

How to Create a T_EX Journal: A Personal Journey

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Abstract

When TUG was first formed, the Internet wasn't generally available; the logical channel for communication with and among TUG's members was on paper. So *TUGboat* came into being.

As T_EX has matured, the needs of the community have evolved, but paper is still a logical medium for showcasing a typesetting tool.

This talk will introduce high- and low-lights in the history of *TUGboat*, some reasons for choosing its particular format and mode of presentation, several experiments, and lots of my personal experiences as editor.

Editor: A person employed on a newspaper whose business it is to separate the wheat from the chaff, and to see that the chaff is printed.

Elbert Hubbard

Although this epithet was directed at newspaper editors, we've all read material in print that would have been better off left unpublished. As long-time editor of *TUGboat*, I'm sure I've let some chaff slip through, however much I've tried to keep the wheat content high.

I've mostly enjoyed my tenure as editor. However, without the help of a lot of people along the way, we never would have had such a long and interesting voyage. I'll try to give credit where credit is due along the way.

Let's start at the beginning, and proceed from the outside in.

How I got involved in this madness

TUG came into existence in February 1980 at a meeting held at Stanford University. About 50 people attended. One of the decisions taken at that meeting was to "organize a newsletter". From the minutes of the first steering committee meeting:¹

Robert Welland agreed to edit the newsletter. The first newsletter will have a report of the meeting and will be distributed free by the AMS upon inquiry about T_EX. Subsequent newsletters will be by subscription only.

Bob Welland, a math professor at Northeastern University, had no production facilities—but the AMS

did, and the AMS had just undertaken projects to use T_EX to prepare its administrative publications and to develop an input system (AMS-T_EX) that would allow mathematicians (or their secretaries) to prepare manuscripts that could be used directly in the composition of AMS journals. This meant that someone was needed in-house at AMS to prepare files

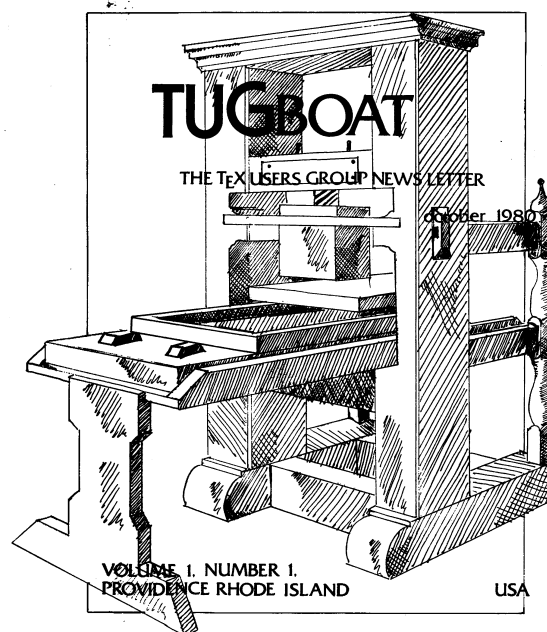


Figure 1: The very first issue—the cover

¹ *TUGboat*, 1:1 (1980), p. 15.

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Figure 2: The very first issue — the back cover

The subject of mathematical printing has never been methodically treated, and many details are left to the compositor which should be attended to by the mathematician. Until some mathematician shall turn printer, or some printer mathematician, it is hardly to be hoped that this subject will be properly treated.

Augustus de Morgan
Penny Cyclopaedia (1842),
on 'Symbols'

TUGBOAT

THE T_EX USERS GROUP NEWSLETTER
EDITOR ROBERT WELLAND

VOLUME 1, NUMBER 1 OCTOBER 1980
PROVIDENCE RHODE ISLAND U.S.A.

Figure 3: The very first issue — the title page

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Figure 4: TUGboat 4:1 — the back cover

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Figure 5: TUGboat 4:1 — the cover

The perpetrator of this assignment was Sam Whidden, head of the AMS Information Systems Development department, and the founding treasurer of T_EX Users Group. He was also my boss. I didn't have a chance.

Sam was also responsible for the name *TUGboat*—the vessel that would convey the organization, TUG, through twisty little passages.

The covers and title page

The first issue of *TUGboat* appeared in October 1980. Bob Welland found an old press that was allegedly a reproduction of the one used by Gutenberg. He made a pen-and-ink drawing that has graced the cover ever since, going through various adaptations:

- For the first issue, a photograph was made of the background, and an overlay was prepared on clear film using rub-on type for the text (Fig. 1). The contents list was placed on cover 4 (Fig. 2), a practice that has continued with only one exception.
- The title page used the same pasted-up “*TUGboat*”, but everything else was set with T_EX, including an epigraph (Fig. 3), a practice modeled on use of quotes in *The T_EXbook*. Finding suitable quotes has provided me considerable amusement, as well as occasional panic attacks when a deadline was approaching, and nothing had turned up. (I cheerfully accept suggestions for quotes, and must thank Don Knuth in particular for his many contributions.) I believe I've received more comments about the epigraphs than about almost anything else; I'm not sure what this is supposed to imply, but it does show that people at least open the cover and look at the title page.
- In the summer of 1982, I attended a workshop at RISD (the Rhode Island School of Design) on the topic “Design with type”. For one of my projects, I decided to redesign the table of contents—I really don't like the dotted effect. I had two goals (in addition to improving the appearance): to strengthen the association between page number and what appears on the page, and to subdivide the contents into logical subject areas. The new cover 4 design debuted with the first issue of 1983 (Fig. 4). This issue was also the first to have all the cover text (except for the name *TUGboat*) prepared in T_EX (Fig. 5), with a “pseudo-spine”—rotated text identifying the issue running from top to bottom near the stapled edge. (Later, when issues were large enough to have a real spine, this text was moved there.)

- Bob Welland “retired” from the editor's post as of the end of the 1983 academic year, and, with no obvious candidates clamoring to take over, I became editor with issue 4:2. (I had been doing most of the production work, after all.) I celebrated this occasion by omitting the name of the publication from the title page (Fig. 6). Sigh.

Everyone knows that debugging is twice as hard as writing a program in the first place. So if you're as clever as you can be when you write it, how will you ever debug it?
 Brian W. Kernighan and P. J. Plauger
The Elements of Programming Style,
 Second edition, McGraw-Hill, 1978.

THE T_EX USERS GROUP NEWSLETTER
 EDITOR BARBARA BEETON

VOLUME 4, NUMBER 2 • SEPTEMBER 1983
 PROVIDENCE • RHODE ISLAND • U.S.A.

Figure 6: *TUGboat* 4:2—the title page

- By 1984, sentiment had been expressed that *TUGboat* should be a representative example of high quality T_EX composition. Dave Kellerman and Barry Smith volunteered to guest-edit and produce an issue demonstrating this capability. They commissioned a designer and a special cover drawing for this issue, which appeared as the first issue of 1986 (Fig. 7). Along with the change in format, the subtitle was upgraded from “The T_EX Users Group Newsletter” to “The Communications of the T_EX Users Group”. The content of the issue was set to a grid, which may be apparent in the layout of the title page (Fig. 8). To avoid the appearance of clutter, the contents list was omitted from cover 4. (Although I understand and sympathize with the goal, I've found the lack of a T-of-C inconvenient, and have taped one to the

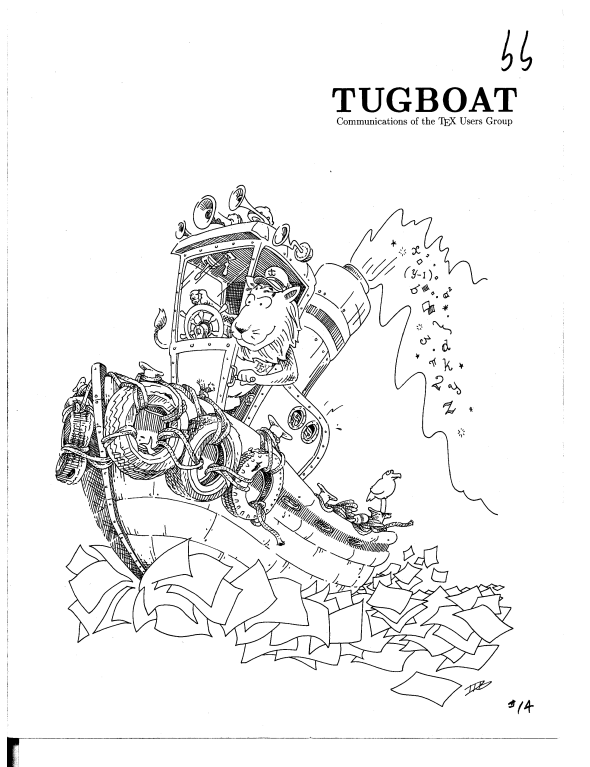


Figure 7: TUGboat 7:1 — the cover of the guest-edited issue



Figure 8: TUGboat 7:1 — the title page

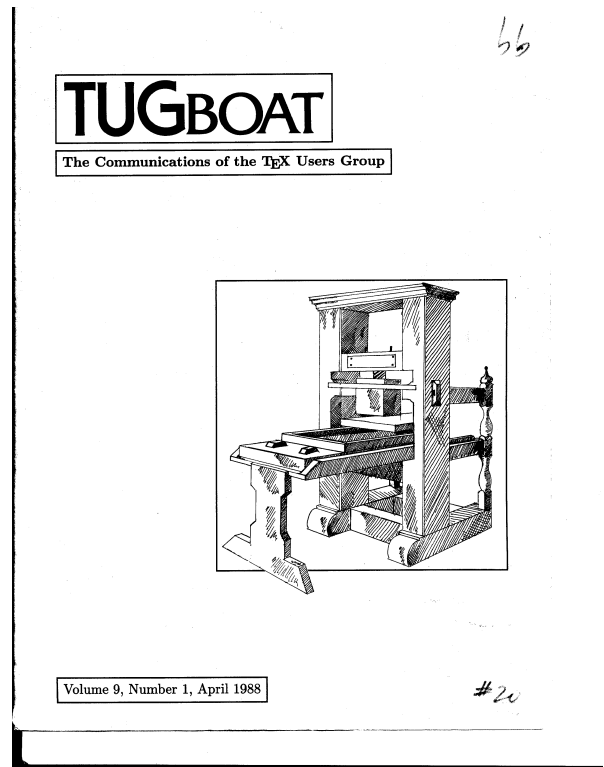


Figure 9: TUGboat 9:1 — a new look for the cover

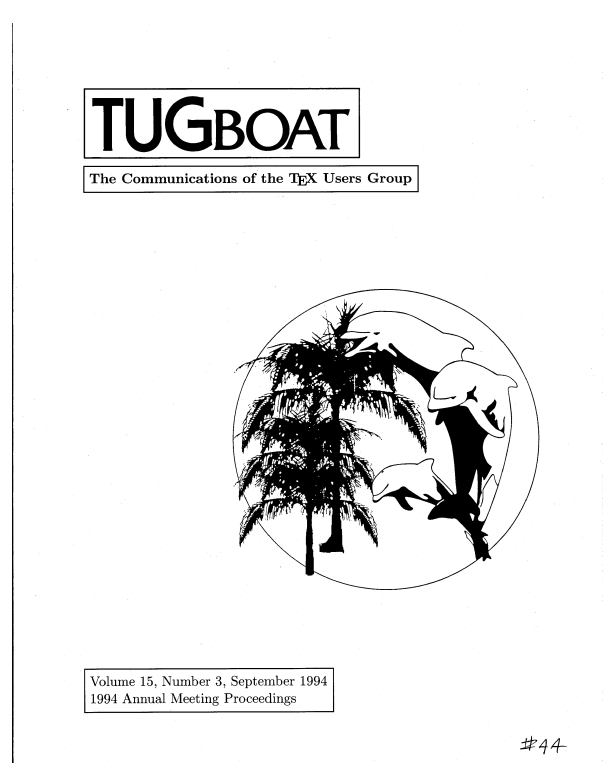


Figure 10: TUGboat 15:3 — and a new look for proceedings issues

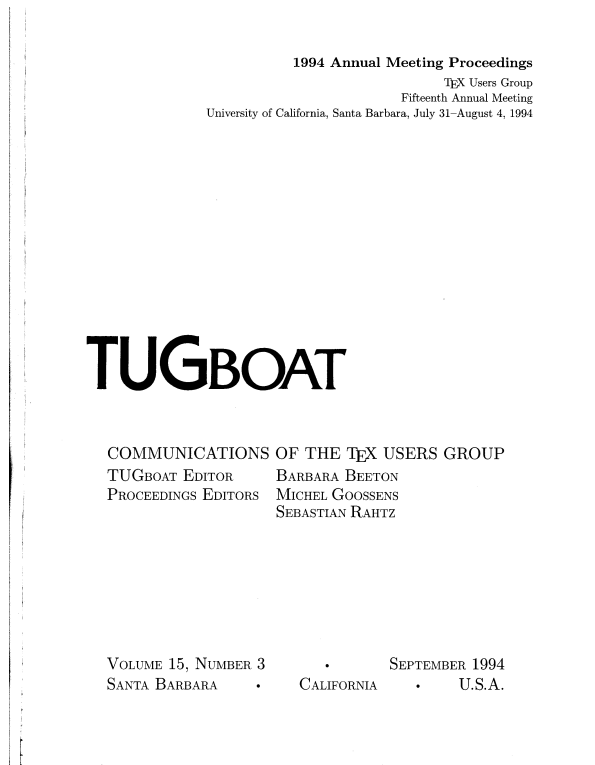


Figure 11: *TUGboat* 15:3—a proceedings issue title page

issue for ease of reference.) More about the content of this issue later.

- The covers and contents reverted to the previous layout with the next issue, and nothing much changed until the first issue of 1988, when Alan Wittbecker, an employee at the newly-relocated TUG office, hired to assist with *TUGboat* production (among other things), reformatted the front cover (Fig. 9), reducing the size of the press drawing and boxing all the other cover elements. Note, however, that the cover drawing and the *TUGboat* name were still pasted up manually for each issue.
- With the first issue of 1989, *TUGboat* permanently got a real spine! No more guessing which one to pull out from a growing run of anonymous grayish covers.
- It gradually became a tradition for annual meetings to have a drawing representing the meeting location. Beginning with the proceedings of the 1994 meeting in Santa Barbara, California, this drawing replaced the press on the cover (Fig. 10). The title page of a proceedings issue is also modified (Fig. 11), substituting the location of the meeting for the epigraph, and

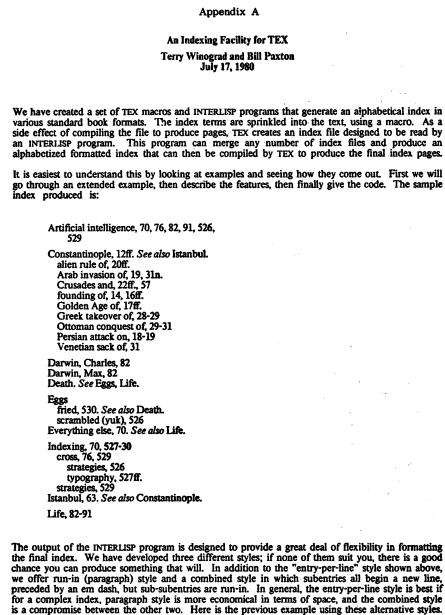


Figure 12: *TUGboat* 1:1, an item reproduced directly from author copy

identifying the proceedings editors who are responsible for the production while I get to rest. This practice continues to the present day.

General format and layout

TUGboat is formatted for US letter-size paper, 8.5 × 11", although it is sometimes trimmed a bit smaller. (The guest-edited issue and several that followed were 8 × 10.5".) This was established at the first issue.

There were several reasons for this decision. First, in the US, authors are used to preparing manuscripts on the paper that is easiest to obtain, and that's letter size. We were hoping to encourage authors to prepare submissions that would be ready to use, and indeed, the first issue contains some items reproduced directly from author-submitted copy (Fig. 12).

