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 Site Reports  
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## NEWS FROM THE T<sub>E</sub>X PROJECT

David Fuchs

Just a short note this time. T<sub>E</sub>X version 1.0 has been out for over half a year, and it's doing quite well. We'll have a 1.1 available 'soon' that fixes the dozen bugs found since then. Overall, the problems have been obscure enough that I wouldn't even suggest that anyone bother to bring up 1.1, except that we'll be sending L<sup>A</sup>T<sub>E</sub>X along, which you're sure to want.

The T<sub>E</sub>Xbook has been out almost as long, and is about to go into a second printing with corrections. Accompanying this TUGboat is a list of errata found before the second printing, and another of errata found after the correction pages for the second printing were sent to the publisher (oh, well). While some of the errors in the first printing were embarrassing, fortunately none of them were disastrous. Prof. Knuth is still offering a reward to the first finder of any error in the T<sub>E</sub>Xbook, as well as any bug in the code.

The biggest roadblock for T<sub>E</sub>X continues to be the availability of fast, inexpensive, high quality printers. The gap is closing though: Imagen has a new model for \$10,000 that prints 8 pages per minute at a very, very pretty 300 dots/inch (it looks much nicer than 2700 output, for instance). This machine is actually shipping, and I'm told that QMS will have a competing model out soon. Let's hope that that will drive the price down. At the other end of the spectrum, John Johnson has been showing off some quite respectable output from a Toshiba printer (180 dots/inch, one half page per minute, under \$2K). Perhaps by the time you read this, these prices will be lower . . . .

For those of you maintaining DVI-to-printer programs based on DVIt<sub>y</sub>p<sub>e</sub>, please note that we've made two changes to DVIt<sub>y</sub>p<sub>e</sub> that should result in better character spacing in special situations. Negative kerns are now rounded correctly, and accents on long words should come out better. Look for DVIt<sub>y</sub>p<sub>e</sub> version 2.4 or later on the T<sub>E</sub>X 1.1 tape.

The TeXhax mailing list continues to expand to more and more sites. We can now reach BITNET hosts as well as ARPANET, CSNET and UUCP. The main address for add/delete requests is TEXHAX@SU-SCORE.ARPA. One big flurry of recent messages concerned where the point (0,0) goes on

an output page when reading a DVI file. Putting it at the upper left corner of the paper can't be right, because that ends up leaving no top or left margin for the text. On the other hand, nowhere in our documentation does it mention that anyone should expect an inch of space at the top and left to be provided automatically. I would urge everyone to adopt the convention used at Stanford: all DVI-reading programs allow the user to specify an extra top or left margin, but these values default to 1 inch if not explicitly specified.

Another major topic of discussion was how to specify various special graphic effects, and in general how the T<sub>E</sub>X community can standardize on \special commands. Perhaps the best way to resolve these issues will be to hold a 'Special Interest' meeting at the coming TUG meeting.

The big activity at Stanford these days revolves around the new Metafont. The program itself is under development on our DEC10 by Prof. Knuth. Although not complete, it's up and running, and is also being used on our Sun machines by the students in the Metafont course currently being taught by Profs. Knuth, Southall and Bigelow. This course is broadcast on the Stanford Instructional TV Network, through which it is picked up by HP in Boise, among others (it will also be available on video tape). We sent the current version of the new Metafont to HP-Boise, and they report that they got it running on their 9836 machines within a few days. I offer this as evidence for the claim that 'change files' for MF.WEB should be nearly the same as the corresponding change files for TeX.WEB. So, everyone should have a pretty easy time getting Metafont going on their machines.

Don't get too excited yet, though. Metafont will undoubtedly be changing rapidly during the next few months, as the course progresses and everyone gains experience with the new system. Even as it stands now, not all of the features that are planned have been coded. So I don't expect to see a Metafont 'version 0' available for distribution before the TUG meeting this summer. A new version of Computer Modern in the new Metafont language will take quite some time, but that shouldn't stop anyone out there from trying their hand at using version 0.

New Metafont differs from the old in every way but name. It's written in WEB for portability; it's much the same size as the new T<sub>E</sub>X, and should run on pretty much the same class of machines as T<sub>E</sub>X. We've done away entirely with the old raster array. This means that the new Metafont should have much less trouble with very-high resolution fonts (both in speed and character size limitations).

