Manmac BLUes

or how to typeset a book via TEX

Kees van der Laan

Hunzeweg 57,
9893 PB Garnwerd, The Netherlands
`cgl@rug.nl`

Abstract

The manmac macros are enumerated. A user's guide is provided, and the encodings are explained. As enhancements the writing of index reminders to the file `index.tex` is elaborated upon, and how to incorporate AMS fonts and non-CM fonts is referred to.
In the appendixes I provided the source of manmac and my personalized report template. With respect to the latter, I played with the idea of formatting the MAPS specials series in this way.

Keywords: Computer-assisted typography, manmac, style/format, customizing, index preparation, plain TEX, fonts, macro writing, education.

Introduction

This is the first article in a series, where basic, general, and public domain macro collections are discussed. In progress are AMS BLUes, and TUGboat BLUes.

Manmac is the collection of macros, used by Don Knuth, to format the TEXbook.[1] They are discussed as an example format in the TEXbook, Appendix E, p. 412–425. The encodings comprise some 10 pages.

Manmac is a gem. Everybody should *know* about it. It contains handy macros, and it demonstrates various macro writing TEXniques. The macros are not alluded to in the index of the TEXbook, alas, so it is hard to find out about their existence.

Why? For quite a while I have looked for a simple collection of macros to typeset my day-to-day notes.

I started with LATEX and even typeset a book with it.[2] I also exercised LATEX with respect to adaptation,[3] but experienced LATEX as too complex and inconsistent, and too time-consuming to customize. For a Ben Lee User[4] type LATEX is there and ready *for use*, for sure.

AMS-TEX has its virtues, if not for the excellent user's guides, and extensive handy math fonts. Its compatibility with LATEX, via AMS-LATEX, is another strong point. But, . . . it is too much biased towards Spivak's modifications of plain's math mark-up.

Spivak's LAMS-TEX is beautiful but complex. Another aspect is—like LATEX—that it is a superseding package. Not a toolbox to cooperate with whatever is already in use. Moreover, the math mark-up is biased towards AMS-TEX. The encodings of commutative diagrams and tables are very well developed. Also his scheme for general symbolic cross-referencing is very good.

I like Amy Hendrickson's MacroTEX-toolbox approach very much, but, . . . alas she has not finished it, and it is not in the public domain.

`TUGboat.sty` and `LTUGboat.sty` are appealing. A wealth of experience gained in high-quality computer-assisted typesetting has been embodied. But, . . . it is not basic, and not designed from one logical viewpoint as root. It has plain and LATEX user interfaces. From the early days of TUG it has grown out as a format upon plain alone. Only quite recently it has been mirrored into a LATEX style.[5]

Doob's macros for typesetting his 'Gentle introduction . . . ' were considered, certainly, but they were too limited, and not what I was looking for.

[1] Also included in the file is the handful of extra macros for typesetting the Metafont book.
[2] 'Publiceren met LATEX.' CWI Syllabus 19 (Dutch).
[3] `trspar.sty`, for making transparencies via LATEX. This is different from SliTEX because the same structuring control sequences as those provided by the common LATEX styles are used (the same input), and because I encoded to distill intelligent headers and footers from the arguments of the commands, automatically.
[4] BLU for short, alias Beginning LATEX User.
[5] Personally, I use these styles heavily. Especially in relation with writing in TEX about (LA)TEX.

> To return to the roots and from there understand all that has been built upon plain, that is my aim, that serves a lifetime.

And so after wandering around for quite a while, I returned to the roots. To manmac, Knuth's macros for formatting the TEXbook. Perhaps, I appreciated his macros more after having studied the epigons.

Mimi Jett and Daniel Olson, EPS,[6] arrived earlier at the same conclusion: their[7] modifying manmac workshops are a great idea! But, . . . should a user start from there nowadays?

My thesis is that
- a publisher should start from what AMS provides—they do their complete production by (AMS)-(LA)TEX, some 100,000 pages per year
- a self-publishing author[8] can better start from the `tugboat.sty`-les
- a hacker should carefully study Knuth's encoding of manmac.

If only there had been a user's guide for manmac, and ipso facto for the other example formats of DEK, then the (LA)TEX world would have looked much different from what it is today.

What is on? In the section Everybody should know about manmac, I give the reasons why, and summarize the funtionalities provided in manmac. The section BLU's needs, provides a user's guide. In The Grandwizard at work, I'll discuss DEK's encodings—the hows-and-whys, and provide now and then some alternative encodings. In the Enhancements section the writing of more general index reminders to a file is elaborated upon, and the inclusion of AMS and non-CM[9] fonts is alluded to. I supplied in Appendix A a listing of manmac.tex—DEK's macros—and in Appendix B the template report based on manmac and Knuth's sample in the TEXbook p. 340–341. I end up with a table of contents.

Notations. `\ea`, `\nx`, and `\ag`, are used as shorthand notations for `\expandafter`, `\noexpand`, respectively `\aftergroup`. ⟨cr⟩ means the ASCII carriage return (and line feed), better known as `^^M` in the TEX-arcana. Some subsections start their title systematically with: mark up, encoding, respectively mod. These stand for
- mark up: how to use it, to insert the mark-up
- encoding: an explanation of how it has been encoded
- mod: concerns a modification or alternative.

1 Everybody should know *about* manmac!

Even the Ben Lee User type. Knuth's approach is that he does not separate user guidelines from explaining the encoding. It is all there, mixed, and too difficult for BLU, I suppose.[10] BLU easily loses the wood for the trees, with the pragmatic but wrong consequence, that *everybody* neglects manmac.

But, . . . also the gurus should exercise patience and study the macros carefully, instead of being carried away by the result of the (fancy) format of their own.

> Manmac embodies a lot of subtle macro writing TEXniques, which can be applied to other contexts too!

I found the encoding of the right-justification of the quotation paragraphs, an eye-opener. Then there are the two-part macros, the alignment display,. . . and even how to shipout a subset of pages.[11]

What is it all about? It is difficult to classify the various items. In want for a better system I like to think in terms of
- logical elements
- page make-up consequences.

Manmac consists of macros on top of plain for
a. loading of fonts
b. size-switching macros
c. mark up of logical elements (chapter, subsection, exercise (and answer), indented displays (math, verbatim), syntax and code charts, . . .)
d. page make-up (A modified OTR, for titlepage handling, and the typesetting of the index. Running heads (no footers))
e. miscellaneous utilities (Shipping out selected pages, some handy macros).

For the beginner there are `\oct#1{...}` and the like. This macro typesets the (number) argument with the octal ´ tag before the number. Other handy macros are
- `\bull`, square bullet (an appropriate `\vrule`)
- `\|`, vertical line (`\char`\|` from `\tt` font)
- `\dn`, downward arrow (`\char`'14 from `\tt` font)
- `\up`, upward arrow (`\char`'13 from `\tt` font)
- `\<...>`, syntactic quantity[12]
- `\[...]`, keyword (for example: to, by, . . .)
- `\cstok`, control sequence token (as in the TEXbook)
- `\parbreak`, to break a paragraph

[6] Electronic Technical Publishing services company.
[7] They started a workshop with the title 'Modifying Manmac,' at the Boston TUG '91 meeting.
[8] Who likes to understand and customize what is used as tool. For example a user's group with its bulletin.
[9] Computer Modern, DEK's parameterized fonts generated by Metafont.
[10] The great step forward of LATEX is the general available user's guide.
[11] Yes, I know of and use the tool `dvitodvi`. Now I understand the process, and DEK's way is more efficient.
[12] With `\beginsyntax. . . \endsyntax` the <, and [, are made active.

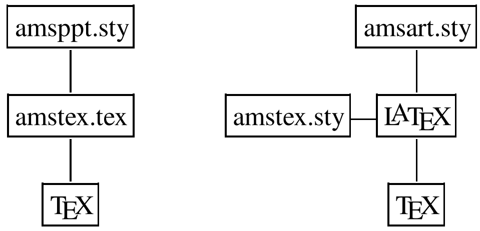
- `\arrows`, ⟵ text ⟶ via `\arrows{2cm}{text}`
- `\hidehrule`, `\hidevrule`, for rules with reference point left invariant
- `\makeblankbox`, puts rules at the end of a blank box whose dimensions are those of `\box0` (assumming nonnegative wd, ht, dp)
- `\samplebox`, the outline of a box, with `\bigdot` as reference point
- `\sampleglue`, makes glue between sample boxes
- `\setcornerrules`, for positioning of paste-up items.

Not in there. There are no facilities provided for automatic symbolic or cross-referencing,[13] handling of graphics (pictures),[14] table of contents preparation (or list of tables, figures, bibliography, . . .), floating (island) objects different from plain's `\midinsert`, and `\topinsert`, marginal note facilities different from plain's use of `\vadjust`, and endnote macros. Most of the above functionalities have been encoded already by the TEX community at large and are available from the file servers. For a survey of what is available see Jones' macro index, or Nelson Beebe's TUGlib, for example.

Appetizer. Of the above macros from manmac, `\makeblankbox` and its descendants can be used for simple schemes as shown below.[15] Via

```
$$\hbox{\vbox{%
\element{\fbox{amsppt.sty}}
\vconnector
\element{\fbox{amstex.tex}}
\vconnector
\element{\fbox{\TeX}}
}\qquad\qquad\qquad\vbox{%
\element{\fbox{amsart.sty}}
\vconnector
\element{\llap{\fbox{amstex.sty}---}
 \fbox{\LaTeX}}
\vconnector
\element{\fbox{\TeX}}
}}$$
```

I obtained



with the auxiliaries

```
\def\strut{\vrule height2.5ex depth1ex
 width0pt}
\def\fbox#1{\setbox0\hbox{\strut
 $\;$#1$\,$}\leavevmode\rlap{\copy0}%
 \makelightbox}
\def\element#1{\hbox to15ex{\hss#1\hss}}
\def\vconnector{\element{\strut\vrule}} .
```

2 BLU's needs: a user's guide

A real user's guide needs a more complete and elaborated documentation, with simple examples and an attractive layout. However, the completeness is a difficult issue, because it is so closely connected to plain, which is also deprived from a user's guide.

I like to look at a book as consisting of front matter, main part, and back matter, in the SGML spirit.

2.1 Front matter

Things like cover page, bibliographic data, preface, and table of contents are easily[16] added when the book is finished, either by the author or the publisher. So there will be nothing about that in the user's guide.

2.2 Back matter

Knuth adopted as back matter the appendixes. These appendixes follow the same structure as the chapters, except for Appendix I, the index (fancy two-column intermezzo), and Appendix B (subsections). Appendix A is a (numbered) anthology of the answers of the exercises. Apart from the two-column typesetting the preparation of an index is complex, because of the many tools involved and the special knowledge required. BLU, and even the guru, can better rely on his publisher for this.

---

[13] It is true, however, that in the code of manmac there are some symbolic names for numbers—for example `\sesame` for the page number of the Sesam street quote—which DEK apparently referred to, abstracting in this way from the places where the references were inserted. Spivak in his LAMS-TEX has provided a nice and general complex for handling cross-references. In my Math into BLUes, I adopted a very simple approach for handling automatic and symbolic cross-referencing.

[14] In the file there are some macros for drawing figures: arrows and frames. Furthermore, there exist various drawing packages, for example PICTEX, to name but one.

[15] Once I realized this, I don't need LATEX's picture environment so much, making my TEXing life simpler.

[16] Provided that the page numbers of the main part are independent of the page numbers of the front matter.

2.3 Main part: The chapters

The book is divided into chapters, all more or less independent. Each chapter consists of a title page,[17] several paragraphs, and some quotations, to end up with.

The copy must obey the structure

\beginchapter⟨*title matter*⟩\par
⟨*copy proper*⟩
\endchapter
⟨*quotation-s*⟩
\eject

Mark up: `\beginchapter`**.** The ⟨*title matter*⟩ must comply with the definition

```
\outer\def\beginchapter#1 #2#3. #4\par{...}
```

with

#1	Chapter (Appendix, or . . .)
#2#3	ordered characters (12, XI, A, . . .)
#4	the title.

