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].

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.

4 Fix bug: I wrote ‘while α ∧ (β ∨ γ)’ when I meant ‘while (α ∧ β) ∨ γ’.

5 Initialize the input routines in `INITEX` [at this time a short, separate program not under user control], in case errors occur.

6 Don’t initialize `mem` in `INITEX`, it wastes time.

7 Include additional test ‘`mem[p] ≠ 0 ∧`’ in `check_mem`.

8 Fix inconsistency between the `eq_def` conventions of `macro_def` and `eq_define`.

9 Add a feature that prints a warning when the end of a file page occurs within a macro definition or call. [System dependent.]

10 Insert space before ‘(’ on terminal when opening a new file.

11 Add ‘set_font:’ to `eq_destroy`.

12 Add code for the case `cur_cmd = 0` [later known as the case ‘t ≥ cs_token_flag’] when scanning a tokenlist.

13 Fix the previous bugfix: I shifted by the wrong amount.

14 About six hours of debugging time today.

15 Add the forgotten case ‘set_font:’ to `eq_destroy`.

16 Improve the readability and spacing of `show_node_list` output.

17 Introduce a ‘d’ option in the error routine, to facilitate debugging.

18 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`].

19 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].

20 Use `eq_destroy` wherever necessary in `unsave`.

11 Mar 1978

10 Insert space before ‘(’ on terminal when opening a new file.

11 Put ‘p ← link(p)’ into the loop of `show_token_list`, so that it doesn’t loop forever.

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.]

13 Add a feature that prints a warning when the end of a file page occurs within a macro definition or call. [System dependent.]

14 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 ‘\lft{#}’ instead of ‘\lft{##}’ inside a macro, and three cases of improper \{ and \} nesting.

15 Add the format intended eventually to typeset The Art of Computer Programming.

16 Change `\require` to `\input`.

17 Add the format intended eventually to typeset The Art of Computer Programming.

18 Introduce a ‘d’ option in the error routine, to facilitate debugging.

19 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].

20 Use `eq_destroy` wherever necessary in `unsave`.

12 Mar 1978

• One hour to enter yesterday’s corrections and recompile.

• At this point TEX correctly located further unintended syntax errors in `acphdr` [the test file].

• About seven hours today.
Change ‘t ← (t − 1) mod 8’ to ‘t ← (t − 1) land 7’ in id_name, since $\texttt{SAIL}$ 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.]

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

Remove unwanted line_feed after getting a carriage_return in response to $\texttt{in_chr_w}$ [a system routine for input from the terminal].

Delete spurious call to flush_list in end_token_list.

• Why did I make such a silly mistake?

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.

• Also $\TeX$ correctly caught an error $0p$ for $0pt$.

Fix bug in scan_spec (while instead of repeat).

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

Disable unforeseen coercion: When scan_spec put hsize on save_stack, the value changed from real to integer.

Use ‘*’ instead of ‘−1.0’ for running dimensions of rules in show_node_list.

• A rule link got clobbered because I forgot to do this.

Translate ASCII control codes to special form when displaying them.

• Ligatures work, but show_node_list showed them funny.

Remember to clear parameters off save_stack in package routine.

• About eight hours today.

13 Mar 1978

Introduce a new variable hang_first [later the sign of hang_after].

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.)

Spruce up the comments in the line_break routine, which appears to be almost working.

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.]

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; $\TeX78$ doesn’t have the concept of internal vertical mode.]

Also initialize tail in that case.

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

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

Fix bug: post_line_break forgot to set adjust_tail.

Update act_width properly when looking for end of word while line breaking.

Repair the “tricky” part of get_node: I used the info field when I meant to say link.

• Now the \corners macro of acphdr works! [See \setcornerrules in The $\TeX$book, page 417.]
47  Reset \texttt{contrib\_tail} properly in \texttt{build\_page}. §995 D
48  Fix typo (- for +) in computation of \texttt{page\_total}. §1004 T
49  Change the page-breaking logic: \TeX{} reached \texttt{fire\_up} with \texttt{best\_page\_break = null} in one case, since the badness was too bad. §1005 S
50  Perform the operation \texttt{delete\_token\_ref(top\_mark)} only when \texttt{top\_mark} ≠ 0. §1012 M
51  Make \texttt{scan\_toks} omit the initial \texttt{\_} of an \texttt{\_output} routine. §473 F
52  Insert a comma to make memory usage statistics look better. §639 I

• About seven good hours of debugging today.
• Tomorrow will be first-output day (I hope).

14 Mar 1978
• (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.
53  Issue an error message for non-character in filename or in font name. §771 I
54  Display \ldots{} for omitted stuff in \texttt{show\_context} routine. §643 I
55  Watch out for the \textsc{SAIL} syntax \‘α + β lsh γ\’; it doesn't shift α + β left (only β). §464 L

56  Show the correct page number when tracing pages before output is shipped. §638 D
57  Remember to nullify a box after using it. §1079 F
58  Issue an error message if \texttt{\_box255} isn't consumed by the output routine. §1015 I

• I'm having trouble with the \textsc{BAIL} debugger; it makes an illegal memory reference and dies, when single-stepping past the entry to recursive procedures \texttt{hist\_out} and \texttt{list\_out}. So I have to reload and be careful to go thru these procedures at high speed.

59  Fix bug in comment (memory parameter description said ≥ not ≤). §11 P
60  Fix typo in definition of rule output (said \texttt{x, y} not \texttt{x0, y0}). [This part of the code went away when \textsc{DVI} files were introduced.] B
61  Correct the embarrassing bug in shellsort, where I said \‘≤ str[k]\’ not \‘≤ t\’.
   [The first \TeX{} had to sort all output by vertical position on page.] B
62  Make \texttt{start\_input} set up \texttt{job\_name} in the form needed by \texttt{shipout}; it uses obsolete conventions. §532, 537 M
63  Insert ( and ) into the \textsc{SAIL} macro definition of \texttt{new\_string}. [This macro was for pre-\textsc{DVI} output.] L
64  Unscramble the parameters of \texttt{out\_rule}: The declaration was (\texttt{x0, y0, x1, y1})
   while the call was (\texttt{x0, x1, y0, y1}). M

• 4:30am. \TeX{}'s first page is successfully output!
• (It was \‘\texttt{\titlepage\_setcpage1\_corners\_eject\_end}\’.)

15 Mar 1978
• 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.)
65  Don't abort the job when \texttt{eq\_destroy} redefines a \TeX{} control sequence. §275 C
66  Fix the typo in \texttt{line\_break} that spoils the test for 'letters in the same font'. §896 T

67  Replace the space at paragraph end by \texttt{fill\_glue}, not by zero. §816 B
68  Pack the hyphen character properly into its node. §582 L
69  Fix a typo (‘←’ for ‘+’) in the computation of \texttt{break\_width}. §838 T
70 Change the `\end` maneuver; the present code doesn’t end the job, since I forgot that `back_input` uses `cur_tok`. §1054 M

71 Add a parameter to `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.] §840 A

72 Bypass kern nodes in pre-hyphenation. §896 F

73 Supply code for the forgotten case `'<~<a~' in pre-hyphenation. [This case was later generalized to a test of `lc_code`.] §897 F

74 Change `mem[q]` to `prev_break(q)` in the reverse-linking loop. §878 B

• (Such blunders. Am I getting feeble-minded?)

75 Introduce special logic for `eject_penalty`; I was wrong to think that forced ejection was exactly like an infinitely negative penalty. §851 A

76 Use `(1 + b)^2 - p^2` when computing demerits with `p<0`. §859 A

• 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. 16 Mar 1978

77 Insert `\topskip` glue at beginning of page. §1001 G

78 Add `\pausing` feature. §363 I

79 Fix discrepancy: In `make_accent` I called `vpackage` with a pointer to the first list item, but `vpackage` itself assumes that the parameter is a pointer to that pointer. [The `vpackage` of TeX82 will be different.] §668 M

• I checked for other lapses like that. Result: 14 calls OK, 12 NG.

80 Create a new temporary list head location, `hold_head`, since there’s a case where `vpackage` is improperly called with parameter `temp_head`. [At this time `vpackage` uses `temp_head` to make a list of all insertions found.] §1014 M

• 11:30pm. The machine is tied up again.

81 Write code to handle charnodes in vlists; I forgot that I’d decided to allow them. [Later I prohibited them again!] §669 F

82 Combine the page lists before pruning off glue in `fire_up`; otherwise the pruning doesn’t go far enough. §1017 F

83 Fix typo where line-breaking starts: `\fill glue` should be `\new_glue(fill_glue)`. §816 B

84 Add `/q` to `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 `/q` option says that the queue of printing requests should be displayed on the user’s terminal.] §642 I

85 Don’t write a form feed after the last page of output. §642 E

• To fix this, I reorganized `ship_out`, and it became simpler.

86 Correct a typo (`<` for `+`) in the `elist_node` case within `hlist_out`. [The output routines were quite different at this time, because output went directly to the XGP.] §622 T

87 Change the message `completed page` to `Completed for page`. §638 I

88 Fix yet another typo in the computation of `page_total`: My original code said `stretch(p)` instead of `stretch(q)` (terrible). §1004 B

89 Document the dirty trick about `bot_mark`’s reference count. [That trick is, fortunately, no longer useful.] §1016 P

90 Rethink the algorithm for contributing an insertion: The original code tests for a page break after incrementing the totals but before the `contrib_list` is updated. [TeX78 handles insertions in a hardwired manner that will be greatly generalized in TeX82.] A
91 Fix \texttt{get_node} again: After the variable memory overflows, control falls through to \texttt{found} instead of going to the \texttt{overflow} call.

\begin{itemize}
\item I spent several hours tracking down that data structure bug!
\end{itemize}

92 Change \texttt{new_line} to \texttt{next_line} in yet another print command (see \#7).

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

\begin{itemize}
\item 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.
\item Seven hours tonight.
\end{itemize}

\textbf{17 Mar 1978}

94 Introduce \texttt{dead_cycles} to keep \texttt{end} active until \texttt{ship_out} occurs.

95 Don’t call \texttt{line_break} with an empty list.

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

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

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

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

99 Make \texttt{show_node_list} and \texttt{show_token_list} more robust in the presence of software bugs.

\textbf{18 Mar 1978}

\begin{itemize}
\item 3:30pm. (Saturday)
\item 2am. I have to go to bed “early” tonight.
\item 3:30pm. I have to go to bed “early” tonight.
\end{itemize}

102 Add a parameter to \texttt{check_mem} (to suppress display unless needed).

103 Introduce a user-settable parameter \texttt{\maxdepth}, and pass it as a parameter to \texttt{vpackage}.

\begin{itemize}
\item I realized the need for \texttt{\maxdepth} while fixing insertions (see \#90).
\item I realized the need for \texttt{\maxdepth} while fixing insertions (see \#90).
\end{itemize}

104 Introduce a user-settable parameter for \texttt{line_break}: The constant 2.0 in my original algorithm becomes \texttt{\par} later \texttt{\tolerance}, to be set like \texttt{\tracing}.

105 Reclaim the \texttt{\eject_penalty} nodes removed during line-breaking.

\begin{itemize}
\item (Those were the 13 extra nodes reported on Thursday.)
\item The \texttt{init\_align} procedure worked right the first time!
\item Also \texttt{init\_row}, \texttt{init\_col}. But then…
\end{itemize}

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

107 Add a \texttt{prev\_cmd} variable for processing delimited macro parameters; the original algorithm loses track of braces. [The rules will change slightly in \TeX82, and \texttt{rbrace} \texttt{ptr} will take on a similar function.]

108 Make the \texttt{get\_next} routine intercept \texttt{&} and \texttt{\cr} tokens.

\begin{itemize}
\item I thought I could just put \& and \texttt{\cr} into \texttt{big_switch} [i.e., in the stomach of \TeX, not the eyes]; that was a great big mistake.
\end{itemize}

109 Make more error checks on \texttt{ende}; e.g., it must not occur in a macro definition or call.
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{\#\v&...} when \# and \v 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 \cr.
- (Namely, to consider a special kind of \def whose parameters don’t interrupt on \&’s and \cr’s.)
- But replaced this by a much better idea (to introduce align_state).
- 11pm. Began to use computer. Performed major surgery (inserting align_state and updating the associated routines and documentation).

