This is a list of all corrections made to *The TEXbook* between the first and second printings. If your copy says '*Second printing (October 1984)*' on the copyright page, you've already got all of these things corrected. Otherwise, you're a lucky owner of the rare first edition; read on.

Page 29, lines 31–32   (8/25/84)

The underfull box that TEX produces in the 1.5-inch case is really bad; with such narrow limits, an occasional wide space is unavoidable. But try

---

Page 54, lines 5–6   (4/20/84)

Appendix B shows that plain TEX handles most of the accents by using TEX's `\accent` primitive. For example, `\'#1` is equivalent to `{\accent19 #1}`, where

---

Page 63, seven lines below the first illustration   (2/27/84)

points, a width of 5.5555 points, and a depth of zero; the letter 'g' has a height

---

Page 72, line 35   (2/28/84)

from `0pt`, but `0.00001filll` is infinitely greater than `16383.99999fill`.

Page 79, line 12   (2/28/84)

`\hbox(6.25+1.94444)x312.0, glue set 0.5783, shifted 36.0 []`

Page 98, line 24   (4/13/84)

and `\finalhyphendemerits=5000`. Demerits are in units of "badness squared," so the

Page 101, lines 29–30   (3/13/84)

It's possible to control the length of lines in a much more general way, if simple changes to `\leftskip` and `\rightskip` aren't flexible enough for your

---

Page 113, bottom two lines   (3/13/84)

Notice that the first "`%` line" of our example says `t=10.0`; this is a consequence of another parameter, called `\topskip`. Glue disappears at a page break, but

---

Page 124, eighth-last line   (8/25/84)

discarded, `\box100` will be void after the `\vsplit`. And if `\box100` was void before the

---

Page 131, display in exercise 16.8   (3/16/84)

`If$ x = y$, then $x$ is equal to $y.$`

| Page 170, table in middle of the page | | | | | | | (2/12/84) |

<div align="center">Right atom</div>

		Ord	Op	Bin	Rel	Open	Close	Punct	Inner
	Ord	0	1	(2)	(3)	0	0	0	(1)
	Op	1	1	*	(3)	0	0	0	(1)
	Bin	(2)	(2)	*	*	(2)	*	*	(2)
Left	Rel	(3)	(3)	*	0	(3)	0	0	(3)
atom	Open	0	0	*	0	0	0	0	0
	Close	0	1	(2)	(3)	0	0	0	(1)
	Punct	(1)	(1)	*	(1)	(1)	(1)	(1)	(1)
	Inner	(1)	1	(2)	(3)	(1)	0	(1)	(1)

| Page 173, line 11 | (1/2/84) |

```
Clearly $a_i<b_i$ for~$i=1, 2, \ldots, n$.
```

| Page 176, bottom two lines | (7/20/84) |

▶ **EXERCISE 18.24**
Typeset the display $\begin{pmatrix} a & b & c \\ d & e & f \end{pmatrix} \begin{pmatrix} u & x \\ v & y \\ w & z \end{pmatrix}$, using `\lgroup` and `\rgroup`.

| Page 189, line 18 | (2/13/84) |

when there is an overlap.] If $e = 0$ and if there is an `\leqno`, the equation number is

| Page 204, line 31 | (2/13/84) |

of `\a` is delimited by a left brace.

| Page 212, line 23 | (7/8/84) |

it equals 2.) Similarly, `\tracingmacros=2` will trace `\output`, `\everypar`, etc.

| Page 216, first five lines | (8/25/84) |

Expanded definitions that are made with `\edef` or `\xdef` continue to expand tokens until only unexpandable tokens remain, except that token lists produced by '`\the`' are not expanded further. Furthermore a token following '`\noexpand`' will not be expanded, since its ability to expand has been nullified. These two operations can be used to control what gets expanded and what doesn't.

| Page 219, simplification of line 18 | (2/15/84) |

```
\advance\count0 by\count2 \hexdigit}}
```

Page 223, lines 3–4 (3/13/84)

Chapters 24 to 26 present summaries of all TEX's operations in all modes, and when those summaries mention a '⟨box⟩' they mean one of the seven

---

Page 242, line 29 (1/2/84)

a relation, the solution is to insert '{}' at the beginning of the right-hand formula; TEX

Page 245, line 24 (2/15/84)

of a box that spans columns i through j, hence the glue in such a box might shrink.

Page 248, the fourth dangerous bend (2/15/84)

You have to be careful with the use of & and \span and \cr, because these tokens are intercepted by TEX's scanner even when it is not expanding macros.

Page 249, lines 20–26 (2/15/84)

line (see Chapter 9). If you don't want a \cr at the end of a certain line, just type '%' and the corresponding \cr will be "commented out." (This special mode doesn't work with \+ lines, since \+ is a macro whose argument is delimited by the token '\cr', not simply by a token that has the same meaning as \cr. But you can redefine \+ to overcome this hurdle, if you want to. For example, define a macro \alternateplus that is just like \+ except that its argument is delimited by the active character ^^M; then include the command '\let\+=\alternateplus' as part of \obeylines.)

Page 253, lines 28–32 (4/25/84)

vertical list at what it thinks is the best place, and at such times it enters internal vertical mode and begins to read the commands in the current \output routine. When the output routine begins, \box255 contains the page that TEX has completed; the output routine is supposed to do something with this vbox. When the output routine ends, the list of items that it has constructed in internal vertical mode is placed just

---

Page 254, lines 1–13 (3/13/84)

TEX's primitive command \shipout⟨box⟩ is what actually causes output. It sends the contents of the box to the dvi file, which is TEX's main output file; after TEX has finished, the dvi file will contain a compact device-independent encoding of instructions that specify exactly what should be printed. When a box is shipped out, TEX displays the values of \count0 through \count9 on your terminal, as explained in Chapter 15; these ten counters are also recorded in the dvi file, where they can be used to identify the page. All of the \openout, \closeout, and \write commands that appear inside of the ⟨box⟩ are performed in their natural order as that box is being shipped out. Since a \write command expands macros, as explained in Chapter 21, TEX's scanning mechanism might detect syntax errors while a \shipout is in progress. If \tracingoutput is nonzero at the time of a \shipout, the contents of the ⟨box⟩ being shipped are written into your log file in symbolic form. You can say \shipout anywhere, not only in an output routine.

Page 255, line 33   (4/25/84)

```
\nointerlineskip
```

Page 256, starting with line −17   (11/1/83)

6) Finally, the `\dosupereject` macro is designed to clear out any insertions that
have been held over, whether they are illustrations or footnotes or both:

```
\ifnum\insertpenalties>0
  \line{} \kern-\topskip \nobreak
\vfill\supereject\fi
```

The mysterious negative `\kern` here cancels out the natural space of the `\topskip`
glue that goes above the empty `\line`; that empty line box prevents the `\vfill` from
disappearing into a page break. The vertical list that results from `\dosupereject` is
placed on TEX's list of things to put out next, just after the straggling insertions have
been reconsidered as explained in Chapter 15. Hence another super-eject will occur,
and the process will continue until no insertions remain.

Page 262, line 14   (2/12/84)

```
\def\endindex{\mark{}\break\endgroup}
```

Page 262, lines 34 and 35   (2/12/84)

if `\next` is '`\endindex`', the next commands executed will be '`\vfill\mark{}\break`
`\endgroup`'; otherwise the line will be treated as a main entry.

Page 269, line 23 becomes two lines   (8/25/84)

tokens like $+_{12}$; (3) keywords like `pt` ; (4) control sequence names like `\dimen`; or (5) the
special symbols `{`, `}`, `$`.

Page 274, line 24   (2/15/84)

```
\lineskip    (interline glue if \baselineskip isn't feasible)
```

Page 289, slight clarification on lines 39–41   (3/10/84)

A ⟨math character⟩ defines a 15-bit number either by specifying it directly
with `\mathchar` or in a previous `\mathchardef`, or by specifying a 27-bit `\delimiter`
value; in the latter case, the least significant 12 bits are discarded.

Page 307, a slightly more explicit answer   (11/3/83)

6.3. It represents the heavy bar that shows up in your output. (This bar wouldn't
be present if `\overfullrule` had been set to `0pt`, nor is it present in an underfull box.)

Page 313, first four lines	(3/13/84)

12.17. You get 'A' at the extreme left and 'puzzle.' at the extreme right, because the space between words has the only stretchability that is finite; the infinite stretchability cancels out. (In this case, TEX's rule about infinite glue differs from what you would get in the limit if the value of 1 fil were finite but getting larger and larger. The true

Page 315, first three lines	(3/13/84)

14.14. Just say `\parfillskip=\parindent`. Of course, TEX will not be able to find appropriate line breaks unless each paragraph is sufficiently long or sufficiently lucky; but with an appropriate text, your output will be immaculately symmetrical.

Page 324, line 16	(2/15/84)

18.41. `$$\{\underbrace{\overbrace{\mathstrut a,\ldots,a}`

Page 324, first line of answer 18.44	(4/11/84)

18.44. `$$\mathop{{\sum}'}_{x\in A}f(x)\mathrel{\mathop=^{\rm def}}`

Page 333, beginning of the final paragraph	(12/19/83)

Note: The stated preamble solves the problem and demonstrates that TEX's line-breaking capability can be used within tables. But this particular table is not really a good example of the use of `\halign`, because TEX could typeset it directly, using `\everypar` in an appropriate manner to set up the hanging indentation, and using `\par` instead of `\cr`. For example, one could say

Page 341, the bottom line was left out!	(2/9/84)

Footline . . . . Page 1009

Page 345, top three lines	(1/26/84)

A mathcode is relevant only when the corresponding category code is 11 or 12; therefore many of these codes will rarely be looked at. For example, the math code for `^^M` specifies the character `\oplus`, but it's hard to imagine a user who would want `^^M`

Page 345, line 31	(2/29/84)

`\delcode'\<="26830A     \delcode'\\="26E30F     \delcode'\>="26930B`

Page 347, lines 1 and 2	(3/16/84)

```
\count18=3  % this counter allocates math families 4, 5, 6, ...
\count19=255 % this counter allocates insertions 254, 253, 252, ...
```

Page 350, line 9 from the bottom	(3/16/84)

font, whose information does not have to be loaded again.

Page 354, line 5   (6/7/84)

```
\def\ialign{\everycr={}\tabskip=0pt \halign} % initialized \halign
```

Page 355, lines 19–21   (7/3/84)

subdivision in a document; to use it, you say '\beginsection⟨section title⟩' followed by
a blank line (or \par). The macro first emits glue and penalties, designed to start a new
page if the present page is nearly full; then it makes a \bigskip and puts the section

---

Page 355, lines 27–29   (7/3/84)

```
\outer\def\beginsection#1\par{\vskip0pt plus.3\vsize\penalty-250
  \vskip0pt plus-.3\vsize\bigskip\vskip\parskip
  \message{#1}\leftline{\bf#1}\nobreak\smallskip\noindent}
```

Page 355, line 37   (4/24/84)

```
\outer\def\proclaim #1. #2\par{\medbreak
```

Page 356, seven lines from the bottom   (4/11/84)

```
\def\TeX{T\kern-.1667em \lower.5ex\hbox{E}\kern-.125em X}
```

Page 359, starting with line 2   (11/16/83)

```
\mathchardef\ldotp="602E\mathchardef\cdotp="6201\mathchardef\colon="603A
\def\ldots{\mathinner{\ldotp\ldotp\ldotp}}
\def\cdots{\mathinner{\cdotp\cdotp\cdotp}}
\def\vdots{\vbox{\baselineskip=4pt \lineskiplimit=0pt
    \kern6pt \hbox{.}\hbox{.}\hbox{.}}}
\def\ddots{\mathinner{\mskip1mu\raise7pt\vbox{\kern7pt\hbox{.}}\mskip2mu
    \raise4pt\hbox{.}\mskip2mu\raise1pt\hbox{.}\mskip1mu}}
```

Page 359, starting with line 19   (11/3/83)

```
\def\overbrace#1{\mathop{\vbox{\ialign{##\crcr\noalign{\kern3pt}
    \downbracefill\crcr\noalign{\kern3pt\nointerlineskip}
    $\hfil\displaystyle{#1}\hfil$\crcr}}}\limits}
\def\underbrace#1{\mathop{\vtop{\ialign{##\crcr
    $\hfil\displaystyle{#1}\hfil$\crcr\noalign{\kern3pt\nointerlineskip}
    \upbracefill\crcr\noalign{\kern3pt}}}}\limits}
```

Page 359, seventh line from the bottom   (2/29/84)

```
\def\backslash{\delimiter"026E30F }    \def\bracevert{\delimiter"000033E }
```

Page 361, line 3   (8/17/84)

```
\def\buildrel#1\over#2{\mathrel{\mathop{\null#2}\limits^{#1}}}
```

Page 363, line 10   (4/26/84)

```
  \ifhmode\edef\@sf{\spacefactor=\the\spacefactor}\/\fi
```

Page 364, starting with line 10   (11/1/83)

```
\def\dosupereject{\ifnum\insertpenalties>0 % something is being held over
  \line{}\kern-\topskip\nobreak\vfill\supereject\fi}
```

Page 364, line 28   (7/8/84)

```
  \tracingmacros=2 \tracingparagraphs=1 \tracingrestores=1
```

Page 370, line 7   (3/16/84)

information about the TEX Users Group.)

Page 374, line 23   (7/8/84)

log file when `\tracingmacros=2` and `\tracingcommands=2`. One of the important ways

Page 379, line 1   (1/12/84)

A particular item can be selected by its position number from the left:

Page 381, line 6   (2/12/84)

```
      \newcount\lineno % the number of file lines listed
```

Page 381, lines 24 and 25   (12/15/83)

          Instead of listing a file verbatim, you might want to define a `\verbatim` macro
such that '`\verbatim{$this$ is {\it!}}`' yields '`$this$ is {\it!}`'. It's somewhat

Page 385, lines 22 and 23   (1/12/84)

macro, a parameter, or a token list variable; (b) when TEX must determine whether
the token `&` or `\span` or `\cr` or `\crcr` is the end of an entry within an alignment.

Page 387, two paragraphs in right column   (1/18/84)

A. Exactamente. Pero los profesores son tan conservadores que temerían espantar al tipo de estudiante «apisonadora» que hace lo que le proponen para casa, obedientemente y de forma mecánica. Además, no creo que les gustase el trabajo adicional de calificar respuestas a preguntas abiertas.

La forma tradicional es dejar la parte creativa para los cursos altos. Durante diecisiete años o más se enseña al estudiante a aprobar, luego de golpe, cerca de la graduación, se le pide que haga algo original.

Page 395, lines 21 and 22   (1/12/84)

Notice that the macros need to do their own checking for ligatures, and they also take appropriate actions when a paragraph begins with an opening quote. Since `\kern`

Page 399, line 1   (1/10/84)

Inside the output routine, `\box\footins` will now be a vbox of hboxes, and

---

Page 399, line 9   (2/28/84)

`.\hbox(7.6359+0.0)x269.62617 []`

Page 407, line 4   (6/10/84)

`\beginlinemode` and `\beginparmode` are defined to initiate these modes; and another

---

Page 408, line 15   (12/14/83)

`P. O. Box 1009, Haga Alto, CA 94321 USA}`

[Also change the ZIP code in the return address on the envelope illustrated at the bottom of page 405.]

Page 409, line 5   (2/18/84)

`\font\twelveit=cmti10 at 12pt  % (a cheap substitute for cmti12)`

Page 417, last six lines   (8/25/84)

`\parskip` of `0pt plus .8pt` between adjacent entries, and since there is room for more than 50 lines per column; therefore the `manmac` balancing routine tries to make both the top and bottom baselines agree at the end of the index. In applications where the glue is not so flexible it would be more appropriate to let the right-hand column be a little short; the best way to do this is probably to replace the command '`\unvbox3`' by '`\dimen2=\dp3 \unvbox3 \kern-\dimen2 \vfil`'.

Page 422, lines 24–26   (2/9/84)

(The last two lines use `\d@nger` and `\dd@nger`, which are non-`\outer` equivalents of `\danger` and `\ddanger`; such duplication is necessary because control sequences of type `\outer` cannot appear within a `\def`.)

Page 428, in the table of sixteen basic fonts   (12/19/83)

[The special fonts called `cmi10` and `cmi7` and `cmi5` should really be called `cmmi10` and `cmmi7` and `cmmi5`.]

Page 433, last eight lines   (8/17/84)

explained in Appendix G. If you want to increase the number of parameters past
the number that actually appear in a font's metric information file, you can assign
new values immediately after that font has been loaded. For example, if some
font \ff with seven parameters has just entered TEX's memory, the command
\fontdimen13\ff=5pt will set parameter number 13 to 5 pt; the intervening
parameters, numbers 8–12, will be set to zero. You can even give more than
seven parameters to \nullfont, provided that you assign the values before any
actual fonts have been loaded.

Page 445, line 6   (11/11/83)

if $(a - \frac{1}{2}\theta) - (h(z) - v) < \varphi$, increase v by the difference. Finally construct a vbox of

---

Page 449, line 12   (1/18/84)

immediately clear why the 'n' should be attached to the 'e' in one case but not

---

Page 459, left column, line 2   (1/18/84)

 al-Khwârizmî, abu Ja'far Muḥammad

Page 460, index entry for Beethoven   (8/16/84)

 Change 'von' to 'van'.

Page 461, third line in left column   (8/25/84)

 The entry for \box255 should not be indented.

Page 461, index entry for boxed material   (8/2/84)

 Add '*420*'.

Page 462, index entry for \colon   (11/16/83)

 Add page <u>359</u> to this list.

Page 462, right column, third-last line   (5/21/84)

 [Change 'crochets' to 'crotchets'; then move this entry down two lines.]

Page 463, right column, line 16   (5/20/84)

 design size, 16–17, 213.

Page 464, index entry for \dump   (1/10/84)

 Add page *344* to this list.

Page 464, right column, line 5 $\hfill$ (1/5/84)

>   Dvořák, Antonín Leopold, 409.

Page 464, index entry for `\end` $\hfill$ (8/25/84)

>   Page number 264 should be underlined.

Page 465, index entry for `\everydisplay` $\hfill$ (8/25/84)

>   Add page *326* to this list.

Page 465, index entry for `\filbreak` $\hfill$ (7/3/84)

>   Delete the reference to page number 355.

Page 466, index entry for `\footnote` $\hfill$ (4/26/84)

>   Page number 363 should be underlined.

Page 467, index entry for `\hidewidth` $\hfill$ (7/3/84)

>   Page number 354 should be underlined.

Page 468, index entry for insertions $\hfill$ (8/25/84)

>   Add pages 115–117, 122–125 to this list.

Page 469, index entry for `\kern` $\hfill$ (11/1/83)

>   Add page *256* to this list.

Page 470, index entry for `\limits` $\hfill$ (11/3/83)

>   Add page *359* to this list.

Page 472, right column, lines 10–11 $\hfill$ (7/9/84)

>   `\normalbaselines`, *325*, 349, <u>351</u>, *414–415*.
>   `\normalbaselineskip`, <u>349</u>, *414–415*.

Page 472, index entry for `\null` $\hfill$ (7/3/84)

>   Page number 351 should be underlined.

Page 472, right column, line 28 $\hfill$ (1/3/84)

>   *\nullfont, 14, 153, 271, 433.

Page 476, a new index entry $\hfill$ (8/25/84)

>   shifted output, *see* `\hoffset`, `\voffset`.

Page 476, index entry for shriek (8/25/84)

It should not be capitalized.

Page 478, index entry for Świerczkowski (9/15/84)

The middle name should be 'Sławomir'.

Page 479, last seven lines in the left column (8/23/84)

*\tracingmacros, <u>205</u>, <u>212</u>, 273, *329*.
*\tracingonline, 121, 212, 273, <u>303</u>.
*\tracingoutput, <u>254</u>, 273, *301–302*.
*\tracingpages, *112–114*, 124, 273, <u>303</u>.
*\tracingparagraphs, *98–99*, 273, <u>303</u>.
*\tracingrestores, 273, <u>301</u>, <u>303</u>.
*\tracingstats, 273, <u>300</u>, <u>303</u>, *383*.

Page 479, index entry for underlined text (8/2/84)

Add '*see also* \underbar'.

Page 480, index entry for \vbox (11/1/83)

Delete page 256 from this list.

This is a list of all corrections made to *The TEXbook* since the second printing. If your copy doesn't say '*Second printing (October 1984)*' on the copyright page, you should also look at the previous bug list. In fact, the most important corrections to the first printing were discovered first, so they've already been made.

Page 23, line 16 (10/13/84)

```
This is TeX, Version 1.0 (preloaded format=plain 83.7.15)
```

Page 33, line 32 (10/21/84)

The bottom line shows how far TEX has gotten until now in the `story`

Page 41, lines 7 and 8 (10/8/85)

The twin operations `\uppercase{`⟨token list⟩`}` and `\lowercase{`⟨token list⟩`}` go through a given token list and convert all of the character tokens to their

---

Page 57, line 17 (1/6/86)

`dd`   didot point $(1157\,\mathrm{dd} = 1238\,\mathrm{pt})$

Page 61, lines 17–19 (12/18/85)

`depth`, `em`, `ex`, `fil`, `height`, `in`, `l`, `minus`, `mm`, `mu`, `pc`, `plus`, `pt`, `scaled`, `sp`, `spread`, `to`, `true`, `width`. (See Appendix I for references to the contexts in which each of these is recognized as a keyword.)

Page 67, append a new exercise (1/19/85)

▶ **EXERCISE 11.6**
Construct a `\frac` macro such that '`\frac1/2`' yields '$^1\!/_2$'.

Page 130, line 15 (4/17/85)

`$y'''_3+g'^2$` $y'''_3 + g'^2$

Page 170, line 5 (5/28/85)

tall, unslanted letter; and so on. But two of the examples involve corrections that were

---

Page 194, lines 13–15 should be centered better (10/22/84)

$$x \equiv x; \tag{1}$$

$$\text{if} \quad x \equiv y \quad \text{then} \quad y \equiv x; \tag{2}$$

$$\text{if} \quad x \equiv y \quad \text{and} \quad y \equiv z \quad \text{then} \quad x \equiv z. \tag{3}$$

Page 215, lines 9 and 10 from the bottom   (12/23/84)

general format is the same as for `\def` and `\gdef`, but TEX blindly expands the tokens
of the replacement text according to the expansion rules above. For example, consider

---

Page 233, lines 15–19   (1/19/85)

Weight	*Servings*	*Approximate Cooking Time**
8 lbs.	6	1 hour and 50 to 55 minutes
9 lbs.	7 to 8	About 2 hours
9$\frac{1}{2}$ lbs.	8 to 9	2 hours and 10 to 15 minutes
10$\frac{1}{2}$ lbs.	9 to 10	2 hours and 15 to 20 minutes

Page 236, lines 18–21   (1/19/85)

Squab	*Poussin*	2	$\frac{3}{4}$ to 1	Broil, Grill, Roast
Broiler	*Poulet Nouveau*	2 to 3	$1\frac{1}{2}$ to $2\frac{1}{2}$	Broil, Grill, Roast
Fryer	*Poulet Reine*	3 to 5	2 to 3	Fry, Sauté, Roast
Roaster	*Poularde*	$5\frac{1}{2}$ to 9	Over 3	Roast, Poach, Fricassee

[This change should also be made at the bottom of page 237.]

Page 236, fifth-last line   (1/19/85)

```
Squab&Poussin&2&\frac3/4 to 1&Broil, Grill, Roast\cr
```

Page 237, line 25   (10/10/84)

saying '`\tabskip=`⟨glue⟩'. For example, let's do the poultry table again, but with the

---

Page 265, bottom line   (11/6/85)

[insert a comma after 'LEONTIEF'.]

Page 271, line 8   (11/12/85)

⟨fil unit⟩ ⟶ `fil` | ⟨fil unit⟩ `l`

Page 280, lines 7 and 8   (1/8/85)

⟨4-bit number⟩. The specified output stream is opened or closed, for use in `\write`
commands, as explained in Chapter 21.

Page 300, lines 5–10 [changed for version 1.3] (11/25/84)

what part of TEX's memory has become overloaded; one of the following fourteen things
will be mentioned:

> `number of strings`   (names of control sequences and files)
> `pool size`   (the characters in such names)
> `main memory size`   (boxes, glue, breakpoints, token lists, characters, etc.)

Page 300, lines 23–29 [changed for version 1.3] (11/25/84)

If you have a job that doesn't overflow TEX's capacity, yet you want to see
just how closely you have approached the limits, just set `\tracingstats` to
a positive value before the end of your job. The log file will then conclude with a
report on your actual usage of the first eleven things named above (i.e., the number of
strings, . . . , the save size), in that order. Furthermore, if you set `\tracingstats` equal
to 2 or more, TEX will show its current memory usage whenever it does a `\shipout`
command. Such statistics are broken into two parts; '490&5950' means, for example,
that 490 words are being used for "large" things like boxes, glue, and breakpoints,
while 5950 words are being used for "small" things like tokens and characters.

Page 302, line 14 (10/8/85)

```
.\tenrm | (ligature ---)
```

Page 305, line 26 (12/24/84)

sentable as ^^M. Asking TEX to `\show\^^M` produces the response '`> \^^M=macro:->\␣.`'.

Page 306, line 10 (7/1/85)

no "explicit kerns," and an italic correction is an explicit kern.) But the italic correction
may be too much (especially in an italic font); `shelf{\kern0pt}ful` is often best.

Page 308, line 25 (3/25/85)

```
\def\appendroman#1#2#3{\edef#1{\def\noexpand#1{\csname
```

Page 311, insert a new answer (1/19/85)

```
11.6. \def\frac#1/#2{\leavevmode\kern.1em
     \raise.5ex\hbox{\the\scriptfont0 #1}\kern-.1em
     /\kern-.15em\lower.25ex\hbox{\the\scriptfont0 #2}}
```

[This causes answer 12.8 to move to page 312; answer 12.16 also moves to page 313.]

Page 320, lines 17–20 (8/10/85)

```
17.16. \def\sqr#1#2{{\vcenter{\vbox{\hrule height.#2pt
           \hbox{\vrule width.#2pt height#1pt \kern#1pt
              \vrule width.#2pt}
           \hrule height.#2pt}}}}
```

Page 327, lines 26–33   (10/22/84)

19.16. `$$\displaylines{\hfill x\equiv x;\hfill\llap{(1)}\cr`
`        \hfill\hbox{if}\quad x\equiv y\quad\hbox{then}\quad`
`            y\equiv x;\hfill\llap{(2)}\cr`
`        \hfill\hbox{if}\quad x\equiv y\quad\hbox{and}\quad`
`            y\equiv z\quad\hbox{then}\quad`
`            x\equiv z.\hfill\llap{(3)}\cr}$$`

There's also a trickier solution, which begins with

`$$\displaylines{x\equiv x;\hfil\llap{(1)}\hfilneg\cr`

Page 330, line 29   (11/15/85)

`\edef\next#1#2{\def#1{\b#2\d}} \next\a\c`

Page 332, lines 17–24   (1/19/85)

`\settabs\+\indent&10\frac1/2 lbs.\qquad&\it Servings\qquad&\cr`
`\+&\negthinspace\it Weight&\it Servings&`
`  {\it Approximate Cooking Time\/}*\cr`
`\smallskip`
`\+&8 lbs.&6&1 hour and 50 to 55 minutes\cr`
`\+&9 lbs.&7 to 8&About 2 hours\cr`
`\+&9\frac1/2 lbs.&8 to 9&2 hours and 10 to 15 minutes\cr`
`\+&10\frac1/2 lbs.&9 to 10&2 hours and 15 to 20 minutes\cr`

Page 332, lines 33–35   (1/19/85)

proofs.   (You weren't supposed to think of this, but it has to be mentioned.)   See
exercise 11.6 for the '`\frac`' macro; it's better to say '¹/₂' than '$\frac{1}{2}$', in a cookbook.
        Another way to treat this table would be to display it in a vbox, instead of
including a first column whose sole purpose is to specify indentation.

Page 337, line 28   (11/12/85)

`\nextnumber`. Quick should put '`\relax`' at the end of his macro. (The keywords `l`,

---

Page 357, lines 35 and 36   (1/8/85)

`\def\*{\discretionary{\thinspace\the\textfont2\char2}{}{}}`

Page 357, last two lines   (4/17/85)

`\def\pr@m@s{\ifx'\next\let\next\pr@@@s \else\ifx^\next\let\next\pr@@@t`
`  \else\let\next\egroup\fi\fi \next}`
`\def\pr@@@s#1{\prim@s} \def\pr@@@t#1#2{#2\egroup}`

Page 358, lines 8–12 (1/23/85)

```
\def\hbar{{\mathchar'26\mkern-9muh}}
\def\surd{{\mathchar"1270}}
\def\angle{{\vbox{\ialign{$\m@th\scriptstyle##$\crcr
     \not\mathrel{\mkern14mu}\crcr \noalign{\nointerlineskip}
     \mkern2.5mu\leaders\hrule height.34pt\hfill\mkern2.5mu\crcr}}}}
```

Page 359, lines 7–8 (1/22/85)

```
\def\ddots{\mathinner{\mkern1mu\raise7pt\vbox{\kern7pt\hbox{.}}\mkern2mu
    \raise4pt\hbox{.}\mkern2mu\raise1pt\hbox{.}\mkern1mu}}
```

Page 360, line 22 (1/22/85)

```
  \mkern5mu \raise.6\dimen@\copy\rootbox \mkern-10mu \box0}
```

Page 361, line 3 (3/27/85)

```
\def\buildrel#1\over#2{\mathrel{\mathop{\kern0pt #2}\limits^{#1}}}
```

Page 361, lines 19–20 (1/22/85)

```
\def\bmod{\mskip-\medmuskip \mkern5mu
  \mathbin{\rm mod} \penalty900 \mkern5mu \mskip-\medmuskip}
```

Page 361, line 27 (5/1/85)

```
\def\matrix#1{\null\,\vcenter{\normalbaselines\m@th
```

Page 361, bottom line (5/1/85)

```
  \null\;\vbox{\kern\ht1\box2}\endgroup}
```

Page 362, line 9 (5/1/85)

```
\def\eqalign#1{\null\,\vcenter{\openup1\jot \m@th
```

Page 362, lines 17–29 (8/10/85)

```
\def\@lign{\tabskip=0pt\everycr={}} % restore inside \displ@y
\def\displaylines#1{\displ@y
  \halign{\hbox to\displaywidth{$\hfil\@lign\displaystyle##\hfil$}\crcr
    #1\crcr}}
\def\eqalignno#1{\displ@y \tabskip=\centering
  \halign to\displaywidth{\hfil$\@lign\displaystyle{##}$\tabskip=0pt
    &$\@lign\displaystyle{{}##}$\hfil\tabskip=\centering
    &\llap{$\@lign##$}\tabskip=0pt\crcr
    #1\crcr}}
\def\leqalignno#1{\displ@y \tabskip=\centering
  \halign to\displaywidth{\hfil$\@lign\displaystyle{##}$\tabskip=0pt
    &$\@lign\displaystyle{{}##}$\hfil\tabskip=\centering
    &\kern-\displaywidth\rlap{$\@lign##$}\tabskip=\displaywidth\crcr
    #1\crcr}}
```

Page 363, line 9   (5/12/85)

`\def\footnote#1{\let\@sf=\empty % parameter #2 (the text) is read later`

Page 364, line 3   (3/23/85)

`\def\plainoutput{\shipout\vbox{\makeheadline\pagebody\makefootline}}%`

Page 364, fifth-last line   (9/15/85)

`\def\fmtname{plain}\def\fmtversion{2.0} % identifies the current format`

Page 399, eighth-last line   (2/11/85)

`  \baselineskip=\footnotebaselineskip\noindent\unhbox0\par}`

Page 401, line 5   (1/29/85)

`\fontdimen` parameters to qualify as a math symbol font). (2) Set all the font identifiers

---

Page 414, line 10   (12/17/84)

`\font\titlefont=cmssdc40          % titles in chapter openings`

Page 444, bottom line   (1/10/85)

depth $d(z) + v$, consisting of box x followed by an appropriate kern followed by box z.

Page 461, entry for character codes   (11/6/85)

        Add 'see also category codes'.

Page 463, entries for `dd`, Didot, and didot   (1/6/86)

        Remove the circumflex accents.

Page 466, left column   (1/19/85)

        fractions, 67, 139–143, 152, 170, 179,
            186, 444–445.
        huge, 196.
        slashed form, 67, 139–140, 233, 236.

Page 467, index entry for `\hsize`   (6/14/85)

        Add a reference to page *60*.

Page 469, index entry for `\kern`   (7/1/85)

        Add a reference to page *306*.

Page 469, index entry for kerns   (7/1/85)

        Add a reference to page 306.

Page 469, new entry   (11/12/85)

> `l` after `fil`, <u>271</u>, 337.

Page 469, second line on the right   (9/13/85)

> LATEX, 137.

Page 470, index entries for `\longleftarrow` thru `\Longrightarrow` (10/5/84)

> The references to page 358 should be underlined (seven times).

Page 475, index entry for punctuation in formulas   (4/29/85)

> Add a reference to page 161.

Page 476, index entry for `\scriptspace`   (8/10/85)

> Change '445' to '445–446'.

Page 478, first and last lines   (10/11/84)

Delete the last line in the right-hand column (since it appears on page 479), and add the following line at the top of the left-hand column (since it was dropped by mistake from the second printing):

> styles of math formatting, 140–141, 441–447.

Page 478, new entry after tabbing   (5/28/85)

> tables, *see* alignments, tabbing.

Page 478, tabskip entries   (3/25/85)

Instead of '237–239' and '237–238' it should say '<u>237–239</u>' twice.

Page 481, the entry for `\widetilde`   (9/23/85)

> Page 359 should be underlined.

Page 483, lines 16–17   (1/19/85)

> ```
> P.O. Box 9506
> Providence RI 02940-9506, USA.
> ```

Page 483, lines 22–23   (1/19/85)

> P.O. Box 9506
> Providence RI 02940-9506, USA.

Note: The next printing will use the "real" Computer Modern fonts instead of the "almost" Computer Modern fonts. Therefore many of the line breaks will be slightly different. Also, the font-related numerical data on pages 27, 29, 66, 75, 76, 79, 88, 98, 99, 112, 113, 310, 314, 396, 399, 409, 420, and 459 will be different. However, these differences need not be listed here, because the old book was correct with respect to the old fonts.

This is a list of all corrections made to *Computers & Typesetting*, Volumes A–E, between the date of publication (May, 1986) and 15 June 1987. It also includes corrections made to the softcover version of *The T_EXbook*, beginning with the sixth printing (January 1986); these are the same as corrections to Volume A. Corrections to the softcover version of *The METAFONTbook* are the same as corrections to Volume C.

Page A7, fourth line from the bottom   (6/28/86)

since control sequences of the second kind always have exactly one symbol after

---

Page A35, second-last line   (1/31/87)

> *He may run who reads.*
>
> — HABAKKUK 2:2 (c. 600 B.C.)
>
> *He that runs may read.*

Page A43, lines 8–9   (8/23/86)

of Appendix B, which defines % to be a special kind of symbol so that you can use it for comments, defines the control sequence \% to mean a percent sign.

Page A45, lines 10–13   (8/23/86)

T_EX adds 64. Hence code 127 can be typed ^^?, and the dangerous bend sign can be obtained by saying {\manual^^?}. However, you must change the category code of character 127 before using it, since this character ordinarily has category 15 (invalid); say, e.g., \catcode`\^^?=12. The ^^ notation is different from \char, because ^^

Page A76, line 7   (8/23/86)

and extra space; for example, these quantities are 3.33333 pt, 1.66666 pt, 1.11111 pt,

---

Page A83, bottom line   (5/19/87)

[This line should be flush right.]

Page A111, 7th-last line, right-hand column   (2/15/87)

if $b = 10000$ and $-10000 < p < 10000$ and $q < 10000$;

Page A117, second-last line   (6/10/87)

marks; sometimes also $\|$ ($\|$). You can say, e.g., `\footnote\dag{...}`.

