10 Mar 1978
1 Rename a few external variables to make their first six letters unique.
2 Initialize escape_char to −1, not 0 [it will be set to the first character input]. §240 D
3 Fix bug: The test ‘id < 200’ was supposed to distinguish one-letter identifiers from longer (packed) ones, but negative values of id also pass this test. §356 L
4 Fix bug: I wrote ‘while α ∧ (β ∨ γ)’ when I meant ‘while (α ∧ β) ∨ γ’. §259 B
5 Initialize the input routines in INITEX [at this time a short, separate program not under user control]. §1337 R
6 Don’t initialize mem in INITEX, it wastes time. §164 E
7 Change ‘new_line’ [which denotes a lexical scanning state] to ‘next_line’ [which denotes carriage_return and line_feed] in print commands. §277 M
• About six hours of debugging time today.
• INITEX appears to work, and the test routine got through start_input, chcode [the TEX78 command for assigning a cat_code], get_next, and back_input the first time.

11 Mar 1978
10 Insert space before ‘(’ on terminal when opening a new file. §537 I
11 Put ‘p ← link(p)’ into the loop of show_tokenlist, so that it doesn’t loop forever. §292 F
12 Shift the last item found by scan_toks into the info field. [With SAIL all packing of fields was done by arithmetic operations, not by the compiler.] §474 L
13 Fix the previous bugfix: I shifted by the wrong amount. §474 B
14 Add a feature that prints a warning when the end of a file page occurs within a macro definition or call. [System dependent.] §336 I
• Unintended bugs in my test routine [a format intended eventually to typeset The Art of Computer Programming] helped check out the error recovery mechanisms. For example, I had ‘\\lift{#}’ instead of ‘\\lift{#}’ inside a macro, and three cases of improper { and } nesting.
15 Add the forgotten case ‘set_font:’ to eq_destroy. §275 F
16 Change \require to eq_dest. §376 C
17 Add code for the case cur_cmd = 0 [later known as the case ‘t ≥ co_token.flag’] when scanning a tokenlist.
• That’s the first “big” error I’ve spotted so far.
18 Introduce a ‘d’ option in the error routine, to facilitate debugging. §84 I
19 Assign a floating-point constant ignore_depth to prev_depth, instead of assigning the integer constant flag [since prev_depth is type real in TEX78]. §215 L
20 Improve the readability and spacing of show_node_list output. §182, 187 I
21 Set the variable v before using the case construction in show_node_list, because there’s one case where v didn’t receive a value [as part of the field unpacking]. §182 F
• About seven hours today.
• One hour to enter yesterday’s corrections and recompile.
• At this point TeX correctly located further unintended syntax errors in acphdr [the test file].

12 Mar 1978
22 Insert debug_help into succumb, giving a chance to look at memory before the system dies. §93 I
23 Use eq_destroy wherever necessary in unsave. §283 D
Change \( t \leftarrow (t - 1) \mod 8 \) to \( t \leftarrow (t - 1) \land 7 \) in id\_name, since SAIL has \(-1 \mod 8 = -1\). [At this time, id\_name is a routine that unpacks control sequence names, according to a scheme that will become obsolete after change #422.]

25 Remove the space that appears at end of paragraph. (I hadn’t anticipated that.)

26 Throw away unwanted line\_feed after getting a carriage\_return in response to in\_chr\_w [a system routine for input from the terminal].

27 Delete spurious call to flush\_list in end\_token\_list.

- Why did I make such a silly mistake?
- While tracking that bug down, I found out incidentally that kerning is okay.

28 Fix bug in get\_x\_token: I forgot to say ‘macro\_call’ (which is the main point of that routine)!

- While tracking that bug down, I found out incidentally that kerning is okay.

29 Fix bug in scan\_spec (while instead of repeat).

30 Make the table entries for \hfill and \hskip consistent with the program conventions.

31 Disable unforeseen coercion: When scan\_spec put hsize on save\_stack, the value changed from real to integer.

32 Use ‘*’ instead of ‘-1.0’ for running dimensions of rules in show\_node\_list.

33 Clear mem\[head\] to null in push\_next [in \\TeX82, this will be done by get\_avail].

- A vrule link got clobbered because I forgot to do this.

34 Translate ASCII control codes to special form when displaying them.

- Ligatures work, but show\_node\_list showed them funny.

35 Remember to clear parameters off save\_stack in package routine.

- About eight hours today.

13 Mar 1978

36 Introduce a new variable hang\_first [later the sign of hang\_after].

37 Simplify the new code, realizing that if hang\_indent = 0 then hang\_first is irrelevant.

- Time sharing is very slow today, so I’m mostly reading technical reports while waiting three hours for compiler, editor, and loading routine.

- I’m not counting this as debugging time!

- (Came back in the evening.)

38 Spruce up the comments in the line\_break routine, which appears to be almost working.

39 Rethink the setting of best\_line; it’s 1 too high in many cases. [The final line of a paragraph was handled in a treacherous way.]

40 Compute proper initialization for prev\_depth when beginning an \hbox with a paragraph inside. [This refers to a special ‘paragraph box’ construction, used when an hbox of specified size becomes overfull; T\TeX78 doesn’t have the concept of internal vertical mode.]

41 Also initialize tail in that case.

42 Also put the result of line\-breaking into the correct list.

43 Fix a typo in the free\_node routine (‘link’ not ‘llink’); by strange chance it had been harmless until today.

44 Fix bug: post\_line\_break forgot to set adjust\_tail.

45 Update act\_width properly when looking for end of word while line breaking.

46 Repair the “tricky” part of get\_node: I used the info field when I meant to say link.

- Now the \lines macro of acphdr works! [See \lines in The \TeXbook, page 417.]
Reset `contrib/tex` properly in `buildpage`. 

Fix typo (- for +) in computation of `page_total`. 

Change the page-breaking logic: TeX reached `fireup` with `best_page_break = null` in one case, since the badness was too bad. 

Perform the operation `delete_token_ref(top_mark)` only when `top_mark \neq 0`. 

Make `scan_toks` omit the initial \ of an `output` routine. 

Insert a comma to make memory usage statistics look better. 

About seven good hours of debugging today. 

Tomorrow will be first-output day (I hope). 

(Came in evening after sleeping most of day, to get computer at better time.) 

(Some day we will have personal computers and will live more normally.) 

8:30pm, began to enter corrections to yesterday’s problems. 

Issue an error message for non-character in filename or in font name. 

Display ‘...’ for omitted stuff in `show_context` routine. 

Watch out for the SAIL syntax `\alpha + \beta \mathfrak{g}`; it doesn’t shift \alpha + \beta left (only \beta). 

That error was very hard to track down; it created a spurious link field and sent `hash[0] = \beta` to the scanner! 

I could have found this bug an hour sooner if I had looked at the correct stack entries for `name` and `token_type`. 

Show the correct page number when tracing pages before output is shipped. 

Remember to nullify a box after using it. 

Issue an error message if `\box255` isn’t consumed by the output routine. 

I’m having trouble with the SAIL debugger; it makes an illegal memory reference and dies, when single-stepping past the entry to recursive procedures `hlistout` and `vlistout`. So I have to reload and be careful to go thru these procedures at high speed. 

Fix bug in comment (memory parameter description said `\geq` not `\leq`). 

Fix typo in definition of rule output (said x, y not x0, y0). [This part of the code went away when DVI files were introduced.] 

Correct the embarrassing bug in shellsort, where I said ‘\leq str[k]’ not ‘\leq t’.

[The first TeX had to sort all output by vertical position on page.] 

Make `start_input` set up `job_name` in the form needed by `shipout`; it uses obsolete conventions. 

Insert ( and ) into the SAIL macro definition of `new_string`. [This macro was for pre-DVI output.] 

Unscramble the parameters of `out_rule`: The declaration was \((x0, y0, x1, y1)\) while the call was \((x0, x1, y0, y1)\). 

4:30am, TeX’s first page is successfully output! 

(It was ‘/titlepage/setcpage1\corners\eject\end’.)

10:30pm. Today I’m instrumenting the line-breaking routine and putting it through a bunch of tests. 

(The inserted instrumentation had bugs that won’t be mentioned here.) 

Don’t abort the job when `eq_destroy` redefines a TeX control sequence. 

The first word of a paragraph won’t be hyphenated \ldots so be it! 

Fix the typo in `line_break` that spoils the test for ‘letters in the same font’. 

The effect of that typo was to suppress all hyphenation attempts. 

Replace the space at paragraph end by fillglue, not by zero. 

Pack the hyphen character properly into its node. 

Fix a typo (‘-‘ for ‘+’) in the computation of `break_width`. 

---

14 Mar 1978

---

15 Mar 1978

---
Change the \end maneuver; the present code doesn’t end the job, since I forgot that \texttt{back_input} uses \texttt{curtok}.

Add a parameter to \texttt{try_break}, since the width is different at a discretionary hyphen. [This problem will be solved differently in \TeX82, when discretionaries become much more general.]

Bypass kern nodes in pre-hyphenation.

Supply code for the forgotten case ’< “a”’ in pre-hyphenation. [This case was later generalized to a test of \texttt{lc_code}.]

\begin{itemize}
\item \emph{Such blunders. Am I getting feeble-minded?}
\end{itemize}

Introduce special logic for \texttt{eject_penalty}; I was wrong to think that forced execution was exactly like an infinitely negative penalty.

Use \((1 + b)^2 - p^2\) when computing demerits with \(p < 0\).

\begin{itemize}
\item 6:30am. The line-breaking algorithm appears to be working fine and efficiently. On small measures (about 20 characters per line), it gives overfull boxes instead of spaced out ones. Surprising but satisfactory.
\end{itemize}

\textbf{16 Mar 1978}

\begin{itemize}
\item 9pm. The plan for tonight is to test page breaking and more paragraphing.
\item Insert ‘\texttt{topskip}’ glue at beginning of page.
\item Add ‘\texttt{pausing}’ feature.
\item Fix discrepancy: In \texttt{make Accent} I called \texttt{vpackage} with a pointer to the first list item, but \texttt{vpackage} itself assumes that the parameter is a pointer to that pointer. [The \texttt{vpackage} of \TeX82 will be different.]
\item I checked for other lapses like that. Result: 14 calls OK, 12 NG.
\item Create a new temporary list head location, \texttt{hold_head}, since there’s a case where \texttt{vpackage} is improperly called with parameter \texttt{temp_head}. [At this time \texttt{vpackage} uses \texttt{temp_head} to make a list of all insertions found.]
\item 11:30pm. The machine is tied up again.
\item Write code to handle charnodes in \texttt{vlists}; I forgot that I’d decided to allow them. [Later I prohibited them again!]
\item Combine the page lists before pruning off glue in \texttt{fire_up}; otherwise the pruning doesn’t go far enough.
\item 25 \rightarrow 83 Fix typo where line-breaking starts: ‘\texttt{fill_glue}’ should be ‘\texttt{new_glue(fill_glue)}’.
\item Add \texttt{/q} to \texttt{xspool} command (cosmetic change). [This changes a system command that causes \TeX output to be printed on the Xerox Graphics Printer (XGP), the progenitor of future laser printers; the \texttt{/q} option says that the queue of printing requests should be displayed on the user’s terminal.]
\item Don’t write a form feed after the last page of output.
\item \emph{To fix this, I reorganized \texttt{shipout}, and it became simpler.}
\item Correct a typo (‘\texttt{+}’ for ‘\texttt{-}’) in the \texttt{elist_node} case within \texttt{hlist_out}. [The output routines were quite different at this time, because output went directly to the XGP.]
\item Change the message ‘\texttt{completed page}’ to ‘Completed for page’.
\item 48 \rightarrow 88 Fix yet another typo in the computation of \texttt{page_total}: My original code said \texttt{stretch(p)} instead of \texttt{stretch(q)} (terrible).
\item Document the dirty trick about \texttt{bot_mark}’s reference count. [That trick is, fortunately, no longer useful.]
\item Rethink the algorithm for contributing an insertion: The original code tests for a page break after incrementing the totals but before the \texttt{contrib_list} is updated. [\TeX78 handles insertions in a hardwired manner that will be greatly generalized in \TeX82.]}

\begin{itemize}
\item 70 \§1054 M
\item 71 \§840 A
\item 72 \§896 F
\item 73 \§897 F
\item 74 \§878 B
\item 75 \§851 A
\item 76 \§859 A
\item 77 \§668 M
\item 78 \§1014 M
\item 79 \§669 F
\item 80 \§1017 F
\item 81 \§642 I
\item 82 \§642 E
\item 83 \§816 B
\item 84 \§622 T
\item 85 \§638 I
\item 86 \§1004 B
\item 87 \§1016 P
\item 88 A
\end{itemize}
Fix `get\_node` again: After the variable memory overflows, control falls through to `found` instead of going to the `overflow` call.

- I spent several hours tracking down that data structure bug!

Change `new\_line` to `next\_line` in yet another print command (see #7).

Amend the line-breaking algorithm: \texttt{\textbackslash break} in paragraph doesn’t work with really bad breaks.

- A problem to be diagnosed tomorrow: Each time I run the test program, the amount of memory in use grows by 13 cells not returned.
- Seven hours tonight.

17 Mar 1978

Introduce \texttt{dead\_cycles} to keep `\end` active until `ship\_out` occurs.

Don’t call `line\_break` with an empty list.

Take proper account of the (infinite) fillglue when computing the width of a paragraph line preceding a display.

Add a new parameter to `hpack` so that `line\_break` won’t be called at the wrong time. [This is for the soon-to-be-obsolete feature described in #40.]

Give a warning message if there’s an `\hfill` in the middle of a paragraph; fillglue upsets the line breaker, because floating-point calculations don’t have sufficient accuracy.

- I spent an hour looking for another bug in \TeX, but the following one was in \texttt{METAFONT}: The `\textwidth` data in fonts had been supplied wrong.
- It took two hours to recompile 32 fonts with proto-\texttt{METAFONT}.

Make `show\_node\_list` and `show\_token\_list` more robust in the presence of software bugs.

Do not remove nodes with `eject\_penalty`, when the new parameter to `hpack` is `true`.

Put a fast exit into `hpack`; e.g., at glue nodes, test `if paragraphing \^h\ current width is large`.

- 2am. I have to go to bed “early” tonight.

18 Mar 1978

- 3:30pm. (Saturday)

Add a parameter to `check\_mem` (to suppress display unless needed).

Introduce a user-settable parameter `\maxdepth`, and pass it as a parameter to `vpackage`.

- I realized the need for `\maxdepth` while fixing insertions (see #90).

Introduce a user-settable parameter for `line\_break`: The constant 2.0 in my original algorithm becomes `\jpar` [later `\tolerance`], to be set like `\tracing`.

Reclaim the `eject\_penalty` nodes removed during line-breaking.

- (Those were the 13 extra nodes reported on Thursday.)
- The `init\_align` procedure worked right the first time!
- Also `init\_row`, `init\_col`. But then…

Rethink the command codes: `ende` in a token list has too high a code for the assumptions of `get\_next`.

Add a `prev\_cmd` variable for processing delimited macro parameters; the original algorithm loses track of braces. [The rules will change slightly in \TeX82, and `brace\_ptr` will take on a similar function.]

Make the `get\_next` routine intercept `&` and `\cr` tokens.

- I’d thought I could just put `&` and `\cr` into `big\_switch` [i.e., in the stomach of \TeX, not the eyes]; that was a great big mistake.

Make more error checks on `endv`; e.g., it must not occur in a macro definition or call.
108 → 110 No, rethink alignments again; the new program still fails!

- For the first time I can glimpse the hairiness of alignment in general (e.g., `\halign{\&\&\&\&}` when & and \& are defined to include \&'s and possible alignments themselves).
- I think there's a "simple" solution, by considering only whether an alignment is currently active [in §342].
- 11:30pm. Went to bed.

19 Mar 1978

- Woke up with "better" idea on how to handle \& and \texttt{\textbackslash cr}.
- (Namely, to consider a special kind of \texttt{\textbackslash def} whose parameters don't interrupt on \&'s and \texttt{\textbackslash cr}'s.)
- But replaced this by a much better idea (to introduce \texttt{align_state}).
- 11pm. Began to use computer. Performed major surgery (inserting \texttt{align_state} and updating the associated routines and documentation).

111 Pop the alignment stacks in \texttt{fun_align}.

110 → 112 Fix a (newly inserted) typo in \texttt{show_context}.

110 → 113 Set \texttt{align_state} false when a live \& or \texttt{\textbackslash cr} is found. [Originally \texttt{align_state} was of type boolean.]

114 Insert \texttt{\textbackslash cr} when \texttt{'\{'} occurs prematurely in an alignment.

115 Remember to record \texttt{glue_stretch} when packaging an unset node.

- I had a mistake in \texttt{acphdr} definition of \texttt{\textbackslash quoteformat}; also extra spaces.
- My first test programs, used before today, were contrived to test macro expansion, line-breaking, and page layout.

- Next I'm using a test program based on Volume 2.

116 Make carriage-return, space, and tab equivalent for macro matching.

117 Omit the reference count node when displaying a mark.

118 Correct a silly slip: I wrote \texttt{'type_displacement'} instead of \texttt{'value_displacement'} when packing data in a penalty node.

119 Don't go to \texttt{build_page} after seeing \texttt{\textbackslash noindent}; \TeX{} isn't ready for that. [In the original program, this was an instance of a bad \texttt{goto}.

- I had undesired spaces coming thru the scanner in my macro definitions of \texttt{\textbackslash tenpoint} [see \TeX{}book, page 414].
- 4am. \TeX{} now knows enough to typeset page 1 of Volume 2!
- Also it did its first "math formula" (namely $\mathbb{R}$) without crucial error.
- (Except that the italic correction was missing for some reason.)

120 Remember to decrement \texttt{cur_level} in \texttt{fun_align}. [The routines will eventually become more general and use \texttt{unsave} here.]

121 Remember to increment \texttt{cur_level} in error corrections by \texttt{handle_right_brace}.

- A better procedure will be adopted later.

122 Fix a typo: ("C instead of "Y") in error message for \texttt{mmode + math_split}.

123 Make \texttt{show_node_list} more robust and more like the new \texttt{show_node_list}. [The routines will be combined in \TeX82.]