The capacity of the press was also a consideration, as was the size of shelves and files. A final product formatted to letter size is readily accommodated by the presses in the AMS print shop; printing is actually done on larger sheets that are then folded and gathered. Anything smaller must be trimmed, which can result in considerable waste.

The material that we expected to publish initially included reports on T_EX development, news

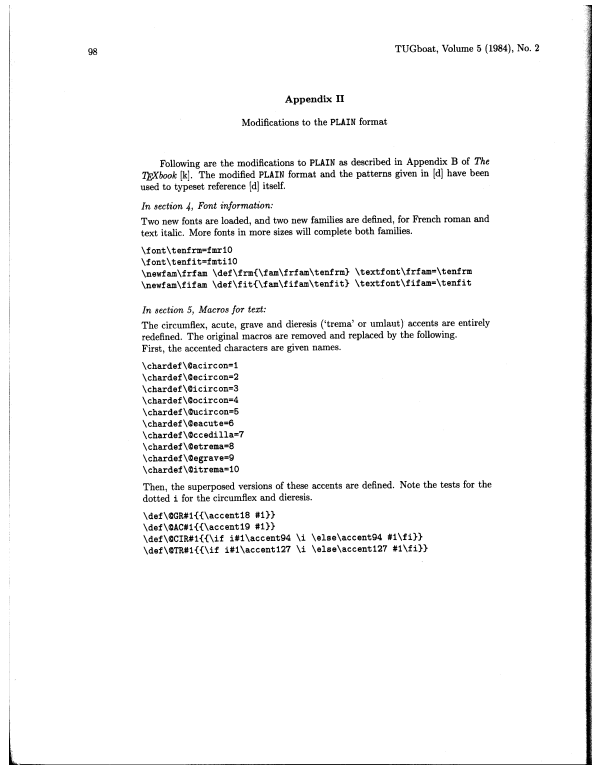


Figure 13: TUGboat 5:2, a single-column page

```

call asend(0,1,0,6,3,4); % 6 is almost the right direction
call online(3,5,7);
z6 = 37[rs,z2]; % 6 to 8 is tangent on top curve
z8 = 37[rs,z2]; % 6 to 8 is tangent on top curve
call online(6,8,2); % 8 is the tangent point
call toward((dotrd(1,.57))[(z8 - y12) - 1,7,4,9]); % 9 is 4 tangent (divergence near n)
call fpoint(4,9,10,11,48 cf dotw - 5,64); % 11 is point of inflection
if z6 < z4;
z11 = z11,y11 = y11; % we are not going to move point 11
call toward(cf dotw; 2,6,100); % 106 is new version of 6
call toward(-cf dotw + 19dotw),10,11,112); % 112 is new version of 12
call sta(106,112,111);
if acc = [qprt 3]; new z12; y12; % free either 106 or 112 to move out
call online(10,11,112);
else: new z106, y106;
call online(2,6,106);
fi;
(z10 - z11 - y11 - y10)(z106 - z112)
+ (z10 - z11 + y10 - y11)(y106 - y112) = 0; % make 106 112 10 a 45 degree angle
z206 = dotrd[z106,z0]; z206 = dotrd[y106,y0]; % 206 is compromise version of 6
z212 = dotrd[z12,z10]; z212 = dotrd[y12,y10]; % 212 is compromise version of 12
call toward(cf dotw; 212,10,100); % 100 is new version of 0
z120 = z100; y120 = y100; % 120=100 since point 0 doesn't split
call toward(cf dotw; 212,206,121); % 101 and 121 are new versions of 1
call toward(cf dotw; 206,212,101); % 101 and 121 are new versions of 1
else:
call toward(cf dotw; 10,11,111); % 111 is new version of 11;
call intersect(10,8,8,90);
call fdist(10,90);
call toward(-dist,50,8,112); % 112 is new version of 12
z206 = z6; y206 = y6; % make 206 same as the original 6
z212 = dotrd[z12,z10]; z212 = dotrd[y12,y10]; % 212 is compromise version of 12
call toward(cf dotw; 10,212,100);
call toward(cf dotw; 212,10,120); % 100 and 120 are new versions of 0
call toward(cf dotw; 212,206,101); % 101 and 120 are new versions of 0
z121 = z101; y121 = y101; % 121=101 since point 1 doesn't split
fi;
z200 = dotrd[z100,(2/7)[z10,z12]];
y200 = dotrd[y100,(2/7)[y10,y12]]; % 200 and 220 are compromises for 0
z220 = dotrd[z120,(2/7)[z10,z12]];
y220 = dotrd[y120,(2/7)[y10,y12]];
z201 = dotrd[z101,tmf[z100,z12]];
y201 = dotrd[y101,tmf[z100,z12]]; % 201 and 221 are compromises for 1
z221 = dotrd[z121,tmf[z100,z12]];
y221 = dotrd[y121,tmf[z100,z12]];
1 ddraw 3(z4 - z3,38 - z3) . 2(z6 - z2,38 - z2) . 201(z12 - z201,y12 - y201)
. 211(z21 - z206,y21 - y206) . 221
4(z6 - z4,39 - y4) . 111(z4 - z11,y4 - y11) . 200(z12 - z200,y12 - y200)
. 220(z20 - z10,y20 - y10) . 221(z206 - z221,y206 - y221).