Page A124, lines 6–11 (2/26/87)

of insertion; an additional '`\penalty-10000`' item is assumed to be present at the end of the vertical list, to ensure that a legal breakpoint exists.) Let u be the natural height plus depth of that least-cost box, and let r be the penalty associated with the optimum breakpoint. Decrease g by uf, and increase q by r. (If `\tracingpages=1`, the log file should now get a cryptic message that says '`% split `n` to `v,u` p=`r'. For example,

```
% split254 to 180.2,175.3 p=100
```

Page A158, lines 6–8 (2/20/87)

the second atom, which has subscript i; the superscripts are empty except for the last atom, whose superscript is $\overline{n+1}$. This superscript is itself a math list consisting of one atom, whose nucleus is $n+1$; and that nucleus is a math list consisting of three atoms.

Page A171, line 20 (1/26/86)

will be surrounded by more space than there would be if that subformula were enclosed

---

Page A176, line 1 (8/23/86)

You can insert '`\noalign{`⟨vertical mode material⟩`}`' just after any `\cr` within

---

Page A248, line 17 (6/17/86)

'`&`' or '`\span`' or '`\cr`', it needs some way to decide which alignment is involved.

Page A249, line 20 (6/17/86)

line (see Chapter 8). If you don't want a `\cr` at the end of a certain line, just type

---

Page A276, line 19 (1/27/86)

| `\font`⟨control sequence⟩⟨equals⟩⟨file name⟩⟨at clause⟩
| ⟨global assignment⟩

[The bottom line of p. 276 will now move to the top of p. 277.]

Page A277, lines 31–32 (1/27/86)

⟨font assignment⟩ $\longrightarrow$ `\fontdimen`⟨number⟩⟨font⟩⟨equals⟩⟨dimen⟩

Page A286, sixth-last line (4/28/87)

`\sfcode` table as described in Chapter 12; characters numbered 128 to 255 set the

---

Page A287, line 19 (2/15/87)

■ `\-`. This "discretionary hyphen" command is defined in Appendix H.

Page A292, lines 9–10 (2/15/87)

■ \-. This command is usually equivalent to '\discretionary{-}{}{}'; the '-'
is therefore interpreted as a hyphen, not as a minus sign. (See Appendix H.)

Page A308, lines 25–26 (6/1/87)

```
\def\appendroman#1#2#3{\edef#1{\csname
    \expandafter\gobble\string#2\romannumeral#3\endcsname}}
```

Page A312, lines 10–14 (8/23/86)

12.11. The interline glue will be zero, and the natural height is $1 + 1 - 3 + 2 = 1\,\text{pt}$
(because the depth of \box2 isn't included in the natural height); so the glue will
ultimately become \vskip-1pt when it's set. Thus, \box3 is 3 pt high, 2 pt deep, 4 pt
wide. Its reference point coincides with that of \box2; to get to the reference point of
\box1 you go up 2 pt and right 3 pt.

Page A312, line 21 (8/23/86)

up 4 pt to get to the upper left corner of \box4; then down -1.6 pt, i.e., up 1.6 pt, to

---

Page A319, line 20 (31/3/87)

make ordinary periods act like \cdot symbols: Just define \mathcode`. to be "0201,

---

Page A328, lines 18–19 (5/14/87)

not performed while the expansion is taking place, and the control sequences following
\def are expanded; so the result is an infinite string

```
A\def A\def A\def A\def A\def A\def A\def A\def A...
```

Page A329, lines 14–15 (8/23/86)

20.5. The ## feature is indispensable when the replacement text of a definition
contains other definitions. For example, consider

Page A356, lines 6–7 (1/30/87)

```
  \spaceskip=.3333em \xspaceskip=.5em\relax}
\def\ttraggedright{\tt\rightskip=0pt plus2em\relax}
```

Page A356, line 33 (6/1/87)

```
    \vbox to.2ex{\hbox{\char'26}\vss}\hidewidth}}
```

Page A357, tenth-last line (10/13/86)

```
\let\sp=^ \let\sb=_        {\catcode`\_=\active \global\let_=\_}
```

Page A357, third-last and second-last lines   (2/17/87)

```
\def\pr@m@s{\ifx'\next\let\nxt\pr@@@s \else\ifx^\next\let\nxt\pr@@@t
  \else\let\nxt\egroup\fi\fi \nxt}
```

Page A364, fifth-last line   (1/30/87)

```
\def\fmtname{plain}\def\fmtversion{2.3} % identifies the current format
```

Page A368, bottom line   (2/26/86)

that includes the symbols ↤, ↓, ≠, ≤, and ≥, and he finds that this makes it much more

---

Page A396, line 13   (8/23/86)

```
        \hyphenpenalty=10000 \exhyphenpenalty=10000
```

Page A414, line 10   (3/4/86)

```
\font\titlefont=cmssdc10 at 40pt    % titles in chapter openings
```

Page A427, line 7   (2/23/86)

the author's book *Computer Modern Typefaces*.)

Page A428, lines 18–20   (6/15/87)

The first eight of these all have essentially the same layout; but `cmr5` needs no
ligatures, and many of the symbols of `cmti10` have different shapes. For example,
the ampersand becomes an 'E.T.', and the dollar changes to pound sterling:

Page A434, lines 25–28   (8/17/86)

from `\nu` (ν). Similarly, `\varsigma` (ς) should not be confused with `\zeta` (ζ). It
turns out that `\varsigma` and `\upsilon` are almost never used in math formulas;
they are included in plain TeX primarily because they are sometimes needed in
short Greek citations (cf. Appendix J).

Page A447, line 32   (6/1/87)

ters also affect mathematical typesetting: dimension parameters `\delimitershortfall`

Page A455, new paragraph to follow line 9   (2/15/87)

The control sequence `\-` is equivalent to `\discretionary{\char h}{}{}`,
where h is the `\hyphenchar` of the current font, provided that h lies be-
tween 0 and 255. Otherwise `\-` is equivalent to `\discretionary{}{}{}`.

Page A457, left column, fifth-last line   (2/17/87)

155, 201, *305*, 324, <u>357</u>, 394–395;

Page A458, left column, line 6 (2/15/87)

> *\- (discretionary hyphen), 95, 283, 287,
> 292, <u>455</u>.

Page A458, left column, near the bottom (5/19/87)

> ! (exclamation point), 51, *72*, 73, 75, *169*.

[This saves a line that otherwise would make the index too long on page 481!]

Page A458, right column, line 10 (11/27/86)

> ˜ (tilde), 38, 51, 343, <u>353</u>; *see also* ties.

Page A458, right column (6/14/87)

> *\accent (general accent), 9, 54, 86, 283, <u>286</u>.

Page A461, entry for boxes (3/16/87)

> boxes, 63–67, 77–83, 221–229.

Page A461, entry for \centering (1/28/86)

> \centering, <u>347</u>, 348, 362.

Page A462, entry for ⟨code assignment⟩ (1/27/86)

> ⟨code assignment⟩, <u>277</u>.

Page A464, left column, line 3 (2/15/87)

> discretionary hyphens, 28, 95–96, 453, <u>455</u>.

Page A465, right column, line 8 (5/3/87)

> expansion of expandable tokens, 212–216, 238,

Page A466, entry for \font, second line (1/27/86)

> 271, <u>276</u>.

Page A466, new entry (2/3/87)

> ⟨fontdef token⟩, <u>271</u>.

Page A467, entry for \hideskip (1/28/86)

> \hideskip, <u>347</u>, 348, 354.

Page A468, left column line 2 (2/15/87)

> 351, 395, *414*, 454, 455.

Page A470, entry for `manfnt` (1/15/86)

> `manfnt`, 44, 408, 414.

Page A471, entry for `\medbreak` (10/13/86)

> `\medbreak`, 111, 113, 353, *355*, *419*, *422*.

Page A471, entry for `\moveright` (2/27/87)

> *`\moveright`, 80–81, *221*, 282.

Page A471, entry for Mozart, second line (3/19/86)

> Gottlieb (= Theophilus = Amadeus), 409.

Page A472, the entry for `\not` (2/12/87)

[The overprinting here is intentional, since `\not` is a character of width zero. More than a dozen people have reported this as an error, but it is not!]

Page A477, entry for `\span` (5/3/87)

> *`\span`, 215, 238, 243, *244*, 245, 248, 249,
>   282, *330*, 385.

Page A479, entry for ties, second line (11/27/86)

> *173*, 353, *404*.

Page A480, changes to various entries (6/14/87)

> *`\underline`, *130–131*, 141, 291, 443.
> *`\unhbox`, 120, 283, 285, *354*, *356*, *361*, *399*.
> *`\unhcopy`, 120, 283, 285, *353*.
> *`\unkern`, 280.
> *`\unpenalty`, 280.
> *`\unskip`, 222–223, 280, 286, *313*, *392*, *418–419*.
> *`\unvbox`, 120, 254, 282, 286, *354*, *361*, *363*, *364*, *392*, *399*, *417*.
> *`\unvcopy`, 120, 282, 286, *361*.
> *`\vadjust`, 95, 105, 109, 110, 117, 259, 281, 393, 454.
> *`\valign`, 249, 283, 285–286, 302, *335*, *397*.
> *`\vcenter`, 150–151, 159, 170, 193, 222, 242,
> *`\vfil`, 71, 72, 111, 256, 281, 286, 417.
> *`\vfill`, 24, 25, 71, 72, 256–257, 281, 286.
> *`\vfilneg`, 72, 111, 281, 286.
>   `\voidb@x`, 347, 348.

Page A481, left column (6/14/87)

> *`\vss`, 71, 72, *255*, 281, 286.

Volume B, in general (7/28/86)

[A number of entries were mistakenly omitted from the mini-indexes on the right-hand pages. Here is a combined list of all the missing items; you can mount it inside the back cover, say, as a secondary mini-index when the first one fails...]

Volume B, in general (4/6/87)

[The percent signs in all the comments (for example, on pages 7 and 50) are in the wrong font! Change '%' to '%'.]

Page Bvi, bottom line, and top line of next page (10/12/86)

puter Science Report 1097 (Stanford, California, April 1986), 146 pp.   *The* *WEB programs for four utility programs that are often used with TEX:* POOLtype, TFtoPL, PLtoTF, *and* DVItype.

Page B2, line 32 (4/22/87)

define *banner* ≡ ´This␣is␣TeX,␣Version␣2.2´   { printed when TEX starts }

Page B7, new line after line 25   (1/28/87)

    if $max\_in\_open \geq 128$ **then** $bad \leftarrow 6$;

Page B13, first three lines   (4/7/87)

The '*name*' parameter, which is of type '**packed array** $[\langle any \rangle]$ **of** *char*', stands for the name of the external file that is being opened for input or output. Blank spaces that might appear in *name* are ignored.

Page B14, line 30   (4/7/87)

31.   The *input_ln* function brings the next line of input from the specified file into available

---

Page B18, line 30   (5/22/86)

str_ptr: str_number;   { number of the current string being created }

Page B21, first line of mini-index, right column   (6/14/87)

    $pool_name = $ `"string"`, §11.

Page B34, lines 5–6   (6/14/87)

to delete a token, and/or if some fatal error occurs while TEX is trying to fix a non-fatal one. But such recursion is never more than two levels deep.

Page B55, lines 12–13   (4/21/87)

    if $r = p$ **then if** $rlink(p) \neq p$ **then** ⟨ Allocate entire node p and **goto** *found* 129 ⟩;

Page B57, lines 25–28   (6/14/87)

The first of these has $font = font\_base$, and its *link* points to the second; the second identifies the font and the character dimensions. The saving feature about oriental characters is that most of them have the same box dimensions. The *character* field of the first *char_node* is a "*charext*" that distinguishes between graphic symbols whose dimensions are identical for typesetting purposes. (See the METAFONT manual.) Such an extension of TEX would not be difficult; further details are left to the reader.

Page B58, second line of section 136   (7/23/86)

the values corresponding to '\hbox{}'. The *subtype* field is set to $min\_quarterword$, since that's

---

Page B66, lines 2–8 (4/21/87)

location is more efficient than dynamic allocation when we can get away with it. For example, locations *mem_bot* to *mem_bot* + 3 are always used to store the specification for glue that is '0pt plus 0pt minus 0pt'. The following macro definitions accomplish the static allocation by giving symbolic names to the fixed positions. Static variable-size nodes appear in locations *mem_bot* through *lo_mem_stat_max*, and static single-word nodes appear in locations *hi_mem_stat_min* through *mem_top*, inclusive. It is harmless to let *lig_trick* and *garbage* share the same location of *mem*.

Page B67, line 23 (4/13/87)

      { previous *mem_end*, *lo_mem_max*, and *hi_mem_min* }

Page B71, line 17 (4/15/87)

  begin while $p > mem\_min$ **do**

[Now *null* can be removed from the mini-index.]

Page B74, line 24 (4/15/87)

procedure *show_node_list*(p : *integer*); { prints a node list symbolically }

Page B74, line 33 (4/15/87)

  while $p > mem\_min$ **do**

Page B84, line 12 (2/15/87)

  define *relax* = 0 { do nothing (\relax) }

Page B86, third line of section 210 (8/23/86)

that their special nature is easily discernible. The "expandable" commands come first.

Page B88, line 23 (5/22/86)

procedure *print_mode*(m : *integer*); { prints the mode represented by m }

Page B93, lines 3–4 (8/17/86)

    In the first region we have 128 equivalents for "active characters" that act as control sequences, followed by 128 equivalents for single-character control sequences.

Page B130, ninth-last line (5/7/87)

This variable has six possible values:

Page B151, line 9 (4/22/87)

  begin if $(end\_line\_char < 0) \vee (end\_line\_char > 127)$ **then** $incr(limit)$;
  if $limit = start$ **then** { previous line was empty }

Page B160, lines 17–20 (7/28/86)

389.   After parameter scanning is complete, the parameters are moved to the *param_stack*. Then the macro body is fed to the scanner; in other words, *macro_call* places the defined text of the control sequence at the top of TEX's input stack, so that *get_next* will proceed to read it next.

Page B200, top line (5/5/87)

495.   When we begin to process a new \if, we set *if_limit* ← *if_code*; then if \or or \else or \fi

---

Page B217, lines 15–16 (6/14/87)

DVI format.

Page B224, lines 4–7 of section 560 (10/22/86)

name and area strings *nom* and *aire*, and the "at" size s. If s is negative, it's the negative of a scale factor to be applied to the design size; $s = -1000$ is the normal case. Otherwise s will be substituted for the design size; in this case, s must be positive and less than 2048 pt (i.e., it must be less than 2^{27} when considered as an integer).

Page B224, second-last line (4/28/87)

done: **if** *file_opened* **then** $b\_close(tfm\_file)$;
 $read\_font\_info \leftarrow g$;

Page B255, mini-index at the bottom (4/15/87)

  mag = macro, §236.

Page B257, lines 11–13 (6/14/87)

  if $c \geq qi(128)$ **then** $dvi\_out(set1)$;
 $dvi\_out(qo(c))$;

Page B260, lines 7–8 (4/15/87)

  In the case of *c_leaders* (centered leaders), we want to increase *cur_h* by half of the excess space not occupied by the leaders; and in the case of *x_leaders* (expanded leaders) we increase

---

Page B267, mini-index at the bottom (4/15/87)

cur_s
  : *integer*, §616. *mag* = macro, §236. *pop* = 142, §586.

Page B271, line 10   (8/23/86)

which will be ignored in the calculations because it is a highly negative number.

Page B285, lines 23 and 24   (5/4/87)

the current string would be '.^._/' if p points to the *ord_noad* for x in the (ridiculous) formula
'\sqrt{a^{\mathinner{b_{c\over x+y}}}}$'.

Page B296, lines 3–5   (5/8/87)

box b and changes it so that the new box is centered in a box of width w. The centering is done
by putting \hss glue at the left and right of the list inside b, then packaging the new box; thus,
the actual box might not really be centered, if it already contains infinite glue.

Page B346, line 19   (5/19/87)

pass_number: *halfword*;   { the number of passive nodes allocated on this pass }

Page B350, lines 36 and 37   (1/28/87)

v: *pointer*;   { points to a glue specification or a node ahead of *cur_p* }
t: *integer*;   { node count, if *cur_p* is a discretionary node }

Page B353, lines 8–22   (1/28/87)

> $s \leftarrow cur\_p$;
> **if** *break_type* > *unhyphenated* **then if** *cur_p* $\neq$ *null* **then**
>   ⟨ Compute the discretionary *break_width* values 840 ⟩;
> **while** $s \neq null$ **do**
> $\vdots$ [as before, but indented one less notch]
> **end**;

Page B354, line 6   (1/28/87)

will be the background plus l_1, so the length from *cur_p* to *cur_p* should be $\gamma + l_0 + l_1 - l$, minus
the length of nodes that will be discarded after the discretionary break.

Page B354, lines 12–18   (1/28/87)

> **begin** $t \leftarrow replace\_count(cur\_p)$; $v \leftarrow cur\_p$; $s \leftarrow post\_break(cur\_p)$;
> **while** $t > 0$ **do**
>   **begin** *decr*(t); $v \leftarrow link(v)$; ⟨ Subtract the width of node v from *break_width* 841 ⟩;
>   **end**;
> **while** $s \neq null$ **do**
>   **begin** ⟨ Add the width of node s to *break_width* and increase t, unless it's discardable 842 ⟩;

Page B354, new line after line 21   (1/28/87)

> **if** $t = 0$ **then** $s \leftarrow link(v)$;   { more nodes may also be discardable after the break }

Page B354, lines 26–34 (1/28/87)

[Change '*s*' to '*v*' throughout this section (8 times).]

Page B354, line 9 from the bottom (1/28/87)

842.   ⟨ Add the width of node *s* to *break_width* and increase *t*, unless it's discardable 842 ⟩ ≡

Page B355, lines 1–3 (1/28/87)

$hlist\_node$, $vlist\_node$, $rule\_node$: $break\_width[1] \leftarrow break\_width[1] + width(s)$;
$kern\_node$: **if** $(t = 0) \wedge (subtype(s) \neq acc\_kern)$ **then** $t \leftarrow -1$ { discardable }
   else $break\_width[1] \leftarrow break\_width[1] + width(s)$;
othercases $confusion($"disc2"$)$
endcases;
$incr(t)$

Page B355, patches to mini-index at bottom (1/28/87)

$acc\_kern = 2$, §155.
$incr =$ macro, §16.
t: $integer$, §830.
v: $pointer$, §830.

Page B372, lines 12–14 (1/28/87)

⟨ Change discretionary to compulsory and set $disc\_break \leftarrow true$ 882 ⟩
else if $(type(q) = math\_node) \vee (type(q) = kern\_node)$ **then** $width(q) \leftarrow 0$;

Page B380, fifth-last line (5/7/87)

`b` and `c`, the two patterns with and without hyphenation are `a b - cd ef` and `a bc de f`. Thus the

---

Page B386, lines 2–4 (5/21/87)

hyphenation, TEX first looks to see if it is in the user's exception dictionary. If not, hyphens
are inserted based on patterns that appear within the given word, using an algorithm due to
Frank M. Liang.

Page B397, line 28 (5/21/87)

$h = z - c$. It follows that location $trie\_max$ will never be occupied in $trie$, and we will have

---

Page B415, the mini-index (4/6/87)

[Delete the spurious entry for '*c*'.]

Page B419, mini-index entry for *c* (4/6/87)

c: $integer$, §994.

Page B422, line 24   (8/23/86)

$prev\_p$: $pointer$;   { predecessor of p }

Page B435, line 16   (10/12/86)

$width(p) \leftarrow font\_info[k].sc$;   { that's $space(f)$ }
$stretch(p) \leftarrow font\_info[k+1].sc$;   { and $space\_stretch(f)$ }
$shrink(p) \leftarrow font\_info[k+2].sc$;   { and $space\_shrink(f)$ }

[And the mini-index gets three new entries: $space = macro$, §558. $space\_shrink = macro$, §558. $space\_stretch = macro$, §558.]

Page B495, lines 18 and 19   (2/15/87)

[delete these lines, since the cases cannot occur]

Page B510, line 8   (12/15/86)

("Pretend␣that␣you're␣Hercule␣Poirot:␣Examine␣all␣clues,")

Page B527, new line to follow line 13   (6/17/86)

This program doesn't bother to close the input files that may still be open.

Page B534, fourth-last line   (5/4/87)

define $write\_stream(\#) \equiv info(\#+1)$ { stream number (0 to 17) }

Page B544, left column   (1/28/87)

acc_kern: <u>155</u>, 191, 837, 842, 879, 1125.

Page B546, entry for c (4/6/87)

[Add a reference to section <u>994</u>.]

Page B547, left column   (4/7/87)

$char$:   19, 26–27, 520, 534.

Page B547, left column   (6/14/87)

Chinese characters: 134, 585.

Page B553, entry for $font\_base$ (6/14/87)

[Insert a reference to section 134.]

Page B555, right column, new entry   (10/25/86)

Huge page..., 641.

Page B556, entry for *incr* (1/28/87)

[Add a reference to section 842.]

Page B557, entry for *is_char_node* (1/28/87)

[Delete the reference to section 881.]

Page B557, right column (6/14/87)

Japanese characters: 134, 585.

Page B560, right column (1/28/87)

max_in_open: <u>11</u>, 14, 304, 328.

Page B561, left column, line 10 (4/15/87)

169–172, 174, 178, 182, 1249, 1312, 1334.

Page B561, left column (5/1/87)

`Missing font identifier`: 577.

Page B563, left column, line 2 (4/15/87)

136, 145, 149–154, 164, 168–169, 175–176, 182,

Page B563, right column (6/14/87)

oriental characters: 134, 585.

Page B569, right column, in appropriate places (10/12/86)

space: 547, <u>558</u>, 752, 755, 1042.
space_shrink: 547, <u>558</u>, 1042.
space_stretch: 547, <u>558</u>, 1042.

Page B570, third-last line (1/28/87)

786, 795, 809, 819–820, 822, 837, 842–844, 866,

Page B571, right column (10/25/86)

`The following...deleted`, 641, 992, 1121.

Page B571, right column (4/7/87)

text_char: <u>19</u>, 20, 25, 47.

Page B573, right column (5/1/87)

[Delete the entry for '`Undefined font code`'.]

Page B576, line 2 (1/28/87)

⟨ Add the width of node s to *break_width* and increase t, unless it's discardable 842 ⟩
   Used in section 840.

Page B591, line 6 from the bottom (1/28/87)

⟨ Subtract the width of node v from *break_width* 841 ⟩   Used in section 840.

Page C14, top two lines (3/16/87)

The recursive midpoint rule for curve-drawing was discovered in 1959 by Paul de Casteljau, who showed that the curve could be described algebraically by the remarkably simple formula

---

Page C54, sixth-last to fourth-last lines (10/13/86)

Jonathan H. Quick (a student) used '`a.plus1`' as the name of a variable at the beginning of his program; later he said '`let plus=+`'. How could he refer to the variable '`a.plus1`' after that?

Page C76, line 14 (10/13/86)

$x_4 = w - .01in$ Point 4 should be one-hundredth of an inch inside

---

Page C103, line 12 (10/12/86)

$ht\# = body\_height\#; \quad .5[ht\#, -dp\#] = axis\#;$

Page C105, line 13 (10/13/86)

The vertical line just to the right of the italic left parenthesis shows the italic

---

Page C113, lines 20–27 (8/23/86)

The command '**erase fill** c' is an abbreviation for '**cullit**; **unfill** c; **cullit**'; this zeros out the pixel values inside the cyclic path c, and sets other pixel values to 1 if they were positive before erasing took place. (It works because the initial **cullit** makes all the values 0 or 1, then the **unfill** changes the values inside c to 0 or negative. The final **cullit** gets rid of the negative values, so that they won't detract from future filling and drawing.)   You can also use '**draw**', '**filldraw**', or '**drawdot**' with '**erase**'; for example, '**erase draw** p' is an abbreviation for '**cullit**; **undraw** p; **cullit**', which uses the currently-picked-up pen as if it were an eraser applied to path p.

Page C124, line 9 (6/17/86)

$$branch_2 = flex((30, 570), (10, 590), (-1, 616))$$

Page C130, 3rd-last line (9/25/86)

Geometry **1** (1986), 123–140]: Given a sequence

Page C144, sixth line of the program   (8/23/86)

    6   $y_2 = .1h;$ $top\ y_3 = .4h;$

Page C148, the line before the illustration   (11/27/86)

are polygons with 32 and 40 sides, respectively:

[New illustrations are needed here, since METAFONT version 1.3 improves the accuracy of pen polygons.]

Page C149, 7th line after the illustration   (10/24/86)

$(200, y + 100 \pm \alpha)$, where $\alpha = \sqrt{5}/4 \approx 0.559$. If we digitize these outlines and fill the

---

Page C178, second-last line   (8/23/86)

(If $t_3 = t_1$ transum t_2, then z transformed $t_3 = z$ transformed $t_1 + z$ transformed t_2,

---

Page C198, fifth-last and fourth-last lines   (10/13/86)

       $top\ y_2 = \text{round}(top\ \beta).$

Such operations occur frequently in practice, so plain METAFONT provides convenient

---

Page C212, lines 9–11 from the bottom   (8/23/86)

      | `point` ⟨numeric expression⟩ `of` ⟨path primary⟩
      | `precontrol` ⟨numeric expression⟩ `of` ⟨path primary⟩
      | `postcontrol` ⟨numeric expression⟩ `of` ⟨path primary⟩

Page C233, lines 13–14   (2/15/87)

one column of white pixels, if the character is $2a$ pixels wide, because the right edge of black pixels is specified here to have the x coordinate $2a - 1$.

Page C247, lines 23–25   (11/27/86)

   16.2. '**pencircle** scaled 1.06060' is the diamond but '**pencircle** scaled 1.06061' is the square. (This assumes that $fillin = 0$. If, for example, $fillin = .1$, the change doesn't occur until the diameter is 1.20204.) The next change is at diameter 1.5, which

---

Page C262, lines 1–4   (7/28/86)

      When we come to macros whose use has not yet been explained—for example, somehow `softjoin` and `stop` never made it into Chapters 1 through 27—we shall consider them from a user's viewpoint. But most of the comments that follow are addressed to a potential base-file designer.

Page C266, line 16   (8/17/86)

variables; they have the side effect of changing the variable's value.

Page C276, line 26 (6/23/86)

```
if charic<>0: r((w+charic*hppp,h.o_),(w+charic*hppp,.5h.o_)); fi
```

Page C286, lines 24–26 (10/13/86)

but METAFONT won't let you. And even if this had worked, it wouldn't have solved the problem; it would simply have put ENDFOR into the replacement text of ast, because expansion is inhibited when the replacement text is being read.

Page C290, line 1 (8/23/86)

2. Fortuitous loops. The 'max' and 'min' macros in Appendix B make use of the fact

---

Page C298, third-last line (8/23/86)

$$t[u_1, \ldots, u_n] = t[t[u_1, \ldots, u_{n-1}], t[u_2, \ldots, u_n]]$$

Page C304, 14th-last line (2/15/87)

[replace this '\smallskip' by a \smallskip between lines!]

Page C307, fifth-last line (12/7/86)

adjust_fit(⟨left sidebearing adjustment⟩, ⟨right sidebearing adjustment⟩);

Page C312, line 34 (10/12/86)

```
params[2] = "sans_params";     fontname[2] = "cmssbx10";
```

Page C316, lines 19–21 (8/17/86)

example, '(some charht values had to be adjusted by as much as 0.12pt)' means that you had too many different nonzero heights, but METAFONT found a way to reduce the number to at most 15 by changing some of them; none of them had to be

---

Page C319, line 3 (8/23/86)

specified by saying, e.g.,

Page C321, line 6 (7/28/86)

```
  special "identifier " & font_identifier_;
```

Page C334, line 2 (6/23/86)

```
  currentpicture := currentpicture shifted-(1,1); pix := currentpicture;
```

Page C339, tenth-last line (2/4/87)

```
  Jackie K\=aren {\L}au\.ra Mar{\'\i}a N\H{a}ta{\l}{\u\i}e {\O}ctave
```

| Page C343, second-last line | (8/23/86) |

the precise needs of a precise but limited intellectual goal.

| Page C346, 2nd line of entry for ';' | (1/12/87) |

217, 223–224, 263, 312.

| Page C348, line 6 | (6/17/86) |

concatenation, of paths, *70–71*, *123*, 127,

| Page C348, just before 'debugging' | (3/16/87) |

de Casteljau, Paul de Faget, 14.

| Page C348, right column | (3/16/87) |

[The entry for '`define_whole_vertical_blacker_pixels`' should be moved up before the entry for '`define_whole_vertical_pixels`'.]

| Page C352, left column | (6/1/87) |

*kern, *97*, *316*, <u>*317*</u>.

| Page C352, right column | (3/8/87) |

[The entry for '`lowres`' belongs before the entry for '`lowres_fix`'.]

| Page C353, left column | (3/8/87) |

[The entries for '`mode`' and '⟨mode command⟩' belong before the entry for '`mode_def`'.]

| Page C353, entry for `mode_def` | (8/17/86) |

`mode_def`, 94, 189, <u>*270*</u>, *278–279*.

| Page C355, right column | (4/15/86) |

[The entry for '`rulepen`' belongs before the entry for 'rules'.]

| Page C355, right column | (8/5/86) |

`screenstrokes`, 191, <u>*277*</u>.

| Page C355, 2nd line of entry for 'semicolons' | (1/12/87) |

217, 223–224, 263, 312.

| Page C356, full names for the Stanfords | (4/10/86) |

Stanford, Amasa Leland, 340.
Stanford, Jane Elizabeth Lathrop, 340.

Volume D, in general   (7/28/86)

[A number of entries were mistakenly omitted from the mini-indexes on the right-hand pages. Here is a combined list of all the missing items; you can mount it inside the back cover, say, as a secondary mini-index when the first one fails...]

Volume D, in general   (4/6/87)

[The percent signs in all the comments (for example, on pages 7 and 42) are in the wrong font! Change '%' to '%'.]

Page Dvii, line 9   (9/25/86)

Discrete and Computational Geometry **1** (1986), 123–140. *Develops the theory*

Page D2, line 27   (6/17/86)

define *banner* ≡ ´This␣is␣METAFONT,␣Version␣1.3´   { printed when METAFONT starts }

Page D18, line 30   (5/22/86)

str_ptr: *str_number*;   { number of the current string being created }

Page D23, second line of mini-index, right column   (6/14/87)

pool_name = "string", §11.

Page D30, lines 33–34   (6/14/87)

to delete a token, and/or if some fatal error occurs while METAFONT is trying to fix a non-fatal one. But such recursion is never more than two levels deep.

Page D63, lines 13–14   (5/5/87)

[These two lines can be eliminated, since the variable *temp_ptr* is no longer used! If you delete them, also remove §158 from the list of sections where global variables are declared (pages D7 and D552), and remove *temp_ptr* from the index on page D540.]

Page D66, line 6   (5/22/86)

function *get_node*(*s* : *integer*): *pointer*;   { variable-size node allocation }

Page D66, lines 31–32   (3/16/86)

controlled growth helps to keep the *mem* usage consecutive when METAFONT is implemented on "virtual memory" systems.

Page D67, lines 7–8   (4/21/87)

if $r = p$ **then if** $rlink(p) \neq p$ **then** ⟨ Allocate entire node p and **goto** *found* 171 ⟩;

Page D86, second line of section 198   (2/27/87)

Individual class numbers have no semantic or syntactic significance, except in a few instances

---

Page D101, line 2   (3/16/86)

like 'x', or they can combine the structural properties of arrays and records, like 'x20a.b'. A

Page D102, line 24 (3/16/86)

In other words, variables have a hierarchical structure that includes enough threads running

---

Page D127, line 10 (5/5/87)

[Variable r can be eliminated, since it is not used in this procedure! If you delete it, also remove <u>280</u> from the corresponding index entry on page D536.]

Page D129, line 15 (5/5/87)

[This line can be eliminated, since *sine* and *cosine* are not used in this procedure! If you delete them, also remove <u>284</u> from the corresponding index entries on pages D538 and D521.]

Page D142, line 23 (4/24/87)

$(7 - \sqrt{28}\,)/12$; the worst case occurs for polynomials like $B(0, 28 - 4\sqrt{28}, 14 - 5\sqrt{28}, 42; t).)$

Page D178, third-last line (7/30/86)

The following code maintains the invariant relations $0 \leq x0 < \max(x1, x1 + x2)$, $|x1| < 2^{30}$,

---

Page D228, line 13 (7/30/86)

    while $max\_coef < fraction\_half$ **do**

The mini-index at the bottom of the next page should also receive the following new entry:

        $fraction\_half$ = macro, §105.

Page D228, 10th-last line (5/5/87)

      begin $right\_type(p) \leftarrow k$;

[Also eliminate 'q,' seven lines above this, and delete <u>497</u> from the index entry for q on page D536.]

Page D248, lines 16–21 (11/27/86)

    $alpha \leftarrow abs(u)$; $beta \leftarrow abs(v)$;
    if $alpha < beta$ **then**
      begin $alpha \leftarrow abs(v)$; $beta \leftarrow abs(u)$; **end**;   { now $\alpha = \max(|u|, |v|)$, $\beta = \min(|u|, |v|)$ }
    if $internal[fillin] \neq 0$ **then**
      $d \leftarrow d - take\_fraction(internal[fillin], make\_fraction(beta + beta, delta))$;
    $d \leftarrow take\_fraction((d + 4) \textbf{ div } 8, delta)$; $alpha \leftarrow alpha \textbf{ div } half\_unit$;

Page D263, line 20 (3/16/86)

instead of *false*, the other routines will simply log the fact that they have been called; they won't

---

Page D268, line 2 (4/28/87)

Given the number k of an open window, the pixels of positive weight in *cur_edges* will be shown

---

Page D301, line 6 of section 652   (5/5/87)

[This line can be eliminated, since variable *s* is not used in this procedure! If you delete it, also remove <u>652</u> from the corresponding index entry on page D537; remove 652 from the index entries for *param_size* and *param_start* on page D534; and remove *param_size* from the mini-index on page D301.]

Page D376, lines 17 and 18   (11/14/86)

[these two mysterious lines should be deleted]

Page D380, line 11   (5/5/87)

[Variables *q* and *r* can be eliminated, since they are not used in this procedure! If you delete them, also remove <u>862</u> from the corresponding index entries on page D536.]

Page D429, line 14   (5/5/87)

    begin $p \leftarrow cur\_exp$;

[Also eliminate line 12, and delete <u>985</u> from the index entry for *vv* on page D543.]

Page D455, line 5   (5/5/87)

[This line can be eliminated, since variable *t* is not used in this procedure! If you delete it, also remove <u>1059</u> from the corresponding index entry on page D540; remove 1059 from the index entries for *small_number* and *with_option* on pages D539 and D544; and remove *with_option* from the mini-index on page D455.]

Page D463, line 10   (12/15/86)

    ("Pretend␣that␣you're␣Miss␣Marple:␣Examine␣all␣clues,")

Page D465, lines 17–18   (6/14/87)

[Delete these two lines.]

Page D474, 5th-last line   (3/16/86)

depths, or italic corrections) are sorted; then the list of sorted values is perturbed, if necessary.

Page D481, line 12   (6/17/86)

    $print\_nl$("Font␣metrics␣written␣on␣"); $print(metric\_file\_name)$; $print\_char$(".");
    $b\_close(tfm\_file)$

The mini-index at the bottom of this page should also receive the following new entry:

        $print\_char$: **procedure**, §58.

Page D510, new line to follow line 5   (6/17/86)

    This program doesn't bother to close the input files that may still be open.

Page D510, just before the fifth-last line   (8/5/86)

$internal[fontmaking] \leftarrow 0;$ { avoid loop in case of fatal error }

Page D520, right column   (6/14/87)

Chinese characters: 1147.

Page D526, left column, lines 1–2   (7/30/86)

$fraction\_half$:   <u>105</u>, 111, 152, 288, 408, 496, 543,
1098, 1128, 1141.