124 Fix a typo in \texttt{char_box}: should say \texttt{font_info_real}. [In \TeX78 a single array is used for both \texttt{real} and \texttt{integer}; in \TeX82 things will be \texttt{scaled}.

125 Fix typos in the definitions of \texttt{default_rule_thickness} and \texttt{big_op_spacing}; they shouldn't start at \texttt{mathex}(7).

126 Reverse the \texttt{before} and \texttt{after} conventions in math nodes.

- I had them backwards; this turned hyphenation on just before math, and off just after it!
- Seven and a half hours debugging today. Got through the test program a little more. But \TeX{} blew up on "$\texttt{\$}^{18}$"; tomorrow I hope to find out why.
20 Mar 1978

• 8pm. I decided to work next on a super-hairy formula.

127 Change \`ascii' to \`cc' (character code). [This name will change again later, to \`char'.] §265 C

128 Don't bother to store a penalty node at the beginning of $$ when the paragraph-so-far fits on a single line, since such a penalty has already been stored. [These conventions will change later, and the \texttt{\textbackslash predisplaypenalty} will always be stored.] §1203 E

129 Avoid reference to tail in \texttt{\textbackslash build\_page}, if \texttt{\textbackslash nest\_ptr} > 0. §995 S

130 Correct a silly slip in \texttt{math\_comp} (the exact opposite of what I did in #118). §1158 B

131 Rectify my mental lapse in \texttt{make\_fraction}; I said nucleus instead of thickness. §743 B

132 Mask off the math class when scanning delimiters. §1160 F

133 Allow an optional space after \texttt{\textbackslash def{...}}. [This decision will be retracted later.] §473 C

• My test example is so complicated it causes the semantic stacks to overflow!

134 Don't test for no pages output by looking at the channel status. §642 L

135 Fix typo in definition of \texttt{\textbackslash mathop (open\_noad not op\_noad)}. §1156 T

136 Rewrite \texttt{\textbackslash mlist}, because \texttt{\textbackslash left(...\textbackslash above...\textbackslash right)} doesn't parse correctly; the \texttt{\textbackslash left} goes into the numerator, the \texttt{\textbackslash right} into the denominator. §1184 A

137 Correct the use of \texttt{depth\_threshold} in \texttt{print\_subsidiary\_data}: Simple fields get shown while others look empty. §692 B

78 ↔ 138 Return the carriage before showing the first line of a new file when pausing. §538 I

139 Fix bug: The call \texttt{show\_noad\_list(mem[...])} should be \texttt{show\_noad\_list(...)}, in the \texttt{incomplete\_noad} case of \texttt{show\_activities}. §219 M

• 3am. The whole messy formula has been parsed correctly into a tree.

• The easy part is done, now comes the harder part.

140 Don't shift single characters down in \texttt{make\_op}. §749 F

141 Make \texttt{clean\_box} return a box (as its name implies), not an hlist.

• Font info still isn't quite right, it has the wrong value of \texttt{quad}. §720 D

142 Retain the italic correction when doing \texttt{rebox}; can make \texttt{glue\_set} \neq 0 a flag for this. [A better solution will be adopted later.]

• 6am; ten hours today. \TeX{} didn't do \texttt{\%3pl\over2\$} correctly, but was close.

• I found that the \texttt{rebox} problem (#142) went away when I fixed the \texttt{clean\_box} problem (#141); but I will leave the extra stuff about \texttt{glue\_set} \neq 0 in the program anyway, just for weird cases.

144 Omit extra levels of boxing when possible in \texttt{clean\_box}. §721 E

• (To do this, I need to face the \texttt{rebox} problem anyway.)

21 Mar 1978

• 10pm. The computer is rather heavily loaded tonight.

145 Don't forget \texttt{thickness} when making a square-root sign (see #131). [The rule thickness will later be derived from the character height.] §737 F

146 Define \texttt{p} local to the \texttt{make\_fraction} routine. §743 L

• Unwittingly using the global \texttt{p} was a disaster.

147 Don't show the amount of \texttt{glue\_set} when it's zero. §186 I

142 ↔ 148 Make \texttt{glue\_set} nonzero in the result of \texttt{var\_delimiter}. §706 D

149 Fix bug: The \texttt{math\_glue} function didn't return any result. §716 F

150 Fix typo in \texttt{char\_box} (c not w); this caused a subscripted P to come out the same width as an unsubscripted P. [Later changes in the rules will move this computation to §755.] §709 T

144 ↔ 151 Revise \texttt{clean\_box} to do operations that are needed often because of the \texttt{rebox} change. §720 P

152 Use the new \texttt{clean\_box} to avoid a bug in \texttt{\textbackslash sqrt\{\textbackslash raise...\}.} §737 D
153 Change the definition of `\not` so that it's a relation (which will butt against the following relation). [All math symbols and Greek letters are defined in INITEX at this time, not in a changeable format definition.] 

154 Give error message `Large delimiter must be in mathex font`, instead of calling confusion, since the error can occur. [This particular error is impossible in \TeX82.] §706 I

155 Change the use of \texttt{p} in \var{delimiter}: it isn't always set when I say \texttt{goto found}. §706 F

- Another font problem now surfaced: The mathex meta-font didn't compute \TeX info in a machine-independent way. (It took two hours to correct this.)

156 Don't forget to set \var{type}(b) in all relevant cases of \var{delimiter}. §708 D

157 Use the correct sign convention for shift\_amount in \package{hpackage}. §653 B

158 Always kern by \delta when there's no superscript. §755 F

159 Declare \space\_table to be [0 \ldots 6, 0 \ldots 6] not [0 \ldots 7, 0 \ldots 7]; otherwise its entries are preloaded into the wrong positions. [The \space\_table in \TeX78 is 7 \times 7; it will become 8 \times 8 in \TeX82, represented as a string called \math{spacing}.] §764 M

160 Use a negative value, not zero, to represent a null delimiter. [Actually zero will come back again later.] §685 C

127 $\rightarrow$ 161 Change `\cc` to `\char`.

162 Don't use tricky subtraction on packed data when changing \texttt{q} to an \texttt{ord\_noad} in \texttt{mlist\_to\_hlist}; subtraction isn't always safe. §729 L

163 Fix two typos in the \space\_table (\star for 0). §764 B

164 Initialize \texttt{cur\_size} everywhere (I forgot it in two places). §703 F

165 Reset \texttt{op\_noad} before resetting \texttt{bin\_noad}. §728 A

166 Treat \texttt{display\_style + cramped} the same as \texttt{display\_style} inside \texttt{make\_op}. §749 F

167 Shift the character correctly in the non-\texttt{\displaystyle} case of \texttt{make\_op}. §749 B

- Still another font problem: The italic corrections are wrong because the corresponding array was declared \texttt{real} in \texttt{proto-METAFONT} (and italic corrections were used in nonstandard way in \texttt{mathex}).

168 Use \texttt{depth} instead of \texttt{height} in \var{delimiter}. [Later, both were used.] §714 B

169 Skew the accents according to the font \texttt{slant}. [Soon retracted.] §741 Q

- At this point I think nearly all the math routines have been exercised.
- Tomorrow they should work!
- Eight hours debugging today.

22 Mar 1978

- (Wednesday, but actually Thursday: I began at midnight because I was proofreading a paper.)
- I checked out the font access tables, slowly (i.e., all the `\mathcode` and special-character name entries were catalogued).

169 $\rightarrow$ 170 Do not consider slants after all in the math accent routine, since slanted math letters are put differently into fonts. §741 Q

171 Don't use \texttt{q} for two different things simultaneously in \texttt{make\_math\_accent}. §738 B

172 Fix bug in \texttt{compact\_list} (I forgot to advance the loop variable). [This procedure became unnecessary in \TeX82.] F

173 Avoid conflict between \var{delimiter} and \texttt{mlist\_to\_hlist}, which want to use \texttt{temp\_head} simultaneously. §713 M

174 Fix bad typo in overbar routine (\texttt{b} for \texttt{p}). §705 T

- Finally \TeXX got to \texttt{after\_math} after dealing with that hairy formula...

175 Fix another bad typo: \texttt{p} for \texttt{b} this time. §1199 T

176 Insert more parentheses (twice) because of `\lsh` precedence in SAIL. §1199 L

36 $\rightarrow$ 177 Use the new hanging-indentation conventions when formatting displayed equations. §1199 M

178 Recompute penalties so that break is allowed after \texttt{punct\_noads}. §761 Q
Center the large delimiters vertically. §749 F
Round all rule sizes (up) before drawing them. §589 Q
Provide more space over \( x \) in \( \sqrt{x} \), and more space atop vincula. §705, 737 Q
Make large delimiters large enough to cover formula height (important for subscripts, superscripts). §762 Q
Insert /\texttt{ntn=33} on XGP prompt message so that complex math won’t blow the device driver. [See #84.] I
Update the comment about the meaning of $\backslash \texttt{char}$, since it can be used in math mode. §208 P

- Six hours today.

23 Mar 1978

- 11pm, Maundy Thursday.

104 $\rightarrow$ 185 Make $\backslash \texttt{tracing}$ and $\backslash \texttt{vpar}$ follow block structure. §283 C

- It took me two hours to enter yesterday’s corrections, because the changes were so numerous.

186 Fix bad call on \texttt{begin_token_list} when marks are to be scanned. §396 M

- Now the formula looks like it should, modulo problems in fonts.

187 Prevent an exponent from going below baseline $+ x$height/4. §758 Q

188 Change quad to math_quad when finishing a display (several places). §1199 B

189 Don’t use \texttt{append_hlist} when putting an \texttt{eqno} box on a separate line, because the page shouldn’t break at glue there. [Later, the \texttt{append} will be used but preceded by an infinite penalty.] §1205 A

190 Increase the input stack_size; \TeX{} may need to back up a lot. §11 S

191 Don’t assume that \texttt{p} always points to a glue node when a page is broken. §1017 A

192 Use $\backslash \texttt{epsilon}$ in \texttt{scan_spec} (I had used a different small constant). [This was a kludge to avoid the extra parameter later called \texttt{exactly} or \texttt{additional}.] §645 A

193 Introduce a new procedure \texttt{scan_positive_length}, to prevent negative or zero lengths in \texttt{scan_rule_spec}. [This restrictive rule will be “overruled” later.] §463 R

194 Fix ridiculous bug in the leaders routine of \texttt{vlist_out}: I had the initialization inside the loop! §635 B

195 Eliminate confusion between the two temp variables named \texttt{h}; one is real and the other is integer. §629 L

196 Include forgotten case (\texttt{leader_node}) in \texttt{hlist_out}. [Type \texttt{leader_node} will be absorbed into \texttt{glue_node} in \TeX{}82.] §622 F

197 Don’t forget to compute \( x0 \) in variable horizontal rules. §624 F

- Seven and a half hours today.

- \TeX{} seems to be ready to tackle my test file based on Volume 2.

198 Calculate \( y0 \) in horizontal rules as an integer number of pixels from the baseline, so that the baseline doesn’t jump. §589 S

25 Mar 1978

- 2am Saturday. (Might as well drop Friday.)

185 $\leftarrow$ 199 Make $\backslash \texttt{def_code}$ consistent with the new \texttt{tracing} conventions. [Many tracing options are packed into a single parameter called \texttt{tracing}.] §1233 D

185 $\leftarrow$ 200 Don’t allow users to change nonexistent things like $\backslash \texttt{catcode1000}$. §1232 R

110 $\leftarrow$ 201 Reset \texttt{align_text} at beginning of \texttt{init_align}. §774 F

202 Don’t forget $\backslash \texttt{scan_left_brace}$ after \texttt{noalign}. §785 F

110 $\leftarrow$ 203 Set cur_w’s $\leftarrow 0$ in \texttt{get_next}, after $\backslash \texttt{cr}$ causes a switch to the \texttt{(e)} template. §342 F

- Ouch, that was a big bad bug, which took me three hours to find (since I thought \TeX{}’s low-level scanning mechanism was working).
Note to myself: I knew it would be cleaner to define get\_next so that it sets cur\_cs to zero every time it begins [i.e., in §341, where this change will in fact be made in \TeX82]. But I had avoided this on grounds of efficiency in the inner loop. Well, now I have earned this tiny bit of efficiency.

204 Prohibit the first word of an unavailable node from becoming negative. [The storage allocator of \TeX78 uses a negative value to signify a node that is available, just as 'link = \text{max\_halfword}' will signal availability in \TeX82.]

\[\begin{align*}
\text{§124 D} & \\
\text{§1100 M} & \\
\text{§240 F} & \\
\text{§188 B} & \\
\text{§292 R} & \\
\text{§1016 D} & \\
\text{§1101 M} & \\
\text{§1014 D} & \\
\text{§1018 A} & \\
\end{align*}\]

205 Remember to un-negate the top save\_stack entry when handle\_right\_brace finishes an insert\_group. [This routine was completely revised in \TeX82.]

206 Initialize \par [i.e., \text{\texttt{tolerance}}].

207 Correct the display of insertion nodes by show\_node\_list.

208 Prevent show\_token\_list from generating really long strings when in a loop.

209 Increase the reference count of bot\_mark when vpackage finds it. [This was later the job of fire\_up.]

210 Remember that the tokenlist for a mark ends with a \}. [§1016 D]

211 Don’t let vpackage lose the top insert. (It fails when the very first item is a \topinsert.)

212 And when that stupid code is corrected, make it handle insertions first-in-first-out.

- Seven hours today.

26 Mar 1978

- Easter Sunday, will work till sunrise.

213 Add an ‘i’ feature to the error recovery routine.

214 Include a prompt.

215 Ignore space after \texttt{\textbackslash noalign}(...).

- Otherwise, things are going well tonight; I’m finding more bugs in my test program than in \TeX.
- The ‘i’ feature is proving to be very helpful.
- I increased the size of \texttt{mem} (now \texttt{lo\_mem\_max} = 3500, \texttt{mem\_max} = 10000).
- In fact I just needed to increase it again (now \texttt{lo\_mem\_max} = 4500, \texttt{mem\_max} = 11000).

216 Make INTEX output \texttt{mem\_top} for consistency checking.

217 Calculate the size of delimiters by considering the enclosed formula’s distance from the axis, not from the baseline.

- I’m having trouble with a \texttt{SAIL} compiler bug; I must rearrange the program, more or less at random, until it compiles correctly. I hope the bug isn’t more severe than it appears.

218 Don’t put a new group on save\_stack if a null mark is expanded. [\TeX82 will remove the \}' from the mark text.]

- I had to redo the typewriter-style font since its width tables were wrong.
- And I increased low-memory size again to 5500, then 6500.
- Finally the entire test program was TEXed. Happy Easter! Six hours today.

27 Mar 1978

- Beginning at 2:30am.

219 Move \texttt{\textbackslash vcenter} processing to the first pass of mlist\_to\_hlist; otherwise the height, depth, subscripts, etc., are way off.

220 Omit space after closing $$.

- Spacing is wrong in the formula $Y_1 + \cdots + Y_k$; I have to rethink the use of three dots.
221 Make conditional thin space available to user as \(\textbackslash&\) [Later will retract this.] §226 G

222 Introduce \texttt{\textbackslash disaspkip} and \texttt{\textbackslash dispbskip} [later called \texttt{\textbackslash abovedisplayshortskip} and \texttt{\textbackslash belowdisplayshortskip}]. §226 Q

- Reminder: I need to test line-breaking with embedded math formulas.

223 Make sure that interaction \(\neq\) error \texttt{\textbackslash stop\_node} in the ‘Whoa’ error \texttt{\textbackslash fatal\_error}. §893 I

224 Fix a big mistake in the \texttt{\textbackslash style\_node} routine (which points to a glue spec, not to glue itself); somehow this didn’t cause trouble yesterday. [In \TeX78, style nodes double as placeholders for math glue like thin spaces.]

225 Make \texttt{\textbackslash nftfam} obey group structure. [\TeX78’s \texttt{\textbackslash nftfam} operation is a combination of \TeX82’s \texttt{\textbackslash textfont}, \texttt{\textbackslash scriptfont}, and \texttt{\textbackslash scriptscriptfont}.]

- At this point the test routine for Volume 2 works perfectly.
- But I will change the page width in order to check harder cases.

178 ↔ 226 Represent italic corrections as boxes, not glue, so that they won’t be broken. [The \texttt{\textbackslash kern} command doesn’t exist yet.]

- Eight hours today.

228 Fix a bug that just clobbered the memory: Call \texttt{\textbackslash free\_avail}, not \texttt{\textbackslash free\_node}, in the \texttt{\textbackslash ins\_node} case of \texttt{\textbackslash vpackage}. [This logic will change completely in \TeX82.] §1019 B

- \texttt{\textbackslash Whoa} error \texttt{\textbackslash fatal\_node}.

29 Mar 1978

- (Wednesday) Again beginning at 2:30am.

189 ↔ 230 Put still more space above and below fraction lines in displayed formulas. §746 Q

231 Call \texttt{\textbackslash build\_page} after finishing a display; and don’t go to the \texttt{\textbackslash noindent} routine because of the next remark.

232 Put \texttt{\textbackslash parskip} glue just before a paragraph, not just after (since it interferes with a penalty after).

- Although the test program gives correct output, it generates 46 locations of variable-size memory and 280 of one-word memory that are not freed.

233 Recycle the ulists and vlists in \texttt{\textbackslash nalign}. §801 F

234 Fix bug when deleting space at end of paragraph: \texttt{\textbackslash delete\_glue\_ref} \texttt{\textbackslash (cur\_node)} not \texttt{\textbackslash delete\_glue\_ref} \texttt{\textbackslash (value(cur\_node))}. §816 M

- There’s also a more mysterious type of uncollected garbage, a fraction\_noad corresponding to \texttt{\textbackslash eq\textbackslash n}, an incompleat\_noad not completed.
- Couldn’t find that one, so I recompiled with \#233 and \#234 corrected.
- Now it gains just 10 locations of variable-size memory and 7 of the other kind.

235 Extend \texttt{\textbackslash search\_mem} to search \texttt{\textbackslash eqtb} also. §255 I

236 Fix bug in \texttt{\textbackslash rebox} when \texttt{\textbackslash list\_ptr(b)} = 0. §715 D

- The seven one-word nodes were generated by this bug; \texttt{\textbackslash rebox} put them onto a linked list starting with \texttt{\textbackslash mem[0]}, growing at the far end!