- Pop the alignment stacks in \fin_align.
- Fix a (newly inserted) typo in \show_context.
- Set align_state false when a live \& or \cr is found. [Originally align_state was of type boolean.]
- Insert \cr when } occurs prematurely in an alignment.
- Remember to record glue stretch when packaging an unset node. [Originally glue stretch was of type boolean.]
- Make carriage-return, space, and tab equivalent for macro matching.
- Correct a silly slip: I wrote ‘type_displacement’ instead of ‘value_displacement’ when packing data in a penalty node.
- Don’t go to \build_page after seeing \noindent; \TeX isn’t ready for that. [In the original program, this was an instance of a bad \goto.] I had undesired spaces coming thru the scanner in my macro definitions of \tenpoint [see The \TeXbook, page 414].
- 4am. \TeX now knows enough to typeset page 1 of Volume 2!
- Also it did its first “math formula” (namely $X$) without crucial error.
- (Except that the italic correction was missing for some reason.)

- Remember to decrement cur_level in \fin_align. [The routines will eventually become more general and use \unsave here.]
- Remember to increment cur_level in error corrections by handle_right_brace.
- Fix a typo: (‘Y’ instead of ‘Y’) in error message for mmode + math_shift.
- Make show_node_list more robust and more like the new show_node_list. [The routines will be combined in \TeX82.]
- Fix a typo in char_box: should say font_info_real. [In \TeX78 a single array is used for both real and integer; in \TeX82 things will be scaled.]
- Fix typos in the definitions of default_rule_thickness and big_op_spacing; they shouldn’t start at mathex(7).

- 11:30pm. Went to bed.
- Seven and a half hours debugging today. Got through the test program a little more. But \TeX blew up on ‘$Y+1$’; tomorrow I hope to find out why.
20 Mar 1978

\begin{itemize}
\item 8pm. I decided to work next on a super-hairy formula.
\item 127 Change \char{} to \ascii{} (character code). \[625\text{C}
\item 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 \predisplaypenalty will al-
ways be stored.]
\[1203\text{E}
\item 129 Avoid reference to tail in \ebuildpage, if \syntax{nest_ptr} > 0.
\[905\text{S}
\item 130 Correct a silly slip in \ebmathcomp (the exact opposite of what I did in \#118).
\[1158\text{B}
\item 131 Rectify my mental lapse in \ebmakefraction; I said nucleus instead of thickness.
\[743\text{B}
\item 132 Mask off the math class when scanning delimiters.
\[1160\text{F}
\item 133 Allow an optional space after \def{}. [This decision will be retracted later.]
\[473\text{C}
\item 134 Don’t test for no pages output by looking at the channel status.
\[642\text{L}
\item 135 Fix typo in definition of \ebmathop (open_noad not op_noad).
\[1156\text{T}
\item 136 Rewrite \ebfinmlist, because \left(...\above...\right) doesn’t parse cor-
rectly; the \left goes into the numerator, the \right into the denominator.
\[1184\text{A}
\item 137 Correct the use of \ebdepth_threshold in \ebprintsubsidary_data: Simple fields get
shown while others look empty.
\[692\text{B}
\end{itemize}

78 \rightarrow 138 Return the carriage before showing the first line of a new file when pausing.
\[538\text{I}
\item 139 Fix bug: The call \ebshow_noad_list(mem[...]) should be \ebshow_noad_list(....), in
the incompleat_noad case of \ebshow_activities.
\[219\text{M}
\item 139.3. The whole messy formula has been parsed correctly into a tree.
\item 139.4. The easy part is done, now comes the harder part.
\item 140 Don’t shift single characters down in \ebmakeop.
\[749\text{F}
\item 141 Make \ebclean_box return a box (as its name implies), not an hlist.
\[720\text{D}
\item 141.1. Font info still isn’t quite right, it has the wrong value of quad.
\item 141.2. Retain the italic correction when doing \ebrebox; can make glue_set \neq 0 a flag for
this. [A better solution will be adopted later.]
\[715\text{A}
\item 141.3. Fix the bug that makes \ebrebox bomb out: value(p) should be value(mem[p]).
\[715\text{B}
\item 141.4. I found that the \ebrebox problem (#142) went away when I fixed the \ebclean_box
problem (#141); but I will leave the extra stuff about glue_set \neq 0 in the
program anyway, just for weird cases.
\[219\text{M}
\item 144 Omit extra levels of boxing when possible in \ebclean_box.
\[721\text{E}
\item 144.1. (To do this, I need to face the \ebrebox problem anyway.)
\item 21 Mar 1978
\item 145 Don’t forget \ebthickness when making a square-root sign (see #131). [The rule
thickness will later be derived from the character height.]
\[737\text{F}
\item 146 Define \var{p} local to the \ebmake_fraction routine.
\[743\text{L}
\item 147 Unwittingly using the global \var{p} was a disaster.
\[180\text{I}
\item 147.1. Don’t show the amount of glue_set when it’s zero.
\[180\text{I}
\item 148 Make glue_set nonzero in the result of \ebvar_delimiter.
\[780\text{D}
\item 149 Fix bug: The \ebmath_glue function didn’t return any result.
\[716\text{F}
\item 150 Fix typo in \ebchar_box (c not w); this caused a subscripted \var{P} to come out the
same width as an unsubscripted \var{P}. [Later changes in the rules will move
this computation to 755.]
\[709\text{T}
\item 144 \rightarrow 151 Revise \ebclean_box to do operations that are needed often because of the \ebrebox
change.
\[720\text{P}
\item 152 Use the new \ebclean_box to avoid a bug in \eb\sqrt{\eb\raise...}.
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 \texttt{INITEX} at this time, not in a changeable format definition.]

154 Give error message ‘Large delimiter must be in \texttt{mathex} font’, instead of calling confusion, since the error can occur. [This particular error is impossible in \TeX82.]

155 Change the use of \texttt{p} in \texttt{var_delimiter}; it isn’t always set when I say \texttt{goto found}. §706 I

• Another font problem now surfaced: The \texttt{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 type\texttt{(b)} in all relevant cases of \texttt{var_delimiter}. §708 D

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

158 Always kern by \texttt{delta} when there’s no superscript. §755 F

159 Declare \texttt{space\_table} to be [0..6,0..6] not [0..7,0..7]; otherwise its entries are preloaded into the wrong positions. [The \texttt{space\_table} in \TeX78 is 7 x 7; it will become 8 x 8 in \TeX82, represented as a string called \texttt{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 \texttt{\char} to \texttt{\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 \texttt{space\_table} (\* for 0).

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

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

166 Treat display\texttt{style} + cramped the same as display\texttt{style} inside \texttt{make\_op}.

167 Shift the character correctly in the non-\texttt{display\_style} case of \texttt{make\_op}.

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

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

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

• 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 \texttt{\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}.

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

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

174 Fix bad typo in overbar routine (b for p).

• Finally \TeX got to after\texttt{math} after dealing with that hairy formula…

175 Fix another bad typo: p for b this time.

176 Insert more parentheses (twice) because of ‘1sh’ precedence in \texttt{SAIL}.

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

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 \( \sqrt{x} \), and more space atop vincula. §705, 737 Q
Make large delimiters large enough to cover formula height (important for subscripts, superscripts). §762 Q
Insert /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 \texttt{\char}, since it can be used in math mode. §208 P

• Six hours today.

23 Mar 1978

• 11pm, Maundy Thursday.

104 → 185 Make \texttt{\tracing} and \texttt{\jpar} 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 + xheight/4. §758 Q

188 Change \texttt{quad} to \texttt{math_quad} when finishing a display (several places). §1190 B

Don’t use \texttt{append} to \texttt{vlist} 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

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

Don’t assume that \( p \) always points to a glue node when a page is broken. §1017 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}: I had the initialization inside the \texttt{loop}! §635 B

195 Eliminate confusion between the two temp variables named \( h \); 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 \( \delta y \) 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 \( y(\delta x) \) 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 → 199 Make \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 → 200 Don’t allow users to change nonexistent things like \texttt{\catcode1000}. §1232 R

110 → 201 Reset \texttt{align_state} at beginning of \texttt{init_align}. §774 F

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

110 → 203 Set \texttt{cur_cs ← 0} in \texttt{get_next}, after \texttt{\cr} causes a switch to the \texttt{(v_i)} 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 ‘\texttt{link = max_halfword}’ will signal availability in \TeX82.]

• That was another bad one, it’s not my night.
• At least I’m developing more subtle diagnostic techniques.

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

185 \texttt{\rightarrow} 206

207 Correct the display of insertion nodes by \texttt{show_node_list}.

208 Prevent \texttt{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 }.

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

210 \texttt{\rightarrow} 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{\vcenter} processing to the first pass of \texttt{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.
THE ERRORS OF \TeX

221 Make conditional thin space available to user as \textbackslash{}\&. [Later will retract this.]

222 Introduce \texttt{\textbackslash{}dispaskip} and \texttt{\textbackslash{}dispbskip} [later called \texttt{\textbackslash{}abovedisplayshortskip} and \texttt{\textbackslash{}belowdisplayshortskip}].

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

223 Make sure that \textbackslash{}interaction \neq \textbackslash{}error\_stop\_node in the \texttt{\textbackslash{}whoa} error \texttt{\textbackslash{}fatal\_error}. §93 I

224 Fix a big mistake in the \texttt{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{}fntfam} obey group structure. [\TeX78’s \texttt{\textbackslash{}fntfam} 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.

- Eight hours today.

226 Disable automatic line breaks after punctuation in math (e.g., consider \textit{f}(x,y)). §761 Q

227 Represent italic corrections as boxes, not glue, so that they won’t be broken.

- Eight hours today.

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

229 Put still more space above and below fraction lines in displayed formulas.

230 Install an infinite penalty feature, which positively suppresses breaks; use it in displayed formulas whose \texttt{\textbackslash{}eqno} doesn’t fit.

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{fin\_align}.

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

- There’s also a more mysterious type of uncleaved garbage, a \texttt{fraction\_node} corresponding to \$p\textbackslash{}choose\$; an \texttt{incomplete\_node} 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{search\_mem} to search \texttt{eqtb} also.

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

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

237 Remember to complete each \texttt{incomplete\_node}.

- This solved the other mystery. I had never noticed that my test output was actually wrong: \$p\textbackslash{}choose k\$ 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!

238 Don’t quit after file lookup fails.

239 Add \texttt{\TeX\_font\_area}, so that it’s easier to change the default library area associated with a device.

29 Mar 1978

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

- Eight hours today.

- Eight hours today.

1 Apr 1978

- Eight hours today.

2 Apr 1978

- Eight hours today.
3 Apr 1978

240 Insert parentheses again, to cope with the precedence of \texttt{lsh} when packing data. (See \#55 and \#176.)

\B

- \texttt{I had never tried hmode + discretionary before!}

241 Remember that \texttt{back_error} requires \texttt{cur_tok} to be set. (Problem can arise during error recovery on parameter \texttt{n} with \texttt{n} out of range.)

\E

4 Apr 1978

242 Add a deletion feature to the \texttt{error} routine.

\E

5 Apr 1978

243 Reset \texttt{space_factor} after \texttt{/} [this was later rescinded] and after math in text.

\E

10 Apr 1978

104 \rightarrow 244 Replace \texttt{\jpar} and \texttt{\tracing} by a new primitive \texttt{\chpar} for parameters. It allows a user to change those quantities as well as the penalties for hyphens, relations, binary ops, widows.

\E

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.]

\E

246 Insert \texttt{\times} into the hash table; I left it out by mistake. [It will eventually move into \texttt{plain.tex}].

\F

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

\C

17 May 1978

248 Fix a silly bug that hasn’t been tweaked until today: \texttt{\halign to size’} [obsolete in \TeX82] used \texttt{vsize} instead of \texttt{hsize}.

\E

19 May 1978

249 Add a \texttt{\topbaseline} feature [later called \texttt{\topskip}].

\E

250 Subtract the math spacing change of May 14.

\E

251 Skip past blanks in the \texttt{scan_math} procedure. [This blank-skipping will eventually go into \texttt{scan_left_brace}.]

\E

252 Introduce a \texttt{missing_brace} routine [later generalized] to improve error recovery in \texttt{mmode + math_shift}, when the top of \texttt{save_stack} isn’t a \texttt{math_shift_group}.

\E

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

\E

254 Make the underline go further under.

\E

96 \rightarrow 255 Compute the proper natural width when a displayed equation follows a paragraph whose fillglue has been deleted by \texttt{line_break}.

\E

20 May 1978

256 Fix the spurious value of \texttt{prev_depth} inside alignments.

\E

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

\E

- That bug was more subtle than usual.