```

Figure 15: TUGboat 5:2, full-width code in the style of The METAFONTbook

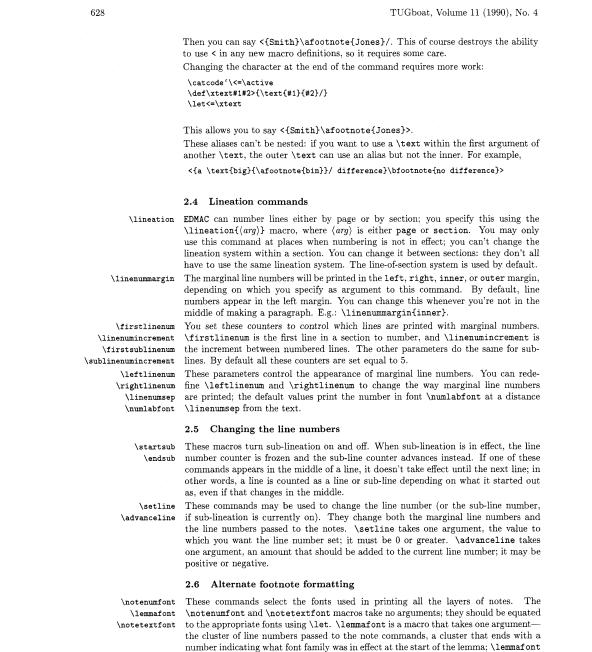


Figure 14: TUGboat 11:4, a doc style page

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E The ISO-Latin Entity Set
To have an idea of how character entity sets are defined in practice, below is shown the file corresponding
to Latin1 (standard ISO/IEC 8859-1), available as SGML public entity ISOlat1 with ISO 8879.
1 <!-- (C) International Organization for Standardization 1995
2 Permission to copy in any form is granted for use with
3 conforming SGML systems and applications as defined in
4 ISO 8879, provided the notice is included on all copies.
5 -->
6 Character entity set. Typical invocation:
7 <ENTITY PUBLIC
8 "ISO 8859-1/ISO/ENTITIES Added Latin 1/ENT"
9 ISOlat1;
10 -->
11 <ENTITY acute SMATA [acute] <--small a, acute accent-->
12 <ENTITY acute SMATA [acute] <--capital A, acute accent-->
13 <ENTITY acute SMATA [acute] <--small a, circumflex accent-->
14 <ENTITY acute SMATA [acute] <--capital A, circumflex accent-->
15 <ENTITY grave SMATA [grave] <--small a, grave accent-->
16 <ENTITY grave SMATA [grave] <--capital A, grave accent-->
17 <ENTITY ring SMATA [ring] <--small a, ring-->
18 <ENTITY ring SMATA [ring] <--capital A, ring-->
19 <ENTITY slash SMATA [slash] <--small a, slash-->
20 <ENTITY slash SMATA [slash] <--capital A, slash-->
21 <ENTITY uml SMATA [uml] <--small u, dieresis or silent mark-->
22 <ENTITY uml SMATA [uml] <--capital U, dieresis or silent mark-->
23 <ENTITY ring SMATA [ring] <--small a, ring with ligature-->
24 <ENTITY ring SMATA [ring] <--capital A, ring with ligature-->
25 <ENTITY cedil SMATA [cedil] <--small c, cedilla-->
26 <ENTITY cedil SMATA [cedil] <--capital C, cedilla-->
27 <ENTITY eth SMATA [eth] <--small eth, Icelandic-->
28 <ENTITY eth SMATA [eth] <--capital Eth, Icelandic-->
29 <ENTITY acute SMATA [acute] <--small a, acute accent-->
30 <ENTITY acute SMATA [acute] <--capital A, acute accent-->
31 <ENTITY acute SMATA [acute] <--small a, circumflex accent-->
32 <ENTITY acute SMATA [acute] <--capital A, circumflex accent-->
33 <ENTITY grave SMATA [grave] <--small a, grave accent-->
34 <ENTITY grave SMATA [grave] <--capital A, grave accent-->
35 <ENTITY uml SMATA [uml] <--small u, dieresis or silent mark-->
36 <ENTITY uml SMATA [uml] <--capital U, dieresis or silent mark-->
37 <ENTITY acute SMATA [acute] <--small a, acute accent-->
38 <ENTITY acute SMATA [acute] <--capital A, acute accent-->
39 <ENTITY acute SMATA [acute] <--small a, circumflex accent-->
40 <ENTITY acute SMATA [acute] <--capital A, circumflex accent-->
41 <ENTITY grave SMATA [grave] <--small a, grave accent-->
42 <ENTITY grave SMATA [grave] <--capital A, grave accent-->
43 <ENTITY slash SMATA [slash] <--small a, slash-->
44 <ENTITY slash SMATA [slash] <--capital A, slash-->
45 <ENTITY uml SMATA [uml] <--small u, dieresis or silent mark-->
46 <ENTITY uml SMATA [uml] <--capital U, dieresis or silent mark-->
47 <ENTITY acute SMATA [acute] <--small a, acute accent-->
48 <ENTITY acute SMATA [acute] <--capital A, acute accent-->
49 <ENTITY acute SMATA [acute] <--small a, circumflex accent-->
50 <ENTITY acute SMATA [acute] <--capital A, circumflex accent-->
51 <ENTITY grave SMATA [grave] <--small a, grave accent-->
52 <ENTITY grave SMATA [grave] <--capital A, grave accent-->
53 <ENTITY slash SMATA [slash] <--small a, slash-->
54 <ENTITY slash SMATA [slash] <--capital A, slash-->
55 <ENTITY uml SMATA [uml] <--small u, dieresis or silent mark-->
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69 <ENTITY acute SMATA [acute] <--small a, circumflex accent-->
70 <ENTITY acute SMATA [acute] <--capital A, circumflex accent-->
71 <ENTITY grave SMATA [grave] <--small a, grave accent-->
72 <ENTITY grave SMATA [grave] <--capital A, grave accent-->
73 <ENTITY slash SMATA [slash] <--small a, slash-->

```

Figure 16: TUGboat 16:2—code takes up space

B Catalogue of Packages

Table 2: T_EX Live packages

Package	Collection	Description
2up	generic3	Allows one to print a document two-up, with considerable flexibility as to paper size and layout. It produces a standard dvi file, and does not involve an additional dvi or PostScript filter. It should work with most T _E X macro packages.
alposter	latex3	A L ^A T _E X class providing fonts in sizes of 12pt up to 107pt. It also makes sure that in math formulas the symbols appear in the right size. This package also creates a PostScript header file for dvips which assures that the poster will be printed in the right size. Sizes DIN A0, DIN A1, DIN A2 and DIN A3 are also supported.
a4	latex3	Originally for L ^A T _E X 2.09 but updated for L ^A T _E X 2 _ε . Mostly superseded by native L ^A T _E X 2 _ε support for A4 paper but defines the extra option of widemargins. The geometry package is usually what you are looking for though.
aaai	latex3	AAAI style.
accents	latex3	A package for multiple accents with nice features concerning creation of accents and placement of scripts.
achemos	latex3	L ^A T _E X and B ^H L ^A T _E X style for American Chemical Society.
acronym	latex3	This package ensures that all acronyms used in the text are spelled out in full at least once. It also provides an environment to build a list of acronyms.
adeflists	latex3	A class that satisfies the requirements of the Australian Defence Force Academy (a college of the University of New South Wales).
adriat	latex3	Using address lists in L ^A T _E X.
ae	font3	A set of virtual fonts which simulate T1 coded fonts using the standard CM fonts. The package is called AE fonts (for Almost European). The main use of the package is to produce PDF files using Type1 versions of the CM fonts instead of the bitmapped EC fonts.
aguplus	latex3	Styles for American Geophysical Union.
aias	latex3	A bundle of L ^A T _E X/B ^H L ^A T _E X files and sample documents to aid those producing papers and journal articles according to the guidelines of the American Institute of Aeronautics and Astronautics (AIAA).
alates	format3	An extended L ^A T _E X with better modularity.
alg	latex3	L ^A T _E X environment for typesetting algorithms.
algorithmx	latex3	Defines a floating algorithm environment designed to work with the algorithmic package.
alpha-ocf2	systems1	System binaries for Alpha running OSF 3.2.
alpha-ocf4	systems1	System binaries for Alpha running OSF 4.0.
allfont	latex3	A generalised replacement for some parts of gensf and mfnfs. Similar to pdfont with the PostScript specific removed.
amiga	systems1	An Amiga port of the complete UNIX-T _E X system.
amofonts	am2	A set of miscellaneous T _E X fonts from the American Mathematical Society that augment the standard set normally distributed with T _E X. The set includes: Extra mathematical symbols; Blackboard bold letters (uppercase only); Fraktur letters; Subscript sizes of bold math italic and bold Greek letters; Subscript sizes of large symbols such as sum and product; Added sizes of the Computer Modern small caps font; Cyrillic fonts (from the University of Washington); Baler math fonts.
amstex	am2	A collection of related files that are distributed together by the American Mathematical Society. These files are miscellaneous enhancements to L ^A T _E X whose aim is superior information structure of mathematical documents and superior printed output.
answers	latex3	American Mathematical Society plain T _E X macros.
	latex3	Styles for setting questions (or exercises) and answers.

Figure 17: TUGboat 19:1 — we tried to format the T_EX Live contents listing to be readable

alposter	Provides fonts in sizes of 12pt up to 107pt. Provides fonts in sizes of 12pt up to 107pt and also makes sure that in math formulas the symbols appear in the right size. Can also create a PostScript header file for dvips which ensures that the poster will be printed in the right size. Supported sizes are DIN A0, DIN A1, DIN A2 and DIN A3.
a2ac	Author: unknown; CTAN location: macros/latex/contrib/supported/alposter AFM to AFM plus Composites. Enables the use of PostScript fonts while typesetting texts in a given language; the presence of more accents themselves (no whole accented characters) is sufficient. The configuration files of the a2ac program are independent of the PostScript font encoding and of the typesetting system encoding. The program may be used to prepare a font for any typesetting system, especially T _E X.
a4	Author: Petr Ošik; CTAN location: fonts/utilities/a2ac Support for A4 paper sizes. Provides support for A4 paper sizes, however it is mostly superseded by the adpaper option of L ^A T _E X and by the geometry package. It does, however also define the extra option of widemargins.
a4wide	Author: Nico Poppelier and Johannes Braune; CTAN location: macros/latex/contrib/supported/strgclass Increases width of printed area of an A4 page. This package provides an option to increase the width of the A4 page. Note however that it is superseded by geometry.
a5	Author: unknown; CTAN location: macros/latex/contrib/other/a5ac Support for A5 paper size. This package provides support for A5 paper sizes. Note however that it is superseded by geometry.
a5comb	Author: Mario Wolzko; CTAN location: macros/latex/contrib/other/a5ac Support for A5 paper sizes. Superseded by geometry.
aaai	Author: unknown; CTAN location: macros/latex209/contrib/aaai American Astronomical Society format.
aaates	Author: American Astronomical Society; CTAN location: macros/latex/contrib/supported/aaates Text abbreviations in L ^A T _E X. A L ^A T _E X package defining abbreviation macros, which expand to defined text and insert following spaces intelligently, based on context. They can also expand to use thing the first time they are used and another thing on subsequent invocations. Thus they can be abbreviations in two senses, in the source and in the document. Also includes a facility for suffixes like BPOHC and GORP4 which correctly handles following periods.
abctext	Author: Matt Swift; CTAN location: macros/latex/contrib/supported/frankenstein Notate tunes stored in abc notation. A package to notate tunes stored in an ASCII format (abc notation). One of the most important aims of abc notation, and perhaps one that distinguishes it from most, if not all, computer-readable musical languages is that it can be easily read by humans. The package produces files that can be processed with MusicT _E X.
abstract	Author: Chris Wolzko; CTAN location: support/abstract Books of abstracts. A L ^A T _E X 2 _ε class file for making “books of abstracts”, commonly used for conferences. It is based on report class, however \chapter has been redefined and shouldn't be used.
abstract	Author: Hvitfeldt; CTAN location: macros/latex/contrib/other/abstract Control the typesetting of the abstract environment. The abstract package gives you control over the typesetting of the abstract environment, and in particular provides for a one column abstract in a two column paper.
abstex	Author: Peter R. Wilson; CTAN location: macros/latex/contrib/supported/abstract No description available.
abstex	Author: unknown Multiple accents. A package for multiple accents with nice features concerning creation of accents and placement of scripts.
abzoo	Author: Javier Bezos; CTAN location: macros/latex/contrib/supported/abzoo Includes makfont, vpl2vpl, CSX, Xef, and Normand.def.
acfonts	Author: John Smith; CTAN location: fonts/utilities/acfonts
achemos	L ^A T _E X and B ^H L ^A T _E X style for American Chemical Society.
adeflists	Author: Mats Dahlgren; CTAN location: macros/latex/contrib/supported/achemos

Figure 18: TUGboat 21:1, but finally just packed it in as tightly as we could

How to Create a T_EX Journal: A Personal Journey

about the Users Group and about what users were doing, “sales pitches” (why T_EX is a Good Thing), examples of things that can be done with T_EX, and solutions to problems.

While blocks of small type on large pages is not easy to read (most AMS books and journals have a text width of 30pc, about 5in), the letter-size page is wide enough to hold two columns of type that are narrow enough to be read easily, but (almost) wide enough to avoid most formatting problems. So a two-column style was adopted as the basic layout.

Variations on the theme

But some material simply can't be shoe-horned into two columns. We've already seen one example printed directly from an author submission (Fig. 12).

- Macros are often difficult to disassemble into the narrow measure, so a “medium-width” format was defined, with a 30pc measure, centered horizontally on the page (Fig. 13). This would be used only sparingly, when the density of macro code makes it impossible to reformat to the two-column style.
- Another single-column format, with text narrower than full page width, that is used occasionally is the L^AT_EX doc format, where macro code is interspersed with commentary, and a wide left margin is used to place macro names as labels (Fig. 14).
- Other material sometimes calls for use of the full page width, as with the presentation of code emulating, for example, *The METAFONTbook* (Fig. 15).
- Extended code listings have been poured into a full-width page container (Fig. 16) for lack of any better ideas.
- And several iterations of all or part of the Catalogue accompanying a T_EX Live disk have used a specially formatted full-width presentation to pack as much information as possible onto the page with (Fig. 17) or without (Fig. 18) rules or shading to help guide the eye.

The initial macros to implement these layouts were based on a plain-T_EX multi-column macro system developed for in-house use at AMS. The original requirements for this system included some interesting features:

- the ability to have as many columns as the data would allow (we've used up to 12);
- full-width “banners” can float across the page at top or bottom or anywhere in between;
- partial width insertions can float across just some columns;

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Resubmitting services, including design, copyright, art and composition; color is no specialty. Custom TeX macros and L^AT_EX-2 document classes and packages. Instruction, support, and consultation for colleagues and authors. Application development in E^lP^AT_EX, T^EX, S^CMM, PostScript, Java, and C++, Database and corporate publishing. Extensive references.

The information here comes from the consultants themselves. We do not include information we know to be false, but we cannot check out any of the information; we are transmitting it to you as it was given to us and do not promise it is correct. Also, this is not an endorsement of the people listed here. We provide this list to enable you to contact service providers and decide for yourself whether to hire one. The TUG office mentions the consultants listed here to please a larger ad in TUGboat; please contact the office or our own web page.
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Calendar

- 2005
Jun 6-9 Seybold Seminars, Amsterdam, Netherlands. For information, visit http://www.seyboldseminars.com/2005/.
Jun 6-9 Haze Book School, University of Virginia, Charlottesville, Virginia. Many one-week courses on topics concerning typography, bookbinding, calligraphy, printing, electronic texts, and more. For information, visit http://www.virginia.edu/oldbooks.
Jun 8-70 Years of Penguin Design: Exhibition, Room 74, Twentieth Century Gallery, Victoria & Albert Museum, London, England.
Practical TeX 2005
Friday Center for Continuing Education, Chapel Hill, North Carolina.
Jun 14-17 Workshops and presentations on E^lP^AT_EX, T^EX, and more. For information, visit http://www.tug.org/practicaltex2005/.
Jun 15-18 ALLC/ACH-2005, Joint International Conference of the Association for Computers and the Humanities, and Association for Literary and Linguistic Computing, "The International Conference on Humanities Computing and Digital Scholarship", University of Victoria, British Columbia. For information, visit http://ach.acad/achall2005/ or the organization web site at http://www.ach.org.
Jun 24-26 YTC 10th meeting, Trondheim, Netherlands. For information, visit http://www.ytc.nl/jeen/bjjeen35.html.

Status as of 1 June 2005
For additional information on TUG-sponsored events listed here, contact the TUG office (+1 503 223-9994, fax: +1 503 223-9950, e-mail: officetug.org). For events sponsored by other organizations, please use the contact address provided. An updated version of this calendar is online at http://www.tug.org/calendar/. Additional type-related events are listed in the Typophile calendar, at http://www.icalls.com/atal1/typophile/month.php?cal=typophile.

Figure 19: TUGboat 26:2 — TUG's institutional members, in three columns

Figure 21: TUGboat 25:2—the calendar heading crosses the whole page; so does the footer

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Figure 26: TUGboat 23:3 — author address list, also three columns

Figure 27: TUGboat 13:2 was accompanied by a membership list in alphabetical order

Member Names Listed by Country and City. Table with columns for country and city, listing names of members. Countries include Argentina, Australia, Canada, etc.

Figure 23: TUGboat 13:2 — and also arranged geographically

- insertions can be delayed until a specified page;
• a message can be dropped into a footer at regular intervals;
• specified pages can be shortened or lengthened, in particular to even off the multiple columns of the final page of a document.

The very first implementation of this system was developed for T_EX 78, but it was one of the first things converted to T_EX 82. Major credit to Ron Whitney for implementing the delaying stack mechanism and many other features of the system. (No. These macros aren't available for distribution. There are some intricate bugs that we've learned to live with, haven't managed to fix, and don't have the time or staff to field questions from outside users who would surely run into the same or new bugs. Sorry.)

Only some of these features made it into the stripped-down document style for TUGboat. The institutional members list (Fig. 19) and (until 2002) the list of contributors' addresses (Fig. 20) are formatted in three columns; the two-column calendar (Fig. 21) also has a full-width bottom insertion. The issue front matter and "boiler plate" are still—in 2006 — prepared with the plain T_EX document style,

Figure 24: TUGboat 5:2 — a full-width illustration at the bottom of the page. Includes Chinese text: 乙江南, 白唐勇, (曹明 772-846), 江南好, 风景旧曾谙; 日出江花红胜火, 春来江水绿如蓝; 能不忆江南?, 唐 白居易. Includes Appendix 8 and Appendix 9.

Figure 10. An example of actual Chinese text. (唐宋词一百首 上海古籍出版社)

Figure 24: TUGboat 5:2 — a full-width illustration at the bottom of the page

which has capabilities that aren't easily available (yet) with L^AT_EX.

The full multi-column system was used for the TUG membership list (Figs. 22 and 23) which was published annually until 1993; however, no features are used there that are not now available in the L^AT_EX multicols package.

Some pages in the main content have used the "extended" plain features:

- Figures at the bottom of the page (Fig. 24);
• Don Knuth's "Answers to Exercises for T_EX: The Program" (Fig. 25), where single- and two-column material were intermixed to provide a reasonably natural flow; this too was implemented by Ron Whitney.

Ron's contribution to TUG encompassed not only major work on the plain T_EX TUGboat document style, but also hard work in the TUG office during several turbulent years. Ron is no longer working in the T_EX world, but he still helps out by coordinating the annual renewal of TUG's Rhode Island incorporation.

Subject arrangement

Within the basic format, the content was divided into logical subject areas (General Delivery, etc.), introduced by distinctive headings. I no longer remember whose ideas were used in creating the style of these headings, but, like the covers, they have undergone some major changes through the years.

- For the first few years, the subject heads were set in a rather spindly sans-serif, centered, with rows of asterisks strung out above and below (Fig. 26). Similar rows of asterisks were used to separate articles within subject areas.
- Beginning with issue 5:2, a much nicer demi-bold sans was adopted, with the subject text centered in a column-wide box (Fig. 27).
- For items like the calendar that fill a dedicated page (Fig. 21), the subject head can span the full page, and if an article using the L^AT_EX doc style starts a section, the box is set to the width of the text (Fig. 28).
- With the change to boxed subject heads, articles in a subject area were separated only by vertical space. Owing to confusion in identifying the end of one article and the beginning of another, in 1989 a rule was added above the title of each succeeding article (Fig. 29).
- Subject areas managed by an associate editor sometimes have a more distinctive subject head. This has been particularly true for early installments of the Font Forum (Fig. 30) and for the Treasure Chest since 1998 (Fig. 31).
- For the guest-edited issue, the arrangement was entirely different. Short items were run together on pages of three columns, and articles of a page or more each began on a new page. This is best appreciated in context: Go to the *TUGboat* web site to examine this issue.

While we're on the subject of subject headings, we originally tried to follow the nautical theme implied by the name *TUGboat*, hence "General Delivery" and "Dreamboat" (wishes for the future), but we clearly ran out of inspiration. So the names of most subjects are far more prosaic.

The transition from plain T_EX to L^AT_EX

The first issues of *TUGboat* — the parts that were actually prepared using the *TUGboat* style — were constructed in T_EX 78. This language was rather different from the T_EX we know now: only 32 fonts could be used at once, the syntax for boxes and alignments was different, etc., etc. In other words, a file created for T_EX 78 probably won't run under

General Delivery

Donald E. Knuth Scholarship

Larry Sharlow was honored at the 1988 Annual Meeting, McGill University, Montréal, as the 1988 Scholarship Winner. He has volunteered to serve on the 1989 selection committee.

We are pleased to announce the Fourth Annual "Donald E. Knuth Scholarship" competition. This year two Scholarships will be awarded. The awards consist of an all-expense-paid trip to TUG's 1989 Annual Meeting and the Short Course offered immediately following the meeting. The competition is open to all 1989 TUG members holding support positions that are secretarial, clerical or editorial in nature.

To enter the competition, applicants should submit to the Scholarship Committee by May 12, 1989, the input file and final T_EX output of a project that displays originality, knowledge of T_EX, and good T_EXing. The project may make use of a macro package, either a public one such as L^AT_EX or one that has been developed locally; such a macro package should be identified clearly. Such features as sophisticated use of math mode, of macros that require more than "filling in the blanks", or creation and use of new macros will be taken as illustrations of the applicant's knowledge. Along with the T_EX files, each applicant should submit a letter stating his/her job title, with a brief description of duties and responsibilities, and affirming that he/she will be able to attend the Annual Meeting and Short Course at Stanford University, Stanford, California, August 21-25, 1989.

Selection of the scholarship recipient will be based on the T_EX sample. Judging will take place May 13 - June 12, and the winner will be notified by mail after June 12.

All applications should be submitted to the Scholarship Committee at the following address:

Larry Sharlow
10 Tottee #3
Flagstaff, AZ 86001

From the President

Bart Childs

I am looking forward to the celebration of 10 years of TUG at Stanford. The call for papers has already appeared. I hope you can and will participate.

Below is an announcement for a "dingbat" competition. I have had a lot of positive response from the preliminary versions. I hope the competition will be a good step in expanding our METAFONT horizons, which I feel have been neglected.

Announcing
A TUG Dingbat Competition

TUG announces a METAFONT competition for the creation of the best dingbat characters. Each entry will consist of one specific character (such as a logo) or a dingbat family, the METAFONT source, annotation of the source for pedagogical use, and samples of the use of the character(s). These characters can be in the spirit of the Zapf dingbats in PostScript, symbols, icons, logos, or of some other useful or entertaining nature.

A dingbat family could be:

- a character in different orientations (such as a hand or flag).
- a character in different presentations (such as outline, solid, black on white, white on black, gray, ...).
- a set of characters for doing border designs (TUGboat, Vol. 5, no. 2).
- a set of characters for a particular use (TUG could use an anchor, a dinghy, a printing press, ...).
- any reasonably useful, entertaining, or interesting character.

TUG is holding this competition to encourage the use of complete T_EX systems and to complement the initial system that was created by Don Knuth and given to us all. It is hoped that this competition will contribute to excellence in fonts, graphics, and documents in general.

Figure 29: *TUGboat* 10:1 — now we make the top of every article stand out



A Handy Little Font

This short communication presents the code for a couple of dingbats that the author has found useful in memos and other correspondence. The code is quite straightforward, and can easily be put to use by the reader on any METAFONT implementation. Despite the simplicity of the code, there are a couple of interesting things done which I will enlarge upon a bit when we get to them.

The first part of the code looks like this:

```

% hands af
mode:=setup;
size:=48pt;
font:=size;
en:=size; cap:=7/10em; desc:=3/10em;
thinline:=1/100em;
define:picrela(en,cap,desc);
define:blacker(picrela(thinline));

Here we assign values to the height, depth and width of the character box and define the single pen size to be used. Since this is a very simple font, there is no call for overshoots or multiple pens, and the height and depth of the character box is just expressed as a fraction of the width.