237 Remember to complete each incompleat\_noad. §1184 D

- This solved the other mystery. I had never noticed that my test output was actually wrong: \$p\textbackslash choose \$S came out as ‘k’.
- After these corrections, the test routine worked ... I feel that \TeX is now pretty well debugged (except perhaps for error recovery)—it’s time to celebrate!

1 Apr 1978

238 Don’t quit after file lookup fails. §530 I

2 Apr 1978

239 Add \TeX\texttt{\textbackslash font\_area}, so that it’s easier to change the default library area associated with a device. §514 P
3 Apr 1978

240 Insert parentheses again, to cope with the precedence of `lsh when packing data. (See #55 and #176.) §1114 L

- I had never tried `hmode + discretionary before!

241 Remember that `back_error requires `cur look to be set. (Problem can arise during error recovery on parameter `n with n out of range.) §476 M

4 Apr 1978

242 Add a deletion feature to the `error routine. §88 I

5 Apr 1978

243 Reset `space_factor after `v [this was later rescinded] and after math in text. §1196 Q

10 Apr 1978

104 → 244 Replace `vpar and `tracing by a new primitive `chpar for parameters. It allows a user to change those quantities as well as the penalties for hyphens, relations, binary ops, widows. §209 G

14 May 1978

- `Beginning to typeset a real book (`Volume 2, second edition), not just a test.

245 Make math in text end with spacing as if it were followed by punctuation. [This rule will soon be rescinded.] §760 Q

246 Insert `times into the hash table; I left it out by mistake. [It will eventually move into `plain.tex.] F

247 Change the names of Scandinavian accents from \o, \oslash, \Oslash to a, \a, \O. [This will also move to `plain.] C

17 May 1978

248 Fix a silly bug that hasn’t been tweaked until today: `halign to size' [obsolete in `TEX82] used `vsize instead of `hsize. §645 B

19 May 1978

249 Add a `topbaseline feature [later called `topskip]. §1001 G

250 Subtract the math spacing change of May 14. §760 Q

251 Skip past blanks in the `scan_math procedure. [This blank-skipping will eventually go into `scan_left_brace.] §403 A

252 Introduce a `missing_brace routine [later generalized] to improve error recovery in `mmode + `math_shift, when the top of `save_stack isn’t a `math_shift_group. §1065 I

253 Adjust the math spacing between closing parentheses and Ord, Op, Open, Punct. §764 Q

254 Make the underline go further under. §735 Q

96 → 255 Compute the proper natural width when a displayed equation follows a paragraph whose fillline has been deleted by `line_break. §1146 S

20 May 1978

256 Fix the spurious value of `prev_depth inside alignments. §775 A

257 Consider (and defeat) the following scenario: The u and v lists are built in `init_align using `temp_head; then while scanning `tabskip 2pt\rt{}' the macro `\rt is expanded, clobbering `temp_head.

- That bug was more subtle than usual.

258 Add the parameter `num3, so that the positioning of `atop can be different from that for fractions. §779 S

259 Add new parameters `delim1 and `delim2, so that `comb can use fixed size delimiters, not computed as with `\left. §748 Q

22 May 1978

221 → 260 Change `\v to `\v and introduce `\v as the negative of `\v. [Later obsolete.] §226 C
261 Fix the display of negative penalty nodes; `show_node_list` is confused when a negative value has been packed into the middle of a word. §194 L

- Memory overflow just occurred with \texttt{lo_mem_max} = 7500 and \texttt{mem_max} = 16384. So I have to go to 15-bit pointers. (A problem on 32-bit machines?)

23 May 1978

262 Add a new parameter `bigop_spacing5`, for extra space above and below limits of big displayed operators. §751 Q

263 Initialize `incomplete_load` in `$\halign{...}$`. §775 F

- That was another heretofore-untested operation. How much of the code has not yet been exercised?

26 May 1978

264 Close the file when doing lookup-failure recovery. §27 F

265 Improve the error recovery for `Extra &`. §792 I

266 The top piece must be calculated mod 128 in \texttt{var_delimiter}, to guarantee a valid subscript range. [Obsolet in \TeX82.] §546 R

252 → 267 Fix a blunder in new `missing_brace` code. §1065 B

262 → 268 Fix a blunder in new code for limits on display operators. §751 B

26 May 1978

269 Don’t insert a new penalty after an explicit penalty in math mode. §767 Q

- The hash table overflowed; I ought to make it much bigger.

110 → 270 Avoid possible bad memory references in alignment when there is erroneous input after `\cr`. [Instead of `extra_info`, the value of `cur_align` in \TeX78 is negated, because we need only distinguish `\cr` from `\&`.]

271 Make the dimension parameters like `\hsize` all global, so that they can be set in the `\output` routine.

- This led to major simplifications, also to major surgery.

- [But it was a kludgy decision, overruled in \TeX82.]

94 → 272 Don’t forget to set the type of the new null box in the `\end` routine. §1054 D

27 May 1978

- The data overflowed memory again, both low and high, doing Section 3.3.2.

184 → 273 Mask off extra bits of `\char` in math mode, to avoid bad memory references. §1151 R

274 Zero out the negative `\edmunkip` in script styles. §732 B

29 May 1978

275 Be prepared to handle an undefined control sequence during `\get_token`. (Can fix this by brute force, using `\get_token` instead of `\get_next`.) §380 S

276 Correct the superscript shift when a single character is raised.

184 → 277 Mask off all but 7 bits in `\char` routine, to avoid space-factor index out of range.

- More memory capacity overflows.

22 → 278 Fix \TeX's overflow stop so that I don’t have to wait for loading of the BAIL debug routines. [System dependent.]

§93 E

279 Remember to adjust the page number when a file page ends in mid-macro. [System dependent.]

§306 F

5 Jun 1978

280 Make sure that the arguments of positioning commands don’t overflow their field size. §610 R

281 Report the excess amount when giving an overfull box warning. §666, 677 I

7 Jun 1978

282 Use \texttt{\_} instead of `>` as termination criterion in \texttt{var_delimiter}. §714 Q

283 Disallow `\eject` in math mode. [In \TeX78, `\eject` is distinct from `\break`; in horizontal mode it includes \TeX82’s `\vadjust{\break}`.]

§1102 R
Don’t put too much clearance above \sqrt in text style.

9 Jun 1978

Make align_state an integer variable, not boolean, so that `align` can be within another `eqalign`.

10 Jun 1978

Provide for preloading of fonts.

Close the output file before switching to edit the input file with the ‘e’ option.

Return adjustments found by `hpack` to free storage if they’re not used. [Later, `hpack` will detach them only when they’re used.]

Strive for consistency between `make_under` and `make_over`.

18 Jun 1978

Fix a serious error in `rebox` (‘b’ instead of ‘list_ptr(b)’).

Strange that such a bug would now surface for the first time!

Remove \deg from INITEX, since macros suffice.

Add an extra hyphenation penalty for two hyphenated lines in a row.

Introduce the ‘no_new_control_sequence’ switch. Among other things, this will prevent an undefined control sequence following `scan_math` from clobbering the save stack.

Force badness to be at most 10^{19}.

Add `end_template` for better error recovery in alignments.

Preload the \bullet [later done by `plain.tex`].

Get the correct `prev_depth` at the beginning of an alignment.

Change `\eject` so that it ejects only once.

14 Jul 1978

Look in standard area if a file isn’t found in the user’s area.

Echo all online inputs in the transcript file.

19 Jul 1978

Equalize spacing when only one of numerator/denominator is big.

Prevent subscript from getting too high above baseline.
Avoid infinite loop when stack overflows: `\texttt{push_input}` should say ‘if \texttt{input_ptr} $\geq$ \texttt{stack_size} $\wedge$ \texttt{interaction} = \texttt{error_stop_mode}’.

22 Jul 1978

Make `\texttt{quad}` meaningful outside math mode. (All fonts must be generated again!)

Show the nesting level at the end of `\texttt{show_activities}`. [But I decided not to do this in \TeX82.]

Put in `\texttt{\textbackslash v}` [namely, `\texttt{\textbackslash mask\textbackslash medskip\textbackslash \textbackslash thimaskip}`; \TeX78 already has `\texttt{l2}`, for conditional `\texttt{\textbackslash thinmaskip}`, as well as the negative amounts `\texttt{\textbackslash k}, `\texttt{\textbackslash l}`]. Change the name of vector accent from `\texttt{\textbackslash v}` to `\texttt{\textbackslash b}`. [Math spacing operators will become much more general in \TeX82.]

25 Jul 1978

Give the correct `\texttt{\hspace{}}` and `\texttt{\vspace{}}` to the null boxes created at \texttt{\textbackslash end}.

And don’t “append” them. [Later this was changed, so that it would work better with generalized output routines.]

Remove the control sequence `\texttt{\textbackslash endv}`, since error recovery is now better.

Define another mode of tracing: It says ‘\texttt{OK}’ and stops after `\texttt{\textbackslash showlists}`.

Give better defaults to parameters. [Later done by `\texttt{plain.tex}`.]

Allow more bits in the packed representation of `\texttt{\textbackslash showboxdepth}`.

Scan past delimiters and/or dimensions when recovering from ambiguous fractions.

Reduce accent numbers modulo 128 or 512, depending on the mode.

Include a warning, ‘(\texttt{\textbackslash end} occurred on level . . .)’.

28 Jul 1978

- \textit{(I’m writing Chapter 27 of the manual: ‘Recovery From Errors’.)}

Improve the error message in `\texttt{scan_digit}`. [This procedure will change its name to `\texttt{scan_right\textbackslash int}` when the number of registers increases from 10 to 256.]

Don’t report overfull boxes if they’re less than .1 point over.

Give the user extra chances to define the font, if `\texttt{\textbackslash read\textbackslash font\textbackslash info}` is unsuccessful.

Change default recovery for bad parameter number from `\texttt{#1}` to `\texttt{##}`, since `\texttt{#1}` won’t always work and since `\texttt{##}` is probably intended.

Omit the “Negative?” message on things like `\texttt{scan_char_num}`.

Improve error recovery when a large delimiter isn’t in family 3. [Obsolete.]

Give a more appropriate error message when the input is ‘\texttt{$\textbackslash right$.}’

- \textit{Currently \TeX says ‘Missing $^$’!}

Call `\texttt{\textbackslash back_input}` before the error message in `\texttt{\textbackslash back_error}`, not afterwards.

1 Aug 1978

Give an appropriate warning when there’s no input file and the user types ‘e’.

Increase the system pushdownlist size so that the manual will compile. [Procedures `\texttt{\textbackslash hlist\textbackslash out}` and `\texttt{\textbackslash vlist\textbackslash out}` can recurse deeply.]

Yesterday I distributed 45 preliminary copies of the manual; today I took out the “debugging hooks” and put \TeX up as a system program.

2 Aug 1978

- \textit{I’m typing Volume 2 again (currently in Section 4.2.2). Culture shock!}

Introduce a `\texttt{\textbackslash ragged}` parameter, to indicate a degree of raggedness. [Previously, ragged-right setting was performed when the `\texttt{\textbackslash tolerance}/100 was odd! Eventually a better approach, with `\texttt{\textbackslash rightskip} and such things, will be discovered.]
5 Aug 1978

336 Generalize \pageno to \count (digit).
§236 G

285 337 Update \alignstate when recovering from ‘Missing {’ and ‘Extra }’ errors.
§1069, 1127 D

338 Show “runaway” tokens, making it easier to pinpoint an error.
§306 I

22 Aug 1978

339 Add \predisplaypenalty.
§1203 G

340 Clarify error messages; they should indicate when something has been inserted, etc.
§1064 I

23 Aug 1978

14 341 Substitute ‘Extra }’ for the losing ‘Missing \cr’ error message.
§1069 I

213 342 Go past online insertions in \showcontext.
§311 I

343 Exact no penalty for breaking one line before a display.
§1145 Q

338 344 Check for runaways at end of file.
§362 I

345 Give error message when a macro argument begins with }.
§395 I

24 Aug 1978

213 346 Remove extra line-feed in \showcontext after printing insertions. [System dependent.]
§338 L

25 Aug 1978

347 Leave no glue at top of page, even after \eject.
§997 Q

27 Aug 1978

348 Adopt Guy Steele’s new version of the \TeX source files. [He has recently made a copy and modified it by introducing compile-time switches for MIT conventions as an alternative to SUAI. This is the first time that \TeX is being ported to another site; additional switches for PARC, TENEX, TOPS10, and TOPS20 will be added later, using the Steele style.]
P

1 Sep 1978

349 Don’t pass over leader nodes in the try\break background computation. [At this time, leaders have not yet been unified with glue.]
§837 Q

82 350 Prune away all penalties at the top of a page.
§997 Q

4 Sep 1978

338 351 Include ‘\’ in error message about a runaway argument.
§306 I

8 Sep 1978

* I just remade all the fonts, with increased ligature field size.

350 352 Insert a necessary \goto statement in the first branch of the new penalty routine within \buildpage.
§997 B

30 Sep 1978

338 353 Make the token list for runaway arguments meaningful outside of \macro_call.
(I just had a runaway argument ending with ‘\lcm’, which turned out to be the control sequence in hashtable location 0.)
§371 M

354 Avoid infinite loop when recovering from $$ in restricted horizontal mode.
§1138 R

355 Fix two hyphenation bugs related to -ages, -ers. [A completely new algorithm for hyphenation will go into \TeX82.]
L

356 Add -est to hyphenation routine; also disable puzzled and rattled, etc.
Q

4 Oct 1978

357 Add new primitive \vtop.
§1087 G

358 Treat implicit kerns properly after discretionary hyphens have been inserted.
§914 Q
4 Nov 1978

359 Forget the half quad originally required at left and right when centering displayed equations without equation numbers. §1202 Q

11 Nov 1978

360 Don’t let the postamble come out empty. [This could occur if no fonts were selected.] §642 R

15 Nov 1978

361 Allow optional space after digit in scan_int routine. §444 C

17 Nov 1978

362 Make the check_mem procedure slightly more robust. §167 R

20 Nov 1978

363 Make the \par in a \def match the \par that comes automatically with a blank line. (Suggested by Terry Winograd.) §351 C

364 Add new parameter mathsurround for spacing before and after math in text. §1196 G

365 Extend \advance to allow increase by other than unity. [At this time it applies only to the ten \count registers, and it is called \advcount.] §1238 G

25 Nov 1978

366 Add a new primitive: \unskip.

367 Add new primitives \uppercase and \lowercase.

28 Nov 1978

368 Don’t let \mark and macro_call interfere with each other’s scanner_status. §306 M

369 Omit extra } after show_node_list shows a \mark, since the right brace is already there. (See #210.) §176 M

370 Add a new primitive suggested by Terry Winograd: \xdef.

29 Nov 1978

371 Delete a space following \else{...} also in the false case. [\TeX78 uses braces, not \fi, for conditionals.] S

372 Make \tracing set \showboxbreadth as advertised. §198 D

373 Account properly for kerns in width calculations of line_break. §866 F

374 Delete a math_node at the beginning of a line. §148 Q

375 Guarantee that \predisplaypenalty=10000 will suppress page breaking before a display. §1005 A

6 Dec 1978

376 Change the file opening statement to allow lines up to 150 characters long. [System dependent.] L

16 Jan 1979

377 Initialize negative properly in the \advance routine with a \count as argument. §440 F

20 Jan 1979

378 Try to keep complex, buggy preambles of alignments from crashing the program. §789 R

17 Feb 1979

379 Give more detailed information when warning about a long line being broken. [System dependent; the buffer size in \TeX78 is very limited.] I

380 Declare p local to try_break, for the “rare” case code. [My original program included the following comment: “This case can arise only in weird circumstances due to changing line lengths, and the code may in fact never be executed.” Later Michael Plass will discover that variable line lengths require an entirely different algorithm, using last_special_line.] §847 L
Don’t omit the raggedness correction when the last line of paragraph has to shrink. [Obsolete in \TeX82.]

22 Feb 1979

Don’t forget to return from get_x_token after finding \par. §351 F

Add a new parameter: \lineskiplimit. §679 Q

Change the syntactic sugar: ‘\hbox par’ replaces ‘\hjust to ...{overfull}’. [This vastly improves on the old idea (see #40), but there still is no internal vertical mode.] C

Introduce new names \hbox and \vbox for \hjust and \vjust. §1071 C

Add a new condition: \ifpos. [It will later be generalized to \ifnum and \ifdim.] §513 G

Add vu and \varunit. [\TeX82 will eventually allow arbitrary internal dimensions as units of measure.] §453 G

Legalize \hbox spread (negative dimension) [since scan_spec no longer uses the sign as a flag]. §645 C

10 Mar 1979

Make scan_toks expand \count during \edef. [This will change later when \the and \number are introduced.] §367 C

23 Mar 1979

Put only 100000 pt stretch at the end of a paragraph instead of 10000000000 pt. [In \TeX78, “infinite” glue is actually finite but large; in the language of \TeX82 we would say that \parfillskip, which is not yet user-settable, is being changed to be like \hfil instead of like \hfill.] §816 Q

Treat the last line of a paragraph more consistently with the other lines (e.g., when \hfil appears in mid-paragraph), by effectively inserting \infpenalty at the end. §816 Q

31 Mar 1979

Ensure that penalty nodes aren’t wiped out, in weird cases where breaks occur at penalties that normally disappear. §879 S

27 Apr 1979

Correct the page number count when files begin with an empty page. [System dependent.] A

Allow the math_code table to be changeable via \chcode. [In \TeX82, \chcode will split into \mathcode and \catcode.] §1232 G

Don’t accept ‘e’ after an error message if not inputting from a file. §84 I

29 May 1979

Don’t call end_file_reading if you haven’t already invoked begin_file_reading; this could happen when trying to recover from an error in start_input. §537 F

7 Jun 1979

Be sure to eject two pages, when \eject comes just at the time another break is preferable (e.g., when the page has just become too full). §1005 A

27 Jun 1979

Don’t say ‘You can’t do that in math mode’ when the user says ‘$$’ in restricted horizontal mode! §1138 I

30 Jun 1979

Add \wd, \dp, \ht dimension units. §455 G

Don’t try the system area for file names whose area is explicitly indicated. §537 I
1 Jul 1979
402 Allow letters as (ASCII) numbers [without the ‘’ marker introduced later]. §442 G

2 Jul 1979
403 Fix a \gdef bug: If the control sequence was never defined before [this later became the \restore_zero option], don’t remove it at group end. §282 F

16 Jul 1979
320 → 404 Update show_node_list to be like show_node_list. [The two routines, originally separate, will be merged in \TeX82.]
§238 I

18 Jul 1979
405 Extend capacity from 32 fonts to 64 fonts if desired. §134 G
406 Add new \extraspce parameter to all text fonts (requested by Frances Yao). §558 Q
407 Make each node_node print properly in show_node_list. §183 F
408 Make \ypar allow any break if it is 1000000 or more. [In \TeX82, a \tolerance of 10000 or more allows any break.]
§851 Q

23 Jul 1979
409 Introduce new primitives \hfil, vfil, \hfilneg, \vfilneg. §1058 E
410 Add \ifmmode. §501 G
411 Add \firstmark. §1012, 1016 G
412 Allow break at leaders (horizontal mode only). §149 C

25 Jul 1979
213 → 413 Revise error so that online insertions work properly after end-of-file errors. §336 I
411 → 414 Change ‘if first_mark ≠ 0’ to ‘if first_mark ≥ 0’ [because −1 is used to indicate ‘not yet given a value’]. §1012 B

28 Jul 1979
370 → 415 Stop \xdef from expanding control sequences after \def’s. [This decision will be rescinded later, after several more years of experience with macro expansion will suggest better ways to cure the problem.]
§366 C
416 Change symbolic printout for control symbols. [System dependent.]
§40 I
308 → 417 Avoid linefeeds in the transcript file. [System dependent.]
§366 C
370 → 418 Expand topmark, etc., in \xdef.