258 Add the parameter \texttt{num3}, so that the positioning of \texttt{\atop} can be different from that for fractions.

\E

259 Add new parameters \texttt{delim1} and \texttt{delim2}, so that \texttt{\comb} can use fixed size delimiters, not computed as with \texttt{\left}.

\E

22 May 1978

221 \rightarrow 260 Change \texttt{\<} to \texttt{\>} and introduce \texttt{\>} as the negative of \texttt{\<}. [Later obsolete.]
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.

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

23 May 1978

Add a new parameter big_op_spacing5, for extra space above and below limits of big displayed operators.

Initialize incompleat_noad in \halign{...}.

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

26 May 1978

Don’t insert a new penalty after an explicit penalty in math mode.

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

Avoid possible bad memory references in alignment when there is erroneous input after \cr. [Instead of extra_info, the value of cur_align in \TeX82 is negated, because we need only distinguish \cr from &.]

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.]

27 May 1978

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

Mask off extra bits of \char in math mode, to avoid bad memory references. \[\] Zero out the negative \medmuskip in script styles.

29 May 1978

Be prepared to handle an undefined control sequence during get_c_token. (Can fix this by brute force, using get_token instead of get_next.)

Correct the superscript shift when a single character is raised.

More memory capacity overflows.

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

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

5 Jun 1978

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

Report the excess amount when giving an overfull box warning.

7 Jun 1978

Use $\geq$ instead of $>$ as termination criterion in var_delimiter.

Disallow \eject in math mode. [In \TeX82, \eject is distinct from \break; in horizontal mode it includes \TeX82’s ‘\vadjust{\break}’.]
Don’t put too much clearance above \sqrt in text style.

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

A \mark should expand its input.

Provide for preloading of fonts.

A \mark should expand its input.

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.

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.

Change the badness test ‘glue \leq 0.0’ to ‘glue \leq 0.0001’. [\TeX82 will avoid such problems by calculating badness without floating point arithmetic.]

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

Add end_template for better error recovery in alignments.

Make INITEX more like the real \TeX; my simple scheme for font preloading was no good because it left thousands of ‘dead’ words in memory.

Economize disk space by using internal arrays in load modules that aren’t being reinitialized. [System dependent.]

Move the declaration of mem to the semantics module, so that the object code will be more efficient. [System dependent. The code of \TeX78 was divided into separately compiled modules for syntax, semantics, output, extensions, and general organization.]

Today I’m working on the user manual.

Disallow \input except in vertical mode. [I will change this in \TeX82, treating \input as a case of expansion.]

Add error recovery for endv and par_end occurring in math mode.

Generalize \ifT to \if T.

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.

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

Echo all online inputs in the transcript file.

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

Prevent subscript from getting too high above baseline.
311 Avoid infinite loop when stack overflows: *push_input* should say ‘if $input_ptr \geq stack_size \land interaction = error_stop_mode$’.

22 Jul 1978
312 Make \texttt{\textbackslash quad} meaningful outside math mode. (All fonts must be generated again!)

313 Show the nesting level at the end of *show_activities*. [But I decided not to do this in TeX82.]

314 Put in \texttt{\textbackslash \textbackslash [namely, \textbackslash makemathskip; TeX78 already has \textbackslash \textbackslash, for conditional \textbackslash thinmathskip, as well as the negative amounts \textbackslash <, \textbackslash \textbackslash]. Change the name of vector accent from \texttt{\textbackslash >} to \texttt{\textbackslash b}. [Math spacing operators will become much more general in TeX82.]

25 Jul 1978
315 Give the correct \texttt{\textbackslash hsize} and \texttt{\textbackslash vsize} to the null boxes created at \texttt{\textbackslash end}. §1054 Q

94 \rightarrow 316 And don’t “append” them. [Later this was changed, so that it would work better with generalized output routines.]

207 \rightarrow 317 Remove the control sequence \texttt{\textbackslash endv}, since error recovery is now better. §375 I

318 Define another mode of tracing: It says ‘OK’ and stops after *showlists*. §1298 I

244 \rightarrow 319 Give better defaults to parameters. [Later done by plain.tex.] §209 Q

320 Allow more bits in the packed representation of \texttt{\textbackslash showboxdepth}. §238 I

321 Scan past delimiters and/or dimensions when recovering from ambiguous fractions. §1183 I

322 Reduce accent numbers modulo 128 or 512, depending on the mode. §1165 R

323 Include a warning, ‘*\textbackslash end occurred on level ...*’. §1335 I

28 Jul 1978

• (I’m writing Chapter 27 of the manual: ‘Recovery From Errors’.)

324 Improve the error message in *scan_digit*. [This procedure will change its name to *scan_eight_bit_int*, when the number of registers increases from 10 to 256.] §433 I

325 Don’t report overfull boxes if they’re less than .1 point over. §666, 677 I

326 Give the user extra chances to define the font, if *read_font_info* is unsuccessful. §560 I

327 Change default recovery for bad parameter number from \texttt{\textbackslash #1} to \texttt{\textbackslash ##}, since \texttt{\textbackslash #1} won’t always work and since \texttt{\textbackslash #2} is probably intended. §479 I

328 Omit the “*Negative?” message on things like *scan_char_num*. §435 I

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

330 Give a more appropriate error message when the input is ‘\textbackslash \textbackslash right’. §1192 I

• Currently TeX says ‘*Missing $!’.

331 Call *back_input* before the error message in *back_error*, not afterwards. §327 I

1 Aug 1978

332 Give an appropriate warning when there’s no input file and the user types ‘e’. §84 I

333 Increase the system pushdownlist size so that the manual will compile. [Procedures *hlist_out* and *vlist_out* can recurse deeply.] L

• 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

• I’m typing Volume 2 again (currently in Section 4.2.2). Culture shock!

334 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.] §886 G

335 Omit the ‘*widow penalty*’ in one-line paragraphs. §890 Q
5 Aug 1978

336 Generalize \pageno to \count (digit).

§236 G

285 \rightarrow 337 Update align_state 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

114 \rightarrow 341 Substitute ‘Extra }’ for the losing ‘Missing \cr’ error message.

§1069 I

213 \rightarrow 342 Go past online insertions in show_context.

§311 I

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

§1145 Q

338 \rightarrow 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 \rightarrow 346 Remove extra line-feed in show_context after printing insertions. [System dependent.]

§318 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 \rightarrow 350 Prune away all penalties at the top of a page.

§997 Q

4 Sep 1978

338 \rightarrow 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 \rightarrow 352 Insert a necessary goto statement in the first branch of the new penalty routine within build_page.

§997 B

30 Sep 1978

338 \rightarrow 353 Make the token list for runway 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 \TeX{}82.]

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 \textit{scan_int} routine. §444 C

17 Nov 1978
362 Make the \texttt{check_mem} procedure slightly more robust. §167 R

20 Nov 1978
363 Make the \texttt{\par} in a \texttt{\def} match the \texttt{\par} that comes automatically with a blank line. (Suggested by Terry Winograd.) §351 C
364 Add new parameter \texttt{\madthsrnround} for spacing before and after math in text. §1196 G
365 Extend \texttt{\advance} to allow increase by other than unity. [At this time it applies only to the ten \texttt{\count} registers, and it is called \texttt{\advcount}.] §1238 G

25 Nov 1978
366 Add a new primitive: \texttt{\unskip}. §1105 G
367 Add new primitives \texttt{\uppercase} and \texttt{\lowercase}. §1288 G

28 Nov 1978
368 Don’t let \texttt{\mark} and \texttt{macro_call} interfere with each other’s \texttt{scanner_status}. §306 M
369 Omit extra } after \texttt{show_node_list} shows a \texttt{\mark}, since the right brace is already there. (See #210.) §176 M
370 Add a new primitive suggested by Terry Winograd: \texttt{\xdef}. §1218 G

29 Nov 1978
371 Delete a space following \texttt{\else{...}} also in the false case. [\TeX78 uses braces, not \texttt{fi}, for conditionals.] S
372 Make \texttt{\tracing set \showboxbreadth} as advertised. §198 D
373 Account properly for kers in width calculations of \texttt{line_break}. §866 F
374 Delete a \texttt{math_node} at the beginning of a line. §148 Q
375 Guarantee that \texttt{\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 \texttt{negative} properly in the \texttt{\advance} routine with a \texttt{\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 \texttt{p} local to \texttt{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 \texttt{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
363 \rightarrow 382 Don’t forget to return from get_x_token after finding \par. §351 F
383 Add a new parameter: \lineskiplimit. §679 Q
384 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
385 Introduce new names \hbox and \vbox for \hjust and \vjust. §1071 C
386 Add a new condition: \ifpos. [It will later be generalized to \ifnum and \ifdim.] §513 G
387 Add \vu and \varunit. [\TeX82 will eventually allow arbitrary internal dimensions as units of measure.] §453 G
312 \rightarrow 388 Add an \em unit. §455 G
389 Legalize \hbox spread ⟨negative dimension⟩ [since scan spec no longer uses the sign as a flag]. §645 C

10 Mar 1979
370 \rightarrow 390 Make scan_toks expand \count during \xdef. [This will change later when \the and \number are introduced.] §367 C

23 Mar 1979
391 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
392 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
393 Ensure that penalty nodes aren’t wiped out, in weird cases where breaks occur at penalties that normally disappear. §879 S

27 Apr 1979
394 Correct the page number count when files begin with an empty page. [System dependent.] A
395 Allow the math_code table to be changeable via \chcode. [In \TeX82, \chcode will split into \mathcode and \catcode.] §1232 G
332 \rightarrow 396 Don’t accept ‘e’ after an error message if not inputting from a file. §84 I

29 May 1979
397 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
306 \rightarrow 398 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
354 \rightarrow 399 Don’t say ‘You can’t do that in math mode’ when the user says ‘$$’ in restricted horizontal mode! §1138 I

30 Jun 1979
400 Add wd, dp, ht dimension units. §455 G
307 \rightarrow 401 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 \restorero \zer \option], don’t remove it at group end. §282 F

16 Jul 1979

320 \rightarrow 404 Update show_node_list to be like show_node_list. [The two routines, originally separate, will be merged in \TeX\textregistered82.] §238 I

18 Jul 1979

405 Extend capacity from 32 fonts to 64 fonts if desired. §134 G
406 Add new extra_space parameter to all text fonts (requested by Frances Yao). §558 Q
407 Make each node_noad print properly in show_node_list. §183 F
408 Make \ypar allow any break if it is 1000000 or more. [In \TeX\textregistered82, 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 \rightarrow 413 Revise error so that online insertions work properly after end-of-file errors. §336 I
411 \rightarrow 414 Change ‘if first_mark \neq 0’ to ‘if first_mark \geq 0’ [because −1 is used to indicate ‘not yet given a value’]. §1012 B

28 Jul 1979

370 \rightarrow 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.] §49 I
308 \rightarrow 417 Avoid \linefeed\slopsec
• 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!

20 Aug 1979

424 Call \texttt{eq\_destroy} when a control sequence is \texttt{\textbackslash def}ed after being \texttt{\textbackslash def}ed. \textsection{283} F
418 \rightarrow 425 Treat the first token consistently when \texttt{\textbackslash topmark} and its cousins are expanded in \texttt{scan\_toks}. \textsection{477} F

• Now I’ve checked things pretty carefully and I think \TeX{} is “fully debugged.”