(The title page and the running heads are now handled automatically. Note the use of the various parameter separators to terminate the arguments, and the generality of the parameters which make the macro flexible and suitable for handling similar but different situations. But we are preoccupied with strong typing isn't?)

Mark up: ⟨*copy proper*⟩**.** Nearly all chapters are just a chain of paragraphs.[18] There is however a control sequence `\subsection`.[19] Its use must comply with the definition

```
\outer\def\subsection#1.{...}
```

with as argument the title. The numbering is handled automatically, as is the terminating period.[20]

Mark up: fonts. Manmac uses in addition to the fonts which come along with plain the following
tentex the TEX character set as supplied in Appendix C of the TEXbook, p 369 (file: cmtex10)
inchhigh the inch-sized chapter numbers (file: cminch)
tenu the unslanted text italic font (file: cmu10)
manual special (sized) symbols for the METAFONT[21] logo, and the dangerous bend (file: manfnt)
cmman miscellaneous Computer Modern variations (file: cmman).

An example is provided by the mark-up of the first words of the preface

```
\noindent\hang\hangafter-2
\smash{\lower12pt\hbox to 0pt{\hskip-
 \hangindent\cmman G\hfill}}\hskip-16pt%
 {\sc ENTLE} R{\sc EADER}: \strut This...
```

with from Appendix B of the TEXbook

```
\def\hang{\hangindent\parindent}
```

Mark up: paragraphs. In the paragraphs of the chapter we can use all what has been provided by plain and the special macros of manmac.

Provided are the environments

- `|...|` typesets `...` as characters. Its use—as in `tugboat.sty`—turns the special characters (`\`, `{`, `}`, `$`, `&`, `#`, `%`, `~`, `_`, `^`) into normal symbols (category other). A so-called inline verbatim. As example `|\abc|` yields `\abc`.
- `\begindisplay...\enddisplay`, an indented display. For an example of use see the TEXbook, p. 420. `\obeylines` is on. This can be used for non-centered (indented) displayed math.
- `\begintt...\endtt`, for (indented) displays entirely in typewriter type. For an example of use see the TEXbook, p. 420. `\obeylines` is on. (It is much like LATEX's `\begin{verbatim}...\end{verbatim}`. `tugboat.sty` has enlarged its functionality by some options.)
- The | is an escape character, and permits escape out of the verbatim mode (actually, it ends the group).[22]
  Some experienced authors will undoubtedly raise the question: 'How to typeset the | itself within such a context?'
  The answer is we can't! But, . . . we can end the group, do whatever we have to do, and go back into verbatim mode as follows
  - end the scope of the redefinitions via |, which is equal in this context to `\endgroup`
  - typeset | via `{\tt\char'174}`, and
  - go back to the inline verbatim situation via `\ttverbatim`, or |.[23]
- `\beginlines...\endlines`,
  a (zero-indented) display, which obeys the line structure and inserts a `\hrule` for and aft. For an example of use see the TEXbook, p. 421. `\obeylines` is on.[24]

[17] With a nice lion illustration as running gag.

[18] This makes the work of Wittbecker, 1988, and Eijkhout, 1990, more interesting. Wittbecker surveys the usual paragraph shapes, and Eijkhout supplies another unusual one. DEK's quotations at the end of each chapter are another example of unusual paragraph shapes.

[19] Not to confuse with plain's `\beginsection`, TEXbook, p. 340.

[20] It is first gobbled because of being a parameter separator. Later it is reinserted. Subsection titles ending with a ! or ? need special attention.

[21] See the `\MF` definitions in the manmac.tex file.

[22] `TUGboat.sty` is more general in the sense that it allows for an option to specify the escape character.

[23] The latter character acts like a toggle, similar to $ for math.

[24] Variant `\endlines` are `\weakendlines`, `\finalendlines`. The former uses a `\medskip` instead of a `\medbreak`.

- `\beginmathdemo...\endmathdemo`, (and variants) indented display for math (Chapters 16–19).[25] They are used to typeset the marked up copy and the typeset result side-by-side (in the one-column format). The user does not have to bother about the template for the used `\halign`, as alignment display. The example on TeXbook p. 132, can be obtained via
  ```
  \beginmathdemo|$x+y-z$|&
              x+y-z\cr\endmathdemo
  ```
  The functionality provided is similar to the temporarily switching from one-column into two-column format. But, ... I guess that the above macro is much simpler and more efficient, because it does not entail the complicated OTR processing.
  > (LA)TeX history has it that the manmac gem has been neglected, especially by the LaTeX community. This is understandable given the widespread LaTeX's user's guide, in contrast with the lack of a 'manmac' user's guide.

  If only I had been aware of this macro, the mark-up of my Table Diversions paper would have been much simpler.
- `\beginsyntax...\endsyntax`, for formal syntax (Chapters 24–26). The syntax elements are specified enclosed by the brackets `<...>`. The alternatives are separated by `\alt`. Reserved words are enclosed by **[** and **]**. The diagrams allow for index reminder mark-up via carets,[26] as does other structures except when in math mode.
- `\beginchart...\endchart`, for the font tables of Appendixes C and F, etc.[27] For its use see the ASCII table example with the data separately provided in manmac via the replacement text of `\def\normalchart{...}`. The invokation reads[28]
  `\beginchart{}\normalchart\endchart`
  The result is shown on p. 367. So nice to have the data separated from the encoding of the table, and the template hidden.[29]
- `\exercise...`, `\dangerexercise...`, or `\ddangerexercise`, with immediately after the exercise the `\answer....` A blank line terminates the answer. The latter is stored.[30] How to verify the typesetting of the answers is shown in the 'galley,' TeXbook, p. 425.

Mark up: $\langle quotations \rangle$**.** The quotations are supplied as paragraphs with the specification of the author in compliance with the definition

`\def\author#1(#2){...}`

with as parameters
 #1 the author name
 #2 the year.

In the mark-up of the TeXbook the quotations have been separated by a `\medskip`.

Mark up: index reminders. Knuth implemented the handling of the following 5 kinds of index entries.

<table>
<tr><th>Mark up</th><th>Typeset in copy*</th><th>In <code>index.tex</code></th></tr>
<tr><td><code>^{...}</code></td><td>...</td><td><code>... !0</code> ⟨page no⟩</td></tr>
<tr><td><code>^^{...}</code></td><td>'silent'</td><td><code>... !0</code> ⟨page no⟩</td></tr>
<tr><td><code>^|...|</code></td><td><code>|...|</code></td><td><code>... !1</code> ⟨page no⟩</td></tr>
<tr><td><code>^|\...|</code></td><td><code>|\...|</code></td><td><code>... !2</code> ⟨page no⟩</td></tr>
<tr><td><code>^|<...>|</code></td><td>⟨...⟩</td><td><code>... !3</code> ⟨page no⟩</td></tr>
</table>

* `|...|` denotes manmac's, inline verbatim.

From this table we distill that DEK first prepared the copy, TeXed it, proofed it, and not until the endproofs phase inserted the ^ (circumflexes) to mark up the index reminders.

To mark up for writing to the index file there is the circumflex, `^`. Silent index reminders—which are not typeset in the copy—take a double circumflex, `^^{...}`.[31] The difficulty is not the writing to the file, but the selection, post-processing and final typesetting. The latter is dealt with in the grandmaster chapter of the TeXbook, p. 261–264.

2.4 Shipping out selected pages

The advantage of this efficient macro is that a smaller `.dvi` file will result, as opposed to the interactive post-processing utility `dvitodvi`, which selects the pages from the complete `.dvi` file. In order to use this facility one simply has to supply the required page numbers in the file `pages.tex`, each page number on a line. That is all. A handy tool!

That is about all from BLU's viewpoint. The structure of the mark-up of a chapter has been given in the TeXbook, p. 418, and how to process each chapter separately is supplied on p. 425. The complete TeXbook copy—one big example of how to mark up copy—is available from the file servers.

[25] There is only one second part macro for all these cases. Its replacement text reads `\egroup$ $`.
[26] According to the TeXbook p369, we should talk about 'circumflex' or 'hat,' because the caret is a larger symbol.
[27] The macro is also used in `testfont.tex` which comes along with Metafont.
[28] Remind the parameter of `\beginchart`.
[29] In my Table Diversions paper, EuroTeX '92, I have also adopted the approach to separate the encoding of the macro from the specification of the data, but not in this TeX-specific way. Another eye-opener!
[30] The answer is not typeset at the place corresponding to where it occurs in the compuscript!
[31] Note that it is not possible to write an index reminder within math mode!

3 The Grandwizard at work

To begin with Knuth knew what he was up to. He does not need safeguarding goodies, like a warning when a chapter is not closed by an `\endchapter`, and the like. Preventive safeguards are not implemented in manmac.

> Although the TEXbook is full of dangerous bends there is no safety-rail along the road through it.

Are there debugging tools provided? Yes, there are! And very fine ones too, once you have learned how to use them. I quite often use `\tracingmacros=1`, to find out what actually has parsed as arguments to the macros.

3.1 Encoding: `\beginchapter`

The numbering of subsections and exercises has been done automatically and relative to the (user) provided chapter 'number.' Peculiar is that for this chapter number two parameters are used.[32] This is done to account for the spacing in between, when typsetting the huge two digits on the title page. The title is typeset via an `\halign`, which allows for a title consisting of a dynamical number of (right-justified) lines.[33] In the mark up each line has to be ended by `\\`. Also heavily used is TEX's redefinition capability, to let control sequences execute context dependent actions. An example at hand is `\\`, which acts like a ␣ in the running heads—therefore an (expanded) `\xdef\rhead{...}` was needed—and as a `\cr` within the `\halign`. This context dependent-ness entailed to abstract from `\cr` into `\\`.

3.2 Encoding: `\endchapter`

This is a nice example of the second part of a two-part macro. We are used to providing the chapter contents via the argument of a routine when nowadays high-level programming languages are used for text processing.

> Two-part macros behave differently. The first part sets up the environment, then the contents is provided, and finally the invokation of the second part finishes the environment, en-passant doing whatever has to be done.

For the TEXbook the purpose of `\endchapter` is to take care of proper typesetting of the quotations. First, the paragraphs of the ⟨*copy proper*⟩ are ended. Then for an even-numbered page a `\vfill\eject\null` is invoked followed by opening a group and a `\vfill`, in order that the quotations will be typeset at the bottom of the odd-numbered pages. Then the parameters for the quotation paragraphs are adjusted such that each paragraph is typeset, right-justified. The latter has been realized via

```
\leftskip0pt plus 40pc minus\parindent
```

together in conjunction with `\parfillskip0pt`.[34] Concise and elegant!

Because of the `\obeylines`, the input can be natural here, line by line. (No terminating `\\` or so, just the ⟨cr⟩.)

The specification of the author is again natural: the name with the year in parentheses, in compliance with the author definition given above. The justification is handled automatically, because the group is closed by `\eject`, which has been redefined to do so within `\endchapter` via `\def\eject{\endgroup\eject}`.[35] Neat!

3.3 Encoding: `\subsection`

Nothing special. It closes a paragraph (via `\medbreak`), handles automatically the numbering and typesets the title as the beginning of a new paragraph. That is all.

Similar is the typesetting of the 'title' of each answer. The answer numbers are maintained automatically and typeset as the beginning of the answer.

3.4 Encoding: `\begindisplay...\enddisplay`

Again a nice example of encoding two-part macros. `\obeylines` is on. `\halign` is used as an alignment display, TEXbook, p. 190. An alignment display is different from the use of `\halign` for tables. Note that despite the `$$`-s an alignment display is not processed within math mode! The opening `$$`⟨*assignments*⟩`\halign\begingroup...` is separated from its closing `\endgroup$$`, via the two-part macro TEXnique.