4 Aug 1979
413 → 419 Fix an error introduced recently: \par was suddenly omitted at end of page.
[System dependent.] B

11 Aug 1979
420 Change error messages that use SAIL characters not in standard ASCII.
§360 P

28 Aug 1979
411 → 421 Move the command ‘first mark ← −1’ from vpackage to fire_up. §1012 D
403 → 422 Correct a serious \gdef bug: Control sequences don’t obey a last-in-first-out discipline, so \TeX loses things from the hash table when deleting a control sequence.

To fix this, I either need to restrict \TeX (so that \gdef can be used inside a group only for control sequences already defined on the outer level) or need to change the hash table algorithm. Although all applications of \TeX known to me will agree to the former restriction, I’ve chosen the latter alternative, because it gives me a chance to improve the language: Control sequences of arbitrary length will now be recognized.
§259 S

423 Make sure that unsave cannot call eq_destroy with a value from the upper part of eqtb.
§282 D
I noticed this long-standing bug while fixing #422. It had very low probability of causing damage (e.g., it required a certain field of a floating-point number to have a certain value), but it would have been devastating on the day it first showed up!

29 Aug 1979

424 Call \texttt{eq:destroy} when a control sequence is \texttt{\textbackslash def}ed after being \texttt{\textbackslash def}ed.

418 \texttt{\textbackslash topmark} and its cousins are expanded in \texttt{scan\_toks}.

25 Jan 1980

Now I've checked things pretty carefully and I think \TeX{} is "fully debugged."

7 Feb 1980

Display runaway alignment preambles.

Introduce active characters (one-stroke control sequences). [I don't yet go all the way: The meanings of \texttt{'}a\ n\ d' \texttt{'} and \texttt{'\} have to be identical.]

3 Mar 1980

Allow any control sequence \texttt{\textbackslash:} to be redefined [it was the 'select font' operator]; this allows the character \texttt{:} to be active. [Obsolete.]

23 Mar 1980

An extend-\TeX{}-for-the-eighties party:

Add a new \texttt{\textbackslash copy} feature.

Add a new \texttt{\textbackslash unbox} feature.

Add a new \texttt{\textbackslash open} feature [later \texttt{\textbackslash openout}].

Add a new \texttt{\textbackslash send} feature [later \texttt{\textbackslash write}].

Add a new \texttt{\textbackslash leqno} feature, requested by MDS.

Add a new \texttt{\textbackslash idim} feature [later \texttt{\textbackslash idim}].

Make \texttt{(space)} in vertical mode begin a paragraph.

Add a new \texttt{\textbackslash font} feature [replacing the silly previous convention that a font must be defined when it is first selected].

Add new \texttt{\textbackslash parval} and \texttt{\textbackslash codeval} features [later \texttt{\the (whatever)}].

Don't let active characters gobble the following space.

Add a new parameter to govern amount of token list dumped. [Obsolete.]

Add a new \texttt{\textbackslash linebreak} feature [later replaced by \texttt{\textbackslash break}].

25 Mar 1980

(Still working on the above, also thought of more.)

Add a new \texttt{\textbackslash skip} feature.

Add a new \texttt{\textbackslash newname} feature [soon changed to \texttt{\textbackslash let}].

Allow any control sequence to be redefined.

Send the output to the user's current file area, even when input comes from elsewhere.

27 Mar 1980

Compute the xheight for accents in math mode from family 1, not family 3. [Obsolete.]

28 Mar 1980

Increase minimum clearance between subscript and superscript.

29 Mar 1980

When a display follows a display, the second should have the 'shortskip' glue.
4 Apr 1980

445 → 450 Look at current token meanings when trying to recognize `\tabskip` in alignment preambles. §782 A

23 Apr 1980

451 Estimate the length of printed output, for the new priority feature on our XGP device driver. [System dependent.]

434 → 452 Break long `\send` lines into pieces so that the file can be read in again. [System dependent.]

19 May 1980

453 Don’t make `\left` and `\right` delimiters too large; they need to be only 90% of the enclosed size. [This eventually became `\delimiterfactor`.] §762 Q

21 May 1980

454 Add a new `pagebreak` feature [later \vadjust{\break}]. §655 G

13 Jun 1980

• *Today I’m beginning to overhaul the line-breaking routine, and I’ll also install miscellaneous goodies.*

455 Allow a radical sign to be in different font positions. §737 G

456 Clear empty token lists off input stacks to allow deeper recursions (suggested by Jim Boyce’s macros for chess positions). §325 E

457 Make `\spaceskip` and `\parfillskip` changeable. §1228 G

458 Add a new parameter `\rfudge` (per request of Zippel) [later `\mag`]. §288 G

459 Add a new parameter `\loose` [later \looseness]; now parameters are allowed to take negative values. §875 G

460 Remove the variable `just_par`. [Obsolet; it was the real equivalent of an integer]. E

14 Jun 1980

461 Install new line-breaking routines, including `\parshape`. (These major changes are introduced as Michael Plass and I write our article.) §813 Q

462 Add a new parameter `\exhyf` [later `\exhyphenpenalty`]. §869 G

16 Jun 1980

444 → 463 Change conventions in `eqtb` so that glue is distinguishable from other equivalents. §275 S

444 → 464 Don’t expand `\b` in `\def{\bf{...}}` after `\let\def`. [Obsolete.] A

444 → 465 Avoid creating dead storage when doing `unsave` in certain regions. §275 D

17 Jun 1980

466 Allow negative dimensions in rules. §138 C

19 Jun 1980

463 → 467 Make the new test for glue at the outer level of `show_eqtb`. §252 B

27 Jun 1980

453 → 468 Don’t let `\left` and `\right` become too small for big matrices. [This eventually became `\delimitershortfall`.] §762 Q

3 Aug 1980

469 Don’t move extra-wide, numbered equations flush left unless they begin with glue. §1202 Q

15 Sep 1980

461 → 470 Say ‘≥ f’ instead of ‘> f’ in the pre-hyphenation routine; I’d forgotten my definition of f. [a variable used to test for a sequence of lowercase letters in the same font]. §897 M

395 → 471 Check the range of the index in `\chcode` before saving the old value. §1232 R
18 Sep 1980

472 Don’t forget to increase the reference count to \parfillskip, or it will mysteriously vanish. §816 D

19 Sep 1980

473 Make leaders break like glue in both horizontal and vertical modes. §149 C
474 Make \mathsurround break properly at left and right end of lines. §879 Q

13 Oct 1980

475 Remove spurious overfull boxes generated when the looseness criterion fails. §749 I

477 Avoid storing a lot of breakpoints when they are dominated by others. §836 E
478 Don’t say ‘\texttt{cur_node}’ when you mean ‘\texttt{mem[cur_node]}’. §1105 B

480 Don’t make badness too big for floating-point calculations, when forced to make an overfull box. [Obsolete.] L

10 Dec 1980

478 Make it impossible to get unmatched ‘}’ in a delimited macro argument. §392 R
481 Add new \topsep and \botsep features. [These are \TeX\textsuperscript{78}’s way to put space at the edge of inserts, replaced in \TeX\textsuperscript{82} by the \skip register corresponding to an \texttt{insert} class.] §1009 G

6 Jan 1981

482 Install new routines for reading the font metrics, using Ramshaw’s TFM files instead of \TeX\textsuperscript{78} files. §539 P
483 Abort after reporting 100 errors, if not pausing on errors. §82 I
484 Add new \spacefactor and \specskip and \skip primitives. [At this time we write ‘\texttt{specskip}=10pt’ and ‘\texttt{skip3}=10pt’ for what will become ‘\texttt{\specskip}=10pt’ and ‘\texttt{\skip3}=10pt’ in \TeX\textsuperscript{82}.] §1060 G
366 \unskip is now allowed in internal vertical mode. §1105 G

26 Jan 1981

487 Don’t say ‘\texttt{mem[q]}’ when you mean ‘q’. (See #143 and #478.) §1009 B

27 Feb 1981

488 Put some linefeeds back into the transcript file, in order to prevent overprinting in listings. [System dependent.] I
489 Add a new \penalty feature [later \postdisplaypenalty]. §1205 G
490 Add the dimension \cc for European users. §458 G
491 Make \texttt{scan}\_keyword match uppercase letters as alternatives to lowercase ones (suggested by Barbara Beeton’s experiments with \texttt{uppercase}). §407 C
492 Add nonstop mode so that overnight batch processing is possible. §73 I

2 Mar 1981

493 Fix a still more serious \gdef bug: The generality of \gdef almost makes it a crime to forget any control sequence names, ever! (The previous bug was only the tip of an iceberg.) §259 S
494 Issue warning message at the end of a file page if nesting level isn’t zero. [System dependent.] I

5 Mar 1981

495 Keep track of maximum memory usage, for statistical reporting. [Obsolete.] §125 I
496 Prune away glue and penalties at top of page after marks, sends, inserts. §1000 Q
497 Allow \mark in horizontal mode. [Later it will be \texttt{\vadjust{\mark...}}.] §655 G
498 Allow optional space before a required left brace, e.g., \if AA {...}. [See #251.]

499 Issue an incomplete \if error, to help catch a bad \if.

§403 C

§336 I

17 Mar 1981

494 → 500 Omit the warning message at end of a file page unless the nesting level has changed on that page. [System dependent.]

310 → 501 Fix the spacing when there is a very tall subscript with a superscript.

§759 Q

20 Mar 1981

371 → 502 Make space-eating after \else fully consistent between the true and false cases.

[Obsolete.]

24 Mar 1981

496 → 503 Change glue\_spec\_size to ins\_spec\_size in vpackage [where insertions are done].

[Obsolete.]

5 Apr 1981

501 → 504 Fix a typo (‘+’ instead of ‘−’) in the new subscript code; this shifted certain subscripts down instead of up.

§759 B

18 Apr 1981

505 Make leaders with rules of specified size act like variable rules.

§626, 635 G

29 Apr 1981

461 → 506 Don’t consider badness > threshold at a line \break except in an emergency.

§854 A

13 Jul 1981

402 → 507 Allow other characters as numbers.

§442 C

294 → 508 Avoid dead storage if a no\_new\_control\_sequence error occurs. [Obsolete.]

§259 R

509 Add a new \iff feature.

§507 G

510 Add new features \xleaders and \cleaders.

§626, 635 G

14 Jul 1981

507 → 511 Amend the new code for constants; the ‘,’ in ‘.5’ is thought to mean ‘056’!

§442 S

507 → 512 And fix an egregious blunder in that code: New commands at the end of a procedure are ignored when earlier statements exit via return.

§442 L

4 Aug 1981

513 Accept alphabetic codes for all online error recovery options, instead of insisting on control codes like line feed or form feed. [The original error-recovery codes were suggested by the conventions of the SAIL compiler.]

§84 P

514 Add a new \thebox feature [later \lastbox].

§1079 G

7 Aug 1981

515 Add fil, fill, and fillll as units for glue stretching or shrinking.

§454 G

516 Suppress the overfull box error when shrinkage amount is negative.

§664 I

9 Aug 1981

517 Let unset boxes inherit the size of their parent in alignments.

§810 Q

12 Apr 1982

518 Make INITEX dump out the font\_size array needed by the new DVI output module.

§1322 F

1 May 1982

151 → 519 Fix clean\_box so that mislist\_alist cannot make link(q) = 0 and type(q) = glue\_node.

[That was the historic final change to \TeX78. All subsequent entries in this log refer to \TeX82.]
15 Jul 1982

- Finished draft of test program and began debugging about 1430 [2:30 pm].
  Taking my time.

X1 Change eqtb[cur_font] to eqtb[cur_font.]
  Compile time is about 2 minutes CPU; times 5 for time-sharing; add another
  half minute for linking and loading.
  Hash table and getnext seem to be working, with no changes needed!
  Time out 1630–1815 for Jill’s birthday party.

X2 Insert begin . . . end around dump_int macro.

X3 Print two blank spaces before date in open_log file.

X4 Update x and cur_used outside the for loop.

X5 Change if = to if ≠ as loop exit condition.
  The TRIP test should preload more fonts.

X6 Insert begin . . . end around statistics output.

X7 Must get(token when scanning a number.

X8 Interactive debug_help needs to print a newline.

X9 Include ignore_spaces and math_accents in print_cmd_char cases.

X10 Don’t call confusions when print_cmd_char sees unknown code.
  Compiler bug causes stack overflow. Retiring for the night at 2145.

16 Jul 1982

- Starting at 0700; DRF has fixed the compiler.

X11 Allow arbitrary integer parameters in diagnostic print routines.

X12 Say cur_tok, not cur_val, when you mean cur_tok.

X13 Make pause effective also on first line of a file.

X14 Show context after online deletion.

X15 Bypass reference count when debug_help shows a token list.

X16 Change ‘case p’ to ‘case type(p)’.

X17 Fix timing of print文化遗产 when scrolling help messages.

X18 Make other_char the default category for ASCII control codes too.

X19 Use special scanning method for font number in new_font.

- Eating lunch, 1020–1035, while the machine slowly recompiles everything.

X20 Don’t forget to increase k in the while loop.

X21 Adjust limit properly after line changed when pausing.

X22 Remember to return a value in new_spec and new_penalty.

- Now stepping through line_break in simple case.

X23 Don’t prune unwanted nodes if cur_p = null.

X24 Print a closing parenthesis when displaying glue nodes.

X25 Use last, not limit, in term_input; else error prompt causes trouble when
  state = token_list.

X26 Set first ← limit + 1 after init_term.

X27 Make sure set_trick_count is always performed.

17 Jul 1982

X28 Add new diagnostic feature \\
  tracingcommands.

- Debugging of system-dependent code not shown in this log.

X29 Initialize passive ← null.

X30 Fix pseudoprinting when the line is empty.

X31 Merge adjacent free areas of dynamic memory before dumping.

X32 Print the word node in print_node.
X33 Improve message and help in case of weird error. §415 I
X34 Allow optional space after \def and similar constructions. §473 G
X35 Declare alpha to be integer in read_font_info. §560 M
X36 Fix timing of back_input in scan_dimen. §448 A
X37 Back up after missing number error. §446 I
X38 Show the ‘at’ size that is considered improper. §1359 I
X39 Streamline the dialog in debug help. §1338 I
X40 Take output of the_tasks from the advertised place. §467, 1297 M
X41 Say true_fix(q), not true_fix(p). §905 T
X42 Decrease low limit of error_count to −1. §76 S

18 Jul 1982
X43 Clear initial reference count of macro definitions. §473 F
X44 Fix timing of back_input in scan_glue. §461 A
X45 Use cur_val/level, not cur_val, when checking levels. §461 B
X46 Multiply fil units by 216 for correct scaling. §454 B
X47 Don’t confuse glue_base with skip_base. §1237 B
X48 Fix print_scaled so that 0.01 doesn’t come out 0.1. §103 A

X28 →
X49 Show mode changes when tracing commands. §299 I
X50 Don’t say if \( n = 0 \) \( \lor \ldots \Div \ n \) in Pascal. §105 L
X51 Don’t confuse box_flag with box_code. §1075 B
X52 Reset offset on print_in even in no_print mode. §57 S
X53 Fix restarting of interrupts after box_switch. §1031 S
X54 Don’t loop for \( k \rightarrow a \rightarrow b \rightarrow 1 \) when \( b = 0 \) if \( k \) is declared nonnegative. L
X55 Put ‘=’ sign into the formal_ident. §1328 I
X56 Allow \( r \) to be any integer in get_mode. §125 S
X57 Don’t put the output of print_file_name in quotes. §518 I
X58 Say ‘dumped’ after dumping. §1311 I
X59 Eliminate unnecessary initialization code. §1322 E
X60 Get the file reading started right when beginning to undump. §1308 L
X61 Give forlorn message if format file can’t be loaded. §1303 I
X62 Assign value to cur_val after glue arithmetic. §1239, 1240 F

19 Jul 1982
X63 Don’t say if \( p > \max \lor \free[p] \) in Pascal. §169 L
X64 Fix memory-undump logic; loops are out of phase with input. §1312 A
X65 Undump hyph_word[y], not hyph_word[k]. §1325 B
• At last trip_fmt loads without bombing out.
X66 Remove assignment of array to array, not allowed by IBM Pascal (Susan Plass). §167 P
X67 Simplify an expression that’s too big for IBM Pascal (Susan Plass). §1009 P
X68 Go to contribute, not done, after insertions. §1000 A
X69 Decrease depth_threshold if there’s not enough string space. §138 I
X70 Show rules as ‘I’ in short displays. §175 I
X71 Don’t show null glue in short displays. §175 I
X72 Set job_name ← 0 as part of output initialization. §528 S
X73 Don’t complain of infinite shrinkage on opt minus 0fil. §825, 976, 1009 S
X74 Use different prompt at beginning when accepting a file name. §37 I
X75 Reset last_glue on nonglue nodes. §996 F
X76 Remember to call error after printing Õ0. §1293 B
X77 Insert begin . . . end around program text of section. §1025 L
X78 Define the \hiput primitive. §1071, 1073 F
X79 Introduce write_loc analogous to par_loc. §1344, 1371 A
X80 Dump and undump par_loc and write_loc. §1313, 1314 F
Allow the in \texttt{scan_the} [later \texttt{scan_something_internal}]. §413 F