Now, we define the whole character in a macro:
%hand pointing right
def handpointings
% define points for thumb and cuff
x1:=x1/2[0,1/16w];
x2:=x4+x4+22w/16w;
y1:=y2+10/18[desc,cap];
y2:=y2+2/18[desc,cap];
y3:=6/7[y4,y2]; y20:=1/7[y4,y2];
x6:=9/76/16w;
y6:=y2;
x7:=11.25/16w;
y7:=4/5[y23,y3];

```

This document originally printed at 300 dpi.

Figure 30: *TUGboat* 10:1 — some section heads are more decorative than others

The Treasure Chest

A package tour from CTAN—*soul.sty*

When the Treasure Chest is CTAN, there's so much to choose from. But even more... there are so many packages that keep being added! And how to even find out about them, if you don't keep up with notices posted to the newsgroups? This column is one way to try to bring some of these treasures to TUGboat readers, with a quick introduction to the package and some examples of what it can do.

This is the first such column; let me know what aspects are most useful and which ones less so, what additional facets should be examined, what packages cover some of the same issues; which packages do you prefer.

1 Quick tour

Package: *soul.sty*
This is version 1.2, dated 11 Jan. 1999. Upon processing, the file *changes.tex* is generated, and describes the differences (the file is also inside the *.dtx* file).

Explanation of the name: "it is only a combination of the two macro names *so* (*space out*) and *ul* (*underline*)—nothing poetic at all..."

Keywords: spacing out, letterspacing, underlining, striking out

Purpose: *soul.sty* provides hyphenate-able letterspacing, underlining, and some variations on each. All features are based upon a common mechanism for typesetting text syllable-by-syllable, using TeX's excellent hyphenation algorithm to find the proper hyphenation points. As well, two examples are presented to show how to use the interface provided to address such issues as "an-a-lyzing syl-la-bles". Although the package is optimized for L^AT_EX 2_ε, it works under plain TeX and L^AT_EX 2.09, and is compatible with other packages, too.

Author: Melchior Franz
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¹ Documented source (*.dtx*) files are a combination of macros and documentation, an evolution of Frank Mittelbach's original Docstrip utility. There are usually two steps: run L^AT_EX over the *.dtx* file to get the documentation, and run L^AT_EX over the *.dtx* file to get the documentation, and run L^AT_EX over the *.dtx* file to generate the style files, which are extracted from the *.dtx* file. The *.ins* file is itself generated by the first step, which means you only have to pick up the one *.dtx* file—even more compact packaging.

Compatible with: plain L^AT_EX (old and new).

Note: the documentation describes some restrictions when the *soul* package is not used with L^AT_EX 2_ε.

Location on CTAN:
`/macros/latex/contrib/supported/soul`

Files to fetch: *soul.dtx* and *example.cfg*

How to install: Put files with your other class and style files on your system. Read the top portion of *soul.dtx* (or the file *soul.txt*) for instructions on processing the files (you will need L^AT_EX 2_ε). Notice that the *soul.sty* package is not actually on CTAN; it uses the *.dtx* method of documentation, a wonderful feature in L^AT_EX 2_ε. If you're unfamiliar with how this works, see footnote 1 for a general overview.

Files generated: *soul.ins*, *soul.dvi* (documentation), *soul.toc*, *soul.sty*, *changes.tex*, (as well as the usual *soul.aux* and *.log* files).

2 Documentation
The documentation is an extensive (26 pages long), with explanations, examples of basic use and variations, that little needs to be said here!

The opening pages are a pleasant introduction to the general notions of emphasis, however it is achieved, and the various opinions which exist on the suitability of their use. There is a pragmatic expressed here, offering the user the choice of options, leaving the reasons for such choices to the user.

The user portion of the documentation provides extensive examples and explanations for creating the various effects (underlining, overstriking, letterspacing).

Chapter 7 (pp. 14-25) provides a detailed explanation of the macros themselves, along with some additional points and tips, so do glance through it.

One nice addition from the author (in collaboration with Stefan Ulrich) is a sample configuration file, *example.cfg*, which shows how to select specific spacing values for different fonts automatically, and store them for local use. As well, the local file (call it *soul.cfg*) and looks easy to read it in automatically via *soul.sty* can be used to store other changes to the package default settings, thus avoiding making changes in either the style file or inserting the customizations into individual source files.

2.1 Table of Contents

1. Introduction
- Note: CTAN also has the file *soul.txt* (description of package processing) and *soul.ins* (which can either be fetched, or generated by processing the *.dtx* file).

to Timbuktu, so Addison-Wesley rushed out a small second printing. No corrections were made to that printing.

Two new document-style options have been added: *bestier* for drawing curves and *ifthen* with conditional evaluation and looping commands. A document style that will format text for the ACM transactions' journals is in preparation, and I will be negotiating with the ACM to allow authors to submit either camera-ready copy or L^AT_EX input files.

I suspect that many sites have installed L^AT_EX without installing the appropriate human system for maintaining it. There should be a site coordinator who is responsible for installing L^AT_EX (with any necessary site-specific changes), creating and maintaining the Local Guide, fielding questions from users, and obtaining the latest versions of L^AT_EX files.

Leslie Lamport
Digital Equipment Corporation

TeX is now truly multi-lingual. The restriction on the *trac* *op* size has been removed. It is now possible to accommodate up to 65000 languages—although L^AT_EX currently has a consistency check that arbitrarily restricts it to 100.

Two new document-style options have been added: *bestier* for drawing curves and *ifthen* with conditional evaluation and looping commands. A document style that will format text for the ACM transactions' journals is in preparation, and I will be negotiating with the ACM to allow authors to submit either camera-ready copy or L^AT_EX input files.

Michael J. Ferguson
INRS-Télecommunications

Multilingual TeX Update

This note updates the extension to TeX that allows for multi-lingual hyphenation reported in TUGboat 6, no. 2 (July 1985): 57-58. A key feature of the extension is that it accommodates standard TeX fonts, including words with accented letters. For details of the features the reader should refer to the TUGboat report. The changes and retractions are as follows:

Figure 31: TUGboat 19:4—and some try to be self-explanatory

Chapter Mottos and Optional Semi-Parameters in General and for L^AT_EX

Reinhard Wonneberger
Hamburg¹

Abstract

Motto texts will cause some logical and practical difficulties, when they are to be prefixed to chapter headings. To solve them, the motto text should be specified after the chapter heading. To allow for a variety of contained constructs such as footnotes or verbatim, this text must not be read as an ordinary parameter. These antagonistic goals are reconciled in a construct which looks like a parameter but is treated as input text. This concept is a modified version of the technique used for PLAIN footnotes. We give all macros necessary to implement this concept as an extension to L^AT_EX.

1 On Mottos

To provide the reader with a glimpse of what is waiting for him, a book or its chapters are sometimes prefaced with mottos. The basic idea of mottos, going right into the heart of a text in one short sentence, can be traced back to the times of ancient Babylon, the myth of *Atromabais* starting with such a motto text:²

inéma dâ auiffum
When the gods were (also still) men...

¹ The macros presented here were developed at DESY, Notkestraße 85, D-2000 Hamburg 94. FRG. Comments should be sent to R. W. Wonneberger, D-2000 Hamburg 94 or through *Bastard*, *clm* to B03555net.univie.ac.at.

² Wulfen von Soden: *Mythos von Bagin*, *Halbabais*, *cher und anderer Epen, Motoren in der Bibel*, In: W. v. S. Bibel und Alter Orient. Altorientalische Beiträge zum Alten Testament. Hans-Peter Müller (ed.), Berlin / New York: de Gruyter 1985, p. 206 from p. 206:212.

From a linguistic point of view, mottos are somewhat similar in function to particles, being both part of the text and a comment on it. So they are better understood in terms of a metatext.³

There is a wide range of possible motto texts, reaching from witty to enigmatic, from aphoristic to devotional, from past to present. Normally motto texts will be quotations of some celebrity, but nowadays *gruffiti* representing the *roz populi* will also be found.

As far as typesetting is concerned, graphic arrangement of mottos should meet several requirements. The special kind of text will be made clear through emphasis or even a different family of character type, e.g. *some serif*. A scope, i.e. the range of text the motto applies to, will be expressed by prefixing the motto to an already established unit like a chapter. And finally, aesthetic concepts should be taken into account. So the motto will normally be broken into smaller lines, which may be right-adjusted to stress the frame of the page in connection with a heading. Professional book designers should be consulted on a specific concept for formatting.

Since mottos are normally taken from some source, one might also wish to put names into the index or give some bibliographic information in a footnote. Through these seems to be nothing peculiar about these requirements, implementation of mottos needs

³ It is fascinating to watch the gradual emergence of such metatexts, which are also used to give direct access to texts, a history still waiting to be written. For some remarks, cf. R. W. Wonneberger: *Normalsprache, Neue Wege bei der Darstellung altorientalischer Texte, Zeitschrift für Sprachwissenschaft* 3 (1984) 303-323, cf. also R. W. Wonneberger: *Biblia Hebraica Stuttgartensia*, Göttingen: Vandenhoeck & Ruprecht 1984, chapters 3-5.

Figure 33: TUGboat 7:1—the coming of L^AT_EX had been foretold

Editorial and Production Notes

These Proceedings were prepared with TeX on various Unix workstations running TeX in Geneva. PostScript files for a Linotronic typesetter at 1270 dpi resolution were generated with Tom Rokicki's *dvips* program. From these files Philip Taylor produced the bromides on the Linotronic of the Computing Centre of the University of London. The color pages were completely done in the United States.

The present Proceedings are typeset in the Lucida Bright typeface designed by Bigelow & Holmes. For L^AT_EX the Lucid package (coming with L^AT_EX 2_ε in the FMS5 system) for defining the fonts was used and a scaling factor of .94 has been applied to make the pages come out at an information density close to that of Computer Modern at 10pt. The complete set of fonts used is LucidaBright for text, LucidaSans for sans serif, LucidaTypeWriter for typewrite, and LucidaNewMath for the maths.

The authors sent their source files electronically via electronic mail or deposited them with *ftp* on a CERNA machine. Most referees were also able to use *ftp* to obtain a PostScript copy of the paper they had to review, and I got their comments, if practical, via email, which made communication relatively straightforward and fast. I would like to thank the authors for their collaboration in keeping (mostly) to the original production schedule. I also want to express my gratitude to the various referees, who kindly agreed to review the paper assigned to them. I am convinced that their comments and suggestions for improvements or clarifications have made the papers clearer and more informative.

Eight of the contributed papers were in plain L^AT_EX while the others used L^AT_EX. All files associated to a given paper reside in a separate subdirectory in our *tug94/papers* directory, and each of the papers is typeset as a separate job. A *makefile* residing in our *tug94/papers/tug94* directory takes care that each paper is picked up from its directory and is processed with the right parameters. Information about the page numbers for the given job is written to the aux files using the `\vcenter` document command for L^AT_EX. A *sed* script then collects this information and writes it to a master file. This master file is read in a subsequent run by using the `\AtBeginDocument` command for L^AT_EX and by redefining the `\vcenter` command for plain TeX.

All L^AT_EX files were run in native L^AT_EX 2_ε mode (if they were not already coded in L^AT_EX 2_ε—about half of the L^AT_EX papers were—it was in most cases sufficient to replace `(begin{documentstyle})` by `(begin{document} class)`. At CERNA we run TeX version 3.1415, based on Karl Berry's *web2t-ε-1* directory structure. This system could be used for most papers without problems, but Haralambous' *Ω*

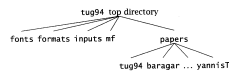


Figure 1: The directory structure for preparing the TUG94 Proceedings

(yanniso), and Phil Taylor's *NyrS* paper, needed the L^AT_EX 2_ε extensions, which have not yet been ported to that latest version of *web2t*. Therefore we had to build two special formats (one for L^AT_EX 2_ε, and one for plain with the L^AT_EX 2_ε mods and the older TeX 3.141 *web2t-ε-1*). The fonts used in Haralambous' *Tiqvah* paper needed 60 instead of the standard 50 font files, so we also had to recompile METAFONT. When the *dvi* files were translated into PostScript with *dvips*, METAFONT would generate the font bitmap *pk* files on the fly, as they were needed, with the desired mode *def*. In total 334 supplementary METAFONT source files were received for running the various papers in the Proceedings.

Although most pictures were available as Encapsulated PostScript files, for two articles (the one by Sotka, and the *BIG2FONT* paper by Sowa) they could not be printed. Therefore we pasted originals obtained from the respective authors into the relevant places in the text.

Acknowledgements

These Proceedings would never have been ready in time were it not for the help of Sebastian Rahtz during the final stages of the production cycle. Building upon his experience gained last year when editing the TUG93 Proceedings, he developed a vastly improved production system for the generation of this year's Proceedings. Together we translated the old TUGboat styles into L^AT_EX 2_ε classes, and used these classes to produce the Proceedings. With the help of Owen Patashnik and Joachim Schrod we also developed a first version of a Chicago-like TUGboat *BiTeX* bibliography style and introduced the corresponding necessary changes into the class files.

I also want to thank Barbara Beeton, Mimi Burbanck, Pierre Mackay, and Christina Thiele who, together, have read the preprint versions of all papers. They have pointed out several remaining typos and provided me and the authors with many useful comments and suggestions for improvement. Last but not least I want to acknowledge the competence and dedication of Phil Taylor (RIBBNC, University of London) during the final production stage of going to film.

Michel Goossens

Figure 32: TUGboat 7:3, the first article produced with L^AT_EX (2.09)

Figure 34: TUGboat 15:3—the 1994 Proceedings issue was produced at CERNA

T_EX 82 without a *lot* of work, regardless of how cleverly one recodes the underlying macros. Because *authors always want to do things their own way*, and *TUGboat* authors were trying to show what they could do with this wonderful new tool.

In any event, by 1984, the *TUGboat* transition was made to T_EX 82, new fonts, new everything, with no more fuss than accompanied the simultaneous transition of AMS projects. (The one often performed as a test bed for the other.) But a growing number of authors wanted to use L^AT_EX, which is a very different beast. The first article written with L^AT_EX was published in 7:3 (Fig. 32), although L^AT_EX had certainly been mentioned earlier (Fig. 33); note Leslie Lamport’s comment regarding the *Local Guide*, an item always honored more in theory than in practice.

By 1991, the volume of L^AT_EX material had increased to the point where the production notes for 12:2 reported a nearly 50/50 split between plain T_EX and L^AT_EX. This made grouping of articles in subject areas more difficult for a couple of reasons:

- “Plain” articles can usually be processed in a single run, using a driver file, unless the complement of articles contains a lot of mutually incompatible author macros — a not infrequent occurrence.
- L^AT_EX requires that packages be loaded only in the preamble; this is true for both 2.09 and L^AT_EX 2_ε; nearly any package use by an author precludes combining files in a single run.
- In *TUGboat*, if an article ends with more than a half-column empty, the next article may be started on that page; other than using physical paste-up or post-processing, the only way to achieve the desired continuity is to process both articles in the same T_EX run.

Needless to say, all known methods of “splicing” disparate items have been used to get camera copy ready for the printer.

The next big leap toward L^AT_EX occurred with the proceedings of the Santa Barbara meeting in 1994. Michel Goossens, then TUG’s vice president, co-edited the proceedings with Sebastian Rahtz. Both were ardent supporters of L^AT_EX, and eager to take advantage of the new features of L^AT_EX 2_ε. Together they created the first *TUGboat* document class file, and handled all the production as well as the editorial duties at CERN (Fig. 34). (Maintenance of the *TUGboat* document class is now in the care of Robin Fairbairns, to whom many thanks.)