The parameter for the `\startdisplay` macro is passed on in a TEX peculiar way. It looks like that `\begindisplay` does not take parameters, and indeed it doesn't, but `\startdisplay` does, and this macro is invoked at the end of the replacement text of `\begindisplay`. Because `\startdisplay` uses the ⟨cr⟩ as end separator, all that occurs on the line after `\begindisplay` will become the argument of `\startdisplay`. This argument is reinserted between `$$` and `\halign{...` and has the syntactical meaning of 'assignments,' of the alignment display, see the TEXbook, p. 190.

`\enddisplay` inserts `\crcr`—allowing users to supply or forget about the ending `\cr`—ends the group and the alignment display environment.

---

[32] That is a maximum of two digits is accounted for.

[33] In actual use the number of title lines varied from 1 to 3.

[34] There is a funtional similarity here with how the title lines are typeset.

[35] Note that this is not an (infinite) recursive definition. After ending the group the original meaning of `\eject` is on, no recursion at all. Contexts!

3.5 Encoding: \begintt...\endtt

The vertical display skips (\abovedisplayskip, \belowdisplayskip) are on via $$. \begintt invokes \ttverbatim, which changes the catcodes of some (the special) characters into category 12—other—and invokes \obeyspaces, \obeylines, and \tt. The things one would expect to be set for verbatim mode.

The vertical bar is made into the escape character (category 0). To allow for overflow at the right \rightskip-5pc is adjusted.[36] The worker \ttfinish takes the first line and the rest as arguments and ends the group and the (math) display. The second argument (=rest) is put in a vbox, and therefore can't be split over a page boundary.

3.6 Encoding: \beginlines...\endlines

\obeylines is on. The idea is that the copy, with a \hrule for and aft, is typeset line by line. Care has been taken to prevent page breaks after the opening \hrule and before the closing one, via the combined use of \nobreak and \medbreak. Again very instructive.

3.7 Encoding: \beginmathdemo...\endmathdemo

TEXnically an alignment display is used with as assignment the enlargement
\advance\baselineskip2pt.
In the alignment this enlargement is undone for the first time, so the above vertical space comes only from one of the \abovedisplayskip-s. The \halign template allows for two columns. The first is an \hbox, rather wide, with the argument flushed left. The second is set in math mode, again flushed left. The variant encodings differ with respect to the size of the \hbox, and which style is set for the second parameter: (\textstyle (default) versus \displaystyle).

3.8 Encoding: \beginsyntax...\endsyntax

The first part of the macro inserts vertical space and starts a group. The catcodes of < and [are changed into active. (Now these symbols can do more than just be typeset. They have the function to indicate the meta-linguistic variables—beginning with <—and the reserved words—beginning with [.) The provision of natural input is encouraged furthermore by \obeylines and giving the ASCII end-of-line the meaning of the replacement text of \endsyntaxline. The latter macro looks ahead and selects via \syntaxswitch the appropriate action. The actions encoded are

- \syntaxrule, a new one has started
- \alt, alternative separator
- \continuerule, and
- \endsyntax.

No parameter parsing. Just processing line after line until the \endsyntax token is encountered.

The \syntaxrule invokes \xref, which is also used in determining what kind of index entry is written to the file index.tex. The invokation of \xref determines the type of element that comes next, and typesets it.

3.9 Encoding: \beginchart...\endchart

This is a marvel of how to encode tables via the two-part macro TEXnique. Again the alignment display is used, with the parameter of \beginchart as the assignments of the alignment display.

The \cr-s of \halign are abstracted into \evenline, respectively \oddline, to handle the row spans in the last column, and the alternating size of the horizontal rules.

\nointerlineskip switches off the interline skip.

The horizontal rule in \oddline is drawn via \multispan{19}\hrulefill[37], and the box with the hexadecimal number is \smashed. The horizontal rule in \evenline is table (and page) wide; just the \hrule.

New for me is the lowering of \null to get enough separation between the text and the horizontal rule below it. Also new is the encoding of the table strut: a lowered \vbox to14pt{}.

The main data can be supplied after \beginchart{}. An example of data specification is given for the ASCII font table in the definition of \normalchart.

\endchart takes care of the last row of the table.

> In essence DEK showed us how to encode a (page-wide) bordered table, with the data separately provided, and the template hidden.

The data specification has to be done with the use of \beginchart...\endchart in mind. No data specification independent from the formatting, however.

The :-definition hides the numbering of the table entries. The automatically maintained entry number is converted into its ASCII character via the TEX primitive \char. Elegant it is!

3.10 Encoding: \exercise

A counter, \exno, is maintained for the exercise number. The triangle is typeset in the margin followed by the word EXERCISE, the chapter number, a period

[36] This has also the effect of non-centering—effectively shifting to the left—of the verbatim text. A very concise way of overriding the centering of math displays!

[37] The font charts logically have 10 columns. The number 19 accounts also for the columns which typeset the vertical rules.

and the exercise number. No parameter and no two-part ending. After the keyword the exercise text has to be supplied. Similar are `\dangerexercise`, and `\ddangerexercise`, which insert dangerous bends.

3.11 Encoding: `\answer`

Each answer consists of the copy between `\answer` and the first blank line. The answer is copied line-by-line and with the catcode of all special characters changed into category 12 (other) to the file `answers.tex`. A nice example of a line-by-line FIFO process. In the notation of FIFO an alternative encoding reads[38]

```
\def\copytoblankline{\begingroup\setupcopy
 \fifol}
{\obeylines\gdef\fifol#1
 {\ifx\empty#1\empty\lofif\fi
  \processl{#1}\fifol}}
\def\lofif#1\fifol{\fi\endgroup}
\def\processl#1{\immediate\write\ans{#1}}
```

The above given alternative encoding of `\copytoblankline` works with `\answer` as encoded by DEK.

3.12 Encoding: shipout selected pages[39]

`\shipout` is redefined such that only pages with page numbers as supplied in the file `pages.tex` will be written to the `.dvi` file. First, plain's `\shipout` is copied under name `\Shipout`. Second, `\shipout` is redefined with the function to `\Shipout`—the original meaning—the page if the number agrees with the specified number. Otherwise the page is put in a garbage box,[40] and TEX goes on, that is, formats the rest of the copy and invokes the output routine for the next page, et cetera.

3.13 Encoding: writing index reminders

Knuth used 5 types of index reminders as displayed in the earlier given table. The encoding for taking care of the various possibilities for writing to `index.tex` is complicated. Many things are intertwined. For a better understanding, I will prune non-essentials, and start with a bare-to-the-bones encoding of the writing of ordinary index reminders to the file.

An ordinary index reminder is a $\langle word\rangle$ which should be typeset in the copy and written to the file `index.tex` with the code 0, and the page number attached to it. The syntax is

$\langle word\rangle$␣!0␣$\langle page\ number\rangle$.

The page number is attached, in the shipout process of the OTR.[41] In order to simplify matters further, I adopted the control sequence `\ir`[42] instead of the ^-symbol and the catcode changes. With these simplifying choices the encoding for writing an ordinary index reminder to a file comes down to

```
\def\ir#1{#1\write\inx{#1 !0 \the\pageno.}}
```

For verification

```
\newwrite\inx
\immediate\openout\inx=index
\ir{aap}\vfil\eject
\ir{noot}\vfil\eject
\ir{mies}       \bye
```

yields in the file `index.tex`

```
aap !0 1.
noot !0 2.
mies !0 3.
```

Knuth's writing to a file. Let's now go back and see how DEK did it. It is important to realize that Knuth used the parameters

- `\text`, to store the $\langle word\rangle$-part of the index reminder, to be written to `index.tex`,
- `\next`,[43] to store the marked up index reminder to be typeset in the copy, with the mark up for |, `\<` and the required font, next to
- `\xreftype`, to store the code number of the type of the index reminder.

With more than one reminder on a page[44] the `\text` parameter must be saved from being overwritten. Knuth did this via the partial expanded definition[45]

```
\xdef\writeit{\write\inx{\text\space
 !\xreftype\space\noexpand\number%
                              \pageno.}}
\writeit.
```

Let us go through the encoding step by step. DEK first checks—in `\specialhat`, which has been `\let`-equal to ^—whether TEX is in math mode or not. If so, nothing is written as index reminder, and the typesetting of the math just goes on. Otherwise, the next token is looked ahead in `\beginxref` and `\beginxrefswitch` is invoked. The latter macro determines whether a silent ref is the case—the switch `\silentref` is set accordingly—and `\xref` is invoked. The latter branches on to the next character and invokes

[38] The test `\ifx\empty#1\empty` can be replaced by `\def\next{#1}\ifx\next\empty ...`.

[39] To remind you the default `\shipout` writes its argument to the `.dvi` file.

[40] With en-passant maintaining `\deadcycles` and reading the number of the next page to be shipped out from `pages.tex`.

[41] Remember that the Output Routine, when handling `\write`-s, knows the page number. This makes me ponder about writing the index entry and code number to an array and let the OTR add the page number to the relevant array elements. This approach would make the writing to a file superfluous, especially because sorting within TEX can be done, as exposed in my Sorting in BLUe. More on that in Two-pass BLUes jobs, to come.

[42] Mnemonics: Index reminder.

[43] This control sequence is also used for storing a 'next' symbol in between. A little confusing.

[44] Which must be accounted for!

[45] Note that the other approach of an `\immediate...` write would yield the wrong page number now and then.

\xrefswitch. This macro selects, and aftergroups, the process to be applied: \vxref, \anglexref, or \normalxref. Quite something isn't it?

In the normal case the index reminder is assigned to \text (and \next), and the type of the reminder is stored in \xreftype, after which \makexref is invoked for the typeset-and-write-to-file process.

The other cases also end up in invoking \makexref, with the parameters \next, \text, and \xreftype appropriately defined.

Intermezzo (*Overloading of the circumflex*)
By the way this is a nice example of overloading the circumflex. It can be applied to the underscore too. All that is needed is[46]

```
\def\specialhat{\ifmmode\def\next{^}\else
 \let\next\yourprocess\fi\next}
\def\yourprocess{%overloaded hat
 ...}
\catcode'\^=\active\let ^=\specialhat .
```

Intermezzo (*Recognition backslash*)
En-passant DEK coded the recognition of the backslash. In \vxref the catcode of the backslash is changed into \active. The look ahead via \futurelet\next\... can store in \next just a backslash. Because this active control sequence is left undefined it is equal to \empty. After this the test

```
\ifx\next\empty...
```

will yield true in this case. Handy to know of this TEXnique!

Alternative encoding. Because I don't use a \text parameter in the simplified encoding, I can also get rid of the induced expansion. I don't need the various look-ahead-s, encoded via \futurelet\next.... I just can go ahead and encode for what has to be done.[47] From the earlier given table we can easily account for the specific typesetting in the copy, while writing the ⟨*word*⟩ along with the appropriate code to the file. I had to think of another four names for the macros. Here we go.

```
\def\sir#1{%Silent Index reminder
 \write\inx{#1 !0 \the\pageno.}}
\def\ttir#1{{\tt#1}%Set in \tt
 \write\inx{#1 !1 \the\pageno.}}
\def\csir#1{|\#1|%Set as control sequence
 \write\inx{#1 !2 \the\pageno.}}
\def\bkir#1{\<#1>%Set <...>
 \write\inx{#1 !3 \the\pageno.}}
```

In my opinion the above is simpler than Knuth's encoding. The same (basic) functionalities have been preserved, at the expense of a slightly more laborous user mark up. Not just the insertion of circumflexes.

3.14 Encoding: font selection

In plain DEK provides fonts to be used in horizontal mode, and organized them into 8 families for use in math mode. The size is basically 10pt.

In Manmac the need arose apparently to provide for 8pt, and 9pt as well.[48] Knuth introduced therefore the size-switching macros: \tenpoint, \ninepoint, and \eightpoint. For the listing of these macros see the file manmac.tex in Appendix A.

Explanation. In the size-switching macros

- \rm is defined as assigning the value zero to the parameter \fam and the invokation of \tenrm
- \textfont, \scriptfont, and \scriptscriptfont with 'indexes' 0, 1, ... 7, are assigned to the appropriate fonts[49]
- \tt[50] is invoked and \ttglue is assigned the appropriate value
- \normalbaselineskip gets its value
- \MF, \sc, \big, \strutbox, some size-dependent control sequences, are defined
- \normalbaselines, and \rm are invoked.