25 Jan 1980

338 \rightarrow 426 Display runaway alignment preambles. \textsection{306} I
427 Introduce active characters (one-stroke control sequences). [I don’t yet go all the way: The meanings of ‘x’ and ‘\textbackslash x’ have to be identical.\textsection{344} G

7 Feb 1980

314 \rightarrow 428 Fix a glaring omission: Op space \texttt{\textbackslash >} was never implemented in math mode! \textsection{716} F

25 Feb 1980

429 Add a new dimension ‘\texttt{ex}’ (for units of xheight). \textsection{455} G

3 Mar 1980

427 \rightarrow 430 Allow the 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

• \textit{An extend-\TeX{}-for-the-eighties party:}
431 Add a new \texttt{\copy} feature. \textsection{204} G
432 Add a new \texttt{\unbox} feature. \textsection{1110} G
433 Add a new \texttt{\open} feature [later \texttt{\openout}]. \textsection{1351} G
434 Add a new \texttt{\send} feature [later \texttt{\write}]. \textsection{1352} G
435 Add a new \texttt{\leqno} feature, requested by MDS. \textsection{1204} G
436 Add a new \texttt{\ifdimen} feature [later \texttt{\ifdim}]. \textsection{513} G
437 Make \texttt{\langle (space\rangle} in vertical mode begin a paragraph. \textsection{1090} C
438 Add a new \texttt{\font} feature [replacing the silly previous convention that a font must be defined when it is first selected]. \textsection{1256} G
439 Add new \texttt{\parval} and \texttt{\codeval} features [later \texttt{\the (whatever)}]. \textsection{413} G
427 \rightarrow 440 Don’t let active characters gobble the following space. \textsection{344} C
208 \rightarrow 441 Add a new parameter to govern amount of token list dumped. [Obsolete.]
442 Add a new \texttt{\linebreak} feature [later replaced by \texttt{\break}]. \textsection{831} G

25 Mar 1980

• (Still working on the above, also thought of more.)
443 Add a new \texttt{\mskip} feature. \textsection{716} G
444 Add a new \texttt{\newname} feature (soon changed to \texttt{\let}). \textsection{1221} G
430 \rightarrow 445 Allow any control sequence to be redefined. \textsection{275} G
446 Send the output to the user’s current file area, even when input comes from elsewhere. \textsection{532} I

27 Mar 1980

447 Compute the xheight for accents in math mode from family 1, not family 3. [Obsolete.] \textsection{Q}

28 Mar 1980

448 Increase minimum clearance between subscript and superscript. \textsection{759} Q

29 Mar 1980

222 \rightarrow 449 When a display follows a display, the second should have the ‘shortskip’ glue. \textsection{1146} Q
4 Apr 1980

445 \rightarrow 450 Look at current token meanings when trying to recognize \texttt{tabskip} in alignment preambles. 

\[ \text{§782 A} \]

23 Apr 1980

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

\[ \text{I} \]

434 \rightarrow 452 Break long \texttt{send} lines into pieces so that the file can be read in again. [System dependent.]

\[ \text{C} \]

19 May 1980

182 \rightarrow 453 Don’t make \texttt{\left} and \texttt{\right} delimiters too large; they need to be only 90% of the enclosed size. [This eventually became \texttt{\delimiterfactor}.] 

\[ \text{§762 Q} \]

21 May 1980

454 Add a new \texttt{pagebreak} feature [later \texttt{\vadjust{\break}}]. 

\[ \text{§655 G} \]

13 Jun 1980

\bullet 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. 

\[ \text{§737 G} \]

456 Clear empty tokenlists off input stacks to allow deeper recursions (suggested by Jim Boyce’s macros for chess positions).

\[ \text{§325 E} \]

457 Make \texttt{\spaceskip} and \texttt{\parfillskip} changeable.

\[ \text{§1228 G} \]

458 Add a new parameter \texttt{\rfudge} (per request of Zippel) [later \texttt{\mag}].

\[ \text{§288 G} \]

459 Add a new parameter \texttt{\loose} [later \texttt{\looseness}]; now parameters are allowed to take negative values.

\[ \text{§875 G} \]

460 Remove the variable \texttt{just.par}. [Obsolete; it was the real equivalent of an integer].

\[ \text{E} \]

14 Jun 1980

461 Install new line-breaking routines, including \texttt{\parshape}. (These major changes are introduced as Michael Plass and I write our article.)

\[ \text{§813 Q} \]

462 Add a new parameter \texttt{\exhyf} [later \texttt{\exhyphenpenalty}].

\[ \text{§869 G} \]

16 Jun 1980

444 \rightarrow 463 Change conventions in \texttt{eqtb} so that glue is distinguishable from other equivalents.

\[ \text{§275 S} \]

444 \rightarrow 464 Don’t expand \texttt{b} in \texttt{\xdef{\d\b{...}}} after \texttt{\let\d=\def}. [Obsolete.]

\[ \text{A} \]

444 \rightarrow 465 Avoid creating dead storage when doing \texttt{unsave} in certain regions.

\[ \text{§275 D} \]

17 Jun 1980

466 Allow negative dimensions in rules.

\[ \text{§138 C} \]

19 Jun 1980

463 \rightarrow 467 Make the new test for glue at the outer level of \texttt{show_eqtb}.

\[ \text{§252 B} \]

27 Jun 1980

453 \rightarrow 468 Don’t let \texttt{\left} and \texttt{\right} become too small for big matrices. [This eventually became \texttt{\delimitershortfall}.]

\[ \text{§762 Q} \]

3 Aug 1980

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

\[ \text{§1202 Q} \]

15 Sep 1980

461 \rightarrow 470 Say ‘\texttt{\geq f_z}’ instead of ‘\texttt{\succ f_z}’ in the pre-hyphenation routine; I’d forgotten my definition of \texttt{f_z} [a variable used to test for a sequence of lowercase letters in the same font].

\[ \text{§897 M} \]

395 \rightarrow 471 Check the range of the index in \texttt{\chcode} before saving the old value.

\[ \text{§1232 R} \]
Don't forget to increase the reference count to \parfillskip, or it will mysteriously vanish.

Make leaders break like glue in both horizontal and vertical modes.

Make \mathsurround break properly at left and right end of lines.

Remove spurious overfull boxes generated when the looseness criterion fails. [Obsolete.]

Redesign the iteration for looseness; breakpoints were not chosen optimally.

Avoid storing a lot of breakpoints when they are dominated by others.

Prefer the oldest break to the youngest break when two break nodes have the same total demerits.

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

Make it impossible to get unmatched ‘\'} in a delimited macro argument.

Add new \topsep and \botsep features. [These are \TeX78’s way to put space at the edge of inserts, replaced in \TeX82 by the \skip register corresponding to an \insert class.]

Install new routines for reading the font metrics, using Ramshaw’s TFM files instead of TFX files.

Abort after reporting 100 errors, if not pausing on errors.

Add new \spacefactor and \specskip and \skip primitives. [At this time we write ‘\specskip3=10pt’ and ‘\skip3’ for what will become ‘\skip3=10pt’ and ‘\skip\skip3’ in \TeX82.]

\unskip is now allowed in internal vertical mode.

Don’t say ‘mem[q]’ when you mean ‘q’. (See #143 and #478.)

Put some linefeeds back into the transcript file, in order to prevent overprinting in listings. [System dependent.]

Add a new \penalty feature [later \postdisplaypenalty].

Add the dimension cc for European users.

Make scan_keyword match uppercase letters as alternatives to lowercase ones (suggested by Barbara Beeton’s experiments with \uppercase).

Add nonstop mode so that overnight batch processing is possible.

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.)

Issue warning message at the end of a file page if nesting level isn’t zero. [System dependent.]

Keep track of maximum memory usage, for statistical reporting. [Obsolete.]

Prune away glue and penalties at top of page after marks, sends, inserts.

Allow \mark in horizontal mode. [Later it will be \vadjust{\mark...}].
THE ERRORS OF \TeX

498 Allow optional space before a required left brace, e.g., \texttt{\if AA ...}. [See \#251.] §403 C

499 Issue an incomplete \texttt{\if} error, to help catch a bad \texttt{\if}. §336 I

17 Mar 1981

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

310 \implies 501 Fix the spacing when there is a very tall subscript with a superscript. §759 Q

20 Mar 1981

371 \implies 502 Make space-eating after \texttt{\else} fully consistent between the true and false cases. [Obsolete.] S

24 Mar 1981

496 \implies 503 Change \texttt{glue_spec_size} to \texttt{ins_spec_size} in \texttt{vpackage} [where insertions are done]. [Obsolete.] B

5 Apr 1981

501 \implies 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 \implies 506 Don’t consider \texttt{badness > threshold} at a line \texttt{\break} except in an emergency. §854 A

13 Jul 1981

402 \implies 507 Allow other characters as numbers. §442 C

294 \implies 508 Avoid dead storage if a \texttt{no_new_control_sequence} error occurs. [Obsolete.] §259 R

509 Add a new \texttt{\ifx} feature. §507 G

510 Add new features \texttt{\xleaders} and \texttt{\cleaders}. §626, 635 G

14 Jul 1981

507 \implies 511 Amend the new code for constants; the ‘.’ in ‘.5’ is thought to mean ‘.056’! §442 S

507 \implies 512 And fix an egregious blunder in that code: New commands at the end of a procedure are ignored when earlier statements exit via \texttt{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 \texttt{SAIL} compiler.] §84 P

514 Add a new \texttt{\thebox} feature [later \texttt{\lastbox}]. §1079 G

7 Aug 1981

515 Add \texttt{fil}, \texttt{fill}, and \texttt{filll} 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 \texttt{INITEX} dump out the \texttt{font_dsize} array needed by the new \texttt{DVI} output module. §1322 F

1 May 1982

151 \implies 519 Fix \texttt{clean_box} so that \texttt{mlist_to_hlist} cannot make \texttt{link}(q) = 0 and \texttt{type}(q) = \texttt{glue_node}. §720 S

• [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 `eqb[cur_font]` to `eqb[cur_font_loc]`. §232 B
- Not logging changes to the exposition.
- Compile time is about 2 minutes CPU, times 5 for time-sharing; add another half minute for linking and loading.
- Hash table and `get_next` 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. §1305 L
X3 Print two blank spaces before date in `open_log_file`. §536 I
X4 Update `x` and `cur_used` outside the `for` loop. §1311 A
X5 Change `if =` to `if ≠` as loop exit condition. §1315, 1316 B
- The TRIP test should preload more fonts.

X6 Insert `begin ... end` around statistics output. §1334 L
X7 Must `get_token` when scanning a number. §445 F
X8 Interactive `debug_help` needs to print a newline. §1338 I
X9 Include `ignore_spaces` and `math Accent` in `print_cmd_char` cases. §266 F
X10 Don’t call `confusion` when `print_cmd_char` sees unknown code. §298 I
- 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. §237, 609 R
X12 Say `cur_tok`, not `cur_val`, when you mean `cur_tok`. §440 T
X13 Make `v pause` effective also on first line of a file. §538 F
X14 Show context after online deletion. §88 F
X15 Bypass reference count when `debug_help` shows a token list. §1339 I
X16 Change `case p` to `case type(p)`. §1000 B
X17 Fix timing of `print_int` when scrolling help messages. §90 F
X18 Make `other_char` the default category for ASCII control codes too. §232 P
X19 Use special scanning method for font number in `new_font`. §1257 A
- Eating lunch, 1020–1035, while the machine slowly recompiles everything.
X20 Don’t forget to increase `k` in the `while` loop. §355 F
X21 Adjust `limit` properly after line changed when pausing. §363 D
X22 Remember to return a value in `new_spec` and `new_penalty`. §151, 158 F
- Now stepping through `line_break` in simple case.
X23 Don’t prune unwanted nodes if `cur_p ≠ null`. §877 A
X24 Print a closing parenthesis when displaying glue nodes. §189 F
X25 Use `last`, not `limit`, in `term_input`; else error prompt causes trouble when `state = token_list`. §71, 87 S
X26 Set `first ← limit + 1` after `init_terminal`. §331 D
X27 Make sure `set_trick_count` is always performed. §317 D

17 Jul 1982

X28 Add new diagnostic feature `tracing commands`. §299, 1031 I
- Debugging of system-dependent code not shown in this log.
- Tangling TeX now takes 1.75 minutes; about 75K bytes, 108K tokens.
- Redundant semicolon sends Pascal compiler into infinite loop!
X29 Initialize `passive ← null`. §864 F
X30 Fix pseudoprinting when the line is empty. §318 A
X31 Merge adjacent free areas of dynamic memory before dumping. §131 E
X32 Print the word `node` in `print_mode`. §211 F
X33  Improve message and help in case of weird error.  §415 I
X34  Allow optional space after \texttt{def} and similar constructions.  §473 G
X35  Declare \texttt{alpha} to be integer in \texttt{read_font_info}.  §560 M
X36  Fix timing of \texttt{back_input} in \texttt{scan_dimen}.  §448 A
X37  Back up after missing number error.  §446 I
X38  Show the \texttt{at} size that is considered improper.  §1259 I
X39  Streamline the dialog in \texttt{debug_help}.  §1338 I
X40  Take output of \texttt{the_toks} from the advertised place.  §467, 1297 M
X41  Say \texttt{true_fix(q)}, not \texttt{true_fix(p)}.  §959 T
X42  Decrease low limit of \texttt{error_count} to \texttt{-1}.  §76 S

