This is a list of all substantial corrections made to *Computers & Typesetting* since the publication of the Millennium Edition at the close of the year 2000. (More precisely, it lists errors corrected since the 16th printing of Volume A, the 7th printing of Volume B, the 6th printing of Volume C, the 4th printing of Volume D, and the 5th printing of Volume E.) Corrections made to the softcover version of *The TEXbook* are the same as corrections to Volume A. Corrections to the softcover version of *The METAFONTbook* are the same as corrections to Volume C. Changes to the mini-indexes and master indexes of Volumes B, D, and E are not shown here unless they are not obviously derivable from what has been shown. Some (or all) of these errors have been corrected in the most recent printings.

Page A16, line 7 from the bottom (6/30/01)

Ten-point type is different from **magnified five-point type.**

Page A17, line 7 (6/30/01)

---

fications that grow in geometric ratios—something like equal-tempered tuning

---

Page A51, lines 18–20 (6/30/01)

`ff` yields ff; `fi` yields fi; `fl` yields fl; `ffi` yields ffi; `ffl` yields ffl;
`` `` `` yields “; `''` yields ”; `!`` yields ¡; `?`` yields ¿;
`--` yields –; `---` yields —.

Page A52, line 7 from the bottom (6/30/01)

`\ae,\AE` æ, Æ (Latin ligature and Scandinavian letter AE)

Page A71, line 15 (6/30/01)

One of the interesting things that can happen when glue stretches and

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Page A180, line 20 (6/30/01)

Challenge number 5: $k = 1.38065 \times 10^{-16}\,\mathrm{erg\,K^{-1}}$.

Page A254, line 12 from the bottom becomes two lines (4/09/01)

```
\output={\unvbox255
  \ifnum\outputpenalty<10000 \penalty\outputpenalty\fi}
```

Page A292, lines 13–16 (6/30/01)

■ `\mathchoice`⟨filler⟩`{`⟨math mode material⟩`}`⟨filler⟩`{`⟨math mode material⟩`}` ⟨filler⟩`{`⟨math mode material⟩`}` ⟨filler⟩`{`⟨math mode material⟩`}`. Four math lists, which are defined as in the second alternative of a ⟨math field⟩), are recorded in a “choice item” that is appended to the current list.

Page A306, line 7 (6/30/01)

instead of a shelfful. In fact, the latter idea—to insert an italic correction—is prefer-

Page A308, lines 25 and 26 (6/17/02)

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

Page A311, line 14 (12/2/02)

```
\def\\{\if\space\next\ % assume that \next is unexpandable
```

Page A323, line 12 from the bottom (6/30/01)

18.31. `$k=1.38065\times10^{-16}\rm\,erg\,K^{-1}$`.

Page A450, lines 14–16 from the bottom (12/19/02)

$$\mathtt{s}_1\mathtt{tic}\ {}_1\mathtt{exp}\ \mathtt{x}_3\mathtt{p}\ \mathtt{pi}_3\mathtt{a}\ {}_2\mathtt{i}_1\mathtt{a}\ \mathtt{i}_2\mathtt{al}\ {}_2\mathtt{id}\ {}_1\mathtt{do}\ {}_1\mathtt{ci}\ {}_2\mathtt{io}\ \mathtt{ou}_2\ {}_2\mathtt{us}$$

(where subscripts that aren't shown are zero), and this yields

$$.{}_0\mathtt{s}_0\mathtt{u}_1\mathtt{p}_0\mathtt{e}_0\mathtt{r}_1\mathtt{c}_0\mathtt{a}_0\mathtt{l}_1\mathtt{i}_0\mathtt{f}_0\mathtt{r}_0\mathtt{a}_0\mathtt{g}_1\mathtt{i}_0\mathtt{l}_4\mathtt{i}_0\mathtt{s}_1\mathtt{t}_2\mathtt{i}_0\mathtt{c}_1\mathtt{e}_0\mathtt{x}_3\mathtt{p}_2\mathtt{i}_3\mathtt{a}_0\mathtt{l}_2\mathtt{i}_1\mathtt{d}_0\mathtt{o}_1\mathtt{c}_2\mathtt{i}_0\mathtt{o}_2\mathtt{u}_2\mathtt{s}_0.$$

Page A451, line 15 (1/30/01)

Connecticut Yankee come out with only nine or ten bad hyphens:

Page A451, line 23 (1/30/01)

```
mo-er-der-mohren-mut-ter-mar-mor-mon-u-menten-macher.
```

Page A454, lines 23–30 (6/30/01)

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

Page A461, right column (7/08/01)

Page A466, left column (7/09/01)

Page A473, left column (6/30/01)

orphans, *see* widow words.