At the same meeting, there was a report on Ω, a new approach to the composition requirements



Figure 35: *TUGboat* 18:1 — the first article produced with Ω

of highly-accented material and non-Western scripts (that is, scripts other than Latin, Greek and Cyrillic). The first article actually produced with Ω (Fig. 35) was set by the author to specs provided by the *TUGboat* production crew. Ω has unfortunately not proved sufficiently stable to be included permanently in the *TUGboat* toolbox, but work continues.

At the 1998 annual meeting, Hàn Thế Thành introduced pdfT_EX (Fig. 36). This extension to T_EX permits the use of existing L^AT_EX or plain T_EX input, along with direct output to PDF. Thành’s dissertation (Fig. 37) was published in *TUGboat* several years later.

For a totally different approach to composition, ConT_EXt is directed largely toward creating attractive presentations on-line as well as in print, and requires pdfT_EX. ConT_EXt made its appearance in several talks by Hans Hagen at the 1998 annual meeting. One of the resulting articles in the proceedings describes an interactive calculator (Fig. 38); sadly, the on-line version of this article is not interactive, but the figures are very colorful. Hans has created a ConT_EXt style for *TUGboat* which has been used for several other articles, but so far always with his assistance.

Improving TeX's Typeset Layout

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Abstract

This paper describes an attempt to improve TeX's typeset layout in PDFTeX, based on the adjustment of interword spacing after the paragraphs have been broken into lines. Instead of changing only the interword spacing in order to justify text lines, we also slightly expand the fonts on the line as well in order to minimise excessive stretching of the interword spaces. This font expansion is implemented using horizontal scaling in PDF. When such expansion is used conservatively, and by employing appropriate settings for TeX's line-breaking and spacing parameters, this method can improve the appearance of TeX's typeset layout.

Motivation

There exist many techniques which can be used to produce high quality typeset layout. Most of these are already implemented in TeX, such as ligatures, kerning, automatic hyphenation, and very importantly the algorithm for breaking paragraphs into lines in an optimal way, generally known as "optimum fit".

However, it is still a very difficult task to obtain a uniform level of grayness of the typeset layout, even with the help of these techniques. The primary reason is that it is not possible to ensure that all the interword spaces in different lines are the same. The "optimum fit" algorithm can break the paragraph into lines in the best way, but the amount of interword space depends strongly on many other parameters, such as the paragraph width, the tolerance of glue stretching/shrinking, the amount of interword glue, etc. Considerable effort is often required in order to adjust these parameters to achieve the appropriate break points and to reduce the contrast between the interword spaces in lines. The purpose of our experiment is an attempt to perform this task better by stretching or shrinking the fonts used in each line within reasonable limits. The idea is not really new, as it represents a quite common technique using electronic font scaling in order to expand text lines that do not fit the paragraph width. However this technique is also often regarded as a bad thing, since it is frequently abused in order to rescue "impossible" cases, which often leads to overdoing the scaling and produces really ugly results. In our approach, we try to use this technique

in a rather different way: instead of using font scaling to improve only some "really bad" lines, we try instead to produce a "relatively good" paragraph, which does not contain any lines where the interword spacing is too bad. Then we apply font scaling to each line to reduce the difference between the interword spaces in lines. The limit of font scaling must, of course, be strictly controlled; in fact, the sum of the spaces between the words on a line is often very small in comparison to the sum of the character widths on the same line, so very slightly expanding the fonts may help considerably in improving the interword spacing.

This idea can easily be integrated with TeX because of the biggest strength of TeX – the "optimum fit" algorithm which is implemented in a very flexible manner, in order to handle restrictions on many various parameters in an optimal way. In particular, we perform the implementation in PDFTeX, where the font expansion is currently carried out by horizontal scaling in PDF as a first attempt. Other approaches may be attempted in the future as time allows.

Implementation

PDFTeX is based on the original source of TeX, and employs the changefile mechanism which allows easy access to TeX's internal data structures and simple modification of the relevant program code. Generating PDF output directly from TeX is also an advantage for our task, as we can control the spacing much better than would have been the case had we attempted it via DVI. The process of adjusting interword spacing is as follows:

Figure 36: TUGboat 19:3—the first article with pdfTeX

Micro-typographic extensions to the TeX typesetting system

Hàn Thế Thành
Dissertation

Masaryk University Brno
Faculty of Informatics
October 2000

Figure 37: TUGboat 21:4, Thành's pdfTeX dissertation

The Calculator Demo

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Abstract

Due to its open character, TeX can act as an authoring tool. This article demonstrates that by integrating TeX, METAPOST, JavaScript and PDF, one can build pretty advanced documents. More and more documents will get the characteristics of programs, and TeX will be our main tool for producing them. The example described here can be produced with PDFTeX as well as traditional TeX.

Introduction

When Acrobat Forms were discussed at the PDFTeX mailing list, Phillip Taylor confessed: "... they're one of the nicest features of PDF". Sebastian Ratz told us that he was "... convinced that people are waiting for forms". A few mails later he reported: "I just found I can embed JavaScript in forms, I can see the world is my oyster" after which in a personal mail he challenged me to pick up the Acrobat Forms plugin and wishing me "Happy JavaScripting".



Figure 1 The calculator demo.

At the moment that these opinions were shared, I already had form support ready in CONTEXT, so picking up the challenge was a sort of natural behaviour. In this article I'll describe some of the experiences I had when building a demo document that shows how forms and JavaScript can be used from within TeX. I also take the opportunity to introduce some of the potentials of PDFTeX, so let's start with introducing this extension to TeX.

Where do we stand

While e-TeX extends TeX's programming and typographic capabilities, PDFTeX primarily acts at the back end of the TeX processor. Traditionally, TeX

was (and is) used in the production chain:

ASCII → TeX → DVI → whatever

The most versatile process probably is:

ASCII → TeX → DVI → POSTSCRIPT

or even:

ASCII → TeX → DVI → POSTSCRIPT → PDF

All functionality that TeX lacks, is to be taken care of by the DVI postprocessing program, and that's why TeX can do color and graphic inclusion. Especially when producing huge files or files with huge graphics, the POSTSCRIPT → PDF steps can become a nuisance, if only in terms of time and disk space.

With PDF becoming more and more popular, it will be no surprise that Han The Thanh's PDFTeX becomes more and more popular too among the TeX users. With PDFTeX we can reduce the chain to:

ASCII → TeX → PDF

The lack of the postprocessing stage, forces PDFTeX (i.e. TeX) to take care of font inclusion, graphic inserts, color and more. One can imagine that this leads to lively discussions on the PDFTeX mailing list and thereby puts an extra burden on the developer(s). Take only the fact that PDFTeX is already used in real life situations while PDF is not stable yet.

To those who know PDF, it will be no surprise that PDFTeX also supports all kind of hyper referencing. The version 1 used when writing this article supports:

1. link annotations
2. Currently I'm using β-version 1.12g.

Figure 38: TUGboat 19:3—the first article with ConTeXt

X_qTeX, the Multilingual Lion: TeX meets Unicode and smart font technologies

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Abstract

Professor Donald Knuth's TeX is a typesetting system with a wide user community, and a range of supporting packages and enhancements available for many types of publishing work. However, it dates back to the 1980s and is tightly wedded to 8-bit character data and custom-encoded fonts, making it difficult to configure TeX for many complex script languages.

This paper will introduce X_qTeX, a system that extends TeX with direct support for modern OpenType and AAT (Apple Advanced Typography) fonts and the Unicode character set. This makes it possible to typeset almost any script and language with the same power and flexibility as TeX has traditionally offered in the 8-bit, single-script world of European languages. X_qTeX (currently available on Mac OS X, but possibly on other platforms in the future) integrates the TeX formatting engine with technologies from both the host operating system (Apple Type Services, CoreGraphics, QuickTime) and auxiliary libraries (CU, TEBOL), to provide a simple yet powerful system for multilingual and multi-script typesetting.

The most significant extensions X_qTeX provides are its native support for the Unicode character set, replacing the myriad of 8-bit encodings traditionally used in TeX with a single standard for both input text encoding and font access; and an extended font command that provides direct access by name to all the fonts installed in the user's computer. It also provides a mechanism to access many of the advanced layout features of modern fonts.

Additional features that will also be discussed include built-in support for a wide variety of graphic file formats, and an extended line-breaking mechanism that supports Asian languages such as Chinese or Thai that are written without word spaces.

Finally, we look briefly at some user-contributed packages that help integrate the features of X_qTeX with the established DVI system. Will Robertson's fontspec, sty provides a simple, consistent user interface in DVI for loading both AAT and OpenType fonts, and accessing virtually all of the advanced features those fonts offer. Ross Moore's outwrite, sty is a package that allows larger DVI documents to be typeset using native Mac OS X fonts without converting the input text entirely to Unicode, by supporting traditional TeX input conventions for access to and other "special" (non-ASCII) characters.

Editor's note: This article is typeset in Adobe Garamond, with Adobe Minion for the code examples, and processed on the author's Mac OS X machine with X_qTeX, so Unicode support was needed in several places.

What is X_qTeX?

X_qTeX is an extension of the TeX processor, designed to integrate TeX's "typesetting language" and document formatting capabilities with the Unicode/ISO 10646 universal character encoding for all the world's scripts, and with the font technologies available on today's computer systems, including fonts that support complex non-Latin writing systems.

X_qTeX is in fact based on e-TeX, and therefore includes a number of well-established extensions to TeX. These include additional registers (ccurset, vcurset, vpos, etc.) beyond the 256 of each that TeX provides; various new conditional commands, tracing features, etc.; and of particular significance for multilingual work, the TeX-X_q extension for bidirectional layout.

The TeX extensions inherited from e-TeX are not discussed further here, as they are already described in the e-TeX documentation¹, except to note that for right-to-left scripts in X_qTeX, it is necessary to set \TXXstate=1 and make proper use of the direction-changing commands \begl, \endgl, \setgl, etc. Without these, there will be some right-to-left behavior due to the inherent directionality defined by the Unicode standard for characters belonging to Hebrew, Arabic and similar scripts, but overall layout will not be correct.

X_qTeX was created in order to typeset materials—literacy and educational books, translated Scriptures, linguistic studies, dictionaries, etc.—in a wide range of languages and scripts, including lesser-known ones that are not adequately supported in most existing products. It inherits ideas, and even some code, from an earlier system called TeX_q that integrated TeX with the QuickDraw GX graphics system on older Macintosh operating systems.

¹The name X_qTeX was inspired by the idea of a Mac OS X extension (hence the "X" prefix) to TeX, and as one of its intended uses is for bidirectional scripts such as Hebrew and Arabic, the name was designed to be memorable. The second letter should ideally be U (for UNICODE CAPITAL LETTER BEVERSED E), but as few current fonts support this character, it is normal to use an enhanced "E" glyph. The name is pronounced as if it were written *ex*TeX.

²E.g., The e-TeX User Reference Manual, <http://www.tt411.uni-wuerzburg.de/tegapaper/etexref.html>.

Figure 39: TUGboat 26:2 — X_qTeX

On an IBM 370/3033 with Pascal/VS at Stanford CIT (Eagle Bera).
 On a VAX (VMS) at Oregon Software (Barry Smith).
 On an IBM 370/3022 (VM-CMS) with SLAC-Pascal at the University of Pisa (Gianfranco Pinzi). They printed the DVI files on a Versatec.
 On a Univac 1100/82 at the University of Wisconsin (Ralph Stromquist). Output is to a Compugraphic 8600. (See report, p. 51.)
 From the information sent to Stanford, we gather that the Pascal compilers being employed in the installations of TeX are:
 IBM 370: Pascal-VS, SLAC-Pascal, Pascal-8000
 UNIVAC: U. of Wisconsin Pascal, Pascal-8000
 PDP-10: Hamburg Pascal
 VAX: (See report by Janet Incepi, p. 49.)
 Note: Charles Lawson (Jet Propulsion Lab.—Caltech) has produced two short reports that can help in reprogramming the SYSDEP module of TeX-Pascal. (Both are reprinted in this issue, pp. 20 and 32.)

TeX FONT METRIC FILES

What happens when you say `\font=CMR10`?
 David Fuchs

When you tell TeX that you will be using a particular font, it has to find out information about that font. It gets this information from what are known as TFM files. For instance, when you say `\font=CMR10` to TeX (`\font=CMR10` in the old TeX lingo), TeX looks around for a file called `CMR10.TFM`, and reads it in. If `CMR10.TFM` is not to be found, TeX will give you the error message `!lookup failed on file CMR10.TFM`, and you will be out of luck as far as using `CMR10` is concerned.

What does TeX want with the TFM file? Generally speaking, a font's TFM file contains information about the height, width and depth of all the characters in the font, plus kerning and ligature information. So, `CMR10.TFM` might say that the lower-case "d" in `CMR10` is 5.55 points wide, 6.94 points high, etc. This is the information that TeX uses to make its lowest-level boxes—those around characters. See the TeX manual (p. 41) for information about what TeX does with these boxes. Note that TFM files do NOT contain any device-dependent description of the font (such as the raster description of the characters at a certain resolution). Remember that the program TeX does not deal with

pixels. Only device-drivers that read TeX's DVI output files use that sort of information.

Where do TFM files come from? The best way to get a TFM file is with METAFONT. Post designers should include the METAFONT instructions that specify the width, height, etc. of each character they design. The METAFONT manual contains details and examples of how to do this—see the index entries for `charwd`, `charh`, `charp`, etc. If this is done, then when METAFONT is run on `CMR10`, it produces `CMR10.TFM`. (Depending on what "mode" it is run in, it also makes `CMR10.FNT`, `CMR10.ANT`, `CMR10.VNT`, or `CMR10.OC`. These are all different formats for files containing the raster description of the font. Drivers for various devices require one or another of these files.)

Whatever happened to the TFX format that the TeX and METAFONT manuals actually refer to? In this just a misprint: For TFM's—NOT—TFX files take the place of TFX files. The differences are conceptually small; they both contain more or less the same information. The main reason for changing TeX and METAFONT from using/making TFX files to TFM files is that TFX files were based on 36-bit words. This proved to be a real problem for people running Pascal TeX, especially on 32-bit machines. The format of TFM files assumes 8-bit bytes, packed four to a 32- or 36-bit word. They are readily adapted for use on 16-bit machines, too. While the format was being changed, a few new bits of information were added, too.

What if I have fonts that I want TeX to know about that were not made with METAFONT? Don't despair—we have two programs, `TFTOPL` and `PLTTF`, that convert TFM files to readable, editable format, and back again. For instance, if we run `TFTOPL` on `CMR10.TFM`, it makes `CMR10.PL`, an excerpt of which follows ("P" means a floating-point number is coming up [all dimensions given in this form are in terms of the `DESIGNSIZE`]; "C" means that a character is next; "O" means an octal value for a character that isn't an ASCII printing character is next):