Page D526, left column, lines 6–7   (7/30/86)

478, 497, 499, 503, 530, 540, 547, 549, 599, 603,
612, 615, 815–816, 917, 1169–1170.

Page D528, right column   (6/14/87)

Japanese characters: 1147.

Page D530, right column, line 45   (7/30/86)

max: <u>539</u>, 543.

Page D533, right column   (6/14/87)

oriental characters: 1147.

Page D535, right column, line 27   (6/17/86)

1134, 1163–1165, 1182, 1194, 1200, 1205, 1213.

Page D547, bottom two lines   (11/27/86)

[These lines, and the top two on the next page, should move down so that they appear in alphabetical order just before 'Compute test coefficients'.]

Page Exiii, lines 1–2   (7/28/86)

February 11–13, 1984), 49.   *An example meta-character of the Devanagari alphabet, worked out "online" with the help of Matthew Carter.*

Page Exiii, line 6   (7/28/86)

and western alphabets work also for Devanagari and Tamil.

Page E12, lines 15 and 19   (7/23/86)

[change '17.32' to '17.28' in both places]

Page E12, third-last line	(12/18/86)

[change '41' to '40']

Page E13, lines 3, 4, and 20	(12/18/86)

[change '40' to '41', '48' to '47', '17' to '7']

Page E18, line 20	(7/23/86)

[change '17.32' to '17.28']

Page E18, line 29	(12/9/86)

[change '236' to '212' in the `cmss9` column]

Page E170, top illustration	(11/2/86)

[There should be no "dish" or depression in the vicinity of point **3r**; the top edge of the character should be straight. This error appears also in the other uses of '*no_dish_serif*' throughout the book, since the illustrations were made before '*no_dish_serif*' was added to the program. See page E180 (twice at the top), E370 (twice), E374 (twice), E376 (twice), E378 (top), E390 (bottom), E398 (top), E402 (top), E406 (top), E453 (twice).]

Page E179, new line to be inserted after line 6	(10/13/86)

if *shaved_stem* $<$ *crisp.breadth*: *shaved_stem* := *crisp.breadth*; **fi**

Page E219, line 29	(6/2/87)

top $y_1 = h$; $x_1 = x_2$; **filldraw stroke** z_{1e} -- $z_{2'e}$;   % stem

Page E279, seventh line from the bottom	(7/20/86)

that delicious but restrained humor which her readers found so irresistible.

Page E301, new line to be inserted after line 28	(5/15/87)

if *lower_side* > 1.2*upper_side*: *upper_side* := *lower_side*; **fi**

Page E554, bottom half of page	(12/18/86)

[The letters will change slightly because of the corrections to `cmr17` noted on pages 12 and 13.]

Page E561, line 3	(12/9/86)

[The numerals should be ' 0123456789 ' (i.e., 2/3 point less tall) because of the correction made to page 18.]

Page E562, line 9   (12/9/86)

[The numerals should be '*0123456789*' (i.e., 2/3 point less tall) because of the correction made to page 18.]

Page E572, entry for *breadth*   (10/13/86)

> *breadth*, 59, 75, 79, 91, 93, 179, 225, 233,

Page E573, entry for `cmcsc10`   (8/17/86)

> `cmcsc10`, <u>30</u>–<u>31</u>, 567.

Page E576, tenth-last line   (5/15/87)

> **lowres_fix**, 550.

This is a list of all corrections made to *Computers & Typesetting*, Volumes A–E, between 16 June 1987 and 20 February 1989. Corrections made to the softcover version of *The TEXbook* are the same as corrections to Volume A. Corrections to the softcover version of *The METAFONTbook* are the same as corrections to Volume C. Some of these corrections have already been made in reprintings of the books. Some of these corrections affect the indexes and mini-indexes of Volumes B and D in ways not shown here. Corrections made up to 15 June 1987 appear in other files.

Page A159, line 22   (2/15/88)

'\nolimits' if the normal \displaylimits convention has been overridden; a Rad

---

Page A213, lines 34–35   (12/23/87)

text will be a single control sequence token, defined to be like \relax if its meaning is currently undefined.

Page A299, line 30   (7/6/88)

```
    Fatal format file error; I'm stymied.
```

Page A326, line 12   (12/12/87)

its natural width. The \hbox version also invokes \everymath.

Page A359, line 2   (11/6/88)

```
\mathchardef\ldotp="613A\mathchardef\cdotp="6201\mathchardef\colon="603A
```

Page A359, lines 35–38   (5/24/88)

```
\def\updownarrow{\delimiter"326C33F } \def\arrowvert{\delimiter"033C000 }
\def\Updownarrow{\delimiter"326D377 } \def\Arrowvert{\delimiter"033D000 }
\def\vert{\delimiter"026A30C }        \def\Vert{\delimiter"026B30D }
\def\backslash{\delimiter"026E30F }   \def\bracevert{\delimiter"033E000 }
```

Page A364, line 35   (11/6/88)

```
\def\fmtname{plain}\def\fmtversion{2.94} % identifies the current format
```

Page A379, line 15   (10/12/87)

```
\def\deleterightmost#1{\edef#1{\expandafter\xyzzy#1\xyzzy}}
```

Page A383, lines 7–15 from the bottom   (1/4/89)

```
209 strings out of 1685
1659 string characters out of 17636
27618 words of memory out of 52821
1172 multiletter control sequences out of 2500
```

Consequently there was plenty of room for more macros: $52821 - 27618 = 25203$ unused cells of main memory, $2500 - 1172 = 1328$ of name memory, $1685 - 209 = 1476$ of string memory, and $17636 - 1659 = 15977$ of character memory. But a fairly large TeX was being used, and only the macros of Appendices B and E were loaded; in other circumstances it might have been necessary to conserve space.

Page A454, lines 23–29   (8/13/87)

If a suitable starting letter is found, let it be in font f. Hyphenation is abandoned unless the `\hyphenchar` of f is between 0 and 255, and unless a character of that number exists in the font. If this test is passed, TeX continues to scan forward until coming to something that's not one of the following three "admissible items": (1) a character in font f whose `\lccode` is nonzero; (2) a ligature formed entirely from characters of type (1); (3) an implicit kern. The first inadmissible item terminates this part of the process; the trial word consists of all the letters found in admissible items. Notice that all of these letters are in font f.

Page A458, left column, line 19   (2/15/88)

\| (‖), *146–147*, *171*, <u>361</u>, 435, 438.

Page A462, left column, line 7   (10/9/87)

152, 178, <u>360</u>.

Page A463, left column   (4/17/88)

*\day, 273, 349, *406*.

Page A464, left column, under Displays   (12/8/88)

non-centered, 186, 326, 375–376, 420–421.

Page A465, entry for `\everymath`   (12/12/87)

[Include also a reference to page 326.]

Page A465, right column   (7/6/88)

`Fatal format file error`, 299.

Page A473, entry for 'page builder' (8/13/87)

> when exercised, 122, 280–283, 286–287.

Page A474, left column (12/27/88)

> *\parshape, 101–102, 214, 271, 277, 283,

Page A480, right column (2/15/88)

> \vdots ($\vdots$), *177*, <u>359</u>.

Page A481, right column (7/3/87)

> \z@, <u>347</u>, 348.
> \z@skip, <u>347</u>, 348.

Page B2, line 32 (2/20/89)

define *banner* $\equiv$ ´This␣is␣TeX,␣Version␣2.97´   { printed when TeX starts }

Page B38, lines 7–9 from the bottom (11/6/88)

[Delete this paragraph; it is being moved to page B214.]

Page B38, line 5 from the bottom (12/14/88)

begin if *log_opened* **then** *selector* $\leftarrow$ *term_and_log*

Page B39, line 5 (12/14/88)

> **if** *log_opened* **then** *error*;

Page B52, line 5 (8/13/87)

cannot be done, i.e., if $hi\_mem\_min = lo\_mem\_max + 1$, we have to quit.

Page B54, lines 34–35 (7/9/88)

begin if $hi\_mem\_min - lo\_mem\_max \geq 1998$ **then** $t \leftarrow lo\_mem\_max + 1000$
else $t \leftarrow lo\_mem\_max + 1 + (hi\_mem\_min - lo\_mem\_max)$ **div** 2; { $lo\_mem\_max + 2 \leq t < hi\_mem\_min$ }

Page B108, new line after line 8 (5/24/88)

> *d*: *integer*;   { number of characters in incomplete current string }

Page B108, lines 31–33 (5/24/88)

$str\_room(l)$; $d \leftarrow cur\_length$;
while $pool\_ptr > str\_start[str\_ptr]$ **do**
    begin $decr(pool\_ptr)$; $str\_pool[pool\_ptr + l] \leftarrow str\_pool[pool\_ptr]$;
    end;   { move current string up to make room for another }
for $k \leftarrow j$ **to** $j + l - 1$ **do** $append\_char(buffer[k])$;
$text(p) \leftarrow make\_string$; $pool\_ptr \leftarrow pool\_ptr + d$;

Page B115, line 12 (4/28/88)

$group\_code = 0 \mathrel{.\,.} max\_group\_code$;   { $save\_level$ for a level boundary }

Page B141, line 19 (4/28/88)

par_token: $halfword$;   { token representing '\par' }

Page B150, line 24 (4/28/88)

358.   The present point in the program is reached only when the *expand* routine has inserted

---

Page B151, mini-index (4/28/88)

Delete the entry for 'no_expand'; replace it by:
        $expand$: **procedure**, §366.

Page B154, lines 25, 29, 34 respectively (9/20/87)

    $cvl\_backup, radix\_backup, co\_backup$: $small\_number$;   { to save cur_val_level, etc. }
$co\_backup \leftarrow cur\_order$; $backup\_backup \leftarrow link(backup\_head)$;
$cur\_order \leftarrow co\_backup$; $link(backup\_head) \leftarrow backup\_backup$;

Page B155, new entry for mini-index (9/20/87)

        cur_order: $glue\_ord$, §447.

Page B156, line 28 (12/23/87)

    begin $eq\_define(cur\_cs, relax, 256)$;

Page B157, mini-index (12/23/87)

Delete the entries for '$eqtb$' and '$frozen\_relax$'; replace them by the following:
        eq_define: **procedure**, §227.
        $relax = 0$, §207.

Page B162, lines 12–14 (4/30/88)

repeat $link(temp\_head) \leftarrow null$;
    if $(info(r) > match\_token + 127) \vee (info(r) < match\_token)$ **then** $s \leftarrow null$
    else begin $match\_chr \leftarrow info(r) - match\_token$; $s \leftarrow link(r)$; $r \leftarrow s$; $p \leftarrow temp\_head$; $m \leftarrow 0$;

Page B177, bottom line before mini-index (7/13/88)

$cur\_val \leftarrow 0$; $\ cur\_val\_level \leftarrow int\_val$; $\ radix \leftarrow 0$; $\ cur\_order \leftarrow 0$;

Page B181, line 31 (4/28/88)

[Change 'x units per sp' to 'x sp per unit'! This change also should be made on line 1 of page B183 and line -8 of page B590.]

Page B188, line 8 (5/25/88)

function $str\_toks(b : pool\_pointer)$: $pointer$; $\quad$ { changes the string $str\_pool[b .. pool\_ptr]$ to a token list }

Page B188, line 13 (5/25/88)

begin $str\_room(1)$; $p \leftarrow temp\_head$; $link(p) \leftarrow null$; $k \leftarrow b$;

Page B188, line 20 (5/25/88)

$pool\_ptr \leftarrow b$; $str\_toks \leftarrow p$;

Page B188, new line after line 28 (5/25/88)

b: $pool\_pointer$; $\quad$ { base of temporary string }

Page B188, line 31 (5/25/88)

else begin $old\_setting \leftarrow selector$; $selector \leftarrow new\_string$; $b \leftarrow pool\_ptr$;

Page B188, line 41 (5/25/88)

$selector \leftarrow old\_setting$; $the\_toks \leftarrow str\_toks(b)$;

Page B190, lines 16–18 (5/25/88)

b: $pool\_pointer$; $\quad$ { base of temporary string }
begin $c \leftarrow cur\_chr$; ⟨ Scan the argument for command c 471 ⟩;
$old\_setting \leftarrow selector$; $selector \leftarrow new\_string$; $b \leftarrow pool\_ptr$; ⟨ Print the result of command c 472 ⟩;
$selector \leftarrow old\_setting$; $link(garbage) \leftarrow str\_toks(b)$; $ins\_list(link(temp\_head))$;

Page B210, line 36 (5/25/88)

begin if $(pool\_ptr + name\_length > pool\_size) \vee (str\_ptr = max\_strings) \vee (cur\_length > 0)$ **then**

Page B211, new line of code before the mini-index (12/14/88)

log_opened: $boolean$; $\quad$ { has the transcript file been opened? }

Page B212, line 5 (12/14/88)

$job\_name \leftarrow 0$; $\ name\_in\_progress \leftarrow false$; $\ log\_opened \leftarrow false$;

Page B213, line 24 (12/14/88)

$log\_name \leftarrow a\_make\_name\_string(log\_file)$; $selector \leftarrow log\_only$; $log\_opened \leftarrow true$;

Page B214, lines 2 and 3 (12/14/88)

messages or even to *show_context*. The *prompt_file_name* routine can result in a *fatal_error*, but the *error* routine will not be invoked because *log_opened* will be false.

The normal idea of *batch_mode* is that nothing at all should be written on the terminal. However, in the unusual case that no log file could be opened, we make an exception and allow an explanatory message to be seen.

Page B214, lines 7–11 reduce to a single line (12/14/88)

begin $selector \leftarrow term\_only$;

Page B224, second-last line (4/28/87)

$done$: **if** *file_opened* **then** $b\_close(tfm\_file)$;
    $read\_font\_info \leftarrow g$;

Page B229, lines 6–8 (11/17/87)

than 2^{27}. If $z < 2^{23}$, the individual multiplications $b \cdot z$, $c \cdot z$, $d \cdot z$ cannot overflow; otherwise we will divide z by 2, 4, 8, or 16, to obtain a multiplier less than 2^{23}, and we can compensate for this later. If z has thereby been replaced by $z' = z/2^e$, let $\beta = 2^{4-e}$; we shall compute

---

Page B229, lines 11–12 (11/17/87)

if $a = 0$, or the same quantity minus $\alpha = 2^{4+e}z'$ if $a = 255$. This calculation must be done exactly, in order to guarantee portability of TeX between computers.

Page B230, lines 2–5 (11/17/87)

begin $alpha \leftarrow 16$;
while $z \geq {}'40000000$ **do**
    begin $z \leftarrow z$ **div** 2; $alpha \leftarrow alpha + alpha$; **end**;
$beta \leftarrow 256$ **div** $alpha$; $alpha \leftarrow alpha * z$;

Page B245, new entry for mini-index (8/7/87)

cur_s: *integer*, §616.

Page B254, line 29 (8/7/87)

cur_s: *integer*; { current depth of output box nesting, initially -1 }

Page B254, line 31 (8/7/87)

[Remove the statement '$cur\_s \leftarrow -1$;' and put it on page B244 at the end of line 31.]

Page B259, line 13 (11/9/87)

begin $rule\_wd \leftarrow rule\_wd + 10$;   { compensate for floating-point rounding }
$edge \leftarrow cur\_h + rule\_wd$; $lx \leftarrow 0$; ⟨Let cur_h be the position of the first box, and set

Page B259, line 17 (11/9/87)

$cur\_h \leftarrow edge - 10$; **goto** $next\_p$;

Page B263, line 21 (11/9/87)

begin $rule\_ht \leftarrow rule\_ht + 10$;   { compensate for floating-point rounding }
$edge \leftarrow cur\_v + rule\_ht$; $lx \leftarrow 0$; ⟨Let cur_v be the position of the first box, and set

Page B263, line 25 (11/9/87)

$cur\_v \leftarrow edge - 10$; **goto** $next\_p$;

Page B266, line 8 (8/7/87)

$dvi\_out(eop)$; $incr(total\_pages)$; $cur\_s \leftarrow -1$;

Page B266, new code between lines 31 and 32 (8/7/87)

while $cur\_s > -1$ **do**
begin if $cur\_s > 0$ **then** $dvi\_out(pop)$
else begin $dvi\_out(eop)$; $incr(total\_pages)$
   end;
$decr(cur\_s)$;
end;

Page B285, line 21 (4/28/88)

is subsidiary to the *nucleus* field of some noad; the dot is replaced by '$\_$' or '$\char`\^$' or '$/$' or '$\backslash$' if p is

Page B338, second-last line (8/19/87)

$q \leftarrow link(head)$; $s \leftarrow head$;

Page B339, line 4 (8/19/87)

$s \leftarrow q$; $q \leftarrow link(q)$;

Page B339, new code to insert after line 10 (8/19/87)

if $o \neq 0$ **then**
   begin $r \leftarrow link(q)$; $link(q) \leftarrow null$; $q \leftarrow hpack(q, natural)$;
   $shift\_amount(q) \leftarrow o$; $link(q) \leftarrow r$; $link(s) \leftarrow q$;
   end;
[These new lines also imply changes to the index that aren't shown in this errata list.]

Page B387, line 2   (5/24/88)

is quite short. In the following code we set $hc[hn + 2]$ to the impossible value 128, in order to

---

Page B387, line 8   (5/24/88)

$hc[0] \leftarrow 127$; $hc[hn + 1] \leftarrow 127$; $hc[hn + 2] \leftarrow 128$;   { insert delimiters }

Page B390, lines 17–18   (5/24/88)

⟨ Enter as many hyphenation exceptions as are listed, until coming to a right brace; then **return** 961 ⟩;
          [The same change applies to lines 20–21, and to page 582.]

Page B396, new line after line 34   (5/24/88)

$trie\_link(trie\_size) \leftarrow 0$; $trie\_back(0) \leftarrow trie\_size$;   { wrap around }

Page B396, bottom line   (12/12/87)

$trie\_link(0) \leftarrow 0$; $trie\_char(0) \leftarrow 0$; $trie\_op(0) \leftarrow min\_quarterword$;

Page B397, lines 15–17   (5/24/88)

begin $c \leftarrow trie\_c[p]$;
if $c < trie\_min$ **then** $trie\_min \leftarrow c$;
if $trie\_min = 0$ **then** $z \leftarrow trie\_link(trie\_size)$
else $z \leftarrow trie\_link(trie\_min - 1)$;   { get the first conceivably good hole }

Page B400, lines 3–4   (5/24/88)

⟨ Enter all of the patterns into a linked trie, until coming to a right brace 961 ⟩ ≡
          [The same change applies to page B399, lines 29–30, and to page 582.]

Page B402, line 10   (5/24/88)

$r \leftarrow trie\_size$;   { finally, we will zero out the holes }

Page B406, line 9 from the bottom   (1/23/89)

$shrink\_order(r) \leftarrow normal$; $delete\_glue\_ref(q)$; $glue\_ptr(p) \leftarrow r$; $q \leftarrow r$;

Page B417, line 10   (1/23/89)

$q \leftarrow new\_skip\_param(top\_skip\_code)$;   { now $temp\_ptr = glue\_ptr(q)$ }

Page B418, line 14   (1/23/89)

$shrink\_order(r) \leftarrow normal$; $delete\_glue\_ref(q)$; $glue\_ptr(p) \leftarrow r$; $q \leftarrow r$;

Page B507, line 13	(12/14/88)

if *log_opened* **then** *selector* ← *selector* + 2;

Page B527, line 21	(12/14/88)

if *log_opened* **then**

Page B528, line 5	(12/14/88)

if *log_opened* **then**

Page B547, right column	(9/20/87)

co_backup: 366.

Page B548, right column	(9/20/87)

cur_order: 366, 447, 448, 454, 462.

Page B548, right column	(8/7/87)

cur_s: 593, 616, 619, 629, 640, 642.

Page B551, both columns	(12/23/87)

[Remove '372' from *eqtb* and put it into *eq_define*.]

Page B552, left column	(4/28/88)

[Insert '358' into *expand*.]

Page B554, left column	(12/23/87)

[Remove '372' from *frozen_relax*.]

Page B559, new entry	(12/14/88)

log_opened, 92–93, 527, 528, 534–535, 1265, 1333–1334.

Page B559, right column	(8/13/87)

[Delete the entry for *low_mem_max*.]

Page B562, left column	(4/28/88)

[Remove '358' from *no_expand*.]

Page B565, left column	(8/7/87)

pop: 584–585, 586, 590, 601, 608, 642.

Page B567, left column   (12/23/87)

[Insert '372' into *relax*.]

Page B568, left column   (4/28/88)

[Move '269' from *save_index* to *save_level*.]

Page C26, bottom line   (7/18/87)

What angle corresponds to the direction North-Northwest?

Page C107, line 13   (10/7/87)

pickup penrazor xscaled *heavyline* rotated $(\text{angle}(z_{32} - z_{31}) + 90)$;

Page C164, line 10   (4/27/88)

$y_{\$c} = top\ y_{\$l}; \ \ y_{\$d} = y_{\$r}; \ \ x_{\$c} = x_{\$l} - left\_jut; \ \ x_{\$d} = x_{\$r} + right\_jut;$

Page C175, line 23   (1/11/88)

expand into a sequence of tokens.   (The language SIMULA67 demonstrated that it is

Page C241, line 11   (5/25/88)

numeric $ht\#, dp\#; \ \ ht\# = body\_height\#; \ \ .5[ht\#, -dp\#] = axis\#;$

Page C248, line 21 becomes two lines   (1/24/89)

which might not be numerically stable in the presence of rounding errors.) Another
case, not really desirable, is *left_jut* = *right_jut* = 0.

Page C262, line 15   (12/23/88)

```
string base_name, base_version; base_name="plain"; base_version="1.7";
```

Page C271, line 12   (1/4/89)

the user and METAFONT's primitive picture commands. First, some important program

Page C271, line 4 from the bottom   (12/23/88)

```
def cutdraw expr p = % caution: you may need autorounding=0
```

Page C272, lines 5 and 6   (12/23/88)

```
  (cut_ scaled (1+max(pen_lft,pen_rt,pen_top,pen_bot))
   rotated theta shifted z)t_;
```

Page C273, lines 20 and 22 (9/26/88)

```
(z_+(0,pen_top))t_=round((z+(0,pen_top))t_); z_ enddef;
(z_+(0,pen_bot))t_=round((z+(0,pen_bot))t_); z_ enddef;
```

Page C290, line 6 from the bottom (12/23/88)

(2) A throwaway variable, '*whatever*', nullifies an unwanted equation at the beginning

---

Page C331, just below the illustration (7/18/87)

Such a pattern is, of course, rather unlikely to occur in a `gf` file, but `GFtoDVI` would

---

Page C337, line 11 (4/28/88)

An online "menu" of the available test routines will be typed at your terminal

---

Page C346, entry for `autorounding` (12/23/88)

212, *262*, *264*, 271–272.

Page C350, left column (7/6/88)

`Fatal base file error`, 226.

Page C356, left column (1/11/88)

SIMULA67 language, 175.

Page C358, right column (2/15/88)

`*yoffset`, 212, <u>220</u>, 315, 324.

Page D2, line 27 (12/14/88)

define *banner* ≡ ´This␣is␣METAFONT,␣Version␣1.7´ { printed when METAFONT starts }

Page D36, lines 3–5 (11/6/88)

[Delete this paragraph; it is being moved to page D349.]

Page D36, line 7 (12/14/88)

begin if log_opened **then** $selector \leftarrow term\_and\_log$

Page D36, line 16 (12/14/88)

if log_opened **then** $error$;

Page D66, lines 34–35 (7/9/88)

begin if $hi\_mem\_min - lo\_mem\_max \geq 1998$ **then** $t \leftarrow lo\_mem\_max + 1000$
else $t \leftarrow lo\_mem\_max + 1 + (hi\_mem\_min - lo\_mem\_max)$ **div** 2; { $lo\_mem\_max + 2 \leq t < hi\_mem\_min$ }

Page D347, new line of code after line 5 — (12/14/88)

log_opened: *boolean*;   { has the transcript file been opened? }

Page D347, line 11 — (12/14/88)

job_name ← 0; *log_opened* ← *false*;

Page D348, line 4 from the bottom — (12/14/88)

log_name ← *a_make_name_string*(*log_file*); *selector* ← *log_only*; *log_opened* ← *true*;

Page D349, lines 6 and 7 — (12/14/88)

print error messages or even to *show_context*. The *prompt_file_name* routine can result in a *fatal_error*, but the *error* routine will not be invoked because *log_opened* will be false.

The normal idea of *batch_mode* is that nothing at all should be written on the terminal. However, in the unusual case that no log file could be opened, we make an exception and allow an explanatory message to be seen.

Page D349, lines 11–15 reduce to a single line — (12/14/88)

begin *selector* ← *term_only*;

Page D420, bottom line — (5/25/88)

   if *txx* **mod** *unity* = 0 **then**

Page D441, delete line 2 and change line 12 as follows — (5/25/88)

done: **if** *eq_type*(*x*) ≠ *tag_token* **then** *clear_symbol*(*x*, *false*);
  if *equiv*(*x*) = *null* **then** *new_root*(*x*);
  scan_declared_variable ← *h*;

Page D444, line 8 from the bottom — (12/14/88)

  if *log_opened* **then** *selector* ← *selector* + 2;

Page D510, line 14 — (12/14/88)

  if *log_opened* **then**

Page D511, line 11 — (12/14/88)

  if *log_opened* **then**

Page D530, new entry — (12/14/88)

Page D545, left column   (10/31/87)

zscaled primitive: 893.
Zabala Salelles, Ignacio Andres: 812.

Page E32, second-last line   (9/20/87)

after which comes '$math\_axis^{\#}$; **generate** `mathsy`' (which we won't bother to

---

Page E111, line 29   (10/16/88)

$lft\ x_{11} = \text{hround}\,u;\ \ x_{1l} - x_{11} = x_{2l} - x_{12} = x_{22} - x_{2r} = \text{hround}\,1.6cap\_jut;$

Page E285, bottom line   (12/1/87)

Due to Technical Developments (1968)

Page E333, lines 9–11   (1/9/89)

$lft\ x_{1l} = \text{hround}(2.5u - .5mfudged.stem);\ \ x_{1l} = x_{1'l} = x_{2l} = x_{2'l};$
$lft\ x_{3l} = \text{hround}(.5w - .5mfudged.stem);\ \ x_5 - x_3 = x_3 - x_1;$
if not *monospace*: $r := \text{hround}(x_5 + x_1) + r - w;$ **fi**   % change width for better fit

---

Page E353, lines 38–39   (8/12/87)

  else: **fill** $diag\_end(6r, 5r, 1, 1, 5l, 6l)$ -- $.9[z_{5l}, z_{6l}]$
    $..\{z_5 - z_6\}\,.1[z_{5r}, z_{6r}]$ -- cycle;   % middle stem

---

Page E387, line 13   (8/12/87)

  pickup $tiny.nib;\ \ bulb(3, 4, 5);$ % bulb

Page E413, lines 37–38   (8/12/87)

  else: **fill** $diag\_end(6r, 5r, 1, 1, 5l, 6l)$ -- $.9[z_{5l}, z_{6l}]$
    $..\{z_5 - z_6\}\,.1[z_{5r}, z_{6r}]$ -- cycle;   % middle stem

---

Page E459, line 24   (8/7/87)

[Delete the '=' sign between 'lft' and 'x_5'.]

Page E471, line 5   (12/11/88)

$x_2 = good.x\,.5w;\ \ center\_on(x_2);$

Page E471, insert two lines below the rule at bottom of page   (12/11/88)

def $center\_on(\textbf{expr}\ x) =$ **if** not *monospace*:   % change width for symmetric fit
  $r := r + 2x - w;\ \ w := 2x;$ **fi enddef**;

Page E477, line 20	(12/11/87)

$x_4 = x_8 = good.x .5w$; $center\_on(x_4)$; $x_2 = w - x_6 = good.x(x_4 + a)$;

Page E483, third line of elementary division operator	(12/11/88)

$x_3 - .5dot\_size = \text{hround}(.5w - .5dot\_size)$; $center\_on(x_3)$;

Page E485, line 4	(8/7/87)

[Delete the '=' sign between '*lft*' and 'x_5'.]

Page E487, line 17	(8/4/88)

fill *fullcircle* scaled $(bold + 3.8dw + eps)$ shifted $(.5[z_4, z_8])$;   % dot
[Also remove page 487 from the index entry for *dot_size*, and add it to the entries for *bold* and *dw*.]

Page E515, lines 5 and 12	(12/11/88)

$.5[x_1, x_2] = x_3 = good.x .5w$; $center\_on(x_3)$; *lft* $x_1 = \text{hround}(.5w - u * \text{sqrt48})$;

Page E515, line 21	(1/23/89)

labels$(5, 6)$; *zero_width*; **endchar**;
[Also put labels '5' and '6' on the upper right figure, page E514.]

Page E521, lines 4 and 14	(12/12/88)

$x_1 = x_2 = good.x .5w$; $center\_on(x_1)$; *lft* $x_3 = \text{hround}\, u$; $x_4 = w - x_3$;

Page E537, line 6	(12/11/88)

$x_1 = x_2 = x_3 = x_4$; $x_1 - .5stem = \text{hround}(.5w - .5stem)$; $center\_on(x_1)$;

Page E537, line 19	(12/11/88)

$x_1 = x_2 = x_3$; $x_1 - .5stem = \text{hround}(.5w - .5stem)$; $center\_on(x_1)$;

Page E539, line 4	(12/11/88)

$x_1 = x_4 = x_{30} = x_{33} = good.x .5w$; $center\_on(x_1)$;

Page E539, line 21	(12/11/88)

$x_1 = x_4 = good.x .5w$; $center\_on(x_1)$;

Page E541, line 4	(12/11/88)

$x_1 = x_5 = good.x .5w$; $center\_on(x_1)$;

Page E541, line 17 $\hspace{6cm}$ (12/11/88)

$x_1 = x_{10} = good.x.5w;\ \ center\_on(x_1);$

Page E550, new line after line 23 $\hspace{4cm}$ (8/15/87)

$\quad$ **forsuffixes** $\$ = notch\_cut, cap\_notch\_cut$: **if** $\$ < 3$: $\$:= 3$; **fi endfor**

[To make room for this, combine lines 38 and 39 into a single line.]

Page E550, line 29 $\hspace{6cm}$ (7/9/88)

$\quad$ **define_whole_vertical_blacker_pixels**$(vair, bar, slab, cap\_bar, cap\_band)$;

Page E572, new entry at bottom $\hspace{4cm}$ (12/11/88)

center_on, <u>471</u>, 477, 483, 515, 521, 537–541.

This is a list of all corrections made to *Computers & Typesetting*, Volumes A–E, between 20 February 1989 and 30 September 1989 (when TeX Version 3.0 and METAFONT Version 2.0 were fully defined). Corrections made to the softcover version of *The TeXbook* are the same as corrections to Volume A. Corrections to the softcover version of *The METAFONTbook* are the same as corrections to Volume C. Some of these corrections have already been made in reprintings of the books. Several minor changes to Volumes A and C are not shown here because they simply make room for the more substantive changes needed to describe the new features of TeX Version 3.0 and METAFONT Version 2.0. Hundreds of changes will soon be made to Volumes B and D because of the upgrades to TeX and METAFONT; it will unfortunately be impossible to document all of those changes. Therefore, readers who need up-to-date information on the TeX and METAFONT programs should refer to the WEB source files until new printings of Volumes B and D are issued.

Volume A, in general (9/23/89)

[Change '127' to '255' and '128' to '256' in contexts referring to character codes. This happens on pages 37(twice), 39, 41, 43, 44(twice), 48, 93, 154, 277, 305(twice), 308(twice), 313, and 343. Also change '7-bit' to '8-bit' on pages 214 and 277.]

Page A23, line 16 (9/23/89)

```
This is TeX, Version 3.0 (preloaded format=plain 89.7.15)
```

Page A34, new copy for bottom of page (9/23/89)

If you use TeX format packages designed by others, your error messages may involve many inscrutable two-line levels of macro context. By setting `\errorcontextlines=0` at the beginning of your file, you can reduce the amount of information that is reported; TeX will show only the top and bottom pairs of context lines together with up to `\errorcontextlines` additional two-line items. (If anything has thereby been omitted, you'll also see '...'.) Chances are good that you can spot the source of an error even when most of a large context has been suppressed; if not, you can say 'I\errorcontextlines=100\oops' and try again. (That will usually give you an undefined control sequence error and plenty of context.) Plain TeX sets `\errorcontextlines=5`.

Page A45, lines 9–15 (9/23/89)

`^^` has an internal code between 64 and 127, TeX subtracts 64 from the code; if the code is between 0 and 63, TeX adds 64. Hence code 127 can be typed `^^?`, and the dangerous bend sign can be obtained by saying `{\manual^^?}`. However, you must change the category code of character 127 before using it, since this character ordinarily has category 15 (invalid); say, e.g., `\catcode'\^^?=12`. The `^^` notation is different from `\char`, because `^^` combinations are like single characters; for example, it would not be permissible to say `\catcode'\char127`, but `^^` symbols can even be used as letters within control words.

Page A45, new copy before line 20   (9/23/89)

There's also a special convention in which `^^` is followed by *two* "lowercase hexadecimal digits," `0`–`9` or `a`–`f`. With this convention, all 256 characters are obtainable in a uniform way, from `^^00` to `^^ff`. Character 127 is `^^7f`.

[Also remove one of the two dangerous bend signs on line 20.]

Page A45, bottom paragraph and footnote   (9/23/89)

People who install TEX systems for use with non-American alphabets can make TEX conform to any desired standard. For example, suppose you have a Norwegian keyboard containing the letter æ, which comes in as code 241 (say). Your local format package should define `\catcode‘æ=11`; then you could have control sequences like `\særtrykk`. Your TEX input files could be made readable by American installations of TEX that don't have your keyboard, by substituting `^^f1` for character 241. (For example, the stated control sequence would appear as `\s^^f1rtrykk` in the file; your American friends should also be provided with the format that you used, with its `\catcode‘^^f1=11`.)   Of course you should also arrange your fonts so that TEX's character 241 will print as æ; and you should change TEX's hyphenation algorithm so that it will do correct Norwegian hyphenation. The main point is that such changes are not extremely difficult; nothing in the design of TEX limits it to the American alphabet. Fine printing is obtained by fine tuning to the language or languages being used.

European languages can also be accommodated effectively with only a limited character set. For example, let's consider Norwegian again, but suppose that

[Now continue with the text on line 11 of page 46.]

Page A47, lines 9–21   (9/23/89)

If TEX sees a superscript character (category 7) in any state, and if that character is followed by another identical character, and if those two equal characters are followed by a character of code $c < 128$, then they are deleted and 64 is added to or subtracted from the code c.   (Thus, `^^A` is replaced by a single character whose code is 1, etc., as explained earlier.)   However, if the two superscript characters are immediately followed by two of the lowercase hexadecimal digits `0123456789abcdef`, the four-character sequence is replaced by a single character having the specified hexadecimal code. The replacement is carried out also if such a trio or quartet of characters is encountered during steps (b) or (c) of the control-sequence-name scanning procedure described above. After the replacement is made, TEX begins again as if the new character had been present all the time. If a superscript character is not the first of such a trio or quartet, it is handled by the following rule.

If TEX sees a character of categories 1, 2, 3, 4, 6, 8, 11, 12, or 13, or a character of category 7 that is not the first of a special sequence as just described, it converts the character to a token by attaching the category code, and goes into state M. This is the normal case; almost every nonblank character is handled by this rule.

Page A48, line 15   (9/23/89)

the input line ' `$x^2$~  \TeX  ^^62^^6`'?

Page A54, third line from the bottom   (9/23/89)

For example, a well-designed TeX font for French might well treat accents as lig-

---

Page A76, lines 3–5 from the bottom   (9/23/89)

TeX does not assign any value to `\sfcode'042`.