Page Bvii, bottom two lines (12/20/02)

all of those changes. I now believe that the final bug was discovered and removed on 20 December 2002. The finder's fee has converged to $327.68.

Page B2, line 10 from the bottom (12/20/02)

define *banner* ≡ `'This␣is␣TeX,␣Version␣3.141592'` { printed when TEX starts }

Page B3, new paragraph to follow line 9 (12/20/02)

Incidentally, Pascal's standard *round* function can be problematical, because it disagrees with the IEEE floating-point standard. Many implementors have therefore chosen to substitute their own home-grown rounding procedure.

Page B8, line 2 (5/04/01)

statements will be meaningful. We insert the label '*exit*' just before the '**end**' of a procedure in

Page B30, line −4 (5/04/01)

begin *update_terminal*; { now the user sees the prompt for sure }

Page B84, lines 22 and 27 (5/04/01)

ignore = 9 { characters to ignore (`^^@`) }
active_char = 13 { characters that invoke macros (`~`) }

Page B139, line 20 (12/19/02)

begin while (*state* = *token_list*) ∧ (*loc* = *null*) ∧ (*token_type* ≠ *v_template*) **do**
end_token_list; { conserve stack space }

Page B206, line 14 (10/30/02)

used input files like `webmac.tex`.

Page B206, new paragraph to follow line 22 (12/20/02)

The following procedures don't allow spaces to be part of file names; but some users seem to like names that are spaced-out. System-dependent changes to allow such things should probably be made with reluctance, and only when an entire file name that includes spaces is "quoted" somehow.

Page B256, line 25 (12/20/02)

```
    cur_glue: real;   {glue seen so far}
    cur_g: scaled;   {rounded equivalent of cur_glue times the glue ratio}
  begin cur_g ← 0; cur_glue ← float_constant(0);
  this_box ← temp_ptr; g_order ← glue_order(this_box); g_sign ← glue_sign(this_box);
```

Page B258, line 5 from the bottom (12/20/02)

```
  begin g ← glue_ptr(p); rule_wd ← width(g) − cur_g;
```

Page B258, bottom line (12/20/02)

```
        begin cur_glue ← cur_glue + stretch(g); vet_glue(float(glue_set(this_box)) * cur_glue);
        cur_g ← round(glue_temp);
```

Page B259, line 4 (12/20/02)

```
        begin cur_glue ← cur_glue − shrink(g); vet_glue(float(glue_set(this_box)) * cur_glue);
        cur_g ← round(glue_temp);
```

Page B259, new line to precede old line 7 (12/20/02)

```
  rule_wd ← rule_wd + cur_g;
```

Page B260, line 21 (12/19/02)

```
    else begin lx ← lr div (lq + 1);
```

Page B261, line 9 (12/20/02)

```
    cur_glue: real;   {glue seen so far}
    cur_g: scaled;   {rounded equivalent of cur_glue times the glue ratio}
  begin cur_g ← 0; cur_glue ← float_constant(0);
  this_box ← temp_ptr; g_order ← glue_order(this_box); g_sign ← glue_sign(this_box);
```

Page B262, line 10 from the bottom (12/20/02)

```
  begin g ← glue_ptr(p); rule_ht ← width(g) − cur_g;
```

Page B262, line 6 from the bottom (12/20/02)

```
        begin cur_glue ← cur_glue + stretch(g); vet_glue(float(glue_set(this_box)) * cur_glue);
        cur_g ← round(glue_temp);
```

Page B262, line 2 from the bottom (12/20/02)

```
        begin cur_glue ← cur_glue − shrink(g); vet_glue(float(glue_set(this_box)) * cur_glue);
        cur_g ← round(glue_temp);
```

Page B263, new line to precede old line 2 (12/20/02)

```
rule_ht ← rule_ht + cur_g;
```

Page B264, line 10 (12/19/02)

```
    else begin lx ← lr div (lq + 1);
```

Page B280, lines 23 and 24 (4/08/01)

or unset nodes; in particular, each mlist item appears in the variable-size part of *mem*, so the *type* field is always present.