The new Metafont's output also works differently than the old. It's more akin to the way  $\TeX$  uses DVI files: the new MF generates 'Generic Font' or GF files for output. A GF file specifies the black and white dots that make up all the characters of a particular font at a given resolution. As with DVI format, GF files are meant to be temporary; the idea is that after you run Metafont to get a GF file, you must then run another program to transform the GF file into a format appropriate for your local printing hardware. For instance, you may have to run a GFtoPXL program if your spooling software looks for PXL-format font files. The old Metafont had to have special code added for each new device that had to be able to interface to  $\TeX$ , and even then each time we added a format there was always some new device that needed vertical scan direction rather than horizontal, or horizontal run-lengths, or 16-bit packing rather than 32, etc. The new scheme unbundles Metafont from such considerations, making it less likely that bugs will crop up in different installations, while still allowing each installation to tailor their font storage formats to their particular output devices.

Elsewhere in this TUGboat (page 31), I have extracted the section of MF.WEB that describes GF format, for those of you who are curious or want to start planning ahead. Part of the first distribution of Metafont will be an ancillary program, GFtype, that serves similar purposes as DVItypE: GFtype is meant to be an unambiguous description of GF format, and also to serve as a basis for future GF-to-whatever format conversion programs. GF format is based on horizontal run-length information, which happened to be the most convenient way to output from Metafont's internal data structures. GFtype demonstrates how to create full bitmaps of each character, from which it should be clear that any other format can be generated without much fuss.

Another program that comes along with the new Metafont is GFtoDVI. This program creates proof sheets for fonts under development with Metafont. These proof sheets are similar to the ones you may have seen that were created with the old Metafont: there are vertical and horizontal lines showing the x-height, cap-height, reference point, etc.; dots show where the critical points are that were used to draw the character; the character itself appears in a half-tone grey image, at many times normal size. Anyway, GFtoDVI assumes that there is a very special font, called GRAY, available to output the proof sheets. A GRAY font is device-specific, and this TUGboat also contains a description, on page 35, of the requirements it must meet.

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## CDC $\TeX$ AT RECAU

Benedict Løfstedt  
RECAU, Aarhus Universitet

RECAU's implementation of  $\TeX$ 80 on the CDC Cyber under the operating system NOS1 has been used increasingly since the system was released to users in 1982. Courses are held for 30 to 40 users per term and the total of active  $\TeX$  users is estimated to be approximately 200. Among other things the system now contains drivers for a Compugraphic MCS8600 phototypesetter, for a NEC spinwriter and for plotters via DISSPLA. In connection with RECAU's change to NOS2 on the CDC Cyber 825 the system has been brought up to date so that it can also be used under this operating system.

The process of installing  $\TeX$ 82 under NOS2 has been started. Based on  $\TeX$ 82, version 0.9999, are the programs TANGLE, PLtoTF, TFtoPL, DVItypE and  $\TeX$  adapted to Pascal3 and NOS2 so that  $\TeX$  may carry out a "TRIP" (cf. A test file for  $\TeX$ , in  $\TeX$ ware).

Proper drivers for  $\TeX$ 82 have not been developed yet, and fonts for the type of printer that RECAU uses also need to be developed (RECAU has no raster-based printing device and so cannot use Stanford's font library).

In the implementation CDC 6/12 ASCII-representation is used, and a DEC10 file name of the format: "area.name.ext" is translated to a NOS file name consisting of the characters in "name" followed by the characters in "ext" (not exceeding 7 characters, the rest are truncated). This is a very coarse adaptation to the NOS2 file system, and the system cannot be used by ordinary users in this form.

Another difficulty is the size of the programs: In the TRIP job INITEX requires 320.000<sub>8</sub> CM words; with the original table sizes from Stanford, INITEX cannot be loaded on our machine with 370.000<sub>8</sub> CM words available. A division of the  $\TeX$  program into capsules (as has been done with  $\TeX$ 80, which can run in down to 140.000<sub>8</sub> CM words) will be necessary before the system can be released to the users.

The adaptation of the abovementioned programs from the  $\TeX$ 82 system is described in the form of change-files (cf. The WEB System of Structured Documentation) which is constructed by means of UPDATE. Installation jobs look like standard NOS2 installation jobs. Other CDC installations interested in RECAU's  $\TeX$ 82 version may contact the centre.

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## TeX at Washington State University

Dean Guenther  
 Alan Hagen-Wittbecker  
 Janene Winter  
 Washington State University  
 Computing Service Center

Late in April, we began a TeX80 to TeX82 conversion. With the help of David Fuchs, we were able to bring up TeX in both our IBM/CMS and MVS environments in 2 days (whew!) That still left some things like creating more font tables, but we expect by the time this article is published we should be fairly well converted to TeX82.