Page A107, new copy for top of page   (9/23/89)

If you want to avoid overfull boxes at all costs without trying to fix them manu-ally, you might be tempted to set `tolerance=10000`; this allows arbitrarily bad lines to be acceptable in tough situations. But infinite tolerance is a bad idea, because TeX doesn't distinguish between terribly bad and preposterously horrible lines. Indeed, a tolerance of 10000 encourages TeX to concentrate all the badness in one place, making one truly unsightly line instead of two moderately bad ones, because a single "write-off" produces fewest total demerits according to the rules. There's a much better way to get the desired effect: TeX has a parameter called `\emergencystretch` that is added to the assumed stretchability of every line when badness and demerits are computed, in cases where overfull boxes are otherwise unavoidable. If `\emergencystretch` is posi-tive, TeX will make a third pass over a paragraph before choosing the line breaks, when the first passes did not find a way to satisfy the `\pretolerance` and `\tolerance`. The effect of `\emergencystretch` is to scale down the badnesses so that large infinities are distinguishable from smaller ones. By setting `\emergencystretch` high enough (based on `\hsize`) you can be sure that the `\tolerance` is never exceeded; hence overfull boxes will never occur unless the line-breaking task is truly impossible.

Page A116, lines 11–15   (6/7/89)

If you have two or more `\topinsert` or `\pageinsert` commands in quick suc-cession, TeX may need to carry them over to several subsequent pages; but they will retain their relative order when they are carried over. For example, suppose you have pages that are nine inches tall, and suppose you have already specified 4 inches of text for some page, say page 25. Then suppose you make seven topinserts in a row, of

---

Page A125, lines 13–29   (9/23/89)

When the best page break is finally chosen, TeX removes everything after the chosen breakpoint from the bottom of the "current page," and puts it all back at the top of the "recent contributions." The chosen breakpoint itself is placed at the very top of the recent contributions. If it is a penalty item, the value of the penalty is recorded in `\outputpenalty` and the penalty in the contribution list is changed to 10000; otherwise `\outputpenalty` is set to 10000. The insertions that remain on the current page are of three kinds: For each class n there are unsplit insertions, followed possibly by a single split insertion, followed possibly by others. If `\holdinginserts` > 0,

all insertions remain in place (so that they might be contributed again); otherwise they are all removed from the current page list as follows: The unsplit insertions are appended to \box *n*, with no interline glue between them. (Struts should be used, as in the \vfootnote macro of Appendix B.) If a split insertion is present, it is effectively \vsplit to the size that was computed previously in Step 4; the top part is treated as an unsplit insertion, and the remainder (if any) is converted to an insertion as if it had not been split. This remainder, followed by any other floating insertions of the same class, is held over in a separate place. (They will show up on the "current page" if \showlists is used while an \output routine is active; the total number of such insertions appears in \insertpenalties during an \output routine.) Finally, the remaining items before the best break on the current page are put together in a \vbox

---

Page A131, line 12   (9/22/89)

work fine; but sometimes you want to have uniformity between different members of a

---

Page A155, lines 3–5   (9/23/89)

when it encounters a character that is given explicitly as \char⟨number⟩.

Page A214, lines 19–24   (9/23/89)

  ▪ \the⟨special register⟩, where ⟨special register⟩ is one of the integer quantities \prevgraf, \deadcycles, \insertpenalties, \inputlineno, \badness, or \parshape (denoting only the number of lines of \parshape); or one of the dimensions \pagetotal, \pagegoal, \pagestretch, \pagefilstretch, \pagefillstretch, \pagefilllstretch, \pageshrink, \pagedepth. In horizontal modes you can also refer to a special integer, \the\spacefactor; in vertical modes there's a special dimension, \the\prevdepth.

Page A229, new copy after line 11   (9/23/89)

TeX will report the badness of glue setting in a box if you ask for the numeric quantity \badness after making a box. For example, you might say

```
\setbox0=\line{\trialtexta}
\ifnum\badness>250 \setbox0=\line{\trialtextb}\fi
```

The badness is between 0 and 10000 unless the box is overfull, when \badness=1000000.

Page A271, lines 17–20   (9/23/89)

    | ⟨countdef token⟩ | \count⟨8-bit number⟩ | ⟨codename⟩⟨8-bit number⟩
    | ⟨chardef token⟩ | ⟨mathchardef token⟩ | \parshape | \inputlineno
    | \hyphenchar⟨font⟩ | \skewchar⟨font⟩ | \badness

Page A272, lines 3–4   (9/23/89)

value is between 0 and $2^8 - 1 = 255$; a ⟨4-bit number⟩ is similar.

Page A273, insert after lines 11, 20, 21, 21, 38   (9/23/89)

     \holdinginserts   (positive if insertions remain dormant in output box)
     \language   (the current set of hyphenation rules)
     \lefthyphenmin   (smallest fragment at beginning of hyphenated word)
     \righthyphenmin   (smallest fragment at end of hyphenated word)
     \errorcontextlines   (maximum extra context shown when errors occur)

Page A274, insert after line 4   (9/23/89)

     \emergencystretch   (reduces badnesses on final pass of line-breaking)

Page A275, line 13   (9/23/89)

That makes a total of 103 parameters of all five kinds.

Page A283, line 14   (9/23/89)

     | \noboundary | \unhbox | \unhcopy | \valign | \vrule

Page A286, lines 3–12 from the bottom   (9/23/89)

    ■ ⟨letter⟩, ⟨otherchar⟩, \char⟨8-bit number⟩, ⟨chardef token⟩, \noboundary. The most common commands of all are the character commands that tell TEX to append a character to the current horizontal list, using the current font. If two or more commands of this type occur in succession, TEX processes them all as a unit, converting to ligatures and/or inserting kerns as directed by the font information. (Ligatures and kerns may be influenced by invisible "boundary" characters at the left and right, unless \noboundary appears.) Each character command adjusts \spacefactor, using the \sfcode table as described in Chapter 12. In unrestricted horizontal mode, a '\discretionary{}{}{}' item is appended after a character whose code is the \hyphenchar of its font, or after a ligature formed from a sequence that ends with such a character.

Page A287, insert after line 19   (9/23/89)

    ■ \setlanguage⟨number⟩. See the conclusion of Appendix H.

Page A289, lines 9–14 from the bottom   (9/23/89)

$2^{15} - 1$. This is done by replacing the character number by its \mathcode value. If the \mathcode value turns out to be $32768 = $ ″8000, however, the ⟨character⟩ is replaced by an active character token having the original character code (0 to 255); TEX forgets the original ⟨character⟩ and expands this active character according to the rules of Chapter 20.

Page A290, insert before 13th line from bottom (9/23/89)

■ \noboundary. This command is redundant and therefore has no effect; boundary ligatures are automatically disabled in math modes.

Page A296, line 16 from the bottom (9/22/89)

[There should be a '^' just above the '3' in the line below. This was mistakenly dropped by the printer some time during 1985; it was correct in the first two printings and it has always been correct inside the computer!]

Page A309, lines 3–5 (9/23/89)

8.4. $3 x_{11} ^7 2_{12} $3 ~_{13} ␣_{10} $\boxed{\text{TeX}}$ b_{12} v_{12} ␣_{10}. The final space comes from the ⟨return⟩ placed at the end of the line. Code ^^6 yields v only when not followed by 0–9 or a–f. The initial space is ignored, because state N governs the beginning of the line.

Page A314, line 27 (9/23/89)

The English word 'eighteen' might deserve similar treatment. TEX's hyphenation algorithm will not make such spelling changes automatically.

Page A318, line 19 (3/3/89)

```
\def\clearnotenumber{\notenumber=0\relax}
```

Page A330, line 3 (8/25/89)

20.10. \def\overpaid{{\count0=\balance

Page A336, lines 4–8 from the bottom (9/23/89)

badness rating of a box is at most 10000, except that the \badness of an overfull box is 1000000. INITEX initializes \tolerance to 10000, thereby making all line breaks feasible. Penalties of 10000 or more prohibit breaks; penalties of −10000 or less make breaks mandatory. The cost of a page break is 100000, if the badness is 10000 and if the associated penalties are less than 10000 in magnitude (see Chapter 15).

Page A337, lines 2–16 (9/23/89)

ifies characters whose codes differ by 64 from the codes of ?, @, A; this convention applies only to characters with ASCII codes less than 128. There are 256 possible characters, hence 256 entries in each of the \catcode, \mathcode, \lccode, \uccode, \sfcode, and \delcode tables. All \lccode, \uccode, and \char values must be less than 256. A font has at most 256 characters. There are 256 \box registers, 256 \count registers, 256 \dimen registers, 256 \skip registers, 256 \muskip registers, 256 \toks registers, 256 hyphenation tables. The "at size" of a font must be less than 2048 pt, i.e., 2^{11} pt. Math delimiters are encoded by multiplying the math code of the "small character" by 2^{12}. The magnitude of a ⟨dimen⟩ value must be less than 16384 pt, i.e., 2^{14} pt; similarly, the ⟨factor⟩ in a ⟨fil dimen⟩ must be less than 2^{14}. A \mathchar

or `\spacefactor` or `\sfcode` value must be less than 2^{15}; a `\mathcode` or `\mag` value must be less than or equal to 2^{15}, and 2^{15} denotes an "active" math character. There are 2^{16} sp per pt. A `\delcode` value must be less than 2^{24}; a `\delimiter`, less than 2^{27}. The `\end` command sometimes contributes a penalty of -2^{30} to the current page. A ⟨dimen⟩ must be less than 2^{30} sp in absolute value; a ⟨number⟩ must be less than 2^{31} in absolute value.

Page A348, line 12 from the bottom   (9/23/89)

```
\showboxbreadth=5 \showboxdepth=3 \errorcontextlines=5
```

Page A364, insert before line 18 from the bottom   (9/23/89)

```
\lefthyphenmin=2 \righthyphenmin=3 % disallow x- or -xx breaks
```

Page A364, line 5 from the bottom   (9/23/89)

```
\def\fmtname{plain}\def\fmtversion{3.0} % identifies the current format
```

Page A369, insert before line 5 from the bottom   (9/23/89)

Modern keyboards allow 256 codes to be input, not just 128; so TeX represents characters internally as numbers in the range 0–255 (i.e., ´000–´377, or ˝00–˝FF). Implementations of TeX differ in which characters they will accept in input files and which they will transmit to output files; these subsets can be specified independently. A completely permissive version of TeX allows full 256-character input and output; other versions might ignore all but the visible characters of ASCII; still other versions might distinguish the tab character (code ´011) from a space on input, but might output each tab as a sequence of three characters `^^I`.

Page A370, lines 3–7   (9/23/89)

close as possible to the ASCII conventions. (b) Make sure that codes ´041–´046, ´060–´071, ´141–´146, and ´160–´171 are present and that each unrepresentable internal code < ´200 leads to a representable code when ´100 is added or subtracted; then all 256 codes can be input and output. (c) Cooperate with everyone else who shares the same constraints, so that you all adopt the same policy. (See Appendix J for information about the TeX Users Group.)

Page A370, bottom line   (9/23/89)

doesn't matter if these symbols have their plain TeX meanings or not. (6) There is a special convention for representing characters 0–255 in the hexadecimal forms `^^00`–`^^ff`, explained in Chapter 8. This convention is always acceptable as input, when `^` is any character of catcode 7. Text output is produced with this convention only when representing characters of code ≥ 128 that a TeX installer has chosen not to output directly.

Page A385, line 8   (5/14/89)

```
\def\beginbox{\setbox0=\hbox\bgroup}
```

Page A400, line 18 from the bottom (9/23/89)

page prematurely if you want to pass a signal. (Set `\holdinginserts` positive to pass a signal when the contents of `\box255` will be sent back through the page builder again, if any insertions are present.)

Page A419, lines 4–6 (9/23/89)

shortened or lengthened anyway; book preparation with TeX, as with type, encourages interaction between humans and machines.) The lines of the quotations are set flush right by using `\obeylines` together with a stretchable `\leftskip`:

Page A444, lines 21–26 (9/23/89)

following one, using the specified family and the current size, then insert the ligature character and continue as specified by the font; two characters may collapse into one, or a new character may appear. Otherwise if the font information shows a kern between the current symbol and the next, insert a kern item after the current Ord atom and move to the next item after that. Otherwise (i.e., if no ligature or kern is specified between the present text symbol and the following character), go to Rule 17.

Page A453, lines 12–14 from the bottom (9/23/89)

Exception: The character '.' is treated as if it were a ⟨letter⟩ of code 0 when it appears in a pattern. Code 0 (which obviously cannot match a nonzero `\lccode`) is used by TeX to represent the left or right edge of a word when it is being hyphenated.

Page A454, lines 7–15 from the bottom (9/23/89)

If a trial word $l_1 \ldots l_n$ has been found by this process, hyphenation will still be abandoned unless $n \geq \lambda + \rho$, where $\lambda = \max(1, \verb|\lefthyphenmin|)$ and $\rho = \max(1, \verb|\righthyphenmin|)$. (Plain TeX takes $\lambda = 2$ and $\rho = 3$.) Furthermore, the items immediately following the trial word must consist of zero or more characters, ligatures, and implicit kerns, followed immediately by either glue or an explicit kern or a penalty item or a whatsit or an item of vertical mode material from `\mark`, `\insert`, or `\vadjust`. Thus, a box or rule or math formula or discretionary following too closely upon the trial word will inhibit hyphenation. (Since TeX inserts empty discretionaries after explicit hyphens, these rules imply that already-hyphenated compound words will not be further hyphenated by the algorithm.)

Page A455, new copy after line 13 (9/23/89)

So far we have assumed that TeX knows only one style of hyphenation at a time; but in fact TeX can remember up to 256 distinct sets of rules, if you have enough memory in your computer. An integer parameter called \language selects the rules actually used; every \hyphenation and \patterns specification appends new rules to those previously given for the current value of \language. (If \language is negative or greater than 255, TeX acts as if \language = 0.) All \patterns for all languages must be given before a paragraph is typeset, if INITEX is used for typesetting.

TeX is able to work with several languages in the same paragraph, because it operates as follows. At the beginning of a paragraph the "current language" is defined to be 0. Whenever a character is added to the current paragraph (i.e., in unrestricted horizontal mode), the current language is compared to \language; if they differ, the current language is reset and a whatsit node specifying the new current language is inserted before the character. Thus, if you say '\def\french{\language1...}' and 'mix {\french franc/ais} with English', TeX will put whatsits before the f and the w; hence it will use language 1 rules when hyphenating franc/ais, after which it will revert to language 0. You can insert the whatsit yourself (even in restricted horizontal mode) by saying \setlanguage⟨number⟩; this changes the current language but it does not change \language.

Page A459, right column (9/23/89)

*\badness, 214, *229*, 271.

Page A461, right column (9/23/89)

caron, *see* háček.

Page A464, line 10 (5/15/89)

displays, 87, 103, *139–145*, *166–167*,

Page A464, right column (9/23/89)

*\emergencystretch, <u>107</u>, 274.

Page A465, left column (9/23/89)

*\errorcontextlines, <u>34</u>, 273, *348*.

Page A466, entry for 'fractions' (9/23/89)

[Add page 332 to this entry.]

Page A466, entry for 'French" (9/23/89)

[Add page 455 to this entry.]

Page A467, entry for 'hexadecimal'   (9/23/89)

[Add pages 45, 47–48 to this entry.]

Page A467, right column   (9/23/89)

*\holdinginserts, <u>125</u>, 273, 400.

Page A467, bottom line   (9/23/89)

*\hyphenation, 277, *419*, <u>452</u>–<u>453</u>, 455.

Page A468, right column   (9/23/89)

infinite badness, 97, 107, 111, 229, 317.

Page A468, right column   (9/23/89)

*\inputlineno, 214, 271.

Page A469, entry for kerns   (9/23/89)

[Add pages 286 and 444 to this entry.]

Page A469, left column   (9/23/89)

*\language (hyphenation method), 273, <u>455</u>.

Page A469, right column   (9/23/89)

*\lefthyphenmin, 273, *364*, <u>454</u>.

Page A470, entry for ligatures   (9/23/89)

[Add pages 286 and 444 to this entry.]

Page A472, left column   (9/23/89)

*\noboundary, 283, <u>286</u>, 290.

Page A473, right column   (9/23/89)

overfull boxes, 27–30, 94, 229, 238,
    302–303, 307, 400.
  avoiding, 107.

Page A474, left column   (9/23/89)

*\patterns, 277, <u>453</u>, 455.

Page A476, left column   (9/23/89)

*\righthyphenmin, 273, *364*, <u>454</u>.

Page A476, right column (9/23/89)

       *\setlanguage, 287, <u>455</u>.

Page A476, right column (9/23/89)

       *\showboxbreadth, 273, <u>302</u>, 303, *348*.
       *\showboxdepth, 79, 273, <u>302</u>, 303, *348*.

Page A479, left column (9/23/89)

       *\tolerance, *29–30*, 91, 94, <u>96</u>, 107, 272,
          317, 333, 342, 348, 364, 451.

Page A481, right column, last six entries (9/23/89)

       $^1\!/_2$, 67, 332.
       1/2, in unslashed form, 141, 186.
       ⟨4-bit number⟩, <u>271</u>.
       ⟨8-bit number⟩, <u>271</u>, 276–278.
       ⟨15-bit number⟩, <u>271</u>, 277, 289, 291.
       ⟨27-bit number⟩, <u>271</u>, 289, 291.

Page A483, lines 15 and 21 (9/23/89)

[Delete these two lines, as TUG's address is no longer c/o AMS.]

Page Bvii, top two lines (4/21/89)

*WEB documentation for four utility programs that are often used in conjunction
with TₑX: POOLtype, TFtoPL, PLtoTF, and DVItype.*

Page B2, line 32 (6/20/89)

   define *banner* ≡ ´This␣is␣TeX,␣Version␣2.991´   { printed when TₑX starts }

Page B118, lines 2–4 (3/2/89)

   begin if *cur_level* > *level_one* **then**
     begin *check_full_save_stack*; *save_type*(*save_ptr*) ← *insert_token*;
     save_level(*save_ptr*) ← *level_zero*; *save_index*(*save_ptr*) ← *t*; *incr*(*save_ptr*);
     end;

Page B182, line 13 becomes two lines (6/20/89)

k, kk: *small_number*;   { number of digits in a decimal fraction }
p, q: *pointer*;   { top of decimal digit stack }

Page B182, line 15 from the bottom (6/20/89)

   begin *k* ← 0; *p* ← *null*; *get_token*;   { *point_token* is being re-scanned }

Page B182, line 11 from the bottom   (6/20/89)

> **begin** $q \leftarrow get\_avail$; $link(q) \leftarrow p$; $info(q) \leftarrow cur\_tok - zero\_token$; $p \leftarrow q$; $incr(k)$;

Page B182, line 8 from the bottom   (6/20/89)

$done1$: **for** $kk \leftarrow k$ **downto** 1 **do**
    begin $dig[kk-1] \leftarrow info(p)$; $q \leftarrow p$; $p \leftarrow link(p)$; $free\_avail(q)$;
    end;
  $f \leftarrow round\_decimals(k)$;

Page B332, lines 11 and 12 from the bottom   (4/8/89)

  begin if $cur\_align = null$ **then** $confusion(\text{´endv´})$;
  $q \leftarrow link(cur\_align)$; **if** $q = null$ **then** $confusion(\text{´endv´})$;

Page B466, line 5 becomes three lines   (6/7/89)

$mmode + halign$: **if** $privileged$ **then**
    if $cur\_group = math\_shift\_group$ **then** $init\_align$
    else off_save;

Page B518, line 25   (8/31/89)

  $undump(lo\_mem\_stat\_max + 1)(lo\_mem\_max)(rover)$; $p \leftarrow mem\_bot$; $q \leftarrow rover$;

Volume C, in general   (9/23/89)

[Change '127' to '255' and '128' to '256' in contexts referring to character codes. This happens on pages 188(thrice) and 251.]

Page C91, lines 12 and 13   (8/31/89)

```
\mode=cheapo; input newface
```

and the same file should also produce a high-resolution font if we start with

---

Page C204, line 4   (8/18/89)

so that *currenttransform* multiplies all y coordinates by *aspect_ratio*, when paths are

---

Page C212, lines 24–27   (9/30/89)

    boundarychar   the right boundary character for ligatures and kerns

All of these quantities are numeric. They are initially zero at the start of a job, except for *year*, *month*, *day*, and *time*, which are initialized to the time the run began; furthermore, *boundarychar* is initially -1. A *granularity* of zero is equivalent to *granularity* = 1. A preloaded base file like plain METAFONT will usually give nonzero values to several other internal quantities on this list.

Page C259, lines 16 and 17 from the bottom   (5/14/89)

```
screenchars; screenstrokes; imagerules; gfcorners; nodisplays;
notransforms; input ⟨filename⟩.
```

Page C282, the three lines following the chart   (9/30/89)

METAFONT can also be configured to accept any or all of the character codes
128–255. However, METAFONT programs that make use of anything in addition
to the 95 standard ASCII characters cannot be expected to run on other systems,
so the use of extended character sets is discouraged.

Page C316, bottom 14 lines and top 30 of page C317   (9/30/89)

Ligature information and kerning information is specified in short "ligtable
programs" of a particularly simple form. Here's an example that illustrates most of
the features (although it is not a serious example of typographic practice):

```
ligtable "f": "f" =: oct"013", "i" |=: oct"020", skipto 1;
ligtable "o": "b": "p": "e" kern .5u#, "o" kern .5u#, "x" kern-.5u#,
        1:: "!" kern u#;
```

This sequence of instructions can be paraphrased as follows:

> Dear TEX, when you're typesetting an 'f' with this font, and when the following
> character also belongs to this font, look at it closely because you might need
> to do something special: If that following character is another 'f', replace the
> two f's by character code `oct"013"` [namely 'ff']; if it's an 'i', retain the 'f'
> but replace the 'i' by character code `oct"020"` [a dotless 'ı']; otherwise skip
> down to label '1::' for further instructions. When you're typesetting an 'o'
> or 'b' or 'p', if the next input to TEX is 'e' or 'o', add a half unit of space
> between the letters; if it's an 'x', subtract a half unit; if it's an exclamation
> point, add a full unit. The last instruction applies also to exclamation points
> following 'f' (because of the label '1::').

When a character code appears in front of a colon, the colon "labels" the starting
place for that character's ligature and kerning program, which continues to the end of
the ligtable statement. A double colon denotes a "local label"; a `skipto` instruction
advances to the next matching local label, which must appear before 128 ligtable steps
intervene. The special label `||:` can be used to initiate ligtable instructions for an
invisible "left boundary character" that is implicitly present just before every word; an
invisible "right boundary character" equal to *boundarychar* is also implicitly present
just after every word, if *boundarychar* lies between 0 and 255.

The general syntax for ligtable programs is pretty easy to guess from these
examples, but we ought to exhibit it for completeness:

⟨ligtable command⟩ ⟶ `ligtable` ⟨ligtable program⟩⟨optional skip⟩
⟨ligtable program⟩ ⟶ ⟨ligtable step⟩ | ⟨ligtable program⟩ `,` ⟨ligtable step⟩
⟨optional skip⟩ ⟶ `,` `skipto` ⟨code⟩ | ⟨empty⟩

⟨ligtable step⟩ ⟶ ⟨code⟩⟨ligature op⟩⟨code⟩
    | ⟨code⟩ `kern` ⟨numeric expression⟩
    | ⟨label⟩⟨ligtable step⟩
⟨ligature op⟩ ⟶ `=:` | `|=:` | `|=:>` | `=:|` | `=:|>` | `|=:|` | `|=:|>` | `|=:|>>`
⟨label⟩ ⟶ ⟨code⟩ `:` | ⟨code⟩ `::` | `||:`
⟨code⟩ ⟶ ⟨numeric expression⟩ | ⟨string expression⟩

A ⟨code⟩ should have a numeric value between 0 and 255, inclusive, after having been rounded to the nearest integer; or it should be a string of length 1, in which case it denotes the corresponding ASCII code (Appendix C). For example, `"A"` and `64.61` both specify the code value 65. Vertical bars to the left or right of '`=:`' tell TeX to retain the original left and/or right character that invoked a ligature. Additional '`>`' signs tell TeX to advance its focus of attention instead of doing any further ligtable operations at the current character position.

Page C338, lines 21 and 22   (9/30/89)

and 127–255 have to be specified with the '`#`' option, on non-fancy installations of TeX, and so does code 35 (which is the ASCII code of '`#`' itself).

Page C346, left column, after line 14   (9/30/89)

    *`|=:`, *316*, <u>317</u>.
    *`|=:>`, <u>317</u>.
    *`=:|`, <u>317</u>.
    *`=:|>`, <u>317</u>.
    *`|=:|`, <u>317</u>.
    *`|=:|>`, <u>317</u>.
    *`|=:|>>`, <u>317</u>.

Page C346, left column, after line 31   (9/30/89)

    *`::` (local label), <u>317</u>.
    *`||:` (left boundary label), <u>317</u>.

Page C347, left column   (9/30/89)

    *`boundarychar`, 212, 317.

Page C352, left column   (9/30/89)

    [Change '⟨ligature replacement⟩' to '⟨ligature op⟩'.]

Page C354, left column   (9/30/89)

    ⟨optional skip⟩, 217.

Page C356, left column   (9/30/89)

    *`skipto`, *316*, <u>317</u>.

Page Dvi, bottom two lines, and top lines of page vii   (4/21/89)

■ "METAFONTware" by Donald E. Knuth, Tomas G. Rokicki, and Arthur L. Samuel, Stanford Computer Science Report 1255 (Stanford, California, April 1989), 207 pp.   *The* WEB *programs for four utility programs that are often used in conjunction with* METAFONT: GFtype, GFtoPK, GFtoDVI, *and* MFT.

Page D63, line 9   (8/31/89)

mem, so we allow pointers to assume any *halfword* value. The minimum memory index represents

---

Page D63, line 28   (8/31/89)

$$null = mem\_min < lo\_mem\_max < hi\_mem\_min < mem\_top \leq mem\_end \leq mem\_max.$$

Page D67, in the July 1987 printing   (4/7/89)

[Delete line 7, which has a redundant '**if** $r = p$ **then**'; move line 8 to the left 10 points for alignment; and restore the following line (which was deleted by mistake after line 8):
　$node\_size(p) \leftarrow q - p$ 　{ reset the size in case it grew }
These corrections are needed only in the reprinting made July, 1987.]

Page D228, in the July 1987 printing   (4/7/89)

[Delete lines 14–15, which were inserted erroneously from a previous errata list; and restore the following lines (which were deleted by mistake):
　begin $double(max\_coef)$; $double(x0)$; $double(x1)$; $double(x2)$;
　$double(y0)$; $double(y1)$; $double(y2)$;
　end
These corrections are needed only in the reprinting made July, 1987.]

Page D248, in the July 1987 printing   (4/7/89)

[Delete line 16, which begins with '$d \leftarrow take\_fraction$'; and restore the following line (which was deleted by mistake after line 22):
　if $d < alpha$ **then** $d \leftarrow alpha$
These corrections are needed only in the reprinting made July, 1987.]

Page D389, line 10   (6/20/89)

　$help1$(´The␣expression␣above␣should␣have␣been␣a␣number␣>=3/4.´);

Page D504, line 25   (8/31/89)

　$undump(lo\_mem\_stat\_max + 1)(lo\_mem\_max)(rover)$; $p \leftarrow mem\_min$; $q \leftarrow rover$;

Page D510, in the July 1987 printing   (4/7/89)

[Move the 7th-to-last line, which begins with '$internal[fontmaking]$', one line down, and indent it to the right by 10 more points. This correction is needed only in the reprinting made July, 1987.]

Page Exiii, bottom four lines	(5/5/89)

■ "Metamarks: Preliminary studies for a Pandora's Box of shapes" by Neenie Billawala, Stanford Computer Science Report 1256 (Stanford, California, May 1989), 132 pp. *Lavishly illustrated studies in parameter variation, leading to the design of a new family of typefaces called Pandora.*

Page E401, bottom line	(5/16/89)

math_fit$(-.3cap\_height\# * slant - .5u\#, ic\#);$
penlabels$(1, 2, 3, 4, 5, 6, 7, 8);$ **endchar**;

[some points and labels are missing at the tip of the tail on page 400]

This is a list of all corrections made to *Computers & Typesetting*, Volumes A, C, and E, between 30 September 1989 (when the revisions for TEX Version 3.0 and METAFONT Version 2.0 were made) and December 31, 1990. Corrections made to the softcover version of *The TEXbook* are the same as corrections to Volume A. Corrections to the softcover version of *The METAFONTbook* are the same as corrections to Volume C. Some of the corrections below have already been made in reprintings of the books. Hundreds of changes, too many to list here, have been made to Volumes B and D because of the upgrades to TEX and METAFONT. Readers who need up-to-date information on the TEX and METAFONT programs should refer to the `WEB` source files until new printings of Volumes B and D are issued.

Page A99, line 4 from the bottom   (2/22/90)

> to be chosen because there was no feasible way to keep total demerits small.

Page A124, lines 18–21   (9/5/90)

Floating insertions can be accommodated as a special case of split insertions, by making each floating topinsert start with a small penalty, and by having zero as the associated `\floatingpenalty`; non-floating insertions like footnotes are accommodated by associating larger penalties with split insertions (see Appendix B).

Page A137, lines 2 and 3 from the bottom   (11/9/90)

> *and you shouldn't even be reading this manual,*
> *which is undoubtedly all English to you.*

Page A141, line 15 from the bottom   (10/18/90)

Thus if you type '`$1\over2$`' (in a text) you get $\frac{1}{2}$, namely style S over style S';

Page A156, line 2   (11/18/89)

> Commands like `\mathchardef\alpha="010B` are used in Appendix B to define

Page A165, lines 2–3   (8/13/90)

> Type the formula $\bar{\mathbf{x}}^{\mathrm{T}}\mathbf{M}\mathbf{x} = 0 \iff \mathbf{x} = \mathbf{0}$, using as few keystrokes as possible.

(The first '0' is roman, the second is bold. The superscript 'T' is roman.)

Page A171, lines 24–26   (3/13/90)

formula produces a result exactly equivalent to '`\left(`⟨subformula⟩`\right)`', when the ⟨subformula⟩ doesn't end with Punct, except that the delimiters are forced to be of the `\big` size regardless of the height and depth of the subformula.

Page A193, lines 16–18 (12/2/89)

line if you insert '`\noalign{\break}`' after the `\cr` for that line. You can prohibit *all* breaks in an `\eqalignno` if you set `\interdisplaylinepenalty=10000`; or you can enclose the whole works in a `\vbox`:

Page A233, bottom 9 lines, and top three on next page (12/2/89)

The `\+` macro in Appendix B works by putting the ⟨text⟩ for each column that's followed by `&` into an hbox as follows:

`\hbox to ` ⟨column width⟩`{`⟨text⟩`\hss}`

The `\hss` means that the text is normally flush left, and that it can extend to the right of its box. Since `\hfill` is "more infinite" than `\hss` in its ability to stretch, it has the effect of right-justifying or centering as stated above. Note that `\hfill` doesn't shrink, but `\hss` does; if the text doesn't fit in its column, it will stick out at the right. You could cancel the shrinkability of `\hss` by adding `\hfilneg`; then an oversize text would produce an overfull box. You could also center some text by putting '`\hss`' before it and just '`&`' after it; in that case the text would be allowed to extend to the left and right of its column. The last column of a `\+` line (i.e., the column entry that is followed by `\cr`) is treated differently: The ⟨text⟩ is simply put into an hbox with its natural width.

Page A254, line 5 from the bottom (10/5/89)

`\vsize` hasn't changed, and if all insertions have been held in place, the same page break

---

Page A286, lines 30–32 (3/13/90)

reading and expanding this `par` token, TEX will see the ⟨vertical command⟩ token again. (The current meaning of the control sequence `\par` will be used; `par` might no longer stand for TEX's `\par` primitive.)

Page A290, lines 12–13 (3/24/90)

simply a single Ord atom without subscripts or superscripts, or an Acc whose nucleus is an Ord, the enclosing braces are effectively removed.

Page A317, line 17 (5/17/90)

`\pretolerance=9999 \tolerance=9999 \parindent=0pt`

Page A321, lines 16–17 (8/13/90)

18.6. $\bf\bar x^{\rm T}Mx={\rm0}\iff x=0$. (If you typed a space between `\rm` and `0`, you wasted a keystroke; but don't feel guilty about it.)

Page A340, nonblank line 11 (3/13/90)

`\topglue 1in % This makes an inch of blank space (1in=2.54cm).`

Page A342, line 6 (3/13/90)

\topglue but not \hglue. It does not illustrate \raggedright setting of para-

---

Page A346, lines 20–21 (12/3/89)

streams used by \read and \write, to math families used by \fam, to sets of hyphen-
ation rules used by \language, and to insertions (which require \box, \count, \dimen,
and \skip registers all having the same number).

Page A346, line 20 from the bottom (12/3/89)

manent value. These macros use registers \count10 through \count20 to hold the

---

Page A346, lines 8–13 from the bottom (12/3/89)

number was allocated. The inside story of how allocation is actually performed should
be irrelevant when the allocation macros are used at a higher level; you mustn't assume
that plain.tex really does allocation in any particular way.

```
\count10=22 % this counter allocates \count registers 23, 24, 25, ...
```

Page A347, lines 2–5 (12/3/89)

```
\count19=0  % this counter allocates language codes 1, 2, 3, ...
\count20=255 % this counter allocates insertions 254, 253, 252, ...
\countdef\insc@unt=20 % nickname for the insertion counter
\countdef\allocationnumber=21 % the most recent allocation
\countdef\m@ne=22 \m@ne=-1 % a handy constant
```

Page A347, new line after former line 17 (12/3/89)

```
\outer\def\newlanguage{\alloc@9\language\chardef\@cclvi}
```

Page A352, new line before line 6 from the bottom (3/13/90)

```
\def\topglue{\nointerlineskip \vglue-\topskip \vglue} % for top of page
```

Page A355, line 8 from the bottom (12/3/89)

```
  \noindent{\bf#1.\enspace}{\sl#2\par}%
```

Page A363, lines 8–9 from the bottom (12/8/89)

```
  \if@mid \dimen@=\ht0 \advance\dimen@ by\dp\z@ \advance\dimen@ by12\p@
    \advance\dimen@ by\pagetotal \advance\dimen@ by-\pageshrink
```

Page A375, line 27 (10/30/89)

depending on whether or not \t contains an asterisk. (Do you see why?) And here's

| Page A393, lines 3–5 from the bottom | (12/3/89) |

```
\hskip-.17em plus-3em minus.11em
\vadjust{}\penalty10000
\leaders\copy\dbox\hskip3.3\wd\dbox plus1fil minus.3\wd\dbox
```

| Page A444, line 4 | (3/13/90) |

Shift box x down by $\frac{1}{2}\bigl(h(x) - d(x)\bigr) - a$, where $a = \sigma_{22}$, so that the operator character

| Page A450, line 8 | (12/3/89) |

$_0h_0e_0n_5a_0t_0 \; _1n_0a_0 \; _0n_2a_0t_0 \; _1t_0i_0o_0 \; _2i_0o_0 \; _0o_2n_0$

| Page A450, line 14 | (12/3/89) |

$._0h_0y_3p_0h_0e_2n_5a_4t_2i_0o_2n_0.$

| Page A450, lines 19 and 20 | (12/3/89) |

$_0o_2n_0 \; _0o_0n_1c_0 \; _1c_0a_0 \; _1n_0a_0 \; _0n_2a_0t_0 \; _1t_0i_0o_0 \; _2i_0o_0 \; _0o_2n_0$

and this yields '$_0c_0o_2n_1c_0a_0t_0e_1n_2a_1t_2i_0o_2n_0$', i.e., '`con-cate-na-tion`'.

| Page A455, last lines before the quotes | (11/30/89) |

sit yourself (even in restricted horizontal mode) by saying `\setlanguage`⟨number⟩; this changes the current language but it does not change `\language`. Each whatsit records the current `\lefthyphenmin` and `\righthyphenmin`.

| Page A467, right column | (12/3/89) |

*`\hfilneg`, 72, 100, 233, 283, 285, 290, 397.

| Page A468, right column | (12/2/89) |

`\interdisplaylinepenalty`, *193*, 349, 362.

| Page A469, left column | (12/3/89) |

*`\language` (hyphenation method), 273, 346, <u>455</u>.

| Page A469, right column | (10/30/89) |

*`\lefthyphenmin`, 273, *364*, <u>454</u>, 455.

| Page A472, left column | (12/3/89) |

`\newlanguage`, 346, <u>347</u>.

| Page A476, left column | (10/30/89) |

*`\righthyphenmin`, 273, *364*, <u>454</u>, 455.