Interchange command codes the \texttt{:=} number [later \texttt{convert}]. §210 E

Don’t confuse breadth with \texttt{depth}. §236 B

Add string printing feature to \texttt{debug.help}. §1339 I

Set state \texttt{midLine} in \texttt{begin_file_reading}. §328 F

\begin{itemize}
  \item Time out 2105–2200 to pick up Jenny from driving lesson.
  \item Keep c ≤ 127 when deleting 99 tokens.
  \item Don’t check for \texttt{str_room} error when \texttt{selector = new_string}. §1328 S
\end{itemize}

21 Jul 1982

Gather more statistics: String usage, font info, hyphen exceptions, stacks. §1334 I

Initialize \texttt{write_loc} from \texttt{cur_val}, not from \texttt{co_ptr}. §1344 D

Remember to pack file name for \texttt{\open}. §1374 F

Defuse \texttt{\outer} test before scanning optional space after ‘\}'. §473 S

Don’t allow \texttt{prepare_mag} to cause errors after \texttt{jump_out}. §84 S

\begin{itemize}
  \item The first page of \texttt{DVI} output is perfect! Pause to play piano.
\end{itemize}

Don’t confuse \texttt{dimen_base} with \texttt{scaled_base}. §1237 B

Initialize \texttt{link(page_head)} \texttt{null} when beginning a page. §991 D

Correct \texttt{cur_height} more often, since \texttt{max_depth} might be negative. §972, 973 S

Calculate page dimensions properly after vertical kerns. §973 A

Install new \texttt{page_contents} logic to handle interaction between insertions and \texttt{\topskip}. §987, 1008 S

Allow \texttt{top_skip} glue to be a valid breakpoint. §1001 S

Don’t forget to count \texttt{dyn_used} in inner loop [erroneous analysis retracted later]. §1034 F

Set p \text{ \texttt{=} } q after migration step. §655 F

Clear \texttt{pregraf} to zero at start of paragraph. §1091 F

Put parentheses into negated \texttt{leader\_flag} macro. 1078 L

\begin{itemize}
  \item Time out 1720–1920 for John’s birthday dinner.
\end{itemize}

Scale \texttt{best_height} when adjusting \texttt{page_goal}. §1010 D

Simplify logic of split insertions; three states become two. §981, 1019, 1020 A

Don’t omit first character when showing a macro argument. §400 M

Prevent clobberage if macros have too many parameters. §390 R

22 Jul 1982

Tell how many \texttt{DVI} bytes were output. §642 I

Adjust for singular or plural statistics. §1320, 1334 I

Consider \texttt{page_head} a glue node, to inhibit unwanted break. §988 S

Introduce \texttt{new\_skip\_param} to keep reference counts updated. §679, 969, 1001 D

Record the correct size of new insertion after it’s split. §1010 D

Use \texttt{free\_node}, not \texttt{flush\_node\_list}, when recycling insertion nodes. §1022 D

Make online insertions work after \texttt{get\_next} is interrupted. §87, 324, 343 S

Print newline on interruption stop. §98 B

Put space before \texttt{end\_write\_token}. §1371 S

Don’t confuse \texttt{glue\_order} with \texttt{stretch\_order}. §838 B

Set \texttt{max\_dimen} \texttt{7777777777}, not \texttt{7777777777}. §421 T

Make \texttt{\global\textfont} legal. §1211 M

Fetch \texttt{\the\textfont} with \texttt{equiv}, not \texttt{\family\textfont}. §415 B

Call \texttt{new\_ligature(\text{f, l...})} not \texttt{(f, c, ...)}. §1035 B

Make \texttt{show\_box} work on random garbage. §174, 177 R

Count reference to \texttt{zero\_glue} from \texttt{cond\_math\_glue}. §1171 D
**THE ERRORS OF \TeX**

**23 Jul 1982**

X123 Allow avail = null when undumping.

X110 ↔ X124 Set \texttt{width(glue(\texttt{ptr}(p)))}, not \texttt{width(p)}.

X125 Put \texttt{begin_file\_reading} inside the \texttt{start/input} loop.

X116 ↔ X126 Don’t confuse \texttt{glue\_stretch} with \texttt{stretch\_order} [the previous fix went only halfway].

X127 Negate \texttt{x} when calculating badness of shrinkage.

X121 ↔ X128 Remove dangling \texttt{else} that parses wrong.

X28 ↔ X129 Print newline before \{, not after \}, when tracing commands.

X130 Remove colon from overfull box messages.

X97 ↔ X131 Compute \texttt{page\_goal} properly when the first box arrives after inserts.

X132 Don’t confuse \texttt{page\_size} [\texttt{new page\_goal}] with \texttt{best\_size}.

X133 Put heldover insertions at front of contribution list.

X88 ↔ X134 Output stats before closing \texttt{DVI} file, since the latter decreases \texttt{font\_ptr}.

X135 Don’t call \texttt{\vbox} an \texttt{\hbox}.

X136 Fix misplaced \texttt{end} caused by editing error.

**24 Jul 1982**

X137 Don’t \texttt{\texttt{oset}\_destroy} any paragraph shape when \texttt{par\_shape} is null.

X138 Omit blank before \texttt{\message} at the beginning of a line.

X104 ↔ X139 Don’t try to split an insertion when \texttt{best\_node} isn’t the split one.

X140 Correct another case of ‘if \texttt{x \& y}’ misunderstood by \texttt{Pascal}.

X141 Provide diagnostic info about insertions via \texttt{\showlists}.

X142 Add ‘\texttt{inside a group}’ to clarify a warning message.

X143 Report \texttt{prev\_depth} on a separate line in \texttt{\showlists}.

X144 Back up input to avoid unexpected clobberage of \texttt{cur\_tok}.

• Wow what a bug: \texttt{new\_graf} calls \texttt{build\_page}, which invokes the output routine, after which \texttt{\texttt{goto reswitch}} ‘is a disaster.

X145 Add insertion glue to \texttt{page\_so\_far} instead of subtracting it from the goal.

X146 Put extra blank line before overfull box warning.

X147 Define break at kern consistently between horizontal and vertical lists.

X148 Renumber so that math nodes are nondiscardable.

X149 Correct the \texttt{char\_kern} macro: \# not \texttt{f}.

X150 Decrease \texttt{t} after reconstituting discretionary break.

X151 Simplify the hyphen routine, knowing that \texttt{link(s) = null}.

X152 Initialize \texttt{r} ← \texttt{q} in discretionary destruction routine.

**25 Jul 1982**

X153 Don’t add interline penalty after last line of paragraph.

X154 Adjust spacing in diagnostic messages.

X155 Avoid simultaneous use of \texttt{temp\_head} by \texttt{prune\_page\_top} and the page builder.

X156 Clear the \texttt{post\_break} field of simple discretionaryss.

X157 Split \texttt{offset} into independent variables \texttt{term\_offset, file\_offset}.

• Am freezing current program as version \texttt{−0.25}, a week of TUG lectures begins tomorrow.

**5 Aug 1982**

X158 The \texttt{.err} file should be \texttt{.log} instead.

X159 Allow \texttt{\special} strings to contain more than 256 bytes.

X99 ↔ X160 Undo “correction” to a non-bug.

X161 Suggest \&\ in help message for unexpected \&.

X162 Make ‘E’ a standard option for exiting.

X163 Restore the use of dead cycles à la \TeX78.

• The previous six changes were suggested during discussions with \TeX82 class.
X164 Fix global variable conflict between open_log_file and new_font. §1257 S
X165 Allow optional ‘w’ when assign to font parameter. §1255 C
X166 Set cur_val after increasing the number of font parameters. §580 F
X167 Set hash_brace when matching ‘{’. §476 D

X88 → X168 Clarify meaning of statistics printed. §1334 I
X169 Change DVI format to include design size. §602, 1260 G
X170 Introduce defref for runaway messages. §306 D
X171 Restore cur_es before calling scan_toks. §1226 M

X157 → X172 Update print_nd to dual offset conventions. §62 A
X163 → X173 Move endgame logic inside main_control, because the output routine becomes active. §1054 A

6 Aug 1982

X174 Allow INITEX to load format files. §1337 C
X175 Conserve input stack space by deleting finished token lists. §325 E
X74 → X176 Print the opening ‘**’ in the transcript file. §534 I
  • Now ready to try breaking new ground in TRIP.
X177 Preserve align_state from tokens deleted online. §88 S
X178 Set f in all branches of scan_toks. §473 D
X179 Change ‘cur_end ≤ right_brace’ to ‘cur_ok ≤ right_brace_limit’; otherwise \relax gets through. §477 S
X180 Allow optional # when setting \spacefactor; disallow zero. §1243 C
X181 Change vpackage (head) to vpackage (link (head)). §796 B
  • Shades of 1978!
X182 Insert missing begin . . . end. §798 L

7 Aug 1982

X183 Keep trie_max declared in non-INITEX [later rescinded]. §950 L
X184 Watch out for empty token list when copying. §466 D
X185 Free unused reference count slot when defining \everypar. §1226 D
X163 → X186 Introduce \maxdeadcycles
  • I believe the line_break routine has passed its test perfectly.
X187 Don’t put discretionary after − inside a discretionary. §1039 S
X188 Change ‘minus’ to ‘minusthe’ [this feature retracted later]. §413 C
X189 Change cur_p to r (three places). §875 B
X190 Increase range of hc to halfword; otherwise end-of-word mark might match a vacant entry in the trie. §892 A
X191 Initialize b in shift_case routine. §1288 F
X192 Don’t back up if a space follows a decimal fraction. §452 E
X193 Don’t confuse glue_base with dimen_base. §1145 B
X194 Guard against anomalous floating-point values in glue display. §186 L

8 Aug 1982

X195 Avoid infinite loop when \outer leads to runaways. §339 S
  • I worked on that problem about two hours before fixing it.
X196 Move final debug help to succumb, except in batch mode. §93 I
X197 Insert kern after spanned box, to defeat access to floating point. §808 R

9 Aug 1982

X198 Include \leftskip and \rightskip in displayed equations [rescinded later]. §1199 C
X199 Trace line-break computations if tracing_stats > 2. §846, 856 I
X200 Keep prev_up to date when passing a string. §867 D
  • Now stepping through math stuff; a lot is working.
X201 Set link (p) ← z when making a fraction. §747 D
X202 Don’t reset space factor when beginning \valign. §775 C
THE ERRORS OF \TeX

X203 Don’t show glue setting if glue_sign = normal.
X204 Clear glue_stretch and glue_shrink when creating an unset box.
X205 Do \space in hmode and vice versa when aligning.
X206 Remove fallacious call to \text{confusion} after alignment in display.
X207 Don’t test \text{mode} = \text{vmode} in display, test \text{nset}_{\text{ptr}} = 1.
X208 Show an \text{inner_noed} as well as the other types.
X209 Renumber \text{mu\_glue} and \text{cond\_math\_glue} so that the glue display logic works.
X210 Don’t confuse \text{cur\_size} with \text{cur\_style}.
X211 Advance p ← q during second pass over mlst.
X212 Add helpful hint about `\text{tracingonline}1'.
X213 Delete spurious statement left from sloppy editing.
X214 Change the subtype when \text{mask} becomes hskip.
X215 Don’t forget to use the remainder when computing math glue.

X199 → X216 Improve paragraph diagnostics using short\_display.
X199 → X217 Introduce \text{artificial\_badness} for better diagnostics.

11 Aug 1982
X218 Introduce char\_box subroutine so that \text{var\_delimiter} adds italic correction.
X219 Save font and char in local variables of \text{make\_math\_accent}, since it can be recursive.
X220 Call error after decreeing an invalid character.

12 Aug 1982
X199 → X221 Install new format for showing break nodes.
X222 Change q to p, in order to catch empty alignments.
X223 Disallow third part of discretionary in math mode.
X224 Don’t change \text{tail} if discretionary third part is empty.
X225 Say \text{nonscript}, not \text{non\_script}.
X226 Inhibit math if \text{\scriptfont3} is improper.
X199 → X227 Introduce @firstpass and @secondpass comments.
X228 Change p to r when you mean r.
X108 → X229 Say \text{page}, not \text{pages}, if there’s only 1.
X230 Insert space before {} on truncated \text{showlists}.

28 Aug 1982
X231 Allow dm as a unit [later .5\text{dimen1} will be .5\text{\textdimen1}].
X108 → X232 Singularize \text{prevgraf 1 lines}.
X233 Omit trailing zero count registers when showing completed page numbers.
X234 Avoid clobbering a by introducing a new local variable t.
X216 → X235 Fix diagnostic printing of discretionaries.
X236 Don’t show unset stretch/shrink that’s zero.
X198 → X237 Make \text{\textalign} in displays consistent with other displays. (Namely, ignore \text{\leftskip} and \text{\rightskip} in nonaligned displays; respect the paragraph shape in aligned displays.)
X238 Parenthesize ‘If you’re confused . . .’.
X239 Say \text{\textfraction}, not \text{\textfrac}.\text{above}\text{vex}.
X240 Remember to return when you should.
X241 Use absolute value to make sure \text{div} is unambiguous.
X242 Don’t confuse depth with height.
X243 Use \text{delta – height}, not \text{height – delta}.
X244 Increase \text{\textshiftdown} to increase the clearance.
X245 Don’t back up after improper use of \text{the}.
X246 Don’t give \opt as the default result when looking for \tokval.
X247 Initialize second_indent in the easy case.
X248 Package the equation number.
X249 Don’t resort to v \maxdimen when glue doesn’t stretch or shrink.
X250 Insert newline before showing current \bottommark.
X251 Call error after giving error message.
X252 Change implementation of \number; it should scan_int, not something internal.
X253 Introduce symbolic constants like \formaterlength.
X254 Change quit to \jumpout, since some compilers treat quit as a reserved word.
X255 Add more parentheses to get proper parsing.
X256 Say please in order to be friendly (or at least polite).
X257 Don’t confuse cur_wcmd with cur_chr.
X258 Use & instead of ! to specify a preloaded format.

X177 \rightarrow X259 Correct a3 to a4.
X260 Introduce new primitive \mathchardef, to save space and time.
X261 Use the \[ convention for noads as well as nodes.
X262 Correct spelling in call to \texttt{primitive}: \texttt{xatopx} should be \texttt{xoverx} [later renamed, thank goodness].

30 Aug 1982

X263 Don’t fetch \link(null) in malformed list.
X264 Initialize align_state at a better time so that align_peak doesn’t see & or \span.
X265 Outlaw preamble interfering with align_state = 0.
X266 Add level of grouping to alignment to tabskip locality.
X267 Check align_state when scanning \langle u_3 \rangle.
X268 Move ‘unsave; new_save_level’ from main_control into fin_col.

X180 \rightarrow X269 Remember cur_chr when you’re looking for optional ’\texttt{w}’.
X270 Change q to r [in code now obsolete].
X271 Disable interrupts during \texttt{back_error} so that help messages aren’t clobbered.
X272 Introduce \texttt{slow_print} for printing control sequences.
X273 Initialize \texttt{delcode(".*"}) \rightarrow 0 for error recovery.
X274 Call end_file_reading before calling check_outter_validity.
X275 Don’t delete an extra ‘\texttt{)}}’ when \texttt{par} will help find a runaway.