\textbf{18 Jul 1982}

X43  Clear initial reference count of macro definitions.  §473 F
X44  Fix timing of \texttt{back_input} in \texttt{scan_glue}.  §461 A
X45  Use \texttt{cur_val_level}, not \texttt{cur_val}, when checking levels.  §461 B
X46  Multiply \texttt{fil} units by \texttt{2^16} for correct scaling.  §454 B
X47  Don't confuse \texttt{glue_base} with \texttt{skip_base}.  §1237 B
X48  Fix \texttt{print_scaled} so that 0.01 doesn't come out \texttt{0.1}.  §103 A

X28 \rightarrow X49  Show mode changes when tracing commands.  §299 I
X50  Don't say \texttt{if (n \neq 0) \vee (\ldots \texttt{div} n) in Pascal.}  §105 L
X51  Don't confuse \texttt{box_flag} with \texttt{box.code}.  §1075 B
X52  Reset \texttt{offset} on \texttt{print_in} even in \texttt{no_print} mode.  §57 S
X53  Fix restarting of interrupts after \texttt{big_switch}.  §1031 S
X54  Don't loop for \texttt{k \leftarrow a to b \rightarrow 1} when \texttt{b = 0} if \texttt{k} is declared nonnegative.  L
X55  Put `=' sign into the \texttt{format_ident}.  §1328 I
X56  Allow \texttt{r} to be any integer in \texttt{get_node}.  §125 S
X57  Don't put the output of \texttt{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 \texttt{cur_val} after glue arithmetic.  §1239, 1240 F

\textbf{19 Jul 1982}

X63  Don't say \texttt{if p > max \vee \texttt{free}[p]} in Pascal.  §169 L
X64  Fix memory-undump logic; loops are out of phase with input.  §1312 A
X65  Undump \texttt{hyph_word[j]}, not \texttt{hyph_word[k]}.  §1325 B

•  At last \texttt{trip.fmt} \texttt{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 \texttt{contribute}, not \texttt{done}, after insertions.  §1000 A
X69  Decrease \texttt{depth_threshold} if there's not enough string space.  §198 I
X70  Show rules as '1' in short displays.  §175 S
X71  Don't show null glue in short displays.  §175 I
X72  Set \texttt{job_name} \leftarrow 0 as part of output initialization.  §528 S
X73  Don't complain of infinite shrinkage on \texttt{opt minus 0fil}.  §825, 976, 1009 S
X74  Use different prompt at beginning when accepting a file name.  §37 I
X75  Reset \texttt{last_glue} on nonglue nodes.  §996 F
X76  Remember to call \texttt{error} after printing 0K.  §1293 B
X77  Insert \texttt{begin . . . end} around program text of section.  §1025 L
X78  Define the \texttt{\backslashhipout} primitive.  §1071, 1073 F
X79  Introduce \texttt{write_loc} analogous to \texttt{par_loc}.  §1344, 1371 A
X80  Dump and undump \texttt{par_loc} and \texttt{write_loc}.  §1313, 1314 F
X81. Allow the in \texttt{scan-the} [later \texttt{scan-something_internal}].
X82. Interchange command codes \texttt{the := number} [later \texttt{convert}].
X83. Don’t confuse breadth with \texttt{depth}.
X84. Add string printing feature to \texttt{debug_help}.
X85. Set state \texttt{=} \texttt{m_id_line} in \texttt{begin_file_reading}.
   \begin{itemize}
   \item Time out 2105–2200 to pick up Jenny from driving lesson.
   \end{itemize}
X86. Keep \texttt{c} \leq 127 when deleting 99 tokens.
X87. Don’t check for \texttt{str_room} error when \texttt{selector = new_string}.

21 Jul 1982

X88. Gather more statistics: String usage, font info, hyphen exceptions, stacks.
X79 $\mapsto$ X89. Initialize \texttt{write_loc} from \texttt{cur_val}, not from \texttt{cs_ptr}.
X90. Remember to pack file name for \texttt{\open}.
X34 $\mapsto$ X91. Defuse \texttt{\outer} test before scanning optional space after ‘)’.
X92. Don’t allow \texttt{prepare_mag} to cause errors after \texttt{\jump_out}.
   \begin{itemize}
   \item The first page of DVI output is perfect! Pause to play piano.
   \end{itemize}
X93. Don’t confuse \texttt{dimen_base} with \texttt{scaled_base}.
X94. Initialize \texttt{link(page_head)} \texttt{=} \texttt{null} when beginning a page.
X95. Correct \texttt{cur_height} more often, since \texttt{max_depth} might be negative.
X96. Calculate page dimensions properly after vertical kerns.
X97. Install new \texttt{page_contents} logic to handle interaction between insertions and \texttt{\topskip}.
X98. Allow \texttt{top_skip} glue to be a valid breakpoint.
X99. Don’t forget to count \texttt{\dyn_used} in inner loop [erroneous analysis retracted later].

22 Jul 1982

X100. Set \texttt{p} \texttt{=} \texttt{q} after migration step.
X101. Clear \texttt{prev_graf} to zero at start of paragraph.
X102. Put parens into negated \texttt{leader_flag} macro.
   \begin{itemize}
   \item Time out 1720–1920 for John’s birthday dinner.
   \end{itemize}
X103. Scale \texttt{best_height} when adjusting \texttt{page_goal}.
X104. Simplify logic of split insertions; three states become two.
X105. Don’t omit first character when showing a macro argument.
X106. Prevent clobberage if macros have too many parameters.

22 Jul 1982

X107. Tell how many DVI bytes were output.
X88 $\mapsto$ X108. Adjust for singular or plural statistics.
X98 $\mapsto$ X109. Consider \texttt{page_head} a glue node, to inhibit unwanted break.
X110. Introduce \texttt{new_skip_param} to keep reference counts updated.
X111. Record the correct size of new insertion after it’s split.
X112. Use \texttt{free_node}, not \texttt{flush_node_list}, when recycling insertion nodes.
X113. Make online insertions work after \texttt{get_next} is interrupted.
X114. Print newline on interruption stop.

X34 $\mapsto$ X115. Put space before \texttt{end_write_token}.
X116. Don’t confuse \texttt{\glue_order} with \texttt{\stretch_order}.
X117. Set \texttt{max_dimen $\leftarrow \texttt{‘777777777}$.} not \texttt{‘7777777}.
X118. Make \texttt{\global\textfont} legal.
X119. Fetch \texttt{\the\textfont} with \texttt{equiv}, not \texttt{\fam_font}.
X120. Call \texttt{new_ligature(f, l, \ldots)} not \texttt{(f, c, \ldots)}.
X121. Make \texttt{show_box} work on random garbage.
X122. Count reference to \texttt{zero_glue} from \texttt{\cond\math_glue}.
23 Jul 1982

X123 Allow avail = null when undumping. §1312 R
X110 → X124 Set width(glue_ptr(p)), not width(p). §679 B
X125 Put begin_file_reading inside the start_input loop. §537 A
X116 → X126 Don’t confuse glue_stretch with stretch_order [the previous fix went only half-way]. §838 B
X127 Negate x when calculating badness of shrinkage. §667, 678 B
X121 → X128 Remove dangling else that parses wrong. §174 L
X28 → X129 Print newline before {, not after }, when tracing commands. §299 I
X130 Remove colon from overfull box messages. §663, 675 I
X97 → X131 Compute page_goal properly when the first box arrives after inserts. §1001 D
X132 Don’t confuse page_size [now page_goal] with best_size. §1017 B
X133 Put heldover insertions at front of contribution list. §1023 A
X88 → X134 Output stats before closing DVI file, since the latter decreases font_ptr. §1333 S
X135 Don’t call a \vbox an \hbox. §674 T
X136 Fix misplaced end caused by editing error. §675 T

24 Jul 1982

X137 Don’t eq_destroy any paragraph shape when par_shape is null. §275 D
X138 Omit blank before \message at the beginning of a line. §1280 I
X104 → X139 Don’t try to split an insertion when best_node isn’t the split one. §1021 A
X140 Correct another case of ‘if x \& y’ misunderstood by Pascal. §1021 L
X141 Provide diagnostic info about insertions via \showlists. §986 I
X142 Add ‘inside a group’ to clarify a warning message. §1335 I
X143 Report prev_depth on a separate line in \showlists. §219 I
X144 Back up input to avoid unexpected clobberage of cur_tok. §1090 S
   • Wow what a bug; new_graf calls build_page, which invokes the output routine, after which ‘goto reswitch’ is a disaster.
X145 Add insertion glue to page_so_far instead of subtracting it from the goal. §1009 D
X146 Put extra blank line before overfull box warning. §660 I
X147 Define break at kern consistently between horizontal and vertical lists. §973, 1000 C
X148 Renumber so that math nodes are nondiscardable. §147 D
X149 Correct the char Kern macro: \&, not f. §557 T
X150 Decrease l after reconstituting discretionary break. §916 F
X151 Simplify the hyphen routine, knowing that link(s) = null. §918 E
X152 Initialize r ← q in discretionary destruction routine. §883 F

25 Jul 1982

X153 Don’t add interline penalty after last line of paragraph. §890 A
X154 Adjust spacing in diagnostic messages. §245 I
X155 Avoid simultaneous use of temp_head by prune_page_top and the page builder. §1017 D
X156 Clear the post_break field of simple discretionary. §916 F
X157 Split offset into independent variables term_offset, file_offset. §54, 57, 58 A
   • Am freezing current program as version −0.25; a week of TUG lectures begins tomorrow.

5 Aug 1982

X158 The ‘.err’ file should be ‘.log’ instead. §534 I
X159 Allow special strings to contain more than 256 bytes. §585, 1368 G
X99 → X160 Undo “correction” to a non-bug. §1034 M
X161 Suggest \& in help message for unexpected &. §1128 I
X162 Make ‘E’ a standard option for exiting. §84 G
X163 Restore the use of dead cycles à la TeX78. §1024, 1054 G
   • 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. §1253 C
X166 Set cur_val after increasing the number of font parameters. §580 F
X167 Set hash_brace when matching ‘c’. §476 D
X88 → X168 Clarify meaning of statistics printed. §1334 I
X169 Change DVI format to include design size. §602, 1260 G
X170 Introduce def_ref for runaway messages. §306 D
X171 Restore cur_es before calling scan_toks. §1226 M
X157 → X172 Update print_at 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 i in all branches of scan_toks. §473 D
X179 Change ‘cur_cmd ≤ right_brace’ to ‘cur_tok ≤ 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-\HTEX [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 pren 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 \align. §775 C
X203 Don’t show glue setting if glue_sign = normal. §186 I
X204 Clear glue_stretch and glue_shrink when creating an unset box. §801 D
X205 Do epack in hmode and vice versa when aligning. §804 B
X206 Remove fallacious call to confusion after alignment in display. §1206 A
X207 Don’t test mode = vmode in display, test nest_ptr = 1. §1145 A
X208 Show an inner_node as well as the other types. §690, 696 F
X209 Renumber mu_glue and cond_math_glue so that the glue display logic works. §149 D
X210 Don’t confuse cur_size with cur_style. §703 B
X211 Advance p ← q during second pass over list. §761 F
X212 Add helpful hint about \tracingonline=1. §1293 I
X213 Delete spurious statement left from sloppy editing. §710 T
X214 Change the subtype when maskip becomes hskip. §732 D
X215 Don’t forget to use the remainder when computing math glue. §716 F

11 Aug 1982
X199 → X216 Improve paragraph diagnostics using short_display. §857 I
X199 → X217 Introduce artificial_badness for better diagnostics. §854, 856 I

X199 → X221 Install new format for showing break nodes. §846 I
  • I have been testing line_break and I think it’s working fine.
X222 Change q to p, in order to catch empty alignments. §812, 1206 B
X223 Disallow third part of discretionary in math mode. §1120 S
X224 Don’t change tail if discretionary third part is empty. §1120 D
X225 Say nonscript, not non_script. §189 I
X226 Inhibit math if \scriptfont3 is improper. §1195 S

X199 → X227 Introduce @firstpass and @secondpass comments. §863 I
X228 Change p to r when you mean r. §1204 T
X108 → X229 Say page, not pages, if there’s only 1. §642 I
X230 Insert space before \ after truncated \showlists. §182 I