The template to use is there. For the Fraktur example see the enhancements section.

4 BLU's manmac

Let us assume that the TUGboat, AMS(ppt/book/...), or...styles are not available and that your publisher does not provide a (LA)TEX style. Then your customization of manmac most likely will concern modifications of the encoding of the layout macros for the pages,[51] that is

- the title page, and in general
- every other page (header, footer, size, number of columns).

[46]Realize that the definition of the \specialhat should precede the \catcode change.

[47]It is true, that I don't write in the margin, and that I also don't take care of the \ifproof status. Those can be added easily in \ir, however.

[48]Not yet full-fledged!

[49]Note the various assignments with *ten*ex.

[50]This is done because the context dependent value of em in the \ttglue is needed.

[51]The use of fonts different from the Computer Modern family occurs too, for example Times Roman, Postscript fonts, ... That is not a modification but an enhancement. Another enhancement is the preparation of bibliographies in cooperation with a bibliographic database. That is beyond the scope of this paper.

4.1 Mod: the layout of the title

Let us assume that we wish to adapt the manmac style into a house-style for (one-column) reports. Up till now reality has it that the cover will be prepared and printed separately, with logo, text for the back of the issue and that kind of things, more efficiently handled by traditional means.

What remains is that each chapter becomes a chapter of the report. And because it is a report the title pages can become much more modest, even absent as such. Let us assume that the title of each chapter will precede the text of the first page of each chapter.

To remind you the typesetting of the title is done in `\beginchapter`, via

```
\halign{\line{\titlefont\hfil##}\\#4
 \unskip\\}
```

with the vertical positioning handled by `\vfill\eject`.[52]

First we can provide another titlefont via redefining `\titlefont`. Horizontal centering can be obtained via inserting `\hfil` after the `##` in the template. In order to continue on the same page replace `\vfill\eject` by for example `\bigskip`. We also have to deactivate the setting of the (title) corner rules via `\def\setcornerrules{}`.

The modified part of `\beginchapter` then reads

```
%mods in manmac
\halign{\line{\titlefont\hfil##\hfil}\\%
       #1 #2#3 #4\unskip\\}
\titlepage\bigskip
%changes at the beginning of copy
\font\titlefont=cmssdc10 at 12pt%
\def\setcornerrules{}
```

4.2 Mod: lay-out headers

Most likely also another format of the headlines is wanted, and we like footers too. This can be done via redefining `\leftheadline`, and `\rightheadline`. In the headings use is made of the def-s `\rhead`, `\folio`, and the dimension variable `\pagewidth`. The first contains as replacement text the contents of the running head (the chapter title), the second takes care of typesetting the page number, and the last contains the size of the page width. Because the OTR of manmac lacks footers it is simplest to fall back on plain's OTR and just fill the token variables `\headline` and `\footline`. See TEXbook, p. 364. For example, begin your compuscript with

```
\headline{\issue\hfil\tenit\rhead}
\footline{\fiverm\rlap{\the\year}\hfil
 --\folio--\hfil\llap{\copyright cgl}}
\def\issue{MAPS93.1}
\output{\plainoutput}
```

[52]By the way, `\unskip` gobbles the optional space.

[53]In being silent about it and just use `\vfil\eject`.

4.3 Mod: odd-numbered pages

Suppose we like to start each chapter just on the next page. To achieve this omit the first line `\ifodd\pageno...\fi`, in `\endchapter`.

4.4 Mod: sober chapter endings

Suppose we don't want to end each chapter of our report with quotations. Then we can simplify[53] `\endchapter` into

```
\outer\def\endchapter{\vfill\eject}
```

If we like to end each chapter with for example a section called 'What have we learned?' or 'Summary' just insert a subsection with that title.

4.5 Mod: page layout parameters

The dimensions in charge are

- `\hsize`, with its value copied in `\pagewidth`,
- `\vsize`, with its value copied in `\pageheight`, and
- the size of the indentation in `\parindent`.

Note that in the running heads `\pagewidth` rather than `\hsize` is used. In the two-column layout of the index, `\hsize` is halved and `\vsize` doubled. The page width value for the headers and footnotes remains unchanged thanks to the stored values in `\pagewidth` and `\pageheight`. Each page is of size (3pc + `\pageheight`) $*$ `\pagewidth`.

For example a 24-by-17.5 page size can be obtained via inclusion of the following at the beginning of your compuscript

```
\hsize17.5cm\pagewidth\hsize
\vsize24cm\pageheight\vsize .
```

4.6 Mod: two-column

It is not true that switching from one-column format into two-column format and vice versa can be attained via a pre-programmed 'switch' (read: using a different OTR). No, also BLU's (math) markup is subject to change.

If we favor a two-column format the Output Routine has to be adapted, as shown for Appendix I. That change does not account for footnotes. Instead of writing another variant, start with borrowing TUGboat's OTR, which is in the public domain.

4.7 In summary

A customized one-column format, which for each

- chapter: starts with the chapter heading and continues the chapter on the same page,
- page: typesets our own running head and footer, with header suppressed on each 'titlepage'

can be obtained on top of manmac, by starting your compuscript with

Manmac customization additions:[54]

```
\input manmac
\font\titlefont=cmssdc10at12pt
%
\outer\def\beginchapter#1 #2#3.#4\par{%
 \def\chapno{#2#3}\global\exno0 \subsecno0
 \def\hl{\gdef\hl{\issue\hfil\it\rhead}}
 \headline{\hl}
 \def\\{ }\xdef\rhead{#4}
 {\let\\\cr\halign{\line{\titlefont
  \hfil##\hfil}\\#1 #2#3 #4\unskip\\}}
 \bigskip\tenpoint\noindent\ignorespaces}
%
\footline{\fiverm\rlap{\the\year}\hfil
 --\folio--\hfil\llap{\copyright cgl}}
%
\outer\def\endchapter{\vfill\eject}
%
\output{\plainoutput}
%
\hsize17.5cm\pagewidth\hsize
\vsize24cm \pageheight\vsize
\def\issue{MAPS93.1}
```

Simple isn't it?

What remains are the handy macros, the suitable environments, the powerful `\exercise`, `\answer`, and the simple mark up and writing to a file of index reminders, next to the shipping-out of selected pages.

5 Enhancements

As enhancements to manmac I will discuss: writing more detailed index reminders to the file `index.tex`, and the use of AMS and non-CM fonts.

5.1 Refined index reminders

Knuth specified the index reminders some 10 years ago. Since then development towards automatic generation of indexes has taken place. The task of the author can be alleviated a little more. In the sequel I'll consider as an IR an accented word, a word which allows for comments, and a (sub)structured word.

Accented words. These do occur in indexes, as can be seen from the TEXbook. My sorting program in TEX allows for accented words too. So, an extension for writing accented words to a file would be nice. The problem with getting the page number from the OTR is that we don't know when it will be invoked, and that we don't know of the environment which will be active then.

In typesetting an accented index entry in the copy we need the normal meaning of the accents. In writing to the file `index.tex` the normal expansion must be suspended. My choice for coping with this is to write `\string...`-s. The encoding reads

```
\def\irdefs{%Accent cs-s as strings
 \def\'{\string\'}\def\`{\string\`}
 \def\^{\string\^}\def\c{\string\c\space}
 \def\"{\string\"}}
\def\ir#1{#1{\irdefs\xdef\txt{#1}
 \ea\write\ea\inx\ea{\txt\space!0
                        \the\pageno.}}}
```

With the above `\^ab\'e` yields in the file `index.tex`

```
\^ab\'e !0 1.
```

Comments. As can be seen from the index in the TEXbook it is handy to allow for comments as part of the index reminder. These comments are silent except for being a comment to what will be typeset in the index. As example of these one can think of `see...`, and `see also...` additions. My choice for the mark up of comments is to enclose them by

```
\co...\oc
```

Here, as with accents, we have to write the names (`\co`, respectively `\oc`) to the `index.tex` file and not their expansions. Again, I adopted the mechanism to convert the control sequences into strings.

For example, with

```
\def\co{\string\co\space}
\def\oc{\string\oc\space}
```

added to the replacement text of `\irdefs`, then

```
\ir{\^ab\'e \co comment\oc}
```

yields in the file `index.tex`

```
\^ab\'e \co comment\oc !0 1.
```

A special situation arises when in the comment a control sequence is supplied. For example the name `\TeX` itself. Then the expansion of that control sequence must be suspended too until the typesetting of the index. In order to achieve this, precede each control sequence by `\string`, when specifying it in the comment. Thus `\co\string\TeX\oc`.[55] This is not too far from natural behaviour, because we like to pass through the string and to typeset it nicely later.[56]

Substructuring. The first obvious thing is to allow for more words, and to have them separated by a ␣ or so.

I also like to handle subentries and subsubentries in this way. The mechanism I adopted is to surround the entries by

```
\se...\es
```

for subentries, and nested within these, enclose the subsubentries by

[54] For my personalized template, see the Appendix B: The file `manmac.tem`.

[55] When text follows the control sequence insert again `\space`.

[56] A more automatic and natural way of doing is to look for control sequences in the comment automatically. This looking ahead for a control sequence has been encoded by DEK already, burried in `\vrefswitch`, TEXbook, p. 424.

```
\sse...\ess
```

For example after having extended `\irdefs` by

```
\def\se{\string\se\space}
\def\es{\string\es\space}
```

then the TEXbook entry

```
\ir{spaces\se as active characters\es}
```

yields in the file `index.tex`

```
spaces\se as active characters\es !0 1.
```

Mark up: ^ and `\irdefs`. I asked myself the question

Do I really need `\ir` and its descendants?

Looking more closely at DEK's encodings revealed that if the one unnecessary expanded `\edef\text{...}` is changed into `\def\text{...}`, then my ideas can be used along with DEK's macros. I have to modify `\makexref`, however. If we assume that `\irdefs` provides the definitions for the context of writing to the file, and `\tirdefs` provides the definitions for typesetting in the copy, then my redefinition of `\makexref` comes basically down to

```
\makexref{{\tirdefs\next\irdefs
 \xdef\text{\text\space!\xreftype\space}
 \ea\write\ea\inx\ea{\text\the\pageno}}}  .
```

In summary. To allow for control sequences in the $\langle word\rangle$ entails

- the index reminder word must be typeset with the substructures neglected: the structuring and comment commands must eat their arguments
- while writing to `index.tex` the control sequence must be retained and not expanded
- the control sequences must be accounted for while sorting,[57]
- the control sequences must be expanded while typesetting the index, taking account of comments, subentries and the like.

Quite some context dependency!

5.2 Fraktur fonts

Suppose we wish to use the AMS Fraktur fonts along with manmac. This is detailed with in the AMSfonts user's guide and included here for completeness. After having copied the `.pk`, and `.tfm` files extend your manmac with

```
\font\teneufm=eufm10
\font\seveneufm=eufm7
\font\fiveeufm=eufm5
\newfam\eufmfam
\textfont\eufmfam=teneufm
\scriptfont\eufmfam=seveneufm
\scriptscriptfont\eufmfam=fiveeufm
\def\frak#1{{\fam\eufmfam\relax#1}}
```

For the worked out examples with respect to the inclusion of modern bold italic or other AMS fonts, see the AMSfonts user's guide.

Explanation. This works because letters are of class 7—variable—and take the actual family value. Note that the above use is just for one argument of `\frak`; no changing of the class for the time being.

5.3 Non-CM fonts

The major stream of late is the inclusion of Postscript and the use of the accompanying fonts.[58] Next to the inclusion of fonts[59] via font definitions, we must create 'families,'[60] especially for size-switching within math mode, via either

- copying DEK's way to include font famillies,[61] or
- adopt a font selection scheme à la Mittelbach and Schöpf.[62]

A font which lacks a `.tfm` file and the like, should first be converted. See for those tools Vens (1992). Virtual fonts is all about the merging at the dvi-level, and is beyond the scope of this paper, though very important.