```
(FAMILY CMR)
(DESIGNSIZE R 10.0000000)
(CODINGSCHEME TEX TFM)
(TEXINFO
(SPACE R .3838380)
(STRIKE R .1686870)
(STRIKE R .1111107)
(CHEIGHT R .4444447)
(OLD R .0000000)
(EXTRAPAGE R .1111107)
)
```

Figure 40: TUGboat 2:1 — 200dpi output is pretty grainy, even reduced from 130%

The most recent addition to the TeX zoo is XeTeX, by Jonathan Kew (Fig. 39). This Unicode-based extension of TeX can use system fonts directly. Jonathan produced the camera copy for this article on his Mac, but he is diligently working on implementations for Unix and Windows that can be included on the next edition of TeX Live.

Production and distribution

Early issues of TUGboat were produced from a miscellany of sources and output devices. Material prepared "in-house" at AMS was processed using TeX on a DECsystem-20. For the first two issues, this output was magnified to 130% on a 200 dpi Benson-Varian electrostatic printer, and photographically reduced for the press (Fig. 40). Quite a bit of material was submitted as camera-ready copy prepared on a variety of other output devices, with running heads and page numbers pasted on.

The quality of copy prepared "in-house" improved radically with issue 2:2, when AMS installed an Alphatype CRS. This machine had the astounding resolution of 5333dpi, with output on large sheets of resin-coated photographic paper. A great deal of material was still arriving as camera-ready copy, however, and a statement of editorial policy (Fig. 41) encouraged authors to pay attention to the

issues, and she is now joined by other volunteers, whose names and addresses are listed inside the front cover. If you are writing an article in one of the areas listed, please submit paper copy to the appropriate editor; articles of general interest, or in areas not listed, should go to Editor-in-Chief Bob Weiland. Tapes are still welcome, and can be sent directly to me. (See Vol. 2: No. 1, page 53, and No. 3, page 23, and the form in the back of this issue for details on tape content and format.) It is not intended that all columns appear in all issues: if there is no traffic in a particular area, there will be no column. On the other hand, if traffic is exceptionally heavy in a particular area at any point, consideration will be given to publishing a "topical" issue.

It was suggested in Cincinnati that issues be published less frequently. In 1982, an issue will be published after every general meeting in order to report to the membership what happened. The deadline for manuscripts will be a month to six weeks after the end of the meeting. In between, any manuscripts received in Providence will be held until the next scheduled issue, unless it becomes obvious that enough material exists, or an associate editor volunteers to take charge of a special issue.

Copy is solicited in camera copy form, when possible. If copy has been prepared by TeX and is legible, it will be used as submitted, reduced photographically if necessary (which is advisable for copy prepared on an output device with 200 dots/inch or lower resolution), with running heads applied. The dimensions used in the TUGboat header files are: `Vsize 54pc` for one-column pages `Vsize 39pc`, and for two-column pages `Vsize 18.75pc` and `vpagewd 39pc`. If the copy is to contain leaders which should not be covered up by the TUGboat running heads, `54pc` should be used as the length of the full page. The type used for ordinary text is `cmr10`, on `\baselinestretch 1.2pc`.

Deadlines will be firmly adhered to. Any material received in Providence later than the published deadline (in the announcements box of every issue) will be consigned to the back of the book, as "Late-Breaking News", or else held over for the next issue.

Since TUGboat is itself an advertisement for TeX, it is not our intention to lower quality, but to streamline production. Your attention to formatting of material submitted as camera copy and to the content and commands in material submitted on tape will assist greatly in reaching that goal.

REPORT ON THE TUG STEERING COMMITTEE MEETING

The Steering Committee meeting in Cincinnati took place in several sessions. At the first, on January 11, the role of the American Mathematical Society in future production of TUGboat was discussed, and other items were suggested for discussion at the second session, an open meeting on January 12.

The following actions were taken, either by the Steering Committee alone or at the open meeting:

- a. Membership for 1981 will be available retroactively through April 30, at \$10.00; thereafter TUGboat Volume 3 will be available at the price of \$10.00 per back issue.
- b. Ordinary subscriptions will be accepted for TUGboat at the same price as individual membership; this is intended primarily for the convenience of libraries.
- c. Effective with the first 1982 issue of TUGboat, the American Mathematical Society can no longer provide free editorial and production services; these services will be charged to TUG at the same rates incurred by internal Society users of similar services. Other actions will be taken to streamline production while maintaining satisfactory quality; see the Statement of Editorial Policy by Barbara Beeton (page 3) for details.
- d. A rough budget was drawn up and presented to the membership, showing the expected cost of various TUG functions for 1982. A redrafted version appears on page 45.
- e. Steering Committee members will be permitted to attend TUG workshops at no charge if they are unable to obtain support from their institutions.
- f. The Finance Committee was requested to investigate the sale of mailing lists and advertisements in TUGboat, after soliciting opinions on the legal and tax consequences of such sales. They were also requested to obtain opinions on the legal and tax consequences of receiving fees for membership, subscriptions and royalties.
- g. The price of Don Knuth's manual for TeX82 will be increased by \$1.00, which will be paid as a royalty to TUG.
- h. A Bylaws Committee was appointed, consisting of Bob Morris, Susan Plass, Lance Carnes, Dave Kellerman, and Craig Platt. They will prepare a report for the next meeting.
- i. Institutional membership will be instituted when TeX82 is ready for distribution. Dees of

Figure 41: TUGboat 3:1 — our first statement of editorial policy

guidelines. (Most authors did; some, I've learned, never read instructions.)

I didn't record when production of camera copy was shifted from the Alphatype to an Autologic APS-5, but 1984 sounds about right. That machine, with a resolution of 1200 dpi, used photographic paper in roll form, and was much less labor-intensive. Since TUGboat is printed on non-glossy paper, the difference in quality was not really noticeable, except perhaps for very tiny print.

In 1988, TUG applied for a second class postal permit, in an attempt to control expenses. One of the requirements for this permit is that at least four issues of the periodical must be published annually. Since the volume of material being submitted was sufficient for about three issues, the board decided that the proceedings of the annual meeting would become the fourth issue. The proceedings of the 1987 and 1988 meetings had already been published as issues of TeXniques, but this had only a limited distribution; inclusion in TUGboat would make the information available to all members. However, the time commitment was greater than I could handle, so the meeting program committee became responsible not only for the acceptance of papers for the meeting, but also for the editing of the proceedings. A member of the committee was designated to be

1989 Conference Proceedings
 TeX Users Group
 Tenth Annual Meeting
 Stanford, August 20-23, 1989

TUGBOAT

COMMUNICATIONS OF THE T_EX USERS GROUP
 TUGBOAT EDITOR BARBARA BEETON
 PROCEEDINGS EDITOR CHRISTINA THIELE

VOLUME 10, NUMBER 4 DECEMBER 1989
 PROVIDENCE RHODE ISLAND U.S.A.

Figure 42: TUGboat 10:4 — the first TUGboat proceedings issue

Lexicography with T_EX

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ABSTRACT

At the Institute of Lexicography at the University of Iceland, T_EX is used for the typesetting of dictionaries. Currently we are in the process of bringing out a large etymological dictionary which is typeset in T_EX with PostScript fonts. Details of this project are presented. The value of generic or logical coding over typographical coding is emphasized.

1. Background

In this paper I will discuss the use of T_EX in the work carried out at the Institute of Lexicography of the University of Iceland. The Institute was founded in 1948 and has as its major aim the production of an historical dictionary of Icelandic from 1540 (when the first printed book appeared in Iceland) up to the present, a dictionary somewhat along the lines of the Oxford English Dictionary.

During the past forty years, a lot of material has been gathered for the dictionary. The main collection of the Institute comprises some 2.5 million dictionary slips; others include, for instance a collection of words from the spoken language. These other collections contain perhaps 300,000 slips in all. Near the end of 1982, it was decided to begin evaluating the collection with the aim of publishing an historical dictionary of the language. At the same time it was decided to embark on computerizing the Institute itself.

The first computational project involved registering the main collection so as to open more paths into the collection itself. A database of all the words contained in the collection was set up. The word class, date of oldest and newest citation, the oldest source, number of citations kept in the collection and the word type (whether the word is a compound, an affixed word or a simple word) were registered for each word. This database contains a total of just over 600,000 words. This is a surprisingly high figure but is explained in part by word-compounding, which is an active process in the Germanic languages, not the least in Icelandic.

In some respects, this database file can be viewed as a first approximation to a dictionary although a very primitive one, since it does not have any grammatical analysis to speak of. Yet, because the material is stored in a database (as opposed to a linear alphabetical order), it does enable us to escape from the "tranny of the alphabet" and gives us multiple access paths to the collections of the Institute.

The editing of historical dictionaries has usually proceeded in alphabetical order, the work being brought out in installments over a period of decades. This is an approach which is in many respects less than ideal since the editor is forced to deal with words which do not form a coherent set under any reasonable linguistic criterion. We would therefore like to proceed in a different manner, dealing with individual word classes at a time. The availability of the computer makes this relatively easy to accomplish. It has now been decided by the governing board of the Institute that the editing work will concentrate on the verbs with the aim of producing an historical dictionary of verbs as the first volumes of what will hopefully later become a comprehensive historical dictionary of Icelandic.

This work was begun in 1985. The editorial strategy involves some novelties compared with traditional methods (e.g., Kahn 1982) in that each citation is furnished with a set of editorial descriptors detailing the grammatical and semantic features of the citation itself. This is done on-line with the

Figure 43: TUGboat 10:4, it hadn't fully sunk in that wide pages are hard to read

E-TeX: Guidelines for Future T_EX Extensions

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Abstract

With the announcement of T_EX 3.0, Don Knuth acknowledged the need of the (ever growing) T_EX community for an even better system. But at the same time, he made it clear, that he will not get involved in any further enhancements that would change *The TeXbook*.

T_EX started out originally as a system designed to typeset its author's own publications. In the meantime it serves hundreds of thousands of users. Now it is time, after ten years' experience, to step back and consider whether or not T_EX 3.0 is an adequate answer to the typesetting requirements of the nineties.

Output produced by T_EX has higher standards than output generated automatically by most other typesetting systems. Therefore, in this paper we will focus on the quality standards set by typographers for hand-typeset documents and ask to what extent they are achieved by T_EX. Limitations of T_EX's algorithms are analyzed; and missing features as well as new concepts are outlined.

1 Introduction

Last year at Stanford we celebrated the tenth birthday of the T_EX project. Up to now, T_EX has served thousands of users well and we expect it will continue to do so in the future. The longevity of T_EX lies in:

- the quality of its output
- its universal availability
- and its stability.

In the last few years, more and more users brought T_EX from the universities into industry where it was challenged by new applications [2]. But time does not stand still, and what was at the top of its profession yesterday might prove to be obsolete tomorrow. T_EX is still state of the art for the tasks it was designed to accomplish, but, with the growing understanding from several years' usage, we can now see where it will fail in high quality typesetting.

As a result of user pressure [27], Don Knuth announced a new version of T_EX at Stanford, acknowledging the fact, that indeed the need for 8-bit input [19]. At the same time, he made it clear, that he had decided to retire from this project and return to his long delayed topic "The Art of Computer Programming".

So T_EX is finally frozen, and any further development will result in a different system no longer maintained by Knuth. The main purpose, therefore, of this paper is to give an overview of high quality typesetting requirements (covered and not covered by T_EX 3.0) thereby, we hope, channeling future developments so that we do not end up with several incompatible "T_EX-based systems", but rather with one system that will provide the same characteristics (i.e., quality, portability, and availability) as the current program.

T_EX was designed as a low-level formatter, a stable kernel, of a typesetting system where extensions at both ends would be possible to take into account developments in printing technology (back end) and in user interfaces (front end) [14]. Thus, complaints about user unfriendliness of T_EX are unfounded, for since such requirements can be handled by front ends either written in the T_EX language itself like L^AT_EX and, therefore, fully portable, or in an external language like ArborText's Publisher, or VAX Document, etc. These systems use T_EX or a T_EX-based system as the ultimate formatter but provide a user-friendly interface [32].

When we discuss missing features, we must distinguish carefully between things which can and should be handled by a front end system and things

Figure 44: TUGboat 11:3, but we learned before the next proceedings issue

Typesetting the Byzantine Cappelli

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Abstract

An overview of the author's rôle in the preparation of the forthcoming *Lexicon of Abbreviations & Ligatures in Greek Minuscule Hands*, with particular emphasis on two challenges: sorting T_EX markup for polytonic Greek using multiple comment keys, and deriving statistical data which could be used to provide input to the book design.

Introduction

One of the greatest pleasures that I get from my position as Webmaster at Royal Holloway, University of London, is the only-too-rare opportunity to work with truly gifted and dedicated scholars. For the last few years, I have been truly privileged to be able to work with Miss Julian Chrysostomides, Director of our Hellenic Institute, and with Dr Charalambos Dendrinos, a Research Fellow within the same Institute. These two extraordinary scholars have both devoted a considerable portion of their lives to the collection, collation and preparation of material for a *Lexicon of Abbreviations & Ligatures in Greek Minuscule Hands* which is intended to do for Byzantine scholarship what Adriano Cappelli's *Dizionario di Abbreviature latine ed italiane* has been doing for Latin scholarship for the past 100 years.

deciphering these, although for Latin scholars Cappelli's *Dizionario* provides an invaluable tool.

Only too aware of the difficulties that their students were experiencing in attempting to decipher Byzantine manuscripts, Julian & Charalambos decided to compile a Byzantine dictionary that would provide their students, and future scholars, with a key to those scribal notations which were most likely to cause problems in interpretation. For over five years, these two scholars have been painstakingly researching and deciphering hundreds if not thousands of individual manuscripts and recording the results of their work, initially using fairly primitive technology such as Windows 3.1's *Cardfile* and Eberhard Mattes' *emTeX* but more recently using spreadsheet technology (Microsoft's *Excel*) and the T_EX Live Windows implementation of Bas Tjebk's *Thick's Pdf(LA)TeX* by Fabrice Popineau.

The Work of the Scholars

Although locating and obtaining copies of the manuscripts requires a not-insignificant amount of time, I will concentrate here on the tasks which the scholars undertake once the copies have been received. Each scribal notation that is potentially of interest is identified and scanned, and any artifacts that might serve to confuse are eliminated using a light pen and suitable software (ASC's *Paintshop PRO*). The resulting "clean" image is then stored as a PDF file using a fixed naming convention, and a corresponding entry made in an *Excel* spreadsheet; this entry contains the filename, the transcription, an explanation (if the notation is an abbreviation or similar) and the provenance (typically the date, but occasionally a more detailed provenance where this is felt to be important). Last this creates the impression that the rôle of the scholars is trivial, let me

Δ̄	(s) alia	xv m.	Δ̄	(s) alioi, -alioi	xvi
Δ̄	(s) Augustus, -	xv	Δ̄	(s) alia	xv m.
Δ̄	(s) alia	xv t.	Δ̄	(s) aliam	xv t.
Δ̄	(s) aliam	xv t.	Δ̄	(s) alid	xv t.

Figure 1: A fragment from Cappelli's *Dizionario*

For both Latin and Byzantine scholars, the task of deciphering manuscripts which may be more than a thousand years old is not simply one of reading a long-dead scribe's handwriting; far more difficult is the task of identifying and correctly interpreting the various abbreviations, ligatures and other scribal shorthand notations that he or she may have used. Even a skilled palaeographer may have difficulty in

Figure 45: TUGboat 26:2, and we try to keep improving

Production Notes

Barbara Beeton

A new approach to TUGboat production

Owing to various circumstances beyond the Editor's control, time available for TUGboat production has diminished to the point where it is no longer possible for the regular issues of TUGboat to remain a one-person operation.

As is quite obvious, this issue is embarrassingly late. But rather than trying to explain why it is late, I would like to describe what has been done to try to avoid such delays in the future.

Mimi Burbank and the system management at SCRI—the Supercomputer Computation Research Institute at Florida State University—have kindly made available copious disk space, login access, and a group identity for a core team of volunteers: Mimi, Robin Fairbairns, Michel Goussens, Sebastian Rahtz, Christina Thiele, and myself. Every member of this team has previous experience in editing or producing TUGboat, proceedings issues, or similar TEX publications, so they have been able to “hit the ground running.”

In the space allotted, we have set up a full, isolated (B)TEX system and TUGboat work areas. Remaining in a management position, I have populated the tree with the material collected for issues 15(4), 16(1), et seq., identified which ones are encoded using plain or L^AT_EX conventions, and encouraged the team members to work first on items that match their interests and expertise. Articles are returned to me as PostScript files to be printed and given a final reading. I have edited the input files directly, where practical, and provided comments by e-mail to the “handlers” regarding adjustments in format. The final version is again delivered in PostScript form for printing and inclusion in a growing pile of printer-ready copy. No item has been slighted, with the result that 16(1) is nearly ready to put together, and should be sent to the printer—and thence to members—in no more than a month from 15(4). As I will be out of town for much of this interim, Mimi Burbank has agreed to be the manager for 16(1).

The plan for issue 16(2) is a bit different. For some time, the Publications Committee has been discussing the idea of theme issues—issues devoted to a single topic of narrower or wider scope—under the direction of a guest editor. 16(2) will be the first of such issues, containing articles related to electronic documents, in particular SGML, HTML, hypertext, Acrobat, . . . , with Malcolm Clark in

charge. Topics for future theme issues will be announced as plans become more firm; one theme issue per year is currently foreseen. Suggestions are welcome for both topics and prospective guest editors.

Input and input processing

Electronic input for articles in this issue was received by e-mail, and was also retrieved from remote sites by anonymous ftp.

In addition to text and various files processable directly by TEX, the input to this issue includes METAFONT source code and many encapsulated PostScript files. More than 200 files were required to generate the final copy; over 100 more contain earlier versions of articles, auxiliary information, and records of correspondence with authors and referees. These numbers represent input files only; .dvi files, device-specific translations, and fonts (.t₁m files and rasters) are excluded from the total.

Most articles as received were fully tagged for TUGboat, using either the usual plain-based or L^AT_EX conventions.

By number, 47% of the articles, and 63% of the pages in this issue are in L^AT_EX. (For ease of production, three mostly-text items which were originally prepared using L^AT_EX were converted to plain, and one, from plain to L^AT_EX.) L^AT_EX2_ε was the version used, thanks to some major systems work by Robin Fairbairns and Sebastian Rahtz.

Font work was required for the Indica article by Haralambous, for MacKay's recycle logo, and for the Chinese fragment in the EuroTEX'94 report.

Articles were processed individually by members of the team according to their own preferred methods, and the final inputs and output (PostScript) files delivered to the Editor for compilation into an issue. The Editor created the table of contents, the cover and front matter, printed out all the files, checked the copy and corrected it to the printer.

Output

The bulk of this issue was prepared at SCRI on an IBM RS6000 running AIX, using the We^AC implementation of TEX. The remainder was run at the American Mathematical Society from files installed on a VAX 6320 (VMS) and TEX'ed on a server running under UNIX on a Solbourne workstation. Output was printed at AMS at 600 dpi on an HP LaserJet 4M plus; this was used rather than a typesetter for reasons of both cost and speed.

Late-Breaking News**Production Notes**

Mimi Burbank

It is April, and the trees and flowers are blooming, and thoughts turn to new life—and the new T_EX Live CD, which is included in this issue. Many thoughts fly through my feeble mind as I think about production of this issue—the first being that I am using the T_EX Live 4 setup for production. I wanted to use each set of binaries available on the CD plus some extras, with the exception of the win32. I even managed to build a set of binaries on my own! The following binaries were used for production of this issue:

