\bracerd
  \braceld\leaders\vrule height\ht\z@ depth\z@\hfill\braceru$}

\outer\def\bye{\par\vfill\supereject\end}
```

```
725
726 % Macros for math setting
727 \message{math definitions,}
728
729 \let\sp=^ \let\sb=_
730 \def\,{\mskip\thinmuskip}
731 \def\>{\mskip\medmuskip}
732 \def\;{\mskip\thickmuskip}
733 \def\!{\mskip-\thinmuskip}
734 \def\*{\discretionary{\thinspace\the\textfont2\char2}{}{}}
735 {\catcode`\'=\active \gdef'{^\bgroup\prim@s}}
736 \def\prim@s{\prime\futurelet\next\pr@m@s}
737 \def\pr@m@s{\ifx'\next\let\nxt\pr@@@s \else\ifx^\next\let\nxt\pr@@@t
738   \else\let\nxt\egroup\fi\fi \nxt}
739 \def\pr@@@s#1{\prim@s} \def\pr@@@t#1#2{#2\egroup}
740 {\catcode`\^^Z=\active \gdef^^Z{\not=}} % ^^Z is like \ne in math
741
742 {\catcode`\_=\active \global\let_=\_} % _ in math is either subscript or \_
743
744 \mathchardef\alpha="010B
745 \mathchardef\beta="010C
746 \mathchardef\gamma="010D
747 \mathchardef\delta="010E
748 \mathchardef\epsilon="010F
749 \mathchardef\zeta="0110
750 \mathchardef\eta="0111
751 \mathchardef\theta="0112
752 \mathchardef\iota="0113
753 \mathchardef\kappa="0114
754 \mathchardef\lambda="0115
755 \mathchardef\mu="0116
756 \mathchardef\nu="0117
757 \mathchardef\xi="0118
758 \mathchardef\pi="0119
759 \mathchardef\rho="011A
760 \mathchardef\sigma="011B
761 \mathchardef\tau="011C
762 \mathchardef\upsilon="011D
763 \mathchardef\phi="011E
764 \mathchardef\chi="011F
765 \mathchardef\psi="0120
766 \mathchardef\omega="0121
767 \mathchardef\varepsilon="0122
768 \mathchardef\vartheta="0123
769 \mathchardef\varpi="0124
770 \mathchardef\varrho="0125
771 \mathchardef\varsigma="0126
772 \mathchardef\varphi="0127
773 \mathchardef\Gamma="7000
774 \mathchardef\Delta="7001
775 \mathchardef\Theta="7002
776 \mathchardef\Lambda="7003
777 \mathchardef\Xi="7004
778 \mathchardef\Pi="7005
779 \mathchardef\Sigma="7006
780 \mathchardef\Upsilon="7007
781 \mathchardef\Phi="7008
782 \mathchardef\Psi="7009
783 \mathchardef\Omega="700A
784
785 \mathchardef\aleph="0240
786 \def\hbar{{\mathchar'26\mkern-9muh}}
787 \mathchardef\imath="017B
788 \mathchardef\jmath="017C
789 \mathchardef\ell="0160
790 \mathchardef\wp="017D
791 \mathchardef\Re="023C
792 \mathchardef\Im="023D
793 \mathchardef\partial="0140
794 \mathchardef\infty="0231
795 \mathchardef\prime="0230
796 \mathchardef\emptyset="023B
797 \mathchardef\nabla="0272
798 \def\surd{{\mathchar"1270}}
```

```
\mathchardef\top="023E
\mathchardef\bot="023F
\def\angle{{\vbox{\ialign{$\m@th\scriptstyle##$\crcr
      \not\mathrel{\mkern14mu}\crcr
      \noalign{\nointerlineskip}
      \mkern2.5mu\leaders\hrule height.34pt\hfill\mkern2.5mu\crcr}}}}
\mathchardef\triangle="0234
\mathchardef\forall="0238
\mathchardef\exists="0239
\mathchardef\neg="023A \let\lnot=\neg
\mathchardef\flat="015B
\mathchardef\natural="015C
\mathchardef\sharp="015D
\mathchardef\clubsuit="027C
\mathchardef\diamondsuit="027D
\mathchardef\heartsuit="027E
\mathchardef\spadesuit="027F

\mathchardef\coprod="1360
\mathchardef\bigvee="1357
\mathchardef\bigwedge="1356
\mathchardef\biguplus="1355
\mathchardef\bigcap="1354
\mathchardef\bigcup="1353
\mathchardef\intop="1352 \def\int{\intop\nolimits}
\mathchardef\prod="1351
\mathchardef\sum="1350
\mathchardef\bigotimes="134E
\mathchardef\bigoplus="134C
\mathchardef\bigodot="134A
\mathchardef\ointop="1348 \def\oint{\ointop\nolimits}
\mathchardef\bigsqcup="1346
\mathchardef\smallint="1273

\mathchardef\triangleleft="212F
\mathchardef\triangleright="212E
\mathchardef\bigtriangleup="2234
\mathchardef\bigtriangledown="2235
\mathchardef\wedge="225E \let\land=\wedge
\mathchardef\vee="225F \let\lor=\vee
\mathchardef\cap="225C
\mathchardef\cup="225B
\mathchardef\ddagger="227A
\mathchardef\dagger="2279
\mathchardef\sqcap="2275
\mathchardef\sqcup="2274
\mathchardef\uplus="225D
\mathchardef\amalg="2271
\mathchardef\diamond="2205
\mathchardef\bullet="220F
\mathchardef\wr="226F
\mathchardef\div="2204
\mathchardef\odot="220C
\mathchardef\oslash="220B
\mathchardef\otimes="220A
\mathchardef\ominus="2209
\mathchardef\oplus="2208
\mathchardef\mp="2207
\mathchardef\pm="2206
\mathchardef\circ="220E
\mathchardef\bigcirc="220D
\mathchardef\setminus="226E % for set difference A\setminus B
\mathchardef\cdot="2201
\mathchardef\ast="2203
\mathchardef\times="2202
\mathchardef\star="213F

\mathchardef\propto="322F
\mathchardef\sqsubseteq="3276
\mathchardef\sqsupseteq="3277
\mathchardef\parallel="326B
\mathchardef\mid="326A
\mathchardef\dashv="3261
\mathchardef\vdash="3260
```

```
\mathchardef\nearrow="3225
\mathchardef\searrow="3226
\mathchardef\nwarrow="322D
\mathchardef\swarrow="322E
\mathchardef\Leftrightarrow="322C
\mathchardef\Leftarrow="3228
\mathchardef\Rightarrow="3229
\def\neq{\not=} \let\ne=\neq
\mathchardef\leq="3214 \let\le=\leq
\mathchardef\geq="3215 \let\ge=\geq
\mathchardef\succ="321F
\mathchardef\prec="321E
\mathchardef\approx="3219
\mathchardef\succeq="3217
\mathchardef\preceq="3216
\mathchardef\supset="321B
\mathchardef\subset="321A
\mathchardef\supseteq="3213
\mathchardef\subseteq="3212
\mathchardef\in="3232
\mathchardef\ni="3233 \let\owns=\ni
\mathchardef\gg="321D
\mathchardef\ll="321C
\mathchardef\not="3236
\mathchardef\leftrightarrow="3224
\mathchardef\leftarrow="3220 \let\gets=\leftarrow
\mathchardef\rightarrow="3221 \let\to=\rightarrow
\mathchardef\mapstochar="3237 \def\mapsto{\mapstochar\rightarrow}
\mathchardef\sim="3218
\mathchardef\simeq="3227
\mathchardef\perp="323F
\mathchardef\equiv="3211
\mathchardef\asymp="3210
\mathchardef\smile="315E
\mathchardef\frown="315F
\mathchardef\leftharpoonup="3128
\mathchardef\leftharpoondown="3129
\mathchardef\rightharpoonup="312A
\mathchardef\rightharpoondown="312B

\def\joinrel{\mathrel{\mkern-3mu}}
\def\relbar{\mathrel{\smash-}} % \smash, because - has the same height as +
\def\Relbar{\mathrel=}
\mathchardef\lhook="312C \def\hookrightarrow{\lhook\joinrel\rightarrow}
\mathchardef\rhook="312D \def\hookleftarrow{\leftarrow\joinrel\rhook}
\def\bowtie{\mathrel\triangleright\joinrel\mathrel\triangleleft}
\def\models{\mathrel|\joinrel=}
\def\Longrightarrow{\Relbar\joinrel\Rightarrow}
\def\longrightarrow{\relbar\joinrel\rightarrow}
\def\longleftarrow{\leftarrow\joinrel\relbar}
\def\Longleftarrow{\Leftarrow\joinrel\Relbar}
\def\longmapsto{\mapstochar\longrightarrow}
\def\longleftrightarrow{\leftarrow\joinrel\rightarrow}
\def\Longleftrightarrow{\Leftarrow\joinrel\Rightarrow}
\def\iff{\;\Longleftrightarrow\;}

\mathchardef\ldotp="613A % ldot as a punctuation mark
\mathchardef\cdotp="6201 % cdot as a punctuation mark
\mathchardef\colon="603A % colon as a punctuation mark
\def\ldots{\mathinner{\ldotp\ldotp\ldotp}}
\def\cdots{\mathinner{\cdotp\cdotp\cdotp}}
\def\vdots{\vbox{\baselineskip4\p@ \lineskiplimit\z@
    \kern6\p@\hbox{.}\hbox{.}\hbox{.}}}
\def\ddots{\mathinner{\mkern1mu\raise7\p@\vbox{\kern7\p@\hbox{.}}\mkern2mu
    \raise4\p@\hbox{.}\mkern2mu\raise\p@\hbox{.}\mkern1mu}}

\def\acute{\mathaccent"7013 }
\def\grave{\mathaccent"7012 }
\def\ddot{\mathaccent"707F }
\def\tilde{\mathaccent"707E }
\def\bar{\mathaccent"7016 }
\def\breve{\mathaccent"7015 }
\def\check{\mathaccent"7014 }
\def\hat{\mathaccent"705E }
```

```
\def\vec{\mathaccent"017E }
\def\dot{\mathaccent"705F }
\def\widetilde{\mathaccent"0365 }
\def\widehat{\mathaccent"0362 }
\def\overrightarrow#1{\vbox{\m@th\ialign{##\crcr
      \rightarrowfill\crcr\noalign{\kern-\p@\nointerlineskip}
      $\hfil\displaystyle{#1}\hfil$\crcr}}}
\def\overleftarrow#1{\vbox{\m@th\ialign{##\crcr
      \leftarrowfill\crcr\noalign{\kern-\p@\nointerlineskip}
      $\hfil\displaystyle{#1}\hfil$\crcr}}}
\def\overbrace#1{\mathop{\vbox{\m@th\ialign{##\crcr\noalign{\kern3\p@}
      \downbracefill\crcr\noalign{\kern3\p@\nointerlineskip}
      $\hfil\displaystyle{#1}\hfil$\crcr}}}\limits}
\def\underbrace#1{\mathop{\vtop{\m@th\ialign{##\crcr
      $\hfil\displaystyle{#1}\hfil$\crcr\noalign{\kern3\p@\nointerlineskip}
      \upbracefill\crcr\noalign{\kern3\p@}}}}\limits}
\def\skew#1#2#3{{\muskip\z@#1mu\divide\muskip\z@\tw@ \mkern\muskip\z@
   #2{\mkern-\muskip\z@{#3}\mkern\muskip\z@}\mkern-\muskip\z@}{}}

\def\lmoustache{\delimiter"437A340 } % top from (, bottom from )
\def\rmoustache{\delimiter"537B341 } % top from ), bottom from (
\def\lgroup{\delimiter"462833A } % extensible ( with sharper tips
\def\rgroup{\delimiter"562933B } % extensible ) with sharper tips
\def\arrowvert{\delimiter"26A33C } % arrow without arrowheads
\def\Arrowvert{\delimiter"26B33D } % double arrow without arrowheads
\def\bracevert{\delimiter"77C33E } % the vertical bar that extends braces
\def\Vert{\delimiter"26B30D } \let\|=\Vert
\def\vert{\delimiter"26A30C }
\def\uparrow{\delimiter"3222378 }
\def\downarrow{\delimiter"3223379 }
\def\updownarrow{\delimiter"326C33F }
\def\Uparrow{\delimiter"322A37E }
\def\Downarrow{\delimiter"322B37F }
\def\Updownarrow{\delimiter"326D377 }
\def\backslash{\delimiter"26E30F } % for double coset G\backslash H
\def\rangle{\delimiter"526930B }
\def\langle{\delimiter"426830A }
\def\rbrace{\delimiter"5267309 } \let\}=\rbrace
\def\lbrace{\delimiter"4266308 } \let\{=\lbrace
\def\rceil{\delimiter"5265307 }
\def\lceil{\delimiter"4264306 }
\def\rfloor{\delimiter"5263305 }
\def\lfloor{\delimiter"4262304 }

\def\bigl{\mathopen\big}
\def\bigm{\mathrel\big}
\def\bigr{\mathclose\big}
\def\Bigl{\mathopen\Big}
\def\Bigm{\mathrel\Big}
\def\Bigr{\mathclose\Big}
\def\biggl{\mathopen\bigg}
\def\biggm{\mathrel\bigg}
\def\biggr{\mathclose\bigg}
\def\Biggl{\mathopen\Bigg}
\def\Biggm{\mathrel\Bigg}
\def\Biggr{\mathclose\Bigg}
\def\big#1{{\hbox{$\left#1\vbox to8.5\p@{}\right.\n@space$}}}
\def\Big#1{{\hbox{$\left#1\vbox to11.5\p@{}\right.\n@space$}}}
\def\bigg#1{{\hbox{$\left#1\vbox to14.5\p@{}\right.\n@space$}}}
\def\Bigg#1{{\hbox{$\left#1\vbox to17.5\p@{}\right.\n@space$}}}
\def\n@space{\nulldelimiterspace\z@ \m@th}

\def\choose{\atopwithdelims()}
\def\brack{\atopwithdelims[]}
\def\brace{\atopwithdelims\{\}}

\def\sqrt{\radical"270370 }

\def\mathpalette#1#2{\mathchoice{#1\displaystyle{#2}}%
  {#1\textstyle{#2}}{#1\scriptstyle{#2}}{#1\scriptscriptstyle{#2}}}
\newbox\rootbox
\def\root#1\of{\setbox\rootbox
  \hbox{$\m@th\scriptscriptstyle{#1}$}\mathpalette\r@@t}
\def\r@@t#1#2{\setbox\z@\hbox{$\m@th#1\sqrt{#2}$}\dimen@\ht\z@
```

```
  \advance\dimen@-\dp\z@
  \mkern5mu\raise.6\dimen@\copy\rootbox \mkern-10mu\box\z@}
\newif\ifv@ \newif\ifh@
\def\vphantom{\v@true\h@false\ph@nt}
\def\hphantom{\v@false\h@true\ph@nt}
\def\phantom{\v@true\h@true\ph@nt}
\def\ph@nt{\ifmmode\def\next{\mathpalette\mathph@nt}%
  \else\let\next\makeph@nt\fi\next}
\def\makeph@nt#1{\setbox\z@\hbox{#1}\finph@nt}
\def\mathph@nt#1#2{\setbox\z@\hbox{$\m@th#1{#2}$}\finph@nt}
\def\finph@nt{\setbox\tw@\null
  \ifv@ \ht\tw@\ht\z@ \dp\tw@\dp\z@\fi
  \ifh@ \wd\tw@\wd\z@\fi \box\tw@}
\def\mathstrut{\vphantom(}
\def\smash{\relax % \relax, in case this comes first in \halign
  \ifmmode\def\next{\mathpalette\mathsm@sh}\else\let\next\makesm@sh
  \fi\next}
\def\makesm@sh#1{\setbox\z@\hbox{#1}\finsm@sh}
\def\mathsm@sh#1#2{\setbox\z@\hbox{$\m@th#1{#2}$}\finsm@sh}
\def\finsm@sh{\ht\z@\z@ \dp\z@\z@ \box\z@}

\def\cong{\mathrel{\mathpalette\@vereq\sim}} % congruence sign
\def\@vereq#1#2{\lower.5\p@\vbox{\lineskiplimit\maxdimen\lineskip-.5\p@
    \ialign{$\m@th#1\hfil##\hfil$\crcr#2\crcr=\crcr}}}
\def\notin{\mathrel{\mathpalette\c@ncel\in}}
\def\c@ncel#1#2{\m@th\ooalign{$\hfil#1\mkern1mu/\hfil$\crcr$#1#2$}}
\def\rightleftharpoons{\mathrel{\mathpalette\rlh@{}}}
\def\rlh@#1{\vcenter{\m@th\hbox{\ooalign{\raise2pt
         \hbox{$#1\rightharpoonup$}\crcr
       $#1\leftharpoondown$}}}}
\def\buildrel#1\over#2{\mathrel{\mathop{\kern\z@#2}\limits^{#1}}}
\def\doteq{\buildrel\textstyle.\over=}

\def\log{\mathop{\rm log}\nolimits}
\def\lg{\mathop{\rm lg}\nolimits}
\def\ln{\mathop{\rm ln}\nolimits}
\def\lim{\mathop{\rm lim}}
\def\limsup{\mathop{\rm lim\,sup}}
\def\liminf{\mathop{\rm lim\,inf}}
\def\sin{\mathop{\rm sin}\nolimits}
\def\arcsin{\mathop{\rm arcsin}\nolimits}
\def\sinh{\mathop{\rm sinh}\nolimits}
\def\cos{\mathop{\rm cos}\nolimits}
\def\arccos{\mathop{\rm arccos}\nolimits}
\def\cosh{\mathop{\rm cosh}\nolimits}
\def\tan{\mathop{\rm tan}\nolimits}
\def\arctan{\mathop{\rm arctan}\nolimits}
\def\tanh{\mathop{\rm tanh}\nolimits}
\def\cot{\mathop{\rm cot}\nolimits}
\def\coth{\mathop{\rm coth}\nolimits}
\def\sec{\mathop{\rm sec}\nolimits}
\def\csc{\mathop{\rm csc}\nolimits}
\def\max{\mathop{\rm max}}
\def\min{\mathop{\rm min}}
\def\sup{\mathop{\rm sup}}
\def\inf{\mathop{\rm inf}}
\def\arg{\mathop{\rm arg}\nolimits}
\def\ker{\mathop{\rm ker}\nolimits}
\def\dim{\mathop{\rm dim}\nolimits}
\def\hom{\mathop{\rm hom}\nolimits}
\def\det{\mathop{\rm det}}
\def\exp{\mathop{\rm exp}\nolimits}
\def\Pr{\mathop{\rm Pr}}
\def\gcd{\mathop{\rm gcd}}
\def\deg{\mathop{\rm deg}\nolimits}

\def\bmod{\nonscript\mskip-\medmuskip\mkern5mu
  \mathbin{\rm mod}\penalty900\mkern5mu\nonscript\mskip-\medmuskip}
\def\pmod#1{\allowbreak\mkern18mu({\rm mod}\,\,#1)}

\def\cases#1{\left\{\,\vcenter{\normalbaselines\m@th
    \ialign{$##\hfil$&\quad##\hfil\crcr#1\crcr}}\right.}
\def\matrix#1{\null\,\vcenter{\normalbaselines\m@th
    \ialign{\hfil$###$\hfil&&\quad\hfil$###$\hfil\crcr
```

```
      \mathstrut\crcr\noalign{\kern-\baselineskip}
      #1\crcr\mathstrut\crcr\noalign{\kern-\baselineskip}}}\,}
\def\pmatrix#1{\left(\matrix{#1}\right)}
\newdimen\p@renwd
\setbox0=\hbox{\tenex B} \p@renwd=\wd0 % width of the big left (
\def\bordermatrix#1{\begingroup \m@th
  \setbox\z@\vbox{\def\cr{\crcr\noalign{\kern2\p@\global\let\cr\endline}}%
    \ialign{$##$\hfil\kern2\p@\kern\p@renwd&\thinspace\hfil$##$\hfil
      &&\quad\hfil$##$\hfil\crcr
      \omit\strut\hfil\crcr\noalign{\kern-\baselineskip}%
      #1\crcr\omit\strut\cr}}%
  \setbox\tw@\vbox{\unvcopy\z@\global\setbox\@ne\lastbox}%
  \setbox\tw@\hbox{\unhbox\@ne\unskip\global\setbox\@ne\lastbox}%
  \setbox\tw@\hbox{$\kern\wd\@ne\kern-\p@renwd\left(\kern-\wd\@ne
    \global\setbox\@ne\vbox{\box\@ne\kern2\p@}%
    \vcenter{\kern-\ht\@ne\unvbox\z@\kern-\baselineskip}\,\right)$}%
  \null\;\vbox{\kern\ht\@ne\box\tw@}\endgroup}

\def\openup{\afterassignment\@penup\dimen@=}
\def\@penup{\advance\lineskip\dimen@
  \advance\baselineskip\dimen@
  \advance\lineskiplimit\dimen@}
\def\eqalign#1{\null\,\vcenter{\openup\jot\m@th
  \ialign{\strut\hfil$\displaystyle{##}$&$\displaystyle{{}##}$\hfil
      \crcr#1\crcr}}\,}
\newif\ifdt@p
\def\displ@y{\global\dt@ptrue\openup\jot\m@th
  \everycr{\noalign{\ifdt@p \global\dt@pfalse \ifdim\prevdepth>-1000\p@
      \vskip-\lineskiplimit \vskip\normallineskiplimit \fi
      \else \penalty\interdisplaylinepenalty \fi}}}
\def\@lign{\tabskip\z@skip\everycr{}} % restore inside \displ@y
\def\displaylines#1{\displ@y \tabskip\z@skip
  \halign{\hbox to\displaywidth{$\@lign\hfil\displaystyle##\hfil$}\crcr
    #1\crcr}}
\def\eqalignno#1{\displ@y \tabskip\centering
  \halign to\displaywidth{\hfil$\@lign\displaystyle{##}$\tabskip\z@skip
    &$\@lign\displaystyle{{}##}$\hfil\tabskip\centering
    &\llap{$\@lign##$}\tabskip\z@skip\crcr
    #1\crcr}}
\def\leqalignno#1{\displ@y \tabskip\centering
  \halign to\displaywidth{\hfil$\@lign\displaystyle{##}$\tabskip\z@skip
    &$\@lign\displaystyle{{}##}$\hfil\tabskip\centering
    &\kern-\displaywidth\rlap{$\@lign##$}\tabskip\displaywidth\crcr
    #1\crcr}}

% Definitions related to output

\message{output routines,}

\countdef\pageno=0 \pageno=1 % first page is number 1
\newtoks\headline \headline={\hfil} % headline is normally blank
\newtoks\footline \footline={\hss\tenrm\folio\hss}
  % footline is normally a centered page number in font \tenrm
\newif\ifr@ggedbottom
\def\raggedbottom{\topskip 10\p@ plus60\p@ \r@ggedbottomtrue}
\def\normalbottom{\topskip 10\p@ \r@ggedbottomfalse} % undoes \raggedbottom
\def\folio{\ifnum\pageno<\z@ \romannumeral-\pageno \else\number\pageno \fi}
\def\nopagenumbers{\footline{\hfil}} % blank out the footline
\def\advancepageno{\ifnum\pageno<\z@ \global\advance\pageno\m@ne
  \else\global\advance\pageno\@ne \fi} % increase |pageno|

\newinsert\footins
\def\footnote#1{\let\@sf\empty % parameter #2 (the text) is read later
  \ifhmode\edef\@sf{\spacefactor\the\spacefactor}\/\fi
  #1\@sf\vfootnote{#1}}
\def\vfootnote#1{\insert\footins\bgroup
  \interlinepenalty\interfootnotelinepenalty
  \splittopskip\ht\strutbox % top baseline for broken footnotes
  \splitmaxdepth\dp\strutbox \floatingpenalty\@MM
  \leftskip\z@skip \rightskip\z@skip \spaceskip\z@skip \xspaceskip\z@skip
  \textindent{#1}\footstrut\futurelet\next\fo@t}
\def\fo@t{\ifcat\bgroup\noexpand\next \let\next\f@@t
  \else\let\next\f@t\fi \next}
\def\f@@t{\bgroup\aftergroup\@foot\let\next}
```

```
\def\f@t#1{#1\@foot}
\def\@foot{\strut\egroup}
\def\footstrut{\vbox to\splittopskip{}}
\skip\footins=\bigskipamount % space added when footnote is present
\count\footins=1000 % footnote magnification factor (1 to 1)
\dimen\footins=8in % maximum footnotes per page

\newinsert\topins
\newif\ifp@ge \newif\if@mid
\def\topinsert{\@midfalse\p@gefalse\@ins}
\def\midinsert{\@midtrue\@ins}
\def\pageinsert{\@midfalse\p@getrue\@ins}
\skip\topins=\z@skip % no space added when a topinsert is present
\count\topins=1000 % magnification factor (1 to 1)
\dimen\topins=\maxdimen % no limit per page
\def\@ins{\par\begingroup\setbox\z@\vbox\bgroup} % start a \vbox
\def\endinsert{\egroup % finish the \vbox
  \if@mid \dimen@\ht\z@ \advance\dimen@\dp\z@ \advance\dimen@12\p@
    \advance\dimen@\pagetotal \advance\dimen@-\pageshrink
    \ifdim\dimen@>\pagegoal\@midfalse\p@gefalse\fi\fi
  \if@mid \bigskip\box\z@\bigbreak
  \else\insert\topins{\penalty100 % floating insertion
    \splittopskip\z@skip
    \splitmaxdepth\maxdimen \floatingpenalty\z@
    \ifp@ge \dimen@\dp\z@
    \vbox to\vsize{\unvbox\z@\kern-\dimen@}% depth is zero
    \else \box\z@\nobreak\bigskip\fi}\fi\endgroup}

\output{\plainoutput}
\def\plainoutput{\shipout\vbox{\makeheadline\pagebody\makefootline}%
  \advancepageno
  \ifnum\outputpenalty>-\@MM \else\dosupereject\fi}
\def\pagebody{\vbox to\vsize{\boxmaxdepth\maxdepth \pagecontents}}
\def\makeheadline{\vbox to\z@{\vskip-22.5\p@
  \line{\vbox to8.5\p@{}\the\headline}\vss}\nointerlineskip}
\def\makefootline{\baselineskip24\p@\lineskiplimit\z@\line{\the\footline}}
\def\dosupereject{\ifnum\insertpenalties>\z@ % something is being held over
  \line{}\kern-\topskip\nobreak\vfill\supereject\fi}

\def\pagecontents{\ifvoid\topins\else\unvbox\topins\fi
  \dimen@=\dp\@cclv \unvbox\@cclv % open up \box255
  \ifvoid\footins\else % footnote info is present
    \vskip\skip\footins
    \footnoterule
    \unvbox\footins\fi
  \ifr@ggedbottom \kern-\dimen@ \vfil \fi}
\def\footnoterule{\kern-3\p@
  \hrule width 2truein \kern 2.6\p@} % the \hrule is .4pt high

% Hyphenation, miscellaneous macros, and initial values for standard layout
\message{hyphenation}

\lefthyphenmin=2 \righthyphenmin=3 % disallow x- or -xx breaks
\input hyphen

\def\magnification{\afterassignment\m@g\count@}
\def\m@g{\mag\count@
  \hsize6.5truein\vsize8.9truein\dimen\footins8truein}

\def\loggingall{\tracingcommands\tw@\tracingstats\tw@
  \tracingpages\@ne\tracingoutput\@ne\tracinglostchars\@ne
  \tracingmacros\tw@\tracingparagraphs\@ne\tracingrestores\@ne
  \showboxbreadth\maxdimen\showboxdepth\maxdimen\errorstopmode}
\def\tracingall{\tracingonline\@ne\loggingall}

\def\showhyphens#1{\setbox0\vbox{\parfillskip\z@skip\hsize\maxdimen\tenrm
  \pretolerance\m@ne\tolerance\m@ne\hbadness0\showboxdepth0\ #1}}

\normalbaselines\rm % select roman font
\nonfrenchspacing % punctuation affects the spacing
\catcode`@=12 % at signs are no longer letters

\def\fmtname{plain}\def\fmtversion{3.14159265} % identifies the current format
```

第 2 章　LaTeX 2.09

文書スタイルのカスタマイズ

〔レスリー・ランポート（大野ほか訳）『文書処理システム LaTeX』（アスキー出版局・1990 年）85–87 頁〕

LaTeX の標準の文書スタイルが気に入らないときには，自分の文書スタイルを作ることもできる。ここでいう “文書スタイルの変更” とは段落や箇条書などのリスト構造の出力形式を変えることで，新たな構造を作成するという意味ではない。新しい論理構造の定義方法については 3.4 節を参照のこと。

文書スタイルのカスタマイズにとりかかる前に，多くの作者が自分の文書をデザインしようとして初歩的な誤りを犯していることを肝に銘じておいてほしい。このような誤りを避けるには，熟練した組版デザインの専門家に相談するか，それに関する本を読んで勉強するほかはない。ここでは，ありがちな間違いについて注意しておく。それは，1 行が長すぎるとひどく読みづらくなるということである。この誤りを冒さないように，**“句読点および空白を含めて，1 行を 75 文字以内に収める”**（欧文の場合）と提案したい。

個別に文書のスタイルを変更するのなら，プリアンブルに宣言を加えるだけでよい。しかし，同じスタイル変更を複数の文書に施すのなら，新たなスタイル・オプションを作成しておいたほうが便利であろう。文書スタイル・オプションは，sty ファイルに適当な宣言を書き込めばできあがる。sty ファイルとは，ファーストネームがオプション名，拡張子が sty のファイルのことだ。たとえば，bauhaus スタイル・オプションの定義を構成する宣言を bauhaus.sty という名前のファイルに書き込んでおく。そして，\documentstyle コマンドのオプション引数に bauhaus を指定すると，LaTeX はメインの文書スタイルの宣言を処理した後，bauhaus.sty ファイルを読み込んでくれる。このとき，複数のスタイル・オプションが指定されていると，指定された順に対応する sty ファイルを読み込んでいく。

文書スタイル・オプションを定義した sty ファイルを読み込むときには，TeX は @ をふつうの英文字として扱う。つまり，\@listi のように @ をコマンド名の一部として使えるのである。ユーザーが作成した文書のなかにこのようなコマンド名があると，TeX はこれを \@ 記号と listi というテキスト文字列とに切り離してしまう。LaTeX の内部コマンドの多くは，文書中で誤って使われないように @ を含んだ名前になっている。文書スタイルのいくつかのパラメータも @ を使って定義されている。これらについての説明は，付録 C を参照のこと。

文書スタイルをすこし変えてみたいときは，ページ内のテキストの高さと横幅を決めるパラメータに手を加えるといいだろう。文書スタイルのパラメータについては，本章と付録 C で説明している。その他の変更には，LaTeX のコマンドの再定義が必要になる。たとえば，章番号を “Chapter 3” ではなく “Capítulo 3” と出力したいとする。そのためには，\chapter コマンドの定義を変更する必要がある。最初から \chapter コマンドを定義しなければならないとしたら，TeX と LaTeX 双方の内部動作に精通しているエキスパートでなければ不可能である。しかし，さいわいなことにこの場合は既存の \chapter コマンドをほんのすこし変更するだけでよい。まず，その定義がどこにあるかを調べよう。

\chapter コマンドは，文書スタイルによって定義されている。主要な文書スタイルの宣言は，スタイル・オプションと同様に sty ファイルのなかにある。たとえば，\documentstyle{report} コマンドを指定すると，TeX は report.sty というファイルを読み込む。sty ファイルは効率優先で設計されているため，あまり読みやすいものではない。そこで，標準の LaTeX の sty ファイルには，それぞれに対応する doc ファイルが用意されている。このファイルは，役に立つコメントを sty ファイルに加え，読みやすいように整形したものである。つまり，report.doc ファイルは，report.sty を読みやすくした版といえる。doc ファイルがどこにあるかは，ローカルガイドを参照してほしい。

効率上の問題から，大半の LaTeX コマンドの定義には，3.4 節で説明した LaTeX のコマンドではなく，TeX の \def コマンドを使っている。このコマンドについては，*The TeXbook* を参照してほしい（新しい文書スタイルを最初から作成するとき以外は，\def コマンドを使用しないほうがよい。LaTeX のコマンドのほうが安全だし，定義の数が少なければそれらの処理にかかる余分な時間はさして気になるほどのものではない）。さて，\chapter の定義を見つけるには，まずテキストエディタを使って report.doc ファイルから “\def\chapter” という文字列を探せばいいはずだ。しかし，この文字列が見つからない…。そのファイルの冒頭部分のコメントから分かるように，report 文書スタイルは rep10.sty，rep11.sty，あるいは rep12.sty のいずれかからさらに宣言を読み込むようになっている。どのファイルを読み込むかは，文字サイズが標準の 10 ポイントか，それとも 11pt あるいは 12pt スタイル・オプションが指定されているかによって決まる。\chapter コマンドは，これらのファイルのなかで定義されているのである。

では，10 ポイント用のスタイル・ファイルを変更するとしよう。rep10.doc ファイルのなかから “\def\chapter” という文字列を捜し，\chapter の定義を見つける。残念ながら，定義中には “Chapter” という文字列がどこで生成されているかを示すようなものは何もない。そこで，\chapter の定義に含まれているコマンドの定義，次にそれらの定義にあるコマンドの定義というふうに見つかるまで捜すこともできる。しかし，“Chapter” は Chapter という入力テキストによって生成されているのだから，この 7 文字の文字列を検索するほうが簡単だ。そうすれば，\@chapapp というコマンドが初期状態では Chapter と定義されており，\appendix

コマンドによって Appendix と再定義されることを示すコメントがすぐに見つかるだろう。これによって，次のようなコマンドを加えたスタイル・オプションを作成すればよいことが分かる（コマンド名に @ が含まれているコマンドは，sty ファイルのなかでしか定義できない）。

```
\renewcommand{\@chapapp}{Cap\'{\i}tulo}
```

同様に，\appendix コマンドを再定義して，Appendix を Ap\'{e}ndice に置き換えることもできる。

この例は，コマンドを変更するときのヒントになる。環境を変更するときの手順も同様だ。ただし，ほとんどの環境は TeX の \def コマンドで定義されている。たとえば，quote 環境は，\begin{quote}によって実行される \quote と，\end{quote}によって実行される \endquote という 2 つのコマンドとして定義されている。

LaTeX コマンドの定義が doc ファイルのなかにないときは，そのコマンドはたいていは LaTeX の組み込みコマンドである。その場合，コマンドの定義は latex.tex ファイルにある。そこにもないときは，TeX コマンドである可能性が高い。*The TeXbook* を調べれば，定義を見つけられるであろう。

だが，かならずしも \chapter コマンドの例のように簡単に変更できるわけではない。コマンドによっては，TeX コマンドについてのより高度な理解や，LaTeX の動作についての詳しい知識が必要になる。TeX については，*The TeXbook* を読めばすべて理解できるはずである。また，LaTeX について知らなければならない事柄のほとんどは，latex.tex のコメント部分に説明がある。ただし，フォント選択コマンドについては lfonts.tex に説明がある。使っているシステムではこれらのファイルがどこにあるのか，また文書スタイルのカスタマイズについての情報がほかにもあるかどうかについては，ローカルガイドを参照してほしい。

Plain TeX コマンドを使う〔同書 210–211 頁〕

LaTeX は TeX の “マクロ・パッケージ”—— すなわち，あらかじめ定義された TeX コマンド群として実現されている。Plain TeX とは，“裸” の TeX とマクロ・パッケージ plain からなる TeX の標準版のことである。Plain TeX の大半のコマンドは LaTeX でも使えるが，利用にあたっては注意が必要である。LaTeX では，それ自体で 1 つのシステムとして機能するようにコマンドが統一されている。つまり，ほかの LaTeX コマンドと矛盾しないように使われるかぎり，そのコマンドが適正に機能するよう多くの妥協点が存在するのである。LaTeX のコマンドには，本書に記載されていない Plain TeX のコマンドとともに使うと正しく動かないものもある。

Plain TeX のコマンドが問題を起こすかどうかを知るには，実際に試してみるよりほかない。一般論としては，LaTeX のコマンドないし環境が使っているパラメータを変更する可能性のある Plain TeX のコマンドは，そのコマンドや環境と組み合わせないほうがよい。たとえば，LaTeX のリスト作成環境のなかでは，TeX の段落作成パラメータを変更する \hangindent のような Plain TeX のコマンドは使ってはならない。

LaTeX の \output ルーチンが用いるパラメータを，本書で指定した以外の方法で変更することはできない。とくに，*The TeXbook* の第 15 章に書かれていることはほとんどすべて忘れるべきであろう。とはいっても，LaTeX はレジスタ割当てに対する TeX の慣習をすべて踏襲しているので，通常の TeX コマンドを使って独自のカウンタやボックスなどを定義することは可能である。

LaTeX で定義が削除（ないし変更）されている Plain TeX コマンドは下記のとおりである。ここに挙げていないものは LaTeX コマンドで，対応する Plain TeX 版のコマンドによく似た LaTeX コマンドや名前に @ を含むような “内部” コマンドである。

タブ・コマンド

LaTeX には tabbing 環境があるので，以下のコマンドは削除した。

```
\tabs     \tabsdone    \settabs    \+
\tabset   \cleartabs   \tabalign
```

出力，脚注，図

Plain TeX の出力ルーチンを必要とする以下のコマンドは削除されている。これらは，LaTeX の脚注生成コマンド，figure 環境，table 環境に置き換えられている。

```
\pageno          \nopagenumbers   \makeheadline   \footstrut
\headline        \advancepageno   \makefootline   \topins
\footline        \nopagenumbers   \dosupereject   \topinsert
\normalbottom    \plainoutput     \pagecontents   \midinsert
\folio           \pagebody        \vfootnote      \pageinsert
                                                  \endinsert
```

フォント選択コマンド

LaTeX では，以下の Plain TeX のコマンドは定義されていない。対応する LaTeX コマンドを知りたいときは，ファイル lfonts.tex を参照のこと。

```
\fivei    \fivebf    \sevensy
\fiverm   \seveni    \teni
\fivesy   \sevenbf   \oldstyle
```

方程式の位置揃え

以下の Plain TeX コマンドは，LaTeX の eqnarray 環境と eqnarray*環境により不要となった。

```
\eqalign    \eqalignno    \leqalignno
```

その他

Plain TeX の \beginsection コマンドは，LaTeX のセクション・コマンドに置き換えられている。また，\end コマンドと \bye コマンドは，\end{document}に置き換えられている。Plain TeX コマンドの \centering と \line は，LaTeX がその名を横取りしている。Plain TeX コマンドでできることはほとんどすべて，center 環境と flushleft 環境，flushright 環境で実現できる。Plain TeX の \magnification コマンドにあたる LaTeX コマンドは存在しない。通常，出力ファイルの拡大は dvi ファイルを印字するプログラムによっておこなうことができる。

2.1 lplain.tex

```
% File LPLAIN - Created 29 October 1985 from plain version 1.5CM
%            - Last modified 20 October 1988 to take into account
%              changes to PLAIN.TEX reported by Arthur Ogawa
%            - Modified February 8, 1990 by Dominik Wujastyk to
%              match the PLAIN.TEX meant for TeX 3.0 (\fmtname{plain},
%              \fmtversion{3.0}).
%            - Modified March 15, 1990 by Frank Mittelbach to
%              allow the use of this file both in TeX 2 and 3
%            - Modified June 21, 1991 by RmS to clear the
%              contents of \box0.
%            - Modified July 1, 1991, by RmS to correct \multispan bug.
%            - Modified August 14, 1991, By RmS to make \cases work
%              with NFSS.
%            - Modified October 30, 1991, by RmS to remove \catcode and
%              \mathcode assignments for control characters.
%            - Modified November 1, 1991, by RmS to remove ^^A and ^^K
%              control characters.
%            - Modified November 4, 1991, by RmS to add missing \m@th
%              assignments and to introduce the file lhyphen.tex.
%            - Modified November 7, 1991, by RmS to make it work with
%              MLTeX version 2.
%            - Modified March 17, 1992, by RmS to match changes in
%              plain.tex of March 16, 1992.
%
% This is the LaTeX version of the plain TeX format that's described in
% The TeXbook. All modifications can be found by searching for
% the word 'LaTeX'.
% N.B.: A version number is defined at the very end of this file;
%       please change that number whenever the file is modified!
% And don't modify the file under any circumstances.
%
%% \CharacterTable
%%  {Upper-case   \A\B\C\D\E\F\G\H\I\J\K\L\M\N\O\P\Q\R\S\T\U\V\W\X\Y\Z
%%   Lower-case   \a\b\c\d\e\f\g\h\i\j\k\l\m\n\o\p\q\r\s\t\u\v\w\x\y\z
%%   Digits       \0\1\2\3\4\5\6\7\8\9
%%   Exclamation  \!    Double quote \"    Hash (number) \#
%%   Dollar       \$    Percent      \%    Ampersand     \&
%%   Acute accent \'    Left paren   \(    Right paren   \)
%%   Asterisk     \*    Plus         \+    Comma         \,
%%   Minus        \-    Point        \.    Solidus       \/
%%   Colon        \:    Semicolon    \;    Less than     \<
%%   Equals       \=    Greater than \>    Question mark \?
%%   Commercial at \@   Left bracket \[    Backslash     \\
%%   Right bracket \]   Circumflex   \^    Underscore    \_
%%   Grave accent \`    Left brace   \{    Vertical bar  \|
%%   Right brace  \}    Tilde        \~}
%%

\catcode`\{=1 % left brace is begin-group character
\catcode`\}=2 % right brace is end-group character
\catcode`\$=3 % dollar sign is math shift
\catcode`\&=4 % ampersand is alignment tab
\catcode`\#=6 % hash mark is macro parameter character
\catcode`\^=7 % circumflex and uparrow are for superscripts
\catcode`\_=8 % underline and downarrow are for subscripts
\catcode`\^^I=10 % ascii tab is a blank space
\chardef\active=13 \catcode`\~=\active % tilde is active
\catcode`\^^L=\active \outer\def^^L{\par} % ascii form-feed is "\outer\par"

\message{Preloading the plain format: codes,}

% We had to define the \catcodes right away, before the message line,
% since \message uses the { and } characters.
% When INITEX (the TeX initializer) starts up,
% it has defined the following \catcode values:
% \catcode`\^^@=9 % ascii null is ignored
% \catcode`\^^M=5 % ascii return is end-line
% \catcode`\\=0 % backslash is TeX escape character
% \catcode`\%=14 % percent sign is comment character
% \catcode`\ =10 % ascii space is blank space
% \catcode`\^^?=15 % ascii delete is invalid
% \catcode`\A=11 ... \catcode`\Z=11 % uppercase letters
```

```
% \catcode`\a=11 ... \catcode`\z=11 % lowercase letters
% all others are type 12 (other)

% Here is a list of the characters that have been specially catcoded:
\def\dospecials{\do\ \do\\\do\{\do\}\do\$\do\&%
  \do\#\do\^\do\_\do\%\do\~}
% (not counting ascii null, tab, linefeed, formfeed, return, delete)
% Each symbol in the list is preceded by \do, which can be defined
% if you want to do something to every item in the list.

% We make @ signs act like letters, temporarily, to avoid conflict
% between user names and internal control sequences of plain format.
\catcode`@=11

% INITEX sets up \mathcode x=x, for x=0..255, except that
% \mathcode x=x+"7100, for x = `A to `Z and `a to `z;
% \mathcode x=x+"7000, for x = `0 to `9.
% The following changes define internal codes as recommended
% in Appendix C of The TeXbook:
\mathcode`\ ="8000 % \space
\mathcode`\!="5021
\mathcode`\'="8000 % ^\prime
\mathcode`\(="4028
\mathcode`\)="5029
\mathcode`\*="2203 % \ast
\mathcode`\+="202B
\mathcode`\,="613B
\mathcode`\-="2200
\mathcode`\.="013A
\mathcode`\/="013D
\mathcode`\:="303A
\mathcode`\;="603B
\mathcode`\<="313C
\mathcode`\=="303D
\mathcode`\>="313E
\mathcode`\?="503F
\mathcode`\[="405B
\mathcode`\\="026E % \backslash
\mathcode`\]="505D
\mathcode`\_="8000 % \_
\mathcode`\{="4266
\mathcode`\|="026A
\mathcode`\}="5267

% INITEX sets \uccode`x=`X and \uccode `X=`X for all letters x,
% and \lccode`x=`x, \lccode`X=`x; all other values are zero.
% No changes to those tables are needed in plain TeX format.

% INITEX sets \sfcode x=1000 for all x, except that \sfcode`X=999
% for uppercase letters. The following changes are needed:
\sfcode`\)=0 \sfcode`\'=0 \sfcode`\]=0
% The \nonfrenchspacing macro will make further changes to \sfcode values.

% Finally, INITEX sets all \delcode values to -1, except \delcode`.=0
\delcode`\(="028300
\delcode`\)="029301
\delcode`\[="05B302
\delcode`\]="05D303
\delcode`\<="26830A
\delcode`\>="26930B
\delcode`\/="02F30E
\delcode`\|="26A30C
\delcode`\\="26E30F
% N.B. { and } should NOT get delcodes; otherwise parameter grouping fails!

% To make the plain macros more efficient in time and space,
% several constant values are declared here as control sequences.
% If they were changed, anything could happen; so they are private symbols.
\chardef\@ne=1
\chardef\tw@=2
\chardef\thr@@=3
\chardef\sixt@@n=16
\chardef\@cclv=255
\mathchardef\@cclvi=256
```

```
\mathchardef\@m=1000
\mathchardef\@M=10000
\mathchardef\@MM=20000

% Allocation of registers

% Here are macros for the automatic allocation of \count, \box, \dimen,
% \skip, \muskip, and \toks registers, as well as \read and \write
% stream numbers, \fam codes, \language codes, and \insert numbers.

\message{registers,}

% When a register is used only temporarily, it need not be allocated;
% grouping can be used, making the value previously in the register return
% after the close of the group. The main use of these macros is for
% registers that are defined by one macro and used by others, possibly at
% different nesting levels. All such registers should be defined through
% these macros; otherwise conflicts may occur, especially when two or more
% more macro packages are being used at once.

% The following counters are reserved:
%   0 to 9 page numbering
%       10  count allocation
%       11  dimen allocation
%       12  skip allocation
%       13  muskip allocation
%       14  box allocation
%       15  toks allocation
%       16  read file allocation
%       17  write file allocation
%       18  math family allocation
%       19  language allocation
%       20  insert allocation
%       21  the most recently allocated number
%       22  constant -1
% New counters are allocated starting with 23, 24, etc. Other registers are
% allocated starting with 10. This leaves 0 through 9 for the user to play
% with safely, except that counts 0 to 9 are considered to be the page and
% subpage numbers (since they are displayed during output). In this scheme,
% \count 10 always contains the number of the highest-numbered counter that
% has been allocated, \count 14 the highest-numbered box, etc.
% Inserts are given numbers 254, 253, etc., since they require a \count,
% \dimen, \skip, and \box all with the same number; \count 20 contains the
% lowest-numbered insert that has been allocated. Of course, \box255 is
% reserved for \output; \count255, \dimen255, and \skip255 can be used freely.

% It is recommended that macro designers always use
% \global assignments with respect to registers numbered 1, 3, 5, 7, 9, and
% always non-\global assignments with respect to registers 0, 2, 4, 6, 8, 255.
% This will prevent ``save stack buildup'' that might otherwise occur.

\count10=22 % allocates \count registers 23, 24, ...
\count11=9 % allocates \dimen registers 10, 11, ...
\count12=9 % allocates \skip registers 10, 11, ...
\count13=9 % allocates \muskip registers 10, 11, ...
\count14=9 % allocates \box registers 10, 11, ...
\count15=9 % allocates \toks registers 10, 11, ...
\count16=-1 % allocates input streams 0, 1, ...
\count17=-1 % allocates output streams 0, 1, ...
\count18=3 % allocates math families 4, 5, ...
\count19=0 % allocates \language codes 1, 2, ...
\count20=255 % allocates insertions 254, 253, ...
\countdef\insc@unt=20 % the insertion counter
\countdef\allocationnumber=21 % the most recent allocation
\countdef\m@ne=22 \m@ne=-1 % a handy constant
\def\wlog{\immediate\write\m@ne} % write on log file (only)

% Here are abbreviations for the names of scratch registers
% that don't need to be allocated.

\countdef\count@=255
\dimendef\dimen@=0
\dimendef\dimen@i=1 % global only
\dimendef\dimen@ii=2
```

```
\skipdef\skip@=0
\toksdef\toks@=0

% Now, we define \newcount, \newbox, etc. so that you can say \newcount\foo
% and \foo will be defined (with \countdef) to be the next counter.
% To find out which counter \foo is, you can look at \allocationnumber.
% Since there's no \boxdef command, \chardef is used to define a \newbox,
% \newinsert, \newfam, and so on.
% LaTeX change: remove \outer from \newcount and \newdimen (FMi)
%               This is necessary to use \newcount inside \if...
%               later on.

\def\newcount{\alloc@0\count\countdef\insc@unt}
\def\newdimen{\alloc@1\dimen\dimendef\insc@unt}
\outer\def\newskip{\alloc@2\skip\skipdef\insc@unt}
\outer\def\newmuskip{\alloc@3\muskip\muskipdef\@cclvi}
\outer\def\newbox{\alloc@4\box\chardef\insc@unt}
\let\newtoks=\relax % we do this to allow plain.tex to be read in twice
\outer\def\newhelp#1#2{\newtoks#1#1\expandafter{\csname#2\endcsname}}
\outer\def\newtoks{\alloc@5\toks\toksdef\@cclvi}
\outer\def\newread{\alloc@6\read\chardef\sixt@@n}
\outer\def\newwrite{\alloc@7\write\chardef\sixt@@n}
\outer\def\newfam{\alloc@8\fam\chardef\sixt@@n}
\outer\def\newlanguage{\alloc@9\language\chardef\@cclvi}
\def\alloc@#1#2#3#4#5{\global\advance\count1#1by\@ne
  \ch@ck#1#4#2% make sure there's still room
  \allocationnumber=\count1#1%
  \global#3#5=\allocationnumber
  \wlog{\string#5=\string#2\the\allocationnumber}}
\outer\def\newinsert#1{\global\advance\insc@unt by\m@ne
  \ch@ck0\insc@unt\count
  \ch@ck1\insc@unt\dimen
  \ch@ck2\insc@unt\skip
  \ch@ck4\insc@unt\box
  \allocationnumber=\insc@unt
  \global\chardef#1=\allocationnumber
  \wlog{\string#1=\string\insert\the\allocationnumber}}
\def\ch@ck#1#2#3{\ifnum\count1#1<#2%
  \else\errmessage{No room for a new #3}\fi}

% Here are some examples of allocation.
\newdimen\maxdimen \maxdimen=16383.99999pt % the largest legal <dimen>
\newskip\hideskip \hideskip=-1000pt plus 1fill % negative but can grow

% LaTeX change: the PLAIN \centering dimension conflicts with
% LaTeX's \centering command, so it is redefined to \@centering.
% This dimension is used by LaTeX.

\newskip\@centering \@centering=0pt plus 1000pt minus 1000pt

\newdimen\p@ \p@=1pt % this saves macro space and time
\newdimen\z@ \z@=0pt % can be used both for 0pt and 0
\newskip\z@skip \z@skip=0pt plus0pt minus0pt
\newbox\voidb@x % permanently void box register

% And here's a different sort of allocation:
% For example, \newif\iffoo creates \footrue, \foofalse to go with \iffoo.
\outer\def\newif#1{\count@\escapechar \escapechar\m@ne
  \expandafter\expandafter\expandafter
   \edef\@if#1{true}{\let\noexpand#1=\noexpand\iftrue}%
  \expandafter\expandafter\expandafter
   \edef\@if#1{false}{\let\noexpand#1=\noexpand\iffalse}%
  \@if#1{false}\escapechar\count@} % the condition starts out false
\def\@if#1#2{\csname\expandafter\if@\string#1#2\endcsname}
{\uccode`1=`i \uccode`2=`f \uppercase{\gdef\if@12{}}} % `if' is required

\message{compatibility for TeX 2, }

% If this file is used in an old TeX we define the new features
% of TeX 3.0 as simple macros or counters so that files that uses
% these features can be processed in such an environment
% (They will however produce some other results).

\ifx\undefined\inputlineno
```

```
  \newcount\inputlineno
  \inputlineno-1             % this could be used to detect that
                             % an old TeX is in force
  \ifx\undefined\language    % extra test for MLTeX 2, RmS 91/11/07
    \newcount\language
  \fi
  \newcount\lefthyphenmin
  \newcount\righthyphenmin
  \newcount\errorcontextlines
  \newcount\holdinginserts
  \newdimen\emergencystretch
  \newcount\badness
  \let\noboundary\relax
  \newcount\setlanguage
\fi

% Assign initial values to TeX's parameters

\message{parameters,}

% All of TeX's numeric parameters are listed here,
% but the code is commented out if no special value needs to be set.
% INITEX makes all parameters zero except where noted.

\pretolerance=100
\tolerance=200 % INITEX sets this to 10000
\hbadness=1000
\vbadness=1000
\linepenalty=10
\hyphenpenalty=50
\exhyphenpenalty=50
\binoppenalty=700
\relpenalty=500
\clubpenalty=150
\widowpenalty=150
\displaywidowpenalty=50
\brokenpenalty=100
\predisplaypenalty=10000
% \postdisplaypenalty=0
% \interlinepenalty=0
% \floatingpenalty=0, set during \insert
% \outputpenalty=0, set before TeX enters \output
\doublehyphendemerits=10000
\finalhyphendemerits=5000
\adjdemerits=10000
% \looseness=0, cleared by TeX after each paragraph
% \pausing=0
% \holdinginserts=0
% \tracingonline=0
% \tracingmacros=0
% \tracingstats=0
% \tracingparagraphs=0
% \tracingpages=0
% \tracingoutput=0
\tracinglostchars=1
% \tracingcommands=0
% \tracingrestores=0
% \language=0
\uchyph=1
% \lefthyphenmin=2 \righthyphenmin=3 set below
% \globaldefs=0
% \maxdeadcycles=25 % INITEX does this
% \hangafter=1 % INITEX does this, also TeX after each paragraph
% \fam=0
% \mag=1000 % INITEX does this
% \escapechar='\\ % INITEX does this
\defaulthyphenchar='\-
\defaultskewchar=-1
% \endlinechar='\^^M % INITEX does this
\newlinechar=-1
\delimiterfactor=901
% \time=now % TeX does this at beginning of job
% \day=now % TeX does this at beginning of job
% \month=now % TeX does this at beginning of job
```

```
% \year=now % TeX does this at beginning of job
\showboxbreadth=5
\showboxdepth=3
\errorcontextlines=5

\hfuzz=0.1pt
\vfuzz=0.1pt
\overfullrule=5pt
\hsize=6.5in
\vsize=8.9in
\maxdepth=4pt
\splitmaxdepth=\maxdimen
\boxmaxdepth=\maxdimen
% \lineskiplimit=0pt, changed by \normalbaselines
\delimitershortfall=5pt
\nulldelimiterspace=1.2pt
\scriptspace=0.5pt
% \mathsurround=0pt
% \predisplaysize=0pt, set before TeX enters $$
% \displaywidth=0pt, set before TeX enters $$
% \displayindent=0pt, set before TeX enters $$
\parindent=20pt
% \hangindent=0pt, zeroed by TeX after each paragraph
% \hoffset=0pt
% \voffset=0pt

% \baselineskip=0pt, changed by \normalbaselines
% \lineskip=0pt, changed by \normalbaselines
\parskip=0pt plus 1pt
\abovedisplayskip=12pt plus 3pt minus 9pt
\abovedisplayshortskip=0pt plus 3pt
\belowdisplayskip=12pt plus 3pt minus 9pt
\belowdisplayshortskip=7pt plus 3pt minus 4pt
% \leftskip=0pt
% \rightskip=0pt
\topskip=10pt
\splittopskip=10pt
% \tabskip=0pt
% \spaceskip=0pt
% \xspaceskip=0pt
\parfillskip=0pt plus 1fil

\thinmuskip=3mu
\medmuskip=4mu plus 2mu minus 4mu
\thickmuskip=5mu plus 5mu

% We also define special registers that function like parameters:
\newskip\smallskipamount \smallskipamount=3pt plus 1pt minus 1pt
\newskip\medskipamount \medskipamount=6pt plus 2pt minus 2pt
\newskip\bigskipamount \bigskipamount=12pt plus 4pt minus 4pt
\newskip\normalbaselineskip \normalbaselineskip=12pt
\newskip\normallineskip \normallineskip=1pt
\newdimen\normallineskiplimit \normallineskiplimit=0pt
\newdimen\jot \jot=3pt
\newcount\interdisplaylinepenalty \interdisplaylinepenalty=100
\newcount\interfootnotelinepenalty \interfootnotelinepenalty=100

% Definitions for preloaded fonts

\def\magstephalf{1095 }
\def\magstep#1{\ifcase#1 \@m\or 1200\or 1440\or 1728\or 2074\or 2488\fi\relax}

% Fonts assigned to \preloaded are not part of "plain TeX",
% but they are preloaded so that other format packages can use them.
% For example, if another set of macros says "\font\ninerm=cmr9",
% TeX will not have to reload the font metric information for cmr9.

% LaTeX font definitions are taken from the file LFONTS.TEX,
% so all of PLAIN's font definitions are commented out.

%\message{fonts,}
%
%\font\tenrm=cmr10 % roman text
%\font\preloaded=cmr9
```

```
%\font\preloaded=cmr8
%\font\sevenrm=cmr7
%\font\preloaded=cmr6
%\font\fiverm=cmr5
%
%\font\teni=cmmi10 % math italic
%\font\preloaded=cmmi9
%\font\preloaded=cmmi8
%\font\seveni=cmmi7
%\font\preloaded=cmmi6
%\font\fivei=cmmi5
%
%\font\tensy=cmsy10 % math symbols
%\font\preloaded=cmsy9
%\font\preloaded=cmsy8
%\font\sevensy=cmsy7
%\font\preloaded=cmsy6
%\font\fivesy=cmsy5
%
%\font\tenex=cmex10 % math extension
%
%\font\preloaded=cmss10 % sans serif
%\font\preloaded=cmssq8
%
%\font\preloaded=cmssi10 % sans serif italic
%\font\preloaded=cmssqi8
%
%\font\tenbf=cmbx10 % boldface extended
%\font\preloaded=cmbx9
%\font\preloaded=cmbx8
%\font\sevenbf=cmbx7
%\font\preloaded=cmbx6
%\font\fivebf=cmbx5
%
%\font\tentt=cmtt10 % typewriter
%\font\preloaded=cmtt9
%\font\preloaded=cmtt8
%
%\font\preloaded=cmsltt10 % slanted typewriter
%
%\font\tensl=cmsl10 % slanted roman
%\font\preloaded=cmsl9
%\font\preloaded=cmsl8
%
%\font\tenit=cmti10 % text italic
%\font\preloaded=cmti9
%\font\preloaded=cmti8
%\font\preloaded=cmti7
%
%\message{more fonts,}
%\font\preloaded=cmu10 % unslanted text italic
%
%\font\preloaded=cmmib10 % bold math italic
%\font\preloaded=cmbsy10 % bold math symbols
%
%\font\preloaded=cmcsc10 % caps and small caps
%
%\font\preloaded=cmssbx10 % sans serif bold extended
%
%\font\preloaded=cmdunh10 % Dunhill style
%
%\font\preloaded=cmr7 scaled \magstep4 % for titles
%\font\preloaded=cmtt10 scaled \magstep2
%\font\preloaded=cmssbx10 scaled \magstep2
%
%\font\preloaded=manfnt % METAFONT logo and dragon curve and special symbols
%
%% Additional \preloaded fonts can be specified here.
%% (And those that were \preloaded above can be eliminated.)
%
%\let\preloaded=\undefined % preloaded fonts must be declared anew later.
%
%\skewchar\teni='177 \skewchar\seveni='177 \skewchar\fivei='177
%\skewchar\tensy='60 \skewchar\sevensy='60 \skewchar\fivesy='60
```

```
%
%\textfont0=\tenrm \scriptfont0=\sevenrm \scriptscriptfont0=\fiverm
%\def\rm{\fam\z@\tenrm}
%\textfont1=\teni \scriptfont1=\seveni \scriptscriptfont1=\fivei
%\def\mit{\fam\@ne} \def\oldstyle{\fam\@ne\teni}
%\textfont2=\tensy \scriptfont2=\sevensy \scriptscriptfont2=\fivesy
%\def\cal{\fam\tw@}
%\textfont3=\tenex \scriptfont3=\tenex \scriptscriptfont3=\tenex
%\newfam\itfam \def\it{\fam\itfam\tenit} % \it is family 4
%\textfont\itfam=\tenit
%\newfam\slfam \def\sl{\fam\slfam\tensl} % \sl is family 5
%\textfont\slfam=\tensl
%\newfam\bffam \def\bf{\fam\bffam\tenbf} % \bf is family 6
%\textfont\bffam=\tenbf \scriptfont\bffam=\sevenbf
%\scriptscriptfont\bffam=\fivebf
%\newfam\ttfam \def\tt{\fam\ttfam\tentt} % \tt is family 7
%\textfont\ttfam=\tentt

% Macros for setting ordinary text
\message{macros,}

\def\frenchspacing{\sfcode`\.\@m \sfcode`\?\@m \sfcode`\!\@m
  \sfcode`\:\@m \sfcode`\;\@m \sfcode`\,\@m}
\def\nonfrenchspacing{\sfcode`\.3000\sfcode`\?3000\sfcode`\!3000%
  \sfcode`\:2000\sfcode`\;1500\sfcode`\,1250 }

\def\normalbaselines{\lineskip\normallineskip
  \baselineskip\normalbaselineskip \lineskiplimit\normallineskiplimit}

\def\^^M{\ } % control <return> = control <space>
\def\^^I{\ } % same for <tab>

\def\lq{`} \def\rq{'}
\def\lbrack{[} \def\rbrack{]}

\let\endgraf=\par \let\endline=\cr

\def\space{ }
\def\empty{}
\def\null{\hbox{}}

\let\bgroup={ \let\egroup=}

% In \obeylines, we say `\let^^M=\par' instead of `\def^^M{\par}'
% since this allows, for example, `\let\par=\cr \obeylines \halign{...'
{\catcode`\^^M=\active % these lines must end with %
  \gdef\obeylines{\catcode`\^^M\active \let^^M\par}%
  \global\let^^M\par} % this is in case ^^M appears in a \write
\def\obeyspaces{\catcode`\ \active}
{\obeyspaces\global\let =\space}

\def\loop#1\repeat{\def\body{#1}\iterate}
\def\iterate{\body \let\next\iterate \else\let\next\relax\fi \next}
\let\repeat=\fi % this makes \loop...\if...\repeat skippable

\def\thinspace{\kern .16667em }
\def\negthinspace{\kern-.16667em }
\def\enspace{\kern.5em }

\def\enskip{\hskip.5em\relax}
\def\quad{\hskip1em\relax}
\def\qquad{\hskip2em\relax}

\def\smallskip{\vskip\smallskipamount}
\def\medskip{\vskip\medskipamount}
\def\bigskip{\vskip\bigskipamount}

\def\nointerlineskip{\prevdepth-1000\p@}
\def\offinterlineskip{\baselineskip-1000\p@
  \lineskip\z@ \lineskiplimit\maxdimen}

\def\vglue{\afterassignment\vgl@\skip@=}
\def\vgl@{\par \dimen@\prevdepth \hrule height\z@
  \nobreak\vskip\skip@ \prevdepth\dimen@}
```

```
\def\hglue{\afterassignment\hgl@\skip@=}
\def\hgl@{\leavevmode \count@\spacefactor \vrule width\z@
  \nobreak\hskip\skip@ \spacefactor\count@}

\def~{\penalty\@M \ } % tie
\def\slash{/\penalty\exhyphenpenalty} % a '/' that acts like a '-'

\def\break{\penalty-\@M}
\def\nobreak{\penalty \@M}
\def\allowbreak{\penalty \z@}

\def\filbreak{\par\vfil\penalty-200\vfilneg}
\def\goodbreak{\par\penalty-500 }
\def\eject{\par\break}
\def\supereject{\par\penalty-\@MM}

\def\removelastskip{\ifdim\lastskip=\z@\else\vskip-\lastskip\fi}
\def\smallbreak{\par\ifdim\lastskip<\smallskipamount
  \removelastskip\penalty-50\smallskip\fi}
\def\medbreak{\par\ifdim\lastskip<\medskipamount
  \removelastskip\penalty-100\medskip\fi}
\def\bigbreak{\par\ifdim\lastskip<\bigskipamount
  \removelastskip\penalty-200\bigskip\fi}

% \line changed to \@@line because LaTeX redefines \line
\def\@@line{\hbox to\hsize}
\def\leftline#1{\@@line{#1\hss}}
\def\rightline#1{\@@line{\hss#1}}
\def\centerline#1{\@@line{\hss#1\hss}}
% end of LaTeX \line -> \@@line change

\def\rlap#1{\hbox to\z@{#1\hss}}
\def\llap#1{\hbox to\z@{\hss#1}}

\def\m@th{\mathsurround=\z@}
\def\underbar#1{$\setbox\z@\hbox{#1}\dp\z@\z@
  \m@th \underline{\box\z@}$}

\newbox\strutbox
\setbox\strutbox=\hbox{\vrule height8.5pt depth3.5pt width\z@}
\def\strut{\relax\ifmmode\copy\strutbox\else\unhcopy\strutbox\fi}

\def\hidewidth{\hskip\hideskip} % for alignment entries that can stick out
\def\ialign{\everycr{}\tabskip\z@skip\halign} % initialized \halign
\newcount\mscount
\def\multispan#1{\omit \mscount#1\relax
  \loop\ifnum\mscount>\@ne \sp@n\repeat}
\def\sp@n{\span\omit\advance\mscount\m@ne}

% LaTeX has its own tabbing environment, so PLAIN's is disabled.
%
%\newif\ifus@ \newif\if@cr
%\newbox\tabs \newbox\tabsyet \newbox\tabsdone
%
%\def\cleartabs{\global\setbox\tabsyet\null \setbox\tabs\null}
%\def\settabs{\setbox\tabs\null \futurelet\next\sett@b}
%\let\+=\relax % in case this file is being read in twice
%\def\sett@b{\ifx\next\+\let\next\relax
%    \def\next{\afterassignment\s@tt@b\let\next}%
%  \else\let\next\s@tcols\fi\next}
%\def\s@tt@b{\let\next\relax\us@false\m@ketabbox}
%\def\tabalign{\us@true\m@ketabbox} % non-\outer version of \+
%\outer\def\+{\tabalign}
%\def\s@tcols#1\columns{\count@#1 \dimen@\hsize
%  \loop\ifnum\count@>\z@ \@nother \repeat}
%\def\@nother{\dimen@ii\dimen@ \divide\dimen@ii\count@
%  \setbox\tabs\hbox{\hbox to\dimen@ii{}\unhbox\tabs}%
%  \advance\dimen@-\dimen@ii \advance\count@\m@ne}
%
%\def\m@ketabbox{\begingroup
%  \global\setbox\tabsyet\copy\tabs
%  \global\setbox\tabsdone\null
%  \def\cr{\@crtrue\crcr\egroup\egroup
%    \ifus@\unvbox\z@\lastbox\fi\endgroup
```

```
%    \setbox\tabs\hbox{\unhbox\tabsyet\unhbox\tabsdone}}%
%  \setbox\z@\vbox\bgroup\@crfalse
%    \ialign\bgroup&\t@bbox##\t@bb@x\crcr}
%
%\def\t@bbox{\setbox\z@\hbox\bgroup}
%\def\t@bb@x{\if@cr\egroup % now \box\z@ holds the column
%  \else\hss\egroup \global\setbox\tabsyet\hbox{\unhbox\tabsyet
%      \global\setbox\@ne\lastbox}% now \box\@ne holds its size
%    \ifvoid\@ne\global\setbox\@ne\hbox to\wd\z@{}%
%    \else\setbox\z@\hbox to\wd\@ne{\unhbox\z@}\fi
%    \global\setbox\tabsdone\hbox{\box\@ne\unhbox\tabsdone}\fi
%  \box\z@}

\def\hang{\hangindent\parindent}
\def\textindent#1{\indent\llap{#1\enspace}\ignorespaces}
\def\item{\par\hang\textindent}
%% RmS 91/11/04: Removed \itemitem since never needed/useful on LaTeX.
%\def\itemitem{\par\indent \hangindent2\parindent \textindent}
\def\narrower{\advance\leftskip\parindent
  \advance\rightskip\parindent}

% LaTeX has its own sectioning macros
%\outer\def\beginsection#1\par{\vskip\z@ plus.3\vsize\penalty-250
%  \vskip\z@ plus-.3\vsize\bigskip\vskip\parskip
%  \message{#1}\leftline{\bf#1}\nobreak\smallskip\noindent}

\outer\def\proclaim #1. #2\par{\medbreak
  \noindent{\bf#1.\enspace}{\sl#2\par}%
  \ifdim\lastskip<\medskipamount \removelastskip\penalty55\medskip\fi}

\def\raggedright{\rightskip\z@ plus2em \spaceskip.3333em \xspaceskip.5em\relax}
\def\ttraggedright{\tt\rightskip\z@ plus2em\relax} % for use with \tt only

\chardef\%=`\%
\chardef\&=`\&
\chardef\#=`\#
\chardef\$=`\$
\chardef\ss="19
\chardef\ae="1A
\chardef\oe="1B
\chardef\o="1C
\chardef\AE="1D
\chardef\OE="1E
\chardef\O="1F
\chardef\i="10 \chardef\j="11 % dotless letters
\def\aa{\accent23a}
\def\l{\char32l}
\def\L{\leavevmode\setbox0\hbox{L}\hbox to\wd0{\hss\char32L}}

\def\leavevmode{\unhbox\voidb@x} % begins a paragraph, if necessary
\def\_{\leavevmode \kern.06em \vbox{\hrule width.3em}}
\def\AA{\leavevmode\setbox0\hbox{h}\dimen@\ht0\advance\dimen@-1ex%
  \rlap{\raise.67\dimen@\hbox{\char'27}}A}

\def\mathhexbox#1#2#3{\leavevmode
  \hbox{$\m@th \mathchar"#1#2#3$}}
\def\dag{\mathhexbox279}
\def\ddag{\mathhexbox27A}
\def\S{\mathhexbox278}
\def\P{\mathhexbox27B}

\def\oalign#1{\leavevmode\vtop{\baselineskip\z@skip \lineskip.25ex%
  \ialign{##\crcr#1\crcr}}} % put characters over each other
\def\ooalign{\lineskiplimit-\maxdimen \oalign}

% LaTeX change: \d, \b, \c redefined to work in a moving argument.
\def\pd#1{\oalign{#1\crcr\hidewidth.\hidewidth}}
\def\d{\protect\pd}

\def\pb#1{\oalign{#1\crcr\hidewidth
    \vbox to.2ex{\hbox{\char22}\vss}\hidewidth}}
\def\b{\protect\pb}

\def\pc#1{\setbox\z@\hbox{#1}\ifdim\ht\z@=1ex\accent24 #1%
```

```
  \else{\ooalign{\unhbox\z@\crcr\hidewidth\char24\hidewidth}}\fi}
\def\c{\protect\pc}
% end of LaTeX change to \d, \b, \c

\def\copyright{{\ooalign{\hfil\raise.07ex\hbox{c}\hfil\crcr\mathhexbox20D}}}

% LaTeX change: \ldots is redefined to do essentially what Plain's \dots does,
% so ...
\def\dots{\ldots}

\def\TeX{T\kern-.1667em\lower.5ex\hbox{E}\kern-.125emX}

\def\‘#1{{\accent18 #1}}
\def\’#1{{\accent19 #1}}
\def\v#1{{\accent20 #1}} \let\^^_=\v
\def\u#1{{\accent21 #1}} \let\^^S=\u
\def\=#1{{\accent22 #1}}
\def\^#1{{\accent94 #1}} \let\^^D=\^
\def\.#1{{\accent95 #1}}
\def\H#1{{\accent"7D #1}}
\def\~#1{{\accent"7E #1}}
\def\"#1{{\accent"7F #1}}

% LaTeX change: Make \t work in a moving argument.
\def\pt#1{{\edef\next{\the\font}\the\textfont1\accent"7F\next#1}}
\def\t{\protect\pt}

% LaTeX change: \kern\z@ added to end of \hrulefill and \dotfill
% to make them work in ‘tabular’ and ‘array’ environments.
% (Change made 24 July 1987).
\def\hrulefill{\leaders\hrule\hfill\kern\z@}
\def\dotfill{\cleaders\hbox{$\m@th \mkern1.5mu.\mkern1.5mu$}\hfill\kern\z@}

\def\rightarrowfill{$\m@th\mathord-\mkern-6mu%
  \cleaders\hbox{$\mkern-2mu\mathord-\mkern-2mu$}\hfill
  \mkern-6mu\mathord\rightarrow$}
\def\leftarrowfill{$\m@th\mathord\leftarrow\mkern-6mu%
  \cleaders\hbox{$\mkern-2mu\mathord-\mkern-2mu$}\hfill
  \mkern-6mu\mathord-$}
\mathchardef\braceld="37A \mathchardef\bracerd="37B
\mathchardef\braceru="37C \mathchardef\braceru="37D
\def\downbracefill{$\m@th\braceld\leaders\vrule\hfill\braceru
  \bracelu\leaders\vrule\hfill\bracerd$}
\def\upbracefill{$\m@th\bracelu\leaders\vrule\hfill\bracerd
  \braceld\leaders\vrule\hfill\braceru$}