5.4 Miscellaneous enhancements

These are the tools provided by the TEX community at large. With respect to (simple) tables I would use my bordered table macro as given in Table Diversions. In that paper I have also discussed other table macros/packages, and mentioned the macros for handling tables which extend the page, and have to be rotated or split over pages.

For the inclusion of figures reality has it that the local—non-portable—facilities are used. Encapsulated Postscript is the Hi-TEX way to paste up the various parts at the driver level.

Very promising is Hoenig's work with respect to interfacing TEX and Metafont. That is a way to solve the high-quality and portability issues of graphics as part of a document.

The typesetting of a bibliography, given a literature database, will be treated in AMS BLUes, as alternative to the TEXniques provided by AMS.

Epilogue

Manmac has been summarized, a user's guide has been given, and the encodings have been explained.

I have touched upon modifying manmac for formatting reports. I enhanced manmac by allowing for writing more general index reminders to `index.tex`. The know-how for using AMS and non-CM fonts has been referred to.

[57] See Indexing with TEX, to come.
[58] See Anita Hoover's compilation, Hoover (1991).
[59] Fonts are supplied via `.pk`—the bitmaps—and `.tfm`—the despritions—files.
[60] Remember that only 16 families are allowed and that plain comes already with seven!
[61] As done in manmac.
[62] This issue will return in AMS BLUes, respectively TUGboat BLUes, when I'll explain how it has been incorporated there.

Acknowledgements

Ronald Kappert is kindly acknowledged for proofing the article.

TEXniques used by Knuth

Handy `\backslash`.
Recognition of `\`.
Coping with a dynamical number of digits.
Handling a dynamical number of lines (title lines, quotations).
Automatic typesetting a paragraph ragged-left and each line right-justified.
Two-part macros.
Separating data specifications from the macros.
Alignment displays.
Preventing unwanted pagebreaks.
Non-centered (math) displays (indented).
TEX input and formatted results side by side.
Natural input, syntax diagrams.
Bordered table (font charts).
Row spans in tables.
Writing strings (index reminders) and lines (answers to exercises) to a file.
Reading answers from file.
Special paragraph shapes, `\hang`, `\hangafter`.
Use of special fonts.
Size-switching macros.
`\ignorespaces`.
`\obeyspaces`, `\obeylines`.
Separate processing of document parts (chapters).

References

[1] AMSfonts User's Guide 2.1. AMS.
[2] Beebe, N.H.F (1991): The TUGlib server. MAPS91.2, 117–123. (Has also appeared in TEXline 11.)
[3] Beeton, B.N, R.F Whitney (1989): TUGboat Author's Guide. *TUGboat* 10, no. 3, 378–385. (The `TUGboat.sty`-les have entailed descendants like the `tugproc.sty`, and `eurotex.sty` formats. The LATEX and TEX user interfaces don't provide of yet the same typeset results, when similar control sequences are used in the mark up. Furthermore, the user interfaces don't provide the same functionalities. For example, in `tugboat.sty` one can include a file verbatim, have the lines numbered and the like, not so of yet in `ltugboat.sty`. I will come back to it in more detail in TUGboat BLUes. There I will enumerate and compare the functionalities and show how easy it is to customize the (plain) `tugboat.sty` once manmac is understood.)
[4] Eijkhout, V (1990): Unusual paragraph shapes. *TUGboat* 11, no. 1, 51–53. (Also MAPS89.2)
[5] Hoenig, A.J.J (1992): When TEX and Metafont work together. Proceedings EuroTEX '92, 1–19. (To appear in MAPS93.1.)
[6] Hoover, A (1991): Report on Workshop Getting PostScript into TEX and LATEX documents. MAPS91.2, 111–116.
[7] Jones, D.M (1992): Macro Index. (From the file server.)
[8] Knuth, D.E (1984): The TEXbook. Addison-Wesley.
[9] Laan, C.G van der (1992): Table Diversions. Proceedings EuroTEX '92, 191–211. (Also in MAPS92.2, 115–129.)
[10] Laan, C.G van der (1993): Sorting in BLUe. MAPS93.1 (Submitted to TUG '93.)
[11] Lamport, L (1986): LATEX user's guide and reference manual. Addison-Wesley.
[12] Mittelbach, F, R. Schöpf (1990): A new font selection scheme, for TEX macro packages – The basic macros. *TUGboat* 10, no. 2, 222–238. (Also elaborated for LATEX in *TUGboat* 11, no. 2, 297–305.)
[13] Quin, L.R.E (1990): Summary of Metafont fonts available. TEXHaX, 4, 6. (Also in MAPS91.1, 93—98.)
[14] Salomon, D (priv. comm.)
[15] Spivak, M.D (1986): The Joy of TEX. AMS. ISBN 0-8218-2999-8. (second printing of 1990).
[16] Spivak, M.D (1989): LAMS-TEX The Synthesis. TEXplorators. 3701 W. Alabama, Suite 450-273, Houston, TX 77027.
[17] Vens, E.J (1992): Incorporating PostScript fonts in TEX. Proceedings EuroTEX '92, 173–181. (Also in MAPS92.2.)
[18] Wittbecker, A (1988): Making paragraphs. *TUGboat* 9, no. 3, 272–276.