We have been using TeX80 here at WSU for production work for the last three years on an Amdahl V/8 under MVS. Our proofing was limited to a line printer or an IBM 6670, for *very* rough drafts. The output was typeset on either a Compugraphics 8600 on campus or downloaded to an APS-5 located in Washington's State Printers Office in Olympia, 350 miles away.

The WSU Computing Service Center is a Washington state data processing service center, that provides computing to many city, state, and federal users throughout the state of Washington, and a few outside the state. Any of these users can use TeX, and many are. The Center also supports these users with training and consulting. The main TeXnicians involved are Dean Guenther, Alan Hagen-Wittbecker, and Janene Winter.

One project we've completed within the Center is the *Chief Joseph Dam Cultural Report*. The *Chief Joseph* report describes five years worth of archaeological finds along the Columbia River behind the Chief Joseph Dam. This report, 160 pages long, is authored jointly by the U. S. Army Corp of Engineers and the University of Washington Department of Archaeology. Two PASCAL/VS programs were developed to convert WORDSTAR codes into TeX codes before the document could be formatted.

Another project we've completed is *The Nature and Practice of Biological Control of Plant Pathogens* by R. James Cook and Kenneth F. Baker (ISBN 0-89054-053-5). *Plant Pathogens* is a 550 page book which explains how biological control works in the soil, in crop residue, on the surface of the living plant, and inside the plant. Special macros were created to the specifications of the authors and publisher.

Our heaviest user of TeX is the Washington State

Printer's office, under the TeXnical supervision of Mike Cole and Tom Zamora. The State Printer's office has produced numerous manuals, brochures, and books using TeX. They have, for example, produced two manuals for the Washington State Department of Game—one on the mountain goats of Washington ( $\approx 100$  pages) and the other on mountain sheep (also  $\approx 100$  pages). Other manuals include a Washington State Department of Transportation bridge specifications manual (750 pages), a real estate manual (300 pages), the liquor board annual report (250 pages), the Washington State SCAN (telephone) directory (170 pages), the Attorney General's manual for contracts, and many others.

The true pioneer of TeX at WSU is the Humanities Research Center (HRC) under the direction of Professor Tom Faulkner. At HRC, Professor Faulkner has been busy on many TeX projects for scholarly publishing. The *Cauda Pavonis* is a biannual publication of material on all aspects of alchemy and Hermeticism. Another biannual publication, *Windrow*, is a vehicle for publishing short stories and poems written by the students and alumni of WSU. *ESQ* is a journal of the American Renaissance devoted to the study of nineteenth-century American literature, religion, philosophical and historical writings emanating from New England, of which Ralph Waldo Emerson is a principal figure.

The project which has been the main thrust of Professor Faulkner's TeX work is a critical edition of Robert Burton's seventeenth-century *The Anatomy of Melancholy*, spearheaded by Professor Nicolas Kiessling. The *Anatomy* was published five times during Burton's lifetime, with a sixth edition published posthumously in 1651. At least five scholars within the last century have devoted their entire lives to creating a critical edition of the *Anatomy*. All have died before they finished.

Professors Faulkner and Kiessling are the first to use a computer in collating the six editions to create a critical edition. (The grand wizard of TeX lent Professor Faulkner some help on the collation problem.) The collation is nearly completed, and the final typesetting for the critical edition is due to begin later this year, or early in 1985. For further information on the collation algorithm used for the Burton project, refer to *Computers and the Humanities* 15 (1981) 163–182.

The Oxford University Press is publishing this critical edition of the *Anatomy*, which is the first time in the history of the Press that they have allowed the typesetting for one of their publications to be

done outside Oxford. The T<sub>E</sub>X-formatted *Anatomy* preliminary sample, a partial copy of which follows this article, was sent to Oxford in 1981. Their chief typographer closely scrutinized the sample and in a letter requested two pages of modifications to the format. These changes included modifying the running headline, changing the rule size, decreasing the paragraph indent and paragraph skip, and modify-

ing the kern for capitals “TO” in the chapter title — all of which were accommodated in less than an hour simply by massaging a few of the macros and fonts. The chief typographer also added, “The hyphenation and justification shown on the specimen are very good.” And the sample was done using the **old** version. T<sub>E</sub>X82 will look even better.

