

Q & A

JUST PLAIN Q&A: Of Partitioned Matrices and Doublespacing.

Alan Hoenig

This column serves as a forum in which people can seek answers to \TeX questions, with an emphasis on plain \TeX . Questions at *all* levels of difficulty are welcome. We hope to hear from you.

How Do You Typeset Partitioned Matrices?

David Handelman sent a request for aid on the typesetting of partitioned matrices. His question lay on my desk for a shamefully long time, and my apologies to him. I hope he will agree that this response is worth the wait, as a superior set of tools has appeared to make his life much easier.

David seeks to typeset partitioned matrices, which are things of this ilk:

$$(A) \quad \left(\begin{array}{c|c} A_1 & Z \\ \hline A_3 & A_4 \end{array} \right);$$

that is, rectangular arrays of expressions (matrices) pierced through by solid or dashed vertical and horizontal line segments.

Since David posed his query, Mike Spivak has created the \LaTeX macro package which handles this type of thing. At the July 1991 TUG meeting in Dedham, Mike announced the placing of this extensive package in the public domain. It can be downloaded from any of several \TeX archives.

Here's how you can typeset matrix (A). First, load in the appropriate macro and style files at the beginning of the document.

```
\input /lamstex/amstexl
\input /lamstex/lamstex
\input /lamstex/ptmatrix
```

File `amstexl` is subset of normal \LaTeX , and `lamstex` is the core set of \LaTeX macros. The partitioned matrix macros are in `ptmatrix`. In math display mode, enter

```
\left(
\partition
\matrix
A_1&Z\\
A_3&A_4
\endmatrix
\vsolid 1:02
\hsolid 1:02
```

```
\endpartition
\right)
```

where the syntax resembles that of \LaTeX with a few obvious additions. The `\vsolid` command specifies a vertical solid rule after column one extending from the top of row 0 (bottom of the matrix) to the top of row 2. `\hsolid` directs the creation of a solid horizontal line after row 1 which extends from the zeroth column (left of the matrix) to the second column.

More complicated examples are possible, such

which comes from

```
\left[\partition
\matrix
\lambda_1\\
&\ddots\\
&&\lambda_3\\
&&&\lambda_{p+1}\\
&&&&\ddots\\
&&&&&\lambda_r\\
&&&&&&0\\
&&&&&&&\ddots\\
&&&&&&&&0
\endmatrix
\vdashed 3:39
\vsolid 6:06
\hsolid 3:39
\hdashed 6:06
\endpartition\right]
```

Many additional options exist for twiddling with the position and appearance of the rules.

The \LaTeX macro package contains many powerful and useful features. It's an extension of \LaTeX with the functionality of \LaTeX (but more concise syntax). Automatic numbering schemes are very flexible, and can easily be modified for special circumstances. Extensive table-making abilities are part of the package. It's possible too to create complicated and professional commutative diagrams along with partitioned matrices. An index program comes with \LaTeX , and \LaTeX

now interfaces with BibTEX. No commands are fragile. And much, much more. You may contact the author via e-mail at spivak@math.rice.edu. Manuals for the package may be purchased from the T_EXplorators Corporation, 3701 W. Alabama, Suite 450-273, Houston, TX 77027.

Controlling Interline Spacing in T_EX and L^AT_EX

I'd like to present a limited discussion of double-spacing on behalf of the many people over the years who have wanted to double-space their T_EX and L^AT_EX documents. At first blush, you might wonder why such an anachronism is needed in this day and age, but copy editors still demand a double-spaced manuscript to ensure enough room for their red pencils. If this is why you need double-spacing, then it's reasonably easy to jury-rig important double-spacing details. If you need double-spacing because of the archaic needs of a thesis style, say, then you can embed all the proper double-space formatting in your style file. (Or perhaps the style file you use already takes it into account.)

It's not enough simply to reset `\baselineskip`, because there are plenty of situations where other parameters such as `\lineskip` control the interline spacing. A better idea is to reset all the relevant parameters by means of the `\openup` command:

```
\openup1pc
```

or

```
\openup \baselineskip
```

for example.

Even this is not enough, though. There may well be groups within which `\offinterlineskip` has been set and spacing is controlled by `\strut`'s. (This is often the case within specialized table macros.) Here is one way to extend a strut after you've `\openup`'ed the baseline.

```
\newbox\newstrutbox
\setbox\newstrutbox=
\hbox{\vrule height.7\baselineskip
depth .3\baselineskip width0pt}
\setbox\strutbox=\box\newstrutbox
```

It's easy to combine all these details into a single macro.

You may also want to increase the space above and below a display with commands like

```
\advance \abovedisplayskip by 6pt
```

or whatever, and similarly for `\abovedisplayshortskip`, `\belowdisplayskip`, and `\belowdisplayshortskip`.

But of course this will not give exact double-spacing in all circumstances. If you `\openup1pc`, then a footnote whose original baseline is 8pt will have a new baseline of 20pt (remember, $20 = 8 + 12$) rather than the 16pt that you might prefer. If you are running off a quick draft for a copy editor, you probably don't care. If this is your thesis, well, you'll have to work a bit harder with your `\footnote` macro.