Appendix A: The file manmac.tex

```
% Macros for The TeXbook (cgl, March 93)

\catcode`@=11 % borrow the private macros
              % of PLAIN (with care)

\font\tentex=cmtex10

\font\inchhigh=cminch
\font\titlefont=cmssdc10 at 40pt

\font\ninerm=cmr9
\font\eightrm=cmr8
\font\sixrm=cmr6

\font\ninei=cmmi9
\font\eighti=cmmi8
\font\sixi=cmmi6
\skewchar\ninei='177
\skewchar\eighti='177
\skewchar\sixi='177

\font\ninesy=cmsy9
\font\eightsy=cmsy8
\font\sixsy=cmsy6
\skewchar\ninesy='60
\skewchar\eightsy='60
\skewchar\sixsy='60

\font\eightss=cmssq8

\font\eightssi=cmssqi8
```

```
\font\ninebf=cmbx9
\font\eightbf=cmbx8
\font\sixbf=cmbx6

\font\ninett=cmtt9
\font\eighttt=cmtt8

\hyphenchar\tentt=-1 % inhibit hyphenation
                     % in typewriter type
\hyphenchar\ninett=-1
\hyphenchar\eighttt=-1

\font\ninesl=cmsl9
\font\eightsl=cmsl8

\font\nineit=cmti9
\font\eightit=cmti8

\font\tenu=cmu10 % unslanted text italic
\font\magnifiedfiverm=cmr5 at 10pt
\font\manual=manfnt % font used for the
                    % METAFONT logo, etc.
%Mod because  cmman not available at RUG
%\font\cmman=cmman % font used for
%miscellaneous Computer Modern variations

\newskip\ttglue
\def\tenpoint{\def\rm{\fam0\tenrm}%
  \textfont0=\tenrm \scriptfont0=\sevenrm
               \scriptscriptfont0=\fiverm
  \textfont1=\teni \scriptfont1=\seveni
                \scriptscriptfont1=\fivei
  \textfont2=\tensy \scriptfont2=\sevensy
               \scriptscriptfont2=\fivesy
  \textfont3=\tenex \scriptfont3=\tenex
                \scriptscriptfont3=\tenex
  \def\it{\fam\itfam\tenit}%
  \textfont\itfam=\tenit
  \def\sl{\fam\slfam\tensl}%
  \textfont\slfam=\tensl
  \def\bf{\fam\bffam\tenbf}%
  \textfont\bffam=\tenbf
   \scriptfont\bffam=\sevenbf
   \scriptscriptfont\bffam=\fivebf
  \def\tt{\fam\ttfam\tentt}%
  \textfont\ttfam=\tentt
  \tt \ttglue=.5em plus.25em minus.15em
  \normalbaselineskip=12pt
  \def\MF{{\manual META}\-{\manual FONT}}%
  \let\sc=\eightrm
  \let\big=\tenbig
  \setbox\strutbox=\hbox{\vrule height8.5pt
   depth3.5pt width\z@}%
  \normalbaselines\rm}

\def\ninepoint{\def\rm{\fam0\ninerm}%
  \textfont0=\ninerm \scriptfont0=\sixrm
              \scriptscriptfont0=\fiverm
  \textfont1=\ninei \scriptfont1=\sixi
               \scriptscriptfont1=\fivei
  \textfont2=\ninesy \scriptfont2=\sixsy
              \scriptscriptfont2=\fivesy
  \textfont3=\tenex \scriptfont3=\tenex
               \scriptscriptfont3=\tenex
  \def\it{\fam\itfam\nineit}%
  \textfont\itfam=\nineit
  \def\sl{\fam\slfam\ninesl}%
  \textfont\slfam=\ninesl
  \def\bf{\fam\bffam\ninebf}%
  \textfont\bffam=\ninebf
   \scriptfont\bffam=\sixbf
   \scriptscriptfont\bffam=\fivebf
  \def\tt{\fam\ttfam\ninett}%
  \textfont\ttfam=\ninett
  \tt \ttglue=.5em plus.25em minus.15em
  \normalbaselineskip=11pt
  \def\MF{{\manual hijk}\-{\manual lmnj}}%
  \let\sc=\sevenrm
  \let\big=\ninebig
  \setbox\strutbox=\hbox{\vrule height8pt
   depth3pt width\z@}%
  \normalbaselines\rm}

\def\eightpoint{\def\rm{\fam0\eightrm}%
  \textfont0=\eightrm \scriptfont0=\sixrm
               \scriptscriptfont0=\fiverm
  \textfont1=\eighti \scriptfont1=\sixi
                \scriptscriptfont1=\fivei
  \textfont2=\eightsy \scriptfont2=\sixsy
               \scriptscriptfont2=\fivesy
  \textfont3=\tenex \scriptfont3=\tenex
                \scriptscriptfont3=\tenex
  \def\it{\fam\itfam\eightit}%
  \textfont\itfam=\eightit
  \def\sl{\fam\slfam\eightsl}%
  \textfont\slfam=\eightsl
  \def\bf{\fam\bffam\eightbf}%
  \textfont\bffam=\eightbf
   \scriptfont\bffam=\sixbf
   \scriptscriptfont\bffam=\fivebf
  \def\tt{\fam\ttfam\eighttt}%
  \textfont\ttfam=\eighttt
  \tt \ttglue=.5em plus.25em minus.15em
  \normalbaselineskip=9pt
  \def\MF{{\manual opqr}\-{\manual stuq}}%
  \let\sc=\sixrm
  \let\big=\eightbig
  \setbox\strutbox=\hbox{\vrule height7pt
   depth2pt width\z@}%
  \normalbaselines\rm}

\def\tenmath{\tenpoint\fam-1 } % use after $
                        % in ninepoint sections
\def\tenbig#1{{\hbox{$\left#1\vbox to8.5pt{}%
                           \right.\n@space$}}}
\def\ninebig#1{{\hbox{$\textfont0=\tenrm
 \textfont2=\tensy
 \left#1\vbox to7.25pt{}\right.\n@space$}}}
\def\eightbig#1{{\hbox{$\textfont0=\ninerm
 \textfont2=\ninesy
 \left#1\vbox to6.5pt{}\right.\n@space$}}}

% Page layout
\newdimen\pagewidth \newdimen\pageheight
\newdimen\ruleht      % Corner rules
\hsize=29pc  \vsize=44pc  \maxdepth=2.2pt
\parindent=3pc \ruleht=.5pt
\pagewidth=\hsize \pageheight=\vsize
\abovedisplayskip=6pt plus 3pt minus 1pt
\belowdisplayskip=6pt plus 3pt minus 1pt
\abovedisplayshortskip=0pt plus 3pt
\belowdisplayshortskip=4pt plus 3pt

%\newinsert\footins
\def\footnote#1{\edef\@sf{\spacefactor
 \the\spacefactor}#1\@sf
 \insert\footins\bgroup\eightpoint
 \interlinepenalty100 \let\par=\endgraf
 \leftskip=\z@skip \rightskip=\z@skip
 \splittopskip=10pt plus 1pt minus 1pt
 \floatingpenalty=20000
 \smallskip\item{#1}\bgroup\strut
 \aftergroup\@foot\let\next}
%
\skip\footins=12pt plus 2pt minus 4pt
% space added when footnote is present
%\count\footins=1000
% footnote magnification factor (1 to 1)
```

```
\dimen\footins=30pc
% maximum footnotes per page

\newinsert\margin
\dimen\margin=\maxdimen
%\count\margin=0 \skip\margin=0pt
% marginal inserts take up no space

\newif\iftitle
\def\titlepage{\global\titletrue}
% for pages without headlines
\def\rhead{} % contains the running headline

\def\leftheadline{\hbox to \pagewidth{%
 \vbox to 10pt{}% strut to position the
               % baseline
 \llap{\tenbf\folio\kern1pc}% folio to
                            % left of text
 \tenit\rhead\hfil% running head flush left
}}
\def\rightheadline{\hbox to \pagewidth{%
 \vbox to 10pt{}% strut to position the
               % baseline
 \hfil\tenit\rhead\/% running head flush
                  % right
 \rlap{\kern1pc\tenbf\folio}% folio to
                            % right of text
}}

\def\onepageout#1{\shipout\vbox{ % here we
               % define one page of output
 \offinterlineskip % butt the boxes together
 \vbox to 3pc{ % this part goes on top of
               % the 44pc pages
  \iftitle % the next is used for title pages
   \global\titlefalse % reset the titlepage
                      % switch
   \setcornerrules % for camera alignment
  \else\ifodd\pageno \rightheadline\else
                     \leftheadline\fi\fi
 \vfill} % this completes the \vbox to 3pc
 \vbox to \pageheight{
  \ifvoid\margin\else%marginal info is present
   \rlap{\kern31pc\vbox to\z@{\kern4pt%
   \box\margin \vss}}\fi
  #1 % now insert the main information
  \ifvoid\footins\else%footnote info is present
   \vskip\skip\footins \kern-3pt
   \hrule height\ruleht width\pagewidth
   \kern-\ruleht \kern3pt
   \unvbox\footins\fi
   \boxmaxdepth=\maxdepth
 } % this completes the \vbox to \pageheight
}\advancepageno}

\def\setcornerrules{\hbox to \pagewidth{%
 \vrule width 1pc height\ruleht
    \hfil \vrule width 1pc}
 \hbox to \pagewidth{\llap{\sevenrm(page
    \folio)\kern1pc}%
 \vrule height1pc width\ruleht depth\z@
    \hfil \vrule width\ruleht depth\z@}}

\output{\onepageout{\unvbox255}}

\newbox\partialpage
\def\begindoublecolumns{\begingroup
 \output={\global\setbox\partialpage=
  \vbox{\unvbox255\bigskip}}
 \eject
 \output={\doublecolumnout}
 \hsize=14pc \vsize=89pc}
\def\enddoublecolumns{\output=
 {\balancecolumns}\eject \endgroup
 \pagegoal=\vsize}

\def\doublecolumnout{\splittopskip=\topskips

 \splitmaxdepth=\maxdepth \dimen@=44pc
 \advance\dimen@ by-\ht\partialpage
 \setbox0=\vsplit255 to\dimen@
 \setbox2=\vsplit255 to\dimen@
 \onepageout\pagesofar
 \unvbox255 \penalty\outputpenalty}
\def\pagesofar{\unvbox\partialpage
 \wd0=\hsize \wd2=\hsize \hbox to
 \pagewidth{\box0\hfil\box2}}
\def\balancecolumns{\setbox0=\vbox{\unvbox255}
 \dimen@=\ht0
  \advance\dimen@ by\topskip
  \advance\dimen@ by-\baselineskip
  \divide\dimen@ by2 \splittopskip=\topskip
 {\vbadness=10000
 \loop \global\setbox3=\copy0
  \global\setbox1=\vsplit3 to\dimen@
 \ifdim\ht3>\dimen@
  \global\advance\dimen@ by1pt
 \repeat}
 \setbox0=\vbox to\dimen@{\unvbox1}
 \setbox2=\vbox to\dimen@{\unvbox3}
 \pagesofar}

% To produce only a subset of pages,
% put the page numbers on separate
% lines in a file called pages.tex
\let\Shipout=\shipout
\newread\pages \newcount\nextpage
\openin\pages=pages
\def\getnextpage{\ifeof\pages\else
 {\endlinechar=-1\read\pages to\next
  \ifx\next\empty % in this case we should
                  % have eof now
  \else\global\nextpage=\next\fi}\fi}
\ifeof\pages\else\message{OK, I'll ship only
 the requested pages!}\getnextpage\fi
%
\def\shipout{\ifeof\pages
 \let\next=\Shipout\else
 \ifnum\pageno=\nextpage
  \getnextpage\let\next=\Shipout
 \else\let\next=\Tosspage\fi\fi \next}
%
\newbox\garbage
\def\Tosspage{\deadcycles=0\setbox\garbage=}

% Chapter formatting
% The preface and table of contents are
% formatted in place, not here

\newcount\exno % for the number of exercises
               % in the current chapter
\newcount\subsecno % for the number of
  % subsections in the current chapter

\def\beginchapter#1 #2#3. #4\par{\global
 \exno=0 \subsecno=0 \def\chapno{#2#3}
 \ifodd\pageno
  \errmessage{You had too much text on
       that last page; I'm backing up}
  \advance\pageno by-1
 \fi \titlepage
 \def\\{ } % \\'s in the title will be
          % treated as spaces
 \message{#1 #2#3:} % show the chapter
                % title on the terminal
 \def\MF{{\manual 89:;<=>:}} % slant the logo
 \xdef\rhead{#1 #2#3: #4\unskip}
 {\def\TeX{T\kern-.2em\lower.5ex%
```

```
          \hbox{E}\kern-.06em X}
  \def\MF{{\vbox to30pt{}\manual ()*+,-.*}}
  \def\\{#3}
  \ifx\empty\\
   \rightline{\inchhigh #2\kern-.04em}
  \else\rightline{\inchhigh #2\kern-.06em%
                #3\kern-.04em}%
  \fi \vskip 1.75pc
  \baselineskip 36pt \lineskiplimit
  \titlelsl \lineskip 12pt
  \let\\=\cr%now the \\'s are line dividers
  \halign{\line{\titlefont\hfil##}\\#4%
   \unskip\\}\vfill\eject} % output the
                  % chapter title page
  \tenpoint\noindent\ignorespaces}% the first
%paragraph of a chapter is not indented

\newdimen\titlelsl \titlelsl=1pt

\outer\def\endchapter{\ifodd\pageno\else
 \vfill\eject\null\fi
 \begingroup\bigskip\vfill % beginning of
                          % the quotes
 \def\eject{\endgroup\eject}
 \def\par{\ifhmode\/\endgraf\fi}\obeylines
 \def\TeX{T\kern-.2em\lower.5ex\hbox{E}%
  \kern-.000em X}
 \def\MF{{\manual opqr}\-{\manual stuq}}
 \eightpoint \let\tt=\ninett
 \baselineskip 10pt
 \parfillskip \z@
 \interlinepenalty 10000
 \leftskip \z@ plus 40pc minus \parindent
 \let\rm=\eightss \let\sl=\eightssi
 \everypar{\sl}}
%
\def\author#1(#2){\smallskip\noindent\rm---
 #1\unskip\enspace(#2)}

\def\dbend{{\manual\char127}}
% dangerous bend sign
\def\d@nger{\medbreak\begingroup
 \clubpenalty=10000
 \def\par{\endgraf\endgroup\medbreak}
 \noindent\hang\hangafter=-2
 \hbox to0pt{\hskip-\hangindent\dbend
  \hfill}\ninepoint}
\outer\def\danger{\d@nger}
\def\dd@nger{\medbreak\begingroup
 \clubpenalty=10000
 \def\par{\endgraf\endgroup\medbreak}
 \noindent\hang\hangafter=-2
 \hbox to0pt{\hskip-\hangindent\dbend
  \kern1pt\dbend\hfill}\ninepoint}
\outer\def\ddanger{\dd@nger}
\def\enddanger{\endgraf\endgroup} % omits
                         % the \medbreak

\outer\def\subsection#1. {\medbreak
 \advance\subsecno by 1
 \noindent
 {\it \the\subsecno.\enspace#1.\enspace}}
\def\ansno#1.#2:{\medbreak\noindent
 \hbox to\parindent{\bf\hss#1.#2.\enspace}
 \ignorespaces}

% Composition macros
\hyphenation{man-u-script man-u-scripts
 ap-pen-dix xscaled}

\def\AmSTeX{$\cal A\kern-.1667em\lower
 .5ex\hbox{$\cal M$}\kern-.075em S$-\TeX}
\def\bull{\vrule height .9ex width .8ex%
 depth -.1ex } % square bullet
\def\SS{{\it SS}} % scriptscript style
\def\|{\leavevmode\hbox{\tt\char`\|}}
 % vertical line
\def\dn{\leavevmode\hbox{\tt\char'14}}
 % downward arrow
\def\up{\leavevmode\hbox{\tt\char'13}}
 % upward arrow
\def\]{\leavevmode\hbox{\tt\char`\ }}
 % visible space

\def\pt{\,{\rm pt}} % units of points,
                    % in math formulas
\def\em{\,{\rm em}} % units of ems,
                    % in math formulas
\def\<#1>{\leavevmode\hbox{$\langle$#1%
 \/$\rangle$}} % syntactic quantity
\def\oct#1{\hbox{\rm\'{}\kern-.2em\it
 #1\/\kern.05em}} % octal constant
\def\hex#1{\hbox{\rm\H{}\tt#1}}
 % hexadecimal constant
\def\cstok#1{\leavevmode\thinspace\hbox{%
 \vrule\vtop{\vbox{\hrule\kern1pt\hbox{%
 \vphantom{\tt/}\thinspace{\tt#1}%
 \thinspace}}\kern1pt\hrule}\vrule}%
 \thinspace} % control sequence token

{\obeyspaces\gdef {\ }}
\def\parbreak{\hfil\break\indent\strut}
\def\stretch{\nobreak\hskip0pt plus2pt\relax}

% macros for non-centered displays
\outer\def\begindisplay{\obeylines
 \startdisplay}
{\obeylines\gdef\startdisplay#1
 {\catcode`\^^M=5$$#1\halign\bgroup\indent
  ##\hfil&\qquad##\hfil\cr}}
\outer\def\enddisplay{\crcr\egroup$$}

% (the following \begin...\end-type
%  macros do not appear in Appendix E)
% macros for demonstrating math constructions
\outer\def\beginmathdemo{
 $$\advance\baselineskip by2pt
 \halign\bgroup\indent\hbox to 160pt{##\hfil}&
  $##$\hfil\cr\noalign{\vskip-2pt}
}
\outer\def\begindisplaymathdemo{
 $$\advance\baselineskip by15pt
 \halign\bgroup\indent\hbox to 160pt{##\hfil}&
  $\displaystyle{##}$\hfil\cr
  \noalign{\vskip-15pt}
}
\outer\def\beginlongmathdemo{
 $$\advance\baselineskip by2pt
 \halign\bgroup\indent\hbox to 210pt{##\hfil}&
  $##$\hfil\cr\noalign{\vskip-2pt}
}
\outer\def\beginlongdisplaymathdemo{
 $$\advance\baselineskip by15pt
 \halign\bgroup\indent\hbox to 210pt{##\hfil}&
  $\displaystyle{##}$\hfil\cr
  \noalign{\vskip-15pt}
}
\outer\def\endmathdemo{\egroup$$}

% macros for font tables
\def\oddline#1{\cr
 \noalign{\nointerlineskip}
 \multispan{19}\hrulefill&
 \setbox0=\hbox{\lower 2.3pt\hbox{%
       \hex{#1x}}}\smash{\box0}\cr
 \noalign{\nointerlineskip}}
\def\evenline{\cr\noalign{\hrule}}
\def\chartstrut{\lower4.5pt\vbox to14pt{}}
```

```
\def\beginchart#1{%
           $$\postdisplaypenalty=-10000
 \global\count@=0 #1
 \halign to\hsize\bgroup
  \chartstrut##\tabskip0pt plus10pt&
          &\hfil##\hfil&\vrule##\cr
  \lower6.5pt\null
  &&&\oct0&&\oct1&&\oct2&&\oct3&&\oct4&&
     \oct5&&\oct6&&\oct7&\evenline}
\def\endchart{\raise11.5pt\null&&&\hex 8&&
 \hex 9&&\hex A&&\hex B&&\hex C&&\hex D&&
 \hex E&&\hex F&\cr\egroup$$}
\def\:{\setbox0=\hbox{\char\count@}%
 \ifdim\ht0>7.5pt\reposition
 \else\ifdim\dp0>2.5pt\reposition\fi\fi
 \box0\global\advance\count@ by1 }
\def\reposition{\setbox0=\hbox{$\vcenter