## DEMOCRITUS JUNIOR TO THE READER

**G**entle Reader, I presume thou wilt be very inquisitive to know what  
 Anticke or Personate Actor this is, that so insolently intrudes upon  
 this common Theater, to the worlds view, arrogating another mans name,  
 whence hee is, why he doth it, and what he hath to say? Although, as <sup>a</sup>he  
 said, *Primum si noluerō, non respondebo, quis coacturus est?* I am a  
 free man borne, and may chuse whether I will tell, who can compell me?  
 If I be urged I will as readily reply as that *Ægyptian* in <sup>b</sup>*Plutarch*, when a  
 curious fellow would needs know what he had in his Basket, *Quum vides  
 velatam, quid inquiris in rem absconditam?* It was therefore covered,  
 because he should not know what was in it. Seeke not after that which  
 is hid, if the contents please thee, <sup>c</sup>*and be for thy use, suppose the  
 Man in the Moone, or whom thou wilt to be the Author;* I would not  
 willingly be knowne. Yet in some sort to give thee satisfaction, which  
 is more then I need, I will shew a reason, both of this usurped Name,  
 Title, and Subject. And first of the name of *Democritus*; lest any man  
 by reason of it, should be deceived, expecting a Pasquill, a Satyre, some  
 ridiculous Treatise (as I my selfe should have done) some prodigious  
 Tenent, or Paradox of the Earths motion, of infinite Worlds *in infinito  
 vacuo, ex fortuitâ atomorum collisione*, in an infinit wast, so caused by  
 an accidentall collision of Motes in the Sunne, all which *Democritus* held,  
*Epicurus* and their Master *Leucippus* of old maintained, and are lately  
 revived by *Copernicus*, *Brunus*, and some others. Besides it hath beene  
 alwaies an ordinary custome, as <sup>d</sup>*Gellius* observes, *For later Writers and  
 impostors, to broach many absurd and insolent fictions, under the name  
 of so noble a Philosopher as Democritus, to get themselves credit, and  
 by that means the more to be respected*, as artificers usually doe, *Novo  
 qui marmoris ascribunt Praxitem suo.* ’Tis not so with me.

<sup>e</sup>*Non hic Centauros, non Gorgonas, Harpyasque  
 Invenies, hominem pagina nostra sapit.*

<sup>a</sup>*Seneca in ludo in mortem Claudii Cæsaris.* [Apocol. 1.]

<sup>b</sup>*Lib. de curiositate.* [Mor. § 516E.]

<sup>c</sup>*Modò hæc tibi usui sint, quemvis authorem fingito.* Wecker. [Med. syntaxes, ‘Pio  
 lectore’.]

<sup>d</sup>*Lib. 10. cap. 12. Multa à malè feriat in Democriti nomine commenta data, nobilitatis,  
 autoritatisque ejus perfugio utentibus.* [NA 10. 12. 8-9.]

<sup>e</sup>*Martialis lib. 10. epig. 4.* [v. 9-10.]

**DATA GENERAL SITE REPORT**

Bart Childs  
Texas A & M University  
Department of Computer Science

TEX 1.0 is running on our MV/8000. We have exported it to several sites and are refining the necessary documentation for easy installation.

Our current output is to the QMS Lasergrafix 1200 printer. This is connected as the AOS/VS LQP (letter quality printer) and is a queued device. The DVI translator I wrote by adapting DVItypewriter will soon be contributed for distribution with the TEX distribution tapes. In its current form, DVI\_QMS creates a raster image of output that is using fonts which are not downloaded. We generally keep about 16 fonts downloaded. It is written in WEB.

A modification of an earlier Tangled DVI\_QMS.PAS is being used on several VAXes. This version does some font caching.

We expect to have our DG driving a Versatec V-80 (no downloaded fonts) by the time you are reading this.

Mark Piwonka, DG-Austin, has a form of DVI\_QMS which is driving the G-500 graphics terminal for previewing output.

We are logging each process which uses DVI\_QMS and capturing the user\_id; document; date and time; and for each font the name, size and count of characters. We intend to use this to create a "best" environment for each installation to "sysgen" their DVI\_QMS-like procedure with regard to selecting font caching procedures or queueing documents based on a preferred set of downloaded fonts.

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**PRIME SITE REPORT**

Bart Childs  
Texas A & M University  
Department of Computer Science

Our progress on this installation has been rather slow. The delays have been due to problems in getting the Prime 750 in the Engineering Experiment Station upgraded to Rev.19.+ of PRIMOS. The communications packages causing the delay have apparently been converted. We expect quick success because Riley Rainey (the person who will do most of it) did a lot of the work on the Data General installation.

The output will be on a QMS Lasergrafix 1200.