Page A479, new entry   (3/13/90)

> `\topglue`, *340*, 352.

Page A480, right column   (3/13/90)

> `\vglue`, 352, *408*.

Page A483, the Providence lines   (10/8/89)

[Change the first one to

```
Providence RI 02940\kern.05em-9506, USA.
```

Then the second one will be

> Providence RI 02940-9506, USA.

The second line will also appear on page C361.]

Page C11, replacement for second quotation at bottom of page   (9/27/90)

> *To anyone who has lived in a modern American city (except Boston)*
> *at least one of the underlying ideas of Descartes' analytic geometry*
> *will seem ridiculously evident. Yet, as remarked,*
> *it took mathematicians all of two thousand years*
> *to arrive at this simple thing.*
> — ERIC TEMPLE BELL, *Mathematics: Queen and Servant of Science* (1951)

Page C220, top line   (3/13/90)

modes you get into by hitting '`S`', '`R`', or '`Q`', respectively, in response to error messages

---

Page C252, line 16   (3/13/90)

```
      for i:=1 upto n_windows: display blankpicture inwindow i; endfor
```

Page C262, lines 19–21   (11/9/90)

for commonly occurring idioms. For example, '**stop `"hello"`**' displays '`hello`' on the
terminal and waits until ⟨return⟩ is typed.

```
def upto = step 1 until enddef;  def downto = step -1 until enddef;
```

Page C264, lines 4–6 from the bottom   (3/24/90)

```
vardef counterclockwise primary c =
 if turningcheck>0:
  interim autorounding:=0;
  if turningnumber c <= 0: reverse fi fi c enddef;
```

Page C306, line 6   (3/13/90)

```
ligtable "'": "'" =: oct"042",              % close quotes
```

Page C309, second line from bottom   (11/18/89)

```
 define_whole_vertical_blacker_pixels(vair,slab, ··· );
```

Page C315, line 9 from the bottom   (1/2/90)

units of printer's points):

Page C329, line 25   (12/29/90)

which can be used to specify a nonstandard file area or directory name for the gray

---

Page C337, line 4 from the bottom   (1/7/90)

```
\def\startfont{\font\testfont=\fontname \spaceskip=0pt
```

Page C347, left column   (9/27/90)

Bell, Eric Temple, 11.

Page C349, left column   (9/27/90)

Descartes, René, 6, 11, 19.

Page C356, right column   (9/27/90)

[remove the entry for Rex Stout.]

Page C358, right column   (9/27/90)

[remove the entry for Nero Wolfe.]

Page Exiii, replacement for last four lines   (4/30/90)

■ "AMS Euler—A new typeface for mathematics" by Donald E. Knuth and Hermann Zapf, *Scholarly Publishing* **21** (1989), 131–157. *The story of a design project that helps bridge the gulf between mathematics and art.*

■ "Meta-Marks: Preliminary studies for a Pandora's Box of shapes" by Neenie Billawala, Stanford Computer Science report 1259 (Stanford, California, July 1989), 132 pp. *Lavishly illustrated studies in parameter variation, leading to the design of a new typeface called Pandora.*

Page E325, line 13   (3/13/90)

if *serifs*: $x_{3r} = \max(x_{1r}, \mathrm{hround}(x_1 + .5dot\_diam - .2jut) - .5tiny)$
else: $x_3 = x_1 - .5$ **fi**;

Page E483, line 4   (3/13/90)

% Character codes $´000$–$´100$ and $´133$–$´177$ are generated.

Page E544, line 5   (3/13/90)

$\vdots$ (the rest of the program for 'γ' in `greekl` comes here)

Page E557, line 9   (3/13/90)

'*Nevermore—Ah nevermore.*'"

Page E558, line 21   (3/13/90)

`Clasp a rare and radiant maiden whom the angels name Lenore."`

Page E570, lines 27–28 look better with proper skewchars   (3/13/90)

Here's some bold 10-point math: $\hat{A}_0^\Gamma + \check{B}_1^\Delta - \tilde{C}_2^\Theta \times \acute{D}_3^\Lambda / \grave{E}_4^\Xi \oplus \dot{F}_5^\Pi \ominus \ddot{G}_6^\Sigma \otimes \breve{H}_7^\Phi \oslash \bar{I}_8^\Psi \odot \vec{J}_9^\Omega.$

This is a list of all corrections made to *Computers & Typesetting*, Volumes A, B, C, and D, between 1 January 1991 and 15 March 1992. Corrections made to the softcover version of *The TEXbook* are the same as corrections to Volume A. Corrections to the softcover version of *The METAFONTbook* are the same as corrections to Volume C. Some of the corrections below have already been made in reprintings of the books. Changes to Volume B refer to the fourth printing (1991), which differs markedly from earlier printings because it includes all the revisions for TEX 3.0. Changes to Volume D refer to the third printing (1991), which differs markedly from earlier printings because it includes all the revisions for METAFONT 2.0. Changes to the mini-indexes and master indexes of Volumes B and D are not shown here unless they are not obviously derivable from what has been shown. Dozens of changes, too many to list here, have been made to Volume E because of recent upgrades to the Computer Modern font source files. Those changes, which affect only the digitization at low resolution and the appearance of lowercase delta and some characters in the math symbols fonts (but not the `TFM` files), are documented at the end of file `cm85.bug`.

Page A96, lines 9–11 (9/18/91)

Some German words traditionally change their spelling when they are split between lines. For example, 'backen' becomes 'bak-ken' and 'Bettuch' becomes 'Bett-tuch'. How can you instruct TEX to produce such effects?

Page A178, line 17 (11/19/91)

If you say '`\phantom{`⟨subformula⟩`}`' in any formula, plain TEX will do its

---

Page A286, bottom two lines and continuing into A287 (11/21/91)

stands for zero or more ⟨assignment⟩ commands other than `\setbox`. If the assignments are not followed by a ⟨character⟩, where ⟨character⟩ stands for any of the commands just discussed in the previous paragraph, TEX treats `\accent` as if it were `\char`, except that the space factor is set to 1000. Otherwise the character that follows the assignment is accented by the character that corresponds to the ⟨8-bit number⟩. (The purpose of the intervening assignments is to allow the accenter and accentee to be in different fonts.) If the accent must be moved up or down, it is put into an hbox that is raised or lowered. Then the accent is effectively superposed on the character by means of kerns, in such a way that the width of the accent does not influence the width of the resulting horizontal list. Finally, TEX sets `\spacefactor=1000`.

Page A291, lines 6–8 (11/21/91)

'`}`' may be followed by optional ⟨assignment⟩ commands other than `\setbox`, after which '`$$`' must conclude the display. TEX will insert the `\abovedisplayskip` and `\belowdisplayskip` glue before and after the result of the alignment.

Page A293, line 14	(9/18/91)

explained in Appendix G. TEX scans ⟨one optional space⟩ after completing a displayed formula; this is usually the implicit space at the end of a line in the input file.

Page A311, bottom four lines	(9/18/91)

12.7. 1000, except: 999 after O, B, S, D, and J; 1250 after the comma; 3000 after the exclamation point, the right-quote marks, and the periods. If a period had come just after the B (i.e., if the text had said '`B. Sally`'), the space factor after that period would have been 1000, not 3000.

Page A314, lines 16–18 from the bottom	(1/10/92)

14.8. ba\ck/en and Be\ttt/uch, where the macros `\ck/` and `\ttt/` are defined by

```
\def\ck/{\discretionary{k-}{k}{ck}}
\def\ttt/{\tt\discretionary{-}{t}{}}
```

Page A354, line 8	(9/18/91)

`\def\multispan#1{\omit\mscount=#1\relax\loop\ifnum\mscount>1 \sp@n\repeat}`

Page A356, line 11 from the bottom	(9/23/91)

`\else{\ooalign{\unhbox0\crcr\hidewidth\char'30\hidewidth}}\fi}`

Page A358, line 8 from the bottom	(9/18/91)

`\mathchardef\mapstochar="3237 \def\mapsto{\mapstochar\rightarrow}`

Page A359, line 13	(11/4/91)

`\def\overrightarrow#1{\vbox{\m@th\ialign{##\crcr`

Page A359, line 16	(11/4/91)

`\def\overleftarrow#1{\vbox{\m@th\ialign{##\crcr`

Page A359, line 19	(11/4/91)

`\def\overbrace#1{\mathop{\vbox{\m@th\ialign{##\crcr\noalign{\kern3pt}`

Page A359, line 22	(11/4/91)

`\def\underbrace#1{\mathop{\vtop{\m@th\ialign{##\crcr`

Page A359, lines 7–14 from the bottom (1/11/92)

```
\def\lgroup{\delimiter"462833A }        \def\rgroup{\delimiter"562933B }
\def\lmoustache{\delimiter"437A340 }    \def\rmoustache{\delimiter"537B341 }
\def\uparrow{\delimiter"3222378 }       \def\Uparrow{\delimiter"322A37E }
\def\downarrow{\delimiter"3223379 }     \def\Downarrow{\delimiter"322B37F }
\def\updownarrow{\delimiter"326C33F }   \def\arrowvert{\delimiter"026A33C }
\def\Updownarrow{\delimiter"326D377 }   \def\Arrowvert{\delimiter"026B33D }
\def\vert{\delimiter"026A30C }          \def\Vert{\delimiter"026B30D }
\def\backslash{\delimiter"026E30F }     \def\bracevert{\delimiter"077C33E }
```

Page A360, line 13 (11/19/91)

\phantom, \smash, \root, and other operations. (Actually \phantom and \smash are not perfect: They assume that the current style is uncramped.)

Page A360, line 2 from the bottom (11/4/91)

```
\def\c@ncel#1#2{\m@th\ooalign{$\hfil#1\mkern1mu/\hfil$\crcr$#1#2$}}
```

Page A361, top line (11/4/91)

```
\def\rlh@#1{\vcenter{\m@th\hbox{\ooalign{\raise2pt
```

Page A364, line 5 from the bottom (11/4/91)

```
\def\fmtname{plain}\def\fmtversion{3.141}
```

Page A377, the bottom 17 lines (9/18/91)

story: Macro \stest decides whether or not a given token list register begins with a ⟨space token⟩ as defined in Chapter 24. If so, the macro decides whether the token is explicit and/or funny and/or active.

```
\newif\ifspace \newif\iffunny \newif\ifexplicit \newif\ifactive
\def\stest#1{\funnyfalse \expandafter\s\the#1! \stest}
\def\s{\global\explicitfalse \global\activefalse \futurelet\next\ss}
\def\ss{\ifcat\noexpand\next\stoken\let\nxt\sx\else\let\nxt\ns\fi\nxt}
\def\sx{\spacetrue\ifx\next\stoken\let\nxt\sss\else\let\nxt=\ssss\fi\nxt}
\long\def\sss#1 #2\stest{\def\next{#1}%
  \ifx\next\empty \global\explicittrue \else\testactive#1\s\fi}
\long\def\ssss#1#2\stest{\funnytrue{\escapechar=\if*#1'?\else'*\fi\relax
  \if#1\string#1\uccode'#1='~ % we assume that ~ is an active character
    \uppercase{\ifcat\noexpand#1}\noexpand~\global\activetrue
    \else\global\explicittrue\fi
  \else\testactive#1\s\fi}}
\long\def\ns#1\stest{\spacefalse}
\long\def\testactive#1#2\s{\expandafter\tact\string#1\s\tact}
\long\def\tact#1#2\tact{\def\next{#2}\ifx\next\xs\global\activetrue
  \else\ifx\next\empty \global\activetrue\fi\fi} \def\xs{\s}
```

Page A444, lines 15–26 (3/26/91)

14. If the current item is an Ord atom, go directly to Rule 17 unless all of the following are true: The nucleus is a symbol; the subscript and superscript are both empty; the very next item in the math list is an atom of type Ord, Op, Bin, Rel, Open, Close, or Punct; and the nucleus of the next item is a symbol whose family is the same as the family in the present Ord atom. In such cases the present symbol is marked as a text symbol. If the font information shows a ligature between this symbol and the following one, using the specified family and the current size, then insert the ligature character and continue as specified by the font; in this process, two characters may collapse into a single Ord text symbol, and/or new Ord text characters may appear. If the font information shows a kern between the current symbol and the next, insert a kern item following the current atom. As soon as an Ord atom has been fully processed for ligatures and kerns, go to Rule 17.

Page A446, lines 5 and 6 from the bottom (1/13/92)

are used to change the current style just as in the first pass, so that both passes have the same value of C when they work on any particular atom.

Page A447, in the parameter usage table (1/13/92)

[Delete the entry for 'σ_2'; the entry for 'σ_{17}' moves down to the bottom of the left column.]

Page A447, line 2 after the parameter usage table (1/13/92)

to parameters in arbitrary families: Rule 17 uses `\fontdimen` parameter 2 (space) to de-

---

Page A467, entry for `\hss` (9/18/91)

    *\hss, 71–72, *82–83*, 233, 283, 285, 290, 442.

Page A467, new subentry under hyphenation (9/18/91)

    suppressing, 93, 414, 424, 454.

Page A476, right column (11/21/91)

    *\setbox, 66–67, 77, 81, <u>120</u>, 276, 279, 286,
      291, *386–392*.

Page B2, line 10 from the bottom (1/11/92)

  define *banner* ≡ ´This␣is␣TeX,␣Version␣3.141´   { printed when TeX starts }

Page B18, lines 21 and 22 (10/12/91)

must have an *xchr* equivalent in the local character set. (This restriction applies only to preloaded strings, not to those generated dynamically by the user.)

Page B26, new line before fourth line from bottom   (1/24/92)

    nl: *integer*;   { new-line character to restore }

Page B26, bottom line and top 3 lines of B27   (1/24/92)

    else begin if *selector* > *pseudo* **then**
       begin *print_char*(s); **return**;   { internal strings are not expanded }
       end;
     if (⟨ Character s is the current new-line character 244 ⟩) **then**
      if *selector* < *pseudo* **then**
       begin *print_ln*; **return**; **end**;
     $nl \leftarrow$ *new_line_char*; *new_line_char* $\leftarrow -1$;   { temporarily disable new-line character }
     $j \leftarrow$ *str_start*[s];
     while $j <$ *str_start*[$s + 1$] **do**
      begin *print_char*(*so*(*str_pool*[j])); *incr*(j); **end**;
     new_line_char $\leftarrow nl$; **return**;
     end;

Page B27, lines 9 and 10   (9/19/91)

60.   Control sequence names, file names, and strings constructed with \string might contain *ASCII_code* values that can't be printed using *print_char*. Therefore we use *slow_print* for them:

Page B27, lines 13–26   (1/24/92)

  var j: *pool_pointer*;   { current character code position }
  begin if ($s \geq$ *str_ptr*) ∨ ($s < 256$) **then** *print*(s)
  else begin $j \leftarrow$ *str_start*[s];
    while $j <$ *str_start*[$s + 1$] **do**
     begin *print*(*so*(*str_pool*[j])); *incr*(j);
     end;
    end;
  end;

Page B28, line 8   (9/19/91)

  else begin *slow_print*(*format_ident*); *print_ln*;

Page B33, line 3   (1/11/92)

recursively. A similar interlock is provided by *set_box_allowed*.

Page B33, new line to come after line 14   (1/11/92)

set_box_allowed: *boolean*;   { is it safe to do a \setbox assignment? }

Page B33, new line to come after line 20   (1/11/92)

  set_box_allowed $\leftarrow$ *true*;

Page B36, line 12 (9/19/91)

> **begin** *print_nl*("You␣want␣to␣edit␣file␣"); *slow_print*(*input_stack*[*base_ptr*].*name_field*);

Page B46, lines 9 and 10 (5/24/91)

arithmetic; see *TUGboat* **3**,1 (March 1982), 10–27. (But the routines cited there must be modified to allow negative glue ratios.)

Page B47, lines 2 and 3 (5/24/91)

structures on a *memory_word*, which contains either a (signed) integer, possibly scaled, or a (signed) *glue_ratio*, or a small number of fields that are one half or one quarter of the size used

---

Page B177, lines 10 and 11 (9/19/91)

> **begin** *print_err*("Bad␣mathchar");
> *help2*("A␣mathchar␣number␣must␣be␣between␣0␣and␣32767.")

Page B196, new lines after line 11 (1/13/92)

> **if** *align_state* < 1000000 **then**   { unmatched '}' aborts the line }
>   **begin repeat** *get_token*; **until** *cur_tok* = 0;
>   *align_state* ← 1000000; **goto** *done*;
>   **end**;

Page B208, line 21 (9/19/91)

> **begin** *slow_print*(*a*); *slow_print*(*n*); *slow_print*(*e*);

Page B214, line 14 (9/19/91)

> **begin** *wlog*(*banner*); *slow_print*(*format_ident*); *print*("␣␣"); *print_int*(*day*); *print_char*("␣");

Page B214, line 2 from the bottom (9/19/91)

> *print_char*("("); *incr*(*open_parens*); *slow_print*(*name*); *update_terminal*; *state* ← *new_line*;

Page B234, line 22 (9/19/91)

> *print*("␣in␣font␣"); *slow_print*(*font_name*[*f*]); *print_char*("!"); *end_diagnostic*(*false*);

Page B267, lines 7 and 8 (9/19/91)

> *print_nl*("Output␣written␣on␣"); *slow_print*(*output_file_name*);
> *print*("␣("); *print_int*(*total_pages*); *print*("␣page");

Page B296, new lines after line 8 of section 716 (1/11/92)

> **if** *f* < 0 **then**
>   **begin** *decr*(*n*); *f* ← *f* + *'200000*;
>   **end**;

Page B297, new lines after line 7 of section 717 (1/11/92)

    if $f < 0$ **then**
      begin $decr(n)$; $f \leftarrow f + \text{'}200000$;
      end;

Page B348, bottom two lines (1/3/92)

    Up to three passes might be made through the paragraph in an attempt to find at least one set of feasible breakpoints. On the first pass, we have $threshold = pretolerance$ and $second\_pass =$

Page B364, line 20 (1/3/92)

863.   The '**loop**' in the following code is performed at most thrice per call of $line\_break$, since

---

Page B377, insert new line after line 12 (9/19/91)

hyf_bchar: $halfword$;   { boundary character after c_n }

Page B378, line 12 from the bottom (9/19/91)

    $hyf\_bchar \leftarrow character(s)$; $c \leftarrow qo(hyf\_bchar)$;

Page B378, line 9 from the bottom (1/10/92)

    $hb \leftarrow s$; $incr(hn)$; $hu[hn] \leftarrow c$; $hc[hn] \leftarrow lc\_code(c)$; $hyf\_bchar \leftarrow non\_char$;

Page B378, line 5 from the bottom (9/19/91)

    else if $(type(s) = kern\_node) \wedge (subtype(s) = normal)$ **then** $hb \leftarrow s$
      else goto $done3$;

Page B379, line 6 (9/19/91)

  $j \leftarrow hn$; $q \leftarrow lig\_ptr(s)$; **if** $q > null$ **then** $hyf\_bchar \leftarrow character(q)$;

Page B379, new line between lines 14 and 15 (1/10/92)

  if $odd(subtype(s))$ **then** $hyf\_bchar \leftarrow font\_bchar[hf]$ **else** $hyf\_bchar \leftarrow non\_char$;

Page B379, line 19 (9/19/91)

  if $hn < l\_hyf + r\_hyf$ **then goto** $done1$;   { l_hyf and r_hyf are always ≥ 1 }

Page B380, lines 9–11 from the bottom reduce to a single line (1/10/92)

  $q \leftarrow link(hb)$; $link(hb) \leftarrow null$; $r \leftarrow link(ha)$; $link(ha) \leftarrow null$; $bchar \leftarrow hyf\_bchar$;

Page B436, lines 9 and 10 (3/15/92)

$$cur\_r = \begin{cases} character(lig\_stack), & \text{if } lig\_stack > null; \\ font\_bchar[cur\_font], & \text{otherwise;} \end{cases}$$

except when $character(lig\_stack) = font\_false\_bchar[cur\_font]$. Several additional global variables are needed.

Page B438, line 13 from the bottom (3/15/92)

$cur\_q \leftarrow tail$; $cur\_l \leftarrow character(lig\_stack)$;

Page B507, line 6 of section 1241 (1/11/92)

$scan\_optional\_equals$;
if $set\_box\_allowed$ **then** $scan\_box(box\_flag + n)$
else begin $print\_err($"Improper␣"$)$; $print\_esc($"setbox"$)$;
$help2($"Sorry,␣\setbox␣is␣not␣allowed␣after␣\halign␣in␣a␣display,"$)$
$($"or␣between␣\accent␣and␣an␣accented␣character."$)$; $error$;
end;

Page B511, new line inserted after line 3 (1/24/92)

$flushable\_string$: str_number;   { string not yet referenced }

Page B512, new line inserted after line 3 of section 1260 (1/24/92)

$flushable\_string \leftarrow str\_ptr - 1$;

Page B512, the former line 6 of section 1260 (1/24/92)

begin if $cur\_name = flushable\_string$ **then**
   begin $flush\_string$; $cur\_name \leftarrow font\_name[f]$; **end**;
if $s > 0$ **then**

Page B512, line 10 from the bottom (9/19/91)

set_font: **begin** $print($"select␣font␣"$)$; $slow\_print(font\_name[chr\_code])$;

Page B514, line 9 (1/11/92)

$set\_box\_allowed \leftarrow false$; $prefixed\_command$; $set\_box\_allowed \leftarrow true$;

Page B515, line 19 (9/19/91)

$slow\_print(s)$; $update\_terminal$;

Page B516, line 2 (9/19/91)

begin $print\_err($""$)$; $slow\_print(s)$;

Page B531, lines 19 and 20　　　　　　　　　　　　　　　　　　(9/19/91)

print_nl("Beginning␣to␣dump␣on␣file␣");　*slow_print*(*w_make_name_string*(*fmt_file*));　*flush_string*;
print_nl("");　*slow_print*(*format_ident*)

Page B533, line 29　　　　　　　　　　　　　　　　　　　　　　(9/19/91)

　　begin *print_nl*("Transcript␣written␣on␣");　*slow_print*(*log_name*);　*print_char*(".");

Page B538, line 13　　　　　　　　　　　　　　　　　　　　　　(9/19/91)

10: *slow_print*(*n*);

Page B577, left column　　　　　　　　　　　　　　　　　　　(12/23/91)

[Add 798 to the index entries for 'system dependencies'.]

Page C262, line 15　　　　　　　　　　　　　　　　　　　　　　(3/26/91)

string base_name, base_version; base_name="plain"; base_version="2.7";

Page C271, line 17 from the bottom　　　　　　　　　　　　　(3/26/91)

　currentpen_path shifted (z.t_) withpen penspeck enddef;

Page C347, Bront"e entry　　　　　　　　　　　　　　　　　　(1/29/91)

[The accent was clobbered; her name should, of course, be Brontë. Fix the entries for Dürer,
Möbius, and Stravinsky in the same way.]

Page C348, left column　　　　　　　　　　　　　　　　　　　(1/11/92)

Page C353, right column　　　　　　　　　　　　　　　　　　(1/11/92)

Page C354, miscellaneous entries in both columns　　　　　(1/11/92)

Page C356, right column　　　　　　　　　　　　　　　　　　(1/11/92)

Page C357, right column　　　　　　　　　　　　　　　　　　(1/11/92)

Page D2, last line of section 2   (1/24/92)

define *banner* ≡ ´This␣is␣METAFONT,␣Version␣2.71´   { printed when METAFONT starts }

Page D102, line 15 from the bottom   (11/1/91)

Then *eq_type*(*h*(*x*)) = *tag_token* and *equiv*(*h*(*x*)) = *p*, where *p* is a two-word value node with

---

Page D188, lines 16 and 17   (1/24/92)

errors. Our subroutines also obey the identity $t[a, b] + t[b, a] = a + b$.

Page D190, new copy before bottom four lines   (1/24/92)

if *x_coord*(*r*) < *x_coord*(*pp*) **then** *x_coord*(*r*) ← *x_coord*(*pp*)
else if *x_coord*(*r*) > *dest_x* **then** *x_coord*(*r*) ← *dest_x*;
if *left_x*(*r*) > *x_coord*(*r*) **then**
  begin *left_x*(*r*) ← *x_coord*(*r*); **if** *right_x*(*pp*) > *x_coord*(*r*) **then** *right_x*(*pp*) ← *x_coord*(*r*); **end**;
if *right_x*(*r*) < *x_coord*(*r*) **then**
  begin *right_x*(*r*) ← *x_coord*(*r*); **if** *left_x*(*qq*) < *x_coord*(*r*) **then** *left_x*(*qq*) ← *x_coord*(*r*); **end**;

Page D191, new copy before bottom two lines of section 416   (1/24/92)

if *x_coord*(*s*) < *x_coord*(*r*) **then** *x_coord*(*s*) ← *x_coord*(*r*)
else if *x_coord*(*s*) > *dest_x* **then** *x_coord*(*s*) ← *dest_x*;
if *left_x*(*s*) > *x_coord*(*s*) **then**
  begin *left_x*(*s*) ← *x_coord*(*s*); **if** *right_x*(*r*) > *x_coord*(*s*) **then** *right_x*(*r*) ← *x_coord*(*s*); **end**;
if *right_x*(*s*) < *x_coord*(*s*) **then**
  begin *right_x*(*s*) ← *x_coord*(*s*); **if** *left_x*(*qq*) < *x_coord*(*s*) **then** *left_x*(*qq*) ← *x_coord*(*s*); **end**;

Page D194, lines 4 and 5   (1/24/92)

[Delete those two lines; I no longer believe that the assertion has been proved (although it might
be true).]

Page D194, lines 7–13 of section 424   (1/24/92)

if *y_coord*(*r*) < *y_coord*(*p*) **then** *y_coord*(*r*) ← *y_coord*(*p*)
else if *y_coord*(*r*) > *dest_y* **then** *y_coord*(*r*) ← *dest_y*;
if *x_coord*(*p*) + *y_coord*(*r*) > *dest_x* + *dest_y* **then** *y_coord*(*r*) ← *dest_x* + *dest_y* − *x_coord*(*p*);
if *left_y*(*r*) > *y_coord*(*r*) **then**
  begin *left_y*(*r*) ← *y_coord*(*r*); **if** *right_y*(*p*) > *y_coord*(*r*) **then** *right_y*(*p*) ← *y_coord*(*r*); **end**;
if *right_y*(*r*) < *y_coord*(*r*) **then**
  begin *right_y*(*r*) ← *y_coord*(*r*); **if** *left_y*(*q*) < *y_coord*(*r*) **then** *left_y*(*q*) ← *y_coord*(*r*); **end**;

Page D194, lines 8–11 from the bottom   (1/24/92)

if *right_y*(*r*) < *y_coord*(*r*) **then**
  begin *right_y*(*r*) ← *y_coord*(*r*); **if** *left_y*(*q*) < *y_coord*(*r*) **then** *left_y*(*q*) ← *y_coord*(*r*); **end**;

Page D195, lines 3–9 of section 425 (1/24/92)

if $y\_coord(s) < y\_coord(r)$ **then** $y\_coord(s) \leftarrow y\_coord(r)$
else if $y\_coord(s) > dest\_y$ **then** $y\_coord(s) \leftarrow dest\_y$;
if $x\_coord(r) + y\_coord(s) > dest\_x + dest\_y$ **then** $y\_coord(s) \leftarrow dest\_x + dest\_y - x\_coord(r)$;
if $left\_y(s) > y\_coord(s)$ **then**
    begin $left\_y(s) \leftarrow y\_coord(s)$; **if** $right\_y(r) > y\_coord(s)$ **then** $right\_y(r) \leftarrow y\_coord(s)$; **end**;
if $right\_y(s) < y\_coord(s)$ **then**
    begin $right\_y(s) \leftarrow y\_coord(s)$; **if** $left\_y(q) < y\_coord(s)$ **then** $left\_y(q) \leftarrow y\_coord(s)$; **end**;

Page D195, lines 3–7 from the bottom if section 425 (1/24/92)

if $right\_y(s) < y\_coord(s)$ **then**
    begin $right\_y(s) \leftarrow y\_coord(s)$; **if** $left\_y(q) < y\_coord(s)$ **then** $left\_y(q) \leftarrow y\_coord(s)$; **end**;

Page D289, lines 9 and 10 (11/1/91)

$p \leftarrow dep\_list(p)$; $r \leftarrow inf\_val$;
repeat if $value(info(p)) \geq value(r)$ **then**

Page D486, line 18 (11/1/91)

The *label_loc* and *label_char* arrays have been set up to record all the starting addresses; we have

This is a list of all corrections made to *Computers & Typesetting* between 15 March 1992 and the publication of the final printed versions of those books. Corrections made to the softcover version of *The TEXbook* are the same as corrections to Volume A. Corrections to the softcover version of *The METAFONTbook* are the same as corrections to Volume C. Changes to Volume B refer to the fourth printing (1991), which differs markedly from earlier printings because it includes all the revisions for TEX3.0. Changes to Volume D refer to the third printing (1991), which differs markedly from earlier printings because it includes all the revisions for METAFONT2.0. Changes to the mini-indexes and master indexes of Volumes B and D are not shown here unless they are not obviously derivable from what has been shown.

Page A23, line 14	(9/1/92)

a command and you type '`tex`' or '`run tex`' or something like that.)

Page A53, line 23	(7/7/92)

scientiarum imperialis petropolitanæ became *Akademiiâ Nauk SSSR, Doklady.*

Page A146, line 2 from the bottom	(2/25/93)

    `$\bigl| |x|-|y| \bigr|$` $\bigl| |x| - |y| \bigr|$

Page A149, lines 3–5	(2/25/93)

example, we used `\bigl` and `\bigr` to produce $\bigl| |x| - |y| \bigr|$ in one of the previous illustrations; `\left` and `\right` don't make things any bigger than necessary, so '`$\left|\left|x\right|-\left|y\right|\right|$`' yields only '$||x| - |y||$'.

Page A158, line 18 from the bottom	(2/25/93)

    are four possibilities for each of these fields. A field can be

Page A282, line 9 from the bottom	(7/8/92)

category 4) are intercepted by the alignment process, en route to TEX's stomach, so

Page A293, new paragraph after line 15	(4/9/92)

    ■ `\unhbox`⟨8-bit number⟩, `\unhcopy`⟨8-bit number⟩. The specified box register must be void. Nothing happens.

Page A309, line 23	(7/7/92)

`petropolitan\ae\/} became {\sl Akademi\t\i a Nauk SSSR, Doklady}.`

Page A320, line 11	(1/26/93)

17.12. `$\bigl(x+f(x)\bigr) \big/ \bigl(x-f(x)\bigr)$`.   Notice especially the

Page A349, second line from the bottom   (7/8/92)

expand to a ⟨number⟩ en route to TeX's "stomach"; `\multiply` wouldn't work, because

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Page A358, bottom line   (2/3/93)

it is easy to define `\ldots` and `\cdots` macros that give the proper spacing in most

---

Page A370, lines 28 and 29   (9/1/92)

example, if TeX is implemented for a purely Cyrillic keyboard, the letter 'п' should be
assigned to code ´160 and 'т' to code ´164, so that 'пт' still means 'pt'; or else control

---

Page A377, lines 17–24   (5/4/92)

```
\def\sanswitch{\let\n@xt\endsanity \ifx\next\endsanity
  \else\ifcat\noexpand\next\stoken\aftergroup\space\let\n@xt=\eat
   \else\ifcat\noexpand\next\bgroup\aftergroup{\let\n@xt=\eat
    \else\ifcat\noexpand\next\egroup\aftergroup}\let\n@xt=\eat
     \else\let\n@xt=\copytok\fi\fi\fi\fi \n@xt}
\def\eat{\afterassignment\sanitize \let\next= }
\long\def\copytok#1{\ifcat\noexpand#1\relax\aftergroup\noexpand\fi
   \ifcat\noexpand#1\noexpand~\aftergroup\noexpand\fi
```

Page A455, line 25   (2/26/93)

rent language" is set equal to `\language`. Whenever a character is added to the cur-

---

Page A459, second line of entry for ampersand   (3/22/92)

Page A461, right column   (2/19/93)

Page A467, left column   (2/25/93)

Page A470, left column   (2/25/93)

Page A471, left column   (2/19/93)

Page A474, right column   (3/22/92)

 pound sterling, 54, *339*, 428.

Page A477, right column   (3/22/92)

 sterling, 54, *339*, 428.

Page A480, left column   (4/9/92)

 *\unhbox, 120, 283, <u>285</u>, 293, *354*, *356*, *399*.
 *\unhcopy, 120, 283, <u>285</u>, 293, *353*.

Page A481, left column   (2/25/93)

 whatsits, 95, 110, 157, 226–229, 455.

Page A483, lines 15–21   (2/25/93)

```
P.O. Box 869
Santa Barbara, CA 93102-0869 USA.
}
```
Don't delay, write today! That number again is

 TEX Users Group
 P.O. Box 869
 Santa Barbara, CA 93102-0869 USA.

Page B2, line 10 from the bottom   (2/27/93)

 define *banner* ≡ ´This␣is␣TeX,␣Version␣3.1415´   { printed when TEX starts }

Page B89, line 12   (2/27/93)

 In horizontal mode, the *prev_graf* field is used for initial language data.

Page B89, line 20   (2/27/93)

 pg_field, *ml_field*: *integer*; *aux_field*: *memory_word*;
[Also delete the definitions of *lhmin* and *rhmin*, lines 32 and 33.]

Page B90, line 13   (2/27/93)

prev_depth ← *ignore_depth*; *mode_line* ← 0; *prev_graf* ← 0;

Page B91, top three lines   (2/27/93)

 if $m = hmode$ **then if** $nest[p].pg\_field \neq$ ´*40600000* **then**
  begin *print*("␣(language"); *print_int*(*nest*[*p*].*pg_field* **mod** ´*200000*);
  print(":hyphenmin"); *print_int*(*nest*[*p*].*pg_field* **div** ´*20000000*); *print_char*(",");
  print_int((*nest*[*p*].*pg_field* **div** ´*200000*) **mod** ´*100*); *print_char*(")");

Page B344, lines 21 and 22 (2/27/93)

This code assumes that a *glue_node* and a *penalty_node* occupy the same number of *mem* words.

Page B344, line 30 (2/27/93)

$link(tail) \leftarrow new\_param\_glue(par\_fill\_skip\_code);\ init\_cur\_lang \leftarrow prev\_graf\ \textbf{mod}\ '200000;$
$init\_l\_hyf \leftarrow prev\_graf\ \textbf{div}\ '20000000;\ init\_r\_hyf \leftarrow (prev\_graf\ \textbf{div}\ '200000)\ \textbf{mod}\ '100;\ pop\_nest;$

Page B353, line 4 (2/27/93)

Kern nodes do not disappear at a line break unless they are *explicit*.

Page B353, lines 15 and 16 (2/27/93)

$math\_node$: $break\_width[1] \leftarrow break\_width[1] - width(s);$
$kern\_node$: **if** $subtype(s) \neq explicit$ **then goto** *done*
    else $break\_width[1] \leftarrow break\_width[1] - width(s);$

Page B354, lines 6 and 7 (2/27/93)

will be the background plus l_1, so the length from *cur_p* to *cur_p* should be $\gamma + l_0 + l_1 - l$. If the post-break text of the discretionary is empty, a break may also discard q; in that unusual case we subtract the length of q and any other nodes that will be discarded after the discretionary break.