28 Aug 1982
  • Back from vacation after having looked at hardcopy listing of TRIP test.
X231 Allow \dim as a unit [later .5\dim will be .5\dimen]. §455 G
X108 → X232 Singularize prevgraf 1 lines. §219 I
X233 Omit trailing zero count registers when showing completed page numbers. §638 I
X234 Avoid clobbering a by introducing a new local variable t. §986 L
X216 → X235 Fix diagnostic printing of discretionarys. §858 D
X236 Don’t show unset stretch/shrink that’s zero. §185 I
X198 → X237 Make \halign in displays consistent with other displays. (Namely, ignore \leftskip and \rightskip in nonaligned displays; respect the paragraph shape in aligned displays.) §800, 1199 C
X238 Parenthesize ‘If you’re confused ...’. §403 I
X239 Say \fraction, not \xabove. §697 I
X240 Remember to return when you should. §1153 F
X241 Use absolute value to make sure div is unambiguous. §737 P
X218 → X242 Don’t confuse depth with height. §709 B
X243 Use delta − height, not height − delta. §736 B
X244 Increase shift_down to increase the clearance. §745 B
X245 Don’t back up after improper use of \the. §428 I
X246  Don’t give 0pt as the default result when looking for tok_eal. §428 I
X247  Initialize second_indent in the easy case. §848 F
X248  Package the equation number. §1204 F
X249  Don’t resort to v ← max_dimen when glue doesn’t stretch or shrink. §1148 Q
X250  Insert newline before showing current \botmark. I
X251  Call error after giving error message. §784 F
X252  Change implementation of \number; it should scan_int, not something internal. §471 A
X253  Introduce symbolic constants like format_area_length. §524 P
X254  Change quit to jump_out, since some compilers treat quit as a reserved word. §81 P
X255  Add more parentheses to get proper parsing. §1260 L
X256  Say please in order to be friendly (or at least polite). §360 I
X257  Don’t confuse cur_vcmd with cur_chr. §508 B
X258  Use & instead of ! to specify a preloaded format. §1337 I

X177 → X259  Correct a3 to a4. §88 T
X260  Introduce new primitive \mathchardef, to save space and time. §1224 G
X261  Use the \hskip convention for noads as well as nodes. §692 C
X262  Correct spelling in call to primitive: \xatopx should be \xoverx [later renamed, thank goodness]. §1178 T

30 Aug 1982

X263  Don’t fetch link(null) in malformed list. §175 R
X264  Initialize align_state at a better time so that align_peek doesn’t see & or \span. §785, 791 S
X265  Outlaw preamble interfering with align_state = 0. §789 S
X266  Add level of grouping to alignment to tabskip locality. §774 C
X267  Check align_state when scanning \u, or \u. §783 F
X268  Move ‘unsaved; new_save_level’ from main_control into fin_col. §791, 1131 A

X180 → X269  Remember cur_chr when you’re looking for optional ‘s’. §1243 S
X270  Change q to r [in code now obsolete]. §804 T
X271  Disable interrupts during back_error so that help messages aren’t clobbered. §327 I
X272  Introduce slow_print for printing control sequences. §506 S
X273  Initialize del_code(".", 0 for error recovery. §240 I
X274  Call end_file_reading before calling check_outer_validity. §362 S
X275  Don’t delete an extra ‘)’ when \par will help find a runaway. §395 I

31 Aug 1982

X276  Don’t confuse thin_muskip with thin_muskip_code. §413 B
X266 → X277  Recover from error if new align_group ends abnormally. §1132 F
X278  Recover from error if \par occurs when align_state < 0. §1094 I
X279  Make \hskip\the\thinmuskip and \mskip\the\baselineskip erroneous. §413 C
X280  Add \muskip and \setmuskip analogs to skip and \setskip. §413, 1228 G
X281  Don’t output pop right after push.
  • The TRIP test looks right; now to test for wasted memory.
  • When memory should be empty I find dyn_used = 18, var_used = 267.

1 Sep 1982

  • Made special MEMTEX program, designed to track all memory allocation.
X282  Delete reference to last_glue when a page is packaged. §1017 D
X283  Include save_stack in the search_mem debugging routine. §285 I
X284  Disallow \vfill in restricted horizontal mode. §1095 C
  • Most of the memory locations I thought were wasted were actually in good use.
  • Total 192 hours (approx) debugging time so far since July 15.
2 Sep 1982

- Now looking at all zero counts in profile and extending TRIP.

X285 Simplify the creation of vtop boxes.
X286 Set space_factor ← 1000 after \bbox.
X287 Introduce preambule into DVI format.
X288 Give special chr_code to \relax.
X289 Don’t show ‘(null)’ when token list is null, just show nothing.
X290 Delete the procedure write_name_string, which is never used.
X291 Rename \abovex to \abovewithdelims; do the same for \xatopx and \xoverx.

X292 Improve clean_box so that it recognizes cleanliness better.
X293 Report a Missing delimiter more meaningfully.
X294 Give endv_token a chr code of 128 so that it will end a file name.
X295 Test present of math fonts after parsing an mlist, not before.
X296 Omit ‘recent contributions’ and/or ‘current page’ when they are empty.

X297 Display what \TeX has deleted after improper discretionary list has arisen.
X298 Show what math character was undefined.
X299 Improve the Incompatible magnification error; break it into two lines.
X300 Put new cases into flush_node_list, to recycle mlist noads.

6 Sep 1982

X300 ⇒ X301 Insert a necessary ‘\goto done’ in that new material.

- It took two hours to diagnose that goto problem.

X295 ⇒ X302 Change ‘2’ to ‘3’ in help message for extension fonts.
X303 Add a special note if material is being held over for the next output.
X304 Divide before multiplying in make_left_right, to avoid overflow.
X305 Introduce the box_error routine.
X306 Clear arith_error after overflow has been reported.
X249 ⇒ X307 Don’t confuse stretch with glue_stretch.

X308 Set glue_sign ← normal when packaging with glue ratio zero.
X309 Test for overflow before attaching the sign.

- That all worked! Now trying min_quarterword negative.

X310 Take absolute value before applying \mod in new\_trie\_op.
X311 Say qi(c), not c, when testing TFM flags [now obsolete].
X312 Initialize token_ref\_count\_def\_ref\_to\_null, not zero.
X313 Change the type of \split parameter n from quarterword to eight_bits.
X314 Initialize null_delimiter different form null_character.
X315 Insert qi twice in scan_delimiter.
X316 Insert qi in scan_math.
X317 Insert qa in fetch.
X318 Insert qi in set_math_char.
X319 Insert qi in math_ac.
X320 Insert qa in mlist_to_list.
X321 Use brackets around 8-bit characters in print\_ASCII.
X322 Include hyp_list in the search_mem debugging routine.

- Now compiling non-\REVTEX to try an industrial-strength version.

X323 Add return to final\_cleanup, because some Pascal compilers insist that each
label be used.
X324 Compute par_token when undumping.
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
X329 Install new feature \expandafter.
§368 G
X330 Change the default file area from ‘<TeX>’ to ‘TeXinputs’.
§574 P

13 Sep 1982

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

• All tests passed now! But when I played with the system I found another bug
(undetected by TRIP);
X333 Set r ← s after matching macro parameter tokens.
§397 F

16 Sep 1982

X199 ↔ X334 Introduce serial numbers in line-break records, improving readability and in-
dependence.
§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 ord_noad, 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

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

2 Oct 1982

525 Use conditional thin spacing next to ‘Inner’ noads.
§764 Q
526 Make thick spaces conditional.
§766 Q
THE ERRORS OF \TeX

4 Oct 1982

527 Increase $trie\_size$ from 7000 to 8000, because of Frank Liang’s improved (but longer) hyphenation patterns. §11 P

6 Oct 1982

X330 $\mapsto$ 528 Change the string lengths to match the new $\TeX$ format default. §520 F

$\bullet$ Version 0 of $\TeX$ is being released today!

8 Oct 1982

529 Fix a blunder: I decreased $h$ mod a quarterword when it should have been decreased mod $trie\_op\_hash\_size$ (HWT). §944 B

9 Oct 1982

X258 $\mapsto$ 530 Fix a typo (’!’ not ‘&’) in the WEB documentation. §524 P

531 Remember to call \texttt{initialize} if a different format was preloaded (Max Díaz). §1337 F

$\bullet$ Version 0.1 incorporates the above changes.

12 Oct 1982

532 Add the ‘\texttt{immediate}’ feature, by popular request. §1375 G

$\bullet$ Version 0.2 incorporates this (somewhat extensive) change.

13 Oct 1982

533 Introduce new WEB macros so that $glue\_ratio$ is more easily changed. §109 P

$\bullet$ I began writing \texttt{The \TeXbook} today: edited the old preface and searched in the library for quotations.

14 Oct 1982

534 Change the type of $hd$ to \texttt{eight\_bits}; it’s not a quarterword (HWT). §649 B

15 Oct 1982

535 Revise the optimization of DVI commands: It’s not always safe to eliminate $pop$ when the preceding byte is $push$, since DVI commands have variable length! (Embarrassing oversight caught by DRF.) §601 S

16 Oct 1982

536 Test ‘$prev\_depth > ignore\_depth$’, not ‘$\not=$’. §679 C

$\bullet$ Version 0.3 incorporates the above changes.

21 Oct 1982

X145 $\mapsto$ 539 Subtract $width(q)$ from $page\_goal$, don’t add it to $page\_so\_far$[1]. §1009 A

$\bullet$ Version 0.4 incorporates the above changes.

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.] §12 P

541 Add a new parameter $\backslash boxmaxdepth$. §1086 G

$\bullet$ Version 0.5 incorporates the above changes.

26 Oct 1982

542 Fix an off-by-one error caught by Gabi Kuper and HWT. (I forgot ‘+ 1’). §1317 B

543 Fix the spacing of displayed control sequences: \texttt{print\_cs} should base its decision on $cat\_code(p – single\_base)$, not $cat\_code(p)$. §262 B

$\bullet$ The TRIP test detected this bug, but I didn’t notice.

27 Oct 1982

544 Set $math\_type$ before saying \texttt{fetch(nucleus(q))}, since fetching can have a side effect. §752 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 '\text{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 The \text{T\textsc{E}}\text{X}book.
• 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 $83\text{ pc} = 35\text{ cm}$, exactly; so I am changing \text{T\textsc{E}}\text{X} to conform.

1 Nov 1982
• Oops! Retract error #546, and retract \text{T\textsc{E}}\text{X} 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
547 Revise unit definitions for the ‘real’ printer’s point. §458, 617 C
• Version 0.7 incorporates the above.

8 Nov 1982
545 $\mapsto$ 548 Introduce “frozen” copies of font identifiers, to be returned by \text{the}\textbackslash\text{font}, so that font manipulation is more robust. §1257 R

5 Nov 1982
549 Reset looseness and paragraph shape when beginning a \texttt{vbox}. §1083 R

6 Nov 1982
550 De-update \texttt{align_state} when braces are in constants. §442 D
551 Improve error recovery for bad alignments. §1127 I
• Today I wrapped up Chapters 4 and 5.

10 Nov 1982
552 Give more power to \texttt{let}: the right-hand side needn’t be a control sequence. §1221 G
553 Amend \texttt{show_context} to say ‘$(\texttt{base_ptr = input_ptr}) \lor$’; 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

11 Nov 1982
555 Save a bit of buffer space by declaring \texttt{pool_file} only in \texttt{INITEX}. §50 E

13 Nov 1982
556 Introduce a new context indicator to clarify \text{T\textsc{E}}\text{X}’s scanning state: A special type called \texttt{backed} up is distinguished from other kinds of \texttt{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 \texttt{hfuzz} or \texttt{vfuzz} if \texttt{hbadness} or \texttt{vbadness} is less than 100. §666, 677 I
• 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 \texttt{tokens} register; this will be useful and easy to add, since \text{T\textsc{E}}\text{X} already can handle \texttt{everypar} and \texttt{output}. §1227 G
X34 $\mapsto$ 560  Change \texttt{get\_x\_token} to \texttt{get\_token} when scanning an optional space; then a construction like \texttt{\textbackslash def\textbackslash foo(...)}\texttt{\textbackslash foo} won't complain that \texttt{\textbackslash foo} is undefined. §443 C

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

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

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

563 Introduce \texttt{get\_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 \texttt{\textbackslash fi}. Also introduce \texttt{\textbackslash caname} and \texttt{\textbackslash endcaname}.

- 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 214 days old!

21 Nov 1982

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

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

567 Don’t ship out huge pages; they might foul up \texttt{DVI} files. §641 R

2 Dec 1982

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

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

- The changes above have been incorporated into Version 0.9 of \TeX{}.

7 Dec 1982

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

8 Dec 1982

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

21 Dec 1982

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

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

574 Fix the logic of glue scanning: In \texttt{\textbackslash hskip\textbackslash line\_no\_pt} plus\texttt{\textbackslash line\_no\_pt} the minus should apply only to the \texttt{\textbackslash line\_no\_pt}.