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**UNIX TEX SITE REPORT**

Richard Furuta<sup>†</sup>  
Department of Computer Science  
University of Washington

Since our last report in these pages, the long awaited "final" TEX version 1.0 was released and the accompanying *TEXbook* has become readily available. Possibly as a result, we have noticed a marked increase in the number of requests for the Unix-TEX distribution tape. As of this date of writing, we have directly distributed Unix-TEX to 107 sites (with some receiving more than one version). Over 80% of these sites received Version 1.0 of TEX and most of the remaining sites received the preceding version numbered 0.9999. We are certain that the software has also been redistributed by these primary sites to a significant number of additional sites. Consequently, the Unix-TEX user community must be reaching a quite reasonable size.

Incidentally, we would like to urge all sites running TEXs older than TEX Version 1.0 to get a new copy. The Unix-TEX distribution runs on Berkeley Unix, either 4.1 or 4.2 bsd, on the VAX. To get it, send me a copy of your 4.1 or 4.2 bsd source license (the license from Berkeley, *not* any of the AT&T licenses) and a check for \$50 made out to the University of Washington (no purchase orders, please). Further details were printed in the last two *TUGboats*, so I won't repeat them here—if you don't have a copy, write to me for an information sheet.

Unfortunately, we don't yet have TEX for distribution here for other types of Unix (e.g., System III or System IV) or for computers other than the VAX. However, Textset, Inc., of Ann Arbor, Michigan, has announced a Sun version of TEX (for the Sun running 4.2 bsd). A description of this port follows the Site Report. Contact Textset directly for further information on this product.

**Summary of Recent Changes in the Unix-TEX distribution**

As of early April, the current version of TEX is Version 1.0. We expect that Stanford will release Version 1.1 soon and it will be included on our tape at that time.

For the benefit of those of you who already have Unix-TEX tapes, I'd like to summarize the major changes we've made to the distribution since September 1983.

<sup>†</sup>This work is funded, in part, by grants from Bell-Northern Research and Northern Telecom, Inc., to the University of Washington.

The largest change was the release of  $\TeX$ , Version 1.0, on December 10, 1983. At that time, Howard Trickey also provided new versions of Tangle and Weave that replaced the `pc` input statements with C language routines and we all marveled at the resulting speedup. Consequently, we performed the same transformations to the Symbolics laser printer device driver as well as corrected some bugs. Due to the efforts of Mike Urban of TRW and Ralph Campbell of the University of California at Berkeley, the distribution included a new version of the Imagen output device driver incorporating landscape page printing. We also began including a statement of our guidelines governing the copying of the distribution tape.

We received a number of significant contributions to the distribution during this period. In January 1984, John Hershberger of Stanford provided a  $\TeX$ -mode for Gosling's `emacs`. In February, we got Mike Urban's writeup entitled *A Guide to  $\TeX$  for the Troff User*. In March, we added a program, written by Mark Senn of Purdue and modified by James Schaad of the University of Washington, that allows one to see DVI files on a BBN BitGraph terminal. If any of you have similar programs for different devices, I'd like to include them in the distribution.

In early March, an experimental version of Leslie Lamport's  $\text{\LaTeX}$  macro package was included on the Unix- $\TeX$  tape. The distribution still doesn't support this package completely (for example, some fonts are missing) but we expect to have everything put together by the time that the general  $\text{\LaTeX}$  releases become available. We urge all  $\TeX$  sites also to provide  $\text{\LaTeX}$ .

The most recent change, implemented by Howard Trickey and added to the distribution in late March, was to generalize the mechanism by which Unix- $\TeX$  finds the files it needs to operate. Previously, default directory names were compiled into the system. Now, the values of environment variables are used as a directory path. If the  $\TeX$  user doesn't set one of the environment variables, a standard path is used. Unix- $\TeX$  uses environment variables `TEXINPUTS`, `TEXFONTS`, `TEXFORMATS`, and `TEXPOOL` to show where to look for input (and `\read`) files, fonts, formats, and the `tex.pool` file. New versions of DVItypet and of the Symbolics laser printer device driver using `TEXFONTS` were also added.

### Two Bugs

During this period, Howard found two bugs affecting  $\TeX$  compilations. The first one only affects 4.1 sites using our modified `pc` with the `-O` switch (`optimize`) to compile  $\TeX$  (in other words, it

is apparently *not* present in the `pc` distributed with 4.2). The problem is present in version 0.9999 and may be present in earlier versions. A simple test to see if your  $\TeX$  has the problem is:

```
\tracingall
\edef\A{\noexpand\B}
\show\A
```

A good  $\TeX$  will say:

```
> \A=macro:
->\B
```

A bad one will say:

```
> \A=macro:
->\notexpanded:
```

The quick fix is to not use the `-O` option when compiling  $\TeX$  (and this change has been included on tapes written after December 1983).