For L^AT_EX users, the same considerations apply, but you must implement them in proper L^AT_EX syntax. The details are in two files that are easily ftp'able. The first, put together by S. Page and subsequently modified by J.-F. Lamy, is `double-space.sty` at `sun.soe.clarkson.edu` in the directory `pub/tex/latex-style`. The same file, with additional modifications by S. Rahtz to render it useful when using the new font selection scheme of Mittelbach and Schöpf, resides in the ymir archive in `[anonymous.tex.inputs.latex-contrib]`. Check the TUG resource directory for assistance in retrieving these (or any) files from the archives.

Department of Amplification

Bernd Raichle, Dante coordinator for `german.sty`, has pointed out that the macros I presented last time for playing around with `\fontdimen` parameters could be easily defeated by users with a sense of the macabre. (But my apologies nevertheless for not being more rigorous in my own testing.) He has taken the trouble to fortify those macros, for which I thank him, and I present them here with his comments, together with a short test.

```
\font\roman=cmr10
\font\specroman=cmr10
\roman
\newdimen\savedvalue
\savedvalue=\fontdimen2\roman
\newdimen\specialvalue
\specialvalue=19.99pt
\newif\ifreset
% changed global, indicates need to reset
\newif\ifspec
% changed local, indicates current spacing
% For normal spacing,
% call \selectspacing with \specfalse
% and switch to \roman font
%
\def\rm{\specfalse \selectspacing \roman}
% For large spacing, call \selectspacing
% with \spectrue, remember that we have
% to change the spacing after the group
% and switch to \specroman font.
%
```

```

\def\specrm{\spectrue \selectspacing
  \aftergroup\selectspacing \specroman}
% Switch to large spacing and remember
% in \ifreset that we have to switch
% back after the group.
%
\def\setdimen{%
  \fontdimen2\specroman=\specialvalue
  \global\resettrue}
% Switch to normal spacing.
% If there is a call to
% \selectspacing after the group,
% there's no need to switch.
%
\def\resetdimen{%
  \fontdimen2\specroman=\savedvalue
  \global\resetfalse}
% This macro does two things:
% 1. If we have changed to larger spacing,
%    we switch back to normal spacing
%    (only if \resettrue).
% 2. If \ifspec is true for the
%    current group we switch to
%    larger spacing. (The correct \font
%    change to \specroman is done
%    by TeX if this macro is called
%    after a group.)
%
\def\selectspacing{%
  \ifreset \resetdimen \fi
  \ifspec \setdimen \fi}

% A short test:
%
\obeylines
\rm n o r m a l
\specrm s p e c
{\specrm s p e c
  \rm n o r m a l
  \rm n o r m a l
  {\specrm s p e c}
  n o r m a l
  \specrm s p e c
}
s p e c
\specrm s p e c
\rm n o r m a l

```

◊ Alan Hoenig
 17 Bay Avenue
 Huntington, NY 11743
 (516) 385-0736
 ajhjj@cunyvms

Tutorials

Elementary Text Processing and Parsing in T_EX

— *the appreciation of tokens* —

L. Siebenmann

Background

Token lists make up the material found in the upper digestive tract of T_EX, and token list registers are very useful means to improve T_EX's digestion. I begin this tutorial by showing how to do elementary 'text processing' with token lists. Then I apply this 'token list processing' to parsing of classical keyword syntax where the keys come in any order and their fields (or arguments) are terminated by nothing more than the next keyword. This processing and parsing are simple concepts that many T_EXperts, not to mention beginners, have largely neglected. I find that T_EX assimilates them well, and hope they will see wider use in the future.

I originally explored this parsing as a possible method to fix a subtle line-breaking bug in *AMS-T_EX* bibliographies that was pointed out by Barbara Beeton in 1990. This remains a convenient example to test methods; but in truth an academic one, since Michael Downes [Do] has successfully fixed the bug (for version 2.1 of July 1991) using a very different \vbox trick proposed by Don Knuth. The general subject of parsing in T_EX language, to which this tutorial contributes two methods called (A) and (B) below, was introduced by W. Appelt in his book [App].

I want to thank Michael Downes, Victor Eijkhout, and Ron Whitney for contributing many helpful comments as this tutorial evolved. My ignorance and uncertainty about what all can or cannot be found in *The T_EXbook* was a problem that delayed this tutorial; one remedy I enjoyed using is surely of interest to readers of *TUGboat*, namely string searches in an online version of *The T_EXbook*.¹⁾ Perhaps a "HyperT_EX" soon will combine this brute force information processing with *The T_EXbook*'s beauty and readability. It will

1) The .tex file for *The T_EXbook* can for example be obtained by anonymous ftp from the archives

labrea.stanford.edu
 rusinfo.rus.uni-stuttgart.de

It fits on a diskette and can conveniently be used on a microcomputer.