```
alpha-osf3.2      mips-sgi-irix5.3
alpha6-osf4.0d   rs6000-aix4.1.4.0
hppa1.1-ppa10.10  rs6000-aix4.2.1.0
i686-linux-gnulib1 sparc-solaris2.5.1
mips-irix6.2      sparc-solaris2.7
```

I tend to “play” (more proficient users would call this “beta testing”) with the binaries until they are complete. I like to think I represent the “noice” when it comes to setting up a TEX system—and always tell the TLA team members that, “If I can do it, anyone can!” I encourage all of you to read the T_EX Live documentation, and become familiar with just what is on your system. There is a world of documentation available with all of the packages on the CD—all ready for your use and enjoyment.

Output. The final camera copy was prepared at SCRI on multiple workstations, using the T_EX Live 4 setup, which is based on the We^AC L^AT_EX implementation version 7.3 by Karl Berry and Olof Weber. PostScript output, using outline fonts, was produced using Radical Eye Software's *dvips*(k) 5.85, and printed on an HP LaserJet 4000 TN printer at 1200dpi.

This issue also marks a new trend in the production of TUGboat—we will also be transferring several PostScript files to the printer.

TUGboat Web Pages

I have been working to update and complete the TUGboat web pages for inclusion in the TLA CD. During this process, I was overcome by guilt feelings—because we promised to begin this process some time in 1996—and somewhere toward the end of March, I decided that we really needed to put up all of the contents files for every sin-

gle issue of TUGboat! The contents are archived in special files which may be run to produce the Contents pages for each volume (or more information see <http://ctan.tug.org/tex-archive/usersrgps/tug/tugboat/t-od-cv/>). During the process, several comments were made about attempting to standardise the “naming” of the TUGboat directories on the TUG web server, so I also had to go in and rename every directory, and then edit each contents file, globally substituting one string for another. This took approximately three full days, and though the contents files are not as “nice” for the older issues, they at least are present and may be viewed at <http://www.tug.org/TUGboat/contents.html>. Any errors are my own; please send comments to sebastian@tug.org and I'll make changes as quickly as I have time to do so.

My primary reason for mentioning the above is to encourage you to look at the early contents files. I have been a member of TUG since 1986, and, having attended nine annual meetings between 1986 and 1996, I must admit to taking a nostalgic trip down “memory lane” as I opened and closed each of the contents files. For those who are longstanding members of TUG, there is quite a bit of history simply in the contents pages, and I enjoyed meeting “old friends” there. I only hope that we will not have to wait too much longer to be able to actually convert some of the earlier .tex files to a readable format on the web. This of course will require more volunteers who have time to convert some of the older files into a format which can be processed either using the original software or recoding files to run with the current version of L^AT_EX.

This will also require permission of every author who ever published in TUGboat! And not only for the TUG web pages. Discussion has begun with regard to making a CD of TUGboat articles. More information on this will appear on the web pages at <http://www.tug.org/TUGboat>, as well as future issues of TUGboat.

Coming In Future Issues. The next issue will contain an article entitled “A short introduction to font characteristics” by Maarten Goussens (reprinted with permission from the editors of the Dutch MAPS). Also scheduled for publication in the next issue is an article describing the latest T_EX system.

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Figure 46: TUGboat 15:4—the transition to production at SCRI

the responsible Proceedings Editor. The first person to take on this challenge was Christina Thiele (Fig. 42). Many of the decisions on the style of the proceedings issues grew out of Christina's ideas and opinions, and Christina remains to this day a valuable member of the TUGboat editorial team.

Articles in the first TUGboat proceedings issue were presented as a single, wide column (Fig. 43). This validated the original contention that text of such great width was difficult to read, and a modified two-column format was introduced for the 1990 proceedings (Fig. 44). With minor modifications—the abstract is now wider, though still less than 5 inches—this format is still in use today (Fig. 45).

Not only was the editorial job getting to be more than I could handle and keep TUGboat on schedule, but the workload at the AMS print shop was growing, and it was necessary to look for another printer. With the help and encouragement of the group that had done such a fine job with the 1994 proceedings, a production team was established. Mimi Burbank, with the support of her employer, the Florida State University Supercomputer Computations Research Institute (SCRI), provided a new production home (Fig. 46). With remote logins at SCRI, everyone involved in the production ef-

Figure 47: TUGboat 20:1—TUGboat goes electronic, both delivering copy to the printer, and posting on-line

fort could work as effectively across the Internet as they could “at home”. Printing and distribution was contracted to Cadmus, a long-established printer of technical journals on the Eastern Shore of Maryland.

At first, physical camera copy was sent to Cadmus, but when they offered the capability of receiving copy in the form of PostScript files, we tried it out, and found that it worked (Fig. 47). TUG had a stable web site by this time, and TUGboat tables of contents had been posted regularly upon publication of each issue. With the routine processing of files to PostScript, and the ability to convert these to a form readable with a browser, it was decided to try to post the entire TUGboat archive on the web site. Since some decisions regarding copyright meant that TUG didn't have clear title to the material, this in turn meant that permission would have to be obtained from every author who had ever published in TUGboat.

Unfortunately, TUGboat suffered a drought of submissions, and that, along with delays in receiving files from meeting presentations, snowballed into a serious production delay. The mailing permit was terminated after the 2002 volume, allowing a cut-back to three issues per year.

By 2003, PostScript files sent to the printer had been supplanted by PDF files; PDF files were already

TUGboat, Volume 3, No. 2

MACRO
O
L
U
M
N

Send Submissions to:
Lynnes A. Price
TUG Macro Coordinator
Calma RBD
577 Lakeside Drive
Sausalito, CA 94968

Many existing macros will be replaced when T_UG₂ is distributed. The current versions tend to exist in large packages; future macros will be most useful if each feature is self-contained so that T_UG users can pick and choose pieces from several packages. In order to promote modularity, Art Keller and Dan Brutsky have volunteered to work on standard mechanisms such as allocation of foot codes and of box and counter numbers. In addition, they have suggested that this column include a "plate book" of T_UG₂ macro names. Macro writers should submit macro names, along with a very brief description, to the editor. When providing an alternate implementation of a similar function, other writers can use a name that appears on the published list; for new capabilities, existing names should be avoided. Of course, writers should contribute their macros as well as the macro names to TUG. Names can be reserved before macros are written. However, names listed in one issue will be deleted, unless the corresponding macro is received before the following issue.

TUGBOAT MACRO INDEX

The following list catalogue macros that have appeared in TUGboat. Entries are listed by volume, number, and page as well as author's name. Items that could not be categorized by an obvious keyword have been listed under "miscellaneous". Many items refer to parts of large macro packages; users of other packages may find them valuable models for macros of their own. Readers' comments on the format as well as the contents of this index are welcome.

ACM style	II 15, 87-93	A. Keller
Address	II 13	S. Beeton
Appendix	II 2	M. D'Az
Arriving operations	II 24-36	G. Leung
Baselines to top of box	II 19, 77	A. Keller
Bibliography	II 2	M. D'Az
Boxes	II 19, 78	A. Keller
Box numbers, automatic allocation	II 21	A. Keller
Bracing, use of		
Capital letters	II 13, 78	A. Keller
Large — at beginning of paragraph	II 22	S. Beeton
Small caps	II 13	S. Beeton
Roman numerals	II 130-131	P. Milligan, L. Price
Color		
Columns and sections	II 11, 80-81, 79-81	A. Keller
Controlling a sequence of lines	II 2	A. Keller
Characters, macros to produce	II 17, 87-93	A. Keller
Chemical notation	II 17, 87-93	M. Healy, S. Beeton
Columns		
Automatic allocation	II 21	M. Price
Boxes	II 21	M. Price
Columns	II 130	P. Milligan, L. Price
Tables	II 2	S. Beeton
Cross references	II 13	S. Beeton
Deferred output	II 13, 85, 84-88	A. Keller
Diagrams	II 2	S. Beeton
Equality of integral values	II 113-120	P. Milligan, L. Price
Figures	II 2	A. Keller
Foot	II 2	A. Keller
Changing features of a particular issue	II 15, 87, 88-89	A. Keller
Width	II 11	M. D'Az
Definition	II 130	P. Milligan, L. Price
Alphas to table form	II 44-45	P. Milligan
Alphas to table form	II 28	S. Beeton
Footnotes	II 28	C. Jackson
Footnotes	II 28, 73-74	A. Keller
Footnotes	II 2	A. Keller
French	II 2	M. D'Az
Graphics	II 48-49	S. Beeton
Graphics	II 11	S. Beeton
Headings, page	II 2	A. Keller
Hidden text	II 11	S. Beeton
Comparison of integral values	II 113-120	P. Milligan, L. Price
Grayscale	II 2	S. Beeton
Self strings, use of using leading characters (header, script or separator)	II 2	S. Beeton
Index production	II Appendix 1	P. Milligan, L. Price
Index production	II 2	S. Beeton

Figure 48: TUGboat 3:2 — macros, macros, macros

being posted to the TUG web site. With Mimi's impending retirement (which occurred at the end of the 2005 academic year), the files archived at FSU were transferred to the TUG box hosted at Aarhus University (thanks to Kaja Christiansen), and production was transferred there. There were a few glitches — the source files for one issue were lost owing to a tape backup failure — but in general, there was very little disruption, since by then everyone was used to working remotely. Karl Berry has taken over as the contact with the printer. And with his hard work, and the substitution of an issue of proceedings for EuroT_EX (distributed to members of most of the European groups as well as TUG), we are back on schedule. Thanks, Karl.

Some random notes on content

The first few issues were devoted almost entirely to reports on who was doing what, where. Macros were still relatively rare, and the ones submitted for publication were indexed for easy reference (Fig. 48). This treatment has been superseded by articles on packages, occasional analyses of interesting macro code, and "The Treasure Chest", a list of recent additions to CTAN.

Errata listings for T_EX and METAFONT were provided regularly in supplements, a practice that

Den also spent some time relaxing at the Grahams' country house on an island in the archipelago outside the Stockholm harbor. A helpful spider provided an appropriate setting for the author of WEB.



Question and answer session at the Nordic group meeting

Donald Knuth (DEK): I would like to say a big "Thank you" to Rowitha, and to the School of Computer Science and Department of Mathematics, for making my visit here possible and arranging everything. Also, I'm glad to be back here—I wanted to say that T_UG owes a lot to the Nordic countries and to Sweden in particular. I guess I never mentioned this in print, but when I designed T_UG, I chose three examples of mathematical typesetting that I considered as standards of excellence, and I studied those three very carefully. I scanned them digitally—in those days we used a TV camera—and made a lot of careful measurements. One of the three was a volume of *Acta Mathematica*, printed in Stockholm about 1910. The second, in case you're wondering, was from the Netherlands in 1950, the mathematical section of their *Academy of Science* proceedings; the third was Addison-Wesley's house style as used in *The Art of Computer Programming*, when math composition was still done by hand. Also, here at KTH you had one of the first four Alphatype machines running my original software. I received a copy of an early publication—I don't

remember the name of it now, but I remember it had a green cover and it was a nice booklet about 40 pages long—a mathematical report. [It was *Non-linear Inverse Problems* by Gerd Ericsson (1983), 46 pp.; see "B_X incubals," TUGboat 5, no. 1 (May 1984), 4-11.—ed.] So some of the very first extensive uses of T_UG happened right at this institution. That makes me especially pleased to be here.

At the end of my courses at Stanford, I usually reserve the last day of class for a session we call "All questions answered," and I volunteer to answer questions on any subject whatsoever except religion or politics. And in recent years I've also excluded questions about Volume 4 of *The Art of Computer Programming*. [laughter] But today this looks like a very friendly audience, and I don't even mind if you have questions about Volume 4 of *The Art of Computer Programming*. So ask any questions whatsoever, go ahead. [Including politics.]

Question: I have a question about Chinese characters used with T_EX.

DEK: Well, I don't know too much, but I'll tell you what I do know. One of the first scientific visitors from the People's Republic of China to the United States was Dong YunMei, who came to work with me and designed a system called LCCD, Language for Chinese Character Definition; he wrote a Stanford Computer Science report about that work. It was inspired by METAFONT, but he had special graphical primitives in there so that LCCD could do things that were especially important in Chinese for positioning radicals and so on. It was a language that wasn't based on, but was similar to METAFONT; he implemented it entirely himself. In the second edition of Volume 2 of *The Art of Computer Programming* (which was published in 1981, and was the first real use of T_EX₂), we used LCCD to typeset the Chinese names in the index. Then Dong went back to China, and now he heads a group at the Institute for Software Technology in Beijing. That group has, of course, done a lot toward extending his work since those early days. They now have a language called SP for typesetting Chinese and arbitrary Western text; it was mentioned in the proceedings of the IFIP Congress, 1989, held in San Francisco; there's a brief, 5-6 page report about what is going on in computer research in China, and this is one of the projects mentioned. When I was at Stanford, he spelled his name "Tung"; now he spells it "Dong", but it's still pronounced "Doong". He's a very fine man. The most exciting thing for me is

Figure 49: TUGboat 13:4 — DEK and a friendly spider

OUTPUT DEVICES AND COMPUTERS

	AlphaCSI	APFS	Canon LBP19	Comp. 8000	Fal. Data 80T	HP5800	Lineart 302	Varian	Veratec	Varian 3700	Varian Damer	Varian VSP
Ethernet												Standard
DEC10			Vendor's								Vendor's	Varian Del.
DEC10	AMS				Math Reviews			Adapt. Inc.	AMS			
IBM(V)W										SLAC		
IBM 370			Info. Handling									
OpenCR22					TV Corp.							Standard 7
Sell												
Standard 1100					Info. Sys.							
VMC(V)W											Cal Tech	
VMC(V)W											Santa	

Output Devices

OUTPUT DEVICES
Rilla J. Thedford
Mathematical Reviews

Thanks to all who responded to the questionnaire on output devices; it was genuinely appreciated. The most common question concerning output devices seems to be "Who has what device on what machine?" In response, we have compiled the above chart of active T_EX configurations. It is far from complete. Please, if you know of or hear of a new or an existing configuration that is not on the chart, notify me or David Fuchs. We recognize that more than one site can have the same configuration, so we listed only one for each. If a list of known sites for a device or for a configuration is desired please contact me at (813) 764-7228. We will do our best to get you the information.

Future articles will describe the characteristics of various output devices, with user comments.