Page B354, line 18 (2/27/93)

begin ⟨ Add the width of node s to *break_width* 842 ⟩;

Page B354, line 22 (2/27/93)

if $post\_break(cur\_p) = null$ **then** $s \leftarrow link(v);$ { nodes may be discardable after the break }

Page B355, top line (2/27/93)

842.   ⟨ Add the width of node s to *break_width* 842 ⟩ ≡

Page B355, lines 9–14 (2/27/93)

$hlist\_node, vlist\_node, rule\_node, kern\_node$: $break\_width[1] \leftarrow break\_width[1] + width(s);$
othercases $confusion($ `"disc2"` $)$
endcases

Page B364, line 10 (2/27/93)

a glue node, penalty node, explicit kern node, or math node.

Page B366, line 11 from the bottom (2/27/93)

$kern\_node$: **if** $subtype(cur\_p) = explicit$ **then** $kern\_break$
    else $act\_width \leftarrow act\_width + width(cur\_p);$

Page B367, line 21   (2/27/93)

> **else if** *precedes_break*(*prev_p*) **then** *try_break*(0, *unhyphenated*)
> **else if** (*type*(*prev_p*) = *kern_node*) ∧ (*subtype*(*prev_p*) ≠ *explicit*) **then** *try_break*(0, *unhyphenated*);

Page B372, lines 12 and 13   (2/27/93)

> **if** *type*(*q*) = *kern_node* **then**
>   **if** *subtype*(*q*) ≠ *explicit* **then goto** *done1*;

Page B376, line 3 from the bottom   (2/27/93)

> *cur_lang* ← *init_cur_lang*; *l_hyf* ← *init_l_hyf*; *r_hyf* ← *init_r_hyf*;

Page B377, lines 11 and 12   (2/27/93)

cur_lang, *init_cur_lang*: *ASCII_code*;   { current hyphenation table of interest }
l_hyf, *r_hyf*, *init_l_hyf*, *init_r_hyf*: *integer*;   { limits on fragment sizes }

Page B378, line 5 from the bottom, overriding earlier change   (2/27/93)

>   **else if** (*type*(*s*) = *kern_node*) ∧ (*subtype*(*s*) = *normal*) **then**
>   **begin** *hb* ← *s*; *hyf_bchar* ← *font_bchar*[*hf*]; **end**
>   **else goto** *done3*;

Page B394, lines 12 and 13   (2/27/93)

> **var** *n*: 0 . . 64;   { length of current word; not always a *small_number* }
>   *j*: 0 . . 64;   { an index into *hc* }

Page B404, line 21   (2/27/93)

> **var** *k*, *l*: 0 . . 64;   { indices into *hc* and *hyf*; not always in *small_number* range }

Page B460, lines 21 and 22   (2/27/93)

push_nest; *mode* ← *hmode*; *space_factor* ← 1000; *set_cur_lang*; *clang* ← *cur_lang*;
prev_graf ← (*norm_min*(*left_hyphen_min*) ∗ ´100 + *norm_min*(*right_hyphen_min*)) ∗ ´200000 + *cur_lang*;

Page B492, line 6 from the bottom   (2/27/93)

unsave; *prev_graf* ← *prev_graf* + 3;
push_nest; *mode* ← *hmode*; *space_factor* ← 1000; *set_cur_lang*; *clang* ← *cur_lang*;
prev_graf ← (*norm_min*(*left_hyphen_min*) ∗ ´100 + *norm_min*(*right_hyphen_min*)) ∗ ´200000 + *cur_lang*;

Page C151, line 11 from the bottom   (6/26/93)

> scaled 1.42(1 + max(−*pen_lft*, *pen_rt*, *pen_top*, −*pen_bot*))

Page C262, line 15   (6/26/93)

```
string base_name, base_version; base_name="plain"; base_version="2.71";
```

Page C262, line 29	(6/26/93)

```
def gobble primary g = enddef; def killtext text t = enddef;
```

Page C271, bottom line	(6/26/93)

```
 culldraw p enddef;
```

Page C272, three new lines for top of page	(6/26/93)

```
def culldraw expr p = addto pic_ doublepath p.t_ withpen currentpen;
 cull pic_ dropping(-infinity,0) withweight default_wt_;
 addto_currentpicture also pic_; pic_:=nullpicture; killtext enddef;
```

Page C272, replacement for former line 5	(6/26/93)

```
  (cut_ scaled (1+max(-pen_lft,pen_rt,pen_top,-pen_bot))
```

Page C296, line 24	(2/3/93)

the definition of `rp` is changed to '`]..tension 4..`', and if '`scaled 5pt`' is inserted

Page C299, line 3	(5/15/92)

a Bernshteǐn polynomial of order $n - 1$.)

Page C347, left column	(5/15/92)

Bernshteǐn, Sergeǐ Natanovich, 14.

Page C348, left column	(6/26/93)

culldraw, *271*, <u>272</u>.

Page C350, left column	(6/26/93)

exponential, *see* mexp.

Page C352, left column	(6/26/93)

killtext, <u>262</u>, *272*.

Page C352, right column	(6/26/93)

logarithm, *see* mlog.

Page C361, lines 14 and 15	(2/25/93)

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Page Dxiv, line 13 (4/19/96)

preprocessor converts these into numeric constants that are 256 or more. This

---

Page Dxiv, line −1 (4/19/96)

This file contains one line per string, starting with string number 256, then number 257,

---

Page Dxv, lines 10 and 11 (4/19/96)

In this case, occurrences of `""` in the `WEB` program will be replaced by 256; occurrences of
`"This longer string"` will be replaced by 257. The symbol `@$` stands for the numeric

---

Page D2, line −17 (8/7/98)

define *banner* ≡ ´This␣is␣METAFONT,␣Version␣2.7182´   { printed when METAFONT starts }

Page D50, line 26 (8/7/98)

   if $b > 0$ **then**

Page D138, line 14 from the bottom (3/6/95)

  2′) Let $Z_k^{(j+1)} = \frac{1}{2}(Z_k^{(j)} + Z_{k+1}^{(j)})$, for $1 \le k \le n - j$, for $1 \le j < n$.

Page D190, D191, D194, D195 (6/26/93)

[Several changes to the code in sections 415, 416, 424, and 425 were made to METAFONT version
2.71 in July 1991, too numerous to mention here. They are documented in file `mf84.bug` as bug
number 560. We also delete lines 4 and 5 of page D194.]

Page D216, line 10 from the bottom (7/15/92)

will be offset by w_1 or w_2, unless its slope drops to zero en route to the eighth octant; in the latter

---

Page D289, lines 9 and 10 (6/26/93)

   $p \leftarrow dep\_list(p);\ \ r \leftarrow inf\_val;$
   repeat if $value(info(p)) \ge value(r)$ **then**

Page D296, lines 8 and 9 from the bottom (9/13/98)

[Delete these spurious lines.]

Page D297, mini-index (6/6/98)

     the meaning of *loc* should be 'macro'

Page D310, line 7 (8/7/98)

  if $(loc = k + 1) \wedge (length(buffer[k]) = 1)$ **then** $cur\_mod := buffer[k]$

Page D363, lines 10 and 11   (3/1/95)

begin if ($max\_c[dependent]$ **div** $´10000 \geq max\_c[proto\_dependent]$) **then** $t \leftarrow dependent$

Page D512, line 13   (11/23/98)

$print\_int(round\_unscaled(internal[year]))$; $print\_char(\texttt{"."})$;

Page D518, insert new material between lines 7 and 8   (3/20/95)

while $input\_ptr > 0$ **do**
   if $token\_state$ **then** end_token_list **else** $end\_file\_reading$;
while $loop\_ptr \neq null$ **do** $stop\_iteration$;

Page D518, line 18   (3/20/95)

$loop\_ptr \leftarrow cond\_ptr$; $cond\_ptr \leftarrow link(cond\_ptr)$; $free\_node(loop\_ptr, if\_node\_size)$;

Page D546, left column   (4/11/96)

Stern, Moritz Abraham: 526.

This is a list of all corrections made to *Computers & Typesetting*, Volume A (also known as *The TEXbook*), between 1992 and the publication of the final printed version of that book in September 1996.

Page A31, line 8   (3/6/95)

TEX begins its error messages with '!', and it shows what it was reading at the

---

Page A46, line 8   (1/22/95)

out for the occasional times when the adjacent characters `aa`, `ae`, and `o/` should not be

---

Page A49, top   (9/1/96)

[The copy on pages 45 and 46 was significantly shortened in the seventeenth printing (October 1989 — see `errata.five`), and exercise 8.7 moved back to page 48 as a result. But the printer was not asked to change page 49; hence exercise 8.7 appeared twice, on pages 48 *and* 49, during a six-year period.]

Page A282, lines 11 and 12   (4/18/96)

unadorned ⟨box⟩ command, except that the new box being appended to the vertical list is also shifted left or right by the specified amount.

Page A285, lines 15–17 from the bottom   (4/18/96)

■ `\raise`⟨dimen⟩⟨box⟩, `\lower`⟨dimen⟩⟨box⟩. This acts just like an unadorned ⟨box⟩ command, except that the new box being appended to the horizontal list is also shifted up or down by the specified amount.

Page A290, lines 4–6 from the bottom   (4/18/96)

■ `\raise`⟨dimen⟩⟨box⟩, `\lower`⟨dimen⟩⟨box⟩. This acts just like an unadorned ⟨box⟩ command, except that the new box being put into the nucleus is also shifted up or down by the specified amount.

Page A331, bottom two lines   (6/25/93)

if you know that the enclosing box is sufficiently small; and `\leaders\vrule\vfill` works fine in vertical mode.

Page A354, lines 19–22   (3/5/95)

```
\def\sett@b{\ifx\next\+\def\nxt{\afterassignment\s@tt@b\let\nxt}%
  \else\let\nxt=\s@tcols\fi
  \let\next=\relax \nxt} % turn off \outerness
\def\s@tt@b{\let\nxt=\relax \us@false\m@ketabbox}
```

Page A356, lines 13–20 from the bottom (3/5/95)

```
\def\oalign#1{\leavevmode\vtop{\baselineskip0pt \lineskip.25ex
  \ialign{##\crcr#1\crcr}}} \def\o@lign{\lineskiplimit=0pt \oalign}
\def\ooalign{\lineskiplimit=-\maxdimen \oalign} % chars over each other
\def\sh@ft#1{\dimen0=.00#1ex \multiply\dimen0 by\fontdimen1\font
  \kern-.0156\dimen0} % compensate for slant in lowered accents
\def\d#1{{\o@lign{\relax#1\crcr\hidewidth\sh@ft{10}.\hidewidth}}}
\def\b#1{{\o@lign{\relax#1\crcr\hidewidth\sh@ft{29}%
    \vbox to.2ex{\hbox{\char'26}\vss}\hidewidth}}}
```

Page A357, lines 7–12 (8/1/95)

```
\def\rightarrowfill{$\m@th \smash- \mkern-7mu
  \cleaders\hbox{$\mkern-2mu \smash- \mkern-2mu$}\hfill
  \mkern-7mu \mathord\rightarrow$}
\def\leftarrowfill{$\m@th \mathord\leftarrow \mkern-7mu
  \cleaders\hbox{$\mkern-2mu \smash- \mkern-2mu$}\hfill
  \mkern-7mu \smash-$}
```

Page A357, lines 16–20 (6/25/93)

```
  \setbox0=\hbox{$\braceld$}%
  \bracelu\leaders\vrule height\ht0 depth0pt\hfill\bracerd
  \braceld\leaders\vrule height\ht0 depth0pt\hfill\braceru$}
\def\downbracefill{$\m@th
  \setbox0=\hbox{$\braceld$}%
  \braceld\leaders\vrule height\ht0 depth0pt\hfill\braceru
  \bracelu\leaders\vrule height\ht0 depth0pt\hfill\bracerd$}
```

[Also delete lines 21 and 22, as the usage is no longer restricted.]

Page A359, line 25 (3/5/95)

```
\def\skew#1#2#3{{\muskip0=#1mu \mkern.5\muskip0
    #2{\mkern-.5\muskip0{#3}\mkern.5\muskip0}\mkern-.5\muskip0}{}}
```

Page A360, line 5 from the bottom (3/5/95)

```
\def\@vereq#1#2{\lower.5pt\vbox{\lineskiplimit\maxdimen \lineskip-.5pt
```

Page A361, lines 19 and 20 (3/5/95)

```
\def\bmod{\nonscript\mskip-\medmuskip \mkern5mu
  \mathbin{\rm mod} \penalty900 \mkern5mu \nonscript\mskip-\medmuskip}
```

Page A362, lines 14–18 (3/5/95)

```
  \everycr{\noalign{\ifdt@p \global\dt@pfalse \ifdim\prevdepth>-1000pt
     \vskip-\lineskiplimit \vskip\normallineskiplimit \fi
     \else \penalty\interdisplaylinepenalty \fi}}}
\def\@lign{\tabskip=0pt\everycr={}} % restore inside \displ@y
\def\displaylines#1{\displ@y \tabskip=0pt
```

Page A363, lines 8–9 from the bottom (12/8/89)

```
  \if@mid \dimen@=\ht0 \advance\dimen@ by\dp\z@ \advance\dimen@ by12\p@
    \advance\dimen@ by\pagetotal \advance\dimen@ by-\pageshrink
```

Page A364, line 5 from the bottom (4/11/96)

```
\def\fmtname{plain}
\def\fmtversion{3.141592} % identifies the current format
```

Page A374, line 3 (3/7/95)

```
        \begingroup\aftergroup\def\aftergroup\asts\aftergroup{
```

Page A410, line 23 (4/18/96)

```
  Tema con variazione \(su un tema differente)
```
(This implies a corresponding correction to page 411.)

Page A451, line 16 (8/8/93)

But when plain TeX is tried on the name of a famous Welsh village,

---

Page A462, right column (3/5/95)

```
        \cong ( ≅ ), 151, 360, 436.
```

Page A463, right column (6/25/93)

```
        direct sum, see \oplus.
```

Page A464, left column (6/25/93)

```
        \downbracefill (⎵⎵⎵⎵⎵), 225–226, 357.
```

Page A483, lines 15–21 (4/29/97)

```
        email: {\tt TUG@tug.org}
        internet: {\tt http://www.tug.org/}
        }
```

Don't delay, subscribe today! That address again is

> TeX Users Group
> email: TUG@tug.org
> internet: http://www.tug.org/

This is a list of all substantial corrections made to *Computers & Typesetting* from the mid-1990s until the first "Millennium edition" was published at the end of the year 2000. Corrections made to the softcover version of *The TEXbook* are the same as corrections to Volume A. Corrections to the softcover version of *The METAFONTbook* are the same as corrections to Volume C. Changes to the mini-indexes and master indexes of Volumes B, D, and E are not shown here unless they are not obviously derivable from what has been shown.

Page A3, line 14 (in certain printings only)   (9/6/00)

that looks like `'` or `´`.

Page A8, lines 14 and 15   (9/6/00)

that is not to be ignored. Notice that `\␣` is a control sequence of the second kind, namely a control symbol, since there is a single nonletter (␣) following

---

Page A43, line −17   (8/4/98)

into your manuscript, if the `b`-key on your keyboard is broken.   (An optional

---

Page A88, lines 14, 16, 18, and 21   (8/12/00)

[Insert two blank spaces between '`blank space`' and '`}`']

Page A96, lines 9 and 10   (8/6/98)

        Before 1998, some German words changed their spelling when split between lines. For example, 'backen' became 'bak-ken' and 'Bettuch' sometimes became 'Bett-

---

Page A107, line 2   (8/5/98)

        ually, you might be tempted to set `\tolerance=10000`; this allows arbitrarily bad

---

Page A115, line −19   (8/5/98)

If there's no room for such an insertion on this page, TEX will insert it at the top of

---

Page A119, line 15   (8/5/98)

of `\dimen3`, assuming that `\dimen3` is positive.

Page A182, middle line of the displayed commutative diagram   (12/3/99)

$$0 \ \longrightarrow\ \mathcal{O}_C \ \xrightarrow{\pi}\ \pi_*\mathcal{O}_D \ \xrightarrow{\delta}\ R^1 f_*\mathcal{O}_V(-D) \ \longrightarrow\ 0$$

Page A233, line −2   (8/5/98)

could avoid this by adding `\hskip 0pt minus-1fil`; then an oversize text would

Page A277, line 1 (8/5/98)

⟨code assignment⟩ ⟶ ⟨codename⟩⟨8-bit number⟩⟨equals⟩⟨number⟩

Page A277, line −11 (8/5/98)

[Move this line, which defines ⟨at clause⟩, up to the top of the page.]

Page A289, line 24 (2/3/97)

⟨math field⟩ ⟶ ⟨filler⟩⟨math symbol⟩ | ⟨filler⟩{⟨math mode material⟩}

Page A309, line 3 (8/12/97)

8.4. $3 x_{11}$ ^$_7$ 2_{12} $3 ˜_{13}$ ␣10 ⎡TeX⎤ b_{11} v_{11} ␣10. The final space comes from the

---

Page A313, line 24 (9/19/00)

stands for '\par\vfill...', so the next three commands are

Page A313, line 27 (9/19/00)

{vertical mode: \par}

Page A318, lines 12 and 13 (8/5/98)

15.8. \advance\dimen2 by\ifnum\dimen2<0 -\fi.5\dimen3
\divide\dimen2 by\dimen3 \multiply\dimen2 by\dimen3

Page A325, line 22 (12/3/99)

O&\mapright{}&{\cal O}_C&\mapright\pi&

Page A337, line 3 from the bottom (9/6/00)

DONALD E. KNUTH, *The TEXbook* (1984)

Page A348, lines 14–16 (8/6/98)

  \def\@if#1{true}{\let#1=\iftrue}%
 \expandafter\expandafter\expandafter
 \def\@if#1{false}{\let#1=\iffalse}%

Page A356, line 21 (8/6/98)

\def\AA{\leavevmode\setbox0=\hbox{!}\dimen@=\ht0 \advance\dimen@ by-1ex

---

Page A356, lines 9–21 from the bottom   (8/6/98)

```
\def\S{\mathhexbox278} \def\P{\mathhexbox27B} \def\Orb{\mathhexbox20D}
\def\oalign#1{\leavevmode\vtop{\baselineskip0pt \lineskip.25ex
  \ialign{##\crcr#1\crcr}}} \def\o@lign{\lineskiplimit=0pt \oalign}
\def\ooalign{\lineskiplimit=-\maxdimen \oalign} % chars over each other
{\catcode`p=12 \catcode`t=12 \gdef\\#1pt{#1}} \let\getf@ctor=\\
\def\sh@ft#1{\dimen@=#1 \kern\expandafter\getf@ctor\the\fontdimen1\font
  \dimen@} % kern by #1 times the current slant
\def\d#1{{\o@lign{\relax#1\crcr\hidewidth\sh@ft{-1ex}.\hidewidth}}}
\def\b#1{{\o@lign{\relax#1\crcr\hidewidth\sh@ft{-3ex}%
    \vbox to.2ex{\hbox{\char'26}\vss}\hidewidth}}}
\def\c#1{{\setbox0=\hbox{#1}\ifdim\ht0=1ex \accent'30 #1%
  \else\ooalign{\unhbox0\crcr\hidewidth\char'30\hidewidth}\fi}}
\def\copyright{{\ooalign{\hfil\raise.07ex\hbox{c}\hfil\crcr\Orb}}}
```

Page A364, line 9   (8/9/98)

```
\def\makefootline{\baselineskip=24pt \lineskiplimit=0pt
    \line{\the\footline}}
```

Page A364, line 4 from the bottom   (8/6/98)

```
\def\fmtversion{3.1415926} % identifies the current format
```

Page A447, bottom line   (6/3/98)

— JOHN SMITH, *The Printer's Grammar* (1755)

Page A450, lines 11–13   (4/12/98)

between 'e' and 'n' there are five relevant values in this case (2 from $_0h_0e_2n_0$, 0 from $_0h_0e_0n_0a_4$, 0 from $_0h_0e_0n_5a_0t_0$, 1 from $_1n_0a_0$, and 0 from $_0n_2a_0t_0$); the maximum of these is 2. The result of all the maximizations is

---

Page A453, line 6   (8/5/98)

tion dictionary, except that plain TEX blocks hyphens after the very first letter or be-

---

Page A458, left column   (9/6/00)

Page A458, right column   (7/5/99)

Page A464, right column   (8/6/98)

> *\edef, *215–216*, 275, *328*, *373–374*.

Page A466, right column   (8/8/98)

> \getfactor, *356*, <u>*375*</u>, *398*.

Page A467, right column   (8/5/98)

> *\hfilneg, 72, 100, 283, 285, 290, 397.

Page A469, left column   (8/5/98)

> italic type, 13–14, 100, 127, 165, 409, 428, 430.

Page A469–A477, passim   (5/13/98)

Add page 272 to the index entries for \lastskip, \pagedepth, \pagefilllstretch,
\pagefillstretch, \pagefilstretch, \pagegoal, \pageshrink, \pagestretch, \pagetotal,
\parshape, \prevdepth, and \spacefactor.

Also change '369' to '370' in the index entries for \lbrack, \lq, \rbrack, \rq, \sb, and \sp.

Also change 'Luckombe, Philip' to 'Smith, John'.

Page A472, right column   (8/6/98)

> *\noexpand, <u>209</u>, <u>213</u>, 215, 216, *377*, *424*.

Page A473, left column   (8/6/98)

> \Orb (◯), <u>356</u>.

Page Bix, line 16   (1/16/00)

> ■ "Word hy-phen-a-tion by com-put-er" by Franklin Mark Liang, Stan-

---

Page Bxiv, line 13   (4/19/96)

preprocessor converts these into numeric constants that are 256 or more. This

---

Page Bxiv, line −1   (4/19/96)

This file contains one line per string, starting with string number 256, then number 257,

---

Page Bxv, lines 10 and 11   (4/19/96)

In this case, occurrences of `""` in the `WEB` program will be replaced by 256; occurrences of
`"This longer string"` will be replaced by 257. The symbol `@$` stands for the numeric

---

Page B2, line −10   (3/8/95)

> **define** *banner* ≡ ´This␣is␣TeX,␣Version␣3.14159´   { printed when TEX starts }

Page B169, line 13 (9/22/95)

something in a "muskip" register, or to one of the three parameters \thinmuskip, \medmuskip,

---

Page B221, line 9 (3/4/95)

define *non_address* = 0 { a spurious *bchar_label* }

Page B221, line 17 (3/4/95)

font_params: **array**[*internal_font_number*] **of** *font_index*; { how many font parameters are present }

Page B256, insert new line 12 before the bottom (3/7/95)

glue_temp: *real*; { glue value before rounding }

Page B258, line 11 before the bottom becomes four lines (3/7/95)

625. **define** *billion* ≡ *float_constant*(1000000000)
define *vet_glue*(#) ≡ *glue_temp* ← #;
    if *glue_temp* > *billion* **then** *glue_temp* ← *billion*
    else if *glue_temp* < −*billion* **then** *glue_temp* ← −*billion*
⟨ Move right or output leaders 625 ⟩ ≡

Page B258, lines 3–6 from the bottom (3/7/95)

        begin *vet_glue*(*float*(*glue_set*(*this_box*)) ∗ *stretch*(*g*));
        rule_wd ← *rule_wd* + *round*(*glue_temp*);
        end;
      end
    else if *shrink_order*(*g*) = *g_order* **then**
      begin *vet_glue*(*float*(*glue_set*(*this_box*)) ∗ *shrink*(*g*));
      rule_wd ← *rule_wd* − *round*(*glue_temp*);

Page B260, line 13 from the bottom (6/26/93)

  doing_leaders ← *outer_doing_leaders*; *dvi_v* ← *save_v*; *dvi_h* ← *save_h*; *cur_v* ← *base_line*;

Page B261, insert new line after line 7 (3/7/95)

  glue_temp: *real*; { glue value before rounding }

Page B262, lines 3–6 from the bottom (3/7/95)

        begin *vet_glue*(*float*(*glue_set*(*this_box*)) ∗ *stretch*(*g*));
        rule_ht ← *rule_ht* + *round*(*glue_temp*);
        end;
      end
    else if *shrink_order*(*g*) = *g_order* **then**
      begin *vet_glue*(*float*(*glue_set*(*this_box*)) ∗ *shrink*(*g*));
      rule_ht ← *rule_ht* − *round*(*glue_temp*);

Page B264, line 22 (6/26/93)

$doing\_leaders \leftarrow outer\_doing\_leaders$; $dvi\_v \leftarrow save\_v$; $dvi\_h \leftarrow save\_h$; $cur\_h \leftarrow left\_edge$;

Page B297, line 11 (3/7/95)

$width(p) \leftarrow mu\_mult(width(p))$; $subtype(p) \leftarrow explicit$;

Page B309, line 7 (9/22/95)

if $cur\_style < text\_style$ **then**   { display style }

Page B356, line −5 (3/4/95)

$hang\_after = 1$, and $hang\_indent = 0$. Note that if $hang\_indent = 0$, the value of $hang\_after$ is

---

Page B388, bottom line (3/4/95)

if $bchar\_label[hf] \neq non\_address$ **then**   { put left boundary at beginning of new line }

Page B406, line 10 (5/1/98)

$q \leftarrow p$;   { now node q represents $p_1 \ldots p_{l-1}$ }

Page B503, line 12 (3/4/95)

of the following procedure. (Exception: The tabskip glue isn't trapped while preambles are being scanned.)

Page B529, line 12 (3/4/95)

$undump(0)(fmem\_ptr - 1)(bchar\_label[k])$;
$undump(min\_quarterword)(non\_char)(font\_bchar[k])$;

Page B531, line 2 (11/23/98)

from appearing again.

Page B531, line 14 (11/23/98)

$print\_int(year)$; $print\_char(".")$; $print\_int(month)$; $print\_char(".")$; $print\_int(day)$;

Page B534, insert new material between lines −16 and −15 (3/20/95)

while $input\_ptr > 0$ **do**
   if $state = token\_list$ **then** end_token_list **else** $end\_file\_reading$;

Page B534, line −2 (3/20/95)

$temp\_ptr \leftarrow cond\_ptr$; $cond\_ptr \leftarrow link(cond\_ptr)$; $free\_node(temp\_ptr, if\_node\_size)$;

Page B535, line 9 $\hspace{5cm}$ (3/20/95)

$\qquad$ **begin init for** $c \leftarrow$ *top_mark_code* **to** *split_bot_mark_code* **do**
$\qquad\quad$ **if** *cur_mark*$[c] \neq$ *null* **then** *delete_token_ref* (*cur_mark*$[c]$);
$\qquad$ *store_fmt_file*; **return**; **tini**

Page B581, Zabala entry $\hspace{5cm}$ (8/19/00)

Zabala Salelles, Ignacio Andrés: 2.

Page C17, lines 12 and 13 $\hspace{4.5cm}$ (9/6/00)

$\qquad$ **draw** $z_4\{\text{curl}\,0\} \,.\,.\, z_2\{z_3 - z_4\} \,.\,.\, \{\text{curl}\,0\}\, z_3$;
$\qquad$ **draw** $z_4\{\text{curl}\,2\} \,.\,.\, z_2\{z_3 - z_4\} \,.\,.\, \{\text{curl}\,2\}\, z_3$

Page C23, line -7 $\hspace{5cm}$ (8/5/98)

$\qquad$ $x_1 = ss = w - x_5$; $y_3 - y_1 = ygap$

Page C69, line 17 $\hspace{5cm}$ (9/6/00)

`"abra"`, while p_1 is '$(0,0) \,.\,.\, (3,3)$' and p_2 is '$(0,0) \,.\,.\, (3,3) \,.\,.\,$ cycle'.

Page C94, line -11 $\hspace{5cm}$ (3/4/95)

put are assumed to have square pixels. But if, for example, the **mode_def** sets

---

Page C107, line 15 $\hspace{5cm}$ (3/4/95)

$\qquad$ **labels**$(1a, 1b, 2a, 2b, 3a, 3b, 4a, 4b,$ **range** 1 **thru** $36)$; **endchar**;

Page C123, lines 21 and 22 $\hspace{4cm}$ (12/19/95)

$\qquad$ ▶ **EXERCISE 14.3**
$\qquad$ Use a *rotated* quarter-circle to produce '⌒' in font position '`c`'.

Page C129, lines 6–17 $\hspace{4.5cm}$ (8/5/98)

$\qquad$ $\langle$path primary$\rangle \longrightarrow \langle$pair primary$\rangle \mid \langle$path variable$\rangle$
$\qquad\quad \mid$ ($\langle$path expression$\rangle$)
$\qquad\quad \mid$ `reverse` $\langle$path primary$\rangle$
$\qquad\quad \mid$ `subpath` $\langle$pair expression$\rangle$ `of` $\langle$path primary$\rangle$
$\qquad$ $\langle$path secondary$\rangle \longrightarrow \langle$pair secondary$\rangle \mid \langle$path primary$\rangle$
$\qquad\quad \mid \langle$path secondary$\rangle\langle$transformer$\rangle$
$\qquad$ $\langle$path tertiary$\rangle \longrightarrow \langle$pair tertiary$\rangle \mid \langle$path secondary$\rangle$
$\qquad$ $\langle$path expression$\rangle \longrightarrow \langle$pair expression$\rangle \mid \langle$path tertiary$\rangle$
$\qquad\quad \mid \langle$path subexpression$\rangle\langle$direction specifier$\rangle$
$\qquad\quad \mid \langle$path subexpression$\rangle\langle$path join$\rangle$ `cycle`
$\qquad$ $\langle$path subexpression$\rangle \longrightarrow \langle$path expression$\rangle$
$\qquad\quad \mid \langle$path subexpression$\rangle\langle$path join$\rangle\langle$path tertiary$\rangle$

Page C134, line 8 (3/4/95)

of p; if $t \le 0$, precontrol t of p is z_0. In particular, if t is an integer, postcontrol t of p

---

Page C139, illustration (8/5/98)

[Remove the labels `2r`, `2`, and `2l` below their dots.]

Page C143, top two lines (3/4/95)

In order to have some transform variables to work with, it's necessary to 'hide' some declarations and commands before giving the next `exprs`:

Page C147, lines 14, 16, and 19 (9/6/00)

[Change '**savepen**' to '*savepen*'.]

Page C147, line 2 from the bottom (9/6/00)

FONT's **penrazor** stands for '**makepen** $((-.5, 0)$ -- $(.5, 0)$ -- cycle)', and **pensquare**

Page C171, line 19 (8/5/98)

($\langle$path tertiary$\rangle$) and ($\langle$pair tertiary$\rangle$).   A pair expression is not considered to

---

Page C172, line 14 (8/5/98)

been evaluated and changed to numeric tokens before being substituted for s.

Page C175, line 23 (1/11/88)

expand into a sequence of tokens. (The language SIMULA67 demonstrated that it is

---

Page C206, minor changes to lines -19 to -5 (3/4/95)

```
Path at line 15, before subdivision into octants:
(1.53745,9.05345)..controls (1.53745,4.00511) and (5.75409,-0.00049)
 ..(10.85147,-0.00049)..controls (16.2217,-0.00049) and (20.46255,4.51297)
 ..(20.46255,9.94655)..controls (20.46255,14.99713) and (16.23842,19.00049)
 ..(11.13652,19.00049)..controls (5.77066,19.00049) and (1.53745,14.48491)
 ..cycle

Cycle spec at line 15, after subdivision:
(1.53745,9.05345) % beginning in octant 'SSE'
   ..controls (1.53745,6.58786) and (2.54324,4.371)
 ..(4.16621,2.74803) % segment 0
% entering octant 'ESE'
   ..controls (5.8663,1.04794) and (8.24362,-0.00049)
 ..(10.85147,-0.00049) % segment 0
% entering octant 'ENE'
```

... and so on; there are lots more numbers! What does this all mean? Well, the first segment of the curve, from $(1.53745, 9.05345)$ to $(10.85147, -0.00049)$, has been

Page C207, minor changes to lines 1–23   (3/4/95)

```
Cycle spec at line 15, after subdivision and autorounding:
(2,9.05348) % beginning in octant 'SSE'
   ..controls (2,6.50526) and (3.02194,4.22272)
 ..(4.6577,2.58696) % segment 0
% entering octant 'ESE'
   ..controls (6.2624,0.98225) and (8.45786,0)
 ..(10.85873,0) % segment 0
% entering octant 'ENE'
```

Point $(1.53745, 9.05345)$, where there was a vertical tangent, has been rounded to $(2, 9.05348)$; point $(10.85147, -.00049)$, where there was a horizontal tangent, has been rounded to $(10.85873, 0)$; the intermediate control points have been adjusted accordingly. (Rounding of x coordinates has been done separately from y coordinates.) Finally, with *autorounding* $= 2$, additional adjustments are made so that the $45°$ transition point will occur at what METAFONT thinks is a good spot:

```
Cycle spec at line 15, after subdivision and double autorounding:
(2,9.05348) % beginning in octant 'SSE'
   ..controls (2,6.6761) and (3.07103,4.42897)
 ..(4.78537,2.71463) % segment 0
% entering octant 'ESE'
   ..controls (6.46927,1.03073) and (8.62749,0)
 ..(10.85873,0) % segment 0
% entering octant 'ENE'
```

(Notice that $4.78537 + 2.71463 = 7.50000$; when the slope is -1 at a transition point

Page C210, line -7 (8/5/98)

| $\langle$numeric token primary$\rangle$

Page C210, line -2 (8/5/98)

$\langle$numeric token primary$\rangle \longrightarrow \langle$numeric token$\rangle$ / $\langle$numeric token$\rangle$

Page C211, line 16   (8/5/98)

| $\langle$numeric token primary not followed by + or - or a numeric token$\rangle$

Page C213, lines 17–27   (8/5/98)

⟨path primary⟩ ⟶ ⟨pair primary⟩ | ⟨path variable⟩ | ⟨path argument⟩
    | (⟨path expression⟩)
    | **begingroup** ⟨statement list⟩⟨path expression⟩ **endgroup**
    | **makepath** ⟨pen primary⟩ | **makepath** ⟨future pen primary⟩
    | **reverse** ⟨path primary⟩
    | **subpath** ⟨pair expression⟩ **of** ⟨path primary⟩
⟨path secondary⟩ ⟶ ⟨pair secondary⟩ | ⟨path primary⟩
    | ⟨path secondary⟩⟨transformer⟩
⟨path tertiary⟩ ⟶ ⟨pair tertiary⟩ | ⟨path secondary⟩
⟨path subexpression⟩ ⟶ ⟨path expression⟩
    | ⟨path subexpression⟩⟨path join⟩⟨path tertiary⟩

Page C213, line −4   (8/5/98)

⟨path expression⟩ ⟶ ⟨pair expression⟩ | ⟨path tertiary⟩

Page C234, line 6   (9/6/00)

line $z_1 \mathinner{.\,.} z_5$ that bisects $z_4 \mathinner{.\,.} z_2$, so it starts out in a south-by-southwesterly direction;

Page C246, line 5 of answer 14.15   (8/5/98)

/ length(postcontrol t of p − point t of p) **enddef**;

Page C246, line 10 of answer 14.15   (8/5/98)

/ length(precontrol t of p − point t of p) **enddef**;

Page C252, line −6   (8/5/98)

$h + o$ and *bot* $y_4 = -o$, so nothing needs to be done there. We should, however, say

---

Page C257, large display on line 5   (3/4/95)

$$
\begin{Bmatrix}
\texttt{boolean} \\
\texttt{numeric} \\
\texttt{pair} \\
\texttt{path} \\
\texttt{pen} \\
\texttt{picture} \\
\texttt{string} \\
\texttt{transform}
\end{Bmatrix}
\langle\text{expression}\rangle;
\quad
\begin{Bmatrix}
\langle\text{boolean}\rangle \\
\langle\text{numeric}\rangle \\
\langle\text{pair}\rangle \\
\langle\text{string}\rangle \\
\langle\text{transform}\rangle
\end{Bmatrix}
\begin{Bmatrix}
\texttt{<} \\
\texttt{<=} \\
\texttt{=} \\
\texttt{<>} \\
\texttt{>=} \\
\texttt{>}
\end{Bmatrix}
\begin{Bmatrix}
\langle\text{boolean}\rangle \\
\langle\text{numeric}\rangle \\
\langle\text{pair}\rangle \\
\langle\text{string}\rangle \\
\langle\text{transform}\rangle
\end{Bmatrix};
$$

Page C261, line −15   (8/5/98)

■ *Hacks:* `gobble`, `gobbled`, `killtext`; `capsule_def`; `numtok`.