 {\kern2pt\box0\kern2pt}$}}
\def\normalchart{%
 &\oct{00x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&&\oddline0
 &\oct{01x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&\evenline
 &\oct{02x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&&\oddline1
 &\oct{03x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&\evenline
 &\oct{04x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&&\oddline2
 &\oct{05x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&\evenline
 &\oct{06x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&&\oddline3
 &\oct{07x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&\evenline
 &\oct{10x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&&\oddline4
 &\oct{11x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&\evenline
 &\oct{12x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&&\oddline5
 &\oct{13x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&\evenline
 &\oct{14x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&&\oddline6
 &\oct{15x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&\evenline
 &\oct{16x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&&\oddline7
 &\oct{17x}&&\:&&\:&&\:&&\:&&\:&&\:&&\:&&
  \:&\evenline}

% (now Appendix E resumes again)
% macros for verbatim scanning
\chardef\other=12
\def\ttverbatim{\begingroup
 \catcode`\\=\other
 \catcode`\{=\other
 \catcode`\}=\other
 \catcode`\$=\other
 \catcode`\&=\other
 \catcode`\#=\other
 \catcode`\%=\other
 \catcode`\~=\other
 \catcode`\_=\other
 \catcode`\^=\other
 \obeyspaces \obeylines \tt}

\outer\def\begintt{$$\let\par=\endgraf
 \ttverbatim \parskip=\z@
 \catcode`\|=0 \rightskip-5pc \ttfinish}
{\catcode`\|=0 |catcode`|\=\other
 % | is temporary escape character
 |obeylines % end of line is active
 |gdef|ttfinish#1^^M#2\endtt{#1|vbox{#2}%
 |endgroup$$}}

\catcode`\|=\active
{\obeylines \gdef|{\ttverbatim \spaceskip
 \ttglue \let^^M=\  \let|=\endgroup}}

% macros for syntax rules (again, not in
%                             Appendix E)
\def\[#1]{\silenttrue\xref|#1|\thinspace
 {\tt#1}\thinspace} % keyword in syntax
\def\beginsyntax{\endgraf\nobreak\medskip
 \begingroup \catcode`<=13 \catcode`[=13
 \let\par=\endsyntaxline \obeylines}
\def\endsyntaxline{\futurelet\next
 \syntaxswitch}
\def\syntaxswitch{\ifx\next\<\let\next=
 \syntaxrule\else
 \ifx\next\endsyntax\let\next=\endgroup
 \else\let\next=\continuerule
 \fi\fi \next
}
\def\continuerule{\hfil\break\indent\qquad}
\def\endsyntax{\medbreak\noindent}
{\catcode`<=13 \catcode`[=13
 \global\let<=\< \global\let[=\[
 \gdef\syntaxrule<#1>{\endgraf\indent
 \silentfalse\xref\<#1>}}
\def\is{\ $\longrightarrow$ }
\def\alt{\ $\vert$ }

% macros to demarcate lines quoted from
% TeX source files
\def\beginlines{\par\begingroup\nobreak
 \medskip\parindent\z@ \obeylines
 \hrule\kern1pt\nobreak \everypar{\strut}}
\def\endlines{\kern1pt\hrule\endgroup
 \medbreak\noindent}
\def\weakendlines{\kern1pt\hrule\endgroup
 \medskip\noindent}
\def\finalendlines{\kern1pt\hrule\endgroup
 \medbreak}

\outer\def\exercise{\medbreak
 \global\advance\exno by 1
 \noindent\llap{\manual\char'170
        \rm\kern.15em}% triangle in margin
 {\ninebf EXERCISE \bf\chapno.\the\exno}\par
 \nobreak\noindent}
\def\dexercise{\global\advance\exno by 1
 \llap{\manual\char'170
  \rm\kern.15em}% triangle in indented space
 {\eightbf EXERCISE \bf\chapno.\the\exno}\hfil
  \break}
\outer\def\dangerexercise{\d@nger\dexercise}
\outer\def\ddangerexercise{\dd@nger\dexercise}

\newwrite\ans
\immediate\openout\ans=answers
 % file for answers to exercises
\outer\def\answer{\par\medbreak
 \immediate\write\ans{}
 \immediate\write\ans{\string\ansno
  \chapno.\the\exno:}\copytoblankline}
\def\copytoblankline{\begingroup\setupcopy
 \copyans}
\def\setupcopy{\def\do##1{\catcode`##1=
 \other}\dospecials
 \catcode`\|=\other \obeylines}
{\obeylines \gdef\copyans#1
 {\def\next{#1}%
  \ifx\next\empty\let\next=\endgroup
  \else\immediate\write\ans{\next}%
   \let\next=\copyans
```

```
  \fi\next}}

% Macros for drawing figures (not in
%                          Appendix E)
\def\hidehrule#1#2{\kern-#1\hrule
 height#1 depth#2 \kern-#2 }
\def\hidevrule#1#2{\kern-#1{\dimen0=#1
 \advance\dimen0 by#2\vrule width\dimen0}%
 \kern-#2 }
% \makeblankbox puts rules at the edges of
% a blank box whose dimensions are those
% of \box0 (assuming nonnegative wd,ht,dp)
% #1 is rule thickness outside,
% #2 is rule thickness inside
\def\makeblankbox#1#2{\hbox{\lower\dp0
 \vbox{\hidehrule{#1}{#2}%
  \kern-#1% overlap the rules at the corners
  \hbox to\wd0{\hidevrule{#1}{#2}%
  \raise\ht0\vbox to #1{}% set the vrule height
  \lower\dp0\vtop to #1{}% set the vrule depth
  \hfil\hidevrule{#2}{#1}}%
  \kern-#1\hidehrule{#2}{#1}}}}
\def\maketypebox{\makesblankbox{0pt}{1pt}}
\def\makelightbox{\makeblankbox{.2pt}{.2pt}}

% \box\bigdot is a null box with a bullet
% at its reference point
\newbox\bigdot \newbox\smalldot
\setbox0=\hbox{$\vcenter{}$}
% \ht0 is the axis height
\setbox1=\hbox to\z@{$\hss\bullet\hss$}
% bullet is centered on the axis
\setbox\bigdot=\vbox to\z@{\kern-\ht1
 \kern\ht0 \box1 \vss}
\setbox1=\hbox to\z@{$\hss\cdot\hss$}
% cdot is centered on the axis
\setbox\smalldot=\vbox to\z@{\kern-\ht1
 \kern\ht0 \box1 \vss}

% \arrows makes things like <--- text --->
\def\arrows#1#2{% #1=width, #2=text
{\setbox0=\hbox{$\mkern-2mu\mathord
                -\mkern-2mu$}
 \hbox to #1{\kern-.055556em$\leftarrow
  \mkern-6mu$\cleaders\copy0\hfil
  \kern.4em #2\kern.4em\cleaders\copy0\hfil
  $\mkern-6mu\rightarrow$\kern-.055556em}}}

% \samplebox makes the outline of a box,
% with big dot at reference point
\def\samplebox#1#2#3#4{% #1=ht, #2=dp, #3=wd,
% #4=text
 {\setbox0=\vtop{\vbox to #1{\hbox to #3{}
  \vss}\nointerlineskip\vbox to #2{}}
  % now \box0 has the desired ht, dp, and wd
 \hbox{\copy\bigdot
  \vrule height.2pt depth.2pt width#3%
  \kern-#3\makelightbox\kern-#3%
  \raise#1\vbox{\hbox to #3{\hss#4\hss}
   \kern 3pt}}}}

% \sampleglue makes glue between sample boxes
\newdimen\varunit
\varunit=\hsize
\advance\varunit by-2\parindent
\divide\varunit by 58 % illustrations in
                      % Chapter 12
\def\sampleglue#1#2{% #1=width, #2=text
 \vtop{\hbox to #1{\xleaders\hbox to
 .5\varunit{\hss\copy\smalldot\hss}\hfil}
 \kern3pt
 \tabskip \z@ plus 1fil
 \halign to #1{\hfil##\cr#2\cr}}}
```

```
% Indexing macros
\newif\ifproofmode
\proofmodetrue % this should be false when
               % making camera-ready copy
\newwrite\inx
\immediate\openout\inx=index % file for
               % index reminders
\newif\ifsilent
\def\specialhat{\ifmmode\def\next{^}\else
 \let\next=\beginxref\fi\next}
\def\beginxref{\futurelet\next
 \beginxrefswitch}
\def\beginxrefswitch{\ifx\next\specialhat
   \let\next=\silentxref\else
 \silentfalse\let\next=\xref\fi \next}
\catcode`\^=\active \let ^=\specialhat
\def\silentxref^{\silenttrue\xref}

\def\marginstyle{\vrule height6pt depth2pt
 width\z@ \sevenrm}

\chardef\bslash=`\\
\def\xref{\futurelet\next\xrefswitch}
\def\xrefswitch{\begingroup
 \ifx\next|\aftergroup\vxref
  % case 1 or 2, |arg| or |\arg|
 \else\ifx\next\<\aftergroup\anglexref
   % case 3, "\<arg>" means angle brackets
  \else\aftergroup\normalxref
 \fi\fi\endgroup} % case 0, "{arg}"
\def\vxref|{\catcode`\\=\active
 \futurelet\next\vxrefswitch}
\def\vxrefswitch#1|{\catcode`\\=0
 \ifx\next\empty\def\xreftype{2}%
  \def\next{{\tt\bslash\text}}% type 2,
                              % |\arg|
 \else\def\xreftype{1}\def\next{%
       {\tt\text}}\fi % type 1, |arg|
 \edef\text{#1}\makexref}
{\catcode`\|=0 \catcode`\\=\active |gdef\{}}
\def\anglexref\<#1>{\def\xreftype{3}%
 \def\text{#1}\def\next{\<\text>}\makexref}
\def\normalxref#1{\def\xreftype{0}%
 \def\text{#1}\let\next=\text\makexref}
\def\makexref{\ifproofmode\insert\margin
  {\hbox{\marginstyle\text}}%
  \xdef\writeit{\write\inx{\text\space!%
   \xreftype\space\noexpand\number\pageno.%
  }}\writeit
 \else\ifhmode\kern\z@\fi\fi
 \ifsilent\ignorespaces\else\next\fi}
% the \insert (which is done in proofmode
% only) suppresses hyphenation, so the
% \kern\z@ is put in to give the same effect
% in non-proofmode.

% Internal cross references that may change
\def\sesame{61}
 % page number for Sesame Street quote
\def\bmiexno{20}
 % exercise number for bold math italic
\def\punishexno{1}
 % exercise number for 'punishment'
\def\fracexno{6}
 % exercise number for '\frac'
\def\vshippage{31}
 % error message from '\vship'
\def\storypage{24}
 % listing of story.tex
\def\metaT{4}
 % exercise number for T of METAFONT
\def\xwhat{2}
 % exercise number for x3:=whatever
\def\Xwhat{2}
```

```
 % exercise number for whatever itself

\def\checkequals#1#2{\ifnum#1=#2\else
 \errmessage{Redefine \string#1 to be
  \the#2}\fi}

% Things for The METAFONTbook only
\ifx\MFmanual\!\else\endinput\fi

\def\!{\kern-.03em\relax}

\def\frac#1/#2{\leavevmode\kern.1em\raise
 .5ex\hbox{\the\scriptfont0 #1}\kern-.1em/%
 \kern-.15em\lower.25ex\hbox{%
 \the\scriptfont0 #2}}

\outer\def\displayfig #1 (#2){$$
 \advance\abovedisplayskip by 3pt
 \leftline{\indent\figbox{#1}{3in}{#2}%
 \vbox}$$}
\def\rightfig #1 (#2 x #3) ^#4 {%
%#2 wide and #3 deep, raised #4
 \strut\vadjust{\setbox0=\vbox to 0pt{\vss
  \hbox to\pagewidth{\hfil
   \raise #4\figbox{#1}{#2}{#3}\vtop \quad}}
  \dp0=0pt \box0}}
\def\figbox#1#2#3#4{#4to#3{%
% makes a box #2 wide and #3 deep
 \ifproofmode\kern0pt\hrule\vfill
  \hsize=#2 \baselineskip 6pt
  \fiverm\noindent\raggedright
  (Figure #1 will be inserted here;
   too bad you can’t see it now.)
  \endgraf\vfill\hrule
 \else\vfill\hbox to#2{}\fi}}

\def\endsyntax{\begingroup\let\par=\endgraf
 \medbreak\endgroup\noindent}

\let\BEGINCHAPTER=\beginchapter
\def\beginchapter{\titlelsl=1pt \BEGINCHAPTER}
\def\beginChapter{\titlelsl=2pt \BEGINCHAPTER}

\def\decreasehsize #1 {\advance\hsize-#1}
\def\restorehsize{\hsize=\pagewidth}

\catcode`\@=\active
\catcode`\"=\active
\def\ttverbatim{\begingroup
 \catcode`\@=\other \catcode`\"=\other
 \catcode`\\=\other \catcode`\{=\other
 \catcode`\}=\other \catcode`\$=\other
 \catcode`\&=\other \catcode`\#=\other
 \catcode`\%=\other \catcode`\~=\other
 \catcode`\_=\other \catcode`\^=\other
 \obeyspaces \obeylines \tt}
\def\setupcopy{\def\do##1{\catcode`##1=
  \other}\dospecials
 \catcode`\|=\other \catcode`\@=\other
 \catcode`\"=\other \obeylines}
\def\_{\leavevmode \kern.06em
 \vbox{\hrule width.3em}}
\def@#1@{\begingroup\def\_{\kern.04em
 \vbox{\hrule width.3em height .6pt}%
 \kern.08em}%
 \ifmmode\mathop{\bf#1}\else
  \hbox{\bf#1\/}\fi\endgroup}
\def"#1"{\hbox{\it#1\/\kern.05em}}
 % italic type for identifiers
\def\xrefswitch{\begingroup
 \ifx\next|\aftergroup\vxref
  % case 1, |arg| or |\arg|
 \else\ifx\next@\aftergroup\boldxref
  % case 2, "@arg@" means boldface
 \else\ifx\next"\aftergroup\italxref
  % case 4, ""arg"" means boldface
 \else\ifx\next\<\aftergroup\anglexref
  % case 3, "\<arg>" means angle brackets
 \else\aftergroup\normalxref
 \fi\fi\fi\fi\endgroup} % case 0, "{arg}"
\def\boldxref@#1@{\def\xreftype{2}%
 \def\text{#1}\def\next{@\text@}\makexref}
\def\italxref"#1"{\def\xreftype{4}%
 \def\text{#1}\def\next{"\text"}\makexref}

\def\pyth+{\mathbin{++}}
\def\0{\raise.7ex\hbox{$\scriptstyle\#$}}
\def\to{\mathrel{\ldotp\ldotp}}
\def\dashto{\mathrel{\hbox{-\thinspace
 -\kern-.05em}}}
\def\ddashto{\mathrel{\hbox{-\thinspace
 -\thinspace-\kern-.05em}}}
\def\round{\mathop{\rm round}}
\def\angle{\mathop{\rm angle}}
\def\rmsqrt{\mathop{\rm sqrt}}
\def\reverse{\mathop{\rm reverse}}
\def\curl{\mathop{\rm curl}}
\def\tension{\mathop{\rm tension}}
\def\atleast{\mathop{\rm atleast}}
\def\controls{\mathop{\rm controls}}
\def\and{\,{\rm and}\,}
\def\cycle{{\rm cycle}}
\def\pickup{@pickup@ \thinspace}
\def\penpos#1{\hbox{\it penpos}_{#1}}
\def\pentaper#1{\hbox{\it pentaper}_{#1}}

\chardef\hexa=1  % first hex
\chardef\hexb=2 % top and bot adjusted
\chardef\hexc=3 % same, bold
\chardef\hexd=4 % same, confined to box
\chardef\hexe=5 % penstroked hex
\chardef\Aa=6 % stick-figure A, golden ratio
\def\sevenAs{\char7\char8\char9\char10
 \char11\char12\char13} % same, variants
\chardef\Az=14 % same, with crooked bar
\chardef\Ab=15 % \Aa with rectilinear
               % elliptical pen
\chardef\Ac=16 % same, with the ellipse
               % tilted
\chardef\beana=17 % kidney bean, default pen
\chardef\beanb=18 % same, twice as bold
\chardef\beanc=19 % same, rectilinear
                  % elliptical pen
\chardef\beand=20 % same, with the ellipse
                  % tilted
\chardef\niba=21 % 10x rectilinear ellipse
\chardef\nibb=22 % same, with the ellipse
                 % tilted
\chardef\nibc=23 % same, 90 degrees titled
\chardef\IOT=24 % Ionian T
\chardef\IOS=25 % Ionian S
\chardef\IOO=26 % Ionian O
\chardef\IOI=27 % Ionian I
\chardef\cubea=28 % possible cube
\chardef\cubeb=29 % impossible cube
\chardef\bicentennial=30
 % star with overlapping strokes
\chardef\oneu=31 % 1/4 of uuuu ornament
\chardef\circa=32 % quartercircle
\chardef\circb=33 % filled quartercircle
\chardef\circc=34 % rotated quartercircle
\chardef\circd=35 % cone
\chardef\circe=36 % concentric circles
\chardef\circf=37 % concentric diamonds
\chardef\fouru=38 % uuuu ornament
\chardef\fourc=39 % same, rotated
\chardef\seventh='140 % 1/7, to go with
                      % cmssqi8
```

```
\newdimen\apspix
\apspix=31448sp % 8 APS pixels = 52413.64sp,
                % and I'm taking 60% of this
% to crude approximation, there are about
% 2\apspix per pt
\newdimen\blankpix \newdimen\Blankpix
\setbox0=\hbox{\manual P} \blankpix=\wd0
% approximately 1pt blank pixel
\setbox0=\hbox{\manual R} \Blankpix=\wd0
% approximately 3pt blank pixel

\def\leftheadline{\hbox to \pagewidth{%
 \vbox to 10pt{}% to position the baseline
 \llap{\tenbf\folio\kern1pc}% to left of text
 \def\MF{{\manual 89:;<=>:}}% slanted 10pt
  \tenit\rhead\hfil% running head flush left
 }}
\def\rightheadline{\hbox to \pagewidth{%
 \vbox to 10pt{}% to position the baseline
 \def\MF{{\manual 89:;<=>:}}% slanted 10pt
 \hfil\tenit\rhead\/% running head flush r.
 \rlap{\kern1pc\tenbf\folio}% to right of text
 }}
\def\ttok#1{\leavevmode\thinspace\hbox{%
 \vrule\vtop{\vbox{\hrule\kern1pt
 \hbox{\vphantom{\tt(j}\thinspace{\tt#1}
  \thinspace}}
 \kern1pt\hrule}\vrule}\thinspace} % token

\newdimen\tinypix
\setbox0=\hbox{\sixrm0} \tinypix=5pt
\newdimen\pixcorr
\pixcorr=\tinypix \advance\pixcorr by-\wd0
\def\pixpat#1#2#3#4{\vcenter{\sixrm
 \baselineskip=\tinypix
 \hbox{#1\kern\pixcorr#2}
 \hbox{#3\kern\pixcorr#4}}}

\font\rand=random
```