The second bug affects 4.2 sites. On 4.2 sites, Unix- $\TeX$  uses the standardly distributed `pc`. An undocumented option to `pxp` (coincidentally also named `-O`) is used to replace the default arm of the case statement with something that `pc` can compile. The bug is that `pxp` incorrectly eliminates parentheses when handling expressions with unary minuses such as  $-(a + b + c)$  which becomes  $-a + b + c$ . The quick fix is to use `pxp -O -f` which causes expressions to be fully parenthesized (and this change was made to the distribution on March 29, 1984). The actual fix is to correct the code in `/usr/src/ucb/pascal/pxp/rval.c`. The current code reads:

```
case T_MINUS:
  ppop(r[0] == T_PLUS ? "+" : "-");
  a1 = r[2];
  rvalue(r[2], prec(a1) > prec(r) || full);
  break;
```

and the corrected code reads:

```
case T_MINUS:
  ppop(r[0] == T_PLUS ? "+" : "-");
  a1 = r[2];
  rvalue(r[2], prec(a1) <= prec(r) || full);
  break;
```

(changing the second parameter to `rvalue` to cause parenthesizing when precedences are  $\leq$  rather than the current code which parenthesizes when precedences are  $>$ ).

### Notes and Comments

Talaris Systems Inc., of La Jolla, California, informs us that they now have a version of their QMS output device driver for Unix. Apparently this is a port of their DEC-10 driver and is based on DVItypet.

In addition to the Sun  $\TeX$  port, Textset, Inc., tells us that they are working on a DVI previewer for the Sun Workstation (displaying  $\TeX$  output

on the Sun's screen) that will eventually also allow editing of the  $\TeX$  source file. They also have available a output device driver for the Autologic APS-5 series phototypesetters. Textset can also configure this output device driver for Mergenthaler and Compugraphic phototypesetters.

You should contact Talaris and Textset directly for further information about their products.

Finally, let me post a call for volunteers. An increasing demand exists for ports and new implementations of support software for  $\TeX$ . If you create a output device driver for a new device or a DVI previewer for a different bit-mapped screen, please consider sending it to us for inclusion on the Unix- $\TeX$  distribution tape.

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### $\TeX$ 1.0 on SUN WORKSTATIONS

D. L. Rodgers, J. J. Sterken, and P. Grosso  
Textset, Inc.

$\TeX$  1.0 has been ported to a Sun Workstation (Berkeley Unix 4.2) and compiled using Oregon Software's Pascal-II. This system is being used by Textset, Inc., for production typesetting on an APS-5 phototypesetter.

The WEB change file required to tailor  $\TeX$  for the Sun Workstation/Oregon Software Pascal-II environment is being distributed on an "as is" cost-recovery basis charge to TUG members—no support or installation assistance is included (the estimated charge is  $\leq$  \$200 and much of this is due to the cost of Sun streamer tapes at \$50 each). A fully supported  $\TeX$  (1.0) system in the form of object files for Sun or Sun-II Workstations is marketed as a product by Textset, Inc. The change file will be available on quarter- and half-inch magnetic tape.

#### $\TeX$ 1.0 Performance on Sun Workstations

For purposes of comparison,  $\TeX$  on the Sun is roughly 1/25th as fast as  $\TeX$  on an Amdahl 5860. That's comparing CPU times though, and while we can get all of the Sun, we get only part of the timeshared Amdahl 5860. Comparing elapsed time on the Amdahl 5860 to Sun CPU time (which is practically equivalent to elapsed time) yields the ratio of 5-to-1.

Here are some timings (all on the Sun):

- Time to Tangle Tangle: 1:10 (1 minute, 10 seconds).
- Time to Tangle  $\TeX$ : 8:31.
- Time to compile  $\TeX$ : 50 minutes.

- Time to initialize  $\TeX$  and get the .fmt file loaded: 10 sec.
- Time/page while doing simple pages—single column, 6.5 by 9.0 inch layout, fairly complicated macro processing going on: 7.5 sec/page.
- Time/page while doing complex pages—8 by 10 inches, dense seven point type, fairly complicated macros: 45.0 sec/page.

For documents being  $\TeX$ ed for the APS-5, it takes about a minute for  $\TeX$  to get going, and then anywhere from 5–60 seconds per page. Page timings correlate closely with character density. We expect typical math books with average character density to take 10–15 seconds/page.