31 Aug 1982

X276 Don’t confuse thin_muskip with \texttt{thin_muskip_code}.
X266 \rightarrow X277 Recover from error if new align_group ends abnormally.
X278 Recover from error if \texttt{par} occurs when align_state < 0.
X279 Make \texttt{haskip/latex_hmskip} and \texttt{\make/latex\baselineskip} erroneous.
X280 Add \texttt{muskip} and \texttt{usetmskip} analogs to \texttt{skip} and \texttt{setskip}.
X281 Don’t output pop right after push.

\begin{itemize}
  \item The \texttt{TRIP} test looks right; now to test for wasted memory.
  \item When memory should be empty I find dyn_used = 18, var_used = 267.
\end{itemize}

1 Sep 1982

\begin{itemize}
  \item Made special \texttt{MEMTEX} program, designed to track all memory allocation.
  \item Delete reference to last_glue when a page is packaged.
  \item Include save_stack in the search_nem debugging routine.
  \item Disallow \texttt{vfill} in restricted horizontal mode.
\end{itemize}

\begin{itemize}
  \item Most of the memory locations I thought were wasted were actually in good use.
  \item Total 192 hours (approx) debugging time so far since July 15.
\end{itemize}
THE ERRORS OF TeX

2 Sep 1982

• Now looking at all zero counts in profile and extending TRIP.
X285 Simplify the creation of \top boxes. §1087 E
X286 Set space_factor ← 1000 after \bbox. §1076 C
X287 Introduce preamble into DVI format. §617 P
X288 Give special chr_code to \relax. §265 S
X289 Don’t show ‘(null)’ when token list is null, just show nothing. §295 I
X290 Delete the procedure write_name_string, which is never used. E
X291 Rename \abox to \above withdelims; do the same for \atopx and \atopx.

\[ \frac{7!}{249} \]
\[ \frac{7!}{295} \]
\[ \frac{7!}{300} \]

X292 Improve clean_box so that it recognizes cleanliness better. §720 Q
X293 Report a Missing delimiter more meaningfully. §1161 I
X294 Give endu_token a chr code of 128 so that it will end a file name. §289 R
X295 Test present of math fonts after parsing an mlist, not before. §1138, 1195 R
X296 Omit ‘recent contributions’ and/or ‘current page’ when they are empty. §218, 986 I
X297 Display what \TeX has deleted after improper discretionary list has arisen. §1121 I
X298 Show what math character was undefined. §723 I
X299 Improve the Incompatible magnification error; break it into two lines. §288 I
X300 Put new cases into flush_node_list, to recycle mlist noads. §698 D

6 Sep 1982

X300 ← X301 Insert a necessary ‘goto done’ in that new material. §698 F
• It took two hours to diagnose that goto problem.
X295 ← X302 Change ‘2’ to ‘3’ in help message for extension fonts. §1195 T
X303 Add a special note if material is being held over for the next output. §986 I
X304 Divide before multiplying in \makeleft,right, to avoid overflow. §762 R
X305 Introduce the box_error routine. §992 I
X306 Clear arith_error after overflow has been reported. §460 F
X249 ← X307 Don’t confuse stretch with glue_stretch. §1148 B
X308 Set glue_sign ← normal when packaging with glue ratio zero. §558, 664 D
X309 Test for overflow before attaching the sign. §448 A
    • That all worked! Now trying min_quarterword negative.
X310 Take absolute value before applying mod in new_triv_op. §944 L
X311 Say qi(c), not c, when testing TFM flags [now obsolete]. §573 L
X312 Initialize token_ref_count(def_ref) to null, not zero. §473 L
X313 Change the type of vsplit parameter n from quarterword to eight_bits. §977 L
X314 Initialize null-delimiter different form null_character. §685 L
X315 Insert qi twice in scan_delimiter. §1160 L
X316 Insert qi in scan_math. §1151 F
X317 Insert qo in fetch. §722, 723 F
X318 Insert qi in set_math_char. §1155 F
X319 Insert qi in math_ac. §1165 F
X320 Insert qo in mlist_to_list. §755 F
X321 Use brackets around 8-bit characters in print_ASCII. §68 I
X322 Include hyph_list in the search_mem debugging routine. §933 I
    • Now compiling non-NiTEX to try an industrial-strength version.
X323 Add return to final_cleanup, because some Pascal compilers insist that each
    label be used. §1335 L
X324 Compute par_token when undumping. §1314 D
**11 Sep 1982**

- X325 Emit newline before file name, if near end of line. §537 I
- X326 Define \ifx for arbitrary tokens. §507 C

**12 Sep 1982**

- X327 Don’t ask users to type x twice before exiting. §84 I
- X328 Install new features \openin, \read, \ifeof, \closein; rename existing \open, \send, \close to be \openout, \write, \closeout. §209, 313, 1275 G

**13 Sep 1982**

- X331 Install new feature \string. §472 G
- X332 Remove spurious space printed by sprint_cs. §263 A

**16 Sep 1982**

- X199 → X334 Introduce serial numbers in line-break records, improving readability and independence. §846 I
- X335 Don’t abort when file_name_size is exceeded. §519 I

**17 Sep 1982**

- X336 Remove unwanted period from font capacity message. §567 I

**18 Sep 1982**

- X329 → X337 Make \expandafter more powerful by moving it from semantics to syntax [i.e., from stomach to mouth]. §368 G

**19 Sep 1982**

- X338 Improve error recovery for ‘Missing number’. §415 I

**22 Sep 1982**

- X339 Suppress italic correction between letters in math mode except in math fonts. §752 Q

**24 Sep 1982**

- X340 Define null = mem_bot, not min_halfword, because there’s a reference to link(null) in try_break. §115 P
- X341 Initialize str_start[0] ← 0. §47 D
- X342 Avoid blank space at beginning of line. §638 I
- X343 Set type of new box in math mode to \ordnoad, not inner_noad. §1076 D

**28 Sep 1982**

- Here are the first changes made to the preliminary listing of \TeX82 that was published by the \TeX project earlier this month.

**520** Insert the missing cases letter and other_char after x_token looks ahead. §1038 F

**521** Change ‘\pause’ to ‘\pausing’. §236 C

**522** Reset overfull_rule when determining tabskip glue. §804 D

**523** Fix the logic for scanning \ifcase [in obsolete syntax—everything is still done with braces since ‘\fi’ doesn’t exist yet]. §509 A

**30 Sep 1982**

- X524 Change "0.0" to "?.?" (suggested by DRF). §186 I

**2 Oct 1982**

- X525 Use conditional thin spacing next to ‘Inner’ noads. §764 Q
- X526 Make thick spaces conditional. §766 Q
4 Oct 1982

527 Increase \texttt{trie\_size} from 7000 to 8000, because of Frank Liang’s improved (but longer) hyphenation patterns. \S11 P

6 Oct 1982

X330 \rightarrow 528 Change the string lengths to match the new \texttt{TeX\_format\_default}. \S520 F

\begin{itemize}
\item Version 0 of \TeX{} is being released today!
\end{itemize}

8 Oct 1982

529 Fix a blunder: I decreased \texttt{h} mod a quarterword when it should have been decreased mod \texttt{trie\_op\_hash\_size} (HWT). \S944 B

9 Oct 1982

X258 \rightarrow 530 Fix a typo (‘!’ not ‘&’) in the \texttt{WEB} documentation. \S524 P

\begin{itemize}
\item Version 0.1 incorporates the above changes.
\end{itemize}

10 Oct 1982

531 Remember to call \texttt{initialize} if a different format was preloaded (Max Díaz). \S1337 F

\begin{itemize}
\item Version 0.2 incorporates this (somewhat extensive) change.
\end{itemize}

12 Oct 1982

532 Add the ‘\texttt{\textbackslash immediate}’ feature, by popular request. \S1375 G

\begin{itemize}
\item Version 0.3 incorporates this (somewhat extensive) change.
\end{itemize}

13 Oct 1982

533 Introduce new \texttt{WEB} macros so that \texttt{glue\_ratio} is more easily changed. \S109 P

\begin{itemize}
\item I began writing The \TeX{}book today: edited the old preface and searched in the library for quotations.
\end{itemize}

14 Oct 1982

534 Change the type of \texttt{hd} to \texttt{eight\_bits}; it’s not a quarterword (HWT). \S649 B

X281 \rightarrow 535 Revise the optimization of \texttt{DVI} commands: It’s not always safe to eliminate \texttt{pop} when the preceding byte is \texttt{push}, since \texttt{DVI} commands have variable length! (Embarrassing oversight caught by DRF.) \S601 S

15 Oct 1982

536 Test ‘\texttt{prec\_depth} > \texttt{ignore\_depth}’, not ‘\texttt{\&}’. \S679 C

\begin{itemize}
\item Version 0.3 incorporates the above changes.
\end{itemize}

16 Oct 1982

537 Omit definition of \texttt{align\_size}; it’s never used (Bill Scherlis). \S11 P

538 Inhibit error messages when packaging box 255. \S1017 I

21 Oct 1982

X145 \rightarrow 539 Subtract \texttt{width(q)} from \texttt{page\_goal}, don’t add it to \texttt{page\_so\_far[1]}. \S1009 A

\begin{itemize}
\item Version 0.4 incorporates the above changes.
\end{itemize}

22 Oct 1982

540 Increase the amount of lower (variable-size) memory from 12000 to 13000, since the \TeX{} program listing now needs about 11500. [At this time there still is a fixed boundary between upper and lower memory.] \S12 P

541 Add a new parameter \texttt{\textbackslash boxmaxdepth}. \S1086 G

\begin{itemize}
\item Version 0.5 incorporates the above changes.
\end{itemize}

26 Oct 1982

542 Fix an off-by-one error caught by Gabi Kuper and HWT. (I forgot ‘+ 1’). \S1317 B

\begin{itemize}
\item The \texttt{\textbackslash TRIP} test detected this bug, but I didn’t notice.
\end{itemize}

27 Oct 1982

544 Set \texttt{math\_type} before saying \texttt{fetch(nucleus(q))}, since fetching can have a side effect. \S752 S
28 Oct 1982
545 Install a major change: Fonts now have identifiers instead of code letters. Eliminate the ‘\:’ primitive, and give corresponding new features to ‘\the’. §209 G

• Actually I began making these changes on October 26, but I needed two days to debug them and to put Humpty Dumpty together again.
• At this time I’m also drafting macros for typesetting \TeXbook.
• The above changes have been incorporated into Version 0.6.

30 Oct 1982
• After years of searching, I’ve finally found a definitive definition of the printer’s point; and (unfortunately) my previous conjecture was wrong. The truth is that 83 pc = 35 cm, exactly; so I am changing \TeX to conform.

547 Revise the definition of \dd, conforming to the definitive value shown me by Chuck Bigelow. §458 C
545 ↔ 548 Introduce “frozen” copies of font identifiers, to be returned by \textfont, so that font manipulation is more robust. §1257 R

5 Nov 1982
• Oops! Retract error #546, and retract \TeX Version 0.7; the source of my information about points was flaky after all. My original suppositions were correct, as confirmed by NBS Circular 570.

4 Nov 1982
549 Reset looseness and paragraph shape when beginning a \vbox. §1083 D

6 Nov 1982
550 De-update align state when braces are in constants. §442 D

X294 ↔ 551 Improve error recovery for bad alignments. §1127 I
• Today I wrapped up Chapters 4 and 5.

8 Nov 1982
552 Give more power to \let: the right-hand side needn’t be a control sequence. §1221 G
553 Amend show context to say ‘(base_ptr = input_ptr) ∨ ’; otherwise undefined control sequences can be invisible in unusual cases (John Hobby). §312 I
554 Compute demerits more suitably by adding a penalty squared, instead of adding penalties before squaring.
• Previously a slightly loose hyphenated line followed by a decent line was considered worse than a decent hyphenated line followed by a quite loose line. §859 A

10 Nov 1982
555 Save a bit of buffer space by declaring poolle only in \INITEX. §50 E

11 Nov 1982
556 Introduce a new context indicator to clarify \TeX’s scanning state. A special type called backed up is distinguished from other kinds of inserted lists; it is called ‘recently read’ or ‘to be read again’, while others are called ‘inserted’. §314 I
557 Append a comment, ‘treated as zero’, to the missing-number message. §446 I
558 Ignore the settings of \hfuzz or \v fuzz if \hbadness or \vbadness is less than 100. §666, 677 I

13 Nov 1982
• Major surgery on the program is planned for today, because of new ideas suggested by correspondence with MDS and other macro writers.
559 Introduce a new \tokens register; this will be useful and easy to add, since \TeX already can handle \everypar and \output. §1227 G
X34 → 560 Change \get\textsubscript{r_token} to \get\textsubscript{token} when scanning an optional space; then a construction like \texttt{\def\foo{...}}\texttt{\foo} won’t complain that \texttt{\foo} is undefined. §443 C

• This change was retracted when it was being debugged, because it could cause endv to abort the job. Then it was re-established again when I found that endv needed to be more robust anyway. [But it was eventually rescinded again.]

561 Make \texttt{\span} mean ‘expand’ in a preamble. §782 G

562 Use three separate if tests instead of ‘^’ in the inner loop of \texttt{\get\textsubscript{next}}, to gain efficiency. §342 E

563 Introduce \texttt{\get\textsubscript{r_token}} so that assignments have uniform error messages and so that frozen equivalents cannot be changed. §1215 R

• I gave a few variables more mnemonic names as I made these changes.

564 Move conditional statements from the semantics (‘stomach’) part of TeX to the syntax (‘mouth’) part, by introducing ‘\fi’. Also introduce \texttt{\csname} and \texttt{\endcsname}. §372, 489–500 C

• This makes macros much more predictable and logical, but it is by far the most drastic change ever made to TeX. The program began to come back to life only after three days of solid hacking.

• Several other things were cleaned up as part of this change because it is now more natural to handle them differently. For example, a null control sequence has now become more logical.

• The result of all this is called Version 0.8.

18 Nov 1982

• Today I resumed writing Chapter 8. Tomorrow I’m 2\textsuperscript{14} days old!

21 Nov 1982

565 Declare c as a local variable for hyphenation (DRF). §912 F

566 Omit the “first pass” and try hyphenations immediately, if \pretolerance is negative (suggested by DRF). §863 E

567 Don’t ship out incredibly huge pages; they might foul up DVI files. §841 R

2 Dec 1982

568 Add new features \texttt{\everymath} and \texttt{\everydisplay}. §1139, 1145 G

569 Add a new feature \texttt{\futurelet}. §1221 G

• The changes above have been incorporated into Version 0.9 of TeX.

7 Dec 1982

570 Add a new \texttt{\endinput} primitive (suggested by FY). §362, 378 G

8 Dec 1982

571 Try \texttt{off\_save}, if \par occurs in restricted horizontal mode. (This avoids embarrassment if TeX says ‘type a command or say \texttt{\end}', then when you type \texttt{\end} it says you can’t!) [However, I soon retracted this change.] §1094 I

21 Dec 1982

572 Redefine \relax so that its chr field exceeds 127. (This facilitates the test for end in \texttt{\scan\_file\_name}.) §265 A

573 Call \texttt{\begin\_diagnostic} when omitting the first pass of line breaking. §863 F

574 Fix the logic of glue scanning: In \texttt{\hskip\_1pt plus2pt} the minus should apply only to the 1pt. §461 A

23 Dec 1982

575 Renumber the decimal codes in paragraph statistics for loose and tight lines; they were ordered backwards. §817 I

576 Treat a paragraph that ends with leaders like a paragraph that ends with glue. §816 C

577 Allow commas as alternates to radix points, for Europeans. §438 C
Change \hangindent to a normal dimension parameter. [It had been a combination of \hangindent and \hangafter, with special syntax.]

Make \prevgraf accessible to users.

Split \clubpenalty off from \widowpenalty.

- I'm typing Chapter 14 while making these changes.

24 Dec 1982

Use \backinput instead of goto reswitch when inserting \par, because \par may have changed.

25 Dec 1982

- It's 10pm after a very Merry Christmas!

Don't prompt for a new file name if \openin doesn't find a file.

Add a new \jobname primitive.

Give the user a way to delete the dollar sign, when \TeX decides to insert one.

Allow optional equals after \parshape, and implement \the\parshape.

26 Dec 1982

Add an ifline field to the condition stack entries, so that more informative error messages can be given.

Introduce a normal paragraph procedure, since initialization is needed also within \insert, \vadjust, \valign, \output.

27 Dec 1982

Give users access to \pagetotal and \pagegoal. (Analogous to \#679 and \#585, but simpler.)

Introduce \tracingpages, allowing users to see page-optimization calculations. Also split \tracingparagraphs off from \tracingstats.

- The changes above have been incorporated into Version 0.91 of \TeX.

31 Dec 1982

Break the build page procedure into two parts, by extracting the section now called fireup. [This is necessary because some Pascal compilers, notably for IBM mainframes, cannot deal with large procedures.]

Make \ifodd1\else legal by introducing \ifcode.

Improve alignments when columns don't occur: Don't append null boxes for columns missing before \cr, and zero out the tabskip glue after nonpresent columns.

Make the error message about overfull alignment more intelligible.

- The changes above have been incorporated into Version 0.92 of \TeX82, which was the last version of 1982, completed at 11:59pm on December 31.

3 Jan 1983

- Today I'm beginning to write Chapter 15, and planning the \output routine of plain.tex.

Change the logic of \allover; use max_deadcycles here too, instead of the fixed constant 100.

Don't forget to pop nest when an insert is empty. Also disallow optional space after \insert n {...}.

4 Jan 1983

Use the \boxmaxdepth that's declared inside a \vbox when packaging it.

Rename \groupbegin and \groupend as \begingroup and \endgroup.

Make deadcycles accessible to users.

Base the split insertions on natural height plus depth, not on delta.

- The changes above have been incorporated into Version 0.93.
6 Jan 1983

600 Add \pushmath to handle a case where I forgot to clear incompleatoad. (This long-standing bug was unearthed today by Phyllis Winkler.) §1136 D

588 → 601 Add \pageshrink, etc., too.

602 Introduce new parameters \floatingpenalty, \insertpenalties. Also adopt a new internal representation of insertion nodes, so that \floatingpenalty, \splittopskip and \splitmaxdepth can be stored with each insertion. §140, 1008 G

7 Jan 1983

603 Improve the rules for entering newline, in particular when the end-of-line character is active. §343 Q

9 Jan 1983

604 Distinguish between implicit and explicit kerns. §155, 896 Q

605 Change the name \ignorespace to \ignorespaces. §265 C

560 → 606 Don’t omit a blank space after \def, \message, \mark, etc.; the previous hodgepodge of rules is impossible to learn.

• The above changes appear in Version 0.94.

12 Jan 1983

• Beginning to write the chapters on math today.

607 Add a new feature: active characters in math mode. §1151 G

15 Jan 1983

608 Fix a surprise bug: \$1-$ treated the – as binary. §729 A

609 Initialize \spacefactor inside discretionaries. §1117 D

16 Jan 1983

610 Fix an incredibly embarrassing bug: I forgot to update spotless in the error routine!

• While fixing this, I decided to change spotless to a more general history variable, as suggested by IBMers who want a return code. §76, 82, 1335

611 Replace two calls of confusion by attempts at error recovery, in places where 'This can’t happen' could actually happen. §1027, 1372 I

18 Jan 1983

612 Introduce the normalize selector routine to protect against startup anomalies when the transcript file isn’t open. Also make open_log_file terminate in some cases. §92, 535 R

591 → 613 Insert \relax, not a blank space, to cure infinite loop like \ifeof\fi (LL). §510 R

614 Change the old \limitswitch to \limits, \noimits, and \displaylimits. Incidentally, this fixes a bug in the former positioning of integral signs. §682, 749 G

615 Give a \char in math mode its inherited \mathcode. §1151 C

525 → 616 Make underline, overline, radical, vcenter, accent noads and {...} all revert to type Ord instead of type Inner. Introduce a new primitive \mathinner. (This fixes the spacing, which got worse in some ways after change #525.) §761 Q

• I’m working on Appendix G today.

19 Jan 1983

617 Introduce a \mathchoice primitive. §1174 G

618 Move \input from the stomach to the mouth. §378 C

X260 → 619 Introduce \chardef, analogous to \mathchardef. §1038, 1224 C

620 Change \unbox to \unhbox and \un vbox; also add \unhcopy. §1110 G

621 Consider \spacefactor, \pagetotal, etc., as part of prefixed_command, even though they are always global. §1211 C
20 Jan 1983

622 Switch modes when \hrule occurs in horizontal mode or \vrule in vertical.

§1090, 1094 C

623 Add a new \globaldefs feature.

§1211 G

21 Jan 1983

624 Optimize the code, in places where it’s important (based on frequency counts of \TeX usage accumulated during the past week): Introduce fast_get_avail and fast_store_new_token; reduce procedure-call overhead in begin_token_list, end_token_list, back_input, flush_node_list; change some tests from ‘if \texttt{a \& b}’ to ‘if \texttt{a then if b}’.