% LaTeX change: \bye is eliminated.
%\outer\def\bye{\par\vfill\supereject\end}

% Macros for math setting
\message{math definitions,}

\let\sp=^ \let\sb=_
\def\,{\mskip\thinmuskip}
\def\>{\mskip\medmuskip}
\def\;{\mskip\thickmuskip}
\def\!{\mskip-\thinmuskip}
\def\*{\discretionary{\thinspace\the\textfont2\char2}{}{}}
{\catcode‘\’=\active \gdef’{^\bgroup\prim@s}}
\def\prim@s{\prime\futurelet\next\pr@m@s}
\def\pr@m@s{\ifx’\next\let\nxt\pr@@@s \else\ifx^\next\let\nxt\pr@@@t
  \else\let\nxt\egroup\fi\fi \nxt}
\def\pr@@@s#1{\prim@s} \def\pr@@@t#1#2{#2\egroup}
{\catcode‘\^^Z=\active \gdef^^Z{\not=}} % ^^Z is like \ne in math

{\catcode‘\_=\active \global\let_=\_} % _ in math is either subscript or \_

\mathchardef\alpha="010B
\mathchardef\beta="010C
\mathchardef\gamma="010D
\mathchardef\delta="010E
\mathchardef\epsilon="010F
\mathchardef\zeta="0110
\mathchardef\eta="0111
```

```
\mathchardef\theta="0112
\mathchardef\iota="0113
\mathchardef\kappa="0114
\mathchardef\lambda="0115
\mathchardef\mu="0116
\mathchardef\nu="0117
\mathchardef\xi="0118
\mathchardef\pi="0119
\mathchardef\rho="011A
\mathchardef\sigma="011B
\mathchardef\tau="011C
\mathchardef\upsilon="011D
\mathchardef\phi="011E
\mathchardef\chi="011F
\mathchardef\psi="0120
\mathchardef\omega="0121
\mathchardef\varepsilon="0122
\mathchardef\vartheta="0123
\mathchardef\varpi="0124
\mathchardef\varrho="0125
\mathchardef\varsigma="0126
\mathchardef\varphi="0127
\mathchardef\Gamma="7000
\mathchardef\Delta="7001
\mathchardef\Theta="7002
\mathchardef\Lambda="7003
\mathchardef\Xi="7004
\mathchardef\Pi="7005
\mathchardef\Sigma="7006
\mathchardef\Upsilon="7007
\mathchardef\Phi="7008
\mathchardef\Psi="7009
\mathchardef\Omega="700A

\mathchardef\aleph="0240
\def\hbar{{\mathchar'26\mkern-9muh}}
\mathchardef\imath="017B
\mathchardef\jmath="017C
\mathchardef\ell="0160
\mathchardef\wp="017D
\mathchardef\Re="023C
\mathchardef\Im="023D
\mathchardef\partial="0140
\mathchardef\infty="0231
\mathchardef\prime="0230
\mathchardef\emptyset="023B
\mathchardef\nabla="0272
\def\surd{{\mathchar"1270}}
\mathchardef\top="023E
\mathchardef\bot="023F
\def\angle{{\vbox{\ialign{$\m@th\scriptstyle##$\crcr
      \not\mathrel{\mkern14mu}\crcr
      \noalign{\nointerlineskip}
      \mkern2.5mu\leaders\hrule height.34pt\hfill\mkern2.5mu\crcr}}}}
\mathchardef\triangle="0234
\mathchardef\forall="0238
\mathchardef\exists="0239
\mathchardef\neg="023A \let\lnot=\neg
\mathchardef\flat="015B
\mathchardef\natural="015C
\mathchardef\sharp="015D
\mathchardef\clubsuit="027C
\mathchardef\diamondsuit="027D
\mathchardef\heartsuit="027E
\mathchardef\spadesuit="027F

\mathchardef\coprod="1360
\mathchardef\bigvee="1357
\mathchardef\bigwedge="1356
\mathchardef\biguplus="1355
\mathchardef\bigcap="1354
\mathchardef\bigcup="1353
\mathchardef\intop="1352 \def\int{\intop\nolimits}
\mathchardef\prod="1351
```

```
\mathchardef\sum="1350
\mathchardef\bigotimes="134E
\mathchardef\bigoplus="134C
\mathchardef\bigodot="134A
\mathchardef\ointop="1348 \def\oint{\ointop\nolimits}
\mathchardef\bigsqcup="1346
\mathchardef\smallint="1273

\mathchardef\triangleleft="212F
\mathchardef\triangleright="212E
\mathchardef\bigtriangleup="2234
\mathchardef\bigtriangledown="2235
\mathchardef\wedge="225E \let\land=\wedge
\mathchardef\vee="225F \let\lor=\vee
\mathchardef\cap="225C
\mathchardef\cup="225B
\mathchardef\ddagger="227A
\mathchardef\dagger="2279
\mathchardef\sqcap="2275
\mathchardef\sqcup="2274
\mathchardef\uplus="225D
\mathchardef\amalg="2271
\mathchardef\diamond="2205
\mathchardef\bullet="220F
\mathchardef\wr="226F
\mathchardef\div="2204
\mathchardef\odot="220C
\mathchardef\oslash="220B
\mathchardef\otimes="220A
\mathchardef\ominus="2209
\mathchardef\oplus="2208
\mathchardef\mp="2207
\mathchardef\pm="2206
\mathchardef\circ="220E
\mathchardef\bigcirc="220D
\mathchardef\setminus="226E % for set difference A\setminus B
\mathchardef\cdot="2201
\mathchardef\ast="2203
\mathchardef\times="2202
\mathchardef\star="213F

\mathchardef\propto="322F
\mathchardef\sqsubseteq="3276
\mathchardef\sqsupseteq="3277
\mathchardef\parallel="326B
\mathchardef\mid="326A
\mathchardef\dashv="3261
\mathchardef\vdash="3260
\mathchardef\nearrow="3225
\mathchardef\searrow="3226
\mathchardef\nwarrow="322D
\mathchardef\swarrow="322E
\mathchardef\Leftrightarrow="322C
\mathchardef\Leftarrow="3228
\mathchardef\Rightarrow="3229
\def\neq{\not=} \let\ne=\neq
\mathchardef\leq="3214 \let\le=\leq
\mathchardef\geq="3215 \let\ge=\geq
\mathchardef\succ="321F
\mathchardef\prec="321E
\mathchardef\approx="3219
\mathchardef\succeq="3217
\mathchardef\preceq="3216
\mathchardef\supset="321B
\mathchardef\subset="321A
\mathchardef\supseteq="3213
\mathchardef\subseteq="3212
\mathchardef\in="3232
\mathchardef\ni="3233 \let\owns=\ni
\mathchardef\gg="321D
\mathchardef\ll="321C
\mathchardef\not="3236
\mathchardef\leftrightarrow="3224
\mathchardef\leftarrow="3220 \let\gets=\leftarrow
```

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```
\mathchardef\rightarrow="3221 \let\to=\rightarrow
\mathchardef\mapstochar="3237 \def\mapsto{\mapstochar\rightarrow}
\mathchardef\sim="3218
\mathchardef\simeq="3227
\mathchardef\perp="323F
\mathchardef\equiv="3211
\mathchardef\asymp="3210
\mathchardef\smile="315E
\mathchardef\frown="315F
\mathchardef\leftharpoonup="3128
\mathchardef\leftharpoondown="3129
\mathchardef\rightharpoonup="312A
\mathchardef\rightharpoondown="312B

\def\joinrel{\mathrel{\mkern-3mu}}
\def\relbar{\mathrel{\smash-}} % \smash, because - has the same height as +
\def\Relbar{\mathrel=}
\mathchardef\lhook="312C \def\hookrightarrow{\lhook\joinrel\rightarrow}
\mathchardef\rhook="312D \def\hookleftarrow{\leftarrow\joinrel\rhook}
\def\bowtie{\mathrel\triangleright\joinrel\mathrel\triangleleft}
\def\models{\mathrel|\joinrel=}
\def\Longrightarrow{\Relbar\joinrel\Rightarrow}

% LaTeX Change: \longrightarrow and \longleftarrow redefined to make
%   then robust.
\def\longrightarrow{\protect\@lra}
  \def\@lra{\relbar\joinrel\rightarrow}
\def\longleftarrow{\protect\@lla}
   \def\@lla{\leftarrow\joinrel\relbar}
% End of LaTeX change to \longrightarrow and \longleftarrow

\def\Longleftarrow{\Leftarrow\joinrel\Relbar}
\def\longmapsto{\mapstochar\longrightarrow}
\def\longleftrightarrow{\leftarrow\joinrel\rightarrow}
\def\Longleftrightarrow{\Leftarrow\joinrel\Rightarrow}
\def\iff{\;\Longleftrightarrow\;}

\mathchardef\ldotp="613A % ldot as a punctuation mark
\mathchardef\cdotp="6201 % cdot as a punctuation mark
\mathchardef\colon="603A % colon as a punctuation mark

% LaTeX change: make \ldots work outside math mode too.
\def\@ldots{\mathinner{\ldotp\ldotp\ldotp}}
\def\ldots{\protect\pldots}
\def\pldots{\relax\ifmmode\@ldots\else\mbox{$\m@th\@ldots\,$}\fi}
% End of LaTeX change to \ldots

\def\cdots{\mathinner{\cdotp\cdotp\cdotp}}
\def\vdots{\vbox{\baselineskip4\p@ \lineskiplimit\z@
    \kern6\p@\hbox{.}\hbox{.}\hbox{.}}}
\def\ddots{\mathinner{\mkern1mu\raise7\p@\vbox{\kern7\p@\hbox{.}}\mkern2mu
    \raise4\p@\hbox{.}\mkern2mu\raise\p@\hbox{.}\mkern1mu}}

\def\acute{\mathaccent"7013 }
\def\grave{\mathaccent"7012 }
\def\ddot{\mathaccent"707F }
\def\tilde{\mathaccent"707E }
\def\bar{\mathaccent"7016 }
\def\breve{\mathaccent"7015 }
\def\check{\mathaccent"7014 }
\def\hat{\mathaccent"705E }
\def\vec{\mathaccent"017E }
\def\dot{\mathaccent"705F }
\def\widetilde{\mathaccent"0365 }
\def\widehat{\mathaccent"0362 }
\def\overrightarrow#1{\vbox{\m@th\ialign{##\crcr
      \rightarrowfill\crcr\noalign{\kern-\p@\nointerlineskip}
      $\hfil\displaystyle{#1}\hfil$\crcr}}}
\def\overleftarrow#1{\vbox{\m@th\ialign{##\crcr
      \leftarrowfill\crcr\noalign{\kern-\p@\nointerlineskip}
      $\hfil\displaystyle{#1}\hfil$\crcr}}}
\def\overbrace#1{\mathop{\vbox{\m@th\ialign{##\crcr\noalign{\kern3\p@}
      \downbracefill\crcr\noalign{\kern3\p@\nointerlineskip}
      $\hfil\displaystyle{#1}\hfil$\crcr}}\limits}
```

```
\def\underbrace#1{\mathop{\vtop{\m@th\ialign{##\crcr
      $\hfil\displaystyle{#1}\hfil$\crcr\noalign{\kern3\p@\nointerlineskip}
      \upbracefill\crcr\noalign{\kern3\p@}}}}\limits}
\def\skew#1#2#3{{#2{#3\mkern#1mu}\mkern-#1mu}{}}

\def\lmoustache{\delimiter"437A340 } % top from (, bottom from )
\def\rmoustache{\delimiter"537B341 } % top from ), bottom from (
\def\lgroup{\delimiter"462833A } % extensible ( with sharper tips
\def\rgroup{\delimiter"562933B } % extensible ) with sharper tips
\def\arrowvert{\delimiter"26A33C } % arrow without arrowheads
\def\Arrowvert{\delimiter"26B33D } % double arrow without arrowheads
\def\bracevert{\delimiter"77C33E } % the vertical bar that extends braces
\def\Vert{\delimiter"26B30D } \let\|=\Vert
\def\vert{\delimiter"26A30C }
\def\uparrow{\delimiter"3222378 }
\def\downarrow{\delimiter"3223379 }
\def\updownarrow{\delimiter"326C33F }
\def\Uparrow{\delimiter"322A37E }
\def\Downarrow{\delimiter"322B37F }
\def\Updownarrow{\delimiter"326D377 }
\def\backslash{\delimiter"26E30F } % for double coset G\backslash H
\def\rangle{\delimiter"526930B }
\def\langle{\delimiter"426830A }
\def\rbrace{\delimiter"5267309 } \let\}=\rbrace
\def\lbrace{\delimiter"4266308 } \let\{=\lbrace
\def\rceil{\delimiter"5265307 }
\def\lceil{\delimiter"4264306 }
\def\rfloor{\delimiter"5263305 }
\def\lfloor{\delimiter"4262304 }

\def\bigl{\mathopen\big}
\def\bigm{\mathrel\big}
\def\bigr{\mathclose\big}
\def\Bigl{\mathopen\Big}
\def\Bigm{\mathrel\Big}
\def\Bigr{\mathclose\Big}
\def\biggl{\mathopen\bigg}
\def\biggm{\mathrel\bigg}
\def\biggr{\mathclose\bigg}
\def\Biggl{\mathopen\Bigg}
\def\Biggm{\mathrel\Bigg}
\def\Biggr{\mathclose\Bigg}
\def\big#1{{\hbox{$\left#1\vbox to8.5\p@{}\right.\n@space$}}}
\def\Big#1{{\hbox{$\left#1\vbox to11.5\p@{}\right.\n@space$}}}
\def\bigg#1{{\hbox{$\left#1\vbox to14.5\p@{}\right.\n@space$}}}
\def\Bigg#1{{\hbox{$\left#1\vbox to17.5\p@{}\right.\n@space$}}}
\def\n@space{\nulldelimiterspace\z@ \m@th}

\def\choose{\atopwithdelims()}
\def\brack{\atopwithdelims[]}
\def\brace{\atopwithdelims\{\}}

\def\sqrt{\radical"270370 }

\def\mathpalette#1#2{\mathchoice{#1\displaystyle{#2}}%
  {#1\textstyle{#2}}{#1\scriptstyle{#2}}{#1\scriptscriptstyle{#2}}}
\newbox\rootbox
\def\root#1\of{\setbox\rootbox\hbox{$\m@th\scriptscriptstyle{#1}$}
  \mathpalette\r@@t}
\def\r@@t#1#2{\setbox\z@\hbox{$\m@th#1\sqrt{#2}$}
  \dimen@\ht\z@ \advance\dimen@-\dp\z@
  \mkern5mu\raise.6\dimen@\copy\rootbox \mkern-10mu \box\z@}
\newif\ifv@ \newif\ifh@
\def\vphantom{\v@true\h@false\ph@nt}
\def\hphantom{\v@false\h@true\ph@nt}
\def\phantom{\v@true\h@true\ph@nt}
\def\ph@nt{\ifmmode\def\next{\mathpalette\mathph@nt}%
  \else\let\next\makeph@nt\fi\next}
\def\makeph@nt#1{\setbox\z@\hbox{#1}\finph@nt}
\def\mathph@nt#1#2{\setbox\z@\hbox{$\m@th#1{#2}$}\finph@nt}
\def\finph@nt{\setbox\tw@\null
  \ifv@ \ht\tw@\ht\z@ \dp\tw@\dp\z@\fi
  \ifh@ \wd\tw@\wd\z@\fi \box\tw@}
\def\mathstrut{\vphantom(}
```

```
\def\smash{\relax % \relax, in case this comes first in \halign
  \ifmmode\def\next{\mathpalette\mathsm@sh}\else\let\next\makesm@sh
  \fi\next}
\def\makesm@sh#1{\setbox\z@\hbox{#1}\finsm@sh}
\def\mathsm@sh#1#2{\setbox\z@\hbox{$\m@th#1{#2}$}\finsm@sh}
\def\finsm@sh{\ht\z@\z@ \dp\z@\z@ \box\z@}

\def\cong{\mathrel{\mathpalette\@vereq\sim}} % congruence sign
\def\@vereq#1#2{\lower.5\p@\vbox{\baselineskip\z@skip\lineskip-.5\p@
    \ialign{$\m@th#1\hfil##\hfil$\crcr#2\crcr=\crcr}}}
\def\notin{\mathrel{\m@th\mathpalette\c@ncel\in}}
\def\c@ncel#1#2{\m@th\ooalign{$\hfil#1\mkern1mu/\hfil$\crcr$#1#2$}}
\def\rightleftharpoons{\mathrel{\mathpalette\rlh@{}}}
\def\rlh@#1{\vcenter{\m@th\hbox{\ooalign{\raise2pt
          \hbox{$#1\rightharpoonup$}\crcr
        $#1\leftharpoondown$}}}}
\def\buildrel#1\over#2{\mathrel{\mathop{\kern\z@#2}\limits^{#1}}}
\def\doteq{\buildrel\textstyle.\over=}

\def\log{\mathop{\rm log}\nolimits}
\def\lg{\mathop{\rm lg}\nolimits}
\def\ln{\mathop{\rm ln}\nolimits}
\def\lim{\mathop{\rm lim}}
\def\limsup{\mathop{\rm lim\,sup}}
\def\liminf{\mathop{\rm lim\,inf}}
\def\sin{\mathop{\rm sin}\nolimits}
\def\arcsin{\mathop{\rm arcsin}\nolimits}
\def\sinh{\mathop{\rm sinh}\nolimits}
\def\cos{\mathop{\rm cos}\nolimits}
\def\arccos{\mathop{\rm arccos}\nolimits}
\def\cosh{\mathop{\rm cosh}\nolimits}
\def\tan{\mathop{\rm tan}\nolimits}
\def\arctan{\mathop{\rm arctan}\nolimits}
\def\tanh{\mathop{\rm tanh}\nolimits}
\def\cot{\mathop{\rm cot}\nolimits}
\def\coth{\mathop{\rm coth}\nolimits}
\def\sec{\mathop{\rm sec}\nolimits}
\def\csc{\mathop{\rm csc}\nolimits}
\def\max{\mathop{\rm max}}
\def\min{\mathop{\rm min}}
\def\sup{\mathop{\rm sup}}
\def\inf{\mathop{\rm inf}}
\def\arg{\mathop{\rm arg}\nolimits}
\def\ker{\mathop{\rm ker}\nolimits}
\def\dim{\mathop{\rm dim}\nolimits}
\def\hom{\mathop{\rm hom}\nolimits}
\def\det{\mathop{\rm det}}
\def\exp{\mathop{\rm exp}\nolimits}
\def\Pr{\mathop{\rm Pr}}
\def\gcd{\mathop{\rm gcd}}
\def\deg{\mathop{\rm deg}\nolimits}

\def\bmod{\mskip-\medmuskip\mkern5mu
  \mathbin{\rm mod}\penalty900\mkern5mu\mskip-\medmuskip}
\def\pmod#1{\allowbreak\mkern18mu({\rm mod}\,\,#1)}

%% RmS 91/08/14 inserted extra braces around entry for NFSS
\def\cases#1{\left\{\,\vcenter{\normalbaselines\m@th
    \ialign{$##\hfil$&\quad{##}\hfil\crcr#1\crcr}}\right.}
\def\matrix#1{\null\,\vcenter{\normalbaselines\m@th
    \ialign{\hfil$##$\hfil&&\quad\hfil$##$\hfil\crcr
      \mathstrut\crcr\noalign{\kern-\baselineskip}
      #1\crcr\mathstrut\crcr\noalign{\kern-\baselineskip}}}\,}
\def\pmatrix#1{\left(\matrix{#1}\right)}
\newdimen\p@renwd

% LaTeX: following command is moved after the \tenex font is defined
%  by LFONTS
%\setbox0=\hbox{\tenex B} \p@renwd=\wd0 % width of the big left (

\def\bordermatrix#1{\begingroup \m@th
  \setbox\z@\vbox{\def\cr{\crcr\noalign{\kern2\p@\global\let\cr\endline}}%
    \ialign{$##$\hfil\kern2\p@\kern\p@renwd&\thinspace\hfil$##$\hfil
      &&\quad\hfil$##$\hfil\crcr
```

```
      \omit\strut\hfil\crcr\noalign{\kern-\baselineskip}%
      #1\crcr\omit\strut\cr}}%
  \setbox\tw@\vbox{\unvcopy\z@\global\setbox\@ne\lastbox}%
  \setbox\tw@\hbox{\unhbox\@ne\unskip\global\setbox\@ne\lastbox}%
  \setbox\tw@\hbox{$\kern\wd\@ne\kern-\p@renwd\left(\kern-\wd\@ne
    \global\setbox\@ne\vbox{\box\@ne\kern2\p@}%
    \vcenter{\kern-\ht\@ne\unvbox\z@\kern-\baselineskip}\,\right)$}%
  \null\;\vbox{\kern\ht\@ne\box\tw@}\endgroup}

\def\openup{\afterassignment\@penup\dimen@=}
\def\@penup{\advance\lineskip\dimen@
  \advance\baselineskip\dimen@
  \advance\lineskiplimit\dimen@}

% LaTeX change: \eqalign eliminated, since it is replaced by the
% eqnarray environment.
%
%\def\eqalign#1{\null\,\vcenter{\openup\jot\m@th
%  \ialign{\strut\hfil$\displaystyle{##}$&$\displaystyle{{}##}$\hfil
%      \crcr#1\crcr}}\,}

\newif\ifdt@p
\def\displ@y{\global\dt@ptrue\openup\jot\m@th
  \everycr{\noalign{\ifdt@p \global\dt@pfalse
      \vskip-\lineskiplimit \vskip\normallineskiplimit
      \else \penalty\interdisplaylinepenalty \fi}}}
\def\@lign{\tabskip\z@skip\everycr{}} % restore inside \displ@y
\def\displaylines#1{\displ@y
  \halign{\hbox to\displaywidth{$\@lign\hfil\displaystyle##\hfil$}\crcr
    #1\crcr}}

% LaTeX: The following \eqalign type macros are eliminated, since
% they are replaced by the eqnarray environment.
%
%\def\eqalignno#1{\displ@y \tabskip\centering
%  \halign to\displaywidth{\hfil$\@lign\displaystyle{##}$\tabskip\z@skip
%    &$\@lign\displaystyle{{}##}$\hfil\tabskip\centering
%    &\llap{$\@lign##$}\tabskip\z@skip\crcr
%    #1\crcr}}
%\def\leqalignno#1{\displ@y \tabskip\centering
%  \halign to\displaywidth{\hfil$\@lign\displaystyle{##}$\tabskip\z@skip
%    &$\@lign\displaystyle{{}##}$\hfil\tabskip\centering
%    &\kern-\displaywidth\rlap{$\@lign##$}\tabskip\displaywidth\crcr
%    #1\crcr}}

% Definitions related to output

% LaTeX uses its own output routine
%
%\message{output routines,}
%
%\countdef\pageno=0 \pageno=1 % first page is number 1
%\newtoks\headline \headline={\hfil} % headline is normally blank
%\newtoks\footline \footline={\hss\tenrm\folio\hss}
%  % footline is normally a centered page number in font \tenrm
%\newif\ifr@ggedbottom
%\def\raggedbottom{\topskip 10\p@ plus60\p@ \r@ggedbottomtrue}
%\def\normalbottom{\topskip 10\p@ \r@ggedbottomfalse} % undoes \raggedbottom
%\def\folio{\ifnum\pageno<\z@ \romannumeral-\pageno \else\number\pageno \fi}
%\def\nopagenumbers{\footline{\hfil}} % blank out the footline
%\def\advancepageno{\ifnum\pageno<\z@ \global\advance\pageno\m@ne
%  \else\global\advance\pageno\@ne \fi} % increase |pageno|

% LaTeX does use the same insert for footnotes as PLAIN
\newinsert\footins

%\def\footnote#1{\let\@sf\empty % parameter #2 (the text) is read later
%  \ifhmode\edef\@sf{\spacefactor\the\spacefactor}\/\fi
%  #1\@sf\vfootnote{#1}}
%\def\vfootnote#1{\insert\footins\bgroup
%  \interlinepenalty\interfootnotelinepenalty
%  \splittopskip\ht\strutbox % top baseline for broken footnotes
%  \splitmaxdepth\dp\strutbox \floatingpenalty\@MM
%  \leftskip\z@skip \rightskip\z@skip \spaceskip\z@skip \xspaceskip\z@skip
```

```
%  \textindent{#1}\footstrut\futurelet\next\fo@t}
%\def\fo@t{\ifcat\bgroup\noexpand\next \let\next\f@@t
%  \else\let\next\f@t\fi \next}
%\def\f@@t{\bgroup\aftergroup\@foot\let\next}
%\def\f@t#1{#1\@foot}
%\def\@foot{\strut\egroup}
%\def\footstrut{\vbox to\splittopskip{}}

% LaTeX leaves these initializations for the \footins insert.
%
\skip\footins=\bigskipamount % space added when footnote is present
\count\footins=1000 % footnote magnification factor (1 to 1)
\dimen\footins=8in % maximum footnotes per page

%\newinsert\topins
%\newif\ifp@ge \newif\if@mid
%\def\topinsert{\@midfalse\p@gefalse\@ins}
%\def\midinsert{\@midtrue\@ins}
%\def\pageinsert{\@midfalse\p@getrue\@ins}
%\skip\topins=\z@skip % no space added when a topinsert is present
%\count\topins=1000 % magnification factor (1 to 1)
%\dimen\topins=\maxdimen % no limit per page
%\def\@ins{\par\begingroup\setbox\z@\vbox\bgroup} % start a \vbox
%\def\endinsert{\egroup % finish the \vbox
%  \if@mid \dimen@\ht\z@ \advance\dimen@\dp\z@ \advance\dimen@12\p@
%    \advance\dimen@\pagetotal \advance\dimen@-\pageshrink
%    \ifdim\dimen@>\pagegoal\@midfalse\p@gefalse\fi\fi
%  \if@mid \bigskip\box\z@\bigbreak
%  \else\insert\topins{\penalty100 % floating insertion
%    \splittopskip\z@skip
%    \splitmaxdepth\maxdimen \floatingpenalty\z@
%    \ifp@ge \dimen@\dp\z@
%    \vbox to\vsize{\unvbox\z@\kern-\dimen@}% depth is zero
%    \else \box\z@\nobreak\bigskip\fi}\fi\endgroup}

%\output{\plainoutput}
%\def\plainoutput{\shipout\vbox{\makeheadline\pagebody\makefootline}%
%  \advancepageno
%  \ifnum\outputpenalty>-\@MM \else\dosupereject\fi}
%\def\pagebody{\vbox to\vsize{\boxmaxdepth\maxdepth \pagecontents}}
%\def\makeheadline{\vbox to\z@{\vskip-22.5\p@
%  \line{\vbox to8.5\p@{}\the\headline}\vss}\nointerlineskip}
%\def\makefootline{\baselineskip24\p@\line{\the\footline}}
%\def\dosupereject{\ifnum\insertpenalties>\z@ % something is being held over
%  \line{}\kern-\topskip\nobreak\vfill\supereject\fi}
%
%\def\pagecontents{\ifvoid\topins\else\unvbox\topins\fi
%  \dimen@=\dp\@cclv \unvbox\@cclv % open up \box255
%  \ifvoid\footins\else % footnote info is present
%    \vskip\skip\footins
%    \footnoterule
%    \unvbox\footins\fi
%  \ifr@ggedbottom \kern-\dimen@ \vfil \fi}

% LaTeX keeps PLAIN TeX's \footnoterule as the default
%
\def\footnoterule{\kern-3\p@
  \hrule width 2truein \kern 2.6\p@} % the \hrule is .4pt high

% Hyphenation, miscellaneous macros, and initial values for standard layout
\message{hyphenation}

\lefthyphenmin=2 \righthyphenmin=3 % disallow x- or -xx breaks
\input lhyphen

% \magnification doesn't work in LaTeX
%
%\def\magnification{\afterassignment\m@g\count@}
%\def\m@g{\mag\count@
%  \hsize6.5truein\vsize8.9truein\dimen\footins8truein}

%% FMi & RmS 91/08/26: added \errorcontextlines=\maxdimen,
%%  suggested by J. Schrod

```

```
\def\tracingall{\tracingcommands\tw@\tracingstats\tw@
  \tracingpages\@ne\tracingoutput\@ne\tracinglostchars\@ne
  \tracingmacros\tw@\tracingparagraphs\@ne\tracingrestores\@ne
  \showboxbreadth\maxdimen\showboxdepth\maxdimen\errorstopmode
  \errorcontextlines\maxdimen\tracingonline\@ne}

\def\showhyphens#1{\setbox0\vbox{\parfillskip\z@skip\hsize\maxdimen\tenrm
  \pretolerance\m@ne\tolerance\m@ne\hbadness0\showboxdepth0\ #1}}

% input LaTeX fonts and commands

%% Initialize \reset@font for use with Old font selection

\let\reset@font\empty

\input lfonts
\input latex

% LaTeX change: moved from above.
\setbox0=\hbox{\tenex B} \p@renwd=\wd0 % width of the big left (

% RmS 91/06/21: clear \box0
\setbox0=\box\voidb@x

% LaTeX: default values
\normalbaselines
% LaTeX: select 10pt font size and \rm style
\xpt

\nonfrenchspacing % punctuation affects the spacing
\catcode`@=12 % at signs are no longer letters

% LaTeX: File called LPLAIN
% Identify the current format
\def\fmtname{lplain}\def\fmtversion{2.09-March 25, 1992}

\typeout{Input any local modifications here.}

\endinput
```

2.2 lhyphen.tex

```
% File LHYPHEN - Created 04 November 1991.
% Copyright (C) 1991 by Leslie Lamport
%

\message{Loading hyphenation patterns for US english.}

% PREPARING A FOREIGN LANGUAGE VERSION:
%
% This file loads hyphenation patterns for US english.
% If you want to load additional or other hyphenation patterns,
% you have to change this file, which is hereby allowed explicitly,
% under the restriction that if you do so, you MUST also change the
% message above.
%

\language=0
\lefthyphenmin=2 \righthyphenmin=3 % disallow x- or -xx breaks
\input hyphen

\endinput
```

2.3 lfonts.tex

```
% File LFONTS - Version of 25 November 1991
%
% This version of LFONTS.TEX is for the CMR fonts. It was converted
% from the AMR version by David Fuchs on 18 December 1985.
% And corrected on 11 Nov 1986 by Leslie Lamport.
% Last vestige of AMR fonts removed 3 Mar 89 by Leslie Lamport.
% Added \endinput 10 Oct 91 by RmS.
% Added some \relax in front of \if's 25 Nov 91 by RmS.

% This file needs to be customized for the fonts available at a particular
% site. There are three places where changes need to be made. They
% can be found by searching this file for the string FONT-CUSTOMIZING.
%
% FONT CONVENTIONS
%
% A TYPESTYLE COMMAND is something like \it that defines a type style.
% Each style command \xx is defined to be \protect\pxx, where
% \pxx is defined to choose the correct font for the current size.
% This allows style commands to appear in 'unsafe' arguments where
% protection is required.
%
% A SIZE COMMAND is something like \normalsize that defines a type size.
% It is defined by the document style. However, \normalsize is handled
% somewhat differently because it is called so often--e.g., on every
% page by the output routine. The document style defines \@normalsize
% instead of \normalsize.
%
% A ONE-SIZE typestyle is one that exists only in the \normalsize size.
%
% A FONT-SIZE COMMAND is one that defines \textfont, \scriptfont and
% \scriptscriptfont for the font families corresponding to preloaded fonts,
% as well as the typestyle commands for the preloaded fonts. Each
% font-size command has an associated @fontsize command, having the same
% name except for an '@' at the front. All font-size commands are defined
% in LFONTS. The naming convention is that a fifteenpt font has a font-size
% name \xvpt, and so on.
%
% Each size command \SIZE executes the command
%            \@setsize\SIZE{BASELINESKIP}\FONTSIZE\@FONTSIZE
% which does the following.
%   0. Executes \@nomath\SIZE to issue warning if in math mode.
%   1. \let \@currsize = \SIZE
%   2. Sets \strutbox to a strut of height .7 * BASELINESKIP and
%      depth .3 * BASELINESKIP
%
%       Note: Charles Karney observed that step 2 is useless, since the
%       \FONTSIZE command executed in step 4 resets \strutbox using
%       the actual baselineskip, which is \baselinestretch * BASELINESKIP.
%       Some day, this step may get removed. (Note made 28 Feb 89)
%
%   3. Sets \baselineskip to \baselinestretch * BASELINESKIP
%      and
%   4. Calls \FONTSIZE
%   5. Executes the \@FONTSIZE command.
% It should then define all the typestyle commands not defined by the font-size
% command, except for the one-size type styles. A typestyle command for which
% the corresponding font exists but is not preloaded is defined to expand to a
% \@getfont command. A typestyle whose font does not exist is defined to
% expand to a \@subfont command.
%
% A one-size typestyle whose font is not preloaded is defined to expand to
% a \@onesizefont command.
%
% \em is defined to be \it inside an unslanted style and \rm inside a
% slanted style. An \em command in a section title will produce a \pem
% command in the table of contents.
%

\def\em{\protect\pem{}}
\def\pem{\relax\ifdim \fontdimen\@ne\font >\z@ \rm \else \it \fi}

\def\normalsize{\relax\ifx\@currsize\normalsize \rm \else \@normalsize\fi}
```

```
73
74 % \load{SIZE}{STYLE} : Solves anomaly of loaded-on-demand font
75 %    used for first time in math mode. Give this command outside math
76 %    mode, before formula using it for first time.
77 \def\load#1#2{\let\@tempa\@currsize \let\@currsize\relax #1#2\@tempa}
78
79 % \newfont{\CMD}{FONT} defines \CMD to be the font FONT.
80 %    It is equivalent to \font \CMD = FONT
81 % \symbol{NUM} == \char NUM
82
83 \def\newfont#1#2{\@ifdefinable #1{\font #1=#2\relax}}
84 \def\symbol#1{\char #1\relax}
85
86
87
88 % \@getfont \STYLE \FAM \@FONTSIZE{LOADING.INFO}
89 %   \STYLE      = style command
90 %   \FAM        = a control sequence defined by \newfam\FAM
91 %   \@FONTSIZE  = the @fontsize command for the current size.
92 %   LOADING.INFO = information needed to load the font--e.g.,
93 %                  cmtti10 \magstep 2
94 %   Does the following, where \FONTNAME denotes a new unique, untypeable
95 %   font name:
96 %    1. Executes \font \FONTNAME = LOADING.INFO
97 %    2. Appends '\textfont FAM \FONTNAME \def\STYLE{\fam \FAM \FONTNAME}'
98 %       to the definition of \@FONTSIZE.
99 %    3. Executes \@FONTSIZE \STYLE.
100 %
101 % \@nohyphens\STYLE\@FONTSIZE
102 %   Used right after \@getfont to set \hyphenchar of the new font to -1,
103 %   thereby prohibiting hyphenation. It is used with \tt fonts.
104 %   (\@nohyphens was added on 12/18/85)
105 %
106 % \@subfont \STYLE \REPSTYLE
107 %   \STYLE, \REPSTYLE = type style commands.
108 %   Types warning message and defines uses \REPSTYLE.
109 %
110 % \@onesizefont \STYLE {LOADING.INFO}
111 %   Defines \STYLE to be a typestyle that exists only for the \normalsize
112 %   size.  It produces the font specified by LOADING.INFO
113 %
114 % \@addfontinfo\@FONTSIZE{DEFS}
115 %    Expands DEFS and adds to the definition of \@FONTSIZE. Items that should
116 %    not be expanded should be protected with \@prtct---except no protection
117 %    is needed for '\def\foo', only for the contents of the definition.
118 %
119 % \@nomath\CS : Types a warning '\CS used in math mode' if encountered
120 %    in math mode.
121
122 % Remove \outer from definition of \newfam
123 \def\newfam{\alloc@8\fam\chardef\sixt@@n}
124
125 \def\@setsize#1#2#3#4{\@nomath#1\let\@currsize#1\baselineskip
126    #2\setbox\strutbox\hbox{\vrule height.7\baselineskip
127       depth.3\baselineskip width\z@}\baselineskip\baselinestretch\baselineskip
128    \normalbaselineskip\baselineskip#3#4}
129
130 \newif\if@bold
131
132 \let\@prtct=\relax
133
134 \def\@addfontinfo#1#2{{\def\@prtct{\noexpand\@prtct\noexpand}\def\def{\noexpand
135     \def\noexpand}\xdef#1{#1#2}}}
136
137 \def\@getfont#1#2#3#4{\@ifundefined{\string #1\string #3}{\global\expandafter
138     \font \csname \string #1\string #3\endcsname #4\relax
139      \@addfontinfo#3{\textfont #2\csname \string #1\string #3\endcsname
140      \scriptfont #2\csname \string #1\string #3\endcsname
141      \scriptscriptfont #2\csname \string #1\string #3\endcsname
142      \def#1{\fam #2\csname\string #1\string #3\endcsname}}}{}#3#1}
143
144 \def\@nohyphens#1#2{\global\expandafter \hyphenchar\csname
145    \string #1\string #2\endcsname \m@ne}
146
```

```
147 \def\@subfont#1#2{\@warning{No \string#1\space typeface in
148        this size, using \string#2}#2}
149
150 \def\@onesizefont#1#2{\expandafter\newfam\csname fm\string#1\endcsname
151   \global\expandafter\font\csname ft\string#1\endcsname #2\relax
152   \gdef#1{\relax\ifx \@currsize\normalsize \@ftfam#1\else
153   \@warning{Typeface \string#1\space available only in
154   \string\normalsize, using \string\rm}\gdef #1{\relax\ifx \@currsize\normalsize
155   \textfont\@fontfam#1 \scriptfont\@fontfam#1 \scriptscriptfont
156   \@fontfam#1\@ftfam#1\else \rm\fi}#1\fi}#1}
157
158 \def\@ftfam#1{\fam\csname fm\string#1\endcsname\csname ft\string#1\endcsname}
159
160 \def\@nomath#1{\relax\ifmmode \@warning{\string#1\space in math mode.}\fi}
161 \def\@nomathbold{\relax\ifmmode
162        \@warning{\string\mathbold\space in math mode.}\fi}
163
164 % The following definitions save token space. E.g., using \@height
165 % instead of height saves 5 tokens at the cost in time of one macro
166 % expansion.
167
168 \def\@height{height}
169 \def\@depth{depth}
170 \def\@width{width}
171
172 \def\@magscale#1{ scaled \magstep #1}
173 \def\@halfmag{ scaled \magstephalf}
174 \def\@ptscale#1{ scaled #100}
175
176
177 %% FONT-CUSTOMIZING: The following \font commands define the
178 %% preloaded LaTeX fonts. Font names should be changed to cause
179 %% different fonts to be loaded in place of these particular AMR fonts.
180 %% \font commands should be added or deleted to change which fonts
181 %% are preloaded.
182
183 % five point
184  \font\fivrm = cmr5             % roman
185  \font\fivmi = cmmi5            % math italic
186     \skewchar\fivmi ='177       %  for placement of accents
187 %\font\fivmib = cmmib10 \@ptscale5 % bold math italic
188  \font\fivsy = cmsy5            % math symbols
189     \skewchar\fivsy ='60        %   for placement of math accents
190 %\font\fivsyb = cmbsy10 \@ptscale5 % bold math symbols
191 %\font\fivit = cmti7 scaled 714 % text italic
192 %\font\fivsl = cmsl10 \@ptscale5 % slanted
193 %\font\fivbf = cmbx7 scaled 714 % extended bold
194 %\font\fivbfs = cmbxsl10\@ptscale5 % extended bold slanted
195 %\font\fivtt = cmtt10 \@ptscale5 % typewriter
196 %\font\fivtti = cmitt10 \@ptscale5 % italic typewriter
197 %\font\fivtts = cmsltt10\@ptscale5 % slanted typewriter
198 %\font\fivsf = cmss10 \@ptscale5 % sans serif
199 %\font\fivsfi = cmssi10 \@ptscale5 % italic sans serif
200 %\font\fivsfb = cmssbx10\@ptscale5 % bold sans serif
201 %\font\fivsc = cmcsc10 \@ptscale5 % small caps
202  \font\fivly = lasy5           % LaTeX symbols
203 %\font\fivlyb = lasyb10 \@ptscale5 % LaTeX symbols
204 %\font\fivuit = cmu10 \@ptscale5 % unslanted italic
205
206 % six point
207  \font\sixrm = cmr6             % roman
208  \font\sixmi = cmmi6            % math italic
209     \skewchar\sixmi ='177       %  for placement of accents
210 %\font\sixmib = cmmib10 \@ptscale6 % bold math italic
211  \font\sixsy = cmsy6            % math symbols
212     \skewchar\sixsy ='60        %   for placement of math accents
213 %\font\sixsyb = cmbsy10 \@ptscale6 % bold math symbols
214 %\font\sixit = cmti7 scaled 857 % text italic
215 %\font\sixsl = cmsl10 \@ptscale6 % slanted
216 %\font\sixbf = cmbx7 scaled 857 % extended bold
217 %\font\sixbfs = cmbxsl10\@ptscale6 % extended bold slanted
218 %\font\sixtt = cmtt10 \@ptscale6 % typewriter
219 %\font\sixtti = cmitt10 \@ptscale6 % italic typewriter
220 %\font\sixtts = cmsltt10\@ptscale6 % slanted typewriter
```

```
%\font\sixsf = cmss10 \@ptscale6 % sans serif
%\font\sixsfi = cmssi10 \@ptscale6 % italic sans serif
%\font\sixsfb = cmssbx10\@ptscale6 % bold sans serif
%\font\sixsc = cmcsc10 \@ptscale6 % small caps
 \font\sixly = lasy6           % LaTeX symbols
%\font\sixlyb = lasyb10 \@ptscale6 % LaTeX symbols
%\font\sixuit = cmu10 \@ptscale6 % unslanted italic

% seven point
 \font\sevrm = cmr7            % roman
 \font\sevmi = cmmi7           % math italic
    \skewchar\sevmi ='177      %  for placement of accents
%\font\sevmib = cmmib10 \@ptscale7 % bold math italic
 \font\sevsy = cmsy7           % math symbols
    \skewchar\sevsy ='60       %  for placement of math accents
%\font\sevsyb = cmbsy10 \@ptscale7 % bold math symbols
 \font\sevit = cmti7           % text italic
%\font\sevsl = cmsl10 \@ptscale7 % slanted
%\font\sevbf = cmbx7           % extended bold
%\font\sevbfs = cmbxsl10\@ptscale7 % extended bold slanted
%\font\sevtt = cmtt10 \@ptscale7 % typewriter
%\font\sevtti = cmitt10 \@ptscale7 % italic typewriter
%\font\sevtts = cmsltt10\@ptscale7 % slanted typewriter
%\font\sevsf = cmss10 \@ptscale7 % sans serif
%\font\sevsfi = cmssi10 \@ptscale7 % italic sans serif
%\font\sevsfb = cmssbx10\@ptscale7 % bold sans serif
%\font\sevsc = cmcsc10 \@ptscale7 % small caps
 \font\sevly = lasy7           % LaTeX symbols
%\font\sevlyb = lasyb10 \@ptscale7 % LaTeX symbols
%\font\sevuit = cmu10 \@ptscale7 % unslanted italic

% eight point
 \font\egtrm = cmr8            % roman
 \font\egtmi = cmmi8           % math italic
    \skewchar\egtmi ='177      %  for placement of accents
%\font\egtmib = cmmib10 \@ptscale8 % bold math italic
 \font\egtsy = cmsy8           % math symbols
    \skewchar\egtsy ='60       %  for placement of math accents
%\font\egtsyb = cmbsy10 \@ptscale8 % bold math symbols
 \font\egtit = cmti8           % text italic
%\font\egtsl = cmsl8           % slanted
%\font\egtbf = cmbx8           % extended bold
%\font\egtbfs = cmbxsl10\@ptscale8 % extended bold slanted
%\font\egttt = cmtt8           % typewriter
%\font\egttti = cmitt10 \@ptscale8 % italic typewriter
%\font\egttts = cmsltt10\@ptscale8 % slanted typewriter
%\font\egtsf = cmss10 \@ptscale8 % sans serif
%\font\egtsfi = cmssi10 \@ptscale8 % italic sans serif
%\font\egtsfb = cmssbx10\@ptscale8 % bold sans serif
%\font\egtsc = cmcsc10 \@ptscale8 % small caps
 \font\egtly = lasy8           % LaTeX symbols
%\font\egtlyb = lasyb10 \@ptscale8 % LaTeX symbols
%\font\egtuit = cmu10 \@ptscale8 % unslanted italic


% nine point
 \font\ninrm = cmr9            % roman
 \font\ninmi = cmmi9           % math italic
    \skewchar\ninmi ='177      %  for placement of accents
%\font\ninmib = cmmib10 \@ptscale9 % bold math italic
 \font\ninsy = cmsy9           % math symbols
    \skewchar\ninsy ='60       %  for placement of math accents
%\font\ninsyb = cmbsy10 \@ptscale9 % bold math symbols
 \font\ninit = cmti9           % text italic
%\font\ninsl = cmsl9           % slanted
 \font\ninbf = cmbx9           % extended bold
%\font\ninbfs = cmbxsl10\@ptscale9 % extended bold slanted
 \font\nintt = cmtt9           % typewriter
    \hyphenchar\nintt = -1     %  suppress hyphenation in \tt font
%\font\nintti = cmitt10 \@ptscale9 % italic typewriter
%\font\nintts = cmsltt10\@ptscale9 % slanted typewriter
%\font\ninsf = cmss10 \@ptscale9 % sans serif
%\font\ninsfi = cmssi10 \@ptscale9 % italic sans serif
%\font\ninsfb = cmssbx10\@ptscale9 % bold sans serif
```

```
%\font\ninsc = cmcsc10 \@ptscale9 % small caps
 \font\ninly = lasy9           % LaTeX symbols
%\font\ninlyb = lasyb10 \@ptscale9 % LaTeX symbols
%\font\ninuit = cmu10 \@ptscale9 % unslanted italic

% ten point
 \font\tenrm = cmr10   % roman
 \font\tenmi = cmmi10  % math italic
    \skewchar\tenmi ='177 % for placement of accents
%\font\tenmib = cmmib10 % bold math italic
 \font\tensy = cmsy10  % math symbols
    \skewchar\tensy ='60 % for placement of math accents
%\font\tensyb = cmbsy10 % bold symbols
 \font\tenit = cmti10  % text italic
 \font\tensl = cmsl10  % slanted
 \font\tenbf = cmbx10  % extended bold
%\font\tenbfs = cmbxsl10 % extended bold slanted
 \font\tentt = cmtt10  % typewriter
    \hyphenchar\tentt = -1      %  suppress hyphenation in \tt font
%\font\tentti = cmitt10 % italic typewriter
%\font\tentts = cmsltt10 % slanted typewriter
 \font\tensf = cmss10  % sans serif
%\font\tensfi = cmssi10 % italic sans serif
%\font\tensfb = cmssbx10 % bold sans serif
%\font\tensc = cmcsc10 % small caps
 \font\tenly = lasy10 % LaTeX symbols
%\font\tenlyb = lasyb10 % bold LaTeX symbols
%\font\tenuit = cmu10  % unslanted italic

% eleven point
 \font\elvrm = cmr10   \@halfmag % roman
 \font\elvmi = cmmi10  \@halfmag % math italic
    \skewchar\elvmi ='177       %  for placement of accents
%\font\elvmib = cmmib10 \@halfmag % bold math italic
 \font\elvsy = cmsy10  \@halfmag % math symbols
    \skewchar\elvsy ='60        %   for placement of math accents
%\font\elvsyb = cmbsy10 \@halfmag % bold symbols
 \font\elvit = cmti10  \@halfmag % text italic
 \font\elvsl = cmsl10  \@halfmag % slanted
 \font\elvbf = cmbx10  \@halfmag % exelvded bold
%\font\elvbfs = cmbxsl10 \@halfmag % exelvded bold slanted
 \font\elvtt = cmtt10  \@halfmag % typewriter
    \hyphenchar\elvtt = -1      %  suppress hyphenation in \tt font
%\font\elvtti = cmitt10 \@halfmag % italic typewriter
%\font\elvtts = cmsltt10 \@halfmag % slanted typewriter
 \font\elvsf = cmss10  \@halfmag % sans serif
%\font\elvsfi = cmssi10 \@halfmag % italic sans serif
%\font\elvsfb = cmssbx10 \@halfmag % bold sans serif
%\font\elvsc = cmcsc10 \@halfmag % small caps
 \font\elvly = lasy10 \@halfmag % LaTeX symbols
%\font\elvlyb = lasyb10 \@halfmag % bold LaTeX symbols
%\font\elvuit = cmu10  \@halfmag % unslanted italic

% twelve point
 \font\twlrm = cmr12              % roman
 \font\twlmi = cmmi12             % math italic
    \skewchar\twlmi ='177       %  for placement of accents
%\font\twlmib = cmmib10 \@magscale1 % bold math italic
 \font\twlsy = cmsy10  \@magscale1 % math symbols
    \skewchar\twlsy ='60        %   for placement of math accents
%\font\twlsyb = cmbsy10 \@magscale1 % bold symbols
 \font\twlit = cmti12             % text italic
 \font\twlsl = cmsl12             % slanted
 \font\twlbf = cmbx12             % extended bold
%\font\twlbfs = cmbxsl10 \@magscale1 % extended bold slanted
 \font\twltt = cmtt12             % typewriter
    \hyphenchar\twltt = -1      %  suppress hyphenation in \tt font
%\font\twltti = cmitt10 \@magscale1 % italic typewriter
%\font\twltts = cmsltt10 \@magscale1 % slanted typewriter
 \font\twlsf = cmss12             % sans serif
%\font\twlsfi = cmssi10 \@magscale1 % italic sans serif
%\font\twlsfb = cmssbx10 \@magscale1 % bold sans serif
%\font\twlsc = cmcsc10 \@magscale1 % small caps
 \font\twlly = lasy10 \@magscale1 % LaTeX symbols
```

```
%\font\twllyb = lasyb10 \@magscale1 % bold LaTeX symbols
%\font\twluit = cmu10  \@magscale1 % unslanted italic

% fourteen point
 \font\frtnrm = cmr10   \@magscale2 % roman
 \font\frtnmi = cmmi10  \@magscale2 % math italic
    \skewchar\frtnmi ='177       %  for placement of accents
%\font\frtnmib = cmmib10 \@magscale2 % bold math italic
 \font\frtnsy = cmsy10  \@magscale2 % math symbols
    \skewchar\frtnsy ='60        %  for placement of math accents
%\font\frtnsyb = cmbsy10 \@magscale2 % bold symbols
%\font\frtnit = cmti10  \@magscale2 % text italic
%\font\frtnsl = cmsl10  \@magscale2 % slanted
 \font\frtnbf = cmbx10  \@magscale2 % extended bold
%\font\frtnbfs = cmbxsl10 \@magscale2 % extended bold slanted
%\font\frtntt = cmtt10  \@magscale2 % typewriter
%\font\frtntti = cmitt10 \@magscale2 % italic typewriter
%\font\frtntts = cmsltt10 \@magscale2 % slanted typewriter
%\font\frtnsf = cmss10  \@magscale2 % sans serif
%\font\frtnsfi = cmssi10 \@magscale2 % italic sans serif
%\font\frtnsfb = cmssbx10 \@magscale2 % bold sans serif
%\font\frtnsc = cmcsc10 \@magscale2 % small caps
 \font\frtnly = lasy10 \@magscale2 % LaTeX symbols
%\font\frtnlyb = lasyb10 \@magscale2 % bold LaTeX symbols
%\font\frtnuit = cmu10  \@magscale2 % unslanted italic

% seventeen point
 \font\svtnrm = cmr17              % roman
 \font\svtnmi = cmmi10  \@magscale3 % math italic
    \skewchar\svtnmi ='177       %  for placement of accents
%\font\svtnmib = cmmib10 \@magscale3 % bold math italic
 \font\svtnsy = cmsy10  \@magscale3 % math symbols
    \skewchar\svtnsy ='60        %  for placement of math accents
%\font\svtnsyb = cmbsy10 \@magscale3 % bold symbols
%\font\svtnit = cmti10  \@magscale3 % text italic
%\font\svtnsl = cmsl10  \@magscale3 % slanted
 \font\svtnbf = cmbx10  \@magscale3 % extended bold
%\font\svtnbfs = cmbxsl10 \@magscale3 % extended bold slanted
%\font\svtntt = cmtt10  \@magscale3 % typewriter
%\font\svtntti = cmitt10 \@magscale3 % italic typewriter
%\font\svtntts = cmsltt10 \@magscale3 % slanted typewriter
%\font\svtnsf = cmss10  \@magscale3 % sans serif
%\font\svtnsfi = cmssi10 \@magscale3 % italic sans serif
%\font\svtnsfb = cmssbx10 \@magscale3 % bold sans serif
%\font\svtnsc = cmcsc10 \@magscale3 % small caps
 \font\svtnly = lasy10 \@magscale3 % LaTeX symbols
%\font\svtnlyb = lasyb10 \@magscale3 % bold LaTeX symbols
%\font\svtnuit = cmu10  \@magscale3 % unslanted italic

% twenty point
 \font\twtyrm = cmr10   \@magscale4 % roman
 \font\twtymi = cmmi10  \@magscale4 % math italic
    \skewchar\twtymi ='177       %  for placement of accents
%\font\twtymib = cmmib10 \@magscale4 % bold math italic
 \font\twtysy = cmsy10  \@magscale4 % math symbols
    \skewchar\twtysy ='60        %  for placement of math accents
%\font\twtysyb = cmbsy10 \@magscale4 % bold symbols
%\font\twtyit = cmti10  \@magscale4 % text italic
%\font\twtysl = cmsl10  \@magscale4 % slanted
%\font\twtybf = cmbx10  \@magscale4 % extended bold
%\font\twtybfs = cmbxsl10 \@magscale4 % extended bold slanted
%\font\twtytt = cmtt10  \@magscale4 % typewriter
%\font\twtytti = cmitt10 \@magscale4 % italic typewriter
%\font\twtytts = cmsltt10 \@magscale4 % slanted typewriter
%\font\twtysf = cmss10  \@magscale4 % sans serif
%\font\twtysfi = cmssi10 \@magscale4 % italic sans serif
%\font\twtysfb = cmssbx10 \@magscale4 % bold sans serif
%\font\twtysc = cmcsc10 \@magscale4 % small caps
 \font\twtyly = lasy10 \@magscale4 % LaTeX symbols
%\font\twtylyb = lasyb10 \@magscale4 % bold LaTeX symbols
%\font\twtyuit = cmu10  \@magscale4 % unslanted italic

% twenty-five point
 \font\twfvrm = cmr10   \@magscale5 % roman
```

```
%\font\twfvmi = cmmi10 \@magscale5 % math italic
%\font\twfvmib = cmmib10 \@magscale5 % bold math italic
%\font\twfvsy = cmsy10 \@magscale5 % math symbols
%\font\twfvsyb = cmbsy10 \@magscale5 % bold symbols
%\font\twfvit = cmti10 \@magscale5 % text italic
%\font\twfvsl = cmsl10 \@magscale5 % slanted
%\font\twfvbf = cmbx10 \@magscale5 % extended bold
%\font\twfvbfs = cmbxsl10 \@magscale5 % extended bold slanted
%\font\twfvtt = cmtt10 \@magscale5 % typewriter
%\font\twfvtti = cmitt10 \@magscale5 % italic typewriter
%\font\twfvtts = cmsltt10 \@magscale5 % slanted typewriter
%\font\twfvsf = cmss10 \@magscale5 % sans serif
%\font\twfvsfi = cmssi10 \@magscale5 % italic sans serif
%\font\twfvsfb = cmssbx10 \@magscale5 % bold sans serif
%\font\twfvsc = cmcsc10 \@magscale5 % small caps
%\font\twfvly = lasy10 \@magscale5 % LaTeX symbols
%\font\twfvlyb = lasyb10 \@magscale5 % bold LaTeX symbols
%\font\twfvuit = cmu10 \@magscale5 % unslanted italic

% Math extension
 \font\tenex  = cmex10

% line & circle fonts
\font\tenln   = line10
\font\tenlnw  = linew10
\font\tencirc = lcircle10  % 21 Nov 89 : circle10 -> lcircle10
\font\tencircw = lcirclew10 % 21 Nov 89 : circlew10 -> lcirclew10

% Change made 6 May 86: '\@warning' replaced by '\immediate\write 15'
% since it's not defined when lfonts.tex is read by lplain.tex.
%
\ifnum\fontdimen8\tenln=\fontdimen8\tencirc \else
  \immediate\write 15{Incompatible thin line and circle fonts}\fi
\ifnum\fontdimen8\tenlnw=\fontdimen8\tencircw \else
  \immediate\write 15{Incompatible thick line and circle fonts}\fi


% protected font names
\def\rm{\protect\prm}
\def\it{\protect\pit}
\def\bf{\protect\pbf}
\def\sl{\protect\psl}
\def\sf{\protect\psf}
\def\sc{\protect\psc}
\def\tt{\protect\ptt}

%% FONT-CUSTOMIZING: The following definitions define certain commands
%% to be abbreviations for certain font names. These commands are used
%% below in \@getfont commands, which load the loaded-on-demand fonts.
%% This is done only to save space. To change the fonts that are loaded
%% on demand, one can either change these definitions or else change
%% the arguments of the \@getfont commands.
%%
\def\@mbi{cmmib10}
\def\@mbsy{cmbsy10}
\def\@mcsc{cmcsc10}
\def\@mss{cmss10}
\def\@lasyb{lasyb10}

% families

\newfam\itfam     % \it is family 4
\newfam\slfam     % \sl is family 5
\newfam\bffam     % \bf is family 6
\newfam\ttfam     % \tt is family 7
\newfam\sffam     % \sf is family 8
\newfam\scfam     % \sc is family 9
\newfam\lyfam     % \ly is family 10

\def\cal{\fam\tw@}
\def\mit{\fam\@ne}

\def\@setstrut{\setbox\strutbox=\hbox{\vrule \@height .7\baselineskip
    \@depth .3\baselineskip \@width\z@}}
```

```
517
518
519 %% FONT-CUSTOMIZING: The commands \vpt, \vipt, ... , \xxvpt perform all
520 %% the declarations needed to change the type size to 5pt, 6pt, ... ,
521 %% 25pt. To see how this works, consider the definition of \viipt,
522 %% which determines the fonts used in a 7pt type size. The command
523 %%    \def\pit{\fam\itfam\sevit}
524 %% means that the \it command causes the preloaded \sevit font to
525 %% be used--this font was defined earlier with a \font\sevit...
526 %% command. The commands
527 %%     \textfont\itfam\sevit
528 %%     \scriptfont\itfam\sevit
529 %%     \scriptscriptfont\itfam\sevit
530 %% tell TeX to use the \sevit font for all three math-mode sizes
531 %% (text, script, and scriptscript) for the 7pt size.
532 %% The fonts appearing in these commands must be preloaded.
533 %%
534 %% The command
535 %%     \def\pbf{\@getfont\pbf\bffam\@viipt{ambx7}}
536 %% declares \bf to use a loaded-on-demand font--namely, the font
537 %% ambx7.
538 %%
539 %% The command
540 %%     \def\ptt{\@subfont\tt\rm}
541 %% declares that the \tt font is unavailable in the 7pt size, so
542 %% the \rm font is used instead. (The substituted type style should
543 %% correspond to a preloaded size.)
544
545 \def\vpt{\textfont\z@\fivrm
546   \scriptfont\z@\fivrm \scriptscriptfont\z@\fivrm
547 \textfont\@ne\fivmi \scriptfont\@ne\fivmi \scriptscriptfont\@ne\fivmi
548 \textfont\tw@\fivsy \scriptfont\tw@\fivsy \scriptscriptfont\tw@\fivsy
549 \textfont\thr@@\tenex \scriptfont\thr@@\tenex \scriptscriptfont\thr@@\tenex
550 \def\prm{\fam\z@\fivrm}%
551 \def\unboldmath{\everymath{}\everydisplay{}\@nomath
552   \unboldmath\fam\@ne\@boldfalse}\@boldfalse
553 \def\boldmath{\@subfont\boldmath\unboldmath}%
554 \def\pit{\@subfont\it\rm}%
555 \def\psl{\@subfont\sl\rm}%
556 \def\pbf{\@getfont\pbf\bffam\@vpt{cmbx5}}%
557 \def\ptt{\@subfont\tt\rm}%
558 \def\psf{\@subfont\sf\rm}%
559 \def\psc{\@subfont\sc\rm}%
560 \def\ly{\fam\lyfam\fivly}\textfont\lyfam\fivly
561     \scriptfont\lyfam\fivly \scriptscriptfont\lyfam\fivly
562 \@setstrut\rm}
563
564 \def\@vpt{}
565
566 \def\vipt{\textfont\z@\sixrm
567   \scriptfont\z@\sixrm \scriptscriptfont\z@\sixrm
568 \textfont\@ne\sixmi \scriptfont\@ne\sixmi \scriptscriptfont\@ne\sixmi
569 \textfont\tw@\sixsy \scriptfont\tw@\sixsy \scriptscriptfont\tw@\sixsy
570 \textfont\thr@@\tenex \scriptfont\thr@@\tenex \scriptscriptfont\thr@@\tenex
571 \def\prm{\fam\z@\sixrm}%
572 \def\unboldmath{\everymath{}\everydisplay{}\@nomath
573   \unboldmath\@boldfalse}\@boldfalse
574 \def\boldmath{\@subfont\boldmath\unboldmath}%
575 \def\pit{\@subfont\it\rm}%
576 \def\psl{\@subfont\sl\rm}%
577 \def\pbf{\@getfont\pbf\bffam\@vipt{cmbx6}}%
578 \def\ptt{\@subfont\tt\rm}%
579 \def\psf{\@subfont\sf\rm}%
580 \def\psc{\@subfont\sc\rm}%
581 \def\ly{\fam\lyfam\sixly}\textfont\lyfam\sixly
582     \scriptfont\lyfam\sixly \scriptscriptfont\lyfam\sixly
583 \@setstrut\rm}
584
585 \def\@vipt{}
586
587 \def\viipt{\textfont\z@\sevrm
588   \scriptfont\z@\sixrm \scriptscriptfont\z@\fivrm
589 \textfont\@ne\sevmi \scriptfont\@ne\fivmi \scriptscriptfont\@ne\fivmi
590 \textfont\tw@\sevsy \scriptfont\tw@\fivsy \scriptscriptfont\tw@\fivsy
```

```
\textfont\thr@@\tenex \scriptfont\thr@@\tenex \scriptscriptfont\thr@@\tenex
\def\prm{\fam\z@\sevrm}%
\def\unboldmath{\everymath{}\everydisplay{}\@nomath
\unboldmath\@boldfalse}\@boldfalse
\def\boldmath{\@subfont\boldmath\unboldmath}%
\def\pit{\fam\itfam\sevit}\textfont\itfam\sevit
   \scriptfont\itfam\sevit \scriptscriptfont\itfam\sevit
\def\psl{\@subfont\sl\it}%
\def\pbf{\@getfont\pbf\bffam\@viipt{cmbx7}}%
\def\ptt{\@subfont\tt\rm}%
\def\psf{\@subfont\sf\rm}%
\def\psc{\@subfont\sc\rm}%
\def\ly{\fam\lyfam\sevly}\textfont\lyfam\sevly
    \scriptfont\lyfam\fivly \scriptscriptfont\lyfam\fivly
\@setstrut \rm}

\def\@viipt{}

\def\viiipt{\textfont\z@\egtrm
  \scriptfont\z@\sixrm \scriptscriptfont\z@\fivrm
\textfont\@ne\egtmi \scriptfont\@ne\sixmi \scriptscriptfont\@ne\fivmi
\textfont\tw@\egtsy \scriptfont\tw@\sixsy \scriptscriptfont\tw@\fivsy
\textfont\thr@@\tenex \scriptfont\thr@@\tenex \scriptscriptfont\thr@@\tenex
\def\prm{\fam\z@\egtrm}%
\def\unboldmath{\everymath{}\everydisplay{}\@nomath
\unboldmath\@boldfalse}\@boldfalse
\def\boldmath{\@subfont\boldmath\unboldmath}%
\def\pit{\fam\itfam\egtit}\textfont\itfam\egtit
   \scriptfont\itfam\sevit \scriptscriptfont\itfam\sevit
\def\psl{\@getfont\psl\slfam\@viiipt{cmsl8}}%
\def\pbf{\@getfont\pbf\bffam\@viiipt{cmbx8}}%
\def\ptt{\@getfont\ptt\ttfam\@viiipt{cmtt8}\@nohyphens\ptt\@viiipt}%
\def\psf{\@getfont\psf\sffam\@viiipt{cmss8}}%
\def\psc{\@getfont\psc\scfam\@viiipt{\@mcsc \@ptscale8}}%
\def\ly{\fam\lyfam\egtly}\textfont\lyfam\egtly
    \scriptfont\lyfam\sixly \scriptscriptfont\lyfam\fivly
\@setstrut \rm}

\def\@viiipt{}

\def\ixpt{\textfont\z@\ninrm
  \scriptfont\z@\sixrm \scriptscriptfont\z@\fivrm
\textfont\@ne\ninmi \scriptfont\@ne\sixmi \scriptscriptfont\@ne\fivmi
\textfont\tw@\ninsy \scriptfont\tw@\sixsy \scriptscriptfont\tw@\fivsy
\textfont\thr@@\tenex \scriptfont\thr@@\tenex \scriptscriptfont\thr@@\tenex
\def\prm{\fam\z@\ninrm}%
\def\unboldmath{\everymath{}\everydisplay{}\@nomath\unboldmath
   \@boldfalse}\@boldfalse
\def\boldmath{\@subfont\boldmath\unboldmath}%
\def\pit{\fam\itfam\ninit}\textfont\itfam\ninit
   \scriptfont\itfam\sevit \scriptscriptfont\itfam\sevit
\def\psl{\@getfont\psl\slfam\@ixpt{cmsl9}}%
\def\pbf{\fam\bffam\ninbf}\textfont\bffam\ninbf
   \scriptfont\bffam\ninbf \scriptscriptfont\bffam\ninbf
\def\ptt{\fam\ttfam\nintt}\textfont\ttfam\nintt
   \scriptfont\ttfam\nintt \scriptscriptfont\ttfam\nintt
\def\psf{\@getfont\psf\sffam\@ixpt{cmss9}}%
\def\psc{\@getfont\psc\scfam\@ixpt{\@mcsc \@ptscale9}}%
\def\ly{\fam\lyfam\ninly}\textfont\lyfam\ninly
   \scriptfont\lyfam\sixly \scriptscriptfont\lyfam\fivly
\@setstrut \rm}

\def\@ixpt{}

\def\xpt{\textfont\z@\tenrm
  \scriptfont\z@\sevrm \scriptscriptfont\z@\fivrm
\textfont\@ne\tenmi \scriptfont\@ne\sevmi \scriptscriptfont\@ne\fivmi
\textfont\tw@\tensy \scriptfont\tw@\sevsy \scriptscriptfont\tw@\fivsy
\textfont\thr@@\tenex \scriptfont\thr@@\tenex \scriptscriptfont\thr@@\tenex
\def\unboldmath{\everymath{}\everydisplay{}\@nomath\unboldmath
          \textfont\@ne\tenmi
          \textfont\tw@\tensy \textfont\lyfam\tenly
          \@boldfalse}\@boldfalse
\def\boldmath{\@ifundefined{tenmib}{\global\font\tenmib\@mbi
```

```
   \global\font\tensyb\@mbsy
   \global\font\tenlyb\@lasyb\relax\@addfontinfo\@xpt
   {\def\boldmath{\everymath{\mit}\everydisplay{\mit}\@prtct\@nomathbold
        \textfont\@ne\tenmib \textfont\tw@\tensyb
        \textfont\lyfam\tenlyb \@prtct\@boldtrue}}{}\@xpt\boldmath}%
\def\prm{\fam\z@\tenrm}%
\def\pit{\fam\itfam\tenit}\textfont\itfam\tenit \scriptfont\itfam\sevit
    \scriptscriptfont\itfam\sevit
\def\psl{\fam\slfam\tensl}\textfont\slfam\tensl
     \scriptfont\slfam\tensl \scriptscriptfont\slfam\tensl
\def\pbf{\fam\bffam\tenbf}\textfont\bffam\tenbf
    \scriptfont\bffam\tenbf \scriptscriptfont\bffam\tenbf
\def\ptt{\fam\ttfam\tentt}\textfont\ttfam\tentt
    \scriptfont\ttfam\tentt \scriptscriptfont\ttfam\tentt
\def\psf{\fam\sffam\tensf}\textfont\sffam\tensf
    \scriptfont\sffam\tensf \scriptscriptfont\sffam\tensf
\def\psc{\@getfont\psc\scfam\@xpt{\@mcsc}}%
\def\ly{\fam\lyfam\tenly}\textfont\lyfam\tenly
   \scriptfont\lyfam\sevly \scriptscriptfont\lyfam\fivly
\@setstrut \rm}

\def\@xpt{}

\def\xipt{\textfont\z@\elvrm
  \scriptfont\z@\egtrm \scriptscriptfont\z@\sixrm
\textfont\@ne\elvmi \scriptfont\@ne\egtmi \scriptscriptfont\@ne\sixmi
\textfont\tw@\elvsy \scriptfont\tw@\egtsy \scriptscriptfont\tw@\sixsy
\textfont\thr@@\tenex \scriptfont\thr@@\tenex \scriptscriptfont\thr@@\tenex
\def\unboldmath{\everymath{}\everydisplay{}\@nomath\unboldmath
          \textfont\@ne\elvmi \textfont\tw@\elvsy
          \textfont\lyfam\elvly \@boldfalse}\@boldfalse
\def\boldmath{\@ifundefined{elvmib}{\global\font\elvmib\@mbi\@halfmag
         \global\font\elvsyb\@mbsy\@halfmag
         \global\font\elvlyb\@lasyb\@halfmag\relax\@addfontinfo\@xipt
         {\def\boldmath{\everymath{\mit}\everydisplay{\mit}\@prtct\@nomathbold
               \textfont\@ne\elvmib \textfont\tw@\elvsyb
               \textfont\lyfam\elvlyb\@prtct\@boldtrue}}{}\@xipt\boldmath}%
\def\prm{\fam\z@\elvrm}%
\def\pit{\fam\itfam\elvit}\textfont\itfam\elvit
   \scriptfont\itfam\egtit \scriptscriptfont\itfam\sevit
\def\psl{\fam\slfam\elvsl}\textfont\slfam\elvsl
    \scriptfont\slfam\tensl \scriptscriptfont\slfam\tensl
\def\pbf{\fam\bffam\elvbf}\textfont\bffam\elvbf
   \scriptfont\bffam\ninbf \scriptscriptfont\bffam\ninbf
\def\ptt{\fam\ttfam\elvtt}\textfont\ttfam\elvtt
   \scriptfont\ttfam\nintt \scriptscriptfont\ttfam\nintt
\def\psf{\fam\sffam\elvsf}\textfont\sffam\elvsf
    \scriptfont\sffam\tensf \scriptscriptfont\sffam\tensf
\def\psc{\@getfont\psc\scfam\@xipt{\@mcsc\@halfmag}}%
\def\ly{\fam\lyfam\elvly}\textfont\lyfam\elvly
   \scriptfont\lyfam\egtly \scriptscriptfont\lyfam\sixly
\@setstrut \rm}

\def\@xipt{}

\def\xiipt{\textfont\z@\twlrm
  \scriptfont\z@\egtrm \scriptscriptfont\z@\sixrm
\textfont\@ne\twlmi \scriptfont\@ne\egtmi \scriptscriptfont\@ne\sixmi
\textfont\tw@\twlsy \scriptfont\tw@\egtsy \scriptscriptfont\tw@\sixsy
\textfont\thr@@\tenex \scriptfont\thr@@\tenex \scriptscriptfont\thr@@\tenex
\def\unboldmath{\everymath{}\everydisplay{}\@nomath\unboldmath
         \textfont\@ne\twlmi
         \textfont\tw@\twlsy \textfont\lyfam\twlly
         \@boldfalse}\@boldfalse
\def\boldmath{\@ifundefined{twlmib}{\global\font\twlmib\@mbi\@magscale1\global
        \font\twlsyb\@mbsy \@magscale1\global\font
         \twllyb\@lasyb\@magscale1\relax\@addfontinfo\@xiipt
             {\def\boldmath{\everymath
               {\mit}\everydisplay{\mit}\@prtct\@nomathbold
               \textfont\@ne\twlmib \textfont\tw@\twlsyb
               \textfont\lyfam\twllyb\@prtct\@boldtrue}}{}\@xiipt\boldmath}%
\def\prm{\fam\z@\twlrm}%
\def\pit{\fam\itfam\twlit}\textfont\itfam\twlit \scriptfont\itfam\egtit
   \scriptscriptfont\itfam\sevit
```

```
\def\psl{\fam\slfam\twlsl}\textfont\slfam\twlsl
     \scriptfont\slfam\tensl \scriptscriptfont\slfam\tensl
\def\pbf{\fam\bffam\twlbf}\textfont\bffam\twlbf
   \scriptfont\bffam\ninbf \scriptscriptfont\bffam\ninbf
\def\ptt{\fam\ttfam\twltt}\textfont\ttfam\twltt
   \scriptfont\ttfam\nintt \scriptscriptfont\ttfam\nintt
\def\psf{\fam\sffam\twlsf}\textfont\sffam\twlsf
    \scriptfont\sffam\tensf \scriptscriptfont\sffam\tensf
\def\psc{\@getfont\psc\scfam\@xiipt{\@mcsc\@magscale1}}%
\def\ly{\fam\lyfam\twlly}\textfont\lyfam\twlly
   \scriptfont\lyfam\egtly \scriptscriptfont\lyfam\sixly
 \@setstrut \rm}

\def\@xiipt{}

\def\xivpt{\textfont\z@\frtnrm
  \scriptfont\z@\tenrm \scriptscriptfont\z@\sevrm
\textfont\@ne\frtnmi \scriptfont\@ne\tenmi \scriptscriptfont\@ne\sevmi
\textfont\tw@\frtnsy \scriptfont\tw@\tensy \scriptscriptfont\tw@\sevsy
\textfont\thr@@\tenex \scriptfont\thr@@\tenex \scriptscriptfont\thr@@\tenex
\def\unboldmath{\everymath{}\everydisplay{}\@nomath\unboldmath
          \textfont\@ne\frtnmi \textfont\tw@\frtnsy
          \textfont\lyfam\frtnly \@boldfalse}\@boldfalse
\def\boldmath{\@ifundefined{frtnmib}{\global\font
        \frtnmib\@mbi\@magscale2\global\font\frtnsyb\@mbsy\@magscale2
         \global\font\frtnlyb\@lasyb\@magscale2\relax\@addfontinfo\@xivpt
              {\def\boldmath{\everymath
               {\mit}\everydisplay{\mit}\@prtct\@nomathbold
              \textfont\@ne\frtnmib \textfont\tw@\frtnsyb
              \textfont\lyfam\frtnlyb\@prtct\@boldtrue}}}{}\@xivpt\boldmath}%
\def\prm{\fam\z@\frtnrm}%
\def\pit{\@getfont\pit\itfam\@xivpt{cmti10\@magscale2}}%
\def\psl{\@getfont\psl\slfam\@xivpt{cmsl10\@magscale2}}%
\def\pbf{\fam\bffam\frtnbf}\textfont\bffam\frtnbf
   \scriptfont\bffam\tenbf \scriptscriptfont\bffam\ninbf
\def\ptt{\@getfont\ptt\ttfam\@xivpt{cmtt10\@magscale2}\@nohyphens\ptt\@xivpt}%
\def\psf{\@getfont\psf\sffam\@xivpt{\@mss\@magscale2}}%
\def\psc{\@getfont\psc\scfam\@xivpt{\@mcsc\@magscale2}}%
\def\ly{\fam\lyfam\frtnly}\textfont\lyfam\frtnly
   \scriptfont\lyfam\tenly \scriptscriptfont\lyfam\sevly
\@setstrut \rm}

\def\@xivpt{}

\def\xviipt{\textfont\z@\svtnrm
  \scriptfont\z@\twlrm \scriptscriptfont\z@\tenrm
\textfont\@ne\svtnmi \scriptfont\@ne\twlmi \scriptscriptfont\@ne\tenmi
\textfont\tw@\svtnsy \scriptfont\tw@\twlsy \scriptscriptfont\tw@\tensy
\textfont\thr@@\tenex \scriptfont\thr@@\tenex \scriptscriptfont\thr@@\tenex
\def\unboldmath{\everymath{}\everydisplay{}\@nomath\unboldmath
          \textfont\@ne\svtnmi \textfont\tw@\svtnsy \textfont\lyfam\svtnly
          \@boldfalse}\@boldfalse
\def\boldmath{\@subfont\boldmath\unboldmath}%
\def\prm{\fam\z@\svtnrm}%
\def\pit{\@getfont\pit\itfam\@xviipt{cmti10\@magscale3}}%
\def\psl{\@getfont\psl\slfam\@xviipt{cmsl10\@magscale3}}%
\def\pbf{\fam\bffam\svtnbf}\textfont\bffam\svtnbf
    \scriptfont\bffam\twlbf \scriptscriptfont\bffam\tenbf
\def\ptt{\@getfont\ptt\ttfam\@xviipt{cmtt10\@magscale3}\@nohyphens
   \ptt\@xviipt}%
\def\psf{\@getfont\psf\sffam\@xviipt{cmss17}}%
\def\psc{\@getfont\psc\scfam\@xviipt{\@mcsc\@magscale3}}%
\def\ly{\fam\lyfam\svtnly}\textfont\lyfam\svtnly
   \scriptfont\lyfam\twlly \scriptscriptfont\lyfam\tenly
\@setstrut \rm}

\def\@xviipt{}

\def\xxpt{\textfont\z@\twtyrm
  \scriptfont\z@\frtnrm \scriptscriptfont\z@\twlrm
\textfont\@ne\twtymi \scriptfont\@ne\frtnmi \scriptscriptfont\@ne\twlmi
\textfont\tw@\twtysy \scriptfont\tw@\frtnsy \scriptscriptfont\tw@\twlsy
\textfont\thr@@\tenex \scriptfont\thr@@\tenex \scriptscriptfont\thr@@\tenex
\def\unboldmath{\everymath{}\everydisplay{}\@nomath\unboldmath
```

```
        \textfont\@ne\twtymi \textfont\tw@\twtysy \textfont\lyfam\twtyly
        \@boldfalse}\@boldfalse
\def\boldmath{\@subfont\boldmath\unboldmath}%
\def\prm{\fam\z@\twtyrm}%
\def\pit{\@getfont\pit\itfam\@xxpt{cmti10\@magscale4}}%
\def\psl{\@getfont\psl\slfam\@xxpt{cmsl10\@magscale4}}%
\def\pbf{\@getfont\pbf\bffam\@xxpt{cmbx10\@magscale4}}%
\def\ptt{\@getfont\ptt\ttfam\@xxpt{cmtt10\@magscale4}\@nohyphens\ptt\@xxpt}%
\def\psf{\@getfont\psf\sffam\@xxpt{\@mss\@magscale4}}%
\def\psc{\@getfont\psc\scfam\@xxpt{\@mcsc\@magscale4}}%
\def\ly{\fam\lyfam\twtyly}\textfont\lyfam\twtyly
   \scriptfont\lyfam\frtnly \scriptscriptfont\lyfam\twlly
\@setstrut \rm}

\def\@xxpt{}

\def\xxvpt{\textfont\z@\twfvrm
  \scriptfont\z@\twtyrm \scriptscriptfont\z@\svtnrm
\textfont\@ne\twtymi \scriptfont\@ne\twtymi \scriptscriptfont\@ne\svtnmi
\textfont\tw@\twtysy \scriptfont\tw@\twtysy \scriptscriptfont\tw@\svtnsy
\textfont\thr@@\tenex \scriptfont\thr@@\tenex \scriptscriptfont\thr@@\tenex
\def\unboldmath{\everymath{}\everydisplay{}\@nomath\unboldmath
        \textfont\@ne\twtymi \textfont\tw@\twtysy \textfont\lyfam\twtyly
        \@boldfalse}\@boldfalse
\def\boldmath{\@subfont\boldmath\unboldmath}%
\def\prm{\fam\z@\twfvrm}%
\def\pit{\@subfont\it\rm}%
\def\psl{\@subfont\sl\rm}%
\def\pbf{\@getfont\pbf\bffam\@xxvpt{cmbx10\@magscale5}}%
\def\ptt{\@subfont\tt\rm}%
\def\psf{\@subfont\sf\rm}%
\def\psc{\@subfont\sc\rm}%
\def\ly{\fam\lyfam\twtyly}\textfont\lyfam\twtyly
   \scriptfont\lyfam\twtyly \scriptscriptfont\lyfam\svtnly
\@setstrut \rm}

\def\@xxvpt{}

% SPECIAL LaTeX character definitions

% Definitions of math operators added by LaTeX
\mathchardef\mho"0A30
\mathchardef\Join"3A31
\mathchardef\Box"0A32
\mathchardef\Diamond"0A33
\mathchardef\leadsto"3A3B
\mathchardef\sqsubset"3A3C
\mathchardef\sqsupset"3A3D
\def\lhd{\mathbin{< \hbox to -.43em{}\hbox{\vrule
      \@width .065em \@height .55em \@depth .05em}\hbox to .2em{}}}
\def\rhd{\mathbin{\hbox to .3em{}\hbox{\vrule \@width .065em \@height
       .55em \@depth .05em}\hbox to -.43em{}>}}
\def\unlhd{\mathbin{\leq \hbox to -.43em{}\hbox
       {\vrule \@width .065em \@height .63em \@depth -.08em}\hbox to .2em{}}}
\def\unrhd{\mathbin{ \hbox to .3em{}\hbox
 {\vrule \@width .065em \@height .63em \@depth -.08em}\hbox to -.43em{}\geq}}

% Definition of \$ to work in italic font (since it produces a pound sterling
% sign in the cmit font.

\def\${\protect\pdollar}
\def\pdollar{{\ifdim \fontdimen\@ne\font >\z@ \sl \fi\char`\$}}

% Definition of pound sterling sign.
% Modified 10 Apr 89 to work in math mode.

\def\pounds{\protect\ppounds}
\def\ppounds{\relax\ifmmode\mathchar"424\else{\it \char'44}\fi}


% Definition of \copyright changed so it works in other type styles,
% and so it is robust
\def\copyright{\protect\pcopyright}
\def\pcopyright{{\rm\ooalign{\hfil
```

```
887      \raise.07ex\hbox{c}\hfil\crcr\mathhexbox20D}}}
888
889 \endinput
```

