

A Primer for T_EX Users

by
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Abstract

T_EX is our latest text formatter. It is designed specifically for technical text (e.g., mathematics), and produces much higher quality output than other formatters previously available. Donald Knuth designed T_EX at Stanford and published a manual *T_EX and METAFONT New Directions in Typesetting* with "Everything you need to know about T_EX." The original people who used T_EX here set up their own macro files but now Daniel Brotsky has developed a standardized macro package which does the types of formatting usually desired. This macro package will be referred to as T_Base in this document.

The aim of this memo is to help you create your first T_EX file, explain the basic commands for formatting (showing some examples) and clarify possible areas of confusion, giving pointers to the more technical documentation available for the advanced user. It is advisable for someone planning to use T_EX to get copies of: INFO;TBASE INFO, NTEXLB;TBASE ORDER, NTEXLB;SAMPLE PRESS, NTEXLB;SAMPLE TEX and a copy of Knuth's manual. This document tries *not* to duplicate information already explained in the materials just mentioned - only to clarify some areas and set the information forth in an easily digestible manner.

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FILE SET-UP

The first line of a TeX file should read `\input tbase`. The next line of the file should select the font size to be used. After this comes the text to be set.

TeX creates your output using two-dimensional units called boxes. These units have three attributes: height (above base-line), depth (below base-line), and width. As you type in text TeX builds a horizontal list of letter boxes forming a long line. This line of boxes goes on endlessly until TeX is ready to form a paragraph and has to paste-up these boxes to fill the paragraph. TeX first divides the assembled extra-long line into page size lines and then stacks them like a vertical list to fill the paragraph. The paragraphs are then arranged to fill the page. The user need only be aware of this box concept when trying to leave space or centering a heading etc. The command which leaves some vertical space is `\yskip` and the command which leaves some horizontal space is `\xskip`.

There are a few important things to remember in creating a TeX file. First, be sure the file ends with `\done` (this tells TeX you are finished and to output a press file); second, do not use tabs within the file. (TeX is set up to treat a tab, a line feed and a carriage return all as a single space. There is an EMACS command M-X Untabify which will convert all tabs to spaces in the buffer.) Finally, command names in must be one word. In order to allow more flexibility for the user Tbase treats the underscore character (`_`) as any other character, so it can be used to join two words together. (To actually create an underline in your text the command `\ul` is used with the text to be underlined set off as an argument in braces.)

FONTS

There are three types of text fonts available in two basic sizes in TeX.¹ They are Computer Modern, Helvetica, and Times Roman. They can be used in 10 point or in 12 point. They can be loaded into your file on the line after `\input tbase` with one of `\cmcm_ten`, `\hehe_ten` or `\trtr_ten`. The chart following (from NTEXLB;TBASE ORDER) shows the possible fonts to use in Tbase.

| Macro | Text Family | Title Family | Fixed Family | Text Size |
|-----------------------------|-----------------|-----------------|--------------|-----------|
| <code>\cmcm_ten</code> | Computer Modern | Computer Modern | <none> | 10pt |
| <code>\cmcm_twelve</code> | Computer Modern | Computer Modern | <none> | 12pt |
| <code>\cmhe_ten</code> | Computer Modern | Helvetica | <none> | 10pt |
| <code>\cmhe_twelve</code> | Computer Modern | Helvetica | <none> | 12pt |
| <code>\cmcntt_ten</code> | Computer Modern | Computer Modern | Typewriter | 10pt |
| <code>\cmcntt_twelve</code> | Computer Modern | Computer Modern | Typewriter | 12pt |
| <code>\cmhett_ten</code> | Computer Modern | Helvetica | Typewriter | 10pt |
| <code>\cmhett_twelve</code> | Computer Modern | Helvetica | Typewriter | 12pt |
| <code>\hehe_ten</code> | Helvetica | Helvetica | <none> | 10pt |
| <code>\hehe_twelve</code> | Helvetica | Helvetica | <none> | 12pt |
| <code>\hehett_ten</code> | Helvetica | Helvetica | Typewriter | 10pt |
| <code>\hehett_twelve</code> | Helvetica | Helvetica | Typewriter | 12pt |
| <code>\trtr_ten</code> | Times Roman | Times Roman | <none> | 10pt |
| <code>\trtr_twelve</code> | Times Roman | Times Roman | <none> | 12pt |
| <code>\trhe_ten</code> | Times Roman | Helvetica | <none> | 10pt |
| <code>\trhe_twelve</code> | Times Roman | Helvetica | <none> | 12pt |
| <code>\trtrga_ten</code> | Times Roman | Times Roman | Gacha | 10pt |
| <code>\trtrga_twelve</code> | Times Roman | Times Roman | Gacha | 12pt |
| <code>\trhega_ten</code> | Times Roman | Helvetica | Gacha | 10pt |
| <code>\trhega_twelve</code> | Times Roman | Helvetica | Gacha | 12pt |

Also available are italic and bold type in the same font size. One way to specify sizes in creating a document is to use commands that specify comparative size: tiny, small, large, or huge. The

¹For more detailed information about fonts (e.g. size, face, and family) read INFO:TBASE INFO - general font node.

commands for these variations are `\tiny`, `\small`, `\large`, or `\huge`. \TeX selects the right font size according to the text size chosen at the beginning of your file. Therefore, if the main body of the text is in 10 point, tiny is 8 point, small 9 point, large 12 point, and huge 14 point. You can also specify the type of font to use for a word or group of words by using braces with the command for bold or italic inside (e.g., `{\it italic,}\{\bf bold}` = *italic*, **bold**). For more information see NTEXLB; SAMPLE PRESS, Font Section.

