

What You Should Know About $\text{T}_{\text{E}}\text{X}$ and $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$

Melody Covington
Covington Innovations
706 549-4633

$\text{T}_{\text{E}}\text{X}$ and $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ are the most advanced technology available for typesetting scholarly books. Many of the books published by Addison-Wesley, Prentice-Hall, and Cambridge University Press are typeset with $\text{T}_{\text{E}}\text{X}$ and $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$. Mathematics books are rarely typeset any other way.

$\text{T}_{\text{E}}\text{X}$, the automated typesetter, is the result of a twenty-year project by Donald Knuth of Stanford University, the inventor of computer typesetting as we know it. Knuth collaborated with Hermann Zapf to become an expert typographer, and his knowledge of typesetting is built into the program.

Instead of relying on the user to move things around on the screen, $\text{T}_{\text{E}}\text{X}$ automatically tries thousands of combinations of line breaks and page breaks on every job, picking the one that gives the best results. Detailed knowledge of kerning, hyphenation, and mathematical notation is built into $\text{T}_{\text{E}}\text{X}$.

The name $\text{T}_{\text{E}}\text{X}$ consists of the Greek letters tau, epsilon, and chi and is pronounced "tekh."

$\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$, the automated layout artist, is the creation of Leslie Lamport, also of Stanford, and has been in wide use for more than ten years, undergoing continuous refinement. $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ is a software package that tells $\text{T}_{\text{E}}\text{X}$ how to lay out books in several standard formats. This includes automated figure placement, cross-referencing, and indexing. $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ enforces a perfectly consistent layout and style.

$\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ is radically different from office-type word processors or page layout programs such as PageMaker. The difference is this: Other programs give you a blank page on which you place type and other objects, but $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ actually lays out the pages for you in accordance with your specifications. It's like the difference between buying a typewriter and hiring a typist.

T_EX and L^AT_EX are at their best when typesetting a book or series of books with a standard design. Many publishers have just two or three L^AT_EX book designs, which they use for all their books. Others make minor or major customizations for each book typeset.

Implementing a new book design in L^AT_EX is a sizable amount of work because it involves modifying software. For this reason, I cannot supply sample pages of a book design “on spec.” Once the design is implemented, the computer does the rest, and relatively little human intervention is needed to typeset the entire book.

You can save money by using a book design you have used before, or a minor modification of a standard one. Since L^AT_EX has considerable typographic expertise built in, *you need not specify everything*. Whenever you leave something unspecified, L^AT_EX knows how to conform to standard practice. You do not need to specify the exact appearance of indented and enumerated lists, footnotes, and the like; L^AT_EX has reasonable defaults built in.

Indeed, *it can be a mistake to specify too much*. If you don’t specify the size of a table, L^AT_EX will automatically size it to fit its contents. If you start specifying all the column widths, you’re doing unnecessary work, and you’ll prevent L^AT_EX from coming up with what might well have been a more pleasing layout.

Authors often like to use L^AT_EX for books that contain mathematical formulas. If an author is preparing a manuscript with L^AT_EX please ask for my brochure of instructions to authors. They will save work for the author, editor, and typesetter.

In the absence of the brochure, instruct authors to use L^AT_EX 2.09 or L^AT_EX 2_ε and use high-level commands such as `chapter` and `section` rather than working out layouts for themselves.

Fonts available include all Adobe Type 1 fonts as well as T_EX’s own built-in fonts. Particularly noteworthy is `Computer Modern Roman`, a favorite for computer program listings because it is narrower and more legible than `Courier`. It is available only with T_EX.

Accents for foreign languages and phonetic symbols are available.

L^AT_EX files are of two kinds. The text of the book is a plain ASCII file with markup codes inserted, for example:

```

\chapter{First Steps in Calculus}
\section{Derivatives}
The derivative of a function is its rate of change.
For example, given the function  $y = f(x)$ , the
derivative  $dy/dx$  is the rate of change of  $y$ 
relative to  $x$ , or  $\lim_{\Delta x \rightarrow 0} \Delta y$ .

```

Note that instead of typing a chapter or section heading, the author or typist uses the commands `\chapter` and `\section`. Likewise, instead of trying to reproduce mathematical formulas on the screen, the author types them in L^AT_EX's special language, using commands such as `\Delta`.

This method of typing has three advantages:

- L^AT_EX files can be typed, viewed, and edited with any file editor or word processor.
- You don't have to worry about whether subtle details of typography are visible on the screen. Instead, you type L^AT_EX commands and L^AT_EX will set exactly what you tell it to.
- A completely separate file called a *style sheet* (actually a computer program) defines what the `\chapter` and `\section` commands, and their kin, actually do. The typist does not have to worry about the physical layout or consistency of chapter or section headings on the screen.

The third of these is the most important. The typist doesn't have to worry about keeping style, margins, and layout consistent from one page or chapter to the next. In fact, the typist *can't* set margins – that is left entirely to the style sheet! If you typeset ten books with the same style sheet, they are guaranteed to look the same.

Figures are placed automatically. It is possible to tie figures to specific places in the text, but L^AT_EX also knows how to handle “floats” — floating figures and tables that are placed where convenient, separated from text by a line or some blank space, as is standard practice in scholarly books.

Figure numbering is done automatically, and in order to refer to them in the text, figures can be given names that will automatically be replaced by the correct numbers.

L^AT_EX is portable. L^AT_EX input files and style sheets are identical, and produce identical results, whether L^AT_EX is running on a PC, Macintosh, UNIX system, VAX, IBM mainframe, or something else.

Usual practice is to deliver the results of the typesetting in the form of PostScript files. These files are also completely portable; they contain all needed fonts within them and will produce identical printouts on any PostScript printer or phototypesetter, regardless of the type of computer to which it is attached.