2.4 latex.tex

```
% LATEX VERSION 2.09 <25 March 1992>
% Copyright (C) 1992 by Leslie Lamport

\everyjob{\typeout{LaTeX Version 2.09 <25 March 1992>}}
\immediate\write10{LaTeX Version 2.09 <25 March 1992>}

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\catcode`\~=13 \def~{\penalty\@M \ }


%    ****************************************
%    *          COMMAND LIST                *
%    ****************************************
%
% DECLARATIONS:
%  PREAMBLE:    \nofiles \documentstyle \includeonly
%               \makeindex \makeglossary
%  IN DOCUMENT :
%    FONT SELECTION:
%         SIZE: \normalsize \small \footnotesize \scriptsize \tiny
%               \large \Large \LARGE \huge \Huge
%         STYLE: \bf \it \rm \sl \ss \tt \mit[math mode only]
%    STYLE:
%         PAGE: [all global] \pagestyle \thispagestyle \pagenumbering \head
%         MISC: \raggedright \thicklines \thinlines
%    PARAMETER: \setlength \settowidth \addtolength \setcounter \addtocounter
%    NEW:       \newlength \newtheorem \newcommand
%    MISC:      \savebox \sbox \obeycr \restorecr
%
% ENVIRONMENTS:
%    ?   -> PAR: document
%   PAR  -> PAR: list enumerate itemize description
%                center flushright flushleft
%                verbatim picture float
%   PAR  -> BOX: tabular tabbing
%   PAR  -> MATH: math displaymath equation
```

```
%   MATH -> MATH: array
%   ANY  -> PAR: minipage
%   ANY  -> BOX: stack
%
% TEXT-PRODUCING:
%   WITH TEXT ARGUMENT:
%      ANY -> BOX: \makebox \mbox \framebox \fbox \dashbox
%                  \shortstack \footnotemark \cite[] \raisebox
%      ANY -> PAR: \parbox[inner]
%      PAR -> PAR: \chapter \section ... \footnote \footnotetext
%                  \topnewpage \verb
%      MATH:       \sqrt \underline \overline
%      PICTURE:    \put \multiput
%      LIST:       \item
%   WITHOUT TEXT ARGUMENT:
%     ANY MODE:
%          SYMBOLS: \$ \{ \} \_ \@ \& \#
%          ACCENTS: See TeXbook
%          OTHER:   \rule \ref \pageref \today \usebox \typein \input \cite
%     MATH:     \over
%     PAR MODE: \include \bibliography \tableofcontents \listoffigures ...
%     LIST:     \item \arabic \roman \Roman \alph \Alph
%     PICTURE: \line \vector \circle \oval
%     ARRAY & TABULAR: \hline \vline
%
% SPACING & BREAKING:
%    ANY       : \hfill \hspace
%    PAR       : \newpage \newpage \vspace \noindent
%    PAR & INNER MATH
%              : \newpage \clearpage \cleardoublepage
%              : \pagebreak \nopagebreak \linebreak \nolinebreak \newline
%    MATH      : \over \; \, \!
%    MULTILINE : \\
%    TABBING   : \pushtab \poptab \> \< \+ \- \kill ...
%    ARRAY & TABULAR
%              : \multicolumn \noalign
%
% NO DIRECT CHANGES TO DOCUMENT:
%    \index \glossary \typeout \label \tableentry \stop \protect
%
% PARAMETERS:
%
% \columnsep        \skip\footin       \intextsep
% \columnseprule                       \oddsidemargin
% \columnwidth                         \textfloatsep
% \evensidemargin   \footsep           \textheight
% \floatsep         \headheight        \textwidth
% \headsep           \topmargin


%   ALPHABETIZED LIST:
%
% ORDINARY COMMANDS:
%
% \Alph               \include           \parbox
% \Roman              \index             \put
% \\                  \item              \raisebox
% \alph               \label             \ref
% \appendix           \line              \roman
% \arabic             \linebreak         \rule
% \bibliography       \listoffigures     \section
% \chapter            \listoftables      \shortstack
% \circle             \makebox           \stop
% \cite               \mbox              \subsection
% \cite               \multicolumn       \subsubsection
% \cleardoublepage    \multiput          \tableentry
% \clearpage                             \tableofcontents
% \dashbox            \newline           \today
% \fbox               \newpage           \typein
% \footnotemark       \noindent          \typeout
% \footnotetext       \nolinebreak       \usebox
% \framebox           \nopagebreak       \vector
% \glossary           \oval              \vline
% \hline              \pagebreak         \vspace
```

```
147 % \hspace            \pageref          \protect
148 %
149 %
150 % ENVIRONMENTS & DECLARATIONS:
151 %
152 % For each of these commands, the same command name prefixed by 'end'
153 % is also reserved--e.g., \enddocument.
154 %
155 % \BIG              \footnotesize     \pagestyle
156 % \Big              \head             \picture
157 % \addtocounter     \includeonly      \raggedright
158 % \addtolength      \itemize          \restorecr
159 % \array            \list             \savebox
160 % \big              \makeglossary     \sbox
161 % \center           \makeindex        \scriptscriptsize
162 % \description      \math             \scriptsize
163 % \displaymath      \minipage         \setcounter
164 % \document         \newcommand       \setlength
165 % \documentstyle    \newlength        \settowidth
166 % \enumerate        \newtheorem       \small
167 % \equation         \nofiles          \shortstack\tabbing
168 %                   \normalsize          \tabular
169 % \float            \obeycr           \thicklines
170 % \flushleft        \pagelayout       \thinlines
171 % \flushright       \pagenumbering    \thispagestyle
172 %                                     \verb, \verbatim
173 %
174 % PARAMETERS :
175 %
176 % \columnsep        \footinsertskip   \intextsep
177 % \columnseprule                      \oddsidemargin
178 % \columnwidth                        \textfloatsep
179 % \evensidemargin   \footsep          \textheight
180 % \floatsep         \headheight       \textwidth
181 % \headsep           \topmargin
182 %
183 %
184 % TABBING COMMANDS:
185 %
186 % These commannds are defined only within a tabbing environment.
187 %
188 % \kill     \>    \-
189 % \pushtab  \<    \=
190 % \poptab   \+
191
192
193 % COMPLETE LIST :
194 % Below is a complete list of every command starting with `\' that
195 % appears in LATEX.TEX.
196
197 % \
198 % \!
199 % \#
200 % \$
201 % \&
202 % \'
203 % \(
204 % \)
205 % \+
206 % \,
207 % \-
208 % \.
209 % \:
210 % \;
211 % \<
212 % \=
213 % \>
214 % \@
215 % \@@
216 % \@@end
217 % \@@endpbox
218 % \@@eqncr
219 % \@@hyph
220 % \@@input
```

```
% \@@par
% \@@sqrt
% \@@startpbox
% \@@underline
% \@@warning
% \@acci
% \@accii
% \@acciii
% \@acol
% \@acolampacol
% \@addamp
% \@addfield
% \@addmarginpar
% \@addtobot
% \@addtocurcol
% \@addtodblcol
% \@addtonextcol
% \@addtopreamble
% \@addtoreset
% \@addtotoporbot
% \@afterheading
% \@afterindentfalse
% \@afterindenttrue
% \@Alph
% \@alph
% \@ampacol
% \@arabic
% \@argarraycr
% \@argdef
% \@argrsbox
% \@argtabularcr
% \@array
% \@arrayacol
% \@arrayclassiv
% \@arrayclassv
% \@arrayclassz
% \@arraycr
% \@arrayparboxrestore
% \@arrayrule
% \@arstrut
% \@arstrutbox
% \@auxout
% \@badcrerr
% \@badend
% \@badlinearg
% \@badmath
% \@badpoptabs
% \@badtab
% \@beginparpenalty
% \@begintheorem
% \@bibitem
% \@biblabel
% \@bitor
% \@botlist
% \@botnum
% \@botroom
% \@bsphack
% \@caption
% \@captype
% \@car
% \@carcube
% \@cclv
% \@cdr
% \@centercr
% \@centering
% \@cfla
% \@cflb
% \@charlb
% \@charrb
% \@chclass
% \@checkend
% \@chnum
% \@circ
% \@circle
```

オマケ

```
% \@circlefnt
% \@cite
% \@citea
% \@citeb
% \@citex
% \@cla        % counter used in \cline
% \@classi
% \@classii
% \@classiii
% \@classiv
% \@classv
% \@classz
% \@clb        % counter used in \cline
% \@cline
% \@clnht
% \@clnwd
% \@clubpenalty
% \@colht
% \@colnum
% \@colroom
% \@combinedblfloats
% \@combinefloats
% \@comdblflelt
% \@comflelt
% \@cons
% \@contfield
% \@ctrerr
% \@curfield
% \@curline
% \@currbox
% \@currentlabel
% \@currentreference
% \@currenvir
% \@currlist
% \@currtype
% \@curtab
% \@curtabmar
% \@dascnt
% \@dashbox
% \@dashcnt
% \@dashdim
% \@dblarg
% \@dbldeferlist
% \@dblfloat
% \@dblfloatplacement
% \@dblfloatsep
% \@dblfpbot
% \@dblfpsep
% \@dblfptop
% \@dblmaxsep
% \@dbltextfloatsep
% \@dbltoplist
% \@dbltopnum
% \@dbltoproom
% \@deferlist
% \@definecounter
% \@defpar
% \@depth
% \@dischyph
% \@doclearpage
% \@documentstyle
% \@doendpe
% \@donoparitem
% \@dot
% \@dotsep
% \@dottedtocline
% \@downline
% \@downvector
% \@eha
% \@ehb
% \@ehc
% \@ehd
% \@elt
% \@empty
```

```
% \@endparenv
% \@endparpenalty
% \@endpbox
% \@endpefalse
% \@endpetrue
% \@endtabbing
% \@endtheorem
% \@enumctr
% \@enumdepth
% \@enumspacing
% \@eqncr
% \@eqnnum
% \@eqnsel
% \@eqnswtrue
% \@esphack
% \@Esphack
% \@evenfoot
% \@evenhead
% \@expast
% \@failedlist
% \@fcolmadefalse
% \@filesw
% \@fileswfalse
% \@fileswtrue
% \@firstampfalse
% \@firstamptrue
% \@firstcolumntrue
% \@firsttab
% \@flfail
% \@float
% \@floatpenalty
% \@floatplacement
% \@floatsep
% \@flsucceed
% \@fltovf
% \@flushglue
% \@fnsymbol
% \@footnotemark
% \@footnotetext
% \@for
% \@forloop
% \@fornoop
% \@fpbot
% \@fpmin
% \@fpsep
% \@fptop
% \@framebox
% \@framepicbox
% \@freelist
% \@getcirc
% \@getlarrow
% \@getlinechar
% \@getpen
% \@getrarrow
% \@glossaryfile
% \@gobble
% \@gobblecr
% \@gobbletwo
% \@gtempa
% \@halfwidth
% \@halignto
% \@hangfrom
% \@height
% \@highpenalty
% \@hightab
% \@hline
% \@holdpg
% \@hspace
% \@hspacer
% \@hvector
% \@icentercr
% \@iden
% \@ifatmargin
% \@ifdefinable
```

オマケ

```
% \@ifnch
% \@ifnextchar
% \@iforloop
% \@iframebox
% \@iframepicbox
% \@ifstar
% \@ifundefined
% \@iinput          % used in \input
% \@iirsbox
% \@imakebox
% \@imakepicbox
% \@iminipage
% \@index
% \@indexfile
% \@inlabelfalse
% \@input
% \@inputcheck
% \@insertfalse
% \@inserttrue
% \@iparbox
% \@irsbox
% \@isavebox
% \@isavepicbox
% \@ishortstack
% \@istackcr
% \@itabcr
% \@item
% \@itemdepth
% \@itemfudge
% \@itemitem
% \@itemlabel
% \@itempenalty
% \@itemspacing
% \@iwhiledim
% \@iwhilenum
% \@iwhilesw
% \@ixstackcr
% \@killglue
% \@labels
% \@lastchclass
% \@latexbug
% \@latexerr
% \@lbibitem
% \@leftcolumn
% \@leftmarginskip
% \@leftmark
% \@lhead
% \@linechar
% \@linefnt
% \@linelen
% \@list
% \@listctr
% \@listdepth
% \@listi
% \@listii
% \@listvi
% \@lnbk
% \@lowpenalty
% \@lquote
% \@ltab
% \@M
% \@m
% \@mainaux
% \@mainout
% \@makebox
% \@makecaption
% \@makecol
% \@makefcolumn
% \@makefnmark
% \@makefntext
% \@makeonecolumn
% \@makeother
% \@makepicbox
% \@maketwocolumn
```

```
% \@marbox
% \@markright
% \@maxdepth
% \@maxsep
% \@maxtab
% \@medpenalty
% \@Mi
% \@midlist
% \@Mii
% \@Miii
% \@minipagefalse
% \@minipagerestore
% \@Miv
% \@mkboth
% \@mklab
% \@mkpream
% \@MM
% \@mparbottom
% \@mparswitchfalse
% \@mpfn
% \@mpfnnumber
% \@mpfootins
% \@mpfootnotetext
% \@mplistdepth
% \@multicnt
% \@namedef
% \@nameuse
% \@nbitem
% \@ne
% \@negargfalse
% \@negargtrue
% \@newctr
% \@newenv
% \@newline
% \@newlist
% \@newlistfalse
% \@next
% \@nextchar
% \@nextwhile
% \@nil
% \@nmbrlistfalse
% \@nmbrlisttrue
% \@nnil
% \@nobreakfalse
% \@nocnterr
% \@nodocument
% \@nofonterror
% \@noitemargfalse
% \@noitemargtrue
% \@noitemerr
% \@noligs
% \@nolnbk
% \@nolnerr
% \@noparitemfalse
% \@noparitemtrue
% \@noparlistfalse
% \@noparlisttrue
% \@nopgbk
% \@normalcr
% \@normalsize
% \@noskipsecfalse
% \@notdefinable
% \@notprerr
% \@nthm
% \@nxttabmar
% \@oddfoot
% \@oddhead
% \@opargbegintheorem
% \@opcol
% \@optionfiles
% \@optionlist
% \@options
% \@othm
% \@outerparskip
```

オマケ

```
% \@outputbox
% \@outputdblcol
% \@outputpage
% \@oval
% \@ovbtrue
% \@ovdx
% \@ovdy
% \@ovhorz
% \@ovltrue
% \@ovri
% \@ovro
% \@ovrtrue
% \@ovttrue
% \@ovvert
% \@ovxx
% \@ovyy
% \@pagedp
% \@pageht
% \@par
% \@parboxrestore
% \@parmoderr
% \@partaux
% \@partlist
% \@partout
% \@partsw
% \@partswfalse
% \@partswtrue
% \@pboxswfalse
% \@pboxswtrue
% \@pgbk
% \@picbox
% \@picht
% \@picture
% \@pnumwidth
% \@preamble
% \@preamblecmds
% \@preamerr
% \@put
% \@qend
% \@qrelax
% \@reargdef
% \@renewenv
% \@restorepar
% \@reversemarginfalse
% \@reversemargintrue
% \@rhead
% \@rightmark
% \@rightskip
% \@Roman
% \@roman
% \@rsbox
% \@rtab
% \@rule
% \@sanitize
% \@savebox
% \@savemarbox
% \@savepicbox
% \@savsf
% \@savsk
% \@scolelt
% \@sdblcolelt
% \@secpenalty
% \@sect
% \@setpar
% \@settab
% \@sharp
% \@shortstack
% \@sline
% \@spaces
% \@specialoutput
% \@specialpagefalse
% \@specialstyle
% \@sptoken
% \@sqrt
```

```
% \@ssect
% \@startcolumn
% \@startdblcolumn
% \@startfield
% \@startline
% \@startpbox
% \@startsection
% \@starttoc
% \@stopfield
% \@stopline
% \@stpelt
% \@svector
% \@sverb
% \@svsec
% \@svsechd
% \@tabacol
% \@tabarray
% \@tabclassiv
% \@tabclassz
% \@tabcr
% \@tablab
% \@tabminus
% \@tabplus
% \@tabpush
% \@tabrj
% \@tabular
% \@tabularcr
% \@temp
% \@tempa
% \@tempb
% \@tempbox
% \@tempboxa
% \@tempc
% \@tempcnta
% \@tempcntb
% \@tempd
% \@tempdima
% \@tempdimb
% \@tempe
% \@tempskipa
% \@tempskipb
% \@tempswa
% \@tempswafalse
% \@tempswatrue
% \@temptokena
% \@testdef
% \@testfp
% \@testpach
% \@textbottom
% \@textfloatsep
% \@textmin
% \@texttop
% \@tfor
% \@tforloop
% \@thanks
% \@thefnmark
% \@thefoot
% \@thehead
% \@themargin
% \@themark
% \@thm
% \@thmcounter
% \@thmcountersep
% \@tocrmarg
% \@toodeep
% \@toplist
% \@topnewpage
% \@topnum
% \@toproom
% \@topsep
% \@topsepadd
% \@totalleftmargin
% \@trivlist
% \@tryfcolumn
```

オマケ

```
% \@trylist
% \@twocolumnfalse
% \@twoside
% \@twosidefalse
% \@typein
% \@upline
% \@upordown
% \@upvector
% \@verb
% \@verbatim
% \@vline
% \@vobeyspaces
% \@vspace
% \@vspacer
% \@vtryfc
% \@vvector
% \@warning
% \@wckptelt
% \@whiledim
% \@whilenoop
% \@whilenum
% \@whilesw
% \@whileswnoop
% \@wholewidth
% \@width
% \@wrindex
% \@writeckpt
% \@writefile
% \@wtryfc
% \@x@sf
% \@xarg
% \@xargarraycr
% \@xarraycr
% \@xbitor
% \@xcentercr
% \@xdblarg
% \@xdblfloat
% \@xdim
% \@xeqncr
% \@xexnoop
% \@xexpast
% \@xfloat
% \@xfootnote
% \@xfootnotemark
% \@xfootnotenext
% \@xhead
% \@xifnch
% \@xmpar
% \@xnewline
% \@xnthm
% \@xobeysp
% \@xsect
% \@xstartcol
% \@xtabcr
% \@xtabularcr
% \@xthm
% \@xtryfc
% \@xtypein
% \@xverbatim
% \@xxxii
% \@xympar
% \@yarg
% \@yargarraycr
% \@ydim
% \@yeqncr
% \@yhead
% \@ympar
% \@ynthm
% \@ythm
% \@ytryfc
% \@yyarg
% \@ztryfc
% \a
% \active
```

```
% \addcontentsline
% \addpenalty
% \addtocontents
% \addtocounter
% \addtolength
% \addvspace
% \advance
% \alloc@
% \allocationnumber
% \Alph
% \alph
% \and
% \appendix
% \arabic
% \array
% \arraycolsep
% \arrayrulewidth
% \arraystretch
% \author
% \bar
% \baselineskip
% \begin
% \begingroup
% \bf
% \bgroup
% \bibcite
% \bibdata
% \bibitem
% \bibliography
% \bibliographystyle
% \bibstyle
% \BIG
% \Big
% \big
% \bigskip
% \botfigrule
% \botmark
% \botnum
% \bottomfraction
% \box
% \boxmaxdepth
% \buildrel
% \bullet
% \c@bottomnumber
% \c@chapter
% \c@dbltopnumber
% \c@equation
% \c@eval
% \c@footnote
% \c@mpfootnote
% \c@page
% \c@secnumdepth
% \c@section
% \c@tocdepth
% \c@topnumber
% \c@totalnumber
% \caption
% \catcode
% \catcoded
% \center
% \centering
% \chapter
% \chaptermark
% \char
% \chardef
% \circle
% \cite
% \cl@@ckpt
% \cleardoublepage
% \clearpage
% \cline
% \closeout
% \clubpenalty
% \columnsep
```

```
% \columnseprule
% \columnwidth
% \contentsline
% \copy
% \count
% \countdef
% \cr
% \crcr
% \csname
% \dag
% \dagger
% \dashbox
% \date
% \dblfigrule
% \dblfloatpagefraction
% \dblfloatsep
% \dbltexfloatsep
% \dbltextfloatsep
% \dbltopfraction
% \ddagger
% \deadcycles
% \def
% \description
% \dimen
% \dimen@
% \discretionary
% \displaymath
% \displaystyle
% \displaywidth
% \divide
% \do
% \document
% \documentstyle
% \dospecials
% \doublerulesep
% \dp
% \edef
% \egroup
% \else
% \end
% \end@dblfloat
% \end@float
% \endarray
% \endcsname
% \enddocument
% \endenumerate
% \endequation
% \endfigure
% \endgroup
% \enditemize
% \endlist
% \endpicture
% \endsloppypar
% \endtabbing
% \endtabular
% \endthebibliography
% \endtrivlist
% \enumerate
% \eqnarray
% \eqno
% \equation
% \errmessage
% \errorstopmode
% \eval
% \evensidemargin
% \everyjob
% \everypar
% \expandafter
% \extracolsep
% \fbox
% \fboxrule
% \fboxsep
% \fi
% \figure
```

```
% \fill
% \firstmark
% \float
% \floatingpenalty
% \floatpagefraction
% \floatsep
% \flushbottom
% \flushleft
% \flushright
% \fnsymbol
% \footins
% \footinsertskip
% \footnote
% \footnotemark
% \footnoterule
% \footnotesep
% \footnotesize
% \footnotetext
% \footsep
% \footskip
% \frac
% \frame
% \framebox
% \frenchspacing
% \fussy
% \futurelet
% \gdef
% \global
% \glossary
% \halfwidth
% \halign
% \hangindent
% \hbox
% \head
% \headheight
% \headsep
% \hfil
% \hfill
% \hfuzz
% \hline
% \hrule
% \hsize
% \hskip
% \hspace
% \hss
% \ht
% \Huge
% \huge
% \hyphenchar
% \if
% \if@afterindent
% \if@eqnsw
% \if@endpe
% \if@fcolmade
% \if@filesw
% \if@firstamp
% \if@firstcolumn
% \if@ignore
% \if@inlabel
% \if@insert
% \if@minipage
% \if@mparswitch
% \if@negarg
% \if@newlist
% \if@nmbrlist
% \if@nobreak
% \if@noitemarg
% \if@noparitem
% \if@noparlist
% \if@noskipsec
% \if@ovb
% \if@ovl
% \if@ovr
% \if@ovt
```

オマケ

```
% \if@pboxsw
% \if@reversemargin
% \if@rjfield
% \if@specialpage
% \if@tempswa
% \if@test
% \if@twocolumn
% \if@twoside
% \ifcase
% \ifdim
% \ifeof
% \ifhmode
% \ifinner
% \ifmmode
% \ifnum
% \ifodd
% \ifvmode
% \ifvoid
% \ifx
% \ignorespaces
% \immediate
% \include
% \includeonly
% \indent
% \index
% \indexentry
% \input
% \insc@unt
% \insert
% \interdisplaylinepenalty
% \interfootnotelinepenalty
% \interlinepenalty
% \intextsep
% \it
% \item
% \itemindent
% \itemize
% \itemsep
% \jobname
% \kern
% \kill
% \label
% \labelenumi
% \labelenumiv
% \labelitemi
% \labelitemii
% \labelitemiii
% \labelitemiv
% \labelsep
% \labelwidth
% \LARGE
% \Large
% \large
% \lastbox
% \lastskip
% \LaTeX
% \lbrace
% \leaders
% \leavevmode
% \lefteqn
% \leftmargin
% \leftmargini
% \leftmarginvi
% \leftmark
% \leftskip
% \let
% \limits
% \line
% \linebreak
% \lineskip
% \linethickness
% \linewidth
% \list
% \listoffigures
```

```
% \listoftables
% \listparindent
% \llap
% \long
% \lower
% \m@ne
% \m@th
% \makeatletter
% \makeatother
% \makebox
% \makeglossary
% \makeindex
% \makelabel
% \maketitle
% \marginpar
% \marginparpush
% \marginparsep
% \marginparwidth
% \mark
% \markboth
% \markright
% \math
% \mathchar
% \mathchardef
% \mathop
% \mathrel
% \maxdeadcycles
% \maxdepth
% \maxdimen
% \mb@b
% \mb@eval
% \mb@l
% \mb@r
% \mb@t
% \mbox
% \medskip
% \message
% \minipage
% \mit
% \mkern
% \moveright
% \mskip
% \multicolumn
% \multiply
% \multiput
% \multispan
% \newbox
% \newcommand
% \newcount
% \newcounter
% \newdimen
% \newenvironment
% \newif
% \newinsert
% \newlabel
% \newlength
% \newline
% \newlinechar
% \newpage
% \newsavebox
% \newskip
% \newswitch
% \newtheorem
% \newtoks
% \newwrite
% \noalign
% \nobreak
% \nocite
% \noexpand
% \nofiles
% \noindent
% \nointerlineskip
% \nolinebreak
% \nonumber
```

```
% \nopagebreak
% \normalbaselineskip
% \normallineskip
% \normalmarginpar
% \normalsize
% \nullfont
% \number
% \numberline
% \obeycr
% \obeylines
% \obeyspaces
% \oddsidemargin
% \of
% \on@line
% \onecolumn
% \openin
% \or
% \outer
% \output
% \outputpenalty
% \oval
% \over
% \overfullrule
% \overline
% \p@
% \pagebreak
% \pagelayout
% \pagenumbering
% \pageref
% \pagestyle
% \par
% \paragraph
% \parbox
% \parfillskip
% \parindent
% \parsep
% \parshape
% \parskip
% \partopsep
% \partsw
% \penalty
% \picture
% \poptab
% \poptabs
% \postdisplaypenalty
% \prevdepth
% \protect
% \ps@empty
% \ps@plain
% \pushtab
% \pushtabs
% \put
% \quotation
% \raggedbottom
% \raggedleft
% \raggedright
% \raise
% \raisebox
% \rbrace
% \read
% \ref
% \refstepcounter
% \relax
% \renewcommand
% \renewenvironment
% \reset@font
% \restorecr
% \reversemarginpar
% \right
% \rightmargin
% \rightmark
% \rightskip
% \rlap
% \rm
```

```
% \Roman
% \roman
% \romannumeral
% \root
% \rule
% \samepage
% \savebox
% \sbox
% \sc
% \scriptscriptsize
% \scriptsize
% \secdef
% \section
% \sectionmark
% \setbox
% \setcounter
% \setlength
% \settowidth
% \shipout
% \shortstack
% \showboxbreadth
% \showboxdepth
% \sixt@@n
% \skip
% \sl
% \SLiTeX
% \sloppy
% \sloppypar
% \small
% \smallskip
% \space
% \spacefactor
% \splitmaxdepth
% \splittopskip
% \sqrt
% \ss
% \stackrel
% \stepcounter
% \stop
% \stretch
% \string
% \strut
% \subsection
% \subsubsection
% \tabalign
% \tabbing
% \tabbingsep
% \tabcolsep
% \tableentry
% \tableofcontents
% \tabskip
% \tabular
% \tencirc
% \tencircw
% \tenln
% \tenlnw
% \textfloatsep
% \textfraction
% \textheight
% \textwidth
% \thanks
% \the
% \thebibliography
% \theenumi
% \theenumii
% \theequation
% \thefigure
% \thefootnote
% \thempfn
% \thempfootnote
% \thepage
% \thesection
% \thicklines
% \thinlines
```

```
% \thinspace
% \thispagestyle
% \tiny
% \title
% \today
% \tolerance
% \topfigrule
% \topfraction
% \topmargin
% \topnewpage
% \topnum
% \topsep
% \topskip
% \tracingonline
% \tracingoutput
% \tracingstats
% \trivlist
% \tt
% \tw@
% \twocolumn
% \typein
% \typeout
% \unbox
% \underline
% \unhbox
% \unitlength
% \unskip
% \unvbox
% \usebox
% \usecounter
% \vadjust
% \value
% \vbox
% \vcenter
% \vector
% \verb
% \verbatim
% \vfil
% \vfuzz
% \vline
% \vrule
% \vsize
% \vskip
% \vspace
% \vsplit
% \vss
% \vtop
% \wd
% \write
% \writes
% \xdef
% \z@
% \[
% \\
% \]
% \^
% \_
% \`
% \{
% \|
% \}
% \~



%      ****************************************
%      *        GENERAL CONVENTIONS           *
%      ****************************************
%
% THE \LaTeX AND \SLiTeX LOGOS ARE DEFINED HERE.
%
%% RmS 91/09/29: \reset@font added to \LaTeX logo.
\def\p@LaTeX{{\reset@font\rm L\kern-.36em\raise.3ex\hbox{\sc a}\kern-.15em%
```

```
1405     T\kern-.1667em\lower.7ex\hbox{E}\kern-.125emX}}
1406
1407 %% RmS 91/09/29: \SLiTeX logo added.
1408 \def\p@SLiTeX{{\reset@font\rm S\kern-.06em{\sc l\kern-.035emi}\kern-.06emT\kern
1409    -.1667em\lower.7ex\hbox{E}\kern-.125emX}}
1410
1411 %% RmS 91/10/17: \protect'ed the logos
1412 \def\LaTeX{\protect\p@LaTeX}
1413 \def\SLiTeX{\protect\p@SLiTeX}
1414
1415
1416 % SAVED VERSIONS OF TeX PRIMITIVES:
1417 %
1418 %  The TeX primitive \foo is saved as \@@foo . The following primitives
1419 %  are handled in this way:
1420
1421 \let\@@par=\par
1422 %\let\@@relax=\relax % This was needed at one time, but seems to be obsolete.
1423 \let\@@input=\input
1424 \let\@@end=\end
1425
1426 % The following was added 19 April 1986:
1427 % The \- command is redefined to allow it to work in the \tt type style,
1428 % where automatic hyphenation is suppressed by setting \hyphenchar to -1.
1429 % The original definition is saved as \@@hyph just in case anyone needs it.
1430
1431 \let\@@hyph=\-      % Original defin
1432 \def\-{\discretionary{-}{}{}}
1433
1434 % SAVED VERSIONS OF TeX PARAMETERS
1435 %
1436 %  \normalbaselineskip and \normallineskip hold the
1437 %  normal values of \baselineskip and \lineskip
1438
1439 % Any font-changing commands that change the normal value of \lineskip
1440 % and \baselineskip should change their saved values.
1441
1442 % The following definitions save token space. E.g., using \@height
1443 % instead of height saves 5 tokens at the cost in time of one macro
1444 % expansion.
1445
1446 \def\@height{height}
1447 \def\@depth{depth}
1448 \def\@width{width}
1449
1450 % The following implements the LaTeX \{ and \} commands.
1451 % Changed 21 Apr 87 to make them robust.
1452
1453 \def\{{\protect\@lb}
1454 \def\@lb{\relax\ifmmode\lbrace\else$\m@th\lbrace$\fi}
1455 \def\}{\protect\@rb}
1456 \def\@rb{\relax\ifmmode\rbrace\else$\m@th\rbrace$\fi}
1457
1458  \message{counters,}
1459 %      ***************************************
1460 %      *          COUNTERS, ETC.             *
1461 %      ***************************************
1462 %
1463 % THE FOLLOWING ARE FROM PLAIN:
1464 % \z@        : A zero dimen or number. It's more efficient to write
1465 %              \parindent\z@ than \parindent 0pt.
1466 % \@ne       : The number 1.
1467 % \m@ne      : The number -1.
1468 % \tw@       : The number 2.
1469 % \sixt@@n   : The number 16.
1470 % \@m        : The number 1000.
1471 % \@xxxii    : The number 32
1472 % \@M        : The number 10000.
1473 % \@Mi       : The number 10001.
1474 % \@Mii      : The number 10002.
1475 % \@Miii     : The number 10003.
1476 % \@Miv      : The number 10004.
1477 % \@MM       : The number 20000.
1478 %
```

```
% \@flushglue : Glue used for \right- & \leftskip to = 0pt plus 1fil

\chardef\@xxxii=32
\mathchardef\@Mi=10001
\mathchardef\@Mii=10002
\mathchardef\@Miii=10003
\mathchardef\@Miv=10004

% Redefine PLAIN.TEX macros not to be \outer

\def\newcount{\alloc@0\count\countdef\insc@unt}
\def\newdimen{\alloc@1\dimen\dimendef\insc@unt}
\def\newskip{\alloc@2\skip\skipdef\insc@unt}
\def\newbox{\alloc@4\box\chardef\insc@unt}
\def\newwrite{\alloc@7\write\chardef\sixt@@n}

\newwrite\@unused
\newcount\@tempcnta
\newcount\@tempcntb
\newif\if@tempswa\@tempswatrue

\newdimen\@tempdima
\newdimen\@tempdimb

\newbox\@tempboxa

\newskip\@flushglue \@flushglue = 0pt plus 1fil
\newskip\@tempskipa
\newskip\@tempskipb
\newtoks\@temptokena

 \message{hacks,}
%     ****************************************
%     *           USEFUL HACKS               *
%     ****************************************
%
%  \@namedef{NAME} : Expands to \def\NAME , except name can contain any
%                    characters.
%  \@nameuse{NAME} : Expands to \NAME .
%
%  \@ifnextchar X{YES}{NO}
%                  : Expands to YES if next character is an 'X',
%                    and to NO otherwise. (Uses temps a-c.)
%                    NOTE: GOBBLES ANY SPACE FOLLOWING IT.
%
%  \@ifstar{YES}{NO} : Gobbles following spaces and then tests if next the
%                    character is a '*'. If it is, then it gobbles the
%                    '*' and expands to YES, otherwise it expands to NO.
%
%  \@dblarg{CMD}{ARG} : \@dblarg{CMD}{ARG} expands to CMD[ARG]{ARG}. Use
%                       \@dblarg\CS when \CS takes arguments [ARG1]{ARG2},
%                       where default is ARG1 = ARG2.
%
%  \@ifundefined{NAME}{YES}{NO}
%                  : If \NAME is undefined then it executes YES,
%                    otherwise it executes NO. More precisely,
%                    true if \NAME either undefined or = \relax.
%  \@ifdefinable \NAME {YES}
%                  : Executes YES if the user is allowed to define \NAME,
%                    otherwise it gives an error. The user can define \NAME
%                    if \@ifundefined{NAME} is true, 'NAME' /= 'relax'
%                    and the first three letters of 'NAME' are not
%                    'end'.
%  \newcommand{\FOO}[i]{TEXT}
%                  : User command to define \FOO to be a macro with
%                    i arguments (i = 0 if missing) having the definition
%                    TEXT. Produces an error if \FOO already defined.
%
%  \renewcommand{\FOO}[i]{TEXT} : Same as \newcommand, except it
%                    checks if \FOO already defined.
%
%  \newenvironment{FOO}[i]{DEF1}{DEF2}
%         equivalent to
%         \newcommand{\FOO}[i]{DEF1} \def{\endFOO}{DEF2}
```

```
%
%  \renewenvironment : obvious companion to \newenvironment
%
%  \@cons : See description of \output routine.
%
%  \@car T1 T2 ... Tn\@nil == T1 (unexpanded)
%
%  \@cdr T1 T2 ... Tn\@nil == T2 ... Tn (unexpanded)
%
%  \typeout{message} : produces a warning message on the terminal
%
%  \@warning{message}: prints 'LaTeX Warning: message.'
%                      With TeX 3.x, it also prints line number.
%                      (Changed 24 Jun 91 RmS)
%  \@@warning{message}: like \@warning, except that it never prints
%                      the line number (added 24 Jun 91 RmS).
%
%  \typein{message} : Types message, asks the user to type in a command, then
%                      executes it
%
%  \typein[\CS]{MSG} : Same as above, except defines \CS to be the input
%                      instead of executing it.

%% RmS 92/03/18: changed input channel from 0 to \@inputcheck to avoid conflicts
%%              with other channels allocated by \newread
\newread\@inputcheck
\def\typein{\let\@typein\relax\@ifnextchar[{\@xtypein}{\@xtypein[\@typein]}}
\def\@xtypein[#1]#2{\typeout{#2}\read\@inputcheck to#1\ifx #1\@defpar \def#1{}\else
   \@iden{\expandafter\@strip\expandafter
   #1#1\@gobble\@gobble} \@gobble\fi\@typein}
\def\@strip#1#2 \@gobble{\def #1{#2}}
\def\@defpar{\par}
\def\@iden#1{#1}

\ifx\inputlineno\undefined
  \let\on@line\empty
\else
  \ifnum\inputlineno=\m@ne
    \let\on@line\empty
  \else
    \def\on@line{ on input line \the\inputlineno}
  \fi
\fi

\def\typeout#1{{\let\protect\string\immediate\write\@unused{#1}}}
\def\@@warning#1{\typeout{LaTeX Warning: #1.}}
\def\@warning#1{\@@warning{#1\on@line}}
\def\@namedef#1{\expandafter\def\csname #1\endcsname}
\def\@nameuse#1{\csname #1\endcsname}

\def\@cons#1#2{\begingroup\let\@elt\relax\xdef#1{#1\@elt #2}\endgroup}

\def\@car#1#2\@nil{#1}
\def\@cdr#1#2\@nil{#2}

% \@carcube T1 ... Tn\@nil = T1 T2 T3 , n > 3
\def\@carcube#1#2#3#4\@nil{#1#2#3}

\def\newcommand#1{\@ifnextchar [{\@argdef#1}{\@argdef#1[0]}}

\def\renewcommand#1{\edef\@tempa{\expandafter\@cdr\string
  #1\@nil}\@ifundefined{\@tempa}{\@latexerr{\string#1\space undefined}\@ehc
    }{}\@ifnextchar [{\@reargdef#1}{\@reargdef#1[0]}}

\def\newenvironment#1{\@ifnextchar
     [{\@newenv{#1}}{\@newenv{#1}[0]}}

\long\def\@newenv#1[#2]#3#4{\expandafter\newcommand
     \csname #1\endcsname[#2]{#3}\long
     \expandafter\def\csname end#1\endcsname{#4}}

\def\renewenvironment#1{\@ifnextchar
     [{\@renewenv{#1}}{\@renewenv{#1}[0]}}
```

```
\long\def\@renewenv#1[#2]#3#4{\expandafter\renewcommand
     \csname #1\endcsname[#2]{#3}\long
     \expandafter\def\csname end#1\endcsname{#4}}

\long\def\@argdef#1[#2]#3{\@ifdefinable #1{\@reargdef#1[#2]{#3}}}

% Absolutely untypable control sequence \@?@? substituted for \@tempb in
% definition of \@reargdef because it (and therefore \newcommand and
% \renewcommand) leaves the control sequence dangerously \let to #.
% (Change made 23 November 87.)
%
\catcode`\?=11\relax
\long\def\@reargdef#1[#2]#3{\@tempcnta#2\relax\let#1\relax
\edef\@tempa{\long\def#1}\@tempcntb \@ne
\let\@?@?\relax\@whilenum\@tempcnta>\z@
\do{\edef\@tempa{\@tempa\@?@?\the\@tempcntb}\advance\@tempcntb \@ne \advance
\@tempcnta \m@ne}\let\@?@?##\@tempa{#3}}
\catcode`\?=12\relax


% 9 Jan 90 : Missing % added to following definition.
\long\def\@ifdefinable #1#2{\edef\@tempa{\expandafter\@cdr\string #1\@nil}%
\@ifundefined{\@tempa}{\edef\@tempb{\expandafter\@carcube \@tempa xxxx\@nil}%
\ifx \@tempb\@qend \@notdefinable\else
\ifx \@tempa\@qrelax \@notdefinable\else #2\fi\fi}{\@notdefinable}}

\long\def\@ifundefined#1#2#3{\expandafter\ifx\csname
  #1\endcsname\relax#2\else#3\fi}


% The following define \@qend and \@qrelax to be the strings 'end' and
% 'relax' with the characters \catcoded 12.

\edef\@qend{\expandafter\@cdr\string\end\@nil}
\edef\@qrelax{\expandafter\@cdr\string\relax\@nil}

% \@ifnextchar X{YES}{NO}
%  BEGIN
%    \@tempe := X % uses \let
%    \@tempa := YES
%    \@tempb := NO
%    \futurelet\@tempc
%    \@ifnch
%  END
%
% \@ifnch ==
%   BEGIN
%     if  \@tempc = blank space
%       then  \@tempd := def(\@xifnch)
%       else  if  \@tempc = \@tempe
%                 then  \@tempd := def(\@tempa)
%                 else  \@tempd := def(\@tempb)
%             fi
%     fi
%     \@tempd
%   END
%
% \@xifnch ==
%  BEGIN
%    gobble blanks
%    \futurelet\@tempc
%    \@ifnch
%  END
%
\def\@ifnextchar#1#2#3{\let\@tempe #1\def\@tempa{#2}\def\@tempb{#3}\futurelet
    \@tempc\@ifnch}
\def\@ifnch{\ifx \@tempc \@sptoken \let\@tempd\@xifnch
      \else \ifx \@tempc \@tempe\let\@tempd\@tempa\else\let\@tempd\@tempb\fi
      \fi \@tempd}

% NOTE: the following hacking must precede the definition of \:
%  as math medium space.

\def\:{\let\@sptoken= } \: % this makes \@sptoken a space token
```

```
1701
1702 \def\:{\@xifnch} \expandafter\def\: {\futurelet\@tempc\@ifnch}
1703
1704 \def\@ifstar#1#2{\@ifnextchar *{\def\@tempa*{#1}\@tempa}{#2}}
1705
1706 \long\def\@dblarg#1{\@ifnextchar[{#1}{\@xdblarg{#1}}}
1707 \long\def\@xdblarg#1#2{#1[{#2}]{#2}}
1708
1709 % The command \@sanitize changes the catcode of all special characters
1710 % except for braces to 'other'. It can be used for commands like
1711 % \index that want to write their arguments verbatim. Needless to
1712 % say, this command should only be executed within a group, or chaos
1713 % will ensue.
1714
1715 \def\@sanitize{\@makeother\ \@makeother\\\@makeother\$\@makeother\&%
1716 \@makeother\#\@makeother\^\@makeother\_\@makeother\%\@makeother\~}
1717
1718
1719  \message{errors,}
1720 %      ***************************************
1721 %      *          ERROR HANDLING             *
1722 %      ***************************************
1723 %
1724 %  \@latexerr{MSG}{HLP}: Types a LaTeX error message MSG and gives an error
1725 %                        halt with error help message HLP.
1726 %
1727 \newlinechar`\^^J
1728
1729 % 19 Jun 86, took out the grouping. re: John Hobby
1730 \def\@latexerr#1#2{%
1731 \edef\@tempc{#2}\errhelp\expandafter{\@tempc}%
1732 \typeout{LaTeX error. \space See LaTeX manual for explanation.^^J
1733  \space\@spaces\@spaces\@spaces Type \space H <return> \space for
1734  immediate help.}\errmessage{#1}}
1735
1736 \def\@spaces{\space\space\space\space}
1737
1738 %% error help message pieces.
1739 \def\@eha{Your command was ignored.
1740 ^^JType \space I <command> <return> \space to replace it
1741   with another command,^^Jor \space <return> \space to continue without it.}
1742 \def\@ehb{You've lost some text. \space \@ehc}
1743 \def\@ehc{Try typing \space <return>
1744   \space to proceed.^^JIf that doesn't work, type \space X <return> \space to
1745   quit.}
1746 \def\@ehd{You're in trouble here. \space\@ehc}
1747
1748 % Here are all the error message-generating commands of LaTeX.
1749 %
1750 % \@notdefinable : Error message generated in \@ifdefinable from calls
1751 %                  by \newcommand, \newlength, \newtheorem specifying an
1752 %                  already-defined command name.
1753 %
1754 % \@nolnerr      : Generated by \newline and \\ when called in vertical mode.
1755 %
1756 % '\... undefined' : Generated in \renewcommand.
1757 %
1758 % \@nocnterr     : Generated by \setcounter, \addtocounter or \newcounter
1759 %                  for undefined counter.
1760 %
1761 % \@ctrerr       : Called when trying to print the value of a counter
1762 %                  numbered by letters that's greater than 26.
1763 %
1764 % 'Environment --- undefined' : Issued by \begin for undefined environment.
1765 %
1766 % \@badend       : Called by \end that doesn't match its \begin.
1767 %
1768 % \@badmath      : Called by \[, \], \( or \) when used in wrong mode.
1769 %
1770 % \@toodeep      : Called by a list environment nested more than six levels
1771 %                  deep, or an enumerate or itemize nested more than four
1772 %                  levels.
1773 %
1774 % \@badpoptabs : Called by \endtabbing when not enough \poptabs have
```

```
% occurred, or by \poptabs when too many have occurred.
%
% \@badtab : Called by \>, \+ , \- or \< when stepping to an undefined tab.
%
% 'tab overflow' : Occurs in \= when maximum number of tabs exceeded.
%
% '\< in mid line' : Occurs in \< when it appears in middle of line.
%
% \@preamerr : Occurs in array or tabular environment, or in \multicolumn
%              command, when error in argument detected.
%
% \@badlinearg : Occurs in \line and \vector command when a bad slope
%                argument is encountered.
%
% \@parmoderr : Occurs in a float environment or a \marginpar when
%               encountered in inner vertical mode.
%
% \@fltovf    : Occurs in float environment or \marginpar when there
%               are no more free boxes for storing floats.
%
% \@latexbug  :  Occurs in output routine. This is bad news.
%
% 'Float(s) lost' : In output routine, caused by a float environment or
%                   \marginpar occurring in inner vertical mode.
%
% \@nofonterror : Typeface not available. %%% OBSOLETE; DELETED.
%
% \@badcrerr    : A \\ used where it shouldn't be in a centering or flushing
%                 environment.
%
% \@noitemerr   : \addvspace or \addpenalty was called when not in vmode.
%                 Probably caused by a missing \item.
%
% \@notprerr    : A command that can be used only in the preamble
%                 appears after the \begin{document} command.

\def\@notdefinable{\@latexerr{Command name '\@tempa' already used}\@eha}

\def\@nolnerr{\@latexerr{There's no line here to end}\@eha}

\def\@nocnterr{\@latexerr{No such counter}\@eha}

\def\@ctrerr{\@latexerr{Counter too large}\@ehb}

\def\@nodocument{\@latexerr{Missing \string\begin{document}}\@ehd}

\def\@badend#1{\@latexerr{\string\begin{\@currenvir} ended by
      \string\end{#1}}\@eha}

\def\@badmath{\@latexerr{Bad math environment delimiter}\@eha}

\def\@toodeep{\@latexerr{Too deeply nested}\@ehd}

\def\@badpoptabs{\@latexerr{\string\pushtabs \space and \string\poptabs
    \space don't match}\@ehd}

\def\@badtab{\@latexerr{Undefined tab position}\@ehd}

\def\@preamerr#1{\@latexerr{\ifcase #1 Illegal character\or
     Missing @-exp\or Missing p-arg\fi\space
     in array arg}\@ehd}

\def\@badlinearg{\@latexerr{Bad \string\line\space or \string\vector
   \space argument}\@ehb}

\def\@parmoderr{\@latexerr{Not in outer par mode}\@ehb}

\def\@fltovf{\@latexerr{Too many unprocessed floats}\@ehb}

\def\@latexbug{\@latexerr{This may be a LaTeX bug}{Call for help}}

% \def\@nofonterror{\@latexerr{Typeface not available}\@eha}

\def\@badcrerr {\@latexerr{Bad use of \string\\}\@ehc}
```

```
1849
1850 \def\@noitemerr{\@latexerr{Something's wrong--perhaps a missing
1851 \string\item}\@ehc}
1852
1853 \def\@notprerr {\@latexerr{Can be used only in preamble}\@eha}
1854
1855  \message{par,}
1856 %       ****************************************
1857 %       *          \par AND \everypar          *
1858 %       ****************************************
1859 %
1860 % There are two situations in which \par may be changed:
1861 %
1862 %   - Long-term changes, in which the new value is to remain in effect
1863 %     until the current environment is left. The environments that
1864 %     change \par in this way are the following:
1865 %
1866 %         * All list environments (itemize, quote, etc.)
1867 %         * Environments that turn \par into a noop:
1868 %             tabbing, array and tabular.
1869 %
1870 %   - Temporary changes, in which \par is restored to its previous value the
1871 %     next time it is executed. The following are all such uses.
1872 %         * \end [when preceded by \@endparenv, which is called by
1873 %                \endtrivlist]
1874 %         * The mechanism for avoiding page breaks and getting the
1875 %           spacing right after section heads.
1876 %
1877 % To permit the proper interaction of these two situations, long-term
1878 % changes are made by the following command:
1879 %     \@setpar{VAL}     : To set \par. It \def's \par and \@par to VAL.
1880 % Short-term changes are made by the usual \def\par commands.
1881 % The original values are restored after a short-term change
1882 % by the \@restorepar commands.
1883 %
1884 % NOTE: \@@par always is defined to be the original TeX \par.
1885 %
1886 % \everypar is changed only for the short term. Whenever \everypar
1887 % is set non-null, it should restore itself to null when executed.
1888 % The following commands change \everypar in this way:
1889 %         * \item
1890 %         * \end [when preceded by \@endparenv, which is called by
1891 %                \endtrivlist]
1892 %         * \minipage
1893 %
1894 % WARNING: Commands that make short-term changes to \par and \everypar
1895 % must take account of the possibility that the new commands and the
1896 % ones that do the restoration may be executed inside a group. In
1897 % particular, \everypar is executed inside a group whenever a new paragraph
1898 % begins with a left brace. The \everypar command that restores its
1899 % definition should be local to the current group (in case the command
1900 % is inside a minipage used inside someplace where \everypar has been
1901 % redefined). Thus, if \everypar is redefined to do an \everypar{}
1902 % it could take several executions of \everypar before
1903 % the restoration 'holds'. This usually causes no problem. However, to
1904 % prevent the extra executions from doing harm, use a global switch
1905 % to keep anything harmful in the new \everypar from being done twice.
1906 %
1907 % WARNING: Commands that change \everypar should remember that \everypar
1908 % might be supposed to set the following switches false:
1909 %             @nobreak
1910 %             @minipage
1911 % they should do the setting if necessary.
1912
1913 \def\@par{\let\par\@@par\par}
1914
1915 \def\@setpar#1{\def\par{#1}\def\@par{#1}}
1916 \def\@restorepar{\def\par{\@par}}
1917
1918  \message{spacing,}
1919 %      *********************************************
1920 %      *     SPACING / LINE AND PAGE BREAKING      *
1921 %      *********************************************
1922 %
```

```
% USER COMMANDS:
% \nopagebreak[i] : i = 0,...,4. Default argument = 4. Puts a penalty
%                 into the vertical list output as follows:
%                   0 : penalty = 0
%                   1 : penalty = \@lowpenalty
%                   2 : penalty = \@medpenalty
%                   3 : penalty = \@highpenalty
%                   4 : penalty = 10000
% \pagebreak[i] : same as \nopagebreak except negatives of its penalty
% \linebreak[i], \nolinebreak[i] : analogs of the above
% \samepage : inhibits page breaking most places by setting the following
%             penalties to 10000
%                   \interlinepenalty
%                   \postdisplaypenalty
%                   \interdisplaylinepenalty
%                   \@beginparpenalty
%                   \@endparpenalty
%                   \@itempenalty
%                   \@secpenalty
%                   \interfootnotelinepenalty
%
% \obeycr   : defines <CR> == \\.
% \restorecr : restores <CR> to its usual meaning.
%
% \\        : initially defined to be \newline
% \\[LENGTH] : initially defined to be \vspace{LENGTH}\newline
%              Note: \\* adds a \vadjust{\penalty 10000}

\def\nopagebreak{\@ifnextchar[{\@nopgbk}{\@nopgbk[4]}}
\def\@nopgbk[#1]{\ifvmode \penalty \@getpen{#1}\else
\@bsphack\vadjust{\penalty \@getpen{#1}}\@esphack\fi}

\def\pagebreak{\@ifnextchar[{\@pgbk}{\@pgbk[4]}}
\def\@pgbk[#1]{\ifvmode \penalty -\@getpen{#1}\else
\@bsphack\vadjust{\penalty -\@getpen{#1}}\@esphack\fi}

\def\nolinebreak{\@ifnextchar[{\@nolnbk}{\@nolnbk[4]}}
\def\@nolnbk[#1]{\ifvmode \@nolnerr\else \@tempskipa\lastskip
    \unskip \penalty \@getpen{#1}\ifdim \@tempskipa >\z@
    \hskip\@tempskipa\ignorespaces\fi\fi}

\def\linebreak{\@ifnextchar[{\@lnbk}{\@lnbk[4]}}
\def\@lnbk[#1]{\ifvmode \@nolnerr\else
    \unskip\penalty -\@getpen{#1}\fi}

\def\samepage{\interlinepenalty\@M
   \postdisplaypenalty\@M
   \interdisplaylinepenalty\@M
   \@beginparpenalty\@M
   \@endparpenalty\@M
   \@itempenalty\@M
   \@secpenalty\@M
   \interfootnotelinepenalty\@M}

% \nobreak added to \newline to prevent null lines when \newline
% ends an overfull line. Change made 24 May 89 as suggested by
% Frank Mittelbach and Rainer Sch\"opf
%
\def\newline{\ifvmode \@nolnerr \else \unskip\nobreak\hfil
  \penalty -\@M\fi}


\def\@normalcr{\@ifstar{\vadjust{\penalty\@M}\@xnewline}{\@xnewline}}

\def\@xnewline{\@ifnextchar[{\@newline}{\newline}}

\def\@newline[#1]{\ifhmode\unskip\fi\vspace{#1}\newline}

\let\\=\@normalcr

\def\@getpen#1{\ifcase #1 0 \or \@lowpenalty\or
        \@medpenalty \or \@highpenalty
        \else \@M \fi}
```

```
% @nobreak : Switch used to avoid page breaks caused by \label after a section
%           heading, etc. It should be GLOBALLY set true after the \nobreak
%           and GLOBALLY set false by the next invocation of \everypar.
%           Commands that reset \everypar should globally set it false
%           if appropriate.
%
\newif\if@nobreak \@nobreakfalse

% \@bsphack ... \@esphack
%    used by macros such as \index and \begin{@float} ... \end{@float}
%    that want to be invisible -- i.e.,
%    not leave any extra space when used in the middle of text. Such
%    a macro should begin with \@bsphack and end with \@esphack
%    The macro in question should not create any text, nor change the
%    mode.
%
% \@Esphack is a variant of \@esphack that sets the @ignore switch to true
%    (as \@esphack used to do previously). This is currently used only
%    for float and similar environments.
%
% \@bsphack ==
% BEGIN
%  if not mmode then             %% Test for math mode added 18 Dec 89
%       \dimen\@savsk := \lastskip
%     if  hmode  then  \@savsf := \spacefactor fi
%  fi
% END
%
% \@esphack ==
% BEGIN
%  if not mmode then             %% Test for math mode added 18 Dec 89
%   if  hmode
%     then  \spacefactor := \@savsf
%           if \dimen\@savsk > 0pt then \ignorespaces fi
%   fi
%  fi
% END
%
% \@Esphack ==
% BEGIN
%  if not mmode then
%   if  hmode
%     then  \spacefactor := \@savsf
%           if \dimen\@savsk > 0pt then \ignorespaces
%                                       \global\@ignoretrue fi
%   fi
%  fi
% END
%

\newdimen\@savsk
\newcount\@savsf

\def\@bsphack{\relax\ifmmode\else\@savsk\lastskip
    \ifhmode\@savsf\spacefactor\fi\fi}

\def\@esphack{\relax\ifmmode\else\ifhmode\spacefactor\@savsf
     {}\ifdim \@savsk >\z@ \ignorespaces
  \fi \fi\fi}

\def\@Esphack{\relax\ifmmode\else\ifhmode\spacefactor\@savsf
     {}\ifdim \@savsk >\z@ \global\@ignoretrue \ignorespaces
  \fi \fi\fi}

% VERTICAL SPACING:
%
% LaTeX supports the PLAIN TeX commands \smallskip, \medskip and \bigskip.
% However, it redefines them using \vspace instead of \vskip.
%
% Extra vertical space is added by the command command \addvspace{SKIP},
% which adds a vertical skip of SKIP to the document. The sequence
%        \addvspace{S1} \addvspace{S2}
% is equivalent to
%        \addvspace{maximum of S1, S2}.
```

```
% \addvspace should be used only in vertical mode, and gives an error if it's
% not.  The \addvspace command does NOT add vertical space if
% @minipage = T.  The minipage environment uses this to inhibit
% the addition of extra vertical space at the beginning.
%
% Penalties are put into the vertical list with the \addpenalty{PENALTY}
% command.  It works properly when \addpenalty and \addvspace commands
% are mixed.
%
% The @nobreak switch is set true used when in vertical mode and no page
% break should occur.  (Right now, it is used only by the section heading
% commands to inhibit page breaking after a heading.)
%
%
% \addvspace{SKIP} ==
%  BEGIN
%   if vmode
%     then if @minipage
%            else if \lastskip =0
%                   then \vskip SKIP
%                   else if \lastskip < SKIP
%                           then \vskip -\lastskip
%                                \vskip SKIP
%                           else if SKIP < 0 and \lastskip >= 0
%                                  then \vskip -\lastskip
%                                       \vskip \lastskip + SKIP
%          fi     fi      fi     fi
%     else 'missing \item' error.
%   fi
%  END

\def\addvspace#1{\ifvmode
     \if@minipage\else
          \ifdim \lastskip =\z@ \vskip #1\relax
            \else \@tempskipb#1\relax\@xaddvskip
     \fi\fi
  \else\@noitemerr\fi}

\def\@xaddvskip{\ifdim \lastskip <\@tempskipb\vskip-\lastskip\vskip
            \@tempskipb
       \else \ifdim \@tempskipb<\z@
                \ifdim \lastskip <\z@
                   \else \advance\@tempskipb\lastskip
                         \vskip -\lastskip \vskip \@tempskipb
      \fi\fi\fi}

\def\addpenalty#1{\ifvmode
   \if@minipage\else\if@nobreak\else
      \ifdim\lastskip=\z@ \penalty#1\relax
         \else \@tempskipb\lastskip
               \vskip -\lastskip \penalty#1\vskip\@tempskipb
      \fi\fi\fi
   \else\@noitemerr\fi}

\def\vspace{\@ifstar{\@vspacer}{\@vspace}}
\def\@vspace#1{\ifvmode
    \dimen@\prevdepth \vskip #1\vskip\z@ \prevdepth\dimen@
       \else
        \@bsphack\vadjust{\dimen@\prevdepth
           \vskip #1\vskip\z@ \prevdepth\dimen@}\@esphack\fi}
\def\@vspacer#1{\ifvmode \dimen@\prevdepth
         \hrule \@height\z@ \nobreak \vskip #1\vskip\z@
           \prevdepth\dimen@
        \else
         \@bsphack\vadjust{\dimen@\prevdepth \hrule \@height\z@ \nobreak
           \vskip #1\vskip\z@ \prevdepth\dimen@}\@esphack\fi}

\def\smallskip{\vspace\smallskipamount}
\def\medskip{\vspace\medskipamount}
\def\bigskip{\vspace\bigskipamount}


% See list environment for explanation of the following macros.