Page B299, line 9 (12/20/02)

```
        if type(r) = kern_node then    { unneeded italic correction }
```

Page B332, line 6 (12/19/02)

is being scanned, or when no alignment preamble is active.

Page B332, line 8 (12/19/02)

```
  begin if (scanner_status = aligning) ∨ (cur_align = null) then
```

Page B382, line 6 (1/01/01)

between 'fl' and 'y', then $m = 2$, $t = 2$, and y_1 will be a ligature node for 'fl' followed by an

Page B386, line 11 (4/08/01)

```
  qi(2), qi(6): begin cur_r ← rem_byte(q);   { |=:, |=:> }
```

Page B472, new paragraph to follow line 10 (12/20/02)

A devious user might force an *endv* command to occur just about anywhere; we must defeat such hacks.

Page B472, replacement for what used to be line 13 (12/20/02)

```
  begin base_ptr ← input_ptr; input_stack[base_ptr] ← cur_input;
  while (input_stack[base_ptr].index_field ≠ v_template) ∧
      (input_stack[base_ptr].loc_field = null) ∧
      (input_stack[base_ptr].state_field = token_list) do decr(base_ptr);
  if (input_stack[base_ptr].index_field ≠ v_template) ∨
      (input_stack[base_ptr].loc_field ≠ null) ∨
      (input_stack[base_ptr].state_field ≠ token_list) then
    fatal_error('(interwoven␣alignment␣preambles␣are␣not␣allowed)');
  if cur_group = align_group then
```

Page B475, line 12 (7/01/01)

end; { now we are in vertical mode, working on the list that will contain the display }

Page C11, line 11 (10/11/01)

the area below the bar to the area above it equal to $(\sqrt{5}+1)/2 \approx 1.61803$, the

Page C29, illustration for exercise 4.11 (9/09/01)

[points 2 and 5 should not be labeled twice]

Page C156, line 15 from the bottom (9/09/01)

be the values they had upon entry to the group.)

Page C171, line 16 from the bottom (6/18/02)

⟨loop⟩ ⟶ ⟨loop header⟩`:`⟨loop text⟩ `endfor`

Page C179, line 7 from the bottom (9/09/01)

next time METAFONT gets to the end of an input line, it will stop reading from the

Page C204, line 3 from the bottom (7/08/01)

slightly. If *autorounding* > 1, you get even more changes: Paths are perturbed slightly

Page C238, lines 9 and 8 from the bottom (7/08/01)

tance is length$(z_4 - z_1)$. But there's a slicker solution: Just calculate

$$\text{abs ypart}((z_1 - z_2) \text{ rotated } -\text{angle}(z_3 - z_2)).$$

Page C286, line 25 (9/09/01)

problem; it would simply have put `ENDFOR` into the replacement text of `asts`, because

Page C289, line 7 (9/09/01)

```
if if pair x: x>(0,0) else: false fi: A else: B fi.
```

Page C292, line 10 from the bottom (9/09/01)

be known by saying '**if** known $p-q$: $p=q$ **else**: **false fi**'; transforms could be handled

Page C313, bottom line (6/30/01)

— LA ROCHEFOUCAULD, *Maximes* (1665)

Page C346, left column (6/18/02)

Page C346, right column (7/09/01)

Page C357, right column (7/08/01)

Page C352, left column (6/30/01)

La Rochefoucauld, François VI, 313.

Page Dvii, bottom two lines (12/21/02)

corporates all of those changes. I now believe that the final bug was discovered on 22 January 2001, and removed in version 2.71828. The finder's fee has converged to $327.68.

Page D2, line −17 (12/21/02)

define *banner* ≡ `'This␣is␣METAFONT,␣Version␣2.71828'` { printed when METAFONT starts }

Page D2, lines 4 and 5 from the bottom (12/23/02)

types; there are no '**var**' parameters, except in the case of files or in the system-dependent *paint_row* procedure; there are no tag fields on variant records; there are no *real* variables; no procedures are declared local to other procedures.)

Page D8, line 2 (5/04/01)

statements will be meaningful. We insert the label '*exit*' just before the '**end**' of a procedure in

Page D28, line −8 (5/04/01)

begin *update_terminal*; { now the user sees the prompt for sure }

Page D42, replacement for lines 8–13 (12/23/02)

Notice that if 64-bit integer arithmetic were available, we could simply compute $(2^{29} * p + q)$ **div** $(2 * q)$. But when we are restricted to Pascal's 32-bit arithmetic we must either resort to multiple-precision maneuvering or use a simple but slow iteration. The multiple-precision technique would be about three times faster than the code adopted here, but it would be comparatively long and tricky, involving about sixteen additional multiplications and divisions.