§122, 371 E

22 Jan 1983

625 Save space in math lists: Don’t insert penalties within restricted horizontal mode; simplify trivial boxes.

§721, 1196 E

626 Fix a surprising oversight in the rebox routine: Ensure that \texttt{b} isn’t a vbox.

§715 S

545 → 627 Make \nullfont a primitive, so that cur_font always has a value. (This is a dramatic improvement over \TeX78, where a missing font was a fatal error called ‘Whoa!’)

§552 C

24 Jan 1983

586 → 628 List all incomplete \texttt{if}’s when the job ends.

§1335 I

29 Jan 1983

552 → 629 Change initialization of align_state so that \halign\bgroup works.

§777 C

30 Jan 1983

625 → 630 Be sure to test ‘is_char_node(q)’ when checking for a trivial box.

§721 D

• By extraordinary coincidence, this bug was caught when somebody used font number 11 (= kern_node) in the second character of a list of length 2!

X168 → 631 Improve format for stats at end of run, as suggested by DRF.

§1334 I

• The changes above have been incorporated into Version 0.95.

632 Don’t ignore the space after a control symbol (except ‘\ ’).

§354 C

633 Remove all trailing spaces at the right of input lines, so that there’s perfect compatibility with IBM systems that extend short lines with spaces.

§31 P

3 Feb 1983

634 Assume that a \texttt{math_accents} was intended, after giving an error message in the case mmode + accent.

§1165 I

635 Add new primitives \texttt{\ifttrue} and \texttt{\iffalse}.

§488 G

6 Feb 1983

X304 → 636 Improve the accuracy of fixed-point arithmetic when calculating sizes for \texttt{\left} and \texttt{\right}. (I had started by dividing \texttt{delimiter_factor}, not delta1, by 500.) §762 A

12 Feb 1983

637 Change the name \texttt{delimiterlimit} to \texttt{delimiter_shortfall}.

§248 C

638 Make \texttt{abovewithdelims..} equivalent to \texttt{\above}; change the order of operands so that delimiters precede the dimension.

§1182 C

607 → 639 Remove the kludgy math codes introduced earlier; make \texttt{fam} a normal integer parameter and allow \texttt{mathcode} to equal 2^{15}.

§1233 C

640 Don’t let \texttt{spacefactor} become more than 2^{15}.

§1233, 1243 R

• I finished drafting Chapter 17 today.

14 Feb 1983

639 → 641 Replace octal output (\texttt{print_octal}) by hexadecimal (\texttt{print_hex}) so that math codes are clearer.

§67 I

619 → 642 Don’t forget \texttt{char_given} in the \texttt{math_accents} routine.

§1124 F
17 Feb 1983
622  643 Switch modes when \halign occurs in horizontal mode, or \valign in vertical mode. §1090, 1094 C

18 Feb 1983
644 Add a new feature \tracingrestores. This requires a new procedure called \showeqtb, whose code can be interspersed with the eqtb definitions. §252 I

25 Feb 1983
622  645 Suggest using \leaders when the user tries a horizontal rule in restricted horizontal mode. §1095 I

27 Feb 1983
646 Specify the range of source lines, when giving warning messages for underfull or overfull boxes in alignments.

Why did it take me all day to type the middle part of Chapter 18?

4 Mar 1983
647 Introduce a new feature \xcr (suggested by LL). [Changed later to \crcr] §785 G
631  648 Subtract out \TeX’s own string requirements from the stats. §1334 I

6 Mar 1983
649 Add new features \everyhbox and \everyvbox. §1083, 1167 G

9 Mar 1983
X295  650 Avoid accessing math_quad when the symbol fonts aren’t known to be present. §1199 R
533  651 Introduce float and unfloat macros to aid portability (HWT). §109 P
652 Introduce new names \abovedisplayskip and \belowdisplayskip for the old \dispskip; also \abovedisplayshortskip and \belowdisplayshortskip for the old \dispskip and \dispskip. §226 C

10 Mar 1983
653 Unbundle \romannumeral from \number (suggested by FY). §468 C

12 Mar 1983
654 Ignore leading spaces in scan_keyword. §407 C

14 Mar 1983
631  655 Use write and write_in directly when printing stats. §1334 E

16 Mar 1983
602  656 Refine the page-break cost function (introducing ‘deplorable’, which is not quite ‘awful_bad’), after suggestion by LL. §974, 1005 Q

The changes above have been incorporated into Version 0.96.

18 Mar 1983
657 Add a new feature \everyjob suggested by FY. §1030 G

19 Mar 1983
658 Don’t treat left braces specially when showing macros. §294 I
659 Ignore blanks that would otherwise become undelimited arguments. §393 C

21 Mar 1983
X280  660 Make \lastskip handle mu_glue as well as ordinary glue. §424 F
561  661 Expand only one level in a preamble \span. §782 C

22 Mar 1983
662 Let a single # suffice in \tokens, \message, etc. (The previous rule, in which ## was always required as in macros, was a loser especially in \write where you had to say ####!) §477 C
X328 → 663 Require the keyword ‘to’ in \read. (This will avoid the common error of an incomplete constant when no space appears before the \cs.) Also allow terminal I/O as a default when a stream number is out of range. §482, 1225, 1370 C

26 Mar 1983

664 Replace \ifeven(countnumber) by \ifodd(number), for better consistency of language. §504 C

564 → 665 Introduce the change_if_limit, to overcome a big surprise bug relating to \if\if aabc\fi.

• Such examples show that car_if might not be current, in my original imple-mentation.

28 Mar 1983

X326 → 666 Tolerate non-characters as arguments to \if and \ifcat. §506 G

667 Change ‘absent’ to ‘void’, a better word. §487 C

668 Clear the shift_amount in \lastbox, since I don’t want to figure out what it means in all cases. §1081 C

29 Mar 1983

669 Wake up the terminal before giving an error message. (This means a special print_err procedure is introduced.) (Suggested by DRF.) §34, 73 I

1 Apr 1983

• Today I finished Chapter 21 (boxes) and began to draft Chapter 22 (align-ments).

670 Allow periodic preambles in alignments. §793 G

671 Make \leaders line up according to the smallest enclosing box. §627, 636 C

672 Allow hyphenation after whatssits (e.g., after items for an index). §896 Q

2 Apr 1983

673 Call build_page when \par occurs in vertical mode. §1094 Q

674 Clear aux in inst_row, for tidyness. §786 C

4 Apr 1983

675 Let digits switch families in math mode. §232 C

7 Apr 1983

602 → 676 Refine the test for not splitting an insertion. §1008 Q

8 Apr 1983

647 → 677 Rename \xcr as \crcr, at LL’s request. §780 C

9 Apr 1983

• Took a day off and had a chance to help print a sample page on a 150-year-old letterpress in Murphys, California.

11 Apr 1983

678 Recover more sensibly after a runaway preamble. §339 I

12 Apr 1983

X328 → 679 Make \read span several input lines, if necessary to get balanced braces. §482 C

14 Apr 1983

680 Fix a subtle bug found by JS: §§882 can make q a char_node, so we need to test ‘if –is_char_node(q)’. [Actually I discovered much later that the real bug was to omit ‘else’ at this point.] §881 S

15 Apr 1983

681 Make \uppercase and \lowercase apply to all characters, regardless of cate-gory. §1289 C
7:30am. After working all night, I completed a draft of the manual thru Chapter 22, for distribution to volunteer readers.

5pm. The changes above have been incorporated into Version 0.97.

17 Apr 1983

682 Change ‘small’ to ‘0…65’ in the hyphenation routine (DRF). §901 R

683 Flush patterns in the input when the user tries \patterns outside of \initex (suggested by DRF). §1252 I

Tomorrow I fly to England, where I’ll lecture and write a paper about ‘Literate Programming’ [Comp. J. 27 (1984), 97–111].

14 May 1983

663 → 684 Improve the behavior of \read from terminal (suggested by Todd Allen at Yale). [I’d forgotten to implement the extended stream numbers in #663. Also, the prompt is now omitted if n < 0.] §484 I

18 May 1983

685 Restrict \write n to the transcript file only, if n < 0. §1350 I

X188 → 686 Unify the syntax for registers and internal quantities. (Remove primitives called \insthe and \minushe; rename scan\h the to scan\h something internal, and change its interface accordingly; clean up command codes generally.) §209, 413 C

687 Introduce new parameters \hoffset, \voffset. §617 G

24 May 1983

688 Introduce a new parameter \everycr (suggested by MDS). §774, 799 G

• Many macro writers and preliminary-manual readers have been requesting new features; I’ll try to keep the language as concise and consistent as possible.

25 May 1983

689 Introduce \countdef, \dimesdef, etc. (suggested by DRF long ago, easy now in view of #686). §1224 G

690 Introduce \advance, \multiply, \divide (suggested by FY). §1240 G

691 Introduce \hyphenchar; this requires a new command \assignfontint, plus minor changes to about 15 modules. §915 G

692 Introduce \kevchar (easy because of #691). §741 G

693 Introduce \noexpand. (I had difficulty thinking of how to implement this one!) §358, 369 G

694 Introduce \meaning. §296 G

X231 → 695 Remove ‘dm’ and ‘vu’; allow the more general ‘.5\hsize’. §455 G

696 Change ‘\texinfo f n’ to \fontdimen n f’. §578 C

27 May 1983

697 Add a new feature \afterassignment (suggested by ARK). §1269 G

619 → 698 Adjust the timing so that commands like \chardef xx=5\times behave sensibly. §1224 C

28 May 1983

699 Ignore ‘\relax’ as if it were a space, in math mode and in a few other places where \relax would otherwise be erroneous. §404 C

700 Improve \mathaccent spacing with respect to subscripts and superscripts (suggested by HWT). §742 Q

30 May 1983

598 → 701 Terminate a job only when dead\cycles = 0. §1054 C

• The changes above constitute Version 0.98.

3 Jun 1983

• I finished the draft of Chapter 23 (output routines) today.
Allow \mark and \insert and \vadjust in restricted horizontal mode, and also in math mode. (This is a comparatively big change, triggered by the fact that \mark in a display presently causes \TeX to crash with ‘This can’t happen!’) The global variable adjust\_tail is introduced.

6 Jun 1983

Replace (and generalize) the previous uses of \ht, \wd, and \dp in dimensions by introducing the new control sequences \ht, \wd, and \dp.

Display sub-parts of noads with the symbols ^ and _ instead of ( and ].

Allow A..F in hex constants to be other char as well as letter.

7 Jun 1983

Remove an instance of h\ Scan optional space i, since it’s now redundant.

Legalize \mkern\thinmuskip and \mkern5\thinmuskip.

Clean up the treatment of optional spaces in numerical specifications.

A construction like 2.5\space\space\dimen0 was previously valid after ‘plus’ or ‘minus’ only!

I’m obviously working on Chapter 24 today.

Make \tracing decisions on the basis of \versus <, not =\versus= .

This is a real bug that existed since the beginning! It showed up on page 37 of the Version 0 \TeX manual, but I didn’t notice the problem.

Today I finished the draft of Chapter 27 (the last chapter)!

The changes above were released as Version 0.99 on June 19, 1983.
20 Jun 1983

727 Set \catcode`\%=14 in INITEX. §232 C

587 → 728 Call normal_paragraph when \par occurs in vertical mode. §1094 C
  • Once again I’m retiring about 8am and awaking about 4pm.

21 Jun 1983

558 → 729 Don’t append an overfull rule solely because of \hbadness. §666 C

730 Don’t allow the glue-ratio of shrinking to be less than \mbox{−1}. §810, 811 R

22 Jun 1983

653 → 731 Declare the parameter to print_roman_int to be of type integer, instead of nonnegative_integer (found by Debby Clark). §69 B

690 → 732 Make the keyword ‘by’ optional (suggested by LL). §1236 C

24 Jun 1983

733 Say ‘preloaded’ when announcing formalident. §1328 I

25 Jun 1983

734 Add extra boxes and glue to the output of alignment. [This thwarts possible attempts at trickery by which system-dependent glue set values computed by \span could have gotten into \TeX’s registers by things like \vsplit and \valign. It also has the advantage of perfect accuracy in alignment of vertical rules.] §809 R

735 Make leaders affect the height or width of the enclosing boxes. §656, 671 C
  • Today I’m mainly installing a much-improved format for change files in WEB programs (suggested by DRF).

28 Jun 1983

736 Permit \nskip in vertical mode when we know that it does nothing. §1106 C

1 Jul 1983

700 → 737 Avoid redundant boxes when things like ‘{\bf A}’ occur in math. §1186 E

738 Add a ‘scaled’ feature to \font input. §1258 G

700 → 739 Remember to correct delta when an accented box changes. §742 D

2 Jul 1983

740 Introduce bypass_eoln, to remove anomalous behavior on input files of length 1. (Suggested by DRF after the problem was discovered by LL). §31 R

4 Jul 1983

741 Allow codes like ‘^b as well as ‘^B. §352, 355 G

742 Introduce new parameters \escapechar, \endlinechar, \defaulthyphenchar, and \defaultskewchar, to make \TeX less dependent on the character set. (This affects many modules, since a lot of error messages must be broken up so that they use print_esc.) G

7 Jul 1983

743 Use a system-dependent function erstat when opening or closing files (suggested by DRF). §27 P

11 Jul 1983

• The computer is back up after more than 50 hours down time (due to air conditioning failure).

744 Show total glue in the output of \tracingpages. §985 I

745 Guard against insertion into an hbox. §993 R

746 Legalize the assignment \{tokenvar\}={\{tokenvar\}. §1227 C

747 Introduce a new parameter \errhelp. §1283 I

623 → 748 Don’t forget to check global_defs when \tabskip is changed. §782 F
12 Jul 1983

749 Allow an \outer macro to appear after \string, \noexpand, and \meaning (Todd Allen). §369, 471 C

750 Make ‘the’ an expandable control sequence (i.e., move it from the stomach to the throat); this cleans up several annoying glitches. §367 C

620 → 751 Allow \unbox and \unhcopy in math mode if the box is void. §1110 C

13 Jul 1983

• I lectured for four hours at the TUG meeting today after very little sleep!

16 Jul 1983

• The following were suggested by TUG meeting discussions.

752 Round the value of default_rule more properly: It should be 26215. §463 L

753 Fix \mathaccent again; it’s still not right! The final height should be the maximum of the height of accented letter without superscript and the height of unaccented letter with superscript. §742 Q

754 Add a new feature \newlinechar. §59 G

755 Allow boxes and rules in discretionaries (suggested by somebody from Hewlett-Packard). §1121 G

X28 → 756 Show all token expansions, not just macros, when \tracingcommands. §367 I

757 Allow \char in a \hyphenation list. §935 C

758 Introduce a new feature \aftergroup; it can be implemented with save_stack. §326 G

759 Run the running dimensions to alignment boundaries (suggested by ARK). §806 C

17 Jul 1983

760 Zero out hyf values at the edges, so that weird pattern data cannot lead to Pascal range checks. §965 R

X190 → 761 Decrease the hc codes for hyphenation, so that code 127 cannot possibly be matched. §937, 962 R

672 → 762 Allow whatsits after hyphenatable words. §899 C

604 → 763 Represent an italic correction as an explicit kern. §1113 C

18 Jul 1983

764 Allow lowercase letters in file names. §519 C

765 Change the message ‘No output file’ to: ‘No pages of output’. §642 I

766 Confirm that a quiet mode is being entered, when error interaction ends with Q, R, or S (suggested by ARK). §86 I

• Version 0.999 was finally installed today; a new program listing has been printed.

• From now on, I plan to keep all section numbers unchanged.

• I’m done writing Appendix H; beginning to revise Chapter 20.

25 Jul 1983

663 → 767 Allow space after ‘to’ in the \read command (FY). §1215 C

• To bed at 1pm today.

27 Jul 1983

665 → 768 Stack the current type of \if; this precaution is necessary in general (FY). §498 S

• To bed at 2pm today.

29 Jul 1983

769 Avoid putting a control sequence in the hash table when it occurs after \ifx. (Requested by Math Reviews people.) §507 E

• Finished a version of The \TeXbook lacking only Appendices D, E, and I, for distribution to interested readers.

• To bed at 10:30pm, planning to arise regularly at 6am for a change.
31 Jul 1983
766 → 770 Call \texttt{update\_terminal} when going quiet (HWT).

§86 I

1 Aug 1983
771 Don’t put an empty line at the end of an \texttt{input} file! (This simplifies the rules and the program, and also gets around a bug that occurred at the end of files with \texttt{end\_line\_char < 0}.)

§362 C

• The changes above went into Version 0.9999, which was widely distributed.

16 Aug 1983
665 → 772 Rectify a ridiculous gaffe: I initialized \texttt{q} every time the loop of \texttt{change\_j\_limit} was performed! (Found by FY.)

§497 B

648 → 773 Distinguish ‘string’ from ‘strings’ when reporting statistics.

§1334 I

774 Introduce \texttt{lx}, to correct a bug in \texttt{xleader} computations (found by FY).

§627 A

20 Aug 1983
775 Don’t forget to apply /\ to ligatures.

§1113 F

• Today I began to read all previous issues of TUGboat, in preparation for Appendix D.

27 Aug 1983
776 Add debugging hack number 16, to help catch subtle data structure bugs.

§1339 I

777 Remove redundant setting and resetting of name in progress.

§531 E

618 → 778 Suppress \texttt{input} during a font size spec; otherwise \texttt{cur\_name} is clobbered (found by MDS).

§1258 S

779 Introduce new conditionals \texttt{ifhbox} and \texttt{ifvbox}.

§505 G

29 Aug 1983
750 → 780 Test for an empty list, if emptiness will mess up the data structure. (Found by Todd Allen.)

§478 D

624 → 781 Use \texttt{fast\_store\_new\_token} in another place for efficiency.

§466 E

782 Say ‘has only’ instead of ‘has’.

§579 I

• These changes yield Version 0.99999, used only at Stanford.