Editor's note: In the membership list, computer hardware and output devices are shown for individual members in the form communicated by the member. For the listing by device type, however, an effort has been made to consolidate similar devices into groups which, when possible, coincide with Site Coordinator coverage. In the case of VAX, for example, there are two significant groups, depending on operating system (VMS or UNIX). When communicating information about hardware for publication in the membership list, please take a look at the device groupings, and provide enough specifics to yield both a satisfactory individual listing and a suitable group assignment. (If your hardware does not belong to any of the existing groups, that is also useful information.)

Site Reports

NEWS FROM STANFORD
David Fuchs

T_EX₂ runs. We're about to put it up for general use. The test input file, called TRIP.TEX, causes 99% of the statements that make up the T_EX₂ program to be executed at least once. Additionally, some of us have been using T_EX₂, and it really works. It seems to be about the same speed as the old Sell version of T_EX, even though our compiler does not optimize at all, so with a good compiler and runtimes, it could well be faster. We're getting output on our Damer printer (thanks to Ignacio Zabala), and there's a nice new program by Joe Weisberg that displays pages of a DVI file on the Sell (DEC10) computer's Data-Disc displays. The T_OP_EX-20 change file seems to be in order, and we hope that installation on VAX and IBM systems will proceed smoothly.

Figure 50: TUGboat 3:2 — just a few output devices so far

ceased when it became practicable to obtain the errata files via a network connection. (Remember—the Internet didn’t exist when T_EX was launched.) Of course, major upgrades to the software and CM fonts have always been announced in *TUGboat*, and Don Knuth has been a significant contributor of other material as well, if only in the form of transcribed question and answer sessions (Fig. 49).

The topic of output devices was very “hot” in the early days of T_EX, and a recurring section contained reports on the devices that users had managed to implement, and examples of output from the devices. (One of my favorites was a Diablo daisy-wheel printer, with a driver cobbled together by Timothy Murphy, although no sample was published.) Beginning with issue 3:2 (Fig. 50) a chart appeared in most issues; the run ended in 11:4, when device drivers and laser printers were no longer a novelty.

A decision that didn’t have a visual effect on *TUGboat* but did have an impact on the quality of the content was the implementation of a peer review process for all technical submissions. This practice was initiated in 1990 with particularly strong encouragement from Nelson Beebe. The goal of this review is not to reject material—there has never been a real problem of over-supply—but to ensure that what is published is complete, accurate, and can be understood by a reader with the requisite background. (We do *not* wish to be a closed society of “great experts talking to other great experts”.) Some really fine tutorials have emerged from this practice. However, it has been a real disappointment for me that many T_EX practitioners who might be best able to write cogently for novices have either pled lack of time to do so, or have directed their efforts solely to writing books, presumably yielding to the profit motive.

Fonts and language support have figured prominently in *TUGboat*’s pages. Although this may be an area of specialized interest (at least one suggestion was received that it should be less prominent), T_EX may provide scholars working with obscure languages their only practical means of producing documents with fonts of good quality. Just a few of the language- and font-specific topics covered are Coptic, Arabic math (Fig. 51), Byzantine music, classical Greek, Bengali, Thai (Fig. 52), Hebrew, Deseret, the list goes on . . .

The future . . .

Maybe it’s time to think about handing this job off to someone else. Karl has been especially supportive and helpful, nagging authors and doing yeoman

The command `\ab{expr}` or `_{expr}` gives `expr` as an index. The index `expr` should be given within braces unless it consists of a single token. The command `_` does not change the direction of `expr`. It can therefore be used for a single token.

$$\$(\{1\}\{177\})+5 ; \$(\{1\}\{2\})+\$(\{1\}\{3\})$$

The empty braces `{}` are necessary to get the exponent or the index closer to the basic symbol.

4.10 Common functions

There are symbols for the usual abbreviations representing elementary functions in use in mathematics. Table 3 shows the predefined names assigned according to typographical conventions.

Generally, the abbreviations representing elementary functions are used with dots. Sometimes, they are noted without dots.

$$\backslash\funcwithdots$$

$$\backslash\sin c + \backslash\an s$$

$$\backslash\funcwithdots$$

$$\backslash\sin c + \backslash\an s$$

4.11 New function

The command `\newfunc{fname}` defines a function named `fname`.

$$\$(\backslashnewfunc{Sqr})(c) = \backslash\cos(c(\{1\}\{2\})) - 6$$

$$6 - (c^2) = \text{صقر}(c)$$

4.12 Function defined with cases

The command `\cases{array}` generates a function defined with different cases presented in `array`.

$$\$(c) = \backslash\cases{(-4c) \& \{\backslash\hrbox{4Y2A kan}\} <0\} \backslash\cr (4c) \& \{\backslash\hrbox{4Y2A kan}\} >0\} \backslash\cr (-2) \& \{\backslash\hrbox{0Yr 21k}\} \backslash\cr}$$

$$\begin{cases} 0 > c \text{ كان } 0 \\ 0 < c \text{ كان } 2 \\ 2 < c \text{ كان } 2 \end{cases} = \text{ص}(c)$$

Mathematical Arabic symbols that stretch or shrink according to the context are provided by the system as well.

4.13 Root

The command `\sqrt{expr}` gives the square root of `expr`.

$$\$(\backslashsqrt{\{b+9\} \over (c)}) \} \} - \backslash\sqrt{c-(\{1\}\{2\})} + \backslash\sqrt{c+\{b\}}$$

$$\sqrt{b^2 + 9c} - \sqrt{c - \frac{b^2}{4}}$$

4.14 Integral

The command `\int_{expr1}^{expr2}` gives the integral from `expr1` to `expr2` using the reversed symbol \int .

$$\$(\backslashroot{3b}) \int \sqrt{2 + \sqrt{1 + \sin(b\theta + c)}}$$

$$\sqrt[3]{2b} \int \sqrt{2 + \sqrt{1 + \sin(b\theta + c)}}$$

Name	Example	Result
<code>\sin</code>	<code>\sin c</code>	جان
<code>\cosine</code>	<code>\cosine c</code>	جنا
<code>\tangent</code>	<code>\tangent c</code>	ظا
<code>\cotangent</code>	<code>\cotangent c</code>	ظنا
<code>\secant</code>	<code>\secant c</code>	قا
<code>\cosecant</code>	<code>\cosecant c</code>	قنا
<code>\Arc sine</code>	<code>\Arc sine c</code>	رجا
<code>\Arc cosine</code>	<code>\Arc cosine c</code>	رجنا
<code>\Arc tangent</code>	<code>\Arc tangent c</code>	ظا
<code>\Arc cotangent</code>	<code>\Arc cotangent c</code>	ظنا
<code>\Arc secant</code>	<code>\Arc secant c</code>	قا
<code>\Arc cosecant</code>	<code>\Arc cosecant c</code>	قنا
<code>\Hyperbolic sine</code>	<code>\sinh c</code>	جان
<code>\Hyperbolic cosine</code>	<code>\cosh c</code>	جنا
<code>\Hyperbolic tangent</code>	<code>\tanh c</code>	ظا
<code>\Hyperbolic cotangent</code>	<code>\coth c</code>	ظنا
<code>\Hyperbolic secant</code>	<code>\sech c</code>	قا
<code>\Hyperbolic cosecant</code>	<code>\csch c</code>	قنا
<code>\Arc hyperbolic sine</code>	<code>\sinh^{-1} c</code>	رجا
<code>\Arc hyperbolic cosine</code>	<code>\cosh^{-1} c</code>	رجنا
<code>\Arc hyperbolic tangent</code>	<code>\tanh^{-1} c</code>	ظا
<code>\Arc hyperbolic cotangent</code>	<code>\coth^{-1} c</code>	ظنا
<code>\Arc hyperbolic secant</code>	<code>\sech^{-1} c</code>	قا
<code>\Arc hyperbolic cosecant</code>	<code>\csch^{-1} c</code>	قنا
<code>\Logarithm</code>	<code>\log c</code>	لوج
<code>\Exponent</code>	<code>\exp c</code>	قهر

Table 3: Usual functions

Figure 51: *TUGboat* 25:2—Fonts: Arabic math

รายการ FAQ นี้สร้างขึ้นเพื่อจุดประกายที่ถาม/ที่ตอบซึ่งจะช่วยให้ผู้อ่านในชุมชนที่สะดวก. โปรดแจ้งรายการ FAQ นี้เมื่อมีเปลี่ยนแปลงเพิ่มเติม. **กรุณาอย่าลบหรือแก้ไขเนื้อหาในเอกสารนี้**

รายการ FAQ นี้สร้างขึ้นเพื่อจุดประกายที่ถาม/ที่ตอบซึ่งจะช่วยให้ผู้อ่านในชุมชนที่สะดวก. โปรดแจ้งรายการ FAQ นี้เมื่อมีเปลี่ยนแปลงเพิ่มเติม. **กรุณาอย่าลบหรือแก้ไขเนื้อหาในเอกสารนี้**

Figure 1: The same text, with and without intercharacter glue. To suppress warnings and error messages for the above variant, `\tolerance` had to be set to 8000 and `\badness` to 10000. `\baselinestretch` has the value 1.2.

- References**
- [1] The Adobe Glyph List. <http://partners.adobe.com/asn/developer/typeform/unicodetags.html>.
 - [2] Allan Jeffrey et al. The fontinst package. Available from CTAN and its mirrors, e.g. <ftp://ftp.dante.de/pub/tex/fonts/utilities/fontinst>.
 - [3] Werner Lemberg. The CJK package. <http://tjck.fzi.org>.
 - [4] Surapont Meknavin and Theppitak Karoonboonyanan. The thalatex package. <ftp://openources.thai.net/pub/linux-t1e/updates/SOURCES/thalatex-0.2.0.t1e.tar.gz>. The implementation for Thai in this package is incompatible to the one described in this article. For this reason, the Babul module of the CJK package is called ‘thaicjk’ and not ‘thai’.
 - [5] John Plince and Yannis Haralambous. The Ω system. <http://www.gettext.org/omega>. Almost all modern T_EX distributions contain support for Ω.
 - [6] Tomas Rokicki. The `sf2t1f` program. Part of the `dvips` package which is available from virtually all T_EX distributions.
 - [7] Hui The Thanh. `pdfTeX`. <ftp://ftp.ctan.org/pub/tex/latex/ctan/thanh/pdfTeX/latest.pdf>. `pdfTeX` is, similar to Ω, already part of most modern T_EX distributions. The given URL specifies the primary address of `pdfTeX` since it still in development, sometimes with incompatible changes.
 - [8] The Unicode Standard. <http://www.unicode.org>.
 - Werner Lemberg
 - KI. Bonhammer, 1
 - 44137 Dortmund
 - ul@gnu.org

Figure 52: *TUGboat* 21:2—Fonts: Bengali

TUGboat wish list

These are some of the topics on which the editor is looking for authors. Add your own suggestions or volunteers! Send e-mail to TUGboat@math.AMS.org with details.

- interviews with people who have influenced T_EX and TUG
- real product reviews of both commercial and PD T_EX implementations and other software, also macro packages like *petricks*, etc.
- surveys of T_EX implementations for particular hardware/operating system combinations, with comparisons of features
- “road map” to the CTAN T_EX areas
- more tutorials and expository material, particularly for new users and users who aren’t intending to become T_EX wizards; one possibility — answers to the “top ten” questions sent to comp-text.tex by people writing dissertations
- “how to” articles — how to build your own style based on, say, article.sty, how to include an abstract and other stuff in the full-width block at the top of a two-column article, etc.
- comparative analyses of style files that address the same problem, e.g., crop marks
- crossword puzzles for the whole T_EX community

columnists of the latter variety may be promoted to associate editor (see the list on the reverse of the title page of this issue). If you are interested in either track, a message to TUGboat would be welcomed.

- **Production assistance.** This is a more problematic area, as the successful production of an issue of TUGboat requires that every file and every font be available to and compatible with the equipment on which the camera copy is generated. However, sometimes it is hard to have someone to call on to generate fonts, vet macro files (I always assume that if the author doesn’t specify otherwise, the current version on CTAN will work properly, an assumption that isn’t always warranted), and help fight other fires. If you’re an experienced (D)T_EX user and are interested in this sort of challenge, send a message to the TUGboat address with the details of the system you’re working on — computer, operating system, implementation and version of T_EX and METAFONT, output device(s) available. Previous production experience is a big plus, and a direct Internet connection is necessary.

By now, you’ve seen Christina’s solicitations for a new T_EX and TUG News editor. The editor of TUGboat has been having similar thoughts off and on for several years, but hasn’t done anything so

far about it. After the nearly disastrous failures to meet the publication schedule this past year, it’s imperative that I do start looking toward the future. I know that TUGboat edited by someone else wouldn’t be quite the same, but there are many valid conceptions of what such a journal should be. The criteria that I’d value in a possible successor include, in no particular order:

- broad and thorough knowledge of T_EX and its relations;
 - fascination with the typographic art and a desire always to learn more;
 - literacy;
 - a good (native) command of English and some ability to understand other human languages;
 - tact;
 - a comfortable familiarity with the electronic networks;
 - the ability to bend a computer to one’s will;
 - a well-developed sense of responsibility.
- If you think you might be such a person, or know of someone else who is, please contact me directly: bb@math.AMS.org.

◊ Barbara Beeton
 American Mathematical Society
 P.O. Box 6248
 Providence, RI 02940 USA
bb@math.AMS.org

Figure 53: TUGboat 14:4 — my wish list, and my list of qualifications for a future TUGboat editor

work with editing and production, especially since Mimi’s retirement. He’d make a fine editor, though perhaps he’d rather “have a life” outside of TUG. I’d like to see TUGboat continue as a publication for *all* T_EX users, and indeed for anyone interested in high-quality typography and composition.

That brings up a matter that has bothered me for a while. The bulk of TUGboat is still produced with L^AT_EX, and much of the content is also biased in that direction. One effect is the downplaying of plain T_EX, which still has its devoted users; a sad consequence is that at least one member of long standing has resigned, citing the L^AT_EX bias as the reason. Remember — *all* T_EX users. Let’s not neglect our old friends, or take them entirely for granted.

A very long time ago, I published a “wish list” (Fig. 53). Rereading it now, I wouldn’t change much, nor would I change the list of qualifications I thought would be good in my successor as editor.

What will I do when I retire? Well, I hope not

Topics in a TUGboat Index

Barbara Beeton and Ron Whitney

Index-construction is a notoriously difficult task. One can approach an index from within (looking at the existing text and classifying what one sees) or from without (imagining what words and concepts users of the index will naturally want to use for queries). Of course, the whole process will comprise both these methods with additional cross-references and consistency checks.

One of the authors (BB) has spent considerable time examining TUGboat issues 7–10, marking items for a cumulative TUGboat index. The

following list contains the headings generated from these volumes for a *subject* index. Items listed within square brackets (as *Notes*) are for production purposes only and will not appear in the final copy. We would value any help you care to give! Please add to the list any subject areas you might naturally query in a TUGboat Subject Index which are not already present. Annotations and other comments are also quite welcome. The whitespace you see is there for your benefit. Please use it!

Accents, see Diacritics

L^AT_EX

Announcements, miscellaneous

Applications, see Back-end formatter; Book production; Database applications; Electronic publishing; General applications; Journal production;

Archives of T_EX material

ASCII output from T_EX or L^AT_EX

Back-end formatter

Beginner’s topics (see also Training; Tutorials)

Bibliographic tools

Book production

Books on T_EX, see Publications on T_EX

Bridge

Budgets, TUG, see Financial reports; Treasurer’s reports

Calendar of events [Note: regular feature]

Chemical notation

Chess

Commercial use of T_EX, see Production use of T_EX

Figure 54: The bare bones of a potential TUGboat index

to lose touch with either TUG or T_EX. If I just hang around the house, it will simply drive my usually patient husband to distraction. A project I started long ago might be revived: a TUGboat index. I’ve already accumulated the data for volumes 1–10. Organizing this needs a method of sorting (and printing) locations that handles volume and issue as well as page number. A basic outline for cross-references already exists — a draft was circulated for comments at the 1990 meeting at Texas A & M in College Station (Fig. 54). No promises, but this seems a worthy project, and at least it would keep me off the streets.

Thanks

And finally, I’d like to thank all TUG members and T_EX users, many of whom have become good friends through the years, for their support and encouragement. The Math Society has been a good place to work and be involved in this T_EX enterprise. And most of all, Don Knuth, who started it all.