Page C286, line 15 (8/5/98)

isn't entirely expanded by **expandafter**; only METAFONT's first step in loop expansion

---

Page C299, line 2 (12/6/99)

$$t[u_1, \ldots, u_n] \;=\; \sum_{k=1}^{n} \binom{n-1}{k-1} (1-t)^{n-k} t^{k-1} u_k,$$

Page C299, swap lines 11 and 12 (8/5/98)

```
def lbrack = hide(delimiters []) lookahead [ enddef;
let [[[ = [; let ]]] = ]; let [ = lbrack;
```

Page C306, line 1 (11/4/98)

```
 ligtable oct"013": "i" =: oct"016", "l" =: oct"017",   % ffi and ffl
```

Page C311, line 2 (8/5/98)

fine $:= 4 - eps$, and *breadth*$_-[1] := 4 - eps$. (A small amount *eps* has been subtracted

---

Page C323, line −3 (8/5/98)

statement occurs, the special string '`"title "` & ⟨title⟩' is output.   (This is how the

---

Page C332, lines 22–24 (8/5/98)

be replicated so that the final proofs will be *rep* times bigger than usual, and
the pattern will be clipped slightly at the edges so that discrete pixels can be
seen plainly.

Page C341, line 23 (10/10/96)

```
\def\:{\setbox0=\hbox{\noboundary\char\n\noboundary}%
```

Page C346, left column (9/6/00)

Page C346, and throughout the index (3/7/95)

(Many index entries for rules of syntax in chapters 25–26 should have been underlined)

Page C350, left column (4/24/00)

Page C351, right column   (9/22/97)

*intersectiontimes, <u>136</u>, *178*, 213, *265*, *294*, *298*.

Page C353, right column   (8/5/98)

⟨numeric token atom⟩, *delete this entry.*
⟨numeric token primary⟩, 72, <u>210</u>.

Page C354, left column   (7/26/98)

Orwell, George (= Blair, Eric Arthur), 85.

Page C355, right column   (3/7/95)

rt, *23*, *77*, 80, *103*, 147, 151, <u>273</u>.

Page C361, lines 14–15   (4/29/97)

```
    email: {\tt TUG@tug.org}
    internet: {\tt http://www.tug.org/}
    }
```

Page C361, bottom five lines   (4/29/97)

> *Don't delay, subscribe today! That address again is*
> *T_EX Users Group*
> *email:* TUG@tug.org
> *internet:* http://www.tug.org/
> DONALD E. KNUTH, *The T_EXbook* (1996)

Page Dix, line ix   (8/19/00)

- "Interfacing with graphic objects" by Ignacio Andrés Zabala Salelles,

---

Page D71, line 11 of section 178   (9/13/00)

{ previous *mem_end*, *lo_mem_max*, and *hi_mem_min* }

Page D132, line 6 of section 291   (9/13/00)

$$= v_n + w_n\theta_0 - u_n\big(v_1 + w_1\theta_0 - u_1(v_2 + \cdots - u_{n-2}(v_{n-1} + w_{n-1}\theta_0 - u_{n-1}\theta_0)\ldots)\big),$$

Page D213, line 7   (9/14/00)

$(-y+\epsilon, x+y+\epsilon\delta)$. We should therefore round as if our skewed coordinates were $(x+\epsilon+\epsilon\delta, y-\epsilon)$

Page D349, line 4 of section 784   (9/14/00)

procedure *pack_job_name*(s : *str_number*);   { $s =$ ".log", ".gf", ".tfm", or *base_extension* }

Page D451, line 11 $\hspace{5cm}$ (9/14/00)

1040. $\hspace{1cm}$ The value of *cur_mod* controls the *verbosity* in the *print_exp* routine: If it's *show_code*,

---

Page D464, bottom line $\hspace{5cm}$ (9/14/00)

long_help_seen: *boolean*; $\hspace{0.5cm}$ { has the long **errmessage** help been used? }

Page D551, Zabala entry $\hspace{5cm}$ (8/19/00)

Zabala Salelles, Ignacio Andrés: $\hspace{0.3cm}$ 812.

Page Exiii, lines 3 and 4 from the bottom $\hspace{3cm}$ (7/17/98)

$\hspace{1cm}$ ■ "Metamarks: Preliminary studies for a Pandora's Box of shapes" by Neenie Billawala, Stanford Computer Science report 1256 (Stanford, California,

---

Page E87, bottom line $\hspace{5cm}$ (6/4/98)

$\hspace{4cm}$ — JOHN SMITH, *The Printer's Grammar* (1755)

Page E95, line 16 $\hspace{5cm}$ (8/8/98)

$\hspace{0.5cm}$ -- z_{1r} -- z_{1l} -- **subpath** $(t, 0)$ **of** $(z_{3l}\{z_9 - z_3\} .. z_{5r})$

Page E95, line 11 from the bottom $\hspace{4cm}$ (8/8/98)

$\hspace{0.5cm}$ -- z_{1r} -- z_{1l} -- **subpath** $(t, 0)$ **of** $(z_{3r}\{z_9 - z_3\} .. z_{5r})$

Page E95, line 8 from the bottom $\hspace{4cm}$ (3/6/95)

cmchar "Extensible vertical arrow--extension module";

Page E97, line 8 from the bottom $\hspace{4cm}$ (3/6/95)

cmchar "Extensible double vertical arrow--extension module";

Page E113, line 9 $\hspace{5cm}$ (3/6/95)

$x_5 = .5[x_4, x_6]; \quad x_4 - x_6 = 1.2u; \quad \textit{lft } x_{5r} = \text{hround}(.5w - .5\textit{curve});$

Page E113, line 10 from the bottom $\hspace{4cm}$ (3/6/95)

$x_5 = .5[x_4, x_6]; \quad x_4 - x_6 = 4.8u; \quad \textit{lft } x_{5r} = \text{hround}(.5w - .5\textit{max\_size});$

Page E115, line 9 $\hspace{5cm}$ (3/6/95)

$x_5 = .5[x_4, x_6]; \quad x_4 - x_6 = 1.2u; \quad \textit{lft } x_{5r} = \text{hround}(.5w - .5\textit{curve});$

Page E115, line 12 from the bottom $\hspace{4cm}$ (3/6/95)

$x_5 = .5[x_4, x_6]; \quad x_4 - x_6 = 4.8u; \quad \textit{lft } x_{5r} = \text{hround}(.5w - .5\textit{max\_size});$

Page E147, lines 11–14 from the bottom   (7/7/97)

$pos_3(.8[hair, stem], 0)$; $pos_4(vair, -90)$; $pos_5(hair, -180)$;
$pos_6(vair, -270)$; $pos_7(stem, -360)$; $pos_8(vair, -450)$; $pos_9(hair, -540)$;
$x_0 = x_1 = x_9$; $lft\ x_{0l} = \text{hround}(1.5u - .5hair)$; $x_2 = x_4 = x_6 = x_8 = .5w - .25u$;
$rt\ x_{3r} = \text{hround}(w - 1.75u)$; $rt\ x_{7r} = \text{hround}(w - u)$;

Page E147, line 8 from the bottom   (7/7/97)

$y_5 = .5[y_4, y_6]$; $top\ y_{6r} - bot\ y_{4r} = vstem + eps$; $bot\ y_8 = -oo$; $y_7 = y_9 = .55[y_6, y_8]$;

Page E165, line 6   (2/8/97)

$y_1 + .5hair = h$; $x_1 = x_2 + .75u$; $pos_1(hair + dw, \text{angle}(2(x_1 - x_2), y_1 - y_2) + 90)$;

Page E165, line 10   (2/8/97)

$x_3 = .5[x_2, x_4]$; $x_7 - .25u = .5[x_6, x_8]$; $rt\ x_{8r} = \text{hround}(w - .5u)$;

Page E187, line 9   (3/6/95)

$lft\ x_{1l} = lft\ x_{2l} = \text{hround}(.5w - .5shaved\_stem)$; $top\ y_1 = h$; $bot\ y_2 = 0$;

Page E189, line 8   (3/6/95)

$lft\ x_{1l} = lft\ x_{2l} = \text{hround}(.5w - .5shaved\_stem)$; $top\ y_1 = h$; $bot\ y_2 = 0$;

Page E233, line 21   (3/6/95)

path p; $\{\{\textbf{interim}\ superness := more\_super;\ p = pulled\_super\_arc_l(3, 4)(pull)\}\}$;

Page E237, line 5   (8/6/98)

$lft\ x_1 = \text{hround}\ .5u$; $x_2 = w - x_1$; $y_1 = y_2 = good.y\ .7[x\_height, asc\_height]$;

Page E239, line 7 from the bottom   (3/6/95)

$lft\ x_{6r} = \text{hround}\ u$; $x_7 = 3u$; $x_8 = w - 3.5u$; $rt\ x_{9l} = \text{hround}(w - u)$;

Page E253, line 2 from the bottom   (8/9/98)

$..\ z_{3e}\{down\}\ ..\ \{z_{5l} - z_{4l}\}z_{4e}\ \text{--}\ z_{5e}\ \text{--}\ z_{6e}$;   % stroke

Page E263, line 21   (5/10/98)

path p; $\{\{\textbf{interim}\ superness := more\_super;\ p = pulled\_super\_arc_l(3, 4)(pull)\}\}$;

Page E289, line 2 from the bottom   (8/9/98)

$..\ z_{3e}\{down\}\ ..\ \{z_{5l} - z_{4l}\}z_{4e}\ \text{--}\ z_{5e}\ \text{--}\ z_{6e}$;   % stroke

---

Page E291, line 18 (3/6/95)

$x_4 = \frac{1}{3}[x_5, x_{3l}]$; $z_4 = z_5 + \text{whatever} * (15u, .1h)$;

Page E297, line 17 (5/10/98)

path p; $\{\{\textbf{interim } \textit{superness} := \textit{more\_super}; \ p = \textit{pulled\_super\_arc}_l(3, 4)(\textit{pull})\}\}$;

Page E303, line 17 (5/10/98)

path p; $\{\{\textbf{interim } \textit{superness} := \textit{more\_super}; \ p = \textit{pulled\_super\_arc}_l(3, 4)(\textit{pull})\}\}$;

Page E309, line 7 from the bottom (5/8/98)

$y_{@0} = y_{@2l} - \textit{bracket} - \textit{eps}$;

Page E313, line 7 from the bottom (5/8/98)

$y_{@0} = y_{@2l} + \textit{bracket} + \textit{eps}$;

Page E319, line 8 (5/11/98)

$\textit{loop\_top} = \textbf{if } \textit{serifs}: \text{Vround } .77[\textit{vair}, \textit{fudged.stem}] \textbf{ else}: \textit{vair } \textbf{fi}$;

Page E373, lines 5 and 6 from the bottom (7/13/97)

$\textit{top } y_{1r} = \text{vround } .95h + oo$; $\textit{top } y_{2r} = h + oo$; $y_3 = .5h$;
$\textit{bot } y_{4r} = -oo$; $\textit{bot } y_{5r} = \text{vround } .08h - oo$; $y_{5l} := \textit{good.y } y_{5l}$; $x_{5l} := \textit{good.x } x_{5l}$;

Page E381, lines 11 and 12 from the bottom (7/13/97)

$\textit{top } y_{1r} = \text{vround } .93h + oo$; $\textit{top } y_{2r} = h + oo$; $y_3 = .5h$;
$\textit{bot } y_{4r} = -oo$; $\textit{bot } y_{5r} = \text{vround } .07h - oo$;

Page E389, bottom two lines (8/7/98)

numeric aa_-, bb_-, cc_-; $bb_- = b/y$; $cc_- = c/y$; $aa_- = a * a - bb_- * bb_-$;
$(a * (cc_- +\!\!+ \text{sqrt } aa_-) - bb_- * cc_-)/aa_-$ **enddef**;

Page E423, line 17 (8/8/98)

$x_{13} = x_{11} - .5$; $\textit{top } y_{14r} = \min(\frac{10}{7}\textit{x\_height} + .5\textit{bulb\_diam}, h) + 1$; $\textit{top } y_{11} = \textit{x\_height}$;

Page E427, line 21 (8/8/98)

$x_{23} = x_{21} - .5$; $\textit{top } y_{24r} = \min(\frac{10}{7}\textit{x\_height} + .5\textit{bulb\_diam}, h) + 1$; $\textit{top } y_{21} = \textit{x\_height}$;

Page E431, lines 18 and 19 (8/8/98)

filldraw $z_0 \text{ -- } (x_0, y_{2l}) \text{ -- } z_{1l}\{\textit{right}\} \mathinner{.\,.} \{\textit{left}\}z_{1r}$
   $\text{ -- } \textbf{subpath } (t, 0) \textbf{ of } (z_{3r} \mathinner{.\,.} \{2(x_0 - x_3), y_0 - y_3\}z_{5r})$

Page E431, line 2 from the bottom   (8/8/98)

$\text{--}\, z_{1l}\{\mathit{right}\}\, ..\, \{\mathit{left}\}z_{1r}\,\text{--}\,(x_0, y_{2r})\,\text{--}\,\text{cycle};$ % arrowhead and stem

---

Page E433, lines 13 and 14   (8/8/98)

filldraw $z_0\,\text{--}\,(x_0, y_{2l})\,\text{--}\,z_{1l}\{\mathit{left}\}\, ..\, \{\mathit{right}\}z_{1r}$
  $\text{--}\,$**subpath** $(t, 0)$ **of** $(z_{3l}\, ..\, \{2(x_0 - x_3), y_0 - y_3\}z_{5r})$

Page E433, line 2 from the bottom   (8/8/98)

$\text{--}\, z_{1l}\{\mathit{left}\}\, ..\, \{\mathit{right}\}z_{1r}\,\text{--}\,(x_0, y_{2r})\,\text{--}\,\text{cycle};$ % arrowhead and stem

---

Page E463, line 15   (8/8/98)

$\text{---}\, z_{1r}\, ..\, z_{1l}\,\text{---}\,$**subpath** $(t, 0)$ **of** $(z_{3r}\{z_9 - z_3\}\, ..\, z_{5r})$

Page E463, line 3 from the bottom   (8/8/98)

$\text{---}\, z_{1r}\, ..\, z_{1l}\,\text{---}\,$**subpath** $(t, 0)$ **of** $(z_{3l}\{z_9 - z_3\}\, ..\, z_{5r})$

Page E465, line 16   (8/8/98)

$\text{---}\, z_{1l}\, ..\, z_{1r}\,\text{---}\,$**subpath** $(t, 0)$ **of** $(z_{3r}\{z_9 - z_3\}\, ..\, z_{5r})$

Page E465, line 3 from the bottom   (8/8/98)

$\text{---}\, z_{1l}\, ..\, z_{1r}\,\text{---}\,$**subpath** $(t, 0)$ **of** $(z_{3l}\{z_9 - z_3\}\, ..\, z_{5r})$

Page E467, line 18   (8/8/98)

$\text{---}\, z_{1l}\, ..\, z_{1r}\,\text{---}\,$**subpath** $(t, 0)$ **of** $(z_{3r}\{z_9 - z_3\}\, ..\, z_{5r})$

Page E467, line 3 from the bottom   (8/8/98)

$\text{---}\, z_{11l}\, ..\, z_{12r}\,\text{---}\,$**subpath** $(t, 0)$ **of** $(z_{13l}\{z_{19} - z_{13}\}\, ..\, z_{15r})$

Page E483, lines 12–14 from the bottom   (3/6/95)

beginarithchar(oct "004"); **pickup** $\mathit{fine}.\mathit{nib}$; **pickup** $\mathit{rule}.\mathit{nib}$;
numeric del; $\mathit{del} = \mathit{dot\_size} - \mathit{currentbreadth}$;   % $\mathit{currentbreadth} = \mathit{fine}$
$x_3 - .5\mathit{del} = \mathit{good}.x(.5w - .5\mathit{del})$; $\mathit{center\_on}(x_3)$;
$y_3 + .5\mathit{del} = \mathit{good}.y(\mathit{math\_axis} + \mathit{math\_spread}[.5x\_height, .6x\_height] + .5\mathit{del})$;

Page E485, bottom line   (6/4/98)

— JOHN SMITH, *The Printer's Grammar* (1755)

Page E489, line 4   (8/8/98)

$\mathit{lft}\, x_6 = \mathrm{hround}\, u$; $x_2 = w - x_6$; $\mathit{top}\, y_8 = h$; $y_8 - y_4 = x_2 - x_6$;

Page E489, line 10 (8/8/98)

lft $x_6 = $ hround u; $x_2 = w - x_6$; *top* $y_8 = h$; $y_8 - y_4 = x_2 - x_6$; *circle_points*;

Page E491, line 3 from the bottom (3/6/95)

$spread := 2\text{ceiling}(spread^{\#} * hppp/2) + eps$; **enddef**;

Page E507, line 15 (8/8/98)

$\mathtt{---}\, z_{1r} \mathbin{..} z_{1l}\, \mathtt{---}$ **subpath** $(t, 0)$ **of** $(z_{3r}\{z_9 - z_3\} \mathbin{..} z_{5r})$

Page E507, line 3 from the bottom (8/8/98)

$\mathtt{---}\, z_{11r} \mathbin{..} z_{11l}\, \mathtt{---}$ **subpath** $(t, 0)$ **of** $(z_{13l}\{z_{19} - z_{13}\} \mathbin{..} z_{15r})$

Page E509, line 17 (8/8/98)

$\mathtt{---}\, z_{1l} \mathbin{..} z_{1r}\, \mathtt{---}$ **subpath** $(t, 0)$ **of** $(z_{3l}\{z_9 - z_3\} \mathbin{..} z_{5r})$

Page E509, lines 3 and 4 from the bottom (8/8/98)

$\mathtt{---}\, z_{1l} \mathbin{..} z_{1r}\, \mathtt{---}$ **subpath** $(t, 0)$ **of** $(z_{3l}\{z_9 - z_3\} \mathbin{..} z_{5r})$

Page E511, line 17 (8/8/98)

$\mathtt{---}\, z_{1l} \mathbin{..} z_{1r}\, \mathtt{---}$ **subpath** $(t, 0)$ **of** $(z_{3l}\{z_9 - z_3\} \mathbin{..} z_{5r})$

Page E511, lines 3 and 4 from the bottom (8/8/98)

$\mathtt{---}\, z_{1l} \mathbin{..} z_{1r}\, \mathtt{---}$ **subpath** $(t, 0)$ **of** $(z_{3l}\{z_9 - z_3\} \mathbin{..} z_{5r})$

Page E541, bottom line (2/27/97)

labels$(1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15)$; **endchar**;

Page E568, the example of `cmtex8` (4/18/96)

(The word '`logician`' should not be hyphenated.)

Page E574, left column (3/6/95)

currentbreadth, 483, <u>545</u>, 546.

Page E575, right column (9/10/98)

Holmes, Kris Ann, vi, vii.

Page E576, right column (6/4/98)

Delete the entry for Luckombe

Page E579, left column (6/4/98)

Smith, John, 87, 485.

This is a list of all substantial corrections made to *Computers & Typesetting* between the first "Millennium edition" of 2000 and the second such edition, which appeared late in 2001. (More precisely, it lists errors to the 16th, 7th, 6th, 4th, and 5th printings of Volumes A, B, C, D, and E, respectively, that were corrected in the 17th, 8th, 7th, 5th, and 6th printings.) Changes to the mini-indexes and master indexes of Volumes B, D, and E are not shown here unless they are not obviously derivable from what has been shown.

Page A16, line 7 from the bottom (06/30/01)

Ten-point type is different from `magnified five-point type.`

Page A17, line 7 (06/30/01)

fications that grow in geometric ratios—something like equal-tempered tuning

---

Page A51, lines 18–20 (06/30/01)

`ff` yields ff; `fi` yields fi; `fl` yields fl; `ffi` yields ffi; `ffl` yields ffl; `' '` yields "; `' '` yields "; `!'` yields ¡; `?'` yields ¿; `--` yields –; `---` yields —.

Page A52, line 7 from the bottom (06/30/01)

`\ae,\AE`   æ, Æ   (Latin ligature and Scandinavian letter AE)

Page A71, line 15 (06/30/01)

One of the interesting things that can happen when glue stretches and

---

Page A180, line 20 (06/30/01)

Challenge number 5: $k = 1.38065 \times 10^{-16} \, \text{erg} \, \text{K}^{-1}$.

Page A254, line 12 from the bottom becomes two lines (04/09/01)

```
\output={\unvbox255
  \ifnum\outputpenalty<10000 \penalty\outputpenalty\fi}
```

Page A292, lines 13–16 (06/30/01)

■ `\mathchoice`⟨filler⟩`{`⟨math mode material⟩`}`⟨filler⟩`{`⟨math mode material⟩`}` ⟨filler⟩`{`⟨math mode material⟩`}` ⟨filler⟩`{`⟨math mode material⟩`}`. Four math lists, which are defined as in the second alternative of a ⟨math field⟩, are recorded in a "choice item" that is appended to the current list.

Page A306, line 7 (06/30/01)

instead of a shelfful. In fact, the latter idea—to insert an italic correction—is prefer-

---

Page A323, line 12 from the bottom   (06/30/01)

18.31. `$k=1.38065\times10^{-16}\rm\,erg\,K^{-1}$`.

Page A451, line 15   (01/30/01)

Connecticut Yankee come out with only nine or ten bad hyphens:

Page A451, line 23   (01/30/01)

mo-er-der-mohren-mut-ter-mar-mor-mon-u-menten-macher.

Page A454, lines 23–30   (06/30/01)

If a suitable starting letter is found, let it be in font f. Hyphenation is abandoned unless the `\hyphenchar` of f is a number between 0 and 255, inclusive. If this test is passed, TeX continues to scan forward until coming to something that's not one of the following three "admissible items": (1) a character in font f whose `\lccode` is nonzero; (2) a ligature formed entirely from characters of type (1); (3) an implicit kern. The first inadmissible item terminates this part of the process; the trial word consists of all the letters found in admissible items. Notice that all of these letters are in font f.

Page A461, right column   (07/08/01)

*`\char`, *43–45*, 76, 86, 155, 283, <u>286</u>,

Page A466, left column   (07/09/01)

*`\floatingpenalty`, <u>123</u>–<u>124</u>, 272, 281, *363*.

Page A473, left column   (06/30/01)

orphans, *see* widow words.

Page B8, line 2   (05/04/01)

statements will be meaningful. We insert the label '*exit*' just before the '**end**' of a procedure in

---

Page B30, line −4   (05/04/01)

begin *update_terminal*;   { now the user sees the prompt for sure }

Page B84, lines 22 and 27   (05/04/01)

ignore = 9   { characters to ignore (`^^@`) }
active_char = 13   { characters that invoke macros (`~`) }

Page B280, lines 23 and 24   (04/08/01)

or unset nodes; in particular, each mlist item appears in the variable-size part of *mem*, so the *type* field is always present.

Page B382, line 6 (01/01/01)

---

between 'fl' and 'y', then $m = 2$, $t = 2$, and y_1 will be a ligature node for 'fl' followed by an

---

Page B386, line 11 (04/08/01)

$qi(2)$, $qi(6)$: **begin** $cur\_r \leftarrow rem\_byte(q)$; { |=:, |=:> }

Page B475, line 12 (07/01/01)

---

end; { now we are in vertical mode, working on the list that will contain the display }

Page C204, line 3 from the bottom (07/08/01)

---

slightly. If $autorounding > 1$, you get even more changes: Paths are perturbed slightly

---

Page C238, lines 9 and 8 from the bottom (07/08/01)

---

tance is length$(z_4 - z_1)$. But there's a slicker solution: Just calculate

$$\text{abs ypart}((z_1 - z_2) \text{ rotated } -\text{angle}(z_3 - z_2)).$$

Page C313, bottom line (06/30/01)

— LA ROCHEFOUCAULD, *Maximes* (1665)

Page C352, left column (06/30/01)

La Rochefoucauld, François VI, 313.

Page C357, right column (07/08/01)

---

*true, 55, *64–65*, 170, 210.

Page D8, line 2 (05/04/01)

---

statements will be meaningful. We insert the label '*exit*' just before the '**end**' of a procedure in

---

Page D28, line −8 (05/04/01)

---

begin *update_terminal*; { now the user sees the prompt for sure }

Page D101, line 21 (07/08/01)

---

define $subscr\_head\_loc(\#) \equiv \# + 1$ { where *value*, *subscr_head*, and *attr_head* are }

Page D180, lines 22 and 23 (01/26/01)

$(y, -x)$ will appear in node p. Similarly, a fourth-octant transformation will have been applied after the transition, so we will have $x\_coord(q) = -x$ and $y\_coord(q) = y$.

Page D196, lines 7 and 8   (01/26/01)

where $x'(t) \geq 0$ we have $\mathit{right\_type} = \mathit{first\_octant}$ or $\mathit{right\_type} = \mathit{eighth\_octant}$; in regions where $x'(t) \leq 0$, we have $\mathit{right\_type} = \mathit{fifth\_octant}$ or $\mathit{right\_type} = \mathit{fourth\_octant}$.

Page D511, line 17   (07/03/01)

from appearing again.

Page E9, line 9   (07/03/01)

        [92] [123] [124])))

This is a list of all substantial corrections made to *Computers & Typesetting* since the publication of the second "Millennium Edition" at the close of the year 2001. (More precisely, it lists errors corrected since the 16th printing of Volume A, the 7th printing of Volume B, the 6th printing of Volume C, the 4th printing of Volume D, and the 5th printing of Volume E.) Corrections made to the softcover version of *The TₑXbook*, beginning with its 32nd printing, are the same as corrections to Volume A. Corrections to the softcover version of *The METAFONTbook*, beginning with its 11th printing, are the same as corrections to Volume C. Changes to the mini-indexes and master indexes of Volumes B, D, and E are not shown here unless they are not obviously derivable from what has been shown. Some (or all) of these errors have been corrected in the most recent printings.

Page A7, line 4 from the bottom	(01/15/04)

since control sequences of the second kind always have exactly one symbol after

Page A123, line 7 from the bottom	(02/27/08)

that it won't make the natural height-plus-depth of `\box` n surpass `\dimen` n, when it is

Page A124, lines 12 and 13	(02/27/08)

means that TₑX has tried to split an `\insert254` to height 180.2 pt; the natural height-plus-depth of the best such split is 175.3 pt, and the penalty for breaking there is 100.)

Page A153, line 7	(01/03/14)

of three fonts: one for text size, one for script size, and one for scriptscript size. The

Page A206, lines 12–17	(05/21/07)

or alignment template is also considered to be `\outer` in this sense; for example, a file shouldn't end in the middle of a definition. If you are designing a format for others to use, you can help them detect errors before too much harm is done, by using `\outer` with all control sequences that should appear only at "quiet times" within a document. For example, Appendix B defines `\proclaim` to be `\outer`, since a user shouldn't be stating a theorem as part of a definition or argument or preamble.

Page A216, line 3 from the bottom	(12/20/07)

      `\openin`⟨number⟩=⟨file name⟩

Page A290, lines 25–26	(02/24/08)

    ■ ⟨leaders⟩⟨box or rule⟩⟨horizontal skip⟩. Here ⟨horizontal skip⟩ refers to one of the first five glue-appending commands just mentioned; the formal syntax for ⟨leaders⟩

Page A292, line 15	(12/02/02)

are defined as in the second alternative of a ⟨math field⟩, are recorded in a "choice

---

Page A308, lines 25 and 26   (06/17/02)

```
    \def\appendroman#1#2#3{\expandafter\def\expandafter#1\expandafter
      {\csname\expandafter\gobble\string#2\romannumeral#3\endcsname}}
```

Page A311, line 14   (12/02/02)

```
    \def\\{\if\space\next\ % assume that \next is unexpandable
```

Page A311, line 17   (12/29/07)

```
      \leavevmode\copy0\kern-\wd0\makelightbox}
```

Page A318, lines 24 and 25   (10/01/03)

15.13. Yes, in severe circumstances. (1) Previous footnotes might have left no room for any more footnotes on the page. (2) If `\vadjust{\eject}` occurs on the same line

---

Page A364, lines 12–15 from the bottom   (02/29/08)

```
\def\loggingall{\tracingcommands=2 \tracingstats=2
  \tracingpages=1 \tracingoutput=1 \tracinglostchars=1
  \tracingmacros=2 \tracingparagraphs=1 \tracingrestores=1
  \showboxbreadth=\maxdimen \showboxdepth=\maxdimen}
\def\tracingall{\tracingonline=1 \loggingall}
```

Page A364, line 5 from the bottom   (02/29/08)

```
\def\fmtversion{3.141592653} % identifies the current format
```

Page A373, lines 4 and 5 from the bottom   (01/02/14)

And here's another solution (which may be faster, because token list registers can be expanded more quickly than macros on some implementations, using `\the`):

Page A373, line 2 from the bottom   (01/02/14)

```
    \loop \ifnum\m>0 \t=\expandafter{\the\t*}\advance\m-1 \repeat
```

Page A399, line 18, through what used to be page A400, line 14   (02/26/08)

Finally, the reformatting of `\box\footins` can be achieved easily with an elegant technique suggested by David Kastrup, using the following TEX code within the `\output` routine:

```
\def\makefootnoteparagraph{\unvbox\footins
  \baselineskip=\footnotebaselineskip \removehboxes}
\def\removehboxes{\unskip\setbox0=\lastbox
  \ifhbox0{\removehboxes}\unhbox0 \else\noindent \fi}
```

The key idea here is `\removehboxes`, a macro that has the magical ability to take a vertical box such as '`\vbox{\box1\box2\box3\removehboxes}`' and transform it into '`\vbox{\noindent\unhbox1\unhbox2\unhbox3}`', if `\box1`, `\box2`, and `\box3` are hboxes. Notice how `\removehboxes` introduces braces so that TEX's save stack will hold all of the hboxes before they are unboxed. Each level of recursion in this routine uses one cell of input stack space and three cells of save stack space; thus, it is generally safe to do more than 100 footnotes without exceeding TEX's capacity.

In our application there is no interline glue within `\box\footins`, so the `\unskip` command could be deleted from `\removehboxes`.

Incidentally, the `\unskip` and `\lastbox` operations have running times of the approximate form $a+mb$, where m is the number of items efficiency on the list preceding the glue or box that is removed. Hence `\removehboxes` has a running time of order n^2 when it removes n boxes. But the constant b is so small that for practical purposes it's possible to think of `\unskip` and `\lastbox` as almost instantaneous.

Page A416, lines 18–22   (06/08/07)

```
\def\leftheadline{\hbox to \pagewidth{\spaceskip=0pt
    \vbox to 10pt{}% strut to position the baseline
    \llap{\tenbf\folio\kern1pc}% folio to left of text
    \tenit\rhead\hfil}} % running head flush left
\def\rightheadline{\hbox to \pagewidth{\spaceskip=0pt\vbox to 10pt{}%
```

Page A418, line 8 from the bottom   (12/13/11)

```
  \def\\{#3} \advance\hsize by -18mm
```

Page A418, line 3 from the bottom   (12/13/11)

```
  \halign{\line{\titlefont\hss##}\\#4\unskip\\}
```

Page A442, lines 7 and 8 from the bottom   (01/03/14)

3. If the current item is a style change, set C to the specified style and move on to the next item.

Page A450, lines 14–16 from the bottom   (12/19/02)

$s_1$tic $_1$exp x_3p pi$_3$a $_2$i$_1$a i$_2$al $_2$id $_1$do $_1$ci $_2$io ou$_2$ $_2$us

(where subscripts that aren't shown are zero), and this yields

.$_0$s$_0$u$_1$p$_0$e$_0$r$_1$c$_0$a$_0$l$_1$i$_0$f$_0$r$_0$a$_0$g$_1$i$_0$l$_4$i$_0$s$_1$t$_2$i$_0$c$_1$e$_0$x$_3$p$_2$i$_3$a$_0$l$_2$i$_1$d$_0$o$_1$c$_2$i$_0$o$_2$u$_2$s$_0$.

Page A458, left column   (01/11/07)

\\, 38, *356*, *378*, *418*.

Page A459, left column   (03/17/06)

angle brackets (⟨ ⟩), 59, *146–147*, 150, 156,
    <u>268</u>, 420, 437; *see also* \langle, \rangle.

Page A461, left column   (02/24/08)

\boxit, 223, 331.

Page A468, right column   (02/26/08)

interline glue, 78–79, <u>80</u>, 104, 105, 125, 221,
    245, 263, 281–282, 335, 352, 399, 409.

Page A469, left column   (02/26/08)

Kastrup, David Friedrich, 399.

Page A470, left column   (01/21/03)

\loggingall, <u>364</u>.

Page A477, right column   (06/08/07)

*\spaceskip, 76, 274, *317*, *356*, *416*, 429.

Page A479, right column   (09/11/07)

\undefined, 350, 384.

Page A483, line 5 from the bottom   (11/18/03)

— HIERONYMUS HORNSCHUCH, Ὀρθοτυπογραφίας (1608)

Page Bv, page number change   (12/27/11)

[For consistency with Volumes A, C, and E, the preface now begins on page v instead of page vii. This change was first made in the ninth printing.]

Page Bv (formerly Bvii), bottom two lines   (01/06/14)

all of those changes. I now believe that the final bug was discovered on 14 September 2008 and removed in version 3.14159265. The finder's fee has converged to $327.68.

Page Bxiii (formerly Bxv), line −7   (12/27/11)

Format specs have no effect on the corresponding Pascal program, but they do influence

---

Page B2, line 10 from the bottom   (01/02/14)

define *banner* ≡ ´This␣is␣TeX,␣Version␣3.14159265´   { printed when TeX starts }

Page B3, new paragraph to follow line 9   (12/20/02)

Incidentally, Pascal's standard *round* function can be problematical, because it disagrees with the IEEE floating-point standard. Many implementors have therefore chosen to substitute their own home-grown rounding procedure.

Page B21, lines 33 and 34   (09/11/07)

$[´41 .. ´46, ´60 .. ´71, ´136, ´141 .. ´146, ´160 .. ´171]$ must be printable. Thus, at least 81 printable characters are needed.

Page B109, line 16   (01/06/14)

begin *print_esc*("csname"); *print_esc*("endcsname"); *print_char*(" "); **end**

Page B114, line 25   (09/11/07)

define *save_index*(#) ≡ *save_stack*[#].*hh.rh*   { *eqtb* location or token or *save_stack* location }

Page B139, line 20   (12/19/02)

begin while (*state* = *token_list*) ∧ (*loc* = *null*) ∧ (*token_type* ≠ *v_template*) **do**
end_token_list;   { conserve stack space }

Page B144, line 14   (09/11/07)

cat: 0 .. *max_char_code*;   { *cat_code*(*cur_char*), usually }

Page B153, lines 2 and 3   (09/11/07)

In fact, these three procedures account for almost every use of *get_next*.

Page B161, line 19   (12/19/02)

while (*state* = *token_list*) ∧ (*loc* = *null*) ∧ (*token_type* ≠ *v_template*) **do**
end_token_list;   { conserve stack space }

Page B163, line 29   (12/19/02)

long_state ← *call*; *cur_tok* ← *par_token*; *ins_error*; **goto** *continue*;

Page B172, lines 2–6 from the bottom   (09/11/07)

---

else if $m = vmode$ **then** $scanned\_result(prev\_depth)(dimen\_val)$
   else $scanned\_result(space\_factor)(int\_val)$

Page B178, line 4   (09/11/07)

   $cur\_val \leftarrow 0;\ cur\_val\_level \leftarrow int\_val;\ radix \leftarrow 0;\ cur\_order \leftarrow normal;$

Page B184, line 9 from the bottom   (04/18/07)

---

and denominator sum to 32768 or less. According to the definitions here, $2660\,\mathrm{dd} \approx 1000.33297\,\mathrm{mm}$;

Page B206, line 14   (10/30/02)

---

used input files like `webmac.tex`.