Page D43, line 20 (12/23/02)

language or 64-bit substitute is advisable.

Page D44, lines 24–26 (12/23/02)

Once again it is a good idea to use 64-bit arithmetic if possible; otherwise `take_scaled` will use more than 2% of the running time when the Computer Modern fonts are being generated.

Page D101, line 21 (7/08/01)

define *subscr_head_loc*(#) ≡ # + 1 { where *value*, *subscr_head*, and *attr_head* are }

Page D180, lines 22 and 23 (1/26/01)

$(y, -x)$ will appear in node p. Similarly, a fourth-octant transformation will have been applied after the transition, so we will have $x\_coord(q) = -x$ and $y\_coord(q) = y$.

Page D184, line 18 (12/21/02)

chopped: *integer*; { positive if data truncated, negative if data dangerously large }

Page D184, line 25 (12/21/02)

if (*internal*[*autorounding*] > 0) ∧ (*chopped* = 0) **then** *xy_round*;

Page D184, line 27 (12/21/02)

if (*internal*[*autorounding*] > *unity*) ∧ (*chopped* = 0) **then** *diag_round*;

Page D184, line 32 (12/21/02)

if (*internal*[*autorounding*] ≤ 0) ∨ (*chopped* ≠ 0) **then** *print_spec*("`,␣after␣subdivision`")

Page D185, lines 15–19 (12/21/02)

```
define procrustes(#) ≡ if abs(#) ≥ dmax then
        if abs(#) > max_allowed then
          begin chopped ← 1;
          if # > 0 then # ← max_allowed else # ← −max_allowed;
          end
        else if chopped = 0 then chopped ← −1
```

Page D185, old line 22 (12/21/02)

$p \leftarrow cur\_spec$; $k \leftarrow 1$; $chopped \leftarrow 0$; $dmax \leftarrow max\_allowed/2$;

Page D185, old line 28 (12/21/02)

if *chopped* > 0 **then**

Page D196, lines 7 and 8 (1/26/01)

where $x'(t) \geq 0$ we have *right_type* = *first_octant* or *right_type* = *eighth_octant*; in regions where $x'(t) \leq 0$, we have *right_type* = *fifth_octant* or *right_type* = *fourth_octant*.

Page D511, line 17 (7/03/01)

from appearing again.

Page E7, line 11 (12/21/02)

hair, *vair*, *stem*, *curve*, *ess*, *flare*, *dot_size*, *bar*, *slab*,

Page E7, line 11 (12/21/02)

crisp, *tiny*, *fine*;

and *thin_join* should not be less than *fine*.

Page E9, line 9 (7/03/01)

```
[92] [123] [124]) ) )
```

Page E19, line 19 (11/7/01)

cap_notch_cut	46/36	31/36	25/36	24/36	22/36	25/36

Page E41, line 8 (12/21/02)

extra_endchar ← *extra_endchar* & `"charcode:=charcode+code_offset;"`;

Page E53, line 7 (12/21/02)

numeric *mid_thickness*; *mid_thickness* = Vround $\frac{1}{3}[vair, stem]$;

Page E377, lines 3 and 4 from the bottom (12/22/02)

path $p_{\_}$; $p_{\_} = z_{\$\$l}\{z_{@1} - z_{\$\$l}\} \ldots darkness[z_{@1}, .5[z_{@2}, z_{\$\$l}]] \ldots z_{@2}$
--- $z_{\$l}$ -- $z_{\$r}$ -- $z_{@0}$ -- $z_{\$\$r}$ -- cycle;
if $(y_{\$\$} > y_{\$}) \neq$ (ypart **precontrol** 1 **of** $p_{\_}$ > ypart **postcontrol** 1 **of** $p_{\_}$):
$p_{\_} = z_{\$\$l}\{z_{@1} - z_{\$\$l}\} \ldots darkness[z_{@1}, .5[z_{@2}, z_{\$\$l}]]$
--- $z_{\$l}$ -- $z_{\$r}$ -- $z_{@0}$ -- $z_{\$\$r}$ -- cycle; **fi**
filldraw $p_{\_}$; % arm and beak

Page E577, right column (12/23/02)