In addition to the fonts described above it is also possible to select a combination of two styles for your document. For example Computer Modern can be used for the text and Helvetica for titles or Times Roman for the text and Helvetica for titles. This is all listed for you in NTEXLB;TBASE ORDER and SAMPLE PRESS. Files using only Computer Modern or only Times Roman, can be \TeX -ed faster by using the programs TEXCM and TEXTR, respectively, instead of the program XTEX.

GROUPS, COMMANDS and ARGUMENTS

The idea of 'Groups' is very important in \TeX and even more so in \TeX base \TeX . There are very few commands to undo the effects of other commands. Groups are specified by `{}` (braces). You can restrict the effects of a command by placing it within braces. For example typing `{\it foo}` italicizes *foo* and does not affect words outside the braces.

Commands in \TeX follow a control symbol `\` and can occur anywhere in the text. Arguments to commands are set off in braces `{}`. A space terminates a control sequence. \TeX ignores spaces after control sequences.

Two carriage returns are interpreted as a paragraph command by \TeX . You could get the same result with a conventional `\par` command. Left margins can be controlled with the command `\pshift`. This brings in the left margin one paragraph indent width. The command `\dshift` brings in the left margin one display indent width. For more specific control over margins read the margin control section in NTEXLB;SAMPLE PRESS.

Commands with more than one argument should not use a space between the arguments. For more detail read the INFO;TBASE INFO macro invocation mode.

DISPLAYS

A "display" is a section of input which is set-off from the surrounding paragraph. \TeX base is aware of three types of displays. These are textual displays, block displays and math displays. \TeX base is designed not to make a page break in the middle of a display. For more information on displays read INFO;TBASE INFO and NTEXLB;TBASE ORDER.

MATHEMATICS

The signal for mathematics in \TeX is `$`. You must remember to signal at the *beginning* and at the *end* of every math section. When \TeX sees `$` it knows to use standard math conventions (e.g. letters in italic and `'` means a minus sign). There is a table of the math control sequences in Knuth's book. These include Greek letters and mathematical symbols. These control sequences can *only* be used in math mode.

Subscripts and superscripts are frequently used mathematical concepts. These are requested by a down arrow (or `\A`) and an up arrow (or `\K`) respectively. If more than one character is to be sub or super scripted the symbols must be placed in brackets. The symbols $x_i + y^{24}$ are written `\Ax\K{24}`.

Alignment is frequently necessary in mathematics. The command `\eqalign` tells \TeX to line up text according to `\V`'s inserted in the text (but which do not appear in the output).

LISTS or TAGGED PARAGRAPHS

Paragraphs come in a variety of styles in \TeX . These are explained with examples in NTEXLB;SAMPLE PRESS. This document was set with printers paragraph `\pp` being called for. The default in \TeX base is a flush paragraph (no indentation).

REFERENCES

A little later this year (probably this summer) special macros for references will be added to \TeX . For the present you can use a tagged paragraph.

FOOTNOTES

Footnotes are treated in the same way as any other argument or group. You just type
`\foot {and the info to be footnoted }.`

CUSTOMIZING \TeX

To customize \TeX to your particular preferences, read the set-up section of INFO;TBASE INFO. Registers may also be used to make the sort of text you customarily use easier to handle. For more information on this read the Register node of INFO;TBASE INFO.

VERTICAL and HORIZONTAL SPACE

The vertical axis of a graph is normally called y and the horizontal axis x . \TeX uses these labels for space commands relating to vertical and horizontal space. `\yskip` is used to create a vertical space of one line in the main font - no dimension follows the command. `\yyskip` leaves more vertical space and is also followed by no dimension. `\xxskip` may also be used within a paragraph (in horizontal mode) and leaves the space of 1 or 2 capital M's in the main font. For more detailed information read SAMPLE PRESS or the \TeX manual. For a lot of vertical space use the command `\vskip` followed by a space and then a number with in for inches. If \TeX decides to break a page where this command is the command is ignored.

Just for your information and better understanding of \TeX it is interesting to know \TeX works with a system of boxes and glue. A file begins in vertical mode. When you begin to type text you automatically go into horizontal mode. Each letter is a separate box surrounded by glue. A period has more glue around it than an individual letter has. A carriage return is the same as a space and indicates the same amount of glue as a space does. Multiple spaces are treated as one space.

RUNNING \TeX

When your file is complete and you are ready to run \TeX , you should leave the editor and go to top level. Now you type `xtex†K`.² This starts up \TeX while at the same time killing any other \TeX job you may have running. When the prompt symbol (*) appears, you type `\input <file-name>` (carriage return). \TeX now loads and reads the macros you have listed in the first lines of your file. As \TeX works its way through the file it uses the TV screen to print out errors and when finished it prints "end of SAIL execution".

ERROR MESSAGES

The most frequent error a beginner gets is "you can't do that in horizontal mode" or "too many braces" and so on. The easiest way to deal with such an error is to press carriage return, telling \TeX to ignore the error and proceed to process the file. You will then get some sort of press file made but will have to go back to the original file to correct your input and get what you want. The other way to proceed is to tell \TeX to stop processing the file and exit. You do this by typing `x`. \TeX asks you again just to be sure and you must type `x` again and then exits, aborting its processing.

DOCUMENTATION

A list of all possible \TeX commands exists in NTEXLB;TBASE ORDER. An on-line information guide to \TeX is available in INFO;TBASE INFO. You can type `M-X INFO TBASE` in EMACS or just `INFO TBASE` to ITS. Direct mail about bugs, problems, compliments etc. to DCB@AI.

²Another option was mentioned earlier in the section on FONTS.