30 Aug 1983
783 Make funny blank spaces showable.

§298 C

31 Aug 1983
754 → 784 Make \texttt{newlinechar} affect \texttt{print\_char}, not just \texttt{print}.

§58 C

4 Sep 1983
785 Add new features \texttt{lastkern}, \texttt{lastpenalty}, \texttt{unkern}, \texttt{unpenalty}.

§424, 996, 1105 G

• OK, Appendix D is finished!!

• The above changes have been installed in Version 0.999999.

17 Sep 1983
548 → 786 Don’t bother making duplicate font identifiers; that was overkill, not really needed.

§1258 P

• Will this be the historic last change to \TeX? (Abbreviated)

18 Sep 1983
787 Correct a minor inconsistency, ‘display’ not ‘displayed’.

§211 I

20 Sep 1983
604 → 788 Treat the kerns inserted for accents as explicit kerns.

§1125 C

26 Sep 1983
789 Change ‘log’ to ‘transcript’ in several messages.

§535, 1335 I

• The index was finished today; I mailed the entire \TeXbook to Massachusetts for final proofreading before publication.
1 Oct 1983
790 Prevent uninitialized trie positions in case of overflow (found by Bernd Schulze). §944 D

7 Oct 1983
• Henceforth our weekly ‘\TeX lunch’ meetings will be called ‘\METAFONT lunch’.
• \METAFONT begins to produce The \TeXbook on our APS phototypesetter.

14 Oct 1983
633 → 791 Ignore spaces at the ends of lines also in \TEX.POOL (found by DRF). §52 P
610 → 792 Initialize the \texttt{history} variable at \texttt{start} here (DRF). §1332 D

18 Oct 1983
793 Extend \texttt{runaway} to catch runaway text (suggested by FY). §306 I
794 Reset \texttt{cur_cs} after \texttt{back_input}, not after scanning the ‘=’ (found by FY). §1226 D

24 Oct 1983
638 → 795 Change the error recovery for bad delimiters, in accordance with the changed syntax. (Found by Barry Smith.) §1183 I

9 Nov 1983
796 Optimize the code a bit more, based on empirical frequency data gathered during September and October: In §45, use the fact that the result is almost always true. In §380, delete \texttt{while true do} since many compilers implement that badly. Rewrite §852 to avoid calling \texttt{badness} in the most common case. §45, 380, 852 E

3 Dec 1983
797 Don’t forget to call \texttt{error} after the message has been given (noticed by Gabi Kuper). §500 F
• Version 1.0 released today incorporates all of the above.

9 Dec 1983
• Dinner party with 36 guests to celebrate \TeX’s coming of age.

2 Feb 1984
786 → 798 Reinstall \texttt{\font} precautions that I thought were unnecessary. I overlooked many problematic possibilities, like \texttt{\{\font\a=x \global\a\} \the\font} and \texttt{\font\a=x \font\b=x \let\b=\undefined \the\a}, etc. (Found by Mike Urban.) The new remedy involves removal of the \texttt{fontIdent} array and putting the identifiers into a frozen part of the hash table; so there’s a sprinkling of corrections in lots of modules. But basically the change is quite conservative, so it shouldn’t spawn any new bugs (it says here). §222, 267, 1257 S

9 Feb 1984
799 Remove the possibility of double interrupt, in a scenario found by Clint Cuzzo. §1031 S

12 Feb 1984
800 Improve spacing in a formula like $(A,<)$. §764 Q

13 Feb 1984
801 Avoid a bad \texttt{goto}, as diagnosed by Clint Cuzzo and George O’Connor. (Must not go directly to \texttt{switch}.) §346 A
802 Conserve string pool space by not storing file name in two guises (suggested by DRF). §537 E

26 Feb 1984
803 Make scaled output look cleaner by printing fewer decimals whenever this involves no loss of accuracy. (Suggested by \METAFONT development.) §103 I
THE ERRORS OF TeX

2 Mar 1984
804 Maintain 17-digit accuracy, not 16; now constants like ‘.00000762939453126pt’ will round correctly.

16 Mar 1984
805 Plug a loophole that permitted recursion in get_next, by disallowing deletions in check_outer_validity.

24 Mar 1984
806 Open the terminal before trying to wake it up, when the program starts bad.

27 Mar 1984
807 Check that $k < 63$, to avoid the \patterns{xxx...xxx...xxdxxdxxx} anomaly found by Jacques Désarménien.

11 Apr 1984

627 $\rightarrow$ 809 Initialize char_base, etc., for null_font. (Found by Nick Briggs.)
810 Clear the buffer array initially (Briggs).

21 Jun 1984
811 Look ahead for ligature or kern after a \chardef’d item (Désarménien).

4 Jul 1984
812 Make the quarterword constraint explicit with a new ‘bad’ case (19).

7 Jul 1984
813 Optimize firm_up_the_line slightly, to be consistent with the METAFONT program.

8 Jul 1984
814 Give additional diagnostics when \tracingmacros>1.

$\bullet$ The changes above were incorporated in Version 1.1, released July 9, 1984.

20 Oct 1984
816 Allow ‘0’ in response to error prompts.

$\bullet$ Those two changes led to Version 1.2.

25 Nov 1984

817 Don’t forget to check for null before looking at subfields of a node. (This was “dirty Pascal,” with two quarterword 0’s read as a halfword.)
818 Ditto in another place!
819 Remove the fixed-at-compile-time partition between lower and upper memory.

$\bullet$ This major change in memory management completes Version 1.3, which was published in preliminary looseleaf form as ‘TeX: The Program’.

5 Jan 1985
821 Improve the missing-format-file error (DRF).
7 Jan 1985
822 Update the terminal right away so that the welcoming message will appear as
soon as possible (DRF).

23 Jan 1985
823 Convey more uncertainty in the help message at times of confusion. §95 I
610 → 824 Improve the history logic in the warning issued case. §245 I

18 Feb 1985
810 → 825 Stick to standard Pascal: Don’t use first in a for loop. [Some procedures
“threaten” it globally, according to British Standard 6192, section 6.8.3.9.]
(Pointed out by CET.) §331 P

11 Apr 1985
826 Prevent nonexistent characters from being output by unusual combinations of
ligatures and hyphenation. §915 S

15 Apr 1985
819 → 827 Compute memory usage correctly in \maketex; the previous number was wrong
because of a \text macro without parentheses (DRF). §164 L

16 Apr 1985
828 Speed up flush_list by not calling free_avail (DRF). §123 E

17 Apr 1985
788 → 829 Introduce a special kind of kern for accent positioning; it must not disappear
after a line break. §837, 879, 1125 A

18 Apr 1985
755 → 830 Prevent \lastbox and \un kern from removing discretionary replacements.
• That completes Version 1.4. §1081, 1105 R

26 Apr 1985
831 Don’t try \TeX_area if a nonstandard file area has been specified (DRF). §537 C
• That was #401 in \TeX78: I never learn!

30 Apr 1985
754 → 832 Eliminate the limitation on \write length; the reason for it has disappeared
(Nancy Tuma). §1370 C

8 May 1985
819 → 833 Allocate two words for the head of the active list (CET). §162 D

11 May 1985
834 Change wterm to wterm_in after a bad beginning (Bill Gropp). §1332 I
806 → 835 Don’t open the terminal twice (CET). §1332 E

22 May 1985
836 Test for batch_mode after trying to open the transcript file, not before (DRF). §92 R
837 Be prepared for string pool overflow while reading the command line! (This
bug was first found in METAFONT, when it could occur more easily.) §525 R

7 Aug 1985
838 Fix a bug in \edef\foo{\iffalse\fi\the\toks0}: \TeX should stay in the
loop when expanding non-\the. (Found by Dan Brotsky.) §478 A
• The above changes were incorporated in Version 1.5.

27 Nov 1985
764 → 839 Make ‘plain’ a lowercase name, for consistency with the manual. §521 C
669 → 840 Wake up the terminal for \show commands. §1294, 1297 I
The above changes were incorporated in Version 2.0, which was published as Volume B of the Computers & Typesetting series.

15 Dec 1986

841 Punctuate the Poirot help message more carefully.

§1283 I

28 Jan 1987

842 Make sure that \max_in_open doesn't exceed 127 (DRF).

§14 R

843 Don’t allow a \ kern to be clobbered at the end of a pre-break list when a discretionary break is taken. (A missing 'else' was the source of the error, diagnosed incorrectly before.)

§881 D

844 Take account of discarded nodes when computing the background width after a discretionary.

§840 D

- That was the first really serious bug detected for more than 17 months! I found it while experimenting with right-to-left extensions.

- Version 2.1 was released on January 26, 1987.

5 Feb 1987

845 Remove cases in shorthand\ def that cannot occur (found by Pat Monardo).

§1224 E

14 Apr 1987

846 Improve robustness of data structure display when debugging (Ronaldo Amá).

§174, 182 R

21 Apr 1987

847 Make the storage allocation algorithm more elegant and efficient.

§127 E

22 Apr 1987

742 → 848 Calculate the empty-line condition properly when end\ line_char is absent.

§360 A

- The previous three changes were found while I was teaching a class based on Volume B; they led to Version 2.2.

28 Apr 1987

849 Avoid closing a file when \TeX knows that it isn’t open (JS).

§560 E

3 Aug 1987

850 Clean up unfinished output if it’s necessary to \jump_out (Klaus Gunterman).

§642 S

- That makes Version 2.3; subsequent version numbers won’t be logged here.

19 Aug 1987

851 Indent rules properly in cases like
\hangindent=1pt\$\halign{...\cr\noalign{\hrule}}\$.

§806 A

20 Aug 1987

852 Introduce co_backup because of cases like \hskip 0pt plus 1fil\ifdim (Alan Guth).

§366 S

9 Nov 1987

853 Change the calculation for number of leader boxes, so that it won’t be too sensitive to roundoff error near exact multiples (M. F. Bridgland).

§626 S

17 Nov 1987

854 Replace my stupid algorithm for fixed-point multiplication of negatives (WGS).

§572 A

12 Dec 1987

855 Fix a typo in the initialization of hyphenation tables (PB).

§952 B

- That error was almost completely harmless, thus undetectable, except if some \lcode is 1 and no \patterns are given.

23 Dec 1987

564 → 856 Be more cautious when “relaxing” a previously undefined \csname; you might be inside a group (CET).

§372 S
20 Apr 1988
857 Make sure \texttt{temp\_head} is well-formed whenever it can be printed in a “runaway” message: Consider constructions like \texttt{\outer\def\a0{}\a\a} (Silvio Levy). §391 S

24 Apr 1988
618 \rightarrow 858 Avoid conflicting use of the string pool in constructions like \texttt{\def\#1\{}\input a\\\z} (Robert Messer). §260 S

10 May 1988
859 Amend the \texttt{patterns} data structure when \texttt{trie\_min} = 0 (PB). §951, 953 R

25 May 1988
860 Guarantee that \texttt{trie\_pointer} cannot be out of range. §923 R
618 \rightarrow 861 Avoid additional bugs like \#858 in constructions like \texttt{\input a\romannumeral1}, etc. §464, 465, 470 S
618 \rightarrow 862 Prevent similar string pool confusion that could occur during the processing of \texttt{**\input\romannumeral6}. §525 R

19 Jun 1988
819 \rightarrow 863 Prevent a negative dividend from rounding upward, causing a loop (CET). §126 S
819 \rightarrow 864 Adopt a smoother allocation strategy when memory is nearly gone (CET). §126 E

20 Jun 1988
852 \rightarrow 865 Initialize \texttt{cur\_order}, now that it’s being backed up (Tsunetoshi Hayashi). §439 D

6 Nov 1988
612 \rightarrow 866 Disable fatal\_error in prompt\_input, so that open\_log\_file can use it safely (Tim Morgan). §71 S
836 \rightarrow 867 Force terminal output whenever open\_log\_file fails. §535 S

14 Dec 1988
866 \rightarrow 868 Restore fatal\_error in prompt\_input, but don’t let it be unsafe for open\_log\_file. §92, 534 P

23 Jan 1989
869 Give \texttt{q} a legal value when recovering from “infinite shrinkage” error. §976, 1004 D

17 Feb 1989
758 \rightarrow 870 Avoid spurious error message for \texttt{\aftergroup\relax\dump} by avoiding inaccessible \texttt{\aftergroup} tokens (FM and Rainer Schöpf). §280 D

20 Mar 1989
871 Don’t refer to link\texttt{(null)} even when it “can’t happen” (PB). §791 R

7 Jun 1989
872 Avoid confusion from \texttt{$$$\begingroup\halign{#cr}$$$} (FM). §1130 S

20 Jun 1989
873 Put fraction digits into dynamic memory, not the global \texttt{dig} array, because of constructions like \texttt{.5\dimen6} (FM). §452 S

17 Jul 1989
874 Prevent embarrassing attempts to report errors before the string mechanism has been fully initialized, for example when the command line exceeds the buffer size (WGS). §31 S

16 Aug 1989
875 Allow integer products to be 31 bits long (FM). §105 M

31 Aug 1989
441 \rightarrow 876 Increase the number of tokens shown by \texttt{token\_show} (J. Lavagnino). §295 C
877 Avoid confusion from \texttt{$$$\begingroup\eqno$$} (FM). §1140 S
The recent TUG meeting turned out to be an extend-T\TeX-for-the-nineties party! I agreed that some extensions for non-English languages ought to be made while I still knew how to do them. (In other words, I broke my firm commitment to keeping T\TeX completely stable; but in this case nobody objected.) The following eleven changes were coded during the month of September.

30 Sep 1989
878 Install major change allowing general 8-bit code input. §38, 352 G
879 Install major change allowing multiple hyphenation tables (M. Ferguson). §923 G
880 Introduce new parameters \texttt{lefthyphenmin} and \texttt{righthyphenmin}. §923 G
881 Introduce major new ligature capabilities including implicit boundary characters. §908, 1037 G
882 Install new \texttt{inputlineno} feature suggested by MDS. §424 G
883 Install new \texttt{holdinginserts} feature suggested by FM. §1014 G
884 Install new \texttt{badness} feature. §424, 664 G
885 Install new \texttt{emergencystretch} feature. §863 G
886 Install new \texttt{errorcontextlines} feature suggested by FM. §311 G
887 Recover from anomaly when hyphenation \texttt{char\_warning} clobbers \texttt{old\_setting}. §863 S
888 Make it easier to change the format extension (Don Hosek). §520, 1328 P

16 Oct 1989
889 Avoid range check in null font with \texttt{bc=256} (PB). §565 R

22 Nov 1989
856 \rightarrow 890 Prevent \texttt{save\_stack} conflicts in \texttt{\hbox\expandafter{\csname\endcsname}}} and similar constructions (WGS). §645, 1117 S
858 \rightarrow 891 System-dependent parts of file names must be addressed relatively, not absolutely (FM and Rainer Schöpf). §516, 517 S

3 Dec 1989
880 \rightarrow 892 Allow different hyphenmins in the same paragraph (M. Ferguson). §1376 G
893 Distinguish \texttt{\par} from characters on \texttt{\if} tests. (MVL). §334 S
378 \rightarrow 894 Alignments need to be more robust against malicious attacks (MVL). §782 S
895 Don’t let kers in discretionaryss disappear at breaks (MVL). §869 C
881 \rightarrow 896 Make the new hyphenation reconstruction procedure less cautious, so that it doesn’t lose hyphens found by the old method. §914 Q

11 Dec 1989
879 \rightarrow 897 Make an undumped trie dumpable again (PB). §1325 D

18 Dec 1989
588 \rightarrow 898 Allow access to page totals in \texttt{\output} routines (FM and Chris Rowley). §421 G

22 Jan 1990
611 \rightarrow 899 Recognize more cases of unbalanced \texttt{\output} (CET). §1026 R

29 Jan 1990
758 \rightarrow 900 Make \texttt{\aftergroup} work properly after \texttt{\eqno} (Michael Downes). §1194 S

1 Feb 1990
878 \rightarrow 901 Fix one more case of \texttt{end\_line\char\_inactive} (WGS). §360 S

22 Feb 1990
902 Don’t lose the last active node when total demerits are very high (FM). §836, 854 R

13 Mar 1990
903 Doublecheck math fonts after making equation number (MVL). §1194 D
904 Don’t forget to rule out charnodes before testing \texttt{\type} (MVL). §805, 1202 D
23 Mar 1990

881 → 905 Don’t change the font of punctuation preceding a hyphenated word (Scott C. Allendorf).

906 Balance the parentheses shown on the terminal during normal runs.

907 Optimize \ifx\p\q after \let\p=\q (MVL).

908 Treat migration properly in displays (MVL).

* We’re now up to Version 3.0; I sincerely hope all bugs have been found.

11 May 1990

881 → 909 Initialize \nullfont ligature parameters (Lance Carnes).

22 July 1990

579 → 910 Treat \prevgraf as zero within \write (Boguslaw Jackowski).

26 July 1990

911 Report ‘1.1’ when first line of file overflows buffer (George Russell).

5 December 1990

878 → 912 Translate unprintable characters in font identifiers (WGS).

28 December 1990

913 Avoid range check when there are 65536 or more pages (Eberhard Mattes).

20 September 1991

878 → 914 Improve error message for \mathchar out of range.

878 → 915 Retain unprintable internal strings in 8-bit form (FM).

881 → 916 Retain right punctuation context for ligature reconstruction (problem found by Brian Hamilton Kelly).

10 January 1992

881 → 917 Also avoid producing a double kern at boundary (CET).

918 Disallow \setbox where it doesn’t work (Robert Hunt).

919 Robustify \make and \makekern in presence of negative quad (WGS).

679 → 920 Defend against ‘\{’ in \read (Michael Downes).

798 → 921 Save string memory if font occurs repeatedly (Boguslaw Jackowski).

784 → 922 Don’t let \newlinechar interrupt unprintable expansion (Bernd Raichle).

7 February 1992

881 → 923 Restore cur_l properly when boundary character doesn’t exist (Mattes and Raichle).

17 July 1992

892 → 924 Use current language at beginning of horizontal mode (Rainer Schöpf and CET).

17 December 1992

879 → 925 Avoid (harmless) range errors (Philip Taylor and CET).

25 February 1993

881 → 926 Protect kerns inserted by boundary characters (William Baxter).

917 → 927 Don’t let boundary kern disappear after hyphenation.

26 June 1993

668 → 928 Avoid potential future bug (Peter Breitenlohner).