```

```
\def\endtrivlist{\if@newlist\@noitemerr\fi
   \if@inlabel\indent\fi
   \ifhmode\unskip \par\fi
   \if@noparlist \else
      \ifdim\lastskip >\z@ \@tempskipa\lastskip \vskip -\lastskip
         \advance\@tempskipa\parskip \advance\@tempskipa -\@outerparskip
         \vskip\@tempskipa
   \fi\@endparenv\fi}

% CHANGES TO \@endparenv:
% Changed \hskip -\parindent to \setbox0=\lastbox so a \noindent
% becomes a no-op when used before a line immediately following a
% list environment. (Changed 23 Oct 86)
%
% To suppress the paragraph indentation in text immediately following
% a paragraph-making environment, \everypar is changed to remove the
% space, and \par is redefined to restore \everypar. Instead of redefining
% \par and \everpar, \@endparenv was changed to set the @endpe switch,
% letting \end redefine \par and \everypar. This allows paragraph-
% making environments work right when called by other environments.
% (Changed 27 Oct 86)

\def\@endparenv{\addpenalty\@endparpenalty\addvspace\@topsepadd\@endpetrue}

\def\@doendpe{\@endpetrue
    \def\par{\@restorepar\everypar{}\par\@endpefalse}\everypar
             {\setbox\z@\lastbox\everypar{}\@endpefalse}}

\newif\if@endpe
\@endpefalse

% HORIZONTAL SPACE
%
% \, : used in paragraph mode produces a \thinspace. It has the ordinary
%      definition in math mode. Useful for quotes inside quotes, as in
%      ``\,`Foo', he said.''
%
% \@ : placed before a '.', makes it a sentence-ending period. Does the
%     right thing for other punctuation marks as well. Does this by
%     setting spacefactor to 1000.

\def\,{\protect\pcomma}
\def\pcomma{\relax\ifmmode\mskip\thinmuskip\else\thinspace\fi}


\def\@{\spacefactor\@m}

\def\hspace{\protect\phspace}
\def\phspace{\@ifstar{\@hspacer}{\@hspace}}
\def\@hspace#1{\leavevmode\hskip #1\relax}

\def\@hspacer#1{\leavevmode\vrule \@width\z@\nobreak
               \hskip #1\hskip \z@skip}
                    %% extra \hskip Opt added 12/17/85 to guard
                    %% against a following \unskip
                    %% \relax added 13 Oct 88 for usual TeX lossage
                    %% replaced both changes by \hskip\z@skip 27 Nov 91

% define \fill to = Opt plus 1fill
\newskip\fill \fill = 0pt plus 1fill

% \stretch{N} == Opt plus N fill
\def\stretch#1{\z@ plus #1fill\relax}

{\catcode`\^^M=13 \gdef\obeycr{\catcode`\^^M=13 \def^^M{\\}\@gobblecr}%
\gdef\restorecr{\catcode`\^^M=5 }} %} BRACE MATCHING


 \message{control,}
%      ********************************************
%      *     PROGRAM CONTROL STRUCTURE MACROS     *
%      ********************************************
%
% \@whilenum TEST \do {BODY}
```

```
% \@whiledim TEST \do {BODY} : These implement the loop
%          while TEST do BODY od
%    where TEST is a TeX \ifnum or \ifdim test, respectively.
%    They are optimized for the normal case of TEST initially false.
%
% \@whilesw SWITCH \fi {BODY} : Implements the loop
%             while SWITCH do BODY od
%    where SWITCH is a command defined by \newswitch.
%    Optimized for normal case of SWITCH initially false.
%
% \@for NAME := LIST \do {BODY} : Assumes that LIST expands to A1,A2, ... ,An .
%     Executes BODY n  times, with NAME = Ai on the i-th iteration.
%     Optimized for the normal case of n = 1. Works for n=0.
%
% \@tfor NAME := LIST \do {BODY}
%     if, before expansion, LIST = T1 ... Tn where each Ti is a
%     token or {...}, then executes BODY n times, with NAME = Ti
%     on the i-th iteration. Works for n=0.
%
% NOTES: 1. These macros use no \@temp sequences.
%        2. These macros do not work if the body contains anything that looks
%           syntactically to TeX like an improperly balanced \if \else \fi.
%
% \@whilenum TEST \do {BODY} ==
% BEGIN
%   if  TEST
%     then  BODY
%           \@iwhilenum{TEST \relax BODY}
% END
%
% \@iwhilenum {TEST BODY} ==
% BEGIN
%   if  TEST
%     then  BODY
%           \@nextwhile = def(\@iwhilenum)
%     else  \@nextwhile = def(\@whilenoop)
%   fi
%   \@nextwhile {TEST BODY}
% END
%
% \@whilesw SWITCH \fi {BODY} ==
% BEGIN
%   if SWITCH
%     then BODY
%          \@iwhilesw {SWITCH BODY}\fi
%   fi
% END
%
% \@iwhilesw {SWITCH BODY} \fi ==
% BEGIN
%   if SWITCH
%     then BODY
%          \@nextwhile = def(\@iwhilesw)
%     else \@nextwhile = def(\@whileswnoop)
%   fi
%   \@nextwhile {SWITCH BODY} \fi
% END

\def\@whilenoop#1{}
\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@iwhilenum{#1\relax
    #2\relax}\fi}
\def\@iwhilenum#1{\ifnum #1\let\@nextwhile\@iwhilenum
        \else\let\@nextwhile\@whilenoop\fi\@nextwhile{#1}}

\def\@whiledim#1\do #2{\ifdim #1\relax#2\@iwhiledim{#1\relax#2}\fi}
\def\@iwhiledim#1{\ifdim #1\let\@nextwhile\@iwhiledim
       \else\let\@nextwhile\@whilenoop\fi\@nextwhile{#1}}

\long\def\@whileswnoop#1\fi{}
\long\def\@whilesw#1\fi#2{#1#2\@iwhilesw{#1#2}\fi\fi}
\long\def\@iwhilesw#1\fi{#1\let\@nextwhile\@iwhilesw
        \else\let\@nextwhile\@whileswnoop\fi\@nextwhile{#1}\fi}

% \@for NAME := LIST \do {BODY} ==
```

```
%    BEGIN \@forloop expand(LIST),\@nil,\@nil \@@ NAME {BODY} END
%
% \@forloop CAR, CARCDR, CDRCDR \@@ NAME {BODY} ==
%   BEGIN
%     NAME = CAR
%     if def(NAME) = def(\@nnil)
%       else BODY;
%            NAME = CARCDR
%            if def(NAME) = def(\@nnil)
%              else BODY
%                   \@iforloop CDRCDR \@@ NAME \do {BODY}
%            fi
%     fi
%   END
%
% \@iforloop CAR, CDR \@@ NAME {BODY} =
%     NAME = CAR
%     if def(NAME) = def(\@nnil)
%        then \@nextwhile = def(\@fornoop)
%        else BODY ;
%             \@nextwhile = def(\@iforloop)
%     fi
%     \@nextwhile name cdr {body}
%
% \@tfor NAME := LIST \do {BODY}
%    =  \@tforloop LIST \@nil \@@ NAME {BODY}
%
% \@tforloop car cdr \@@ name {body} =
%     name = car
%     if def(name) = def(\@nnil)
%        then \@nextwhile == \@fornoop
%        else body ;
%             \@nextwhile == \@forloop
%     fi
%     \@nextwhile name cdr {body}
%

\def\@nnil{\@nil}
\def\@empty{}
\def\@fornoop#1\@@#2#3{}

\def\@for#1:=#2\do#3{\edef\@fortmp{#2}\ifx\@fortmp\@empty \else
    \expandafter\@forloop#2,\@nil,\@nil\@@#1{#3}\fi}

\def\@forloop#1,#2,#3\@@#4#5{\def#4{#1}\ifx #4\@nnil \else
       #5\def#4{#2}\ifx #4\@nnil \else#5\@iforloop #3\@@#4{#5}\fi\fi}

\def\@iforloop#1,#2\@@#3#4{\def#3{#1}\ifx #3\@nnil
       \let\@nextwhile\@fornoop \else
      #4\relax\let\@nextwhile\@iforloop\fi\@nextwhile#2\@@#3{#4}}

%%RmS 91/10/17: Corrected bug in \@tfor: \xdef replaced by \def
%% (See FMi's array.doc)
\def\@tfor#1:=#2\do#3{\def\@fortmp{#2}\ifx\@fortmp\@empty \else
    \@tforloop#2\@nil\@nil\@@#1{#3}\fi}
\def\@tforloop#1#2\@@#3#4{\def#3{#1}\ifx #3\@nnil
       \let\@nextwhile\@fornoop \else
      #4\relax\let\@nextwhile\@tforloop\fi\@nextwhile#2\@@#3{#4}}


 \message{files,}
%     ****************************************
%     *          FILE HANDLING               *
%     ****************************************
%
% THE FOLLOWING USER COMMANDS ARE DEFINED IN THIS PART:
%  \document          : Reads in the .AUX files and \catcode's @ to 12.
%  \nofiles           : Suppresses all file output by setting \@filesw false.
%  \includeonly{NAME1, ... ,NAMEn}
%                   : Causes only parts NAME1, ... ,NAMEn to be read by
%                     their \include commands. Works by setting \@partsw true
%                     and setting \@partlist to NAME1, ... ,NAMEn.
%  \include{NAME}   : Does an \input NAME unless \partsw is true and
%                     NAME is not in \@partlist. If \@filesw is true, then
```

```
%                    it directs .AUX output to NAME.AUX, including a
%                    checkpoint at the end.
% \input{NAME}     : The same as TeX's \input, except it allows optional
%                    braces around the file name.
%
% VARIABLES, SWITCHES AND INTERNAL COMMANDS:
%   \@mainaux   : Output file number for main .AUX file.
%   \@partaux   : Output file number for current part's .AUX file.
%   \@auxout    : Either \@mainout or \@partout, depending on which .AUX
%                 file output goes to.
%   \@input{foo} : If file foo exists, then \input's it, otherwise types
%                 a warning message.
%   @filesw      : Switch -- set false if no .AUX, .TOC, .IDX etc files are
%                 to be
%   @partsw     : Set true by a \includeonly command.
%   \@partlist  : Set to the argument of the \includeonly command.
%
%   \cp@FOO     : The checkpoint for \include'd file FOO.TEX, written
%                 by \@writeckpt at the end of file FOO.AUX
%
% \document ==
%  BEGIN
%    \endgroup  % cancels \begingroup generated by \begin command
%    \@colht := \@colroom := \vsize := \textheight
%    \columnwidth := \textwidth
%    \@clubpenalty := \clubpenalty      % \@clubpenalty saves value.
%    IF @twocolumn = T
%      THEN \columnwidth := (\columnwidth - \columnsep)/2
%           @firstcolumn := T
%    FI
%    \hsize := \linewidth := \columnwidth
%    \begingroup
%       \@floatplacement \@dblfloatplacement
%       \@input{\jobname.aux}
%    \endgroup
%    IF \@filesw = T
%      THEN  open file \@mainaux for writing
%            write ``\relax''on file \@mainaux
%    FI
%    \do{COMMAND} == BEGIN \let COMMAND = \@notprerr END
%    \@preamblecmds
%    \do == \noexpand
%    \@normalsize
%    \everypar{}
%    @noskipsec := F
%  END
%
% \includeonly{FILELIST} ==
%  BEGIN
%   \@partsw  := T
%   \@partlist := FILELIST
%  END
%
% \include{FILE} ==
%  BEGIN
%   \clearpage
%   if \@filesw = T
%     then  \immediate\write\@mainaux{\string\@input{FILE.AUX}}
%   fi
%   if  \@partsw = T
%     then \@tempswa := F
%          \@tempb == FILE
%          for \@tempa := \@partlist
%              do if eval(\@tempa) = eval(\@tempb)
%                   then \@tempswa := T       fi
%              od
%   fi
%
%   if \@tempswa = T
%      then \@auxout := \@partaux
%           if \@filesw = T
%             then  \immediate\openout\@partaux{FILE.AUX}
%                   \immediate\write\@partaux{\relax}
%           fi
```

```
%          \@input{FILE.TEX}
%          \clearpage
%          \@writeckpt{FILE}
%          if @filesw then \closeout \@partaux fi
%          \@auxout := \@mainaux
%      else \cp@FILE
%   fi
%  END
%
% \@writeckpt{FILE} ==
%  BEGIN
%    if \@filesw = T
%       \immediate\write on file \@partaux:
%                \gdef\cp@FILE{               %% }
%       for \@tempa := \cl@@ckpt
%          do  \immediate\write on file \@partaux:
%                 \global\string\setcounter
%                    {eval(\@tempa)}{eval(\c@eval(\@tempa))}
%          od                                 %% {
%       \immediate\write on file \@partaux: }
%    fi
%  END
%
%  INITIALIZATION
%    \@tempswa := T

\newif\if@filesw \@fileswtrue
\newif\if@partsw \@partswfalse
\newwrite\@mainaux
\newwrite\@partaux

\newcount\@clubpenalty

%% FMi & RmS 91/08/26 set @noskipsec switch to true in the preamble
%% and to false by \begin{document} to catch lists in the preamble,
%% i.e., to produce a ``nodocument'' error when things like
%% \maketitle appear before \begin{document}.
%
% \@noskipsectrue %% set below where switch is defined

% 91/03/26 FMi: |\process@table| added to support NFSS.
% This will also work with old lfonts if no other style defines
% |\process@table|.
%
\def\document{\endgroup
  \@colht\textheight \@colroom\textheight \vsize\textheight
   \columnwidth\textwidth \@clubpenalty\clubpenalty
   \if@twocolumn \advance\columnwidth -\columnsep
      \divide\columnwidth\tw@ \hsize\columnwidth \@firstcolumntrue
   \fi
  \hsize\columnwidth \linewidth\hsize
  \begingroup\@floatplacement\@dblfloatplacement
   \makeatletter\let\@writefile\@gobbletwo
   \@input{\jobname.aux}\endgroup
  \if@filesw \immediate\openout\@mainaux=\jobname.aux
    \immediate\write\@mainaux{\relax}\fi
  \csname process@table\endcsname
  \let\glb@currsize\@empty %% Force \baselineskip initialisation.
  \def\do##1{\let ##1\@notprerr}%
  \@preamblecmds
  \let\do\noexpand
  \@normalsize\everypar{}\@noskipsecfalse}

\def\@gobbletwo#1#2{}

\def\nofiles{\@fileswfalse \typeout
   {No auxiliary output files.}\typeout{}}

%% RmS 92/03/18: changed input channel from 1 to \@inputcheck to avoid
%%               conflicts with other channels allocated by \newread
\def\@input#1{\openin\@inputcheck #1 \ifeof\@inputcheck \typeout
  {No file #1.}\else\closein\@inputcheck \relax\@@input #1 \fi}
\let\@auxout=\@mainaux

```

```
\def\includeonly#1{\@partswtrue\edef\@partlist{#1}}

% In the definition of \include, \def\@tempb changed to \edef\@tempb to
% be consistent with the \edef in \includeonly. (Suggested by Rainer
% Sch\"opf & Frank Mittelbach. Change made 20 Jul 88.)
%
% Changed definition of \include to allow space at end of file name--
% otherwise, typing \include{foo } would cause LaTeX to overwrite
% foo.tex. Change made 24 May 89, suggested by Rainer Sch\"opf and
% Frank Mittelbach

\def\include#1{\@include#1 }
\def\@include#1 {\clearpage
\if@filesw \immediate\write\@mainaux{\string\@input{#1.aux}}\fi
\@tempswatrue\if@partsw \@tempswafalse\edef\@tempb{#1}\@for
\@tempa:=\@partlist\do{\ifx\@tempa\@tempb\@tempswatrue\fi}\fi
\if@tempswa \if@filesw \let\@auxout\@partaux
\immediate\openout\@partaux #1.aux
\immediate\write\@partaux{\relax}\fi\@input{#1.tex}\clearpage
\@writeckpt{#1}\if@filesw \immediate\closeout\@partaux \fi
\let\@auxout\@mainaux\else\@nameuse{cp@#1}\fi}

\def\@writeckpt#1{\if@filesw
\immediate\write\@partaux{\string\global\string\@namedef{cp@#1}\@charlb}%
{\let\@elt\@wckptelt \cl@@ckpt}\immediate\write\@partaux{\@charrb}\fi}

\def\@wckptelt#1{\immediate\write\@partaux
{\string\setcounter{#1}{\the\@nameuse{c@#1}}}}

\def\input{\@ifnextchar \bgroup{\@iinput}{\@@input }}
\def\@iinput#1{\@@input #1 }

% The following defines \@charlb and \@charrb to be { and }, respectively
% with \catcode 11.
{\catcode`[=1 \catcode`]=2
\catcode`{=11 \catcode`}=11
\gdef\@charlb[{]
\gdef\@charrb[}]
]% }brace matching


 \message{env. counters,}
%         ****************************************
%         *     ENVIRONMENT COUNTER MACROS     *
%         ****************************************
%
%  An environment foo has an associated counter defined by the
%  following control sequences:
%    \c@foo :  Contains the counter's numerical value. It is defined by
%                  \newcount\foocounter.
%    \thefoo : Macro that expands to the printed value of \foocounter.
%              For example, if sections are numbered within chapters,
%              and section headings look like
%                  Section II-3. The Nature of Counters
%              then \thesection might be defined by:
%                 \def\thesection{\@Roman{\c@chapter}-\@arabic{\c@section}}
%
%    \p@foo : Macro that expands to a printed 'reference prefix' of
%              counter foo. Any \ref to a value created by counter
%              foo will produce the expansion of \p@foo\thefoo when the
%              the \label command is executed.
%
% NOTE: \thefoo and \p@foo MUST BE DEFINED IN SUCH A WAY THAT
% \edef\bar{\thefoo} OR \edef\bar{\p@foo}
% DEFINES \bar SO THAT IT WILL EVALUATE TO THE COUNTER VALUE AT THE TIME
% OF THE \edef, EVEN AFTER \foocounter AND ANY OTHER COUNTERS HAVE BEEN
% CHANGED. THIS WILL HAPPEN IF YOU USE THE STANDARD COMMANDS \@arabic,
% \@Roman, ETC.
%
%    \cl@foo : List of counters to be reset when foo stepped. Has format
%              \@elt{countera}\@elt{counterb}\@elt{counterc}.
%
%  The following commands are used to define and modify counters.
%    \setcounter{FOO}{VAL} : Globally sets \foocounter equal to VAL.
```

```
2589 %    \addtocounter{FOO}{VAL}: Globally increments \foocounter by VAL.
2590 %    \newcounter{NEWCTR}[OLDCTR] : Defines NEWCTR to be a counter, which is
2591 %                          reset when counter OLDCTR is stepped. If
2592 %                          NEWCTR already defined produces 'c@NEWCTR
2593 %                          already defined' error.
2594 %    \value{CTR}         : produces the value of counter CTR, for use with
2595 %                          a \setcounter or \addtocounter command.
2596 %    \stepcounter{FOO}   : Globally increments counter \c@FOO
2597 %                          and resets all subsidiary counters.
2598 %    \refstepcounter{FOO} : Same a \stepcounter, but it also defines
2599 %                          \@currentreference so that a subsequent
2600 %                          \label{bar} command causes \ref{bar} to
2601 %                          generate the current value of counter foo.
2602 %    \@definecounter{FOO} : Initializes counter FOO (with empty reset list),
2603 %                          defines \p@FOO and \theFOO to be null.
2604 %                          Also adds FOO to \cl@@ckpt -- the reset
2605 %                          list of a dummy counter @ckpt used for
2606 %                          taking checkpoints.
2607 %    \@addtoreset{FOO}{BAR} : Adds counter FOO to the list of counters
2608 %                          \cl@BAR to be reset when counter bar is stepped.
2609 %
2610 %   NUMBERING MACROS:
2611 %     \arabic{COUNTER} : Representation of COUNTER as arabic numerals.
2612 %                        Changed 29 Apr 86 to make it print the obvious thing
2613 %                        it COUNTER not positive.
2614 %
2615 %     \roman{COUNTER} : Representation of COUNTER as lower-case
2616 %                          Roman numerals.
2617 %     \Roman{COUNTER} : Representation of COUNTER as upper-case
2618 %                          Roman numerals.
2619 %     \alph{COUNTER}  : Representation of COUNTER as a lower-case
2620 %                          letter: 1 = a, 2 = b, etc.
2621 %     \Alph{COUNTER}  : Representation of COUNTER as an upper-case
2622 %                          letter: 1 = A, 2 = B, etc.
2623 %     \fnsymbol{COUNTER} : Representation of COUNTER as a footnote
2624 %                          symbol: 1 = *, 2 = \dagger, etc. Can be
2625 %                          used only in math mode.
2626 %
2627 %  THE ABOVE ARE IMPLEMENTED IN TERMS OF THE FOLLOWING:
2628 %     \@arabic\FOOcounter : Representation of \FOOcounter as arabic numerals.
2629 %     \@roman\FOOcounter : Representation of \FOOcounter as lower-case
2630 %                          Roman numerals.
2631 %     \@Roman\FOOcounter : Representation of \FOOcounter as upper-case
2632 %                          Roman numerals.
2633 %     \@alph\FOOcounter : Representation of \FOOcounter as a lower-case
2634 %                          letter: 1 = a, 2 = b, etc.
2635 %     \@Alph\FOOcounter : Representation of \FOOcounter as an upper-case
2636 %                          letter: 1 = A, 2 = B, etc.
2637 %     \@fnsymbol\FOOcounter : Representation of \FOOcounter as a footnote
2638 %                            symbol. Can be used only in math mode.
2639
2640 \def\setcounter#1#2{\@ifundefined{c@#1}{\@nocnterr}%
2641 {\global\csname c@#1\endcsname#2\relax}}
2642
2643 \def\addtocounter#1#2{\@ifundefined{c@#1}{\@nocnterr}%
2644 {\global\advance\csname c@#1\endcsname #2\relax}}
2645
2646 \def\newcounter#1{\expandafter\@ifdefinable \csname c@#1\endcsname
2647     {\@definecounter{#1}}\@ifnextchar[{\@newctr{#1}}{}}
2648
2649 \def\value#1{\csname c@#1\endcsname}
2650
2651 \def\@newctr#1[#2]{\@ifundefined{c@#2}{\@nocnterr}{\@addtoreset{#1}{#2}}}
2652
2653 \def\stepcounter#1{\global\advance\csname c@#1\endcsname \@ne
2654     {\let\@elt\@stpelt \csname cl@#1\endcsname}}
2655
2656 \def\@stpelt#1{\global\csname c@#1\endcsname \z@}
2657
2658 \def\cl@@ckpt{\@elt{page}}
2659
2660 \def\@definecounter#1{\expandafter\newcount\csname c@#1\endcsname
2661      \setcounter{#1}0 \expandafter\gdef\csname cl@#1\endcsname{}\@addtoreset
2662      {#1}{@ckpt}\expandafter\gdef\csname p@#1\endcsname{}\expandafter
```

```
2663      \gdef\csname the#1\endcsname{\arabic{#1}}}
2664
2665 \def\@addtoreset#1#2{\expandafter\@cons\csname cl@#2\endcsname {{#1}}}
2666
2667 % Numbering commands for definitions of \theCOUNTER and \list arguments.
2668 % \fnsymbol produces the standard footnoting symbols: asterisk, dagger, etc.
2669 % They can be used only in math mode.
2670
2671 \def\arabic#1{\@arabic{\@nameuse{c@#1}}}
2672 \def\roman#1{\@roman{\@nameuse{c@#1}}}
2673 \def\Roman#1{\@Roman{\@nameuse{c@#1}}}
2674 \def\alph#1{\@alph{\@nameuse{c@#1}}}
2675 \def\Alph#1{\@Alph{\@nameuse{c@#1}}}
2676 \def\fnsymbol#1{\@fnsymbol{\@nameuse{c@#1}}}
2677
2678 \def\@arabic#1{\number #1} %% changed 29 Apr 86
2679 \def\@roman#1{\romannumeral #1}
2680 \def\@Roman#1{\expandafter\uppercase\expandafter{\romannumeral #1}}
2681 \def\@alph#1{\ifcase#1\or a\or b\or c\or d\else\@ialph{#1}\fi}
2682 \def\@ialph#1{\ifcase#1\or \or \or \or \or e\or f\or g\or h\or i\or j\or
2683    k\or l\or m\or n\or o\or p\or q\or r\or s\or t\or u\or v\or w\or x\or y\or
2684    z\else\@ctrerr\fi}
2685 \def\@Alph#1{\ifcase#1\or A\or B\or C\or D\else\@Ialph{#1}\fi}
2686 \def\@Ialph#1{\ifcase#1\or \or \or \or \or E\or F\or G\or H\or I\or J\or
2687    K\or L\or M\or N\or O\or P\or Q\or R\or S\or T\or U\or V\or W\or X\or Y\or
2688    Z\else\@ctrerr\fi}
2689 \def\@fnsymbol#1{\ifcase#1\or *\or \dagger\or \ddagger\or
2690    \mathchar "278\or \mathchar "27B\or \|\or **\or \dagger\dagger
2691    \or \ddagger\ddagger \else\@ctrerr\fi\relax}
2692
2693
2694
2695
2696  \message{page nos.,}
2697 %         ***************************************
2698 %         *         PAGE NUMBERING              *
2699 %         ***************************************
2700 %
2701 % Page numbers are produced by a page counter, used just like any other
2702 % counter. The only difference is that \c@page contains the number of
2703 % the next page to be output (the one currently being produced), rather
2704 % than one minus it. Thus, it is normally initialized to 1 rather than
2705 % 0.  \c@page is defined to be \count0, rather than a count assigned by
2706 % \newcount.
2707 %
2708 % The user sets the pagenumber style with the \pagenumbering{FOO}
2709 % command, which sets the page counter to 1 and defines \thepage to be
2710 % \FOO. For example, \pagenumbering{roman} causes pages to be numbered
2711 % i, ii, etc.
2712
2713
2714 \countdef\c@page=0 \c@page=1
2715 \def\cl@page{}
2716 \def\pagenumbering#1{\global\c@page \@ne \gdef\thepage{\csname @#1\endcsname
2717    \c@page}}
2718
2719
2720  \message{x-ref,}
2721 %         ***************************************
2722 %         *     CROSS REFERENCING MACROS        *
2723 %         ***************************************
2724 %
2725 %  The user writes \label{foo} to define the following cross-references:
2726 %     \ref{foo}    : value of most recently incremented referencable counter.
2727 %                    in the current environment. (Chapter, section, theorem
2728 %                    and enumeration counters counters are referencable,
2729 %                    footnote counters are not.)
2730 %     \pageref{foo} : page number at which \label{foo} command appeared.
2731 %  where foo  can be any string of characters not containing '\', '{' or '}'.
2732 %
2733 %  Note: The scope of the \label command is delimited by environments, so
2734 %         \begin{theorem} \label{foo} ... \end{theorem} \label{bar}
2735 %  defines \ref{foo} to be the theorem number and \ref{bar} to be
2736 %  the current section number.
```

```
%
%  Note: \label does the right thing in terms of spacing -- i.e.,
%  leaving a space on both sides of it is equivalent to leaving
%  a space on either side.
%
%  This is implemented as follows. A referencable counter CNT is
%  incremented by the command \refstepcounter{CNT} , which sets
%  \@currentlabel == {CNT}{eval(\p@cnt\theCNT)}. The command
%  \label{FOO} then writes the following on file \@auxout :
%        \newlabel{FOO}{{eval(\@currentlabel)}{eval(\thepage)}}
%
%  \ref{FOO} ==
%    BEGIN
%      if \r@foo undefined
%        then ??
%             Warning: 'reference foo on page ... undefined'
%        else \@car \eval(\r@FOO)\@nil
%      fi
%    END
%
%  \pageref{foo} =
%    BEGIN
%      if \r@foo undefined
%        then ??
%             Warning: 'reference foo on page ... undefined'
%        else \@cdr \eval(\r@FOO)\@nil
%      fi
%    END
%

%% RmS 91/10/25: added a few extra \reset@font,
%%              as suggested by Bernd Raichle
\def\ref#1{\@ifundefined{r@#1}{{\reset@font\bf ??}\@warning
   {Reference `#1' on page \thepage \space
    undefined}}{\edef\@tempa{\@nameuse{r@#1}}\expandafter
    \@car\@tempa \@nil\null}}

\def\pageref#1{\@ifundefined{r@#1}{{\reset@font\bf ??}\@warning
   {Reference `#1' on page \thepage \space
    undefined}}{\edef\@tempa{\@nameuse{r@#1}}\expandafter
    \@cdr\@tempa\@nil\null}}

\def\newlabel#1#2{\@ifundefined{r@#1}{}{\@warning{Label `#1' multiply
   defined}}\global\@namedef{r@#1}{#2}}

% \label and \refstepcounter changed to allow \protect'ed commands to
% work properly. For example,
%   \def\thechapter{\protect\foo{\arabic{chapter}.\roman{section}}}
% will cause a \label{bar} command to define \ref{bar} to expand to
% something like \foo{4.d}. Change made 20 Jul 88.

\def\label#1{\@bsphack\if@filesw {\let\thepage\relax
   \def\protect{\noexpand\noexpand\noexpand}%
   \edef\@tempa{\write\@auxout{\string
      \newlabel{#1}{{\@currentlabel}{\thepage}}}}%
   \expandafter}\@tempa
   \if@nobreak \ifvmode\nobreak\fi\fi\fi\@esphack}

\def\refstepcounter#1{\stepcounter{#1}\let\@tempa\protect
\def\protect{\noexpand\protect\noexpand}%
\edef\@currentlabel{\csname p@#1\endcsname\csname the#1\endcsname}%
\let\protect\@tempa}

\def\@currentlabel{} % For \label commands that come before any environment

 \message{environments,}
%         ************************************
%         *           ENVIRONMENTS           *
%         ************************************
%
%  \begin{foo} and \end{foo} are used to delimit environment foo.
%  \begin{foo} starts a group and calls \foo if it is defined, otherwise
%  it does nothing. \end{foo} checks to see that it matches the
%  corresponding \begin and if so, it calls \endfoo and does an
```

```
% \endgroup. Otherwise, \end{foo} does nothing.
%
% If \end{foo} needs to ignore blanks after it, then \endfoo should
% globally set the @ignore switch true with \global\@ignoretrue.
%
% \@currenvir : the name of the current environment. Initialized to
%               'document' to make \end{document} work right.
%
% \@preamblecmds : a list of commands that can be used only in the
%                  preamble (before the \begin{document}), in the
%                  form \do \CMDA \do \CMDB ... . These commands
%                  are redefined to \@notprerr by \begin{document}
%                  to save space. They include the following:
%                      \document \documentstyle \@documentstyle
%                      \@options \@preamblecmds \@optionlist
%                      \@optionfiles \nofiles \includeonly \makeindex
%                      \makeglossary
%                  The document style can add any other commands to
%                  this list by
%                     \def\do{\noexpand\do\noexpand}
%                     \edef\@preamblecmds{\@preamblecmds \do ...}
%
% NOTE: \@@end is defined to be the \end command of TeX82.
%
% \enddocument is the user's command for ending the manuscript file.
%
% \stop is a panic button -- to end TeX in the middle.
%
% \enddocument ==
%  BEGIN
%   \@checkend{document} %% checks for unmatched \begin
%   \clearpage
%   \begingroup
%     if @filesw = true
%       then  close file @mainaux
%             \global \@namedef {ARG1}{ARG2} == null
%             \newlabel{LABEL}{VAL} ==
%                 BEGIN
%                   \@tempa == VAL
%                   if def(\@tempa) = def(\r@LABEL)
%                     else @tempswa := true       fi
%                 END
%             \bibcite{LABEL}{VAL} == null
%                 BEGIN
%                   \@tempa == VAL
%                   if def(\@tempa) = def(\g@LABEL)
%                     else @tempswa := true       fi
%                 END
%             @tempswa := false
%             make @ a letter
%             \input \jobname.AUX
%             if @tempswa = true
%               then LaTeX Warning: 'Label may have changed.
%                                   Rerun to get cross-references right.'
%      fi    fi
%   \endgroup
%   finish up
%  END
%
% \@writefile{EXT}{ENTRY} ==
%     if tf@EXT undefined
%       else \write\tf@EXT{ENTRY}
%     fi
%
\def\@currenvir{document}

\def\@preamblecmds{\do\document \do\documentstyle \do\@documentstyle
   \do\@options \do\@preamblecmds \do\@optionlist \do\@optionfiles
   \do\nofiles \do\includeonly \do\makeindex \do\makeglossary}

\newif\if@ignore

\def\enddocument{\@checkend{document}\clearpage\begingroup
\if@filesw \immediate\closeout\@mainaux
```

```
2885 \def\global\@namedef##1##2{}\def\newlabel{\@testdef r}%
2886 \def\bibcite{\@testdef b}\@tempswafalse \makeatletter\input \jobname.aux
2887 \if@tempswa \@@warning{Label(s) may have changed. Rerun to get
2888 cross-references right}\fi\fi\endgroup\deadcycles\z@\@@end}
2889
2890 \def\@testdef #1#2#3{\def\@tempa{#3}\expandafter \ifx \csname #1@#2\endcsname
2891  \@tempa \else \@tempswatrue \fi}
2892
2893 \long\def\@writefile#1#2{\@ifundefined{tf@#1}{}{%
2894    \immediate\write\csname tf@#1\endcsname{#2}}}
2895  % \long added 8 Feb 90, as suggested by Chris Rowley
2896
2897 \def\stop{\clearpage\deadcycles\z@\let\par\@@par\@@end}
2898
2899 \everypar{\@nodocument} %% To get an error if text appears before the
2900 \nullfont             %% \begin{document}
2901
2902 % \begin, \end, and \@checkend changed so \end{document} will catch
2903 % an unmatched \begin. Changed 24 May 89 as suggested by
2904 % Frank Mittelbach and Rainer Sch\"opf.
2905
2906
2907 % \begin{NAME} ==
2908 %  BEGIN
2909 %    IF \NAME undefined THEN \@tempa == BEGIN report error END
2910 %                       ELSE  \@tempa == (\@currenvir :=L NAME) \NAME
2911 %    FI
2912 %    @ignore :=G F     %% Added 30 Nov 88
2913 %    \begingroup
2914 %    \@currenvir :=L NAME
2915 %    \NAME
2916 %  END
2917
2918 % \end{NAME} ==
2919 %  BEGIN
2920 %   \endNAME
2921 %   \@checkend{NAME}
2922 %   IF @endpe = T                %% @endpe set True by \@endparenv
2923 %     THEN \@gtempa :=G \@doendpe %% \@doendpe redefines \par and \everypar
2924 %     ELSE \@gtempa :=G \relax    %% to suppress paragraph indentation in
2925 %   FI                            %% immediately following text
2926 %   \endgroup
2927 %   \@gtempa
2928 %   IF @ignore = T
2929 %     THEN @ignore :=G F
2930 %          \ignorespaces
2931 %   FI
2932 %  END
2933
2934 % \@checkend{NAME} ==
2935 %  BEGIN
2936 %   IF \@currenvir = NAME
2937 %     ELSE \@badend{NAME}
2938 %   FI
2939 %  END
2940
2941 %% RmS 92/03/18: changed \@ignoretrue to \@ignorefalse (as documented)
2942 \def\begin#1{\@ifundefined{#1}{\def\@tempa{\@latexerr{Environment #1
2943   undefined}\@eha}}{\def\@tempa{\def\@currenvir{#1}%
2944   \csname #1\endcsname}}\global\@ignorefalse %% \global... added 2 May 90
2945      \begingroup\@endpefalse\@tempa}
2946
2947 \def\end#1{\csname end#1\endcsname\@checkend{#1}%
2948   \expandafter\endgroup \if@endpe \@doendpe \fi
2949   \if@ignore \global\@ignorefalse \ignorespaces\fi}
2950
2951 \def\@checkend#1{\def\@tempa{#1}\ifx
2952      \@tempa\@currenvir \else\@badend{#1}\fi}
2953
2954
2955  \message{math,}
2956 %      ********************************************
2957 %      *              MATH ENVIRONMENTS           *
2958 %      ********************************************
```

```
%
% \( == BEGIN if math mode
%                 then error: '\( in math mode'
%                 else $
%               fi
%       END
%
% \) == BEGIN if math mode
%                 then if inner mode
%                        then $
%                        else error ``\[ closed with \)''
%                 else error 'unmatched \)'
%               fi
%       END
%
% \[ == BEGIN if math mode
%                 then error: '\[ in math mode'
%                 else $$
%               fi
%       END
%
% \] == BEGIN if math mode
%                 then if inner mode
%                        then error '\( closed with \]'
%                        else $$
%                 else error 'unmatched \]'
%               fi
%       END
%
% \equation    == BEGIN \refstepcounter{equation} $$ END
%
% \endequation == BEGIN \eqno (\theequation) $$\ignorespaces END
%
% NOTE: The document style must define \theequation etc., and do
% the appropriate \@addtoreset. It should also redefine \@eqnnum
% if another format for the equation number is desired other than the
% standard (...), or to move the equation numbers to the flushleft.
% (See comment on the \def of \@eqnnum.)
%
% \stackrel{TOP}{BOT} == PLAIN TeX's \buildrel {TOP} \over {BOT}
%
% \frac{TOP}{BOT} == {TOP \over BOT}
%
% \sqrt[N]{EXP} produces an Nth root of EXP formula.
%
%  \: == \> (medium space)

\def\({\relax\ifmmode\@badmath\else$%%$BRACE MATCH HACK
\fi}

\def\){\relax\ifmmode\ifinner$\else\@badmath%%$ BRACE MATCH HACK
\fi\else \@badmath\fi}

\def\[{\relax\ifmmode\@badmath\else
    \ifvmode \nointerlineskip \makebox[.6\linewidth]\fi$$%%$$ BRACE MATCH HACK
\fi}

\def\]{\relax\ifmmode\ifinner\@badmath\else$$\fi%%$$ BRACE MATCH HACK
       \else \@badmath \fi\ignorespaces}

\let\math=\(
\let\endmath=\)
\def\displaymath{\[}
\def\enddisplaymath{\]\global\@ignoretrue}

\@definecounter{equation}
\def\equation{$$ % $$ BRACE MATCHING HACK
\refstepcounter{equation}}

%% RmS 92/01/10: put \hbox around \@eqnnum to typeset the equation
%%               number in text mode (as in the eqnarray env.).
\def\endequation{\eqno \hbox{\@eqnnum}% $$ BRACE MATCHING HACK
$$\global\@ignoretrue}

```

```
%  \@eqnnum: Produces the equation number for equation and
%     eqnarray environments. The following definition is for
%     flushright numbers; for flushleft numbers, see leqno.doc.
%     The {\rm ... } puts the equation number in roman type even if
%     an eqnarray environment appears in an italic environment.
%
%% RmS 91/09/29: \reset@font added.
\def\@eqnnum{{\reset@font\rm (\theequation)}}


\def\stackrel#1#2{\mathrel{\mathop{#2}\limits^{#1}}}
\def\frac#1#2{{#1\over #2}}

\let\@@sqrt=\sqrt
\def\sqrt{\@ifnextchar[{\@sqrt}{\@@sqrt}}
\def\@sqrt[#1]{\root #1\of}

\let\:=\>

% Here's the eqnarray environment:
%  Default is for left-hand side of equations to be flushleft.
%  To make them flushright, \let\@eqnsel = \hfil

\newcount\@eqcnt
\newcount\@eqpen
\newif\if@eqnsw\@eqnswtrue

\@centering = 0pt plus 1000pt % Changed 11/4/85 to produce warning message
                              % if line extends into margin. Doesn't warn
                              % about formula overprinting equation number.

\def\eqnarray{\stepcounter{equation}\let\@currentlabel\theequation
\global\@eqnswtrue\m@th
\global\@eqcnt\z@\tabskip\@centering\let\\\@eqncr
$$\halign to\displaywidth\bgroup\@eqnsel\hskip\@centering
  $\displaystyle\tabskip\z@{##}$&\global\@eqcnt\@ne
  \hskip 2\arraycolsep \hfil${##}$\hfil
  &\global\@eqcnt\tw@ \hskip 2\arraycolsep $\displaystyle\tabskip\z@{##}$\hfil
   \tabskip\@centering&\llap{##}\tabskip\z@\cr}

\def\endeqnarray{\@@eqncr\egroup
     \global\advance\c@equation\m@ne$$\global\@ignoretrue}

\let\@eqnsel=\relax

\def\nonumber{\global\@eqnswfalse}

\def\@eqncr{{\ifnum0=`}\fi\@ifstar{\global\@eqpen\@M
    \@yeqncr}{\global\@eqpen\interdisplaylinepenalty \@yeqncr}}

\def\@yeqncr{\@ifnextchar [{\@xeqncr}{\@xeqncr[\z@]}}

\def\@xeqncr[#1]{\ifnum0=`{\fi}\@@eqncr
   \noalign{\penalty\@eqpen\vskip\jot\vskip #1\relax}}

\def\@@eqncr{\let\@tempa\relax
    \ifcase\@eqcnt \def\@tempa{& & &}\or \def\@tempa{& &}%
      \else \def\@tempa{&}\fi
     \@tempa \if@eqnsw\@eqnnum\stepcounter{equation}\fi
     \global\@eqnswtrue\global\@eqcnt\z@\cr}

% Here's the eqnarray* environment:

\let\@seqncr=\@eqncr
\@namedef{eqnarray*}{\def\@eqncr{\nonumber\@seqncr}\eqnarray}
\@namedef{endeqnarray*}{\nonumber\endeqnarray}

% \lefteqn{FORMULA} typesets FORMULA in display math style
%  flushleft in a box of width zero.
%

\def\lefteqn#1{\hbox to\z@{$\displaystyle #1$\hss}}


```

```
3107  \message{center,}
3108 %      ***********************************************
3109 %      *      CENTER, FLUSHRIGHT, FLUSHLEFT, ETC. *
3110 %      ***********************************************
3111 %
3112 %
3113 % \center, \flushright and \flushleft set
3114 %   \rightskip = 0pt or \@flushglue (as appropriate)
3115 %   \leftskip = 0pt or \@flushglue (as appropriate)
3116 %   \parindent = 0pt
3117 %   \parfillskip  = 0pt. (except \flushleft)
3118 %   \\         == \par \vskip -\parskip
3119 %   \\[LENGTH] == \\ \vskip LENGTH
3120 %   \\*        == \par \penalty 10000 \vskip -\parskip
3121 %   \\*[LEN]   == \\* \vskip LENGTH
3122 %
3123 % They invoke the trivlist environment to handle vertical spacing before
3124 % and after them.
3125 %
3126 % \centering, \raggedright and \raggedleft are the declaration analogs
3127 % of the above.
3128 %
3129 % \raggedright has a more universal effect, however. It sets
3130 % \@rightskip := flushglue. Every environment, like the list environments,
3131 % that set \rightskip to its 'normal' value set it to \@rightskip
3132
3133 \def\@centercr{\ifhmode \unskip\else \@badcrerr\fi
3134       \par\@ifstar{\penalty \@M\@xcentercr}{\@xcentercr}}
3135
3136 \def\@xcentercr{\addvspace{-\parskip}\@ifnextchar
3137    [{\@icentercr}{\ignorespaces}}
3138
3139 \def\@icentercr[#1]{\vskip #1\ignorespaces}
3140
3141 \def\center{\trivlist \centering\item[]}
3142 \def\centering{\let\\=\@centercr\rightskip\@flushglue\leftskip\@flushglue
3143 \parindent\z@\parfillskip\z@}
3144 \let\endcenter=\endtrivlist
3145
3146 \newskip\@rightskip \@rightskip \z@
3147
3148 \def\flushleft{\trivlist \raggedright\item[]}
3149 \def\raggedright{\let\\=\@centercr\@rightskip\@flushglue \rightskip\@rightskip
3150   \leftskip\z@
3151   \parindent\z@}
3152 \let\endflushleft=\endtrivlist
3153
3154 \def\flushright{\trivlist \raggedleft\item[]}
3155 \def\raggedleft{\let\\=\@centercr\rightskip\z@\leftskip\@flushglue
3156   \parindent\z@\parfillskip\z@}
3157 \let\endflushright=\endtrivlist
3158
3159  \message{verbatim,}
3160 %      ***************************************
3161 %      *             VERBATIM                *
3162 %      ***************************************
3163 %
3164 %  The verbatim environment uses the fixed-width \tt font, turns blanks into
3165 %  spaces, starts a new line for each carrige return (or sequence of
3166 %  consecutive carriage returns), and interprets EVERY character literally.
3167 %  I.e., all special characters \, {, $, etc. are \catcode'd to 'other'.
3168 %
3169 %  The command \verb produces in-line verbatim text, where the argument
3170 %  is delimited by any pair of characters. E.g., \verb #...# takes
3171 %  '...' as its argument, and sets it verbatim in \tt font.
3172 %
3173 %  The *-variants of these commands is the same, except that spaces
3174 %  print as the TeXbook's space character instead of as blank spaces.
3175
3176 {\catcode`\^^M=13 \gdef\@gobblecr{\@ifnextchar
3177 {\@gobble}{\ignorespaces}}}
3178
3179 {\catcode`\ =\active\gdef\@vobeyspaces{\catcode`\ \active\let \@xobeysp}}
3180
```

```
% Definition of \@xobeysp chaned on 19 Nov 86 from
% \def\@xobeysp{\leavevmode{} }
% to prevent line breaks at spaces. Change suggested by
% Nelson Beebe
%
\def\@xobeysp{\leavevmode\penalty10000\ }



\begingroup \catcode `|=0 \catcode `[= 1
\catcode`]=2 \catcode `\{=12 \catcode `\}=12
\catcode`\\=12 |gdef|@xverbatim#1\end{verbatim}[#1|end[verbatim]]
|gdef|@sxverbatim#1\end{verbatim*}[#1|end[verbatim*]]
|endgroup

% \@sverbatim obsolete -- removed 24 May 89, as suggested by
% Rainer Sch\"opf and Frank Mittelbach
% \def\@sverbatim{\obeyspaces\@verbatim}

\def\@gobble#1{}

% 91/07/24 RmS: added \penalty\interlinepenalty to definition
%               of \par so that \samepage works.

\def\@verbatim{\trivlist \item[]\if@minipage\else\vskip\parskip\fi
\leftskip\@totalleftmargin\rightskip\z@
\parindent\z@\parfillskip\@flushglue\parskip\z@
%%RmS 91/08/26 Added \@@par to clear possible \parshape definition
%%from a surrounding list (the verbatim guru says)
\@@par
\@tempswafalse \def\par{\if@tempswa\hbox{}\fi\@tempswatrue\@@par
\penalty\interlinepenalty}%
\obeylines \tt \catcode``=13 \@noligs \let\do\@makeother \dospecials}

\def\verbatim{\@verbatim \frenchspacing\@vobeyspaces \@xverbatim}
\let\endverbatim=\endtrivlist

\@namedef{verbatim*}{\@verbatim\@sxverbatim}
\expandafter\let\csname endverbatim*\endcsname =\endtrivlist


\def\@makeother#1{\catcode`#1=12\relax}

\def\verb{\begingroup \catcode``=13 \@noligs
\tt \let\do\@makeother \dospecials
\@ifstar{\@sverb}{\@verb}}

% Definitions of \@sverb and \@verb changed so \verb+ foo+ does not lose
% leading blanks when it comes at the beginning of a line.
% Change made 24 May 89. Suggested by Frank Mittelbach and Rainer Sch\"opf.
%
\def\@sverb#1{\def\@tempa ##1#1{\leavevmode\null##1\endgroup}\@tempa}

\def\@verb{\@vobeyspaces \frenchspacing \@sverb}


%% \@noligs prevents ?` and !` from being treated as ligatures
%% added 19 April 86

\begingroup
\catcode``=13
\gdef\@noligs{\let`\@lquote}
\endgroup

%% RmS 91/06/21: added \leavevmode to definition of \@lquote
%%  to avoid the \kern being processed in vertical mode

\def\@lquote{\leavevmode{\kern\z@}`}
 \message{list,}
%       ***************************************
%       *        THE LIST ENVIRONMENT         *
%       ***************************************
%
% The generic commands for creating an indented environment -- enumerate,
```

```
% itemize, quote, etc -- are
%       \list{LABEL}{COMMANDS} ... \endlist
% which can be invoked by the user as the list environment. The LABEL
% argument specifies item labeling. COMMANDS contains commands for
% changing the horizontal and vertical spacing parameters.
%
% Each item of the environment is begun by the command \item[ITEMLABEL]
% which produces an item labeled by ITEMLABEL. If the argument is
% missing, then the LABEL argument of the \list command is used as the
% item label.
%
% The label is formed by putting \makelabel{ITEMLABEL} in an hbox whose
% width is either its natural width or else \labelwidth, whichever is
% larger. The \list command defines \makelabel to have the default
% definition
%     \makelabel{ARG} == BEGIN \hfil ARG END
% which, for a label of width less than \labelwidth, puts the label
% flushright, \labelsep to the left of the item's text. However,
% \makelabel can be \let to another command by the \list's COMMANDS
% argument.
%
% A \usecounter{foo} command in the second argument causes the counter
% foo to be initialized to zero, and stepped by every \item command
% without an argument. (\label commands within the list refer to this
% counter.)
%
% When you leave a list environment, returning either to an enclosing
% list or normal text mode, LaTeX begins a new paragraph if and only if
% you leave a blank line after the \end command. This is accomplished
% by the \@endparenv command.
%
% Blank lines are ignored every other reasonable place--i.e.:
%     - Between the \begin{list} and the first \item,
%     - Between the \item and the text of that item.
%     - Between the end of the last item and the \end{list}.
%
% For an environment like quotation, in which items are not labeled,
% the entire environment is a single item. It is defined by
% letting \quotation == \list{}{...}\item[]. (Note the [], there in
% case the first character in the environment is a '['.) The spacing
% parameters provide a great deal of flexability in designing the
% format, including the ability to let the indentation of the first
% paragraph be different from that of the subsequent ones.
%
% The trivlist environment is equivalent to a list environment
% whose second argument sets the following parameter values:
%    \leftmargin = 0 : causes no indentation of left margin
%    \labelwidth = 0 : see below for precise effect this has.
%    \itemindent = 0 : with a null label, makes first paragraph
%        have no indentation. Succeeding paragraphs have \parindent
%        indentation. To give first paragraph same indentation, set
%        \itemindent = \parindent before the \item[].
% Every \item in a trivlist environment must have an argument---in many
% cases, this will be the null argument (\item[]). The trivlist
% environment is mainly used for paragraphing environments, like
% verbatim, in which there is no margin change. It provides the same
% vertical spacing as the list environment, and works reasonably well
% when it occurs immediately after an \item command in an enclosing list.
%
% The following variables are used inside a list environment:
%  \@totalleftmargin : The distance that the prevailing left margin is
%                      indented from the outermost left margin,
%  \linewidth        : The width of the current line. Must be
%                      initialized to \hsize.
%  \@listdepth       : A count for holding current list nesting depth.
%  \makelabel        : A macro with a single argument, used to generate
%                      the label from the argument (given or implied) of the
%                      \item command. Initialized to \@mklab by the \list
%                      command. This command must produce some stretch--i.e.,
%                      an \hfil.
%  @inlabel          : A switch that is false except between the time an
%                      \item is encountered and the time that TeX actually
%                      enters horizontal mode. Should be tested by
%                      commands that can be messed up by the list
```

```
3329 %                      environment's use of \everypar.
3330 %   \box\@labels     : When @inlabel = true, it holds the labels
3331 %                      to be put out by \everypar.
3332 %   @noparitem      : A switch set by \list when @inlabel = true.
3333 %                      Handles the case of a \list being the first thing
3334 %                      in an item.
3335 %   @noparlist      : A switch set true for a list that begins an
3336 %                      item. No \topsep space is added before or after
3337 %                      such a list.
3338 %   @newlist        : Set true by \list, set false by the first \item's
3339 %                      text (by \everypar).
3340 %   @noitemarg      : Set true when executing an \item with no explicit
3341 %                      argument. Used to save space. To save time,
3342 %                      make two separate \@item commands.
3343 %   @nmbrlist       : Set true by \usecounter command, causes list to
3344 %                      be numbered.
3345 %   \@listctr       : \def'ed by \usecounter to name of counter.
3346 %   @noskipsec      : A switch set true by a sectioning command when it is
3347 %                      creating an in-text heading with \everypar.
3348 %
3349 % Throughout a list environment, \hsize is the width of the current
3350 % line, measured from the outermost left margin to the outermost right
3351 % margin. Environments like tabbing should use \linewidth instead of
3352 % \hsize.
3353 %
3354 % Here are the parameters of a list that can be set by commands in
3355 % the \list's COMMANDS argument. These parameters are all TeX
3356 % skips or dimensions (defined by \newskip or \newdimen), so the usual
3357 % TeX or LaTeX commands can be used to set them. The commands will
3358 % be executed in vmode if and only if the \list was preceded by a
3359 % \par (or something like an \end{list}), so the spacing parameters
3360 % can be set according to whether the list is inside a paragraph
3361 % or is its own paragraph.
3362 %
3363 %   VERTICAL SPACING (skips):
3364 %
3365 %      \topsep : Space between first item and preceding paragraph.
3366 %      \partopsep : Extra space added to \topsep when environment starts
3367 %                   a new paragraph (is called in vmode).
3368 %      \itemsep : Space between successive items.
3369 %      \parsep : Space between paragraphs within an item -- the \parskip
3370 %                for this environment.
3371 %
3372 %   PENALTIES
3373 %     \@beginparpenalty : put at the beginning of a list
3374 %     \@endparpenalty : put at end of list
3375 %     \@itempenalty   : put between items.
3376 %
3377 %   HORIZONTAL SPACING (dimens)
3378 %      \leftmargin   : space between left margin of enclosing environment
3379 %                      (or of page if top level list) and left margin of
3380 %                      this list. Must be nonnegative.
3381 %      \rightmargin  : analogous.
3382 %      \listparindent : extra indentation at beginning of every paragraph
3383 %                      of a list except the one started by the \item
3384 %                      command. May be negative! Usually, labeled lists
3385 %                      have \listparindent equal to zero.
3386 %      \itemindent   : extra indentation added right BEFORE an item label.
3387 %      \labelwidth   : nominal width of box that contains the label.
3388 %                      If the natural width of the label < = \labelwidth,
3389 %                      then the label is flushed right inside a box
3390 %                      of width \labelwidth (with an \hfil). Otherwise,
3391 %                      a box of the natural width is employed, which causes
3392 %                      an indentation of the text on that line.
3393 %      \labelsep     : space between end of label box and text of
3394 %                      first item.
3395 %
3396 %   DEFAULT VALUES:
3397 %      Defaults for the list environment are set as follows.
3398 %      First, \rightmargin, \listparindent and \itemindent are set
3399 %      to Opt. Then, one of the commands \@listi, \@listii, ... , \@listvi
3400 %      is called, depending upon the current level of the list.
3401 %      The \@list... commands should be defined by the document
3402 %      style. A convention that the document style should follow is
```

```
%     to set \leftmargin to \leftmargini, ... , \leftmarginvi for
%     the appropriate level. Items that aren't changed may be left
%     alone, but everything that could possibly be changed must be
%     reset.
%
%  \list{LABEL}{COMMANDS} ==
%   BEGIN
%     if \@listdepth > 5
%       then LaTeX error: 'Too deeply nested'
%       else \@listdepth :=G \@listdepth + 1
%     fi
%     \rightmargin    := 0pt
%     \listparindent  := 0pt
%     \itemindent     := 0pt
%     \eval(@list \romannumeral\the\@listdepth) %% Set default values:
%     \@itemlabel     :=L LABEL
%     \makelabel      == \@mklab
%     @nmbrlist       :=L false
%     COMMANDS
%
%     \@trivlist              % commands common to \list and \trivlist
%
%     \parskip         :=L \parsep
%     \parindent       :=L \listparindent
%     \linewidth       :=L \linewidth - \rightmargin -\leftmargin
%     \@totalleftmargin :=L \@totalleftmargin + \leftmargin
%     \parshape 1 \@totalleftmargin \linewidth
%     \ignorespaces                % gobble space up to \item
%    END
%
% \endlist == BEGIN \@listdepth :=G \@listdepth -1
%                 \endtrivlist
%           END
%
% \@trivlist ==
%  BEGIN
%     if @newlist = T then \@noitemerr fi %% This command removed for some
%                                         %% forgotten reason.
%     \@topsepadd :=L \topsep
%     if @noskipsec then leave vertical mode fi %% Added 11 Jun 85
%     if vertical mode
%       then \@topsepadd :=L \@topsepadd + \partopsep
%       else \unskip \par             % remove glue from end of last line
%     fi
%     if @inlabel = true
%        then @noparitem :=L true
%             @noparlist :=L true
%        else @noparlist :=L false
%             \@topsep  :=L \@topsepadd
%     fi
%     \@topsep        :=L \@topsep + \parskip %% Change 4 Sep 85
%     \leftskip       :=L 0pt          % Restore paragraphing parameters
%     \rightskip      :=L \@rightskip
%     \parfillskip    :=L 0pt + 1fil
%
%   NOTE: \@setpar called on every \list in case \par has been temporarily
%         munged before the \list command.
%     \@setpar{if @newlist = false then {\@@par} fi}
%     \@newlist        :=G T
%     \@outerparskip   :=L \parskip
% END
%
% \trivlist ==
% BEGIN
%  \parsep    := \parskip
%  \@trivlist
%  \labelwidth := 0
%  \leftmargin := 0
%  \itemindent := \parindent
%  \makelabel{LABEL} == LABEL
% END
%
% \endtrivlist ==
%   BEGIN
```

```
%     if @inlabel = T then \indent fi
%     if horizontal mode then \unskip \par fi
%     if @noparlist = true
%       else if \lastskip > 0
%              then \@tempskipa := \lastskip
%                   \vskip - \lastskip
%                   \vskip \@tempskipa -\@outerparskip + \parskip
%           fi
%           \@endparenv
%     fi
%   END
%
% \@endparenv ==
%   BEGIN
%    \addpenalty{@endparpenalty}
%    \addvspace{\@topsepadd}
%    \endgroup   %% ends the \begin command's \begingroup
%    \par  ==  BEGIN
%                \@restorepar
%                \everypar{}
%                \par
%              END
%    \everypar == BEGIN remove \lastbox \everypar{} END
%    \begingroup %% to match the \end commands \endgroup
%   END
%
% \item == BEGIN if next char = [
%                 then  \@item
%                 else  @noitemarg := true
%                       \@item[@itemlabel]
%         END
%
% \@item[LAB] ==
%    BEGIN
%     if @noparitem = true
%       then @noparitem := false                    % NOTE: then clause
%                                                   % hardly every taken,
%           \box\@labels :=G \hbox{\hskip -\leftmargin % so made a macro
%                                 \box\@labels      % \@donoparitem
%                                 \hskip \leftmargin }
%           if @minipage = false then
%              \@tempskipa := \lastskip
%              \vskip -\lastskip
%              \vskip \@tempskipa + \@outerparskip - \parskip
%           fi
%       else if @inlabel = true
%              then \indent \par % previous item empty.
%           fi
%           if hmode then 2 \unskip's % To remove any space at end of prev.
%                  \par            % paragraph that could cause a blank
%           fi                     % line.
%           if @newlist = T
%              then if @nobreak = T % Kludge if list follows \section
%                     then \addvspace{\@outerparskip - \parskip}
%                     else \addpenalty{\@beginparpenalty}
%                          \addvspace{\@topsep}
%                          \addvspace{-\parskip} %% added 4 Sep 85
%                   fi
%              else \addpenalty{\@itempenalty}
%                   \addvspace{\itemsep}
%           fi
%           @inlabel :=G true
%     fi
%
%     \everypar{ @minipage :=G F
%                @newlist :=G F
%                if  @inlabel = true
%                  then @inlabel :=G false
%                       \hskip -\parindent
%                       \box\@labels
%                       \penalty 0     %% 3 Oct 85 -- allow line break here
%                       \box\@labels :=G null
%                fi
%                \everypar{} }
```

```
%     @nobreak :=G false
%     if  @noitemarg = true
%       then @noitemarg := false
%            if @nmbrlist
%              then \refstepcounter{\@listctr}
%     fi     fi
%     \@tempboxa  :=L \hbox{\makelabel{LAB}}
%     \box\@labels :=G \@labels \hskip \itemindent
%                      \hskip - (\labelwidth + \labelsep)
%                      if \wd \@tempboxa > \labelwidth
%                         then \box\@tempboxa
%                         else \hbox to \labelwidth {\makelabel{LAB}}
%                      fi
%                      \hskip\labelsep
%     \ignorespaces                      %gobble space up to text
%   END
%
%   \usecounter{CTR} == BEGIN @nmbrlist :=L true
%                             \@listctr == CTR
%                             \setcounter{CTR}{0}
%                      END
%
% DEFINE \dimen's and \count
\newskip\topsep
\newskip\partopsep
\newskip\itemsep
\newskip\parsep
\newskip\@topsep
\newskip\@topsepadd
\newskip\@outerparskip

\newdimen\leftmargin
\newdimen\rightmargin
\newdimen\listparindent
\newdimen\itemindent
\newdimen\labelwidth
\newdimen\labelsep
\newdimen\linewidth
\newdimen\@totalleftmargin \@totalleftmargin=\z@
\newdimen\leftmargini
\newdimen\leftmarginii
\newdimen\leftmarginiii
\newdimen\leftmarginiv
\newdimen\leftmarginv
\newdimen\leftmarginvi

\newcount\@listdepth \@listdepth=0
\newcount\@itempenalty
\newcount\@beginparpenalty
\newcount\@endparpenalty

\newbox\@labels

\newif\if@inlabel \@inlabelfalse
\newif\if@newlist \@newlistfalse
\newif\if@noparitem \@noparitemfalse
\newif\if@noparlist \@noparlistfalse
\newif\if@noitemarg \@noitemargfalse
\newif\if@nmbrlist \@nmbrlistfalse

\def\list#1#2{\ifnum \@listdepth >5\relax \@toodeep
     \else \global\advance\@listdepth\@ne \fi
  \rightmargin \z@ \listparindent\z@ \itemindent\z@
  \csname @list\romannumeral\the\@listdepth\endcsname
  \def\@itemlabel{#1}\let\makelabel\@mklab \@nmbrlistfalse #2\relax
  \@trivlist
  \parskip\parsep \parindent\listparindent
  \advance\linewidth -\rightmargin \advance\linewidth -\leftmargin
  \advance\@totalleftmargin \leftmargin
  \parshape \@ne \@totalleftmargin \linewidth
  \ignorespaces}

\def\@trivlist{\@topsepadd\topsep
  \if@noskipsec \leavevmode \fi
```

```
3625   \ifvmode \advance\@topsepadd\partopsep \else \unskip\par\fi
3626   \if@inlabel \@noparitemtrue \@noparlisttrue
3627     \else \@noparlistfalse \@topsep\@topsepadd \fi
3628     \advance\@topsep \parskip
3629   \leftskip\z@\rightskip\@rightskip \parfillskip\@flushglue
3630   \@setpar{\if@newlist\else{\@@par}\fi}%
3631   \global\@newlisttrue \@outerparskip\parskip}
3632
3633 %% RmS 92/03/18 added \@nmbrlistfalse
3634 \def\trivlist{\parsep\parskip\@nmbrlistfalse
3635   \@trivlist \labelwidth\z@ \leftmargin\z@
3636   \itemindent\z@ \def\makelabel##1{##1}}
3637
3638 \def\endlist{\global\advance\@listdepth\m@ne
3639     \endtrivlist}
3640
3641 % Definition of \endtrivlist moved earlier in file so other commands
3642 % can be \let = to it.
3643
3644 \def\@mklab#1{\hfil #1}
3645
3646 \def\item{\@ifnextchar [{\@item}{\@noitemargtrue \@item[\@itemlabel]}}
3647
3648 \def\@donoparitem{\@noparitemfalse
3649    \global\setbox\@labels\hbox{\hskip -\leftmargin
3650                               \unhbox\@labels
3651                                \hskip \leftmargin}\if@minipage\else
3652   \@tempskipa\lastskip
3653   \vskip -\lastskip \advance\@tempskipa\@outerparskip
3654   \advance\@tempskipa -\parskip \vskip\@tempskipa\fi}
3655
3656 \def\@item[#1]{\if@noparitem \@donoparitem
3657   \else \if@inlabel \indent \par \fi
3658         \ifhmode \unskip\unskip \par \fi
3659         \if@newlist \if@nobreak \@nbitem \else
3660                       \addpenalty\@beginparpenalty
3661                       \addvspace\@topsep \addvspace{-\parskip}\fi
3662           \else \addpenalty\@itempenalty \addvspace\itemsep
3663          \fi
3664    \global\@inlabeltrue
3665 \fi
3666 \everypar{\global\@minipagefalse\global\@newlistfalse
3667          \if@inlabel\global\@inlabelfalse \hskip -\parindent \box\@labels
3668             \penalty\z@ \fi
3669          \everypar{}}\global\@nobreakfalse
3670 \if@noitemarg \@noitemargfalse \if@nmbrlist \refstepcounter{\@listctr}\fi \fi
3671 \setbox\@tempboxa\hbox{\makelabel{#1}}%
3672 \global\setbox\@labels
3673  \hbox{\unhbox\@labels \hskip \itemindent
3674       \hskip -\labelwidth \hskip -\labelsep
3675       \ifdim \wd\@tempboxa >\labelwidth
3676                \box\@tempboxa
3677 %% RmS 91/11/22: Changed second call to \makelabel to \unhbox\@tempboxa.
3678 %%              Avoids problems with side effects in \makelabel and is
3679 %%              more efficient.
3680 %         \else \hbox to\labelwidth {\makelabel{#1}}\fi
3681          \else \hbox to\labelwidth {\unhbox\@tempboxa}\fi
3682       \hskip \labelsep}\ignorespaces}
3683
3684 %% RmS 91/11/04: added default definition for \makelabel,
3685 %%              to produce an error message.
3686 \def\makelabel#1{\@latexerr{Lonely \string\item--perhaps a missing
3687        list environment}\@ehc}
3688
3689 \def\@nbitem{\@tempskipa\@outerparskip \advance\@tempskipa -\parskip
3690              \addvspace{\@tempskipa}}
3691
3692 \def\usecounter#1{\@nmbrlisttrue\def\@listctr{#1}\setcounter{#1}\z@}
3693
3694  \message{itemize,}
3695 %      ****************************************
3696 %      *        ITEMIZE AND ENUMERATE         *
3697 %      ****************************************
3698 %
```

```
% Enumeration is done with four counters: enumi, enumii, enumiii
% and enumiv, where enumN controls the numbering of the Nth level
% enumeration. The label is generated by the commands
% \labelenumi ... \labelenumiv, which should be defined by the
% document style. Note that \p@enumN\theenumN defines the output
% of a \ref command. A typical definition might be:
%    \def\theenumii{\alph{enumii}}
%    \def\p@enumii{\theenumi\theenumii}
%    \def\labelenumii{(\theenumii)}
% which will print the labels as '(a)', '(b)', ... and print a \ref as
% '3a'.
%
% The item numbers are moved to the right of the label box, so they are
% always a distance of \labelsep from the item.
%
% \@enumdepth holds the current enumeration nesting depth.
%
% Itemization is controlled by four commands: \labelitemi, \labelitemii,
% \labelitemiii, and \labelitemiv. To cause the second-level list to be
% bulleted, you just define \labelitemii to be $\bullet$. \@itemspacing
% and \@itemdepth are the analogs of \@enumspacing and \@enumdepth.
%
% \enumerate ==
%  BEGIN
%    if \@enumdepth > 3
%      then errormessage: ``Too deeply nested''.
%      else \@enumdepth :=L \@enumdepth + 1
%           \@enumctr :=L eval(enum@\romannumeral\the\@enumdepth)
%           \list{\label(\@enumctr)}
%               {\usecounter{\@enumctr}
%                \makelabel{LABEL} == \hss \llap{LABEL}}
%    fi
%  END
%
% \endenumerate == \endlist
%
\newcount\@enumdepth \@enumdepth = 0

\@definecounter{enumi}
\@definecounter{enumii}
\@definecounter{enumiii}
\@definecounter{enumiv}

\def\enumerate{\ifnum \@enumdepth >3 \@toodeep\else
      \advance\@enumdepth \@ne
      \edef\@enumctr{enum\romannumeral\the\@enumdepth}\list
      {\csname label\@enumctr\endcsname}{\usecounter
        {\@enumctr}\def\makelabel##1{\hss\llap{##1}}}\fi}

\let\endenumerate =\endlist


%  \itemize ==
%   BEGIN
%     if \@itemdepth > 3
%       then  errormessage: 'Too deeply nested'.
%       else  \@itemdepth :=L \@itemdepth + 1
%             \@itemitem == eval(labelitem\romannumeral\the\@itemdepth)
%             \list{\@nameuse{\@itemitem}}
%                  {\makelabel{LABEL} == \hss \llap{LABEL}}
%     fi
%   END
%
%  \enditemize == \endlist
%
\newcount\@itemdepth \@itemdepth = 0

\def\itemize{\ifnum \@itemdepth >3 \@toodeep\else \advance\@itemdepth \@ne
\edef\@itemitem{labelitem\romannumeral\the\@itemdepth}%
\list{\csname\@itemitem\endcsname}{\def\makelabel##1{\hss\llap{##1}}}\fi}

\let\enditemize =\endlist

 \message{boxes,}
```

```
%      ******************************************
%      *                BOXES                   *
%      ******************************************
%
% USER COMMANDS:
%
% \makebox [WID][POS]{OBJ}
%         : puts OBJ in an \hbox of width WID, positioned by POS.
%           POS = l -> flushleft, POS = r -> flushright.
%           Default is centered.
%           If WID is missing, then POS is also missing and OBJ
%           is put in an \hbox of its natural width.
%
% \mbox{OBJ} == \makebox{OBJ}, and is more efficient.
%
% \makebox (X,Y)[POS]{OBJ}
%         : puts OBJ in an \hbox of width X * \unitlength
%           and height Y * \unitlength. POS arguments are
%           l or r for flushleft, flushright and t or b
%           for top, bottom -- or combinations like tr or rb.
%           Default for horizontal and vertical are centered.
%
% \newsavebox{\CMD} : If \CMD is undefined, then defines it
%          to be a TeX box register.
%
% \savebox {\CMD} ... : \CMD is defined to be a TeX box register,
%           and the '...' are any \makebox arguments. It is
%           like \makebox, except it doesn't produce text but
%           saves the value in \box \CMD.
%           \sbox N{OBJ} is an efficient abbreviation for
%           \savebox N{OBJ}.
%
% \framebox ... : like \makebox, except it puts a 'frame' around
%           the box. The frame is made of lines of thickness
%           \fboxrule, separated by space \fboxsep from the
%           text -- except for \framebox(X,Y) ... , where the
%           thickness of the lines is as for the picture environment,
%           and there is no separation added.
%           \fbox{OBJ} is an efficient abbreviation for \framebox{OBJ}
%
% \parbox[POS]{WIDTH}{TEXT} : Makes a box with \hsize TEXT, positioned
%        by POS as follows:
%             c : \vcenter (placed in $...$ if not in math mode)
%             b : \vbox
%             t : \vtop
%        default value is c.
%   Sets \hsize := WIDTH and calls \@parboxrestore, which does
%    the following:
%        Restores the original definitions of:
%             \par
%             \\
%             \- \' \` \=
%        Resets the following parameters:
%             \parindent      = 0pt
%             \parskip        = 0pt          %% added 20 Jan 87
%             \linewidth      = \hsize
%             \@totalleftmargin = 0pt
%             \leftskip       = 0pt
%             \rightskip      = 0pt
%             \@rightskip     = 0pt
%             \parfillskip    = 0pt plus 1fil
%             \lineskip       = \normallineskip
%             \baselineskip   = \normalbaselineskip
%        Calls \sloppy
%
% Note: \@arrayparboxrestore same as \@parboxrestore
%       but it doesn't restore \\.
%
% \minipage : Similar to parbox, except it also
%       makes this look like a page by setting
%             \textwidth == \columnwidth == box width
%       changes footnotes by redefining:
%             \@mpfn       == mpfootnote
%             \thempfn     == \thempfootnote
```

```
%             \@footnotetext == \@mpfootnotetext
%       resets the following list environment parameters
%             \@listdepth   == \@mplistdepth
%       where \@mplistdepth is initialized to zero,
%       and executes \@minipagerestore to allow the document
%       style to reset any other parameters it desires.
%       It sets @minipage := T, and resets \everypar to set
%       it false. This switch keeps \addvspace from putting space
%       at the top of a minipage.
%
%       Change added 24 May 89: \minipage sets @minipage globally;
%       \endminipage resets it false.
%
%
% \rule [RAISED]{WIDTH}{HEIGHT} : Makes a WIDTH X HEIGHT rule, raised
%       RAISED.
%
% \underline {TEXT} : Makes an underlined hbox with TEXT in it.
%
% \raisebox{DISTANCE}[HEIGHT][DEPTH]{BOX} : Raises BOX up by DISTANCE
%       length (down if DISTANCE negative). Makes TeX think that
%       the new box extends HEIGHT above the line and DEPTH below, for
%       a total vertical length of HEIGHT+DEPTH. Default values of
%       HEIGHT & DEPTH = actual height and depth of box in new position.
%
% \makebox ==
% BEGIN
%   if next char = (
%     then \@makepicbox
%     else if next char = [
%             then \@makebox
%             else \mbox    fi
%   fi
% END
%
% \@makebox[LEN] ==
% BEGIN
%  leave vertical mode
%  if next char '[' then \@imakebox[LEN]
%                   else \@imakebox[LEN][x] fi
% END
%
% \@imakebox[LEN][POS]{OBJ} ==
% BEGIN
%   \hbox to LEN
%     { \mb@l :=L \mb@r :=L \hss
%       \let\mb@POS = \relax
%      \mb@l OBJ \mb@r }
% END
%
% \@makepicbox(X,Y) ==
% BEGIN
%   leave vertical mode
%   if next char = [ then \@imakepicbox(X,Y)
%                    else \@imakepicbox(X,Y)[] fi
% END
%
% \@imakepicbox(X,Y)[POS]{OBJ} ==
% BEGIN
%   \vbox to Y * \unitlength
%      { \mb@l :=L \mb@r :=L \hss
%        \mb@t :=L \mb@b :=L \hss
%        tfor \@tempa := POS  % one iteration for each token in POS
%          do  \mb@eval(\@tempa) :=L null od
%        \mb@t
%        \hbox to X * \unitlength
%          {\mb@l OBJ \mb@r }
%       \mb@b}
% END
%

\def\makebox{\@ifnextchar ({\@makepicbox}{\@ifnextchar
     [{\@makebox}{\mbox}}}