Page B206, new paragraph to follow line 22   (12/20/02)

   The following procedures don't allow spaces to be part of file names; but some users seem to
like names that are spaced-out. System-dependent changes to allow such things should probably
be made with reluctance, and only when an entire file name that includes spaces is "quoted"
somehow.

Page B227, new line to precede line 23   (09/11/07)

---

if $(nw = 0) \vee (nh = 0) \vee (nd = 0) \vee (ni = 0)$ **then** $abort;$

Page B256, line 25   (12/20/02)

---

   cur_glue: $real$;   { glue seen so far }
   cur_g: $scaled$;   { rounded equivalent of cur_glue times the glue ratio }
 begin $cur\_g \leftarrow 0;\ cur\_glue \leftarrow float\_constant(0);$
 $this\_box \leftarrow temp\_ptr;\ g\_order \leftarrow glue\_order(this\_box);\ g\_sign \leftarrow glue\_sign(this\_box);$

Page B258, line 5 from the bottom   (12/20/02)

---

   begin $g \leftarrow glue\_ptr(p);\ rule\_wd \leftarrow width(g) - cur\_g;$

Page B258, bottom line   (12/20/02)

---

      begin $cur\_glue \leftarrow cur\_glue + stretch(g);\ vet\_glue(float(glue\_set(this\_box)) * cur\_glue);$
      $cur\_g \leftarrow round(glue\_temp);$

Page B259, line 4   (12/20/02)

---

      begin $cur\_glue \leftarrow cur\_glue - shrink(g);\ vet\_glue(float(glue\_set(this\_box)) * cur\_glue);$
      $cur\_g \leftarrow round(glue\_temp);$

Page B259, new line to precede old line 7   (12/20/02)

   $rule\_wd \leftarrow rule\_wd + cur\_g;$

Page B260, line 21   (12/19/02)

> **else begin** $lx \leftarrow lr$ **div** $(lq + 1)$;

Page B261, line 9   (12/20/02)

> cur_glue: $real$;   { glue seen so far }
> cur_g: $scaled$;   { rounded equivalent of cur_glue times the glue ratio }
> **begin** $cur\_g \leftarrow 0$; $cur\_glue \leftarrow float\_constant(0)$;
> $this\_box \leftarrow temp\_ptr$; $g\_order \leftarrow glue\_order(this\_box)$; $g\_sign \leftarrow glue\_sign(this\_box)$;

Page B262, line 10 from the bottom   (12/20/02)

> **begin** $g \leftarrow glue\_ptr(p)$; $rule\_ht \leftarrow width(g) - cur\_g$;

Page B262, line 6 from the bottom   (12/20/02)

> **begin** $cur\_glue \leftarrow cur\_glue + stretch(g)$; $vet\_glue(float(glue\_set(this\_box)) * cur\_glue)$;
> $cur\_g \leftarrow round(glue\_temp)$;

Page B262, line 2 from the bottom   (12/20/02)

> **begin** $cur\_glue \leftarrow cur\_glue - shrink(g)$; $vet\_glue(float(glue\_set(this\_box)) * cur\_glue)$;
> $cur\_g \leftarrow round(glue\_temp)$;

Page B263, new line to precede old line 2   (12/20/02)

> $rule\_ht \leftarrow rule\_ht + cur\_g$;

Page B264, line 10   (12/19/02)

> **else begin** $lx \leftarrow lr$ **div** $(lq + 1)$;

Page B266, line 29   (09/11/07)

$total\_pages \geq 65536$, the DVI file will lie. And if $max\_push \geq 65536$, the user deserves whatever chaos might ensue.

Page B279, line 19   (09/11/07)

> p: $pointer$;   { a new glue node }

Page B288, lines 18–20   (09/11/07)

$left\_noad$: **begin** $print\_esc(\texttt{"left"})$; $print\_delimiter(delimiter(p))$;
   end;
$right\_noad$: **begin** $print\_esc(\texttt{"right"})$; $print\_delimiter(delimiter(p))$;

Page B290, line 12   (09/11/07)

> **begin if** $s = text\_size$ **then** $print\_esc(\texttt{"textfont"})$;

Page B299, line 9 (12/20/02)

> **if** $type(r) = kern\_node$ **then**   { unneeded italic correction }

Page B332, line 6 (12/19/02)

is being scanned, or when no alignment preamble is active.

Page B332, line 8 (12/19/02)

> **begin if** $(scanner\_status = aligning) \vee (cur\_align = null)$ **then**

Page B336, line 11 from the bottom (10/13/03)

$j - i + min\_quarterword$ in their *link* fields. The values of w_{ii} were initialized to *null_flag*,

---

Page B342, lines 5 and 6 (09/11/07)

In restricted horizontal mode, the *clang* part of *aux* is undefined; an over-cautious Pascal runtime system may complain about this.

Page B416, line 22 (02/29/08)

> **if** $count(t) = 1000$ **then** $t \leftarrow height(r)$
> **else** $t \leftarrow x\_over\_n(height(r), 1000) * count(t)$;
> $print\_scaled(t)$

Page B438, lines 1–3 (09/11/07)

1035.   If $link(cur\_q)$ is nonnull when *wrapup* is invoked, cur_q points to the list of characters that were consumed while building the ligature character cur_l.

Page B438, lines 19 and 20 (09/11/07)

> **begin if** $link(cur\_q) > null$ **then**
>   **if** $character(tail) = qi(hyphen\_char[main\_f])$ **then** $ins\_disc \leftarrow true$;

Page B438, line 4 from the bottom (09/11/07)

> $link(tail) \leftarrow lig\_stack$; $tail \leftarrow lig\_stack$ { *main_loop_lookahead* is next }

Page B439, line 3 (09/11/07)

> **if** $main\_p > null$ **then** $tail\_append(main\_p)$;   { append a single character }

Page B440, new line to follow line 9 (09/11/07)

> **if** $cur\_r = non\_char$ **then goto** $main\_loop\_wrapup$;

Page B452, line 18 (28/03/11)

hmode, where the latter two are used to denote \vbox and \hbox, respectively.

Page B455, lines 3 and 4 　　　　　　　　　　　　　　　　　　　　　(09/11/07)

if $((cur\_cmd = hskip) \wedge (abs(mode) \neq vmode)) \vee ((cur\_cmd = vskip) \wedge (abs(mode) = vmode))$ **then**

Page B472, new paragraph to follow line 10 　　　　　　　　　　　　　(12/20/02)

A devious user might force an *endv* command to occur just about anywhere; we must defeat such hacks.

Page B472, replacement for what used to be line 13 　　　　　　　　　(12/20/02)

begin $base\_ptr \leftarrow input\_ptr$; $input\_stack[base\_ptr] \leftarrow cur\_input$;
while $(input\_stack[base\_ptr].index\_field \neq v\_template) \wedge$
　　$(input\_stack[base\_ptr].loc\_field = null) \wedge$
　　$(input\_stack[base\_ptr].state\_field = token\_list)$ **do** $decr(base\_ptr)$;
if $(input\_stack[base\_ptr].index\_field \neq v\_template) \vee$
　　$(input\_stack[base\_ptr].loc\_field \neq null) \vee$
　　$(input\_stack[base\_ptr].state\_field \neq token\_list)$ **then**
$fatal\_error(\text{´(interwoven\_alignment\_preambles\_are\_not\_allowed)´})$;
if $cur\_group = align\_group$ **then**

Page B505, line 19 　　　　　　　　　　　　　　　　　　　　　　　(09/11/07)

$(\text{"since\_the\_result\_is\_out\_of\_range."})$;
if $p \geq glue\_val$ **then** $delete\_glue\_ref(cur\_val)$;
$error$; **return**;

Page B506, line 1 　　　　　　　　　　　　　　　　　　　　　　　　(10/13/03)

1237. Here we use the fact that the consecutive codes *int_val* .. *mu_val* and *assign_int* ..

Page B520, line 8 　　　　　　　　　　　　　　　　　　　　　　　　(06/25/04)

says, for example, '(preloaded format=plain 1982.11.19)', showing the year, month, and day

---

Page B535, new line to follow line 11 　　　　　　　　　　　　　　　(09/11/07)

if $last\_glue \neq max\_halfword$ **then** $delete\_glue\_ref(last\_glue)$;

Page B578, new entry 　　　　　　　　　　　　　　　　　　　　　　(06/04/06)

Trabb Pardo, Luis Isidoro, 2.

Page Cxi, line 4 　　　　　　　　　　　　　　　　　　　　(05/20/07)

Page C11, line 11 　　　　　　　　　　　　　　　　　　　　(10/11/01)

the area below the bar to the area above it equal to $(\sqrt{5} + 1)/2 \approx 1.61803$, the

---

Page C29, illustration for exercise 4.11 (09/09/01)

[points 2 and 5 should not be labeled twice]

Page C32, line 5 from the bottom (01/04/14)

```
20    penpos1(stem,15); penpos2(.9stem,12); penpos3(stem,10);
```

Page C36, line 5 from the bottom (01/05/14)

line 12, where it says 'x1l', not 'x11' or 'xll'); be sure to distinguish between

---

Page C55, lines 5 and 6 (01/05/14)

suffixed or subscripted. Thus, the syntax rule for ⟨variable⟩ should actually be replaced by a slightly more complicated pair of rules:

Page C129, line 16 (02/21/08)

⟨path subexpression⟩ ⟶ ⟨path expression not ending with direction specifier⟩

Page C130, lines 13–15 from the bottom (09/13/03)

point but not after it, the nonempty one is duplicated in a similar way. A basic path join '.. controls u and v ..' specifies explicit control points that override any direction specifiers that may immediately surround it.

Page C137, lines 5–7 from the bottom (02/21/08)

Let's conclude this chapter by applying what we've learned about paths to a real-life example. The *Journal of Algorithms* was published for many years by Academic Press, and its cover page carried the following logo, which was designed

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Page C137, bottom two lines (02/21/08)

A METAFONT program to produce this logo made it possible for the editors of the journal to use it on letterheads in their correspondence. Here is one way to do that job,

---

Page C156, line 15 from the bottom (09/09/01)

be the values they had upon entry to the group.)

Page C159, lines 12–15 (12/01/06)

```
def --- = ..tension infinity.. enddef;
```

it makes 'z_1 --- z_2' become 'z_1 .. tension *infinity* .. z_2'. The replacement text can be any sequence of tokens not including '**enddef**'; or it can include entire subdefinitions like '**def** ... **enddef**', according to certain rules that we shall explain later.

Page C171, line 16 from the bottom   (06/18/02)

$\langle$loop$\rangle \longrightarrow \langle$loop header$\rangle{:}\langle$loop text$\rangle$ `endfor`

Page C179, line 7 from the bottom   (09/09/01)

next time METAFONT gets to the end of an input line, it will stop reading from the

---

Page C180, lines 14–16   (04/25/03)

digits should be a file name that works in essentially the same way on all installations of METAFONT. Uppercase letters are considered to be distinct from their lowercase counterparts, on many systems.

Page C180, new line to be inserted 4 from the bottom   (06/25/04)

▪ When METAFONT is reading the symbolic tokens to be saved by **save**.

Page C203, line 12 from the bottom   (04/25/03)

point 3 at the right of the triangle might digitize into a

Page C213, line 26   (02/21/08)

$\langle$path subexpression$\rangle \longrightarrow \langle$path expression not ending with direction specifier$\rangle$

Page C226, line 23   (02/21/08)

following nineteen things will be mentioned:

Page C226, new line to be second from the bottom   (02/21/08)

`independent variables`   (distinct numeric variables)

Page C236, line 7 from the bottom   (01/05/14)

7.4. False. After '`newinternal x;`' you can't say '`x`$\langle$tag$\rangle$' in a $\langle$suffix list$\rangle$.

Page C246, line 12   (02/21/08)

is performed whenever METAFONT uses the last two alternatives in the definition

---

Page C250, lines 13 and 14   (02/19/08)

19.3. Yes, if and only if $n - \frac{1}{2}$ is a nonnegative even integer. (Because ambiguous values are rounded upwards.)

Page C250, line 12 from the bottom   (04/25/03)

following $\langle$boolean primary$\rangle$.)

Page C286, line 25   (09/09/01)

problem; it would simply have put ENDFOR into the replacement text of `asts`, because

---

Page C289, line 7   (09/09/01)

```
if if pair x: x>(0,0) else: false fi: A else: B fi.
```

Page C292, line 10 from the bottom   (09/09/01)

be known by saying '**if** known $p - q$: $p = q$ **else**: **false fi**'; transforms could be handled

---

Page C293, line 5 from the bottom   (04/25/03)

given angle ϕ. We can consider the common angle θ of $z_{1r} - z_{1l}$ and $z_{0r} - z_{0l}$ to be

---

Page C315, line 15 from the bottom   (04/25/03)

'b' was shipped out.)   The second letter, 'o', is placed in a second little box adjacent

---

Page C325, bottom line   (02/29/08)

— CAROLUS LINNÆUS, *Philosophia Botanica* (1751)

Page C332, line 4 from the bottom   (04/25/03)

(The proofsheet resolution will be 50 pixels per inch, because *cheapo* has 200 pixels per

---

Page C346, left column   (06/18/02)

*:, 169, 171, 317–319.

Page C346, right column   (07/09/01)

*`angle`, *29*, *67*, <u>*72*</u>, *107*, *135*, 211, *238*.

Page C346, right column   (10/04/04)

arccosine, arcsine, arctangent, *see* `angle`.

Page C351, right column   (02/21/08)

independent variables, <u>81</u>–<u>83</u>, 88, 224, 226.

Page C352, right column   (02/29/08)

Linné, Carl von (= Linnæus, Carolus), 325.

Page C355, right column   (02/29/08)

*`save`, <u>*155*</u>–<u>*156*</u>, *160*, 173, *178*, 180, 218,
    236, *244*, *296*, 299.

Page Dv, page number change	(12/27/11)

[For consistency with Volumes A, C, and E, the preface now begins on page v instead of page vii. This change was first made in the sixth printing.]

Page Dv (formerly Dvii), bottom two lines	(01/06/14)

corporates all of those changes. I now believe that the final bug was discovered on 03 June 2008, and removed in version 2.7182818. The finder's fee has converged to $327.68.

Page Dxiii (formerly Dxv), line −7	(12/27/11)

Format specs have no effect on the corresponding Pascal program, but they do influence

Page D2, line −17	(01/03/14)

define *banner* ≡ ´This␣is␣METAFONT,␣Version␣2.7182818´   { printed when METAFONT starts }

Page D2, lines 4 and 5 from the bottom	(12/23/02)

types; there are no '**var**' parameters, except in the case of files or in the system-dependent *paint_row* procedure; there are no tag fields on variant records; there are no *real* variables; no procedures are declared local to other procedures.)

Page D16, new paragraph to follow line 26	(06/25/04)

The first line is special also because it may be read before METAFONT has input a base file. In such cases, normal error messages cannot yet be given. The following code uses concepts that will be explained later. (If the Pascal compiler does not support non-local **goto**, the statement '**goto** *final_end*' should be replaced by something that quietly terminates the program.)

Page D22, line 26	(09/11/07)

ASCII codes [´60 .. ´71, ´136, ´141 .. ´146] must be printable.

Page D31, line 29	(06/25/04)

This is the only nontrivial **goto** statement in the whole program. It is used when there is no

Page D42, replacement for lines 8–13	(12/23/02)

Notice that if 64-bit integer arithmetic were available, we could simply compute $(2^{29} * p + q)$ **div** $(2 * q)$. But when we are restricted to Pascal's 32-bit arithmetic we must either resort to multiple-precision maneuvering or use a simple but slow iteration. The multiple-precision technique would be about three times faster than the code adopted here, but it would be comparatively long and tricky, involving about sixteen additional multiplications and divisions.

Page D43, line 20	(12/23/02)

language or 64-bit substitute is advisable.

Page D44, lines 24–26   (12/23/02)

Once again it is a good idea to use 64-bit arithmetic if possible; otherwise *take_scaled* will use more than 2% of the running time when the Computer Modern fonts are being generated.

Page D58, line 16 from the bottom   (06/25/04)

      if *j_random* $= 0$ **then** *new_randoms* **else** *decr*(*j_random*)

Page D63, line 21   (06/25/04)

Locations of *mem* between *mem_min* and *mem_top* may be dumped as part of preloaded base

---

Page D75, line 13   (06/25/04)

define *fi_or_else* $= 2$ { delimiters for conditionals **elseif**, **else**, **fi**) }

Page D76, line 5   (06/25/04)

define *type_name* $= 30$ { declare a type (**numeric**, **pair**, etc.) }

Page D77, line 16   (06/25/04)

define *lig_kern_token* $= 76$ { the operators '**kern**' and '**=:**' and '**=:|**', etc. }

Page D98, bottom two lines   (06/25/04)

They consist of zero or more parameter tokens followed by a code for the type of macro.

Page D101, line 3   (06/25/04)

METAFONT user assigns a type to a variable like `x20a.b` by saying, for example, '`boolean x[]a.b`'.

Page D102, lines 10–16   (06/25/04)

variable that is relevant when no attributes are attached to the parent. The *attr_head* node has the fields of either a value node, a subscript node, or an attribute node, depending on what the parent would be if it were not structured; but the subscript and attribute fields are ignored, so it effectively contains only the data of a value node. The *link* field in this special node points to an attribute node whose *attr_loc* field is zero; the latter node represents a collective subscript '`[]`' attached to the parent, and its *link* field points to the first non-special attribute node (or to *end_attr* if there are none).

Page D102, lines 7 and 8 from the bottom   (06/25/04)

subscr_head(*q1*) $=$ *qq1*; *qq* is a three-word "attribute-as-value" node with *type*(*qq*) $=$ *numeric_type* (assuming that `x5` is numeric, because *qq* represents '`x[]`' with no further attributes), *name_type*(*qq*) $=$ *structured_root*, *attr_loc*(*qq*) $=$ 0, *parent*(*qq*) $=$ *p*,

---

Page D103, line 6 (06/25/04)

The value of variable `x20b` appears in node $qqq2 = link(qqq1)$, as you can well imagine. Similarly, the value of '`x.a`' appears in node $q2 = link(q1)$, where $attr\_loc(q2) = h(a)$ and $parent(q2) = p$.

Page D114, line 12 (06/25/04)

Such save stack entries are generated by &save commands.

Page D120, line 3 (06/25/04)

[delete the line 'The code here ...', since the code *doesn't* use the stated fact]

Page D126, line 10 (06/25/04)

If θ_0 is supposed to have a given value E_0, we simply define $C_0 = 1$, $D_0 = 0$, and $R_0 = E_0$.

Page D138, line 11 from the bottom (10/26/06)

for the bisected interval are $z'_0 = z_0$ and $z''_0 = z_0 + (Z'_1 + Z'_2 + \cdots + Z'_n)/2^{l+1}$.

Page D142, line 3 (06/25/04)

out to hold if and only if $x_0 \le x_1$ and $x_2 \le x_3$, and either $x_1 \le x_2$ or $(x_1-x_2)^2 \le (x_1-x_0)(x_3-x_2)$.

Page D142, line 8 (10/26/06)

For example, if we start with $(x_1 - x_0, x_2 - x_1, x_3 - x_2) = (X_1, X_2, X_3) = (7, -16, 39)$, the

---

Page D142, lines 21–23 (06/25/04)

monotonic cubic, then $B(x_0, x_1, x_2, x_3; \frac{1}{2})$ is always between $.06[x_0, x_3]$ and $.94[x_0, x_3]$; and it is impossible for $\bar{x}$ to be within ϵ of such a number. Contradiction! (The constant .06 is actually $(2 - \sqrt{3})/4$; the worst case occurs for polynomials like $B(0, 2 - \sqrt{3}, 1 - \sqrt{3}, 3; t)$.)

Page D177, line 18 (06/25/04)

cur_x, cur_y: *scaled*; { outputs of *skew*, *unskew*, and a few other routines }

Page D182, lines 27–29 (06/25/04)

399. If the segment numbers on the cycle are t_1, t_2, ..., t_m, and if $m \le max\_quarterword$, we have $t_{k-1} \le t_k$ except for at most one value of k. If there are no exceptions, f will point to t_1; otherwise it will point to the exceptional t_k.

Page D184, line 18 (12/21/02)

chopped: *integer*; { positive if data truncated, negative if data dangerously large }

Page D184, line 25 (12/21/02)

if $(internal[autorounding] > 0) \wedge (chopped = 0)$ **then** xy_round;

Page D184, line 27 (12/21/02)

if $(internal[autorounding] > unity) \wedge (chopped = 0)$ **then** $diag\_round$;

Page D184, line 32 (12/21/02)

if $(internal[autorounding] \leq 0) \vee (chopped \neq 0)$ **then** $print\_spec(",{\sqcup}after{\sqcup}subdivision")$

Page D185, lines 15–19 (12/21/02)

define $procrustes(\#) \equiv$ **if** $abs(\#) \geq dmax$ **then**
       if $abs(\#) > max\_allowed$ **then**
         begin $chopped \leftarrow 1$;
         if $\# > 0$ **then** $\# \leftarrow max\_allowed$ **else** $\# \leftarrow -max\_allowed$;
         end
       else if $chopped = 0$ **then** $chopped \leftarrow -1$

Page D185, old line 22 (12/21/02)

$p \leftarrow cur\_spec$; $k \leftarrow 1$; $chopped \leftarrow 0$; $dmax \leftarrow half(max\_allowed)$;

Page D185, old line 28 (12/21/02)

if $chopped > 0$ **then**

Page D196, lines 3–8 (06/25/04)

The first job is to fix things so that $x(t)$ plus the horizontal pen offset is an integer multiple of the current "granularity" when the derivative $x'(t)$ crosses through zero. The given cyclic path contains regions where $x'(t) \geq 0$ and regions where $x'(t) \leq 0$. The *quadrant_subdivide* routine is called into action before any of the path coordinates have been skewed, but some of them may have been negated. In regions where $x'(t) \geq 0$ we have *right_type* = *first_octant* or *right_type* = *eighth_octant*; in regions where $x'(t) \leq 0$, we have *right_type* = *fifth_octant* or *right_type* = *fourth_octant*.

Page D196, lines 15 and 16 (06/25/04)

current pen might be unsymmetric in such a way that x coordinates should round differently in different parts of the curve. These considerations imply that round(x_0)

Page D200, line 4 (06/25/04)

and that there are similar ways to address other important offsets.

[Also delete the definitions of *north_south_edge*, etc., on lines 11–15; those definitions are never used.]

Page D212, line 18 (06/25/04)

at (x_0, y_0) and ends at (x_1, y_1), it's possible to prove (by induction on the length of the truncated

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Page D216, bottom line (06/25/04)

we list it twice (with coordinates interchanged, so as to make the second octant look like

---

Page D217, lines 2–10 (06/25/04)

$$w_2\, w_2\, w_2 \;\mapsto\; (-5,6)\ (-5,6)\ (-5,6)$$

as the list of transformed and skewed offsets to use when curves that travel in the second octant. Similarly, we will have

$$
\begin{array}{rll}
w_2\, w_2\, w_2 \;\mapsto\; (7,-6)\ (7,-6)\ (7,-6) & \text{in the third;} \\
w_2\, w_2\, w_3\, w_3 \;\mapsto\; (-7,1)\ (-7,1)\ (-3,2)\ (-3,2) & \text{in the fourth;} \\
w_3\, w_3\, w_3 \;\mapsto\; (3,-2)\ (3,-2)\ (3,-2) & \text{in the fifth;} \\
w_3\, w_3\, w_0\, w_0 \;\mapsto\; (-3,1)\ (-3,1)\ (1,0)\ (1,0) & \text{in the sixth;} \\
w_0\, w_0\, w_0 \;\mapsto\; (1,0)\ (1,0)\ (1,0) & \text{in the seventh;} \\
w_0\, w_0\, w_0 \;\mapsto\; (-1,1)\ (-1,1)\ (-1,1) & \text{in the eighth.}
\end{array}
$$

Page D218, lines 2 and 3 (06/25/04)

count followed by pointers to the eight offset lists, followed by an indication of the pen's range of values.

Page D218, line 15 (06/25/04)

The *link* field of a pen header node should be *null* if and only if the pen is a single point.

Page D227, line 11 (06/25/04)

endpoint. The cubics all have monotone-nondecreasing $x(t)$ and $y(t)$.

Page D228, lines 4–7 from the bottom (06/25/04)

In odd-numbered octants, the numerator and denominator of this fraction will be nonnegative; in even-numbered octants they will both be nonpositive. Furthermore we always have $0 = s_0 \le s_1 \le \cdots \le s_n = \infty$. The goal of *offset_prep* is to find an offset index k to associate with each cubic, such that the slope $s(t)$ of the cubic satisfies

---

Page D231, line 7 (06/25/04)

if $abs(du) \ge abs(dv)$ **then**　$\{\, s_{k-1} \le 1 \text{ or } s_k \le 1 \,\}$

Page D231, line 16 (06/25/04)

and return towards s_{k-1} or s_k, respectively, yielding another solution of $(*)$.

Page D246, line 4 from the bottom (06/25/04)

dinate fields. Hence, for example, the point $\big(x\_coord(p) - left\_v(q), y\_coord(p) + right\_u(p)\big)$ also

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Page D248, lines 14 and 15 (01/06/14)

the x-axis at the point $((a^2 - b^2)\sin\theta\cos\theta/\rho) + i\rho$, where $\rho = \sqrt{(a\sin\theta)^2 + (b\cos\theta)^2}$. It reaches furthest to the right of the y-axis at the point $\sigma + i(a^2 - b^2)\sin\theta\cos\theta/\sigma$, where $\sigma =$

Page D248, line 24 (06/25/04)

    else begin $beta \leftarrow minor\_axis$; $gamma \leftarrow major\_axis$; $theta \leftarrow 0$;

Page D251, line 1 (01/06/14)

536.   Only the coordinates need to be copied, not the class numbers and other stuff. At this point either $link(p)$ or $link(link(p))$ is $null$.

Page D251, line 10 (01/06/14)

$done1$: **if** $(link(p) \neq null)$ **then** $free\_node(link(p), knot\_node\_size)$;
  $link(p) \leftarrow s$; $beta \leftarrow -y\_coord(h)$;

Page D256, line 2 from the bottom (06/25/04)

we have $2^l u_{\min} = 2^l u_0 + U_{\min}$, etc.; the condition for overlap reduces to

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Page D261, line 5 (06/25/04)

tol: $integer$; { bound on the uncertainty in the overlap test }

Page D262, lines 26 and 27 (06/25/04)

    $uv \leftarrow uv + int\_packets$; { switch from $l\_packets$ to $r\_packets$ }
    $decr(cur\_tt)$; $xy \leftarrow xy - int\_packets$; { switch from $r\_packets$ to $l\_packets$ }

Page D262, line 11 from the bottom (06/25/04)

    $xy \leftarrow xy + int\_packets$; { switch from $l\_packets$ to $r\_packets$ }

Page D274, line 15 from the bottom (06/25/04)

      begin if $serial\_no > el\_gordo - s\_scale$ **then**
        $overflow(\texttt{"independent\_variables"}, serial\_no$ **div** $s\_scale)$;
      $type(\texttt{\#}) \leftarrow independent$; $serial\_no \leftarrow serial\_no + s\_scale$; $value(\texttt{\#}) \leftarrow serial\_no$;

Page D309, line 21 (06/25/04)

670.   We go to $restart$ instead of to $switch$, because we might enter $token\_state$ after the error

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Page D314, line 6 from the bottom (06/25/04)

macro_def or *iteration*).

Page D330, line 1 (06/25/04)

728. A **suffix** or **text** parameter will have been scanned as a token list pointed to by *cur_exp*,

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Page D354, lines 15 and 16 from the bottom (06/25/04)

cur_type = *unknown_boolean* means that *cur_exp* points to a capsule node that is in a ring of equivalent booleans whose value has not yet been defined.

Page D354, lines 11 and 12 from the bottom (06/25/04)

cur_type = *unknown_string* means that *cur_exp* points to a capsule node that is in a ring of equivalent strings whose value has not yet been defined.

Page D354, lines 7 and 8 from the bottom (06/25/04)

cur_type = *unknown_pen* means that *cur_exp* points to a capsule node that is in a ring of equivalent pens whose value has not yet been defined.

Page D355, lines 1 and 2 (06/25/04)

cur_type = *unknown_path* means that *cur_exp* points to a capsule node that is in a ring of equivalent paths whose value has not yet been defined.

Page D355, lines 5 and 6 (06/25/04)

cur_type = *unknown_picture* means that *cur_exp* points to a capsule node that is in a ring of equivalent pictures whose value has not yet been defined.

Page D355, lines 21 and 22 (06/25/04)

cur_type = *token_list* means that *cur_exp* points to a linked list of tokens.

Page D356, lines 2–3 (06/25/04)

nodes have *name_type* = *capsule*, and their *type* field is one of the possibilities for *cur_type* listed above. Also *link* ≤ *void* in capsules that aren't part of a token list.

Page D368, line 13 (06/25/04)

   my_var_flag: 0 .. *max_command_code*;   { initial value of *var_flag* }

Page D378, line 9 from the bottom (06/25/04)

   begin *cur_type* ← *known*; *cur_exp* ← 0; *free_node*(*q*, *dep_node_size*);

Page D380, line 12   (06/25/04)

> **begin** $type(r) \leftarrow known$; $value(r) \leftarrow 0$; $free\_node(p, dep\_node\_size)$;

Page D390, lines 2 and 3   (06/25/04)

by a previous operation.   We must maintain the value of $right\_type(q)$ in cases such as '..\\{curl2\}z\{0,0\}..'.

Page D437, line 1   (06/25/04)

996.   And $do\_assignment$ is similar to $do\_equation$:

Page D439, line 10 becomes two lines   (06/25/04)

> **begin** $nonlinear\_eq(v, cur\_exp, false)$; $cur\_type \leftarrow t$; **goto** $done$;

Page D443, line 11   (06/25/04)

$done$: **if** $eq\_type(x)$ **mod** $outer\_tag \neq tag\_token$ **then** $clear\_symbol(x, false)$;

Page D452, line 9   (06/25/04)

though they don't necessarily correspond to primitive tokens.

Page D476, line 12 from the bottom   (06/25/04)

> **if** $nl - skip\_table[c] > 128$ **then**

Page D483, line 7   (06/25/04)

> $max\_tfm\_dimen \leftarrow 16 * internal[design\_size] - 1 - internal[design\_size]$ **div** $´10000000$;

Page D483, lines 15–17   (06/25/04)

> **if** $x > 0$ **then** $x \leftarrow max\_tfm\_dimen$ **else** $x \leftarrow -max\_tfm\_dimen$;
> **end**;
> $x \leftarrow make\_scaled(x * 16, internal[design\_size])$;

Page D496, line 2   (06/25/04)

a pointer to an edge structure.   Its mission is to describe the positive pixels in GF form,

Page D500, line 16   (06/25/04)

> $selector \leftarrow old\_setting$; $gf\_out(cur\_length)$; $gf\_string(0, make\_string)$; $decr(str\_ptr)$;

Page D506, lines 8–10   (06/25/04)

METAFONT it says, for example, '(preloaded base=plain 1984.2.29)', showing the year, month, and day that the base file was created. We have $base\_ident = 0$ before METAFONT's tables are loaded.

Page D514, line 14 from the bottom (06/25/04)

CMMF, should also be provided for commonly used bases such as cmbase.

Page E1, line 3 (01/06/06)

Zillions of alphabets can be generated by the programs in this book. All

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Page E6, lines 16–19 (12/29/04)

- *square_dots* tells whether dots should be square, not rounded;
- *hefty* tells whether weight-reducing strategies should be used;
- *monospace* tells whether the characters should all be forced to have the same width;

Page E7, line 11 (12/21/02)

$hair$, $vair$, $stem$, $curve$, ess, $flare$, dot_size, bar, $slab$,

---

Page E7, line 14 (12/21/02)

$crisp$, $tiny$, $fine$;

and *thin_join* should not be less than *fine*.

Page E19, line 19 (11/07/01)

cap_notch_cut	46/36	31/36	25/36	24/36	22/36	25/36

Page E41, line 8 (12/21/02)

$extra\_endchar \leftarrow extra\_endchar$ & `"charcode:=charcode+code_offset;"`;

Page E53, line 7 (12/21/02)

numeric $mid\_thickness$; $mid_thickness = $ Vround $1/3[vair, stem]$;

Page E125, line 6 from the bottom (07/10/05)

$top\ y_1 = top\ y_6 = h$; $z_2 = .5[z_3, z_1] + bend$;

Page E125, line 3 from the bottom (07/10/05)

draw $z_1 - flourish\_change\{up\} + (0, .15asc\_height)\{up\}$
$\ldots \{right\}(z_1 + (2u, 0)) \text{ --- } z_6 \ldots \{down\}z_7$;   % upper bar

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Page E146, also pages 164 and 540 (02/08/03)

[The labels on the new illustrations of beta, omega, and spadesuit are too large, and the resolution of the shapes is too small.]

Page E147, line 11 from the bottom   (04/23/04)

$x_0 = x_1 = x_9$; *lft* x_{0r} = hround($1.5u - .5hair$); $x_2 = x_4 = x_6 = x_8 = .5w - .25u$;

Page E147, line 8 from the bottom   (04/23/04)

$y_5 = .5[y_4, y_6]$; *top* y_{6r} − *bot* y_{4r} = *vstem* + *eps*; *bot* y_{8r} = −*oo*; $y_7 = y_9 = .55[y_6, y_8]$;

Page E149, line 8 from the bottom   (04/23/04)

$y_5 + .1x\_height = y_7 = .5[y_6, y_8]$; *bot* y_{6r} = −*oo*;

Page E157, line 11   (02/29/08)

filldraw z_{1l} -- z_{2l} ... (x_3, y_{2l}) ... z -- z_{1r} -- cycle;   % stem

---

Page E161, line 7 from the bottom   (04/23/04)

top y_{1r} = *x_height* + *oo*; $y_2 = y_4 = .5[y_1, y_3]$; *bot* y_{3r} = −*oo*;

Page E209, line 3   (12/29/04)

  % This lowercase italic alphabet was prepared by D. E. Knuth in December, 1979,

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Page E377, lines 3 and 4 from the bottom   (12/22/02)

   path p_-; $p_- = z_{\$\$l}\{z_{@1} - z_{\$\$l}\}$ ... *darkness*$[z_{@1}, .5[z_{@2}, z_{\$\$l}]]$ ... $z_{@2}$
     --- $z_{\$l}$ -- $z_{\$r}$ -- $z_{@0}$ -- $z_{\$\$r}$ -- cycle;
   if $(y_{\$\$} > y_{\$}) \neq$ (ypart **precontrol** 1 of p_- > ypart **postcontrol** 1 of p_-):
     $p_- = z_{\$\$l}\{z_{@1} - z_{\$\$l}\}$ ... *darkness*$[z_{@1}, .5[z_{@2}, z_{\$\$l}]]$
       --- $z_{\$l}$ -- $z_{\$r}$ -- $z_{@0}$ -- $z_{\$\$r}$ -- cycle; **fi**
   filldraw p_-;   % arm and beak

Page E379, lines 17 and 18 become one line   (01/06/14)

else: *rt* x_{6r} = hround($w - 1.5u$); $y_6 = y_{5l} + eps$; **fi**

Page E379, bottom line of the program   (01/06/14)

math_fit$(0, ic^{\#} - 2.5u^{\#})$; **penlabels**$(0, 1, 2, 3, 4, 5, 6, 7)$; **endchar**;

Page E489, bottom line   (06/25/04)

labels$(1, 2, 3, 4, 5, 6)$; **endchar**;
[Labels '5' and '6' should also be added to the lower illustration on page E488.]

Page E545, line 11 from the bottom   (12/29/04)

  The most important general routine in `cmbase` is probably the *pos*

Page E551, line 3 from the bottom (12/29/04)

quantities needed in the `calu` programs are also established at this time.

Page E577, right column (12/23/02)

p_-, 305, 377.
padded, 103–111, 117–121, <u>549</u>.

Page E578, left column (12/23/02)

postcontrol, 347, 377.
precontrol, 347, 377.