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 back_input 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 if_line_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 fire_up. [This is necessary because some Pascal compilers, notably for IBM mainframes, cannot deal with large procedures.]

Make \ifodd1\else legal by introducing \if\code.

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 its_all_over; use max_dead_cycles 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.
6 Jan 1983

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

588 → 601 Add \pageshrink, etc., too. §1245 G

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 new line, 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. §473 C

• 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

16 Jan 1983

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

• While fixing this, I decided to change \spacefactor 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 \normalizeselector 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 \limitchar, \nolimits, 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 \unbox and \unvbox; also add \unhcopy. §1110 G

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

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

623 Add a new \globaldefs feature.

§1090, 1094 C

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 a \land b’ to ‘if a then if b’.

§1211 G

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 b isn’t a vbox.

715 S

545 \rightarrow 627 Make \nullfont a primitive, so that \car\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 \rightarrow 628 List all incomplete \if’s when the job ends.

§1335 I

29 Jan 1983

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

§777 C

30 Jan 1983

625 \rightarrow 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 \rightarrow 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.

§354 C

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

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 \math\accent was intended, after giving an error message in the case mmode + accent.

§1165 I

635 Add new primitives \iftrue and \iffalse.

§488 G

6 Feb 1983

X304 \rightarrow 636 Improve the accuracy of fixed-point arithmetic when calculating sizes for \left and \right. (I had started by dividing delimiter_factor, not delta1, by 500.)

§762 A

12 Feb 1983

637 Change the name \delimiterlim to \delimitershortfall.

§248 C

638 Make \above\withdelims.. equivalent to \above; change the order of operands so that delimiters precede the dimension.

§1182 C

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

§1233 C

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

§1233, 1243 R

• I finished drafting Chapter 17 today.

14 Feb 1983

639 \rightarrow 641 Replace octal output (print\octal) by hexadecimal (print\hex) so that math codes are clearer.

§67 I

619 \rightarrow 642 Don’t forget char\given in the \math\accent routine.

§1124 F
17 Feb 1983
622 $\mapsto$ 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 $\texttt{\textbackslash tracingrestore}$. This requires a new procedure called $\texttt{\textbackslash show_eqtb}$, whose code can be interspersed with the eqtb definitions.

§252 I

25 Feb 1983
622 $\mapsto$ 645 Suggest using $\texttt{\textbackslash leaders}$ 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 $\texttt{\textbackslash xcr}$ (suggested by LL). [Changed later to $\texttt{\textbackslash crcr}$] §785 G
631 $\mapsto$ 648 Subtract out \TeX{}’s own string requirements from the stats.

§1334 I

6 Mar 1983
649 Add new features $\texttt{\textbackslash everyhbox}$ and $\texttt{\textbackslash everyvbox}$.

§1083, 1167 G

9 Mar 1983
X295 $\mapsto$ 650 Avoid accessing $\texttt{math_quad}$ when the symbol fonts aren’t known to be present. §1199 R
533 $\mapsto$ 651 Introduce $\texttt{float}$ and $\texttt{unfloat}$ macros to aid portability (HWT).

§109 P

652 Introduce new names $\texttt{\abovedispshortskip}$ and $\texttt{\belowdispshortskip}$ for the old $\texttt{\dispshortskip}$; also $\texttt{\abovedispshortskip}$ and $\texttt{\belowdispshortskip}$ for the old $\texttt{\dispskip}$ and $\texttt{\dispshortskip}$.

§226 C

10 Mar 1983
653 Unbundle $\texttt{\romannumeral}$ from $\texttt{number}$ (suggested by FY).

§468 C

12 Mar 1983
654 Ignore leading spaces in $\texttt{scan_keyword}$.

§407 C

14 Mar 1983
631 $\mapsto$ 655 Use $\texttt{write}$ and $\texttt{write_line}$ directly when printing stats.

§1334 E

16 Mar 1983
602 $\mapsto$ 656 Refine the page-break cost function (introducing ‘$\texttt{\textbackslash deplorable}$’, which is not quite ‘$\texttt{\textbackslash awfulbad}$’), after suggestion by LL.

• The changes above have been incorporated into Version 0.96.

§974, 1005 Q

18 Mar 1983
657 Add a new feature $\texttt{\textbackslash everyjob}$ 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 $\mapsto$ 660 Make $\texttt{\textbackslash lastskip}$ handle $\texttt{mu}$ as well as ordinary glue.

§424 F

561 $\mapsto$ 661 Expand only one level in a preamble $\texttt{\textbackslash span}$.

§782 C

22 Mar 1983
662 Let a single $\texttt{#}$ suffice in $\texttt{\tokens}$, $\texttt{\message}$, etc. (The previous rule, in which $\texttt{##}$ was always required as in macros, was a loser especially in $\texttt{\write}$ where you had to say $\texttt{####}$)

§477 C
X328 $\mapsto$ 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 $\mapsto$ 665 Introduce the change_if_limit, to overcome a big surprise bug relating to \if\if aabc\fi. §497 S

- Such examples show that cur_if might not be current, in my original implementation.

28 Mar 1983

X326 $\mapsto$ 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 (alignments).

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 whatsits (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 $\mapsto$ 676 Refine the test for not splitting an insertion. §1008 Q

8 Apr 1983

647 $\mapsto$ 677 Rename \xcr as \cr, 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 $\mapsto$ 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 category. §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_number' to '0...65' in the hyphenation routine (DRF).

683 Flush patterns in the input when the user tries \patterns outside of INITEX (suggested by DRF).

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 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.]

18 May 1983
685 Restrict \write n to the transcript file only, if n < 0.

X188 ← 686 Unify the syntax for registers and internal quantities. (Remove primitives called \insthe and \minusthe; rename scan_the to scan_something_internal, and change its interface accordingly; clean up command codes generally.) §209, 413 C

24 May 1983
688 Introduce a new parameter \everycr (suggested by MDS).

• 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, \dimendef, etc. (suggested by DRF long ago, easy now in view of #686).

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

691 Introduce \hyphenchar: this requires a new command assign_font_int, plus minor changes to about 15 modules.

692 Introduce \skewchar (easy because of #691).

693 Introduce \noexpand. (I had difficulty thinking of how to implement this one!)

694 Introduce \meaning.

695 Remove 'dm' and 'vu'; allow the more general '.5\hsize'. §455 G

696 Change '\texinfo f n' to '\fontdimen n f'.

27 May 1983
697 Add a new feature \afterassignment (suggested by ARK).

698 Adjust the timing so that commands like \chardef\xx=5\xx behave sensibly.

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.

700 Improve \mathaccent spacing with respect to subscripts and superscripts (suggested by HWT).

30 May 1983
701 Terminate a job only when dead_cycle = 0.

• 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 \textit{This can't happen}!) The global variable \texttt{adjust_tail} is introduced. §796, 888, 1085  G

6 Jun 1983

Replace \textit{(and generalize)} the previous uses of \texttt{ht}, \texttt{wd}, and \texttt{dp} in dimensions by introducing the new control sequences \texttt{\ht}, \texttt{\wd}, and \texttt{\dp}. §1247  G

Display sub-parts of noads with the symbols ^ and _ instead of ( and [. §696  I

Allow A..F in hex constants to be \texttt{other_char} as well as \texttt{letter}. §445  C

§7 Jun 1983

Remove an instance of ⟨Scan optional space⟩, since it's now redundant. §457  E

Legalize \texttt{\mkern\thinmuskip} and \texttt{\mkern5\thinmuskip}. §456  C

Clean up the treatment of optional spaces in numerical specifications. §445  C

8 Jun 1983

Disallow \texttt{\openout-1} and \texttt{\closeout-1}. §1350  C

Disallow \texttt{\lastbox} in math mode. §1080  C

9 Jun 1983

Call \texttt{\back_error}, not \texttt{\error}, when \texttt{\leaders} aren’t followed by proper glue. §1078  I

Initialize for a possible paragraph, after \texttt{\noalign} in a \texttt{\valign}. §785  D

10 Jun 1983

Expand the optional space after an ASCII constant. §442  C

12 Jun 1983

Set \texttt{space_factor} ← 1000 after a rule or a constructed accent. §1056, 1123  C

14 Jun 1983

Correct a serious blunder: Set \texttt{disc_width} ← 0 before testing if \textit{s} is null (caught by JS). §869  D

\textbullet\ This is a real bug that existed since the beginning! It showed up on page 37 of the Version 0 \textit{TRIP} manual, but I didn’t notice the problem.

Make optional spaces after \texttt{\dimen} like those after \texttt{\number}. §448  C

Insert every \texttt{\display} before calling \texttt{\build_page}. §1145  C

Report \TeX’s capacity on overflow errors in a way that’s fully consistent with other statistical reports. §42  I

17 Jun 1983

Make all \texttt{\tracing} decisions on the basis of \texttt{\geq} versus \texttt{\lt}, \texttt{\neq} versus \texttt{\eq}. §581  C

\textbullet\ Today I finished the draft of Chapter 27 (the last chapter)!

\textbullet\ The changes above were released as Version 0.99 on June 19, 1983.
THE ERRORS OF \TeX

\textbf{20 Jun 1983}

\textbf{727} Set \texttt{\catcode'\%=14 in INITEX.} §323 C

\textbf{567} \textbf{728} Call normal\texttt{\_paragraph} when \texttt{\par} occurs in vertical mode. §1094 C

\begin{itemize}
  \item Once again I'm retiring about 8am and awaking about 4pm.
\end{itemize}

\textbf{21 Jun 1983}

\textbf{558} \textbf{729} Don't append an overfull rule solely because of \texttt{\hbadness.} §666 C

\textbf{730} Don't allow the glue-ratio of shrinking to be less than $-1$. §810, 811 R

\textbf{22 Jun 1983}

\textbf{653} \textbf{731} Declare the parameter to \texttt{print\_roman\_int} to be of type \texttt{integer}, instead of \texttt{nonnegative\_integer} (found by Debby Clark). §69 B

\textbf{690} \textbf{732} Make the keyword 'by' optional (suggested by LL). §1236 C

\textbf{24 Jun 1983}

\textbf{733} Say 'preloaded' when announcing \texttt{format\_ident}. §1328 I

\textbf{25 Jun 1983}

\textbf{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 \texttt{\span} could have gotten into \TeX's registers by things like \texttt{\valign} and \texttt{\vsplit}. It also has the advantage of perfect accuracy in alignment of vertical rules.] §809 R

\textbf{735} Make leaders affect the height or width of the enclosing boxes. §656, 671 C

\begin{itemize}
  \item Today I'm mainly installing a much-improved format for change files in \texttt{WEB} programs (suggested by DRF).
\end{itemize}

\textbf{28 Jun 1983}

\textbf{736} Permit \texttt{\unskip} in vertical mode when we know that it does nothing. §1106 C

\textbf{1 Jul 1983}

\textbf{700} \textbf{737} Avoid redundant boxes when things like '{\bf A}' occur in math. §1186 E

\textbf{738} Add a 'scaled' feature to \texttt{\font} input. §1258 G

\textbf{700} \textbf{739} Remember to correct delta when an accented box changes. §742 D

\textbf{2 Jul 1983}

\textbf{740} Introduce \texttt{bypass\_color}, to remove anomalous behavior on input files of length 1. (Suggested by DRF after the problem was discovered by LL). §31 R

\textbf{4 Jul 1983}

\textbf{741} Allow codes like ^^b as well as ^^B. §352, 355 G

\textbf{742} Introduce new parameters \texttt{\escapechar}, \texttt{\endlinechar}, \texttt{\defaulthyphenchar}, and \texttt{\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.escape.) G

\textbf{7 Jul 1983}

\textbf{743} Use a system-dependent function \texttt{erstat} when opening or closing files (suggested by DRF). §27 P

\textbf{11 Jul 1983}

\begin{itemize}
  \item The computer is back up after more than 50 hours down time (due to air conditioning failure).
\end{itemize}

\textbf{744} Show total glue in the output of \texttt{\tracingpages}. §985 I

\textbf{745} Guard against insertion into an hbox. §993 R

\textbf{746} Legalize the assignment \texttt{(tokenvar)=\{tokenvar\}}. §1227 C

\textbf{747} Introduce a new parameter \texttt{\errhelp}. §1283 I

\textbf{623} \textbf{748} Don't forget to check \texttt{global\_defs} when \texttt{\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 \unhbox 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

700 → 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).

• 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 `update_terminal` when going quiet (HWT).