```

```
\def\mbox#1{\leavevmode\hbox{#1}}

\def\@makebox[#1]{\leavevmode\@ifnextchar [{\@imakebox[#1]}{\@imakebox[#1][x]}}

\long\def\@imakebox[#1][#2]#3{\hbox to#1{\let\mb@l\hss
\let\mb@r\hss \expandafter\let\csname mb@#2\endcsname\relax
\mb@l #3\mb@r}}

\def\@makepicbox(#1,#2){\leavevmode\@ifnextchar
   [{\@imakepicbox(#1,#2)}{\@imakepicbox(#1,#2)[]}}

\long\def\@imakepicbox(#1,#2)[#3]#4{\vbox to#2\unitlength
   {\let\mb@b\vss \let\mb@l\hss\let\mb@r\hss
    \let\mb@t\vss
    \@tfor\@tempa :=#3\do{\expandafter\let
       \csname mb@\@tempa\endcsname\relax}%
\mb@t\hbox to #1\unitlength{\mb@l #4\mb@r}\mb@b}}

\def\newsavebox#1{\@ifdefinable#1{\newbox#1}}

\def\savebox#1{\@ifnextchar ({\@savepicbox#1}{\@ifnextchar
     [{\@savebox#1}{\sbox#1}}}

\def\sbox#1#2{\setbox#1\hbox{#2}}

\def\@savebox#1[#2]{\@ifnextchar [{\@isavebox#1[#2]}{\@isavebox#1[#2][x]}}

\long\def\@isavebox#1[#2][#3]#4{\setbox#1 \hbox{\@imakebox[#2][#3]{#4}}}

\def\@savepicbox#1(#2,#3){\@ifnextchar
   [{\@isavepicbox#1(#2,#3)}{\@isavepicbox#1(#2,#3)[]}}

\long\def\@isavepicbox#1(#2,#3)[#4]#5{\setbox#1 \hbox{\@imakepicbox
     (#2,#3)[#4]{#5}}}

\def\usebox#1{\leavevmode\copy #1\relax}

%% The following definition of \frame was written by Pavel Curtis
%% (Extra space removed 14 Jan 88)
\long\def\frame#1{\leavevmode
    \hbox{\hskip-\@wholewidth
     \vbox{\vskip-\@wholewidth
           \hrule \@height\@wholewidth
          \hbox{\vrule \@width\@wholewidth #1\vrule \@width\@wholewidth}\hrule
           \@height \@wholewidth\vskip -\@halfwidth}\hskip-\@wholewidth}}

\newdimen\fboxrule
\newdimen\fboxsep

%% (Extra space removed 21 Jun 1991)
\long\def\fbox#1{\leavevmode\setbox\@tempboxa\hbox{#1}\@tempdima\fboxrule
    \advance\@tempdima \fboxsep \advance\@tempdima \dp\@tempboxa
   \hbox{\lower \@tempdima\hbox
  {\vbox{\hrule \@height \fboxrule
          \hbox{\vrule \@width \fboxrule \hskip\fboxsep
          \vbox{\vskip\fboxsep \box\@tempboxa\vskip\fboxsep}\hskip
                \fboxsep\vrule \@width \fboxrule}%
                \hrule \@height \fboxrule}}}}

\def\framebox{\@ifnextchar ({\@framepicbox}{\@ifnextchar
     [{\@framebox}{\fbox}}}

\def\@framebox[#1]{\@ifnextchar [{\@iframebox[#1]}{\@iframebox[#1][x]}}

%% (Extra space removed 21 Jun 1991)
\long\def\@iframebox[#1][#2]#3{\leavevmode
  \savebox\@tempboxa[#1][#2]{\kern\fboxsep #3\kern\fboxsep}\@tempdima\fboxrule
    \advance\@tempdima \fboxsep \advance\@tempdima \dp\@tempboxa
   \hbox{\lower \@tempdima\hbox
  {\vbox{\hrule \@height \fboxrule
          \hbox{\vrule \@width \fboxrule \hskip-\fboxrule
              \vbox{\vskip\fboxsep \box\@tempboxa\vskip\fboxsep}\hskip
                  -\fboxrule\vrule \@width \fboxrule}%
                  \hrule \@height \fboxrule}}}}
```

```
3995
3996 \def\@framepicbox(#1,#2){\@ifnextchar
3997    [{\@iframepicbox(#1,#2)}{\@iframepicbox(#1,#2)[]}}
3998
3999 \long\def\@iframepicbox(#1,#2)[#3]#4{\frame{\@imakepicbox(#1,#2)[#3]{#4}}}
4000
4001 \def\parbox{\@ifnextchar [{\@iparbox}{\@iparbox[c]}}
4002
4003 \long\def\@iparbox[#1]#2#3{\leavevmode \@pboxswfalse
4004    \if #1b\vbox
4005      \else \if #1t\vtop
4006              \else \ifmmode \vcenter
4007                       \else \@pboxswtrue $\vcenter
4008                     \fi
4009            \fi
4010 %% RmS 91/11/04 added \m@th
4011     \fi{\hsize #2\@parboxrestore #3}\if@pboxsw \m@th$\fi}
4012
4013 \let\@dischyph=\-
4014 \let\@acci=\'
4015 \let\@accii=\`
4016 \let\@acciii=\=
4017
4018
4019 \def\@arrayparboxrestore{\let\par\@@par
4020     \let\-\@dischyph
4021     \let\'\@acci \let\`\@accii \let\=\@acciii
4022     \parindent\z@ \parskip\z@
4023     \everypar{}\linewidth\hsize
4024     \@totalleftmargin\z@ \leftskip\z@ \rightskip\z@ \@rightskip\z@
4025     \parfillskip\@flushglue \lineskip\normallineskip
4026     \baselineskip\normalbaselineskip\sloppy}
4027
4028 \def\@parboxrestore{\@arrayparboxrestore\let\\=\@normalcr}
4029
4030 \newif\if@minipage \@minipagefalse
4031
4032 \def\minipage{\@ifnextchar [{\@iminipage}{\@iminipage[c]}}
4033
4034 \def\@iminipage[#1]#2{\leavevmode \@pboxswfalse
4035    \if #1b\vbox
4036      \else \if #1t\vtop
4037              \else \ifmmode \vcenter
4038                       \else \@pboxswtrue $\vcenter
4039                     \fi
4040            \fi
4041     \fi\bgroup
4042     \hsize #2\textwidth\hsize \columnwidth\hsize
4043     \@parboxrestore
4044     \def\@mpfn{mpfootnote}\def\thempfn{\thempfootnote}\c@mpfootnote\z@
4045     \let\@footnotetext\@mpfootnotetext
4046     \let\@listdepth\@mplistdepth \@mplistdepth\z@
4047     \@minipagerestore\global\@minipagetrue %% \global added 24 May 89
4048     \everypar{\global\@minipagefalse\everypar{}}}
4049
4050
4051 \let\@minipagerestore=\relax
4052
4053 \def\endminipage{\par\vskip-\lastskip
4054 \ifvoid\@mpfootins\else
4055 \vskip\skip\@mpfootins\footnoterule\unvbox\@mpfootins\fi
4056 \global\@minipagefalse %% added 24 May 89
4057 \egroup\if@pboxsw \m@th$\fi} %% RmS 91/11/04 added \m@th
4058
4059 \newcount\@mplistdepth
4060 \newinsert\@mpfootins
4061
4062 %% RmS 91/09/29: added \reset@font
4063 \long\def\@mpfootnotetext#1{\global\setbox\@mpfootins
4064     \vbox{\unvbox\@mpfootins
4065     \reset@font\footnotesize
4066     \hsize\columnwidth \@parboxrestore
4067    \edef\@currentlabel{\csname p@mpfootnote\endcsname\@thefnmark}\@makefntext
4068      {\rule{\z@}{\footnotesep}\ignorespaces #1\strut}}}
```

```
4069      % \strut added 27 Mar 89, on suggestion by Don Hosek
4070
4071 \newif\if@pboxsw
4072
4073 \def\rule{\@ifnextchar[{\@rule}{\@rule[\z@]}}
4074
4075 \def\@rule[#1]#2#3{\@tempdima#3\advance\@tempdima #1\leavevmode\hbox{\vrule
4076   \@width#2 \@height\@tempdima \@depth-#1}}
4077
4078 \let\@@underline\underline
4079 \def\underline#1{\relax\ifmmode
4080   \@@underline{#1}\else $\@@underline{\hbox{#1}}\m@th$\relax\fi}
4081
4082 \def\raisebox#1{\@ifnextchar[{\@argrsbox{#1}}{\@rsbox{#1}}}
4083
4084 \def\@argrsbox#1[#2]{%
4085 \@ifnextchar[{\@iirsbox{#1}[#2]}{\@irsbox{#1}[#2]}}
4086
4087 \long\def\@rsbox#1#2{\leavevmode\hbox{\raise #1\hbox{#2}}}
4088
4089 \long\def\@irsbox#1[#2]#3{\setbox\@tempboxa \hbox
4090    {\raise #1\hbox{#3}}\ht\@tempboxa#2\leavevmode\box\@tempboxa}
4091
4092 \long\def\@iirsbox#1[#2][#3]#4{\setbox\@tempboxa \hbox
4093    {\raise #1\hbox{#4}}\ht\@tempboxa#2\dp\@tempboxa#3\leavevmode\box\@tempboxa}
4094
4095
4096  \message{tabbing,}
4097 %       ****************************************
4098 %       *       THE TABBING ENVIRONMENT        *
4099 %       ****************************************
4100 %
4101 %  \dimen(\@firsttab + i) = distance of tab stop i from left margin
4102 %         0 <= i <= 15 (?).
4103 %
4104 %  \dimen\@firsttab is initialized to \@totalleftmargin, so it starts
4105 %      at the prevailing left margin.
4106 %
4107 %  \@maxtab         = number of highest defined tab register
4108 %                       probably = \@firsttab + 12
4109 %  \@nxttabmar = tab stop number of next line's left margin
4110 %  \@curtabmar = tab stop number of current line's left margin
4111 %  \@curtab    = number of the current tab. At start of line,
4112 %                    it equals \@curtabmar
4113 %  \@hightab   = largest tab number currently defined.
4114 %  \@tabpush   = depth of \pushtab's
4115 %
4116 %  \box\@curline    = contents of current line, excluding left margin skip,
4117 %                     and excluding contents of current field
4118 %  \box\@curfield   = contents of current field
4119 %
4120 %  @rjfield         = switch: T iff the last field of the line should be
4121 %                     right-justified at the right margin.
4122 %
4123 %  \tabbingsep        = distance left by the \' command between the current
4124 %                     position and the field that is ``left-shifted''.
4125 %
4126 %  UTILITY MACROS
4127 %   \@stopfield : closes the current field
4128 %   \@addfield  : adds the current field to the current line.
4129 %   \@contfield : continues the current field
4130 %   \@startfield : begins the next field
4131 %   \@stopline  : closes the current line and outputs it
4132 %   \@startline : starts the next line
4133 %   \@ifatmargin : an \if that is true iff the current line.
4134 %                  has width zero
4135 %
4136 % \@startline ==
4137 %  BEGIN
4138 %   \@curtabmar :=G \@nxttabmar
4139 %   \@curtab :=G \@curtabmar
4140 %   \box\@curline :=G null
4141 %   \@startfield
4142 %   \strut
```

```
% END
%
% \@stopline ==
% BEGIN
%  \unskip
%  \@stopfield
%  if @rjfield = T
%    then @rjfield :=G F
%         \@tempdima := \@totalleftmargin + \linewidth
%         \hbox to \@tempdima{\@itemfudge
%                             \hskip \dimen\@curtabmar
%                             \box\@curline
%                             \hfil
%                             \box\@curfield}
%    else \@addfield
%         \hbox {\@itemfudge
%                \hskip \dimen\@curtabmar
%                \box\@curline}
%  fi
% END
%
% \@startfield ==
% BEGIN
%   \box\@curfield :=G \hbox {
% END
%
% \@stopfield ==
% BEGIN
%    }
% END
%
% \@contfield ==
% BEGIN
%  \box\@curfield :=G \hbox { \unhbox\@currfield %%} brace matching
% END
% \@addfield ==
% BEGIN
%  \box\@curline :=G \unbox\@curline * \unbox\@curfield
% END
%
% \@ifatmargin ==
% BEGIN
%  if  dim of box\@curline = 0pt then
% END
%
%
% \tabbing ==
% BEGIN
%  \lineskip :=L 0pt
%  \> == \@rtab
%  \< == \@ltab
%  \= == \@settab
%  \+ == \@tabplus
%  \- == \@tabminus
%  \‘ == \@tabrj
%  \’ == \@tablab
%  \\ == BEGIN \@stopline \@startline END
%  \\[DIST] == BEGIN \@stopline \vskip DIST \@startline\ignorespaces END
%  \\* == BEGIN \@stopline \penalty 10000 \@startline END
%  \\*[DIST] == BEGIN \@stopline \penalty 10000 \vskip DIST
%                     \@startline\ignorespaces           END
%  \@hightab :=G \@nxttabmar :=G \@firsttab
%  \@tabpush :=G 0
%  \dimen\@firsttab := \@totalleftmargin
%  @rjfield :=G F
%  \trivlist \item[]
%  if @minipage = F then \vskip \parskip fi
%  \box\@tabfbox = \rlap{\indent\the\everypar} % note: \the\everypar sets
%  \@itemfudge == BEGIN \box\@tabfbox END  %      @inlabel :=G F
%  \@startline
%  \ignorespaces
% END
%
% \@endtabbing ==
```

```
4217 %  BEGIN
4218 %   \@stopline
4219 %   if \@tabpush > 0 then error message: ''unmatched \poptabs'' fi
4220 %   \endtrivlist
4221 %  END
4222 %
4223 % \@rtab ==
4224 %  BEGIN
4225 %   \@stopfield
4226 %   \@addfield
4227 %   if \@curtab < \@hightab
4228 %     then \@curtab :=G \@curtab + 1
4229 %     else error message ``Undefined Tab'' fi
4230 %   \@tempdima := \dimen\@curtab - \dimen\@curtabmar
4231 %                       - width of box \@curline
4232 %   \box\@curline :=G \hbox{\unhbox\@curline + \hskip\@tempdima}
4233 %   \@startfield
4234 %  END
4235 %
4236 % \@settab ==
4237 %  BEGIN
4238 %   \@stopfield
4239 %   \@addfield
4240 %   if \@curtab < \@maxtab
4241 %     then \@curtab :=G \@curtab+1
4242 %     else error message: ``Too many tabs'' fi
4243 %   if \@curtab > \@hightab
4244 %     then \@hightab :=L \@curtab fi
4245 %   \dimen\@curtab :=L \dimen\@curtabmar + width of \box\@curline
4246 %   \@startfield
4247 %  END
4248 %
4249 % \@ltab ==
4250 %  BEGIN
4251 %   \@ifatmargin
4252 %     then if \@curtabmar > \@firsttab
4253 %            then \@curtab :=G \@curtab - 1
4254 %                 \@curtabmar :=G \@curtabmar - 1
4255 %            else error message ``Too many untabs''  fi
4256 %     else error message ``Left tab in middle of line''
4257 %    fi
4258 %  END
4259 %
4260 % \@tabplus ==
4261 %  BEGIN
4262 %        if  \@nxttabmar < \@hightab
4263 %           then \@nxttabmar :=G \@nxttabmar+1
4264 %           else error message ``Undefined tab''
4265 %        fi
4266 %  END
4267 %
4268 % \@tabminus ==
4269 %  BEGIN
4270 %        if \@nxttabmar > \@firsttab
4271 %           then \@nxttabmar :=G \@nxttabmar-1
4272 %           else error message ``Too many untabs''
4273 %        fi
4274 %  END
4275 %
4276 % \@tabrj ==
4277 %  BEGIN \@stopfield
4278 %        \@addfield
4279 %        @rjfield :=G T
4280 %        \@startfield
4281 %  END
4282 %
4283 % \@tablab ==
4284 %  BEGIN \@stopfield
4285 %        \box\@curline G:= \hbox{ \box\@curline %% `G' added 17 Jun 86
4286 %                                \hskip - width of \box\@curfield
4287 %                                \hskip -\tabbingsep
4288 %                                \box\@curfield
4289 %                                \hskip \tabbingsep }
4290 %        \@startfield
```

```
% END
%
% \pushtabs ==
%  BEGIN
%    \@stopfield
%    \@tabpush :=G \@tabpush + 1
%    \begingroup
%    \@contfield
%  END
%
% \poptabs ==
% BEGIN
%   \@stopfield
%   if \@tabpush > 0
%     then \endgroup
%          \@tabpush :=G \@tabpush - 1
%     else error message: ``Too many \poptabs''
%   fi
%   \@contfield
% END
%
% The accents \` , \' , and \= that have been redefined inside a tabbing
% environment can be called by typing \a` , \a' , and \a=.
%

\expandafter \let \csname a`\endcsname = \`
\expandafter \let \csname a'\endcsname = \'
\expandafter \let \csname a=\endcsname = \=
\def\a#1{\csname a#1\endcsname}

\newif\if@rjfield
\newcount\@firsttab
\newcount\@maxtab
\newdimen\@gtempa \@firsttab=\allocationnumber
\newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa
\newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa
\newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa
\newdimen\@gtempa \@maxtab=\allocationnumber
\dimen\@firsttab=0pt
\newcount\@nxttabmar
\newcount\@curtabmar
\newcount\@curtab
\newcount\@hightab
\newcount\@tabpush
\newbox\@curline
\newbox\@curfield
\newbox\@tabfbox

\def\@startline{\global\@curtabmar\@nxttabmar
   \global\@curtab\@curtabmar\global\setbox\@curline\hbox % missing \global
    {}\@startfield\strut}                                 % added 17 Jun 86

\def\@stopline{\unskip\@stopfield\if@rjfield \global\@rjfieldfalse
   \@tempdima\@totalleftmargin \advance\@tempdima\linewidth
\hbox to\@tempdima{\@itemfudge\hskip\dimen\@curtabmar
   \box\@curline\hfil\box\@curfield}\else\@addfield
   \hbox{\@itemfudge\hskip\dimen\@curtabmar\box\@curline}\fi}

\def\@startfield{\global\setbox\@curfield\hbox\bgroup}%{ BRACE MATCH HACK
\let\@stopfield=}
\def\@contfield{\global\setbox\@curfield\hbox\bgroup\unhbox\@curfield}
\def\@addfield{\global\setbox\@curline\hbox{\unhbox
     \@curline\unhbox\@curfield}}
\def\@ifatmargin{\ifdim \wd\@curline =\z@}

\def\@tabcr{\@stopline \@ifstar{\penalty \@M \@xtabcr}{\@xtabcr}}

\def\@xtabcr{\@ifnextchar[{\@itabcr}{\@startline\ignorespaces}}

\def\@itabcr[#1]{\vskip #1\@startline\ignorespaces}

\def\kill{\@stopfield\@startline\ignorespaces}

% REMOVE \outer FROM PLAIN'S DEF OF \+
```

```
4365
4366 \def\+{\tabalign}
4367
4368
4369 \def\tabbing{\lineskip \z@\let\>\@rtab\let\<\@ltab\let\=\@settab
4370      \let\+\@tabplus\let\-\@tabminus\let\`\@tabrj\let\'\@tablab
4371      \let\\=\@tabcr
4372      \global\@hightab\@firsttab
4373      \global\@nxttabmar\@firsttab
4374      \dimen\@firsttab\@totalleftmargin
4375      \global\@tabpush\z@ \global\@rjfieldfalse
4376      \trivlist \item[]\if@minipage\else\vskip\parskip\fi
4377      \setbox\@tabfbox\hbox{\rlap{\indent\hskip\@totalleftmargin
4378        \the\everypar}}\def\@itemfudge{\box\@tabfbox}\@startline\ignorespaces}
4379
4380 \def\endtabbing{\@stopline\ifnum\@tabpush >\z@ \@badpoptabs \fi\endtrivlist}
4381
4382 \def\@rtab{\@stopfield\@addfield\ifnum \@curtab<\@hightab
4383       \global\advance\@curtab \@ne \else\@badtab\fi
4384       \@tempdima\dimen\@curtab
4385       \advance\@tempdima -\dimen\@curtabmar
4386       \advance\@tempdima -\wd\@curline
4387       \global\setbox\@curline\hbox{\unhbox\@curline\hskip\@tempdima}%
4388       \@startfield\ignorespaces}
4389 % Omitted \global added to \@rtab 17 Jun 86
4390
4391 \def\@settab{\@stopfield\@addfield\ifnum \@curtab <\@maxtab
4392       \global\advance\@curtab \@ne \else\@latexerr{Tab overflow}\@ehd\fi
4393       \ifnum\@curtab >\@hightab
4394       \@hightab\@curtab\fi
4395       \dimen\@curtab\dimen\@curtabmar
4396       \advance\dimen\@curtab \wd\@curline\@startfield\ignorespaces}
4397 \def\@ltab{\@ifatmargin\ifnum\@curtabmar >\@firsttab
4398       \global\advance\@curtab \m@ne \global\advance\@curtabmar \m@ne \else
4399       \@badtab\fi\else
4400       \@latexerr{\string\<\space in mid line}\@ehd\fi\ignorespaces}
4401 \def\@tabplus {\ifnum \@nxttabmar <\@hightab
4402       \global\advance\@nxttabmar \@ne \else
4403       \@badtab\fi\ignorespaces}
4404 \def\@tabminus{\ifnum\@nxttabmar >\@firsttab
4405       \global\advance\@nxttabmar \m@ne \else
4406       \@badtab\fi\ignorespaces}
4407 \def\@tabrj{\@stopfield\@addfield\global\@rjfieldtrue\@startfield\ignorespaces}
4408
4409 \def\@tablab{\@stopfield\global\setbox\@curline\hbox{\box\@curline
4410      \hskip -\wd\@curfield \hskip -\tabbingsep \box\@curfield
4411       \hskip \tabbingsep}\@startfield\ignorespaces}
4412 % \setbox\@curline made \global in \@tablab. 17 Jun 86
4413
4414 \def\pushtabs{\@stopfield\@addfield\global\advance\@tabpush \@ne \begingroup
4415        \@contfield}
4416 \def\poptabs{\@stopfield\@addfield\ifnum\@tabpush >\z@ \endgroup
4417      \global\advance\@tabpush \m@ne \else
4418      \@badpoptabs\fi\@contfield}
4419
4420 \newdimen\tabbingsep
4421
4422  \message{array,}
4423 %      ****************************************
4424 %      *    ARRAY AND TABULAR ENVIRONMENTS *
4425 %      ****************************************
4426 %
4427 % ARRAY PARMETERS:
4428 %  \arraycolsep   : half the width separating columns in an array environment
4429 %  \tabcolsep     : half the width separating columns in a tabular environment
4430 %  \arrayrulewidth : width of rules
4431 %  \doublerulesep : space between adjacent rules in array or tabular
4432 %  \arraystretch : line spacing in array and tabular environments is done by
4433 %                  placing a strut in every row of height and depth
4434 %                  \arraystretch times the height and depth of the strut
4435 %                  produced by an ordinary \strut commmand.
4436 %
4437 % PREAMBLE:
4438 %  The PREAMBLE argument of an array or tabular environment can contain
```

```
% the following:
%   l,r,c : indicate where entry is to be placed.
%   |     : for vertical rule
%   @{EXP} : inserts the text EXP in every column. \arraycolsep or \tabcolsep
%            spacing is suppressed.
%   *{N}{PRE} : equivalent to writing N copies of PRE in the preamble. PRE
%               may contain *{N'}{EXP'} expressions.
%   p{LEN} : makes entry in parbox of width LEN.
%
% SPECIAL ARRAY COMMANDS:
%  \multicolumn{N}{FORMAT}{ITEM} : replaces the next N column items by
%     ITEM, formatted according to FORMAT. FORMAT should contain at most
%     one l,r or c. If it contains none, then ITEM is ignored.
%
%  \vline : draws a vertical line the height of the current row. May
%           appear in an array element entry.
%  \hline : draws a horizontal line between rows. Must appear either
%           before the first entry (to appear above the first row) or right
%           after a \\ command. If followed by another \hline, then adds
%           a \vskip of \doublerulesep.
%
%  \cline[i-j] : draws horizontal lines between rows covering columns
%                i through j, inclusive. Multiple commands may follow
%                one another to provide lines covering several disjoint
%                columns
%  \extracolsep{WIDTH} : for use inside an @ in the preamble. Causes a WIDTH
%                space to be added between columns for the rest of the
%                columns. This is in addition to the ordinary intercolumn
%                space.
%
% \array ==
%   BEGIN
%     \@acol   == \@arrayacol
%     \@classz == \@arrayclassz
%     \@classiv == \@arrayclassiv
%     \\       == \@arraycr
%     \@halignto == NULL
%     \@tabarray
%   END
%
% \endarray{NAME} == BEGIN \crcr }} END
%
% \tabular ==
%   BEGIN
%     \@halignto == NULL
%     \@tabular
%   END
%
% \tabular*{WIDTH} ==
%   BEGIN
%     \@halignto == to WIDTH
%     \@tabular
%   END
%
% \@tabular ==
%   BEGIN
%     \leavevmode
%     \hbox { $
%        \@acol   == \@tabacol
%        \@classz == \@tabclassz
%        \@classiv == \@tabclassiv
%        \\       == \@tabularcr
%        \@tabarray
%   END
%
% \endtabular == BEGIN \crcr}} $} END
%
% \@tabarray == if next char = [ then \@array else \@array[c] fi
%
% \@array[POS]{PREAMBLE} ==
%   BEGIN
%     define \@arstrutbox to make \@arstrut produce strut of height
%       and depth \arraystretch times the height and
%       depth of a normal strut.
```

```
%      \@mkpream{PREAMBLE}
%      \@preamble == \halign \@halignto {\tabskip=Opt\@arstrut
%                                 eval{\@preamble}\tabskip = Opt\cr %% }
%      \@startpbox == \@@startpbox
%      \@endpbox == \@@endpbox
%      if POS = t then \vtop
%                 else if POS = b then \vbox
%                                 else \vcenter
%      fi             fi
%     {
%      \par         ==L \relax
%      \@sharp      == #
%      \protect     == \relax
%      \lineskip    :=L Opt
%      \baselineskip :=L Opt
%      \@preamble
%    END
%
%
%  \@arraycr ==
%   BEGIN
%     $                   %% Prevents extra space at end of row's last entry.
%     if next char = [
%      then \@argarraycr
%      else $ \cr         %% Needed to balance $
%   END
%
%  \@argarraycr[LENGTH] ==
%   BEGIN
%     $                   %% Needed to balance $ of \@arraycr
%     if LENGTH > 0
%       then \@tempdima := depth of \@arstrutbox + LENGTH
%            \vrule height Opt width Opt depth \@tempdima
%            \cr
%       else \cr \noalign{\vskip LENGTH}
%   END
%
%  \@tabularcr and \@argtabularcr same as \@arraycr and \@argarraycr
%  except without the extra $'s.

\def\extracolsep#1{\tabskip #1\relax}

\def\array{\let\@acol\@arrayacol \let\@classz\@arrayclassz
 \let\@classiv\@arrayclassiv \let\\\@arraycr\let\@halignto\@empty\@tabarray}

\def\endarray{\crcr\egroup\egroup}
\def\endtabular{\crcr\egroup\egroup $\egroup}
\expandafter \let \csname endtabular*\endcsname = \endtabular

\def\tabular{\let\@halignto\@empty\@tabular}

\expandafter \def\csname tabular*\endcsname #1{\def\@halignto{to#1}\@tabular}

\def\@tabular{\leavevmode \hbox \bgroup $\let\@acol\@tabacol
   \let\@classz\@tabclassz
   \let\@classiv\@tabclassiv \let\\\@tabularcr\@tabarray}

%% RmS 91/11/04 added \m@th
\def\@tabarray{\m@th\@ifnextchar[{\@array}{\@array[c]}}

\def\@array[#1]#2{\setbox\@arstrutbox\hbox{\vrule
     \@height\arraystretch \ht\strutbox
     \@depth\arraystretch \dp\strutbox
     \@width\z@}\@mkpream{#2}\edef\@preamble{\halign \noexpand\@halignto
\bgroup \tabskip\z@ \@arstrut \@preamble \tabskip\z@ \cr}%
\let\@startpbox\@@startpbox \let\@endpbox\@@endpbox
  \if #1t\vtop \else \if#1b\vbox \else \vcenter \fi\fi
  \bgroup \let\par\relax
  \let\@sharp##\let\protect\relax \lineskip\z@\baselineskip\z@\@preamble}

\def\@arraycr{${\ifnum0=`}\fi\@ifstar{\@xarraycr}{\@xarraycr}}
\def\@xarraycr{\@ifnextchar[{\@argarraycr}{\ifnum0=`{\fi}${}\cr}}

\def\@argarraycr[#1]{\ifnum0=`{\fi}${}\ifdim #1>\z@ \@xargarraycr{#1}\else
```

```
4587    \@yargarraycr{#1}\fi}
4588
4589 \def\@tabularcr{{\ifnum0=`}\fi\@ifstar{\@xtabularcr}{\@xtabularcr}}
4590 \def\@xtabularcr{\@ifnextchar[{\@argtabularcr}{\ifnum0=`{\fi}\cr}}
4591
4592 \def\@argtabularcr[#1]{\ifnum0=`{\fi}\ifdim #1>\z@
4593    \unskip\@xargarraycr{#1}\else \@yargarraycr{#1}\fi}
4594
4595 \def\@xargarraycr#1{\@tempdima #1\advance\@tempdima \dp \@arstrutbox
4596    \vrule \@height\z@ \@depth\@tempdima \@width\z@ \cr}
4597
4598 \def\@yargarraycr#1{\cr\noalign{\vskip #1}}
4599
4600
4601 % \multicolumn{NUMBER}{FORMAT}{ITEM} ==
4602 %  BEGIN
4603 %  \multispan{NUMBER}
4604 %  \begingroup
4605 %  \@addamp == null
4606 %  \@mkpream{FORMAT}
4607 %  \@sharp == ITEM
4608 %  \protect == \relax
4609 %  \@startpbox == \@@startpbox
4610 %  \@endpbox == \@@endpbox
4611 %  \@arstrut
4612 %  \@preamble
4613 %  \endgroup
4614 %  END
4615
4616 % The command \def\@addamp{} was removed from \multicolumn on 6 Dec 86
4617 % because it caused embedded array environments not to work. I think
4618 % that it was included originally to prevent an error message if
4619 % the 2nd argument to the \multicolumn command had two column specifiers.
4620 %
4621 % 8 Feb 89 - \hbox{} added after \@preamble to correct bug that
4622 %           occurred if \multicolumn preceded \\[D] with D > 0,
4623 %           caused by \\[] command doing an \unskip, which removed
4624 %           \tabcolsep glue inserted by \multicolumn
4625
4626 \def\multicolumn#1#2#3{\multispan{#1}\begingroup
4627 \@mkpream{#2}%
4628 \def\@sharp{#3}\let\protect\relax
4629   \let\@startpbox\@@startpbox\let\@endpbox\@@endpbox
4630   \@arstrut \@preamble\hbox{}\endgroup\ignorespaces}
4631
4632
4633 % Codes for classes and character numbers of array, tabular and
4634 % multicolumn arguments.
4635 %
4636 %    Character    Class      Number
4637 %    ---------    -----      ------
4638 %        c          0          0
4639 %        l          0          1
4640 %        r          0          2
4641 %
4642 %        |          1          -
4643 %        @          2          -
4644 %        p          3          -
4645 %      {@-exp}      4          -
4646 %      {p-arg}      5          -
4647 %
4648 % \@testpach \foo : expands \foo, which should be an array parameter token,
4649 %                   and sets \@chclass and \@chnum to its class and number.
4650 %                   Uses \@lastchclass to distinguish 4 and 5
4651 %
4652 % Preamble error codes
4653 %    0: 'illegal character'
4654 %    1: 'Missing @-exp'
4655 %    2: 'Missing p-arg'
4656 %
4657 % \@addamp ==
4658 %   BEGIN if @firstamp = true then @firstamp := false
4659 %                             else &                  fi
4660 %   END
```

```
4661 %
4662 % \@mkpream TOKENLIST ==
4663 %  BEGIN
4664 %   @firstamp    := T
4665 %   \@lastchclass := 6
4666 %   \@preamble   == null
4667 %   \@sharp      == \relax
4668 %   \protect     == BEGIN \noexpand\protect\noexpand END
4669 %   \@startpbox  == \relax
4670 %   \@endpbox    == \relax
4671 %   \@expast{TOKENLIST}
4672 %   for \@nextchar := expand(\@tempa)
4673 %     do  \@testpach{\@nextchar}
4674 %         case of \@chclass
4675 %           0 -> \@classz
4676 %           1 -> \@classi
4677 %             ...
4678 %           5 -> \@classv
4679 %         end case
4680 %         \@lastchclass := \@chclass
4681 %     od
4682 %     case of \@lastchclass
4683 %        0 -> \hskip \arraycolsep          % lrc
4684 %        1 ->                               % |
4685 %        2 -> \@preamerr1 % 'Missing @-exp' % @
4686 %        3 -> \@preamerr2 % 'Missing p-arg' % p
4687 %        4 ->                               % @-exp
4688 %        5 -> \hskip \arraycolsep          % p-exp
4689 %     end case
4690 %  END
4691 %
4692 % \@arrayclassz ==
4693 %   BEGIN
4694 %     \@preamble := \@preamble *
4695 %                   case of \@lastchclass
4696 %                     0 -> \hskip \arraycolsep \@addamp \hskip \arraycolsep
4697 %                     1 -> \@addamp \hskip \arraycolsep
4698 %                     2 -> % impossible
4699 %                     3 -> % impossible
4700 %                     4 -> \@addamp
4701 %                     5 -> \hskip \arraycolsep \@addamp \hskip \arraycolsep
4702 %                     6 -> \@addamp \hskip \arraycolsep
4703 %                   end case
4704 %                 * case of \@chnum
4705 %                      0 -> \hfil$\relax\@sharp$\hfil
4706 %                      1 -> $\relax\@sharp$\hfil
4707 %                      2 -> \hfil$\relax\@sharp$
4708 %                   end case
4709 %   END
4710 %
4711 % \@tabclassz == similar to \@arrayclassz
4712 %
4713 % \@classi ==
4714 % BEGIN
4715 %   \@preamble := \@preamble *
4716 %                 case of \@lastchclass
4717 %                   0 -> \hskip \arraycolsep \@arrayrule
4718 %                   1 -> \hskip \doublerulesep \@arrayrule
4719 %                   2 -> % impossible
4720 %                   3 -> % impossible
4721 %                   4 -> \@arrayrule
4722 %                   5 -> \hskip \arraycolsep \@arrayrule
4723 %                   6 -> \@arrayrule
4724 %                 end case
4725 % END
4726 %
4727 % \@classii ==
4728 % BEGIN
4729 %   \@preamble := \@preamble *
4730 %                 case of \@lastchclass
4731 %                   0   ->
4732 %                   1   -> \hskip .5\arrayrulewidth
4733 %                   2   -> % impossible
4734 %                   else ->
```

```
% end case
% END
%
% \@classiii ==
% BEGIN
%   \@preamble := \@preamble *
%                 case of \@lastchclass
%                    0 -> \hskip \arraycolsep \@addamp \hskip \arraycolsep
%                    1 -> \@addamp \hskip \arraycolsep
%                    2 -> % impossible
%                    3 -> % impossible
%                    4 -> \@addamp
%                    5 -> \hskip \arraycolsep \@addamp \hskip \arraycolsep
%                    6 -> \@addamp \hskip \arraycolsep
%                 end case
% END
%
% \@arrayclassiv == BEGIN \@preamble := \@preamble * $ \@nextchar$ END
%
% \@tabclassiv == same as \@arrayclassv except without the $ ... $
%
% \@classv ==
%  BEGIN
%   \@preamble := \@preamble * \@startpbox{\@nextchar}\ignorespaces\@sharp
%                              \@endpbox
%  END
%
% \@expast{S}: Sets \@tempa := S with all instances of *{N}{STRING}
%              replaced by N copies of STRING, where N > 0. An *
%              appearing inside braces is ignored, but *-expressions
%              inside STRING are expanded, so nested *-expressions are
%              handled properly.
%
% \@expast{S} == BEGIN \@xexpast S *0x\@@ END
%
% \@xexpast S1 *{N}{S2} S3 \@@ ==
% BEGIN
%   \@tempa  := S1
%   \@tempcnta := N
%   if \@tempcnta > 0
%     then while \@tempcnta > 0 do \@tempa := \@tempa S2
%                                  \@tempcnta := \@tempcnta - 1 od
%          \@tempb == \@xexpast
%     else \@tempb == \@xexnoop
%   fi
%   \expandafter \@tempb \@tempa S3 \@@
% END
%

\def\@xexnoop #1\@@{}

\def\@expast#1{\@xexpast #1*0x\@@}

\def\@xexpast#1*#2#3#4\@@{\edef\@tempa{#1}\@tempcnta#2\relax
    \ifnum\@tempcnta >\z@ \@whilenum\@tempcnta >\z@\do
      {\edef\@tempa{\@tempa#3}\advance\@tempcnta \m@ne}\let\@tempb\@xexpast
     \else \let\@tempb\@xexnoop\fi
    \expandafter\@tempb \@tempa #4\@@}


\newif\if@firstamp
\def\@addamp{\if@firstamp \@firstampfalse \else
    \edef\@preamble{\@preamble &}\fi}
\def\@arrayacol{\edef\@preamble{\@preamble \hskip \arraycolsep}}
\def\@tabacol{\edef\@preamble{\@preamble \hskip \tabcolsep}}
\def\@ampacol{\@addamp \@acol}
\def\@acolampacol{\@acol\@addamp\@acol}

\def\@mkpream#1{\@firstamptrue\@lastchclass6
\let\@preamble\@empty\def\protect{\noexpand\protect\noexpand}\let\@sharp\relax
\let\@startpbox\relax\let\@endpbox\relax
\@expast{#1}\expandafter\@tfor \expandafter
  \@nextchar \expandafter:\expandafter=\@tempa\do{\@testpach\@nextchar
  \ifcase \@chclass \@classz \or \@classi \or \@classii \or \@classiii
```

```
4809     \or \@classiv \or\@classv \fi\@lastchclass\@chclass}%
4810 \ifcase \@lastchclass \@acol
4811     \or \or \@preamerr \@ne\or \@preamerr \tw@\or \or \@acol \fi}
4812
4813 \def\@arrayclassz{\ifcase \@lastchclass \@acolampacol \or \@ampacol \or
4814    \or \or \@addamp \or
4815    \@acolampacol \or \@firstampfalse \@acol \fi
4816 \edef\@preamble{\@preamble
4817   \ifcase \@chnum
4818     \hfil$\relax\@sharp$\hfil \or $\relax\@sharp$\hfil
4819    \or \hfil$\relax\@sharp$\fi}}
4820
4821 %% RmS 91/08/14 inserted extra braces around entry for NFSS
4822 \def\@tabclassz{\ifcase \@lastchclass \@acolampacol \or \@ampacol \or
4823    \or \or \@addamp \or
4824    \@acolampacol \or \@firstampfalse \@acol \fi
4825 \edef\@preamble{\@preamble{%
4826   \ifcase \@chnum
4827     \hfil\ignorespaces\@sharp\unskip\hfil
4828     \or \ignorespaces\@sharp\unskip\hfil
4829     \or \hfil\hskip\z@ \ignorespaces\@sharp\unskip\fi}}}
4830
4831 \def\@classi{\ifcase \@lastchclass \@acol \@arrayrule \or
4832    \@addtopreamble{\hskip \doublerulesep}\@arrayrule\or
4833    \or \or \@arrayrule \or
4834    \@acol \@arrayrule \or \@arrayrule \fi}
4835
4836
4837 \def\@classii{\ifcase \@lastchclass \or
4838    \@addtopreamble{\hskip .5\arrayrulewidth}\fi}
4839
4840 \def\@classiii{\ifcase \@lastchclass \@acolampacol \or
4841    \@addamp\@acol \or
4842    \or \or \@addamp \or
4843    \@acolampacol \or \@ampacol \fi}
4844
4845 \def\@tabclassiv{\@addtopreamble\@nextchar}
4846
4847 \def\@arrayclassiv{\@addtopreamble{$\@nextchar$}}
4848
4849 \def\@classv{\@addtopreamble{\@startpbox{\@nextchar}\ignorespaces
4850 \@sharp\@endpbox}}
4851
4852 \def\@addtopreamble#1{\edef\@preamble{\@preamble #1}}
4853
4854 \newcount\@chclass
4855 \newcount\@lastchclass
4856 \newcount\@chnum
4857
4858 \newdimen\arraycolsep
4859 \newdimen\tabcolsep
4860 \newdimen\arrayrulewidth
4861 \newdimen\doublerulesep
4862
4863 \def\arraystretch{1}  % Default value.
4864
4865 \newbox\@arstrutbox
4866 \def\@arstrut{\relax\ifmmode\copy\@arstrutbox\else\unhcopy\@arstrutbox\fi}
4867
4868
4869 \def\@arrayrule{\@addtopreamble{\hskip -.5\arrayrulewidth
4870    \vrule \@width \arrayrulewidth\hskip -.5\arrayrulewidth}}
4871
4872 \def\@testpach#1{\@chclass \ifnum \@lastchclass=\tw@ 4 \else
4873     \ifnum \@lastchclass=3 5 \else
4874      \z@ \if #1c\@chnum \z@ \else
4875                              \if #1l\@chnum \@ne \else
4876                              \if #1r\@chnum \tw@ \else
4877          \@chclass \if #1|\@ne \else
4878                    \if #1@\tw@ \else
4879                    \if #1p3 \else \z@ \@preamerr 0\fi
4880   \fi  \fi  \fi  \fi  \fi  \fi
4881 \fi}
4882
```

```
\def\hline{\noalign{\ifnum0=`}\fi\hrule \@height \arrayrulewidth \futurelet
   \@tempa\@xhline}

\def\@xhline{\ifx\@tempa\hline\vskip \doublerulesep\fi
      \ifnum0=`{\fi}}

\def\vline{\vrule \@width \arrayrulewidth}

\newcount\@cla
\newcount\@clb

\def\cline#1{\@cline[#1]}
\def\@cline[#1-#2]{\noalign{\global\@cla#1\relax
\global\advance\@cla\m@ne
\ifnum\@cla>\z@\global\let\@gtempa\@clinea\else
  \global\let\@gtempa\@clineb\fi
\global\@clb#2\relax
\global\advance\@clb-\@cla}\@gtempa
\noalign{\vskip-\arrayrulewidth}}

\def\@clinea{\multispan\@cla&\multispan\@clb
\unskip\leaders\hrule \@height \arrayrulewidth \hfill
\cr}

\def\@clineb{\multispan\@clb
\unskip\leaders\hrule \@height \arrayrulewidth \hfill
\cr}

% \@startpbox{WIDTH} TEXT \egroup == \parbox{WIDTH}{TEXT}
% \@endpbox == \unskip \strut \par \egroup\hfil (Changed 14 Jan 89)
%

\def\@startpbox#1{\vtop\bgroup \hsize #1\@arrayparboxrestore}
\def\@endpbox{\unskip\strut\par\egroup\hfil}

% 14 Jan 89: Def of \@endpbox changed from
%    \def\@endpbox{\par\vskip\dp\@arstrutbox\egroup\hfil}
% so vertical spacing works out right if the last line of a `p' entry
% has a descender.

\let\@@startpbox=\@startpbox
\let\@@endpbox=\@endpbox

 \message{picture,}
%     ****************************************
%     *       THE PICTURE ENVIRONMENT        *
%     ****************************************
%
%  \unitlength    = value of dimension argument
%  \@wholewidth   = current line width
%  \@halfwidth    = half of current line width
%  \@linefnt      = font for drawing lines
%  \@circlefnt    = font for drawing circles
%
% \linethickness{DIM} : Sets the width of horizontal and vertical lines
%    in a picture to DIM. Does not change width of slanted lines
%    or circles.  Width of all lines reset by \thinlines and
%    \thicklines
%
% \picture(XSIZE,YSIZE)(XORG,YORG)
%   BEGIN
%     \@picht :=L YSIZE * \unitlength
%     box \@picbox :=
%          \hbox to XSIZE * \unitlength
%            {\hskip -XORG * \unitlength
%             \lower YORG * \unitlength
%             \hbox{
%             \ignorespaces  %% added 13 June 89
%   END
%
% \endpicture ==
%   BEGIN
%                  } \hss }
%                  heigth of \@picbox := \@picht
```

```
%                 depth of \@picbox := 0
%                 \mbox{\box\@picbox} %% change 26 Aug 91
%   END
%
% \put(X, Y){OBJ} ==
%   BEGIN
%     \@killglue
%     \raise Y * \unitlength \hbox to 0pt { \hskip X * \unitlength
%                                          OBJ \hss           }
%     \ignorespaces
%   END
%
% \multiput(X,Y)(DELX,DELY){N}{OBJ} ==
%   BEGIN
%     \@killglue
%     \@multicnt := N
%     \@xdim := X * \unitlength
%     \@ydim := Y * \unitlength
%     while \@multicnt > 0
%       do \raise \@ydim \hbox to 0pt { \hskip \@xdim
%                                       OBJ \hss  }
%          \@multicnt := \@multicnt - 1
%          \@xdim     := \@xdim + DELX * \unitlength
%          \@ydim     := \@ydim + DELY * \unitlength
%       od
%     \ignorespaces
%   END
%
%  \shortstack[POS]{TEXT} : Makes a \vbox containing TEXT stacked as
%      a one-column array, positioned l, r or c as indicated by POS.

\newdimen\@wholewidth
\newdimen\@halfwidth
\newdimen\unitlength \unitlength =1pt
\newbox\@picbox
\newdimen\@picht

\def\picture(#1,#2){\@ifnextchar({\@picture(#1,#2)}{\@picture(#1,#2)(0,0)}}

\def\@picture(#1,#2)(#3,#4){\@picht #2\unitlength
\setbox\@picbox\hbox to#1\unitlength\bgroup
\hskip -#3\unitlength \lower #4\unitlength \hbox\bgroup\ignorespaces}

%% 91/08/26 RmS & FMi: extra boxing level around \@picbox
%%     to guard against unboxing in math mode
%%     (proposed by John Hobby)

\def\endpicture{\egroup\hss\egroup\ht\@picbox\@picht
\dp\@picbox\z@\mbox{\box\@picbox}}

% In the definitions of \put and \multiput, \hskip was replaced by \kern
% just in case arg #3 = ``plus''. (Bug detected by Don Knuth.
% changed 20 Jul 87).
%
\long\def\put(#1,#2)#3{\@killglue\raise#2\unitlength\hbox to\z@{\kern
#1\unitlength #3\hss}\ignorespaces}

\long\def\multiput(#1,#2)(#3,#4)#5#6{\@killglue\@multicnt #5\relax
\@xdim #1\unitlength
\@ydim #2\unitlength
\@whilenum \@multicnt >\z@\do
{\raise\@ydim\hbox to\z@{\kern
\@xdim #6\hss}\advance\@multicnt \m@ne\advance\@xdim
#3\unitlength\advance\@ydim #4\unitlength}\ignorespaces}

\def\@killglue{\unskip\@whiledim \lastskip >\z@\do{\unskip}}

\def\thinlines{\let\@linefnt\tenln \let\@circlefnt\tencirc
  \@wholewidth\fontdimen8\tenln \@halfwidth .5\@wholewidth}
\def\thicklines{\let\@linefnt\tenlnw \let\@circlefnt\tencircw
  \@wholewidth\fontdimen8\tenlnw \@halfwidth .5\@wholewidth}

\def\linethickness#1{\@wholewidth #1\relax \@halfwidth .5\@wholewidth}

```

```
\def\shortstack{\@ifnextchar[{\@shortstack}{\@shortstack[c]}}

\def\@shortstack[#1]{\leavevmode
\vbox\bgroup\baselineskip-\p@\lineskip 3\p@\let\mb@l\hss
\let\mb@r\hss \expandafter\let\csname mb@#1\endcsname\relax
\let\\\@stackcr\@ishortstack}

%% RmS 91/08/14 inserted extra braces around entry for NFSS
\def\@ishortstack#1{\halign{\mb@l {##}\unskip\mb@r\cr #1\crcr}\egroup}


\def\@stackcr{\@ifstar{\@ixstackcr}{\@ixstackcr}}
\def\@ixstackcr{\@ifnextchar[{\@istackcr}{\cr\ignorespaces}}

\def\@istackcr[#1]{\cr\noalign{\vskip #1}\ignorespaces}


% \line(X,Y){LEN} ==
% BEGIN
%  \@xarg   := X
%  \@yarg   := Y
%  \@linelen := LEN * \unitlength
%  if \@xarg = 0
%     then \@vline
%     else if \@yarg = 0
%            then \@hline
%            else \@sline
%          if
%  if
% END
%
% \@sline ==
%  BEGIN
%    if \@xarg < 0
%      then @negarg := T
%           \@xarg := -\@xarg
%           \@yyarg := -\@yarg
%      else @negarg := F
%           \@yyarg := \@yarg
%    fi
%    \@tempcnta := |\@yyarg|
%    if \@tempcnta > 6
%      then error: 'LATEX ERROR: Illegal \line or \vector argument.'
%           \@tempcnta := 0
%    fi
%    \box\@linechar := \hbox{\@linefnt \@getlinechar(\@xarg,\@yyarg) }
%     if \@yarg > 0 then \@upordown = \raise
%                        \@clnht := 0
%                   else \@upordown = \lower
%                        \@clnht := height of \box\@linechar
%     fi
%     \@clnwd := width of \box\@linechar
%     if @negarg
%       then \hskip - width of \box\@linechar
%            \@tempa == \hskip - 2* width of box \@linechar
%       else \@tempa == \relax
%     fi
%  %% Put out integral number of line segments
%     while \@clnwd < \@linelen
%       do  \@upordown \@clnht \copy\@linechar
%           \@tempa
%           \@clnht := \@clnht + ht of \box\@linechar
%           \@clnwd := \@clnwd + width of \box\@linechar
%       od
%
%  %% Put out last segment
%     \@clnht := \@clnht - height of \box\@linechar
%     \@clnwd := \@clnwd - width of \box\@linechar
%     \@tempdima  := \@linelen - \@clnwd
%     \@tempdimb  := \@tempdima - width of \box\@linechar
%     if @negarg then \hskip -\@tempdimb
%                else \hskip \@tempdimb
%     fi
%     \@tempdima  := 1000 * \@tempdima
```

```
5105 %     \@tempcnta  := \@tempdima / width of \box\@linechar
5106 %     \@tempdima  := (\@tempcnta * ht of \box\@linechar)/1000
5107 %     \@clnht := \@clnht + \@tempdima
5108 %     if \@linelen < width of box\@linechar
5109 %         then \hskip width of box\@linechar
5110 %         else \hbox{\@upordown \@clnht \copy\@linechar}
5111 %     fi
5112 % END
5113 %
5114 % \@hline ==
5115 %   BEGIN
5116 %     if \@xarg < 0 then \hskip -\@linelen \fi
5117 %     \vrule height \@halfwidth depth \@halfwidth width \@linelen
5118 %     if \@xarg < 0 then \hskip -\@linelen \fi
5119 %  END
5120 %
5121 % \@vline == if \@yarg < 0 \@downline else \@upline fi
5122 %
5123 %
5124 % \@getlinechar(X,Y) ==
5125 %   BEGIN
5126 %     \@tempcnta := 8*X - 9
5127 %     if Y > 0
5128 %       then \@tempcnta := \@tempcnta + Y
5129 %       else \@tempcnta := \@tempcnta - Y + 64
5130 %     fi
5131 %     \char\@tempcnta
5132 %   END
5133 %
5134 % \vector(X,Y){LEN} ==
5135 % BEGIN
5136 %  \@xarg   := X
5137 %  \@yarg   := Y
5138 %  \@linelen := LEN * \unitlength
5139 %  if \@xarg = 0
5140 %     then \@vvector
5141 %     else if \@yarg = 0
5142 %            then \@hvector
5143 %            else \@svector
5144 %          if
5145 %  if
5146 % END
5147 %
5148 % \@hvector ==
5149 %   BEGIN
5150 %     \@hline
5151 %     {\@linefnt if \@xarg < 0 then \@getlarrow(1,0)
5152 %                               else  \@getrarrow(1,0)
5153 %                fi}
5154 %   END
5155 %
5156 % \@vvector == if \@yarg < 0 \@downvector else \@upvector fi
5157 %
5158 % \@svector ==
5159 %  BEGIN
5160 %   \@sline
5161 %   \@tempcnta := |\@yarg|
5162 %     if  \@tempcnta < 5
5163 %        then  \hskip - width of \box\@linechar
5164 %              \@upordown \@clnht \hbox
5165 %                      {\@linefnt
5166 %                       if @negarg then \@getlarrow(\@xarg,\@yyarg)
5167 %                                  else \@getrarrow(\@xarg,\@yyarg)
5168 %                       fi }
5169 %        else  error: 'LATEX ERROR: Illegal \line or \vector argument.'
5170 %     fi
5171 %  END
5172 %
5173 % \@getlarrow(X,Y) ==
5174 %  BEGIN
5175 %   if Y = 0
5176 %     then \@tempcnta := '33
5177 %     else \@tempcnta := 16 * X - 9
5178 %          \@tempcntb := 2 * Y
```

```
%         if \@tempcntb > 0
%           then \@tempcnta := \@tempcnta + \@tempcntb
%           else \@tempcnta := \@tempcnta - \@tempcntb + 64
%         fi
%  fi
%  \char\@tempcnta
% END
%
% \@getrarrow(X,Y) ==
% BEGIN
%  \@tempcntb := |Y|
%  case of \@tempcntb
%    0 : \@tempcnta := '55
%    1 : if X < 3
%          then \@tempcnta := 24*X - 6
%          else if X = 3
%                 then \@tempcnta := 49
%                 else \@tempcnta := 58 fi
%        fi
%    2 : if X < 3
%          then \@tempcnta := 24*X - 3
%          else \@tempcnta := 51   % X must = 3
%        fi
%    3 : \@tempcnta := 16*X - 2
%    4 : \@tempcnta := 16*X + 7
%  endcase
%  if Y < 0
%    then \@tempcnta := \@tempcnta + 64
%  fi
%  \char\@tempcnta
% END

\newif\if@negarg

\def\line(#1,#2)#3{\@xarg #1\relax \@yarg #2\relax
\@linelen #3\unitlength
\ifnum\@xarg =\z@ \@vline
  \else \ifnum\@yarg =\z@ \@hline \else \@sline\fi
\fi}

\def\@sline{\ifnum\@xarg<\z@ \@negargtrue \@xarg -\@xarg \@yyarg -\@yarg
  \else \@negargfalse \@yyarg \@yarg \fi
\ifnum \@yyarg >\z@ \@tempcnta\@yyarg \else \@tempcnta -\@yyarg \fi
\ifnum\@tempcnta>6 \@badlinearg\@tempcnta\z@ \fi
\ifnum\@xarg>6 \@badlinearg\@xarg \@ne \fi
\setbox\@linechar\hbox{\@linefnt\@getlinechar(\@xarg,\@yyarg)}%
\ifnum \@yarg >\z@ \let\@upordown\raise \@clnht\z@
   \else\let\@upordown\lower \@clnht \ht\@linechar\fi
\@clnwd \wd\@linechar
\if@negarg \hskip -\wd\@linechar \def\@tempa{\hskip -2\wd\@linechar}\else
     \let\@tempa\relax \fi
\@whiledim \@clnwd <\@linelen \do
  {\@upordown\@clnht\copy\@linechar
   \@tempa
   \advance\@clnht \ht\@linechar
   \advance\@clnwd \wd\@linechar}%
\advance\@clnht -\ht\@linechar
\advance\@clnwd -\wd\@linechar
\@tempdima\@linelen\advance\@tempdima -\@clnwd
\@tempdimb\@tempdima\advance\@tempdimb -\wd\@linechar
\if@negarg \hskip -\@tempdimb \else \hskip \@tempdimb \fi
\multiply\@tempdima \@m
\@tempcnta \@tempdima \@tempdima \wd\@linechar \divide\@tempcnta \@tempdima
\@tempdima \ht\@linechar \multiply\@tempdima \@tempcnta
\divide\@tempdima \@m
\advance\@clnht \@tempdima
\ifdim \@linelen <\wd\@linechar
   \hskip \wd\@linechar
  \else\@upordown\@clnht\copy\@linechar\fi}

\def\@hline{\ifnum \@xarg <\z@ \hskip -\@linelen \fi
\vrule \@height \@halfwidth \@depth \@halfwidth \@width \@linelen
\ifnum \@xarg <\z@ \hskip -\@linelen \fi}
```

```
 \def\@getlinechar(#1,#2){\@tempcnta#1\relax\multiply\@tempcnta 8%
\advance\@tempcnta -9\ifnum #2>\z@ \advance\@tempcnta #2\relax\else
\advance\@tempcnta -#2\relax\advance\@tempcnta 64 \fi
\char\@tempcnta}

\def\vector(#1,#2)#3{\@xarg #1\relax \@yarg #2\relax
\@tempcnta \ifnum\@xarg<\z@ -\@xarg\else\@xarg\fi
\ifnum\@tempcnta<5\relax
\@linelen #3\unitlength
\ifnum\@xarg =\z@ \@vvector
  \else \ifnum\@yarg =\z@ \@hvector \else \@svector\fi
\fi
\else\@badlinearg\fi}

\def\@hvector{\@hline\hbox to\z@{\@linefnt
\ifnum \@xarg <\z@ \@getlarrow(1,0)\hss\else
    \hss\@getrarrow(1,0)\fi}}

\def\@vvector{\ifnum \@yarg <\z@ \@downvector \else \@upvector \fi}

\def\@svector{\@sline
\@tempcnta\@yarg \ifnum\@tempcnta <\z@ \@tempcnta -\@tempcnta\fi
\ifnum\@tempcnta <5%
  \hskip -\wd\@linechar
  \@upordown\@clnht \hbox{\@linefnt \if@negarg
  \@getlarrow(\@xarg,\@yyarg)\else \@getrarrow(\@xarg,\@yyarg)\fi}%
\else\@badlinearg\fi}

\def\@getlarrow(#1,#2){\ifnum #2=\z@ \@tempcnta'33 \else
\@tempcnta #1\relax\multiply\@tempcnta \sixt@@n \advance\@tempcnta
-9 \@tempcntb #2\relax\multiply\@tempcntb \tw@
\ifnum \@tempcntb >\z@ \advance\@tempcnta \@tempcntb
\else\advance\@tempcnta -\@tempcntb\advance\@tempcnta 64
\fi\fi\char\@tempcnta}

\def\@getrarrow(#1,#2){\@tempcntb #2\relax
\ifnum\@tempcntb <\z@ \@tempcntb -\@tempcntb\relax\fi
\ifcase \@tempcntb\relax \@tempcnta'55 \or
\ifnum #1<\thr@@ \@tempcnta #1\relax\multiply\@tempcnta
24\advance\@tempcnta -6 \else \ifnum #1=\thr@@ \@tempcnta 49
\else\@tempcnta 58 \fi\fi\or
\ifnum #1<\thr@@ \@tempcnta=#1\relax\multiply\@tempcnta
24\advance\@tempcnta -\thr@@ \else \@tempcnta 51 \fi\or
\@tempcnta #1\relax\multiply\@tempcnta
\sixt@@n \advance\@tempcnta -\tw@ \else
\@tempcnta #1\relax\multiply\@tempcnta
\sixt@@n \advance\@tempcnta 7 \fi\ifnum #2<\z@ \advance\@tempcnta 64 \fi
\char\@tempcnta}



\def\@vline{\ifnum \@yarg <\z@ \@downline \else \@upline\fi}

\def\@upline{\hbox to \z@{\hskip -\@halfwidth \vrule \@width \@wholewidth
   \@height \@linelen \@depth \z@\hss}}

\def\@downline{\hbox to \z@{\hskip -\@halfwidth \vrule \@width \@wholewidth
   \@height \z@ \@depth \@linelen \hss}}

\def\@upvector{\@upline\setbox\@tempboxa\hbox{\@linefnt\char'66}\raise
     \@linelen \hbox to\z@{\lower \ht\@tempboxa\box\@tempboxa\hss}}

\def\@downvector{\@downline\lower \@linelen
      \hbox to \z@{\@linefnt\char'77\hss}}

% \dashbox{D}(X,Y) ==
%  BEGIN
%  leave vertical mode
%  \hbox to Opt {
%       \baselineskip := Opt
%       \lineskip    := Opt
%  %% HORIZONTAL DASHES
%       \@dashdim := X * \unitlength
%       \@dashcnt := \@dashdim + 200 % to prevent roundoff error
```

```
5327 %       \@dashdim := D * \unitlength
5328 %       \@dashcnt := \@dashcnt / \@dashdim
5329 %       if \@dashcnt is odd
5330 %         then \@dashdim := Opt
5331 %              \@dashcnt := (\@dashcnt + 1) / 2
5332 %         else \@dashdim := \@dashdim / 2
5333 %              \@dashcnt := \@dashcnt / 2 - 1
5334 %              \box\@dashbox  := \hbox{\vrule height \@halfwidth
5335 %                                      depth \@halfwidth width \@dashdim}
5336 %              \put(0,0){\copy\@dashbox}
5337 %              \put(0,Y){\copy\@dashbox}
5338 %              \put(X,0){\hskip -\@dashdim\copy\@dashbox}
5339 %              \put(X,Y){\hskip -\@dashdim\box\@dashbox}
5340 %              \@dashdim := 3 * \@dashdim
5341 %       fi
5342 %       \box\@dashbox := \hbox{\vrule height \@halfwidth
5343 %                              depth \@halfwidth width D * \unitlength
5344 %                             \hskip D * \unitlength}
5345 %       \@tempcnta := 0
5346 %       \put(0,0){\hskip \@dashdim
5347 %                 while \@tempcnta < \@dascnt
5348 %                   do \copy\@dashbox
5349 %                      \@tempcnta := \@tempcnta + 1
5350 %                   od
5351 %                 }
5352 %       \@tempcnta := 0
5353 %       put(0,Y){\hskip \@dashdim
5354 %                 while \@tempcnta < \@dascnt
5355 %                   do \copy\@dashbox
5356 %                      \@tempcnta := \@tempcnta + 1
5357 %                   od
5358 %                 }
5359 %
5360 % %% vertical dashes
5361 %       \@dashdim := Y * \unitlength
5362 %       \@dashcnt := \@dashdim + 200 % to prevent roundoff error
5363 %       \@dashdim := D * \unitlength
5364 %       \@dashcnt := \@dashcnt / \@dashdim
5365 %       if \@dashcnt is odd
5366 %         then \@dashdim := Opt
5367 %              \@dashcnt := (\@dashcnt + 1) / 2
5368 %         else \@dashdim := \@dashdim / 2
5369 %              \@dashcnt := \@dashcnt / 2 - 1
5370 %              \box\@dashbox  := \hbox{\hskip -\@halfwidth
5371 %                                      \vrule width \@wholewidth
5372 %                                             height \@dashdim }
5373 %              \put(0,0){\copy\@dashbox}
5374 %              \put(X,0){\copy\@dashbox}
5375 %              \put(0,Y){\lower\@dashdim\copy\@dashbox}
5376 %              \put(X,Y){\lower\@dashdim\copy\@dashbox}
5377 %              \@dashdim := 3 * \@dashdim
5378 %       fi
5379 %       \box\@dashbox := \hbox{\vrule width \@wholewidth
5380 %                              height D * \unitlength    }
5381 %       \@tempcnta := 0
5382 %       put(0,0){\hskip -\halfwidth
5383 %                \vbox{while \@tempcnta < \@dashcnt
5384 %                      do \vskip D*\unitlength
5385 %                         \copy\@dashbox
5386 %                         \@tempcnta := \@tempcnta + 1
5387 %                      od
5388 %                      \vskip \@dashdim
5389 %                     } }
5390 %       \@tempcnta := 0
5391 %       put(X,0){\hskip -\halfwidth
5392 %                \vbox{while \@tempcnta < \@dashcnt
5393 %                      do \vskip D*\unitlength
5394 %                         \copy\@dashbox
5395 %                         \@tempcnta := \@tempcnta + 1
5396 %                      od
5397 %                      \vskip \@dashdim
5398 %                     }
5399 %                 }
5400 %    }     % END DASHES
```

```
%
%  \@imakepicbox(X,Y)
% END

\def\dashbox#1(#2,#3){\leavevmode\hbox to\z@{\baselineskip \z@
\lineskip \z@
\@dashdim #2\unitlength
\@dashcnt \@dashdim \advance\@dashcnt 200
\@dashdim #1\unitlength\divide\@dashcnt \@dashdim
\ifodd\@dashcnt\@dashdim \z@
\advance\@dashcnt \@ne \divide\@dashcnt \tw@
\else \divide\@dashdim \tw@ \divide\@dashcnt \tw@
\advance\@dashcnt \m@ne
\setbox\@dashbox \hbox{\vrule \@height \@halfwidth \@depth \@halfwidth
\@width \@dashdim}\put(0,0){\copy\@dashbox}%
\put(0,#3){\copy\@dashbox}%
\put(#2,0){\hskip-\@dashdim\copy\@dashbox}%
\put(#2,#3){\hskip-\@dashdim\box\@dashbox}%
\multiply\@dashdim \thr@@
\fi
\setbox\@dashbox \hbox{\vrule \@height \@halfwidth \@depth \@halfwidth
\@width #1\unitlength\hskip #1\unitlength}\@tempcnta\z@
\put(0,0){\hskip\@dashdim \@whilenum \@tempcnta <\@dashcnt
\do{\copy\@dashbox\advance\@tempcnta \@ne }}\@tempcnta\z@
\put(0,#3){\hskip\@dashdim \@whilenum \@tempcnta <\@dashcnt
\do{\copy\@dashbox\advance\@tempcnta \@ne }}%
\@dashdim #3\unitlength
\@dashcnt \@dashdim \advance\@dashcnt 200
\@dashdim #1\unitlength\divide\@dashcnt \@dashdim
\ifodd\@dashcnt \@dashdim \z@
\advance\@dashcnt \@ne \divide\@dashcnt \tw@
\else
\divide\@dashdim \tw@ \divide\@dashcnt \tw@
\advance\@dashcnt \m@ne
\setbox\@dashbox\hbox{\hskip -\@halfwidth
\vrule \@width \@wholewidth
\@height \@dashdim}\put(0,0){\copy\@dashbox}%
\put(#2,0){\copy\@dashbox}%
\put(0,#3){\lower\@dashdim\copy\@dashbox}%
\put(#2,#3){\lower\@dashdim\copy\@dashbox}%
\multiply\@dashdim \thr@@
\fi
\setbox\@dashbox\hbox{\vrule \@width \@wholewidth
\@height #1\unitlength}\@tempcnta\z@
\put(0,0){\hskip -\@halfwidth \vbox{\@whilenum \@tempcnta <\@dashcnt
\do{\vskip #1\unitlength\copy\@dashbox\advance\@tempcnta \@ne }%
\vskip\@dashdim}}\@tempcnta\z@
\put(#2,0){\hskip -\@halfwidth \vbox{\@whilenum \@tempcnta<\@dashcnt
\do{\vskip #1\unitlength\copy\@dashbox\advance\@tempcnta \@ne }%
\vskip\@dashdim}}}\@makepicbox(#2,#3)}

% CIRCLES AND OVALS
%
%  USER COMMANDS:
%
%  \circle{D} : Produces the circle with the diameter as close as
%               possible to D * \unitlength. \put(X,Y){\circle{D}}
%               puts the circle with its center at (X,Y).
%
%  \oval(X,Y) : Makes an oval as round as possible that fits in the
%               rectangle of width X * \unitlength and height
%               Y * \unitlength. The reference point is the center.
%
% \oval(X,Y)[POS] : Save as \oval(X,Y) except it draws only the
%                   half or quadrant of the oval indicated by POS.
%                   E.G., \oval(X,Y)[t] draws just the top half
%                   and \oval(X,Y)[br] draws just the bottom right
%                   quadrant. In all cases, the reference point is
%                   the same as the unqualified \oval(X,Y) command.
%
% \@ovvert {DELTA1} {DELTA2} : Makes a vbox containing either the left side
%       or the right side of the oval being constructed. The baseline
%       will coincide with the outside bottom edge of the oval; the left
%       side of the box will coincide with the left edge of the vertical
```

```
%       rule.  The width of the box will be \@tempdima.
%       DELTA1 and DELTA2 are added to the character number in \@tempcnta
%       to get the characters for the top and bottom quarter circle pieces.
%
% \@ovhorz : Makes an hbox containing the straight rule for either the
%        top or the bottom of the oval being constructed. The baseline
%        will coincide with bottom edge of the rule; the left side of
%        the box will coincide with the left side of the oval.
%        The width of the box will be \@ovxx.
%
% \@getcirc {DIAM} : Sets \@tempcnta to the character number
%                 of the top-right quarter circle with the largest
%                 diameter less than or equal to DIAM.
%                 Sets \@tempboxa to an hbox containing that character.
%                 Sets \@tempdima to \wd \@tempboxa, which is the distance
%                 from the circle's left outside edge to its right
%                 inside edge.
%                 (These characters are like those described in the
%                 TeXbook, pp. 389-90.)
%
% \@getcirc {DIAM} ==
%  BEGIN
%    \@tempcnta      := integer coercion of (DIAM + 2pt) %% + 2pt added
%    \@tempcnta      := \@tempcnta / integer coercion of 4pt %% 1 Nov 88
%    if \@tempcnta > 10
%      then \@tempcnta := 10 fi
%    if \@tempcnta > 0
%      then \@tempcnta := \@tempcnta-1
%      else LaTeX Warning: Oval too small.
%    fi
%    \@tempcnta      := 4 * \@tempcnta
%    \@tempboxa      := \hbox{\@circlefnt \char \@tempcnta}
%    \@tempdima      := \wd \@tempboxa
%  END
%
% \@put{X}{Y}{OBJ} ==
%  BEGIN
%    \raise Y \hbox to 0pt{\hskip X OBJ \hss}
%  END
%
% \@oval(X,Y)[POS] ==
%  BEGIN
%    \begingroup
%      \boxmaxdepth := \maxdimen
%      @ovt := @ovb := @ovl := @ovr := true
%      for all E in POS
%        do  @ovE := false od
%      \@ovxx     := X * \unitlength
%      \@ovyy     := Y * \unitlength
%      \@tempdimb := min(\@ovxx,\@ovyy)
%      \@getcirc{\@tempdimb-2pt} %% "-2pt" added 7 Dec 89
%      \@ovro    := \ht \@tempboxa
%      \@ovri    := \dp \@tempboxa
%      \@ovdx    := \@ovxx - \@tempdima
%      \@ovdx    := \@ovdx/2
%      \@ovdy    := \@ovyy - \@tempdima
%      \@ovdy    := \@ovyy/2
%      \@circlefnt
%      \@tempboxa :=
%          \hbox{
%                if @ovr
%                  then \@ovvert{3}{2} \kern -\@tempdima
%                fi
%                if @ovl
%                  then \kern \@ovxx \@ovvert{0}{1} \kern -\@tempdima
%                       \kern -\@ovxx
%                fi
%                if @ovt
%                  then \@ovhorz \kern -\@ovxx
%                fi
%                if @ovb
%                  then \raise \@ovyy \@ovhorz
%                fi
%               }
```

```
5549 %       \@ovdx   := \@ovdx + \@ovro
5550 %       \@ovdy   := \@ovdy + \@ovro
5551 %      \ht\@tempboxa := \dp\@tempboxa := 0
5552 %       \@put{-\@ovdx}{-\@ovdy}{\box\@tempboxa}
5553 %    \endgroup
5554 %   END
5555 %
5556 % \@ovvert {DELTA1} {DELTA2} ==
5557 %   BEGIN
5558 %      \vbox to \@ovyy {
5559 %                      if @ovb
5560 %                        then \@tempcntb := \@tempcnta + DELTA1
5561 %                             \kern -\@ovro
5562 %                             \hbox { \char \@tempcntb }
5563 %                             \nointerlineskip
5564 %                        else \kern \@ovri \kern \@ovdy
5565 %                      fi
5566 %                      \leaders \vrule width \@wholewidth \vfil
5567 %                      \nointerlineskip
5568 %                      if @ovt
5569 %                        then \@tempcntb := \@tempcnta + DELTA2
5570 %                             \hbox { \char \@tempcntb }
5571 %                        else \kern \@ovdy \kern \@ovro
5572 %                      fi
5573 %                     }
5574 %   END
5575 %
5576 % \@ovhorz ==
5577 %   BEGIN
5578 %    \hbox to \@ovxx{
5579 %                    \kern \@ovro
5580 %                    if @ovr
5581 %                      then
5582 %                      else \kern \@ovdx
5583 %                    fi
5584 %                    \leaders \hrule height \@wholewidth \hfil
5585 %                    if @ovl
5586 %                      then
5587 %                      else \kern \@ovdx
5588 %                    fi
5589 %                    \kern \@ovri
5590 %                   }
5591 %   END
5592 %
5593 % \circle{DIAM} ==
5594 %   BEGIN
5595 %    \begingroup
5596 %    \boxmaxdepth := maxdimen
5597 %    \@tempdimb := DIAM *\unitlength
5598 %    if \@tempdimb > 15.5pt
5599 %      then \@getcirc{\@tempdimb}
5600 %           \@ovro := \ht \@tempboxa
5601 %           \@tempboxa := \hbox{
5602 %                  \@circlefnt
5603 %                  \@tempcnta := \@tempcnta + 2
5604 %                  \char \@tempcnta
5605 %                  \@tempcnta := \@tempcnta - 1
5606 %                  \char \@tempcnta
5607 %                  \kern -2\@tempdima
5608 %                  \@tempcnta := \@tempcnta + 2
5609 %                  \raise \@tempdima \hbox { \char \@tempcnta }
5610 %                  \raise \@tempdima \box\@tempboxa
5611 %                 }
5612 %           \ht\@tempboxa := \dp\@tempboxa := 0
5613 %           \@put{-\@ovro}{-\@ovro}{\@tempboxa}
5614 %      else
5615 %           \@circ{\@tempdimb}{96}
5616 %    fi
5617 %   \endgroup
5618 %   END
5619 %
5620 % \circle*{DIAM} == \@dot{DIAM} == \@circ{DIAM*\unitlength}{112}
5621 %
5622 % \@circ{DIAM}{CHAR} ==
```

```
% BEGIN
%   \@tempcnta := integer coercion of (DIAM + .5pt)/1pt.
%   if \@tempcnta > 15 then \@tempcnta := 15 fi
%   if \@tempcnta > 1 then \@tempcnta := \@tempcnta - 1 fi
%   \@tempcnta := \@tempcnta + CHAR
%   \@circlefnt
%   \char \@tempcnta
% END
%

\newif\if@ovt
\newif\if@ovb
\newif\if@ovl
\newif\if@ovr
\newdimen\@ovxx
\newdimen\@ovyy
\newdimen\@ovdx
\newdimen\@ovdy
\newdimen\@ovro
\newdimen\@ovri

%% \advance\@tempdima 2pt\relax added 1 Nov 88 to fix bug in which
%% size of drawn circle not monotonic function of argument of \circle,
%% caused by different rounding for dimensions of large and small circles.
%
\def\@getcirc#1{\@tempdima #1\relax \advance\@tempdima 2\p@
  \@tempcnta\@tempdima
  \@tempdima 4\p@ \divide\@tempcnta\@tempdima
  \ifnum \@tempcnta >10\relax \@tempcnta 10\relax\fi
  \ifnum \@tempcnta >\z@ \advance\@tempcnta\m@ne
    \else \@warning{Oval too small}\fi
  \multiply\@tempcnta 4\relax
  \setbox \@tempboxa \hbox{\@circlefnt
  \char \@tempcnta}\@tempdima \wd \@tempboxa}

\def\@put#1#2#3{\raise #2\hbox to\z@{\hskip #1#3\hss}}

\def\oval(#1,#2){\@ifnextchar[{\@oval(#1,#2)}{\@oval(#1,#2)[]}}

\def\@oval(#1,#2)[#3]{\begingroup\boxmaxdepth \maxdimen
  \@ovttrue \@ovbtrue \@ovltrue \@ovrtrue
  \@tfor\@tempa :=#3\do{\csname @ov\@tempa false\endcsname}\@ovxx
  #1\unitlength \@ovyy #2\unitlength
  \@tempdimb \ifdim \@ovyy >\@ovxx \@ovxx\else \@ovyy \fi
  \advance \@tempdimb -2\p@
  \@getcirc \@tempdimb
  \@ovro \ht\@tempboxa \@ovri \dp\@tempboxa
  \@ovdx\@ovxx \advance\@ovdx -\@tempdima \divide\@ovdx \tw@
  \@ovdy\@ovyy \advance\@ovdy -\@tempdima \divide\@ovdy \tw@
  \@circlefnt \setbox\@tempboxa
  \hbox{\if@ovr \@ovvert32\kern -\@tempdima \fi
  \if@ovl \kern \@ovxx \@ovvert01\kern -\@tempdima \kern -\@ovxx \fi
  \if@ovt \@ovhorz \kern -\@ovxx \fi
  \if@ovb \raise \@ovyy \@ovhorz \fi}\advance\@ovdx\@ovro
  \advance\@ovdy\@ovro \ht\@tempboxa\z@ \dp\@tempboxa\z@
  \@put{-\@ovdx}{-\@ovdy}{\box\@tempboxa}%
  \endgroup}

\def\@ovvert#1#2{\vbox to\@ovyy{%
    \if@ovb \@tempcntb \@tempcnta \advance \@tempcntb #1\relax
      \kern -\@ovro \hbox{\char \@tempcntb}\nointerlineskip
    \else \kern \@ovri \kern \@ovdy \fi
    \leaders\vrule \@width \@wholewidth\vfil \nointerlineskip
    \if@ovt \@tempcntb \@tempcnta \advance \@tempcntb #2\relax
      \hbox{\char \@tempcntb}%
    \else \kern \@ovdy \kern \@ovro \fi}}

\def\@ovhorz{\hbox to \@ovxx{\kern \@ovro
    \if@ovr \else \kern \@ovdx \fi
    \leaders \hrule \@height \@wholewidth \hfil
    \if@ovl \else \kern \@ovdx \fi
    \kern \@ovri}}

\def\circle{\@ifstar{\@dot}{\@circle}}
```

```
\def\@circle#1{\begingroup \boxmaxdepth \maxdimen \@tempdimb #1\unitlength
   \ifdim \@tempdimb >15.5\p@ \@getcirc\@tempdimb
      \@ovro\ht\@tempboxa
     \setbox\@tempboxa\hbox{\@circlefnt
      \advance\@tempcnta\tw@ \char \@tempcnta
      \advance\@tempcnta\m@ne \char \@tempcnta \kern -2\@tempdima
      \advance\@tempcnta\tw@
      \raise \@tempdima \hbox{\char\@tempcnta}\raise \@tempdima
        \box\@tempboxa}\ht\@tempboxa\z@ \dp\@tempboxa\z@
      \@put{-\@ovro}{-\@ovro}{\box\@tempboxa}%
   \else \@circ\@tempdimb{96}\fi\endgroup}

\def\@dot#1{\@tempdimb #1\unitlength \@circ\@tempdimb{112}}

\def\@circ#1#2{\@tempdima #1\relax \advance\@tempdima .5\p@
   \@tempcnta\@tempdima \@tempdima \p@
   \divide\@tempcnta\@tempdima
   \ifnum\@tempcnta >15\relax \@tempcnta 15\relax \fi
   \ifnum \@tempcnta >\z@ \advance\@tempcnta\m@ne\fi
   \advance\@tempcnta #2\relax
   \@circlefnt \char\@tempcnta}


%INITIALIZATION
\thinlines

\newcount\@xarg
\newcount\@yarg
\newcount\@yyarg
\newcount\@multicnt
\newdimen\@xdim
\newdimen\@ydim
\newbox\@linechar
\newdimen\@linelen
\newdimen\@clnwd
\newdimen\@clnht
\newdimen\@dashdim
\newbox\@dashbox
\newcount\@dashcnt


 \message{theorem,}
%       ****************************************
%       *        THEOREM ENVIRONMENTS          *
%       ****************************************
%
%  The user creates his own theorem-like environments with the command
%      \newtheorem{NAME}{TEXT}[COUNTER] or
%      \newtheorem{NAME}[OLDNAME]{TEXT}
%  This defines the environment NAME to be just as one would expect a
%  theorem environment to be, except that it prints ``TEXT'' instead of
%  ``Theorem''.
%
%  If OLDNAME is given, then environments NAME and OLDNAME use the same
%  counter, so using a NAME environment advances the number of the next
%  NAME environment, and vice-versa.
%
%  If COUNTER is given, then environment NAME is numbered within COUNTER.
%  E.g., if COUNTER = subsection, then the first NAME in subsection 7.2
%  is numbered TEXT 7.2.1.
%
%  The way NAME environments are numbered can be changed by redefining
%  \theNAME.
%
%  DOCUMENT STYLE PARAMETERS
%
%  \@thmcounter{COUNTER} : A command such that
%                \edef\theCOUNTER{\@thmcounter{COUNTER}}
%          defines \theCOUNTER to produce a number for a theorem environment.
%          The default is:
%             BEGIN \noexpand\arabic{COUNTER} END
%
%  \@thmcountersep : A separator placed between a theorem number and
```

```
%        the number of the counter within which it is numbered.
%        E.g., to make the third theorem of section 7.2 be numbered
%        7.2-3, \@thmcountersep should be \def'ed to '-'. Its
%        default is '.'.
%
%  \@begintheorem{NAME}{NUMBER} : A command that begins a theorem
%        environment for a 'theorem' named 'NAME NUMBER' --
%        e.g., \@begintheorem{Lemma}{3.7} starts Lemma 3.7.
%
%  \@opargbegintheorem{NAME}{NUMBER}{OPARG} : A command that begins a theorem
%        environment for a 'theorem' named 'NAME NUMBER' with optional
%        argument OPARG -- e.g., \@begintheorem{Lemma}{3.7}{Jones}
%        starts `Lemma 3.7 (Jones):'.
%
%  \@endtheorem : A command that ends a theorem environment.
%
% \newtheorem{NAME}{TEXT}[COUNTER] ==
%   BEGIN
%     if \NAME is definable
%       then \@definecounter{NAME}
%            if COUNTER present
%              then \@addtoreset{NAME}{COUNTER} fi
%                   \theNAME == BEGIN \theCOUNTER \@thmcountersep
%                                     eval\@thmcounter{NAME}    END
%              else \theNAME == BEGIN eval\@thmcounter{NAME} END
%            \NAME == \@thm{NAME}{TEXT}
%            \endNAME == \@endtheorem
%       else  error
%     fi
%   END
%
% \newtheorem{NAME}[OLDNAME]{TEXT}==
%   BEGIN
%     if \NAME is definable
%       then \theNAME == \theOLDNAME
%            \NAME == \@thm{OLDNAME}{TEXT}
%            \endNAME == \@endtheorem
%       else  error
%     fi
%   END
%
% \@thm{NAME}{TEXT} ==
%   BEGIN
%    \refstepcounter{NAME}
%    if next char = [
%       then \@ythm{NAME}{TEXT}
%       else \@xthm{NAME}{TEXT}
%    fi
%   END
%
% \@xthm{NAME}{TEXT} ==
%   BEGIN
%    \@begintheorem{TEXT}{\theNAME}
%    \ignorespaces
%   END
%
% \@ythm{NAME}{TEXT}[OPARG] ==
%   BEGIN
%    \@opargbegintheorem{TEXT}{\theNAME}{OPARG}
%    \ignorespaces
%   END
%
\def\newtheorem#1{\@ifnextchar[{\@othm{#1}}{\@nthm{#1}}}

\def\@nthm#1#2{%
\@ifnextchar[{\@xnthm{#1}{#2}}{\@ynthm{#1}{#2}}}

\def\@xnthm#1#2[#3]{\expandafter\@ifdefinable\csname #1\endcsname
{\@definecounter{#1}\@addtoreset{#1}{#3}%
\expandafter\xdef\csname the#1\endcsname{\expandafter\noexpand
  \csname the#3\endcsname \@thmcountersep \@thmcounter{#1}}%
\global\@namedef{#1}{\@thm{#1}{#2}}\global\@namedef{end#1}{\@endtheorem}}}

\def\@ynthm#1#2{\expandafter\@ifdefinable\csname #1\endcsname
```

```
{\@definecounter{#1}%
\expandafter\xdef\csname the#1\endcsname{\@thmcounter{#1}}%
\global\@namedef{#1}{\@thm{#1}{#2}}\global\@namedef{end#1}{\@endtheorem}}}

%% RmS 92/01/10: check for existence of theorem environment #2
\def\@othm#1[#2]#3{%
  \@ifundefined{c@#2}{\@latexerr{No theorem environment `#2' defined}\@eha}%
  {\expandafter\@ifdefinable\csname #1\endcsname
  {\global\@namedef{the#1}{\@nameuse{the#2}}%
\global\@namedef{#1}{\@thm{#2}{#3}}%
\global\@namedef{end#1}{\@endtheorem}}}}

\def\@thm#1#2{\refstepcounter
    {#1}\@ifnextchar[{\@ythm{#1}{#2}}{\@xthm{#1}{#2}}}

\def\@xthm#1#2{\@begintheorem{#2}{\csname the#1\endcsname}\ignorespaces}
\def\@ythm#1#2[#3]{\@opargbegintheorem{#2}{\csname
       the#1\endcsname}{#3}\ignorespaces}

%DEFAULT VALUES
\def\@thmcounter#1{\noexpand\arabic{#1}}
\def\@thmcountersep{.}
%deleted September 2, 1986 MDK
%\def\@makethmnumber#1#2{\bf #1 #2:}

%% RmS 91/08/14 Moved \it after \item to make it work with NFSS
\def\@begintheorem#1#2{\trivlist \item[\hskip \labelsep{\bf #1\ #2}]\it}
\def\@opargbegintheorem#1#2#3{\trivlist
      \item[\hskip \labelsep{\bf #1\ #2\ (#3)}]\it}
\def\@endtheorem{\endtrivlist}


 \message{lengths,}
%     ****************************************
%     *              LENGTHS                 *
%     ****************************************
%
% USER COMMANDS:
%
%   \newlength{\NAME}        == \newskip\NAME
%   \setlength{\NAME}{VALUE} == \NAME :=L VALUE
%   \addtolength{\NAME}{VALUE} == \NAME :=L \NAME + VALUE
%   \settowidth{\NAME}{TEXT} == \NAME :=L width of \hbox{TEXT}
%
\def\newlength#1{\@ifdefinable#1{\newskip#1}}
\def\setlength#1#2{#1#2\relax}
\def\addtolength#1#2{\advance#1 #2\relax}
\def\settowidth#1#2{\setbox\@tempboxa\hbox{#2}#1\wd\@tempboxa\relax}
   %% \relax added 24 Mar 86

 \message{title,}
%     ****************************************
%     *             THE TITLE                *
%     ****************************************
%
% The user defines the title, author, date by the declarations \title{NAME},
% \author{NAME} and \date{DATE}. Inside these, he can use the \thanks
% command to make footnoted acknowledgements, notice of address, etc.
% The \maketitle command produces the actual title. Note: multiple authors
% are separated with the \and command.

\def\title#1{\gdef\@title{#1}}

\def\author#1{\gdef\@author{#1}}

\def\date#1{\gdef\@date{#1}}
\gdef\@date{\today}        %Default is today's date

\def\thanks#1{\footnotemark\begingroup
\def\protect{\noexpand\protect\noexpand}\xdef\@thanks{\@thanks
  \protect\footnotetext[\the\c@footnote]{#1}}\endgroup}

\def\@thanks{}