#### Program Size

The Pascal-II version of standard  $\TeX$ , compiled with optimization enabled and with no runtime checking, takes 159K bytes for the code, 1K for data/constants, and 326K for the runtime stack/storage. For a larger version (Big $\TeX$ ) with limits bumped, 554K is required for runtime storage.

So, the grand total is 486K for  $\TeX$  and 714K for Big $\TeX$ . The  $\TeX$  grand total just sneaks in under 500K so it is conceivable that  $\TeX$  might fit in a half-megabyte—though it is unlikely that programs get anywhere near 500K on a half-megabyte machine. However, there is no problem on the Sun—we have a megabyte of main memory (1000K) and an extra 16 megabytes of virtual memory. With just one user doing  $\TeX$  processing, no paging is observed.

As an aside: the IBM Pascal/VS compiler produces less compact code than the Oregon Software Pascal-II compiler. The code for  $\TeX$  requires 270K on the Amdahl 5860. The runtime stack/storage sizes are comparable.

We're mildly surprised that the runtime stack/storage takes 326K for standard 1.0  $\TeX$ . The MEM array at size 30000 takes only about 120K—we didn't realize that much extra storage was needed and are checking further.

#### Comments on Pascal-II

The Pascal-II compiler is a very good piece of software, but Oregon Software is not finished working on it. Barry Smith and David Kellerman completed putting up the basic compiler—a job started by David Billstrom. Now Billstrom is back working on it—he seems very good too, he just didn't have the time last fall. Billstrom did most of the preliminary coding for the Unix/68000 version.

Here's what works:

- The basic compiler without runtime error checking. That's exactly what we needed

for our production  $\TeX$  system. The port of  $\TeX$  to the Sun was made easier because Oregon Software put in all of the Pascal extensions that should have been a part of standard Pascal. For the most part all we did was strip some stuff out of the Pascal/VS change files, and add a little Unix related stuff.

- A few hooks to Unix ... enough, for example, to be able to set things up so  $\TeX$  can be invoked via `tex docfile`.

And what doesn't work:

- Run time error checking (subscript out-of-bounds, etc.)
- The Pascal debugger
- The Pascal execution profiler

And what would be nice:

- They don't have any reset/rewrite options corresponding to the `/I` used in  $\TeX$  to suppress the initial get when opening a file. That wasn't hard to get around though.
- Can't use `writeln` with packed file of char, `writeln` can only be used with text.
- Can't say `type eight_bits = packed 0..255` as was possible in Pascal/VS.
- With just `type eight_bits = 0..255`, Pascal-II uses 2 bytes instead of of one. It'll use one byte though if you say:

```
type eight_bits = 0..255;
var string: packed array[0..100]
  \qqquad of eight_bits;
```

This turns out not to be a big problem in  $\TeX$  because most of the big arrays are defined with `packed`. We didn't worry about throwing in `packed` for all the other `eight_bits` or `ascii` array definitions, so we're using a little more storage than we really need.

- Can't write single bytes to files easily. `packed` file of `eight_bits` doesn't work because `packed` is ignored in that case, so it writes each byte to the file as two bytes, padded with a zero byte on the left. We've changed  $\TeX$  to always read TFM's and write DVIs one 4-byte word at a time.
- More hooks to Unix. It currently isn't possible/easy to associate a file with `stdin`, `stdout`, or `stderr`. For the time being, I'm just using `/dev/tty` for `|term_in|` and `|term_out|`—but that doesn't allow redirection of the  $\TeX$  output away from the terminal to a file.

We've talked to Oregon Software about these problems. They claim they will work on them over the next few months.

## Bottlenecks

We've got the slow Interlogic disk controller on our Sun, but that doesn't seem to be much of a problem since  $\TeX$  is CPU bound. For most  $\TeX$  runs the CPU time used is 90–95% of the actual elapsed time. And we can't hear the disk doing much seeking.

CPU time is the main bottleneck. We've still not received the Sun-II upgrade (free)—that's supposed to add about 20% to CPU speed.

Actually our main bottleneck is going to be getting data into and out of the Sun given that we don't have a 9-track tape drive, and that we aren't hooked to an Ethernet. The only recourse is the phone—and for binary data like DVI-files, our file transfer program goes at a rate of 80 chars/second over a 1200 baud connection. For a document with a 1.8 million byte DVI-file, that'll take about 6.5 hours! We've got to do something about that.