1 Aug 1983
771 Don’t put an empty line at the end of an `\input` file! (This simplifies the rules and the program, and also gets around a bug that occurred at the end of files with `end_line_char < 0`.)

16 Aug 1983
665 ↔ 772 Rectify a ridiculous gaffe: I initialized `q` every time the loop of `change_if_limit` was performed! (Found by FY.)

20 Aug 1983
775 Don’t forget to apply `/` to ligatures.

27 Aug 1983
776 Add debugging hack number 16, to help catch subtle data structure bugs.

30 Aug 1983
783 Make funny blank spaces showable.

31 Aug 1983
754 ↔ 784 Make `\newlinechar` affect `\print_char`, not just `\print`.

4 Sep 1983
785 Add new features `\lastkern`, `\lastpenalty`, `\unkern`, `\unpenalty`. §424, 996, 1105

17 Sep 1983
548 ↔ 786 Don’t bother making duplicate font identifiers; that was overkill, not really needed.

18 Sep 1983
787 Correct a minor inconsistency, ‘display’ not ‘displayed’.

20 Sep 1983
604 ↔ 788 Treat the kerns inserted for accents as explicit kerns.

26 Sep 1983
789 Change ‘log’ to ‘transcript’ in several messages.
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’.
• DRF begins to produce The \TeX{}book on our APS phototypesetter.

14 Oct 1983

633 \rightarrow 791 Ignore spaces at the ends of lines also in \TeX{}\texttt{.POOL} (found by DRF). §52 P

610 \rightarrow 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 \rightarrow 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).

• Version 1.0 released today incorporates all of the above. §500 F

• Dinner party with 36 guests to celebrate \TeX{}’s coming of age.

9 Dec 1983

2 Feb 1984

786 \rightarrow 798 Reinstall \texttt{\font} precautions that I thought were unnecessary. I overlooked many problematic possibilities, like ‘\texttt{\font\a=x \global\a} \texttt{\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{font\_ident} 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
2 Mar 1984
804 Maintain 17-digit accuracy, not 16; now constants like ‘.0000762939453126pt’ will round correctly. §452 R
16 Mar 1984
805 Plug a loophole that permitted recursion in \getnext, by disallowing deletions in check_outer_validity. §336 R
24 Mar 1984
806 Open the terminal before trying to wake it up, when the program starts bad. §1332 I
27 Mar 1984
807 Check that \k < 63, to avoid the \patterns{xxx...xxddxx...dxxx} anomaly found by Jacques Désarménien. §962 R
11 Apr 1984
808 Supply code for the missing case adjust_node in \copy_node_list. §206 F
809 Yoicks, how could serious bugs like that have escaped detection? §1038 C
810 Initialize char_base, etc., for null_font. (Found by Nick Briggs.) §552 D
811 Clear the buffer array initially (Briggs). §331 R
21 Jun 1984
812 Look ahead for ligature or kern after a \chardef’d item (Désarménien). §111 R
7 Jul 1984
813 Optimize firm_up_the_line slightly, to be consistent with the \META\FONT program. §363 E
814 Give additional diagnostics when \tracingmacros>1. §323 I
815 The changes above were incorporated in Version 1.1, released July 9, 1984. §1298 I
27 Jul 1984
816 Allow ‘0’ in response to error prompts. §84 I
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.) §846 R
818 Ditto in another place! §939 R
819 Remove the fixed-at-compile-time partition between lower and upper memory. §116, 125, 162 E
Those two changes led to Version 1.2.
20 Dec 1984
820 Keep the node_size field from overflowing if the lower part of memory is too large. §125 R
5 Jan 1985
821 Improve the missing-format-file error (DRF). §524 I
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.

610 → 824 Improve the history logic in the warning issued case.

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.)

11 Apr 1985

826 Prevent nonexistent characters from being output by unusual combinations of ligatures and hyphenation.

15 Apr 1985

819 → 827 Compute memory usage correctly in INITEX; the previous number was wrong because of a WEB text macro without parentheses (DRF).

16 Apr 1985

828 Speed up flush_list by not calling free_avail (DRF).

17 Apr 1985

788 → 829 Introduce a special kind of kern for accent positioning; it must not disappear after a line break.

18 Apr 1985

755 → 830 Prevent \lastbox and \un kern from removing discretionary replacements.

26 Apr 1985

831 Don’t try \TeX_area if a nonstandard file area has been specified (DRF).

30 Apr 1985

754 → 832 Eliminate the limitation on \write length; the reason for it has disappeared (Nancy Tuma).

8 May 1985

819 → 833 Allocate two words for the head of the active list (CET).

11 May 1985

834 Change wterm to wterm_in after a bad beginning (Bill Gropp).

806 → 835 Don’t open the terminal twice (CET).

22 May 1985

836 Test for batch_mode after trying to open the transcript file, not before (DRF).

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.)

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.)

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7 Aug 1985

§788, 837, 879, 1125 A

18 Apr 1985

• That completes Version 1.4.

26 Apr 1985

537 C

• That was #401 in \TeX78; I never learn!

30 Apr 1985

1370 C

8 May 1985

1305 R

8 May 1985

1081, 1105 R

8 May 1985

1332 E

8 May 1985

1370 C

8 May 1985

162 D

8 May 1985

1362 I

22 May 1985

82 R

22 May 1985

525 R

22 May 1985

478 A

27 Nov 1985

829 Introduce a special kind of kern for accent positioning; it must not disappear after a line break.

8 May 1985

§837, 879, 1125 A

18 Apr 1985

1081, 1105 R

26 Apr 1985

537 C

30 Apr 1985

1370 C

8 May 1985

1362 I

22 May 1985

82 R

22 May 1985

525 R

22 May 1985

478 A

27 Nov 1985

521 C

27 Nov 1985

1294, 1297 I

27 Nov 1985

669 → 840 Wake up the terminal for \show commands.

27 Nov 1985

521 C

27 Nov 1985

1294, 1297 I

27 Nov 1985

839 Make ‘plain’ a lowercase name, for consistency with the manual.
• 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 Guntermann). §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).

• That error was almost completely harmless, thus undetectable, except if some \lccode is 1 and no \patterns are given.

23 Dec 1987

564 → 856 Be more cautious when “relaxing” a previously undefined \cname; you might be inside a group (CET). §372 S
20 Apr 1988

857  Make sure temp_head is well-formed whenever it can be printed in a “runaway” message: Consider constructions like `\outer\def\a0{}\a\a` (Silvio Levy). §391 S

24 Apr 1988

618 → 858  Avoid conflicting use of the string pool in constructions like `\def\#1{}\input a\\\z` (Robert Messer). §260 S

10 May 1988

859  Amend the `\patterns` data structure when `trie_min = 0` (PB). §951, 953 R

25 May 1988

860  Guarantee that `trie_pointer` cannot be out of range. §923 R

618 → 861  Avoid additional bugs like #858 in constructions like `\input a\romannumeral1`, etc. §464, 465, 470 S

618 → 862  Prevent similar string pool confusion that could occur during the processing of `**\input\romannumeral6`. §525 S

19 Jun 1988

819 → 863  Prevent a negative dividend from rounding upward, causing a loop (CET). §126 S

819 → 864  Adopt a smoother allocation strategy when memory is nearly gone (CET). §126 E

20 Jun 1988

852 → 865  Initialize `cur_order`, now that it’s being backed up (Tsunetoshi Hayashi). §439 D

6 Nov 1988

612 → 866  Disable `fatal_error` in `prompt_input`, so that `open_log_file` can use it safely (Tim Morgan). §71 S

836 → 867  Force terminal output whenever `open_log_file` fails. §535 S

14 Dec 1988

866 → 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 q a legal value when recovering from “infinite shrinkage” error. §976, 1004 D

17 Feb 1989

758 → 870  Avoid spurious error message for `\aftergroup\relax\dump` by avoiding inaccessible `\aftergroup` tokens (FM and Rainer Schöpf). §280 D

20 Mar 1989

871  Don’t refer to `link(null)` even when it “can’t happen” (PB). §791 R

7 Jun 1989

872  Avoid confusion from `\$\begingroup\halign{\#\cr}\$` (FM). §1130 S

20 Jun 1989

873  Put fraction digits into dynamic memory, not the global `dig` array, because of constructions like `.5\ifdim.6` (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 → 876  Increase the number of tokens shown by `token_show` (J. Lavagnino). §295 C

877  Avoid confusion from `\$\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 \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 \lefthyphenmin and \righthyphenmin. §923 G
881 Introduce major new ligature capabilities including implicit boundary characters. §908, 1037 G
882 Install new \inputlineno feature suggested by MDS. §424 G
883 Install new \holdinginserts feature suggested by FM. §1014 G
884 Install new \badness feature. §424, 664 G
885 Install new \ emergencies stretch feature. §863 G
886 Install new \errorcontextlines feature suggested by FM. §311 G
887 Recover from anomaly when hyphenation char_warning clobbers 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 bc=256 (PB). §565 R

22 Nov 1989

856 \rightarrow 890 Prevent save_stack conflicts in \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 \par from characters on \if tests. (MVL). §334 S
378 \rightarrow 894 Alignments need to be more robust against malicious attacks (MVL). §782 S
895 Don’t let kerns in discretionary characters 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 \output routines (FM and Chris Rowley). §421 G

22 Jan 1990

611 \rightarrow 899 Recognize more cases of unbalanced \output (CET). §1026 R

29 Jan 1990

758 \rightarrow 900 Make \aftergroup work properly after \eqno (Michael Downes). §1194 S

1 Feb 1990

878 \rightarrow 901 Fix one more case of 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 char nodes before testing 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 \mskip and \mkern in presence of negative quad (WGS).

679 → 920 Defend against \Y 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).

17 December 1993

881 → 929 Boundary character representation shouldn’t depend on the font memory size (Berthold Horn).

10 March 1994

930 Huge font parameter number may exceed array bound (CET).
4 September 1994
926 → 931 Math kerns are explicit (Walter Carlip). §717 F
932 Avoid overflow on huge real-to-integer conversion. §625, 634 R

19 March 1995
933 Avoid spurious reference counts in format files (PB). §1335 R

23 November 1998
934 Make sure that \TeX is certifiably Y2K-safe. §1328 R

12 July 1999
255 → 935 \leaders often drops the final box (Hiroshi Nakashima). §627, 636 A

30 August 2001
936 Don’t allow a million unbalanced braces followed by \cr outside of any alignment (Ralf Roth). §789 R
937 Don’t allow end-template except at end of template (Roth). §325, 1131 R

30 September 2002
938 Improve rounding of glue during output (M. F. Bridgland). §625, 634 Q

18 March 2008
939 Forgot to goto the proper error recovery (DRF). §395 F
940 Avoid a case of dirty Pascal and speed up inner loop. §1035 E
941 Forget reference to last glue in format file (DRF). §1335 R
942 Glue reference not updated after overflow error (DRF). §1236 R
943 Muglue in \leaders had wrong units; now disallowed (DRF). §1078 B
944 Speedup of ligatures and kerns at end of a word (DRF). §1039 E
945 Another sanity check of TFM files for security (DRF). §565 R
946 Give better size data for unmagnified insertions. §986 I

6 January 2014
947 Space after \csname\endcsname to match other spaces. (Oleg Bulatov) §262 C

15 January 2021
948 Don’t pause on errors when tracing paragraphs (Udo Wermuth). §826 I
949 Don’t try to interact when in \batchmode (Xiaosa Zhang). §83 S
950 Don’t try to edit when no file is active (Xiaosa Zhang). §84 S
951 Take date and time sometimes from system, not user (Udo Wermuth). §241, 536 R
952 Don’t allow implicit left brace after # (Udo Wermuth). §476 B
953 After nine parameters, must delete offending tokens (Bruno Le Floch). §476 R
954 Garbage visible in buffer after file ends prematurely (DRF). §486 D
955 Force nonexistent characters to have null specs (DRF). §722 R
956 Don’t mark fraction noads as temporarily Inner (DRF). §761 C
957 Reset \newlinechar before logging the stats (Udo Wermuth). §1333, 1335 Q

List of abbreviated names:
DRF: David Fuchs
HWT: Howard Trickey
FY: Frank Yellin
LL: Leslie Lamport
JS: Jim Sterken
ARK: Arthur Keller
CET: Chris Thompson
FM: Frank Mittelbach
PB: Peter Breitenlohner
WGS: Wayne G. Sullivan
MVL: Marc van Leeuwen
MDS: Michael D. Spivak