```

```
\def\and{%%                          % \begin{tabular}
\end{tabular}\hskip 1em plus.17fil\begin{tabular}[t]{c}%% \end{tabular}
}



 \message{sectioning,}
%     ****************************************
%     *             SECTIONING               *
%     ****************************************
%
%
% \@startsection {NAME}{LEVEL}{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE}
%           optional * [ALTHEADING]{HEADING}
%   Generic command to start a section.
%   NAME      : e.g., 'subsection'
%   LEVEL     : a number, denoting depth of section -- e.g., chapter=1,
%               section = 2, etc.
%   INDENT    : Indentation of heading from left margin
%   BEFORESKIP : Absolute value = skip to leave above the heading.
%               If negative, then paragraph indent of text following
%               heading is suppressed.
%   AFTERSKIP : if positive, then skip to leave below heading, else
%               negative of skip to leave to right of run-in heading.
%   STYLE     : commands to set style
% If '*' missing, then increments the counter. If it is present, then
% there should be no [ALTHEADING] argument.
% Uses the counter 'secnumdepth' whose value is the highest section
% level that is to be numbered.
%
% WARNING: The \@startsection command should be at the same or higher
% grouping level as the text that follows it. For example, you
% should NOT do something like
%     \def\foo{ \begingroup ...
%                 \paragraph{...}
%               \endgroup}
%
% \@startsection {NAME}{LEVEL}{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE} ==
%   BEGIN
%    IF  @noskipsec = T THEN \leavevmode FI % true if previous section
%                                           % had no body.
%    \par
%    \@tempskipa := BEFORESKIP
%    @afterindent := T
%    IF \@tempskipa < 0 THEN \@tempskipa := -\@tempskipa
%                            @afterindent := F
%    FI
%    IF @nobreak = true
%      THEN \everypar == null
%      ELSE \addpenalty{\@secpenalty}
%           \addvspace{\@tempskipa}
%    FI
%    IF * next
%      THEN \@ssect{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE}
%      ELSE \@dblarg{\@sect
%                    {NAME}{LEVEL}{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE}}
%    FI
% END
%
% \@sect{NAME}{LEVEL}{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE}[ARG1]{ARG2} ==
%  BEGIN
%   IF LEVEL > \c@secnumdepth
%     THEN \@svsec :=L null
%     ELSE \refstepcounter{NAME}
%          \@svsec :=L BEGIN \theNAME END
%   FI
%   IF AFTERSKIP > 0
%     THEN \begingroup
%            STYLE
%            \@hangfrom{\hskip INDENT\@svsec}
%            {\interlinepenalty 10000 ARG2\par}
%          \endgroup
%          \NAMEmark{ARG1}
%          \addcontentsline{toc}{NAME}
```

```
5993 %             { IF LEVEL > \c@secnumdepth
5994 %                 ELSE \protect\numberline{\theNAME} FI
5995 %               ARG1 }
5996 %     ELSE \@svsechd == BEGIN STYLE
5997 %                            \hskip INDENT\@svsec
5998 %                           ARG2
5999 %                           \NAMEmark{ARG1}
6000 %                           \addcontentsline{toc}{NAME}
6001 %                              { IF LEVEL > \c@secnumdepth
6002 %                                  ELSE \protect\numberline{\theNAME} FI
6003 %                                ARG1 }
6004 %                       END
6005 %   FI
6006 %   \@xsect{AFTERSKIP}
6007 % END
6008 %
6009 % \@xsect{AFTERSKIP} ==
6010 %  BEGIN
6011 %   IF AFTERSKIP > 0
6012 %     THEN \par \nobreak
6013 %          \vskip AFTERSKIP
6014 %          \@afterheading
6015 %     ELSE @nobreak :=G F
6016 %          @noskipsec :=G T
6017 %          \everypar{ IF @noskipsec = T
6018 %                     THEN @noskipsec :=G F
6019 %                          \clubpenalty :=G 10000
6020 %                          \hskip -\parindent
6021 %                          \begingroup
6022 %                            \@svsechd
6023 %                          \endgroup
6024 %                          \unskip
6025 %                          \hskip -AFTERSKIP \relax %% relax added 14 Jan 91
6026 %                     ELSE \clubpenalty :=G \@clubpenalty
6027 %                          \everypar := NULL
6028 %                   FI
6029 %                 }
6030 %   FI
6031 %
6032 %  END
6033 %
6034 % \@ssect{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE}{ARG} ==
6035 %  BEGIN
6036 %   IF AFTERSKIP > 0
6037 %     THEN \begingroup
6038 %           STYLE
6039 %           \@hangfrom{\hskip INDENT}{\interlinepenalty 10000 ARG\par}
6040 %          \endgroup
6041 %     ELSE \@svsechd == BEGIN STYLE
6042 %                            \hskip INDENT
6043 %                           ARG
6044 %                       END
6045 %   FI
6046 %   \@xsect{AFTERSKIP}
6047 %  END
6048 %
6049 % \@afterheading ==
6050 %  BEGIN
6051 %   @nobreak :=G true
6052 %   \everypar := BEGIN IF @nobreak = T
6053 %                      THEN @nobreak :=G false
6054 %                           \clubpenalty :=G 10000
6055 %                           IF @afterindent = F
6056 %                             THEN remove \lastbox
6057 %                           FI
6058 %                      ELSE \clubpenalty :=G \@clubpenalty
6059 %                           \everypar := NULL
6060 %                    FI
6061 %               END
6062 %  END
6063 %
6064 % \@secpenalty : The penalty (usually negative) put before a section
6065 %               heading unless it immediately follows another one.
6066 %
```

```
\newcount\@secpenalty
\@secpenalty = -300


\newif\if@noskipsec \@noskipsectrue


\def\@startsection#1#2#3#4#5#6{\if@noskipsec \leavevmode \fi
   \par \@tempskipa #4\relax
   \@afterindenttrue
   \ifdim \@tempskipa <\z@ \@tempskipa -\@tempskipa \@afterindentfalse\fi
   \if@nobreak \everypar{}\else
     \addpenalty{\@secpenalty}\addvspace{\@tempskipa}\fi \@ifstar
     {\@ssect{#3}{#4}{#5}{#6}}{\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}}

\def\@sect#1#2#3#4#5#6[#7]#8{\ifnum #2>\c@secnumdepth
     \let\@svsec\@empty\else
     \refstepcounter{#1}\edef\@svsec{\csname the#1\endcsname\hskip 1em}\fi
     \@tempskipa #5\relax
      \ifdim \@tempskipa>\z@
        \begingroup #6\relax
          \@hangfrom{\hskip #3\relax\@svsec}{\interlinepenalty \@M #8\par}%
        \endgroup
       \csname #1mark\endcsname{#7}\addcontentsline
         {toc}{#1}{\ifnum #2>\c@secnumdepth \else
                     \protect\numberline{\csname the#1\endcsname}\fi
                   #7}\else
       \def\@svsechd{#6\hskip #3\relax %% \relax added 2 May 90
                  \@svsec #8\csname #1mark\endcsname
                    {#7}\addcontentsline
                         {toc}{#1}{\ifnum #2>\c@secnumdepth \else
                           \protect\numberline{\csname the#1\endcsname}\fi
                     #7}}\fi
     \@xsect{#5}}

\def\@xsect#1{\@tempskipa #1\relax
      \ifdim \@tempskipa>\z@
       \par \nobreak
       \vskip \@tempskipa
       \@afterheading
    \else \global\@nobreakfalse \global\@noskipsectrue
       \everypar{\if@noskipsec \global\@noskipsecfalse
                 \clubpenalty\@M \hskip -\parindent
                 \begingroup \@svsechd \endgroup \unskip
                 \hskip -#1\relax % relax added 14 Jan 91
                \else \clubpenalty \@clubpenalty
                  \everypar{}\fi}\fi\ignorespaces}

\def\@ssect#1#2#3#4#5{\@tempskipa #3\relax
   \ifdim \@tempskipa>\z@
     \begingroup #4\@hangfrom{\hskip #1}{\interlinepenalty \@M #5\par}\endgroup
   \else \def\@svsechd{#4\hskip #1\relax #5}\fi
    \@xsect{#3}}

\newif\if@afterindent \@afterindenttrue

\def\@afterheading{\global\@nobreaktrue
      \everypar{\if@nobreak
                 \global\@nobreakfalse
                 \clubpenalty \@M
                 \if@afterindent \else {\setbox\z@\lastbox}\fi
                \else \clubpenalty \@clubpenalty
                  \everypar{}\fi}}


% \@hangfrom{TEXT} : Puts TEXT in a box, and makes a hanging indentation
%    of the following material up to the first \par. Should be used
%    in vertical mode.
%
\def\@hangfrom#1{\setbox\@tempboxa\hbox{#1}%
      \hangindent \wd\@tempboxa\noindent\box\@tempboxa}

\newcount\c@secnumdepth
\newcount\c@tocdepth
```

```
6141
6142 % \secdef{UNSTARCMDS}{STARCMDS} :
6143 %    When defining a \chapter or \section command without using
6144 %    \@startsection, you can use \secdef as follows:
6145 %       \def\chapter { ... \secdef \CMDA \CMDB }
6146 %       \def\CMDA    [#1]#2{ ... } % Command to define \chapter[...]{...}
6147 %       \def\CMDB    #1{ ... }     % Command to define \chapter*{...}
6148
6149 \def\secdef#1#2{\@ifstar{#2}{\@dblarg{#1}}}
6150
6151 % Initializations
6152 %
6153 \def\sectionmark#1{}
6154 \def\subsectionmark#1{}
6155 \def\subsubsectionmark#1{}
6156 \def\paragraphmark#1{}
6157 \def\subparagraphmark#1{}
6158
6159  \message{contents,}
6160 %     ****************************************
6161 %     *       TABLE OF CONTENTS, ETC.        *
6162 %     ****************************************
6163 %
6164 % CONVENTIONS:
6165 %   \tf@foo = file number for output for table foo. The file is
6166 %             opened only if @filesw = true.
6167 %
6168 %   \contentsline{TYPE}{ENTRY}{PAGE}
6169 %       Macro to produce a TYPE entry in a table of contents, etc.
6170 %       It will appear in the .TOC or other file. For example,
6171 %       The entry for subsection 1.4.3 in the table of contents might
6172 %       be produced by:
6173 %       \contentsline{subsection}{\makebox{30pt}[r]{1.4.3} Gnats and Gnus}{22}
6174 %       The \protect command causes command sequences to be written
6175 %       without expanding them.
6176 %
6177 %   \l@TYPE{ENTRY}{PAGE}
6178 %       Macro defined by document style for making an entry of
6179 %       type TYPE in a table of contents, etc. E.g., the document
6180 %       style should define \l@chapter, \l@section, etc.
6181 %
6182 %   \addcontentsline{TABLE}{TYPE}{ENTRY}
6183 %      User command for adding his own entry to a table of contents, etc.
6184 %      It adds the entry
6185 %         \contentsline{TYPE}{ENTRY}{page}
6186 %      to the .TABLE file.
6187 %
6188 %   \addtocontents{TABLE}{TEXT} : Adds TEXT to the .TABLE file, with no
6189 %      page number.
6190 %
6191 %  Note: When used in the ENTRY or TEXT of one of the above commands,
6192 %  \protect causes the following control sequence to be written
6193 %  on the file without being expanded. The sequence will be expanded
6194 %  when the table of contents entry is processed.
6195 %
6196 %  SURPRISE: \index, \glossary, and \label are no-ops inside an
6197 %  \addcontentsline or \addtocontents command argument. This could cause a
6198 %  problem if the user puts an \index or \label into one of the commands he
6199 %  writes, or into the optional 'short version' argument of a \section or
6200 %  \caption command.
6201 %
6202 % \addcontentsline{TABLE}{TYPE}{ENTRY} ==
6203 %   BEGIN
6204 %     if @filesw = true
6205 %       then  \begingroup
6206 %               \index == \label == \glossary == \@gobble
6207 %               \protect{ARG} == \string\string\string ARG \string\space\space
6208 %               \@temptokena := \thepage
6209 %               \@tempa == write \string\contentsline
6210 %                           {TYPE}{ENTRY}{\the\@temptokena}
6211 %               \@tempa
6212 %               IF vmode and @nobreak = true THEN \nobreak FI
6213 %              \endgroup
6214 %     fi
```

```
%   END
%
% \@starttoc{EXT} : Used to define \tableofcontents, \listoffigures, etc.--
%      e.g., \@starttoc{lof} is used in \listoffigures. This command reads
%      the .EXT file and sets up to write the new .EXT file.
%
% \@starttoc{EXT} ==
%   BEGIN
%     \begingroup
%        \makeatletter
%        read file \jobname.EXT
%        IF @filesw = true
%          THEN open \jobname.EXT as file \tf@EXT
%        FI
%        @nobreak :=G FALSE %% added 24 May 89
%     \endgroup
%   END

%% RmS 92/01/14: added \immediate to \openout as all \write commands
%%              are also executed \immediate
\def\@starttoc#1{\begingroup
  \makeatletter
  \@input{\jobname.#1}\if@filesw \expandafter\newwrite\csname tf@#1\endcsname
             \immediate\openout \csname tf@#1\endcsname \jobname.#1\relax
  \fi \global\@nobreakfalse \endgroup}


\let\protect=\relax

\def\addcontentsline#1#2#3{\if@filesw \begingroup
\let\label\@gobble \let\index\@gobble \let\glossary\@gobble
\def\protect##1{\string\string\string##1\string\space
   \space}\@temptokena{\thepage}%
\edef\@tempa{\write \@auxout{\string\@writefile{#1}{\protect
     \contentsline{#2}{#3}{\the\@temptokena}}}}\@tempa
   \if@nobreak \ifvmode\nobreak\fi\fi\endgroup\fi}

\long\def\addtocontents#1#2{\if@filesw \begingroup
\let\label\@gobble \let\index\@gobble \let\glossary\@gobble
\def\protect##1{\string\string\string##1\string\space\space}%
\edef\@tempa{\write \@auxout {\string\@writefile{#1}{#2}}}\@tempa
  \if@nobreak \ifvmode\nobreak\fi\fi\endgroup\fi}

\def\contentsline#1{\csname l@#1\endcsname}

% \@dottedtocline{LEVEL}{INDENT}{NUMWIDTH}{TITLE}{PAGE} :
%  Macro to produce a table of contents line with the following
%  parameters:
%    LEVEL    : If LEVEL > \c@tocdepth, then no line produced.
%    INDENT   : Total indentation from the left margin.
%    NUMWIDTH : Width of box for number if the TITLE has a
%               \numberline command.
%               As of 25 Jan 88, this is also the amount of extra indentation
%               added to second and later lines of a multiple line entry.
%    TITLE    : Contents of entry.
%    PAGE     : Page number.
%
% Uses the following parameters, which must be set by the document style.
% They should be defined with \def's.
%    \@pnumwidth : Width of box in which page number is set.
%    \@tocrmarg : Right margin indentation for all but last line of
%                 multiple-line entries.
%    \@dotsep   : Separation between dots, in mu units. Should be \def'd to
%                 a number like 2 or 1.7
%

%% RmS 91/09/29: added \reset@font for page number
\def\@dottedtocline#1#2#3#4#5{\ifnum #1>\c@tocdepth \else
  \vskip \z@ plus.2\p@
  {\leftskip #2\relax \rightskip \@tocrmarg \parfillskip -\rightskip
    \parindent #2\relax\@afterindenttrue
   \interlinepenalty\@M
   \leavevmode
   \@tempdima #3\relax \advance\leftskip \@tempdima \hbox{}\hskip -\leftskip
```

```
    #4\nobreak\leaders\hbox{$\m@th \mkern \@dotsep mu.\mkern \@dotsep
       mu$}\hfill \nobreak
           \hbox to\@pnumwidth{\hfil\reset@font\rm #5}\par}\fi}


%%% Note: \nobreak's added 7 Jan 86 to prevent bad line break that
%%% left the page number dangling by itself at left edge of a new line.
%%%
%%% Changed 25 Jan 88 to use \leftskip instead of \hangindent so
%%% leaders of multiple-line contents entries would line up properly.

% \numberline{NUMBER} : For use in a \contentsline command.
%   It puts NUMBER flushleft in a box of width \@tempdima
%   (Before 25 Jan 88 change, it also added \@tempdima to the hanging
%   indentation.)

\def\numberline#1{\hbox to\@tempdima{#1\hfil}}


 \message{index,}
%      ************************************************
%      *           INDEX COMMANDS AND GLOSSARY        *
%      ************************************************
%
% \makeindex ==
%   BEGIN
%    if \@filesw = T
%      then  open file \jobname.IDX as \@indexfile
%            \index == BEGIN \@bsphack
%                            \begingroup
%                               \protect{X} == \string X\space
%                                    %% added 3 Feb 87 for \index commands
%                                    %% in \footnotes
%                               re-\catcode special characters to 'other'
%                               \@wrindex
%    fi
%   END
%
%  \@wrindex{ITEM} ==
%    BEGIN
%       write of {\indexentry{ITEM}{page number}}
%      \endgroup
%      \@esphack
%    END
%
%  INITIALIZATION:
%
%  \index == BEGIN \@bsphack
%                  \begingroup
%                     re-\catcode special characters (in case '%' there)
%                     \@index
%           END
%
%  \@index{ITEM} == BEGIN \endgroup \@esphack END
%
% Changes made 14 Apr 89 to write \glossaryentry's instead of
% \indexentry's on the .glo file.

\def\makeindex{\if@filesw \newwrite\@indexfile
  \immediate\openout\@indexfile=\jobname.idx
  \def\index{\@bsphack\begingroup
            \def\protect####1{\string####1\space}\@sanitize
            \@wrindex}\typeout
  {Writing index file \jobname.idx }\fi}

\def\@wrindex#1{\let\thepage\relax
   \edef\@tempa{\write\@indexfile{\string
      \indexentry{#1}{\thepage}}}\expandafter\endgroup\@tempa
   \if@nobreak \ifvmode\nobreak\fi\fi\@esphack}

\def\index{\@bsphack\begingroup \@sanitize\@index}

\def\@index#1{\endgroup\@esphack}
```

```
\def\makeglossary{\if@filesw \newwrite\@glossaryfile
  \immediate\openout\@glossaryfile=\jobname.glo
  \def\glossary{\@bsphack\begingroup\@sanitize\@wrglossary}\typeout
  {Writing glossary file \jobname.glo }\fi}

\def\@wrglossary#1{\let\thepage\relax
   \edef\@tempa{\write\@glossaryfile{\string
      \glossaryentry{#1}{\thepage}}}\expandafter\endgroup\@tempa
   \if@nobreak \ifvmode\nobreak\fi\fi\@esphack}

\def\glossary{\@bsphack\begingroup\@sanitize\@index}

 \message{bibliography,}
%     ***************************************
%     *           BIBLIOGRAPHY              *
%     ***************************************
%
% A bibliography is created by the bibliography environment, which
% generates a title such as ``References'', and a list of entries.
% The BIBTeX program will create a file containing such an environment,
% which will be read in by the \bibliography command. With
% BIBTeX, the following commands will be used.
%
% \bibliography{FILE1,FILE2, ... ,FILEn} : specifies
%    the bibdata files. Writes a \bibdata entry on the .aux file
%    and tries to read in mainfile.BBL.
%
% \bibliographystyle{STYLE} : Writes a \bibstyle entry on the .aux file.
%
% The thebibliography environment is a list environment. To save the
% use of an extra counter, it should use enumiv as the item counter.
% Instead of using \item, items in the bibliography are produced by the
% following commands:
%   \bibitem{NAME}          : Produces a numbered entry cited as NAME.
%   \bibitem[LABEL]{NAME}   : Produces an entry labeled by LABEL and
%                             cited by NAME.
% The former is used for bibliographies with citations like [1], [2], etc.;
% the latter is used for citations like [Knuth82].
%
% The document style must define the thebibliography environment. This
% environment has a single argument, which is the widest bibliography
% label-- e.g., if the [Knuth67] is the widest entry, then thist argument
% will be Knuth67. The \thebibliography command must begin a list
% environment, which the \endthebibliography command ends.
%
% Entries are cited by the command \cite{NAME}.
%
% PARAMETERS
%
%  \@cite    : A macro such that \@cite{LABEL1,LABEL2}{NOTE}
%              produces the output for a \cite[NOTE]{FOO1,FOO2} command,
%              where entry FOOi is defined by \bibitem[LABELi]{FOOi}.
%              The switch @tempswa is true if the optional NOTE argument
%              is present.
%              The default definition is :
%                \@cite{LABELS}{NOTE} ==
%                   BEGIN [LABELS
%                         IF @tempswa = T THEN , NOTE FI
%                         ]
%                   END
%
%  \@biblabel : A macro to produce the label in the bibliography
%              entry. For \bibitem[LABEL]{NAME}, the label is
%              generated by \@biblabel{LABEL}. It has the default
%              definition \@biblabel{LABEL} -> [LABEL].
% CONVENTION
%
% \b@FOO : The name or number of the reference created by \cite{FOO}
%          E.g., if \cite{FOO} -> [17] , then \b@FOO -> 17.
%
%

\def\bibitem{\@ifnextchar[{\@lbibitem}{\@bibitem}}