Appendix B: The file manmac.tem

A little mixing of the functionalities provided by manmac and DEK's sample, supplied in the Appendix B of the TEXbook, yields the following proposal for NTG's MAPS Special report series. The proposal is molded into a template, which makes the total structure clear. An author can reuse the template and just fill-in the copy.

For convenience the auxiliary macro files are appended after the `\bye`.

Just a few macros on top of manmac and 80% or so of your report layout is there, ready for your customization. Run it, and I hope you will be surprised too. I welcome your comments.

```
%Template for manmac based MAPS report
\def\issue{%
MAPS Special 93.x           %issue
}\def\title{%
MAPS Special Template       %title
}\def\abstract{%
A template for MAPS Special is provided.
}\def\keywords{%
manmac, MAPS, NTG           %keywords
}
\input manmac               %to be
\input manmac.mod           %combined
\input ntglogo              %in one file
\input cover                %mapsspecial
%\input toc%table of contents
%Copy proper
\beginchapter {} {}1. First\par
%{} is keyword, after. the title
%In original and my mod the . disappears,
%making it flexible with respect to
%unnumbered chapters.
\beginsection 1. Introduction\par
...%copy proper introduction
\beginsection 2.Real first section\par
...%copy proper real first section
\endchapter
%et cetera
\beginchapter Bibliography {}{}.{}\par
\item{[1]} Knuth, D.E (1984):
 The \TeX book. Addison-Wesley.
\endchapter
Further an index or so, and
on inside back cover the NTG info sheet.
%\input ntg.info
\bye                     %cgl, March 93


%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%Auxiliary files
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%File: manmac.mod        %modifications
\font\titlefont=cmbx12\relax
%First manmac's mod-s
\outer\def\beginchapter#1 #2#3.#4\par{%
 \def\chapno{#2#3}\global\exno0 \subsecno0
 \def\hl{\gdef\hl{\issue\hfil\it\rhead}}
 \headline{\hl}
 \def\\{ }\xdef\rhead{#4}
 {\let\\\cr\halign{\line{\titlefont
  \hfil##\hfil}\\#1 #2#3 #4\unskip\\}}
 \bigskip\tenpoint\noindent\ignorespaces}
%
\outer\def\endchapter{\vfill\eject}
%
\output{\output}
%
\hsize17cm\pagewidth\hsize
\vsize24cm\pageheight\vsize
\def\date{\ifcase\month\or Jan\or Feb\or
 March\or April\or May\or June\or July\or
 Aug\or Sept\or Oct\or Nov\or Dec\fi
 $\,$'93}
\endinput                %cgl, March 93

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%File: ntglogo.tex
\font\calx=cmsy10 scaled \magstep 4
\font\rmx =cmr10  scaled \magstephalf
\def\NTG{{\rmx\noindent\vtop to0pt{%
 \hbox{{\calx N}ederlandstalige}
 \hbox{\hskip1em\relax{\calx T}\raise
  -.5ex\hbox{E}X}
 \vskip0.1ex
 \hbox{\hskip2em{\calx G}ebruikersgroep}
 \vss}}}
\font\hmx=cmr10 scaled\magstep0
\def\NTGADR{{\hmx\noindent\vtop to 0pt{%
 \hbox{Postbus 394}
 \hbox{1740 AJ Schagen}\vss}
}}
\def\NTGKOP{\NTG\hfill\NTGADR\quad}
\endinput                 %cgl March 93

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%File: cover.tex
\nopagenumbers%Cover and inside cover
\NTGKOP\vskip4.5cm
```