\* \* \* \* \*

## VAX/VMS SITE REPORT

Monte C. Nichols  
Sandia National Laboratory  
Livermore, California

There have been a number of new developments for VAX/VMS since the last issue of TUGboat. First, we have Carlos Felippa (Lockheed) to thank for contributing a VERSATEC driver to the VMS  $\TeX$  tape distributed by Maria Code (see page 69). Significant contributions have been made to Felippa's driver by S. Marsh (Sachs/Freeman Assoc.) with additional help from I. Haber (NRL), P. Poggio (LLNL) and P. Leary (SNLL). Thanks to all of you for your efforts which have allowed us to get  $\TeX$ 82 out on at least one device for VAX/VMS. Also during this period, David Fuchs has upgraded the VAX/VMS  $\TeX$ 82 to version 1.0 of  $\TeX$ . We owe many thanks to David for seeing that the tape distributed by M. Code has been kept up to date. By the time this issue reaches you, the distribution tape as distributed through M. Code is expected to contain a VMS compatible version of both  $\mathcal{L}^{\text{A}}\TeX$  and  $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{T}\mathcal{E}\mathcal{X}$ . The most recent version of the Stanford VMS tape is available from M. Code. Use the form on page 69 and be sure to specify that you want the Backup format.

As if that isn't enough good news, be sure to see the article by Kellerman and Smith in this issue regarding the  $\TeX$ 82 package that Barry Smith and David Kellerman (both formerly at Oregon



Software) are offering. It is impressive that they plan to offer phone support for their products and, if contacted by enough interested VERSATEC users, would be willing to consider providing a true spooler for the VERSATEC.

We are planning to have a VMS/TeX session as part of the upcoming TUG meeting at Stanford. If you have suggestions on subjects that should be discussed that are VMS specific, be sure to contact me.

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### NOTICE TO VAX/VMS USERS

David Kellerman  
Barry Smith

Early this year, we left Oregon Software, forming a partnership to continue our work with TeX and WEB. We are continuing to handle the distribution of TeX software for VAX/VMS systems (Oregon Software will no longer distribute TeX).

Our new address:

Kellerman and Smith  
2343 SE 45th Avenue  
Portland, Oregon 97215  
(503) 232-4799

The following software is currently available:

- **TeX 1.0 (TeX82).** TeX itself is compatible with the version put together by David Fuchs, and offers some additional performance and friendly features (the PLAIN format is really preloaded, for example). The system interface to VMS is cleaner, especially for batch processing. For those who commonly use canned macros, we've packaged INITEX so that you can easily create saved images with new preloaded formats. Included on one 2400' tape are the TeXware programs, the WEB system, all program sources and executable images, and the new AM fonts at twenty-one different magnifications. (We include a copy of The TeXbook.)
- **VERTEX.** This is an all-new WEB language Versatec driver program for model 1200 and V-80 printers. VERTEX uses the VMS Command Language Definition facility and has a bewildering number of options. It can print TeX78 or TeX 1.0 DVI files, with the old or new PXL font files, in either landscape or portrait orientation. Like TeX, you can easily preload your set of common PXL images at your site. VERTEX is provided in executable image format on a 600' tape.

- **IMPRINT.** This is a print spooler that, in various versions, will drive the Imagen printers (IMPRINT-10, 8/300, 5/840, 60/240). IMPRINT uses the VAX/VMS print queueing facilities and is completely compatible with the standard PRINT command. It prints files in Printer, Daisy, Tektronix, Impress, and DVI formats without intermediate processing. Even more than VERTEX, IMPRINT has a ridiculous array of options, as well as several layers of site and user-dependent defaults to simplify commands. IMPRINT is provided in executable image format on a 600' tape, and is also available directly from the Imagen Corporation.

All of the above software includes a user's guide, system manager's installation guide, 90-day unconditional warranty, telephone support for the same period, and domestic shipping via UPS 2nd-day air. International orders will be billed for air-freight costs, and must include a written statement that the software will not be re-exported.

Prices? TeX is \$200 (US), VERTEX is \$400, a package with both TeX and VERTEX is \$500, and IMPRINT (IMPRINT-10, 8/300) is \$1,200 (\$900 for educational institutions). We will be offering support, maintenance, and update services in the near future.

Our current projects are a true spooler for the Versatec, and a VAX/VMS spooling interface to the Compugraphics 8400/8600 photo-typesetters. We're open to other requests.

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### Fonts

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Editor's note: The two documents on the following pages are extracted from a work-in-progress—the new Metafont—and are thus subject to change. Nonetheless, they give the flavor of the new approach to device-independent font definition, and should be useful for (as David Fuchs has put it in his report on page 22) 'planning ahead'.