```

```
%% RmS 92/02/26: Added \hfill to restore left-alignment of
%%              bibliography labels in alpha style
\def\@lbibitem[#1]#2{\item[\@biblabel{#1}\hfill]\if@filesw
      {\def\protect##1{\string ##1\space}\immediate
       \write\@auxout{\string\bibcite{#2}{#1}}}\fi\ignorespaces}
%% Placement of `}' in def of \@lbibitem corrected 29 Apr 87
%% (Error found by Arthur Ogawa.)

%% RmS 91/11/13: Changed counter enumi to enumiv,
%%              as it says in the comment above
%% RmS 92/01/10: Changed \c@enumiv to \value{\@listctr}.
\def\@bibitem#1{\item\if@filesw \immediate\write\@auxout
      {\string\bibcite{#1}{\the\value{\@listctr}}}\fi\ignorespaces}

\def\bibcite#1#2{\global\@namedef{b@#1}{#2}}

\let\citation\@gobble

\def\cite{\@ifnextchar [{\@tempswatrue\@citex}{\@tempswafalse\@citex[]}}

% \penalty\@m added to definition of \@citex to allow a line
% break after the `,' in citations like [Jones80,Smith77]
% (Added 23 Oct 86)
%
% space added after the `,' (21 Nov 87)
%
%% RmS 91/10/25: added \reset@font, suggested by Bernd Raichle.
%% RmS 91/11/06: added code to remove a leading blank
\def\@citex[#1]#2{\if@filesw\immediate\write\@auxout{\string\citation{#2}}\fi
  \let\@citea\@empty
  \@cite{\@for\@citeb:=#2\do
    {\@citea\def\@citea{,\penalty\@m\ }%
     \def\@tempa##1##2\@nil{\edef\@citeb{\if##1\space##2\else##1##2\fi}}%
     \expandafter\@tempa\@citeb\@nil
     \@ifundefined{b@\@citeb}{{\reset@font\bf ?}\@warning
       {Citation `\@citeb' on page \thepage \space undefined}}%
     \hbox{\csname b@\@citeb\endcsname}}}{#1}}

\let\bibdata=\@gobble
\let\bibstyle=\@gobble

\def\bibliography#1{\if@filesw\immediate\write\@auxout{\string\bibdata{#1}}\fi
  \@input{\jobname.bbl}}

\def\bibliographystyle#1{\if@filesw\immediate\write\@auxout
    {\string\bibstyle{#1}}\fi}

% \nocite{CITATIONS} : puts information on .AUX file to cause
%   BibTeX to include the CITATIONS list in the bibliography,
%   but puts nothing in the text. (Added 14 Jun 85)

\def\nocite#1{\@bsphack
  \if@filesw\immediate\write\@auxout{\string\citation{#1}}\fi
  \@esphack}



%DEFAULT DEFINITIONS

\def\@cite#1#2{[{#1\if@tempswa , #2\fi}]}
%% RmS 92/01/14: removed \hfill in definition of \@biblabel
\def\@biblabel#1{[#1]}

 \message{floats,}
%     ****************************************
%     *              FLOATS                  *
%     ****************************************
%
%  The different types of floats are identified by a TYPE name, which is
%  the name of the counter for that kind of float. For example, figures
%  are of type 'figure' and tables are of type 'table'. Each TYPE has
%  associated a positive TYPE NUMBER, which is a power of two. E.g.,
%  figures might be have type number 1, tables type number 2, programs
%  type number 4, etc.
```

```
%
%  The locations where a float can go are specified by a PLACEMENT
%  SPECIFIER, which is a list of the possible locations, each denoted
%  by a letter as follows:
%     h : here  - at the current location in the text.
%     t : top   - at the top of a text page.
%     b : bottom - at the bottom of a text page.
%     p : page  - on a separate float page.
%  For example, 'pht' specifies that the float can appear in any of three
%  locations: page, here or top.
%
% Where floats may appear on a page, and how many may appear there
% are specified by the following float placement parameters. The
% numbers are named like counters so the user can set them with
% the ordinary counter-setting commands.
%
%  \c@topnumber          : Number of floats allowed at the top of a column.
%  \topfraction          : Fraction of column that can be devoted to floats.
%  \c@dbltopnumber, \dbltopfraction : Same as above, but for double-column
%                        floats.
%  \c@bottomnumber, \bottomfraction : Same as above for bottom of page.
%  \c@totalnumber        : Number of floats allowed in a single column,
%                        including in-text floats.
%  \textfraction       : Minimum fraction of column that must contain text.
%  \floatpagefraction  : Minimum fraction of page that must be taken
%                        up by float page.
%  \dblfloatpagefraction : Same as above, for double-column floats.
%
% The document style must define the following.
%
%    \fps@TYPE  : The default placement specifier for floats of type TYPE.
%
%    \ftype@TYPE : The type number for floats of type TYPE.
%
%    \ext@TYPE  : The file extension indicating the file on which the
%                 contents list for float type TYPE is stored. For example,
%                 \ext@figure = 'lof'.
%
%    \fnum@TYPE : A macro to generate the figure number for a caption.
%                 For example, \fnum@TYPE == Figure \thefigure.
%
%    \@makecaption{NUM}{TEXT} : A macro to make a caption, with NUM the value
%                 produced by \fnum@... and TEXT the text of the caption.
%                 It can assume it's in a \parbox of the appropriate width.
%
% \@float{TYPE}[PLACEMENT] : This macro begins a float environment for a
%     single-column float of type TYPE with PLACEMENT as the placement
%     specifier. The default value of PLACEMENT is defined by \fps@TYPE.
%     The environment is ended by \end@float.
%     E.g., \figure == \@float{figure}, \endfigure == \end@float.
%
%  \caption ==
%    BEGIN
%     \refstepcounter{\@captype}
%     \@dblarg{\@caption{\@captype}}
%    END
%
%% In following definition, \par moved from after \addcontentsline to
%% before \addcontentsline because the \write could cause
%% an extra blank line to be added to the paragraph above the
%% caption. (Change made 12 Jun 87)
%
%  \@caption{TYPE}[STEXT]{TEXT} ==
%   BEGIN
%     \par
%     \addcontentsline{\ext@TYPE}{TYPE}{\numberline{\theTYPE}{STEXT}}
%     \begingroup
%       \@parboxrestore
%       \normalsize
%       \@makecaption{\fnum@TYPE}{TEXT}
%       \par
%     \endgroup
%   END
%
```

```
6585 %  \@float{TYPE}[PLACEMENT] ==
6586 %   BEGIN
6587 %     if hmode then \@bsphack
6588 %                  \@floatpenalty := -10002
6589 %             else \@floatpenalty := -10003
6590 %     fi
6591 %     \@captype ==L TYPE
6592 %     if inner
6593 %       then LaTeX Error: 'Not in outer paragraph mode.'
6594 %            \@floatpenalty := 0
6595 %       else if \@freelist nonempty
6596 %              then \@currbox :=L head of \@freelist
6597 %                   \@freelist :=G tail of \@freelist
6598 %                   \count\@currbox :=G 32*\ftype@TYPE + 16 +
6599 %                                      bits determined by PLACEMENT
6600 %              else \@floatpenalty := 0
6601 %                   LaTeX Error: 'Too many unprocessed floats'
6602 %            fi
6603 %     fi
6604 %     \@currbox :=G \vbox{ %% 15 Dec 87 -- removed \boxmaxdepth :=L Opt
6605 %                          %% that made box zero depth because it screwed
6606 %                          %% things up. Instead, added \vskip Opt at end
6607 %                    \hsize = \columnwidth
6608 %                    \@parboxrestore
6609 %   END
6610 %
6611 %  \end@float ==
6612 %    BEGIN
6613 %       \vskip Opt %% makes 0 depth box -- added 15 Dec 87
6614 %       }
6615 %      if \@floatpenalty < 0
6616 %        then add \@currbox to \@currlist
6617 %             if \ht\@currbox > \textheight
6618 %               then \ht\@currbox :=G \textheight fi
6619 %             if \@floatpenalty < -10002
6620 %               then \penalty -10004
6621 %                    \vbox{}
6622 %                    \penalty \@floatpenalty
6623 %               else \vadjust{\penalty -10004
6624 %                             \vbox{}
6625 %                             \penalty \@floatpenalty}
6626 %                    \@Esphack
6627 %      fi    fi
6628 %    END
6629 %
6630 %  \@dblfloat{TYPE}[PLACEMENT] : Macro to begin a float environment for a
6631 %     double-column float of type TYPE with PLACEMENT as the placement
6632 %     specifier. The default value of PLACEMENT is 'tp'
6633 %     The environment is ended by \end@dblfloat.
6634 %     E.g., \figure* == \@dblfloat{figure}, \endfigure* == \end@dblfloat.
6635 %
6636 %  \@dblfloat{TYPE}[PLACEMENT] ==
6637 %     Identical to \@float{TYPE}[PLACEMENT] except \hsize and \linewidth
6638 %     are set to \textwidth.
6639 %
6640 %  \end@dblfloat ==
6641 %     BEGIN   %%% { BRACE MATCHING
6642 %       \vskip Opt %% makes 0 depth box -- added 15 Dec 87
6643 %       }
6644 %       if \@floatpenalty < 0
6645 %         then \@dbldeferlist :=G \@dbldeferlist * \@currbox
6646 %       fi
6647 %       if \@floatpenalty = -10002 then \@Esphack fi
6648 %     END
6649 %
6650 \newcount\@floatpenalty
6651
6652 \def\caption{\refstepcounter\@captype \@dblarg{\@caption\@captype}}
6653
6654
6655 \long\def\@caption#1[#2]#3{\par\addcontentsline{\csname
6656   ext@#1\endcsname}{#1}{\protect\numberline{\csname
6657   the#1\endcsname}{\ignorespaces #2}}\begingroup
6658     \@parboxrestore
```

```
    \normalsize
    \@makecaption{\csname fnum@#1\endcsname}{\ignorespaces #3}\par
  \endgroup}

\def\@float#1{\@ifnextchar[{\@xfloat{#1}}{\edef\@tempa{\noexpand\@xfloat
    {#1}[\csname fps@#1\endcsname]}\@tempa}}

\def\@xfloat#1[#2]{\ifhmode \@bsphack\@floatpenalty -\@Mii\else
   \@floatpenalty-\@Miii\fi\def\@captype{#1}\ifinner
      \@parmoderr\@floatpenalty\z@
    \else\@next\@currbox\@freelist{\@tempcnta\csname ftype@#1\endcsname
       \multiply\@tempcnta\@xxxii\advance\@tempcnta\sixt@@n
       \@tfor \@tempa :=#2\do
                       {\if\@tempa h\advance\@tempcnta \@ne\fi
                        \if\@tempa t\advance\@tempcnta \tw@\fi
                        \if\@tempa b\advance\@tempcnta 4\relax\fi
                        \if\@tempa p\advance\@tempcnta 8\relax\fi
         }\global\count\@currbox\@tempcnta}\@fltovf\fi
    \global\setbox\@currbox\vbox\bgroup
%    \boxmaxdepth\z@   % commented out 15 Dec 87
    \hsize\columnwidth \@parboxrestore}

\def\end@float{\par\vskip\z@\egroup %% \par\vskip\z@ added 15 Dec 87
   \ifnum\@floatpenalty <\z@
     \@cons\@currlist\@currbox
     \ifdim \ht\@currbox >\textheight
%% RmS 91/11/06 added warning message
% perhaps we should use an error message
        \@warning{Float larger than \string\textheight}%
        \ht\@currbox\textheight \fi
     \ifnum\@floatpenalty <-\@Mii
        \penalty -\@Miv
        \@tempdima\prevdepth  %% saving and restoring \prevdepth added
        \vbox{}%              %% 26 May 87 to prevent extra vertical
        \prevdepth \@tempdima %% space when used in vertical mode
        \penalty\@floatpenalty
%% RmS 92/03/18 changed \@esphack to \@Esphack
      \else \vadjust{\penalty -\@Miv \vbox{}\penalty\@floatpenalty}\@Esphack
     \fi\fi}


\def\@dblfloat{\if@twocolumn\let\@tempa\@dbflt\else\let\@tempa\@float\fi
  \@tempa}

\def\@dbflt#1{\@ifnextchar[{\@xdblfloat{#1}}{\@xdblfloat{#1}[tp]}}

\def\@xdblfloat#1[#2]{\@xfloat{#1}[#2]\hsize\textwidth\linewidth\textwidth}

\def\end@dblfloat{\if@twocolumn
     \par\vskip\z@\egroup %% \par\vskip\z@ added 15 Dec 87\egroup
     \ifnum\@floatpenalty <\z@
% make sure that we never exceed \textheight, otherwise float
% will never get typeset =91/03/15 FMi=
       \ifdim\ht\@currbox >\textheight
% perhaps we should use an error message
         \@warning{Float larger than \string\textheight}%
         \ht\@currbox\textheight \fi
        \@cons\@dbldeferlist\@currbox\fi
%% RmS 92/03/18 changed \@esphack to \@Esphack
      \ifnum \@floatpenalty =-\@Mii \@Esphack\fi\else\end@float\fi}

\newcount\c@topnumber
\newcount\c@dbltopnumber
\newcount\c@bottomnumber
\newcount\c@totalnumber

\def\@floatplacement{\global\@topnum\c@topnumber
   \global\@toproom \topfraction\@colht
   \global\@botnum \c@bottomnumber
   \global\@botroom \bottomfraction\@colht
   \global\@colnum \c@totalnumber
   \@fpmin  \floatpagefraction\@colht}

\def\@dblfloatplacement{\global\@dbltopnum\c@dbltopnumber
```

```
6733    \global\@dbltoproom \dbltopfraction\@colht
6734    \@fpmin \dblfloatpagefraction\textheight
6735    \@fptop \@dblfptop
6736    \@fpsep \@dblfpsep
6737    \@fpbot \@dblfpbot}
6738
6739 %   MARGINAL NOTES:
6740 %
6741 %   Marginal notes use the same mechanism as floats to communicate
6742 %   with the \output routine. Marginal notes are distinguished from
6743 %   floats by having a negative placement specification. The command
6744 %   \marginpar [LTEXT]{RTEXT} generates a marginal note in a parbox,
6745 %   using LTEXT if it's on the left and RTEXT if it's on the right.
6746 %   (Default is RTEXT = LTEXT.) It uses the following parameters.
6747 %
6748 %   \marginparwidth : Width of marginal notes.
6749 %   \marginparsep  : Distance between marginal note and text.
6750 %        the page layout to determine how to move the marginal
6751 %        note into the margin. E.g., \@leftmarginskip ==
6752 %        \hskip -\marginparwidth \hskip -\marginparsep .
6753 %   \marginparpush : Minimum vertical separation between \marginpar's
6754 %
6755 %  Marginal notes are normally put on the outside of the page
6756 %  if @mparswitch = true, and on the right if @mparswitch = false.
6757 %  The command \reversemarginpar reverses the side where they
6758 %  are put. \normalmarginpar undoes \reversemarginpar.
6759 %  These commands have no effect for two-column output.
6760 %
6761 %  SURPRISE: if two marginal notes appear on the same line of
6762 %  text, then the second one could appear on the next page, in
6763 %  a funny position.
6764 %
6765 %
6766 %  \marginpar [LTEXT]{RTEXT} ==
6767 %   BEGIN
6768 %     if hmode then \@bsphack
6769 %                   \@floatpenalty := -10002
6770 %              else \@floatpenalty := -10003
6771 %     fi
6772 %     if inner
6773 %       then LaTeX Error: 'Not in outer paragraph mode.'
6774 %            \@floatpenalty := 0
6775 %       else if \@freelist has two elements:
6776 %              then get \@marbox, \@currbox from \@freelist
6777 %                   \count\@marbox :=G -1
6778 %              else \@floatpenalty := 0
6779 %                   LaTeX Error: 'Too many unprocessed floats'
6780 %                   \@currbox, \@marbox := \@tempboxa %%use \def
6781 %            fi
6782 %     fi
6783 %     if optional argument
6784 %       then %% \@xmpar ==
6785 %            \@savemarbox\@marbox{LTEXT}
6786 %            \@savemarbox\@currbox{RTEXT}
6787 %       else %% \@ympar ==
6788 %            \@savemarbox\@marbox{RTEXT}
6789 %            \box\@currbox :=G \box\@marbox
6790 %    fi
6791 %    %% \@xympar ==
6792 %    if \@floatpenalty < 0 then add \@marbox to \@currlist fi
6793 %    \setbox\@tempboxa =L   %% added 3 Jan 88 to correct bug introduced
6794 %       { \end@float %%%% BRACE MATCHING}    %% by 15 Dec 87 change
6795 %   END
6796 %
6797 % \@savemarbox\BOX{TEXT} ==
6798 %   BEGIN
6799 %     \BOX  :=G \vtop{ \hsize = \marginparwidth
6800 %                      \@parboxrestore
6801 %                      TEXT
6802 %                    }
6803 %   END
6804 %
6805 % \reversemarginpar == BEGIN \@mparbottom :=G 0
6806 %                           @reversemargin :=G true
```

```
%                     END
%
% \normalmarginpar == BEGIN \@mparbottom :=G 0
%                           @reversemargin :=G false
%                     END
%

\def\marginpar{\ifhmode \@bsphack\@floatpenalty -\@Mii\else
   \@floatpenalty-\@Miii\fi\ifinner
      \@parmoderr\@floatpenalty\z@
    \else\@next\@currbox\@freelist{}{}\@next\@marbox\@freelist{\global
      \count\@marbox\m@ne}{\@floatpenalty\z@ \@fltovf\def\@currbox{\@tempboxa
          }\def\@marbox{\@tempboxa}}\fi
     \@ifnextchar [{\@xmpar}{\@ympar}}

\long\def\@xmpar[#1]#2{\@savemarbox\@marbox{#1}\@savemarbox\@currbox
   {#2}\@xympar}

\long\def\@ympar#1{\@savemarbox\@marbox{#1}\global\setbox\@currbox
     \copy\@marbox\@xympar}

\long\def\@savemarbox#1#2{\global\setbox#1\vtop{\hsize\marginparwidth
   \@parboxrestore #2}}

\def\@xympar{\ifnum\@floatpenalty <\z@\@cons\@currlist\@marbox\fi
     \setbox\@tempboxa\vbox %% added 3 Jan 88
%% RmS 92/03/18 added \global\@ignorefalse
     \bgroup\end@float\global\@ignorefalse\@esphack}

\def\reversemarginpar{\global\@mparbottom\z@ \@reversemargintrue}
\def\normalmarginpar{\global\@mparbottom\z@ \@reversemarginfalse}


 \message{footnotes,}
%       ****************************************
%       *            FOOTNOTES                 *
%       ****************************************
%
%   \footnote{NOTE}     : User command to insert a footnote.
%
%   \footnote[NUM]{NOTE} : User command to insert a footnote numbered
%                          NUM, where NUM is a number -- 1, 2,
%                          etc.  For example, if footnotes are numbered
%                          *, **, etc. within pages, then \footnote[2]{...}
%                          produces footnote '**'. This command does not
%                          step the footnote counter.
%
%   \footnotemark[NUM]  : Command to produce just the footnote mark in
%                          the text, but no footnote. With no argument,
%                          it steps the footnote counter before generating
%                          the mark.
%
%   \footnotetext[NUM]{TEXT} : Command to produce the footnote but no
%                             mark.  \footnote is equivalent to
%                             \footnotemark \footnotetext .
%
%  As in PLAIN, footnotes use \insert\footins, and the following parameters:
%
%   \footnotesize  : Size-changing command for footnotes.
%
%   \footnotesep   : The height of a strut placed at the beginning of
%                    every footnote.
%   \skip\footins  : Space between main text and footnotes. The rule
%                    separating footnotes from text occurs in this space.
%                    This space lies above the strut of height \footnotesep
%                    which is at the beginning of the first footnote.
%   \footnoterule  : Macro to draw the rule separating footnotes from text.
%                    It is executed right after a \vspace of \skip\footins.
%                    It should take zero vertical space--i.e., it should to
%                    a negative skip to compensate for any positive space
%                    it occupies. (See PLAIN.TEX.)
%
%   \interfootnotelinepenalty : Interline penalty for footnotes.
%
```

```
6881 %   \thefootnote : In usual LaTeX style, produces the footnote number.
6882 %                 If footnotes are to be numbered within pages, then the
6883 %                 document style file must include an \@addtoreset command
6884 %                 to cause the footnote counter to be reset when the page
6885 %                 counter is stepped. This is not a good idea, though,
6886 %                 because the counter will not always be reset in time
6887 %                 to ensure that the first footnote on a page is footnote
6888 %                 number one.
6889 %
6890 %   \@thefnmark : Holds the current footnote's mark--e.g., \dag or '1' or 'a'.
6891 %
6892 %   \@mpfnnumber    : A macro that generates the numbers for \footnote
6893 %                     and \footnotemark commands. It == \thefootnote
6894 %                     outside a minipage environment, but can be changed
6895 %                     inside to generate numbers for \footnote's.
6896 %
6897 %   \@makefnmark : A macro to generate the footnote marker from \@thefnmark
6898 %                  The default definition is \hbox{$^\@thefnmark$}.
6899 %
6900 %   \@makefntext{NOTE} :
6901 %        Must produce the actual footnote, using \@thefnmark as the mark
6902 %        of the footnote and NOTE as the text. It is called when effectively
6903 %        inside a \parbox, with \hsize = \columnwidth. For example, it might
6904 %        be as simple as
6905 %              $^{\@thefnmark}$ NOTE
6906 %
6907 % In a minipage environment, \footnote and \footnotetext are redefined
6908 % so that
6909 %    (a) they use the counter mpfootnote
6910 %    (b) the footnotes they produce go at the bottom of the minipage.
6911 % The switch is accomplished by letting \@mpfn == footnote or mpfootnote
6912 % and \thempfn == \thefootnote or \thempfootnote, and by redefining
6913 % \@footnotetext to be \@mpfootnotetext in the minipage.
6914 %
6915 % \footnote{NOTE} ==
6916 %  BEGIN
6917 %    \stepcounter{\@mpfn}
6918 %    \@thefnmark :=G eval (\thempfn)
6919 %    \@footnotemark
6920 %    \@footnotetext{NOTE}
6921 %  END
6922 %
6923 % \footnote[NUM]{NOTE} ==
6924 %  BEGIN
6925 %    begingroup
6926 %       counter \@mpfn :=L NUM
6927 %       \@thefnmark :=G eval (\thempfn)
6928 %    endgroup
6929 %    \@footnotemark
6930 %    \@footnotetext{NOTE}
6931 %  END
6932 %
6933 % \@footnotetext{NOTE} ==
6934 %  BEGIN
6935 %    \insert into \footins
6936 %       {\footnotesize
6937 %        \interlinepenalty :=L \interfootnotelinepenalty
6938 %        \splittopskip    :=L \footnotesep
6939 %        \splitmaxdepth   :=L \dp\strutbox
6940 %        \floatingpenalty :=L 20000
6941 %        \hsize :=L \columnwidth
6942 %        \@parboxrestore
6943 %        set \@currentlabel to make \label command work right
6944 %        \@makefntext{\rule{0pt}{\footnotesep} NOTE}
6945 %       }
6946 %  END
6947 %
6948 % \footnotemark    ==
6949 %  BEGIN \stepcounter{footnote}
6950 %        \@thefnmark :=G eval(\thefootnote)
6951 %        \@footnotemark
6952 %  END
6953 %
6954 % \footnotemark[NUM] ==
```

```
%   BEGIN
%       begingroup
%         footnote counter :=L NUM
%        \@thefnmark :=G eval(\thefootnote)
%       endgroup
%       \@footnotemark
%   END
%
% \@footnotemark ==
%   BEGIN
%    \leavevmode
%    IF hmode THEN \@x@sf := \the\spacefactor FI
%    \@makefnmark        % put number in main text
%    IF hmode THEN \spacefactor := \@x@sf FI
%   END
%
% \footnotetext    ==
%    BEGIN \@thefnmark :=G eval (\thempfn)
%          \@footnotetext
%    END
%
% \footnotetext[NUM] ==
%    BEGIN begingroup counter \@mpfn :=L NUM
%                     \@thefnmark :=G eval (\thempfn)
%          endgroup
%          \@footnotetext
%    END
%

\@definecounter{footnote}
\def\thefootnote{\arabic{footnote}}

\@definecounter{mpfootnote}
\def\thempfootnote{\alph{mpfootnote}}

% Default definition
\def\@makefnmark{\hbox{$^{\@thefnmark}\m@th$}}

\newdimen\footnotesep

%% RmS 91/11/01: Added \let\protect\noexpand in \footnote, \footnotemark,
%%               and \footnotetext, since \xdef is used.
%% RmS 91/11/22: Added \let\protect\noexpand in \@xfootnote, \@xfootnotemark,
%%               and \@xfootnotetext.

\def\footnote{\@ifnextchar[{\@xfootnote}{\stepcounter{\@mpfn}%
     \begingroup\let\protect\noexpand
       \xdef\@thefnmark{\thempfn}\endgroup
     \@footnotemark\@footnotetext}}

\def\@xfootnote[#1]{\begingroup \csname c@\@mpfn\endcsname #1\relax
   \let\protect\noexpand
   \xdef\@thefnmark{\thempfn}\endgroup
   \@footnotemark\@footnotetext}

%% RmS 91/09/29: added \reset@font
\long\def\@footnotetext#1{\insert\footins{\reset@font\footnotesize
    \interlinepenalty\interfootnotelinepenalty
    \splittopskip\footnotesep
    \splitmaxdepth \dp\strutbox \floatingpenalty \@MM
    \hsize\columnwidth \@parboxrestore
   \edef\@currentlabel{\csname p@footnote\endcsname\@thefnmark}\@makefntext
    {\rule{\z@}{\footnotesep}\ignorespaces
      #1\strut}}}

\def\footnotemark{\@ifnextchar[{\@xfootnotemark}{\stepcounter{footnote}%
     \begingroup\let\protect\noexpand
       \xdef\@thefnmark{\thefootnote}\endgroup
     \@footnotemark}}

\def\@xfootnotemark[#1]{\begingroup \c@footnote #1\relax
   \let\protect\noexpand
   \xdef\@thefnmark{\thefootnote}\endgroup \@footnotemark}
```

```
\def\@footnotemark{\leavevmode\ifhmode
  \edef\@x@sf{\the\spacefactor}\fi \@makefnmark
   \ifhmode\spacefactor\@x@sf\fi\relax}

\def\footnotetext{\@ifnextchar [{\@xfootnotenext}%
   {\begingroup\let\protect\noexpand
      \xdef\@thefnmark{\thempfn}\endgroup
    \@footnotetext}}

\def\@xfootnotenext[#1]{\begingroup \csname c@\@mpfn\endcsname #1\relax
   \let\protect\noexpand
   \xdef\@thefnmark{\thempfn}\endgroup \@footnotetext}

\def\@mpfn{footnote}
\def\thempfn{\thefootnote}

 \message{initial,}
%         ************************************
%         *    INITIAL DECLARATION COMMANDS   *
%         ************************************
%
%                  DOCUMENT STYLE
%                  --------------
%
% The user starts his file with the command
%      \documentstyle [OPTION1, ... ,OPTIONk]{STYLE}
% which saves the OPTION's and \input's the file STYLE.STY. When the
% STYLE.STY file issues the command \@options, the following happens
% for each i :
%    IF \ds@OPTIONi is defined
%      THEN execute \ds@OPTIONi
%      ELSE save OPTIONi on a list of unprocessed options.
%    FI
% After STYLE.STY has been executed, the file OPTIONi.STY is read for
% each OPTIONi on the list of unprocessed options.
%
% \documentstyle ==
%   BEGIN
%     IF next char = [
%       THEN  \@documentstyle
%       ELSE  \@documentstyle[]
%     FI
%   END
%
% \@documentstyle[OPTIONS]{STYLE} ==
%   BEGIN
%     \makeatletter
%     \@optionlist := OPTIONS
%     \@optionfiles :=G null
%     \input STYLE.STY
%     \@elt == \input
%     \@optionfiles
%     \@elt == \relax
%     \makeatother
%   END
%
% \@options ==
%    BEGIN
%      \@elt := \relax
%      FOR \@tempa := \@optionlist
%         DO  IF \ds@[eval(\@tempa)] defined
%               THEN  \ds@[eval(\@tempa)]
%               ELSE  \@optionfiles :=G \@optionfiles *
%                                       \@elt eval(\@tempa) \relax
%         OD  FI
%    END
%
%             PAGE STYLE COMMANDS
%             -------------------
% \pagestyle{STYLE}   : sets the page style of the current and succeeding
%                       pages to STYLE
%
% \thispagestyle{STYLE} : sets the page style of the current page only
%                       to STYLE
```

```
%
%  To define a page style STYLE, you must define \ps@STYLE to set the page
%  style parameters.
%
%  HOW A PAGE STYLE MAKES RUNNING HEADS AND FEET:
%
% The \ps@... command defines the macros \@oddhead, \@oddfoot,
% \@evenhead, and \@evenfoot to define the running heads and feet.
% (See output routine.) To make headings determined by the sectioning
% commands, the page style defines the commands \chaptermark,
% \sectionmark, etc., where \chaptermark{TEXT} is called by \chapter to
% set a mark. The \...mark commands and the \...head macros are defined
% with the help of the following macros. (All the \...mark commands
% should be initialized to no-ops.)
%
% MARKING CONVENTIONS:
% LaTeX extends TeX's \mark facility by producing two kinds of marks
% a 'left' and a 'right' mark, using the following commands:
%     \markboth{LEFT}{RIGHT} : Adds both marks.
%     \markright{RIGHT}    : Adds a 'right' mark.
%     \leftmark : Used in the output routine, gets the current 'left' mark.
%                 Works like TeX's \botmark.
%     \rightmark : Used in the output routine, gets the current 'right' mark.
%                 Works like TeX's \firstmark.
% The marking commands work reasonably well for right marks 'numbered
% within' left marks--e.g., the left mark is changed by a \chapter command and
% the right mark is changed by a \section command. However, it does
% produce somewhat anomalous results if 2 \markboth's occur on the same page.
%
% Commands like \tableofcontents that should set the marks in some page styles
% use a \@mkboth command, which is \let by the pagestyle command (\ps@...)
% to \markboth for setting the heading or to \@gobbletwo to do nothing.

\def\documentstyle{\@ifnextchar[{\@documentstyle}{\@documentstyle[]}}

\def\@documentstyle[#1]#2{\makeatletter
   \def\@optionlist{#1}\gdef\@optionfiles{}\input #2.sty\relax
   \let\@elt\input \@optionfiles \let\@elt\relax \makeatother}

\def\@options{\let\@elt\relax
    \@for\@tempa:=\@optionlist\do
        {\@ifundefined{ds@\@tempa}{\xdef\@optionfiles{\@optionfiles
             \@elt \@tempa.sty\relax}}{\csname ds@\@tempa\endcsname}}}

\def\pagestyle#1{\@nameuse{ps@#1}}
\def\thispagestyle#1{\global\@specialpagetrue\gdef\@specialstyle{#1}}

% \head : An obsolete command that was used in the `myheadings'
%        page style.  (Removed 14 Jun 85)
% \def\head{\@ifnextchar[{\@xhead}{\@yhead}}
% \def\@xhead[#1]#2{\if #1l \def\@lhead{#2}\else \def\@rhead{#2}\fi}
% \def\@yhead#1{\def\@lhead{#1}\def\@rhead{#1}}

% Initialization
%
%\def\@lhead{} %% RmS 91/09/29: removed since no longer used
%\def\@rhead{} %% ditto


% Default Initializations
%
\def\ps@empty{\let\@mkboth\@gobbletwo\let\@oddhead\@empty\let\@oddfoot\@empty
\let\@evenhead\@empty\let\@evenfoot\@empty}

\def\ps@plain{\let\@mkboth\@gobbletwo
     \let\@oddhead\@empty\def\@oddfoot{\reset@font\rm\hfil\thepage
     \hfil}\let\@evenhead\@empty\let\@evenfoot\@oddfoot}

\def\@leftmark#1#2{#1}
\def\@rightmark#1#2{#2}

%% test for @nobreak added 15 Apr 86 in \markboth and \markright
%% letting \label and \index to \relax added 22 Feb 86 so these
%%   commands can appear in sectioning command arguments
```

```
%% RmS 91/06/21 Same for \glossary
%%

\def\markboth#1#2{\gdef\@themark{{#1}{#2}}{\let\protect\noexpand
     \let\label\relax \let\index\relax \let\glossary\relax
     \mark{\@themark}}\if@nobreak\ifvmode\nobreak\fi\fi}
\def\markright#1{{\let\protect\noexpand
     \let\label\relax \let\index\relax \let\glossary\relax
     \expandafter\@markright\@themark
     {#1}\mark{\@themark}}\if@nobreak\ifvmode\nobreak\fi\fi}

\def\@markright#1#2#3{\gdef\@themark{{#1}{#3}}}
\def\leftmark{\expandafter\@leftmark\botmark}
\def\rightmark{\expandafter\@rightmark\firstmark}

% Initialization
%
\def\@themark{{}{}}


%  OTHER
%  -----
%
%   \raggedbottom : Typesets pages with no vertical stretch, so they have
%                   their natural height instead of all being exactly the
%                   same height. (Uses a space of .0001fil to avoid
%                   interfering with the 1fil space of \newpage.)
%
%   \flushbottom : Inverse of \raggedbottom - makes all pages the same
%                  height.
%
%   \sloppy : Resets TeX's parameters so it accepts worse line and page
%             breaks, and slightly more overfull boxes.
%
%   \fussy : Resets TeX's parameters to their normal finnicky values.
%

\def\raggedbottom{\def\@textbottom{\vskip \z@ plus.0001fil}\let\@texttop\relax}
\def\flushbottom{\let\@textbottom\relax \let\@texttop\relax}

% Default definitions
%  \sloppy will never (well, hardly ever) produce overfull boxes, but may
%  produce underfull ones. (14 June 85)
%  A sloppypar environment is equivalent to {\par \sloppy ... \par}.
\def\sloppy{\tolerance \@M \hfuzz .5\p@ \vfuzz .5\p@}
\def\sloppypar{\par\sloppy}
\def\endsloppypar{\par}
\def\fussy{\tolerance 200 \hfuzz .1\p@ \vfuzz .1\p@}



% LaTeX default is no overfull box rule. Changed by document
% style option

\overfullrule 0pt

 \message{output,}
%     ****************************************
%     *              OUTPUT                  *
%     ****************************************
%
%
%  PAGE LAYOUT PARAMETERS
%
%   \topmargin     : Extra space added to top of page.
%   @twoside       : boolean. T if two-sided printing
%   \oddsidemargin : IF @twoside = T
%                        THEN extra space added to left of odd-numbered
%                             pages.
%                        ELSE extra space added to left of all pages.
%   \evensidemargin : IF @twoside = T
%                        THEN extra space added to left of even-numbered
%                             pages.
%   \headheight    : height of head
```

```
%   \headsep      : separation between head and text
%   \footskip     : distance separation between baseline of last
%                   line of text and baseline of foot.
%                   Note difference between \footSKIP and \headSEP.
%   \textheight   : height of text on page, excluding head and foot
%   \textwidth    : width of printing on page
%   \columnsep    : IF @twocolumn = T
%                     THEN width of space between columns
%   \columnseprule : IF @twocolumn = T
%                     THEN width of rule between columns (0 if none).
%   \columnwidth  : IF @twocolumn = T
%                     THEN (\textwidth - \columnsep)/2
%                     ELSE \textwidth
%                   It is set by the \@maketwocolumn and \@makeonecolumn
%                   commands.
%   \@textbottom  : Command executed at bottom of vbox holding text of page
%                   (including figures). The \raggedbottom command
%                   almost \let's this to \vfil (actually sets it to
%                   \vskip \z@ plus.0001fil). %expanded 18 Jun 86
%
%   \@texttop     : Command executed at top of vbox holding text of page
%                   (including figures). Used by letter style; can also
%                   be used to produce centered pages. Is \let to \relax
%                   by \raggedbottom and \flushbottom.
%
%  Page layout must also initialize \@colht and \@colroom to \textheight.
%
% PAGE STYLE PARAMETERS:
%
%   \floatsep     : Space left between floats.
%   \textfloatsep : Space between last top float or first bottom float
%                   and the text.
%   \topfigrule   : Command to place rule (or whatever) between floats
%                   at top of page and text. Executed in inner vertical
%                   mode right before the \textfloatsep skip separating
%                   the floats from the text. Must occupy zero vertical
%                   space. (See \footnoterule.)
%   \botfigrule   : Same as \topfigrule, but put after the \textfloatsep
%                   skip separating text from the floats at bottom of page.
%   \intextsep    : Space left on top and bottom of an in-text float.
%   \@maxsep      : The maximum of \floatsep, \textfloatsep and \intextsep
%   \dblfloatsep  : Space between double-column floats.
%   \dbltextfloatsep : Space between top or bottom double-column floats
%                      and text.
%   \dblfigrule   : Similar to \topfigrule, but for double-column floats.
%   \@dblmaxsep   : The maximum of \dblfloatsep and \dbltexfloatsep
%   \@fptop       : Glue to go at top of float column -- must be 0pt +
%                   stretch
%   \@fpsep       : Glue to go between floats in a float column.
%   \@fpbot       : Glue to go at bottom of float column -- must be 0pt +
%                   stretch
%   \@dblfptop, \@dblfpsep, \@dblfpbot
%                 : Analogous for double-column float page in two-column
%                   format.
%
% FOOTNOTES: As in PLAIN, footnotes use \insert\footins.
%
% PAGE LAYOUT SWITCHES AND MACROS
%
%  @twocolumn    : Boolean. T if two columns per page.
%
% PAGE STYLE MACROS AND SWITCHES
%
%   \@oddhead      : IF @twoside = T
%                         THEN macro to generate head of odd-numbered pages.
%                         ELSE macro to generate head of all pages.
%   \@evenhead     : IF @twoside = T
%                         THEN macro to generate head of even-numbered pages.
%   \@oddfoot      : IF @twoside = T
%                         THEN macro to generate foot of odd-numbered pages.
%                         ELSE macro to generate foot of all pages.
%   \@evenfoot     : IF @twoside = T
%                         THEN macro to generate foot of even-numbered pages.
%   @specialpage   : boolean. T if current page is to have a special format.
```

```
%   \@specialstyle : If its value is foo then
%                    IF @specialpage = T
%                      THEN the command \ps@foo is executed to temporarily
%                           reset the page style parameters before composing
%                           the current page. This command should execute
%                           only \def's and \edef's, making only local
%                           definitions.
%
%
%  FLOAT PLACEMENT PARAMETERS
%
% The following parameters are set by the macro \@floatplacement.
% When \@floatplacement is called,
% \@colht is the height of the page or column being built. I.e.:
%        * For single-column page it equals \textheight.
%        * For double-column page it equals \textheight - height
%          of double-column floats on page.
% Note that some are set globally and some locally:
%    \@topnum :=G Maximum number of floats allowed on the top of a column.
%    \@toproom :=G Maximum amount of top of column devoted to floats--
%                 excluding \textfloatsep separation below the floats and
%                 \floatsep separation between them. For two-column
%                 output, should be computed as a function of \@colht.
%    \@botnum, \@botroom
%                : Analogous to above.
%    \@colnum :=G Maximum number of floats allowed in a column, including
%                 in-text floats.
%    \@textmin :=L Minimum amount of text (excluding footnotes) that must
%                 appear on a text page. %% 27 Sep 85 : made local to
%                                        %% \@addtocurcol and \@addtonextcol
%    \@fpmin  :=L Minimum height of floats in a float column.
%
% The macro \@dblfloatplacement sets the following parameters.
%    \@dbltopnum :=G Maximum number of double-column floats allowed at the
%                   top of a two-column page.
%    \@dbltoproom :=G Maximum height of double-column floats allowed at
%                   top of two-column page.
%    \@fpmin     :=L Minimum height of floats in a float column.
% It should also perform the following local assignments where necessary
% -- i.e., where the new value differs from the old one:
%      \@fptop      :=L \@dblfptop
%      \@fpsep      :=L \@dblfpsep
%      \@fpbot      :=L \@dblfpbot
%
%  OUTPUT ROUTINE VARIABLES
%
%  \@colht : The total height of the current column. In single column
%           style, it equals \textheight. In two-column style, it is
%           \textheight minus the height of the double-column floats
%           on the current page. MUST BE INITIALIZED TO \textheight.
%
%  \@colroom : The height available in the current column for text and
%              footnotes. It equals \@colht minus the height of all
%              floats committed to the top and bottom of the current
%              column.
%
%  \footins : Footnote insertion number.
%
%  \@maxdepth : Saved value of TeX's \maxdepth. Must be set
%               when any routine sets \maxdepth.
%
%           CALLING THE OUTPUT ROUTINE
%           --------------------------
%
% The output routine is called either by TeX's normal page-breaking
% mechanism, or by a macro putting a penalty < or = -10000 in the output
% list. In the latter case, the penalty indicates why the output
% routine was called, using the following code.
%
%   penalty  reason
%   -------  ------
%   -10000   \pagebreak
%            \newpage
%   -10001   \clearpage (called with \penalty -10000 \vbox{} \penalty -10001
```

```
%  -10002   float insertion, called from horizontal mode
%  -10003   float insertion, called from vertical mode.
%  -10004   float insertion.
%
% Note: A float or marginpar puts the following sequence in the output
%       list: (i) a penalty of -10004,
%             (ii) a null \vbox
%            (iii) a penalty of -10002 or -10003.
%       This solves two special problems:
%         1. If the float comes right after a \newpage or \clearpage,
%            then the first penalty is ignored, but the second one
%            invokes the output routine.
%         2. If there is a split footnote on the page, the second 'page'
%            puts out the rest of the footnote.
%
%             THE OUTPUT ROUTINE
%             ------------------
%
% FUNCTIONS USED IN THE OUTPUT ROUTINE:
%
% \@outputpage : Produces an output page with the contents of box
%             \@outputbox as the text part. Also sets
%             \@colht :=G \textheight. The page style is determined
%             as follows.
%               IF  @thispagestyle = true
%                 THEN use \thispagestyle style
%                 ELSE use ordinary page style.
%
% \@tryfcolumn\FLIST : Tries to form a float column composed of floats from
%             \FLIST with with the following parameters:
%               \@colht : height of box
%               \@fpmin : minimum height of floats in the box
%               \@fpsep : interfloat space
%               \@fptop : glue at top of box
%               \@fpbot : glue at bottom of box.
%             If it succeeds, then it does the following:
%               * \@outputbox :=L the composed float box.
%               * @fcolmade  :=L true
%               * \FLIST     :=G \FLIST - floats put in box
%               * \@freelist :=G \@freelist + floats put in box
%             If it fails, then:
%               * @fcolmade :=L false
%          NOTE: BIT MUST BE A SINGLE TOKEN!
%
% \@makefcolumn \FLIST : Same as \@tryfcolumn except that it
%            fails to make a float column only if \FLIST is empty.
%            Otherwise, it makes a float column containing at least
%            the first box in \FLIST, disregarding \@fpmin.
%
% \@startcolumn :
%       Calls \@tryfcolumn\@deferlist{8}. If \@tryfcolumn returns with
%       @fcolmade = false, then:
%               * Globally sets \@toplist and \@botlist to floats
%                 from \@deferlist to go at top and bottom of column,
%                 deleting them from \@deferlist. It does
%                 this using \@colht as the total height, the page
%                 style parameters \@floatsep and \@textfloatsep, and
%                 the float placement parameters \@topnum, \@toproom,
%                 \@botnum, \@botroom, \@colnum and \textfraction.
%               * Globally sets \@colroom to \@colht minus the height
%                 of the added floats.
%
% \@startdblcolumn :
%      Calls \@tryfcolumn\@dbldeferlist{8}. If \@tryfcolumn returns
%      with @fcolmade = false, then:
%              * Globally sets \@dbltoplist to floats from \@dbldeferlist
%                to go at top and bottom of column, deleting them from
%                \@dbldeferlist. It does this using \textheight as the
%                total height, and the parameters \@dblfloatsep, etc.
%              * Globally sets \@colht to \textheight minus the height
%                of the added floats.
%
% \@combinefloats : Combines the text from box
%             \@outputbox with the floats from \@toplist and \@botlist,
```

```
%             putting the new box in \@outputbox. It uses \floatsep and
%             \textfloatsep for the appropriate separations. It puts the
%             elements of \TOPLIST and \BOTLIST onto \@freelist, and makes
%             those lists null.
%
% \@makecol : Makes the contents of \box255 plus the accumulated
%             footnotes, plus the floats in \@toplist and \@botlist,
%             into a single column of height \@colht, which it puts
%             into box \@outputbox. It puts boxes in \@midlist back
%             onto \@freelist and restores \maxdepth.
%
% \@opcol : Outputs a column whose text is in box \@outputbox
%             If @twocolumn = false, then it calls \@outputpage,
%             sets \@colht :=G \textheight, and calls \@floatplacement.
%
%             If @twocolumn = true, then:
%                 If @firstcolumn = true, then it puts box \@outputbox
%                 into \@leftcolumn and sets @firstcolumn :=G false.
%
%                 If @firstcolumn = false, then it puts out the current
%                 two-column page, any possible two-column float pages,
%                 and determines \@dbltoplist for the next page.
%
% \@opcol ==
%  BEGIN
%   \@mparbottom :=G 0pt
%   if @twocolumn = true
%     then %% \@outputdblcol ==
%          if @firstcolumn = true
%            then @firstcolumn :=G false
%                 \@leftcolumn :=G \@outputbox
%            else @firstcolumn :=G true
%                 \@outputbox := \vbox{
%                                  \hbox to \textwidth{
%                                    \hbox to\columnwidth{\box\@leftcolumn
%                                                         \hss}
%                                    \hfil \vrule width \columnseprule \hfil
%                                    \hbox to\columnwidth{\box\@outputbox}
%                                                         \hss}          }
%                 \@combinedblfloats
%                 \@outputpage
%                 \begingroup
%                    \@dblfloatplacement
%                    \@startdblcolumn
%                    while @fcolmade = true
%                      do  \@outputpage
%                          \@startdblcolumn od
%                 \endgroup
%          fi
%     else
%       \@outputpage
%       \@colht :=G \textheight
%   fi
%  END
%
%  \@makecol ==
%    BEGIN
%     ifvoid \insert\footins
%        then \@outputbox := \box255
%        else \@outputbox := \vbox {\boxmaxdepth :=L \maxdepth
%                                           %added 21 Jan 87
%                                   \unvbox255
%                                   \vskip \skip\footins
%                                   \footnoterule
%                                   \unvbox\footins
%                                  }
%     fi
%     \@freelist :=G \@freelist * \@midlist
%     \@midlist :=G empty
%     \@combinefloats
%     \@outputbox := \vbox to \@colht{\boxmaxdepth := \maxdepth
%                                     \@texttop
%                                     temp :=L \dp\@outputbox
%                                     \unvbox\@outputbox
```

```
%                                   \vskip -temp
%                                   \@textbottom}
%    \maxdepth :=G \@maxdepth
%    END
%
% \@outputpage ==
%   BEGIN
%     \begingroup         %%% added 11 Jun 85 to keep special page
%                         %%%  declarations local to this output page
%     \catcode`\ := 10      %%make sure space is really a space
%     \- := \@dischyph    %%% Added 4 Aug 88 in event output routine
%     \' := \@acci        %%% called inside a tabbing environment.
%     \` := \@accii
%     \= := \@acciii
%     if @specialpage = T
%       then @specialpage :=G F
%            execute \ps@[eval(\@specialstyle)] fi
%     if \@twoside = T
%       then if \count0 odd
%                 \@thehead      ==L \@oddhead
%                 \@thefoot      ==L \@oddfoot
%                 \@themargin    ==L \oddsidemargin
%            else \@thehead      ==L \@evenhead
%                 \@thefoot      ==L \@evenfoot
%                 \@themargin    ==L \evensidemargin fi fi
%     \shipout\vbox
%       {\normalsize        % set fonts size for head and foot
%        \baselineskip :=L \lineskip :=L 0pt
%        \par :=L \@@par     %% added 15 Sep 87 for robustness
%        \vskip \topmargin
%        \moveright\@themargin\vbox
%             { \box\@tempboxa := \vbox to \headheight{\vfil
%                                   \hbox to \textwidth
%                                     {\index == \label ==
%                                       \glossary == \@gobble
%                                         %% Added 22 Feb 87 as bug fix
%                                         %% RmS 91/06/21 \glossary added
%                                      \@thehead}}
%               \dp\@tempboxa := 0pt % Don't skip space for descenders in
%               \box\@tempboxa       % running head.
%               \vskip \headsep
%               \box\@outputbox
%               \baselineskip\footskip
%               \hbox to \textwidth{\index == \label == \glossary == \@gobble
%                                    %%% added 22 Feb 87 as bug fix
%                                    %%% RmS 91/06/21 \glossary added
%                                 \@thefoot}
%             }
%       }
%     \@colht :=G \textheight
%     \endgroup              %% added 11 Jun 85
%     \stepcounter{page}
%     \firstmark ==L \botmark %% So marks work properly on float
%                            %% pages. (14 Jun 85)
%   END
%
% \@startcolumn ==
%  BEGIN
%    \@colroom :=G \@colht
%    if \@deferlist is empty
%      then @fcolmade := false
%      else \@tryfcolumn\@deferlist    %% else clause == \@xstartcol
%           if @fcolmade = false
%             then \begingroup
%                  \@tempb    :=L \@deferlist
%                  \@deferlist :=G empty
%                  \@elt \BOX == BEGIN \@currbox == \BOX   % use \gdef
%                                      \@addtonextcol
%                                 END  == \@scolelt
%                  \@tempb
%                \endgroup
%    fi    fi
%  END
%
```

```
% \@startdblcolumn ==
% BEGIN
%   \@colht :=G \textheight
%     \@tryfcolumn\@dbldeferlist   %% else clause == \@xstartcol
%     if @fcolmade = false
%       then \begingroup
%            \@tempb       :=L \@dbldeferlist
%            \@dbldeferlist :=G empty
%            \@elt \BOX    == BEGIN \@currbox == \BOX   % use \gdef
%                                   \@addtodblcol
%                              END  == \@sdblcolelt
%            \@tempb
%          \endgroup
%   fi    fi
% END
%
% \output ==
% BEGIN
%  case of \outputpenalty
%     > -10001 -> \@makecol
%                 \@opcol
%                 \@floatplacement
%                 \@startcolumn
%                 while @fcolmade = true
%                    do \@opcol
%                       \@startcolumn
%                    od
%
% %%% \@specialoutput ==
%
%     -10001  ->  %% \@doclearpage ==
%                    if there are no footnote insertions
%                      then unbox the \writes at the head of \box255
%                             and throw away the rest
%                           \@deferlist :=G \@toplist * \@botlist
%                                           * \@deferlist
%                           \@toplist :=G \@botlist :=G empty
%                           \@colroom :=G \@colht
%                           if \@currlist not empty
%                             then LaTeX error: float(s) lost
%                                  \@currlist :=G empty
%                           fi
%                           \@makefcolumn\@deferlist
%                           while @fcolmade = true
%                                do \@opcol
%                                   \@makefcolumn\@deferlist
%                                od
%                           if @twocolumn
%                             then
%                               if @firstcolumn = true
%                                 then \@dbldeferlist :=G \@dbltoplist *
%                                                         \@dbldeferlist
%                                      \@dbltoplist  :=G empty
%                                      \@colht :=G \textheight
%                                      \begingroup
%                                         \@dblfloatplacement
%                                         \@makefcolumn\@dbldeferlist
%                                         while @fcolmade = true
%                                           do \@outputpage
%                                              \@makefcolumn\@dbldeferlist
%                                           od
%                                      \endgroup
%                                 else \vbox{} \clearpage
%                           fi fi
%                      else \box255 := \vbox{\box255\vfil}
%                           \@makecol
%                           \@opcol
%                           \clearpage
%                    fi
%    < -10001    ->
%             if \outputpenalty < -10003
%               then if \outputpenalty <-20000 %% true only at end
%                       then \deadcycles := 0
%                    fi
```

```
%                   box \@holdpg :=G box255
%               else throw away box 255
%                   \@pagedp :=L natural depth of box \@holdpg
%                   \@pageht :=L natural ht of box \@holdpg
%                   \unvbox box \@holdpg %% put text back
%                   if \@currlist nonempty
%                      then \@currbox :=L head of \@currlist
%                           \@currlist :=G tail of \@currlist
%                           if \count\@currbox > 0
%                         %% Changed 28 Feb 88 so \@pageht and \@pagedp
%                         %% aren't changed for a marginal note
%                             then %% this is a float
%                               if there are footnote insertions
%                                 then advance \@pageht and \@pagedp and
%                                 reinsert footnotes
%                               fi
%                               \@addtocurcol
%                             else %% this is a marginal note
%                               if there are footnote insertions
%                                 reinsert footnotes
%                               fi
%                               \@addmarginpar
%                           fi
%                      else THIS SHOULDN'T HAPPEN
%                   fi
%                   if \outputpenalty < 0       %% TO PERMIT PAGE BREAK
%                     then \penalty\interlinepenalty fi %% IF \@addtocurcol
%                                               %% DIDN'T INSERT A PENALTY
%             fi
%  end case
% \vsize :=G if \outputpenalty > -10004 then \@colroom %%normal case
%                                       else \maxdimen %%processing float
%           fi
% END
%
% \@combinefloats ==
% BEGIN
%   if \@toplist nonempty
%     then %%\@cfla ==
%          \@elt\BOX == BEGIN \@tempbox := \vbox{\unvbox\@tempbox
%                                                \box\BOX
%                                                \vskip \floatsep}
%                       END  ==  \@comflelt
%          \@tempbox := null
%          \@toplist
%          \@outputbox := \vbox{\boxmaxdepth :=L \maxdepth
%                                           %added 21 Jan 87
%                               \unvbox\@tempbox
%                               \vskip - \floatsep
%                               \topfigrule
%                               \vskip \textfloatsep
%                               \unvbox\@outputbox            }
%          \@elt == \relax
%          \@freelist :=G \@freelist * \@toplist
%          \@toplist :=G null
%   fi
%   if \@botlist nonempty
%     then %%\@cflb ==
%          \@elt == \@comflelt
%          \@tempbox  := null
%          \@botlist
%          \@outputbox := \vbox{ \unvbox\@outputbox
%                                \vskip \textfloatsep
%                                \botfigrule
%                                \unvbox\@tempbox
%                                \vskip - \floatsep  }
%          \@elt == \relax
%          \@freelist :=G \@freelist * \@botlist
%          \@botlist :=G null
%   fi
% END
%
% \@combinedblfloats ==
% BEGIN
```

```
%    if \@dbltoplist nonempty
%      then \@elt == \@comdblflelt
%           \@tempbox := null
%           \@dbltoplist
%           \@outputbox := \vbox to \textheight
%                          {\boxmaxdepth :=L \maxdepth
%                           \unvbox\@tempbox
%                           \vskip - \dblfloatsep
%                           \dblfigrule
%                           \vskip \dbltextfloatsep
%                           \box\@outputbox                    }
%           \@elt == \relax
%           \@freelist :=G \@freelist * \@dbltoplist
%           \@dbltoplist :=G null
%    fi
%  END
%
%
%           USER COMMANDS THAT CALL OR AFFECT THE OUTPUT ROUTINE
%           ---------------------------------------------------
%
% \newpage == BEGIN \par\vfil\penalty -10000 END
%
% \clearpage == BEGIN \newpage
%                   \write -1{}   % Part of hack to make sure no
%                   \vbox{}       % \write's get lost.
%                   \penalty -10001
%              END
%
% \cleardoublepage == BEGIN \clearpage
%                         if @twoside = true and c@page is even
%                           then \hbox{} \newpage fi
%                   END
%
% \twocolumn ==
%  BEGIN
%    \clearpage
%    \columnwidth :=G .5(\textwidth - \columnsep)
%    \hsize      :=G \columnwidth
%    @twocolumn  :=G true
%    @firstcolumn :=G true
%    \@dblfloatplacement
%  END
%
% \onecolumn ==
%  BEGIN
%    \clearpage
%    \columnwidth :=G \textwidth
%    \hsize      :=G \columnwidth
%    @twocolumn  :=G false
%    \@floatplacement
%  END
%
%
% \topnewpage{BOX} : starts a new page and puts BOX in a parbox of width
%     \textwidth across the top. Useful for full-width titles for
%     double-column pages.
%     SURPRISE: The stretch from \@dbltextfloatsep will be inserted
%     between the BOX and the top of the two columns.
%
% \topnewpage{BOX} ==
%  BEGIN
%   \clearpage
%   Take \@currbox from \@freelist
%   \box\@currbox :=G \parbox{BOX \par
%                             \vskip - \@dbltextfloatsep}
%   \count\@currbox :=G 2
%   \@dbltopnum    :=G 1
%   \@dbltoproom   :=G maxdimension
%   \@addtodblcol
%   \vsize         :=G \@colht
%   \@colroom      :=G \@colht
%  END
```

```
7843
7844 %           FLOAT-HANDLING MECHANISMS
7845 %           -------------------------
7846 %
7847 % The float environment obtains an insertion number B from the
7848 % \@freelist (see below for a description of list manipulation), puts
7849 % the float into box B and sets \count B to a FLOAT SPECIFIER. For
7850 % a normal (not double-column) float, it then causes a page break
7851 % in one of the following two ways:
7852 %   - In outer hmode: \vadjust{\penalty -10002}
7853 %   - In vmode :     \penalty -10003.
7854 % For a double-column float, it puts B onto the \@dbldeferlist.
7855 % The float specifier has two components:
7856 %    * A PLACEMENT SPECIFICATION, describing where the float may
7857 %      be placed.
7858 %    * A TYPE, which is a power of two--e.g., figures might be
7859 %      type 1 floats, tables type 2 floats, programs type 4 floats, etc.
7860 % The float specifier is encoded as follows, where bit 0 is the least
7861 % significant bit.
7862 %
7863 %  Bit    Meaning
7864 %  ---    -------
7865 %   0     1 iff the float may go where it appears in the text.
7866 %   1     1 iff the float may go on the top of a page.
7867 %   2     1 iff the float may go on the bottom of a page.
7868 %   3     1 iff the float may go on a float page.
7869 %   4     always 1
7870 %   5     1 iff a type 1 float
7871 %   6     1 iff a type 2 float
7872 %   etc.
7873 %
7874 %  A negative float specifier is used to indicate a marginal note.
7875 %
7876 %     MACROS AND DATA STRUCTURES FOR PROCESSING FLOATS
7877 %     -----------------------------------------------
7878 %
7879 %  A FLOAT LIST consisting of the floats in boxes \boxa ... \boxN has the form:
7880 %        \@elt \boxa ... \@elt \boxN
7881 %  where \boxI is defined by
7882 %        \newinsert\boxI
7883 %  Normally, \@elt is \let to \relax. A test can be performed on the entire
7884 %  float list by locally \def'ing \@elt appropriately and executing
7885 %  the list. This is a lot more efficient than looping through the list.
7886 %
7887 %  The following macros are used for manipulating float lists.
7888 %
7889 %  \@next \CS \LIST {NONEMPTY}{EMPTY} == %% NOTE: ASSUME \@elt = \relax
7890 %    BEGIN assume that \LIST == \@elt \B1 ... \@elt \Bn
7891 %          if n = 0
7892 %            then EMPTY
7893 %            else \CS   :=L \B1
7894 %                 \LIST :=G \@elt \B2 ... \@elt \Bn
7895 %                 NONEMPTY
7896 %          fi
7897 %    END
7898 %
7899 %
7900 %  \@bitor\NUM\LIST : Globally sets switch @test to the disjunction for all I
7901 %       of bit log2 \NUM of the float specifiers of all the floats in
7902 %       \LIST. I.e., @test is set to true iff there is at least one
7903 %       float in \LIST having bit log2 \NUM of its float specifier
7904 %       equal to 1.
7905 %
7906 %  Note: log2 [(\count I)/32] is the bit number corresponding to the
7907 %  type of float I. To see if there is any float in \LIST having
7908 %  the same type as float I, you run \@bitor with \NUM = [(\count I)/32] * 32.
7909 %
7910 % \@bitor\NUM\LIST ==
7911 %   BEGIN
7912 %      @test :=G false
7913 %      { \@elt \CTR == if \count\CTR / \NUM is odd
7914 %                      then @test := true     fi
7915 %        \LIST
7916 %      }
```

```
%   END
%
%
% \@cons\LIST\NUM : Globally sets \LIST := \LIST * \@elt \NUM
%
% \@cons\LIST\NUM ==
%   BEGIN { \@elt == \relax
%           \LIST :=G \LIST \@elt \NUM
%         }
%
% BOX LISTS FOR FLOAT-PLACEMENT ALGORITHMS
%
%    \@freelist    : List of empty boxes for placing new floats.
%    \@toplist     : List of floats to go at top of current column.
%    \@midlist     : List of floats in middle of current column.
%    \@botlist     : List of floats to go at bottom of current column.
%    \@deferlist   : List of floats to go after current column.
%    \@dbltoplist  : List of double-col. floats to go at top of current page.
%    \@dbldeferlist : List of double-column floats to go on subsequent pages.
%
% FLOAT-PLACEMENT ALGORITHMS
%
% \@tryfcolumn \FLIST ==
% BEGIN
%   @fcolmade   :=G false
%   \@trylist   :=G \FLIST
%   \@failedlist :=G empty
%   \begingroup
%    \@elt == \@xtryfc
%    \@trylist
%   \endgroup
%   if @fcolmade = true
%     then \@vtryfc \FLIST
%   fi
% END
%
% \@vtryfc ==
%    BEGIN
%      \@outputbox :=G \vbox{}
%      \@elt\BOX == BEGIN
%                     \@outputbox :=L \vbox{ \unvbox \@outputbox
%                                            \vskip \@fpsep
%                                            \box\BOX          }
%                   END  == \@wtryfc
%      \@flsucceed
%      \@outputbox :=G \vbox to \@colht{ \vskip \@fptop
%                                        \vskip -\@fpsep
%                                        \unvbox \@outputbox
%                                        \vskip \@fpbot    }
%      \@elt     ==  \relax
%      \@freelist :=G \@freelist * \@flsucceed
%      \FLIST    :=G \@failedlist * \@flfail
%    END
%
% \@xtryfc \BOX ==
% BEGIN
%    remove first element from \@trylist
%    \@currtype := (\count\BOX / 32) * 32
%    \@bitor \@currtype \@failedlist % @test := true if type on list
%    \@testfp \BOX                   % @test := true if no p-option
%    if ht of \BOX > \@colht
%      then @test :=G true
%    fi
%    if @test = true
%      then add \BOX to \@failedlist
%      else \@ytryfc \BOX
%    fi
% END
%
% \@ytryfc ==
% BEGIN
%    \begingroup
%      \@flsucceed :=G \@elt\BOX
%      \@flfail   :=G empty
```

```
%     \@tempdima := \ht\BOX
%     \@elt == \@ztryfc
%     \@trylist
%     if \@tempdima > \@fpmin
%       then @fcolmade :=G true
%       else add \BOX to \@failedlist
%     fi
%   \endgroup
%   if @fcolmade = true then \@elt == \@gobble fi
%  END
%
% \@ztryfc \BOX ==
%  BEGIN
%   \@tempcnta := (\count\BOX / 32) * 32
%   \@bitor \@tempcnta {\@failedlist \@flfail} % @test := true if on a list
%   \@testfp \BOX                          % @test := true if not p-option
%   \@tempdimb := \@tempdima + ht of \BOX + \@fpsep
%   if \@tempdimb > \@colht
%     then @test :=G true
%   fi
%   if @test = true
%     then add \BOX to \@flfail
%     else add \BOX to \@flsucceed
%          \@tempdima := \@tempdimb
%   fi
%  END
%
% \@testfp \BOX == BEGIN if bit 3 of \count\BOX = 0
%                       then @test :=G true    fi
%                END
%
% \@makefcolumn \FLIST ==
%  BEGIN
%   \begingroup
%     \@fpmin =:L 0
%     \@testfp == \@gobble
%     \@tryfcolumn \FLIST
%   \endgroup
%  END
%
%  \@addtobot : Tries to put insert \@currbox on \@botlist. Called only when:
%                * \ht BOX + \@maxsep < \@colroom
%                * type of \@currbox not on \@deferlist
%                * \@colnum > 0
%                * @insert = false
%             If it succeeds, then:
%                * sets @insert true
%                * decrements \@botroom by \ht BOX
%                * decrements \@botnum and \@colnum by 1
%                * decrements \@colroom by \ht BOX + either \floatsep
%                  or \textfloatsep, as appropriate.
%                * sets \maxdepth to Opt
%
%  \@addtotoporbot : Tries to put insert \@currbox on \@toplist or \@botlist.
%                    Called only under same conditions as \@addtobot.
%                    If it succeeds, then:
%                       * sets @insert true
%                       * decrements either \@toproom or \@botroom by \ht BOX
%                       * decrements \@colnum and either \@topnum or
%                         \@botnum by 1
%                       * decrements \@colroom by \ht BOX + either \floatsep
%                         or \textfloatsep, as appropriate.
%
% \@addtocurcol : Tries to add \@currbox to current column, setting @insert
%                 true if it succeeds, false otherwise. It will add
%                 \@currbox to top only if bit 0 of \count \@currbox is 0, and
%                 to the bottom only if bit 0 = 0 or an earlier float of
%                 the same type is put on the bottom.
%                 If the float is put in the text, then
%                 \penalty\interlinepenalty is put
%                 right after the float, before the following \vskip, and
%                 \outputpenalty :=L 0.
%
% \@addtonextcol : Tries to add \@currbox to the next column, setting @insert
```

```
%               true if it succeeds, false otherwise.
%
% \@addtodblcol : Tries to add \@currbox to the next double-column page,
%               adding it to \@dbltoplist if it succeeds and \@dbldeferlist
%               if it fails.
%
%  \@addtobot ==
%    BEGIN
%      if bit 2 of \count \@currbox = 1
%        then if \@botnum > 0
%               then if \@botroom > \ht \@currbox
%                      then \@botnum  :=G \botnum - 1
%                           \@colnum  :=G \@colnum - 1
%                           \@tempdima :=L - \ht\@currbox -
%                                         if \@botlist empty
%                                            then \textfloatsep
%                                            else \floatsep
%                                         fi
%                           \@botroom :=G \@botroom + \@tempdima
%                           \@colroom :=G \@colroom + \@tempdima
%                            add \@currbox to \@botlist
%                            \maxdepth :=G Opt
%                            @insert :=L true
%      fi     fi      fi
%    END
%
%  \@addtotoporbot ==
%    BEGIN
%      if bit 1 of \count \@currbox = 1
%        then if \@topnum > 0
%               then if \@toproom > \ht \@currbox
%                      then if \@currtype not on \@midlist or \@botlist
%                             then \@topnum  :=G \topnum - 1
%                                  \@colnum  :=G \@colnum - 1
%                                  \@tempdima :=L - \ht\@currbox -
%                                                if \@toplist empty
%                                                   then \textfloatsep
%                                                   else \floatsep
%                                                fi
%                                  \@toproom  :=G \@toproom + \@tempdima
%                                  \@colroom  :=G \@colroom + \@tempdima
%                                  add \@currbox to \@toplist
%                                  @insert :=L true
%      fi    fi     fi     fi
%      if @insert = false then \@addtobot fi
%    END
%
% \@addtocurcol ==
%  BEGIN
%    @insert :=L false
%    \@textmin := \textfraction\@colht     %% added 27 Sep 85
%    if \@colroom > \ht \@currbox + max(\@pageht+\@pagedp, \@textmin)
%                       + \@maxsep
%       then if \@colnum > 0
%               then \@currtype := type of \@currbox
%                    if \@currtype not on \@deferlist
%                      then if \@currtype on \@botlist
%                             then \@addtobot
%                             else if bit0 of \count \@currbox = 1
%                                    then decrement \@colnum
%                                         put \@currbox on \@midlist
%                                         add \@currbox + space +
%                                           \penalty \interlinepenalty to text
%                                         \outputpenalty :=L 0
%                                         @insert := true
%                                    else \@addtotoporbot
%    fi     fi     fi    fi    fi
%    if @insert = false
%      then add \@currbox to \@deferlist
%    fi
%  END
%
% \@addtonextcol ==
%  BEGIN
```

```
%    @insert :=L false
%    \@textmin := \textfraction\@colht     %% added 27 Sep 85
%    if \@colroom > \ht \@currbox + \@textmin + \@maxsep
%       then if \@colnum > 0
%              \@currtype := type of \@currbox
%              then if \@currtype not on \@deferlist
%                    then \@addtotoporbot
%    fi     fi     fi
%    if @insert = false
%      then add \@currbox to \@deferlist
%    fi
%  END
%
%  \@addtodblcol ==
%    BEGIN
%      @insert :=L false
%      if bit 1 of \count \@currbox = 1
%        then if \@dbltopnum > 0
%               then if \@dbltoproom > \ht \@currbox
%                     then if type of \@currbox not on \@dbldeferlist
%                           then \@dbltopnum :=G \@dbltopnum - 1
%                                \@tempdima := -\ht\@currbox -
%                                              if \@dbltoplist empty
%                                                 then \dbltextfloatsep
%                                                 else \dblfloatsep
%                                              fi
%                                \@dbltoproom :=G \@dbltoproom+\@tempdima
%                                \@colht      :=G \@colht+\@tempdima
%                                add \@currbox to \@dbltoplist
%                                 @insert :=L true
%      fi     fi      fi   fi
%      if @insert = false then add \@currbox to \@dbldeferlist
%    END
%
%  \@addmarginpar ==
%   BEGIN
%     if \@currlist nonempty
%       then remove \@marbox from \@currlist %% NOTE: \@currbox = left box
%            add \@marbox and \@currbox to \@freelist
%       else LaTeX error: ? %% shouldn't happen
%     fi
%     \@tempcnta := 1   %% 1 = right, -1 = left
%     if @twocolumn = true
%       then if @firstcolumn = true
%              then \@tempcnta := -1
%            fi
%       else if @mparswitch = true
%              then if count0 odd
%                     else \@tempcnta := -1
%                   fi
%            fi
%            if @reversemargin = true
%               then \@tempcnta := -\@tempcnta
%            fi
%     fi
%     if \@tempcnta < 0 then \box\@marbox :=G \box\@currbox fi
%     \@tempdima  :=L maximum(\@mparbottom - \@pageht + ht of \@marbox, 0)
%     if \@tempdima > 0 then LaTeX warning: 'marginpar moved' fi
%     \@mparbottom :=G \@pageht + \@tempdima + depth of \@marbox
%                      + \marginparpush
%     \@tempdima  :=L \@tempdima - ht of \@marbox
%     height of \@marbox :=G depth of \@marbox :=G 0
%     \vskip -\@pagedp
%     \vskip \@tempdima
%     \nointerlineskip
%     \hbox{ if @tempcnta > 0 then \hskip \columnwidth
%                                  \hskip \marginparsep
%                            else \hskip -\marginparsep
%                                 \hskip -\marginparwidth
%            fi
%            \box\@marbox
%            \hss
%          }
%     \vskip -\@tempdima
```

```
%     \nointerlineskip
%     \hbox{\vrule height 0 width 0 depth \@pagedp}
%   END

\maxdeadcycles = 100 % floats and \marginpar's add a lot of dead cycles

\let\@elt\relax

\def\@next#1#2#3#4{\ifx#2\@empty #4\else
   \expandafter\@xnext #2\@@#1#2#3\fi}

\def\@xnext \@elt #1#2\@@#3#4{\def#3{#1}\gdef#4{#2}}

\newif\if@test

\def\@bitor#1#2{\global\@testfalse {\let\@elt\@xbitor
   \@tempcnta #1\relax #2}}

%% RmS 91/11/22: Added test for \count#1 being 0.
%%               Suggested by Chris Rowley.
\def\@xbitor #1{\@tempcntb \count#1
   \ifnum \@tempcnta =\z@
   \else
     \divide\@tempcntb\@tempcnta
     \ifodd\@tempcntb \global\@testtrue\fi
   \fi}

% DEFINITION OF FLOAT BOXES:
\newinsert\bx@A
\newinsert\bx@B
\newinsert\bx@C
\newinsert\bx@D
\newinsert\bx@E
\newinsert\bx@F
\newinsert\bx@G
\newinsert\bx@H
\newinsert\bx@I
\newinsert\bx@J
\newinsert\bx@K
\newinsert\bx@L
\newinsert\bx@M
\newinsert\bx@N
\newinsert\bx@O
\newinsert\bx@P
\newinsert\bx@Q
\newinsert\bx@R



\gdef\@freelist{\@elt\bx@A\@elt\bx@B\@elt\bx@C\@elt\bx@D\@elt\bx@E
              \@elt\bx@F\@elt\bx@G\@elt\bx@H\@elt\bx@I\@elt\bx@J
               \@elt\bx@K\@elt\bx@L\@elt\bx@M\@elt\bx@N
               \@elt\bx@O\@elt\bx@P\@elt\bx@Q\@elt\bx@R}

\gdef\@toplist{}
\gdef\@botlist{}
\gdef\@midlist{}
\gdef\@currlist{}
\gdef\@deferlist{}
\gdef\@dbltoplist{}
\gdef\@dbldeferlist{}

% PAGE LAYOUT PARAMETERS
\newdimen\topmargin
\newdimen\oddsidemargin
\newdimen\evensidemargin
\let\@themargin=\oddsidemargin
\newdimen\headheight
\newdimen\headsep
\newdimen\footskip
\newdimen\footheight % even though it never gets used.
\newdimen\textheight
\newdimen\textwidth
```

```
\newdimen\columnwidth
\newdimen\columnsep
\newdimen\columnseprule
\newdimen\@maxdepth  \@maxdepth = \maxdepth
\newdimen\marginparwidth
\newdimen\marginparsep
\newdimen\marginparpush

% PAGE STYLE PARAMETERS
\newskip\floatsep
\newskip\textfloatsep
\newskip\intextsep
\newdimen\@maxsep
\newskip\dblfloatsep
\newskip\dbltextfloatsep
\newdimen\@dblmaxsep
\newskip\@fptop
\newskip\@fpsep
\newskip\@fpbot
\newskip\@dblfptop
\newskip\@dblfpsep
\newskip\@dblfpbot
\let\topfigrule=\relax
\let\botfigrule=\relax
\let\dblfigrule=\relax

% INTERNAL REGISTERS

\newcount\@topnum
\newdimen\@toproom
\newcount\@dbltopnum
\newdimen\@dbltoproom
\newcount\@botnum
\newdimen\@botroom
\newcount\@colnum
\newdimen\@textmin
\newdimen\@fpmin
\newdimen\@colht
\newdimen\@colroom
\newdimen\@pageht
\newdimen\@pagedp
\newdimen\@mparbottom \@mparbottom\z@
\newcount\@currtype
\newbox\@outputbox
\newbox\@leftcolumn
\newbox\@holdpg

\newif\if@insert
\newif\if@fcolmade
\newif\if@specialpage \@specialpagefalse
\newif\if@twoside   \@twosidefalse
\newif\if@firstcolumn \@firstcolumntrue
\newif\if@twocolumn \@twocolumnfalse
\newif\if@reversemargin \@reversemarginfalse
\newif\if@mparswitch \@mparswitchfalse

\def\@thehead{\@oddhead} % initialization
\def\@thefoot{\@oddfoot}

\def\newpage{\par\vfil\penalty -\@M}

\def\clearpage{\newpage \write\m@ne{}\vbox{}\penalty -\@Mi}

\def\cleardoublepage{\clearpage\if@twoside \ifodd\c@page\else
    \hbox{}\newpage\if@twocolumn\hbox{}\newpage\fi\fi\fi}

\def\twocolumn{\clearpage \global\columnwidth\textwidth
   \global\advance\columnwidth -\columnsep \global\divide\columnwidth\tw@
   \global\hsize\columnwidth \global\linewidth\columnwidth
   \global\@twocolumntrue \global\@firstcolumntrue
   \@dblfloatplacement\@ifnextchar[{\@topnewpage}{}}

\def\onecolumn{\clearpage\global\columnwidth\textwidth
     \global\hsize\columnwidth \global\linewidth\columnwidth
```

```
8361      \global\@twocolumnfalse \@floatplacement}
8362
8363 \long\def\@topnewpage[#1]{\@next\@currbox\@freelist{}{}%
8364     \global\setbox\@currbox\vbox{\hsize\textwidth \@parboxrestore
8365      #1\par\vskip -\dbltextfloatsep}\global\count\@currbox\tw@
8366     \global\@dbltopnum\@ne \global\@dbltoproom\maxdimen\@addtodblcol
8367     \global\vsize\@colht \global\@colroom\@colht}
8368
8369 %% RmS 91/09/29: added reset of \par to the output routine.
8370 %%              This avoids problems when the output routine is
8371 %%              called within a list where \par may be a no-op.
8372
8373 \output{\let\par\@@par
8374   \ifnum\outputpenalty <-\@M\@specialoutput\else
8375   \@makecol\@opcol\@floatplacement\@startcolumn
8376   \@whilesw\if@fcolmade \fi{\@opcol\@startcolumn}\fi
8377   \global\vsize\ifnum\outputpenalty >-\@Miv \@colroom
8378                 \else \maxdimen\fi}
8379
8380 % CHANGES TO \@specialoutput:
8381 % * \penalty\z@ changed to \penalty\interlinepenalty so \samepage
8382 %   works properly with figure and table environments.
8383 %   (Changed 23 Oct 86)
8384 %
8385 % * Definition of \@specialoutput changed 26 Feb 88 so \@pageht and \@pagedp
8386 %   aren't changed for a marginal note. (Change suggested by
8387 %   Chris Rowley.)
8388 %
8389 \def\@specialoutput{\ifnum\outputpenalty >-\@Mii
8390     \@doclearpage
8391   \else
8392     \ifnum \outputpenalty <-\@Miii
8393        \ifnum\outputpenalty<-\@MM \deadcycles\z@\fi
8394        \global\setbox\@holdpg\vbox{\unvbox\@cclv}%
8395     \else \setbox\@tempboxa\box\@cclv
8396         \@pagedp\dp\@holdpg \@pageht\ht\@holdpg
8397         \unvbox\@holdpg
8398         \@next\@currbox\@currlist{\ifnum\count\@currbox >\z@
8399            \ifvoid\footins\else\advance\@pageht\ht\footins
8400              \advance\@pageht\skip\footins \advance\@pagedp\dp\footins
8401              \insert\footins{\unvbox\footins}\fi
8402             \@addtocurcol\else
8403            \ifvoid\footins\else\insert\footins{\unvbox\footins}\fi
8404             \@addmarginpar\fi}\@latexbug
8405     \ifnum \outputpenalty <\z@ \penalty\interlinepenalty\fi
8406   \fi\fi}
8407
8408
8409 \def\@doclearpage{\ifvoid\footins
8410         \setbox\@tempboxa\vsplit\@cclv to\z@ \unvbox\@tempboxa
8411         \setbox\@tempboxa\box\@cclv
8412         \xdef\@deferlist{\@toplist\@botlist
8413             \@deferlist}\gdef\@toplist{}\gdef\@botlist{}\global\@colroom\@colht
8414              \ifx\@currlist
8415               \@empty\else\@latexerr{Float(s)
8416                  lost}\@ehb\gdef\@currlist{}\fi
8417        \@makefcolumn\@deferlist
8418         \@whilesw\if@fcolmade \fi{\@opcol
8419                                  \@makefcolumn\@deferlist}\if@twocolumn
8420            \if@firstcolumn
8421              \xdef\@dbldeferlist{\@dbltoplist
8422                  \@dbldeferlist}\gdef\@dbltoplist{}\global\@colht\textheight
8423               \begingroup \@dblfloatplacement \@makefcolumn\@dbldeferlist
8424                \@whilesw\if@fcolmade \fi{\@outputpage
8425                                          \@makefcolumn\@dbldeferlist}\endgroup
8426            \else \vbox{}\clearpage
8427         \fi\fi
8428      \else\setbox\@cclv\vbox{\box\@cclv\vfil}\@makecol\@opcol
8429       \clearpage
8430      \fi}
8431
8432 \def\@opcol{\global\@mparbottom\z@\if@twocolumn\@outputdblcol\else
8433     \@outputpage \global\@colht\textheight \fi}
8434
```

```
\def\@outputdblcol{\if@firstcolumn \global\@firstcolumnfalse
    \global\setbox\@leftcolumn\box\@outputbox
  \else \global\@firstcolumntrue
    \setbox\@outputbox\vbox{\hbox to\textwidth{\hbox to\columnwidth
      {\box\@leftcolumn \hss}\hfil \vrule width\columnseprule\hfil
       \hbox to\columnwidth{\box\@outputbox \hss}}}\@combinedblfloats
       \@outputpage \begingroup \@dblfloatplacement \@startdblcolumn
       \@whilesw\if@fcolmade \fi{\@outputpage\@startdblcolumn}\endgroup
    \fi}

% Extra \@texttop somehow found its way into \@makecol. Deleted
% 1 Dec 86. (Found by Mike Harrison)
%% RmS 91/10/22: Replaced \dimen128 by \dimen@.
\def\@makecol{\ifvoid\footins \setbox\@outputbox\box\@cclv
   \else\setbox\@outputbox
     \vbox{\boxmaxdepth \maxdepth
     \unvbox\@cclv\vskip\skip\footins\footnoterule\unvbox\footins}\fi
     \xdef\@freelist{\@freelist\@midlist}\gdef\@midlist{}\@combinefloats
     \setbox\@outputbox\vbox to\@colht{\boxmaxdepth\maxdepth
        \@texttop\dimen@\dp\@outputbox\unvbox\@outputbox
        \vskip-\dimen@\@textbottom}%
     \global\maxdepth\@maxdepth}

\let\@texttop=\relax
\let\@textbottom=\relax

\def\@outputpage{\begingroup\catcode`\ =10
    \let\-\@dischyph \let\'\@acci \let\`\@accii \let\=\@acciii
    \if@specialpage
     \global\@specialpagefalse\@nameuse{ps@\@specialstyle}\fi
     \if@twoside
       \ifodd\count\z@ \let\@thehead\@oddhead \let\@thefoot\@oddfoot
            \let\@themargin\oddsidemargin
          \else \let\@thehead\@evenhead
          \let\@thefoot\@evenfoot \let\@themargin\evensidemargin
     \fi\fi
     \shipout
     \vbox{\reset@font %% RmS 91/08/15
           \normalsize \baselineskip\z@ \lineskip\z@
           \let\par\@@par %% 15 Sep 87
           \vskip \topmargin \moveright\@themargin
           \vbox{\setbox\@tempboxa
                  \vbox to\headheight{\vfil \hbox to\textwidth
                                {\let\label\@gobble \let\index\@gobble
                                 \let\glossary\@gobble %% 21 Jun 91
                                  \@thehead}}% %% 22 Feb 87
                \dp\@tempboxa\z@
                \box\@tempboxa
                \vskip \headsep
                \box\@outputbox
                \baselineskip\footskip
                \hbox to\textwidth{\let\label\@gobble
                         \let\index\@gobble %% 22 Feb 87
                         \let\glossary\@gobble %% 21 Jun 91
                         \@thefoot}}\global\@colht\textheight
           \endgroup\stepcounter{page}\let\firstmark\botmark}


\def\@combinefloats{\boxmaxdepth\maxdepth \ifx\@toplist\@empty\else\@cfla\fi
    \ifx\@botlist\@empty\else\@cflb\fi}

\def\@cfla{\let\@elt\@comflelt \setbox\@tempboxa\vbox{}\@toplist
    \setbox\@outputbox\vbox{\unvbox\@tempboxa\vskip-\floatsep
    \topfigrule\vskip\textfloatsep \unvbox\@outputbox}\let\@elt\relax
    \xdef\@freelist{\@freelist\@toplist}\gdef\@toplist{}}

\def\@cflb{\let\@elt\@comflelt \setbox\@tempboxa\vbox{}\@botlist
    \setbox\@outputbox\vbox{\unvbox\@outputbox \vskip\textfloatsep
    \botfigrule\unvbox\@tempboxa \vskip-\floatsep}\let\@elt\relax
    \xdef\@freelist{\@freelist\@botlist}\gdef\@botlist{}}

\def\@comflelt#1{\setbox\@tempboxa
      \vbox{\unvbox\@tempboxa\box #1\vskip\floatsep}}
```

```
\def\@combinedblfloats{\ifx\@dbltoplist\@empty\else
    \let\@elt\@comdblflelt \setbox\@tempboxa\vbox{}\@dbltoplist
    \setbox\@outputbox\vbox to\textheight
      {\boxmaxdepth\maxdepth
       \unvbox\@tempboxa\vskip-\dblfloatsep
       \dblfigrule\vskip\dbltextfloatsep \box\@outputbox}\let\@elt\relax
    \xdef\@freelist{\@freelist\@dbltoplist}\gdef\@dbltoplist{}\fi}


\def\@comdblflelt#1{\setbox\@tempboxa
      \vbox{\unvbox\@tempboxa\box #1\vskip\dblfloatsep}}


\def\@startcolumn{\global\@colroom\@colht
    \ifx\@deferlist\@empty\global\@fcolmadefalse\else\@xstartcol\fi}

\def\@xstartcol{\@tryfcolumn\@deferlist \if@fcolmade\else
   \begingroup\edef\@tempb{\@deferlist}\gdef\@deferlist{}\let\@elt\@scolelt
   \@tempb\endgroup\fi}

\def\@scolelt#1{\def\@currbox{#1}\@addtonextcol}

\def\@startdblcolumn{\global\@colht\textheight
   \@tryfcolumn\@dbldeferlist \if@fcolmade\else
     \begingroup
       \edef\@tempb{\@dbldeferlist}\gdef\@dbldeferlist{}\let\@elt\@sdblcolelt
       \@tempb\endgroup\fi}

\def\@sdblcolelt#1{\def\@currbox{#1}\@addtodblcol}

\def\@tryfcolumn #1{\global\@fcolmadefalse \xdef\@trylist{#1}\xdef\@failedlist
   {}\begingroup \let\@elt\@xtryfc \@trylist \endgroup
    \if@fcolmade \@vtryfc #1\fi}

\def\@vtryfc #1{\global\setbox\@outputbox\vbox{}\let\@elt\@wtryfc
       \@flsucceed \global\setbox\@outputbox\vbox to\@colht{\vskip \@fptop
       \vskip -\@fpsep \unvbox \@outputbox \vskip \@fpbot}\let\@elt\relax
       \xdef #1{\@failedlist\@flfail}\xdef\@freelist{\@freelist\@flsucceed}}

\def\@wtryfc #1{\global\setbox\@outputbox\vbox{\unvbox\@outputbox
    \vskip\@fpsep\box #1}}


\def\@xtryfc #1{\@next\@tempa\@trylist{}{}\@currtype
  \count #1\divide\@currtype\@xxxii \multiply\@currtype\@xxxii
  \@bitor \@currtype \@failedlist \@testfp #1\ifdim
    \ht #1>\@colht \global\@testtrue\fi
    \if@test \@cons\@failedlist #1\else \@ytryfc #1\fi}

\def\@ytryfc #1{\begingroup \gdef\@flsucceed{\@elt #1}\gdef\@flfail
  {}\@tempdima\ht #1\let\@elt\@ztryfc \@trylist \ifdim \@tempdima >\@fpmin
     \global\@fcolmadetrue \else \@cons\@failedlist #1\fi
  \endgroup \if@fcolmade \let\@elt\@gobble \fi}

\def\@ztryfc #1{\@tempcnta\count #1\divide\@tempcnta\@xxxii
    \multiply\@tempcnta\@xxxii \@bitor \@tempcnta {\@failedlist
    \@flfail}\@testfp #1\@tempdimb\@tempdima \advance\@tempdimb\ht #1\advance
    \@tempdimb\@fpsep \ifdim \@tempdimb >\@colht \global\@testtrue\fi
    \if@test \@cons\@flfail #1\else \@cons\@flsucceed #1\@tempdima\@tempdimb
    \fi}

\def\@testfp #1{\@tempcnta\count #1\divide\@tempcnta 8\relax
   \ifodd\@tempcnta \else \global\@testtrue\fi}

\def\@makefcolumn #1{\begingroup \@fpmin\z@ \let\@testfp\@gobble
   \@tryfcolumn #1\endgroup}

\def\@addtobot{\@tempcnta\count\@currbox\divide\@tempcnta4 \ifodd\@tempcnta
   \ifnum \@botnum >\z@ \ifdim \@botroom >\ht\@currbox
    \global\advance\@botnum\m@ne
    \global\advance\@colnum\m@ne
    \@tempdima -\ht\@currbox
    \advance\@tempdima -\ifx\@botlist\@empty \textfloatsep
       \else\floatsep\fi
```

```
8583     \global\advance\@botroom \@tempdima
8584     \global\advance\@colroom \@tempdima
8585     \@cons\@botlist\@currbox \global\maxdepth\z@
8586     \@inserttrue\fi\fi\fi}
8587
8588 \def\@addtotoporbot{\@tempcnta\count\@currbox \divide\@tempcnta\tw@
8589    \ifodd\@tempcnta \ifnum \@topnum >\z@ \ifdim\@toproom >\ht\@currbox
8590      \@bitor\@currtype{\@midlist\@botlist}\if@test\else
8591         \global\advance\@topnum\m@ne
8592         \global\advance\@colnum\m@ne
8593         \@tempdima-\ht\@currbox
8594         \advance\@tempdima
8595            -\ifx\@toplist\@empty \textfloatsep \else\floatsep\fi
8596         \global\advance\@toproom \@tempdima
8597         \global\advance\@colroom \@tempdima
8598         \@cons\@toplist\@currbox
8599         \@inserttrue
8600 \fi\fi\fi\fi
8601 \if@insert\else\@addtobot \fi}
8602
8603 \def\@addtonextcol{\@insertfalse \@textmin \textfraction\@colht
8604    \@tempdima\ht\@currbox
8605    \advance\@tempdima\@textmin\advance\@tempdima\@maxsep
8606    \ifdim\@colroom >\@tempdima
8607      \ifnum\@colnum >\z@
8608         \@currtype\count\@currbox \divide\@currtype\@xxxii
8609         \multiply\@currtype\@xxxii
8610         \@bitor\@currtype\@deferlist
8611         \if@test\else
8612           \@addtotoporbot
8613     \fi\fi\fi
8614     \if@insert\else \@cons\@deferlist\@currbox\fi}
8615
8616 \def\@addtodblcol{\@insertfalse
8617    \@tempcnta\count\@currbox \divide\@tempcnta\tw@
8618    \ifodd\@tempcnta
8619       \ifnum\@dbltopnum >\z@
8620          \ifdim\@dbltoproom >\ht\@currbox
8621            \@currtype\count\@currbox \divide\@currtype\@xxxii
8622                \multiply\@currtype\@xxxii
8623            \@bitor\@currtype\@dbldeferlist
8624            \if@test\else
8625               \global\advance\@dbltopnum\m@ne
8626               \@tempdima -\ht\@currbox
8627               \advance\@tempdima -\ifx\@dbltoplist\@empty
8628                  \dbltextfloatsep\else\dblfloatsep\fi
8629               \global\advance\@dbltoproom \@tempdima
8630               \global\advance\@colht \@tempdima
8631               \@cons\@dbltoplist\@currbox
8632               \@inserttrue
8633    \fi\fi\fi\fi
8634    \if@insert\else \@cons\@dbldeferlist\@currbox \fi}
8635
8636 % CHANGE TO \@addtocurcol:
8637 % \penalty\z@ changed to \penalty\interlinepenalty so \samepage
8638 % works properly with figure and table environments.
8639 % (Changed 23 Oct 86)
8640 %
8641 \def\@addtocurcol{\@insertfalse \@textmin \textfraction\@colht
8642    \@tempdima\@pageht \advance\@tempdima\@pagedp
8643    \ifdim \@textmin >\@tempdima \@tempdima\@textmin \fi
8644        \advance\@tempdima\ht\@currbox \advance\@tempdima\@maxsep
8645    \ifdim\@colroom >\@tempdima
8646       \ifnum\@colnum >\z@
8647          \@currtype\count\@currbox \divide\@currtype\@xxxii
8648                \multiply\@currtype\@xxxii
8649          \@bitor\@currtype\@deferlist
8650          \if@test\else
8651             \@bitor\@currtype\@botlist
8652             \if@test \@addtobot \else
8653                \ifodd\count\@currbox
8654                  \global\advance\@colnum\m@ne
8655                  \@cons\@midlist\@currbox
8656                  \vskip\intextsep \box\@currbox
```

```
                \penalty\interlinepenalty \vskip\intextsep
                \ifnum\outputpenalty <-\@Mii \vskip -\parskip\fi
                \outputpenalty\z@
                \@inserttrue
              \else \@addtotoporbot
   \fi\fi\fi\fi\fi
   \if@insert\else\@cons\@deferlist\@currbox\fi}

\def\@addmarginpar{\@next\@marbox\@currlist{\@cons\@freelist\@marbox
    \@cons\@freelist\@currbox}\@latexbug\@tempcnta\@ne
    \if@twocolumn
        \if@firstcolumn \@tempcnta\m@ne \fi
    \else
      \if@mparswitch
        \ifodd\c@page \else\@tempcnta\m@ne \fi
      \fi
      \if@reversemargin \@tempcnta -\@tempcnta \fi
    \fi
    \ifnum\@tempcnta <\z@ \global\setbox\@marbox\box\@currbox \fi
    \@tempdima\@mparbottom \advance\@tempdima -\@pageht
       \advance\@tempdima\ht\@marbox \ifdim\@tempdima >\z@
       \@@warning{Marginpar on page \thepage\space moved}\else\@tempdima\z@ \fi
    \global\@mparbottom\@pageht \global\advance\@mparbottom\@tempdima
       \global\advance\@mparbottom\dp\@marbox
       \global\advance\@mparbottom\marginparpush
    \advance\@tempdima -\ht\@marbox
    \global\ht\@marbox\z@ \global\dp\@marbox\z@
    \vskip -\@pagedp \vskip\@tempdima\nointerlineskip
    \hbox to\columnwidth
      {\ifnum \@tempcnta >\z@
          \hskip\columnwidth \hskip\marginparsep
        \else \hskip -\marginparsep \hskip -\marginparwidth \fi
       \box\@marbox \hss}\nobreak %% RmS 91/06/21 \nobreak added
    \vskip -\@tempdima
    \nointerlineskip
    \hbox{\vrule \@height\z@ \@width\z@ \@depth\@pagedp}}

 \message{debugging}
%     ****************************************
%     * DEBUGGING AND TEST INITIALIZATIONS *
%     ****************************************
%
% DEBUGGING
\def\showoverfull{\tracingonline=1}
\tracingstats1  % SHOWS HOW MUCH STUFF TeX HAS USED
\def\showoutput{\tracingonline1\tracingoutput1
    \showboxbreadth99999\showboxdepth99999\errorstopmode}
\def\makeatletter{\catcode`\@=11\relax}
\def\makeatother{\catcode`\@=12\relax}

\newcount\@lowpenalty
\newcount\@medpenalty
\newcount\@highpenalty

% LIST

% ENUMERATION

% ITEMIZE

% ARRAY AND TABULAR

% THE PICTURE ENVIRONMENT

\unitlength = 1pt
\fboxsep = 3pt
\fboxrule = .4pt

%% FOOTNOTES

%\def\footnoterule{} % INITIALIZED BY PLAIN
%\skip\footins{}    % INITIALIZED BY PLAIN
%\interfootnotelinepenalty % INITIALIZED BY PLAIN

```

```
8731 \@maxdepth      = \maxdepth
8732
8733 % \vsize initialized because a \clearpage with \vsize < \topskip
8734 %  causes trouble.
8735 % \@colroom and \@colht also initialized because \vsize may be
8736 %  set to them if a \clearpage is done before the \begin{document}
8737
8738 \vsize = 1000pt
8739 \@colroom = \vsize
8740 \@colht = \vsize
8741
8742 \endinput
```

2.5 report.doc

```
% REPORT STANDARD DOCUMENT STYLE -- Released 14 January 1992
%    for LaTeX version 2.09
% Copyright (C) 1992 by Leslie Lamport

\typeout{Standard Document Style `report' <14 Jan 92>.}

% PREPARING A FOREIGN LANGUAGE VERSION:
%
% This document style is for documents prepared in the English language.
% To prepare a version for another language, various English words must
% be replaced. All the English words that required replacement are
% indicated below, where we give the name of the command in which the
% words appear, and which must be redefined, with the actual words
% underlined.
%
% \tableofcontents:
\def\contentsname{Contents}
%                 ~~~~~~~~
%
% \listoffigures:
\def\listfigurename{List of Figures}
%                  ~~~~~~~~~~~~~~~
%
% \listoftables:
\def\listtablename{List of Tables}
%                   ~~~~~~~~~~~~~~~
%
% \thebibliography:
\def\bibname{Bibliography}
%            ~~~~~~~~~~~~
%
% \theindex:
\def\indexname{Index}
%              ~~~~~
%
% figure environment:
\def\figurename{Figure}
%               ~~~~~~
%
% table environment:
\def\tablename{Table}
%              ~~~~~
%
% \chapter:
\def\chaptername{Chapter}
%                ~~~~~~~
% \appendix:
\def\appendixname{Appendix}
%                 ~~~~~~~~
% \part
\def\partname{Part}
%             ~~~~
% abstract environment:
\def\abstractname{Abstract}
%                 ~~~~~~~~
%

% CHOOSING THE TYPE SIZE:
%
%  The type size option is handled by reading a different file for each
%  size, as follows, to define font size-specific commands:
%       10pt : REP10, 11pt : REP11, 12pt : REP12
%  Implemented by \def'ing \@ptsize to last digit of file name.
%

\def\@ptsize{0}            % Default is REP10.STY
\@namedef{ds@11pt}{\def\@ptsize{1}} % 11pt option reads in REP11.STY
\@namedef{ds@12pt}{\def\@ptsize{2}} % 12pt option reads in REP12.STY

%  Two-side or one-side printing.
%
% \@twosidefalse             %  Default is one-sided printing.
```

```
\def\ds@twoside{\@twosidetrue % Defines twoside option.
          \@mparswitchtrue} %   Marginpars go on outside of page.
%  draft option
%
% \overfullrule = Opt         %Default is don't mark overfull hboxes.
\def\ds@draft{\overfullrule 5pt} % Causes overfull hboxes to be marked.

% FMi 91/03/30: made twocolum.sty a file and twocolumn an option.

% RmS 91/10/15: moved actual reading of twocolumn.sty
%              to the end of this file.
%\def\ds@twocolumn{\@@input twocolum.sty\relax}
\def\ds@twocolumn{\@twocolumntrue}

% The \@options command causes the execution of every command \ds@FOO
% which is defined and for which the user typed the FOO option in his
% \documentstyle command. For every option BAR he typed for which
% \ds@BAR is not defined, the file BAR.sty will be read after the
% present (main) .STY file is executed.

\@options

\input rep1\@ptsize.sty\relax


%    ****************************************
%    *              LISTS                   *
%    ****************************************
%

% ENUMERATE
%  Enumeration is done with four counters: enumi, enumii, enumiii
%  and enumiv, where enumN controls the numbering of the Nth level
%  enumeration. The label is generated by the commands \labelenumi
%  ... \labelenumiv. The expansion of \p@enumN\theenumN defines the
%  output of a \ref command.
%
% 16 Mar 88 -- changed defs of \labelenum... to use \theenum...

\def\labelenumi{\theenumi.}
\def\theenumi{\arabic{enumi}}

\def\labelenumii{(\theenumii)}
\def\theenumii{\alph{enumii}}
\def\p@enumii{\theenumi}

\def\labelenumiii{\theenumiii.}
\def\theenumiii{\roman{enumiii}}
\def\p@enumiii{\theenumi(\theenumii)}

\def\labelenumiv{\theenumiv.}
\def\theenumiv{\Alph{enumiv}}
\def\p@enumiv{\p@enumiii\theenumiii}

% ITEMIZE
% Itemization is controlled by four commands: \labelitemi, \labelitemii,
% \labelitemiii, and \labelitemiv, which define the labels of the
% various itemization levels.

\def\labelitemi{$\m@th\bullet$}
\def\labelitemii{\bf --}
\def\labelitemiii{$\m@th\ast$}
\def\labelitemiv{$\m@th\cdot$}


% VERSE
%   The verse environment is defined by making clever use of the
%   list environment's parameters. The user types \\ to end a line.
%   This is implemented by \let'in \\ equal \@centercr.
%
\def\verse{\let\\=\@centercr
  \list{}{\itemsep\z@ \itemindent -1.5em\listparindent \itemindent
          \rightmargin\leftmargin\advance\leftmargin 1.5em}\item[]}
\let\endverse\endlist
```

```
147
148 % QUOTATION
149 %   Fills lines
150 %   Indents paragraph
151 %
152 \def\quotation{\list{}{\listparindent 1.5em
153     \itemindent\listparindent
154     \rightmargin\leftmargin\parsep \z@ plus\p@}\item[]}
155 \let\endquotation=\endlist
156
157 % QUOTE -- same as quotation except no paragraph indentation,
158 %
159 \def\quote{\list{}{\rightmargin\leftmargin}\item[]}
160 \let\endquote=\endlist
161
162 % DESCRIPTION
163 %
164 %  To change the formatting of the label, you must redefine
165 %  \descriptionlabel.
166
167 \def\descriptionlabel#1{\hspace\labelsep \bf #1}
168 \def\description{\list{}{\labelwidth\z@ \itemindent-\leftmargin
169       \let\makelabel\descriptionlabel}}
170
171 \let\enddescription\endlist
172
173 \newdimen\descriptionmargin
174 \descriptionmargin=3em
175
176
177 %    ***************************************
178 %    *        OTHER ENVIRONMENTS           *
179 %    ***************************************
180 %
181 %
182 % THEOREM
183 % \@begintheorem ... \@endtheorem are the commands executed at the
184 % beginning and end of a (user-defined) theorem-like environment.
185 % Except \@opargbegintheorem is executed when an optional argument is
186 % given. Cf. LATEX.TEX.
187 %
188 % \def\@begintheorem#1#2{\it \trivlist
189 %       \item[\hskip \labelsep{\bf #1\ #2}]}
190 % \def\@opargbegintheorem#1#2#3{\it \trivlist
191 %       \item[\hskip \labelsep{\bf #1\ #2\ (#3)}]}
192 % \def\@endtheorem{\endtrivlist}
193
194
195 % TITLEPAGE
196 %  In the normal environments, the titlepage environment does nothing
197 %  but start and end a page, and inhibit page numbers. It also resets
198 %  the page number to zero. In two-column style, it still makes a
199 %  one-column page.
200 \def\titlepage{\@restonecolfalse\if@twocolumn\@restonecoltrue\onecolumn
201     \else \newpage \fi \thispagestyle{empty}\c@page\z@}
202
203 \def\endtitlepage{\if@restonecol\twocolumn \else \newpage \fi}
204
205 % ARRAY AND TABULAR
206 %
207
208 \arraycolsep 5pt    % Half the space between columns in an array
209                     % environment.
210 \tabcolsep 6pt      % Half the space between columns in a tabular
211                     % environment.
212 \arrayrulewidth .4pt % Width of rules in array and tabular environment.
213 \doublerulesep 2pt % Space between adjacent rules in array or tabular
214                     % environment.
215
216 % TABBING
217 %
218 \tabbingsep \labelsep % Space used by the \' command.
219                       %  (See LaTeX manual.)
220
```

```
% MINIPAGE
%  \@minipagerestore is called upon entry to a minipage environment to
%  set up things that are to be handled differently inside a minipage
%  environment. In the current styles, it does nothing.
%
% \skip\@mpfootins : plays same role for footnotes in a minipage as
%                    \skip\footins does for ordinary footnotes

\skip\@mpfootins = \skip\footins

% FRAMEBOX
%
\fboxsep = 3pt   % Space left between box and text by \fbox and
                 % \framebox.
\fboxrule = .4pt % Width of rules in box made by \fbox and \framebox.


%    ****************************************
%    *       CHAPTERS AND SECTIONS      *
%    ****************************************
%
% DEFINE COUNTERS:
%
% \newcounter{NEWCTR}[OLDCTR] : Defines NEWCTR to be a counter, which is
%                               reset to zero when counter OLDCTR is
%                               stepped.
%                               Counter OLDCTR must already be defined.

\newcounter {part}
\newcounter {chapter}
\newcounter {section}[chapter]
\newcounter {subsection}[section]
\newcounter {subsubsection}[subsection]
\newcounter {paragraph}[subsubsection]
\newcounter {subparagraph}[paragraph]

% For any counter CTR, \theCTR is a macro that defines the printed
% version of counter CTR. It is defined in terms of the following
% macros:
%
%  \arabic{COUNTER} : The value of COUNTER printed as an arabic numeral.
%  \roman{COUNTER} : Its value printed as a lower-case roman numberal.
%  \Roman{COUNTER} : Its value printed as an upper-case roman numberal.
%  \alph{COUNTER}  : Value of COUNTER printed as a lower-case letter:
%                      1 = a, 2 = b, etc.
%  \Alph{COUNTER}  : Value of COUNTER printed as an upper-case letter:
%                        1 = A, 2 = B, etc.
%

\def\thepart         {\Roman{part}}
\def\thechapter      {\arabic{chapter}}
\def\thesection      {\thechapter.\arabic{section}}
\def\thesubsection   {\thesection.\arabic{subsection}}
\def\thesubsubsection {\thesubsection .\arabic{subsubsection}}
\def\theparagraph    {\thesubsubsection.\arabic{paragraph}}
\def\thesubparagraph {\theparagraph.\arabic{subparagraph}}

% \@chapapp is initially defined to be '\chaptername'. The \appendix
% command redefines it to be '\appendixname'.
%
\def\@chapapp{\chaptername}

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%                        PART                        %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

\def\part{\cleardoublepage % Starts new page.
   \thispagestyle{plain}% % Page style of part page is 'plain'
  \if@twocolumn            % IF two-column style
     \onecolumn            %  THEN \onecolumn
     \@tempswatrue         %       @tempswa := true
    \else \@tempswafalse   %  ELSE @tempswa := false
  \fi                      % FI
  \hbox{}\vfil             % Add fil glue to center title
```

```
%%  \bgroup \centering     % BEGIN centering %% Removed 19 Jan 88
  \secdef\@part\@spart}

\def\@part[#1]#2{\ifnum \c@secnumdepth >-2\relax % IF secnumdepth > -2
       \refstepcounter{part}%                 %   THEN step
                                              %        part counter
       \addcontentsline{toc}{part}{\thepart   %       add toc line
       \hspace{1em}#1}\else                   %   ELSE add
                                              %        unnumb. line
       \addcontentsline{toc}{part}{#1}\fi     % FI
   \markboth{}{}%
   {\centering                    % %% added 19 Jan 88
    \interlinepenalty \@M         %% RmS added 11 Nov 91
    \ifnum \c@secnumdepth >-2\relax % IF secnumdepth > -2
      \huge\bf \partname~\thepart %   THEN Print '\partname' and
    \par                          %        number in \huge bold.
    \vskip 20\p@\fi               %       Add space before title.
    \Huge \bf                     % FI
    #2\par}\@endpart}             % Print Title in \Huge bold.
                                  % Bug Fix 13 Nov 89: #1 -> #2


% \@endpart finishes the part page
%
\def\@endpart{\vfil\newpage % End page with 1fil glue.
   \if@twoside              % IF twoside printing
       \hbox{}%             %   THEN Produce totally blank page
       \thispagestyle{empty}%
       \newpage
   \fi                      % FI
   \if@tempswa              % IF @tempswa = true
     \twocolumn             %   THEN \twocolumn
   \fi}                     % FI

\def\@spart#1{{\centering   % %% added 19 Jan 88
   \interlinepenalty \@M    %% RmS added 11 Nov 91
   \Huge \bf                % Print title in \Huge boldface
   #1\par}\@endpart}




%    ****************************************
%    *        TABLE OF CONTENTS, ETC.       *
%    ****************************************
%
% A \subsection command writes a
%       \contentsline{subsection}{TITLE}{PAGE}
% command on the .toc file, where TITLE contains the contents of the
% entry and PAGE is the page number. If subsections are being numbered,
% then TITLE will be of the form
%       \numberline{NUM}{HEADING}
% where NUM is the number produced by \thesubsection. Other sectioning
% commands work similarly.
%
% A \caption command in a 'figure' environment writes
%    \contentsline{figure}{\numberline{NUM}{CAPTION}}{PAGE}
% on the .lof file, where NUM is the number produced by \thefigure and
% CAPTION is the figure caption. It works similarly for a 'table'
% environment.
%
% The command \contentsline{NAME} expands to \l@NAME. So, to specify
% the table of contents, we must define \l@chapter, \l@section,
% \l@subsection, ... ; to specify the list of figures, we must define
% \l@figure; and so on. Most of these can be defined with the
% \@dottedtocline command, which works as follows.
%
% \@dottedtocline{LEVEL}{INDENT}{NUMWIDTH}{TITLE}{PAGE}
%    LEVEL    : An entry is produced only if LEVEL < or = value of
%               'tocdepth' counter. Note, \chapter is level 0, \section
%               is level 1, etc.
%    INDENT   : The indentation from the outer left margin of the start
%               of the contents line.
```

```
%    NUMWIDTH : The width of a box in which the section number is to go,
%               if TITLE includes a \numberline command.
%
% This command uses the following three parameters, which are set
% with a \def (so em's can be used to make them depend upon the font).
%   \@pnumwidth : The width of a box in which the page number is put.
%   \@tocrmarg : The right margin for multiple line entries. One
%                wants \@tocrmarg > or = \@pnumwidth
%   \@dotsep   : Separation between dots, in mu units. Should be
%                \def'd to a number like 2 or 1.7

\def\@pnumwidth{1.55em}
\def\@tocrmarg {2.55em}
\def\@dotsep{4.5}
\setcounter{tocdepth}{2}


% TABLEOFCONTENTS
%  In report style, \tableofcontents, \listoffigures, etc. are always
%  set in single-column style. @restonecol

\def\tableofcontents{\@restonecolfalse
  \if@twocolumn\@restonecoltrue\onecolumn\fi
  \chapter*{\contentsname
        \@mkboth{\uppercase{\contentsname}}{\uppercase{\contentsname}}}%
  \@starttoc{toc}\if@restonecol\twocolumn\fi}

\def\l@part#1#2{\addpenalty{-\@highpenalty}%
   \addvspace{2.25em plus\p@}% space above part line
   \begingroup
   \@tempdima 3em       % width of box holding part number, used by
     \parindent \z@ \rightskip \@pnumwidth        %% \numberline
     \parfillskip -\@pnumwidth
     {\large \bf        % set line in \large boldface
     \leavevmode        % TeX command to enter horizontal mode.
     #1\hfil \hbox to\@pnumwidth{\hss #2}}\par
     \nobreak           % Never break after part entry
    \global\@nobreaktrue                    %% Added 24 May 89 as
    \everypar{\global\@nobreakfalse\everypar{}}%% suggested by
                                            %% Jerry Leichter
   \endgroup}

%% First line of l@chapter changed 24 May 89, as suggested
%% by Jerry Leichter.
%%
\def\l@chapter#1#2{\addpenalty{-\@highpenalty}%
   \vskip 1.0em plus\p@ % space above chapter line
   \@tempdima 1.5em     % width of box holding chapter number
   \begingroup
     \parindent \z@ \rightskip \@pnumwidth
     \parfillskip -\@pnumwidth
     \bf                % Boldface.
     \leavevmode        % TeX command to enter horizontal mode.
      \advance\leftskip\@tempdima %% added 5 Feb 88 to conform to
      \hskip -\leftskip         %% 25 Jan 88 change to \numberline
     #1\nobreak\hfil \nobreak\hbox to\@pnumwidth{\hss #2}\par
     \penalty\@highpenalty %% added 24 May 89, suggested by J. Leichter
   \endgroup}

\def\l@section{\@dottedtocline{1}{1.5em}{2.3em}}
\def\l@subsection{\@dottedtocline{2}{3.8em}{3.2em}}
\def\l@subsubsection{\@dottedtocline{3}{7.0em}{4.1em}}
\def\l@paragraph{\@dottedtocline{4}{10em}{5em}}
\def\l@subparagraph{\@dottedtocline{5}{12em}{6em}}

% LIST OF FIGURES
%
\def\listoffigures{\@restonecolfalse
  \if@twocolumn\@restonecoltrue\onecolumn\fi
  \chapter*{\listfigurename\@mkboth{\uppercase{\listfigurename}}%
     {\uppercase{\listfigurename}}}\@starttoc{lof}\if@restonecol
    \twocolumn\fi}

\def\l@figure{\@dottedtocline{1}{1.5em}{2.3em}}
```

```
443
444 % LIST OF TABLES
445 %
446 \def\listoftables{\@restonecolfalse
447   \if@twocolumn\@restonecoltrue\onecolumn\fi
448   \chapter*{\listtablename\@mkboth{\uppercase{\listtablename}}%
449    {\uppercase{\listtablename}}}\@starttoc{lot}\if@restonecol
450   \twocolumn\fi}
451
452 \let\l@table\l@figure
453
454
455
456 %    ***************************************
457 %    *            BIBLIOGRAPHY             *
458 %    ***************************************
459 %
460 % The thebibliography environment executes the following commands:
461 %
462 %  \def\newblock{\hskip .11em plus .33em minus .07em} --
463 %      Defines the 'closed' format, where the blocks (major units of
464 %      information) of an entry run together.
465 %
466 %  \sloppy -- Used because it's rather hard to do line breaks in
467 %      bibliographies,
468 %
469 %  \sfcode`\.=1000\relax --
470 %      Causes a '.' (period) not toproduce an end-of-sentence space.
471
472 %% RmS 91/10/27 [ .. ] replaced by \@biblabel{ .. }
473 %% RmS 91/11/13: Changed counter enumi to enumiv,
474 %%              as it says in the comment in latex.tex
475 %% RmS 92/01/14: Set \p@enumiv to {} and \theenumiv to \arabic{enumiv}
476 %%              to get correct references
477 \def\thebibliography#1{\chapter*{\bibname\@mkboth
478   {\uppercase{\bibname}}{\uppercase{\bibname}}}\list
479   {\@biblabel{\arabic{enumiv}}}{\settowidth\labelwidth{\@biblabel{#1}}%
480     \leftmargin\labelwidth
481     \advance\leftmargin\labelsep
482     \usecounter{enumiv}%
483     \let\p@enumiv\@empty
484     \def\theenumiv{\arabic{enumiv}}}%
485     \def\newblock{\hskip .11em plus.33em minus.07em}%
486     \sloppy\clubpenalty4000\widowpenalty4000
487     \sfcode`\.=\@m}
488
489 %% 91/08/26 FMI & RmS: introduced warning instead of error
490
491 \def\endthebibliography{%
492   \def\@noitemerr{\@warning{Empty 'thebibliography' environment}}%
493   \endlist}
494
495
496 % \def\@biblabel#1{[#1]\hfill} % Produces the label for a \bibitem[...]
497                               % command.
498 % \def\@cite#1{[#1]}          % Produces the output of the \cite
499                               % command.
500
501
502
503 %    ***************************************
504 %    *              THE INDEX              *
505 %    ***************************************
506 %
507 % THE THEINDEX ENVIRONMENT
508 % Produces double column format, with each paragraph a separate entry.
509 % The user commands \item, \subitem and \subsubitem are used to
510 % produce the entries, and \indexspace adds an extra vertical space
511 % that's the right size to put above the first entry with a new letter
512 % of the alphabet.
513
514 \newif\if@restonecol
515
516 \def\theindex{\@restonecoltrue\if@twocolumn\@restonecolfalse\fi
```

```
\columnseprule \z@
\columnsep 35\p@\twocolumn[\@makeschapterhead{\indexname}]%
    \@mkboth{\uppercase{\indexname}}{\uppercase{\indexname}}%
    \thispagestyle{plain}\parindent\z@
    \parskip\z@ plus .3\p@\relax\let\item\@idxitem}

\def\@idxitem{\par\hangindent 40\p@}

\def\subitem{\par\hangindent 40\p@ \hspace*{20\p@}}

\def\subsubitem{\par\hangindent 40\p@ \hspace*{30\p@}}

\def\endtheindex{\if@restonecol\onecolumn\else\clearpage\fi}

\def\indexspace{\par \vskip 10\p@ plus5\p@ minus3\p@\relax}


%    ****************************************
%    *            FOOTNOTES                 *
%    ****************************************
%
% \footnoterule is a macro to draw the rule separating the footnotes
% from the text. It should take zero vertical space, so it needs a
% negative skip to compensate for any positive space taken by the rule.
% (See PLAIN.TEX.)

\def\footnoterule{\kern-3\p@
  \hrule width .4\columnwidth
  \kern 2.6\p@}              % The \hrule has default height of .4pt.

% \newcounter{footnote}
\@addtoreset{footnote}{chapter} % Numbers footnotes within chapters

%   \@makefntext{NOTE} :
%       Must produce the actual footnote, using \@thefnmark as the mark
%       of the footnote and NOTE as the text. It is called when
%       effectively inside a \parbox of width \columnwidth (i.e., with
%       \hsize = \columnwidth).
%
%       The following macro indents all lines of the footnote by 10pt,
%       and indents the first line of a new paragraph by 1em. To
%       change these dimensions, just substitute the desired value for
%       '10pt' [in both places] or '1em'. The mark is flushright
%       against the footnote.
%         \long\def\@makefntext#1{\@setpar{\@@par\@tempdima \hsize
%            \advance\@tempdima-10pt\parshape \@ne 10pt \@tempdima}\par
%            \parindent 1em\noindent
%            \hbox to \z@{\hss$\m@th^{\@thefnmark}$}#1}
%
%       A simpler macro is used, in which the footnote text is
%       set like an ordinary text paragraph, with no indentation except
%       on the first line of a paragraph, and the first line of the
%       footnote. Thus, all the macro must do is set \parindent
%       to the appropriate value for succeeding paragraphs and put the
%       proper indentation before mark.

\long\def\@makefntext#1{\parindent 1em\noindent
           \hbox to 1.8em{\hss$\m@th^{\@thefnmark}$}#1}

% \@makefnmark : A macro to generate the footnote marker that goes
%    in the text. Default used.
%


%    ****************************************
%    *        FIGURES AND TABLES            *
%    ****************************************
%
% Float placement parameters. See LaTeX manual for their definition.
%
\setcounter{topnumber}{2}
\def\topfraction{.7}
\setcounter{bottomnumber}{1}
```

```
\def\bottomfraction{.3}
\setcounter{totalnumber}{3}
\def\textfraction{.2}
\def\floatpagefraction{.5}
\setcounter{dbltopnumber}{2}
\def\dbltopfraction{.7}
\def\dblfloatpagefraction{.5}

% \@makecaption{NUMBER}{TEXT} : Macro to make a figure or table caption.
%     NUMBER : Figure or table number--e.g., 'Figure 3.2'
%     TEXT   : The caption text.
%  Macro should be called inside a \parbox of right width, with
%  \normalsize.
% changed 25 Jun 86 to fix according to Howard Trickey:
% instead of \unhbox\@tempboxa\par we do #1: #2\par

\long\def\@makecaption#1#2{%
   \vskip 10\p@
   \setbox\@tempboxa\hbox{#1: #2}%
   \ifdim \wd\@tempboxa >\hsize % IF longer than one line:
       #1: #2\par               %   THEN set as ordinary paragraph.
     \else                      %   ELSE center.
       \hbox to\hsize{\hfil\box\@tempboxa\hfil}%
   \fi}

% To define a float of type TYPE (e.g., TYPE = figure), the document
% style must define the following.
%
%  \fps@TYPE  : The default placement specifier for floats of type
%               TYPE.
%
% \ftype@TYPE : The type number for floats of type TYPE. Each TYPE
%               has associated a unique positive TYPE NUMBER, which
%               is a power of two. E.g., figures might have type
%               number 1, tables type number 2, programs type number
%               4, etc.
%
% \ext@TYPE : The file extension indicating the file on which the
%               contents list for float type TYPE is stored. For
%               example, \ext@figure = 'lof'.
%
%  \fnum@TYPE : A macro to generate the figure number for a caption.
%               For example, \fnum@TYPE == Figure \thefigure.
%
%  The actual float-making environment commands--e.g., the commands
%  \figure and \endfigure--are defined in terms of the macros \@float
%  and \end@float, which are described below.
%
% \@float{TYPE}[PLACEMENT] : Macro to begin a float environment for a
%     single-column float of type TYPE with PLACEMENT as the placement
%     specifier. The default value of PLACEMENT is defined by
%     \fps@TYPE. The environment is ended by \end@float. E.g.,
%     \figure == \@float{figure}, \endfigure == \end@float.


% FIGURE

\newcounter{figure}[chapter]
\def\thefigure{\thechapter.\@arabic\c@figure}

\def\fps@figure{tbp}
\def\ftype@figure{1}
\def\ext@figure{lof}
\def\fnum@figure{\figurename~\thefigure}
\def\figure{\@float{figure}}
\let\endfigure\end@float
\@namedef{figure*}{\@dblfloat{figure}}
\@namedef{endfigure*}{\end@dblfloat}

% TABLE
%
\newcounter{table}[chapter]
\def\thetable{\thechapter.\@arabic\c@table}

```

```
\def\fps@table{tbp}
\def\ftype@table{2}
\def\ext@table{lot}
\def\fnum@table{\tablename~\thetable}
\def\table{\@float{table}}
\let\endtable\end@float
\@namedef{table*}{\@dblfloat{table}}
\@namedef{endtable*}{\end@dblfloat}


%    ****************************************
%    *        TITLE AND ABSTRACT            *
%    ****************************************
%
%
% Uses same title and abstract format as the article style's
% titlepage option.

\input titlepag.sty


%    ****************************************
%    *           PAGE STYLES                *
%    ****************************************
%
% The page style 'foo' is defined by defining the command \ps@foo. This
% command should make only local definitions. There should be no stray
% spaces in the definition, since they could lead to mysterious extra
% spaces in the output.
%
% The \ps@... command defines the macros \@oddhead, \@oddfoot,
% \@evenhead, and \@evenfoot to define the running heads and
% feet---e.g., \@oddhead is the macro to produce the contents of the
% heading box for odd-numbered pages. It is called inside an \hbox of
% width \textwidth.
%
% To make headings determined by the sectioning commands, the page style
% defines the commands \chaptermark, \sectionmark, ... , where
% \chaptermark{TEXT} is called by \chapter to set a mark, and so on.
% The \...mark commands and the \...head macros are defined with the
% help of the following macros. (All the \...mark commands should be
% initialized to no-ops.)
%
% MARKING CONVENTIONS:
% LaTeX extends TeX's \mark facility by producing two kinds of marks
% a 'left' and a 'right' mark, using the following commands:
%     \markboth{LEFT}{RIGHT} : Adds both marks.
%     \markright{RIGHT}    : Adds a 'right' mark.
%     \leftmark : Used in the \@oddhead, \@oddfoot, \@evenhead or
%                 \@evenfoot macro, gets the current 'left' mark.
%                 Works like TeX's \botmark command.
%     \rightmark : Used in the \@oddhead, \@oddfoot, \@evenhead or
%                 \@evenfoot macro, gets the current 'right' mark.
%                 Works like TeX's \firstmark command.
% The marking commands work reasonably well for right marks 'numbered
% within' left marks--e.g., the left mark is changed by a \chapter
% command and the right mark is changed by a \section command. However,
% it does produce somewhat anomalous results if two \bothmark's occur on
% the same page.
%
%
% Commands like \tableofcontents that should set the marks in some
% page styles use a \@mkboth command, which is \let by the pagestyle
% command (\ps@...) to \markboth for setting the heading or
% \@gobbletwo to do nothing.

\mark{{}{}}  % Initializes TeX's marks

% \ps@empty and \ps@plain defined in LATEX.TEX

% Definition of 'headings' page style
%  Note the use of ##1 for parameter of \def\chaptermark inside the
%  \def\ps@headings.
%
```

```
% 91/03/26 FMi: Added extra set of braces arround |\sl| in |\@oddhead|
% to support NFSS (|\sl| is a shape |\rm| a family). Also remove
% unnecessary |\hbox{}| commands.
%

\if@twoside       % If two-sided printing.
\def\ps@headings{\let\@mkboth\markboth
 \def\@oddfoot{}\def\@evenfoot{}%   No feet.
 \def\@evenhead{\rm \thepage\hfil \sl \leftmark}%  Left heading.
 \def\@oddhead{{\sl \rightmark}\hfil \rm\thepage}% Right heading.
 \def\chaptermark##1{\markboth {\uppercase{\ifnum \c@secnumdepth >\m@ne
      \@chapapp\ \thechapter. \ \fi ##1}}{}}%
 \def\sectionmark##1{\markright {\uppercase{\ifnum \c@secnumdepth >\z@
   \thesection. \ \fi ##1}}}}
\else             % If one-sided printing.
\def\ps@headings{\let\@mkboth\markboth
\def\@oddfoot{}\def\@evenfoot{}% No feet.
\def\@oddhead{{\sl \rightmark}\hfil \rm\thepage}% Heading.
\def\chaptermark##1{\markright {\uppercase{\ifnum \c@secnumdepth >\m@ne
  \@chapapp\ \thechapter. \ \fi ##1}}}}
\fi

% Definition of 'myheadings' page style.
%
\def\ps@myheadings{\let\@mkboth\@gobbletwo
 \def\@oddhead{{\sl\rightmark}\hfil \rm\thepage}%
 \def\@oddfoot{}\def\@evenhead{\rm \thepage\hfil\sl\leftmark}%
 \def\@evenfoot{}\def\chaptermark##1{}\def\sectionmark##1{}%
 \def\subsectionmark##1{}}



%    ****************************************
%    *           MISCELLANEOUS              *
%    ****************************************
%
% DATE
%
\def\today{\ifcase\month\or
  January\or February\or March\or April\or May\or June\or
  July\or August\or September\or October\or November\or December\fi
  \space\number\day, \number\year}

% EQUATION and EQNARRAY -- put here because it must follow \chapter
% definition
%
% \newcounter{equation}
%
\@addtoreset{equation}{chapter} % Makes \chapter reset 'equation'
                                % counter.

\def\theequation{\thechapter.\arabic{equation}}

% \jot = 3pt     % Extra space added between lines of an eqnarray
                 % environment

% The macro \@eqnnum defines how equation numbers are to appear in
% equations.
%
% \def\@eqnnum{(\theequation)}
%


%    ****************************************
%    *          INITIALIZATION              *
%    ****************************************
%
% Default initializations

\ps@plain                % 'plain' page style
\pagenumbering{arabic}   % Arabic page numbers
\if@twoside\else\raggedbottom\fi % Ragged bottom unless twoside
                                 % option.
\if@twocolumn
```

```
 \@@input twocolum.sty\relax
\else
 \onecolumn                % Single-column.
\fi

\endinput
```

2.6 rep10.doc

```
% REPORT STANDARD DOCUMENT STYLE -- Released 14 Jan 1992
%    for LaTeX version 2.09
% Copyright (C) 1992 by Leslie Lamport


%  ***************************************
%  *              FONTS                  *
%  ***************************************
%

\lineskip 1pt          % \lineskip is 1pt for all font sizes.
\normallineskip 1pt
\def\baselinestretch{1}

% Each size-changing command \SIZE executes the command
%       \@setsize\SIZE{BASELINESKIP}\FONTSIZE\@FONTSIZE
% where:
%   BASELINESKIP = Normal value of \baselineskip for that size. (Actual
%                  value will be \baselinestretch * BASELINESKIP.)
%
%  \FONTSIZE    = Name of font-size command. The currently available
%                 (preloaded) font sizes are: \vpt (5pt), \vipt (6pt),
%                 \viipt (etc.), \viiipt, \ixpt, \xpt, \xipt, \xiipt,
%                 \xivpt, \xviipt, \xxpt, \xxvpt.
%  \@FONTSIZE   = The same as the font-size command except with an
%                 '@' in front---e.g., if \FONTSIZE = \xivpt then
%                 \@FONTSIZE = \@xivpt.
%
% For reasons of efficiency that needn't concern the designer, the
% document style defines \@normalsize instead of \normalsize . This
% is done only for \normalsize, not for any other size-changing
% commands.

\def\@normalsize{\@setsize\normalsize{12pt}\xpt\@xpt
\abovedisplayskip 10\p@ plus2\p@ minus5\p@
\belowdisplayskip \abovedisplayskip
\abovedisplayshortskip \z@ plus3\p@
\belowdisplayshortskip 6\p@ plus3\p@ minus3\p@
\let\@listi\@listI} % Setting of \@listi added 9 Jun 87

\def\small{\@setsize\small{11pt}\ixpt\@ixpt
\abovedisplayskip 8.5\p@ plus3\p@ minus4\p@
\belowdisplayskip \abovedisplayskip
\abovedisplayshortskip \z@ plus2\p@
\belowdisplayshortskip 4\p@ plus2\p@ minus2\p@
\def\@listi{\leftmargin\leftmargini %% Added 22 Dec 87
\topsep 4\p@ plus2\p@ minus2\p@\parsep 2\p@ plus\p@ minus\p@
\itemsep \parsep}}

\def\footnotesize{\@setsize\footnotesize{9.5pt}\viiipt\@viiipt
\abovedisplayskip 6\p@ plus2\p@ minus4\p@
\belowdisplayskip \abovedisplayskip
\abovedisplayshortskip \z@ plus\p@
\belowdisplayshortskip 3\p@ plus\p@ minus2\p@
\def\@listi{\leftmargin\leftmargini %% Added 22 Dec 87
\topsep 3\p@ plus\p@ minus\p@\parsep 2\p@ plus\p@ minus\p@
\itemsep \parsep}}

\def\scriptsize{\@setsize\scriptsize{8pt}\viipt\@viipt}
\def\tiny{\@setsize\tiny{6pt}\vpt\@vpt}
\def\large{\@setsize\large{14pt}\xiipt\@xiipt}
\def\Large{\@setsize\Large{18pt}\xivpt\@xivpt}
\def\LARGE{\@setsize\LARGE{22pt}\xviipt\@xviipt}
\def\huge{\@setsize\huge{25pt}\xxpt\@xxpt}
\def\Huge{\@setsize\Huge{30pt}\xxvpt\@xxvpt}

\normalsize % Choose the normalsize font.


%  ***************************************
%  *           PAGE LAYOUT               *
%  ***************************************
```

```
%
% All margin dimensions measured from a point one inch from top and side
% of page.

% SIDE MARGINS:
\if@twoside             % Values for two-sided printing:
   \oddsidemargin 44pt  %  Left margin on odd-numbered pages.
   \evensidemargin 82pt %  Left margin on even-numbered pages.
   \marginparwidth 107pt % Width of marginal notes.
\else                   % Values for one-sided printing:
   \oddsidemargin 63pt  %  Note that \oddsidemargin = \evensidemargin
   \evensidemargin 63pt
   \marginparwidth 90pt
\fi
\marginparsep 11pt      % Horizontal space between outer margin and
                        % marginal note


% VERTICAL SPACING:
                        % Top of page:
\topmargin 27pt         %   Nominal distance from top of page to top
                        %   of box containing running head.
\headheight 12pt        %   Height of box containing running head.
\headsep 25pt           %   Space between running head and text.
\topskip = 10pt         %   '\baselineskip' for first line of page.
                        % Bottom of page:
\footskip 30pt          %   Distance from baseline of box containing
                        %   foot to baseline of last line of text.


% DIMENSION OF TEXT:
% 24 Jun 86: changed to explicitly compute \textheight to avoid
% roundoff. The value of the multiplier was calculated as the floor
% of the old \textheight minus \topskip, divided by \baselineskip for
% \normalsize. The old value of \textheight was 528pt. \textheight
% is the height of text (including footnotes and figures, excluding
% running head and foot).

\textheight = 43\baselineskip
\advance\textheight by \topskip
\textwidth 345pt        % Width of text line.
                        % For two-column mode:
\columnsep 10pt         %   Space between columns
\columnseprule 0pt      %   Width of rule between columns.

% A \raggedbottom command causes 'ragged bottom' pages: pages set to
% natural height instead of being stretched to exactly \textheight.

% FOOTNOTES:

\footnotesep 6.65pt % Height of strut placed at the beginning of every
                    % footnote = height of normal \footnotesize strut,
                    % so no extra space between footnotes.

\skip\footins 9pt plus 4pt minus 2pt % Space between last line of text
                                     % and top of first footnote.

% FLOATS: (a float is something like a figure or table)
%
%  FOR FLOATS ON A TEXT PAGE:
%
%    ONE-COLUMN MODE OR SINGLE-COLUMN FLOATS IN TWO-COLUMN MODE:
\floatsep 12pt plus 2pt minus 2pt    % Space between adjacent floats
                                     % moved to top or bottom of
                                     % text page.
\textfloatsep 20pt plus 2pt minus 4pt % Space between main text and
                                     % floats at top or bottom of
                                     % page.
\intextsep 12pt plus 2pt minus 2pt   % Space between in-text figures
                                     % and text.
\@maxsep 20pt                        % The maximum of \floatsep,
                                     % \textfloatsep and \intextsep
                                     % (minus the stretch and
                                     % shrink).
```

```
%    TWO-COLUMN FLOATS IN TWO-COLUMN MODE:
\dblfloatsep 12pt plus 2pt minus 2pt % Same as \floatsep for
                                     % double-column figures in
                                     % two-column mode.
\dbltextfloatsep 20pt plus 2pt minus 4pt % \textfloatsep for
                                     % double-column floats.
\@dblmaxsep 20pt                     % The maximum of \dblfloatsep
                                     % and \dbltexfloatsep.

%  FOR FLOATS ON A SEPARATE FLOAT PAGE OR COLUMN:
%    ONE-COLUMN MODE OR SINGLE-COLUMN FLOATS IN TWO-COLUMN MODE:
\@fptop 0pt plus 1fil  % Stretch at top of float page/column. (Must
                       % be 0pt plus ...)
\@fpsep 8pt plus 2fil  % Space between floats on float page/column.
\@fpbot 0pt plus 1fil  % Stretch at bottom of float page/column. (Must
                       % be 0pt plus ... )

%   DOUBLE-COLUMN FLOATS IN TWO-COLUMN MODE.
\@dblfptop 0pt plus 1fil % Stretch at top of float page. (Must be 0pt
                       % plus ...)
\@dblfpsep 8pt plus 2fil % Space between floats on float page.
\@dblfpbot 0pt plus 1fil % Stretch at bottom of float page. (Must be
                       % 0pt plus ... )
% MARGINAL NOTES:
%
\marginparpush 5pt     % Minimum vertical separation between two
                       % marginal notes.


%  ***************************************
%  *          PARAGRAPHING               *
%  ***************************************
%
\parskip 0pt plus 1pt           % Extra vertical space between
                                % paragraphs.
\parindent 15pt                 % Width of paragraph indentation.
%\topsep 8pt plus 2pt minus 4pt % Extra vertical space, in addition
                                % to \parskip, added above and below
                                % list and paragraphing environments.
\partopsep 2pt plus 1pt minus 1pt % Extra vertical space, in addition
                                % to \parskip and \topsep, added when
                                % user leaves blank line before
                                % environment.
%\itemsep 4pt plus 2pt minus 1pt % Extra vertical space, in addition
                                % to \parskip, added between list
                                % items.
% See \@listI for values of \topsep and \itemsep
% (Change made 9 Jun 87)

% The following page-breaking penalties are defined

\@lowpenalty  51      % Produced by \nopagebreak[1] or \nolinebreak[1]
\@medpenalty 151      % Produced by \nopagebreak[2] or \nolinebreak[2]
\@highpenalty 301     % Produced by \nopagebreak[3] or \nolinebreak[3]

\@beginparpenalty -\@lowpenalty % Before a list or paragraph
                                % environment.
\@endparpenalty -\@lowpenalty   % After a list or paragraph
                                % environment.
\@itempenalty   -\@lowpenalty   % Between list items.

% \clubpenalty       % 'Club line' at bottom of page.
% \widowpenalty      % 'Widow line' at top of page.
% \displaywidowpenalty % Math display widow line.
% \predisplaypenalty % Breaking before a math display.
% \postdisplaypenalty % Breaking after a math display.
% \interlinepenalty  % Breaking at a line within a paragraph.
% \brokenpenalty     % Breaking after a hyphenated line.


%    ***************************************
%    *       CHAPTERS AND SECTIONS         *
%    ***************************************
%
```

```
%
% Definition of \part moved to report.doc on 19 Jan 88

% \@makechapterhead {TEXT} : Makes the heading for the \chapter command.
%

\def\@makechapterhead#1{%       % Heading for \chapter command
  \vspace*{50\p@}%              % Space at top of text page.
  {\parindent \z@\raggedright
    \ifnum \c@secnumdepth >\m@ne % IF secnumdepth > -1 THEN
     \huge\bf \@chapapp{} \thechapter % Print '\chaptername' and number.
    \par
    \vskip 20\p@ \fi            % Space between number and title.
    \Huge \bf                   % Title.
    #1\par
    \nobreak                    % TeX penalty to prevent page break.
    \vskip 40\p@                % Space between title and text.
  }}

% \@makeschapterhead {TEXT} : Makes the heading for the \chapter*
% command.
%

\def\@makeschapterhead#1{%      % Heading for \chapter* command
  \vspace*{50\p@}%              % Space at top of page.
  {\parindent \z@ \raggedright
    \Huge \bf                   % Title.
    #1\par
    \nobreak                    % TeX penalty to prevent page break.
    \vskip 40\p@                % Space between title and text.
  }}

% \secdef{UNSTARCMDS}{STARCMDS} :
%    When defining a \chapter or \section command without using
%    \@startsection, you can use \secdef as follows:
%       \def\chapter { ... \secdef \CMDA \CMDB }
%       \def\CMDA   [#1]#2{ ... } % Command to define
%                                 % \chapter[...]{...}
%       \def\CMDB   #1{ ... }     % Command to define
%                                 % \chapter*{...}

\def\chapter{\clearpage   % Starts new page.
   \thispagestyle{plain}% % Page style of chapter page is 'plain'
   \global\@topnum\z@     % Prevents figures from going
                          % at top of page.
   \@afterindentfalse     % Suppresses indent in first paragraph.
   \secdef\@chapter\@schapter} % Change to \@afterindenttrue to
                              % have indent.

\def\@chapter[#1]#2{\ifnum \c@secnumdepth >\m@ne
        \refstepcounter{chapter}%
        \typeout{\@chapapp\space\thechapter.}%
        \addcontentsline{toc}{chapter}{\protect
        \numberline{\thechapter}#1}\else
      \addcontentsline{toc}{chapter}{#1}\fi
   \chaptermark{#1}%
   \addtocontents{lof}%
       {\protect\addvspace{10\p@}} % Adds between-chapter space
   \addtocontents{lot}%
       {\protect\addvspace{10\p@}} % to lists of figs & tables.
   \if@twocolumn                % Tests for two-column mode.
         \@topnewpage[\@makechapterhead{#2}]%
     \else \@makechapterhead{#2}%
         \@afterheading         % Routine called after chapter and
     \fi}                       % section heading.

\def\@schapter#1{\if@twocolumn \@topnewpage[\@makeschapterhead{#1}]%
        \else \@makeschapterhead{#1}%
             \@afterheading\fi}

% \@startsection {NAME}{LEVEL}{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE}
%           optional * [ALTHEADING]{HEADING}
%    Generic command to start a section.
```

```
295 %    NAME      : e.g., 'subsection'
296 %    LEVEL     : a number, denoting depth of section -- e.g.,
297 %                chapter=1, section = 2, etc. A section number will be
298 %                printed if and only if LEVEL < or = the value of the
299 %                secnumdepth counter.
300 %    INDENT    : Indentation of heading from left margin
301 %    BEFORESKIP : Absolute value = skip to leave above the heading.
302 %                 If negative, then paragraph indent of text following
303 %                 heading is suppressed.
304 %    AFTERSKIP : if positive, then skip to leave below heading,
305 %                      else - skip to leave to right of run-in heading.
306 %    STYLE     : commands to set style
307 %  If '*' missing, then increments the counter. If it is present, then
308 %  there should be no [ALTHEADING] argument. A sectioning command
309 %  is normally defined to \@startsection + its first six arguments.
310
311 \def\section{\@startsection {section}{1}{\z@}{-3.5ex plus-1ex minus
312     -.2ex}{2.3ex plus.2ex}{\reset@font\Large\bf}}
313 \def\subsection{\@startsection{subsection}{2}{\z@}{-3.25ex plus-1ex
314     minus-.2ex}{1.5ex plus.2ex}{\reset@font\large\bf}}
315 \def\subsubsection{\@startsection{subsubsection}{3}{\z@}{-3.25ex plus
316     -1ex minus-.2ex}{1.5ex plus.2ex}{\reset@font\normalsize\bf}}
317 \def\paragraph{\@startsection
318     {paragraph}{4}{\z@}{3.25ex plus1ex minus.2ex}{-1em}{\reset@font
319     \normalsize \bf}}
320 \def\subparagraph{\@startsection
321      {subparagraph}{4}{\parindent}{3.25ex plus1ex minus
322      .2ex}{-1em}{\reset@font\normalsize\bf}}
323
324
325 % Default initializations of \...mark commands. (See below for their
326 % us in defining page styles.
327 %
328
329 \def\chaptermark#1{}
330 % \def\sectionmark#1{}        % Preloaded definitions
331 % \def\subsectionmark#1{}
332 % \def\subsubsectionmark#1{}
333 % \def\paragraphmark#1{}
334 % \def\subparagraphmark#1{}
335
336 % The value of the counter secnumdepth gives the depth of the
337 % highest-level sectioning command that is to produce section numbers.
338 %
339
340 \setcounter{secnumdepth}{2}
341
342 % APPENDIX
343 %
344 % The \appendix command must do the following:
345 %    -- reset the chapter counter to zero
346 %    -- set \@chapapp to Appendix (for messages)
347 %    -- redefine the chapter counter to produce appendix numbers
348 %    -- reset the section counter to zero
349 %    -- redefine the \chapter command if appendix titles and headings
350 %       are to look different from chapter titles and headings.
351
352 \def\appendix{\par
353   \setcounter{chapter}{0}%
354   \setcounter{section}{0}%
355   \def\@chapapp{\appendixname}%
356   \def\thechapter{\Alph{chapter}}}
357
358
359 %    ***************************************
360 %    *              LISTS                  *
361 %    ***************************************
362 %
363
364 % The following commands are used to set the default values for the list
365 % environment's parameters. See the LaTeX manual for an explanation of
366 % the meanings of the parameters. Defaults for the list environment are
367 % set as follows. First, \rightmargin, \listparindent and \itemindent
368 % are set to Opt. Then, for a Kth level list, the command \@listK is
```

```
% called, where 'K' denotes 'i', 'ii', ... , 'vi'. (I.e., \@listiii is
% called for a third-level list.) By convention, \@listK should set
% \leftmargin to \leftmarginK.
%
% For efficiency, level-one list's values are defined at top level, and
% \@listi is defined to set only \leftmargin.

\leftmargini 25pt
\leftmarginii 22pt   % > \labelsep + width of '(m)'
\leftmarginiii 18.7pt % > \labelsep + width of 'vii.'
\leftmarginiv 17pt   % > \labelsep + width of 'M.'
\leftmarginv 10pt
\leftmarginvi 10pt

\leftmargin\leftmargini
\labelsep 5pt
\labelwidth\leftmargini\advance\labelwidth-\labelsep
%\parsep 4pt plus 2pt minus 1pt (Removed 9 Jun 87)

% \@listI defines top level and \@listi values of
% \leftmargin, \topsep, \parsep, and \itemsep
% (Added 9 Jun 87)
\def\@listI{\leftmargin\leftmargini \parsep 4\p@ plus2\p@ minus\p@%
\topsep 8\p@ plus2\p@ minus4\p@
\itemsep 4\p@ plus2\p@ minus\p@}

\let\@listi\@listI
\@listi

\def\@listii{\leftmargin\leftmarginii
   \labelwidth\leftmarginii\advance\labelwidth-\labelsep
   \topsep 4\p@ plus2\p@ minus\p@
   \parsep 2\p@ plus\p@ minus\p@
   \itemsep \parsep}

\def\@listiii{\leftmargin\leftmarginiii
    \labelwidth\leftmarginiii\advance\labelwidth-\labelsep
    \topsep 2\p@ plus\p@ minus\p@
    \parsep \z@ \partopsep\p@ plus\z@ minus\p@
    \itemsep \topsep}

\def\@listiv{\leftmargin\leftmarginiv
     \labelwidth\leftmarginiv\advance\labelwidth-\labelsep}

\def\@listv{\leftmargin\leftmarginv
     \labelwidth\leftmarginv\advance\labelwidth-\labelsep}

\def\@listvi{\leftmargin\leftmarginvi
     \labelwidth\leftmarginvi\advance\labelwidth-\labelsep}

\endinput
```

第 3 章　LaTeX 2ε

文書スタイルのカスタマイズ

〔レスリー・ランポート（阿瀬はる美訳）『文書処理システム LaTeX 2ε』（ピアソン・エデュケーション・1999 年）103–105 頁〕

LaTeX の標準スタイルオプションによって生成される出力のスタイルが気に入らないときは，希望に沿った出力を生成してくれるオプションがないかどうか『The LaTeX Companion』やローカルガイドを調べてみてほしい。望むようなオプションが用意されていない場合は，文書のスタイルを自分自身で変更しなければならない。ここでいう “文書スタイルの変更” とは，段落やリストといった通常の構造の出力形式を変えることであり，新たな構造を作成するという意味ではない。新しい論理構造を作成する方法については，3.4 節を参照のこと。

文書スタイルのカスタマイズに取り組む前に，自分で文書をデザインしようとした作者の多くが，ごく初歩的な誤りを犯しているという事実を知っておいてほしい。彼らのような誤りを避けるためには，熟練した組版デザイナーに相談するか，あるいは組版デザインに関する書籍などを読んで自分で勉強するしかない。ただ，ここでは，犯しがちな間違いを 1 つだけ指摘しておこう。それは，1 行が長すぎると文が非常に読みづらくなる，ということである。そこで筆者は，**“1 行の長さは，句読点やスペース文字も含めて 75 文字以内にすること”** という提案をしておくことにする〔訳注（阿瀬）：これは欧文の場合の指標である．文書の版形にもよるが，和文の場合であれば 1 行の文字数は 40 字前後までが適当で，これを超えると読みづらくなるようである．〕。

特定の文書のスタイルを変更する場合であれば，その文書のプリアンブルに宣言を付け加えるだけでよい。しかし，いくつかの文書について同じスタイル変更を行う場合は，宣言を 1 つのパッケージにまとめておいたほうが効率的である。パッケージは，必要な宣言を sty ファイル中に書き入れてやれば作成できる。sty ファイルとは，主ファイル名がパッケージ名，拡張子が sty のファイルのことである。たとえば，vacation という名前のパッケージを定義するときは，vacation.sty というファイルを作成すればよい。ファイルを作成したら，\usepackage{vacation}というコマンドを使えば，vacation.sty ファイルを LaTeX に読み込ませることができる。

なお，パッケージの sty ファイルを読み込む際，TeX は @（アット記号）をふつうの英文字として扱うことに注意してほしい。このため，\@listi のようにコマンド名の中で @ 記号を使うことができる。しかし，文書中では，このようなコマンド名を使うことはできない。TeX は，\@というコマンドの後に listi という文字列があると解釈してしまうからである。LaTeX の内部コマンドの多くには，文書中で誤って使われるのを防ぐために，あまり使われることのない @ 記号が含まれている。文書スタイルを変更する際に使われるパラメータにも，@ 記号が含まれているものがある（付録 C を参照）。

文書のスタイルを変更する最も手軽な方法は，ページに出力されるテキストの高さや幅などを決めるパラメータを変えることだろう。LaTeX のスタイルパラメータに関しては，この章および付録 C で説明している。パラメータを変更しただけでは望むような結果が得られないときは，LaTeX コマンドを再定義する必要がある。たとえば，章の見出し形式を変更したいときなどは，\chapter コマンドを再定義しなければならない。さらに，章の見出しに以前の章の表題をすべて書き出したいなど，より複雑な作業が必要になる場合には，高度な TeX のコマンドを勉強しなくてはならない。しかし，そのような複雑な作業を必要とする変更はめったにないと思われる。ここでは，スタイル変更のやりかたを示すために，典型的なスタイル変更の例を 1 つ挙げ，それについて説明する。具体的には，章の表題を通常のローマンのボールド体ではなく，サンセリフのボールド体で印字するようにしてみよう。

\chapter の定義を変更することになるので，まず \chapter の定義がどこにあるかを調べる必要がある。すべての文書クラスに共通するコマンドは，**プリロード**（事前にロード）されていることが多い。プリロードされたコマンドが定義されているファイルの名前は，source2e.tex というファイルに書かれている（このファイルがどのディレクトリにあるかについては，ローカルガイドを参照のこと）。しかし，\chapter のように，特定の文書クラスにしか存在しないコマンドやパッケージによって定義されているコマンドは，ふつうプリロードされていない。これらのコマンドの定義は，文書を処理するときに LaTeX が読み込むファイルに収められている（LaTeX が読み込むファイルについては，4.7 節を参照）。

ここでは，report 文書クラスを使って文書を作成しているものとする。この場合，LaTeX は report.cls というファイルを読み込む。そこで，このファイルの中から “\chapter” という文字列を探せば，次のような行が見つかるはずだ。

```
\newcommand\chapter{\if@openright\cleardoublepage\else...
                    \thispagestyle{plain}%
                    \global\@topnum\z@
                    \@afterindentfalse
                    \secdef\@chapter\@schapter}
```

\chapter コマンドは，ここで定義されている（TeX プログラミングのエキスパートは，\newcommand の最初の引数を囲んでいるブレースを省略してしまうことがあるが，これは真似しない方がよい）。この定義を見ればすぐに，章の見出しを生成するのは \@chapter，あるいは \@schapter であろうと見当がつく。\chapter の定義のすぐ下には，次のような行がある。

```
\def\@chapter[#1]#2{...
```

\@chapter は，ここで定義されているということだ（TeX プログラミングのエキスパートは，TeX コマンドであ

る \def を使ってコマンドを定義することがあるが，これも決して真似しないでほしい）。この定義を見ると，見出しは \@makechapterhead コマンドによって生成されると推測できる。さらに \@makechapterhead コマンドの定義では，2 つの \bfseries コマンドが使われている。これら 2 つのコマンドの前か後に \sffamily コマンドを付け加えれば，きっと章の見出しをサンセリフのボールド体で生成することができるに違いない。そこで，sfchap.sty という名前のファイルを作り，そこに変更した \@makechapterhead の定義を収める。そして，文書のプリアンブルに \usepackage{sfchap}コマンドを付け加えてから，LaTeX を実行してみよう。すると，LaTeX は，希望どおり，サンセリフのボールド体で見出しを出力してくれる。最初の推理は正しかったのである！

以上の例は，スタイルを変更するときのためのよいヒントになるだろう。しかし，もっと簡単にスタイルを変更する方法もある。report.cls の先頭にある注釈を読んでみると，report.cls ファイルは classes.dtx という名前のソースファイルから生成されたことがわかる（source2e.tex にも，classes.dtx のことが書かれている）。dtx ファイルには，注釈と整形コマンドが入っている。LaTeX で処理すれば dtx ファイルを紙に印刷できるが，dtx ファイル自身をそのまま読んでもよい。classes.dtx からは，\@schapter コマンドが，番号付けされていない章の見出しを生成するということがわかる（番号付けされていない見出しは，\chapter*コマンドで生成できる。C.4.1 節を参照）。ここで注釈を読めば，番号付けされていない章見出しの出力形式を変更する方法がわかるはずである。

以上，コマンドの変更のしかたについて説明したが，環境の変更も同様にして行うことができる。ただし，環境によっては \newenvironment ではなく，\def という TeX のコマンドで定義されているものもあるので，定義の書かれている場所を探すときには注意が必要である。たとえば，euqation 環境は，\begin{equation}によって実行される \equation と \end{equation}によって実行される \endequation という，2 つのコマンドによって定義されている。

スタイル変更のためのパッケージを自分で作成しようと思い立ったときには，何よりもまず『The LaTeX Companion』やローカルガイドなどを読み，すでにだれかが自分の希望するような出力結果を生成してくれる文書クラスやパッケージを作成していないかどうか，調べるようにすべきだろう。

Plain TeX コマンドを使う〔同書 266–267 頁〕

LaTeX は，TeX の “マクロパッケージ”，つまり，あらかじめ定義された TeX コマンドの集まりとして実現されている。Pain TeX は，“裸” の TeX とマクロパッケージ plain によって構成された，TeX の標準版である。Plain TeX コマンドを使えば，標準の LaTeX コマンドではできないようなことを実現できる。ただし，Plain TeX を使おうと考える前に，自分が希望する処理を行ってくれるようなパッケージがないかどうか，『The LaTeX Companion』を読んで調べるようにしたほうがよいだろう。

ほとんどの Plain TeX コマンドは，LaTeX の中でも使うことができるが，使用に際しては注意が必要である。LaTeX は，その中のコマンド群が集まって 1 つのシステムとして機能するように設計されている。LaTeX の各コマンドは，ほかのコマンドといっしょに使ったときにもうまく機能するよう，さまざまな妥協がなされているのである。したがって，LaTeX コマンドを，本書で説明されていない Plain TeX コマンドと組み合わせて使った場合，うまく機能しないかもしれない。

Plain TeX コマンドが問題を引き起こすかどうかは，簡単に判断することはできない。これは，実際に試してみるしか方法はない。一般則としては，LaTeX のコマンドや環境が利用しているパラメータを変更する可能性のある Plain TeX のコマンドを，そのコマンドや環境と組み合わせて使うのは避けたほうがよい。たとえば，LaTeX のリスト作成環境中では，TeX の段落作成パラメータを変更する \hangindent のような Plain TeX コマンドを使ってはならない。

LaTeX の \output ルーチンで使われるパラメータについては，本書中で指定されている以外の方法で変更してはならない。とくに『The TeXbook』の 15 章については，そのほとんどはすでに適用できないと考えたほうがよい。とはいえ，LaTeX はレジスタ割り当てに関する TeX の規約をすべて受け継いでいるため，通常の TeX コマンドを使って独自のカウンタやボックスなどを定義することは可能である。

LaTeX の中で定義が削除，あるいは変更されている Plain TeX コマンドは，次に示すとおりである。LaTeX コマンドの中で Plain TeX コマンドで似たような機能を持つものや，名前の中に @ が含まれる “内部” コマンドについては，ここには示していない。

タブ・コマンド

LaTeX には tabbing 環境があるため，次のコマンドは削除されている。

```
\tabs     \tabsdone    \settabs    \+
\tabset   \cleartabs   \tabalign
```

出力，脚注，図

次のコマンドは，Plain TeX の出力ルーチンを必要とするため，削除されている。これらのコマンドは，LaTeX の脚注作成コマンド，figure 環境，あるいは table 環境によって置き換えられている。

```
\pageno          \nopagenumbers   \makeheadline   \topins
\headline        \advancepageno   \makefootline   \topinsert
\footline        \pagebody        \dosupereject   \midinsert
\normalbottom    \plainoutput     \footstrut      \pageinsert
\folio           \pagecounters    \vfootnote      \endinsert
```

フォント選択コマンド

次の Plain TeX コマンドは，LaTeX では定義されていない。

```
\fivei    \fivebf    \sevensy
\fiverm   \seveni    \teni
\fivesy   \sevenbf   \oldstyle
```

数式の位置揃え

LaTeX には eqnarray 環境や eqnarray*環境があるため，次の Plain TeX コマンドは削除されている。

```
\eqalign    \eqalignno    \leqalignno
```

そのほか

Plain TEX の $$ は正しく機能しないが，LATEX コマンドでは \[と \] に置き換えられている。Plain TEX の \beginsection コマンドは，LATEX のセクションコマンドに置き換えられている。また，\end と \bye コマンドは，\end{document} に置き換えられている。Plain TEX コマンドの \centering と \line は，LATEX では同名の別機能のコマンドとなっており，\input コマンドの構文も LATEX の規約に従うように変更されている。Plain TEX の \line コマンドで行えることはほとんど，center，flushleft，あるいは flushright の各環境を利用すれば実現できる。なお，LATEX には，Plain TEX の \magnification コマンドに対応するコマンドはないが，出力の拡大は，dvi ファイルの印字プログラムによって行える場合が多い。

source2e.tex

ランポートさんの本にも出て来る “source2e.tex” を以下に挙げておきます（このファイル自体はどなたの PC の中にもあるはずです）。\end{document} の後ろ（341 行以下）に書いてある指示に従ってタイプセットすると，“The LATEX 2_ε Sources” という約 550 ページのドキュメントになります。216 行〜296 行で “\DocInclude” している 41 個の dtx ファイルをひとつにまとめて，目次やコマンドインデックスを付けたものです（202 行以下にも書かれていますように，必要な dtx ファイルだけを個々にタイプセットしてももちろん構いません．でも，まとめてタイプセットして，コマンドインデックスも作っておくと，検索するのに重宝します）。これが，“*kernel*” と呼ばれる LATEX の中核部分のコードと，それについての説明ですね。source2e.tex から説明の部分を取り去ったものが，“latex.ltx”（kernel そのもの）なんだと思います。

この『別冊付録』では，コードをカラフルにしたかったというだけの理由で listings パッケージを使ってますが，doc パッケージを使うと，source2e.tex と同様に，コマンドインデックスを作ることが出来ます（source2e.tex で使われているクラスファイル “ltxdoc.cls” は，内部で doc パッケージを読み込んでいます）。ですんで，“plain.tex” や “latex.tex” なんかも，doc パッケージを使えば，コマンドインデックスを得ることが出来ます。

あと，hypdoc というパッケージもあって，こちらを使うと doc パッケージだけでなく hyperref パッケージも読み込んでタイプセット出来るので，そうすると，目次やコマンドインデックスにリンクが張られた pdf が作れて，検索がもっと楽チンになります。

```
% \iffalse meta-comment
%
% Copyright 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006
% The LaTeX3 Project and any individual authors listed elsewhere
% in this file.
%
% This file is part of the LaTeX base system.
% -------------------------------------------
%
% It may be distributed and/or modified under the
% conditions of the LaTeX Project Public License, either version 1.3c
% of this license or (at your option) any later version.
% The latest version of this license is in
%   http://www.latex-project.org/lppl.txt
% and version 1.3c or later is part of all distributions of LaTeX
% version 2005/12/01 or later.
%
% This file has the LPPL maintenance status "maintained".
%
% The list of all files belonging to the LaTeX base distribution is
% given in the file `manifest.txt'. See also `legal.txt' for additional
% information.
%
% The list of derived (unpacked) files belonging to the distribution
% and covered by LPPL is defined by the unpacking scripts (with
% extension .ins) which are part of the distribution.
%
% \fi

% This document will typeset the LaTeX sources as a single document.
% This will produce quite a large file (roughly 555 pages) and may
```

```
% take a long time.
%
% Some notes on processing this document are contained at the end
% of this document, after \end{document}
%
% DPC 1997/11/17
%
% First a special index style for makeindex
%

\begin{filecontents}{source2e.ist}
actual '='
quote '!'
level '>'
preamble
"\n \\begin{theindex} \n \\makeatletter\\scan@allowedfalse\n"
postamble
"\n\n \\end{theindex}\n"
item_x1  "\\efill \n \\subitem "
item_x2  "\\efill \n \\subsubitem "
delim_0  "\\pfill "
delim_1  "\\pfill "
delim_2  "\\pfill "
% The next lines will produce some warnings when
% running Makeindex as they try to cover two different
% versions of the program:
lethead_prefix "{\\bfseries\\hfil "
lethead_suffix "\\hfil}\\nopagebreak\n"
lethead_flag     1
heading_prefix "{\\bfseries\\hfil "
heading_suffix "\\hfil}\\nopagebreak\n"
headings_flag    1

% and just for source2e:
% Remove R so I is treated in sequence I J K not I II III
page_precedence "rnaA"
\end{filecontents}



\documentclass{ltxdoc}

\listfiles

% Do not index some TeX primitives, and some common plain TeX commands.

\DoNotIndex{\def,\long,\edef,\xdef,\gdef,\let,\global}
\DoNotIndex{\if,\ifnum,\ifdim,\ifcat,\ifmmode,\ifvmode,\ifhmode,%
            \iftrue,\iffalse,\ifvoid,\ifx,\ifeof,\ifcase,\else,\or,\fi}
\DoNotIndex{\box,\copy,\setbox,\unvbox,\unhbox,\hbox,%
            \vbox,\vtop,\vcenter}
\DoNotIndex{\@empty,\immediate,\write}
\DoNotIndex{\egroup,\bgroup,\expandafter,\begingroup,\endgroup}
\DoNotIndex{\divide,\advance,\multiply,\count,\dimen}
\DoNotIndex{\relax,\space,\string}
\DoNotIndex{\csname,\endcsname,\@spaces,\openin,\openout,%
            \closein,\closeout}
\DoNotIndex{\catcode,\endinput}
\DoNotIndex{\jobname,\message,\read,\the,\m@ne,\noexpand}
\DoNotIndex{\hsize,\vsize,\hskip,\vskip,\kern,\hfil,\hfill,\hss}
\DoNotIndex{\m@ne,\z@,\z@skip,\@ne,\tw@,\p@}
\DoNotIndex{\dp,\wd,\ht,\vss,\unskip}

% Set up the Index and Change History to use \part
\IndexPrologue{\part*{Index}%
               \markboth{Index}{Index}%
               \addcontentsline{toc}{part}{Index}%
               The italic numbers denote the pages where the
               corresponding entry is described,
               numbers underlined point to the definition,
               all others indicate the places where it is used.}

\GlossaryPrologue{\part*{Change History}%
%              Allow control names to be hyphenated here...
```

```
                {\GlossaryParms\ttfamily\hyphenchar\font=`\-}%
                \markboth{Change History}{Change History}%
                \addcontentsline{toc}{part}{Change History}}

% The standard \changes command modified slightly to better cope with
% this multiple file document.
\makeatletter
\def\changes@#1#2#3{%
  \let\protect\@unexpandable@protect
  \edef\@tempa{\noexpand\glossary{#2\space\currentfile\space#1\levelchar
                                  \ifx\saved@macroname\@empty
                                    \space
                                    \actualchar
                                    \generalname
                                  \else
                                    \expandafter\@gobble
                                    \saved@macroname
                                    \actualchar
                                    \string\verb\quotechar*%
                                    \verbatimchar\saved@macroname
                                    \verbatimchar
                                  \fi
                                  :\levelchar #3}}%
  \@tempa\endgroup\@esphack}
\makeatother

% Produce a Change Log and (2 column) Index.
\RecordChanges
\CodelineIndex
\EnableCrossrefs
\setcounter{IndexColumns}{2}

% Needed for documentation in ltoutenc.dtx
\usepackage{textcomp}

\begin{document}
 \title{The \LaTeXe\ Sources}
 \author{%
  Johannes Braams\\
  David Carlisle\\
  Alan Jeffrey\\
  Leslie Lamport\\
  Frank Mittelbach\\
  Chris Rowley\\
  Rainer Sch\"opf}

% This command will be used to input the patch file
% if that file exists.
\newcommand{\includeltpatch}{%
  \def\currentfile{ltpatch.ltx}
  \part{ltpatch}
  {\let\ttfamily\relax
    \xdef\filekey{\filekey, \thepart={\ttfamily\currentfile}}}%
  Things we did wrong\ldots
  \IndexInput{ltpatch.ltx}}



% Get the date from ltvers.dtx
\makeatletter
\let\patchdate=\@empty
\begingroup
   \def\ProvidesFile#1\fmtversion#2{\date{#2}\endinput}
   \input{ltvers.dtx}
\global\let\X@date=\@date

% Add the patch version if available.
   \long\def\Xdef#1#2#3\def#4#5{%
    \xdef\X@date{#2}%
    \xdef\patchdate{#5}%
    \endinput}%
   \InputIfFileExists{ltpatch.ltx}
    {\let\def\Xdef}{\global\let\includeltpatch\relax}
\endgroup
```

```
\ifx\@date\X@date
   \def\Xpatch{0}
   \ifx\patchdate\Xpatch\else
     \edef\@date{\@date\space Patch level \patchdate}
   \fi
\else
   \@warning{ltpatch.ltx does not match ltvers.dtx!}
   \let\includeltpatch\relax
\fi
\makeatother

 \pagenumbering{roman}
 \maketitle
 \renewcommand\maketitle{}

 \tableofcontents

 \clearpage

 \pagenumbering{arabic}

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Each of the following \DocInclude lines includes a file with extension
% .dtx. Each of these files may be typeset separately. For instance
% latex ltboxes.dtx
% will typeset the source of the LaTeX box commands.
%
% If this file is processed, each of these separate dtx files will be
% contained as a part of a single document. Using ltxdoc.cfg you can
% then optionally produce a combined index and/or change history for
% the entire source of the format file. Note that such a document will
% be quite large (about 555 pages).
%

 \DocInclude{ltdirchk} % System dependant initialisation

 \DocInclude{ltplain} % LaTeX version of Knuth's plain.tex

 \DocInclude{ltvers} % Current version date

 \DocInclude{ltdefns} % Initial definitions.

 \DocInclude{ltalloc} % Allocation of counters and others.

 \DocInclude{ltcntrl} % Program control macros.

 \DocInclude{lterror} % Error handling.

 \DocInclude{ltpar}  % Paragraphs.

 \DocInclude{ltspace} % Spacing, line and page breaking.

 \DocInclude{ltlogos} % Logos.

 \DocInclude{ltfiles} % \input files and related commands

 \DocInclude{ltoutenc} % Output encoding interface

 \DocInclude{ltcounts} % Counters

 \DocInclude{ltlength} % Lengths

 \DocInclude{ltfssbas} % NFSS Base macros

 \DocInclude{ltfsstrc} % NFSS Tracing (and tracefnt.sty)

 \DocInclude{ltfsscmp} % NFSS1 Compatibility

 \DocInclude{ltfssdcl} % NFSS Declarative interface

 \DocInclude{ltfssini} % NFSS Initialisation

```

```
254  \DocInclude{fontdef} % fonttext.ltx/fontmath.ltx
255
256  \DocInclude{preload} % preload.ltx
257
258  \DocInclude{ltfntcmd} % \textrm etc
259
260  \DocInclude{ltpageno} % Page numbering
261
262  \DocInclude{ltxref} % Cross referencing
263
264  \DocInclude{ltmiscen} % Miscellaneous environment definitions.
265
266  \DocInclude{ltmath} % Mathematics set up.
267
268  \DocInclude{ltlists} % List and related environments
269
270  \DocInclude{ltboxes} % Parbox and friends
271
272  \DocInclude{lttab}  % Tabbing tabular and array
273
274  \DocInclude{ltpictur} % Picture mode
275
276  \DocInclude{ltthm}  % Theorem environments
277
278  \DocInclude{ltsect} % Sectioning
279
280  \DocInclude{ltfloat} % Floats
281
282  \DocInclude{ltidxglo} % Index and Glossary
283
284  \DocInclude{ltbibl} % Bibliography
285
286  \DocInclude{ltpage} % \pagestyle \raggedbottom \sloppy
287
288  \DocInclude{ltoutput} % Output routine
289
290  \DocInclude{ltclass} % Package & Class interface
291
292  \DocInclude{lthyphen} % Hyphenation (hyphen.ltx).
293
294  \DocInclude{ltfinal} % Last minute initialisations and dump
295
296  \includeltpatch     % Corrections distributed after the full release
297
298 % Stop here if ltxdoc.cfg says \AtEndOfClass{\OnlyDescription}
299 \StopEventually{\end{document}}
300
301 \clearpage
302 \pagestyle{headings}
303
304 % Make TeX shut up.
305 \hbadness=10000
306 \newcount\hbadness
307 \hfuzz=\maxdimen
308
309 \typeout{%
310   \string # Produce change log with^^J%
311   makeindex -s gglo.ist -o source2e.gls source2e.glo}
312
313
314 \PrintChanges
315
316 \clearpage
317
318 % makeindex needs a symbol between the parts of composite page numbers
319 % but we dont want one, so:
320 \typeout{%
321   \string # Produce index with^^J%
322   makeindex -s source2e.ist source2e.idx}
323
324 \begingroup
325 \def\endash{--}
326 \catcode`\-\active
327 \def-{\futurelet\temp\indexdash}
```

```
\def\indexdash{\ifx\temp-\endash\fi}

\PrintIndex
\endgroup

% Make sure that the index is not printed twice
% (ltxdoc.cfg might have a second \PrintIndex command)
\let\PrintChanges\relax
\let\PrintIndex\relax

\end{document}


%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

To use this file to produce a fully indexed source code
you need to execute the following (or equivalent) commands:

   latex source2e.tex

   makeindex -s source2e.ist source2e.idx
   makeindex -s gglo.ist -o source2e.gls source2e.glo

   latex source2e.tex
   latex source2e.tex


The makeindex style source2e.ist is used in place of the usual
doc gind.ist to ensure that I is used in the sequence I J K
not I II III, which would be the default makeindex behaviour.

The third run with latex is only required to get the table of
contents entries for the change log and index. You may speed things up
by using the \includeonly mechanism so as not to typeset the source
files on the second run. This involves changing the file
ltxdoc.cfg
between the latex runs.

The following unix script automates this.
  (It could easily be ported to scripts for DOS or VMS,
   rm is ReMove a file, and echo "..." > file writes ... to "file".)


After this script (after the second ==========) is a similar script
that will produce the documentation for all the files in the base
distribution that are *not* included in source2e.dvi. This second script
was requested, but before using it, beware it will take a long time!
It may however be modified as required, eg to not typeset the fdd files
or whatever...

==========
#!/bin/sh

rm  -f source2e.gls source2e.ind source2e.toc

# First run:
# Create new standard ltxdoc.cfg file
# Pass the (possibly empty) list of arguments supplied on the
# command line to article class.
#
# If you use A4 paper, running this script with argument
#    a4paper
# may save about 30 pages.
#
echo "\PassOptionsToClass{$*}{article}" > ltxdoc.cfg


# Now LaTeX the file with this cfg file.
#
latex source2e.tex


# Make the Change log and Glossary.
#
```

```
makeindex -s source2e.ist source2e.idx
makeindex -s gglo.ist -o source2e.gls source2e.glo


# Second run: append \includeonly{} to ltxdoc.cfg to speed up things
# (this run needed only to get changes and index listed in .toc file)
#
# Note that the index will not be made incorrect by the insertion
# of the table of contents as the front matter uses a diferent page
# numbering scheme.
#
echo "\includeonly{}" >> ltxdoc.cfg

latex source2e.tex


# Third and final run, to put everything together.
# First restore the cfg file:
#
echo "\PassOptionsToClass{$*}{article}" > ltxdoc.cfg
latex source2e.tex


==============
#!/bin/sh

# Running this script will process all the dtx fdd and *guide.tex
# and ltnews*.tex files in the LaTeX distribution, except the dtx
# files included in source2e.tex.
# (The shell first script in the comments of source2e.tex will
#  process those.)

# Any command line arguments (eg a4paper) are taken as options to the
# article class.

# This script is likely to take ages!

echo "\PassOptionsToClass{$*}{article}"            > ltxdoc.cfg
echo "\batchmode"                                 >> ltxdoc.cfg

# The next four lines produce full indexes and change logs
# you may not want those.
echo "\AtBeginDocument{\RecordChanges}"           >> ltxdoc.cfg
echo "\AtEndDocument{\PrintChanges}"              >> ltxdoc.cfg
echo "\AtBeginDocument{\CodelineIndex\EnableCrossrefs}" >> ltxdoc.cfg
echo "\AtEndDocument{\PrintIndex}"                >> ltxdoc.cfg

# If you do not want any code listings, just documentation, then instead
# of the above four lines, uncomment the following:
# echo "\AtBeginDocument{\OnlyDescription}"          >> ltxdoc.cfg

echo "\PassOptionsToClass{$*}{article}"            > ltxguide.cfg
echo "\batchmode"                                 >> ltxguide.cfg

cp ltxguide.cfg ltnews.cfg


for i in *dtx *fdd *guide.tex ltnews*.tex
do
B=`basename $i .dtx`

if (grep "Include{$B}" source2e.tex >/dev/null ; )
then
echo In source2e: $i
else
echo latex $i
  if (latex $i > /dev/null)
  then
    echo latex $i
    latex $i > /dev/null
    echo makeindex -s gind.ist $B.idx
    makeindex -s gind.ist $B.idx > /dev/null 2> /dev/null
    echo makeindex -s gglo.ist -o $B.gls $B.glo
    makeindex -s gglo.ist -o $B.gls $B.glo > /dev/null 2> /dev/null
```

```
476     echo latex $i
477     latex $i > /dev/null
478   else
479     echo "!!! LaTeX ERROR: $i. (See $B.log.)"
480   fi
481 fi
482
483 done
```

classes.dtx

ランポートさんの本には「source2e.tex にも，classes.dtx のことが書かれている」とありますが，（少なくとも現時点の）source2e.tex には特には書いてないみたいですね。

いずれにしても，“kernel” には定義されていない（または，kernel ではその準備だけがされている）各種クラスファイルに依存するいろいろな設定の説明については，“classes.dtx” のほうに書いてあります。

“classes.dtx” は，article.cls, report.cls, book.cls, size10.clo, size11.clo, size12.clo, bk10.clo，bk11.clo，bk12.clo の，ソースです。

第 4 章　pLaTeX 2ε

Ken Nakano「pLaTeX 2ε について」（作成日：1997/01/29）〔platex.dtx〕

第 1 節　概 要

この文書は，pLaTeX 2ε の概要を示していますが，使い方のガイドではありません。pLaTeX 2ε の機能についての説明は，中野賢『日本語 LaTeX 2ε ブック』（アスキー・1996 年）を参照してください。日本語 TeX については，アスキー出版技術部責任編集『日本語 TeX テクニカルブック I』（アスキー・1990 年）を参照してください。

pLaTeX 2ε では，インプレス・ラボ監修・アスキー書籍編集部編『縦組対応パーソナル日本語 TeX』（アスキー出版局・1994 年）で説明されている，いくつかの拡張コマンドの動作を修正しています。その詳細については，`plext.dtx` を参照してください。

LaTeX の機能については，Laslie Lamport, "*LaTeX: A Document Preparation System*", Addison-Wesley, second edition, 1994 や Michel Goossens, Frank Mittelbach, Alexander Samarin, "*The LaTeX Companion*", Addison-Wesley, 1994 などを参照してください。新しい機能については `usrguide.tex` を参照してください。

この文書の構成は次のようになっています。

第 1 節 この節です。この文書についての概要と，DOCSTRIP のためのオプションについて述べています。

第 2 節 pLaTeX 2ε で拡張した機能についての概要です。付属のクラスファイルやパッケージファイルについても簡単に説明しています。

第 3 節 旧バージョンの pLaTeX との互換性について述べています。

付録 A pLaTeX 2ε の dtx ファイルをまとめて一つの DVI ファイルにするための文書ファイル説明をしています。

付録 B 付録 A で説明をした文書ファイルを処理する sh スクリプト（手順），DOCSTRIP 文書ファイル内の入れ子の対応を調べる perl スクリプトなどについて説明しています。

1.1　DOCSTRIP プログラムのためのオプション

この文書を DOCSTRIP プログラムによって処理することによって，いくつかの異なるファイルを生成することができます。

この文書の DOCSTRIP プログラムのためのオプションは，次のとおりです。

オプション	意 味
plcore	フォーマットファイルを作るためのファイルを生成
pldoc	pLaTeX 2ε のソースファイルをまとめて組版するための文書ファイルを生成
shprog	上記のファイルを作成するための sh スクリプトを生成
plprog	入れ子構造を調べる簡単な perl スクリプトを生成
Xins	上記の sh スクリプトや perl スクリプトを取り出すための DOCSTRIP バッチファイルを生成

1.1.1　ファイルの取り出し方

たとえば，この文書の "plcore" の部分を "`platex.ltx`" というファイルにするときの手順はつぎのようになります。

1. platex docstrip
2. 入力ファイルの拡張子（dtx）を入力する。
3. 出力ファイルの拡張子（ltx）を入力する。
4. DOCSTRIP オプション（plcore）を入力する。
5. 入力ファイル名（platex）を入力する。
6. `platex.ltx` が存在する場合は，確認を求めてくるので，"y" を入力する。
7. 別の処理を行なうかを問われるので，"n" を入力する。

これで，`platex.ltx` が作られます。

あるいは，次のような内容のファイル `batch.ins` を作成し，`platex fmt.ins` することでも `platex.ltx` を作ることができます。

```
\def\batchfile{batch.ins}
\input docstrip.tex
\generateFile{platex.ltx}{t}{\from{platex.dtx}{plcore}}
```

DOCSTRIP プログラムの詳細は，`docstrip.dtx` を参照してください。

第 2 節　pLaTeX 2ε の機能について

pLaTeX 2ε の機能は，いくつものファイルに分割されて実装されています。これらのファイルはつぎの 3 種類に分類することができます。

- フォーマットファイル
- クラスファイル
- パッケージファイル

フォーマットファイルには，基本的な機能が定義されており，pLaTeX 2εの核となるファイルです。このファイルに定義されているマクロは，実行時の速度を高めるために，あらかじめ TeX の内部形式の形で保存されています。

クラスファイルとパッケージファイルは，従来，スタイルファイルと呼ばれていたものです。LaTeX 2εではそれらを，レイアウトに関するものをクラスファイルと呼び，マクロの拡張をするものをパッケージファイルと呼んで区別するようになりました。

TeX 文書が使用するクラスは，文書のプリアンブルで \documentclass コマンドを用いて指定します。\documentclass ではなく，旧版の \documentstyle を用いると，自動的に *2.09* **互換モード**に入ります。互換モードは旧版の文書を組版するためだけに作られていますので，新しく文書を作成する場合は，\documentclass コマンドを用いてください。互換モードでは LaTeX の新機能も使えなくなります。

旧版では，\documentstyle のオプションでマクロファイルを読み込んでいましたが，LaTeX では，\usepackage コマンドを用いて読み込みます。

2.1 フォーマットファイル

フォーマットファイルには，基本的な機能が定義されていますが，これらは TeX の内部形式に変換された形式となっています。フォーマットファイルを作成するには，ソースファイル “platex.ltx” を `iniptex` プログラムで処理します。

次のリストが，その内容です。ただし，このバージョンでは，LaTeX から pLaTeX 2ε への拡張を `plcore.ltx` をロードすることで行ない，`latex.ltx` には直接，手を加えないようにしています。したがって `platex.ltx` はとても短いものとなっています。`latex.ltx` には LaTeX のコマンドが，`plcore.ltx` には pLaTeX 2εで拡張したコマンドが定義されています。

```
 1 <*plcore>
 2 \let\orgdump\dump
 3 \let\dump\relax
 4 \input latex.ltx
 5 \typeout
       {*************************^^J%
 6          *^^J%
 7          * making pLaTeX format^^J%
 8          *^^J%
 9          *************************}
10 \makeatletter
11 \input plcore.ltx
12 \makeatother
13 \the\everyjob
14 \let\dump\orgdump
15 \dump
16 <plcore>\endinput
17 </plcore>
```

実際に pLaTeX 2εへの拡張を行なっている `plcore.ltx` は，DOCSTRIP プログラムによって，次のファイルの断片が連結されたものです。

- `plvers.dtx` は，pLaTeX 2εのフォーマットバージョンを定義しています。
- `plfonts.dtx` は，NFSS2 を拡張しています。
- `plcore.dtx` は，上記以外のコマンドでフォーマットファイルに格納されるコマンドを定義しています。

プリロードフォントや組版パラメータなどの設定は，`pldefs.ltx` をロードすることで行なっています。このファイルに記述されている設定を変更すれば，pLaTeX 2εをカスタマイズすることができます。カスタマイズする場合は，このファイルを直接，修正するのではなく，`pldefs.cfg` という名前でコピーをして，そのファイルを編集します。`pldefs.cfg` は `pldefs.ltx` の代わりに読み込まれます。

2.1.1 バージョン

pLaTeX 2εのバージョンやフォーマットファイル名は，`plvers.dtx` で定義しています。

2.1.2 NFSS2 コマンド

LaTeX では，フォント選択機構として NFSS2 を用いています。pLaTeX 2εでは，オリジナルの NFSS2 と同様のインターフェイスで，和文フォントを選択できるように，`plfonts.dtx` で NFSS2 を拡張しています。

pLaTeX 2εの NFSS2 は，フォントを切替えるコマンドを指定するときに，それが欧文書体か和文書体のいずれかを対象とするものかを，できるだけ意識しないようにする方向で拡張しています。いいかえれば，コマンドが（可能な限りの）判断をします。したがって数多くある英語版のクラスファイルやパッケージファイルなどで書体の変更を行っている箇所を修正する必要はあまりありません。

`plfonts.dtx` ファイルでは，NFSS2 コマンドの定義のほか，プリロードフォントの設定，和文エンコードの定義，組版パラメータなどの設定，フォント定義ファイルなどの記述も含まれています。

NFSS2 についての詳細は，LaTeX 2εに付属の `fntguide.tex` を参照してください。

2.1.3 出力ルーチンとフロート

`plcore.dtx` は，次の項目に関するコマンドを日本語処理用に修正や拡張をしています。

- プリアンブルコマンド
- 改ページ
- 改行
- オブジェクトの出力順序
- トンボ
- 脚注マクロ
- 相互参照
- 疑似タイプ入力

2.2 クラスファイルとパッケージファイル

クラスファイルとパッケージファイルは，従来，スタイルファイルと呼ばれていたものです。LaTeX ではそれらを，レイアウトに関するものをクラスファイルと呼び，マクロの拡張をするものをパッケージファイルと呼んで区別するようになりました。

pLaTeX 2εが提供をする，クラスファイルやパッケージファイルのいくつかは，オリジナルのファイルを修正しています。修正箇所には “platex” 条件が付けられています。

pLaTeX 2εに付属のクラスファイルは，次のとおりです。

- jbook.cls, jarticle.cls, jreport.cls
  横組用の標準クラスファイル。`jclasses.dtx` から作成される。

- tbook.cls, tarticle.cls, treport.cls
  縦組用の標準クラスファイル。jclasses.dtx から作成される。
- jltxdoc.cls
  .dtx ファイルを組版するためのクラスファイル。jltxdoc.dtx から作成される。
- jltxguid.cls
  usrguide.tex や fntguide.tex などを組版するためのクラスファイル。

また，pLaTeX 2ε に付属のパッケージファイルは，次のとおりです。

- oldpfont.sty
  pLaTeX2.09 のフォントコマンドを提供するパッケージ。oldpfont.dtx から作成される。
- ptrace.sty
  tracefnt.sty で再定義された NFSS2 コマンドを pLaTeX 2ε 用に再々定義するためのパッケージ。
- ascmac.sty, tascmac.sty
  旧バージョンの pLaTeX で配布されていたファイル。
- plext.sty
  縦組用の拡張コマンドなどが定義されているファイル。

第 3 節　旧バージョンとの互換性

ここでは，このバージョンと以前のバージョンとの互換性や拡張部分について説明をしています。

3.1　pLaTeX2.09 との互換性

pLaTeX 2ε は，LaTeX の上位互換という形を取っていますが，いくつかのパラメータなども変更しています。したがって英文書など，LaTeX でも処理できるファイルを pLaTeX 2ε で処理しても，完全に同じ結果になるとは限りません。これは，英語版の LaTeX でも同じです。詳細は，LaTeX 2ε に付属の usrguide.tex を参照してください。

多くのクラスファイルやパッケージフィルはそのまま使えると思います。ただし，それらが pLaTeX 2ε で拡張しているコマンドと同じ名前のコマンドを再定義している場合は，コマンドの拡張の仕方によってはエラーになることもあります。用いようとしている，クラスファイルやパッケージファイルがうまく動くかどうかを，完全に確かめる方法は残念ながらありません。一番簡単なのは，動かしてみることです。不幸にもうまく動かない場合は，ログファイルや付属の文書ファイルを参考に原因を調べてください。

付録 A　文書ファイル

ここでは，このパッケージに含まれている dtx ファイルをまとめて組版をするための文書ファイルについて説明をしています。個別に処理した場合と異なり，変更履歴や索引も付きます。全体で，およそ 150 ページ程度になります。

〔…以下略.「**付録 A**」は “pldoc.tex” の解説です．続きはお手許のファイルをご覧ください．pldoc.tex 自体は，次頁以降に挙げてあります.〕

付録 B　おまけプログラム

〔略．お手許のファイルをご覧ください.〕

この “platex.dtx” というファイルは，pLaTeX の開発者である中野賢さんご自身が書かれた pLaTeX を概説するドキュメントなのですから，pLaTeX を使われる方はまず最初に読むべきものだと思うのですけど，必ずしもそうはなってないみたいですので，ここに再録させていただきました（このファイルも，どなたの PC の中にもあると思います．なお，オリジナルの文書の見出しはただ「1, 2, 3, A, B」となっているのですが，ここでは勝手に「第 1 節，第 2 節，第 3 節，付録 A，付録 B」とさせていただいています．申し訳ありません）。

次頁以降には，“pldoc.tex” を listings に流し込んだものを掲載しています。上の「**付録 A**」の部分に書かれていますように，pldoc.tex を pLaTeX で処理すると，全体で 150 ページほどの “The pLaTeX 2ε Sources” というドキュメントになります（目次や変更履歴，コマンドインデックスも付いてます）。

“source2e.tex” と “classes.dtx” は別ファイルですが，こちらの “pldoc.tex” のほうには，“jclasses.dtx” も含まれます（154 行目に \DocInclude{jclasses} とありますよね．もちろん，jclasses.dtx だけを別個にタイプセットすることも出来ます）。

source2e.tex のところにも書きましたが，hypdoc パッケージを使ってタイプセットすると，リンク付きのドキュメントになりますので，検索にとても便利になります。

pldoc.tex

```
%%
%% This is file `pldoc.tex',
%% generated with the docstrip utility.
%%
%% The original source files were:
%%
%% platex.dtx (with options: `pldoc')
%%
%% IMPORTANT NOTICE:
%%
%% For the copyright see the source file.
%%
%% Any modified versions of this file must be renamed
%% with new filenames distinct from pldoc.tex.
%%
%% For distribution of the original source see the terms
%% for copying and modification in the file platex.dtx.
%%
%% This generated file may be distributed as long as the
%% original source files, as listed above, are part of the
%% same distribution. (The sources need not necessarily be
%% in the same archive or directory.)
%% File: platex.dtx
%% \CharacterTable
%%  {Upper-case   \A\B\C\D\E\F\G\H\I\J\K\L\M\N\O\P\Q\R\S\T\U\V\W\X\Y\Z
%%   Lower-case   \a\b\c\d\e\f\g\h\i\j\k\l\m\n\o\p\q\r\s\t\u\v\w\x\y\z
%%   Digits       \0\1\2\3\4\5\6\7\8\9
%%   Exclamation  \!     Double quote \"    Hash (number) \#
%%   Dollar       \$     Percent      \%    Ampersand     \&
%%   Acute accent \'     Left paren   \(    Right paren   \)
%%   Asterisk     \*     Plus         \+    Comma         \,
%%   Minus        \-     Point        \.    Solidus       \/
%%   Colon        \:     Semicolon    \;    Less than     \<
%%   Equals       \=     Greater than \>    Question mark \?
%%   Commercial at \@    Left bracket \[    Backslash     \\
%%   Right bracket \]    Circumflex   \^    Underscore    \_
%%   Grave accent \`     Left brace   \{    Vertical bar \|
%%   Right brace  \}     Tilde        \~}
%%
\begin{filecontents}{pldoc.dic}
西暦    せいれき
和暦    われき
\end{filecontents}
\documentclass{jltxdoc}
\usepackage{plext}
\listfiles

\DoNotIndex{\def,\long,\edef,\xdef,\gdef,\let,\global}
\DoNotIndex{\if,\ifnum,\ifdim,\ifcat,\ifmmode,\ifvmode,\ifhmode,%
           \iftrue,\iffalse,\ifvoid,\ifx,\ifeof,\ifcase,\else,\or,\fi}
\DoNotIndex{\box,\copy,\setbox,\unvbox,\unhbox,\hbox,%
           \vbox,\vtop,\vcenter}
\DoNotIndex{\@empty,\immediate,\write}
\DoNotIndex{\egroup,\bgroup,\expandafter,\begingroup,\endgroup}
\DoNotIndex{\divide,\advance,\multiply,\count,\dimen}
\DoNotIndex{\relax,\space,\string}
\DoNotIndex{\csname,\endcsname,\@spaces,\openin,\openout,%
           \closein,\closeout}
\DoNotIndex{\catcode,\endinput}
\DoNotIndex{\jobname,\message,\read,\the,\m@ne,\noexpand}
\DoNotIndex{\hsize,\vsize,\hskip,\vskip,\kern,\hfil,\hfill,\hss,\vss,\unskip}
\DoNotIndex{\m@ne,\z@,\z@skip,\@ne,\tw@,\p@,\@minus,\@plus}
\DoNotIndex{\dp,\wd,\ht,\setlength,\addtolength}
\DoNotIndex{\newcommand, \renewcommand}

\IndexPrologue{\part*{索 引}%
               \markboth{索 引}{索 引}%
               \addcontentsline{toc}{part}{索 引}%
イタリック体の数字は、その項目が説明されているページを示しています。
下線の引かれた数字は、定義されているページを示しています。
```

```
その他の数字は、その項目が使われているページを示しています。}
\GlossaryPrologue{\part*{変更履歴}%
                \markboth{変更履歴}{変更履歴}%
                \addcontentsline{toc}{part}{変更履歴}}

\makeatletter
\def\changes@#1#2#3{%
  \let\protect\@unexpandable@protect
  \edef\@tempa{\noexpand\glossary{#2\space\currentfile\space#1\levelchar
              \ifx\saved@macroname\@empty
                 \space\actualchar\generalname
              \else
                 \expandafter\@gobble
                 \saved@macroname\actualchar
                 \string\verb\quotechar*%
                 \verbatimchar\saved@macroname
                 \verbatimchar
              \fi
              :\levelchar #3}}%
  \@tempa\endgroup\@esphack}
\makeatother
\RecordChanges
\CodelineIndex
\EnableCrossrefs
\setcounter{IndexColumns}{2}
\settowidth\MacroIndent{\ttfamily\scriptsize 000\ }
\begin{document}
 \title{The p\LaTeXe\ Sources}
 \author{Ken Nakano}

\newcommand{\includeltpatch}{%
  \def\currentfile{plpatch.ltx}
  \part{plpatch}
  {\let\ttfamily\relax
    \xdef\filekey{\filekey, \thepart={\ttfamily\currentfile}}}%
  Things we did wrong\ldots
  \IndexInput{plpatch.ltx}}

\makeatletter
\let\patchdate=\@empty
\begingroup
   \def\ProvidesFile#1\pfmtversion#2{\date{#2}\endinput}
   \input{plvers.dtx}
\global\let\X@date=\@date

   \long\def\Xdef#1#2#3\def#4#5{%
    \xdef\X@date{#2}%
    \xdef\patchdate{#5}%
    \endinput}%
   \InputIfFileExists{plpatch.ltx}
    {\let\def\Xdef}{\global\let\includeltpatch\relax}
\endgroup

\ifx\@date\X@date
  \def\Xpatch{0}
  \ifx\patchdate\Xpatch\else
    \edef\@date{\@date\space Patch level\patchdate}
  \fi
\else
   \@warning{plpatch.ltx does not match plvers.dtx!}
   \let\includeltpatch\relax
\fi
\makeatother

\pagenumbering{roman}
\maketitle
\renewcommand\maketitle{}
\tableofcontents
\clearpage
\pagenumbering{arabic}

\DocInclude{plvers} % pLaTeX version

\DocInclude{plfonts} % NFSS2 commands
```

```
145
146 \DocInclude{plcore} % kernel commands
147
148 \DocInclude{plext}  % external commands
149
150 \DocInclude{pl209}  % 2.09 compatibility mode commands
151
152 \DocInclude{kinsoku} % kinsoku parameter
153
154 \DocInclude{jclasses} % Standard class
155
156 \DocInclude{jltxdoc} % dtx documents class
157
158 \includeltpatch     % patch file
159
160 \StopEventually{\end{document}}
161
162 \clearpage
163 \pagestyle{headings}
164 \hbadness=10000
165 \newcount\hbadness
166 \hfuzz=\maxdimen
167 \PrintChanges
168 \clearpage
169 \begingroup
170   \def\endash{--}
171   \catcode`\-\active
172   \def-{\futurelet\temp\indexdash}
173   \def\indexdash{\ifx\temp-\endash\fi}
174
175   \PrintIndex
176 \endgroup
177 \let\PrintChanges\relax
178 \let\PrintIndex\relax
179 \end{document}
180 \endinput
181 %%
182 %% End of file `pldoc.tex'.
```